

TEST REPORT For FCC

Test Report No. : 2010080093
Date of Issue : August 31, 2010
FCC ID : UZCGBC-1000
Model/Type No. : GBC-1000
Kind of Product : Bluetooth Handsfree Car kit
Applicant : GT Telecom Co., Ltd.
Applicant Address : 848-16 Gupyeong-Dong, Gumi-City, Gyeongbuk, Korea
Manufacturer : Mobisolution Co., Ltd.
Manufacturer Address : A-101, 848-16 Gupyeong-Dong, Gumi-City,
Gyeongsanbuk-Do, Korea
Contact Person : Gi Pyo, Kim / Junior Engineer
Telephone : +82-54-474-2220
Received Date : August 11, 2010
Test period : Start : August 11, 2010 End : August 31, 2010
Test Results : ☒ In Compliance ☐ Not in Compliance

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

Tested by

Y. T. Lee

Lee Young-taek
Test Engineer
Date: August 31, 2010

Reviewed by

Y. J. Park

Young-Joon, Park
Technical Manager
Date: August 31, 2010



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REPORT REVISION HISTORY

Date	Revision	Page No
August 31, 2010	Issued (2010080093)	All

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1.0 General Product Description

Equipment model name : GBC-1000

Serial number : Prototype

EUT condition : Pre-production, not damaged

Antenna type : Chip antenna Gain 0.218 dBi

Frequency Range : 2402 ~ 2480 MHz

RF power : 3.03 dBm Peak Conducted (GFSK)
: 1.74 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 Polymer Battery(DC 3.7 V)

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
Low, Mid, High	FHSS	GFSK
Low, Mid, High	FHSS	8-DPSK

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.	FCC ID or DoC
Notebook PC	TOSHIBA	PSL48K-00L00K	Z7037782R	DoC
AC/DC ADAPTOR (for PC)	DELTA ELECTRONICS	ADP-75SB BB	T8W0746330531	-

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 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	 805871
JAPAN	VCCI	10 meter Open Area Test Site and one conducted site.	 R-948, C-986
KOREA	KCC	EMI (10 meter Open Area Test Site and two conducted sites) 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
15.249 /15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)	Radiated	C
15.207 /15.107	AC Conducted Emissions	EN 55022	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

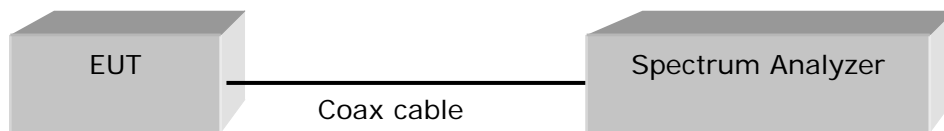


Figure 1 : Measurement setup for the carrier frequency separation

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	1002	517	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	1000	837	25	Complies

See next pages for actual measured spectrum plots.



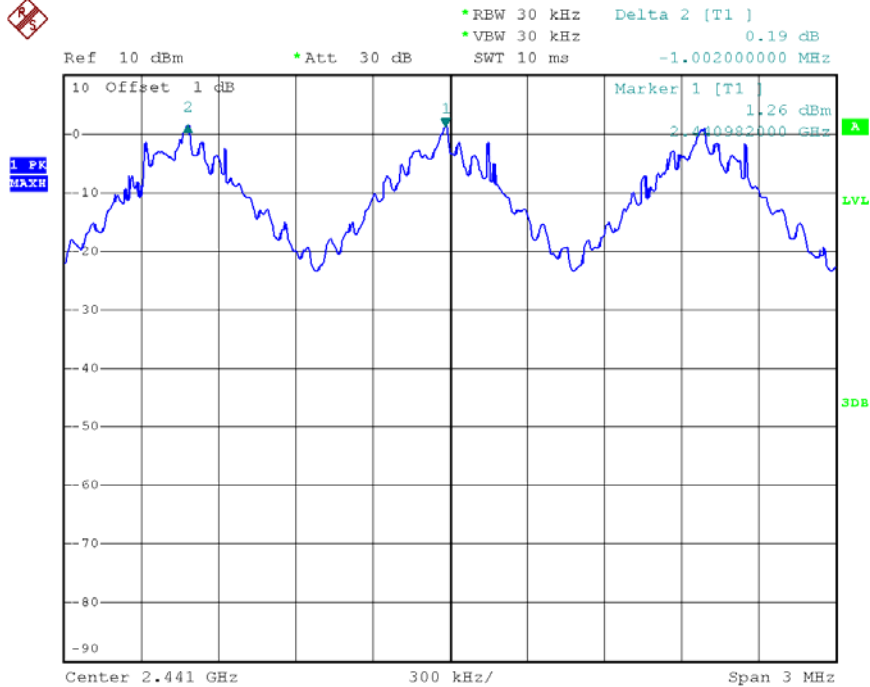
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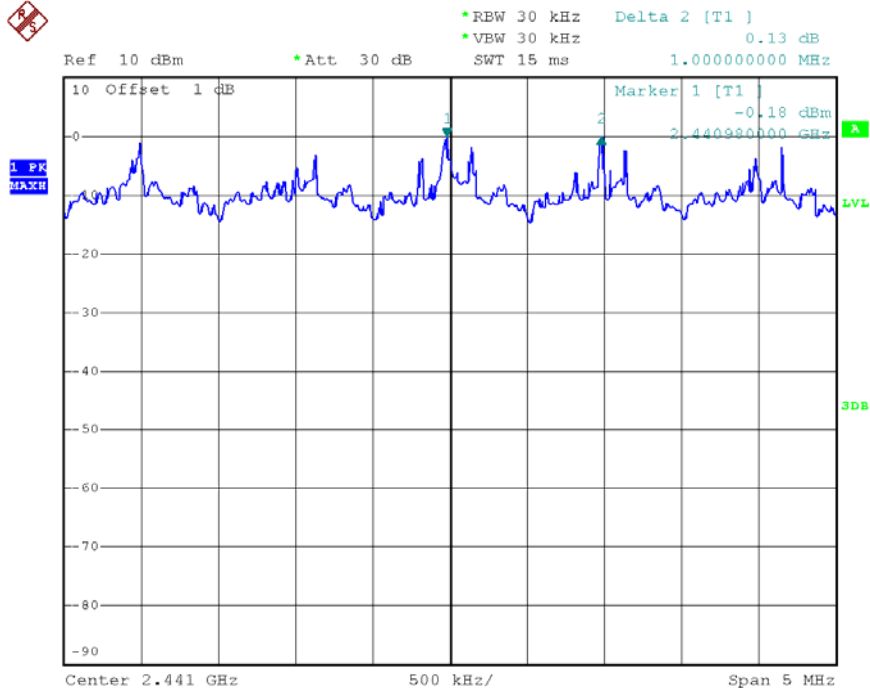
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Carrier Frequency Separation

Data Rate : GFSK



Data Rate : 8-DPSK



2.1.2 Number of Hopping Frequencies

Test Location

RF Test Room

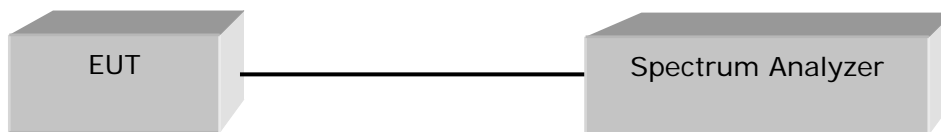
Test Procedures

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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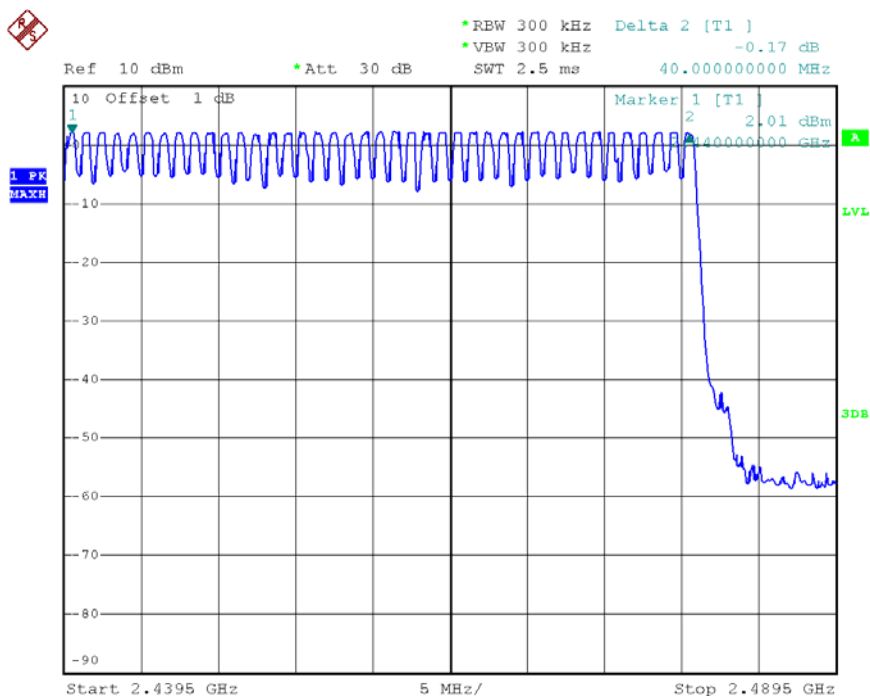
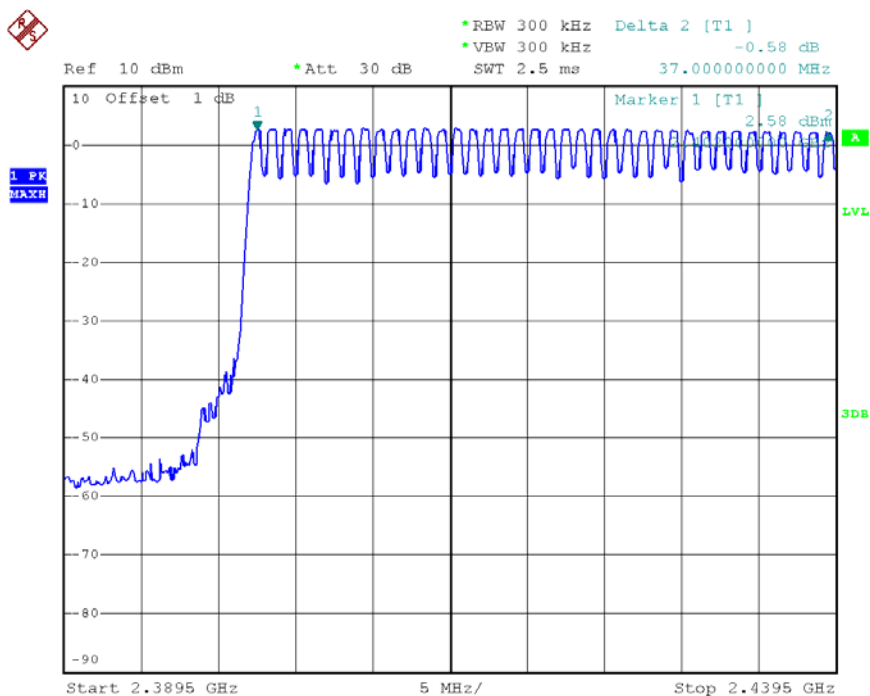
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Number of Hopping Frequencies(GFSK)





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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)

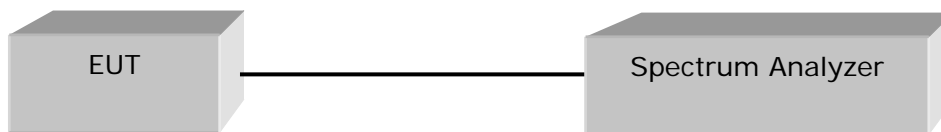
RBW = 30 kHz ($\geq 1\%$ of the span)

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	0.788	Complies
2441	39	0.776	Complies
2480	78	0.784	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	1.256	Complies
2480	78	1.252	Complies

See next pages for actual measured spectrum plots.



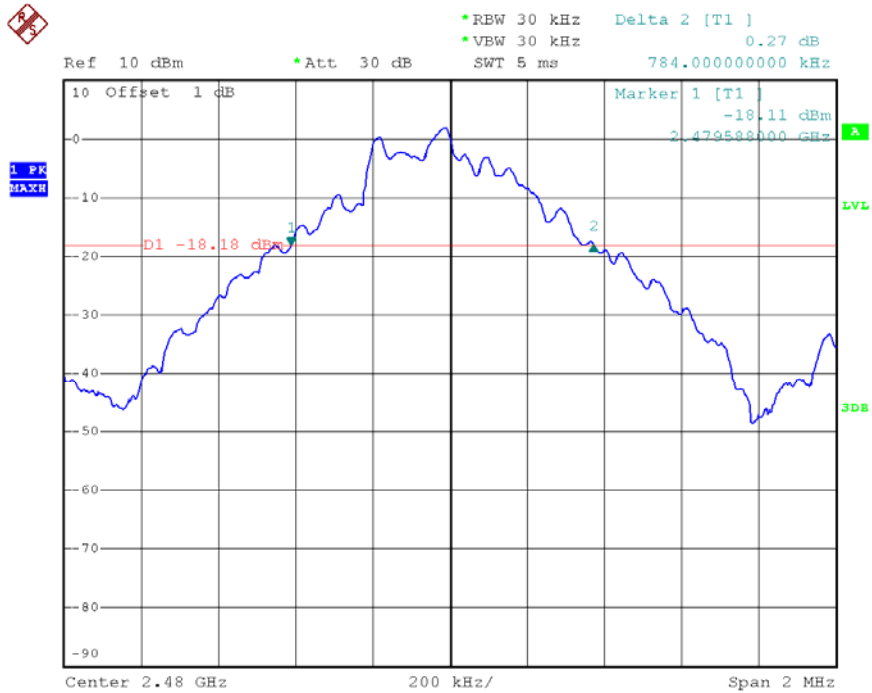
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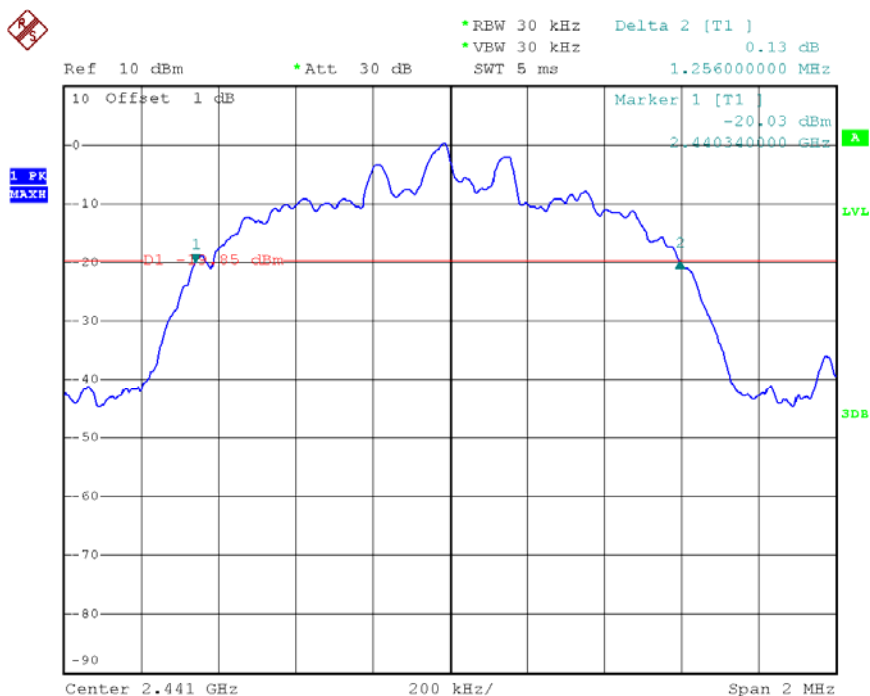
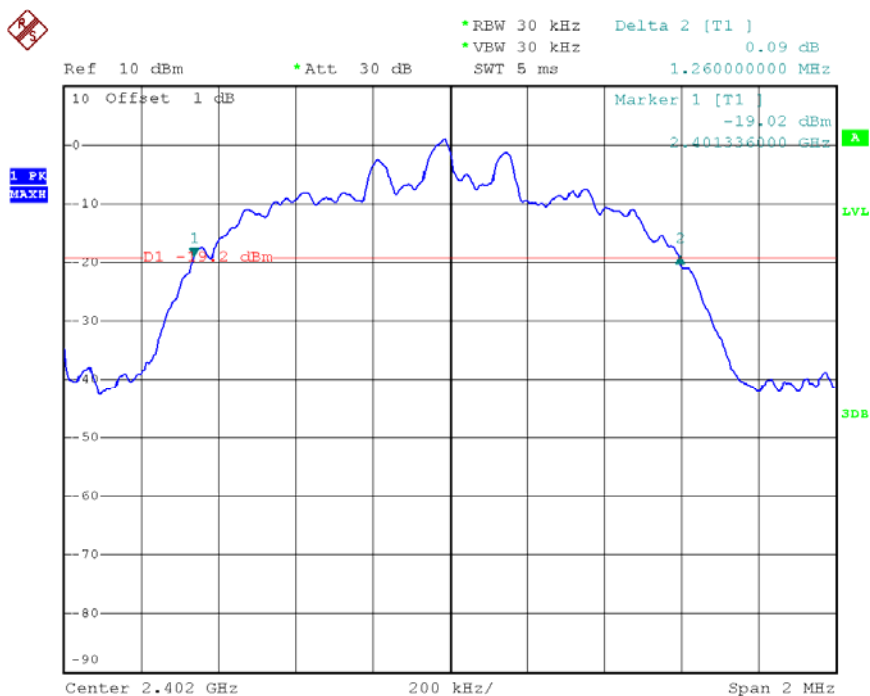
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20 dB Bandwidth – 8-DPSK





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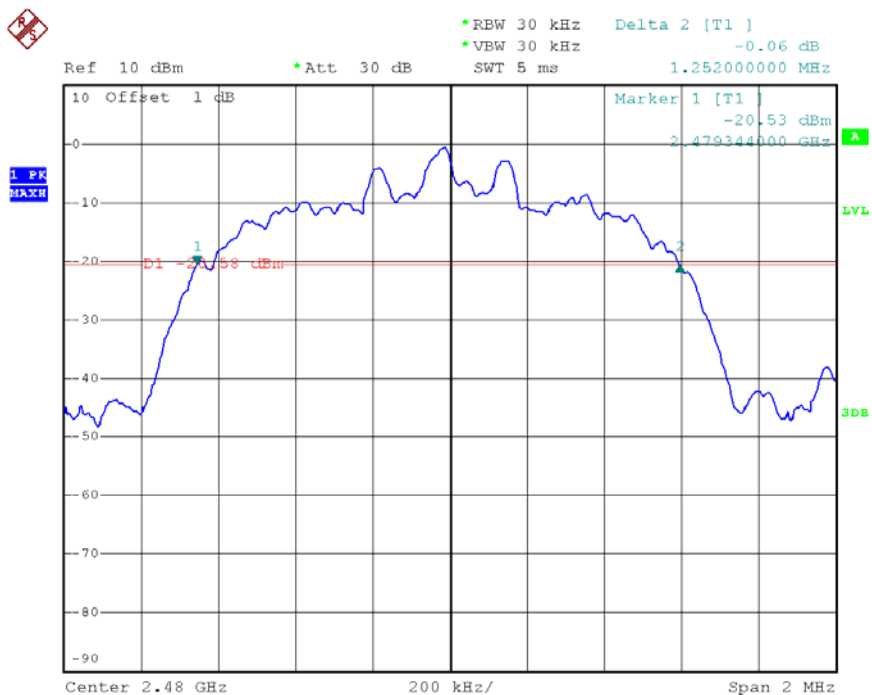
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2.1.4 Time of Occupancy (Dwell Time)

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 H318B 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

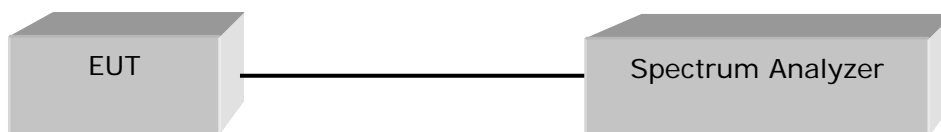
RBW = 1 MHz

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	0.435	139.20	Complies
	DH 3	1.699	271.84	Complies
	DH 5	2.959	315.63	Complies

DH1 Dwell time = $0.435 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 139.20 \text{ ms}$

DH3 Dwell time = $1.699 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 271.84 \text{ ms}$

DH5 Dwell time = $2.959 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 315.63 \text{ ms}$

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	0.457	146.24	Complies
	3DH 3	1.693	270.88	Complies
	3DH 5	2.925	312.00	Complies

3DH1 Dwell time = $0.457 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 146.24 \text{ ms}$

3DH3 Dwell time = $1.693 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 270.88 \text{ ms}$

3DH5 Dwell time = $2.925 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 312.00 \text{ ms}$

See next pages for actual measured spectrum plots.



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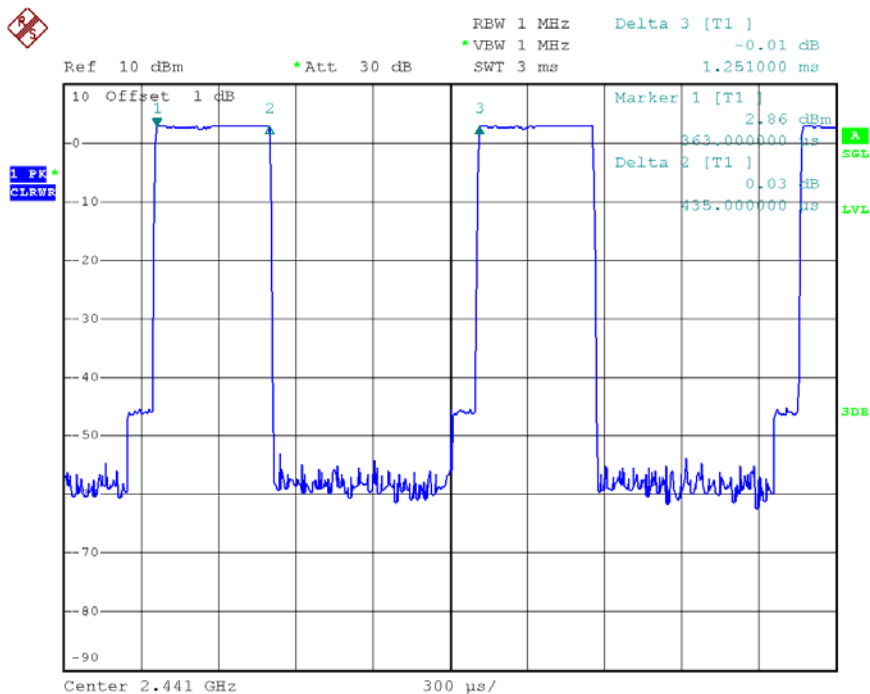
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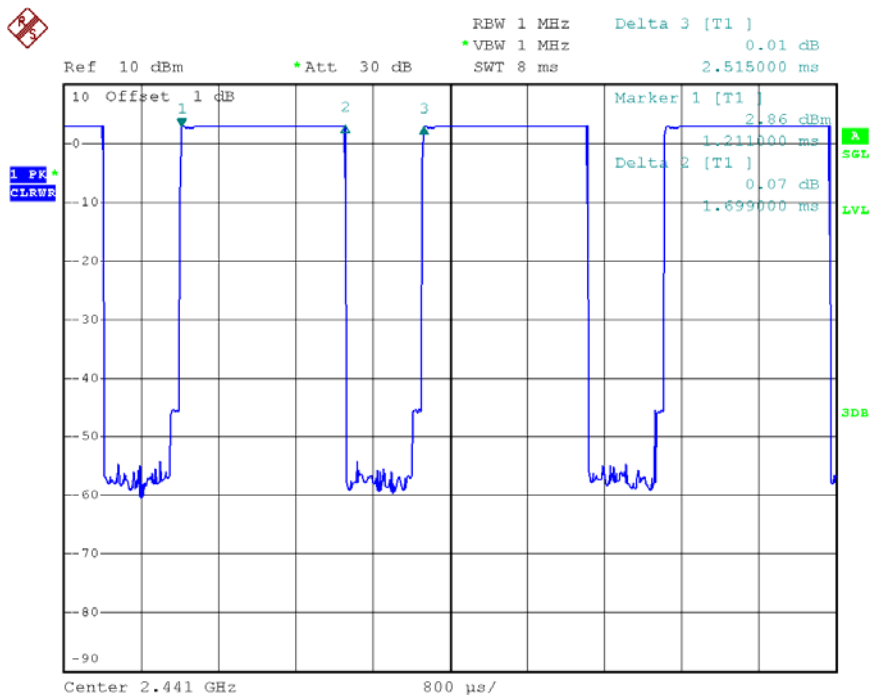
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Time of Occupancy for PACKET Type DH1(GFSK)



Time of Occupancy for PACKET Type DH3(GFSK)





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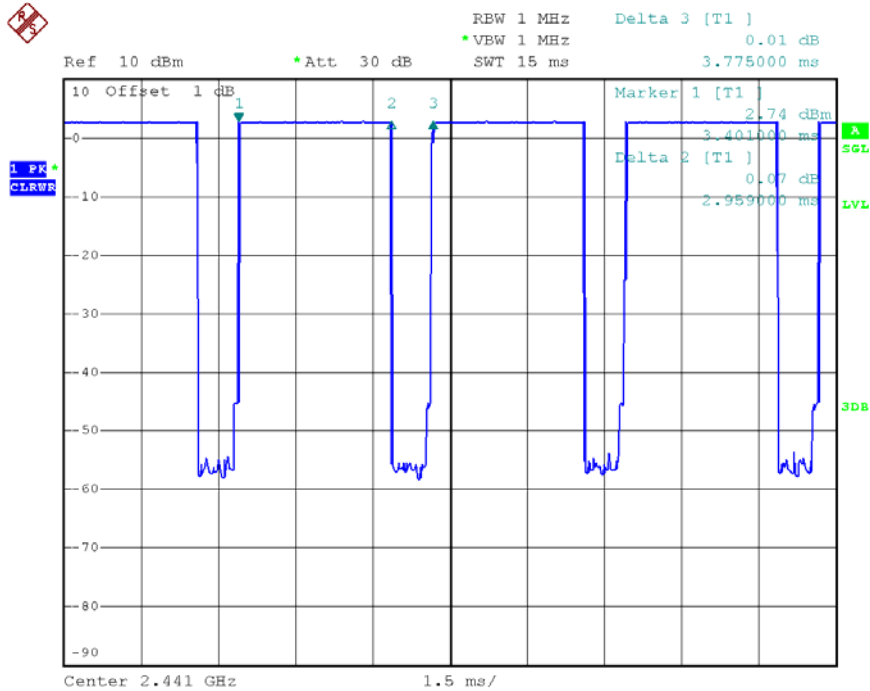
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Time of Occupancy for PACKET Type DH5(GFSK)





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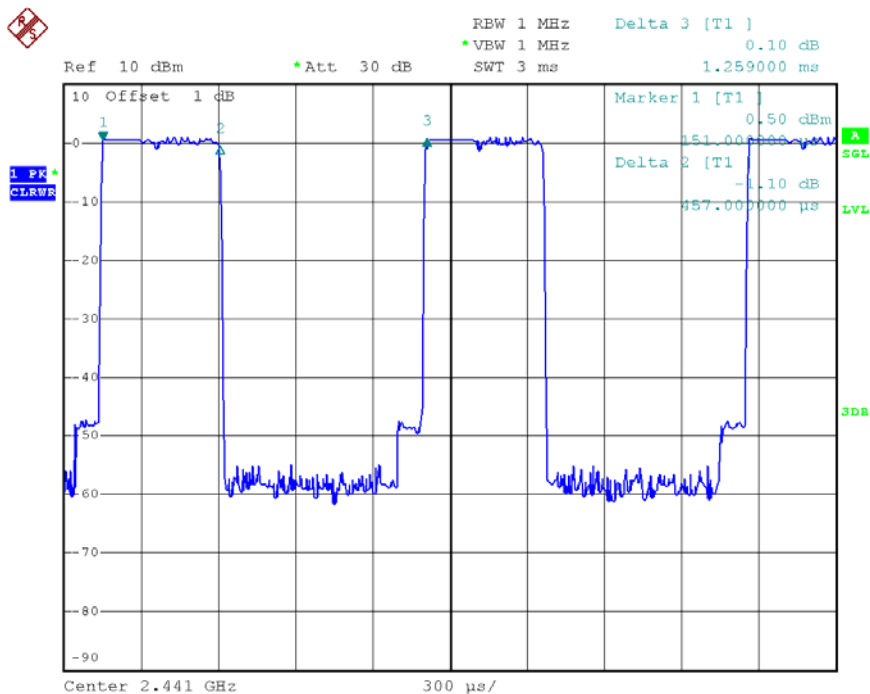
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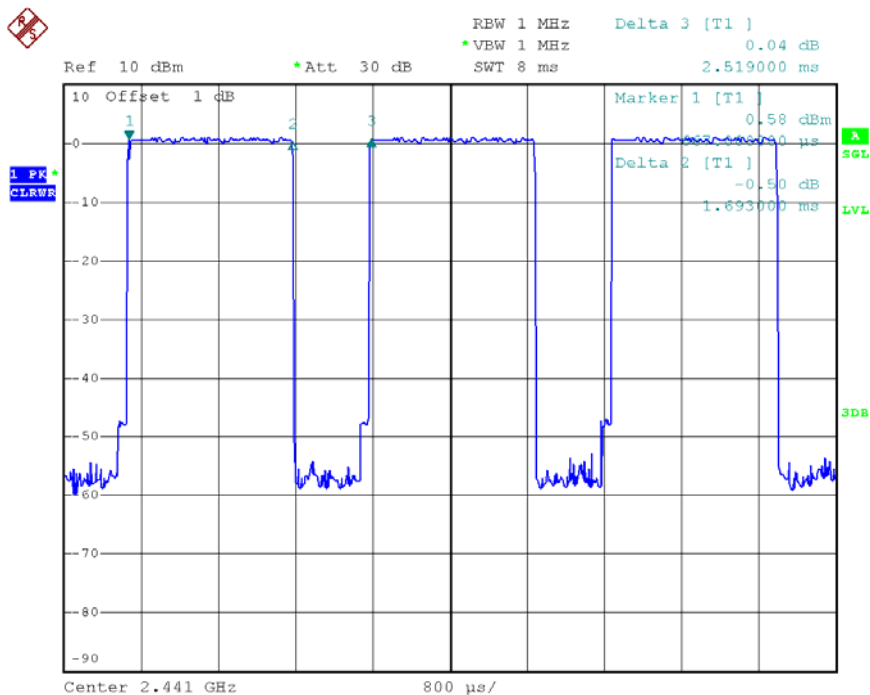
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Time of Occupancy for PACKET Type 3DH1(8-DPSK)



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





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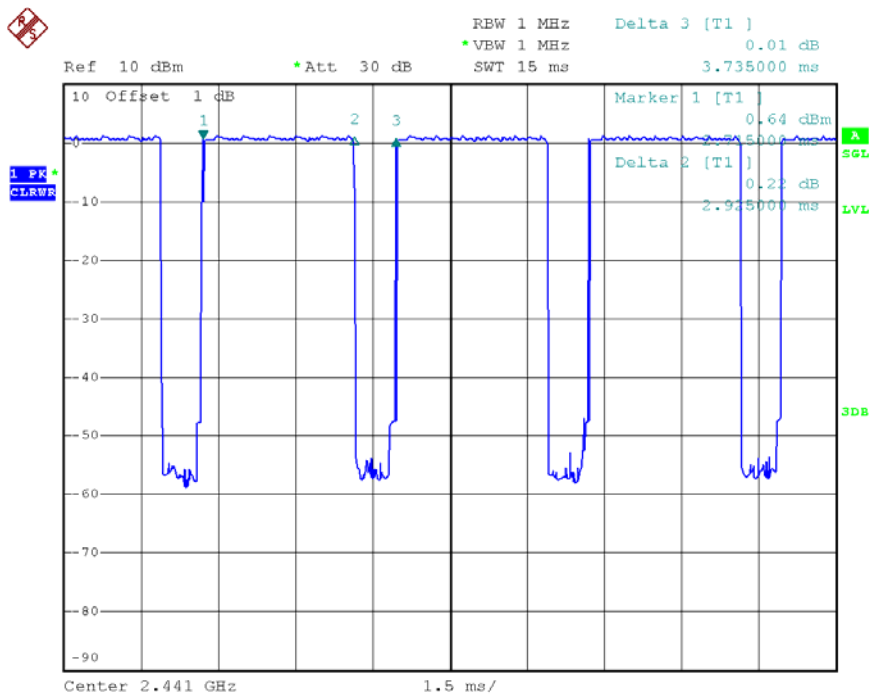
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Time of Occupancy for PACKET Type 3DH5(8-DPSK)



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 = approximately 5 times of the 20 dB bandwidth

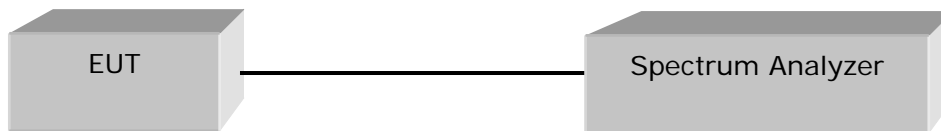
RBW = greater than the 20 dB bandwidth of the emission being measured

VBW = \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 : 4 Packet Size : 27(DH1)

Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	3.03	2.01	Complies
2441	39	2.52	1.79	Complies
2480	78	2.39	1.73	Complies

Test mode : 8-DPSK, CFG PKT Packet Type : 24 Packet Size : 83(3DH1)

Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	2.52	1.79	Complies
2441	39	1.73	1.49	Complies
2480	78	1.50	1.41	Complies

See next pages for actual measured spectrum plots.



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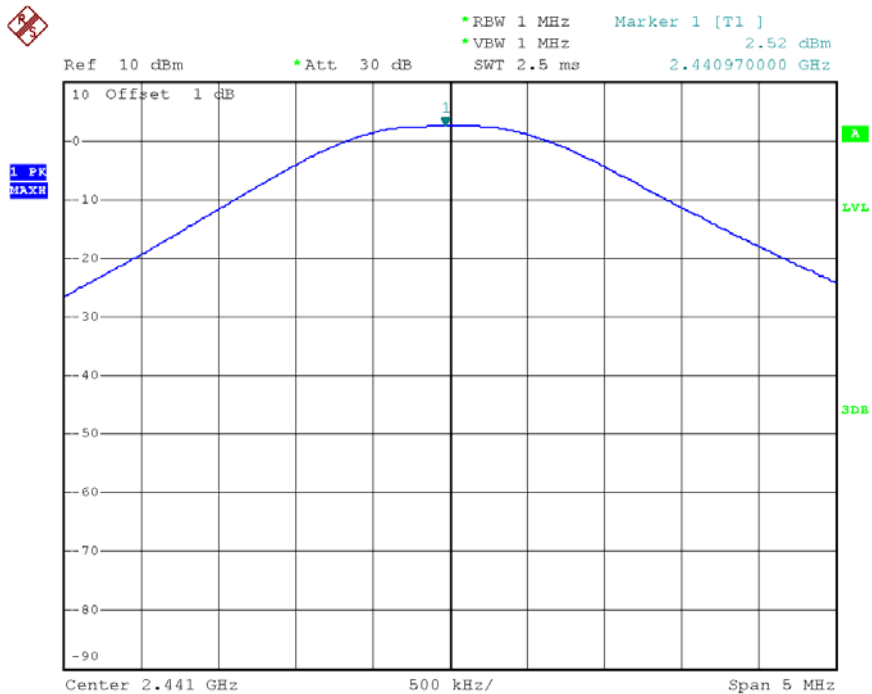
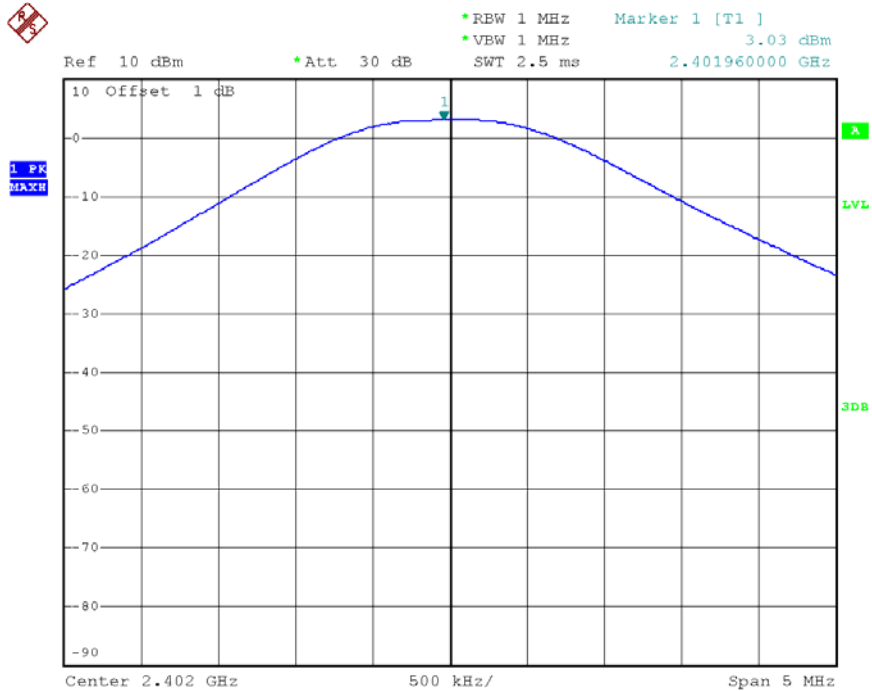
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Maximum peak Conducted Output Power - GFSK





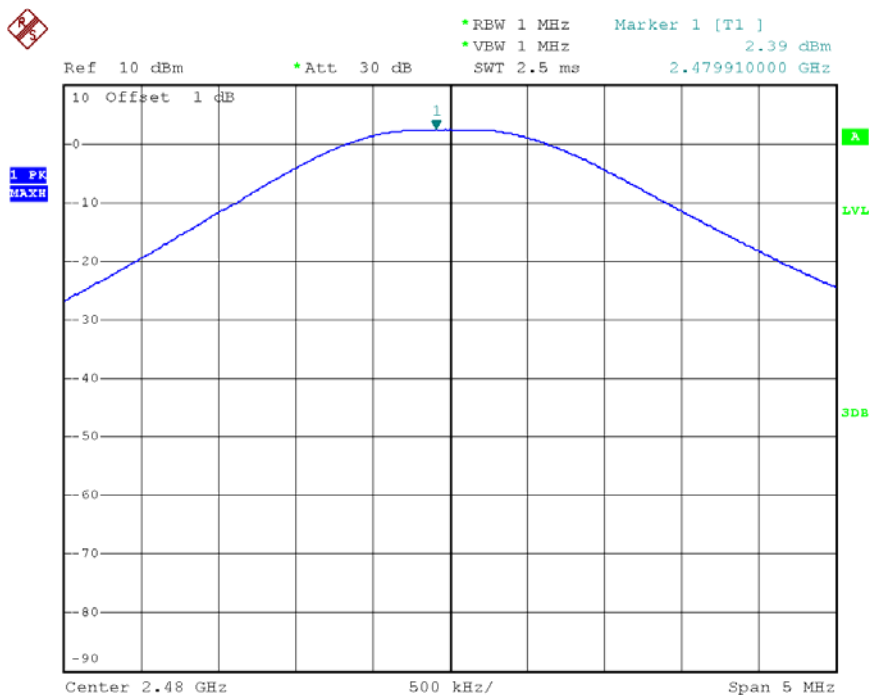
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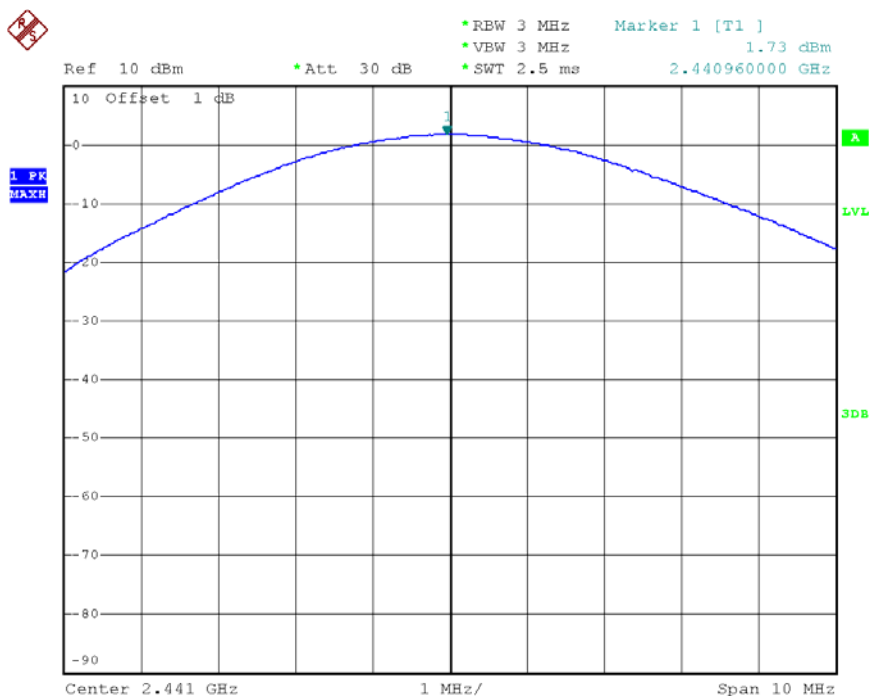
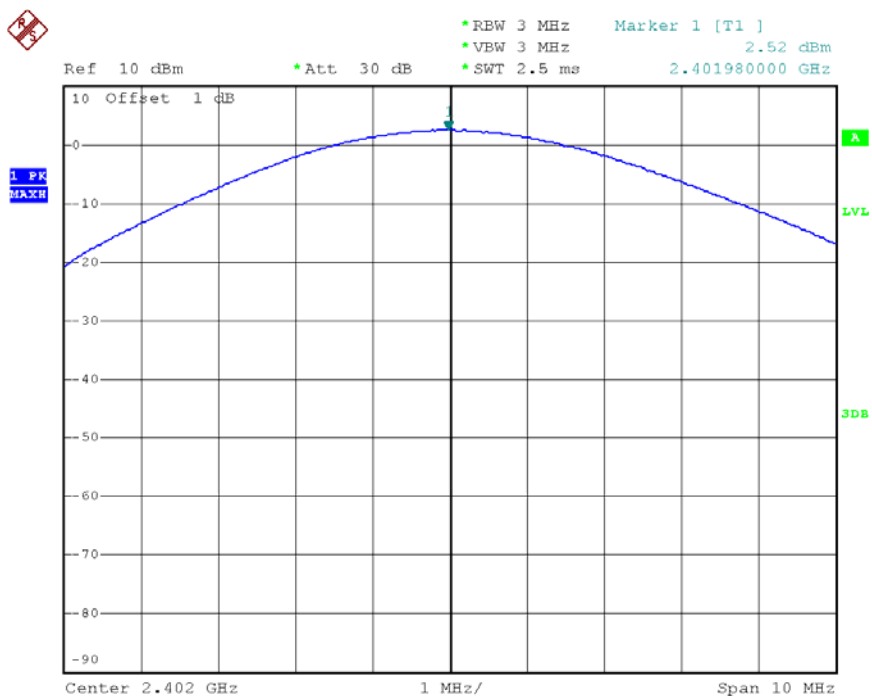
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Maximum peak Conducted Output Power - 8-DPSK





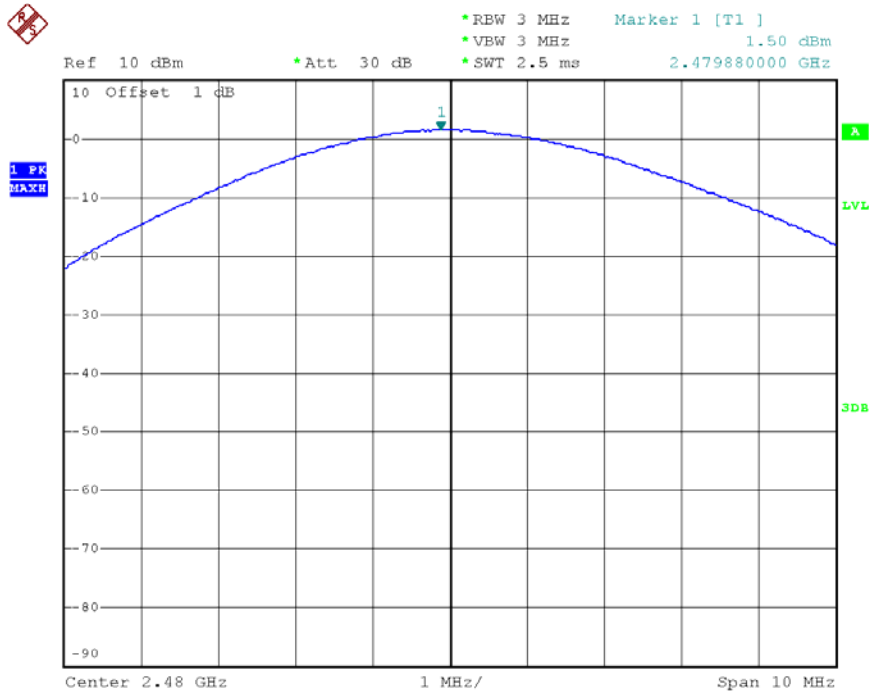
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2.1.6 Band-edge

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

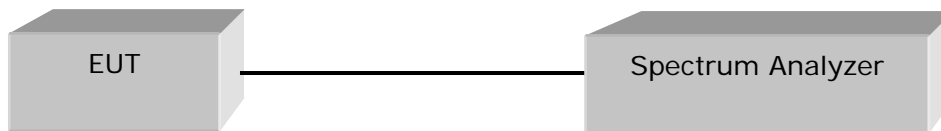
VBW = 100 kHz (\geq RBW)

Span = 100 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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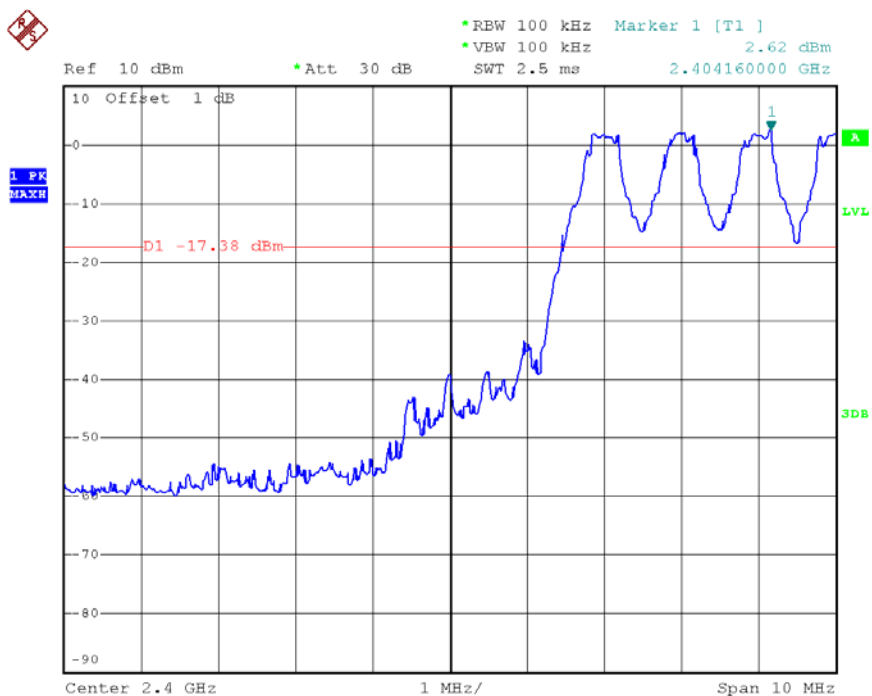
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Band – edge (with Hopping) - GFSK





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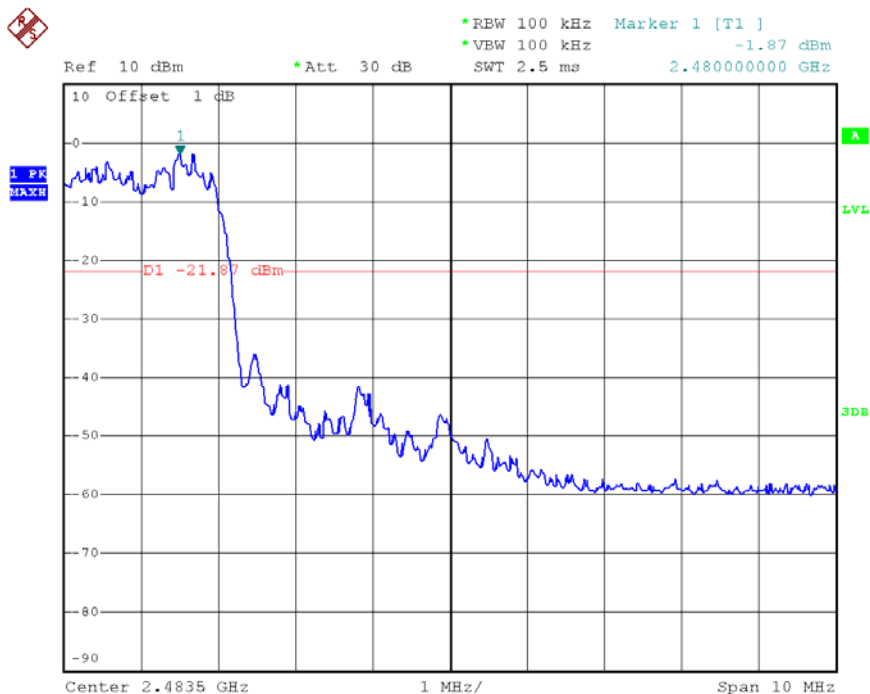
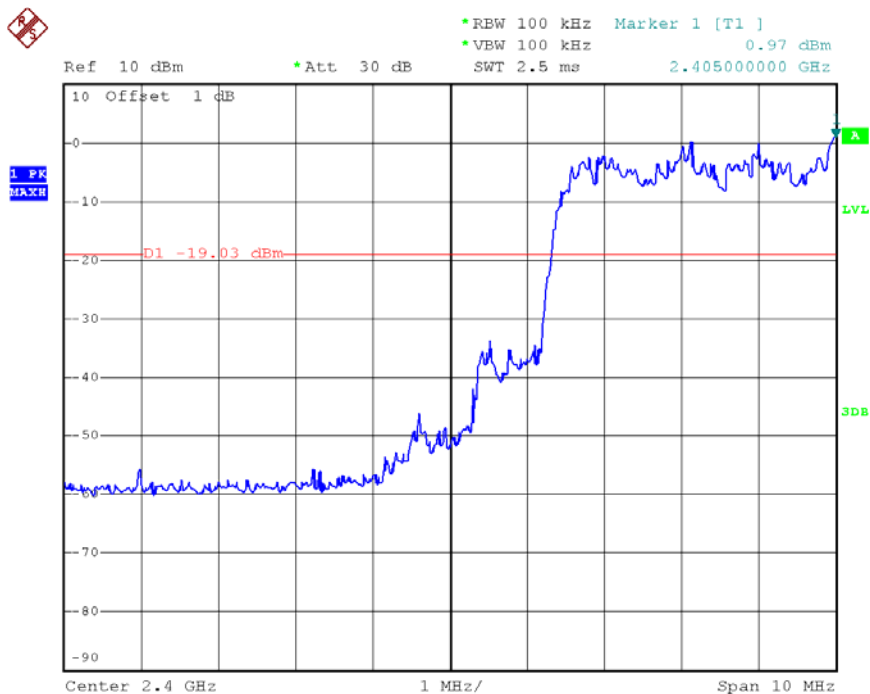
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Band – edge (with Hopping) - 8-DPSK





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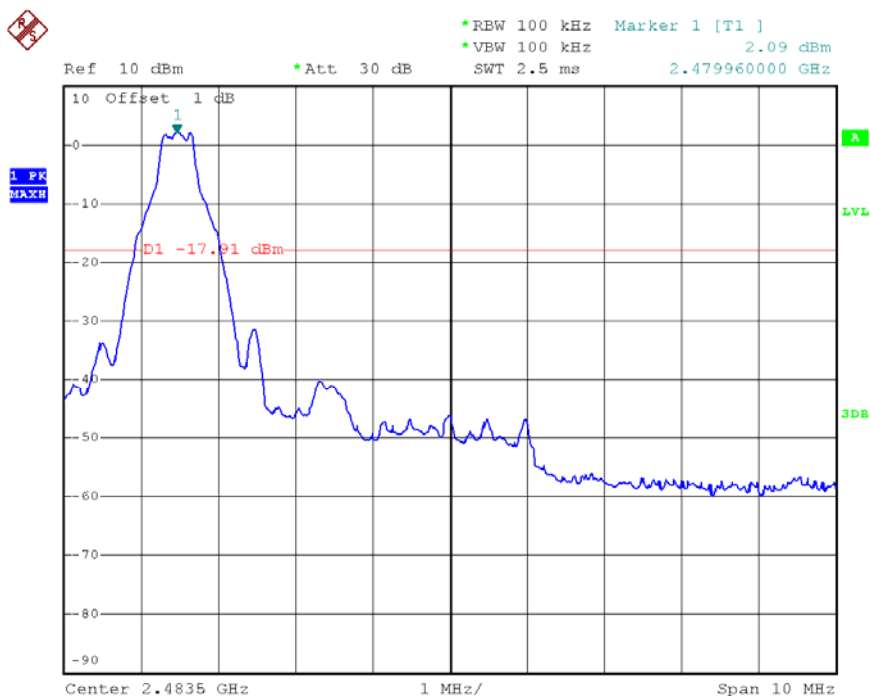
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Band – edge (without Hopping) - GFSK





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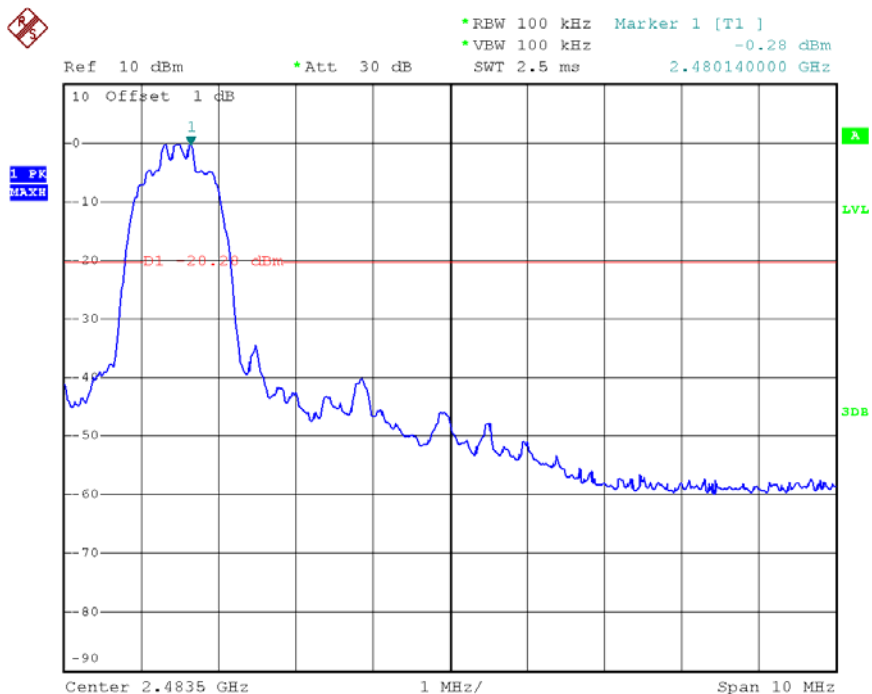
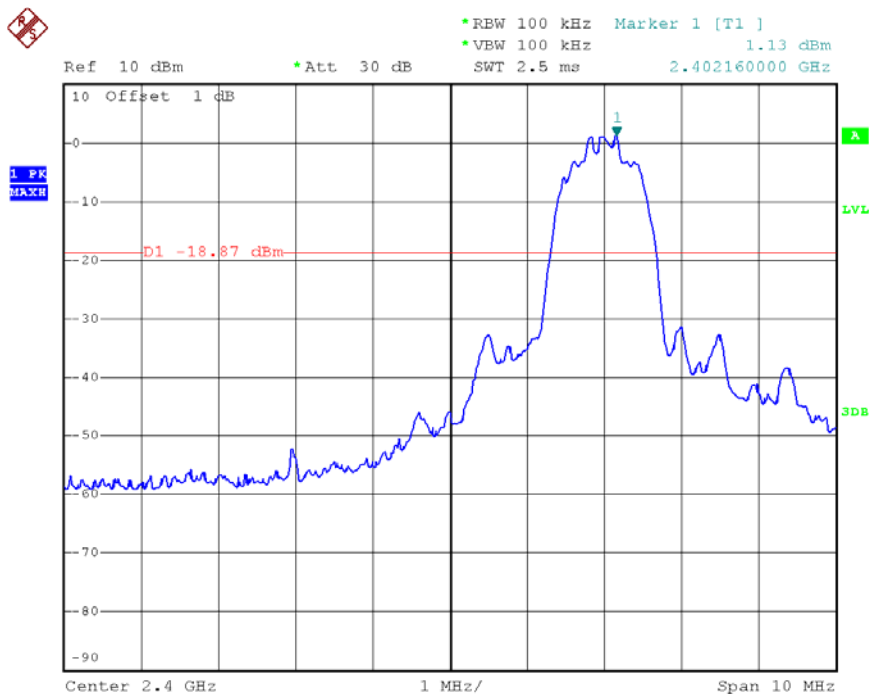
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Band – edge (without Hopping) - 8-DPSK





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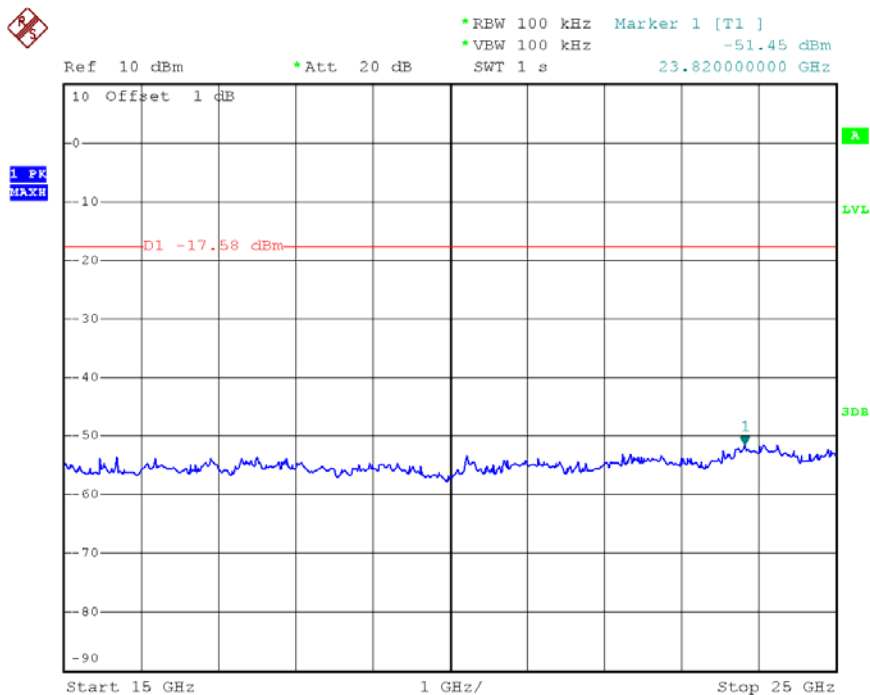
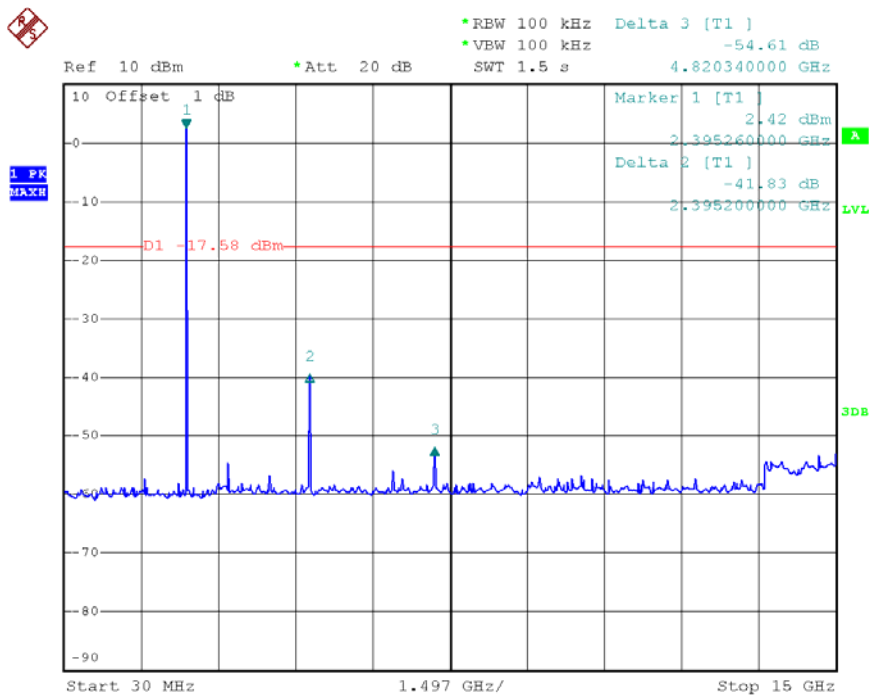
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Band – edge (at 20 dB blow) – Low channel Frequency Range = 30 MHz ~ 10th harmonic (GFSK : Worst-Case)



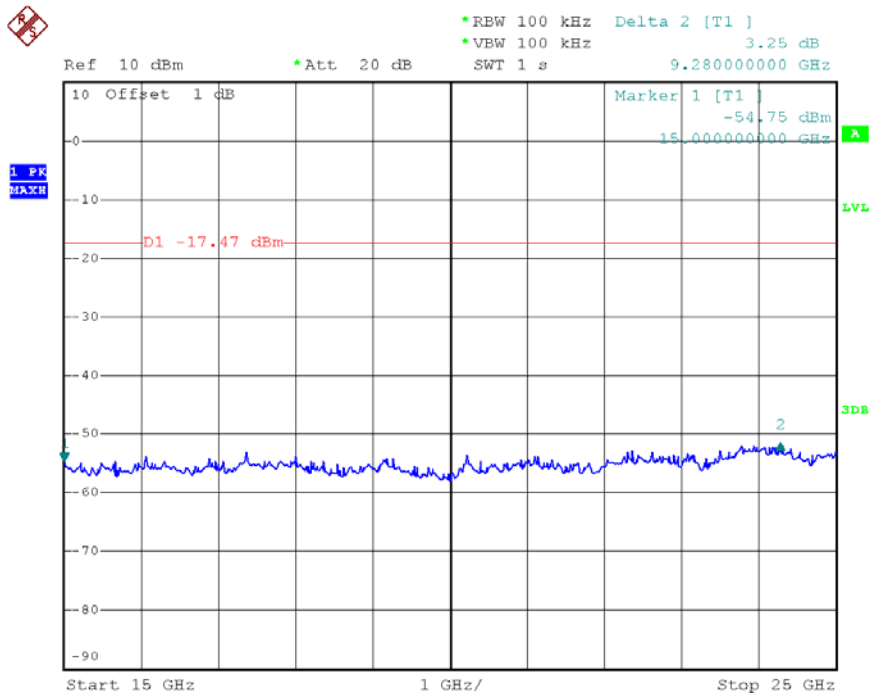
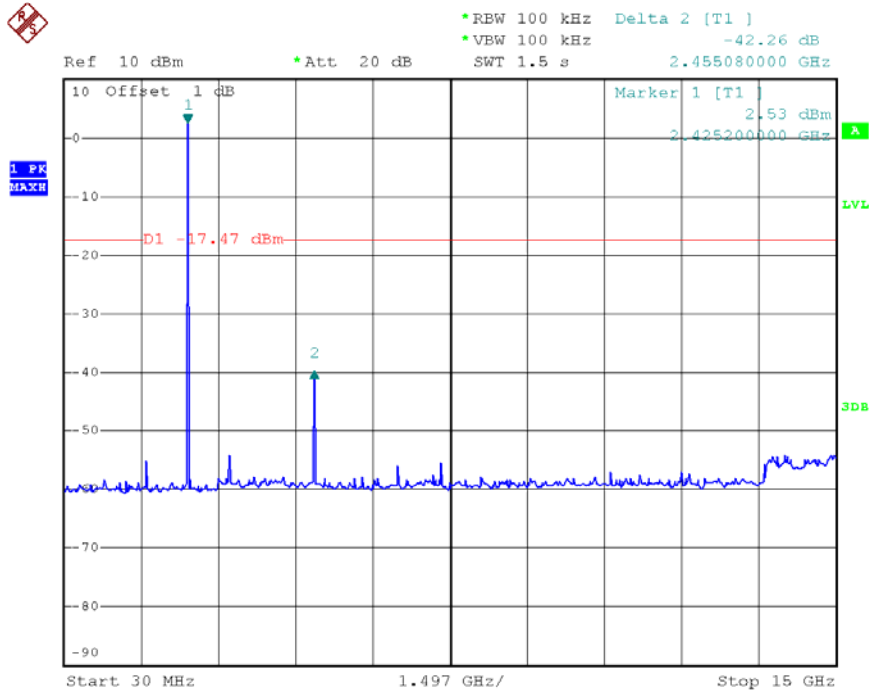


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Band – edge (at 20 dB blow) – Mid channel Frequency Range = 30 MHz ~ 10th harmonic (GFSK : Worst-Case)



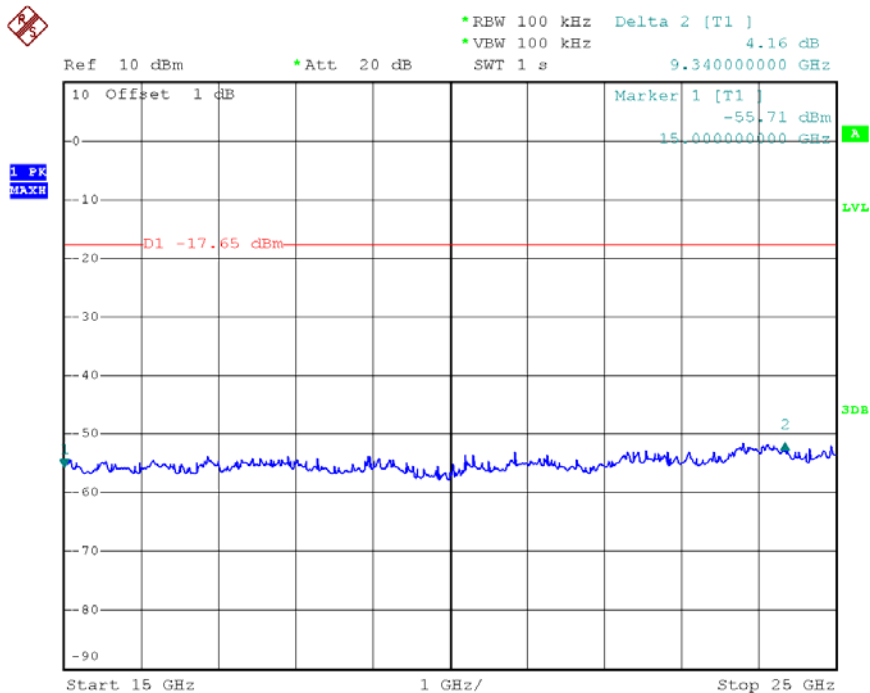
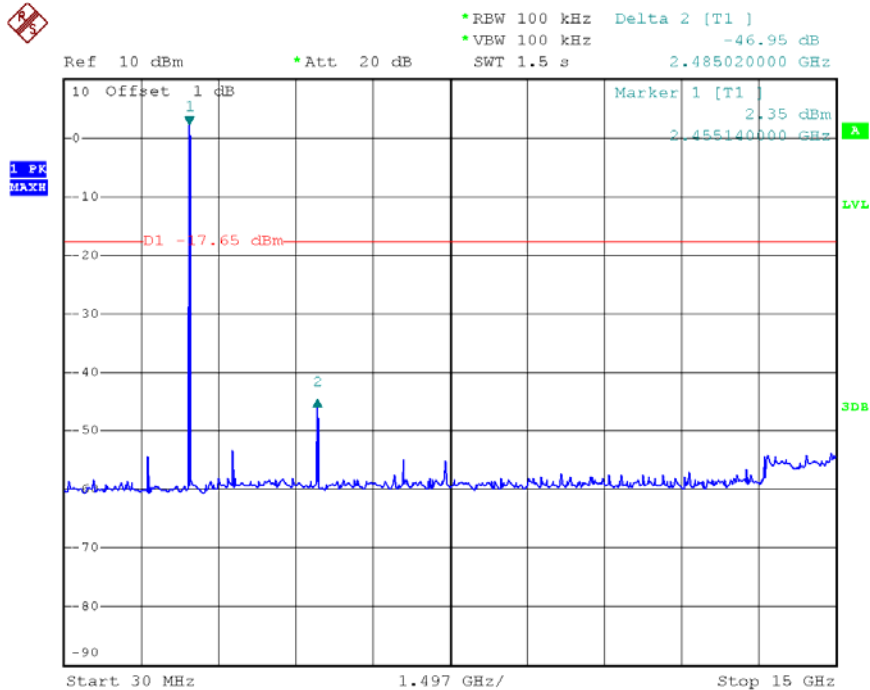


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Band – edge (at 20 dB blow) – High channel Frequency Range = 30 MHz ~ 10th harmonic (GFSK : Worst-Case)



2.1.7 Field Strength of Emissions

Test Location

☒ Testing was performed at a test distance of 3 meter Open Area Test Site

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

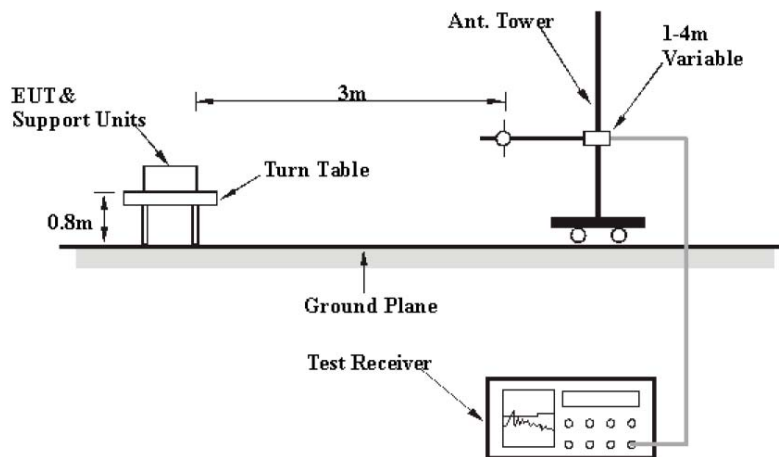
Frequency Range = 30 MHz ~ 10th harmonic

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.

Test Results

Test mode : Hopping(GFSK), CFG PKT Packet Type : 4 Packet Size : 27(DH1)

EUT	Bluetooth Handsfree Car kit	Measurement Detail	
Model	GBC-1000	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
158.53	38.9	4.6	Quasi-peak

Test Data

Frequency [MHz]	Reading [dBμV/m]	Pol.	Height [m]	Correction Factor			Limits [dBμV/m]	Result [dBμV/m]	Margin [dB]
				Antenna	Cable	Amp. Gain			
90.67	53.4	H	2.0	9.1	0.7	31.4	43.5	31.8	11.7
158.53	61.5	H	2.2	7.5	1.3	31.4	43.5	38.9	4.6
161.10	61.4	V	1.2	7.4	1.3	31.4	43.5	38.7	4.8
224.07	56.1	V	1.0	8.8	1.8	31.3	46.0	35.4	10.6
580.56	48.2	H	1.8	16.9	3.8	31.3	46.0	37.6	8.4
750.23	48.5	V	1.0	19.3	4.1	31.3	46.0	40.6	5.4

H : Horizontal, V : Vertical

Result = Reading + Antenna + Cable - Amp.Gain

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.

Test Results

Test mode : GFSK, CFG PKT Packet Type : 4 Packet Size : 27(DH1)

EUT	Bluetooth Handsfree Car kit	Measurement Detail	
Model	GBC-1000	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
4803.75	51.0 / 56.2	3.0 / 17.8	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			
4825.00	41.8 : 47.0	H	1.5	32.7	34.9	11.4	54.0 : 74.0	51.0 : 56.2	3.0 : 17.8

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.									



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Test Results

Test mode : GFSK, CFG PKT Packet Type : 4 Packet Size : 27(DH1)

EUT	Bluetooth Handsfree Car kit	Measurement Detail	
Model	GBC-1000	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	47.9 / 52.8	6.1 / 21.2	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			
4910.00	38.7 / 43.6	H	1.5	32.7	34.9	11.4	54.0 / 74.0	47.9 / 52.8	6.1 / 21.2

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.									



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Test Results

Test mode : GFSK, CFG PKT Packet Type : 4 Packet Size : 27(DH1)

EUT	Bluetooth Handsfree Car kit	Measurement Detail	
Model	GBC-1000	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
4959.80	50.4 / 55.2	3.6 / 18.8	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			
4995.00	41.2 / 46.0	H	1.5	32.7	34.9	11.4	54.0 / 74.0	50.4 / 55.2	3.6 / 18.8

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.									

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 : 4,
Packet Size : 27(DH1), Battery Charging mode**

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
0.474	38.3	8.1	Average

Test Data

[HOT]

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	53.6	1000.0	9.000	On	L1	10.1	12.4	66.0
0.186000	49.2	1000.0	9.000	On	L1	10.2	15.0	64.2
0.240000	44.5	1000.0	9.000	On	L1	10.1	17.6	62.1
0.303000	41.8	1000.0	9.000	On	L1	10.1	18.4	60.2
0.474000	38.7	1000.0	9.000	On	L1	10.2	17.7	56.4
0.564000	37.8	1000.0	9.000	On	L1	10.1	18.2	56.0
0.802500	35.6	1000.0	9.000	On	L1	10.0	20.4	56.0
0.820500	35.2	1000.0	9.000	On	L1	10.0	20.8	56.0
9.879000	30.0	1000.0	9.000	On	L1	9.8	30.0	60.0
10.482000	27.0	1000.0	9.000	On	L1	9.9	33.0	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.303000	39.3	1000.0	9.000	On	L1	10.1	10.9	50.2
0.474000	38.3	1000.0	9.000	On	L1	10.2	8.1	46.4
0.645000	35.7	1000.0	9.000	On	L1	10.1	10.3	46.0
0.735000	34.0	1000.0	9.000	On	L1	10.0	12.0	46.0
0.906000	34.9	1000.0	9.000	On	L1	10.0	11.1	46.0
1.077000	33.7	1000.0	9.000	On	L1	9.9	12.3	46.0
1.423500	30.5	1000.0	9.000	On	L1	9.9	15.5	46.0
1.594500	32.0	1000.0	9.000	On	L1	9.9	14.0	46.0
2.112000	27.5	1000.0	9.000	On	L1	9.9	18.5	46.0
9.519000	25.3	1000.0	9.000	On	L1	9.8	24.7	50.0

[NEUTRAL]

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154500	53.1	1000.0	9.000	On	N	10.2	12.7	65.8
0.204000	47.4	1000.0	9.000	On	N	10.0	16.0	63.4
0.231000	45.2	1000.0	9.000	On	N	10.0	17.2	62.4
0.303000	42.8	1000.0	9.000	On	N	10.1	17.4	60.2
0.357000	37.8	1000.0	9.000	On	N	10.1	21.0	58.8
0.496500	41.3	1000.0	9.000	On	N	10.2	14.8	56.1
0.780000	34.9	1000.0	9.000	On	N	10.0	21.1	56.0
0.820500	35.2	1000.0	9.000	On	N	10.0	20.8	56.0
9.856500	42.8	1000.0	9.000	On	N	9.8	17.2	60.0
10.410000	30.7	1000.0	9.000	On	N	9.9	29.3	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.303000	38.2	1000.0	9.000	On	N	10.1	12.0	50.2
0.474000	37.2	1000.0	9.000	On	N	10.2	9.2	46.4
0.559500	33.9	1000.0	9.000	On	N	10.1	12.1	46.0
0.730500	34.6	1000.0	9.000	On	N	10.1	11.4	46.0
0.906000	32.3	1000.0	9.000	On	N	10.0	13.7	46.0
1.077000	32.5	1000.0	9.000	On	N	10.0	13.5	46.0
1.419000	31.6	1000.0	9.000	On	N	9.9	14.4	46.0
1.765500	30.4	1000.0	9.000	On	N	9.9	15.6	46.0
10.257000	27.4	1000.0	9.000	On	N	9.9	22.6	50.0
16.944000	26.2	1000.0	9.000	On	N	10.0	23.8	50.0



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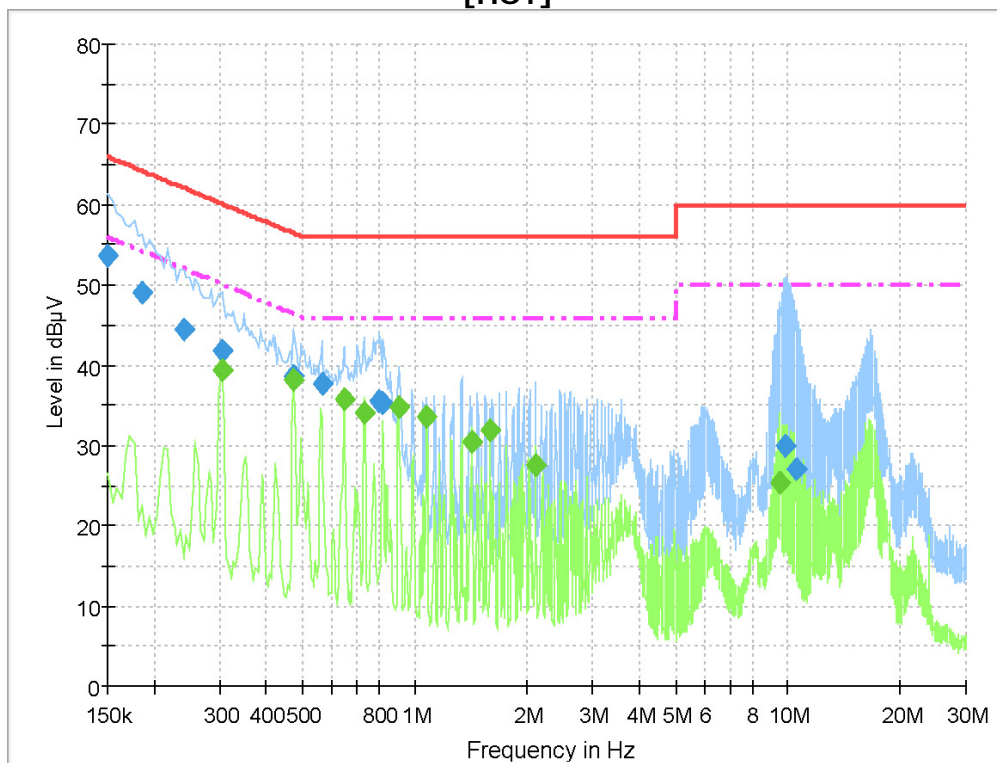
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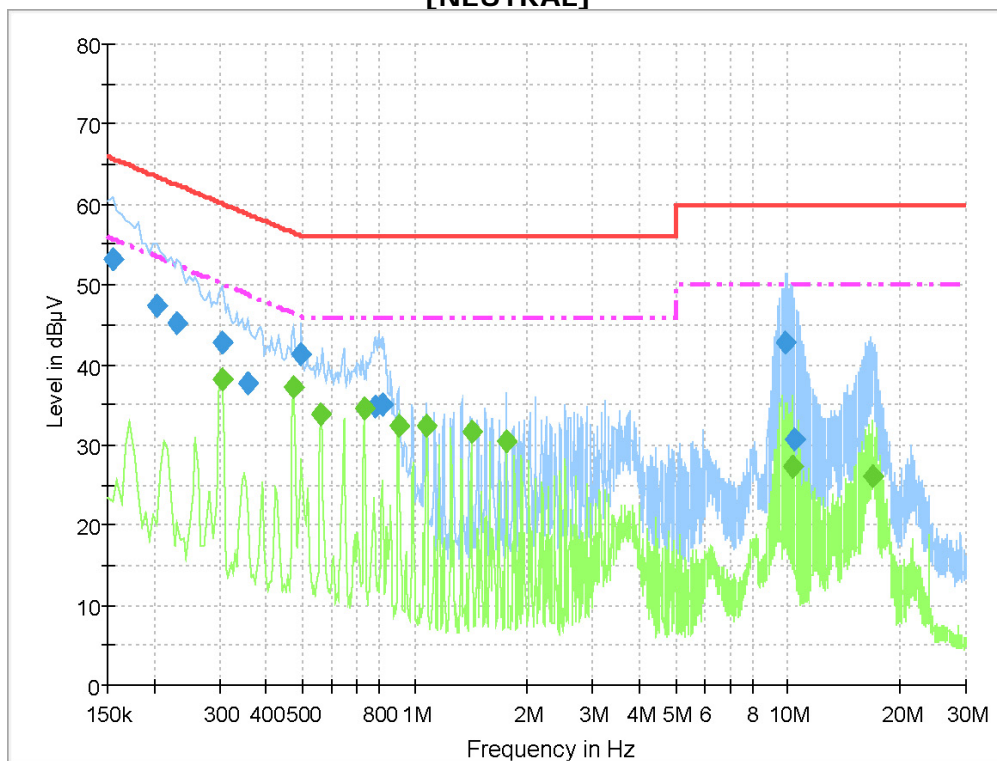
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[HOT]



[NEUTRAL]





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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	2010-10-30
2	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2010-10-30
3	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2010-08-10
4	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2011-11-18
5	LOOP ANTENNA	EMCO	6502	9107-2652	2010-10-13
6	System Power Supply	HP	6032A	3440A-10521	2011-07-07
7	EPM Series Power Meter	HP	E4418A	GB38272734	2010-10-30
8	Power Sensor	HP	8487A	3318A03524	2011-07-12
9	Audio Analyzer	HP	8903B	2747A03432	2010-11-03
10	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2010-10-30
11	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2010-10-30
12	Modulation Analyzer	HP	8901B	3438A05228	2010-11-06
13	Attenuator	HP	8494A	3308A33351	2010-11-02
14	Temp&Humi Chamber	Kunpoong	KP-1000	2002KP050041	2011-01-25
15	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2010-10-30
16	EMC Analyzer	Agilent	E7405A	MY45110859	2011-01-25
17	Horn Antenna	ETS-Lindgren	3115	00078894	2010-12-18
18	Horn Antenna	ETS-Lindgren	3115	00078895	2010-12-18
19	Dipole Antenna	SCHWARZBECK	VHA 9103	VHA91032557	2010-11-27
20	Dipole Antenna	SCHWARZBECK	UHA 9105	UHA91052417	2010-11-27
21	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2011-03-31
22	PREAMPLIFIER	Agilent	8449B	3008A02307	2010-10-30
23	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2011-02-23
24	Band Reject Filter	Wainwright Instruments	WRCG824	-	2011-04-01
25	Band Reject Filter	Wainwright Instruments	WRCG1750	-	2011-04-01
26	Field Strength Meter	Rohde & Schwarz	ESHS30	862024/001	2011-03-08
27	LISN	Rohde & Schwarz	ESH3-Z5	100207	2010-12-15
28	LISN	EMCO	3825/2	9206-1971	2010-12-16
29	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2010-10-30