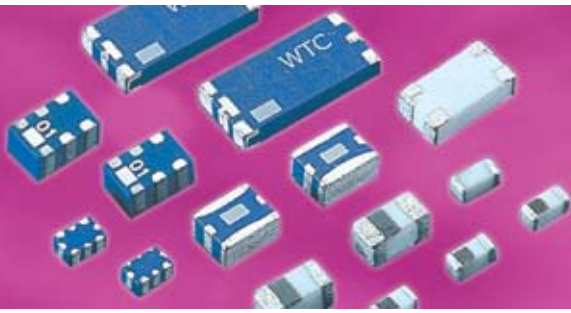




Walsin Technology Corporation



## RF Devices and High Frequency Inductors

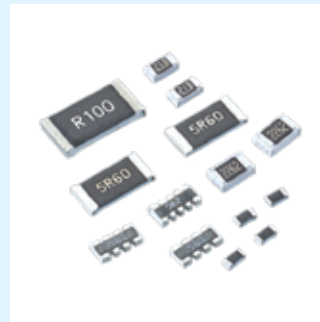
# 2008



## Product Portfolio



**Multilayer Ceramic Capacitors (MLCC)**



**Chip-Resistor**



**RF Device and High Frequency Inductors**



**Varistors and SMD-Varistors**

## IEC-63 Nominal Resistance / Capacitance

| E1  | 100 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| E3  | 100 |     |     |     |     |     |     |     | 220 |     |     |     |     |     |     |     | 470 |     |     |     |     |     |     |     |
| E6  | 100 |     |     |     | 150 |     |     |     | 220 |     |     |     | 330 |     |     |     | 470 |     |     |     | 680 |     |     |     |
| E12 | 100 |     | 120 |     | 150 |     | 180 |     | 220 |     | 270 |     | 330 |     | 390 |     | 470 |     | 560 |     | 680 |     | 820 |     |
| E24 | 100 | 110 | 120 | 130 | 150 | 160 | 180 | 200 | 220 | 240 | 270 | 300 | 330 | 360 | 390 | 430 | 470 | 510 | 560 | 620 | 680 | 750 | 820 | 910 |
| E96 | 100 | 102 | 121 | 124 | 147 | 150 | 178 | 182 | 215 | 221 | 261 | 267 | 316 | 324 | 383 | 392 | 464 | 475 | 562 | 576 | 681 | 698 | 825 | 845 |
|     | 105 | 107 | 127 | 130 | 154 | 158 | 187 | 191 | 226 | 232 | 274 | 280 | 332 | 340 | 402 | 412 | 487 | 499 | 590 | 604 | 715 | 732 | 866 | 887 |
|     | 110 | 113 | 133 | 137 | 162 | 165 | 196 | 200 | 237 | 243 | 287 | 294 | 348 | 357 | 422 | 432 | 511 | 523 | 619 | 634 | 750 | 768 | 909 | 931 |
|     | 115 | 118 | 140 | 143 | 169 | 174 | 205 | 210 | 249 | 255 | 301 | 309 | 365 | 374 | 442 | 453 | 536 | 549 | 649 | 665 | 787 | 806 | 953 | 976 |

E6:  $\sqrt[6]{10} \approx 1.46$  E12:  $\sqrt[12]{10} \approx 1.21$

E1 series resistance: 1Ω, 10Ω, 100Ω, 1000Ω, 10000Ω, 100000Ω

## INDEX

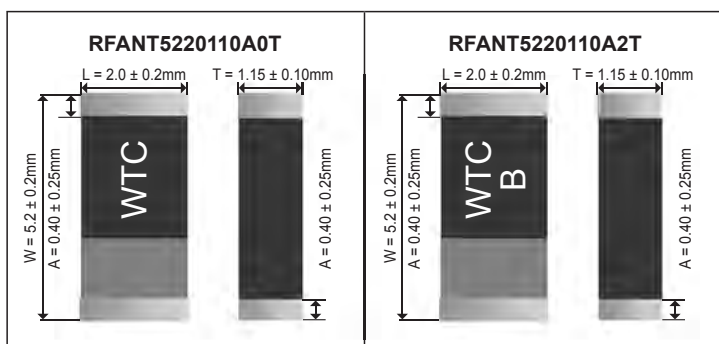
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## ■ 2.4 GHz Bluetooth/WLAN-Chip Antenna-RFANT5220110A□T

### ■ How to Order

| RF                         | ANT                                  | 522011                                                                           | 0                                                  | A                                        | □                                   | T                                                                         |
|----------------------------|--------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>ANT : Antenna | <b>Dimension code</b><br>522011 =<br>Length = 52<br>Width = 20<br>Thickness = 11 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

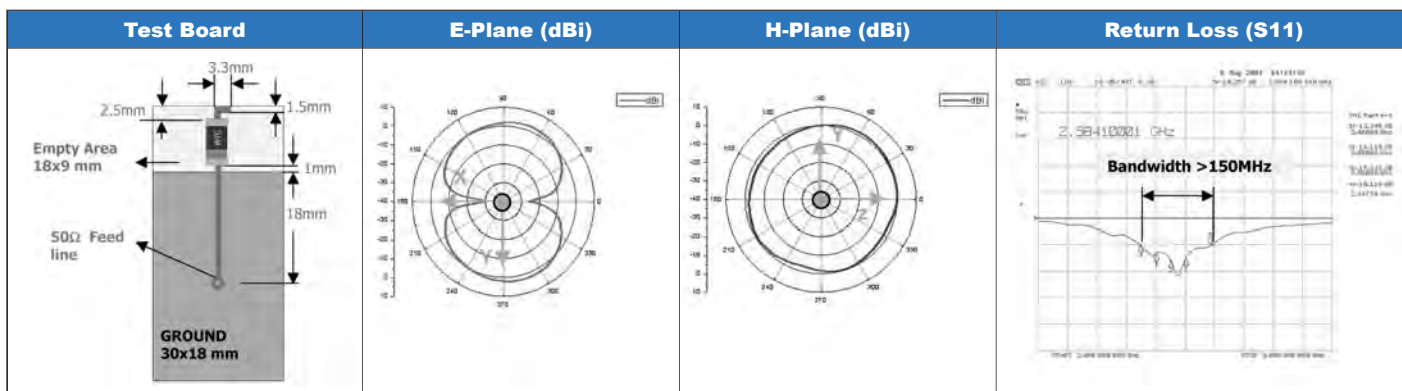


### ■ RFANT5220110A□T Series

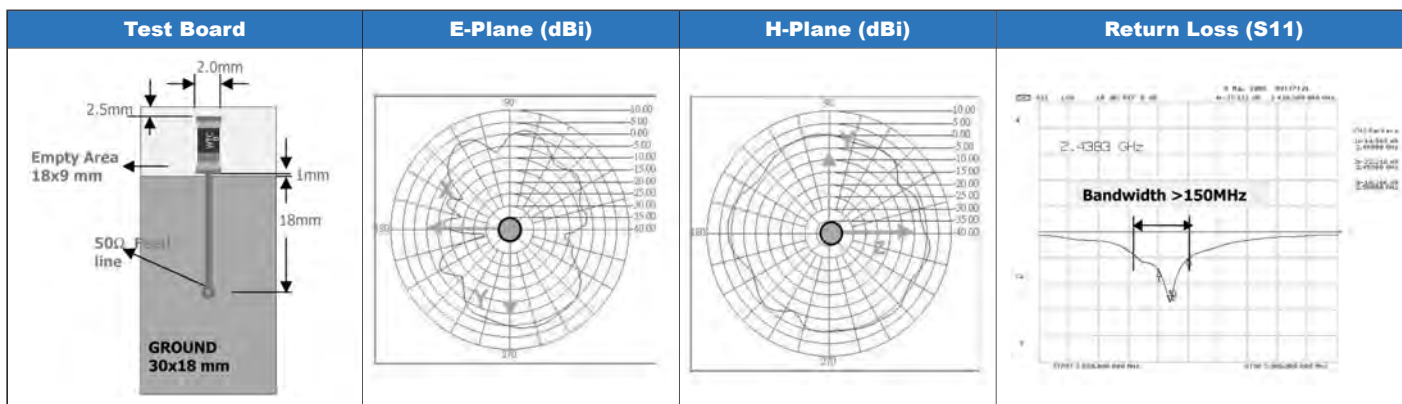
| Item                    | Specification         |
|-------------------------|-----------------------|
| Working Frequency Range | 2.4 GHz ~ 2.5 GHz     |
| Gain                    | 2 dBi (Typical)       |
| VSWR                    | 2 max.                |
| Polarization            | Linear                |
| Azimuth Bandwidth       | Omni-directional      |
| Impedance               | 50 Ω                  |
| Rated Power (max.)      | 3 Watts               |
| Maximum Input Power     | 5 Watts for 5 minutes |

### ■ Typical Electrical Characteristics:

#### RFANT5220110A0T



#### RFANT5220110A2T



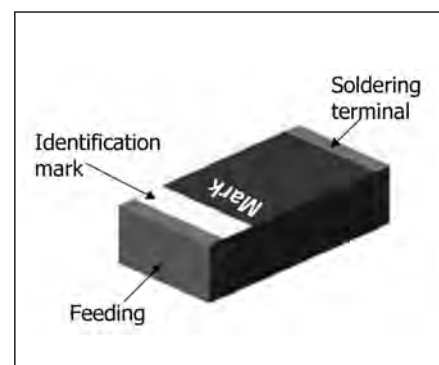
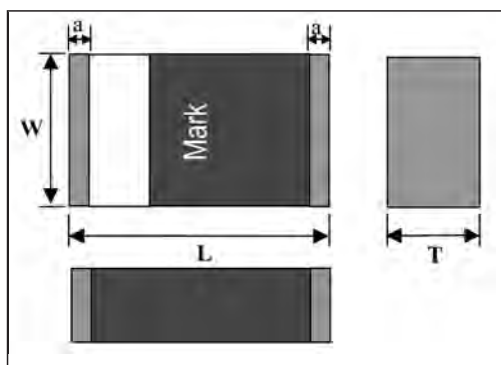
## ■ 2.4 GHz Bluetooth/WLAN-Chip Antenna-RFANT3216120A□T

### ■ How to Order

| RF                         | ANT                                  | 321612                                                                                                                           | 0                                                  | A                                        | □                                   | T                                                                         |
|----------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>ANT : Antenna | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>321612 = Length32,<br>Width 16,<br>Thickness 12 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

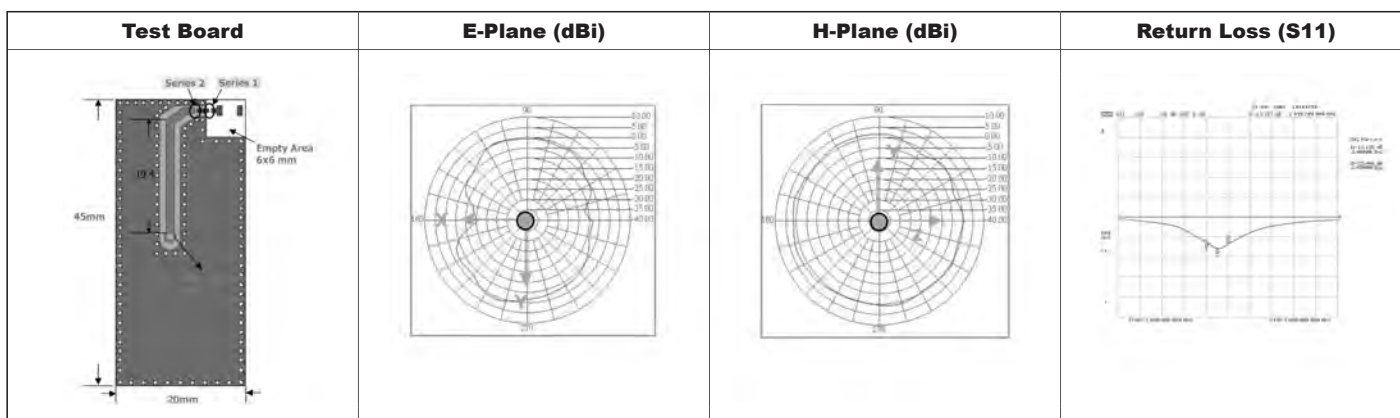
| Symbol | Dimension      |
|--------|----------------|
| L      | 3.20 ± 0.20 mm |
| W      | 1.60 ± 0.10 mm |
| T      | 1.20 ± 0.10 mm |
| a      | 0.25 ± 0.15 mm |



### ■ RFANT3216120A□T Series

| Product code             | RFANT3216120A1T | RFANT3216120A3T | RFANT3216120A5T |
|--------------------------|-----------------|-----------------|-----------------|
| Working Frequency Range  | 2450 ± 50 MHz   | 2450 ± 50 MHz   | 2450 ± 50 MHz   |
| Fc (GHz)                 | 2.5             | 2.7             | 2.9             |
| Gain (dBi)               | 2 (Typical)     | 2 (Typical)     | 2 (Typical)     |
| Matching component value | Series 1        | 2.7 nH          | 6.8 nH          |
|                          | Series 2        | -               | -               |

### ■ Typical Electrical Characteristics(RFANT3216120A5T):



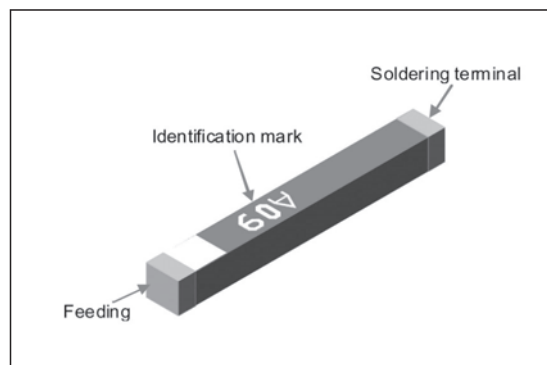
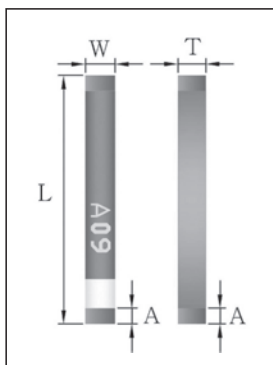
## ■ 2.4 GHz Bluetooth/WLAN-Chip Antenna-RGANT8010100A0T

### ■ How to Order

| RG                                           | ANT                                  | 801010                                                                                                                                 | 0                                                  | A                                        | 0                                   | T                                                                         |
|----------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RG:RF<br>/Pb free<br>device | <b>Product code</b><br>ANT : Antenna | <b>Dimension code</b><br>Per 2 digits of<br>Length, Width,<br>Thickness :<br>e.g. :<br>801010 = Length80,<br>Width 10,<br>Thickness 10 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

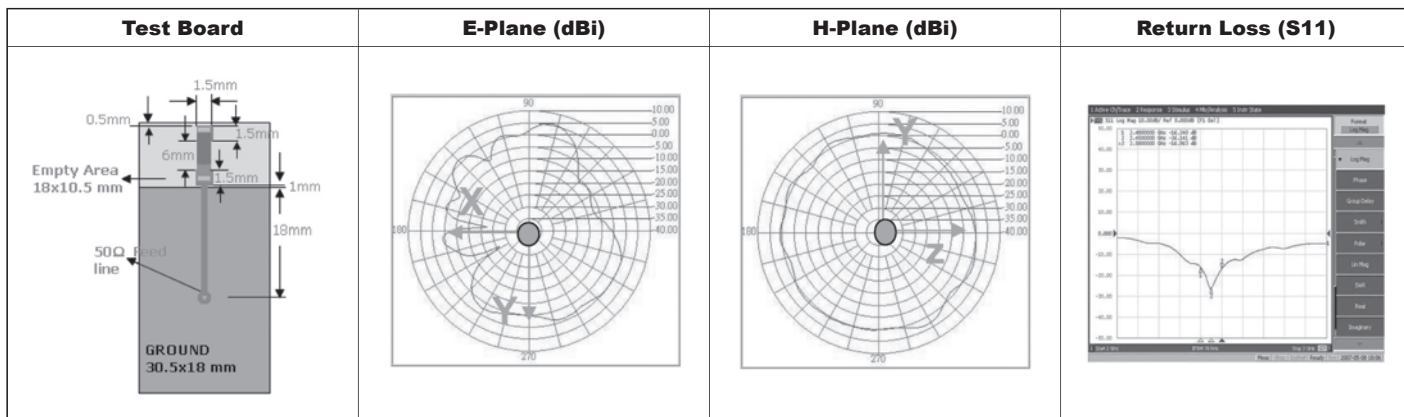
| Symbol | Dimension      |
|--------|----------------|
| L      | 8.00 ± 0.20 mm |
| W      | 1.00 ± 0.20 mm |
| T      | 1.00 ± 0.20 mm |
| A      | 0.50 ± 0.30 mm |



### ■ RGANT8010100A0T Series

| Item                    | Specification         |
|-------------------------|-----------------------|
| Working Frequency Range | 2.4 GHz ~ 2.5 GHz     |
| Gain                    | 2 dBi (Typical)       |
| VSWR                    | 2 max                 |
| Polarization            | Linear                |
| Azimuth Bandwidth       | Omni-directional      |
| Impedance               | 50 Ω                  |
| Rated Power (max)       | 3 Watts               |
| Maximum Input Power     | 5 Watts for 5 minutes |
| Operation Temperature   | -40°C ~ +85°C         |

### ■ Typical Electrical Characteristics:



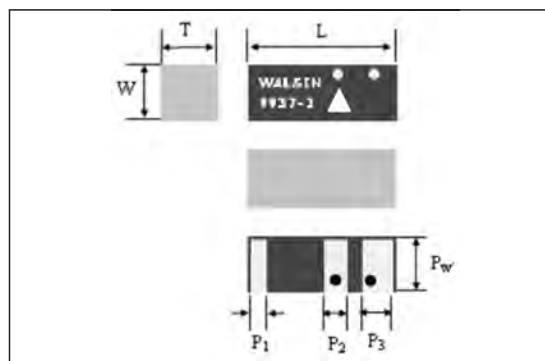
## ■ 2.4 GHz Bluetooth/WLAN-Free Antenna-RGFRA9937380A3T

### ■ How to Order

| RG                                                | FRA                                  | 993738                                                                                                                                 | 0                                                  | A                                        | 3                                   | T                                                                         |
|---------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RG: RF Device<br>/Pb free device | <b>Product code</b><br>FRA : Antenna | <b>Dimension code</b><br>Per 2 digits of<br>Length, Width,<br>Thickness :<br>e.g. :<br>993738 = Length99,<br>Width 37,<br>Thickness 38 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

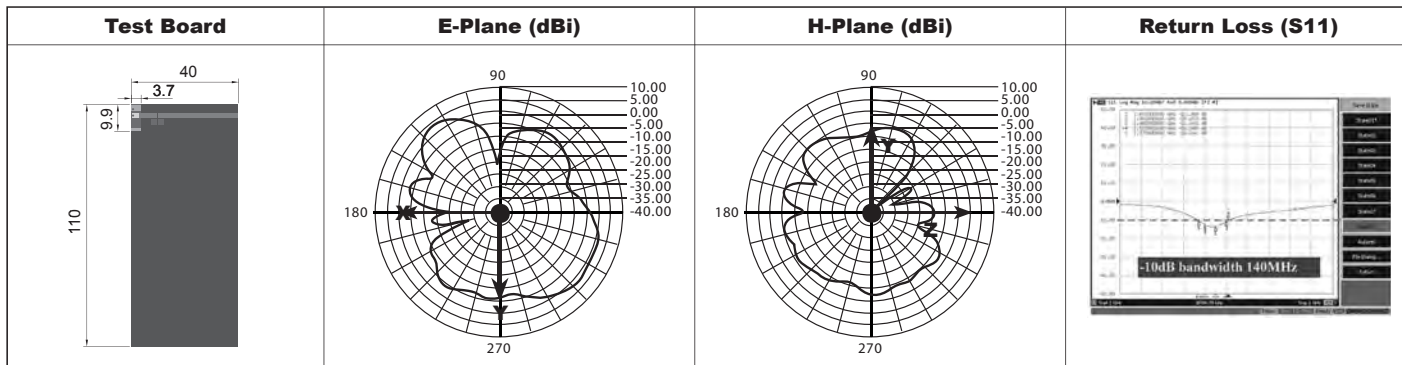
| Dimension      | Port definition                        |
|----------------|----------------------------------------|
| L              | 9.9 ± 0.15 mm                          |
| W              | 3.7 ± 0.15 mm                          |
| T              | 3.8 ± 0.20 mm                          |
| P <sub>w</sub> | 3.48 ± 0.10 mm<br>Pad width            |
| P <sub>1</sub> | 1.4 ± 0.10 mm<br>Soldering termination |
| P <sub>2</sub> | 1.9 ± 0.10 mm<br>Feed termination      |
| P <sub>3</sub> | 2.4 ± 0.15 mm<br>Ground termination    |



### ■ RGFRA9937380A3T Series

| Item                    | Specification    |
|-------------------------|------------------|
| Central Frequency (GHz) | 2.45 GHz         |
| Gain                    | 2 dBi (Typical)  |
| VSWR                    | 2 max.           |
| Polarization            | Linear           |
| Azimuth Bandwidth       | Omni-directional |
| Impedance               | 50 Ω             |
| Rated Power (max.)      | 1 Watts          |
| Operation Temperature   | -40°C ~ +85°C    |

### ■ Typical Electrical Characteristics:



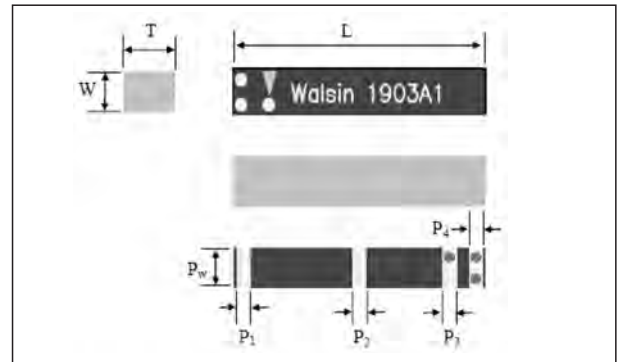
## ■ 2.4 GHz Bluetooth/WLAN-Free Antenna-RGFRA1903041A1T

### ■ How to Order

| RG                                       | FRA                                  | 190304                                                                                                                      | 1                                                  | A                                        | 1                                   | T                                                                         |
|------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RG: RF / Pb free device | <b>Product code</b><br>FRA : Antenna | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>190304 = Length19, Width 3.0 Thickness 3.8 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

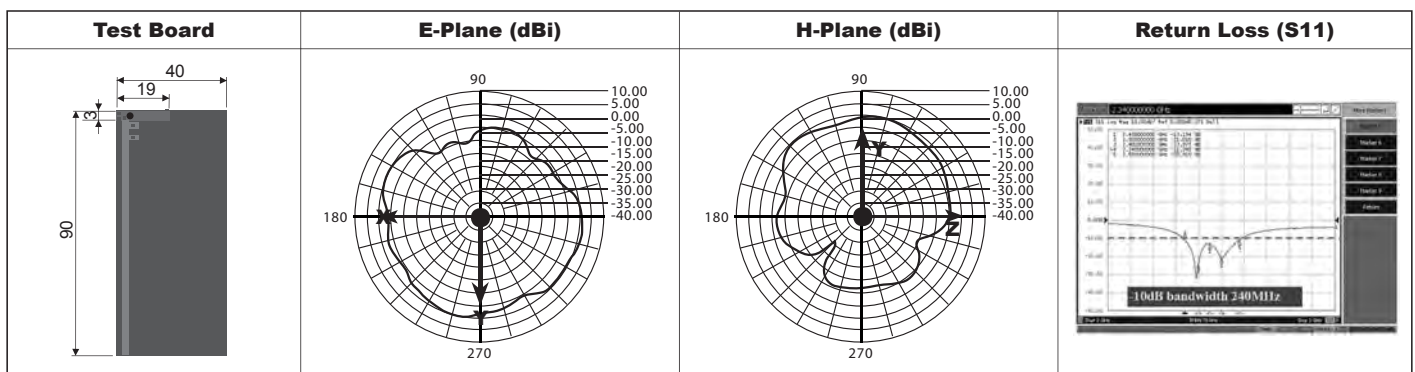
| Dimension      | Port definition                     |
|----------------|-------------------------------------|
| L              | 19.0 ± 0.15 mm                      |
| W              | 3.0 ± 0.15 mm                       |
| T              | 3.8 ± 0.20 mm                       |
| P <sub>w</sub> | 3.0 ± 0.10 mm Pad width             |
| P <sub>1</sub> | 1.0 ± 0.10 mm Soldering termination |
| P <sub>2</sub> | 1.0 ± 0.10 mm Soldering termination |
| P <sub>3</sub> | 1.0 ± 0.10 mm Feed termination      |
| P <sub>4</sub> | 1.0 ± 0.10 mm Ground termination    |



### ■ RGFRA1903041A1T Series

| Item                  | Specification    |
|-----------------------|------------------|
| Central Frequency     | 2.450 GHz        |
| Gain                  | 2 dBi (Typical)  |
| VSWR                  | 2 max.           |
| Polarization          | Linear           |
| Azimuth Bandwidth     | Omni-directional |
| Impedance             | 50 Ω             |
| Rated Power (max.)    | 1 Watts          |
| Operation Temperature | -40°C ~ +85°C    |

### ■ Typical Electrical Characteristics:



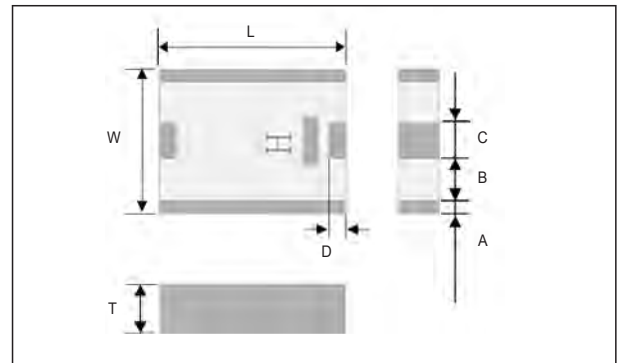
## ■ 2.4 GHz High Frequency Devices-Band Pass Filter-RFBPF3225150A□T

### ■ How to Order

| RF                         | BPF                                           | 322515                                                                           | 0                                                  | A                                        | □                                   | T                                                                         |
|----------------------------|-----------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>BPF : Band Pass Filter | <b>Dimension code</b><br>322515 =<br>Length = 32<br>Width = 25<br>Thickness = 15 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

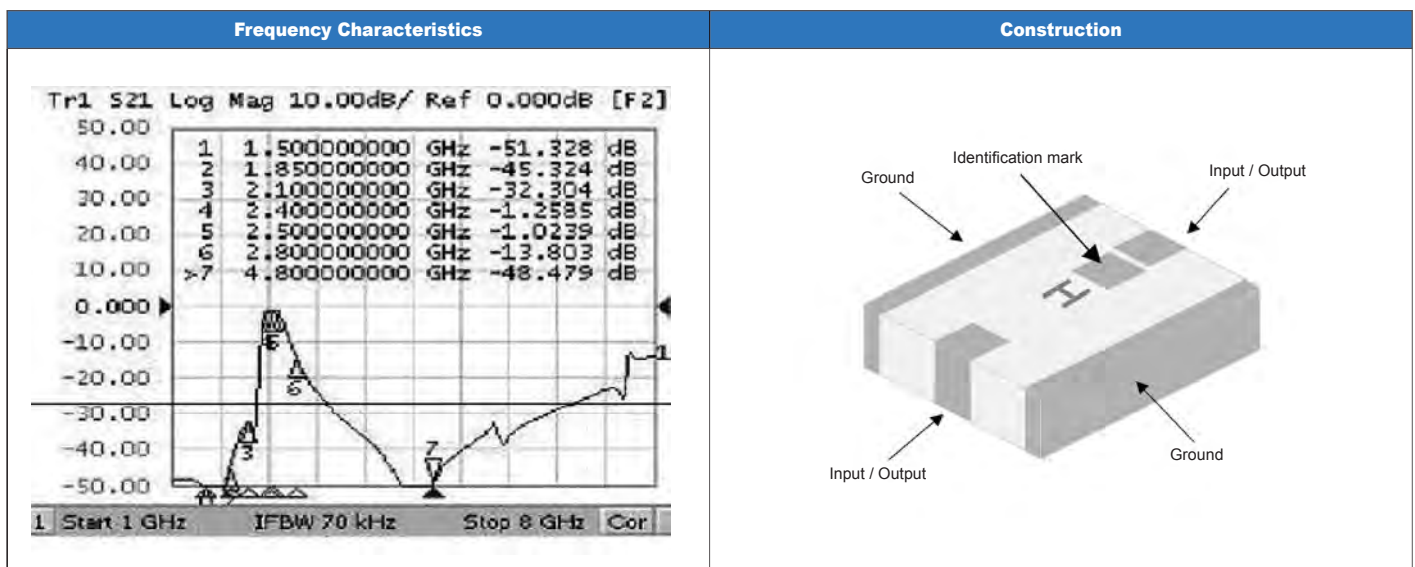
| Symbol | Dimension      |
|--------|----------------|
| L      | 3.20 ± 0.20 mm |
| W      | 2.50 ± 0.20 mm |
| T      | 1.50 ± 0.10 mm |
| A      | 0.40 ± 0.20 mm |
| B      | 0.60 ± 0.20 mm |
| C      | 0.70 ± 0.20 mm |
| D      | 0.20 ± 0.15 mm |



### ■ RFBPF3225150A□T Series

| Item                  | Specification   |                 |
|-----------------------|-----------------|-----------------|
|                       | RFBPF3225150A4T | RFBPF3225150A5T |
| Frequency range (MHz) | 2450 ± 50 MHz   | 2450 ± 50 MHz   |
| Insertion Loss        | 2.0 dB (max)    | 1.8 dB (max)    |
| VSWR                  | 2.0 (max)       | 2.0 (max)       |
| Impedance             | 50 Ω            | 50 Ω            |
| Attenuation (min.)    | 30 dB @900 MHz  | 30 dB @900 MHz  |
|                       | 30 dB @1850 MHz | 30 dB @1850 MHz |
|                       | 20 dB @2100 MHz | 20 dB @2100 MHz |
|                       | 30 dB @4800 MHz | 30 dB @4800 MHz |

### ■ Typical Electrical Characteristics:



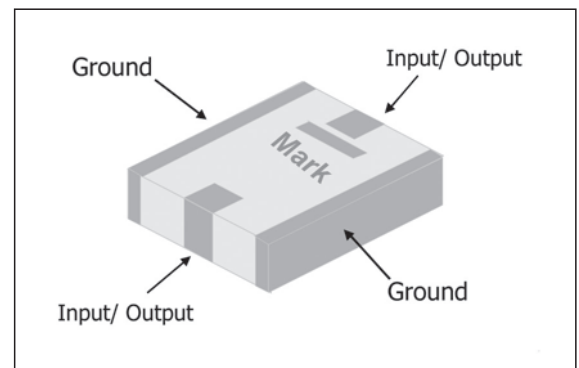
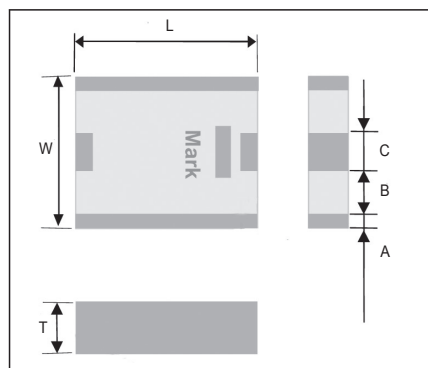
## ■ 2.4 GHz High Frequency Devices-Band Pass Filter-RFBPF2520120A□T

### ■ How to Order

| RF                         | BPF                                           | 252012                                                                                                                     | 0                                                  | A                                        | □                                   | T                                                                         |
|----------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>BPF : Band Pass Filter | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>252012 = Length25, Width 20, Thickness 12 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

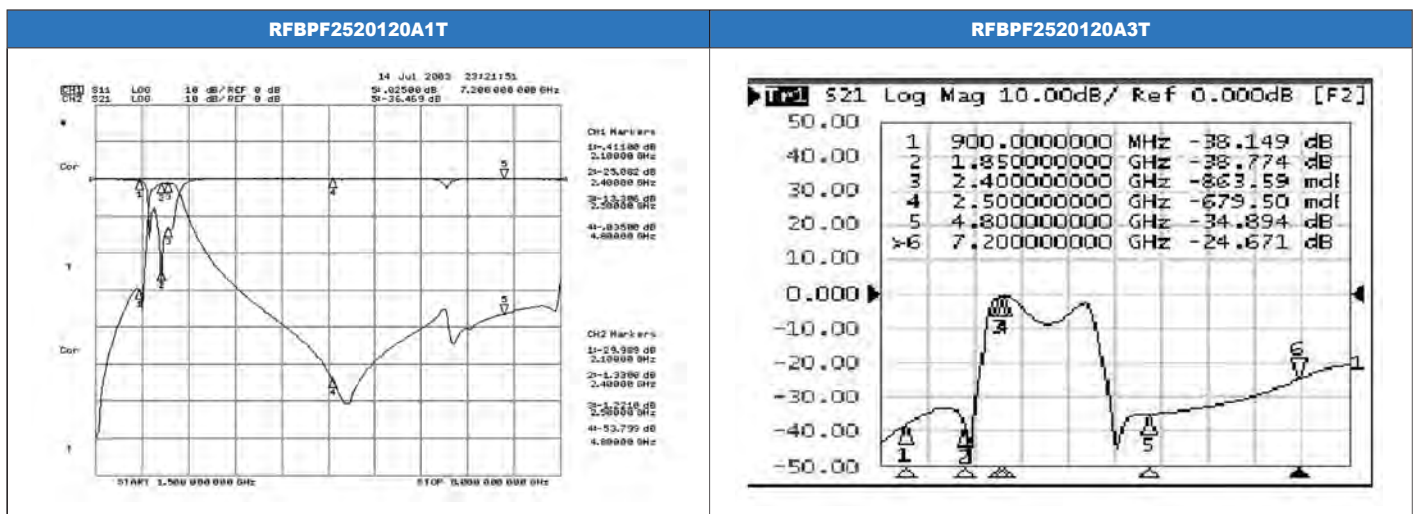
| Symbol | Dimension      |
|--------|----------------|
| L      | 2.50 ± 0.20 mm |
| W      | 2.00 ± 0.20 mm |
| T      | 1.20 ± 0.10 mm |
| A      | 0.25 ± 0.20 mm |
| B      | 0.50 ± 0.20 mm |
| C      | 0.50 ± 0.20 mm |



### ■ RFBPF2520120A□T Series

| Item                  | Specification                                                                              |                                                      |                                                      |                                                      |
|-----------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
|                       | RFBPF2520120A1T                                                                            | RFBPF2520120A2T                                      | RFBPF2520120A3T                                      | RFBPF2520120A4T                                      |
| Frequency range (MHz) | 2450 ± 50 MHz                                                                              | 2450 ± 50 MHz                                        | 2450 ± 50 MHz                                        | 2450 ± 50 MHz                                        |
| Insertion Loss        | 1.7 dB (max)                                                                               | 2.1 dB (max)                                         | 1.2 dB (max)                                         | 1.7 dB (max)                                         |
| VSWR                  | 2.0 (max)                                                                                  | 2.0 (max)                                            | 2.0 (max)                                            | 2.0 (max)                                            |
| Impedance             | 50 Ω                                                                                       | 50 Ω                                                 | 50 Ω                                                 | 50 Ω                                                 |
| Attenuation (min.)    | 30 dB @900 MHz<br>30 dB @1850 MHz<br>20 dB @2100 MHz<br>40 dB @4800 MHz<br>25 dB @7200 MHz | 30 dB @900 MHz<br>30 dB @1850 MHz<br>30 dB @4800 MHz | 30 dB @900 MHz<br>30 dB @1850 MHz<br>25 dB @4800 MHz | 30 dB @900 MHz<br>30 dB @1850 MHz<br>25 dB @4800 MHz |

### ■ Typical Electrical Characteristics:



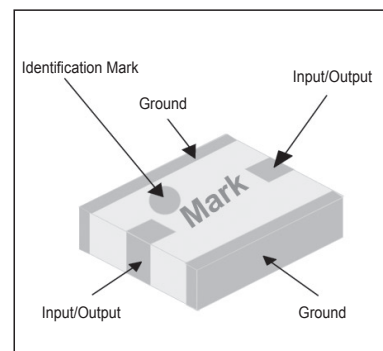
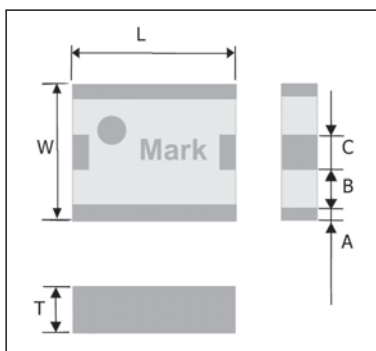
## ■ 2.4 GHz High Frequency Devices-Band Pass Filter-RFBPF2520100A□T

### ■ How to Order

| RF                         | BPF                                           | 252010                                                                                                                     | 0                                                  | A                                        | □                                   | T                                                                         |
|----------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>BPF : Band Pass Filter | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>252010 = Length25, Width 20, Thickness 10 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

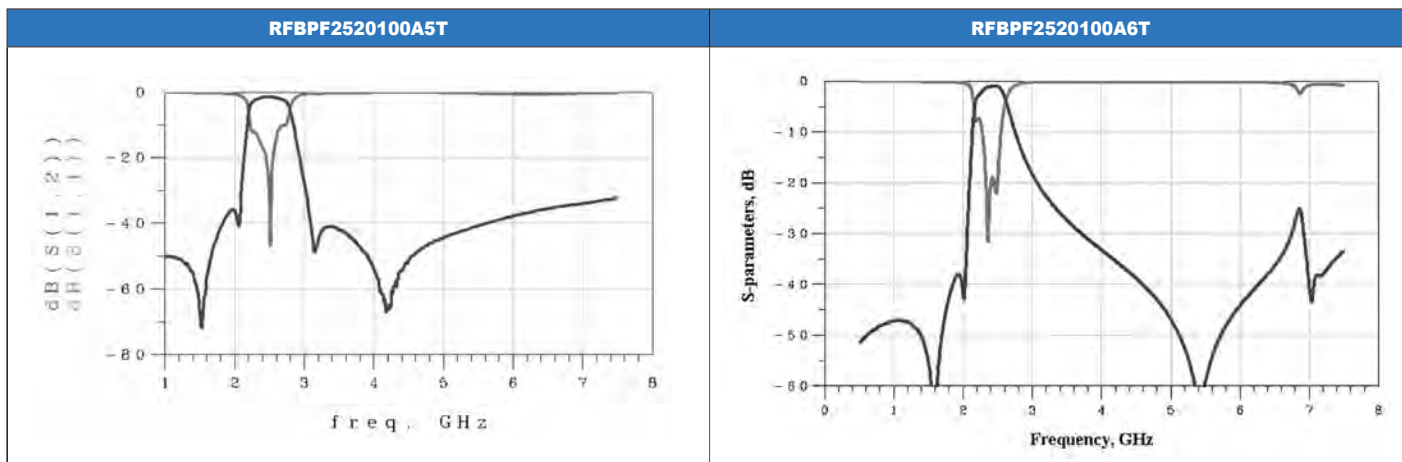
| Symbol | RFBPF2520100A5T | RFBPF2520100A6T |
|--------|-----------------|-----------------|
| L      | 2.50 ± 0.20 mm  | 2.50 ± 0.20 mm  |
| W      | 2.00 ± 0.20 mm  | 2.00 ± 0.20 mm  |
| T      | 1.00 ± 0.10 mm  | 1.05 ± 0.10 mm  |
| A      | 0.20 ± 0.20 mm  | 0.25 ± 0.20 mm  |
| B      | 0.50 ± 0.20 mm  | 0.50 ± 0.20 mm  |
| C      | 0.50 ± 0.20 mm  | 0.50 ± 0.20 mm  |



### ■ RFBPF2520100A□T Series

| Item                  | Specification                                                                                                                    |                                    |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
|                       | RFBPF2520100A5T                                                                                                                  | RFBPF2520100A6T                    |
| Frequency range (MHz) | 2450 ± 50 MHz                                                                                                                    | 2450 ± 50 MHz                      |
| Insertion Loss        | 2 dB max                                                                                                                         | 1.4 dB max                         |
| VSWR                  | 2.0 (max)                                                                                                                        | 2.0 (max)                          |
| Impedance             | 50 Ω                                                                                                                             | 50 Ω                               |
| Attenuation (min.)    | 40 dB @900 MHz<br>30 dB @1990 MHz<br>20 dB @2100 MHz<br>35 dB @3200 MHz<br>40 dB @4800 MHz<br>25dB @7200 MHz* ( * for reference) | 35 dB @1900 MHz<br>35 dB @4800 MHz |

### ■ Typical Electrical Characteristics:



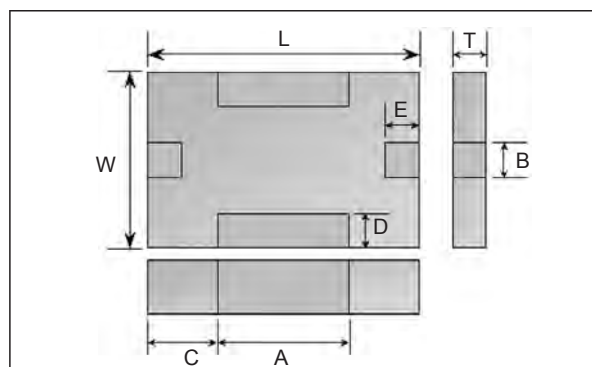
## ■ 2.4 GHz High Frequency Devices-Band Pass Filter-RFBPF2012090A1T

### ■ How to Order

| RF                                | BPF                                           | 201209                                                                                                                     | 0                                                  | A                                        | 1                                   | T                                                                         |
|-----------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>Walsin RF Device | <b>Product code</b><br>BPF : Band Pass Filter | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>201209 = Length20, Width 12, Thickness 09 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension      |
|--------|----------------|
| L      | 2.00 ± 0.15 mm |
| W      | 1.25 ± 0.15 mm |
| T      | 0.90 ± 0.10 mm |
| A      | 1.00 ± 0.15 mm |
| B      | 0.30 ± 0.15 mm |
| C      | 0.50 ± 0.15 mm |
| D      | 0.25 ± 0.15 mm |
| E      | 0.25 ± 0.15 mm |



### ■ RFBPF2012090A1T Series

| Item                  | Specification                                        |
|-----------------------|------------------------------------------------------|
| Frequency range (MHz) | 2450 ± 50 MHz                                        |
| Insertion Loss        | 1.7 dB max                                           |
| VSWR                  | 2.0 (max)                                            |
| Impedance             | 50 Ω                                                 |
| Attenuation (min.)    | 30 dB @900 MHz<br>20 dB @1850 MHz<br>30 dB @4800 MHz |

### ■ Typical Electrical Characteristics:

| Frequency Characteristics | Construction |
|---------------------------|--------------|
|                           |              |

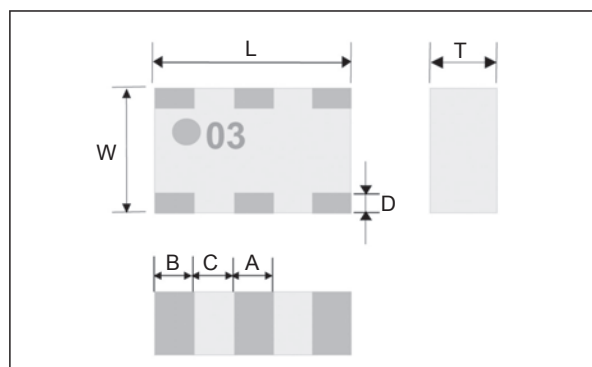
## ■ 2.4 GHz High Frequency Devices-Band Pass Filter-RFBPF2012080A5T

### ■ How to Order

| RF                         | BPF                                           | 201208                                                                                                                      | 0                                                  | A                                        | 5                                   | T                                                                         |
|----------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>BPF : Band Pass Filter | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>201208 = Length 20, Width 12, Thickness 08 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

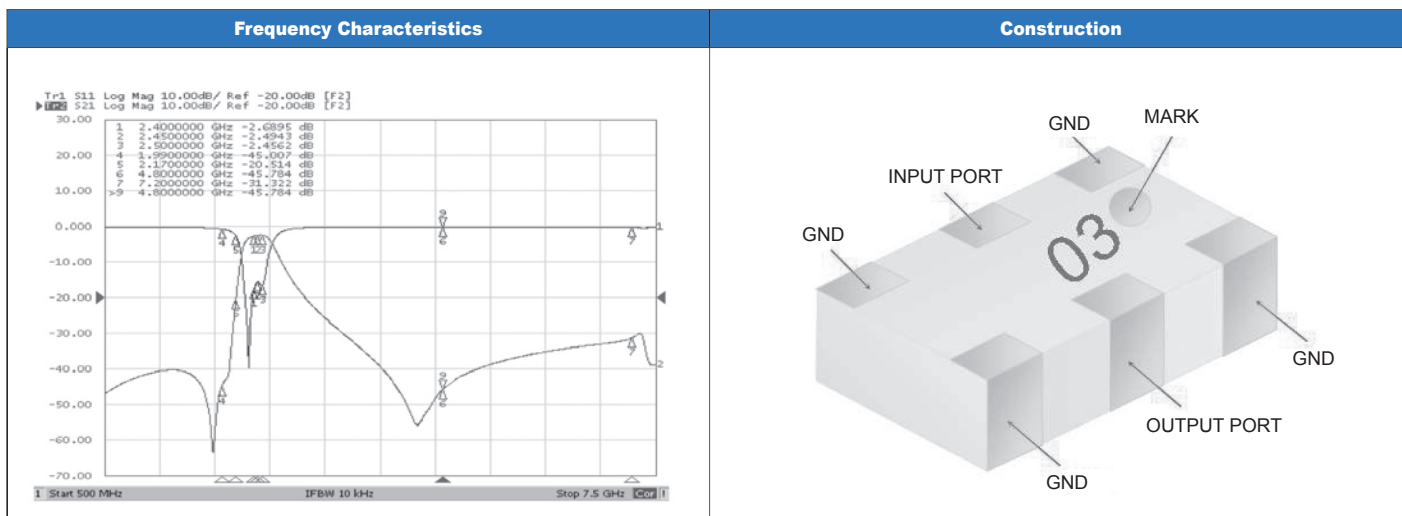
| Symbol | Dimension    |
|--------|--------------|
| L      | 2.0 ± 0.2 mm |
| W      | 1.2 ± 0.2 mm |
| T      | 0.8 ± 0.1 mm |
| A      | 0.4 ± 0.2 mm |
| B      | 0.4 ± 0.2 mm |
| C      | 0.4 ± 0.2 mm |
| D      | 0.2 ± 0.1 mm |



### ■ RFBPF2012080A5T Series

| Item                  | Specification                                                                                                      |
|-----------------------|--------------------------------------------------------------------------------------------------------------------|
| Frequency range (MHz) | 2450 ± 50 MHz                                                                                                      |
| Insertion Loss        | 3 dB (max)                                                                                                         |
| VSWR                  | 2.0 (max)                                                                                                          |
| Impedance             | 50 Ω                                                                                                               |
| Attenuation (min.)    | 40 dB @880~960 MHz<br>40 dB @1710~1990 MHz<br>20 dB @2110~2170 MHz<br>40 dB @4800~5000 MHz<br>30 dB @7200~7500 MHz |

### ■ Typical Electrical Characteristics:



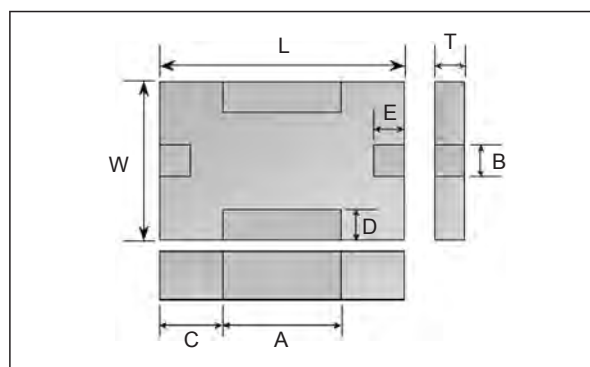
## ■ 2.4 GHz High Frequency Devices-Band Pass Filter-RFBPF2012080A7T

### ■ How to Order

| RF            | BPF                    | 201208                                                                                             | 0                        | A                  | 7                    | T                                                       |
|---------------|------------------------|----------------------------------------------------------------------------------------------------|--------------------------|--------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b> | <b>Product code</b>    | <b>Dimension code</b>                                                                              | <b>Unit of dimension</b> | <b>Application</b> | <b>Specification</b> | <b>Packing</b>                                          |
| RF Device     | BPF : Band Pass Filter | Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>201208 = Length 20, Width 12, Thickness 08 | 0: 0.1 mm<br>1: 1.0 mm   | A: 2.4GHz ISM Band | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

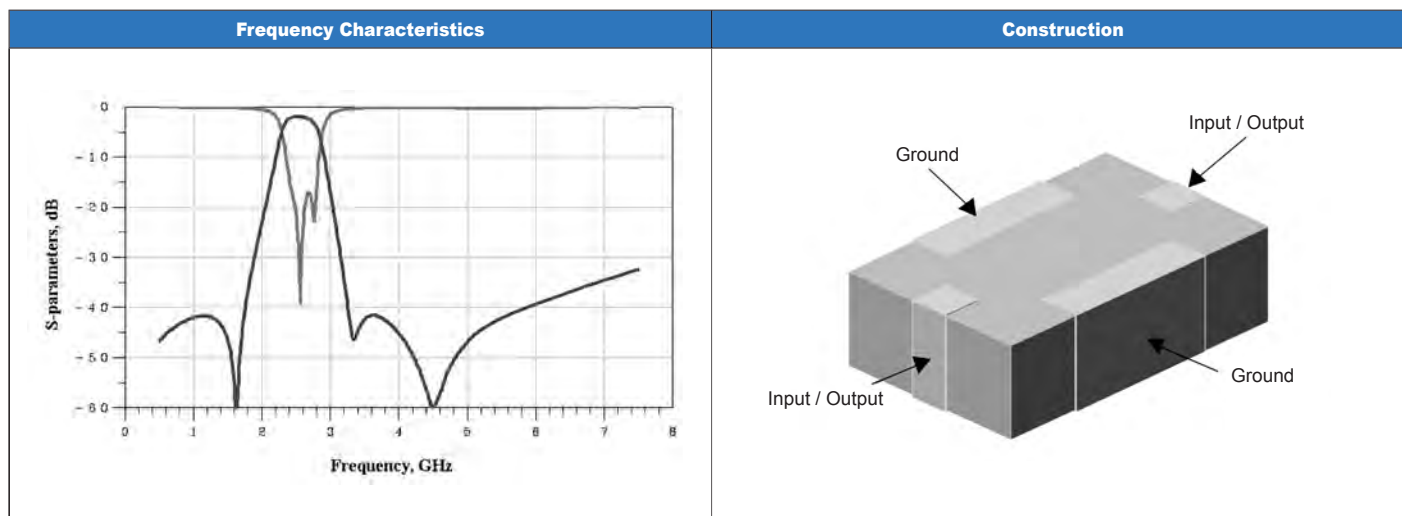
| Symbol | Dimension      |
|--------|----------------|
| L      | 2.00 ± 0.15 mm |
| W      | 1.25 ± 0.15 mm |
| T      | 0.75 ± 0.10 mm |
| A      | 1.00 ± 0.15 mm |
| B      | 0.30 ± 0.15 mm |
| C      | 0.50 ± 0.15 mm |
| D      | 0.25 ± 0.15 mm |
| E      | 0.25 ± 0.15 mm |



### ■ RFBPF2012080A7T Series

| Item                  | Specification                                                                                                      |
|-----------------------|--------------------------------------------------------------------------------------------------------------------|
| Frequency range (MHz) | 2450 ± 50 MHz                                                                                                      |
| Insertion Loss        | 3 dB (max)                                                                                                         |
| VSWR                  | 2.0 (max)                                                                                                          |
| Impedance             | 50 Ω                                                                                                               |
| Attenuation (min.)    | 40 dB @DC~1600 MHz<br>18 dB @1600~2000 MHz<br>30 dB @3000~3100 MHz<br>35 dB @4800~5000 MHz<br>20 dB @7200~7500 MHz |

### ■ Typical Electrical Characteristics:



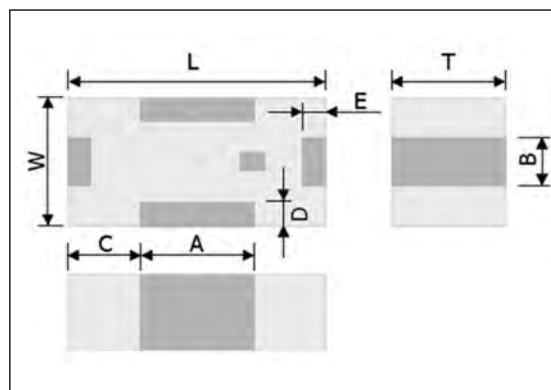
## ■ 2.4 GHz High Frequency Devices-Band Pass Filter-RFBPF1608070A0T

### ■ How to Order

| RF            | BPF                    | 160807                                                                                            | 0                        | A                  | 0                    | T                                                       |
|---------------|------------------------|---------------------------------------------------------------------------------------------------|--------------------------|--------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b> | <b>Product code</b>    | <b>Dimension code</b>                                                                             | <b>Unit of dimension</b> | <b>Application</b> | <b>Specification</b> | <b>Packing</b>                                          |
| RF Device     | BPF : Band Pass Filter | Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>160807 = Length16, Width 08, Thickness 07 | 0: 0.1 mm<br>1: 1.0 mm   | A: 2.4GHz ISM Band | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

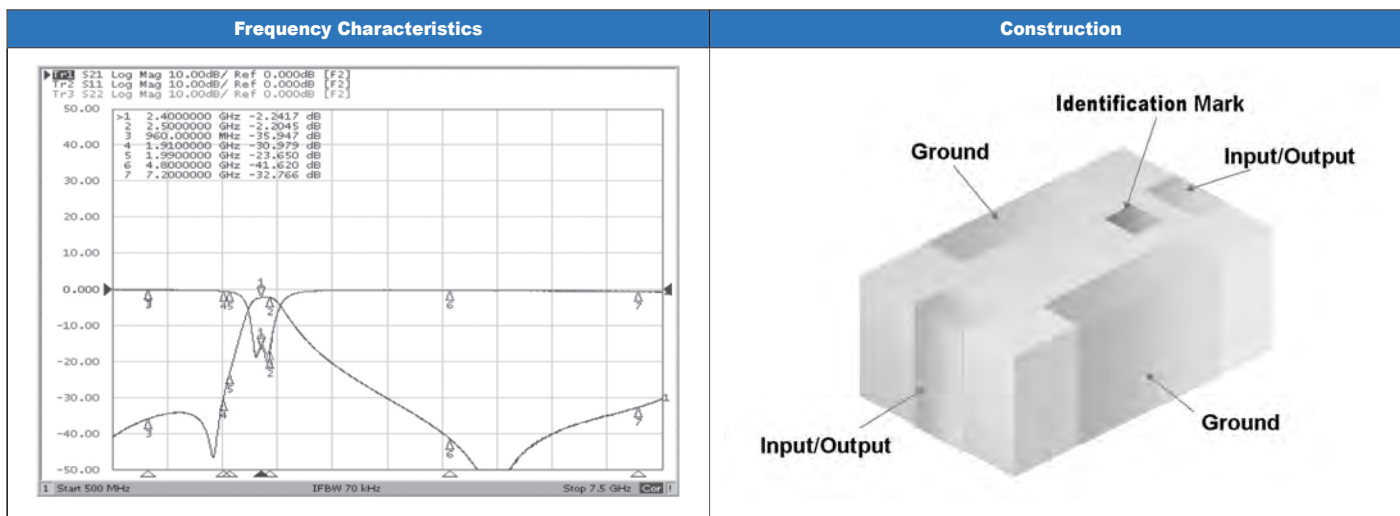
| Symbol | Dimension      |
|--------|----------------|
| L      | 1.60 ± 0.15 mm |
| W      | 0.80 ± 0.15 mm |
| T      | 0.70 ± 0.10 mm |
| A      | 0.70 ± 0.15 mm |
| B      | 0.30 ± 0.15 mm |
| C      | 0.45 ± 0.15 mm |
| D      | 0.15 ± 0.10 mm |
| E      | 0.15 ± 0.10 mm |



### ■ RFBPF1608070A0T Series

| Item                  | Specification                                                                              |
|-----------------------|--------------------------------------------------------------------------------------------|
| Frequency range (MHz) | 2450 ± 50 MHz                                                                              |
| Insertion Loss        | 2.5 dB (max)                                                                               |
| VSWR                  | 2.0 (max)                                                                                  |
| Impedance             | 50 Ω                                                                                       |
| Attenuation (min.)    | 30 dB @960 MHz<br>25 dB @1910 MHz<br>20 dB @1990 MHz<br>30 dB @4800 MHz<br>25 dB @7200 MHz |

### ■ Typical Electrical Characteristics:



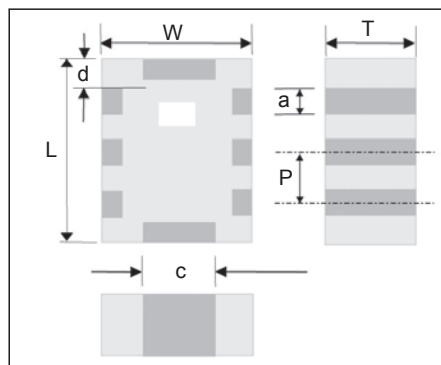
## ■ 2.4 GHz High Frequency Devices-Balanced Filter-RFBPB2520120A□T

### ■ How to Order

| RF             | BPB                                              | 252012                                                                                                        | 0                        | A                  | □                    | T                                                       |
|----------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b>  | <b>Product code</b>                              | <b>Dimension code</b>                                                                                         | <b>Unit of dimension</b> | <b>Application</b> | <b>Specification</b> | <b>Packing</b>                                          |
| RF :<br>device | BPB :<br>Balanced<br>Type<br>Band<br>Pass Filter | Per 2 digits of<br>Length, Width,<br>Thickness :<br>e.g. :<br>252012 = Length25,<br>Width 20,<br>Thickness 12 | 0: 0.1 mm<br>1: 1.0 mm   | A: 2.4GHz ISM Band | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

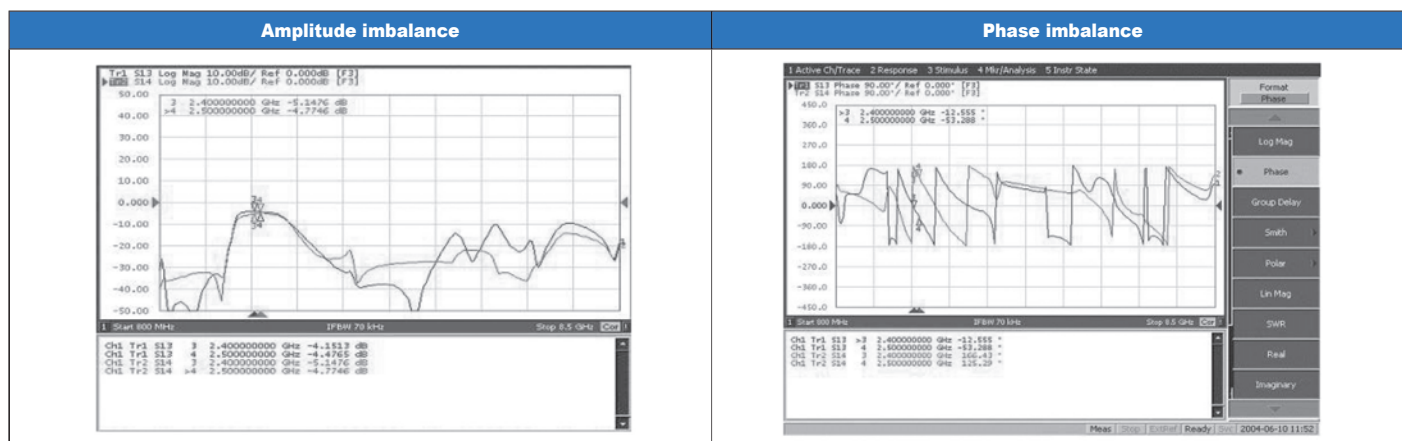
| Symbol | Dimension (mm) |
|--------|----------------|
| L      | 2.50±0.2/-0.10 |
| W      | 2.00±0.2/-0.10 |
| T      | 1.20±0.1/-0.20 |
| a      | 0.30 ± 0.20    |
| c      | 1.00 ± 0.10    |
| d      | 0.30 ± 0.20    |
| P      | 0.80 ± 0.20    |



### ■ RFBPB2520120A□T Series

| Item                   | Specification                                                           |                                                                         |
|------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|
|                        | RFBPB2520120A1T                                                         | RFBPB2520120A2T                                                         |
| Frequency range (MHz)  | 2450 ± 50                                                               | 2450 ± 50                                                               |
| Insertion Loss (dB)    | 2.0 max                                                                 | 2.2 max                                                                 |
| VSWR                   | 2.0 max                                                                 | 2.0 max                                                                 |
| Impedance (Unbalanced) | 50 Ω                                                                    | 50 Ω                                                                    |
| Impedance (Balanced)   | 100 Ω                                                                   | 100 Ω                                                                   |
| Phase Difference       | 180° ± 10°                                                              | 180° ± 10°                                                              |
| Amplitude Difference   | 1.2 dB max                                                              | 1.4 dB max                                                              |
| Attenuation ( dB min.) | 25 @900 MHz<br>25 @1900 MHz<br>30 @4800 MHz<br>20 @7200 MHz (reference) | 25 @900 MHz<br>25 @1900 MHz<br>30 @4800 MHz<br>15 @7200 MHz (reference) |

### ■ Typical Electrical Characteristics(RFBPB2520120A1T):



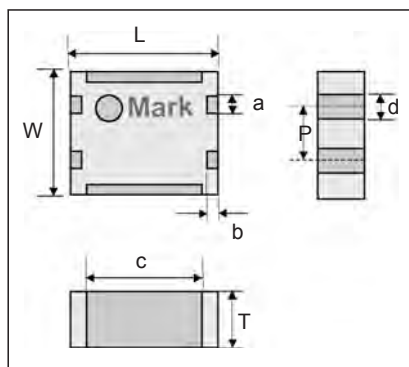
## ■ 2.4 GHz High Frequency Devices-Balanced Filter-RGBPB2520090A□T

### ■ How to Order

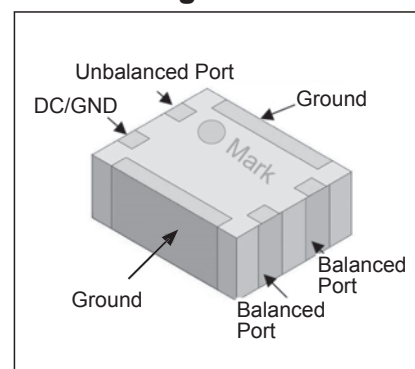
| RG                         | BPB                                              | 252009                                                                                                        | 0                        | A                  | □                    | T                                                       |
|----------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b>              | <b>Product code</b>                              | <b>Dimension code</b>                                                                                         | <b>Unit of dimension</b> | <b>Application</b> | <b>Specification</b> | <b>Packing</b>                                          |
| RG :<br>RF /Pb free device | BPB :<br>Balanced<br>Type<br>Band<br>Pass Filter | Per 2 digits of<br>Length, Width,<br>Thickness :<br>e.g. :<br>252009 = Length25,<br>Width 20,<br>Thickness 09 | 0: 0.1 mm<br>1: 1.0 mm   | A: 2.4GHz ISM Band | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimention      |
|--------|----------------|
| L      | 2.50 ± 0.20 mm |
| W      | 2.00 ± 0.20 mm |
| T      | 0.95 ± 0.10 mm |
| a      | 0.40 ± 0.10 mm |
| b      | 0.25 ± 0.10 mm |
| c      | 1.83 ± 0.10 mm |
| d      | 0.40 ± 0.10 mm |
| p      | 0.80 ± 0.20 mm |



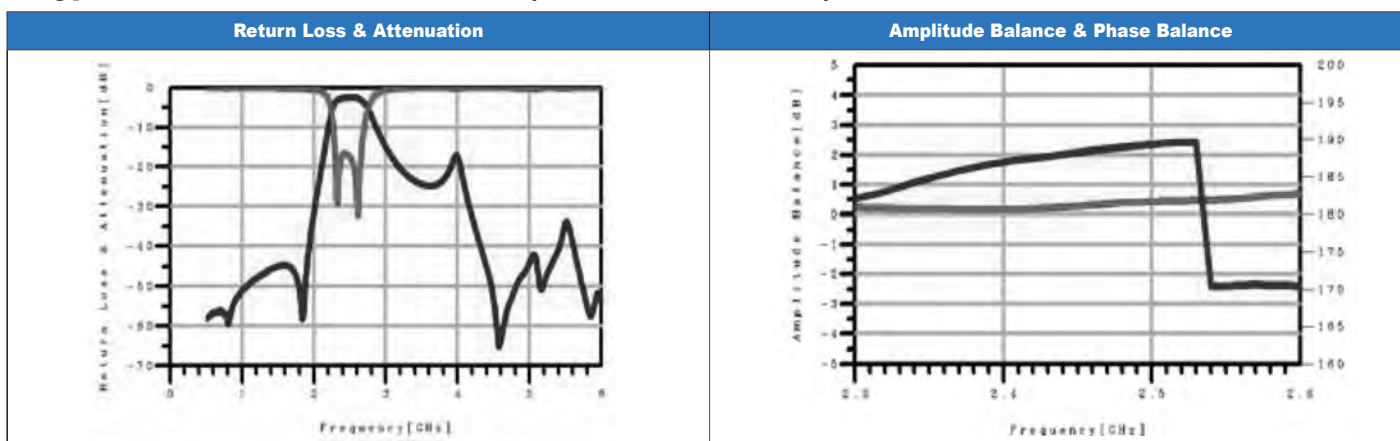
### ■ Pin Arrangement



### ■ RGBPB2520090A□T Series

| Item                   | Specification                                                                              |                                                                                            |
|------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
|                        | RGBPB2520090A5T                                                                            | RGBPB2520090A6T                                                                            |
| Frequency range (MHz)  | 2450 ± 50 MHz                                                                              | 2450 ± 50 MHz                                                                              |
| Insertion Loss         | 3 dB max                                                                                   | 3.5 dB max                                                                                 |
| VSWR                   | 2.0 max                                                                                    | 2.0 max                                                                                    |
| Impedance (Unbalanced) | 50 Ω                                                                                       | 50 Ω                                                                                       |
| Impedance (Balanced)   | Match to BC series of Bluetooth chipset                                                    | Match to BC series of Bluetooth chipset                                                    |
| Phase Difference       | 180° ± 15°                                                                                 | 180° ± 15°                                                                                 |
| Amplitude Difference   | 1.5 dB max                                                                                 | 1.5 dB max                                                                                 |
| Attenuation ( min.)    | 40 dB @880~960 MHz<br>40 dB @1710~1880 MHz<br>20 dB @1880~1990 MHz<br>30 dB @4800~5000 MHz | 40 dB @880~960 MHz<br>40 dB @1710~1880 MHz<br>20 dB @1880~1990 MHz<br>30 dB @4800~5000 MHz |

### ■ Typical Electrical Characteristics(RGBPB2520090A5T):



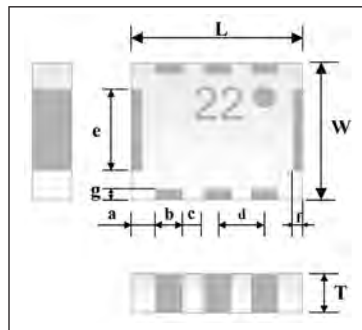
## ■ 2.4 GHz High Frequency Devices-Balanced Filter-RFBPB2520090A7T

### ■ How to Order

| RF            | BPB                                              | 252009                                                                                                        | 0                        | A                  | 7                    | T                                                       |
|---------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b> | <b>Product code</b>                              | <b>Dimension code</b>                                                                                         | <b>Unit of dimension</b> | <b>Application</b> | <b>Specification</b> | <b>Packing</b>                                          |
| RF Device     | BPB :<br>Balanced<br>Type<br>Band<br>Pass Filter | Per 2 digits of<br>Length, Width,<br>Thickness :<br>e.g. :<br>252009 = Length25,<br>Width 20,<br>Thickness 09 | 0: 0.1 mm<br>1: 1.0 mm   | A: 2.4GHz ISM Band | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension      |
|--------|----------------|
| L      | 2.50 ± 0.20    |
| W      | 2.00 ± 0.20    |
| T      | 0.85 ± 0.10    |
| a      | 0.35 ± 0.20    |
| b      | 0.4 ± 0.20     |
| c      | 0.30 ± 0.20    |
| d      | 0.70 ± 0.20    |
| e      | 1.20 ± 0.20    |
| f      | 0.15 (Typical) |
| g      | 0.15 (Typical) |



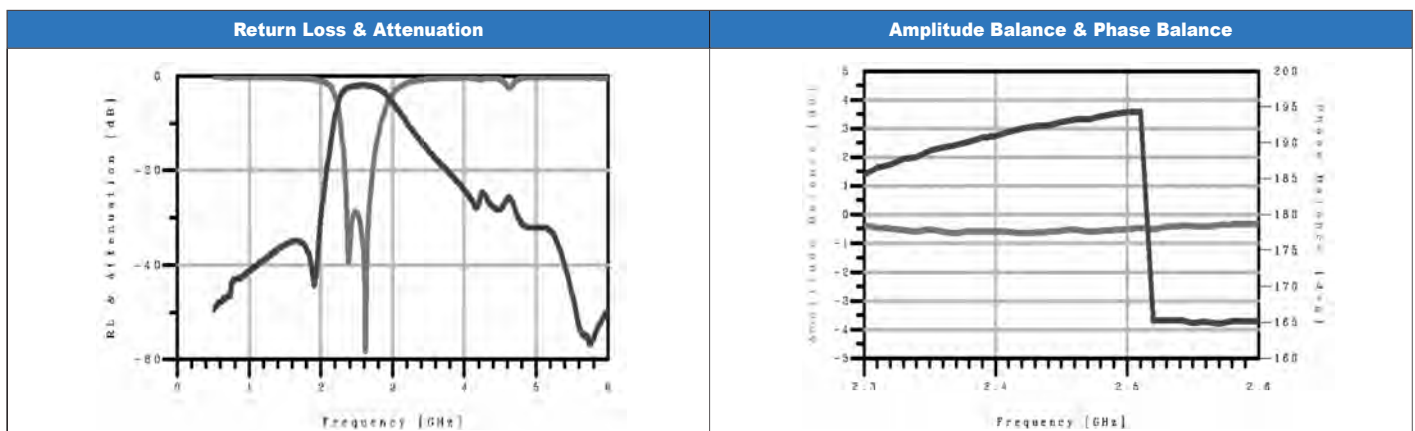
### ■ Pin Arrangement

| PIN | Definition      | PIN | Definition    |
|-----|-----------------|-----|---------------|
| P1  | NC              | P5  | Balanced Port |
| P2  | Unbalanced Port | P6  | Balanced Port |
| P3  | DC              | P7  | GND           |
| P4  | GND             | P8  | GND           |

### ■ RFBPB2520090A7T Series

| Item                   | Specification                                                                  |
|------------------------|--------------------------------------------------------------------------------|
| Frequency range (MHz)  | 2450 ± 50                                                                      |
| Insertion Loss (dB)    | 3.5 max                                                                        |
| VSWR                   | 2.0 max                                                                        |
| Impedance (Unbalanced) | 50 Ω                                                                           |
| Impedance (Balanced)   | Conjugate match to BR6150 of TI                                                |
| Phase Difference       | 180° ± 15°                                                                     |
| Amplitude Difference   | 1.5dB max                                                                      |
| Attenuation ( dB min.) | 35 @880-960 MHz<br>30 @1710-1880 MHz<br>25 @1880-1990 MHz<br>25 @4800-5000 MHz |

### ■ Typical Electrical Characteristics:



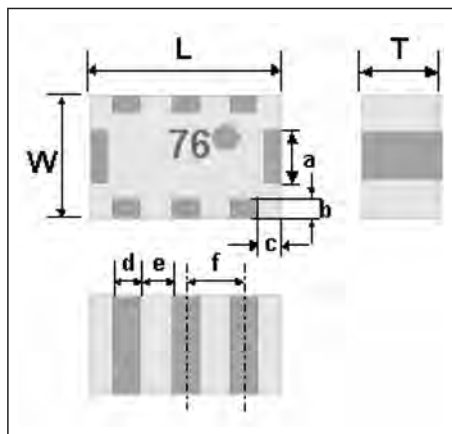
## 2.4 GHz High Frequency Devices-Balanced Filter-RFBPB2012110A5T

### How to Order

| RF                         | BPB                                                                     | 201211                                                                                                                                  | 0                                                  | A                                        | 5                                   | T                                                                         |
|----------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>BPB :<br>Balanced<br>Type<br>Band<br>Pass Filter | <b>Dimension code</b><br>Per 2 digits of<br>Length, Width,<br>Thickness :<br>e.g. :<br>201211 = Length 20,<br>Width 12,<br>Thickness 11 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### Dimensions

| Symbol | Dimension (mm) |
|--------|----------------|
| L      | 2.00 ± 0.15 mm |
| W      | 1.25 ± 0.10 mm |
| T      | 1.10 ± 0.10 mm |
| a      | 0.55 ± 0.10 mm |
| b      | 0.20 ± 0.15 mm |
| c      | 0.20 ± 0.15 mm |
| d      | 0.30 ± 0.10 mm |
| e      | 0.35 ± 0.10 mm |
| f      | 0.65 ± 0.10 mm |



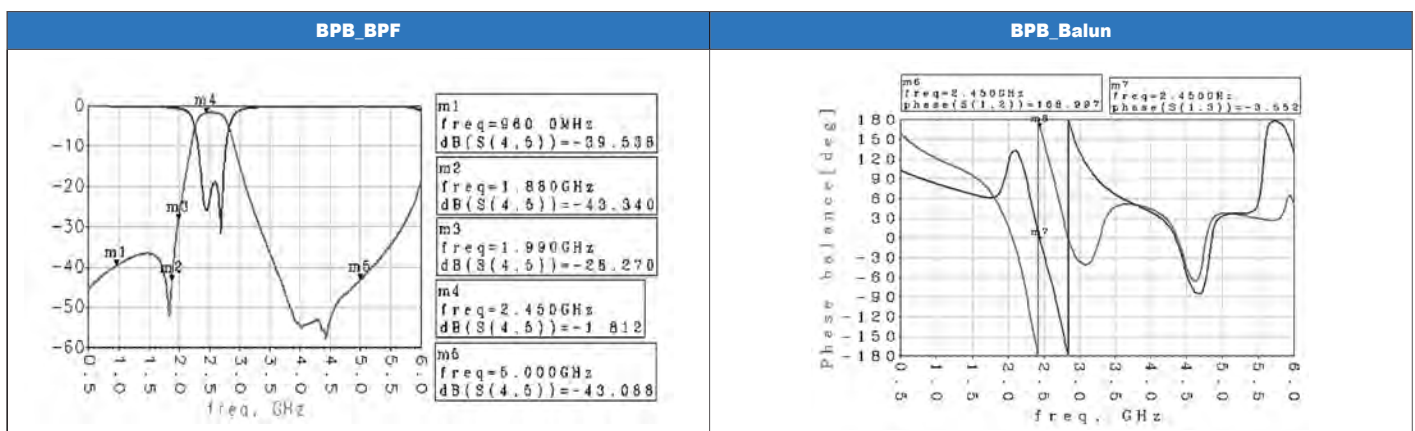
### Pin Arrangement

| PIN | Definition      | PIN | Definition    |
|-----|-----------------|-----|---------------|
| P1  | Unbalanced Port | P5  | Balanced Port |
| P2  | DC or GND       | P6  | GND           |
| P3  | NC              | P7  | Balanced Port |
| P4  | GND             | P8  | GND           |

### RFBPB2012110A5T Series

| Item                   | Specification                                                                          |
|------------------------|----------------------------------------------------------------------------------------|
| Frequency range        | 2450 ± 50 MHz                                                                          |
| Insertion Loss         | 2.8 dB max                                                                             |
| VSWR                   | 2.0 max                                                                                |
| Impedance (Unbalanced) | 50 Ω                                                                                   |
| Impedance (Balanced)   | Conjugate match to BC series of Bluetooth chipset                                      |
| Phase Difference       | 180° ± 10°                                                                             |
| Amplitude Difference   | 2.0 dB max                                                                             |
| Attenuation ( min.)    | 30dB @880~960 MHz<br>30dB @1710~1880 MHz<br>20dB @1880~1990 MHz<br>30dB @4800~5000 MHz |

### Typical Electrical Characteristics:



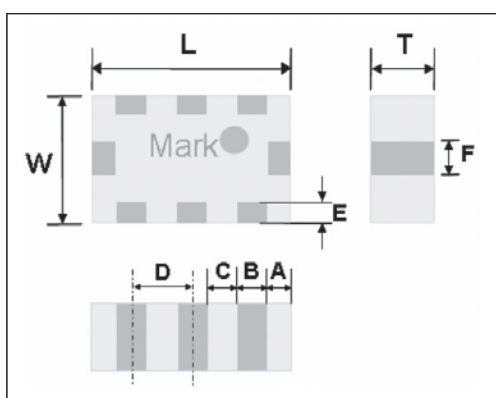
## ■ 2.4 GHz High Frequency Devices-Balanced Filter-RFBPB2012100A□T

### ■ How to Order

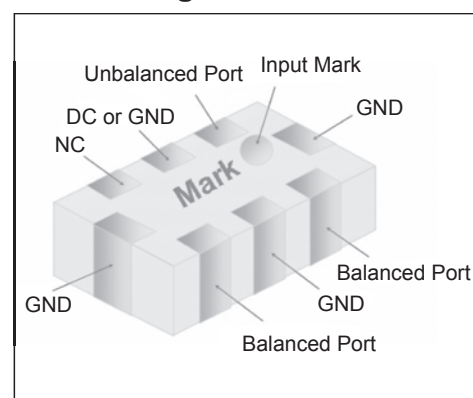
| RF            | BPB                                              | 201210                                                                                                         | 0                        | A                  | □                    | T                                                       |
|---------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b> | <b>Product code</b>                              | <b>Dimension code</b>                                                                                          | <b>Unit of dimension</b> | <b>Application</b> | <b>Specification</b> | <b>Packing</b>                                          |
| RF Device     | BPB :<br>Balanced<br>Type<br>Band<br>Pass Filter | Per 2 digits of<br>Length, Width,<br>Thickness :<br>e.g. :<br>201210 = Length 20,<br>Width 12,<br>Thickness 10 | 0: 0.1 mm<br>1: 1.0 mm   | A: 2.4GHz ISM Band | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension (mm) |
|--------|----------------|
| L      | 2.00 ± 0.15 mm |
| W      | 1.25 ± 0.10 mm |
| T      | 1.00 ± 0.10 mm |
| A      | 0.20 ± 0.15 mm |
| B      | 0.30 ± 0.10 mm |
| C      | 0.35 ± 0.10 mm |
| D      | 0.65 ± 0.10 mm |
| E      | 0.20 ± 0.10 mm |
| F      | 0.50 ± 0.10 mm |



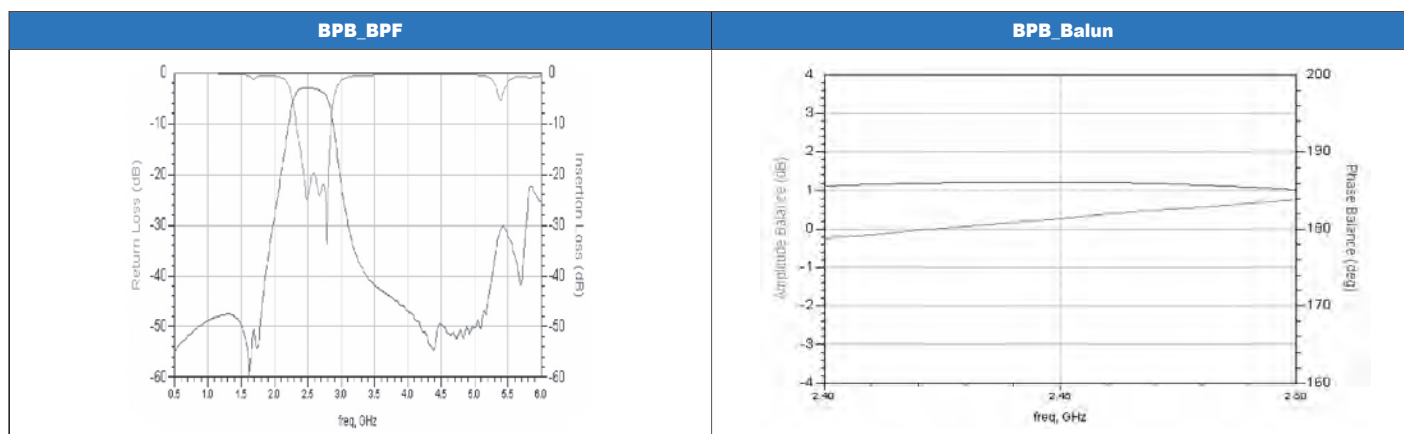
### ■ Pin Arrangement



### ■ RFBPB2012100A□T Series

| Item                   | RFBPB2012100A1T                                                                                                                            | RFBPB2012100A6T                                                                                 |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Frequency range (MHz)  | 2450 ± 50                                                                                                                                  | 2450 ± 50                                                                                       |
| Insertion Loss (dB)    | 3.5 max                                                                                                                                    | 3.5 max                                                                                         |
| VSWR                   | 2.0 max                                                                                                                                    | 2.0 max                                                                                         |
| Impedance (Unbalanced) | 50 Ω                                                                                                                                       | 50 Ω                                                                                            |
| Impedance (Balanced)   | Conjugate match to BC series of Bluetooth chipset                                                                                          | Conjugate match to BC series of Bluetooth chipset                                               |
| Phase Difference       | 180° ± 10°                                                                                                                                 | 180° ± 10°                                                                                      |
| Amplitude Difference   | 2 dB max                                                                                                                                   | 2.0 dB max                                                                                      |
| Attenuation (dB min.)  | 40 dB @880~960 MHz<br>35 dB @1710~1880 MHz<br>40 dB @1880~1900 MHz<br>35 dB @1900~1990 MHz<br>15 dB @2110~2170 MHz<br>30 dB @4800~5000 MHz | 35 dB @880~960 MHz<br>30 dB @1710~1880 MHz<br>20 dB @1880~1900 MHz<br>40 dB(Min) @4800~5000 MHz |

### ■ Type Electrical Characteristics (RFBPB2012100A6T):



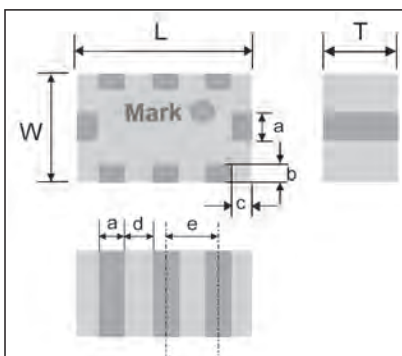
## ■ 2.4 GHz High Frequency Devices-Balanced Filter - RFBPB2012090A□T

### ■ How to Order

| RF            | BPB                                              | 201209                                                                                                       | 0                        | A                  | □                    | T                                                       |
|---------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b> | <b>Product code</b>                              | <b>Dimension code</b>                                                                                        | <b>Unit of dimension</b> | <b>Application</b> | <b>Specification</b> | <b>Packing</b>                                          |
| RF Device     | BPB :<br>Balanced<br>Type<br>Band<br>Pass Filter | Per 2 digits of<br>Length, Width,<br>Thickness :<br>e.g. :<br>201209 = Length20,<br>Width 12,<br>Thickness 9 | 0: 0.1 mm<br>1: 1.0 mm   | A: 2.4GHz ISM Band | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension (mm) |
|--------|----------------|
| L      | 2.00 ± 0.15    |
| W      | 1.25 ± 0.10    |
| T      | 0.90 ± 0.10    |
| a      | 0.30 ± 0.10    |
| b      | 0.20 ± 0.15    |
| c      | 0.20 ± 0.15    |
| d      | 0.35 ± 0.10    |
| e      | 0.65 ± 0.10    |

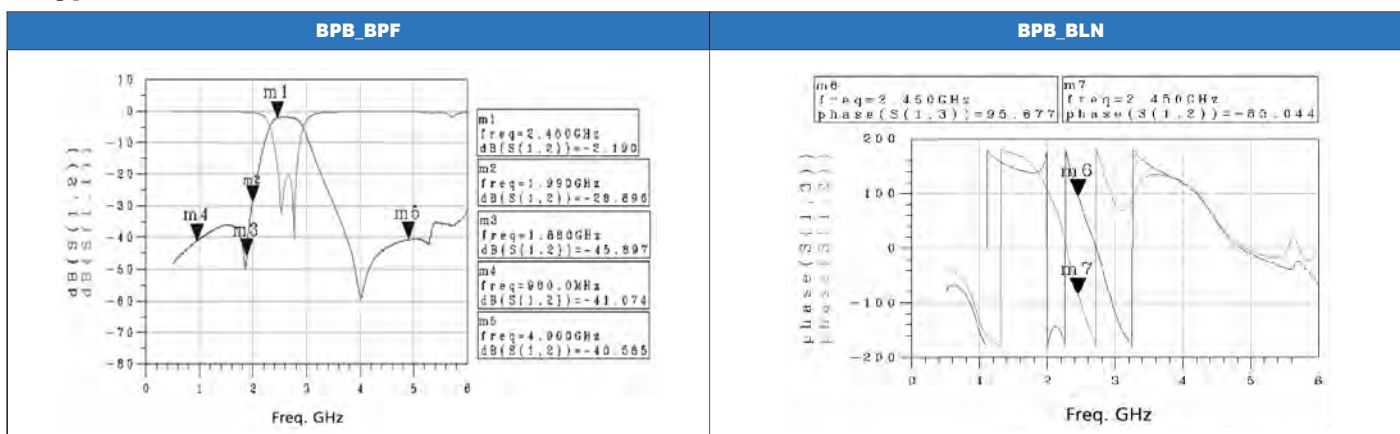


| PIN | Definition      | PIN | Definition    |
|-----|-----------------|-----|---------------|
| P1  | Unbalanced Port | P5  | Balanced Port |
| P2  | DC or GND       | P6  | GND           |
| P3  | NC              | P7  | Balanced Port |
| P4  | GND             | P8  | GND           |

### ■ RFBPB2012090A□T Series

| Item                   | RFBPB2012090A1T (Mark:41)                                                                  | RFBPB2012090A3T (Mark:97)                                                                  | RFBPB2012090A9T (Mark:93)                                          |
|------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Frequency range (MHz)  | 2450 ± 50                                                                                  | 2450 ± 50                                                                                  | 2450 ± 50                                                          |
| Insertion Loss (dB)    | 3.5 dB max                                                                                 | 3.5 dB max                                                                                 | 2.8 dB max                                                         |
| VSWR                   | 2.1 max                                                                                    | 2.1 max                                                                                    | 2.1 max                                                            |
| Impedance (Unbalanced) | 50 Ω                                                                                       | 50 Ω                                                                                       | 50 Ω                                                               |
| Impedance (Balanced)   | Conjugate match to BC series of Bluetooth chipset                                          | Conjugate match to BC series of Bluetooth chipset                                          | Conjugate match to BC series of Bluetooth chipset                  |
| Phase Difference       | 180° ± 10°                                                                                 | 180° ± 10°                                                                                 | 180° ± 10°                                                         |
| Amplitude Difference   | 2.0 dB max                                                                                 | 2.0 dB max                                                                                 | 2.0 dB max                                                         |
| Attenuation ( dB min.) | 35dB @ 880~960 MHz<br>30dB @ 1710~1880 MHz<br>20dB @ 1880~1990 MHz<br>30dB @ 4800~5000 MHz | 35dB @ 880~960 MHz<br>30dB @ 1710~1880 MHz<br>20dB @ 1880~1990 MHz<br>30dB @ 4800~5000 MHz | 35dB @ 880~960 MHz<br>25dB @ 1710~1880 MHz<br>30dB @ 4800~5000 MHz |

### ■ Typical Electrical Characteristics:



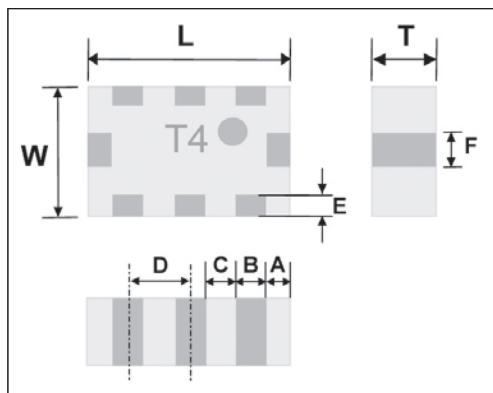
## ■ 2.4 GHz High Frequency Devices-Balanced Filter-RFBPB2012060A1T

### ■ How to Order

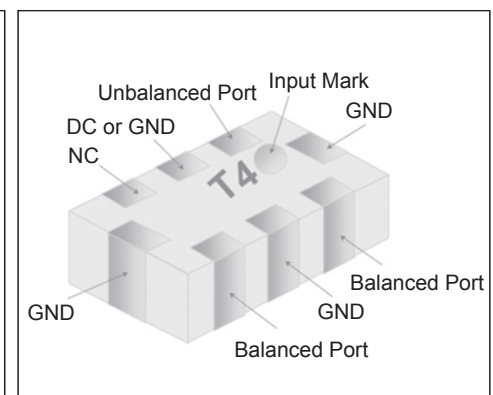
| RF            | BPB                                              | 201206                                                                                                         | 0                        | A                  | 1                    | T                                                       |
|---------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b> | <b>Product code</b>                              | <b>Dimension code</b>                                                                                          | <b>Unit of dimension</b> | <b>Application</b> | <b>Specification</b> | <b>Packing</b>                                          |
| RF Device     | BPB :<br>Balanced<br>Type<br>Band<br>Pass Filter | Per 2 digits of<br>Length, Width,<br>Thickness :<br>e.g. :<br>201206 = Length 20,<br>Width 12,<br>Thickness 06 | 0: 0.1 mm<br>1: 1.0 mm   | A: 2.4GHz ISM Band | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension (mm) |
|--------|----------------|
| L      | 2.00 ± 0.15 mm |
| W      | 1.25 ± 0.10 mm |
| T      | 0.60 ± 0.10 mm |
| A      | 0.20 ± 0.15 mm |
| B      | 0.30 ± 0.10 mm |
| C      | 0.35 ± 0.10 mm |
| D      | 0.65 ± 0.10 mm |
| E      | 0.20 ± 0.10 mm |
| F      | 0.50 ± 0.10 mm |



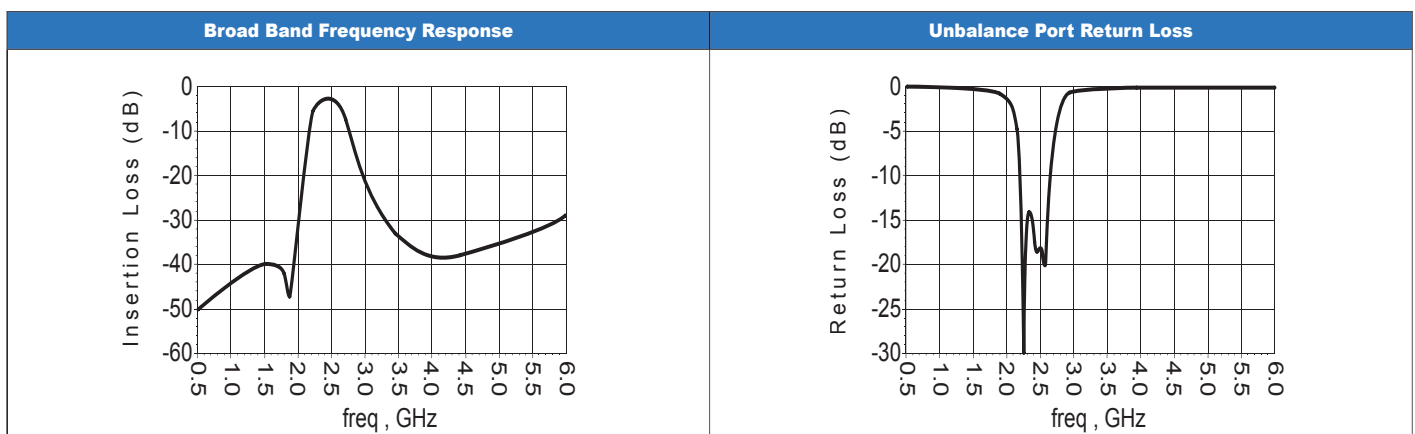
### ■ Pin Arrangement



### ■ RFBPB2012060A1T Series

| Item                   | Specification                                                                                                      |
|------------------------|--------------------------------------------------------------------------------------------------------------------|
| Frequency range (MHz)  | 2450 ± 50                                                                                                          |
| Insertion Loss (dB)    | 3.5 max                                                                                                            |
| VSWR                   | 2.0 max                                                                                                            |
| Impedance (Unbalanced) | 50 Ω                                                                                                               |
| Impedance (Balanced)   | Conjugate match to BC series of CSR                                                                                |
| Phase Difference       | 180° ± 10°                                                                                                         |
| Amplitude Difference   | 2 dB max                                                                                                           |
| Attenuation ( dB min.) | 35 dB @880~960 MHz<br>30 dB @1710~1880 MHz<br>25 dB @1880~1900 MHz<br>20 dB @1900~1990 MHz<br>30 dB @4800~5000 MHz |

### ■ Type Electrical Characteristics:



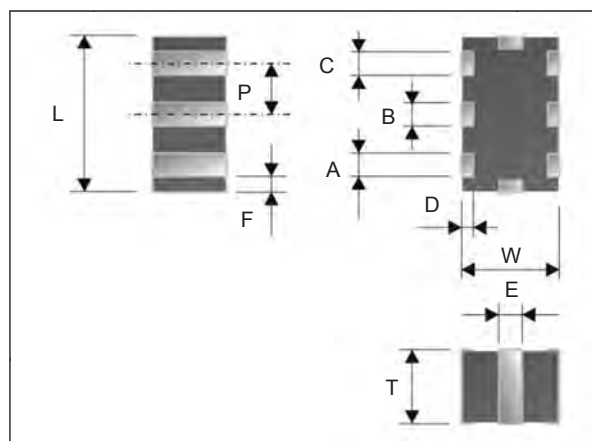
## ■ 2.4 GHz High Frequency Devices-Low Pass Filter-RFLPF2012110A0T

### ■ How to Order

| RF        | LPF                   | 201211                                                    | 0                      | A                  | 0             | T                                                       |
|-----------|-----------------------|-----------------------------------------------------------|------------------------|--------------------|---------------|---------------------------------------------------------|
| Walsin    | Product code          | Dimension code                                            | Unit of dimension      | Application        | Specification | Packing                                                 |
| RF Device | LPF : Low Pass Filter | 201211 =<br>Length = 20,<br>Width = 12,<br>Thickness = 11 | 0: 0.1 mm<br>1: 1.0 mm | A: 2.4GHz ISM Band | Design Code   | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

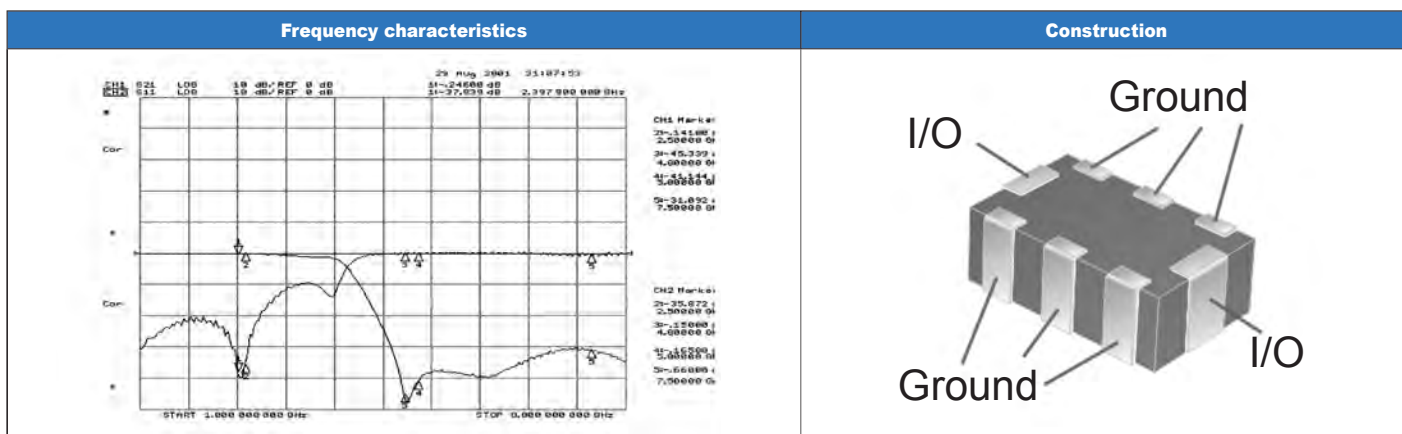
| Symbol | Dimension      |
|--------|----------------|
| L      | 2.00 ± 0.15 mm |
| W      | 1.25 ± 0.10 mm |
| T      | 1.05 ± 0.10 mm |
| A      | 0.30 ± 0.10 mm |
| B      | 0.30 ± 0.10 mm |
| C      | 0.30 ± 0.10 mm |
| D      | 0.40 ± 0.20 mm |
| E      | 0.30 ± 0.10 mm |
| F      | 0.20 ± 0.10 mm |
| P      | 0.65 ± 0.10 mm |



### ■ RFLPF2012110A0T Series

| Item                  | Specification                                                        |
|-----------------------|----------------------------------------------------------------------|
| Frequency range (MHz) | 2450 ± 50                                                            |
| Insertion Loss (dB)   | 0.7 (max)                                                            |
| VSWR                  | 1.5                                                                  |
| Attenuation (dB min.) | 30 @ 2 x (f <sub>0</sub> ± BW/2)<br>25 @ 3 x (f <sub>0</sub> ± BW/2) |

### ■ Typical Electrical Characteristics:



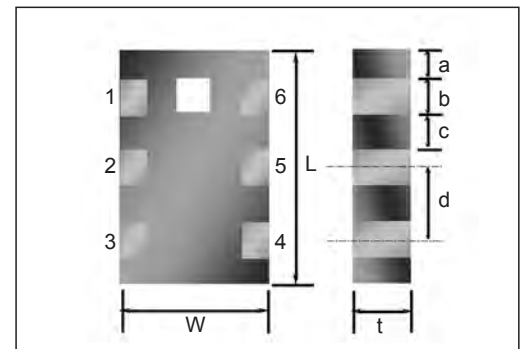
## ■ 2.4 GHz High Frequency Devices-Balun-RFBLN2012090A□T

### ■ How to Order

| RF                         | BLN                                | 201209                                                                             | 0                                                  | A                                        | □                                   | T                                                                         |
|----------------------------|------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>BLN : BALUN | <b>Dimension code</b><br>201209 =<br>Length = 20,<br>Width = 12,<br>Thickness = 09 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=13" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

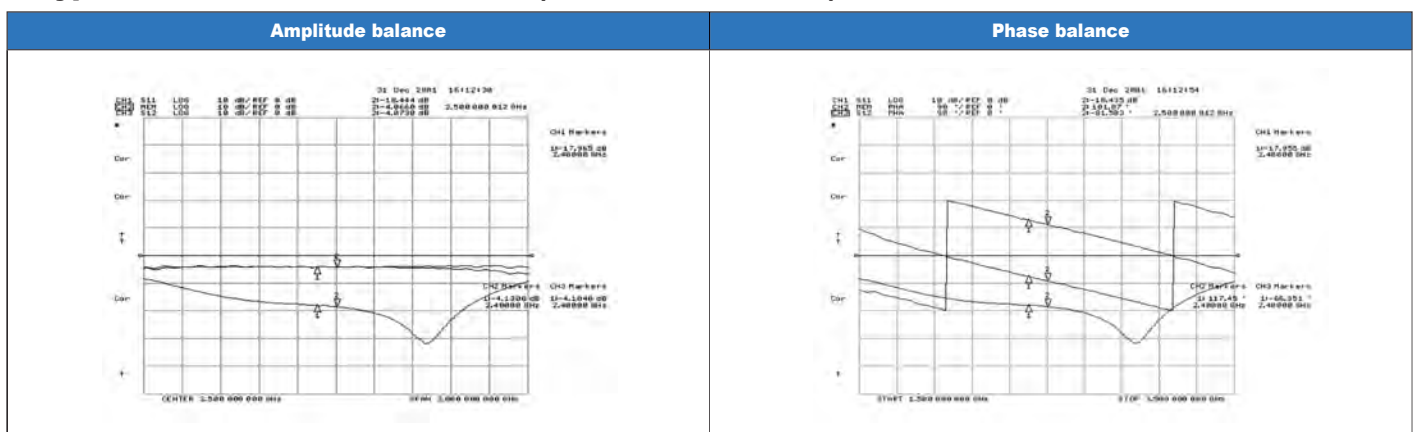
| Symbol | Dimension      | Terminals | Connection        |
|--------|----------------|-----------|-------------------|
| L      | 2.00 ± 0.15 mm | 1         | Unbalanced port   |
| W      | 1.25 ± 0.15 mm | 2         | Ground or DC feed |
| t      | 0.95 ± 0.10 mm | 3         | Balanced port     |
| a      | 0.20 ± 0.20 mm | 4         | Balanced port     |
| b      | 0.30 ± 0.20 mm | 5         | Ground            |
| c      | 0.35 ± 0.20 mm | 6         | Non Connection    |
| d      | 0.65 ± 0.20 mm | -         | -                 |



### ■ RFBLN2012090A□T Series

| Part Number.    | Frequency(MHz) | Impedance (Ω) |          | Return Loss (dB) Min. | Inband Amplitude imbalance (dB) Max. | Inband Phase imbalance (degree) | Insertion Loss (dB) |
|-----------------|----------------|---------------|----------|-----------------------|--------------------------------------|---------------------------------|---------------------|
|                 |                | Unbalanced    | Balanced |                       |                                      |                                 |                     |
| RFBLN2012090A0T | 2450 ± 50      | 50            | 50       | 10                    | 2.0                                  | 180 ± 10                        | 1.2                 |
| RFBLN2012090A1T | 2450 ± 50      | 50            | 100      | 10                    | 2.0                                  | 180 ± 10                        | 1.0                 |
| RFBLN2012090A2T | 2450 ± 50      | 50            | 200      | 10                    | 2.0                                  | 180 ± 10                        | 1.0                 |

### ■ Typical Electrical Characteristics (RFBLN2012090A1T):



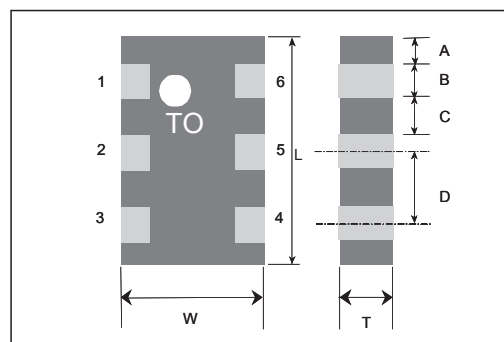
## ■ 2.4 GHz High Frequency Devices-Balun-RGBLN2012080A4T

### ■ How to Order

| RG                                      | BLN                                | 201208                                                                                                                     | 0                                                  | A                                        | 4                                   | T                                                                         |
|-----------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RG: RF /Pb free device | <b>Product code</b><br>BLN : BALUN | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>201208 = Length20, Width 12, Thickness 08 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=13" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

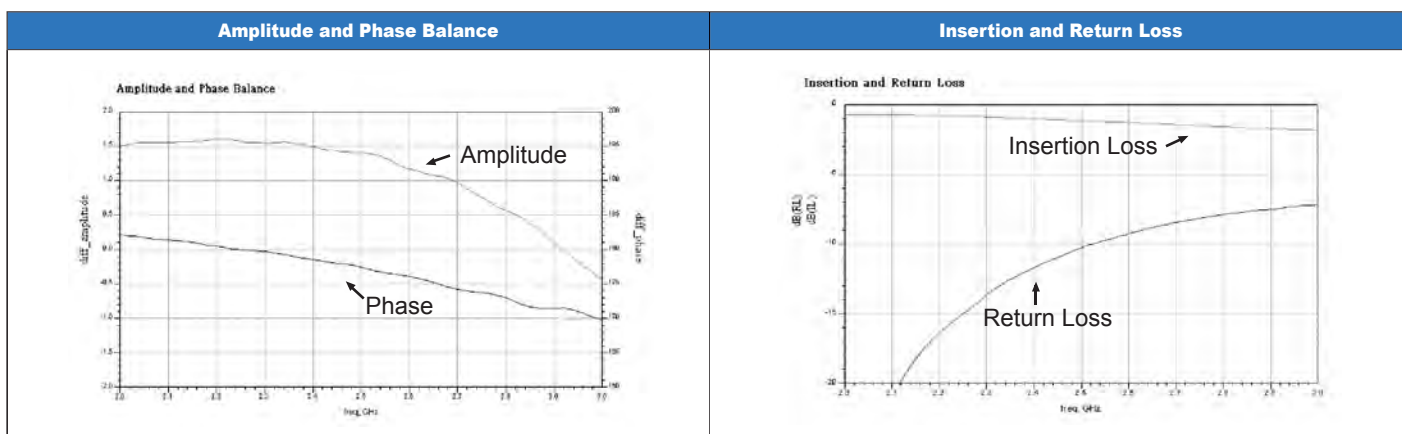
| Symbol | Dimension      | Terminals | Connection        |
|--------|----------------|-----------|-------------------|
| L      | 2.00 ± 0.15 mm | 1         | Unbalanced port   |
| W      | 1.25 ± 0.15 mm | 2         | Ground or DC feed |
| T      | 0.80 ± 0.10 mm | 3         | Balanced port     |
| A      | 0.20 ± 0.20 mm | 4         | Balanced port     |
| B      | 0.30 ± 0.20 mm | 5         | Ground            |
| C      | 0.35 ± 0.20 mm | 6         | Non Connection    |
| D      | 0.65 ± 0.20 mm | -         | -                 |



### ■ RGLN2012080A4T Series

| Part Number.   | Frequency(MHz) | Impedance (Ω) |          | Return Loss (dB) Min. | Inband Amplitude imbalance (dB) Max. | Inband Phase imbalance (degree) | Insertion Loss (dB) |
|----------------|----------------|---------------|----------|-----------------------|--------------------------------------|---------------------------------|---------------------|
|                |                | Unbalanced    | Balanced |                       |                                      |                                 |                     |
| RGLN2012080A4T | 2450 ± 50      | 50            | 50       | 10                    | 2.0                                  | 180 ± 10                        | 1.5                 |

### ■ Typical Electrical Characteristics:



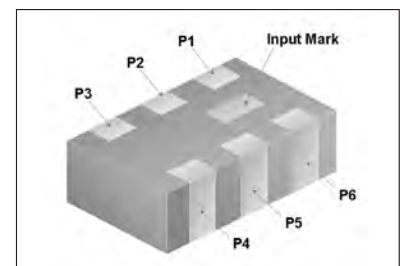
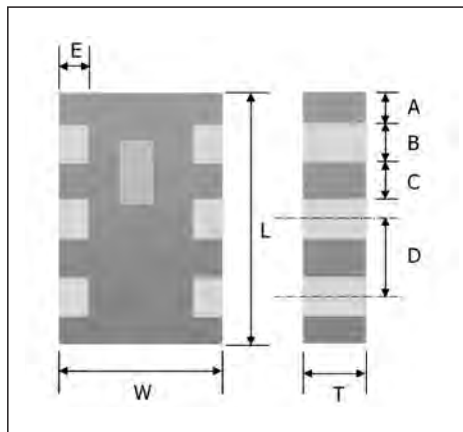
## ■ 2.4 GHz High Frequency Devices-Balun-RGBLN1608070A1T

### ■ How to Order

| RG                                      | BLN                                | 160807                                                                                                                     | 0                                                  | A                                        | 1                                   | T                                                                         |
|-----------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RG: RF /Pb free device | <b>Product code</b><br>BLN : BALUN | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>160807 = Length16, Width 08, Thickness 07 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=13" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension      |
|--------|----------------|
| L      | 1.60 ± 0.10 mm |
| W      | 0.85 ± 0.10 mm |
| T      | 0.7 ± 0.10 mm  |
| E      | 0.15 ± 0.10 mm |
| A      | 0.20 ± 0.10 mm |
| B      | 0.20 ± 0.10 mm |
| C      | 0.30 ± 0.10 mm |
| D      | 0.50 ± 0.05 mm |

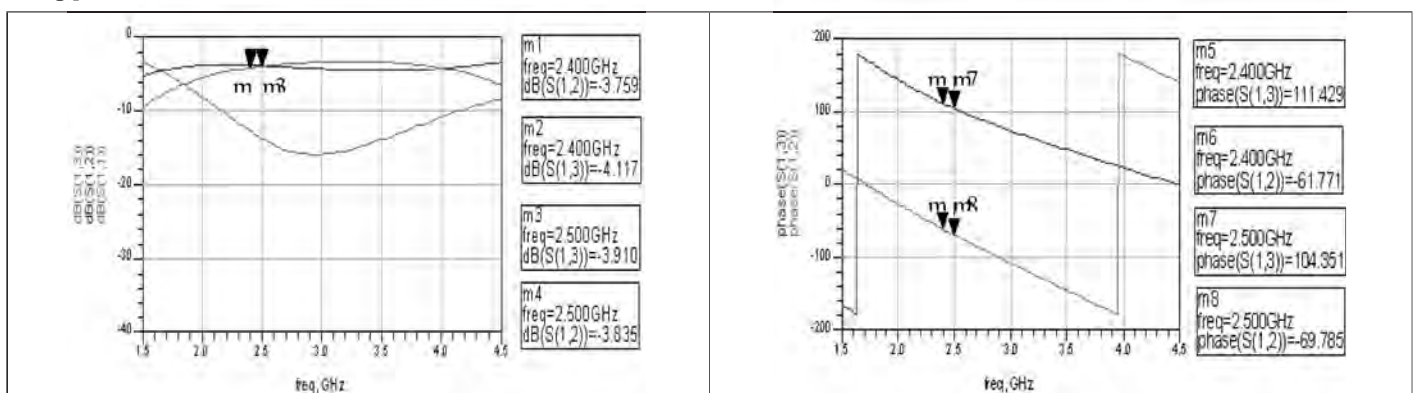


| PIN | Connection      |
|-----|-----------------|
| P1  | Unbalanced Port |
| P2  | Non Connection  |
| P3  | Ground          |
| P4  | Balanced port   |
| P5  | Non Connection  |
| P6  | Balanced port   |

### ■ RGLN1608070A1T Series

| Part Nr.       | Frequency(MHz) | Impedance (Ω) |          | Return Loss (dB) Min. | Inband Amplitude imbalance (dB) Max. | Inband Phase imbalance (degree) | Insertion Loss (dB) |
|----------------|----------------|---------------|----------|-----------------------|--------------------------------------|---------------------------------|---------------------|
|                |                | Unbalanced    | Balanced |                       |                                      |                                 |                     |
| RGLN1608070A1T | 2450 ± 50      | 50            | 100      | 10                    | 2.0                                  | 180 ± 15                        | 1.5                 |

### ■ Typical Electrical Characteristics:



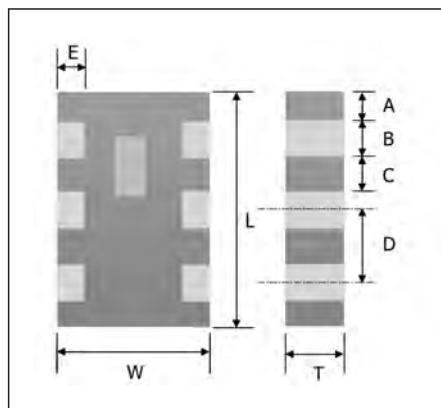
## 2.4 GHz High Frequency Devices-Balun-RGBLN1608070A5T

### How to Order

| RG                                      | BLN                                | 160807                                                                                                                     | 0                                                  | A                                        | 5                                   | T                                                                         |
|-----------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RG: RF /Pb free device | <b>Product code</b><br>BLN : BALUN | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>160807 = Length16, Width 08, Thickness 07 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>A: 2.4GHz ISM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=13" Reeled<br>B=Bulk<br>X: SFC product |

### Dimensions

| Symbol | Dimension      |
|--------|----------------|
| L      | 1.60 ± 0.10 mm |
| W      | 0.85 ± 0.10 mm |
| T      | 0.70 ± 0.10 mm |
| E      | 0.15 ± 0.10 mm |
| A      | 0.15 ± 0.10 mm |
| B      | 0.25 ± 0.10 mm |
| C      | 0.25 ± 0.10 mm |
| D      | 0.50 ± 0.05 mm |

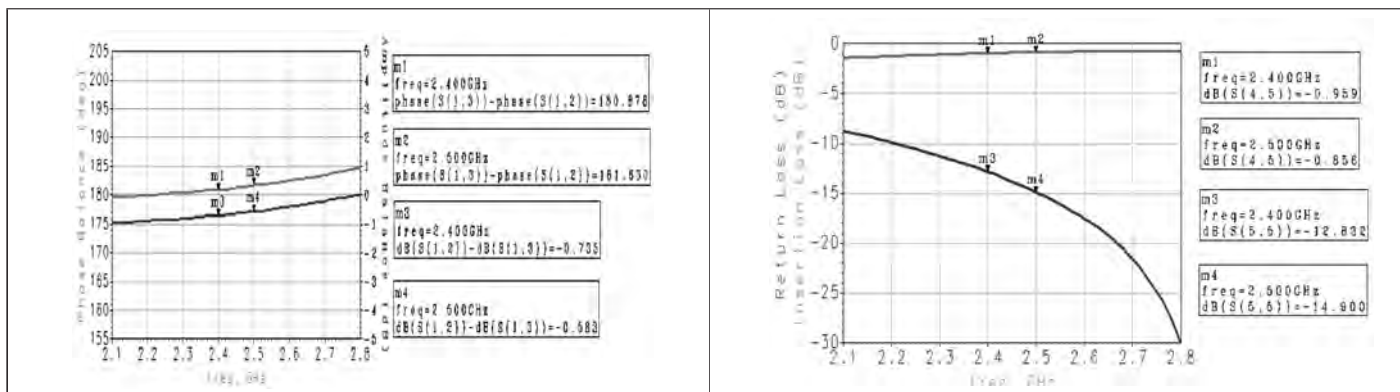


| PIN | Connection      |
|-----|-----------------|
| P1  | Unbalanced Port |
| P2  | DC or GND       |
| P3  | Balanced port   |
| P4  | Balanced port   |
| P5  | GND             |
| P6  | NC              |

### RGLN1608070A5T Series

| Part Nr.       | Frequency(MHz) | Impedance (Ω) |          | Return Loss (dB) Min. | Inband Amplitude imbalance (dB) Max. | Inband Phase imbalance (degree) | Insertion Loss (dB) |
|----------------|----------------|---------------|----------|-----------------------|--------------------------------------|---------------------------------|---------------------|
|                |                | Unbalanced    | Balanced |                       |                                      |                                 |                     |
| RGLN1608070A5T | 2450 ± 50      | 50            | 100      | 10                    | 2.0                                  | 180 ± 10                        | 1.2                 |

### Typical Electrical Characteristics:



## ■ 2.4/4.9/5.2/5.8 GHz WLAN IEEE802.11 a/b/g Combo-Chip Antenna-RFANT6050110L□T

### ■ How to Order

| RF                         | ANT                                 | 605011                                                                                                                     | 0                                                  | L                                                              | □                                   | T                                                                         |
|----------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF device | <b>Product code</b><br>ANT: Antenna | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>605011 = Length60, Width 50, Thickness 11 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>L: 2.4/4.9/5.8 GHz Multiband Application | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=13" Reeled<br>B=Bulk<br>X: SFC product |

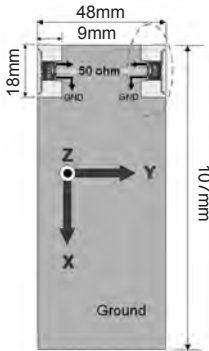
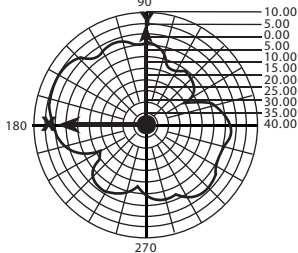
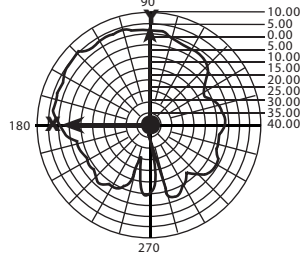
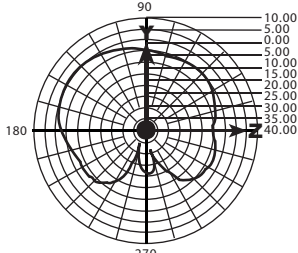
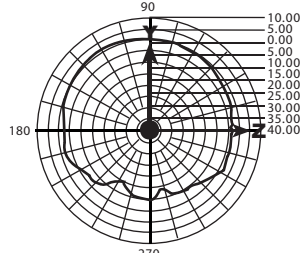
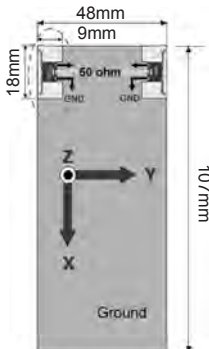
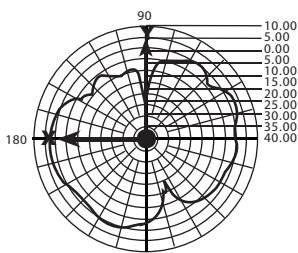
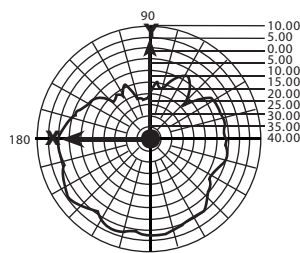
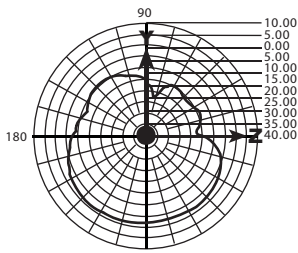
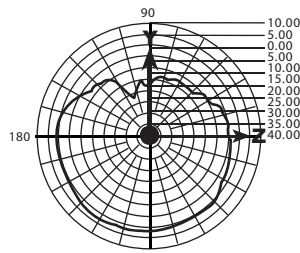
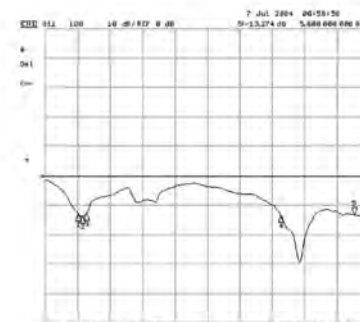
### ■ Dimensions

| RFANT6050110L0T |               |                 | RFANT6050110L1T |              |                    |
|-----------------|---------------|-----------------|-----------------|--------------|--------------------|
|                 |               |                 |                 |              |                    |
| Symbol          | Dimension     | Port Definition | Symbol          | Dimension    | Port Definition    |
| L               | 5.9 ± 0.3 mm  | ---             | c               | 1.0 ± 0.2 mm | ---                |
| W               | 5.1 ± 0.3 mm  | ---             | d               | 2.0 ± 0.2 mm | ---                |
| T               | 1.1 ± 0.1 mm  | ---             | 1               | 1.0 ± 0.2 mm | 50 Ω RF Feeding    |
| a               | 0.45 ± 0.2 mm | ---             | 2               | 1.0 ± 0.2 mm | Ground Termination |
| b               | 1.0 ± 0.2 mm  | ---             | 3               | 1.0 ± 0.2 mm | Solder Termination |

### ■ RFANT6050110L□T Series

| Item                | Specification    |          |          |
|---------------------|------------------|----------|----------|
| Central Frequency   | 2.45 GHz         | 5.25 GHz | 5.85 GHz |
| Gain (Typical)      | 1.5 dBi          | 4 dBi    | 4 dBi    |
| Bandwidth (Typical) | 100 MHz          | 200 MHz  | 100 MHz  |
| VSWR                | 2 Max.           |          |          |
| Polarization        | Linear           |          |          |
| Azimuth Bandwidth   | Omni-directional |          |          |
| Impedance           | 50 Ω             |          |          |

## ■ Typical Electrical Characteristics:

| RFANT6050110L0T (Right side)                                                        |                                                   | 2.45GHz                                                                              |                                                                                       | 5.80GHz                                                                               |  |
|-------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|
|    | E-Plane                                           |    |    |                                                                                       |  |
|                                                                                     |                                                   | Peak Gain = +4.74 dBi<br>Average Gain = -1.46 dBi                                    | Peak Gain = +4.99 dBi<br>Average Gain = -1.31 dBi                                     |                                                                                       |  |
| Return Loss (S11)                                                                   |                                                   | H-Plane                                                                              |    |   |  |
|   | Peak Gain = +0.48 dBi<br>Average Gain = -4.59 dBi |                                                                                      | Peak Gain = +3.02 dBi<br>Average Gain = -0.85 dBi                                     |                                                                                       |  |
| RFANT6050110L1T (Left side)                                                         |                                                   | 2.45GHz                                                                              |                                                                                       | 5.80GHz                                                                               |  |
|  | E-Plane                                           |  |  |                                                                                       |  |
|                                                                                     |                                                   | Peak Gain = +3.82 dBi<br>Average Gain = -1.19 dBi                                    | Peak Gain = +4.81 dBi<br>Average Gain = -1.42 dBi                                     |                                                                                       |  |
| Return Loss (S11)                                                                   |                                                   | H-Plane                                                                              |   |  |  |
|  | Peak Gain = +0.16 dBi<br>Average Gain = -4.33 dBi |                                                                                      | Peak Gain = +3.13 dBi<br>Average Gain = -0.85 dBi                                     |                                                                                       |  |

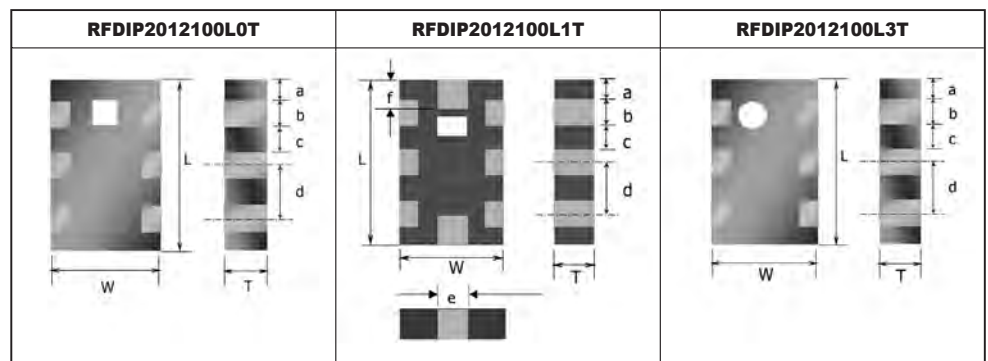
## ■ 2.4/4.9/5.2/5.8 GHz High Frequency Devices-Diplexer-RFDIP2012100L□T

### ■ How to Order

| RF                         | DIP                                   | 201210                                                                           | 0                                                  | L                                                                       | □                                   | T                                                                         |
|----------------------------|---------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>DIP : Diplexer | <b>Dimension code</b><br>201210 =<br>Length = 20<br>Width = 12<br>Thickness = 10 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>L: 2.4/ 4.9/ 5.2/ 5.8GHz<br>Multiband Application | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension      |
|--------|----------------|
| L      | 2.00 ± 0.15 mm |
| W      | 1.25 ± 0.15 mm |
| T      | 0.95 ± 0.10 mm |
| a      | 0.20 ± 0.20 mm |
| b      | 0.30 ± 0.20 mm |
| c      | 0.35 ± 0.20 mm |
| d      | 0.65 ± 0.20 mm |
| e      | 0.30 ± 0.20 mm |
| f      | 0.25 ± 0.20 mm |



### ■ RFDIP2012100L□T Series

| Item              | RFDIP2012100L0T                                          |                   | RFDIP2012100L1T                                          |                   | RFDIP2012100L3T                                          |                   |
|-------------------|----------------------------------------------------------|-------------------|----------------------------------------------------------|-------------------|----------------------------------------------------------|-------------------|
|                   | Band 1                                                   | Band 2            | Band 1                                                   | Band 2            | Band 1                                                   | Band 2            |
| Central Frequency | 2450 ± 50 MHz                                            | 5400 ± 500 MHz    | 2450 ± 50 MHz                                            | 5400 ± 500 MHz    | 2450 ± 50 MHz                                            | 5400 ± 500 MHz    |
| Impedance         | 50 Ω                                                     | 50 Ω              | 50 Ω                                                     | 50 Ω              | 50 Ω                                                     | 50 Ω              |
| insertion Loss    | 0.7 dB                                                   | 0.9 dB            | 0.7 dB                                                   | 0.9 dB            | 0.7 dB                                                   | 0.9 dB            |
| Return Loss       | Min.10 dB                                                |                   | Min.10 dB                                                |                   | Min.10 dB                                                |                   |
| Attenuation       | -20 dB @ 4.9 GHz<br>-25 dB @ 5.2 GHz<br>-25 dB @ 5.8 GHz | -25 dB @ 2.45 GHz | -20 dB @ 4.9 GHz<br>-20 dB @ 5.2 GHz<br>-20 dB @ 5.8 GHz | -20 dB @ 2.45 GHz | -20 dB @ 4.9 GHz<br>-25 dB @ 5.2 GHz<br>-25 dB @ 5.8 GHz | -25 dB @ 2.45 GHz |
| Ripple            | 0.5 dB                                                   |                   | 0.5 dB                                                   |                   | 0.5 dB                                                   |                   |

### ■ Typical Electrical Characteristics:

| RFDIP2012100L0T           | RFDIP2012100L1T           | RFDIP2012100L3T           |
|---------------------------|---------------------------|---------------------------|
|                           |                           |                           |
| Frequency Characteristics | Frequency Characteristics | Frequency Characteristics |
|                           |                           |                           |

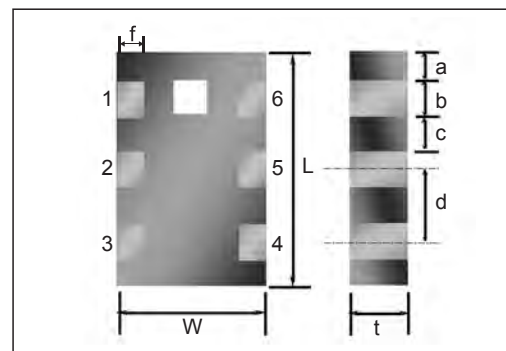
## ■ 4.9/ 5.2/ 5.8 GHz High Frequency Devices-Balun-RFBLN2012090K□T

### ■ How to Order

| RF                         | BLN                                | 201209                                                                           | 0                                                  | K                                                                | □                                   | T                                                                         |
|----------------------------|------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>BLN : BALUN | <b>Dimension code</b><br>201209 =<br>Length = 20<br>Width = 12<br>Thickness = 09 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>K: ISM 5.2/5.8 GHz<br>Dualband Application | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=13" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

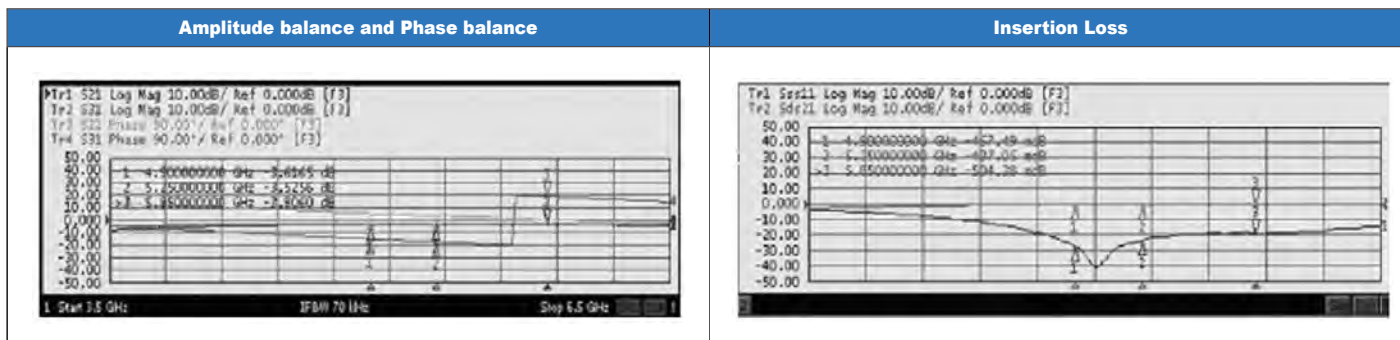
| Symbol | Dimension      | Terminals | Connection        |
|--------|----------------|-----------|-------------------|
| L      | 2.00 ± 0.15 mm | 1         | Unbalanced port   |
| W      | 1.25 ± 0.15 mm | 2         | Ground or DC feed |
| t      | 0.95 ± 0.10 mm | 3         | Balanced port     |
| a      | 0.20 ± 0.20 mm | 4         | Balanced port     |
| b      | 0.30 ± 0.20 mm | 5         | Ground            |
| c      | 0.35 ± 0.20 mm | 6         | Non Connection    |
| d      | 0.65 ± 0.20 mm |           |                   |
| f      | 0.30 ± 0.20 mm |           |                   |



### ■ RFBLN2012090K□T Series

| Part Number.    | Frequency(MHz) | Impedance (Ω) |          | Return Loss (dB) Min. | Inband Amplitude imbalance (dB) Max. | Inband Phase imbalance (degree) | Insertion Loss (dB) |
|-----------------|----------------|---------------|----------|-----------------------|--------------------------------------|---------------------------------|---------------------|
|                 |                | Unbalanced    | Balanced |                       |                                      |                                 |                     |
| RFBLN2012090K0T | 5400 ± 500     | 50            | 50       | -10                   | 2.0                                  | 180° ± 10°                      | -1.1                |
| RFBLN2012090K1T | 5400 ± 500     | 50            | 100      | -10                   | 2.0                                  | 180° ± 10°                      | -1.2                |

### ■ Typical Electrical Characteristics (RFBLN2012090K1T):



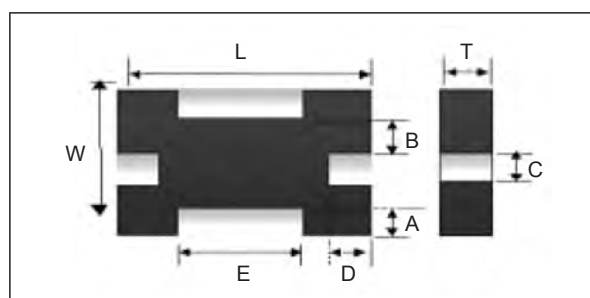
## ■ 4.9/ 5.2/ 5.8 GHz High Frequency Devices-Band Pass Filter-RFBPF2012100K0T

### ■ How to Order

| RF            | BPF                    | 201210                                                  | 0                        | K                                          | 0                    | T                                                       |
|---------------|------------------------|---------------------------------------------------------|--------------------------|--------------------------------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b> | <b>Product code</b>    | <b>Dimension code</b>                                   | <b>Unit of dimension</b> | <b>Application</b>                         | <b>Specification</b> | <b>Packing</b>                                          |
| RF Device     | BPF : Band Pass Filter | 201210 =<br>Length = 20<br>Width = 12<br>Thickness = 10 | 0: 0.1 mm<br>1: 1.0 mm   | K: ISM 5.2/5.8 GHz<br>Dualband Application | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension      |
|--------|----------------|
| L      | 2.00 ± 0.15 mm |
| W      | 1.25 ± 0.15 mm |
| T      | 0.95 ± 0.10 mm |
| A      | 0.25 ± 0.15 mm |
| B      | 0.25 ± 0.10 mm |
| C      | 0.25 ± 0.10 mm |
| D      | 0.25 ± 0.15 mm |
| E      | 1.00 ± 0.15 mm |



### ■ RFBPF2012100K0T Series

| Item                | Specification                                                     |
|---------------------|-------------------------------------------------------------------|
| Central Frequency   | 5400 ± 500 MHz                                                    |
| Insertion Loss (dB) | -1.7 dBi @ 4.90 GHz<br>-1.5 dBi @ 5.25 GHz<br>-1.5 dBi @ 5.85 GHz |
| VSWR                | 2.0 Max.                                                          |
| Ripple              | 0.6 dB                                                            |
| Attenuation (Min.)  | -30 dBi @ 3450 MHz<br>-20 dBi @ 11000 MHz                         |

### ■ Typical Electrical Characteristics:

| Frequency characteristics                                                                                                                                                                                                                                                    | Construction                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>CH1 LOG 10 dB/ REF 0 dB<br/>S21 1:-47.316 dB 3.450 000 000 GHz</p> <p>CH1 Markers<br/>2:-1.83800 dB<br/>5.00000 GHz<br/>3:-1.77800 dB<br/>5.25000 GHz<br/>4:-1.92500 dB<br/>5.80000 GHz<br/>5:-28.060 dB<br/>11.0000 GHz</p> <p>START 2000.000 MHz STOP 12000.000 MHz</p> | <p>The 3D view shows the filter as a small rectangular component with two I/O ports on opposite sides and two ground planes on the top and bottom surfaces.</p> |

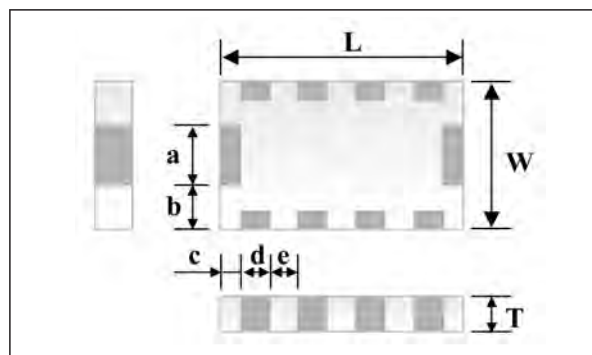
## ■ LTCC EMI Filter Array (4 Channel EMI Filter Array) - RGEMA2012080B□T

### ■ How to Order

| RG                                     | EMA                                     | 201208                                                                                                                    | 0                                                  | B                                 | □                                   | T                                                                         |
|----------------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RG: RF/Pb free device | <b>Product code</b><br>EMI filter array | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>201208 = Length20, Width 12, Thickness 8 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>B: GSM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension (mm) |
|--------|----------------|
| L      | 2.00 ± 0.10    |
| W      | 1.20 ± 0.05    |
| T      | 0.80 ± 0.10    |
| a      | 0.25 ± 0.05    |
| b      | 0.40 ± 0.05    |
| c      | 0.10 ± 0.05    |
| d      | 0.25 ± 0.05    |
| e      | 0.20 ± 0.05    |



### ■ RGEMA2012080B□T Series

| Item                          | RGEMA2012080B4T     | RGEMA2012080B5T     | RGEMA2012080B6T     |
|-------------------------------|---------------------|---------------------|---------------------|
| Attenuation (min)             | 20dB @ 800~2500 MHz | 20dB @ 800~2500 MHz | 20dB @ 800~2500 MHz |
| -3dB Cut-Off Frequency        | 400MHz +/-15%       | 500MHz +/-15%       | 600MHz +/-15%       |
| Rated Current                 | 100 mA              | 100 mA              | 100 mA              |
| Isolation                     | 20dB                | 20dB                | 20dB                |
| Capacitance @ 1MHz(Reference) | 25 pF +/-20%        | 25 pF +/-20%        | 22 pF +/-20%        |
| ESD surge capability (KV)     | >15                 | >15                 | >15                 |

### ■ Typical Electrical Characteristics:

| EMI Characteristic                                                                                                                                                                                                                                                       | Construction                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The graph plots Attenuation (dB) on the y-axis (from 0 to -60) against Frequency (GHz) on the x-axis (from 0.5 to 3.0). Four specific points are marked: m1 (500 MHz, -2.30 dB), m2 (950 MHz, -32.05 dB), m3 (1.80 GHz, -32.70 dB), and m4 (2.45 GHz, -25.92 dB).</p> | <p>The 3D view shows the physical structure of the filter array. The dimensions are 1.2 mm (width of a single element), 2.0 mm (length of a single element), and 0.8 mm (height of the array).</p> |

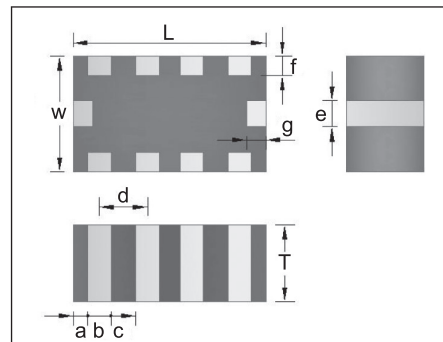
## ■ LTCC EMI Filter Array (4 Channel EMI Filter Array) - RFLVA2012080B□T

### ■ How to Order

| RG                         | LVA                                     | 201208                                                                                                                    | 0                                                  | B                                 | □                                   | T                                                                         |
|----------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>EMI filter array | <b>Dimension code</b><br>Per 2 digits of Length, Width, Thickness :<br>e.g. :<br>201208 = Length20, Width 12, Thickness 8 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>B: GSM Band | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension (mm) |
|--------|----------------|
| L      | 2.00 ± 0.10    |
| W      | 1.20 ± 0.10    |
| T      | 0.80 ± 0.10    |
| a      | 0.13 ± 0.10    |
| b      | 0.24 ± 0.12    |
| c      | 0.26 ± 0.12    |
| d      | 0.50 ± 0.12    |
| e      | 0.27 ± 0.10    |
| f      | 0.20 ± 0.15    |
| g      | 0.20 ± 0.15    |



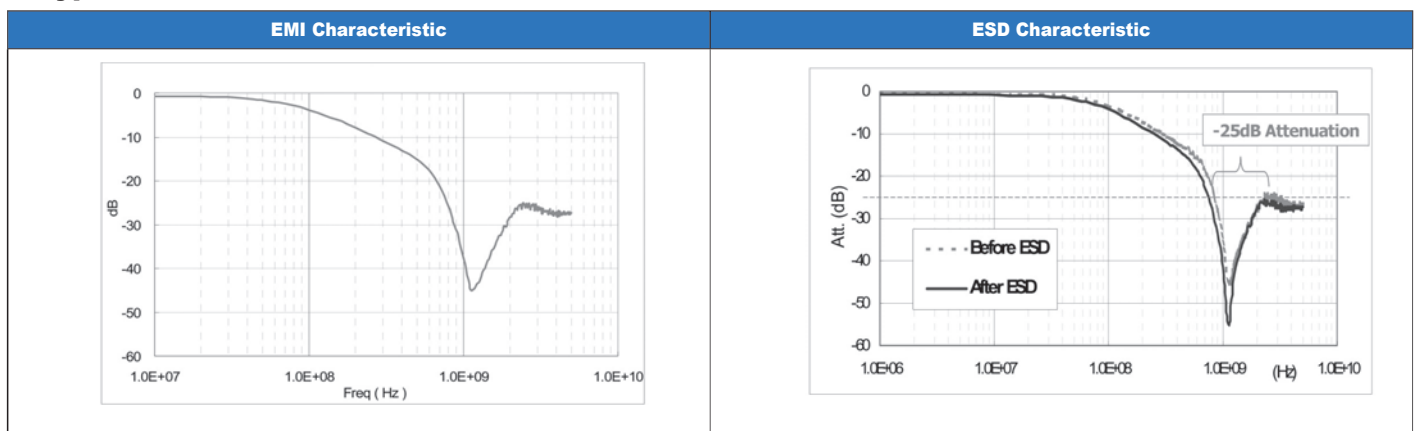
### ■ EMI Specification

| Item                          | Specification                   |
|-------------------------------|---------------------------------|
| Attenuation (min)             | 20dB @900 MHz<br>20dB @2000 MHz |
| Cut-Off Frequency (Typical)   | 120/ 220MHz ± 30%               |
| Rated Current                 | 100 mA                          |
| Operating Temperature         | -40 ~ +85 deg. c                |
| Capacitance @1MHz (Reference) | 40/ 30 pF ± 20%                 |
| DC Resistance (Reference)     | 5.0 ohm ± 20%                   |

### ■ ESD Specification

| Max. Continuous Working Voltage | Max. Clamping Voltage at Specified Current (8/20 us) | Varistor Voltage At 1mA (DC) current |      |
|---------------------------------|------------------------------------------------------|--------------------------------------|------|
| V <sub>M</sub> (DC)             | V <sub>c</sub> at 1A                                 | Min.                                 | Max. |
| 5V                              | 85V                                                  | 30V                                  | 55V  |

### ■ Typical Electrical Characteristics:



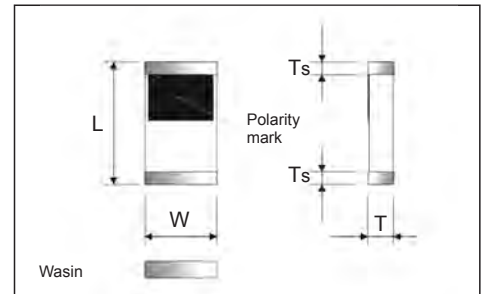
## High Frequency Inductors

### How to Order

| WL              | 160808                                                                                       | G                               | 4N7                                               | S                                               | G                               | T                  | 03                                     |
|-----------------|----------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------------|-------------------------------------------------|---------------------------------|--------------------|----------------------------------------|
| Product code    | Dimension code                                                                               | Material                        | Inductance                                        | Tolerance                                       | Specification                   | Packing            | Rated Current                          |
| WL: HF Inductor | 160808 =<br>L: 1.6mm<br>W: 0.8mm<br>T: 0.8mm<br>100505 =<br>L: 1.0mm<br>W: 0.5mm<br>T: 0.5mm | A<br>B<br>C<br>D<br>E<br>F<br>G | For Ls<10nH<br>1N0=1.0nH<br>4N7=4.7nH<br>10N=10nH | S: ±0.3nH<br>J: ±5%<br>K: ±10%<br>C: Customized | N=Normal<br>A=±0.2nH<br>G=Green | T=Reeled<br>B=Bulk | 03=250mA or 300mA<br>02=150mA or 200mA |

### Dimensions

| Symbol | WL1608 Series  | WL1005 Seeries | WL0603 Seeries |
|--------|----------------|----------------|----------------|
| L      | 1.60 ± 0.15 mm | 1.00 ± 0.10    | 0.60 ± 0.03    |
| W      | 0.80 ± 0.15 mm | 0.50 ± 0.10    | 0.30 ± 0.03    |
| T      | 0.80 ± 0.15 mm | 0.50 ± 0.10    | 0.30 ± 0.03    |
| Ts     | 0.30 ± 0.20 mm | 0.25 ± 0.10    | 0.15 ± 0.05    |



### High Frequency Inductors 1608 (0603)

| Part Number.      | L(nH) | Tolerance | Q Min<br>(100 MHz) | Typical Q @ Frequency (MHz) |     |      | SRF Typical<br>(MHz) | DC Resistance<br>Max. (Ω) | IDC (mA) |
|-------------------|-------|-----------|--------------------|-----------------------------|-----|------|----------------------|---------------------------|----------|
|                   |       |           |                    | 100                         | 800 | 1800 |                      |                           |          |
| WL160808G1N0SGT03 | 1.0   | ±0.3nH    | 8                  | 13                          | 44  | 60   | 8100                 | 0.10                      | 300      |
| WL160808G1N2SGT03 | 1.2   | ±0.3nH    | 8                  | 13                          | 44  | 60   | 8100                 | 0.10                      | 300      |
| WL160808G1N5SGT03 | 1.5   | ±0.3nH    | 8                  | 14                          | 37  | 56   | 8100                 | 0.10                      | 300      |
| WL160808G1N8SGT03 | 1.8   | ±0.3nH    | 8                  | 12                          | 37  | 55   | 8300                 | 0.10                      | 300      |
| WL160808G2N2SGT03 | 2.2   | ±0.3nH    | 8                  | 12                          | 38  | 54   | 8000                 | 0.10                      | 300      |
| WL160808G2N7SGT03 | 2.7   | ±0.3nH    | 8                  | 13                          | 38  | 53   | 7600                 | 0.10                      | 300      |
| WL160808G3N3SGT03 | 3.3   | ±0.3nH    | 8                  | 12                          | 37  | 49   | 5800                 | 0.12                      | 300      |
| WL160808G3N9SGT03 | 3.9   | ±0.3nH    | 8                  | 14                          | 44  | 62   | 5100                 | 0.14                      | 300      |
| WL160808G4N7SGT03 | 4.7   | ±0.3nH    | 8                  | 15                          | 43  | 63   | 4600                 | 0.16                      | 300      |
| WL160808G5N6SGT03 | 5.6   | ±0.3nH    | 8                  | 15                          | 45  | 59   | 4200                 | 0.18                      | 300      |
| WL160808G6N8JGT03 | 6.8   | ±5%       | 8                  | 15                          | 43  | 58   | 3700                 | 0.22                      | 300      |
| WL160808G8N2JGT03 | 8.2   | ±5%       | 8                  | 15                          | 44  | 52   | 3600                 | 0.24                      | 300      |
| WL160808G10NJGT03 | 10    | ±5%       | 12                 | 17                          | 49  | 50   | 3500                 | 0.26                      | 300      |
| WL160808G12NJGT03 | 12    | ±5%       | 12                 | 15                          | 41  | 37   | 2500                 | 0.28                      | 300      |
| WL160808G15NJGT03 | 15    | ±5%       | 12                 | 17                          | 45  | 35   | 2600                 | 0.32                      | 300      |
| WL160808G18NJGT03 | 18    | ±5%       | 12                 | 16                          | 45  | 39   | 2000                 | 0.35                      | 300      |
| WL160808G22NJGT03 | 22    | ±5%       | 12                 | 16                          | 43  | 21   | 1800                 | 0.40                      | 300      |
| WL160808G27NJGT03 | 27    | ±5%       | 12                 | 16                          | 41  | 11   | 1600                 | 0.45                      | 300      |
| WL160808G33NJGT03 | 33    | ±5%       | 12                 | 19                          | 41  | 11   | 1500                 | 0.55                      | 300      |
| WL160808G39NJGT03 | 39    | ±5%       | 12                 | 19                          | 42  | 17   | 1400                 | 0.60                      | 300      |
| WL160808G47NJGT03 | 47    | ±5%       | 12                 | 17                          | 35  | -    | 1300                 | 0.70                      | 300      |
| WL160808G56NJGT03 | 56    | ±5%       | 12                 | 19                          | 31  | -    | 1300                 | 0.75                      | 300      |
| WL160808G68NJGT03 | 68    | ±5%       | 12                 | 19                          | 26  | -    | 1150                 | 0.85                      | 300      |
| WL160808G82NJGT03 | 82    | ±5%       | 12                 | 19                          | 21  | -    | 1000                 | 0.95                      | 300      |
| WL160808GR10JGT03 | 100   | ±5%       | 12                 | 19                          | 20  | -    | 1000                 | 1.00                      | 300      |
| WL160808GR12JGT03 | 120   | ±5%       | 12                 | 19                          | 16  | -    | 950                  | 1.20                      | 300      |
| WL160808GR15JGT03 | 150   | ±5%       | 12                 | 19                          | -   | -    | 800                  | 1.50                      | 300      |
| WL160808GR18JGT03 | 180   | ±5%       | 12                 | 19                          | -   | -    | 750                  | 1.90                      | 300      |
| WL160808GR22JGT03 | 220   | ±5%       | 12                 | 18                          | -   | -    | 680                  | 2.20                      | 300      |
| WL160808GR27JGT03 | 270   | ±5%       | 12                 | 20                          | -   | -    | 600                  | 2.50                      | 300      |

## ■ High Frequency Inductors

### ■ High Frequency Inductors 1005 (0402)

| Part Number.      | L(nH) | Tolerance      | Q Min<br>(100 MHz) | Typical Q @ Frequency (MHz) |           |           | SRF Typical<br>(MHz) | DC Resistance<br>Max. (Ω) | IDC (mA) |
|-------------------|-------|----------------|--------------------|-----------------------------|-----------|-----------|----------------------|---------------------------|----------|
|                   |       |                |                    | 100                         | 800       | 1800      |                      |                           |          |
| WL100505G1N0SGT03 | 1.0   | ±0.3nH         | 8                  | 9                           | 27        | 44        | 13000                | 0.12                      | 300      |
| WL100505G1N2SGT03 | 1.2   | ±0.3nH         | 8                  | 9                           | 25        | 45        | 12000                | 0.12                      | 300      |
| WL100505G1N5SGT03 | 1.5   | ±0.3nH         | 8                  | 9                           | 23        | 43        | 10000                | 0.13                      | 300      |
| WL100505G1N8SGT03 | 1.8   | ±0.3nH         | 8                  | 9                           | 24        | 43        | 9000                 | 0.14                      | 300      |
| WL100505G2N2SGT03 | 2.2   | ±0.3nH         | 8                  | 9                           | 26        | 45        | 9000                 | 0.16                      | 300      |
| WL100505G2N7SGT03 | 2.7   | ±0.3nH         | 8                  | 9                           | 26        | 42        | 8000                 | 0.17                      | 300      |
| WL100505G3N3SGT03 | 3.3   | ±0.3nH         | 8                  | 9                           | 26        | 42        | 6500                 | 0.19                      | 300      |
| WL100505G3N9□GT03 | 3.9   | ±0.3nH<br>±10% | 8                  | 9                           | 26        | 40        | 6000                 | 0.22                      | 300      |
| WL100505G4N7□GT03 | 4.7   | ±0.3nH<br>±10% | 8                  | 9                           | 27        | 46        | 5000                 | 0.23                      | 300      |
| WL100505G5N6□GT03 | 5.6   | ±0.3nH<br>±10% | 8                  | 10                          | 28        | 40        | 4700                 | 0.27                      | 300      |
| WL100505G6N8□GT03 | 6.8   | ±5%<br>±10%    | 8                  | 10                          | 28        | 36        | 4500                 | 0.32                      | 250      |
| WL100505G8N2□GT03 | 8.2   | ±5%<br>±10%    | 8                  | 10                          | 28        | 36        | 4000                 | 0.37                      | 250      |
| WL100505G10N□GT03 | 10    | ±5%<br>±10%    | 8                  | 10                          | 27        | 33        | 3500                 | 0.42                      | 250      |
| WL100505G12N□GT03 | 12    | ±5%<br>±10%    | 8                  | 11                          | 31        | 41        | 3000                 | 0.48                      | 250      |
| WL100505G15N□GT03 | 15    | ±5%<br>±10%    | 8                  | 10                          | 27        | 33        | 2900                 | 0.53                      | 250      |
| WL100505G18N□GT02 | 18    | ±5%<br>±10%    | 8                  | 11                          | 29        | 31        | 2200                 | 0.65                      | 200      |
| WL100505G22N□GT02 | 22    | ±5%<br>±10%    | 8                  | 10                          | 26        | 15        | 2100                 | 0.80                      | 200      |
| WL100505G27N□GT02 | 27    | ±5%<br>±10%    | 8                  | 10                          | 23        | 15        | 2000                 | 0.90                      | 200      |
| WL100505G33N□GT02 | 33    | ±5%<br>±10%    | 8                  | 10                          | 22 note 1 | 24 note 2 | 1900                 | 1.00                      | 200      |
| WL100505G39N□GT02 | 39    | ±5%<br>±10%    | 8                  | 10                          | 19 note 1 | 20 note 2 | 1800                 | 1.20                      | 200      |
| WL100505G47N□GT02 | 47    | ±5%<br>±10%    | 8                  | 12                          | 22 note 1 | 20 note 2 | 1500                 | 1.30                      | 200      |
| WL100505G56N□GT02 | 56    | ±5%<br>±10%    | 8                  | 12                          | 22 note 1 | 18 note 2 | 1400                 | 1.60                      | 200      |
| WL100505G68N□GT02 | 68    | ±5%<br>±10%    | 8                  | 11                          | 18 note 1 | 10 note 2 | 1200                 | 1.90                      | 180      |
| WL100505G82N□GT02 | 82    | ±5%<br>±10%    | 8                  | 12                          | 20 note 1 | 7 note 2  | 1100                 | 2.10                      | 150      |
| WL100505GR10□GT01 | 100   | ±5%<br>±10%    | 8                  | 11                          | 18 note 1 | -         | 930                  | 2.30                      | 100      |

Note 1: at 500MHz

Note 2: at 1000MHz

For special inductance values, please contact with sales representatives of the HF Business Division.

## ■ High Frequency Inductors

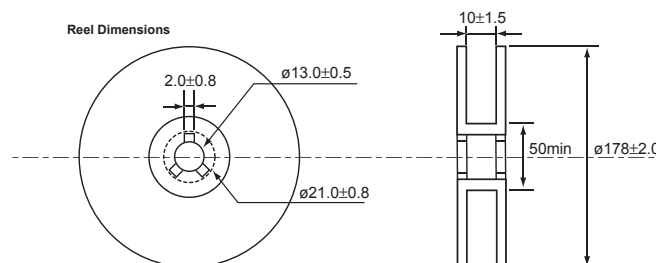
### ■ High Frequency Inductors 0603 (0201)

| Walsiv Part Number. | L(nH) | Tolerance | Q Min<br>(100 MHz) | Typical Q @ Frequency (MHz) |     |      | SRF Typical<br>(MHz) | DC Resistance<br>Max. (Ω) | IDC (mA) |
|---------------------|-------|-----------|--------------------|-----------------------------|-----|------|----------------------|---------------------------|----------|
|                     |       |           |                    | 100                         | 800 | 1800 |                      |                           |          |
| WL060303G1N0SGT03   | 1.0   | ±0.3nH    | 4                  | 13                          | 17  | 26   | 13000                | 0.12                      | 300      |
| WL060303G1N2SGT03   | 1.2   | ±0.3nH    | 4                  | 14                          | 17  | 26   | 13000                | 0.15                      | 300      |
| WL060303G1N5SGT03   | 1.5   | ±0.3nH    | 4                  | 14                          | 17  | 26   | 13000                | 0.18                      | 300      |
| WL060303G1N8SGT03   | 1.8   | ±0.3nH    | 4                  | 15                          | 17  | 28   | 10500                | 0.22                      | 300      |
| WL060303G2N2SGT03   | 2.2   | ±0.3nH    | 4                  | 15                          | 18  | 28   | 9500                 | 0.26                      | 300      |
| WL060303G2N7SGT03   | 2.7   | ±0.3nH    | 4                  | 16                          | 18  | 18   | 8500                 | 0.32                      | 300      |
| WL060303G3N3SGT03   | 3.3   | ±0.3nH    | 4                  | 16                          | 19  | 28   | 7500                 | 0.38                      | 300      |
| WL060303G3N9SGT03   | 3.9   | ±0.3nH    | 4                  | 16                          | 20  | 26   | 6800                 | 0.45                      | 300      |
| WL060303G4N7SGT03   | 4.7   | ±0.3nH    | 4                  | 16                          | 20  | 26   | 6000                 | 0.50                      | 300      |
| WL060303G5N6SGT03   | 5.6   | ±0.3nH    | 5                  | 16                          | 20  | 25   | 5500                 | 0.60                      | 300      |
| WL060303G6N8JGT03   | 6.8   | ±5%       | 5                  | 16                          | 20  | 25   | 4800                 | 0.70                      | 250      |
| WL060303G8N2JGT03   | 8.2   | ±5%       | 5                  | 16                          | 20  | 23   | 4600                 | 0.90                      | 250      |
| WL060303G10NJGT03   | 10    | ±5%       | 5                  | 16                          | 20  | 23   | 4000                 | 1.20                      | 250      |
| WL060303G12NJGT03   | 12    | ±5%       | 5                  | 16                          | 19  | 22   | 3500                 | 1.30                      | 250      |
| WL060303G15NJGT03   | 15    | ±5%       | 5                  | 15                          | 19  | 18   | 3000                 | 1.40                      | 250      |
| WL060303G18NJGT02   | 18    | ±5%       | 5                  | 15                          | 19  | 16   | 2500                 | 1.50                      | 200      |
| WL060303G22NJGT02   | 22    | ±5%       | 5                  | 14                          | 18  | 15   | 2200                 | 1.80                      | 200      |
| WL060303G27NJGT03   | 27    | ±5%       | 5                  | 13                          | 18  | 9    | 1800                 | 2.00                      | 200      |
| WL060303G33NJGT03   | 33    | ±5%       | 5                  | 13                          | 17  | 7    | 1500                 | 2.30                      | 200      |

## ■ Package

1. Reel material; Polystyrene
2. Ordering code No., Quantity, Batch No. and Walsin
3. Parts per reel:

| Size           | Quantity / reel |
|----------------|-----------------|
| WL 1608 Series | 4K pcs          |
| WL 1005 Series | 10K pcs         |
| WL 0603 Series | 10K pcs         |



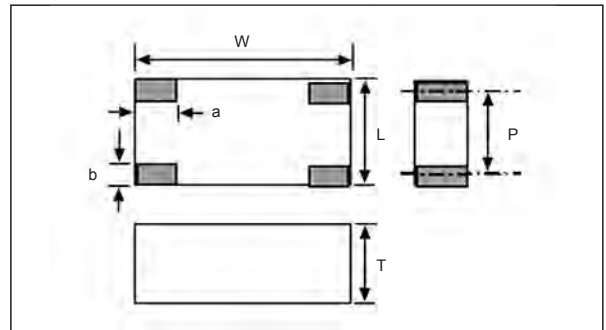
## ■ High Frequency Devices - Common Mode Filter - RFCMF1632140M2T / RFCMF1632100M3T

### ■ How to Order

| RF            | CMF                     | 163214                                                                                                             | 0                        | M                        | 2                    | T                                                       |
|---------------|-------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b> | <b>Product code</b>     | <b>Dimension code</b>                                                                                              | <b>Unit of dimension</b> | <b>Application</b>       | <b>Specification</b> | <b>Packing</b>                                          |
| RF Device     | CMF: Common Mode Filter | 163214 =<br>Length = 16<br>Width = 32<br>Thickness = 14<br>163210 =<br>Length = 16<br>Width = 32<br>Thickness = 10 | 0: 0.1 mm<br>1: 1.0 mm   | M: USB 2.0 /<br>IEEE1394 | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | RFCMF1632140M2T | RFCMF1632100M3T |
|--------|-----------------|-----------------|
| L      | 1.60 ± 0.20 mm  | 1.60 ± 0.20 mm  |
| W      | 3.20 ± 0.20 mm  | 3.20 ± 0.20 mm  |
| T      | 1.40 ± 0.20 mm  | 1.00 ± 0.20 mm  |
| P      | 1.10 ± 0.20 mm  | 1.10 ± 0.20 mm  |
| a      | 0.60 ± 0.20 mm  | 0.60 ± 0.20 mm  |
| b      | 0.50 ± 0.20 mm  | 0.50 ± 0.20 mm  |



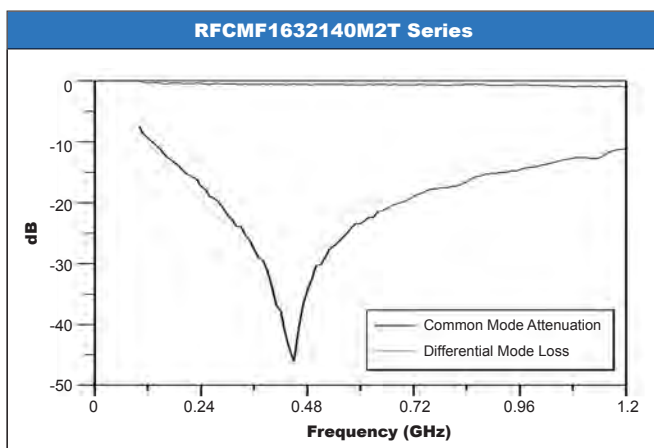
### ■ RFCMF1632140M2T Series

| Item                             | Specification             |
|----------------------------------|---------------------------|
| Common Mode Attenuation          | Min. 9 dB @ 140MHz ~ 1GHz |
| Differential Mode Insertion Loss | Max. 0.8 dB @ 240MHz      |
| DC Resistance                    | Max. 2.5Ω                 |
| Rated Current                    | 300 mA                    |
| Characteristic Impedance         | (Differential) 90Ω        |

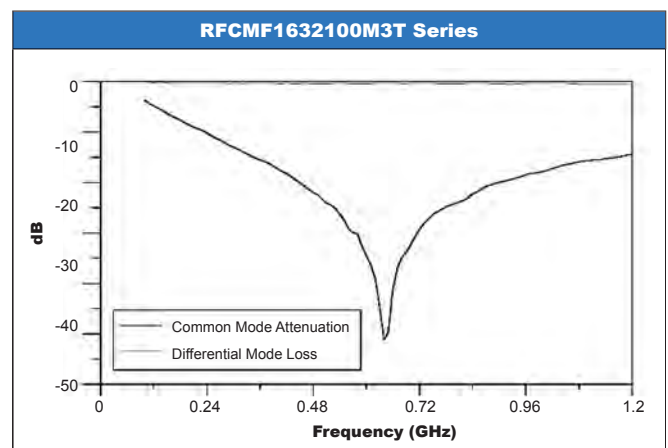
### ■ RFCMF1632100M3T Series

| Item                             | Specification             |
|----------------------------------|---------------------------|
| Common Mode Attenuation          | Min. 9 dB @ 240MHz ~ 1GHz |
| Differential Mode Insertion Loss | Max. 0.6 dB @ 240MHz      |
| DC Resistance                    | Max. 1.5Ω                 |
| Rated Current                    | 300 mA                    |
| Characteristic Impedance         | (Differential) 90Ω        |

### ■ Typical Electrical Characteristics:



### ■ Typical Electrical Characteristics:



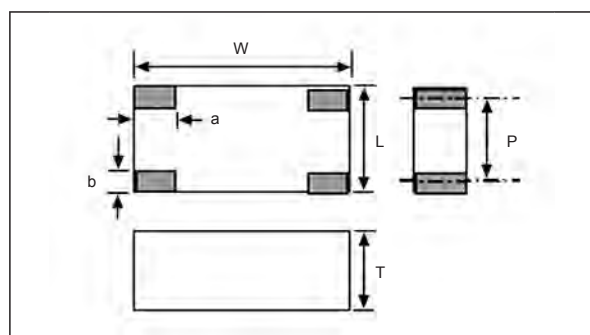
## ■ High Frequency Devices - Common Mode Filter - RFCMF1220100M□T

### ■ How to Order

| RF                         | CMF                                            | 122010                                                                           | 0                                                  | M                                              | □                                   | T                                                                         |
|----------------------------|------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>Walsin</b><br>RF Device | <b>Product code</b><br>CMF: Common Mode Filter | <b>Dimension code</b><br>122010 =<br>Length = 12<br>Width = 20<br>Thickness = 10 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>M: USB 2.0 /<br>IEEE1394 | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

| Symbol | Dimension      |
|--------|----------------|
| L      | 1.20 ± 0.20 mm |
| W      | 2.00 ± 0.20 mm |
| T      | 1.00 ± 0.20 mm |
| P      | 0.80 ± 0.10 mm |
| a      | 0.45 ± 0.20 mm |
| b      | 0.40 ± 0.20 mm |



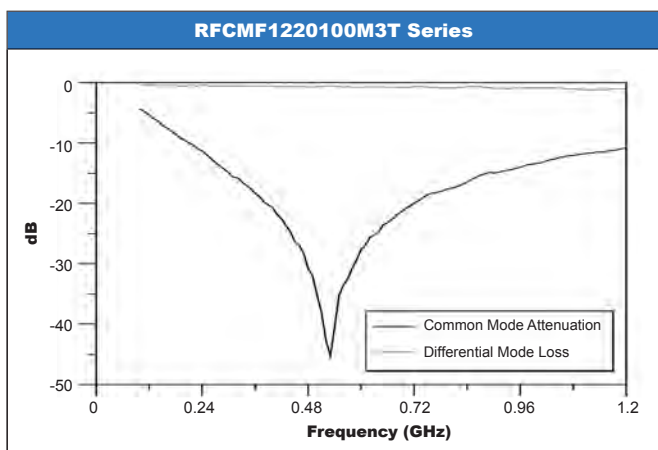
### ■ RFCMF1220100M3T Series

| Item                             | Specification             |
|----------------------------------|---------------------------|
| Common Mode Attenuation          | Min. 9 dB @ 240MHz ~ 1GHz |
| Differential Mode Insertion Loss | Max. 0.6 dB @ 240MHz      |
| DC Resistance                    | Max. 1.5Ω                 |
| Rated Current                    | 300 mA                    |
| Characteristic Impedance         | (Differential) 90Ω        |

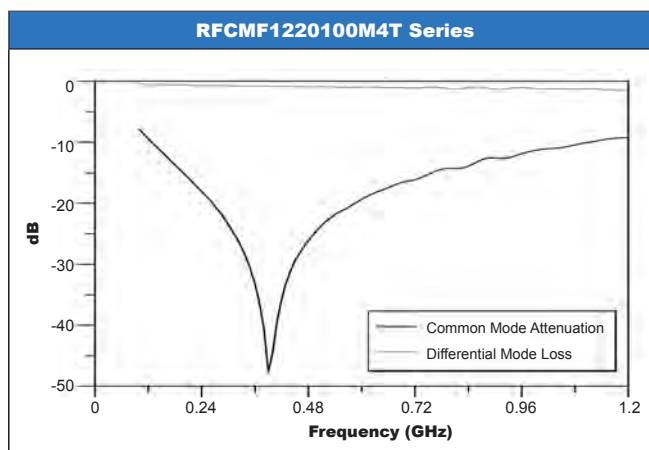
### ■ RFCMF1220100M4T Series

| Item                             | Specification             |
|----------------------------------|---------------------------|
| Common Mode Attenuation          | Min. 9 dB @ 130MHz ~ 1GHz |
| Differential Mode Insertion Loss | Max. 1.0 dB @ 240MHz      |
| DC Resistance                    | Max. 2.5Ω                 |
| Rated Current                    | 200 mA                    |
| Characteristic Impedance         | (Differential) 90Ω        |

### ■ Typical Electrical Characteristics:



### ■ Typical Electrical Characteristics:



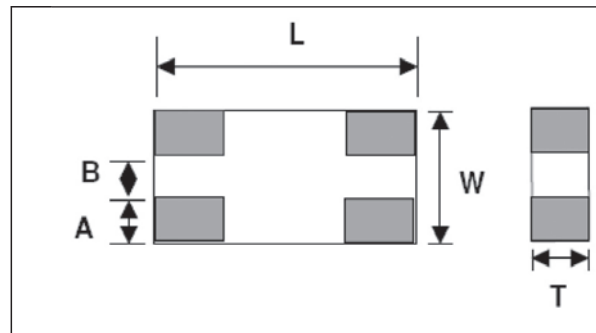
## ■ High Frequency Devices - Common Mode Filter - RGCMF1220080M5T

### ■ How to Order

| RG                        | CMF                        | 122008                                                 | 0                        | M                        | 5                    | T                                                       |
|---------------------------|----------------------------|--------------------------------------------------------|--------------------------|--------------------------|----------------------|---------------------------------------------------------|
| <b>Walsin</b>             | <b>Product code</b>        | <b>Dimension code</b>                                  | <b>Unit of dimension</b> | <b>Application</b>       | <b>Specification</b> | <b>Packing</b>                                          |
| RG: RF /Pd<br>free device | CMF: Common Mode<br>Filter | 122008 =<br>Length = 12<br>Width = 20<br>Thickness = 8 | 0: 0.1 mm<br>1: 1.0 mm   | M: USB 2.0 /<br>IEEE1394 | Design Code          | T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### ■ Dimensions

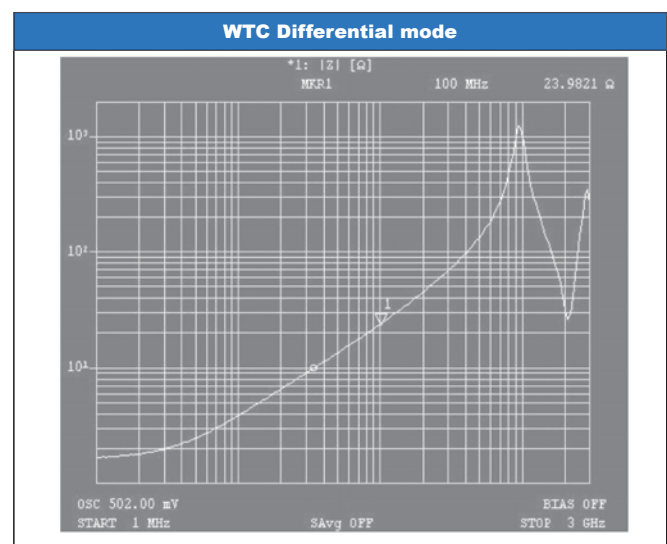
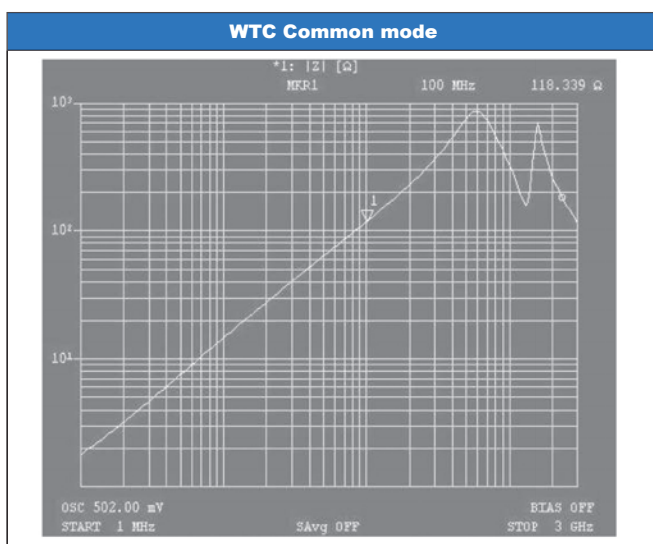
| Symbol | Dimension      |
|--------|----------------|
| L      | 2.00 ± 0.10 mm |
| W      | 1.25 ± 0.10 mm |
| T      | 0.80 ± 0.10 mm |
| A      | 0.35 ± 0.10 mm |
| B      | 0.55 ± 0.10 mm |



### ■ RGCMF1220080M5T Series

| Item                     | Specification         |
|--------------------------|-----------------------|
| Common Mode Attenuation  | 120 ohm ±20% @ 100MHz |
| DC Resistance            | Max. 1.5Ω             |
| Rated Current            | 200 mA                |
| Characteristic Impedance | 90 Ω (Typical)        |
| Operating Temperature    | -40°C ~ 85°C          |

### ■ Typical Electrical Characteristics:



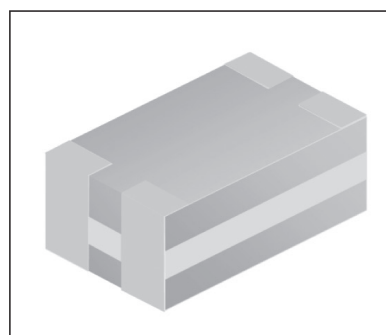
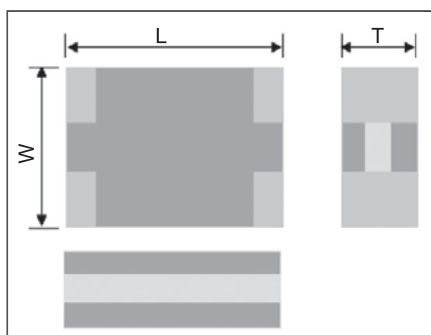
## High Frequency Devices - Common Mode Filter - RFCMF1210080M□T

### How to Order

| RF                          | CMF                                            | 121008                                                                          | 0                                                  | M                                              | □                                   | T                                                                         |
|-----------------------------|------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------|
| <b>WalGin</b><br>RF: Device | <b>Product code</b><br>CMF: Common Mode Filter | <b>Dimension code</b><br>121008 =<br>Length = 12<br>Width = 10<br>Thickness = 8 | <b>Unit of dimension</b><br>0: 0.1 mm<br>1: 1.0 mm | <b>Application</b><br>M: USB 2.0 /<br>IEEE1394 | <b>Specification</b><br>Design Code | <b>Packing</b><br>T=7" Reeled<br>G=10" Reeled<br>B=Bulk<br>X: SFC product |

### Dimensions

| Symbol | RFCMF120080M1T | RFCMF1210080M2T |
|--------|----------------|-----------------|
| L      | 1.27 ± 0.1 mm  | 1.28 ± 0.1 mm   |
| W      | 1.01 ± 0.1 mm  | 1.02 ± 0.1 mm   |
| T      | 0.79 ± 0.1 mm  | 0.81 ± 0.1 mm   |



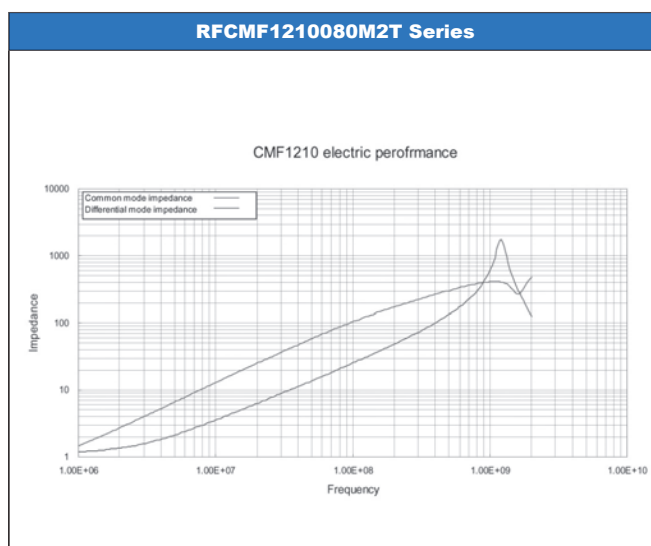
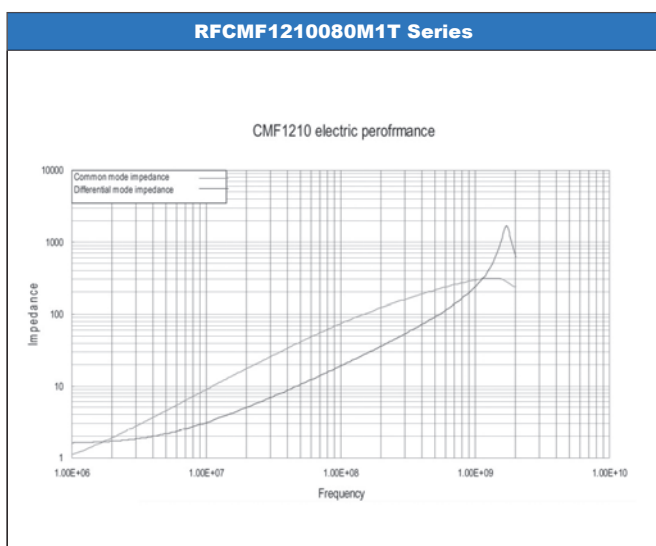
### RFCMF1210080M1T Series

| Item                     | Specification        |
|--------------------------|----------------------|
| Characteristic Impedance | 90 ohm               |
| DC Resistance            | 0.85 ohm (max.)      |
| Rated Current            | 100 mA               |
| Common Mode Attenuation  | 70 ohm+/-20%@ 100HMZ |
| Operating Temperature    | -40°C ~ +85°C        |

### RFCMF1210080M2T Series

| Item                     | Specification         |
|--------------------------|-----------------------|
| Characteristic Impedance | 90 ohm                |
| DC Resistance            | 1.0 ohm (max.)        |
| Rated Current            | 100 mA                |
| Common Mode Attenuation  | 100 ohm+/-20%@ 100HMZ |
| Operating Temperature    | -40°C ~ +85°C         |

### Impedance Vs. Frequency:



## ■ Multilayer Chip Varistor (MLV) - VZ Series & VH Series

### ■ How to Order

| VH                                                                                                    | 0402                                                                                                                                  | M                          | 050                                                                                        | C                                                                    | G                  | T                  | 330                                                                                                                                                                                                               | -               |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Type code                                                                                             | Chip Size                                                                                                                             | Style                      | Rated Voltage                                                                              | Cap. Tolerance                                                       | Termination        | Packing            | Cap. code (pf)                                                                                                                                                                                                    | Special Request |
| V: Walsin ZnO Varistor<br>H: High Speed and RF, and Special Capacitance Concern<br>Z: General Purpose | 0402, 0603<br>0805, 1206<br>Code is L x W (in inches)<br>0402 = 0.4 x 0.2<br>0603 = 0.6 x 0.3<br>0805 = 0.8 x 0.5<br>1206 = 1.2 x 0.6 | M: Multilayer<br>A: Array* | 050: 5.5Vdc<br>090: 9.0Vdc<br>120: 12.0Vdc<br>140: 14.0Vdc<br>180: 18.0Vdc<br>300: 30.0Vdc | A: Typ. Capacitance for Z series<br>C: Max. capacitance for H series | G : Green Material | T=Reeled<br>B=Bulk | This item is only for H Series.<br>Two significant digits followed by number of Zeros<br>3R0=3pF when C < 10pF<br>330=33x10 <sup>0</sup> =33pF<br>101=10x10 <sup>1</sup> =100pF<br>102=10x10 <sup>2</sup> =1000pF |                 |

\*Array: Please contact sales for availability

### ■ Introduction - Plated & Lead-free Termination

High Speed ESD Voltage Suppressor is an advanced series of Walsin's Multilayer Chip Varistor (MLV). Nowadays, more and more communication devices become compact and apply denser and higher frequency circuits inside. Protection against the electronic static discharge (ESD) generated from human body transient voltage surge is more important when downsize of high-speed transistor makes its vulnerability to ESD and surge. Walsin's High Speed ESD Voltage Suppressor provides protection from ESD and EFT in high-speed data line and radio frequency (RF) circuits. Also, if capacitance of MLV is a concern to circuit designers, Walsin MLV H Series would supply a solution, MLV with specified capacitance and range. It is compatible with modern reflow and wave soldering procedures. We would give you a solution to transient over voltage and ESD protection to your products.

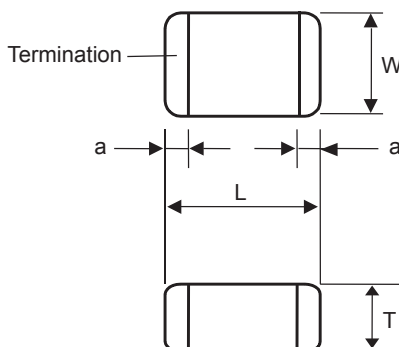
### ■ Features

- Multilayer Fabrication Technology
- Small size (0402 & 0603)
- -55°C to 125°C Operating Temperature Range
- Operating Voltage Range V<sub>M</sub>(DC) at 5.5V ~ 85V
- Able to withstand ESD test of IEC-61000-4-2
- Bi-directional Clamping characteristic
- Standard / Low / Customized Capacitance Types Available

### ■ Applications

- Protection of Cellular Phones, PDA, High Speed Data Line...etc.
- ESD Protection for Components Sensitive to IEC 61000-4-2, Provides Circuit Board Transient Voltage Protection for Transistors.
- Protection of Video & Audio ports.

### ■ Dimensions



Unit: mm

| Size | 0402        | 0603        | 0805        | 1206                          |
|------|-------------|-------------|-------------|-------------------------------|
| L    | 1.00 ± 0.10 | 1.60 ± 0.15 | 2.00 ± 0.20 | 3.20 ± 0.20                   |
| W    | 0.50 ± 0.10 | 0.80 ± 0.15 | 1.25 ± 0.20 | 1.60 ± 0.20                   |
| T    | 0.50 ± 0.10 | 0.80 ± 0.15 | 0.80 ± 0.20 | 0.80 ± 0.10*<br>1.10 ± 0.20** |
| a    | 0.25 ± 0.15 | 0.35 ± 0.15 | 0.50 ± 0.20 | 0.65 ± 0.25                   |

Note: \*Means VZ1206 5.5Vdc~22Vdc items

\*\*Means VZ1206 26Vdc~85Vdc items

## ■ Multilayer Chip Varistor (MLV) - VZ Series & VH Series

### ■ Quick Reference Specifications

#### VH Series

| Symbol           | Maximum Ratings                    |                                                 |                                                     | Specifications                      |                          |                        |          |
|------------------|------------------------------------|-------------------------------------------------|-----------------------------------------------------|-------------------------------------|--------------------------|------------------------|----------|
| Part Number      | Maximum Continuous Working Voltage | Maximum Non-Repetitive Surge Energy (10/1000μs) | Max. Clamping Voltage at Specified Current (8/20μs) | Nominal Voltage at 1mA (DC) Current |                          | Max. Capacitance @1MHz |          |
|                  | V <sub>M</sub> (DC)                | W <sub>TM</sub>                                 | V <sub>C</sub>                                      | V <sub>N</sub> (DC) Min.            | V <sub>N</sub> (DC) Max. | C                      |          |
|                  | (V)                                | (J)                                             | (V)                                                 | (V)                                 | (V)                      | (pF)                   | %        |
| VH0402M050CGT5R0 | 5                                  | 0.05                                            | 55 at 1A                                            | 20                                  | 30                       | 5                      | +80/-20  |
| VH0402M050CGT100 | 5                                  | 0.05                                            | 60 at 1A                                            | 24                                  | 36                       | 10                     | ± 30     |
| VH0402M050CGT220 | 5                                  | 0.05                                            | 45 at 1A                                            | 15                                  | 25                       | 22                     | ± 30     |
| VH0402M050CGT330 | 5                                  | 0.05                                            | 45 at 1A                                            | 15                                  | 25                       | 33                     | ± 30     |
| VH0402M050CGT560 | 5                                  | 0.05                                            | 45 at 1A                                            | 15                                  | 25                       | 56                     | ± 30     |
| VH0402M050CGT101 | 5                                  | 0.05                                            | 30 at 1A                                            | 11                                  | 21                       | 100                    | ± 30     |
| VH0402M120CGT5R0 | 12                                 | 0.05                                            | 85 at 1A                                            | 33                                  | 50                       | 5                      | +80/-20  |
| VH0402M120CGT100 | 12                                 | 0.05                                            | 70 at 1A                                            | 27                                  | 42                       | 10                     | ± 30     |
| VH0402M120CGT220 | 12                                 | 0.05                                            | 55 at 1A                                            | 20                                  | 30                       | 22                     | ± 30     |
| VH0402M120CGT330 | 12                                 | 0.05                                            | 55 at 1A                                            | 20                                  | 30                       | 33                     | ± 30     |
| VH0402M120CGT560 | 12                                 | 0.05                                            | 55 at 1A                                            | 20                                  | 30                       | 56                     | ± 30     |
| VH0402M120CGT101 | 12                                 | 0.05                                            | 55 at 1A                                            | 20                                  | 30                       | 100                    | ± 30     |
| VH0402M240CGT0R8 | 24                                 | 0.05                                            | 200 at 1A                                           | 100                                 | 150                      | 0.8~1                  | ± 30     |
| VH0402M240CGT2R5 | 24                                 | 0.05                                            | 200 at 1A                                           | 100                                 | 150                      | 2~4                    | ± 30     |
| VH0603M050CGT5R0 | 5                                  | 0.1                                             | 55 at 1A                                            | 20                                  | 30                       | 5                      | +80/-20% |
| VH0603M050CGT100 | 5                                  | 0.1                                             | 60 at 1A                                            | 24                                  | 36                       | 10                     | +/- 30%  |
| VH0603M050CGT220 | 5                                  | 0.1                                             | 45 at 1A                                            | 15                                  | 25                       | 22                     | +/- 30%  |
| VH0603M050CGT330 | 5                                  | 0.1                                             | 45 at 1A                                            | 15                                  | 25                       | 33                     | +/- 30%  |
| VH0603M050CGT560 | 5                                  | 0.1                                             | 45 at 1A                                            | 15                                  | 25                       | 56                     | +/- 30%  |
| VH0603M050CGT101 | 5                                  | 0.1                                             | 30 at 1A                                            | 11                                  | 21                       | 100                    | +/- 30%  |
| VH0603M120CGT5R0 | 12                                 | 0.1                                             | 85 at 1A                                            | 33                                  | 50                       | 4~9                    | +80/-20% |
| VH0603M120CGT100 | 12                                 | 0.1                                             | 70 at 1A                                            | 27                                  | 42                       | 10                     | +/- 30%  |
| VH0603M120CGT220 | 12                                 | 0.1                                             | 55 at 1A                                            | 20                                  | 30                       | 22                     | +/- 30%  |
| VH0603M120CGT330 | 12                                 | 0.1                                             | 55 at 1A                                            | 20                                  | 30                       | 33                     | +/- 30%  |
| VH0603M120CGT560 | 12                                 | 0.1                                             | 55 at 1A                                            | 20                                  | 30                       | 56                     | +/- 30%  |
| VH0603M120CGT820 | 12                                 | 0.1                                             | 55 at 1A                                            | 20                                  | 30                       | 82                     | +/- 30%  |
| VH0603M120CGT101 | 12                                 | 0.1                                             | 55 at 1A                                            | 20                                  | 30                       | 100                    | +/- 30%  |
| VH0603M240CGT0R8 | 24                                 | 0.1                                             | 200 at 1A                                           | 100                                 | 150                      | 0.8~1                  | +/- 30%  |
| VH0603M240CGT2R5 | 24                                 | 0.1                                             | 200 at 1A                                           | 100                                 | 150                      | 2~4                    | +/- 30%  |

| SPECIFICATIONS    |                                    |                             |                                         |                                  |                             |                 |
|-------------------|------------------------------------|-----------------------------|-----------------------------------------|----------------------------------|-----------------------------|-----------------|
| Part Number       | Maximum Continuous Working Voltage | Typical ESD Trigger Voltage | Typical ESD clamping Voltage after 30ns | Leakage Current @V <sub>DC</sub> | Minimum ESD pulse withstand | Capacitance     |
|                   | V <sub>M</sub> (DC)                | V <sub>T</sub>              | V <sub>clamp</sub>                      | μA                               | Times                       | @1MHz           |
|                   | (V)                                | (V)                         | (V)                                     | (V)                              |                             | Cp (pF)         |
| VH0402M060CGT0R20 | 6                                  | 150                         | 30                                      | 0.05                             | >2000                       | 0.2-0.1/+0.5    |
| VH0402M240CGT0R05 | 24                                 | 350                         | 50                                      | 0.001                            | >2000                       | 0.05+0.05/-0.05 |
| VH0603M060CGT0R20 | 6                                  | 150                         | 30                                      | 0.05                             | >2000                       | 0.2-0.1/+0.5    |
| VH0603M240CGT0R05 | 24                                 | 350                         | 50                                      | 0.001                            | >2000                       | 0.05+0.05/-0.05 |

## ■ Multilayer Chip Varistor (MLV) - VZ Series &amp; VH Series

## ■ Quick Reference Specifications

## VZ Series

| Symbol        | Maximum Ratings                    |                     |                                                     |                                                       |                                                           | Specifications                      |                          |                        |
|---------------|------------------------------------|---------------------|-----------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------|-------------------------------------|--------------------------|------------------------|
| Part Number   | Maximum Continuous Working Voltage |                     | Maximum Non-Repetitive Surge Current (8/20 $\mu$ s) | Maximum Non-Repetitive Surge Energy (10/1000 $\mu$ s) | Max. Clamping Voltage at Specified Current (8/20 $\mu$ s) | Nominal Voltage at 1mA (DC) Current |                          | Max. Capacitance @1KHz |
|               | V <sub>M</sub> (DC)                | V <sub>M</sub> (AC) | I <sub>TM</sub>                                     | W <sub>TM</sub>                                       | V <sub>c</sub>                                            | V <sub>N</sub> (DC) Min.            | V <sub>N</sub> (DC) Max. | C                      |
|               | (V)                                | (V)                 | (A)                                                 | (J)                                                   | (V)                                                       | (V)                                 | (V)                      | (pF)                   |
| VZ0402M050AGT | 5.5                                | 4                   | 20                                                  | 0.05                                                  | 20 at 1A                                                  | 8.0                                 | 11.0                     | 295                    |
| VZ0402M090AGT | 9                                  | 6                   | 20                                                  | 0.05                                                  | 23 at 1A                                                  | 10.2                                | 13.8                     | 190                    |
| VZ0402M110AGT | 11                                 | 8                   | 20                                                  | 0.05                                                  | 25 at 1A                                                  | 12.75                               | 17.25                    | 160                    |
| VZ0402M140AGT | 14                                 | 11                  | 20                                                  | 0.05                                                  | 30 at 1A                                                  | 15.3                                | 20.7                     | 135                    |
| VZ0402M180AGT | 18                                 | 14                  | 20                                                  | 0.05                                                  | 40 at 1A                                                  | 21.6                                | 26.4                     | 93                     |
| VZ0603M050AGT | 5.5                                | 4                   | 30                                                  | 0.1                                                   | 20 at 1A                                                  | 8.0                                 | 11.0                     | 800                    |
| VZ0603M090AGT | 9                                  | 6                   | 30                                                  | 0.1                                                   | 23 at 1A                                                  | 10.2                                | 13.8                     | 680                    |
| VZ0603M140AGT | 14                                 | 11                  | 30                                                  | 0.1                                                   | 30 at 1A                                                  | 15.3                                | 20.7                     | 350                    |
| VZ0603M180AGT | 18                                 | 14                  | 30                                                  | 0.1                                                   | 39 at 1A                                                  | 21.6                                | 26.4                     | 270                    |
| VZ0603M260AGT | 26                                 | 20                  | 30                                                  | 0.1                                                   | 54 at 1A                                                  | 29.7                                | 36.3                     | 200                    |
| VZ0603M300AGT | 30                                 | 25                  | 30                                                  | 0.1                                                   | 65 at 1A                                                  | 35.1                                | 42.9                     | 120                    |
| VZ0603M380AGT | 38                                 | 30                  | 30                                                  | 0.1                                                   | 77 at 1A                                                  | 42.3                                | 51.7                     | 100                    |
| VZ0805M050AGT | 5.5                                | 4                   | 80                                                  | 0.1                                                   | 20 at 1A                                                  | 8.0                                 | 11.0                     | 1600                   |
| VZ0805M090AGT | 9                                  | 6                   | 80                                                  | 0.1                                                   | 23 at 1A                                                  | 10.2                                | 13.8                     | 1180                   |
| VZ0805M140AGT | 14                                 | 10                  | 100                                                 | 0.2                                                   | 35 at 1A                                                  | 15.3                                | 20.7                     | 1180                   |
| VZ0805M180AGT | 18                                 | 14                  | 100                                                 | 0.2                                                   | 39 at 1A                                                  | 21.6                                | 26.4                     | 550                    |
| VZ0805M220AGT | 22                                 | 17                  | 100                                                 | 0.2                                                   | 44 at 1A                                                  | 24.3                                | 29.7                     | 400                    |
| VZ0805M260AGT | 26                                 | 20                  | 100                                                 | 0.3                                                   | 54 at 1A                                                  | 29.7                                | 36.3                     | 350                    |
| VZ0805M300AGT | 30                                 | 25                  | 100                                                 | 0.3                                                   | 65 at 1A                                                  | 35.1                                | 42.9                     | 310                    |
| VZ0805M380AGT | 38                                 | 30                  | 100                                                 | 0.3                                                   | 77 at 1A                                                  | 42.3                                | 51.7                     | 280                    |
| VZ0805M450AGT | 45                                 | 35                  | 80                                                  | 0.3                                                   | 90 at 1A                                                  | 50.4                                | 61.6                     | 195                    |
| VZ1206M050AGT | 5.5                                | 4                   | 100                                                 | 0.2                                                   | 20 at 1A                                                  | 8.0                                 | 11.0                     | 3200                   |
| VZ1206M140AGT | 14                                 | 11                  | 100                                                 | 0.3                                                   | 30 at 1A                                                  | 15.3                                | 20.7                     | 1150                   |
| VZ1206M180AGT | 18                                 | 14                  | 100                                                 | 0.3                                                   | 38 at 1A                                                  | 21.6                                | 26.4                     | 900                    |
| VZ1206M220AGT | 22                                 | 17                  | 100                                                 | 0.4                                                   | 44 at 1A                                                  | 24.3                                | 29.7                     | 840                    |
| VZ1206M260AGT | 26                                 | 20                  | 100                                                 | 0.5                                                   | 54 at 1A                                                  | 29.7                                | 36.3                     | 490                    |
| VZ1206M300AGT | 30                                 | 25                  | 100                                                 | 0.6                                                   | 65 at 1A                                                  | 35.1                                | 42.9                     | 440                    |
| VZ1206M380AGT | 38                                 | 30                  | 100                                                 | 0.7                                                   | 77 at 1A                                                  | 42.3                                | 51.7                     | 400                    |
| VZ1206M450AGT | 45                                 | 35                  | 100                                                 | 0.8                                                   | 90 at 1A                                                  | 50.4                                | 61.6                     | 310                    |
| VZ1206M560AGT | 56                                 | 40                  | 100                                                 | 1.0                                                   | 110 at 1A                                                 | 61.2                                | 74.8                     | 280                    |
| VZ1206M650AGT | 65                                 | 50                  | 100                                                 | 0.5                                                   | 135 at 1A                                                 | 73.8                                | 90.2                     | 240                    |
| VZ1206M850AGT | 85                                 | 60                  | 100                                                 | 0.6                                                   | 165 at 1A                                                 | 90.0                                | 110                      | 160                    |





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