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TEST REPORT For FCC

Test Report No. : CTK-2012-00471
Date of Issue : May 31, 2012
FCC ID : U5MSPP-R200II
Model/Type No. : SPP-R200II
Kind of Product : Mobile Printer
Applicant : BIXOLON Co., Ltd.
Applicant Address : 7th~8th FL, Miraeasset Venture Tower, 685, Sampyeong-dong,
Bundang-gu Seongnam-si, Gyeonggi-do, Korea
Manufacturer : BIXOLON Co., Ltd.
Manufacturer Address : 7th~8th FL, Miraeasset Venture Tower, 685, Sampyeong-dong,
Bundang-gu Seongnam-si, Gyeonggi-do, Korea
Contact Person : Hyun-suk Son / Assistant Manager
Telephone : +82-31-218-5582
Received Date : April 23, 2012
Test period : Start : April 24, 2011 End : May 10, 2012

The test results presented in this report relate only to the object tested.

Tested by

Y. T. Lee

Young-taek Lee
Test Engineer
Date: May 31, 2012

Reviewed by

Y. J. Park

Young-Joon, Park
Technical Manager
Date: May 31, 2012



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REPORT REVISION HISTORY

Date	Revision	Page No
May 31, 2012	Issued (CTK-2012-00471)	All

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1.0 General Product Description

Equipment model name : SPP-R200II

Serial number : Prototype

EUT condition : Pre-production, not damaged

Antenna type : Chip antenna Gain 0.55 dBi

Frequency Range : 2402 MHz - 2480 MHz

RF power : 6.263 dBm Peak Conducted (GFSK)
: 3.379 dBm Peak Conducted (8-DPSK)

Type of Modulation : Frequency Hopping Spread Spectrum

Number of channels : 79

Channel Spacing : 1MHz

Channel Access Protocol : Frequency Hopping

Type of Modulation : GFSK(1Mbps), DQPSK(2Mbps), 8-DPSK(3Mbps)

Power Source : Lithium-ion Battery Pack(Rechargeable battery)
7.4 Vdc/1200 mAh

1.1 Tested Frequency

	LOW	MID	HIGH
Frequency (MHz)	2402	2441	2480

1.2 Tested Mode

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

Tested Ch	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH 5
Low, Mid, High	FHSS	8-DPSK	3DH 5

1.3 Model Differences

Not applicable

1.4 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.5 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Battery Charger (for EUT)	BridgePower Corp.	BL607080085600NK	K 1008000947
Personal Computer	Samsung Electronics Co., Ltd.	DB-A150	ZMSI96BSB00124E
LCD Monitor	Innocom Technology(Shenzhen) Co., Ltd.	SE198WFPf	CN-ORR716-72872-81T-OWG
Keyboard (PS/2 type)	HEWLETT-PACKARD COMPANY	5219	BN50702141
Mouse (USB type)	INTECH ELECTRONICS CORP., SHEN ZHEN ZHI	3D-510	-
Notebook Computer	Samsung Electronics Co., Ltd.	NY-R60Y	Z9GJ93GS302109B

1.6 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.7 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea.



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1.8 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 m & 10 m OATS, 3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements	 805871
JAPAN	VCCI	10 m OATS, 3 m & 10 m SAC and Conducted Test Site	 R-948, C-986 T-1843
KOREA	KCC	EMI (10 m OATS, 10 m SAC and Conducted Test Site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and Interruptions)	 No. 51, KR0025
International	KOLAS	EMC	



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2.0 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	Carrier Frequency Separation	> 25 kHz	Conducted	C
15.247(a)	Number of Hopping Frequencies	> 15 hops		C
15.247(a)	20 dB Bandwidth	NA		C
15.247	Dwell Time	< 0.4 seconds		C
15.247(b)	Transmitter Output Power	< 0.125 Watts		C
15.247(d)	Conducted Spurious emission	> 20 dBc		C
15.247(d)	Band Edge	> 20 dBc		C
15.209	Field Strength of Harmonics	15.209(a)	Radiated	C
15.207	AC Conducted Emissions	15.207(a)	Line Conducted	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:
- FCC Part 15.247, ANSI C63.4-2003

2.1 Transmitter Requirements

2.1.1 Carrier Frequency Separation

Test Location

RF Test Room

Test Procedures

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 30 kHz ($\geq 1\%$ of the span) Sweep = auto

VBW = 30 kHz ($\geq$ RBW) Detector function = peak

Trace = max hold

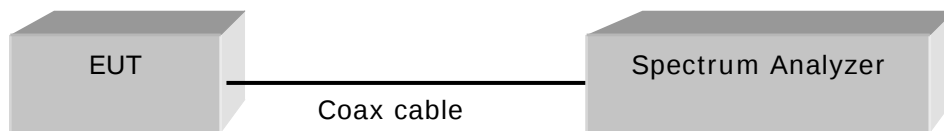


Figure 1 : Measurement setup for the carrier frequency separation

Limit

§15.247(a)(1) Frequency hopping system operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-third of 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

Channel	Adjacent Hopping Channel Separation (kHz)	Two-third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
2441MHz	1000	624.7	25	Complies

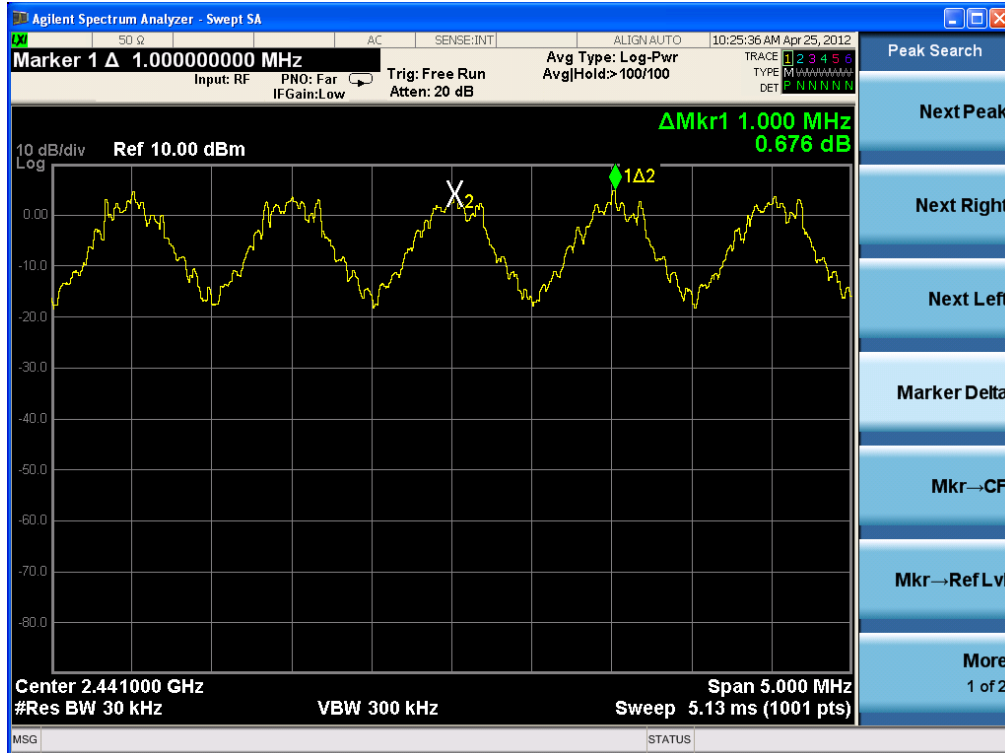
Test mode : 8-DPSK, CFG PKT Packet Type : 31 Packet Size : 1021(3DH5)

Channel	Adjacent Hopping Channel Separation (kHz)	Two-third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
2441MHz	1010	838.7	25	Complies

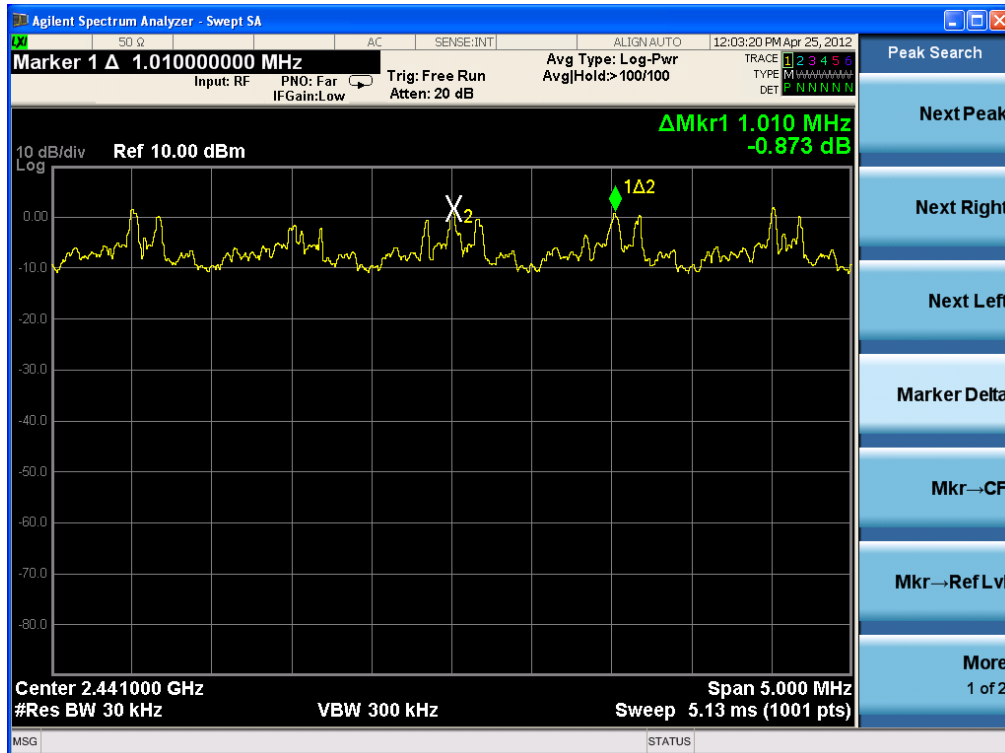
See next pages for actual measured spectrum plots.

Carrier Frequency Separation

Data Rate : GFSK



Data Rate : 8-DPSK



2.1.2 Number of Hopping Frequencies

Test Location

RF Test Room

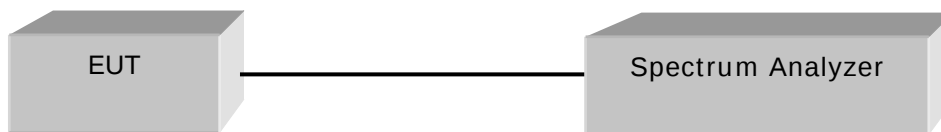
Test Procedures

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Frequency range 1: Start = 2389.5 MHz, Stop = 2439.5 MHz
 2: Start = 2439.5 MHz, Stop = 2489.5 MHz

Span = 50 MHz
RBW = 300 kHz ($\geq 1\%$ of the span)
VBW = 300 kHz ($\geq$ RBW)
Trace = max hold
Sweep = auto
Detector function = peak



Limit

§15.247(a)(1)(iii) For frequency hopping system operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.

Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

Total number of Hopping Channels	Result
79	Complies

Test mode : 8-DPSK, CFG PKT Packet Type : 31 Packet Size : 1021(3DH5)

Total number of Hopping Channels	Result
79	Complies

See next pages for actual measured spectrum plots.

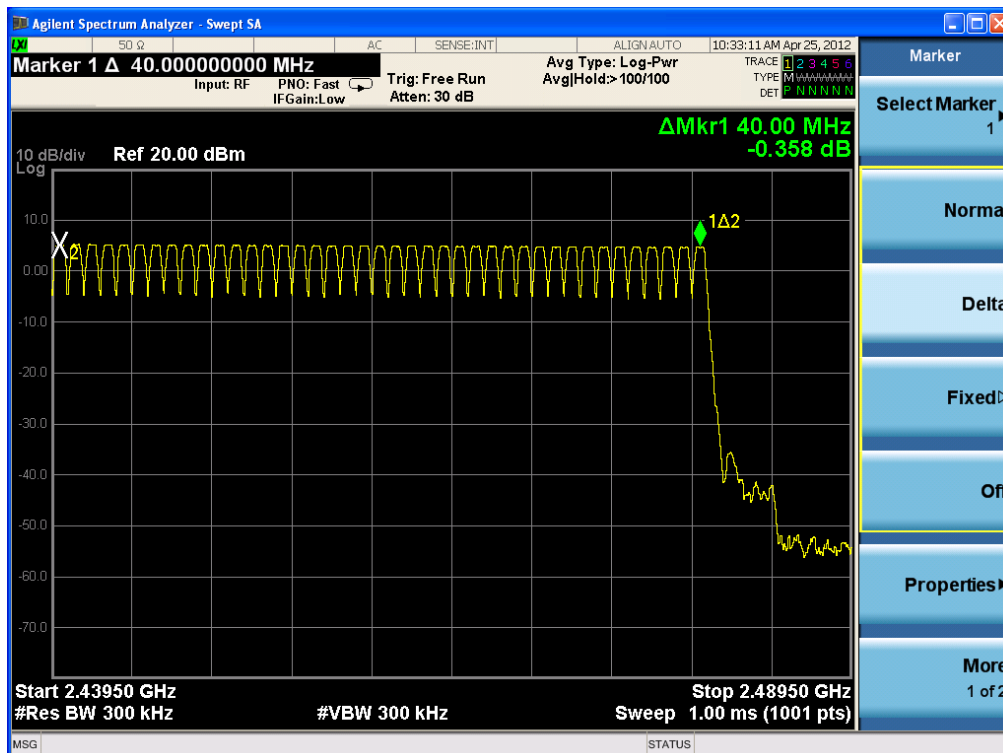
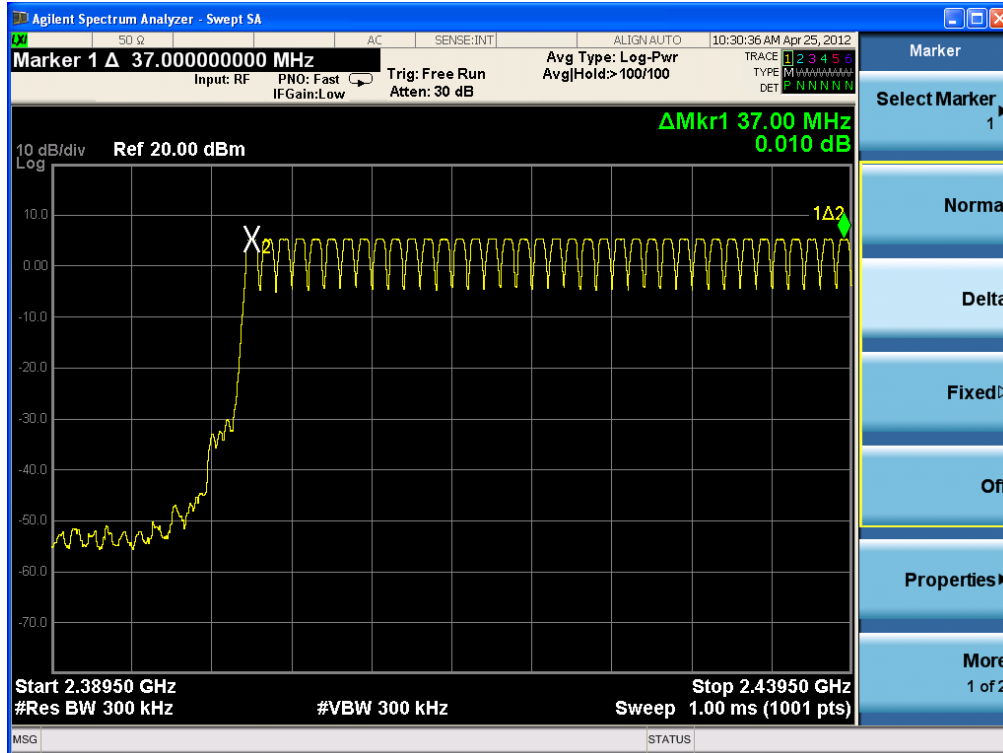


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Number of Hopping Frequencies(GFSK)



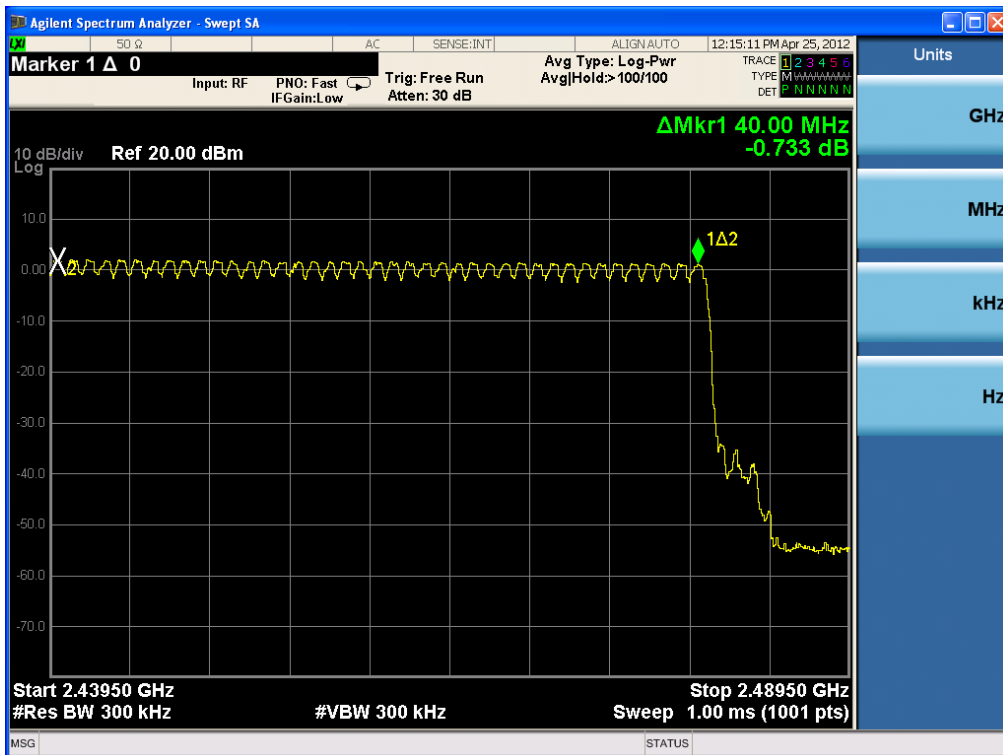
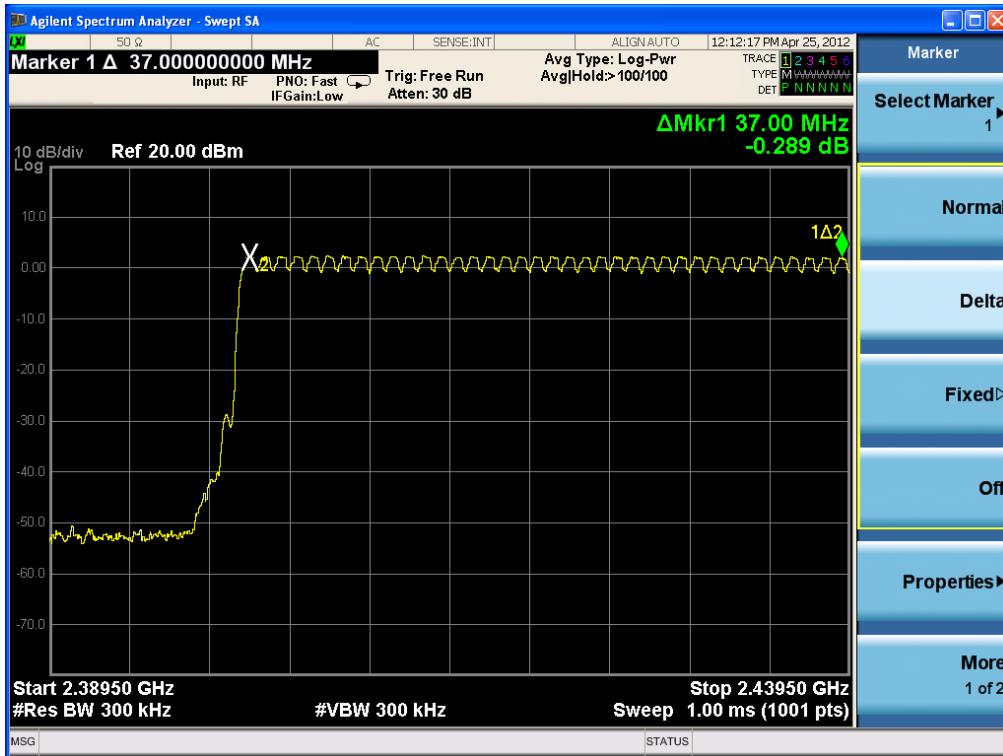


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Number of Hopping Frequencies(8-DPSK)



2.1.3 20 dB bandwidth

Test Location

RF Test Room

Test Procedures

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 2 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

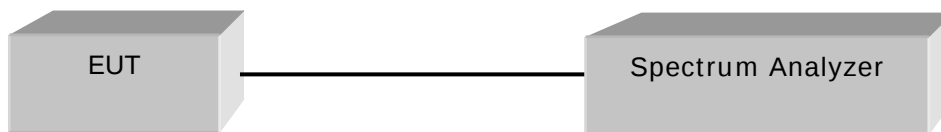
RBW = 30 kHz ($\geq 1\%$ of the span)

Sweep = auto

VBW = 30 kHz ($\geq$ RBW)

Detector function = peak

Trace = max hold



Limit

Limit : N/A



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Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

Frequency (MHz)	Channel Number.	Measured Bandwidth (MHz)	Result
2402	0	0.9422	Complies
2441	39	0.9370	Complies
2480	78	0.9397	Complies

Test mode : 8-DPSK, CFG PKT Packet Type : 31 Packet Size : 1021(3DH5)

Frequency (MHz)	Channel Number.	Measured Bandwidth (MHz)	Result
2402	0	1.260	Complies
2441	39	1.258	Complies
2480	78	1.258	Complies

See next pages for actual measured spectrum plots.



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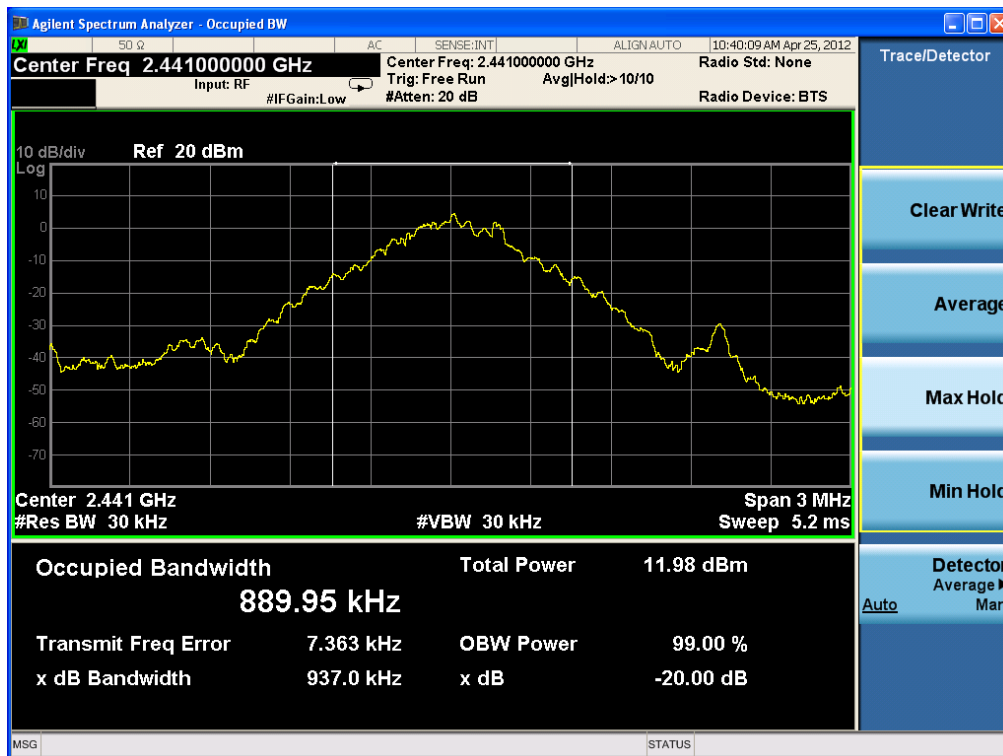
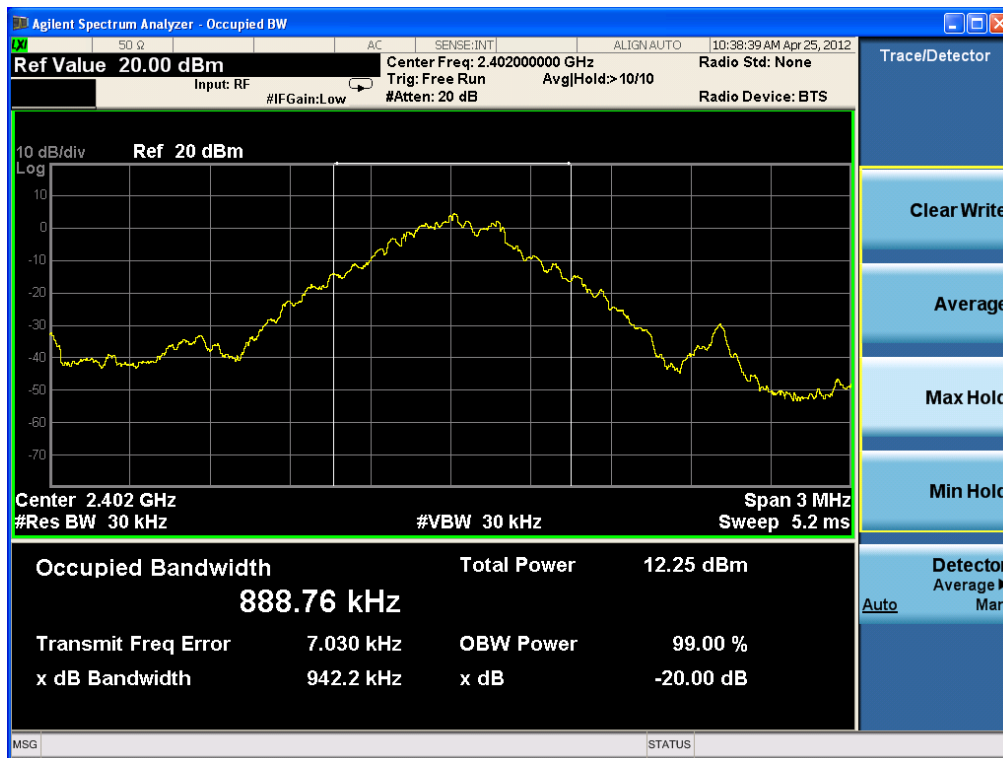
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20 dB Bandwidth - GFSK





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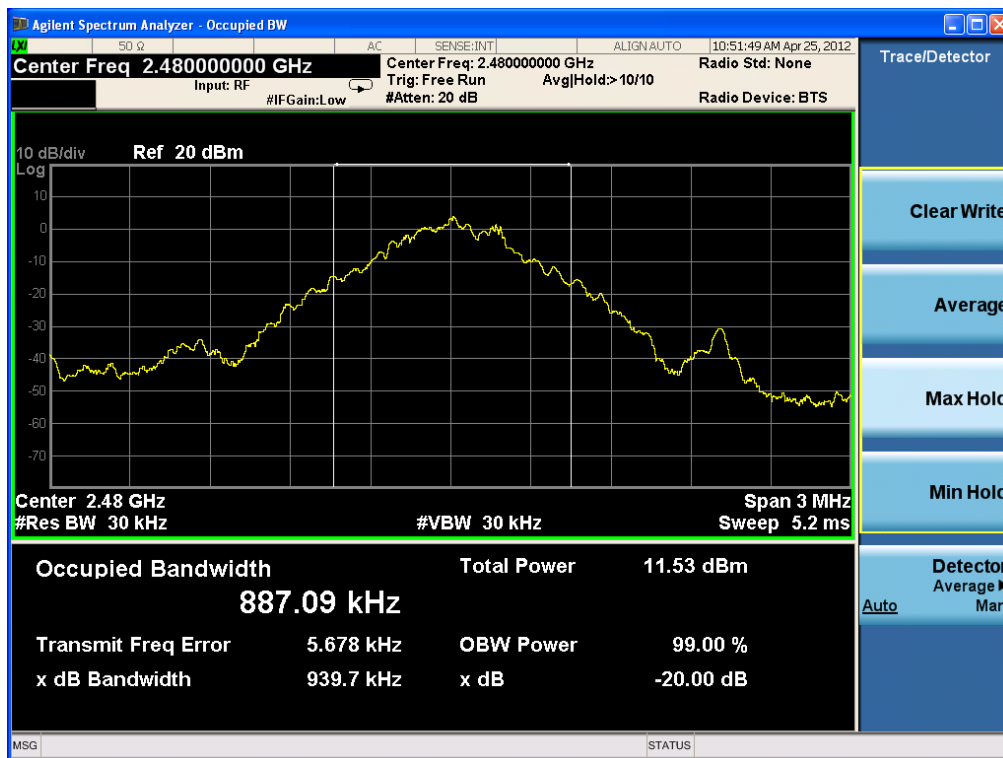
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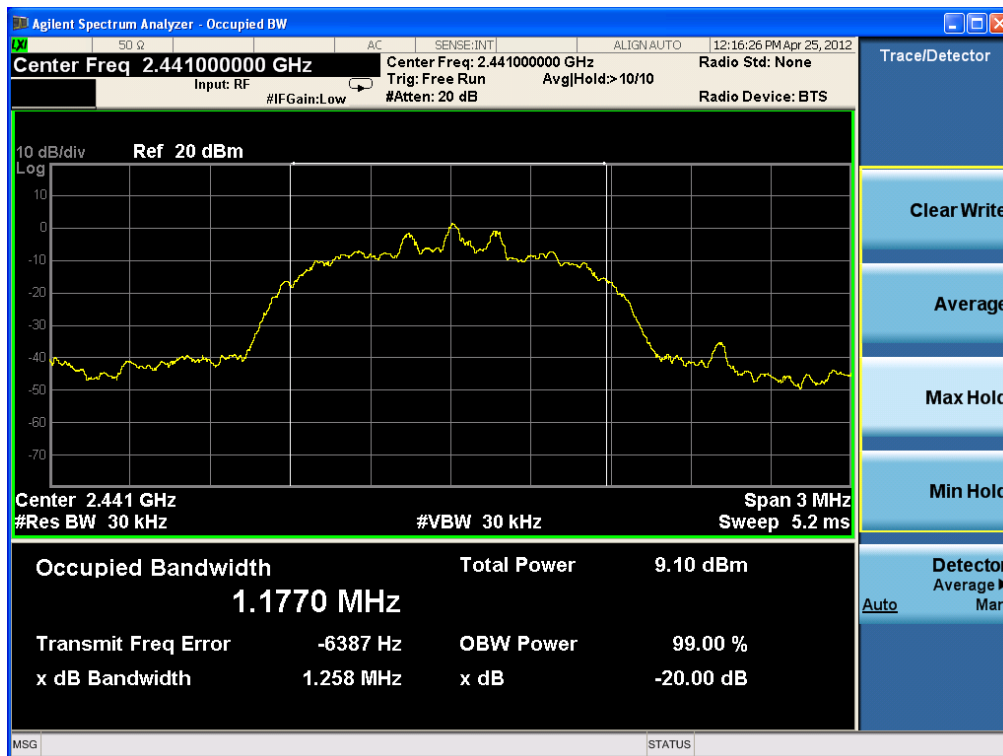
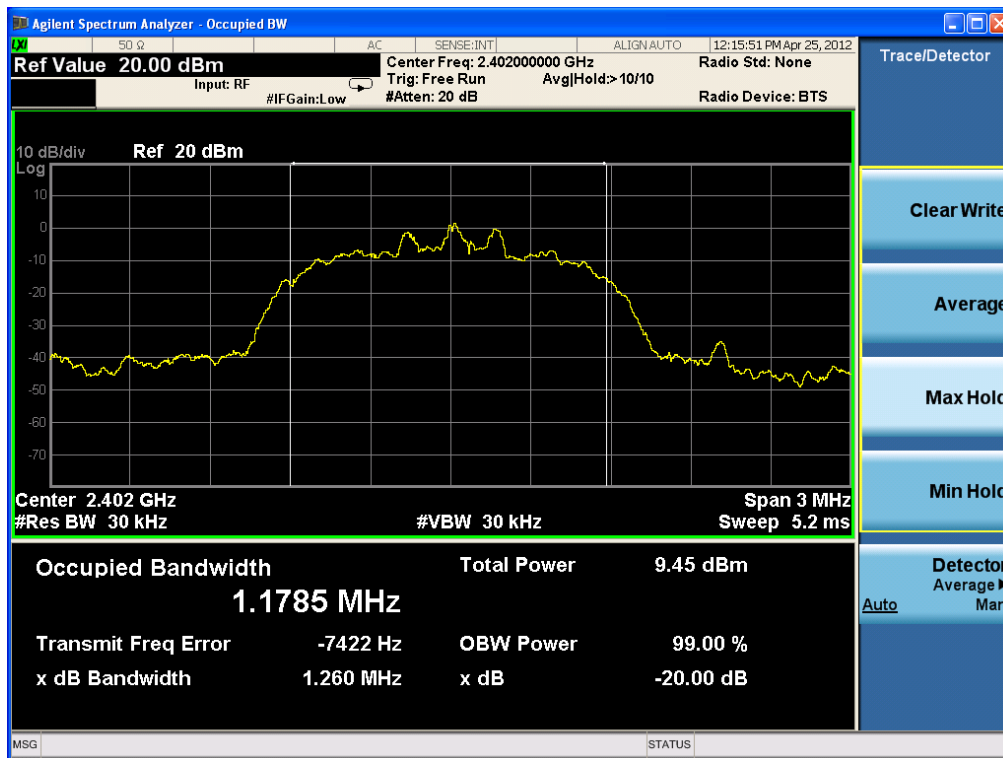
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20 dB Bandwidth – 8-DPSK





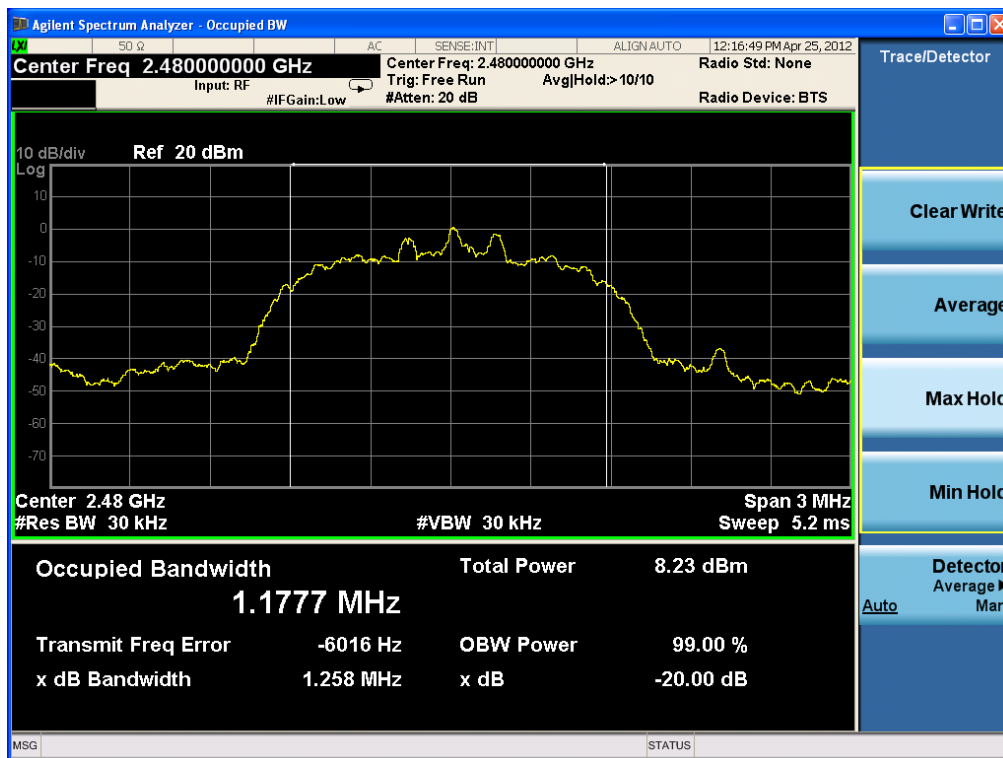
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2.1.4 Time of Occupancy (Dwell Time)

Test Location

RF Test Room

Test Procedures

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.
6. The SPP-R200II has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second.

The spectrum analyzer is set to:

Center frequency = the highest, middle, and the lowest channels

Span = zero

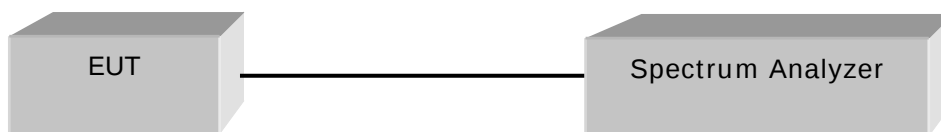
RBW = 1 MHz

Trace = max hold

VBW = 1 MHz ($\geq$ RBW)

Detector function = peak

Sweep = as necessary to capture the entire dwell time per hopping channel



Limit

§15.247(a)(1)(iii) For frequency hopping system operating in 2400-2483.5 MHz band, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test Results

Time of occupancy on the TX channel in 31.6 sec = time domain slot length × hop rate ÷
number of hop per channel × 31.6

Test mode : GFSK

Channel Frequency (MHz)	Packet Type	Dwell Time (ms)	Test Results	
			Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441	DH 1	0.395	126.40	Complies
	DH 3	1.650	264.00	Complies
	DH 5	2.890	308.27	Complies

DH1 Dwell time = $0.395 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 126.40 \text{ ms}$

DH3 Dwell time = $1.650 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 264.00 \text{ ms}$

DH5 Dwell time = $2.890 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 308.27 \text{ ms}$

Test mode : 8-DPSK

Channel Frequency (MHz)	Packet Type	Dwell Time (ms)	Test Results	
			Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441	3DH 1	0.410	131.20	Complies
	3DH 3	1.650	264.00	Complies
	3DH 5	2.890	308.27	Complies

3DH1 Dwell time = $0.410 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 131.20 \text{ ms}$

3DH3 Dwell time = $1.650 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 264.00 \text{ ms}$

3DH5 Dwell time = $2.890 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 308.27 \text{ ms}$

See next pages for actual measured spectrum plots.



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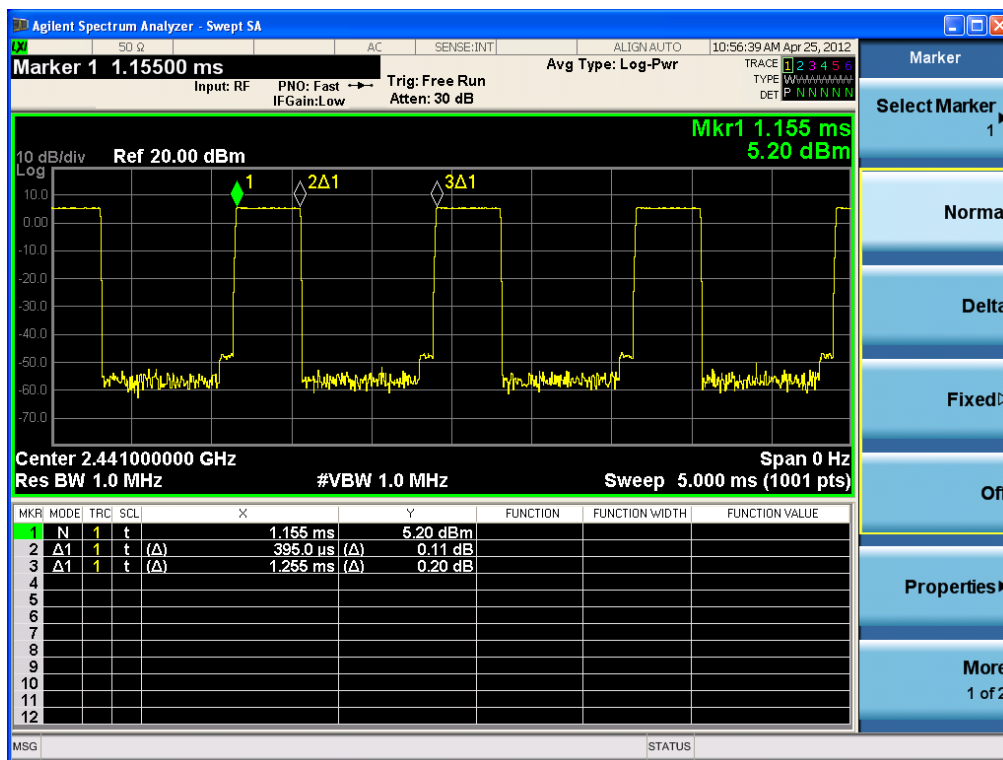
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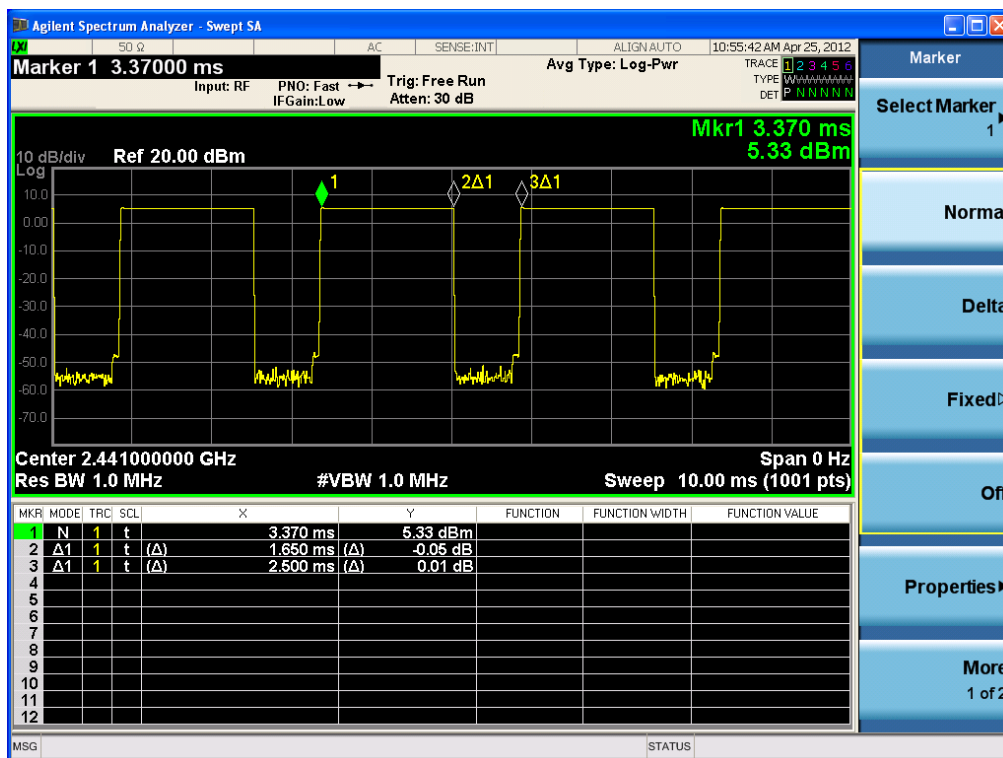
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Time of Occupancy for PACKET Type DH1(GFSK)



Time of Occupancy for PACKET Type DH3(GFSK)



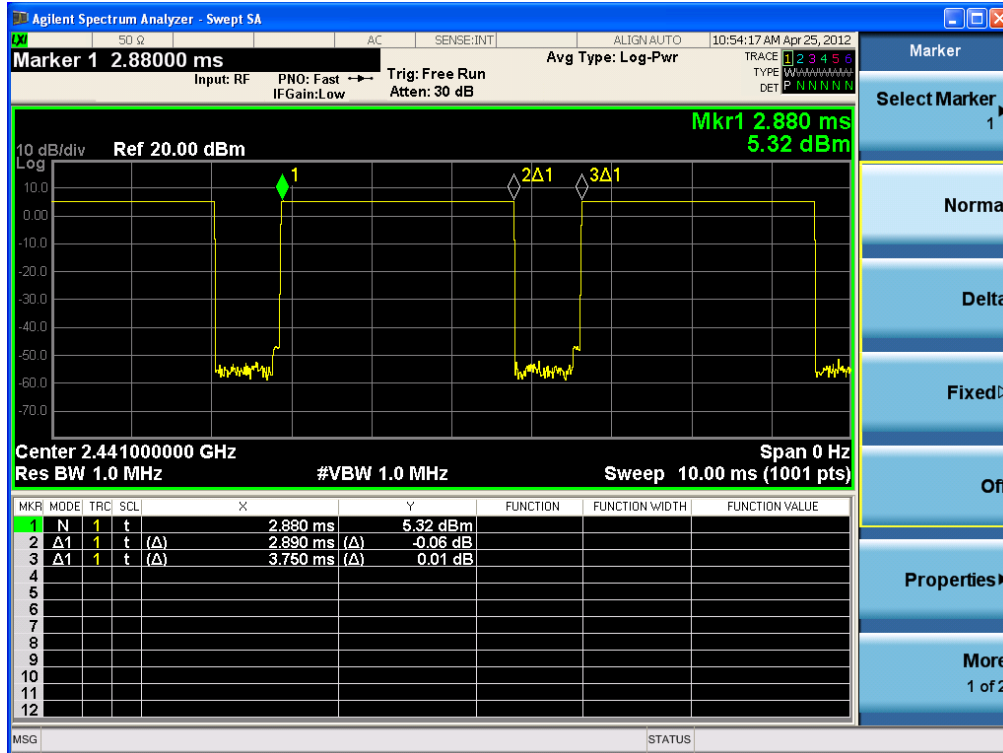


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Time of Occupancy for PACKET Type DH5(GFSK)



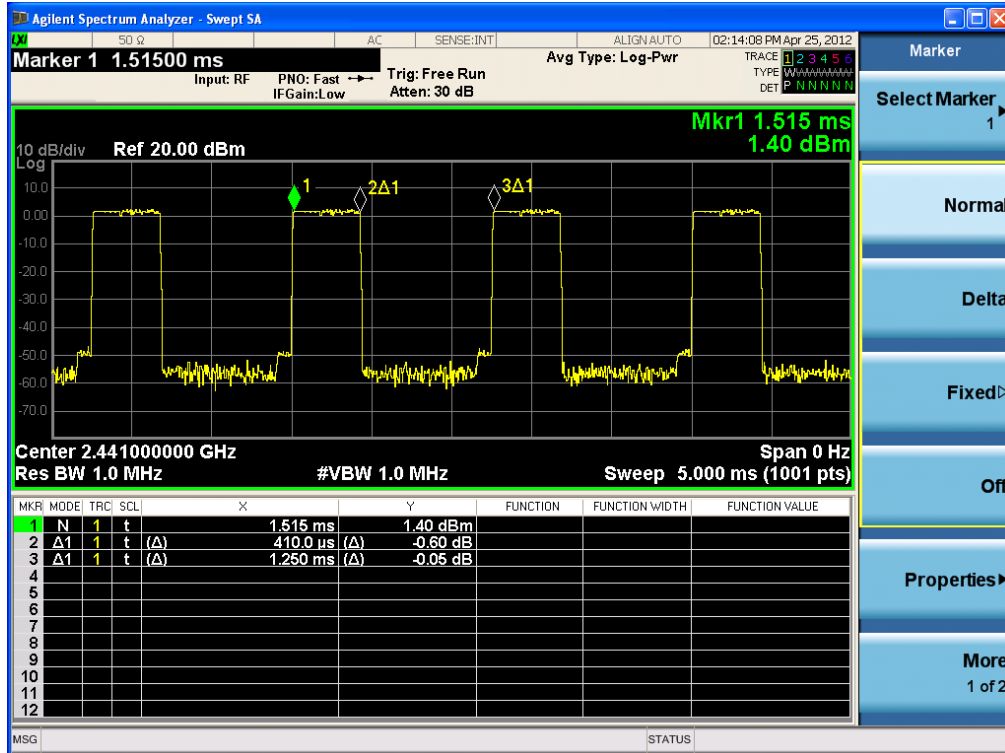


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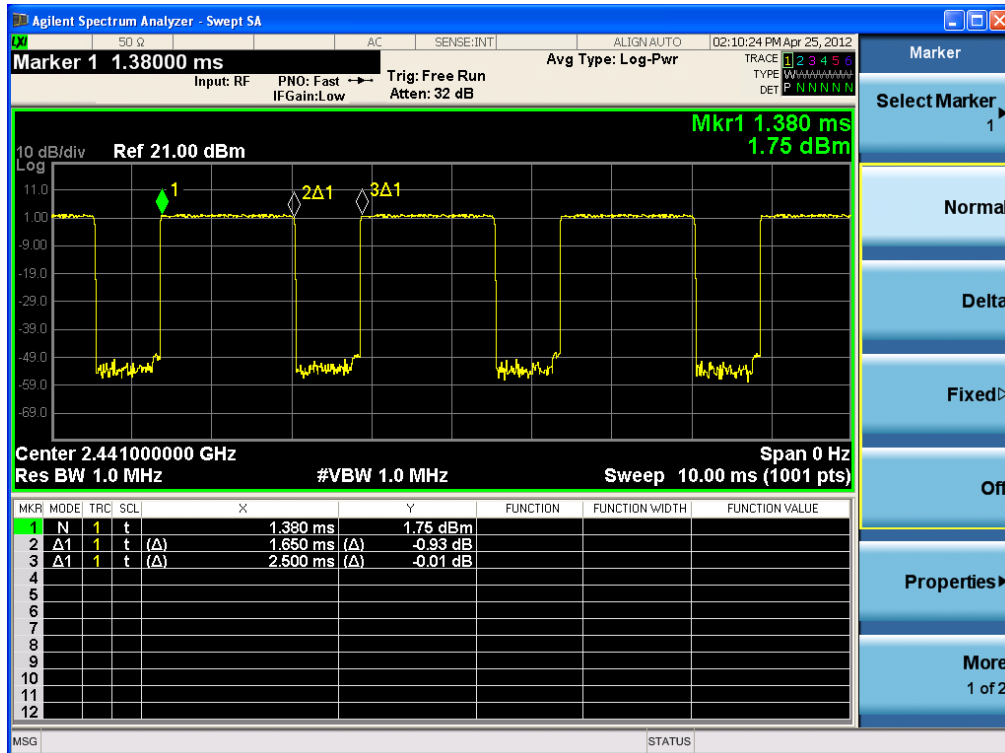
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Time of Occupancy for PACKET Type 3DH1(8-DPSK)



Time of Occupancy for PACKET Type 3DH3(8-DPSK)



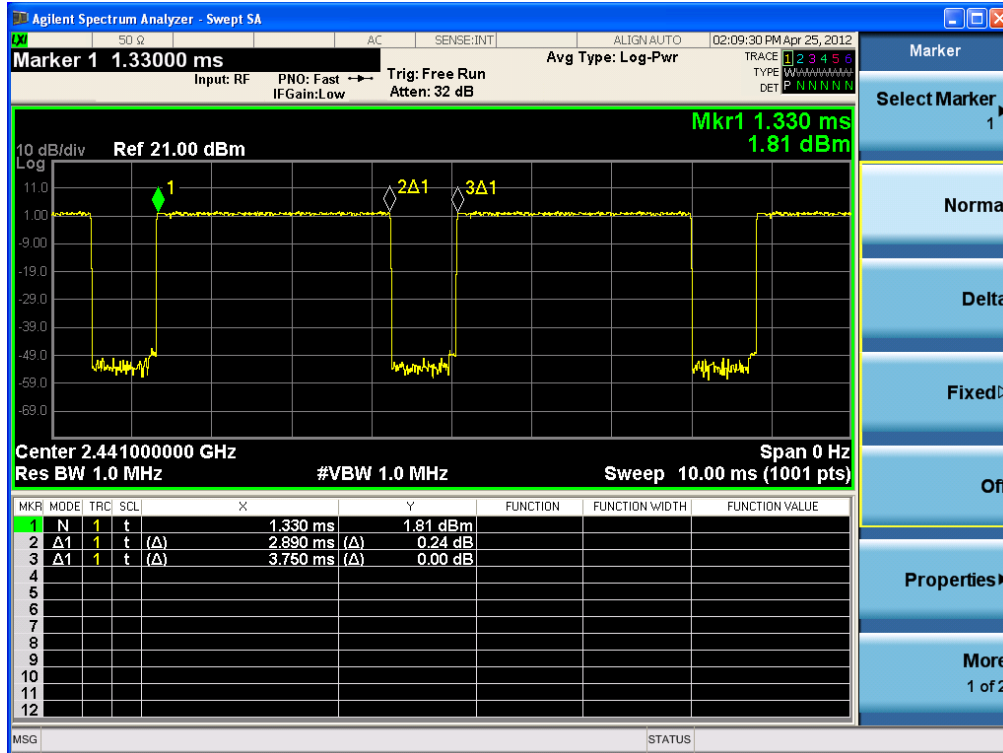


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Time of Occupancy for PACKET Type 3DH5(8-DPSK)



2.1.5 Maximum peak Conducted Output Power

Test Location

RF Test Room

Test Procedures

The maximum peak conducted output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:

Center frequency = the highest, middle, and the lowest channels

Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)

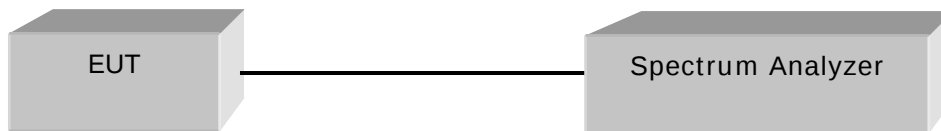
RBW = 1 MHz (greater than the 20 dB bandwidth of the emission being measured)

VBW = 1 MHz ($\geq$ RBW)

Detector function = peak

Trace = max hold

Sweep = auto



Limit

§5.247(b)(1) The Maximum Peak Output Power Measurement is 0.125 Watts for frequency hopping system operating in 2400-2483.5 MHz employing at least 15 Hopping channels.

Test Results

Test mode : GPSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	6.135	4.107	Complies
2441	39	6.263	4.230	Complies
2480	78	5.729	3.740	Complies

Test mode : 8-DPSK, CFG PKT Packet Type : 31 Packet Size : 1021(3DH5)

Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	3.379	2.177	Complies
2441	39	3.285	2.131	Complies
2480	78	2.461	1.762	Complies

See next pages for actual measured spectrum plots.

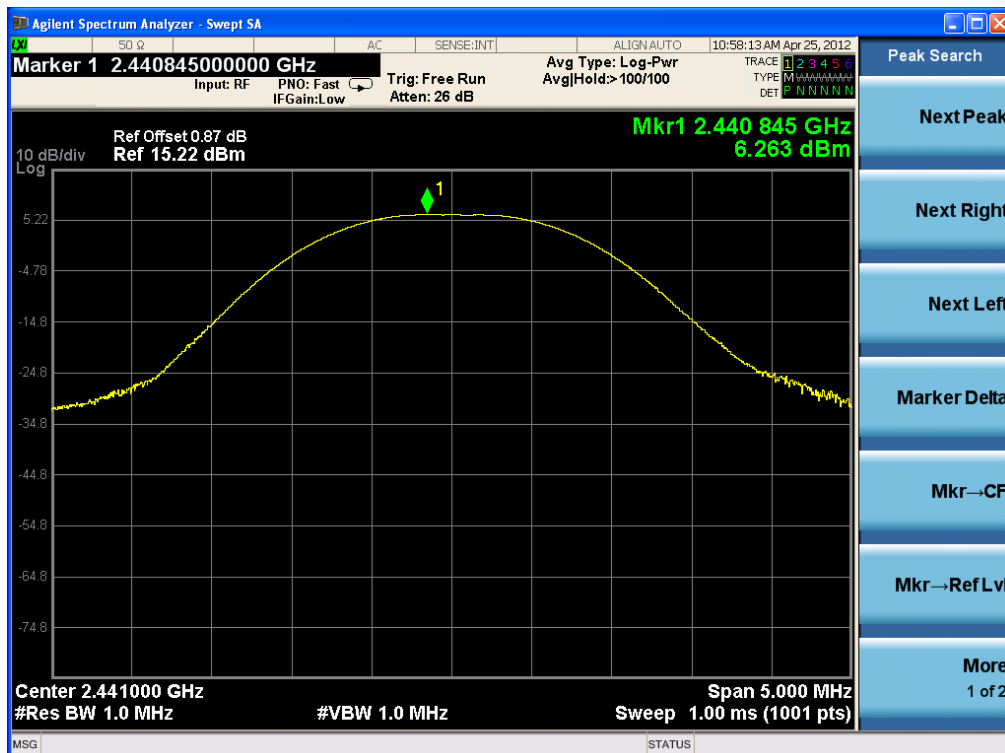
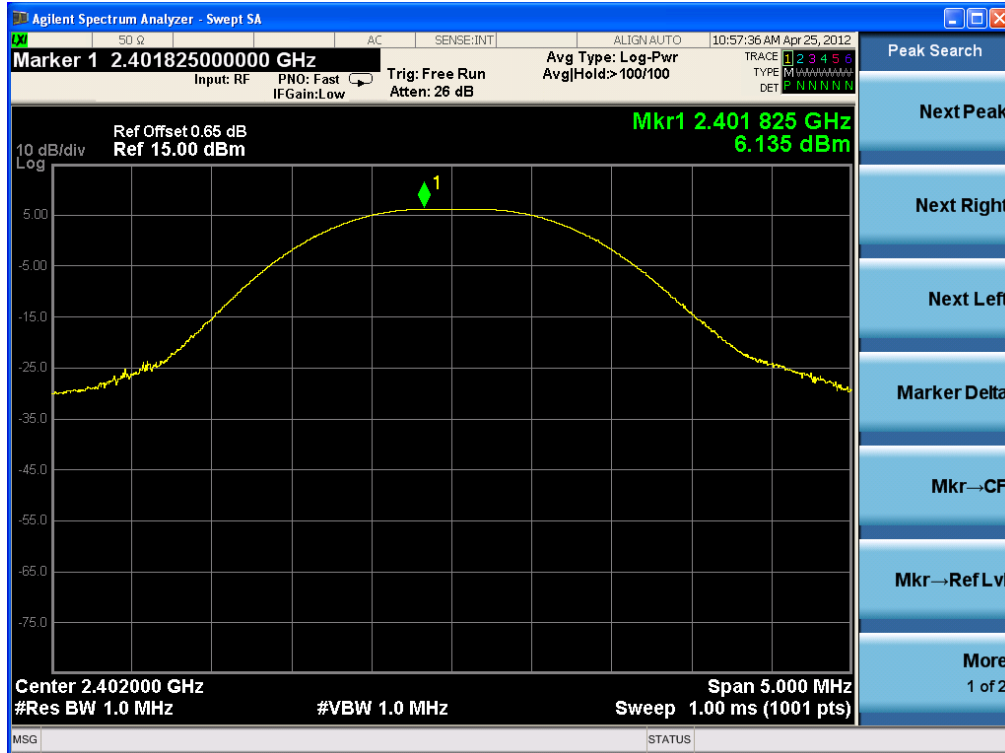


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Maximum peak Conducted Output Power - GFSK





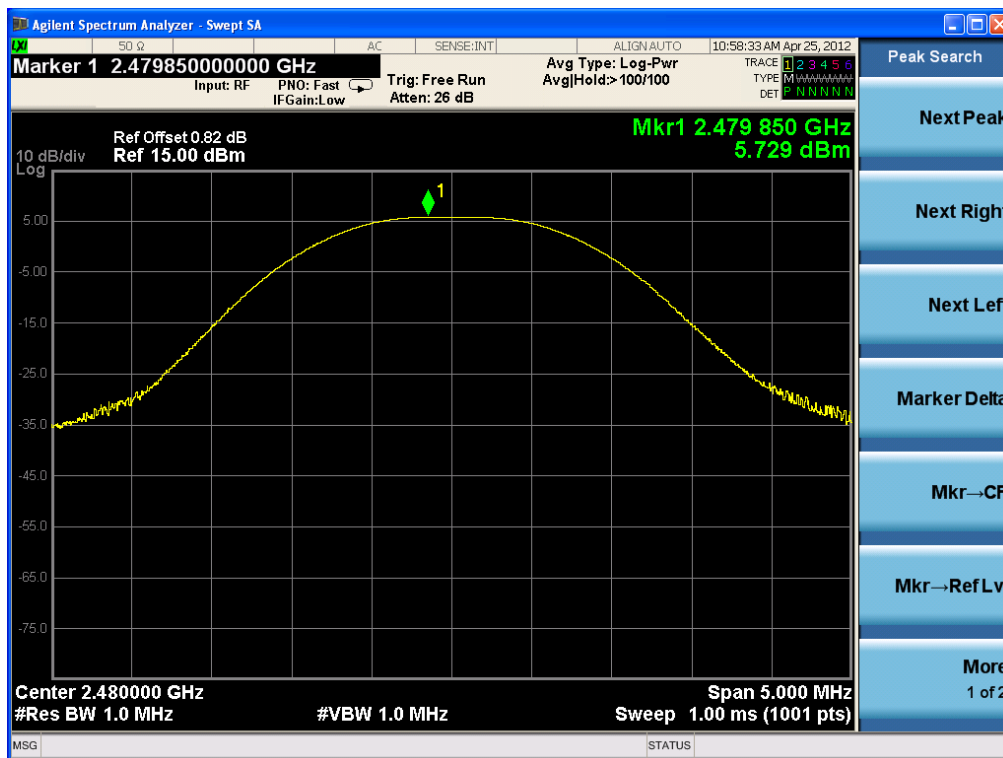
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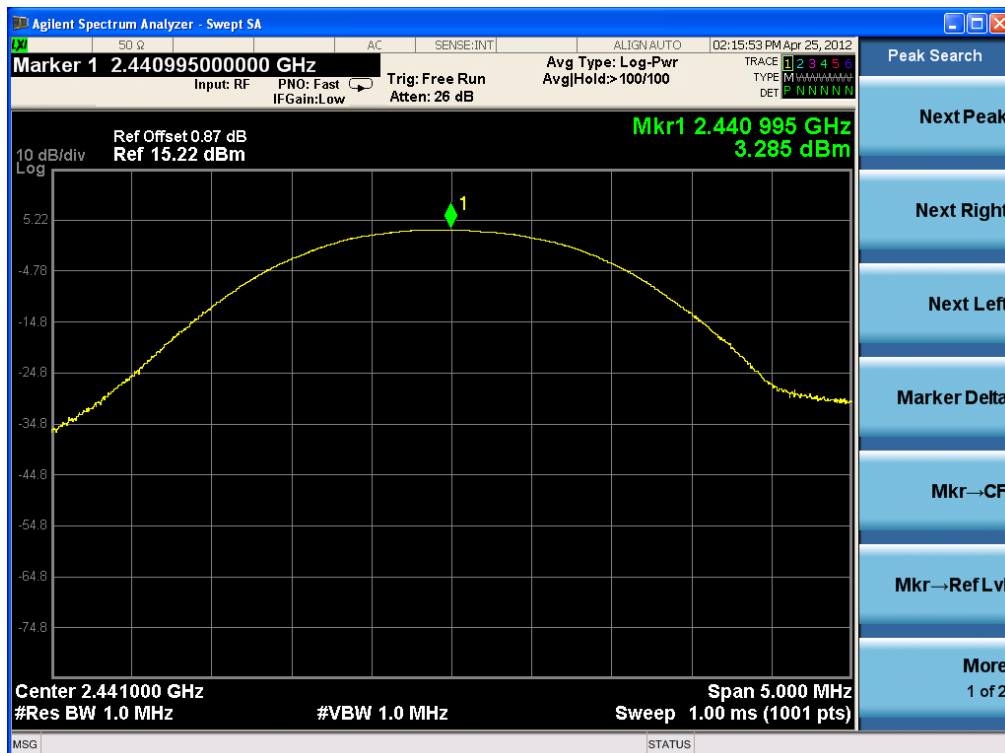
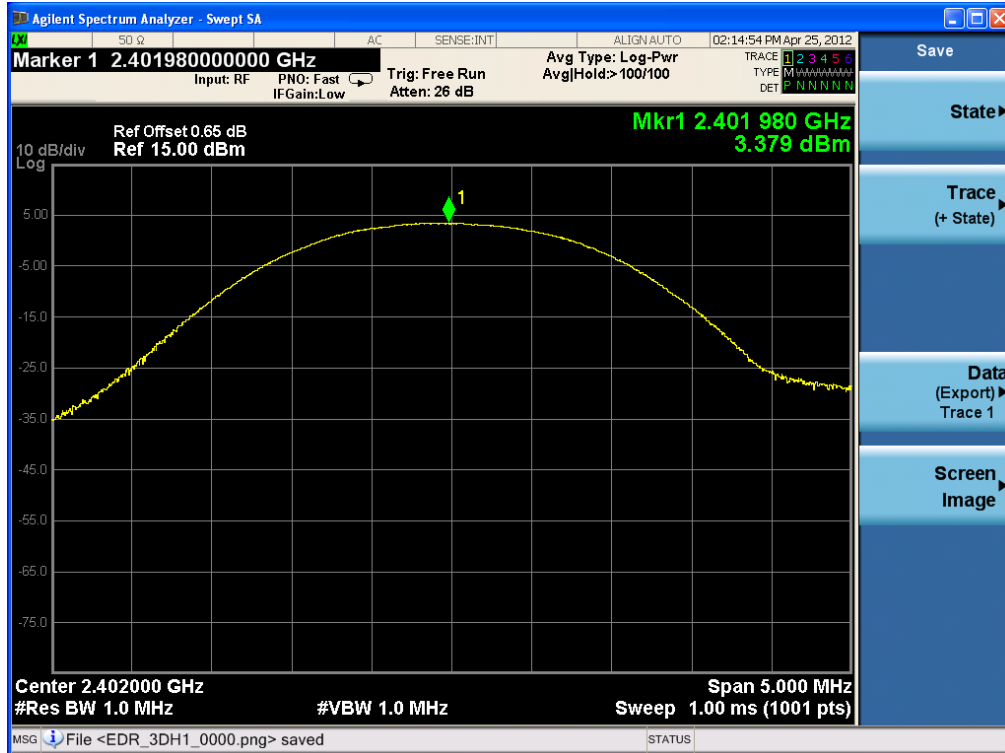


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Maximum peak Conducted Output Power - 8-DPSK





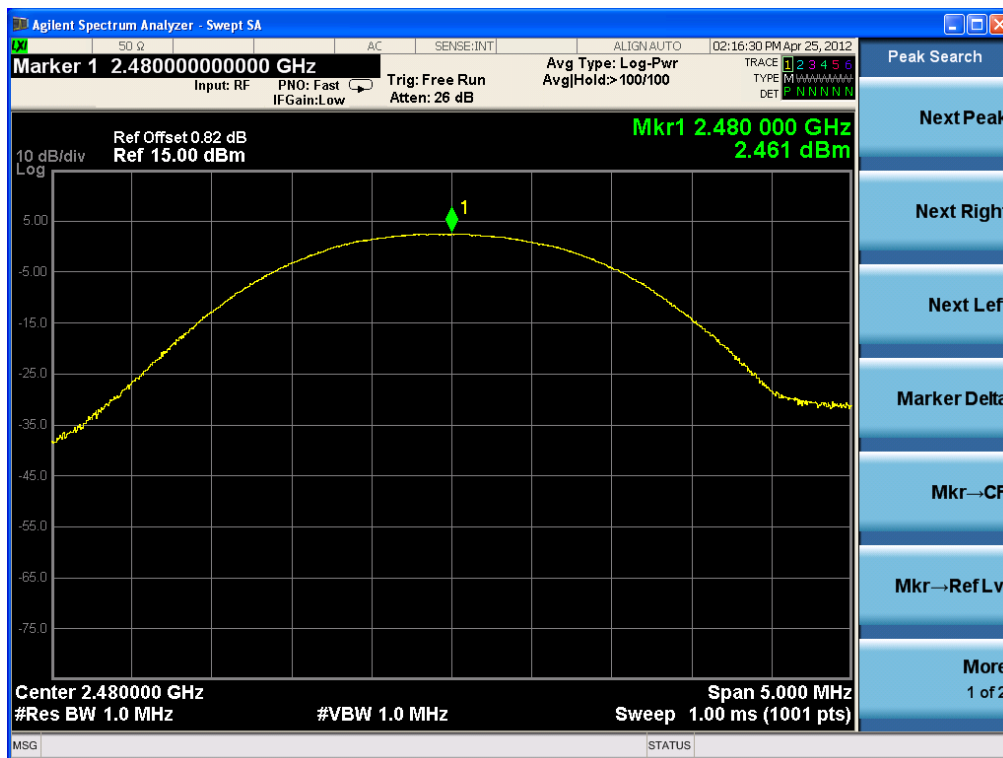
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2.1.6 Band-edge

Test Location

RF Test Room

Test Procedures

The bandwidth at 20 dB down from the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:

Center frequency = the highest, middle, and the lowest channels

RBW = 100 kHz

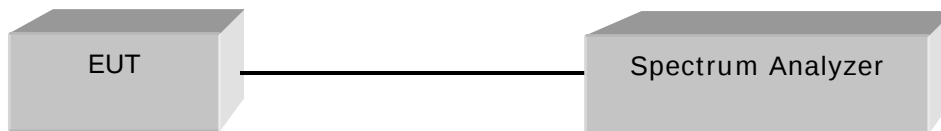
VBW = 100 kHz ($\geq$ RBW)

Span = 10 MHz

Trace = max hold

Detector function = peak

Sweep = auto



Limit

> 20 dBc

Test Results

All conducted emission in any 100 kHz bandwidth outside of the spectrum band was at least 20 dB lower than the highest level of the inband spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.



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Band - edge (with Hopping) - GFSK





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Band - edge (with Hopping) - 8-DPSK



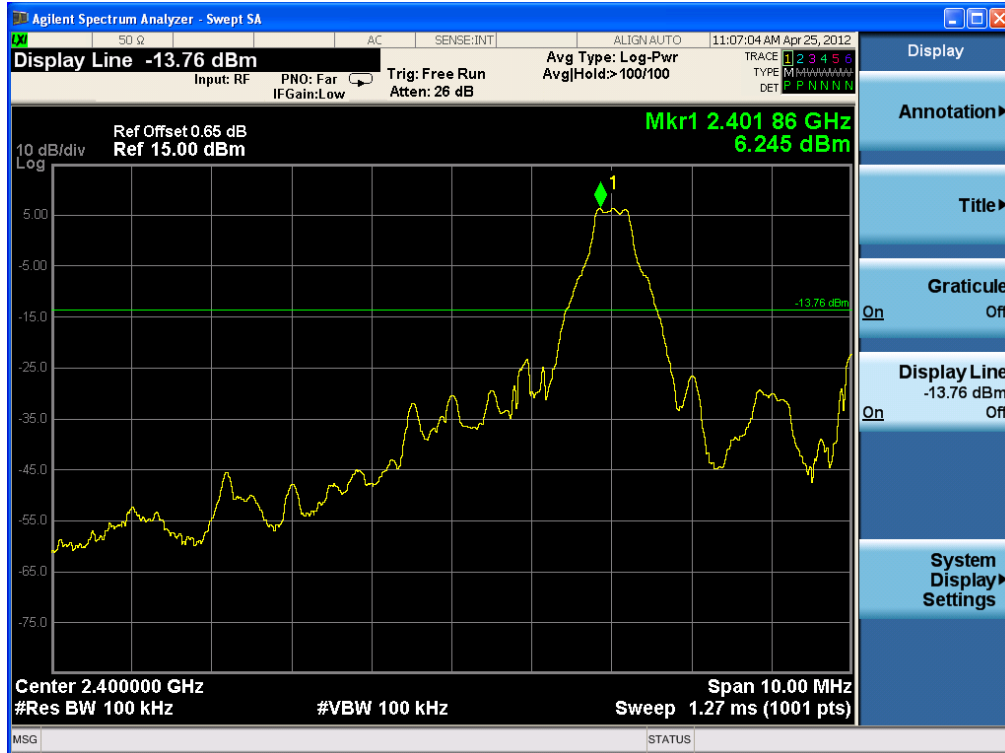


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Band - edge (without Hopping) - GFSK



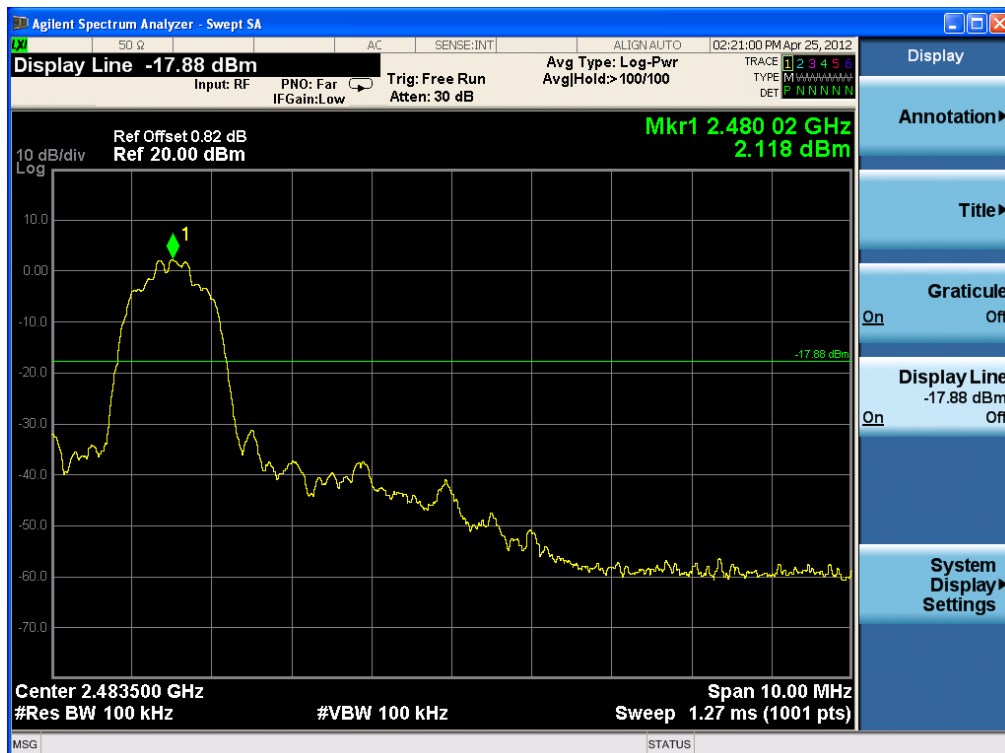
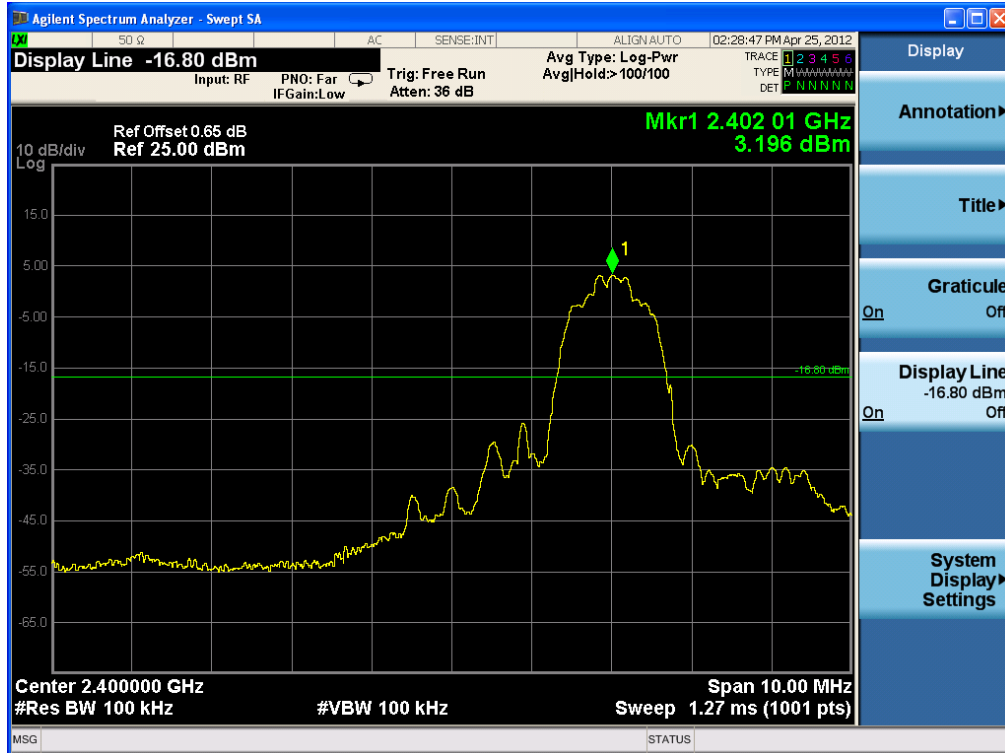


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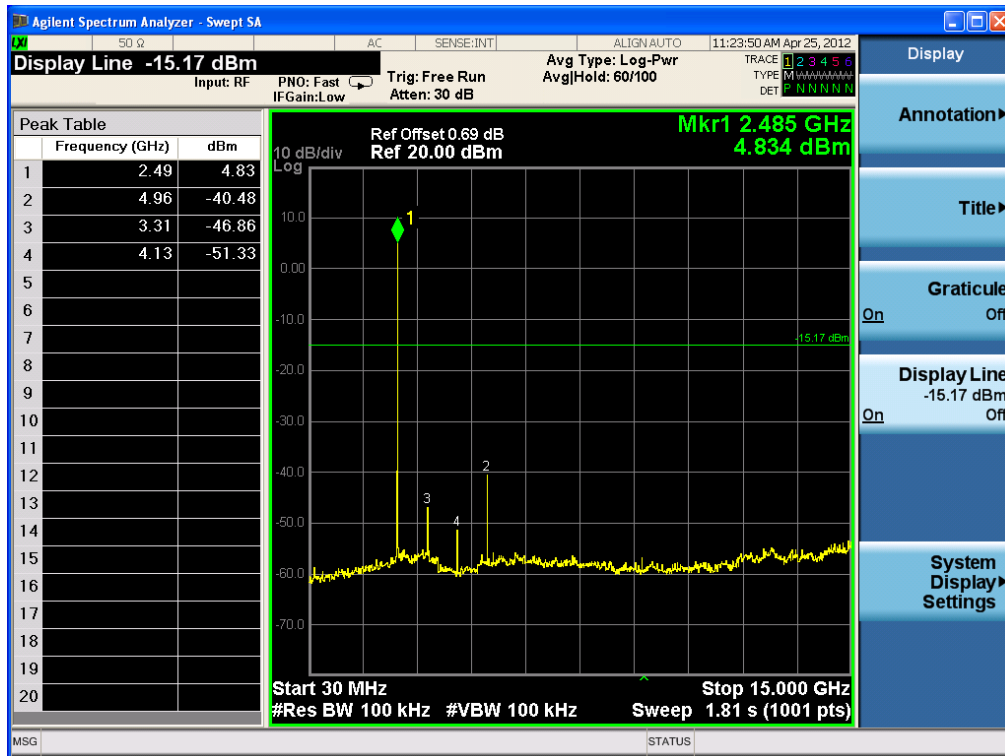
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Band – edge (without Hopping) - 8-DPSK



Band – edge (at 20 dB blow) – High channel
Frequency Range = 30 MHz ~ 10th harmonic
(GFSK : Worst-Case)



2.1.7 Field Strength of Emissions

Test Location

☒ Testing was performed at a test distance of 3 meter SAC

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10th harmonic

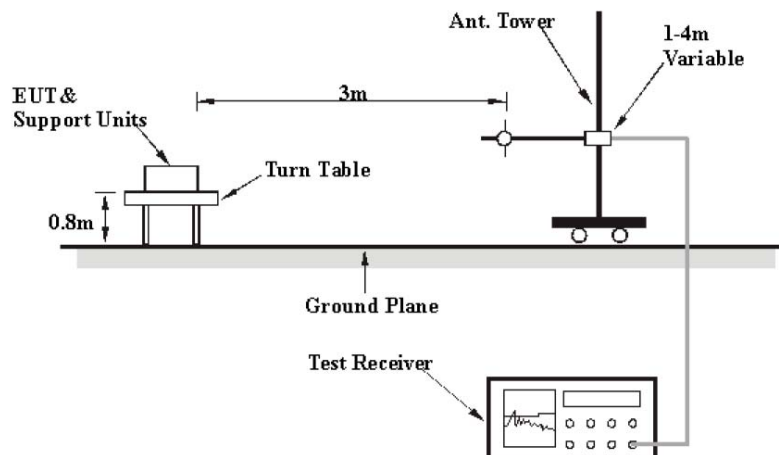
RBW = 120 kHz (30 MHz ~ 1 GHz) VBW ≥ RBW

= 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

Detector function = Quasi-peak

Trace = max hold



Limit

- 15.209(a)

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m
30-88	100 **	40
88-216	150 **	43.5
216-960	200 **	46
Above 960	500	54

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.



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Test Results

Test mode : Hopping(GFSK), CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Mobile Printer	Measurement Detail	
Model	SPP-R200II	Frequency Range	Below 1000MHz
Test mode	GFSK (Worst case)	Detector function	Quasi-Peak

The requirements are:

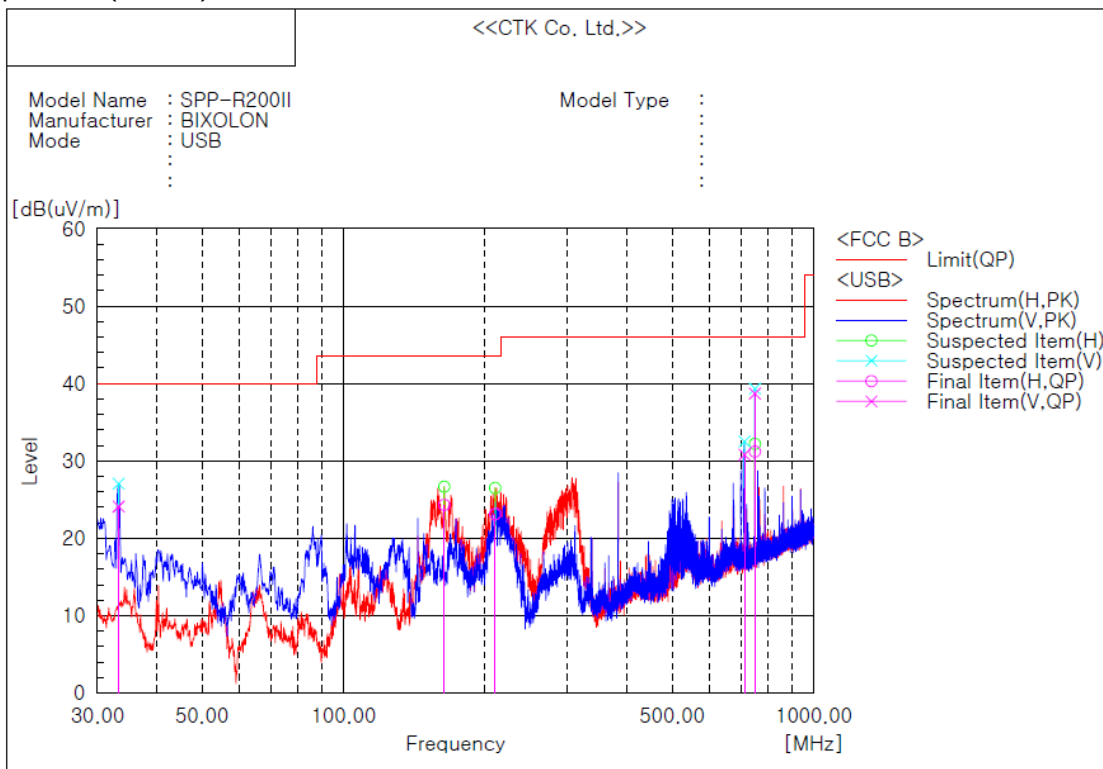
☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
750.104	38.7	7.3	Quasi-peak

Test Data

Remark :

1. The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.



Final Result

No.	Frequency (P)	Reading QP	c.f	Result QP	Limit QP	Margin QP	Height	Angle
	[MHz]	[dB(uV)]	[dB(1/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB]	[cm]	[deg]
1	33.274	V	37.7	-13.6	24.1	40.0	15.9	196.0
2	163.860	H	45.8	-21.5	24.3	43.5	19.2	100.0
3	210.299	H	44.4	-21.3	23.1	43.5	20.4	208.0
4	712.638	V	37.5	-6.7	30.8	46.0	15.2	100.0
5	750.104	H	37.1	-5.9	31.2	46.0	14.8	100.0
6	750.104	V	44.6	-5.9	38.7	46.0	7.3	100.0



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Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Mobile Printer	Measurement Detail	
Model	SPP-R200II	Frequency Range	1-25GHz
Channel	Channel 0	Detector function	Peak
Test Mode	GFSK (Worst case)		

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
4804.00	46.9 / 62.5	7.1 / 11.5	Average / Peak

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
4804.00	37.7 / 53.3	V	1.1	32.7	34.9	11.4	54.0 / 74.0	46.9 / 62.5	7.1 / 11.5

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
2390.00	39.9 / 50.4	V	1.1	28.2	35.3	7.4	54.0 / 74.0	40.2 / 50.7	13.8 / 23.3



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Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Mobile Printer	Measurement Detail	
Model	SPP-R200II	Frequency Range	1-25GHz
Channel	Channel 39	Detector function	Peak
Test Mode	GFSK (Worst case)		

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
4882.00	49.7 / 62.7	4.3 / 11.3	Average / Peak

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
4882.00	40.5 / 53.5	V	1.1	32.7	34.9	11.4	54.0 / 74.0	49.7 / 62.7	4.3 / 11.3

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV / m]	Pol.	Height [m]	Correction Factor			Limits [dBuV / m]	Result [dBuV / m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
No emissions were detected at a level greater than 20dB below limit.									

Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Mobile Printer	Measurement Detail	
Model	SPP-R200II	Frequency Range	1-25GHz
Channel	Channel 78	Detector function	Peak
Test Mode	GFSK (Worst case)		

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
2483.5	48.2 / 62.4	5.8 / 11.6	Average / Peak

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
4960.00	38.5 / 53.2	V	1.1	32.7	34.9	11.4	54.0 / 74.0	47.7 / 62.4	6.3 / 11.6

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
2483.50	47.9 / 62.1	V	1.1	28.2	35.3	7.4	54.0 / 74.0	48.2 / 62.4	5.8 / 11.6



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2.1.8 AC Conducted Emissions

Test Location

Shielded Room

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- 15.207(a)

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency.

Test Results

The requirements are:

☒ Complies

Test mode : Hopping(GFSK), CFG PKT Packet Type : 15,
Packet Size : 339(DH5), Hopping mode

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
23.9865	40.8	9.2	Average



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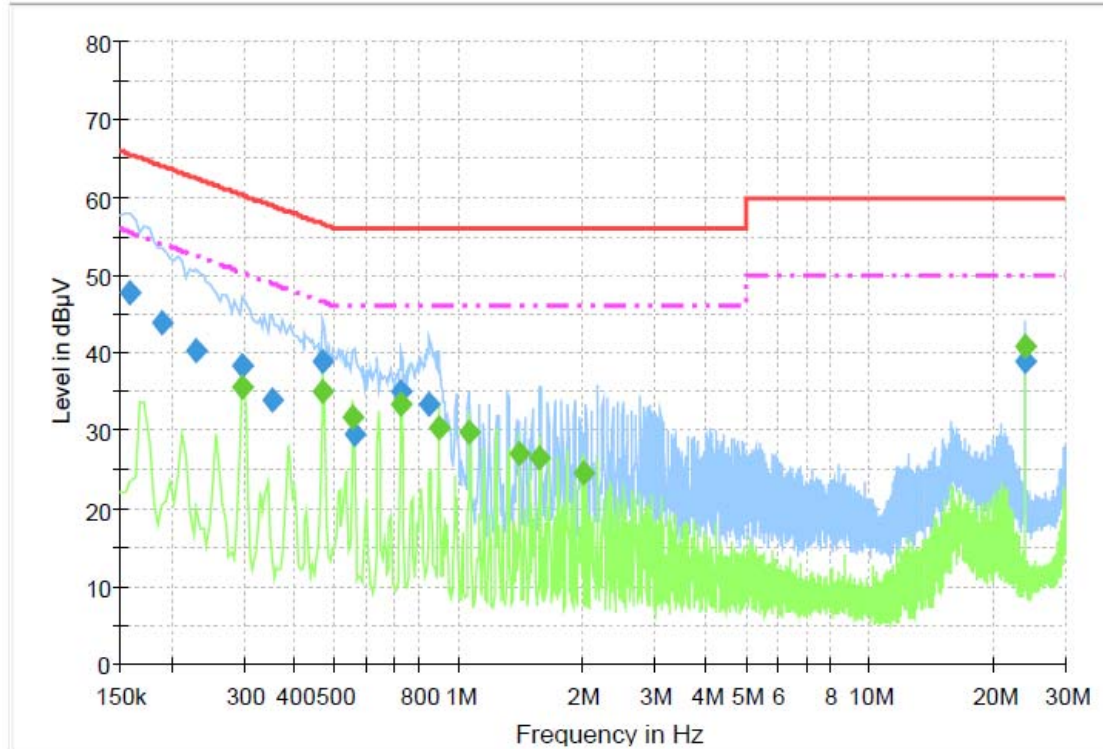
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Test Data

[HOT]



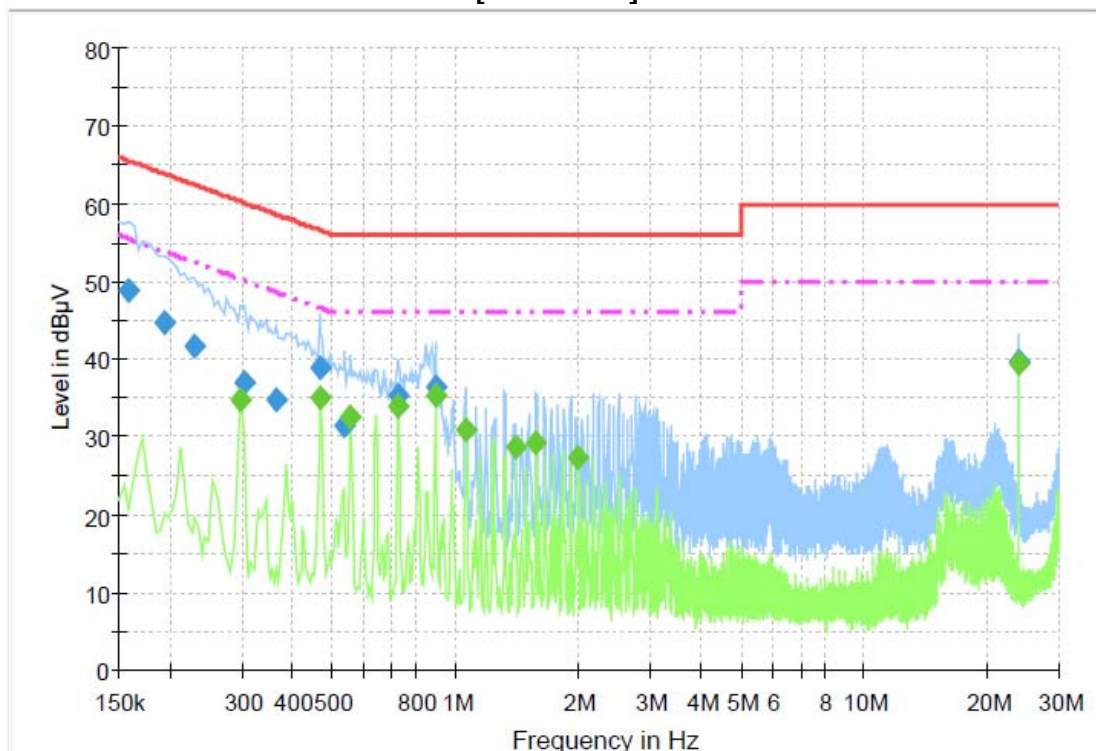
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159000	47.8	1000.0	9.000	On	L1	10.1	17.8	65.5
0.190500	43.8	1000.0	9.000	On	L1	10.0	20.3	64.0
0.231000	40.4	1000.0	9.000	On	L1	10.1	22.1	62.4
0.298500	38.4	1000.0	9.000	On	L1	10.1	21.9	60.3
0.352500	34.0	1000.0	9.000	On	L1	10.0	24.9	58.9
0.469500	38.9	1000.0	9.000	On	L1	10.0	17.6	56.5
0.559500	29.5	1000.0	9.000	On	L1	10.0	26.5	56.0
0.726000	35.1	1000.0	9.000	On	L1	10.1	20.9	56.0
0.852000	33.4	1000.0	9.000	On	L1	10.0	22.6	56.0
23.991000	39.0	1000.0	9.000	On	L1	9.9	21.0	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.298500	35.5	1000.0	9.000	On	L1	10.1	14.8	50.3
0.469500	35.1	1000.0	9.000	On	L1	10.0	11.4	46.5
0.555000	31.8	1000.0	9.000	On	L1	10.0	14.2	46.0
0.726000	33.5	1000.0	9.000	On	L1	10.1	12.5	46.0
0.897000	30.5	1000.0	9.000	On	L1	10.0	15.5	46.0
1.068000	29.7	1000.0	9.000	On	L1	10.0	16.3	46.0
1.410000	27.0	1000.0	9.000	On	L1	10.0	19.0	46.0
1.581000	26.6	1000.0	9.000	On	L1	9.9	19.4	46.0
2.008500	24.5	1000.0	9.000	On	L1	9.9	21.5	46.0
23.986500	40.8	1000.0	9.000	On	L1	9.9	9.2	50.0

[NEUTRAL]



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.159000	48.9	1000.0	9.000	On	N	10.1	16.6	65.5
0.195000	44.6	1000.0	9.000	On	N	10.2	19.3	63.8
0.231000	41.7	1000.0	9.000	On	N	10.2	20.7	62.4
0.303000	37.1	1000.0	9.000	On	N	10.1	23.1	60.2
0.366000	34.9	1000.0	9.000	On	N	10.0	23.7	58.6
0.465000	38.8	1000.0	9.000	On	N	9.9	17.8	56.6
0.537000	31.6	1000.0	9.000	On	N	9.9	24.4	56.0
0.726000	35.4	1000.0	9.000	On	N	10.1	20.6	56.0
0.897000	36.5	1000.0	9.000	On	N	10.0	19.5	56.0
23.986500	39.7	1000.0	9.000	On	N	10.1	20.4	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.298500	34.6	1000.0	9.000	On	N	10.1	15.7	50.3
0.469500	35.0	1000.0	9.000	On	N	9.9	11.5	46.5
0.555000	32.5	1000.0	9.000	On	N	10.0	13.5	46.0
0.726000	33.9	1000.0	9.000	On	N	10.1	12.1	46.0
0.897000	35.4	1000.0	9.000	On	N	10.0	10.6	46.0
1.068000	31.0	1000.0	9.000	On	N	10.0	15.0	46.0
1.405500	28.8	1000.0	9.000	On	N	10.0	17.2	46.0
1.576500	29.2	1000.0	9.000	On	N	9.9	16.8	46.0
2.004000	27.4	1000.0	9.000	On	N	9.9	18.6	46.0
23.986500	39.5	1000.0	9.000	On	N	10.1	10.5	50.0



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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Signal Analyzer	Agilent	N9020A	MY48011598	2012-11-10
2	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2012-11-10
3	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2012-07-07
4	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	100203	2013-07-05
5	LOOP ANTENNA	EMCO	6502	9107-2652	2012-10-29
6	Attenuator	HP	8494A	3308A33351	2012-11-14
7	EPM Series Power Meter	HP	E4418A	GB38272734	2012-11-10
8	Power Sensor	HP	8487A	3318A03524	2012-07-07
9	Audio Analyzer	HP	8903B	2747A03432	2012-11-10
10	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2012-11-21
11	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2012-11-10
12	Modulation Analyzer	HP	8901B	3438A05228	2012-11-18
13	Attenuator	BIRD	1000-WA-MFN-30	236	2012-11-14
14	Temp&Humi Chamber	Kunpoong	JT-TH-556-1	9QE5-002	2013-01-12
15	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2012-11-10
16	EMC Analyzer	Agilent	E7405A	MY45110859	2013-02-13
17	Horn Antenna	ETS-Lindgren	3115	00078894	2013-03-22
18	Horn Antenna	ETS-Lindgren	3115	00078895	2013-03-22
19	Antenna(Biconical)	EMCO	3110	9202-1510	2012-06-10
20	Antenna(Log Periodic)	EMCO	3146	9607-4567	2012-06-10
21	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2013-03-27
22	PREAMPLIFIER	Agilent	8449B	3008A02307	2012-11-17
23	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2013-02-09
24	LISN	Rohde & Schwarz	ESH3-Z5	101235	2012-08-18
25	LISN	Rohde & Schwarz	ENV216	101236	2012-08-06
26	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2012-11-10
27	EMI Test Receiver	Rohde & Schwarz	ESCI3	100032	2013-02-09