Vertical Collinear Antenna

2400-2500 MHz

CD2405

CD2405

The CD2405 is a high performance 4.5dBi meander style collinear base station antenna which covers from 2400MHz to 2500Mhz.

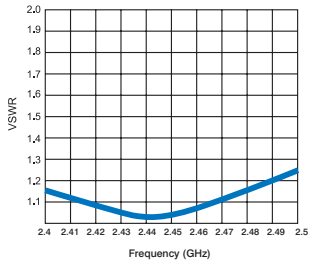
The patented PCB based design delivers superior pattern stability across the entire band, avoiding inherent pattern tilting common in more traditional collinear designs.

This antenna incorporates an N male connector with internal integrated PCB launch. It is covered with black fibreglass radome, matching black cap and delrin connector housing making it ideal for outdoor application.

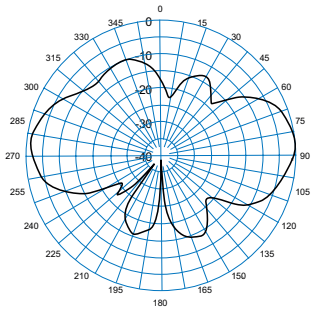
- Tightly controlled radiation patterns for optimum coverage
- Integrated N male connector at base
- PCB design for optimum RF pattern stability
- Small unobtrusive design

Australian Patent Number 2003255049, USA Patent No. 6909403, European Patent No. 03 023406.6, Chinese Patent No. 200310100548.5, and Indian Patent No. 844/CHE/2003

Typical VSWR response (CD2405)



CD2405 - E Plane



Electrical

Model Number	CD2405
Frequency *MHz*	2400 - 2500
Nominal Gain *dBi*	4.5
Tuned Bandwidth *MHz*	Full
VSWR (Return Loss)	<1.5:1 (14dB)
Polarisation	Vertical
Vertical Beamwidth *degrees*	33
Horizontal Beamwidth *degrees*	360
Nominal Impedance Ω	50
Power Rating *W*	5

Mechanical

Model Number		CD2405
Connector/Termination		Integrated N male
Mounting Area		Integrated N male
Suggested Clamping/Finish		Bulkhead N female/black fibreglass radome and black Delrin connector housing
Overall length *mm*		205
Weight *kg*		0.1
Wind Loading @ 160 km/h *N*	*no ice*	4
	with ice	11
Max. torque at clamps @ 160 km/h *Nm*	*no ice*	1
	with ice	3
Projected Area *cm²*	*no ice*	35
	with ice	97

MobileMark
antenna solutions

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www.mobilemark.com

700 MHz Surface, Mag-Mount & Glass Mount

RM-WLF Series

MMF3-700 Series

MGRM-WLF Series

Direct N Jack (Female)

- Rugged construction
- Wideband RM models operate on 700, GSM, AWS, 2.4 WiFi & 2.6 WiMAX
- Surface and mag-mount models handle up to 35 watts
- Window Mount model installs easily to window with 3M tape

The RM-WLF wideband Series are 3 dBi gain broadband antennas. A ground plane is recommended for best performance. These antennas will operate over the entire 694-894 MHz spectrum, along with 1.7-2.7 GHz high frequency spectrum.

The RM-WLF requires a 5/8" hole (16 mm) for mounting and is out-fitted with a gasket for weather sealing. The RM-WLF-DN is available with a direct N Female connector.

A magnetic mount version is available in the MGRM-WLF. This model provides all the same performance as the RM-WLF, with a powerful magnet for less permanent installations.

For glass mounting, Mobile Mark's MMF3-700 antennas provide a no-hole installation. This model has two mounting/transfer plates that attach to the inside/outside. They attach using field proven 3M double sided tape.

The short flexible whip on the MMF is fixed in the vertical position and never needs to be removed.

Model #	Frequency	Description
RM-WLF-1C-BLK-12	694-894 MHz & 1.7-2.7 GHz	Body Mount
RM-WLF-DN-BLK	694-894 MHz & 1.7-2.7 GHz	Direct N Jack (Female)
MGRM-WLF-1C-BLK-120	694-894 MHz & 1.7-2.7 GHz	Mag Mount
Color options available for above models WHT-White or BLK-Black		
MMF3-700-1C-BLK-180	694-960 MHz	Glass Mount
RM-MK	Optional pipe mounting kit	
NT-MK	Universal wall/pipe mounting kit	

Specifications

Frequency:	See above
Gain:	3 dBi peak gain
VSWR:	2:1 max over range
Nominal Impedance:	50 ohms
Maximum Power:	
RM & MGRM	35 Watts
MMF	10 watts
Antenna Size/Mount:	
RM Series	1.75"D x 3"H, 5/8" hole required (45 mm x 76 mm, 16 mm hole)
RM-WLF-DN	1.75"D x 3"H x .63" hole (45 mm x 76 mm, 16 mm hole)
MGRM Mag	2.65" base diameter x 3.62" high (67 mm x 92 mm)
MMF3-700	2" dia. Mount, 3.75"L Whips (51 mm dia, 95 mm)

Case Material:	RM, MGRM: ASA; MM3: ABS
RM Stud Depth:	Mount to 1/2" metal (12.7 mm)
Operating Temp:	-40° to +85° C
Hardware Supplied:	
RM Stud Mount	Locknut and gasket
MMF Glass Mount	3M tape
Cable:	
RM-WLF-1C	1 ft RG-58 (305 mm)
MGRM Mag	10 ft RG-58 (3 meters)
MMF3-700	15ft RG-58 (4.5 meters)
Standard Connector:	SMA Plug (Male)
DN Connector:	Direct N Jack (Female)
Shock & Vibration:	
RM & MGRM	EN 61373, IEEE 1478, MIL 810G TIA-329.2-C
Dust/Water Ingress:	RM:IP67, MGRM:IPx5

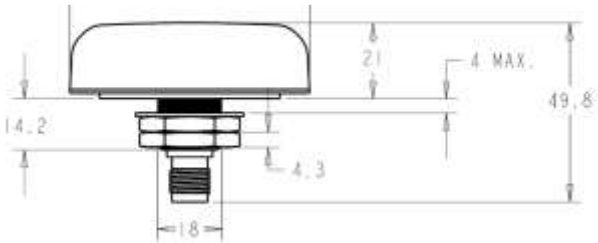
TW3320/TW3322 Wideband GPS/GLONASS Antenna

The TW3320/TW3322 is a high performance antenna covering the GPS L1, GLONASS L1 and SBAS (WAAS, EGNOS & MSAS) frequency band (1575 to 1606 MHz). It features a patch element with 40% wider bandwidth than hitherto available in this format. Unlike its competitors, both GPS-L1 and GLONASS signals are included in the 1dB received power bandwidth.

The TW3320/TW3322 has a two stage Low Noise Amplifier with a mid-section SAW. An optional tight pre-filter is available with part number TW3322 to protect against saturation by high level sub-harmonics and L-Band signals.

The TW3320/3322 is housed in a permanent mount industrial-grade weather-proof enclosure. Two options for pole mounting are available an L-bracket (P/N#23-0040-0) or a pipe mount (P/N#23-0065-0)

TW3320/TW3322
Shown with Low Profile Radome. Conical Radome also available



Applications

- Cost Sensitive Mission Critical Positioning
- Military & Security
- Fleet Management & Asset Tracking

Features

- Low noise LNA: 1 dB typical (TW3320)
- High rejection mid-section SAW filter
- Available Pre-filter (TW3322)
- High gain: 28 dB typ.
- Wide voltage input range: 2.5 to 16 VDC
- IP67 weather proof housing
- Low Power: 9mA typ.

Benefits

- Bandwidth fully Includes GPS-L1 & GLONASS
- Excellent multipath rejection
- Increased system accuracy
- Excellent signal to noise ratio
- Great out of band signal rejection
- Ideal for harsh environments
- RoHS and REACH compliant

TW3320/TW3322 Wideband GPS/GLONASS Antenna

Specifications

Antenna

Architecture	Wideband Single Feed Patch
1 dB Bandwidth	31 MHz
10dB Return Loss Bandwidth	45MHz
Antenna Gain (with 100mm ground plane)	4.5 dBic
Axial Ratio	<4dB @ 1590MHz, 8 dB typical at band edges

Electrical

Architecture	TW3320	LNA stage 1 -> SAW filter-> LNA stage 2
	TW3322	SAW Prefilter ->LNA stage 1 -> SAW filter-> LNA stage 2
Filtered LNA Frequency Bandwidth		1574 to 1606 MHz
Polarization		RHCP
Gain (1575.42 to 1606 MHz)		28dB min., TW3320; 26dB, TW3322,
Gain flatness		+/- 2 dB, 1575 to 1606 MHz
Out-of-Band Rejection		<1500 MHz >35 dB
		<1550 MHz >25 dB
		>1640 MHz >35 dB
VSWR (at LNA output)		<1.5:1
Noise Figure		1 dB typ., TW3320; 2.5dB typ., TW3322
Supply Voltage Range (over coaxial cable)		+2.5 to 16 VDC nominal
Supply Current		9 mA typ
ESD Circuit Protection		15 KV air discharge

Mechanicals & Environmental

Mechanical Size	66.5 mm dia. x 21 mm H
Operating Temperature Range	40 to +85 °C
Enclosure	Radome: EXL9330, Base: Zamak White Metal
Weight	150 g
Environmental	IP67 and RoHS compliant
Shock	Vertical axis: 50 G, other axes: 30 G
Vibration	3 axis, sweep = 15 min, 10 to 200 Hz sweep: 3 G
Salt Spray	MIL-STD-810 Section 509.4

Ordering Information

TW3320 – GPS/GLONASS antenna	33-3320-xx-yy-zzzz
TW3322 – GPA/GLONASS antenna w/pre-filter	33-3322-xx-yy-zzzz

Where xx = connector type, yy = type and colour of radome, and zzzz = cable length in mm (where applicable)

Please refer to the Ordering Guide (http://www.tallysman.com/wp-content/uploads/Current-Ordering-Guide.pdf) for the current and complete list of available radomes and connectors.

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TIMES MICROWAVE SYSTEMS

LMR®-240
Flexible Low Loss Communications Coax

Ideal for...

- Jumper Assemblies in Wireless Communications Systems
- Short Antenna Feeder runs (e.g. WLL, GPS, LMR, Mobile Antennas)
- Any application (e.g. WLL, GPS, LMR, WLAN, WISP, WiMax, SCADA, Mobile Antennas) requiring an easily routed, low loss RF cable

• **LMR®** standard is a UV Resistant Polyethylene jacketed cable designed for 20-year service outdoor use. The bending and handling characteristics are significantly better than air-dielectric and corrugated hard-line cables.

• **LMR®- DB** is identical to standard LMR plus has the advantage of being watertight. The addition of waterproofing compound in and around the foil/braid insures continuous reliable service should the jacket be inadvertently damaged during installation or in the future.

• **LMR®- FR** is a non-halogen (non-toxic), low smoke, fire retardant cable designed for in-building runs that can be routed anywhere except air handling plenums. LMR-FR is UL/NEC & CSA rated 'CMR' and 'FT4' respectively, meets FAA FAR25 requirements and is MSHA-P for mining applications.

• **LMR®- FR-PVC** is a general-purpose indoor cable and has a UL/NEC & CSA rating of 'CMR' and 'FT4' respectively. It is less expensive than LMR-FR, however it emits toxic fumes (HCL) and greater smoke density when burned.

• **LMR®- PVC** is designed for low loss general-purpose applications and is somewhat more flexible than the standard polyethylene jacketed LMR.

• **LMR®- PVC-W** is a white-jacketed version of LMR-PVC for marine and other applications where color compatibility is desired.

• **LMR®- MA** is a flexible cable designed specifically for mobile antenna applications. It has a PVC jacket and un-bonded aluminum tape to facilitate end stripping with automated equipment.

• **Flexibility** and bendability are hallmarks of the LMR-240 cable design. The flexible outer conductor enables the tightest bend radius available for any cable of similar size and performance.

• **Low Loss** is another hallmark feature of LMR-240. Size for size LMR has the lowest loss of any flexible cable and comparable loss to semirigid hard-line cables.

• **RF Shielding** is 50 dB greater than typical single shielded coax (40 dB). The multi-ply bonded foil outer conductor is rated conservatively at > 90 dB (i.e. >180 dB between two adjacent cables).

• **Weatherability**: LMR-240 cables designed for outdoor exposure incorporate the best materials for UV resistance and have life expectancy in excess of 20 years.

• **Connectors**: A wide variety of connectors are available for LMR-240 cable, including all common interface types, reverse polarity, and a choice of solder or non-solder center pins. Most LMR connectors employ crimp outer attachment using standard hex crimp sizes.

• **Cable Assemblies**: All LMR-240 cable types are available as pre-terminated cable assemblies. Refer to the section on FlexTech for further details.

Part Description

Part Number	Application	Jacket	Color	Stock Code
LMR-240	Outdoor	PE	Black	54021
LMR-240-DB	Outdoor/Watertight	PE	Black	54090
LMR-240-FR	Indoor/Outdoor Riser CMR	FRPE	Black	54029
LMR-240-FR-PVC	Indoor/Outdoor Riser CMR	FRPVC	Black	54214
LMR-240-PVC	General Purpose	PVC	Black	54140
LMR-240-PVC-W	General Purpose	PVC	White	54202
LMR-240-MA	Indoor & Mobile Antenna	PVC	Black	54046

Construction Specifications

Description	Material	In.	(mm)
Inner Conductor	Solid BC	0.056	(1.42)
Dielectric	Foam PE	0.150	(3.81)
Outer Conductor	Aluminum Tape	0.155	(3.94)
Overall Braid	Tinned Copper	0.178	(4.52)
Jacket	(see table above)	0.240	(6.10)

Mechanical Specifications

Performance Property	Units	US	(metric)
Bend Radius: installation	in. (mm)	0.75	(19.1)
Bend Radius: repeated	in. (mm)	2.5	(63.5)
Bending Moment	ft-lb (N-m)	0.25	(0.34)
Weight	lb/ft (kg/m)	0.034	(0.05)
Tensile Strength	lb (kg)	80	(36.3)
Flat Plate Crush	lb/in. (kg/mm)	20	(0.36)

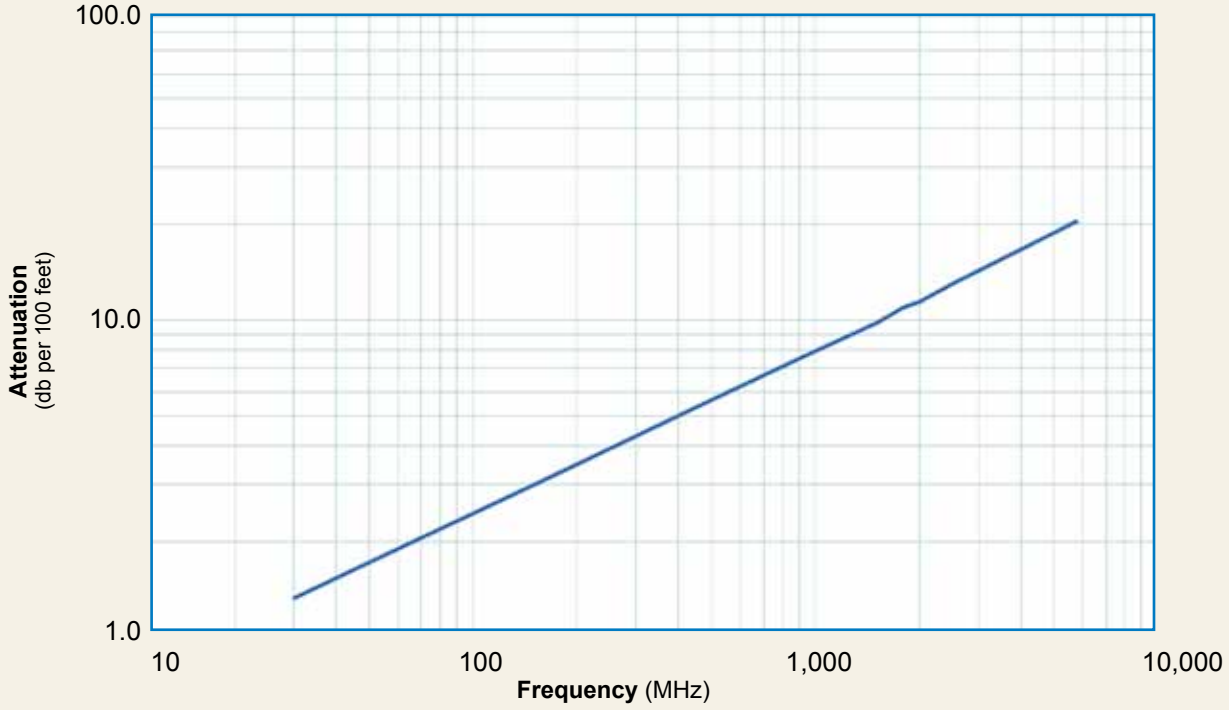
Environmental Specifications

Performance Property	°F	°C
Installation Temperature Range	-40/+185	-40/+85
Storage Temperature Range	-94/+185	-70/+85
Operating Temperature Range	-40/+185	-40/+85

Electrical Specifications

Performance Property	Units	US	(metric)
Velocity of Propagation	%	84	
Dielectric Constant	NA	1.42	
Time Delay	nS/ft (nS/m)	1.21	(3.97)
Impedance	ohms	50	
Capacitance	pF/ft (pF/m)	24.2	(79.4)
Inductance	uH/ft (uH/m)	0.060	(0.20)
Shielding Effectiveness	dB	>90	
DC Resistance			
Inner Conductor	ohms/1000ft (/km)	3.2	(10.5)
Outer Conductor	ohms/1000ft (/km)	3.89	(12.8)
Voltage Withstand	Volts DC	1500	
Jacket Spark	Volts RMS	5000	
Peak Power	kW	5.6	

Attenuation vs. Frequency (typical)



Frequency (MHz)	30	50	150	220	450	900	1500	1800	2000	2500	5800
Attenuation dB/100 ft	1.3	1.7	3.0	3.7	5.3	7.6	9.9	10.9	11.5	12.9	20.4
Attenuation dB/100 m	4.4	5.7	9.9	12.0	17.3	24.8	32.4	35.6	37.7	42.4	66.8
Avg. Power kW	1.49	1.15	0.66	0.54	0.38	0.26	0.20	0.18	0.17	0.15	0.10

Calculate Attenuation =

$(0.242080) \cdot \sqrt{FMHz} + (0.000330) \cdot FMHz$ (interactive calculator available at http://www.timesmicrowave.com/cable_calculators)

Attenuation:

VSWR=1.0 ; Ambient = +25°C (77°F)

Power: VSWR=1.0; Ambient = +40°C; Inner Conductor = 100°C (212°F); Sea Level; dry air; atmospheric pressure; no solar loading

TIMES MICROWAVE SYSTEMS

LMR®-240
Flexible Low Loss Communications Coax

Connectors

Interface	Description	Part Number	Stock Code	VSWR** Freq. (GHz)	Coupling Nut	Inner Contact Attach	Outer Contact Attach	Finish* Body /Pin	Length in	Length (mm)	Width in	Width (mm)	Weight lb	Weight (g)
1. F Male	Straight Plug	TC-240-FM-X	3190-2891	<1.25:1 (2.5)	Knurl	Solder	Crimp	N/G	1.1	(28)	0.45	(11.4)	0.014	(6.4)
2. N Male	Straight Plug	EZ-240-NMH-X	3190-2893	<1.25:1 (2.5)	Hex/Knurl	Spring Finger	Crimp	A/G	1.5	(38.1)	0.78	(19.8)	0.086	(39.0)
3. N Male	Right Angle	TC-240-NMH-RA-D	3190-2426	<1.35:1 (6)	Hex/Knurl	Solder	Crimp	A/G	1.2	(32.4)	1.22	(31.0)	0.091	(41.7)
4. N Male	Straight Plug	TC-240-NMH-X	3190-2887#	<1.25:1 (2.5)	Hex/Knurl	Solder	Crimp	N/S	1.5	(38)	0.75	(19.1)	0.086	(39.0)
5. N Male	Straight Plug	TC-240-NMC	3190-244	<1.25:1 (2.5)	Knurl	Solder	Clamp	S/G	1.5	(38)	0.75	(19.1)	0.082	(37.2)
6. 1.0/2.3 DIN	Straight Plug	EZ-240-1023M	3190-2512	<1.35:1 (2.5)	knurl	Spring Finger	Crimp	N/G	1.1	(228.5)	0.33	(8.5)	0.014	(6.63)
7. N Female	Bulkhead Jack	TC-240-NF-BH-X	3190-2888	<1.25:1 (2.5)	NA	Solder	Crimp	A/G	1.7	(44)	0.88	(22.2)	0.115	(52.2)
8. N Female	Panel Mount	TC-240-NF-PM-X	3190-2889#	<1.25:1 (6)	NA	Solder	Crimp	A/G	1.7	(44)	0.88	(22.2)	0.115	(52.2)
9. BNC Male	Straight Plug	TC-240-BMC	3190-242	<1.25:1 (2.5)	Knurl	Solder	Clamp	S/G	1.7	(43)	0.56	(14.2)	0.040	(18.1)
10. BNC Male	Straight Plug	TC-240-BM-X	3190-2890	<1.25:1 (2.5)	Knurl	Solder	Crimp	A/G	1.3	(34)	0.58	(14.7)	0.043	(19.5)
11. BNC Male	Straight Plug	TC-240-BM-RA-D	3190-2869	<1.25:1 (2)	Knurl	Solder	Crimp	A/G	1.0	(25.1)	0.57	(14.5)	0.115	(52.0)
12. TNC Male	Straight Plug	EZ-240-TM-X	3190-2725	<1.25:1 (2.5)	Knurl	Spring Finger	Crimp	N/G	1.4	(34.3)	0.59	(15.0)	0.043	(19.5)
13. TNC Male	Straight Plug	TC-240-TM-X	3190-2797	<1.25:1 (2.5)	Knurl	Solder	Crimp	N/G	1.7	(43)	0.59	(15.0)	0.043	(19.5)
14. TNC Male	Reverse Polarity	EZ-240-TM-RP-X	3190-2892	<1.25:1 (6)	Knurl	Spring Finger	Crimp	A/G	1.4	(36)	0.59	(15.0)	0.043	(19.5)
15. TNC Male	Right Angle	TC-240-TM-RA-D	3190-2798	<1.25:1 (6)	Hex	Solder	Crimp	A/G	1.0	(25.1)	0.62	(15.7)	0.115	(52.0)
16. QMA Male	Straight Plug	EZ-240-QM-X	3190-2894	<1.25: (6)	Knurl	Spring Finger	Crimp	N/G	1.2	(30.0)	0.41	(10.5)	0.014	(6.35)
17. QMA Male	Right Angle	EZ-240-QM-RA-X	3190-2895	<1.25: (<6)	Knurl	Spring Finger	Crimp	N/G	0.8	(20.3)	0.65	(16.5)	0.019	(8.62)
18. SMA Male	Straight Plug	EZ-240-SM-X	3190-2897	<1:25: (6)	Hex	Spring Finger	Crimp	N/G	1.0	(25.4)	0.32	(8.1)	0.016	(7.26)
19. SMA Male	Straight Plug	TC-240-SM-SS-X	3190-2898#	<1.25:1 (10)	Hex	Solder	Crimp	SS/G	1.0	(25)	0.32	(8.1)	0.016	(7.3)
20. SMA Male	Right Angle	TC-240-SM-RA-SS-X	3190-2900#	<1.35:1 (6)	Hex	Solder	Crimp	SS/G	0.8	(20)	0.65	(16.5)	0.019	(8.6)
21. SMA Male	Right Angle	EZ-240-SM-RA-X	3190-2899	<1.25:1 (6)	Hex	Spring Finger	Crimp	A/G	0.9	(22.8)	0.31	(7.9)	0.019	(8.6)
22. SMA Male	Reverse Polarity	TC-240-SM-RP	3190-326	<1.25:1 (2.5)	Hex	Solder	Crimp	SS/G	1.0	(25)	0.32	(8.1)	0.016	(7.3)
23. SMA Female	Bulkhead Jack	TC-240-SF-SS-BH-X	3190-2896#	<1.25:1 (2.5)	NA	Solder	Crimp	SS/G	1.1	(29)	0.31	(7.9)	0.019	(8.6)
24. Mini-UHF	Straight Plug	TC-240-MUHF	3190-445	<1.25:1 (2.5)	Knurl	Solder	Crimp	N/G	1.1	(28)	0.45	(11.4)	0.014	(6.4)
25. 7/16 Din Male	Straight Plug	TC-240-716M	3190-2982	<1.35:1 (3)	Hex	Spring Finger	Crimp	A/S	2.0	(50.5)	1.26	(32.0)	0.186	(84.4)
26. 7/16 Din Male	Right Angle	TC-240-716M-RA-D	3190-2983	<1.35:1 (3)	Hex	Solder	Crimp	A/S	1.4	(34.3)	1.60	(40.6)	0.239	(108.5)
27. TNC Female	Straight Jack	EZ-240-TF	3190-2552	<1.35:1 (6)	NA	Spring Finger	Crimp	N/G	1.1	(27.0)	0.45	(11.4)	0.035	(15.9)

Hardware Accessories

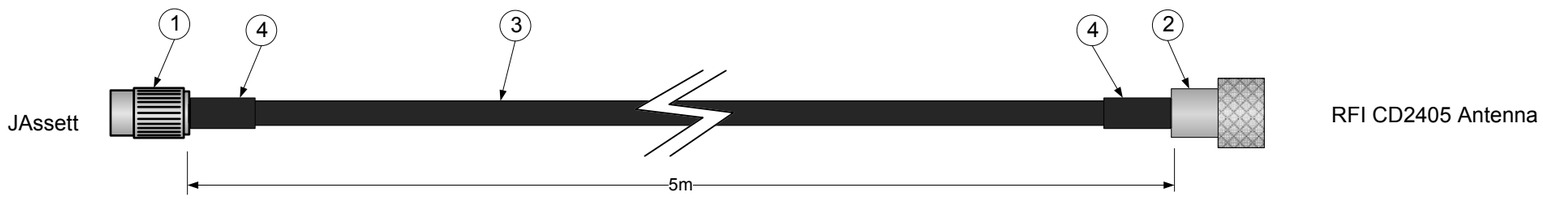
Type	Part Number	Stock Code	Description
Ground Kit	GK-S240TT	GK-S240TT	Standard Ground Kit (each)

Install Tools

Type	Part Number	Stock Code	Description
Crimp Tool	CT-240/200/195/100	3190-667	Crimp tool for LMR-100, 195, 200 and 240 connectors
Strip Tool	CST-240A	3192-152	Prep tool for LMR-240 connectors
Deburr Tool	DBT-U	3192-001	Removes center conductor rough edges
Cutting Tool	CCT-01	3190-1544	Cable end flush cut tool
Replacement Blade	RB-01	3190-1609	Replacement blade for cutting tool
Replacement Blade Kit	RB-CST	3192-086	Replacement blade kit for all CST strip tools

JASSET GPS ANTENNA CABLE BOM						
Item	**Description**	**Manufacturer**	**Manufacturer Part No**	**Qty**	**Price Ea**	**Total**
1	Connector,TNC, straight plug (male), cable size LMR-240-UF	Times Microwave Systems	TC-240-TM-X *	1		
2	Connector, N Type, male, cable size LMR-240-UF	Times Microwave Systems	TC-240-SM-SS-X *	1		
3	Cable, Coaxial, Low Loss, UltraFlex	Times Microwave Systems	LMR-240-UF	5m		
4	Heat Shrink Tube, Adhesive lined, Black, Shrink Dia 5mm			50mm		

* Specific manufacturer parts specified for item numbers 1, and 2 are suggested only. Alternatives may be used upon approval by Product Development.



WiFi Antenna Cable

NOTES
1. Item no 4, heat shrink to be cut to approx 25mm length to provide stress relief at connector entry.
2. N-Type F-F Bulk head adaptor to be supplied with antenna as part of kit, to allow for panel mount of antenna.

REV	DATE	DESCRIPTION	DRAWN	CHECK	APPRVD
A	30 Sep 2014	Initial Revision	GST	BL	DH

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- when it has to be **right**

Leica Geosystems

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES: <100mm ±2mm; 100-300mm ±5mm; 300-3000mm ±20mm; >3000mm ±100mm

MATERIAL
FINISH
SHEET 1 OF 1
SCALE -

TITLE: Jasset Tracker WiFi Antenna Cable Assembly
DWG NO. JAS-DWG-016
SIZE A3
PART NO. 828375
REV A