

## TEST REPORT For FCC

Test Report No. : 2010070013  
Date of Issue : July 01, 2010  
FCC ID : QJCH318B  
Model/Type No. : H318B  
Kind of Product : Braille Sense OnHand  
Applicant : HIMS Co., Ltd.  
Applicant Address : KT Daejeon Satellite Center, 139-9, Gajung-dong, Yuseong-gu, Daejeon, KOREA, 305-350  
Manufacturer : HIMS Co., Ltd.  
Manufacturer Address : KT Daejeon Satellite Center, 139-9, Gajung-dong, Yuseong-gu, Daejeon, KOREA, 305-350  
Contact Person : Kim Sung Man / Researcher  
Telephone : +82-42-864-4460  
Received Date : June 18, 2010  
Test period : Start : June 18, 2010 End : July 01, 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: July 01, 2010

Reviewed by

*Y. J. Park*

Young-Joon, Park  
Technical Manager  
Date: July 01, 2010



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### REPORT REVISION HISTORY

Date	Revision	Page No
July 01, 2010	Issued (2010070013)	All

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## 1.0 General Product Description

Equipment model name : H318B

Serial number : Prototype

EUT condition : Pre-production, not damaged

Antenna type : Chip antenna Gain -1.0 dBi

Frequency Range : 2402 MHz ~ 2480 MHz

RF power : -3.88 dBm Peak Conducted (GFSK)  
: -7.06 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 Rechargeable 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	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.	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

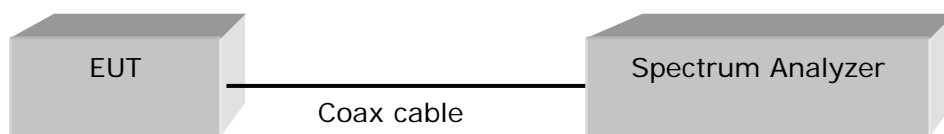


Figure 1 : Measurement setup for the carrier frequency separation

#### 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.





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### Test Results

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

Hopping (GFSK)	Adjacent Hopping Channel Separation (kHz)	Two-third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
	996	635	25	Complies

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

Hopping (8-DPSK)	Adjacent Hopping Channel Separation (kHz)	Two-third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
	1002	845	25	Complies

#### Test mode : Inquiry mode

Inquiry	Adjacent Hopping Channel Separation (kHz)	Two-third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
	2000	-	25	Complies

See next pages for actual measured spectrum plots.



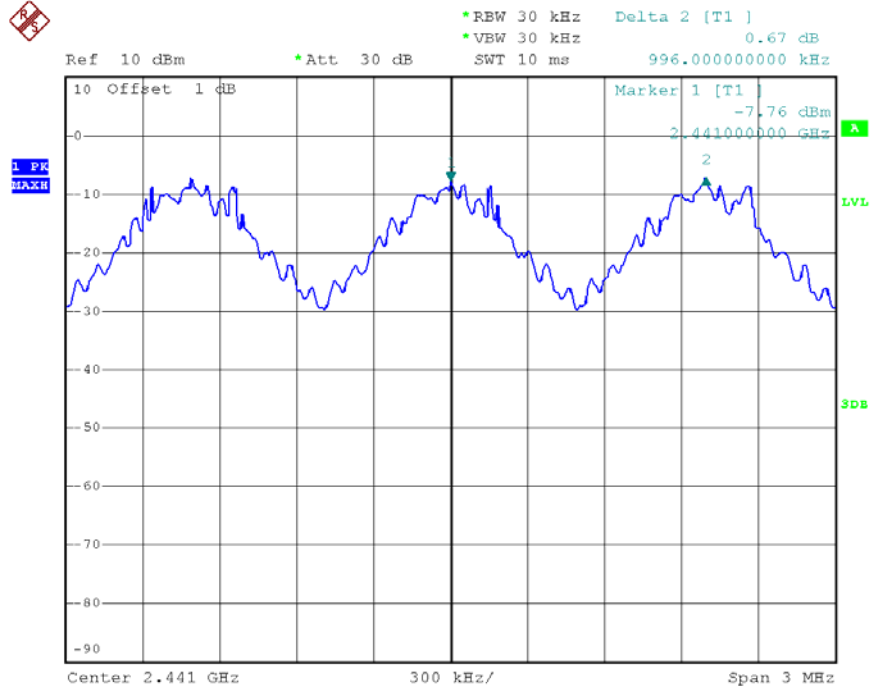
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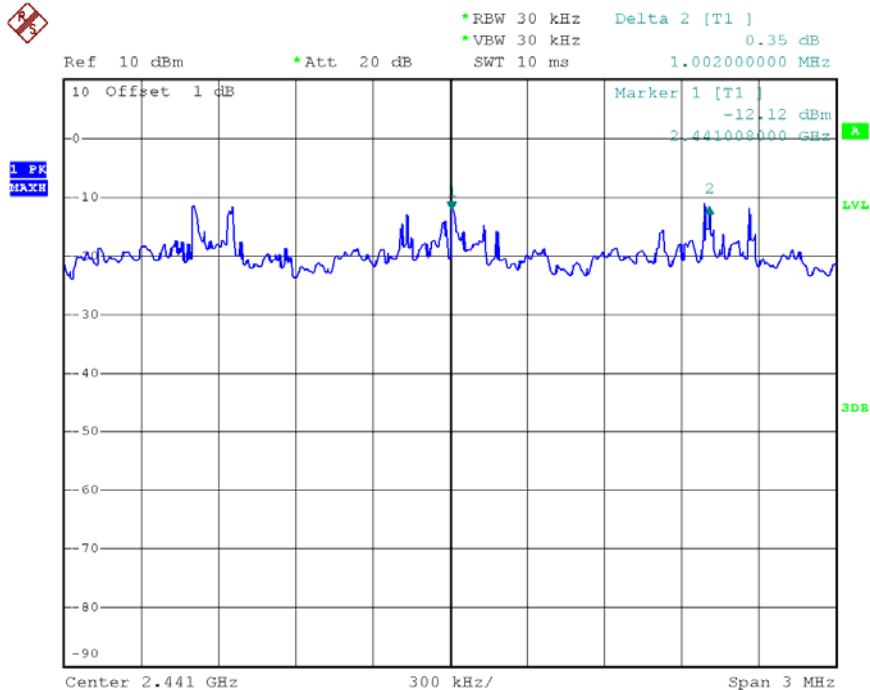
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### Carrier Frequency Separation(Hopping mode)

#### Data Rate : GFSK



#### Data Rate : 8-DPSK





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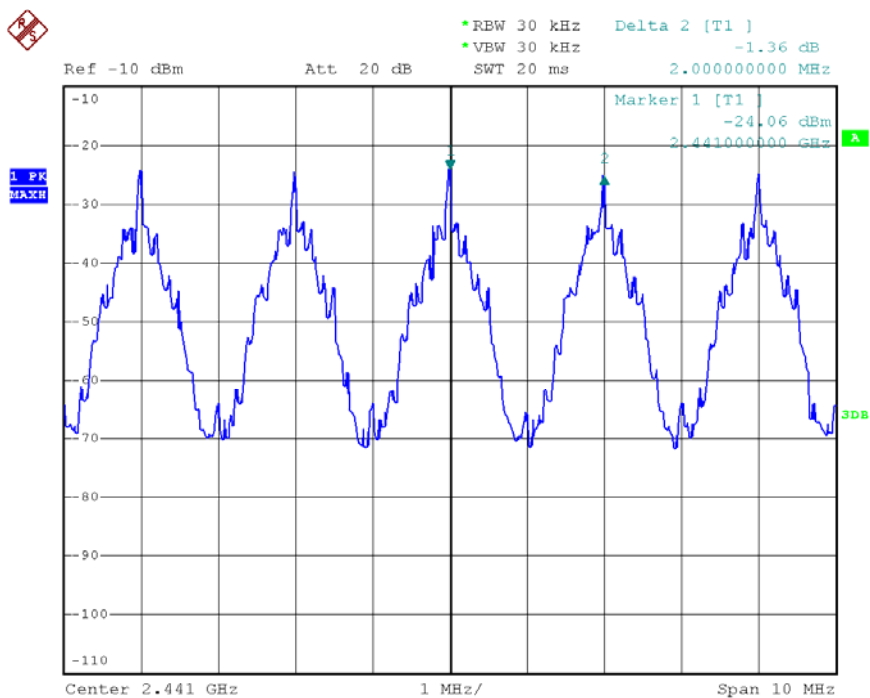
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### Carrier Frequency Separation(Inquiry mode)



## 2.1.2 Number of Hopping Frequencies

### Test Location

RF Test Room

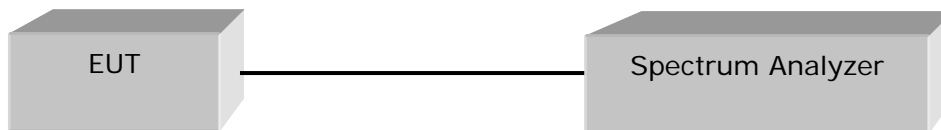
### Test Procedures

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.



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### 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

**Test mode : Inquiry**

Total number of Hopping Channels	Result
32	Complies

See next pages for actual measured spectrum plots.

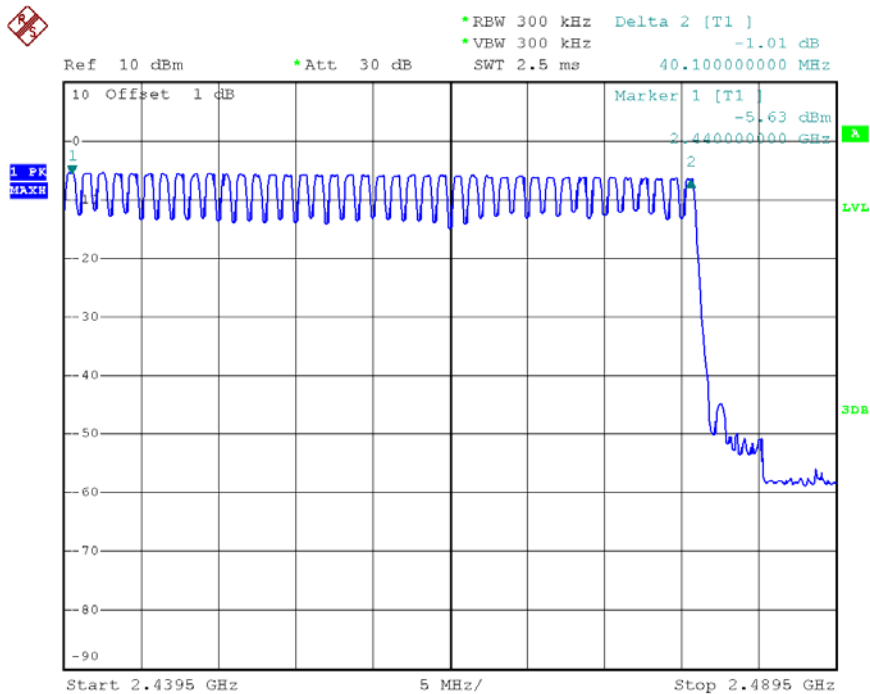
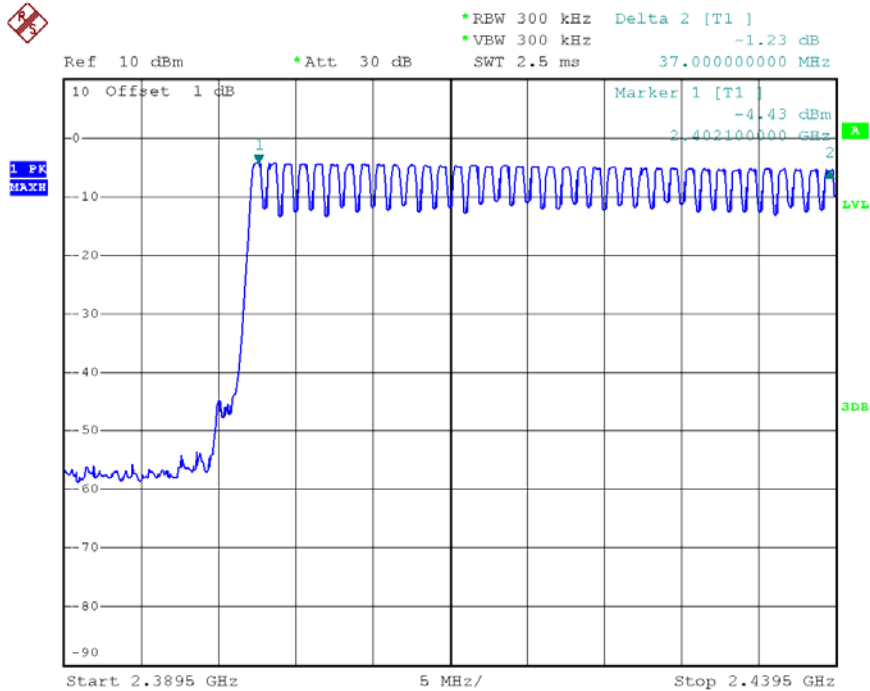


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### Number of Hopping Frequencies(GFSK)



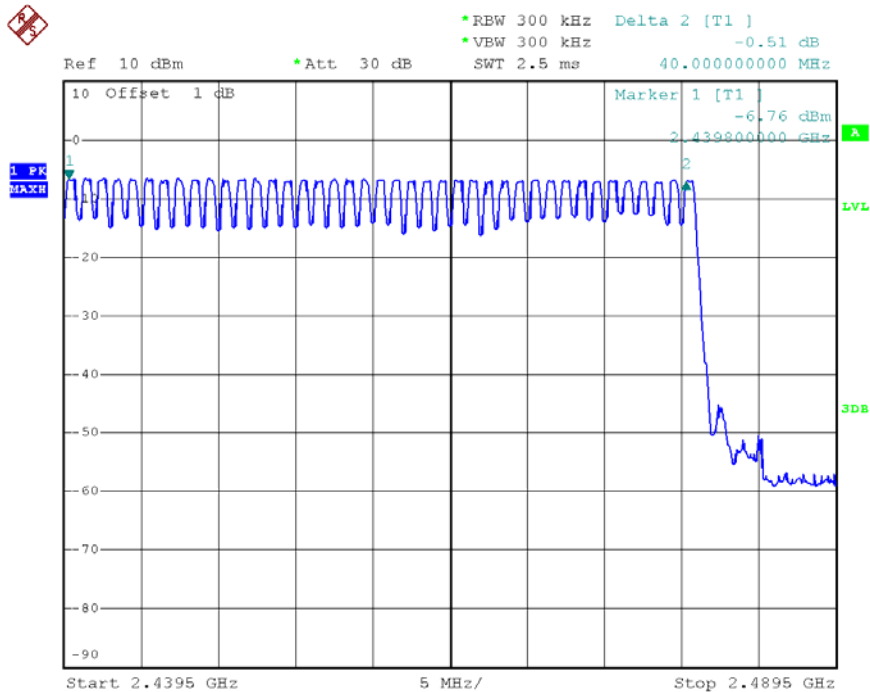
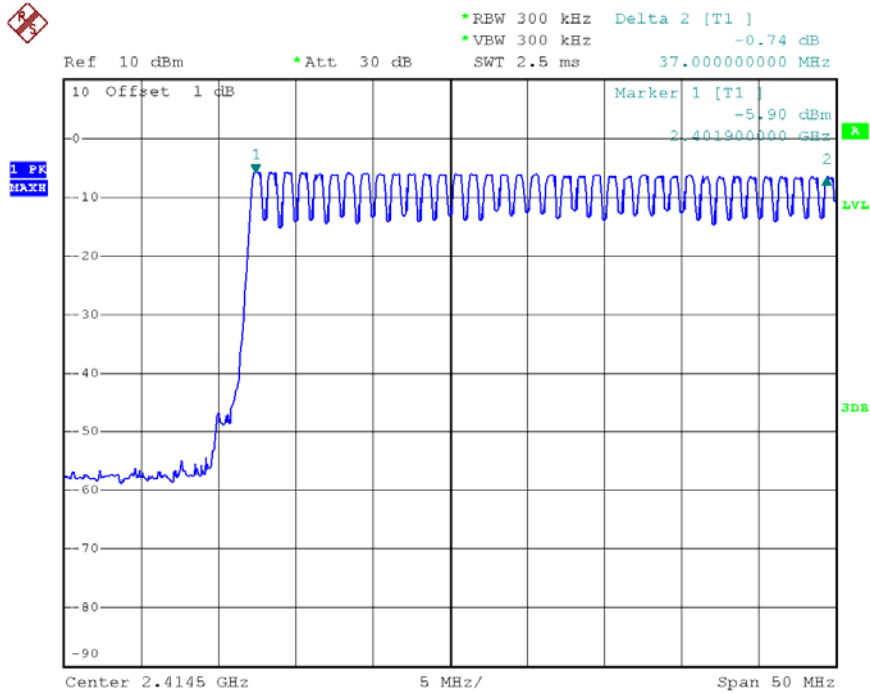


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### Number of Hopping Frequencies(8-DPSK)



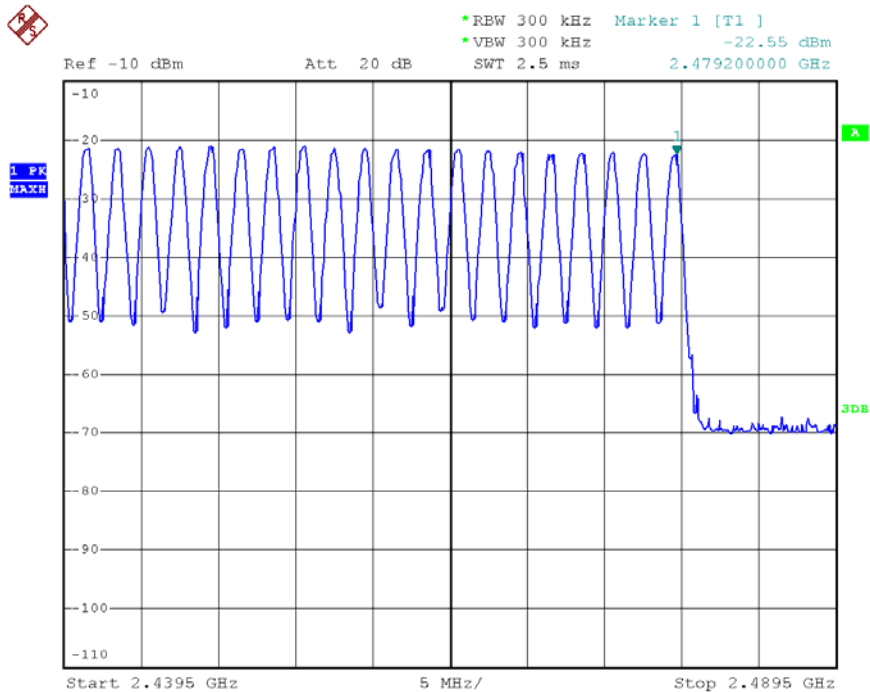
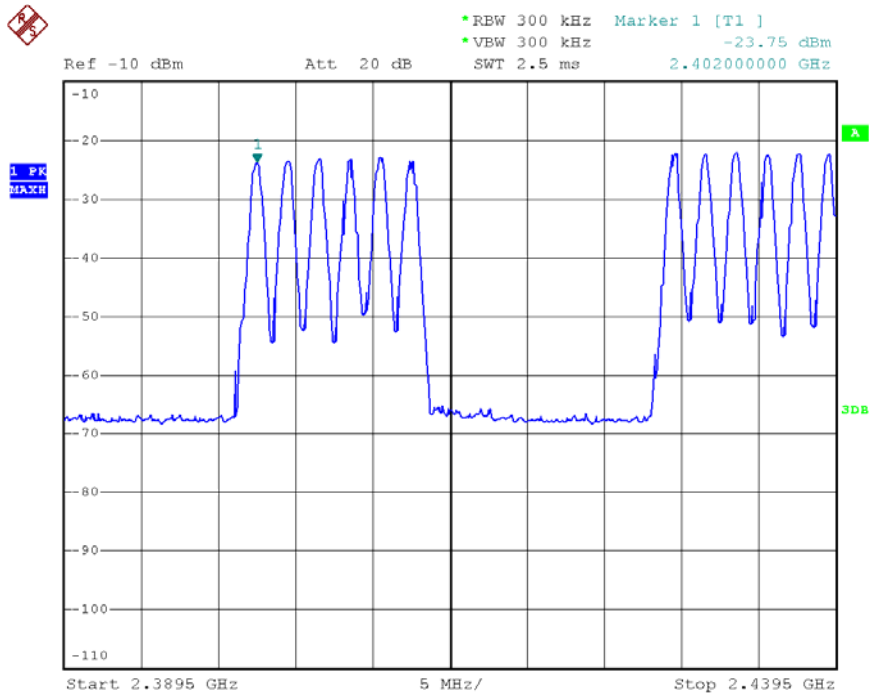


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### Number of Hopping Frequencies(Inquiry)





### 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)

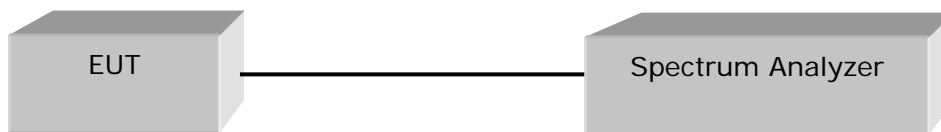
RBW = 30 kHz ( $\geq 1\%$  of the span)

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	0.948	Complies
2441	39	0.948	Complies
2480	78	0.952	Complies

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

Frequency (MHz)	Channel Number.	Measured Bandwidth (MHz)	Result
2402	0	1.264	Complies
2441	39	1.268	Complies
2480	78	1.268	Complies

See next pages for actual measured spectrum plots.

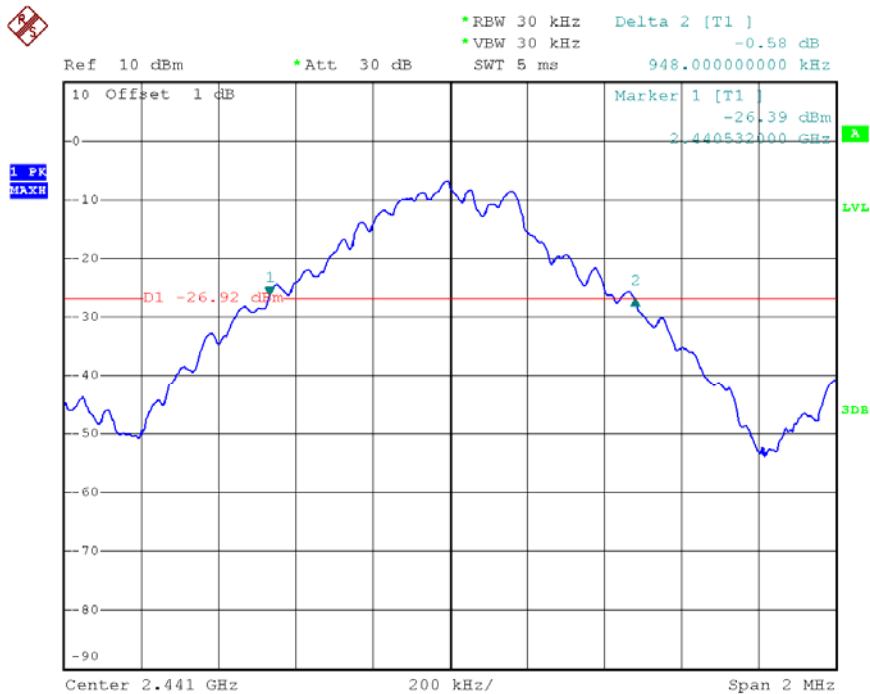
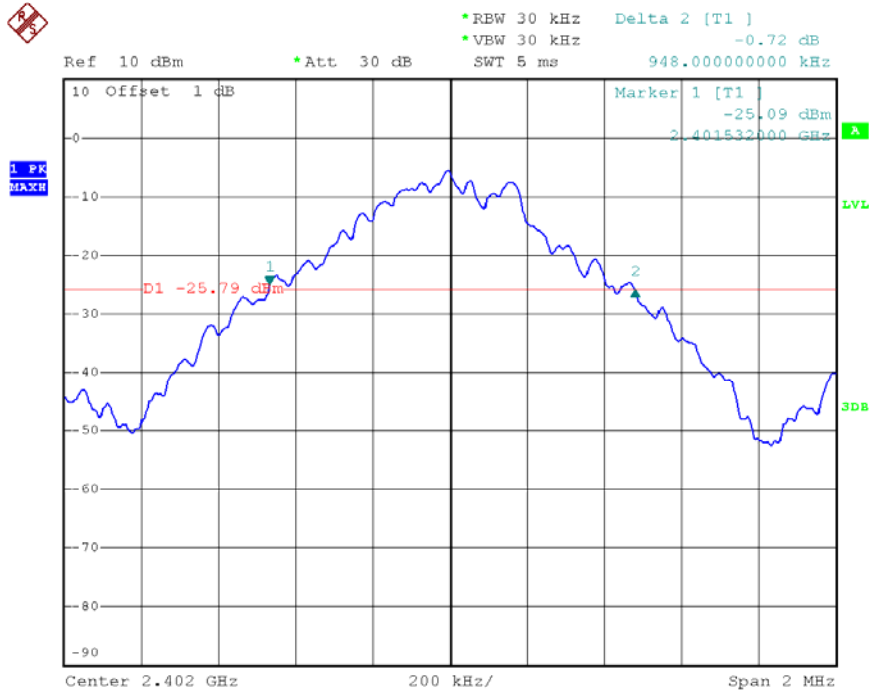


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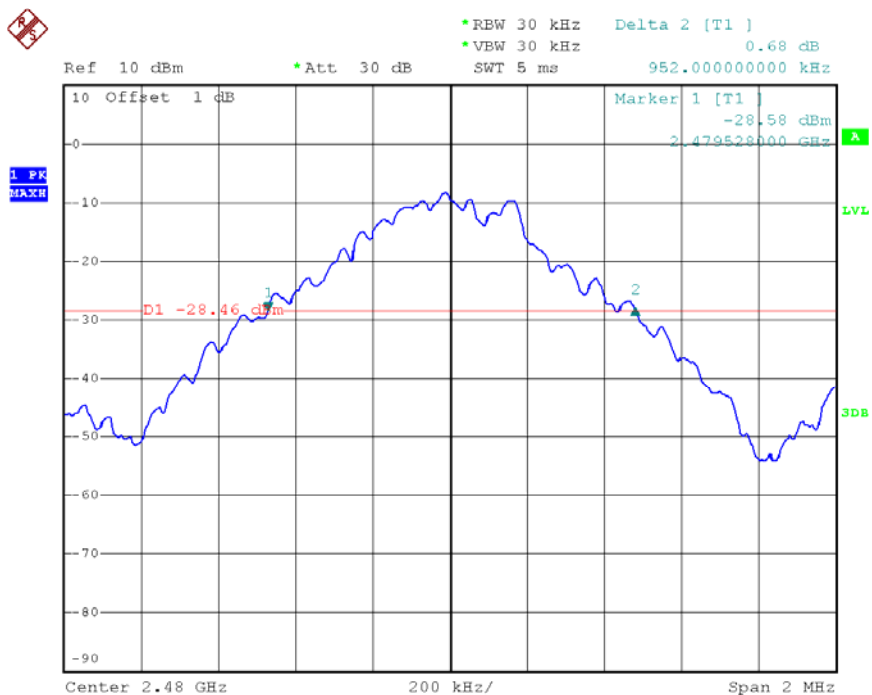
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### 20 dB Bandwidth - GFSK





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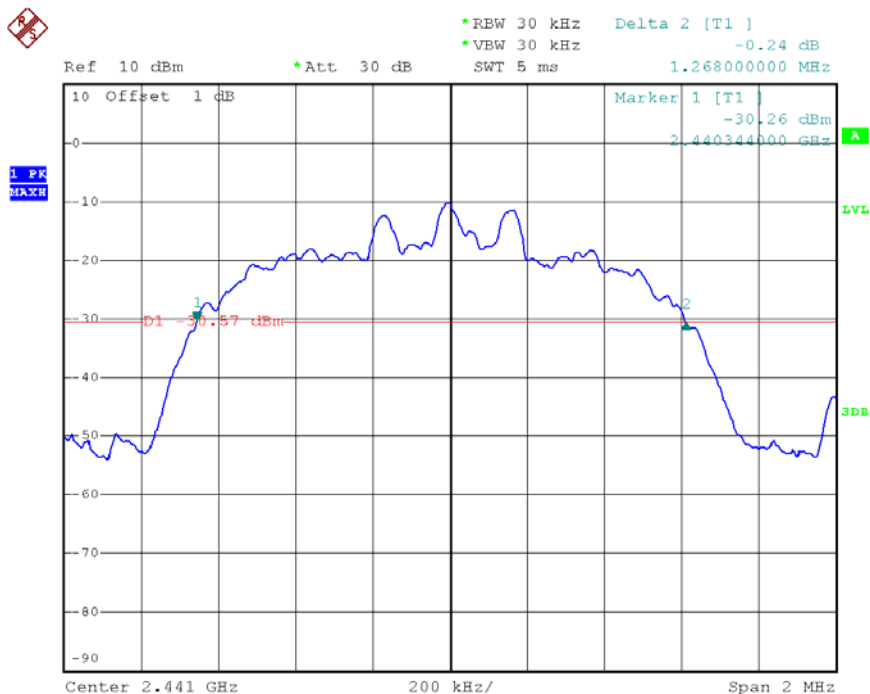
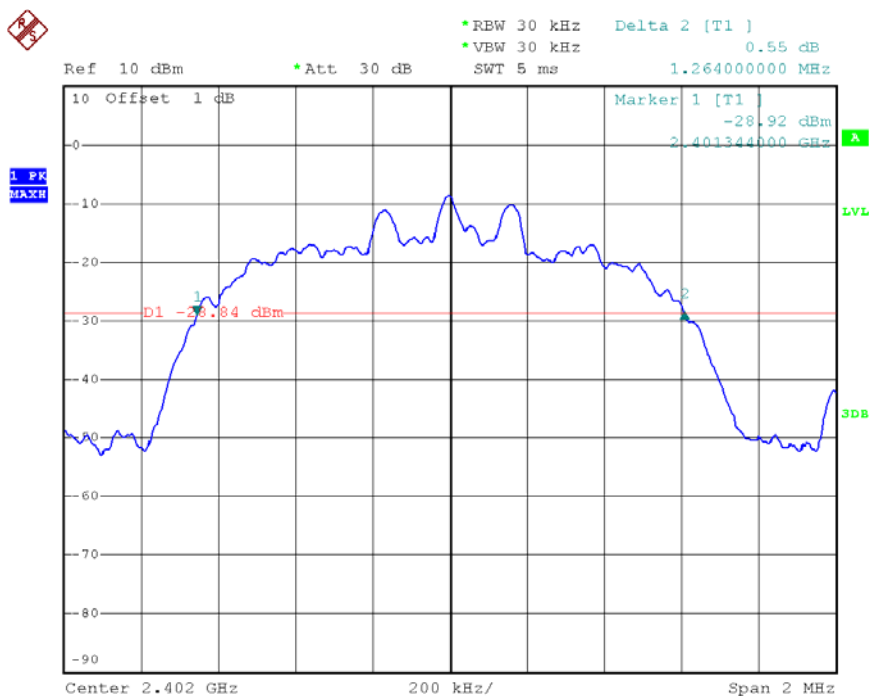
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### 20 dB Bandwidth – 8-DPSK





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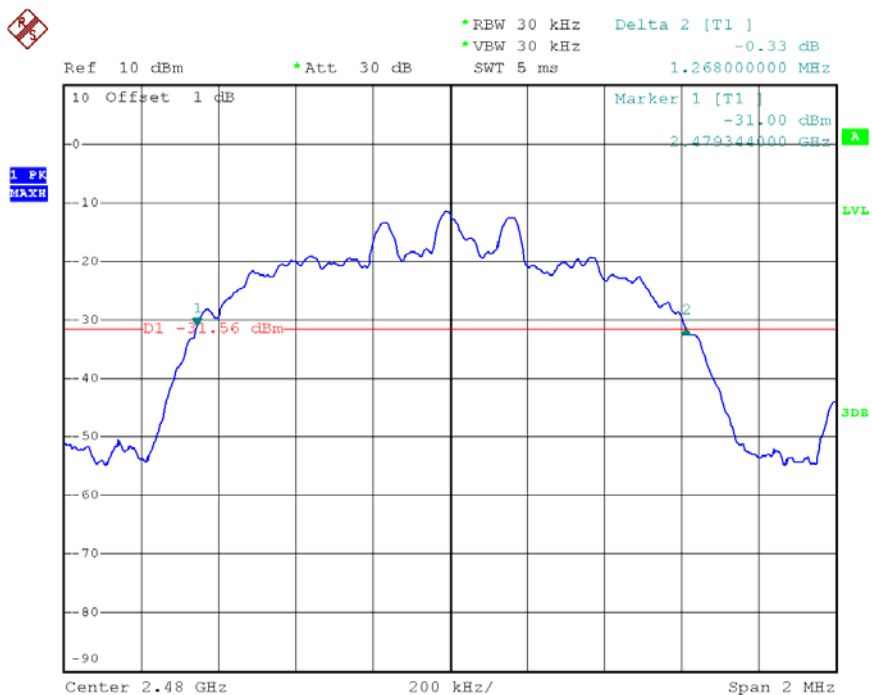
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## 2.1.4 Time of Occupancy (Dwell Time)

### 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

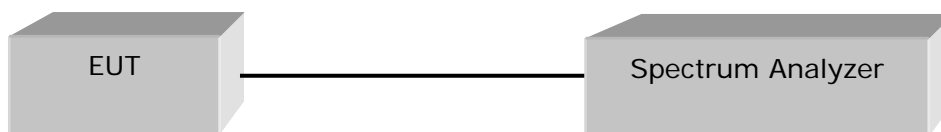
RBW = 1 MHz

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 : Hopping(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	1.655	264.80	Complies
	DH 5	2.905	309.87	Complies

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

DH3 Dwell time =  $1.655 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 264.80 \text{ ms}$

DH5 Dwell time =  $2.905 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 309.87 \text{ ms}$

### Test mode : Hopping(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	0.409	130.88	Complies
	3DH 3	1.662	265.92	Complies
	3DH 5	2.913	310.72	Complies

3DH1 Dwell time =  $0.409 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 130.88 \text{ ms}$

3DH3 Dwell time =  $1.662 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 265.92 \text{ ms}$

3DH5 Dwell time =  $2.913 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 310.72 \text{ ms}$

### Test mode : Inquiry

Test mode	Channel Frequency (MHz)	Dwell time (ms)	Test Results	
			Time of occupancy on the TX channel in 12.8sec (ms)	Result
Inquiry	2441	0.084	64.51	Complies

The system have 32 hopping channel in Inquiry mode.

The time period =  $32 \times 0.4 = 12.8 \text{ seconds}$ .

In maximum case the Bluetooth system have three blocks of 2560ms in 12.8 sec period. One block has 256 burst at each hopping channel.

Each tx time per appearance is 0.084ms.

Dwell time =  $0.084 \times 256 \times 3 = 64.51 \text{ ms}$

See next pages for actual measured spectrum plots.





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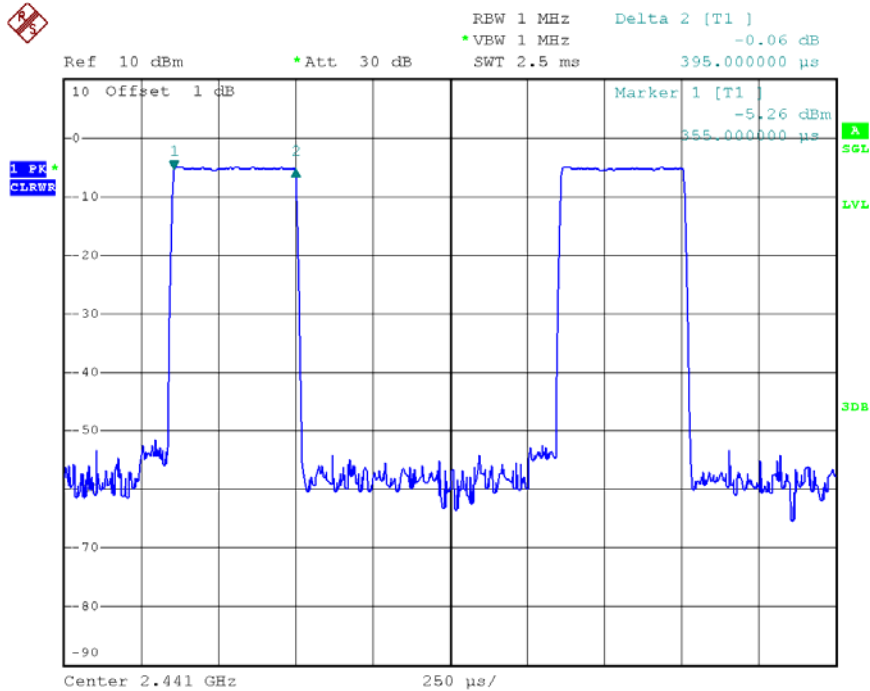
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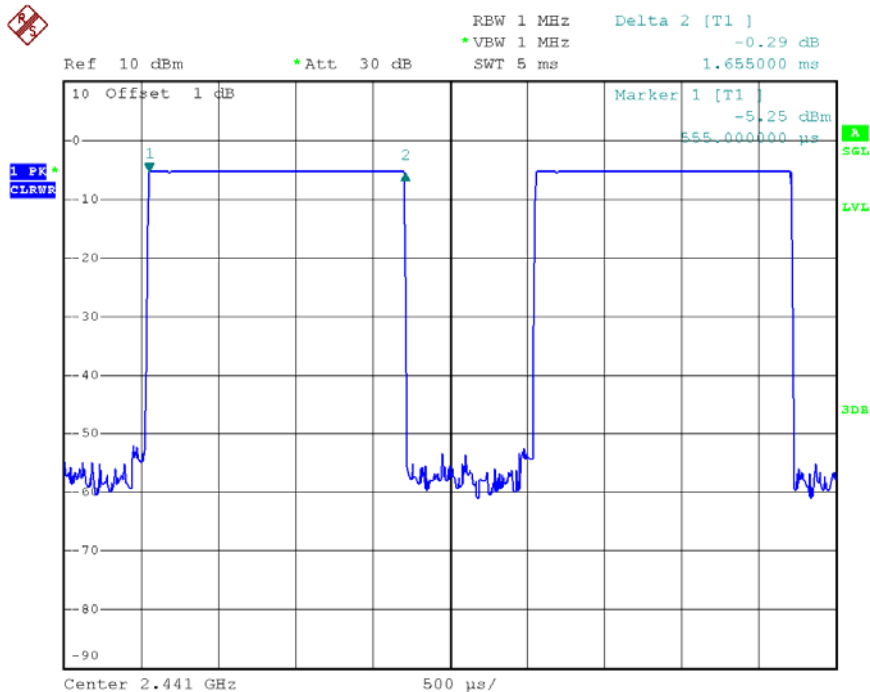
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### Time of Occupancy for PACKET Type DH1(GFSK)



### Time of Occupancy for PACKET Type DH3(GFSK)





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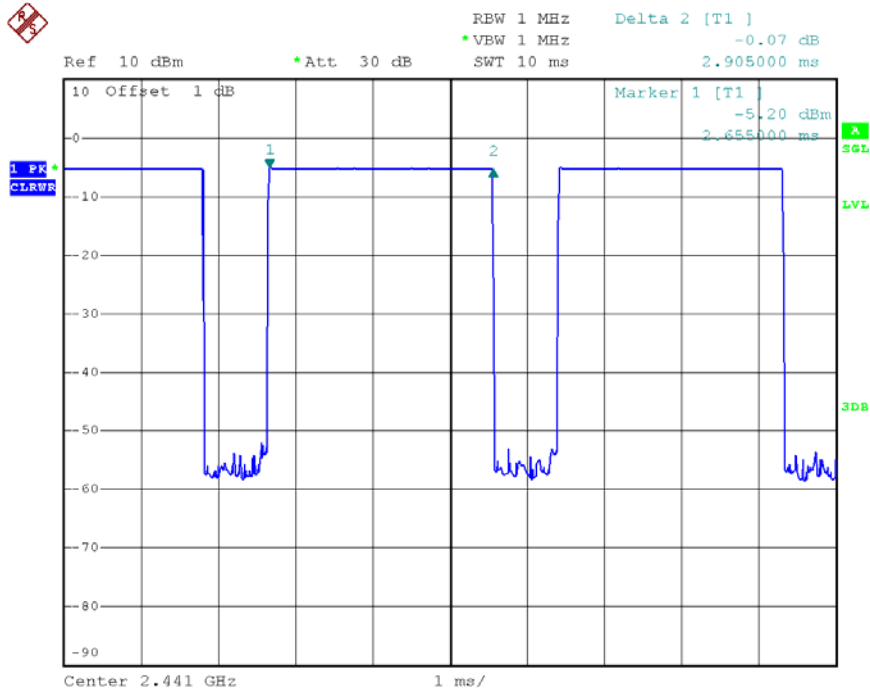
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### Time of Occupancy for PACKET Type DH5(GFSK)



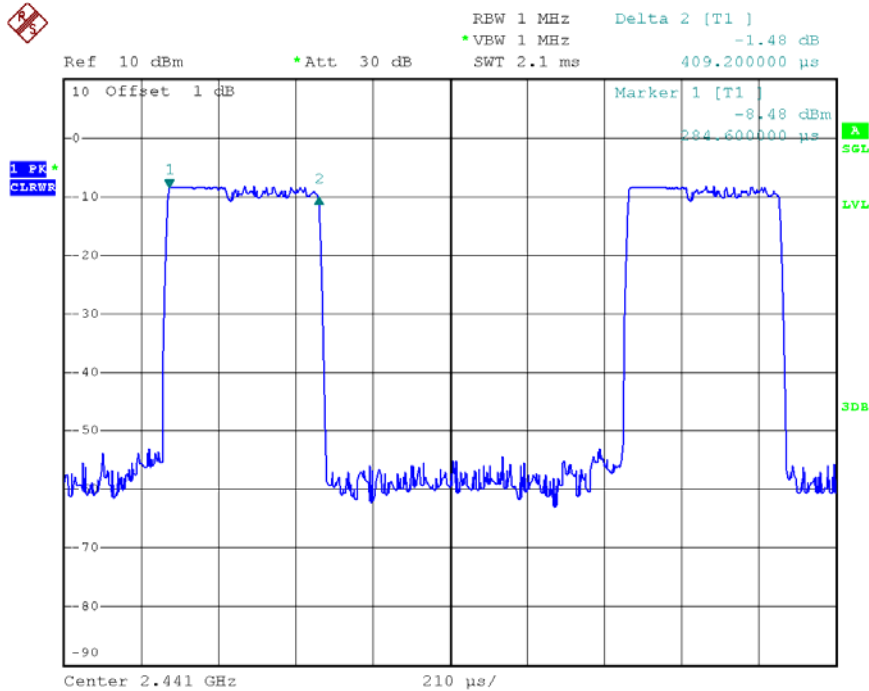


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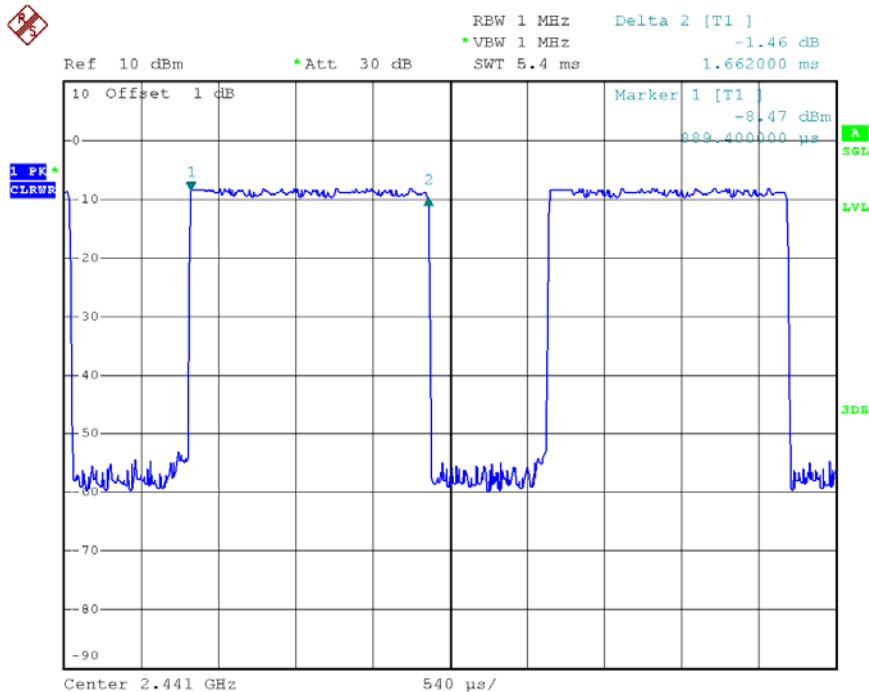
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### Time of Occupancy for PACKET Type 3DH1(8-DPSK)



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



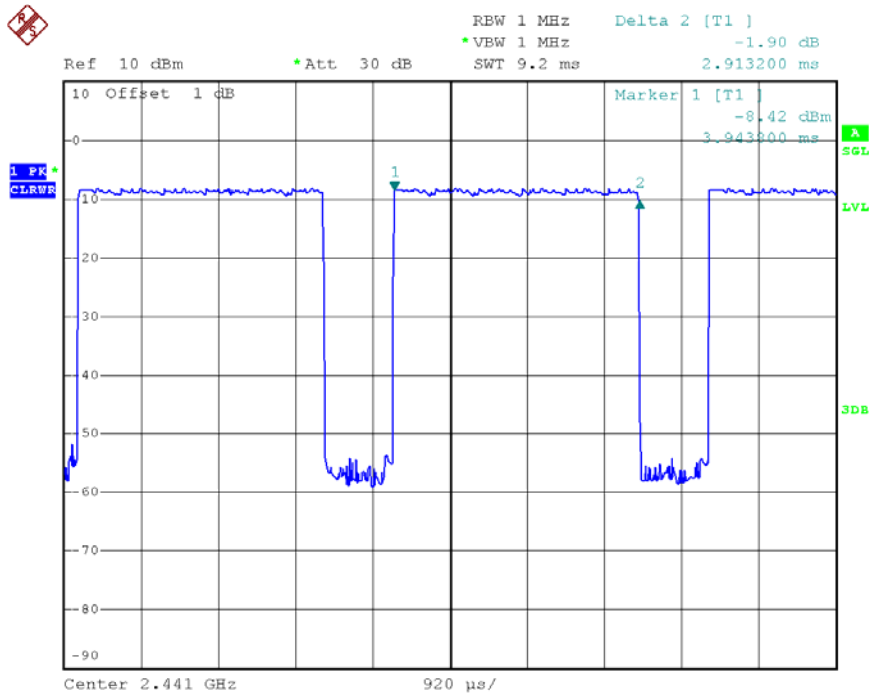


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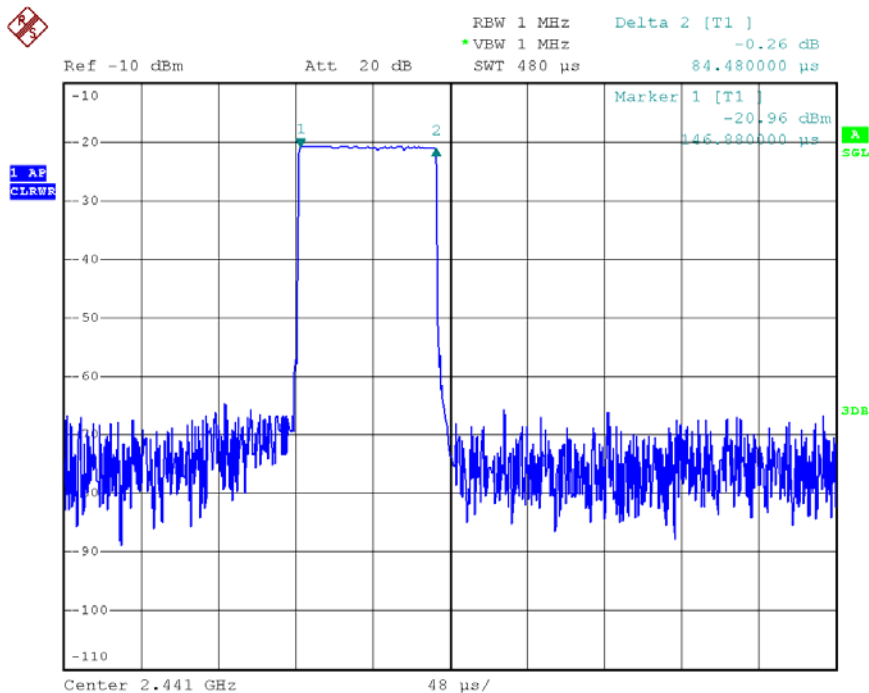
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### Time of Occupancy for PACKET Type 3DH5(8-DPSK)



### Time of Occupancy for Inquiry mode



## 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)

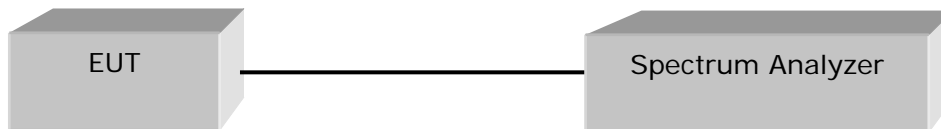
RBW = 1 MHz (greater than the 20 dB bandwidth of the emission being measured)

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

#### Modulation type : GFSK

Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	-3.88	0.41	Complies
2441	39	-4.31	0.37	Complies
2480	78	-5.08	0.31	Complies

#### Modulation type : 8-DPSK

Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	-7.06	0.20	Complies
2441	39	-7.10	0.19	Complies
2480	78	-7.70	0.17	Complies

See next pages for actual measured spectrum plots.

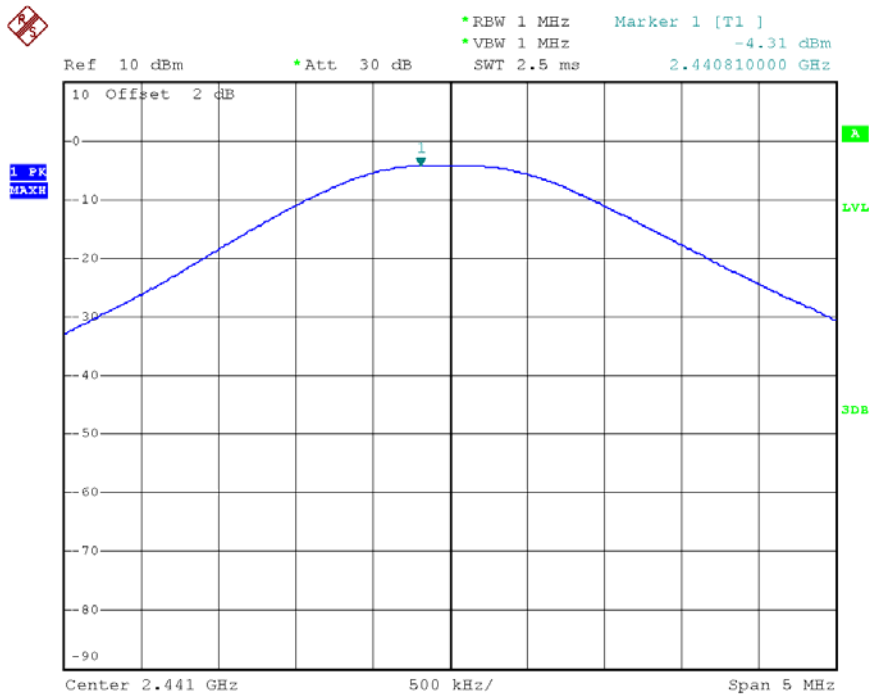
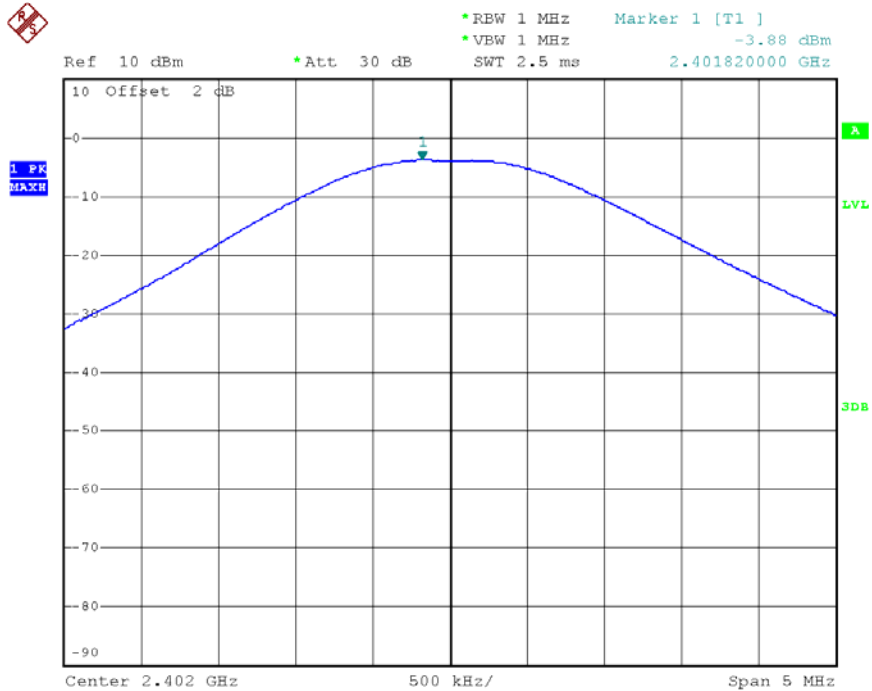


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### Maximum peak Conducted Output Power - GFSK

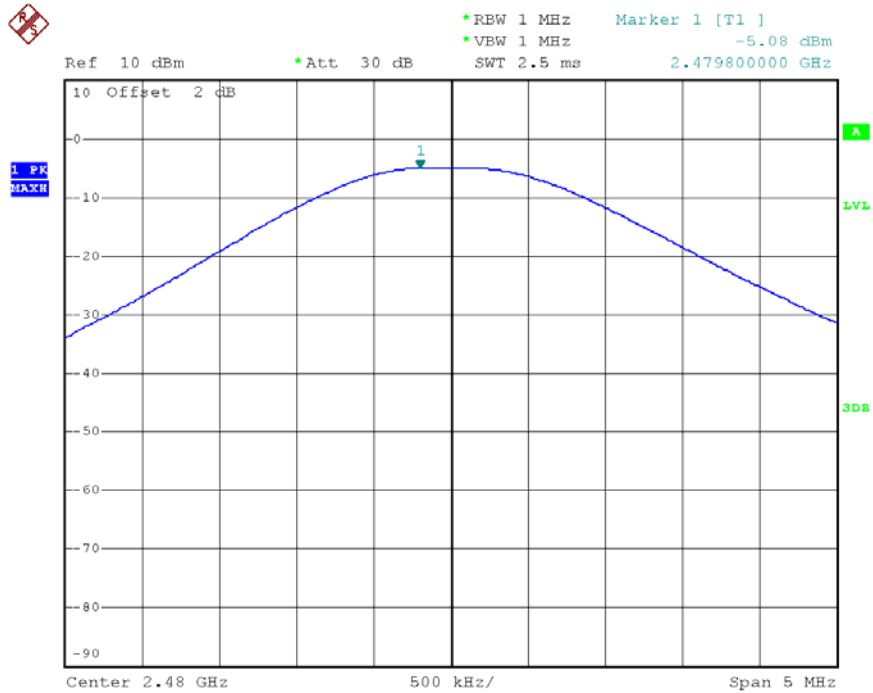




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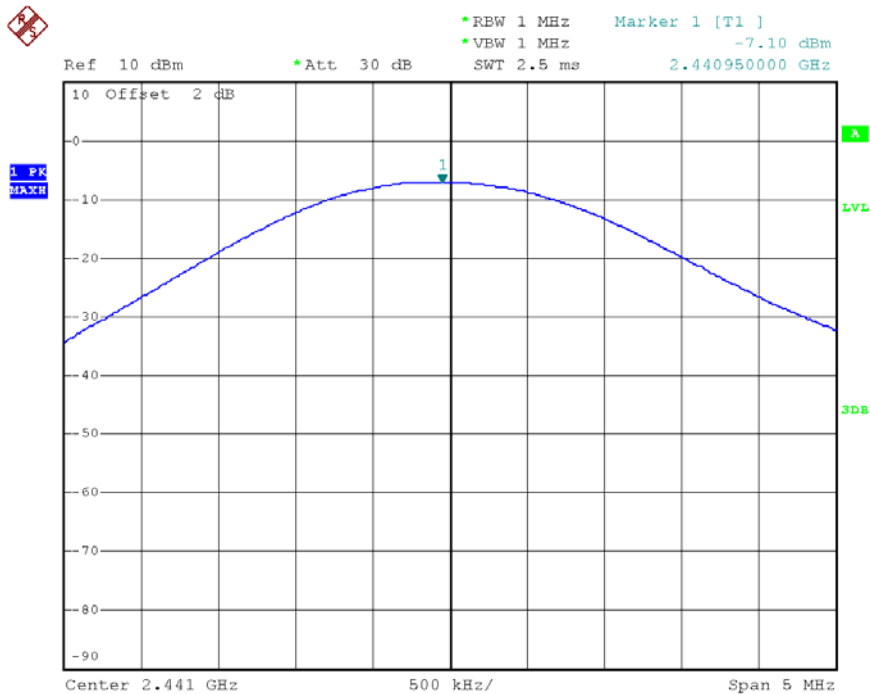
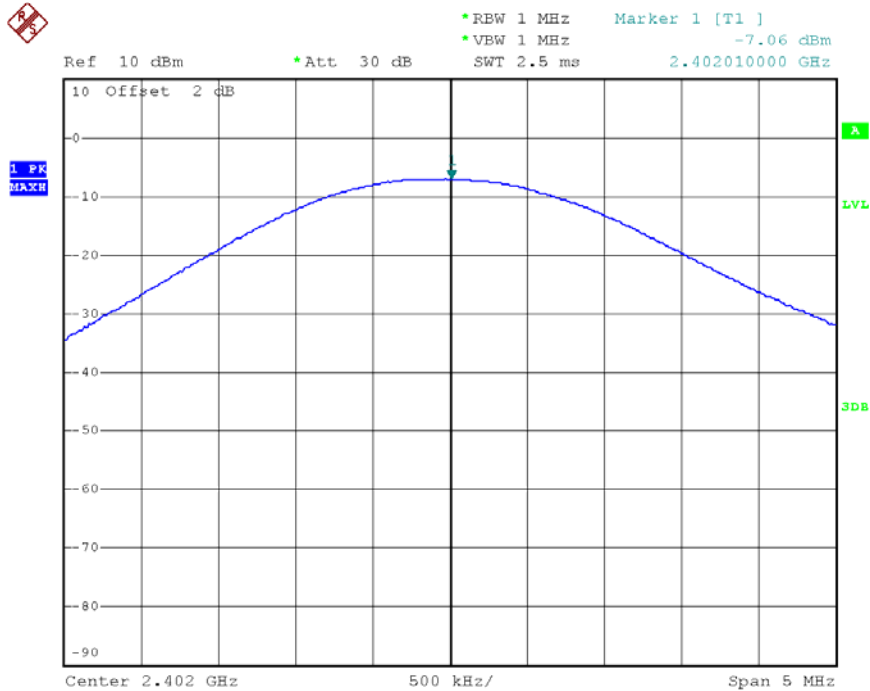


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### Maximum peak Conducted Output Power - 8-DPSK







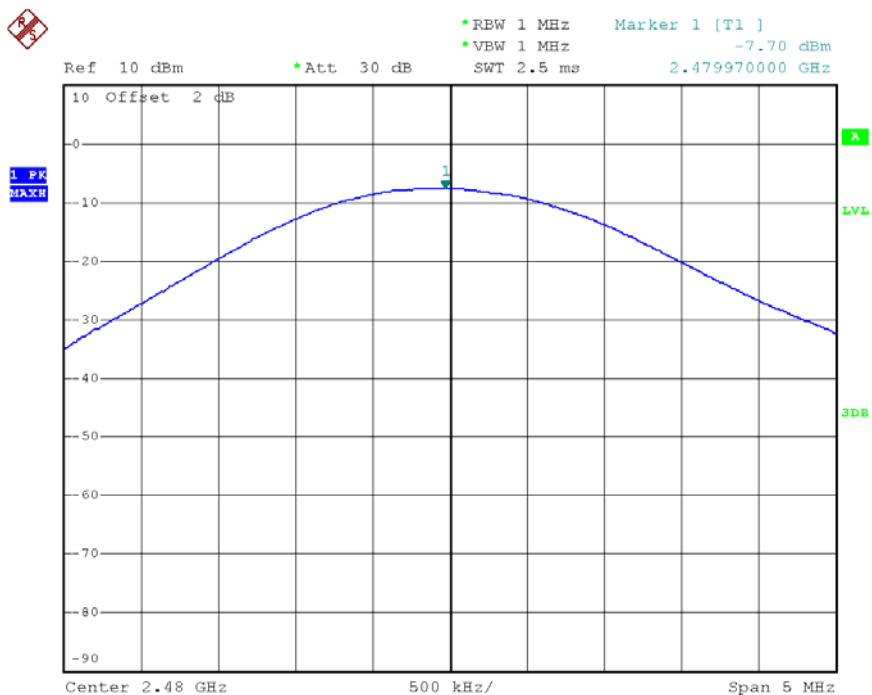
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## 2.1.6 Band-edge

### 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

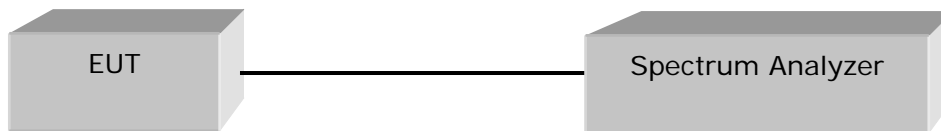
VBW = 100 kHz ( $\geq$  RBW)

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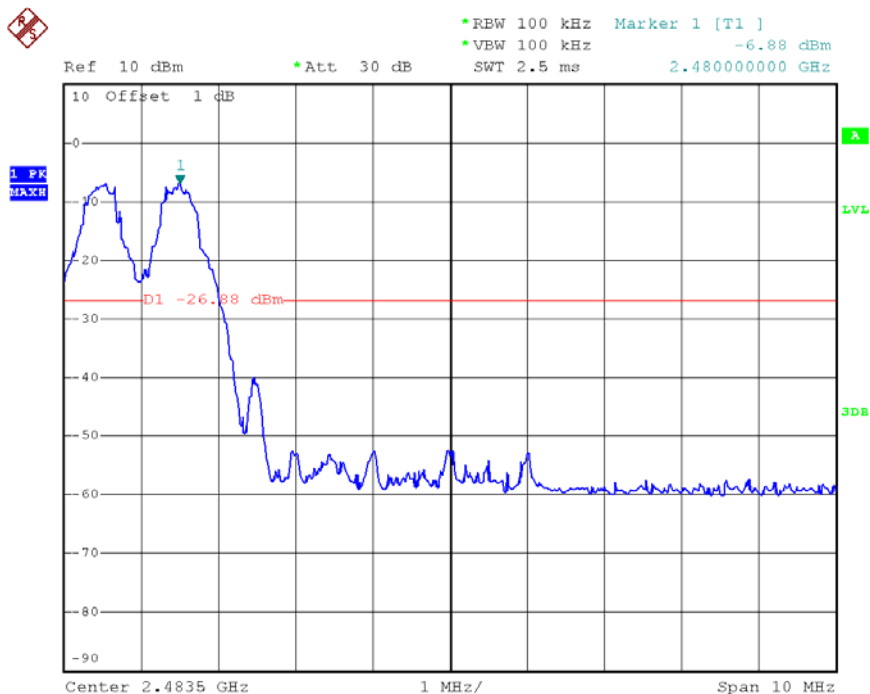
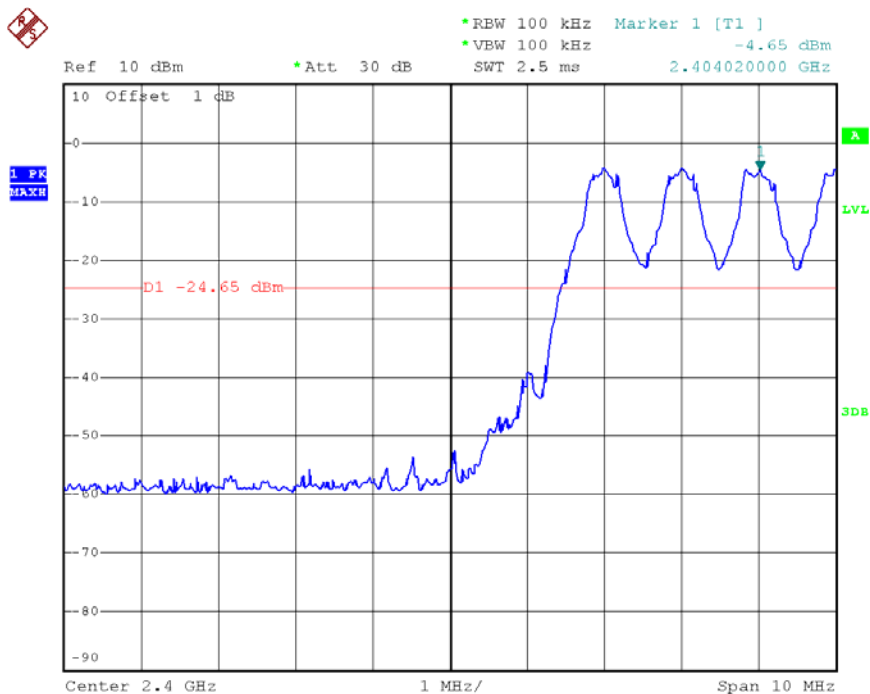
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### Band – edge (with Hopping) - GFSK



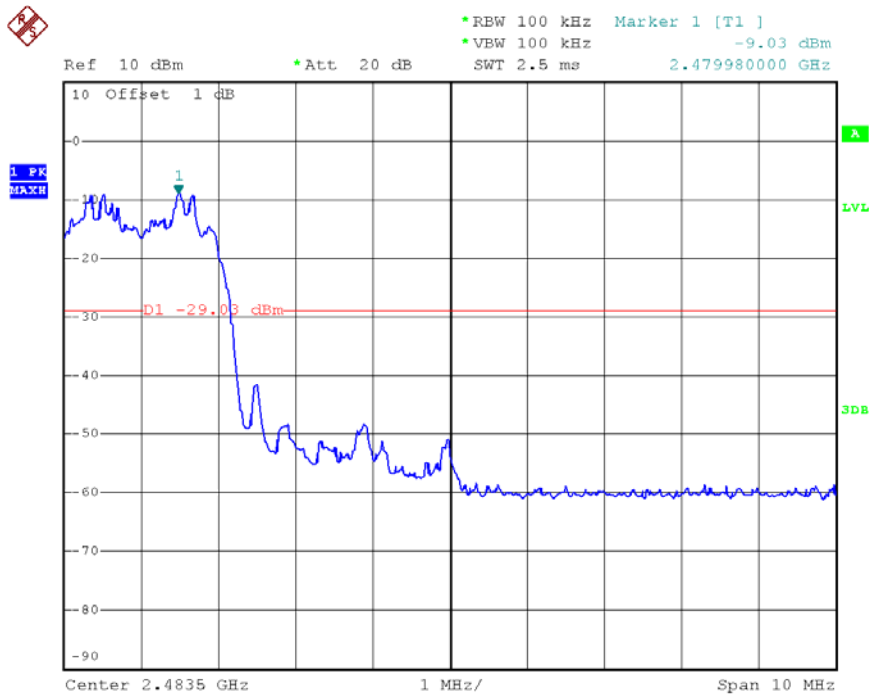
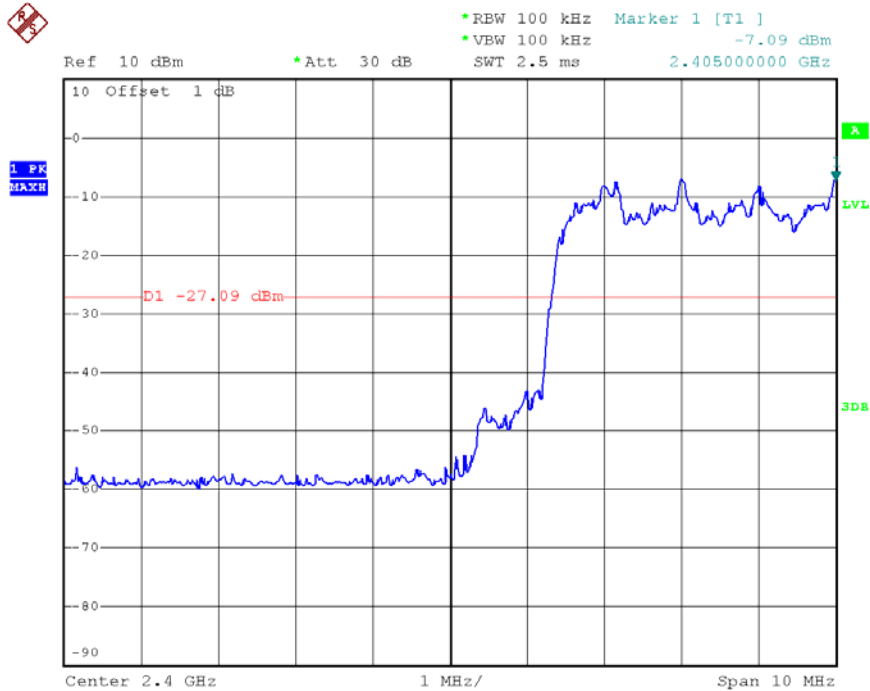


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### Band – edge (with Hopping) - 8-DPSK



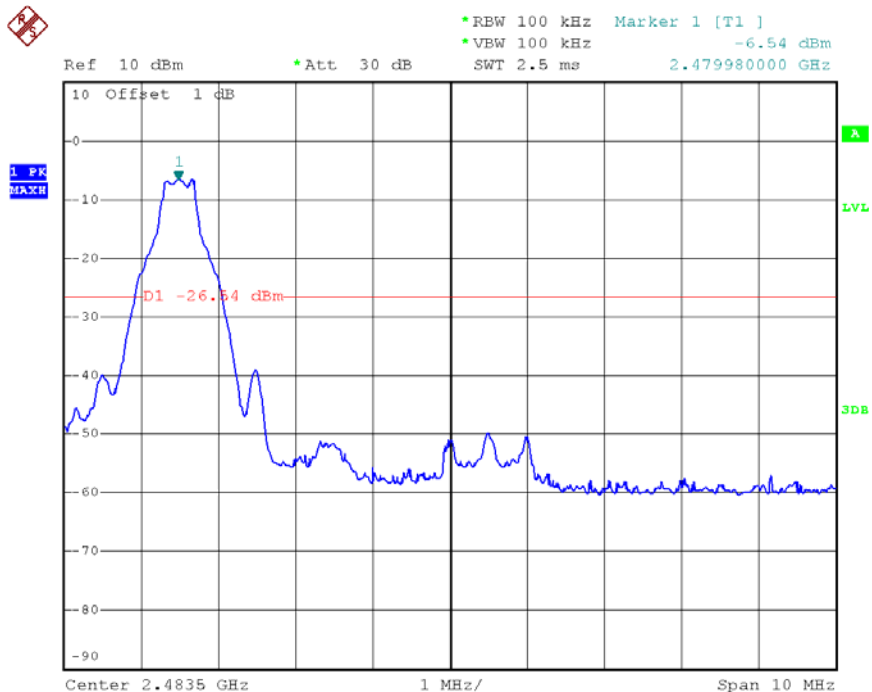
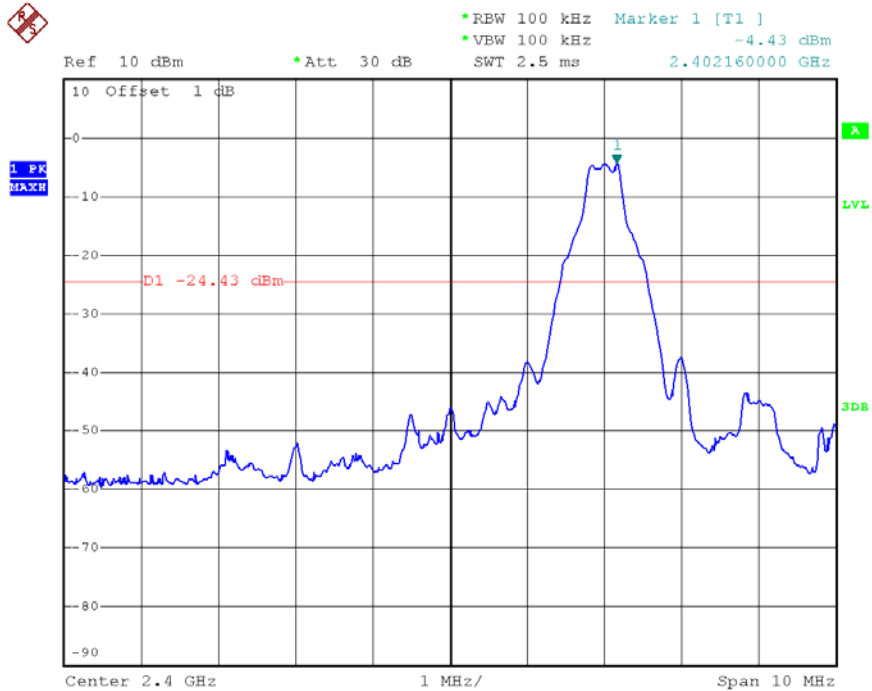


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### Band – edge (without Hopping) - GFSK



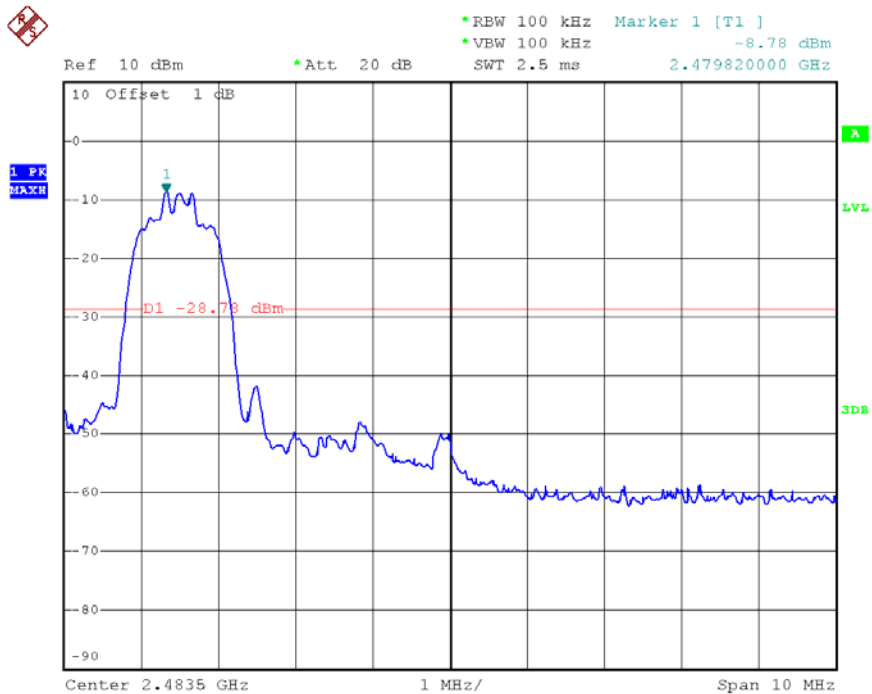
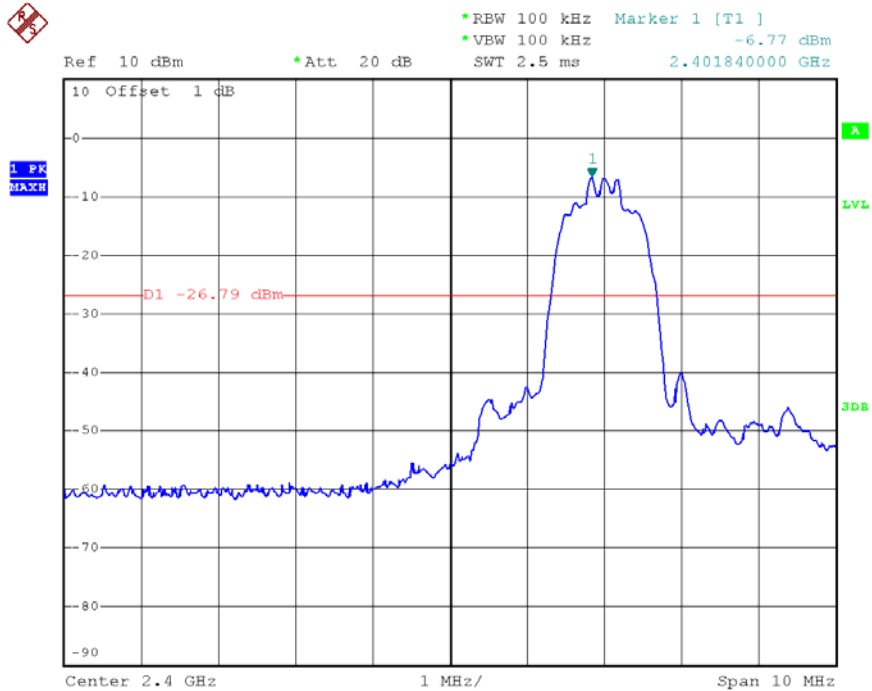


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### Band – edge (without Hopping) - 8-DPSK



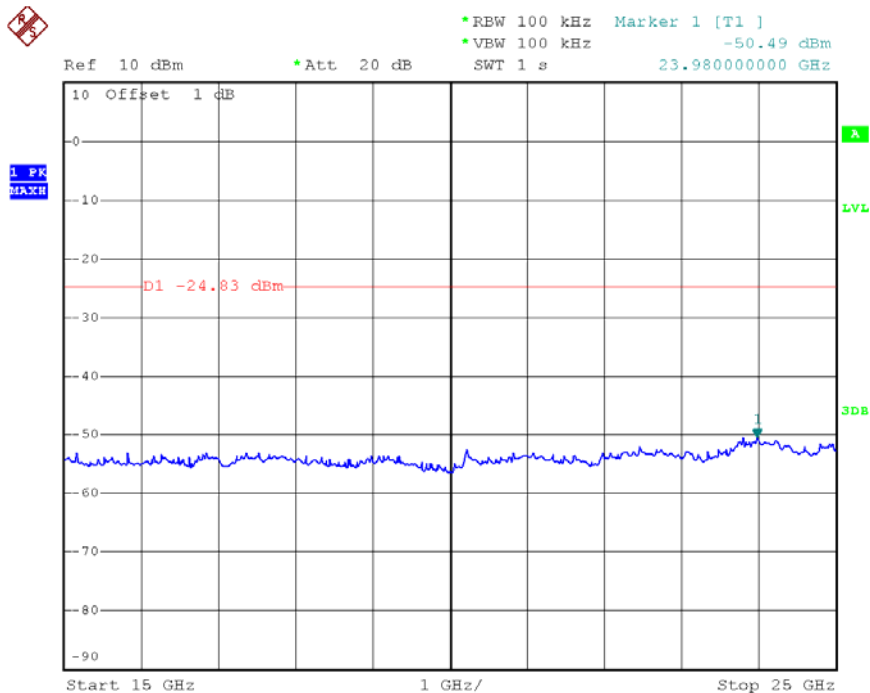
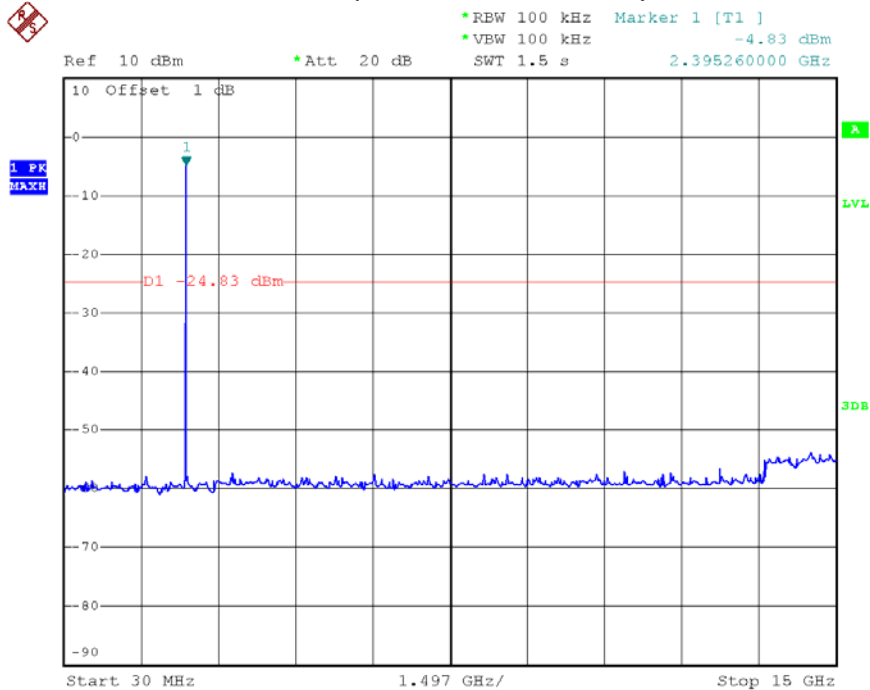


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### Band – edge (at 20 dB blow) – Low channel Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic (GFSK : Worst-Case)



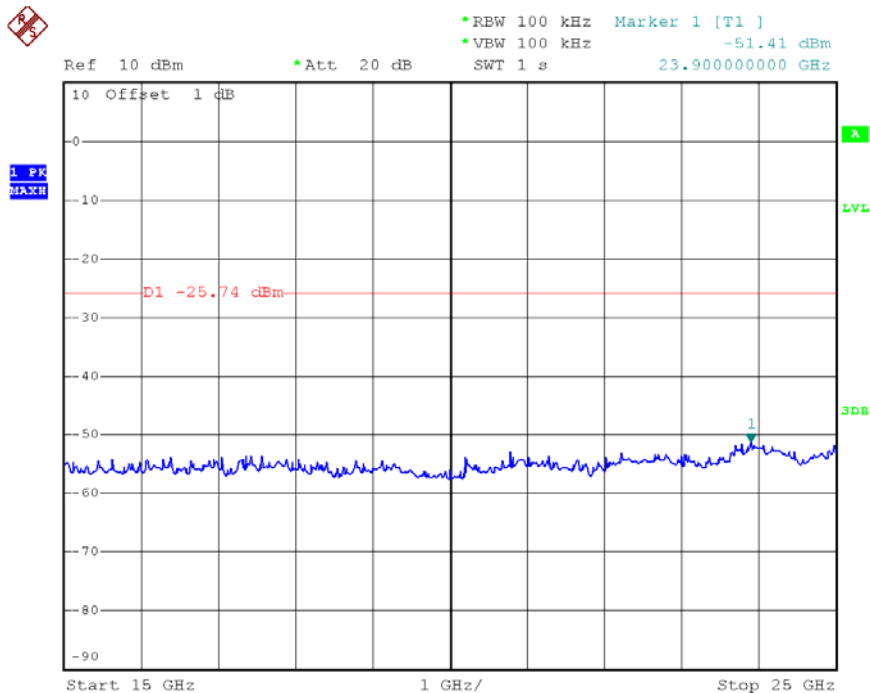
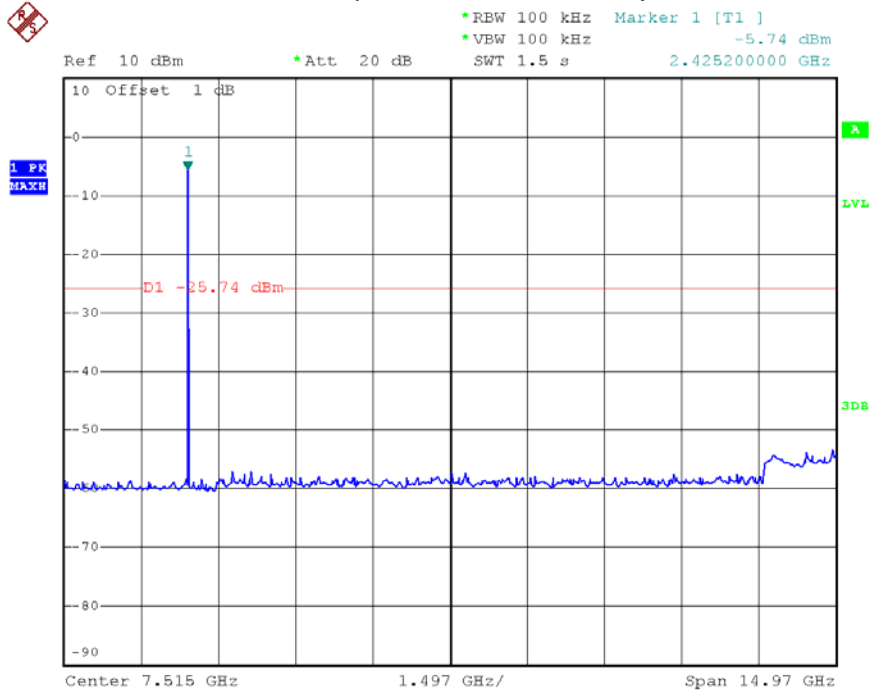


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### Band – edge (at 20 dB blow) – Mid channel Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic (GFSK : Worst-Case)





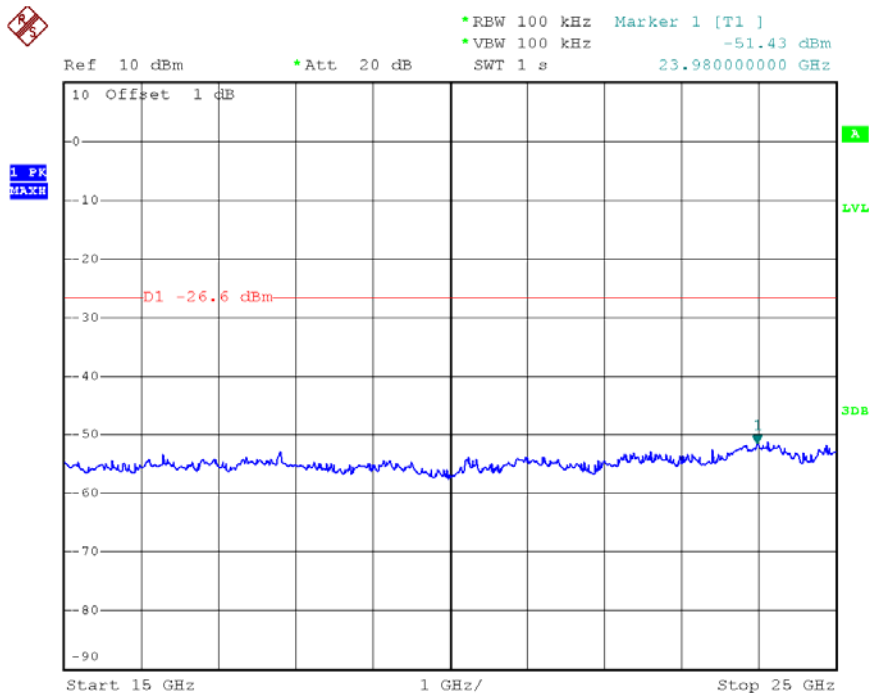
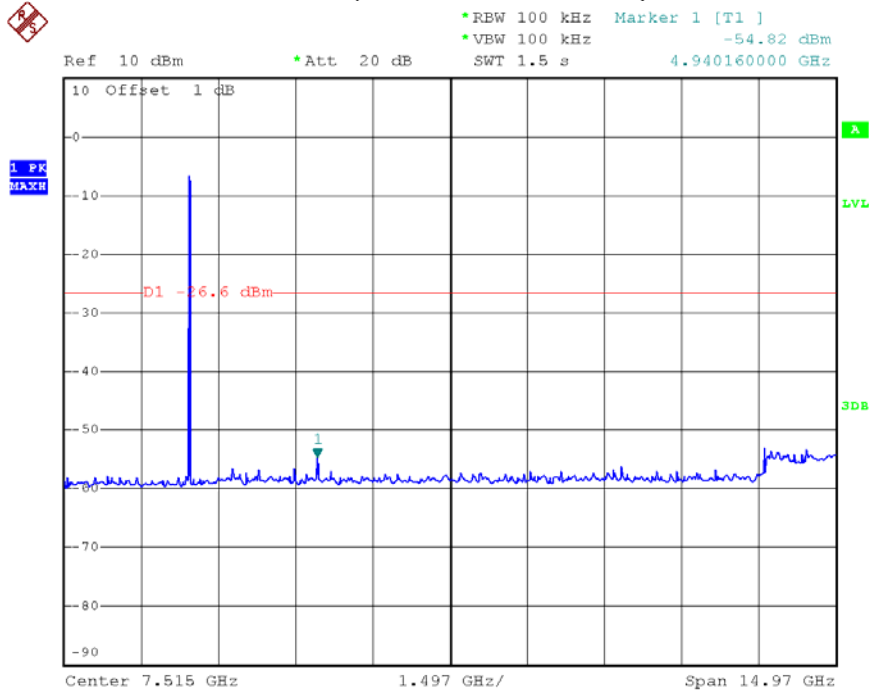


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### Band – edge (at 20 dB blow) – High channel Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic (GFSK : Worst-Case)



## 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 ~ 10<sup>th</sup> harmonic

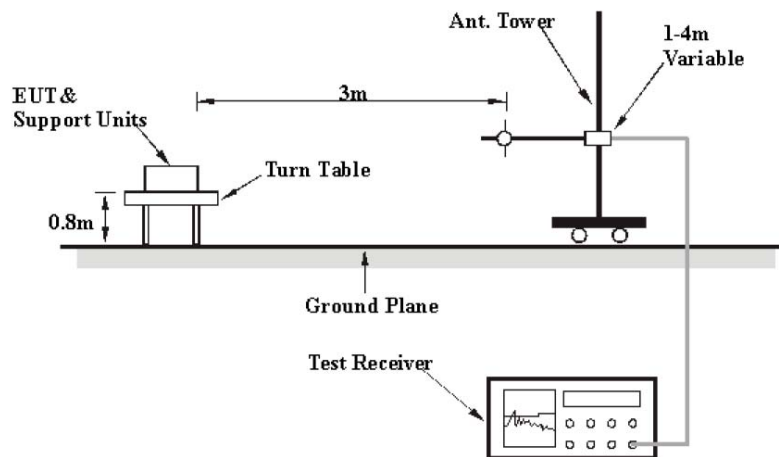
RBW = 120 kHz (30 MHz ~ 1 GHz) VBW ≥ RBW

= 1 MHz (1 GHz ~ 10<sup>th</sup> 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

EUT	Braille Sense OnHand	Measurement Detail	
Model	H318B	Frequency Range	Below 1000MHz
Mode	GFSK(Worst Case)	Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
728.41	42.3	3.7	Quasi-peak

## Test Data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable	Amp. Gain			
105.21	57.3	V	1.0	9.9	0.9	31.5	43.5	36.6	6.9
228.93	56.9	V	1.2	9.0	1.8	31.3	46.0	36.4	9.6
519.94	53.1	H	2.1	16.0	3.6	31.4	46.0	41.3	4.7
604.69	49.9	H	1.9	17.3	3.8	31.3	46.0	39.7	6.3
728.41	50.5	H	2.0	19.0	4.1	31.3	46.0	42.3	3.7
832.75	47.8	H	2.3	19.9	4.5	31.1	46.0	41.1	4.9

H : Horizontal, V : Vertical

Result = Reading + Antenna + Cable - Amp.Gain

### Remark :

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

EUT	Braille Sense OnHand	Measurement Detail	
Model	H318B	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
4805.32	47.2 / 51.1	6.8 / 22.9	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			
4803.90	38.0 ..... 41.9	V	1.0	32.7	34.9	11.4	54.0 ..... 74.0	47.2 ..... 51.1	6.8 ..... 22.9

## 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

EUT	Braille Sense OnHand	Measurement Detail	
Model	H318B	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
4881.49	47.1 / 52.4	6.9 / 21.6	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			
4882.05	37.9 ..... 43.2	V	1.2	32.7	34.9	11.4	54.0 ..... 74.0	47.1 ..... 52.4	6.9 ..... 21.6

## 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

EUT	Braille Sense OnHand	Measurement Detail	
Model	H318B	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
4955.17	48.3 / 53.3	5.7 / 20.7	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			
4960.10	39.1 : 44.1	V	1.0	32.7	34.9	11.4	54.0 : 74.0	48.3 : 53.3	5.7 : 20.7

### 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

#### Modulation type : GFSK(Worst Case)

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
0.20	44.1	9.5	Average



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## Test Data

Frequency  [MHz]	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
	LISN	Cable		[dB $\mu$ V]	[dB $\mu$ V]	[dB $\mu$ V]	[dB]	[dB $\mu$ V]	[dB $\mu$ V]	[dB $\mu$ V]	[dB]
0.20	10.0	0.1	H	63.6	42.3	52.4	11.2	53.6	34.0	44.1	9.5
0.70	10.0	0.1	N	56.0	35.6	45.7	10.3	46.0	22.4	32.5	13.5
0.74	10.0	0.1	N	56.0	33.8	43.9	12.1	46.0	25.3	35.4	10.6
0.88	9.9	0.1	N	56.0	32.9	42.9	13.1	46.0	19.6	29.6	16.4
1.02	9.9	0.1	N	56.0	36.4	46.4	9.6	46.0	21.6	31.6	14.4
1.08	9.9	0.1	N	56.0	35.9	45.9	10.1	46.0	22.0	32.0	14.0

H : HOT, N : NEUTRAL





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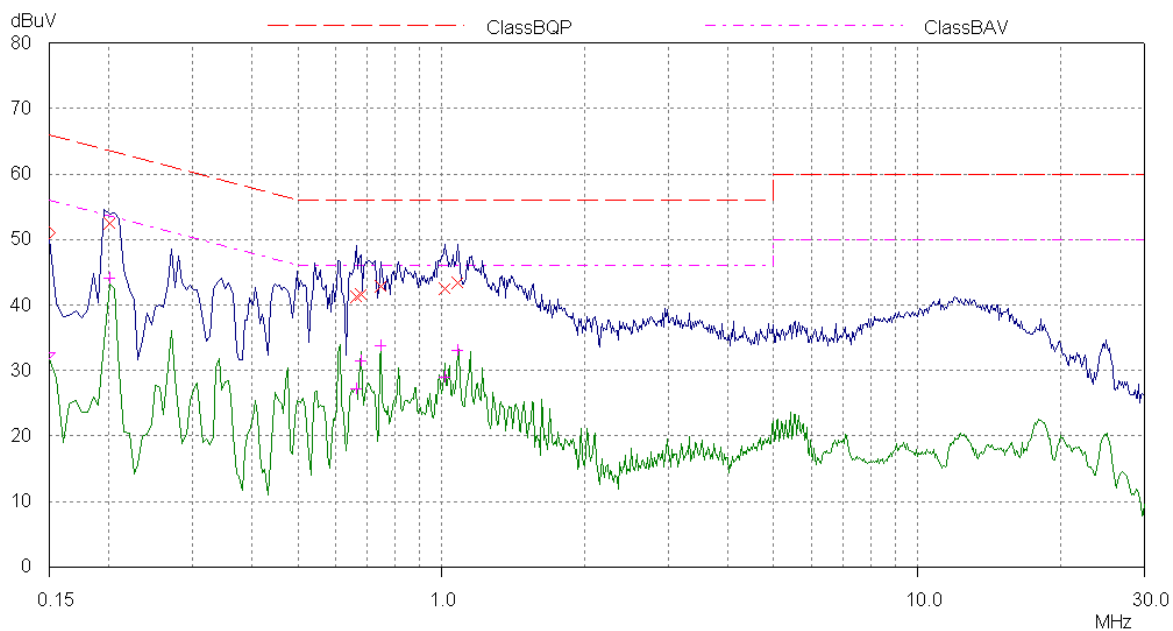
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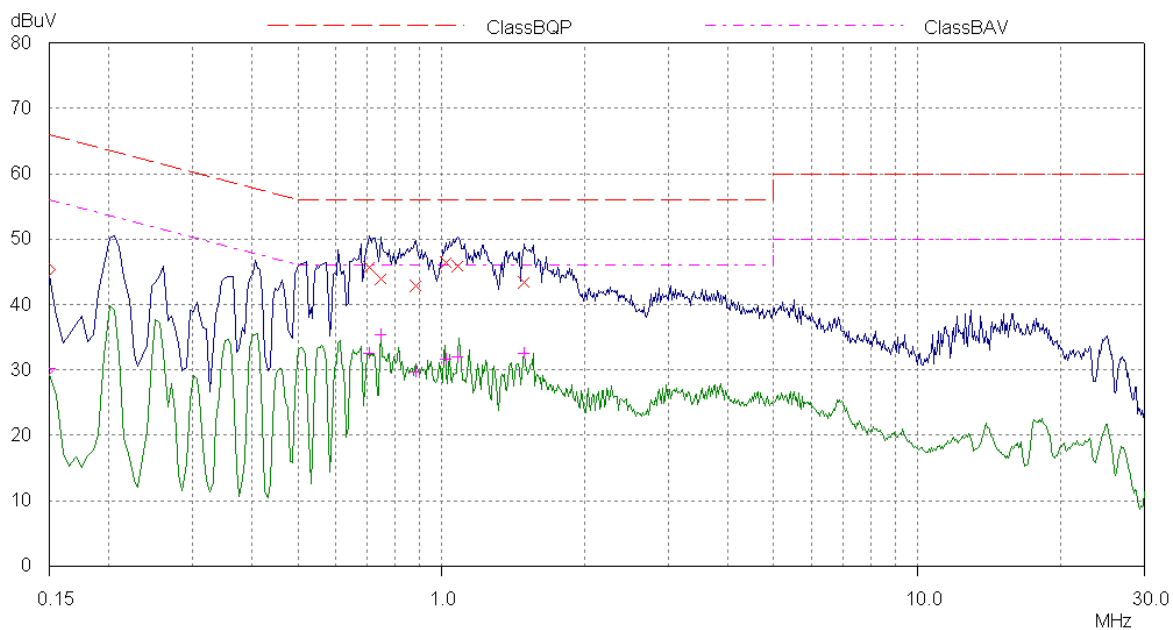
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### [Hot]



### [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	2010-07-07
7	EPM Series Power Meter	HP	E4418A	GB38272734	2010-10-30
8	Power Sensor	HP	8487A	3318A03524	2010-07-09
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