

TEST REPORT For FCC

Test Report No. : 2011120080
Date of Issue : December 28, 2011
FCC ID : QJCH432B
Model/Type No. : H432B
Kind of Product : Braille Sense U2
Applicant : HIMS International Corporation
Applicant Address : KT Daejeon Satellite Center, 139-9, Gajung-dong, Yuseong-gu, Daejeon, KOREA, 305-350
Manufacturer : HIMS International Corporation
Manufacturer Address : KT Daejeon Satellite Center, 139-9, Gajung-dong, Yuseong-gu, Daejeon, KOREA, 305-350
Contact Person : Kim Sung Man / Associate Researcher
Telephone : +82-42-864-4460
Received Date : November 16, 2011
Test period : Start : November 22, 2011 End : December 12, 2011

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

Tested by

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Date: December 28, 2011

Reviewed by

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Date: December 28, 2011



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REPORT REVISION HISTORY

Date	Revision	Page No
December 28, 2011	Issued (2011120080)	All

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1.0 General Product Description

Equipment model name	H432B
Serial number	Prototype
EUT condition	Pre-production, not damaged
Antenna type	Chip antenna Gain -1 dBi
Frequency Range	2402 MHz - 2480 MHz
RF power	-3.385 dBm Peak Conducted (GFSK) -5.620 dBm Peak Conducted (8-DPSK)
Number of channels	79
Channel Spacing	1 MHz
Channel Access Protocol	Frequency Hopping
Type of Modulation	GFSK(1 Mbps), DQPSK(2 Mbps), 8-DPSK(3 Mbps)
Power Source	DC 3.7 V (Lithium Ion Rechargeable Battery)

1.1 Tested Frequency

	LOW	MID	HIGH
Frequency (MHz)	2402	2441	2480

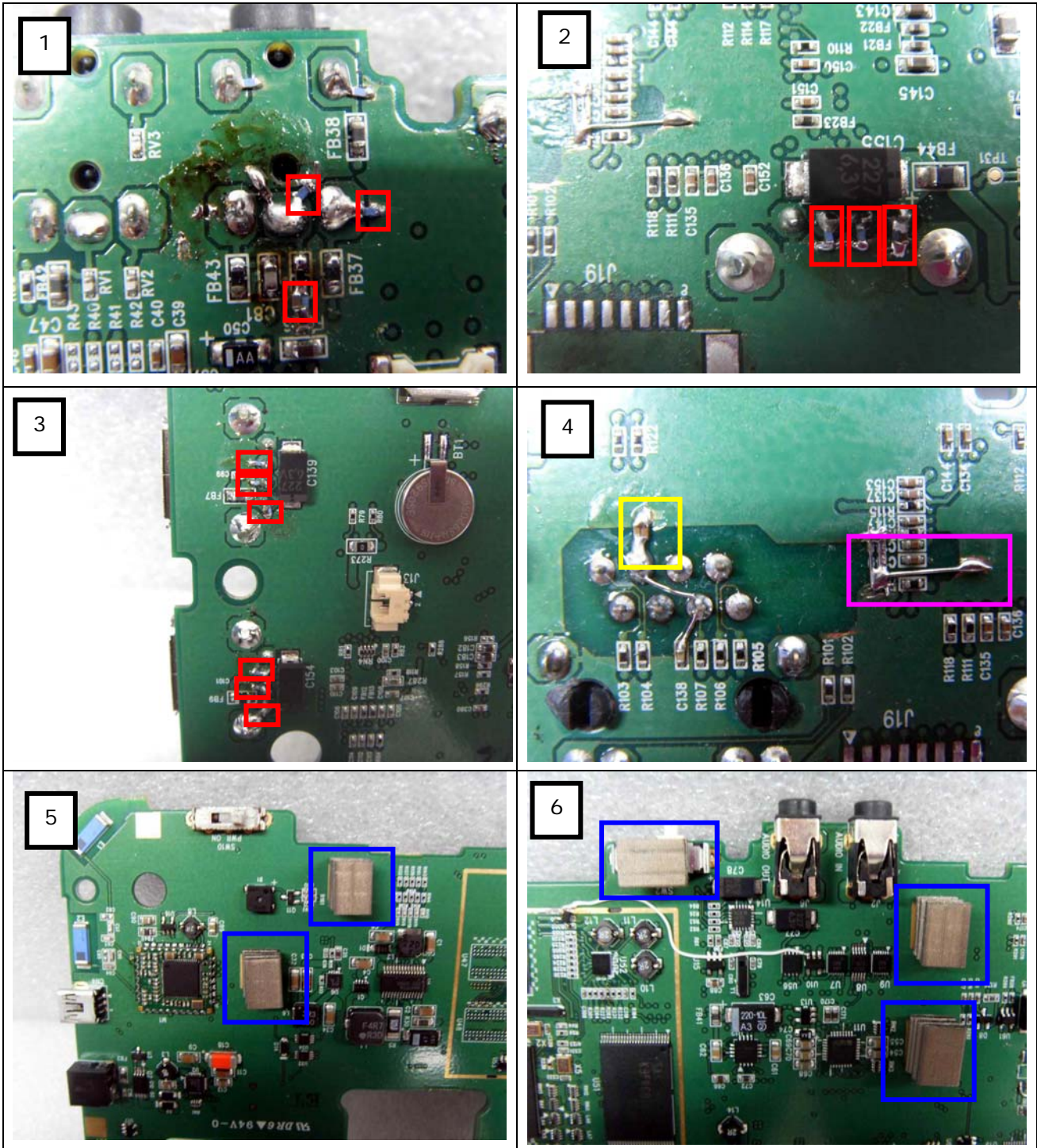
1.2 Tested Mode

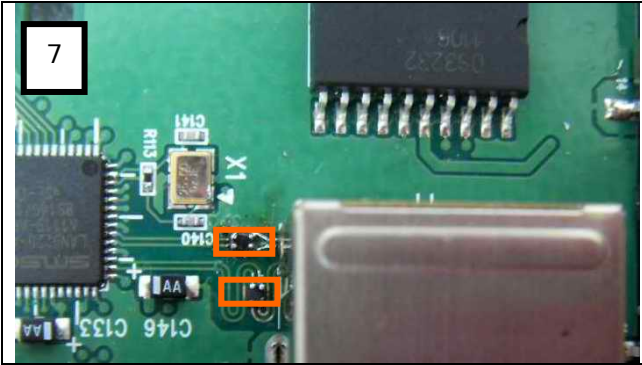
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

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 Device Modifications

The following modifications were necessary for compliance and was applied by applicant.



	
<p>Varistor [Part No. : ULCE0505C015FR]</p> <p>1) Location No. : RV4, RV26, RV27</p> <p>2) Location No. : RV36, RV37, RV38</p> <p>3) Location No. : RV30, RV31, RV32, RV33, RV34, RV35</p> <p>4) Capacitor [Part No. : X7R/22nF/25V] Location No. : C24</p> <p>4) Ground reinforcement</p> <p>5) Gasket</p> <p>6) Gasket</p> <p>7) Common mode Filter [Part No. : MCZ1210AH900TAOG] Location No. : T2, T3</p>	



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1.4 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Switching Adapter (for EUT)	Dee Van Electronics(Longchuan)Co., Ltd.	DSA-12CA-05 050200	-
LCD Monitor 1	Innocom Technology(Shenzhen) Co., Ltd.	SE198WFPf	CN-ORR716-72872-81T-OWG
Keyboard (USB type)	-	GP-K5000	82019943
Mouse (USB type) 1	INTECH ELECTRONICS CORPORATION	3D-510	-
SD Card	-	-	-
USB Drive	BMK	MemoRive	-
Headset	-	-	-
Personal Computer	SAMSUNG	DB-A75	Z9KM96BS300055E
LCD Monitor 2	Lite-On Technology Corp.	VS17	CNN5130QMC
Keyboard (PS/2 type)	-	SEM-DT35US	31001616
Mouse (USB type) 2	MICROSOFT CORPORATION	Optical Mouse USB/PS2 Compatible	69657-492-4974533-40420

1.5 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.

1.6 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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1.7 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 meter Open Area Test Site and one conducted site.	 R-948, C-986 T-1843
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
15.209	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

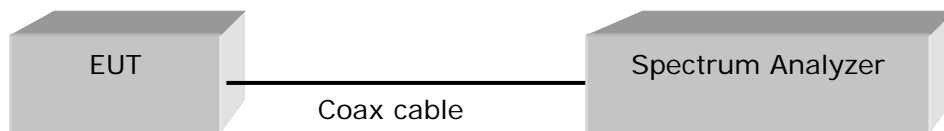


Figure 1 : Measurement setup for the carrier frequency separation

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	980	631	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	842	25	Complies

See next pages for actual measured spectrum plots.



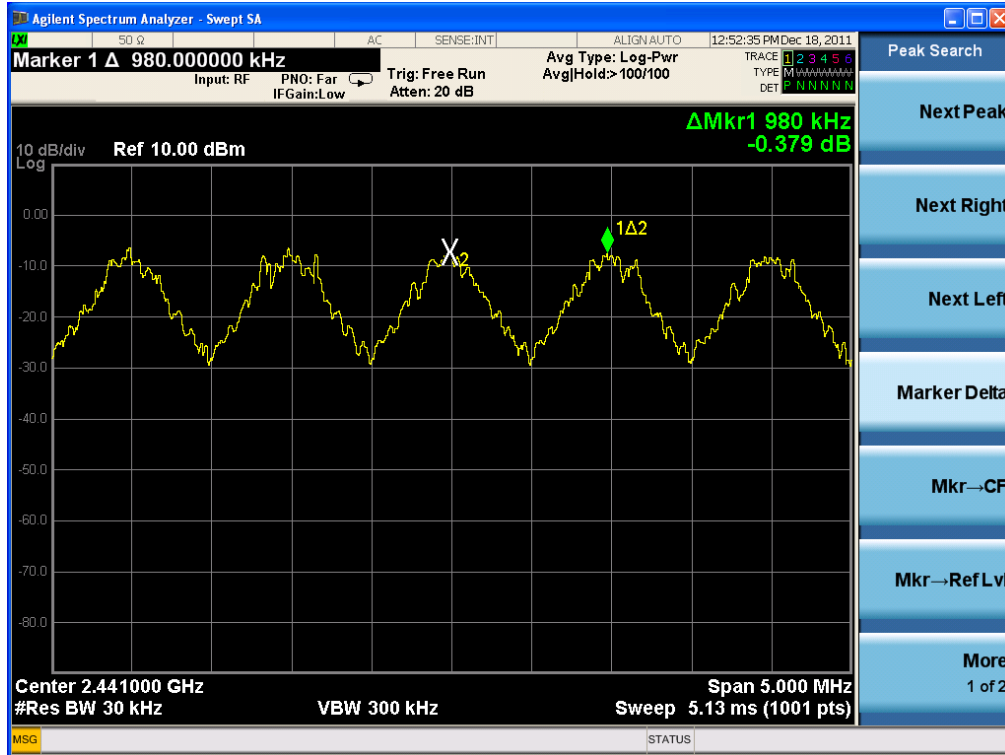
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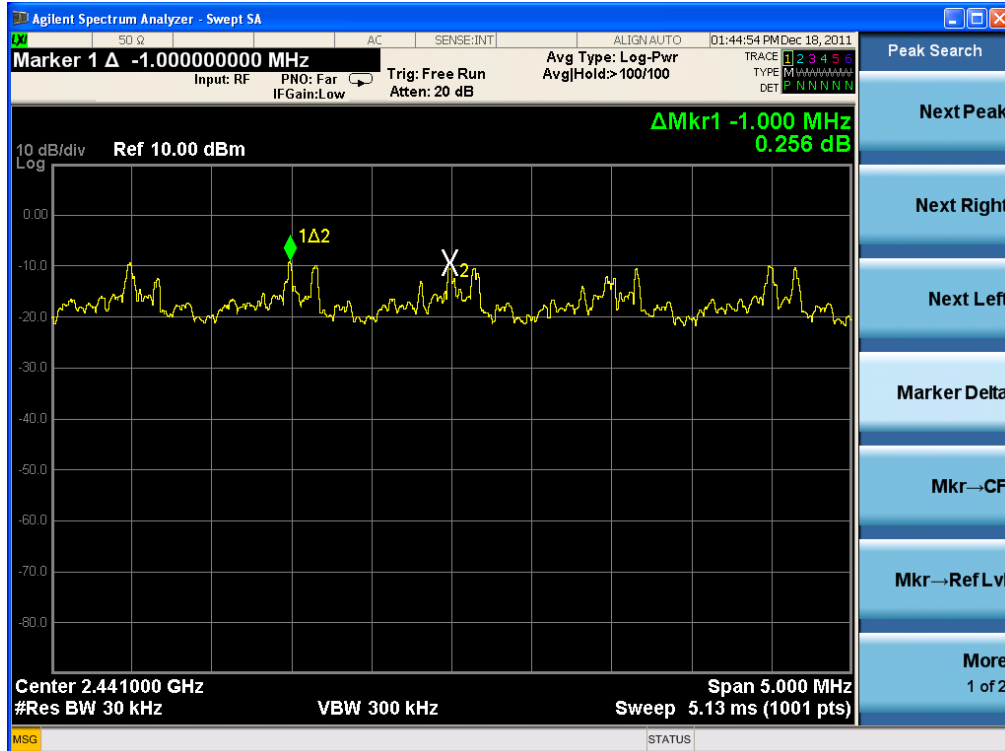
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Carrier Frequency Separation

Data Rate : GFSK



Data Rate : 8-DPSK



2.1.2 Number of Hopping Frequencies

Test Location

RF Test Room

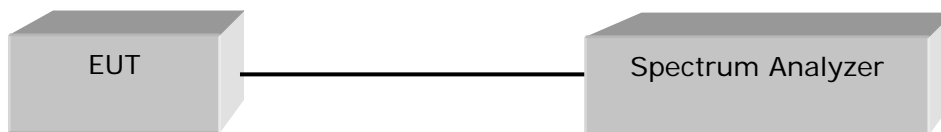
Test Procedures

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.

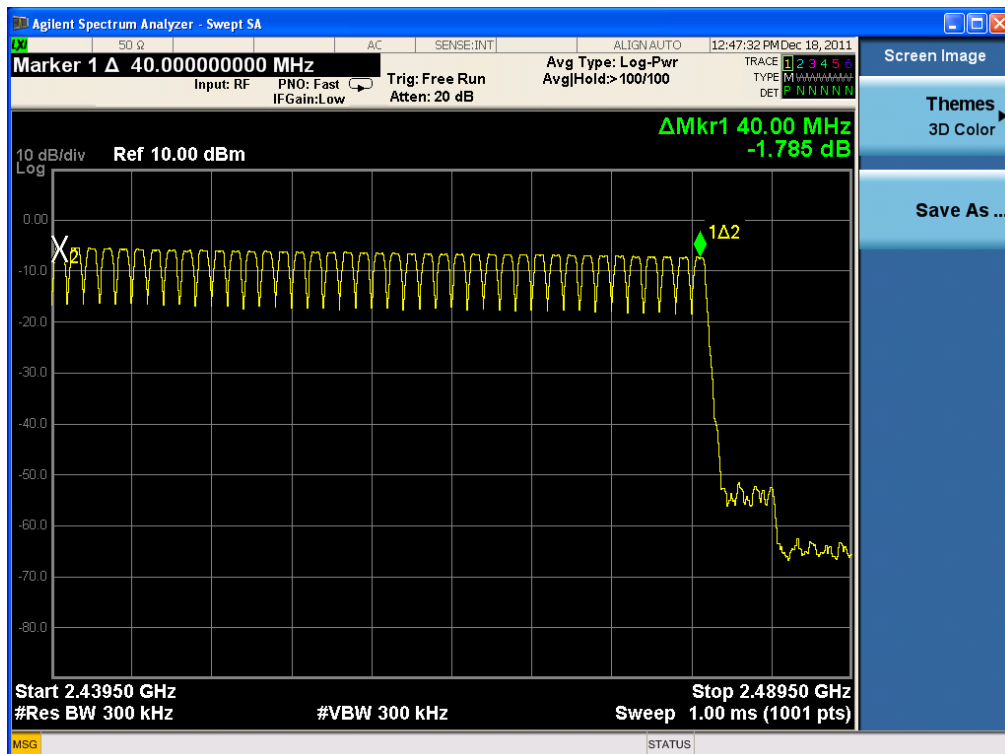
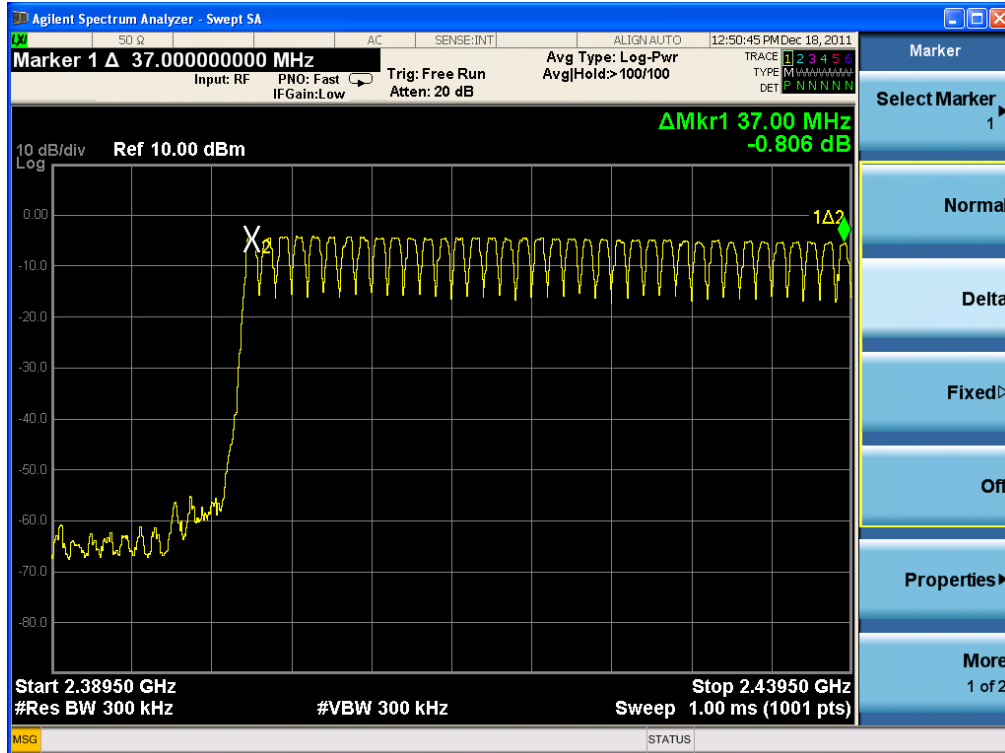


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Number of Hopping Frequencies(GFSK)



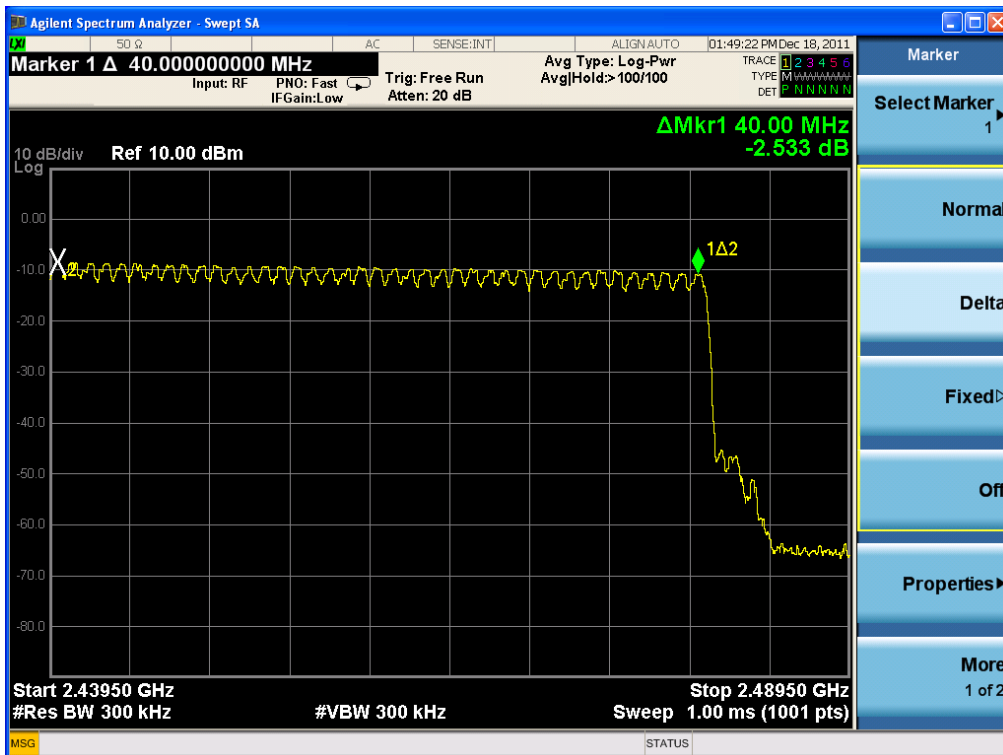
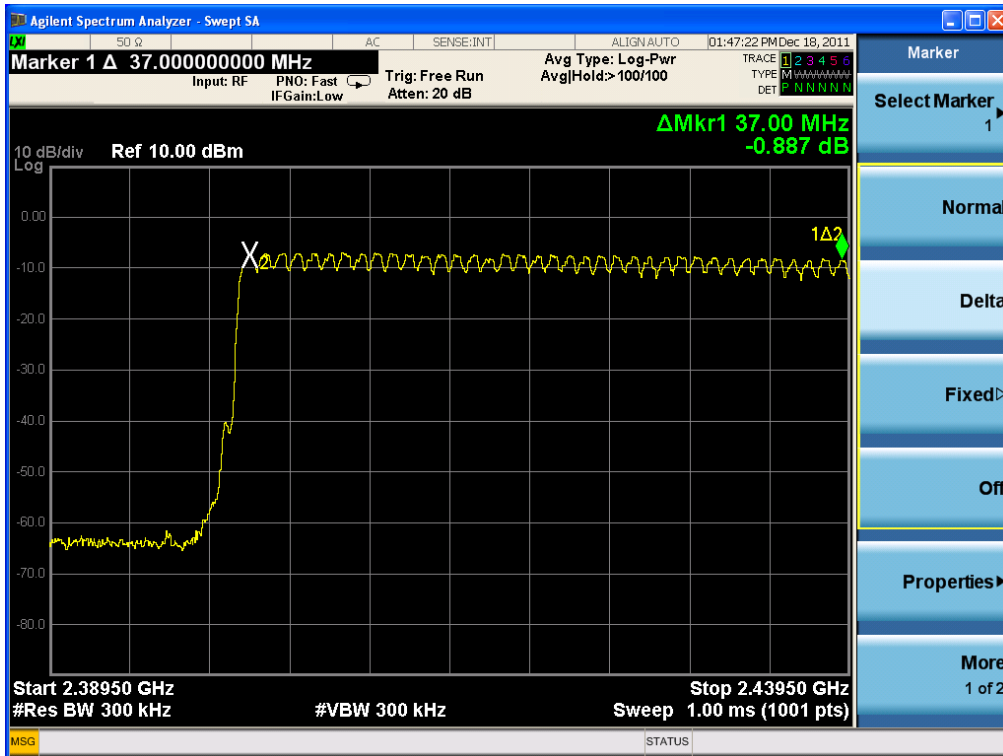


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Number of Hopping Frequencies(8-DPSK)



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)

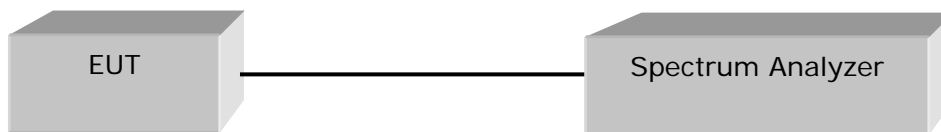
RBW = 30 kHz ($\geq 1\%$ of the span)

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	0.941	Complies
2441	39	0.947	Complies
2480	78	0.950	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	1.263	Complies
2480	78	1.264	Complies

See next pages for actual measured spectrum plots.

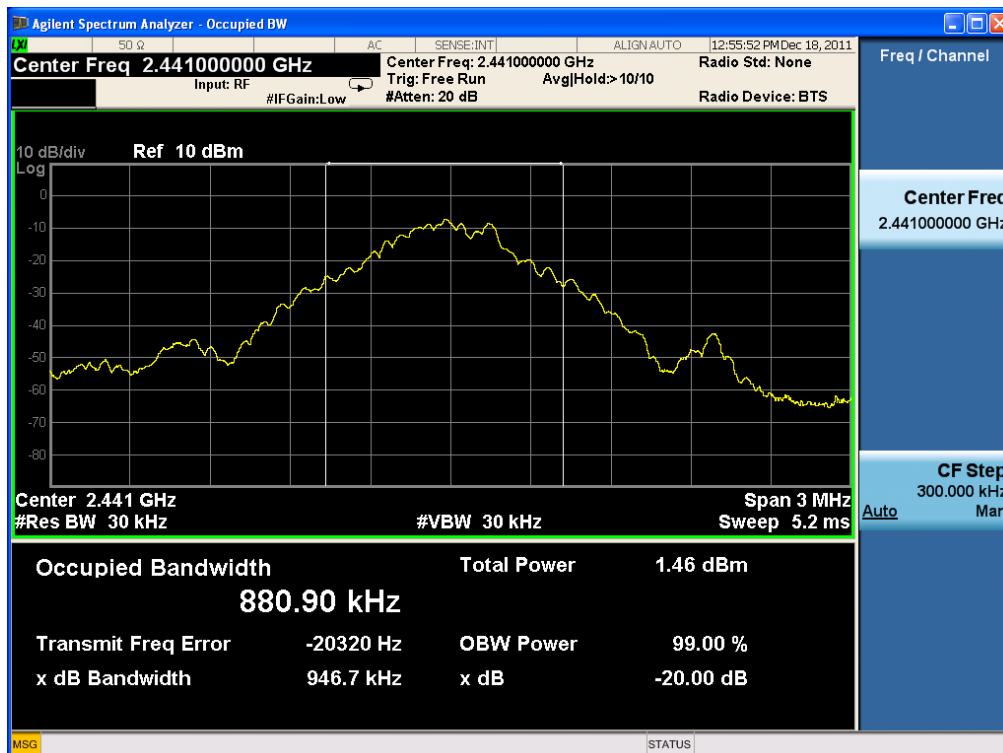
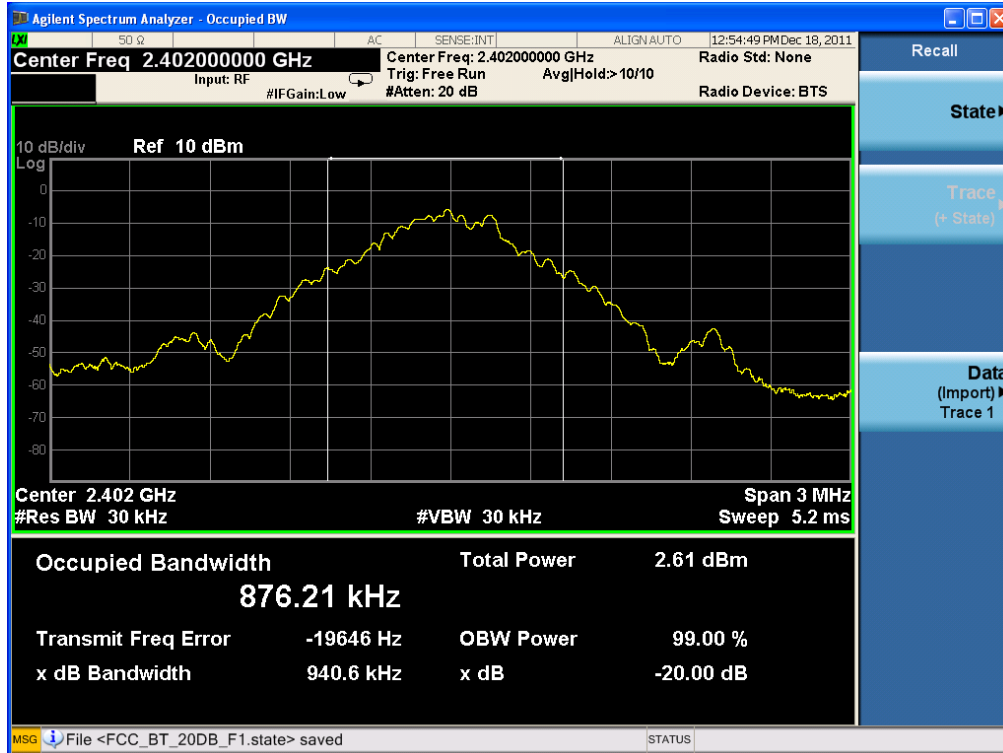


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20 dB Bandwidth - GFSK

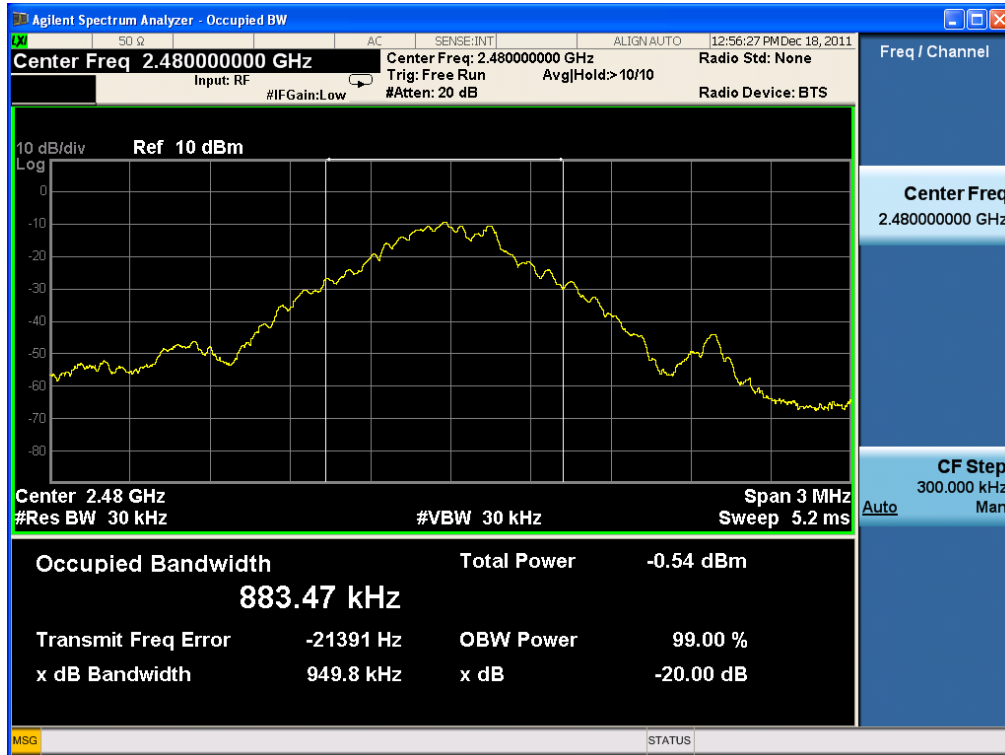




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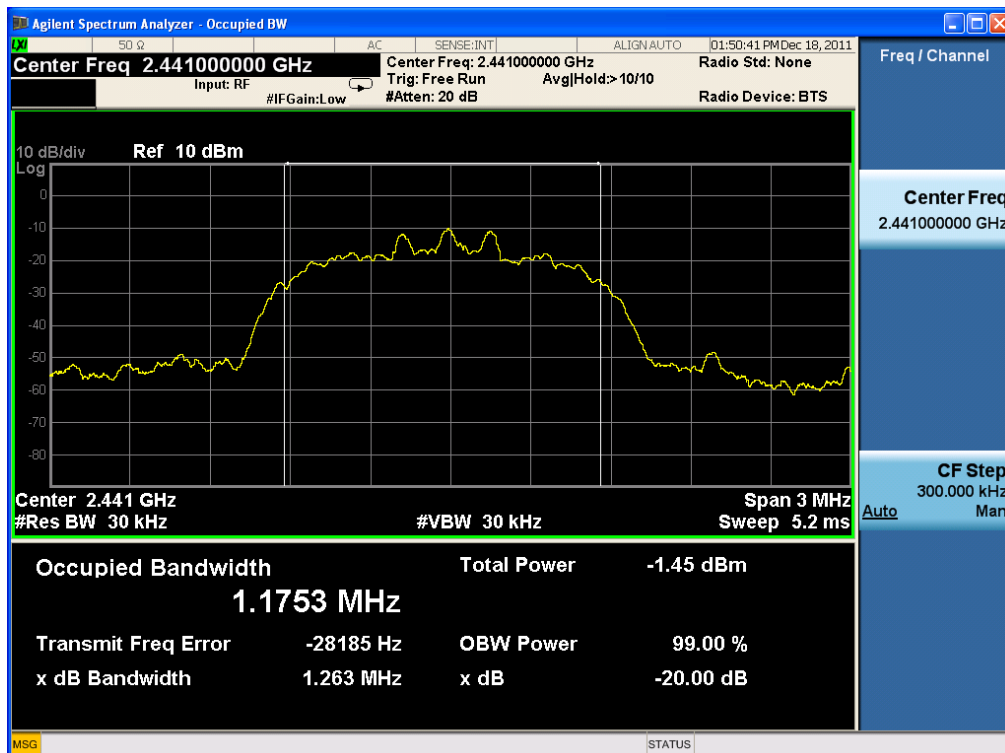
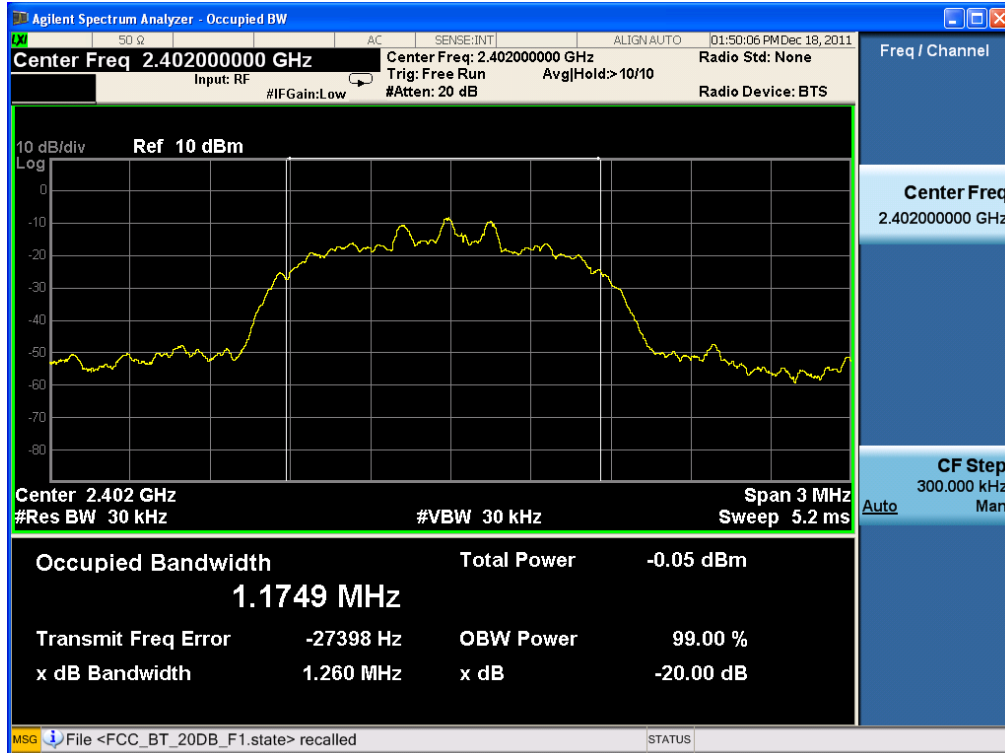


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20 dB Bandwidth – 8-DPSK

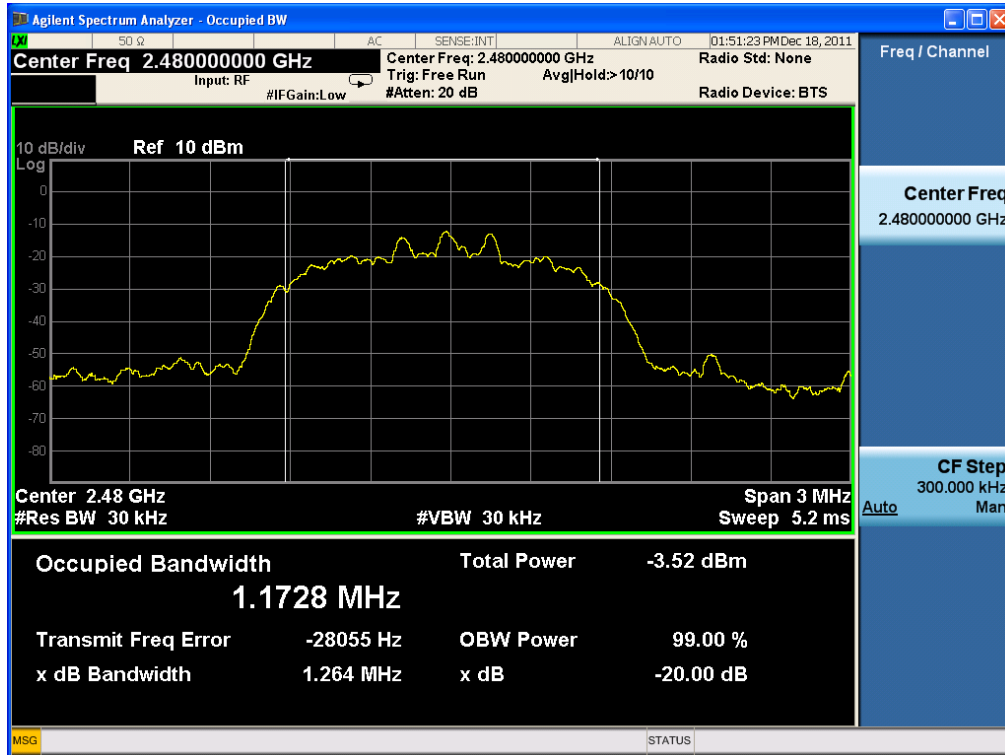




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2.1.4 Time of Occupancy (Dwell Time)

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 H432B 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

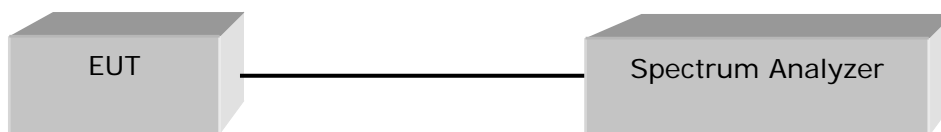
RBW = 1 MHz

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	2.900	308.33	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 = $2.900 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 308.33 \text{ ms}$

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	0.405	129.60	Complies
	3DH 3	1.640	262.40	Complies
	3DH 5	2.910	310.40	Complies

3DH1 Dwell time = $0.405 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 129.60 \text{ ms}$

3DH3 Dwell time = $1.640 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 262.40 \text{ ms}$

3DH5 Dwell time = $2.910 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 310.40 \text{ ms}$

See next pages for actual measured spectrum plots.

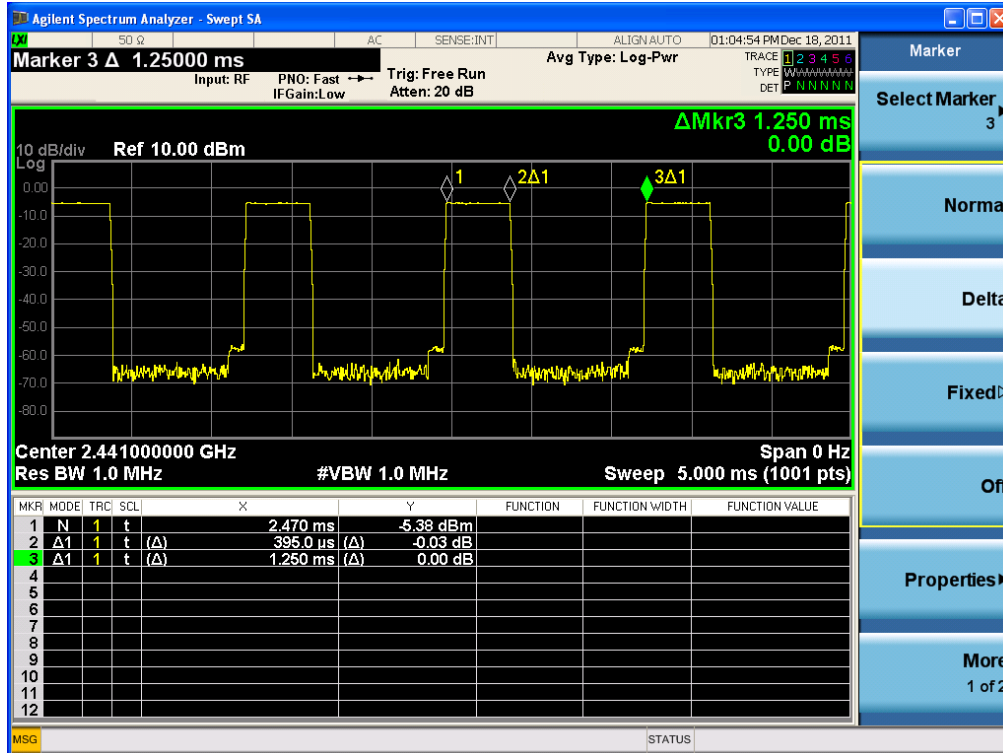


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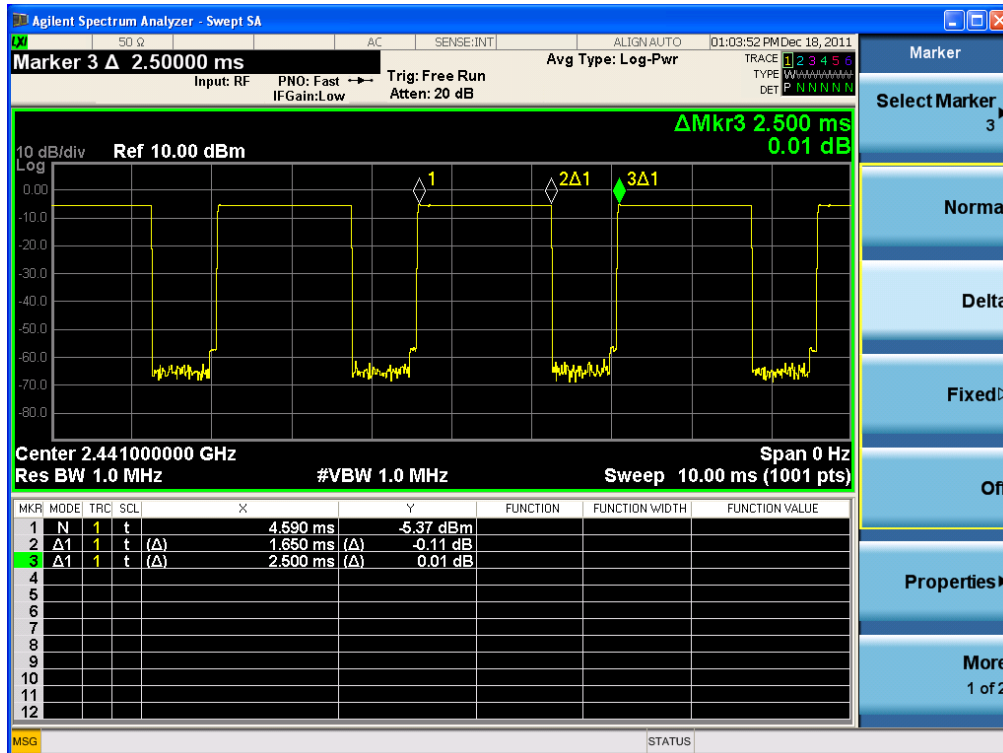
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Time of Occupancy for PACKET Type DH1(GFSK)



Time of Occupancy for PACKET Type DH3(GFSK)



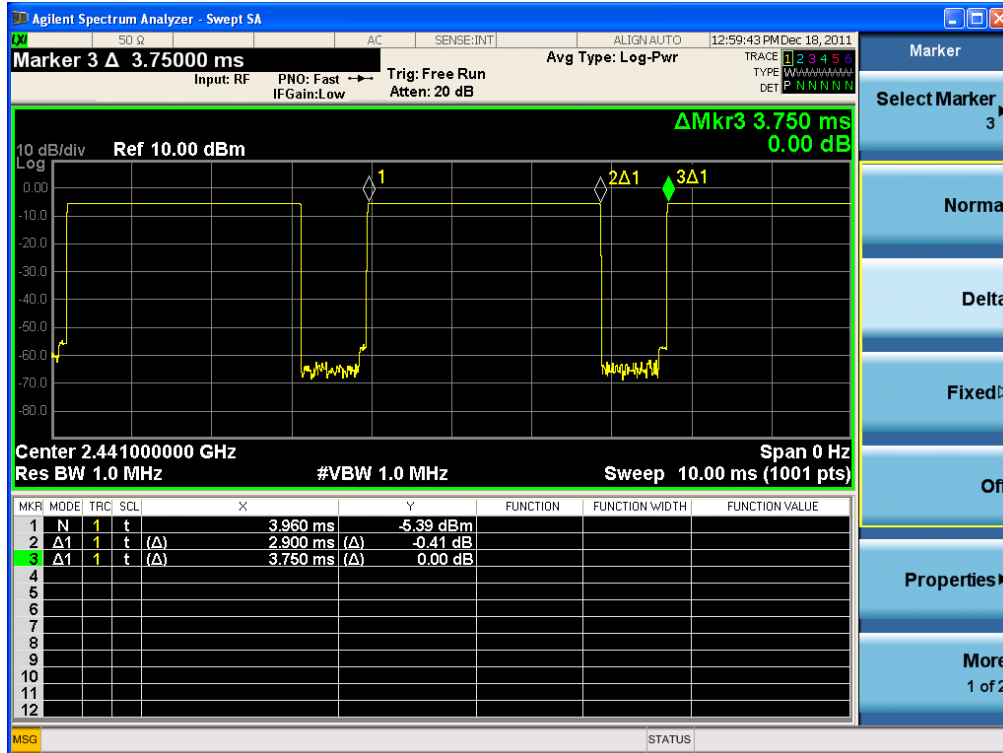


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Time of Occupancy for PACKET Type DH5(GFSK)



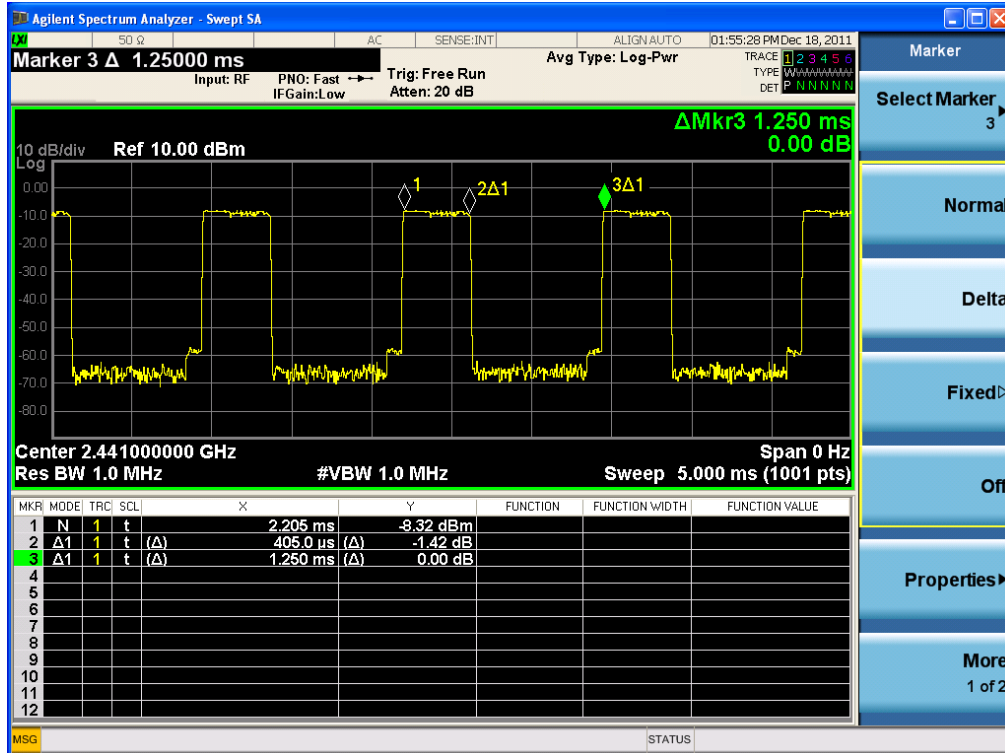


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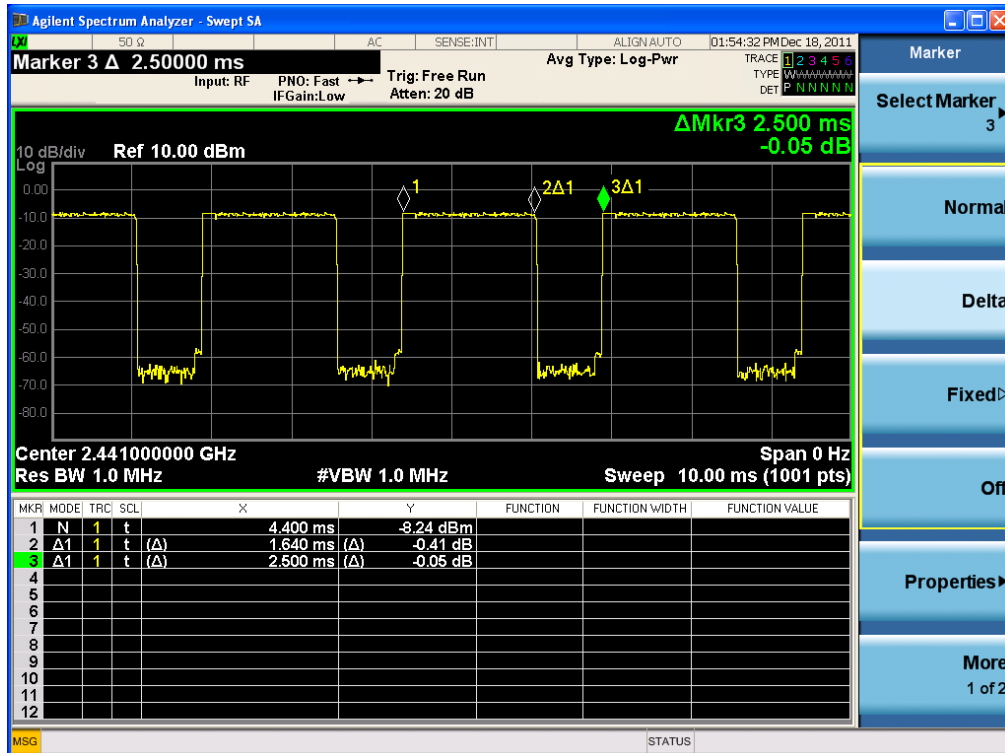
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Time of Occupancy for PACKET Type 3DH1(8-DPSK)



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



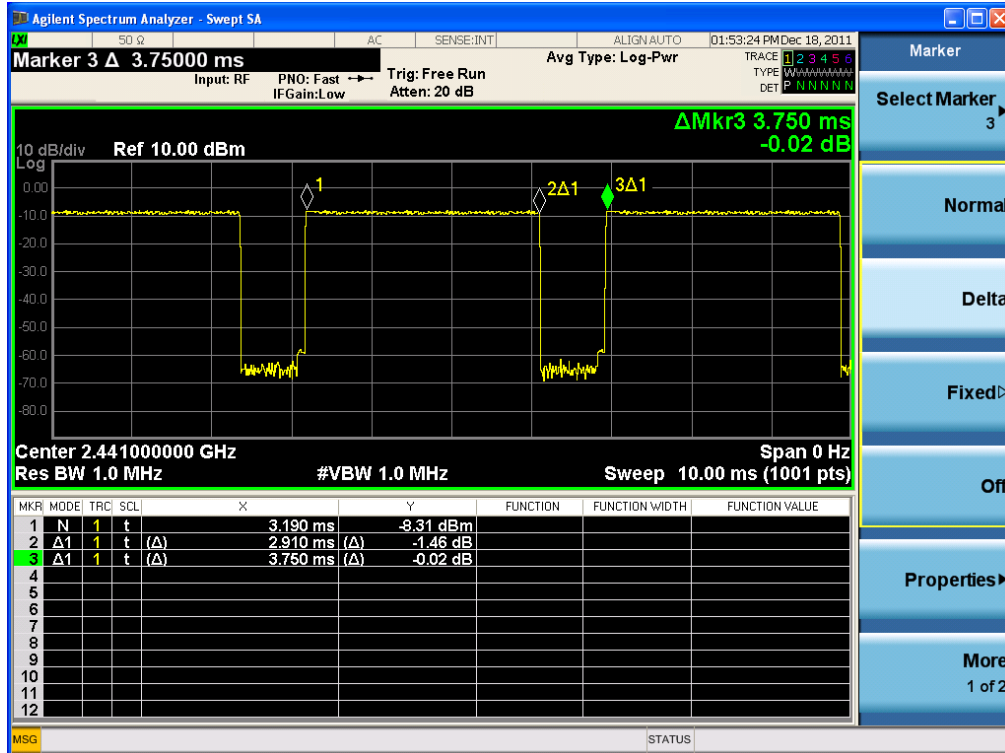


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Time of Occupancy for PACKET Type 3DH5(8-DPSK)



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)

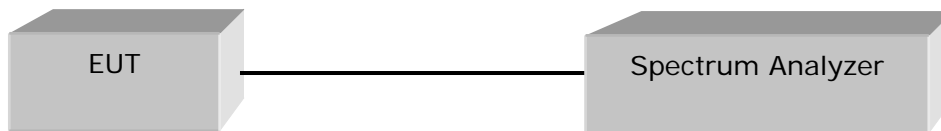
RBW = 1 MHz (greater than the 20 dB bandwidth of the emission being measured)

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 : 4 Packet Size : 27(DH1)

Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	-3.385	0.459	Complies
2441	39	-4.290	0.372	Complies
2480	78	-6.179	0.241	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	-5.620	0.274	Complies
2441	39	-6.823	0.208	Complies
2480	78	-9.008	0.126	Complies

See next pages for actual measured spectrum plots.

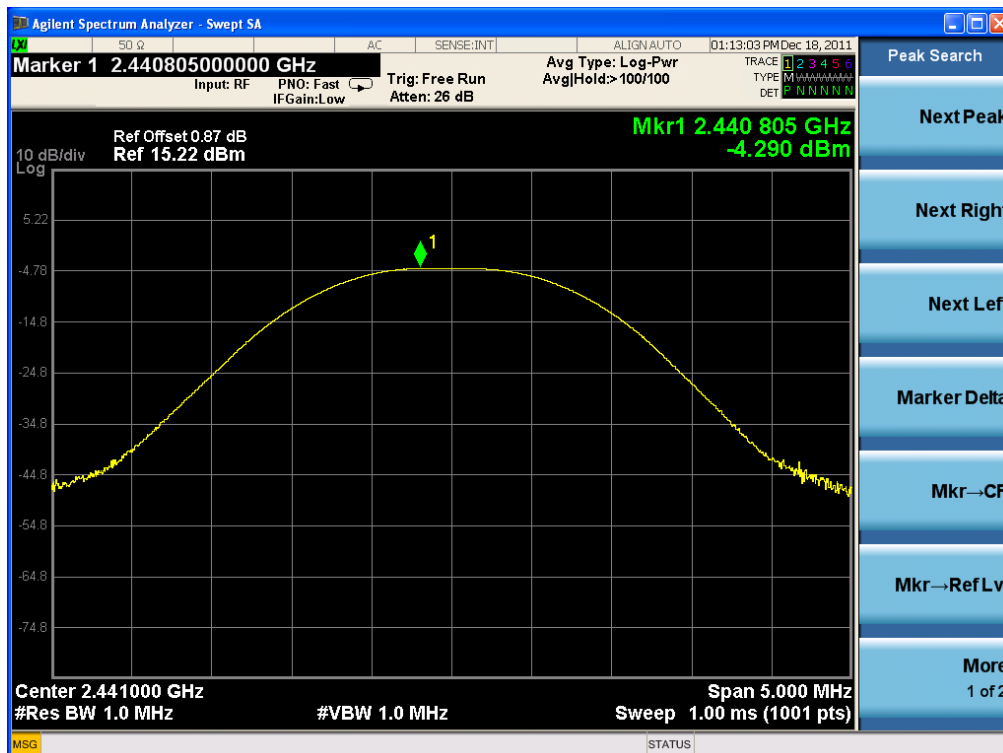
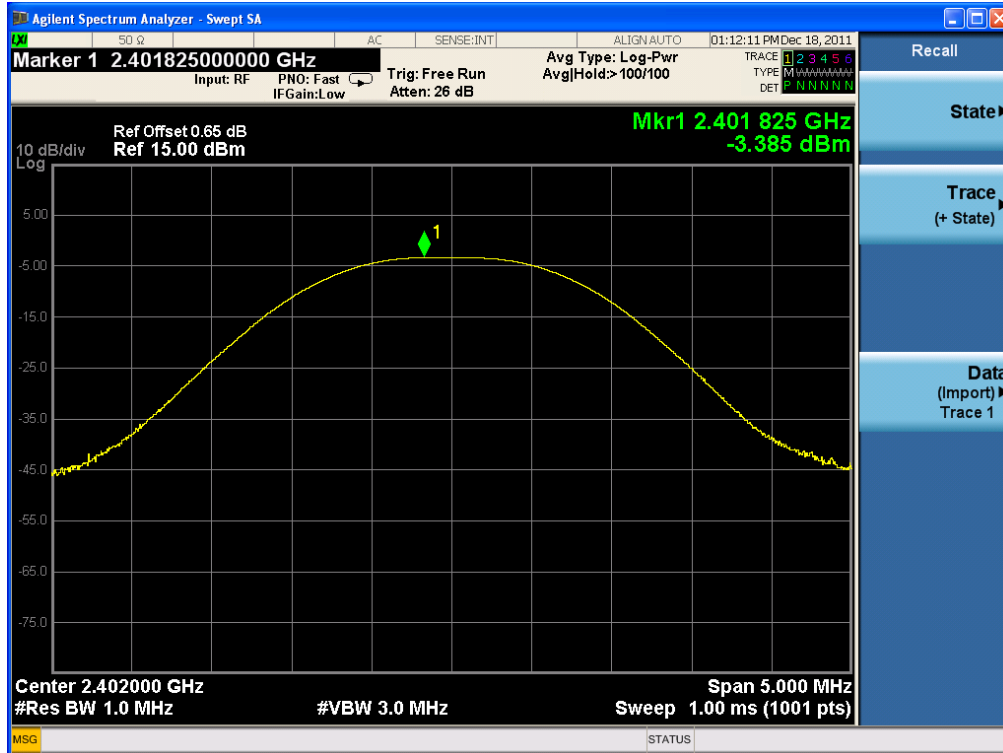


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Maximum peak Conducted Output Power - GFSK





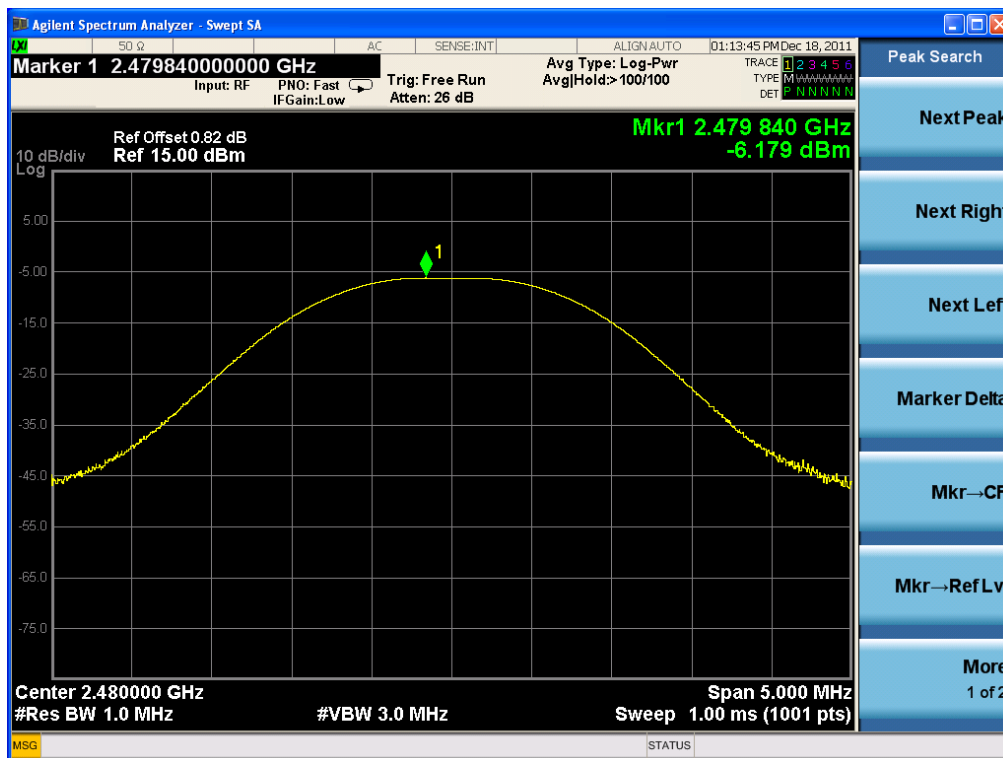
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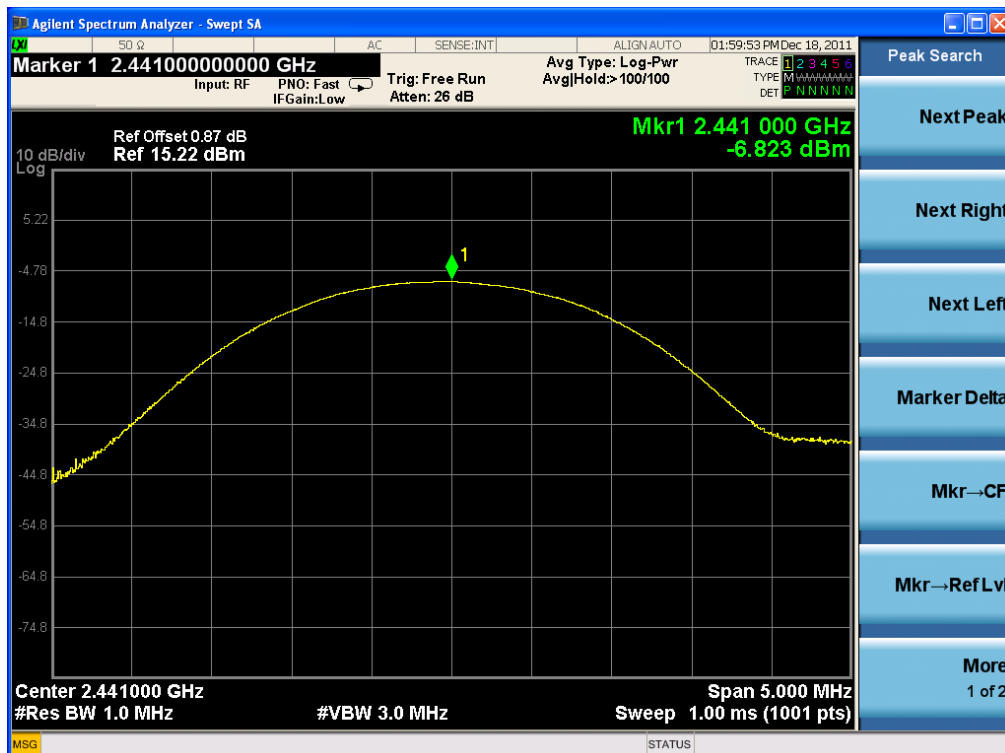
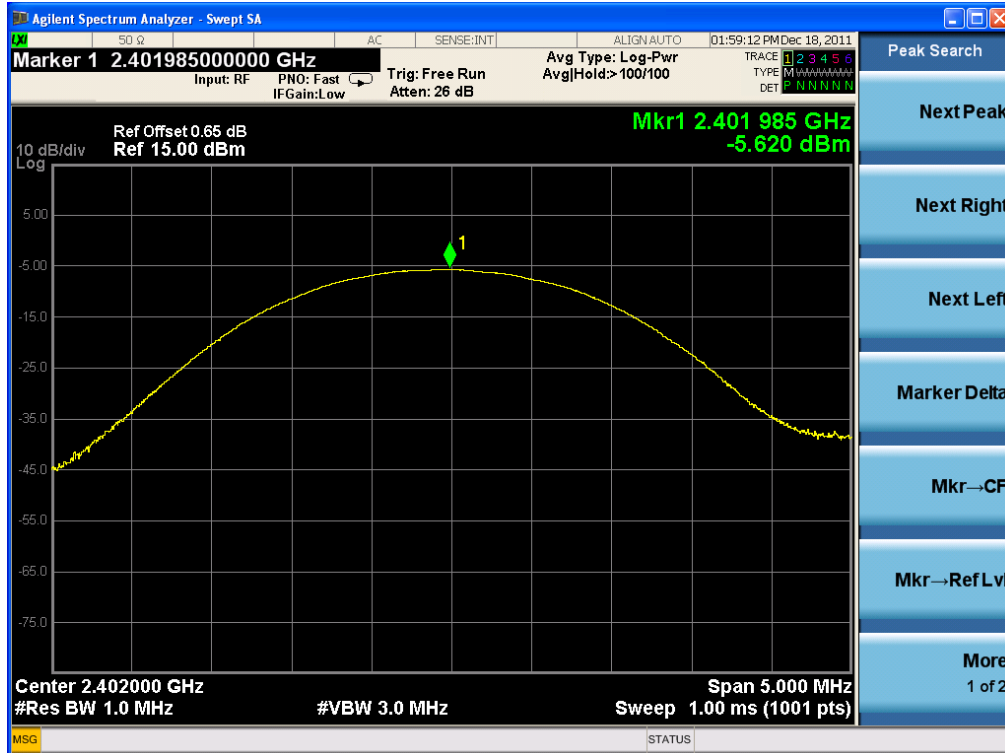


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Maximum peak Conducted Output Power - 8-DPSK





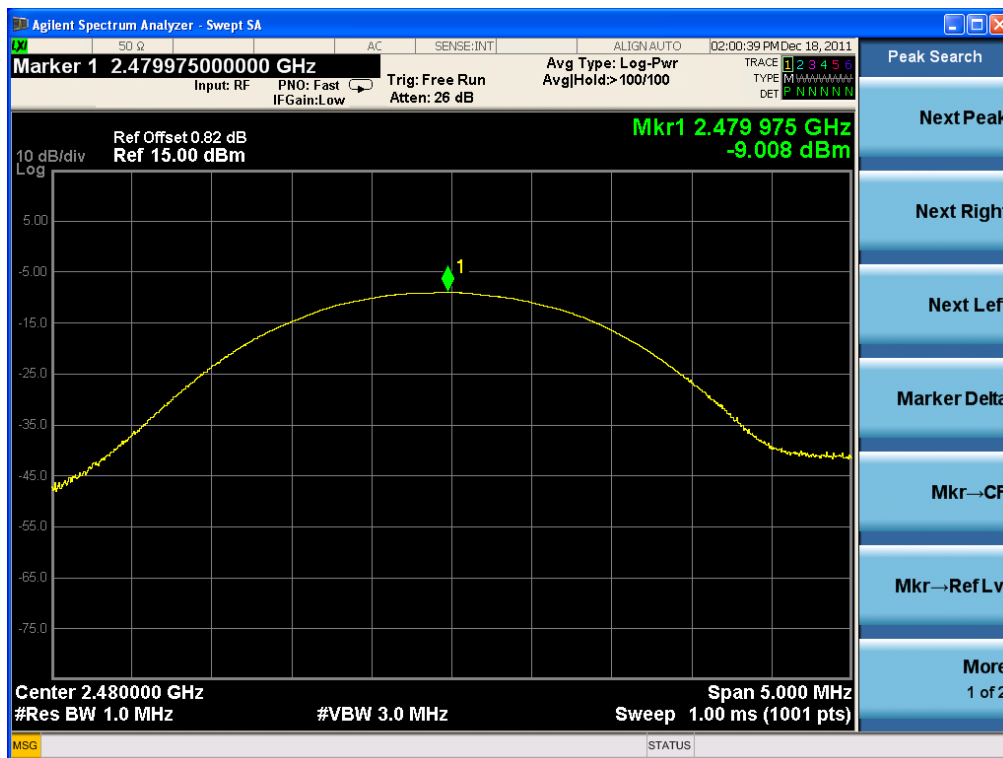
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2.1.6 Band-edge

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

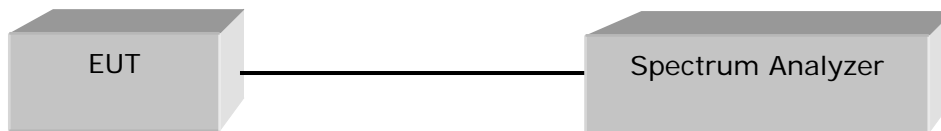
VBW = 100 kHz (\geq RBW)

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.

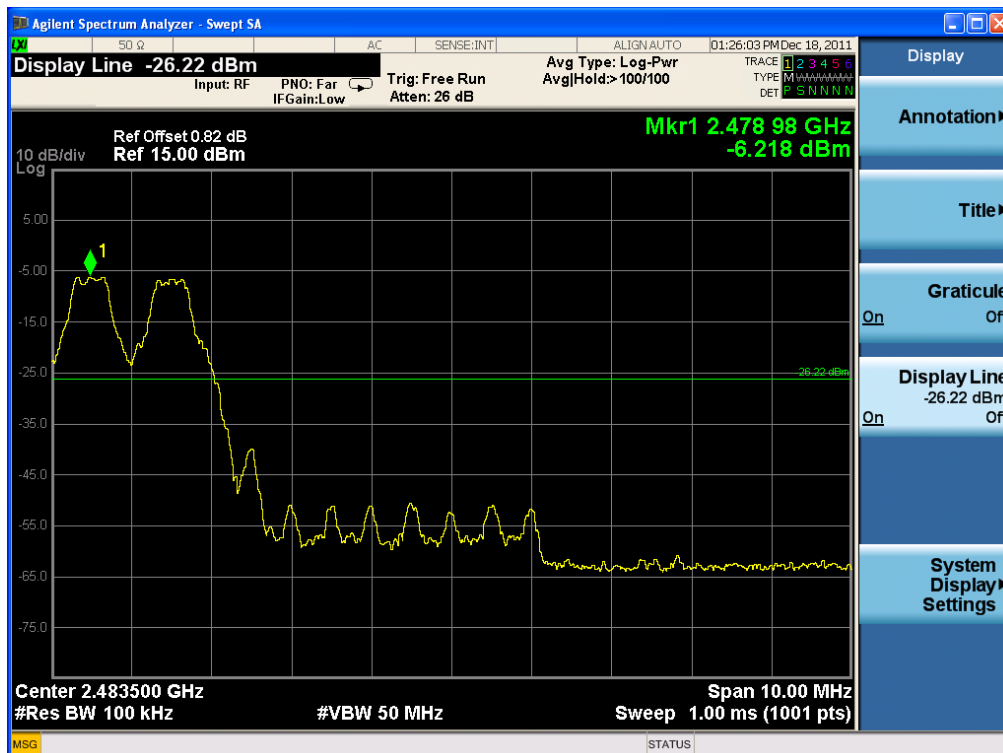
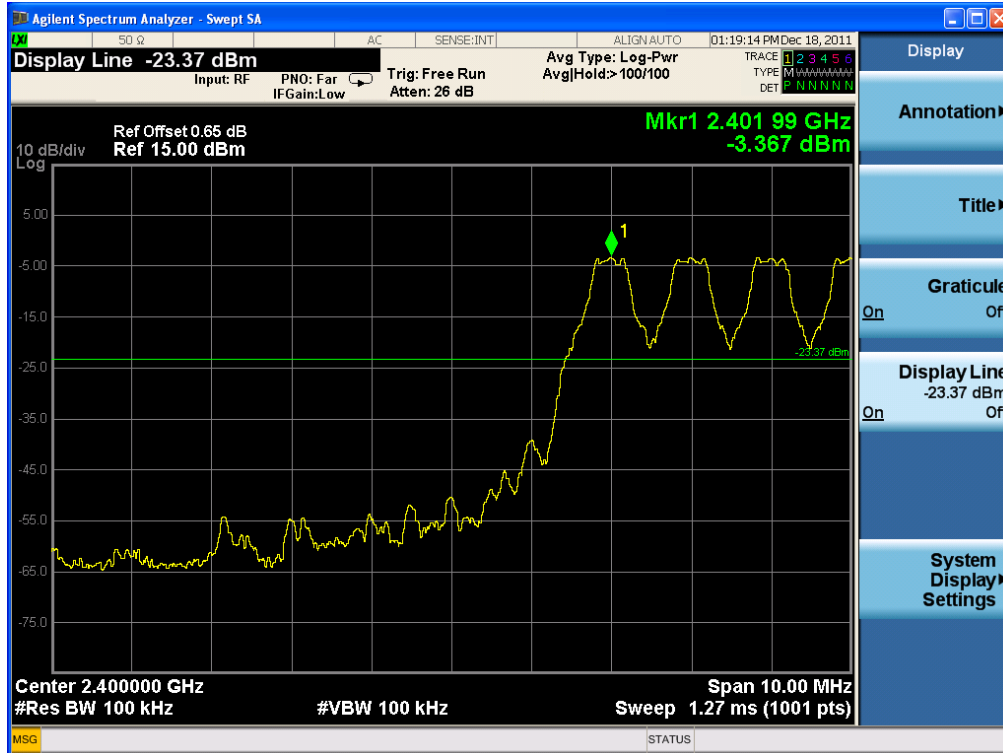


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Band – edge (with Hopping) - GFSK



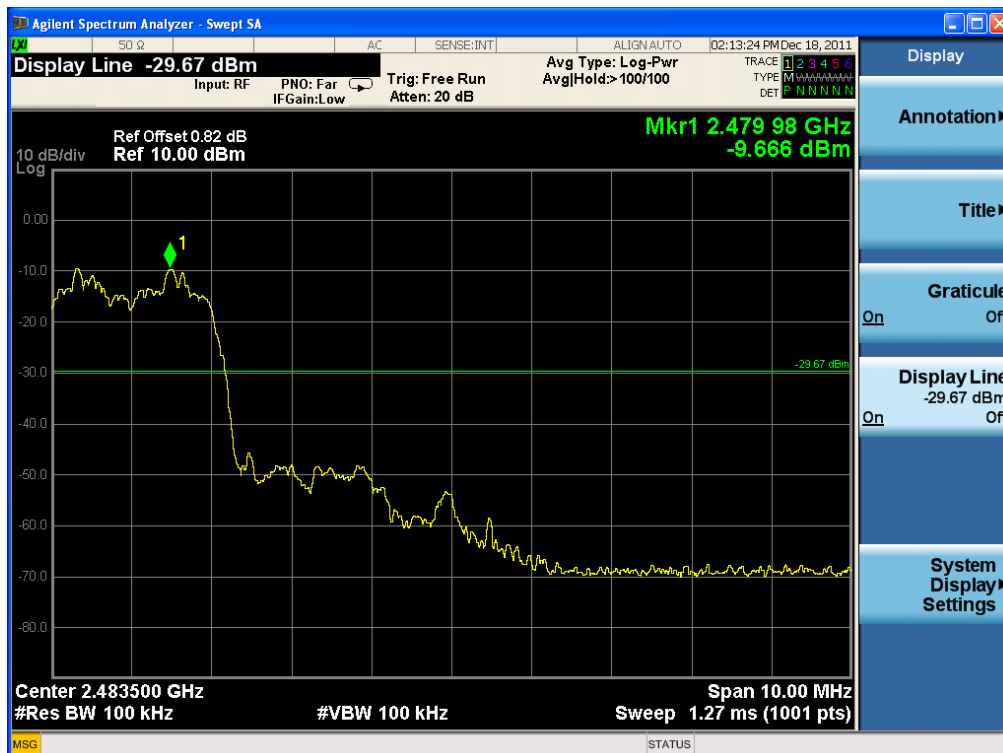


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Band – edge (with Hopping) - 8-DPSK



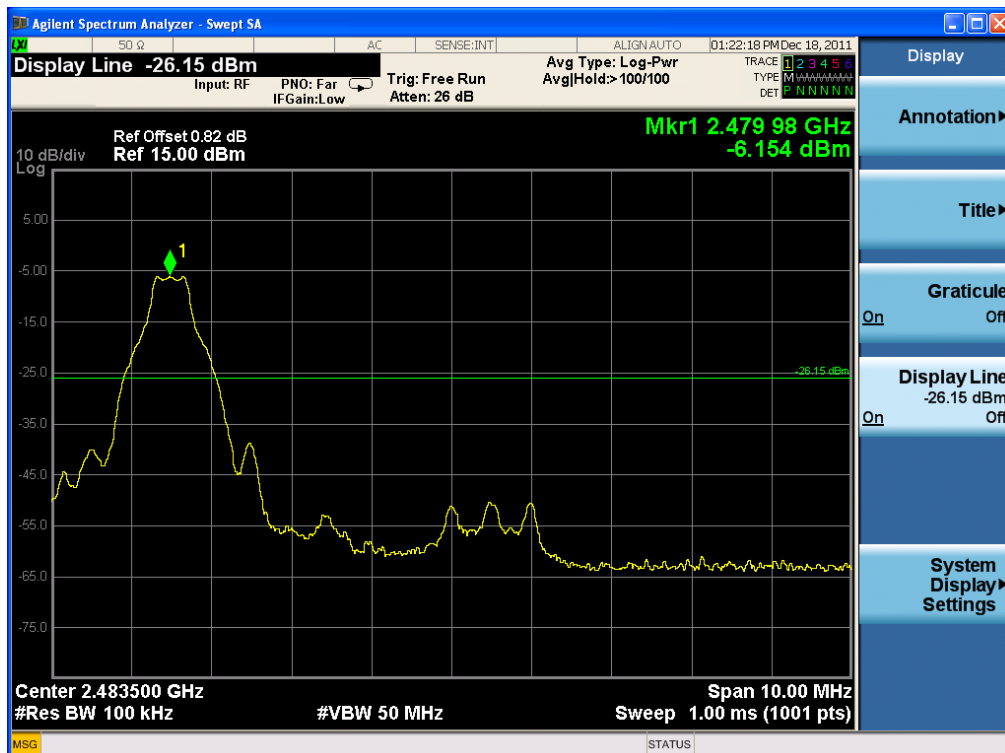
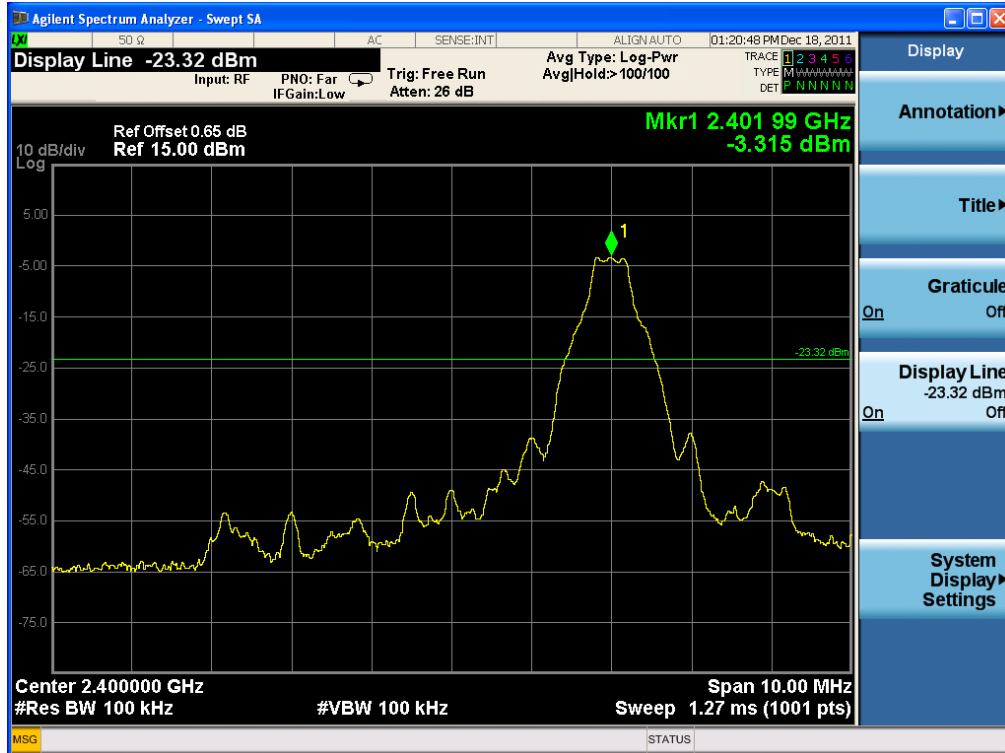


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Band – edge (without Hopping) - GFSK



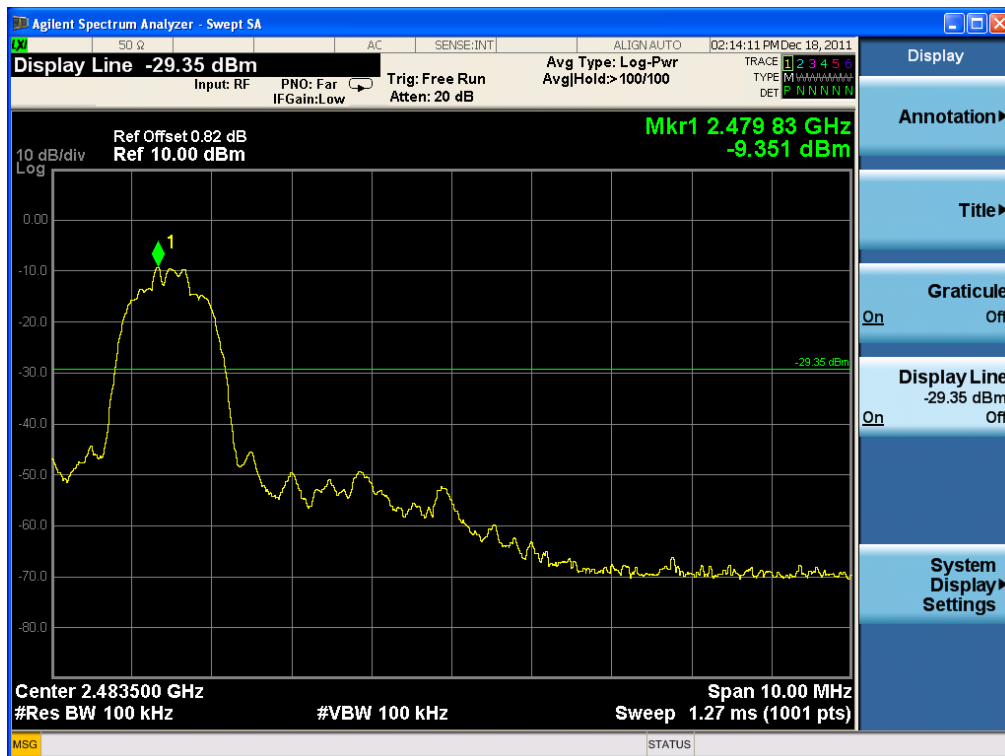
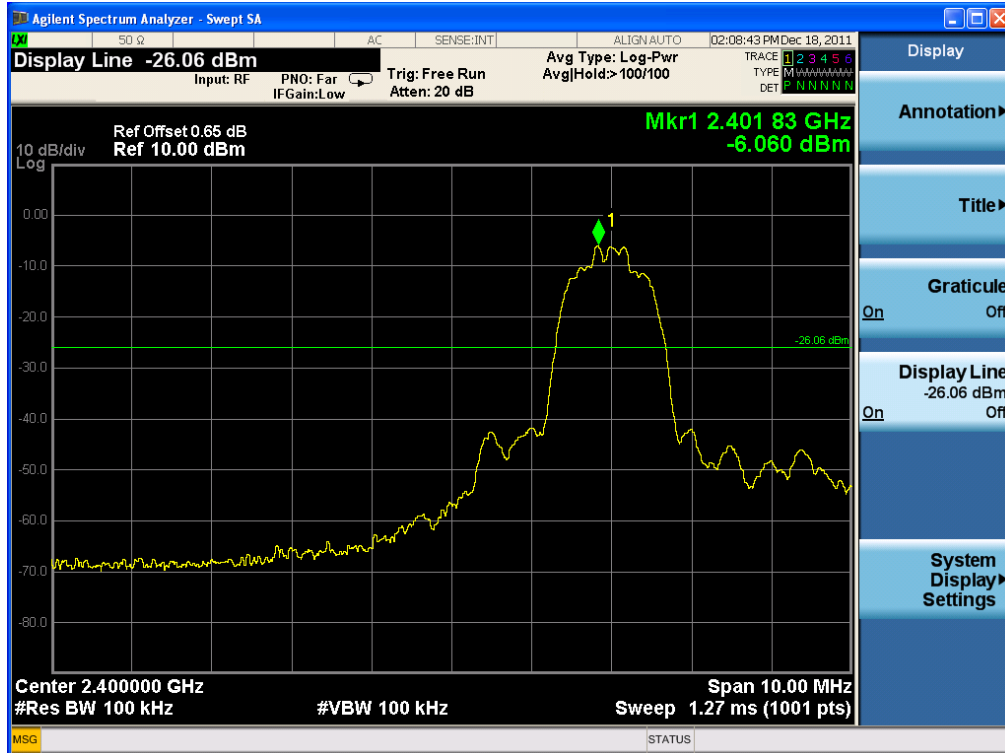


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Band – edge (without Hopping) - 8-DPSK



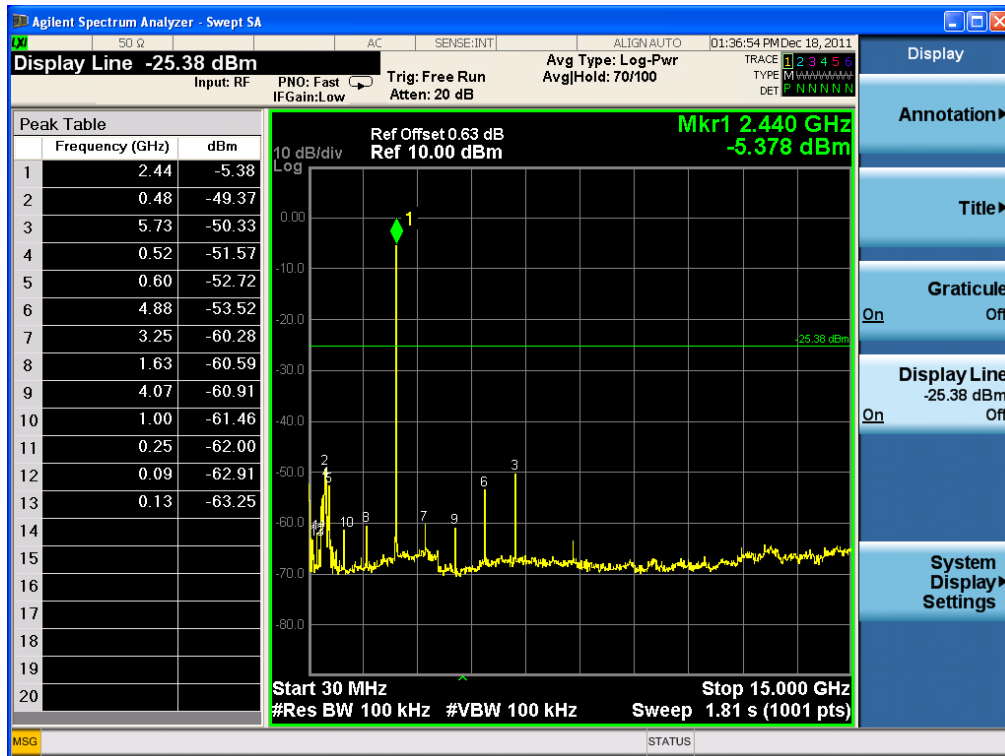


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Band – edge (at 20 dB blow) – Mid channel
Frequency Range = 30 MHz ~ 10th harmonic
(GFSK : Worst-Case)



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

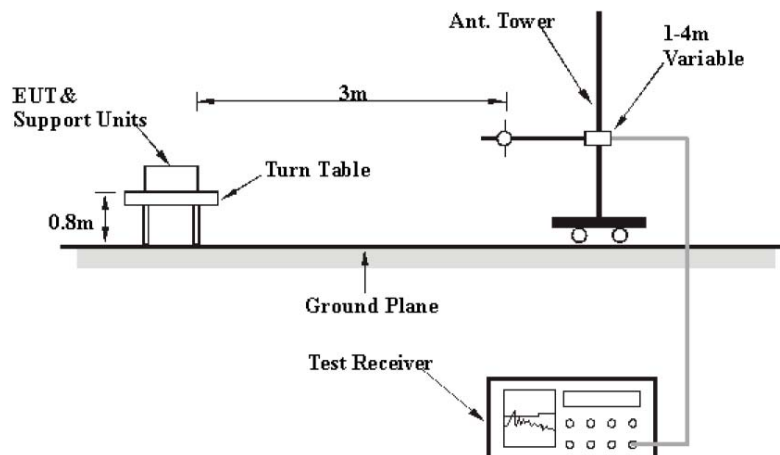
RBW = 120 kHz (30 MHz ~ 1 GHz) VBW ≥ RBW

= 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.

Test Results

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

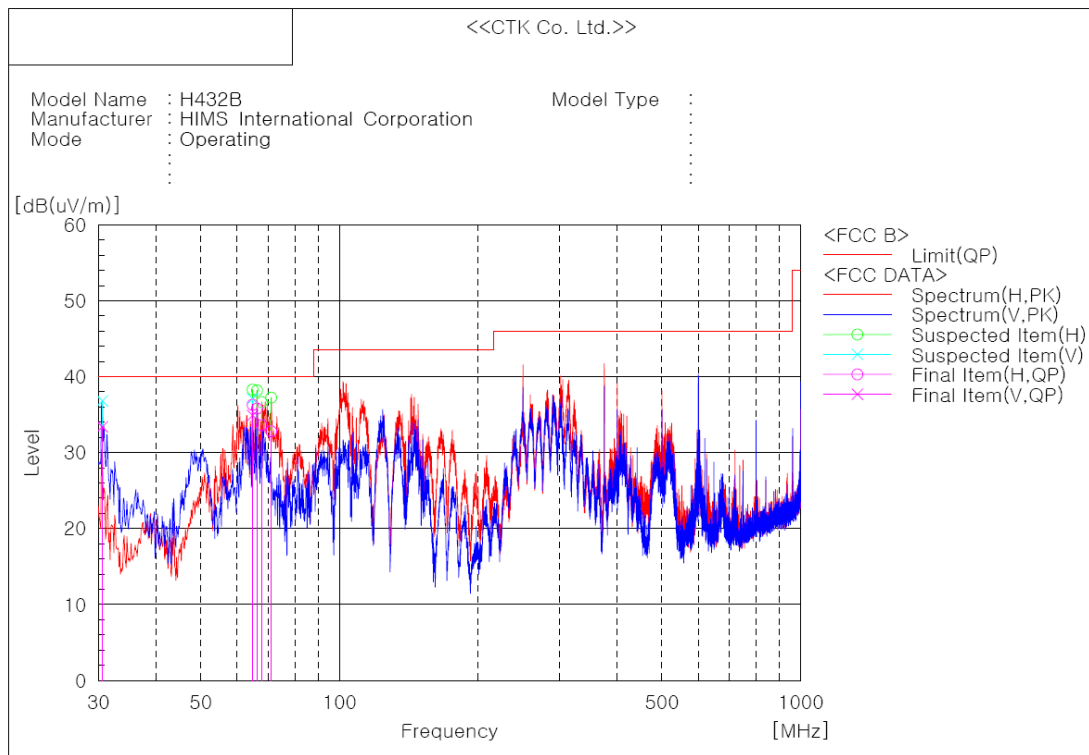
EUT	Braille Sense U2	Measurement Detail	
Model	H432B	Frequency Range	Below 1000MHz
Test mode	GFSK (Worst case)	Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
64.799	36.3	3.7	Quasi-peak

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	30.606	V	44.6	-11.2	33.4	40.0	6.6	295.0	104.0
2	64.799	H	60.6	-24.3	36.3	40.0	3.7	309.0	129.0
3	64.799	V	59.2	-24.3	34.9	40.0	5.1	295.0	104.0
4	66.254	H	59.7	-23.9	35.8	40.0	4.2	400.0	66.0
5	67.830	H	57.0	-23.4	33.6	40.0	6.4	309.0	129.0
6	71.104	H	55.2	-22.4	32.8	40.0	7.2	400.0	66.0

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(X axis) and the worst case was recorded.

Test Results

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

EUT	Braille Sense U2	Measurement Detail	
Model	H432B	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	44.0 / 52.9	10.0 / 21.1	Average / Peak

Test Data

Test mode : GFSK

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	34.8 / 43.7	V	1.1	32.7	34.9	11.4	54.0 / 74.0	44.0 / 52.9	10.0 / 21.1

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	40.3 / 52.0	V	1.1	28.2	35.3	7.4	54.0 / 74.0	40.6 / 52.3	13.4 / 21.7

Test Results

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

EUT	Braille Sense U2	Measurement Detail	
Model	H432B	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	43.7 / 51.6	10.3 / 22.4	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	34.5 / 42.4	V	1.1	32.7	34.9	11.4	54.0 / 74.0	43.7 / 51.6	10.3 / 22.4

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	Braille Sense U2	Measurement Detail	
Model	H432B	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	51.6 / 60.6	2.4 / 13.4	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	30.1 / 40.4	V	1.1	32.7	34.9	11.4	54.0 / 74.0	39.3 / 49.6	14.7 / 24.4

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	51.3 / 60.3	V	1.1	28.2	35.3	7.4	54.0 / 74.0	51.6 / 60.6	2.4 / 13.4

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:

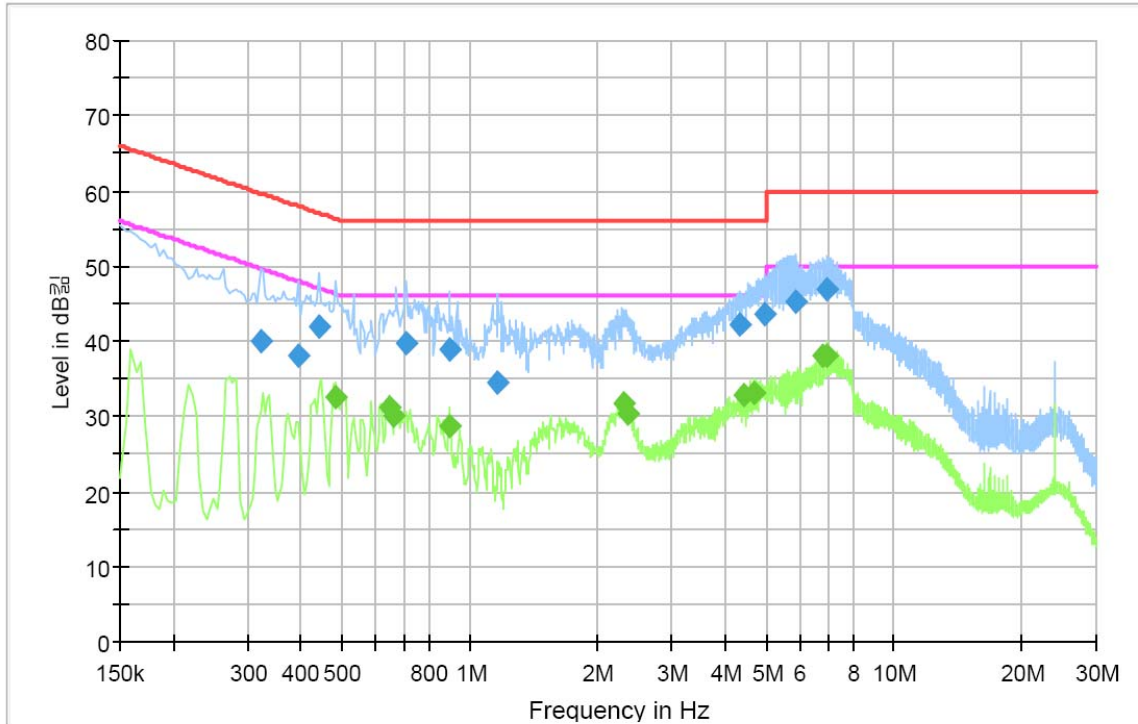
☒ Complies

Test mode : Hopping(GFSK)

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
6.972	38.1	11.9	Average

Test Data

[HOT]



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.321000	39.9	1000.0	9.000	On	L1	10.0	19.8	59.7
0.393000	38.1	1000.0	9.000	On	L1	10.0	19.9	58.0
0.442500	41.9	1000.0	9.000	On	L1	10.0	15.2	57.0
0.708000	39.6	1000.0	9.000	On	L1	10.1	16.4	56.0
0.897000	38.9	1000.0	9.000	On	L1	10.0	17.1	56.0
1.167000	34.5	1000.0	9.000	On	L1	10.0	21.5	56.0
4.339500	42.3	1000.0	9.000	On	L1	9.8	13.7	56.0
4.974000	43.6	1000.0	9.000	On	L1	9.8	12.4	56.0
5.901000	45.3	1000.0	9.000	On	L1	9.8	14.7	60.0
6.972000	46.9	1000.0	9.000	On	L1	9.7	13.1	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.483000	32.6	1000.0	9.000	On	L1	10.0	13.7	46.3
0.645000	31.0	1000.0	9.000	On	L1	10.1	15.0	46.0
0.663000	30.0	1000.0	9.000	On	L1	10.1	16.0	46.0
0.897000	28.8	1000.0	9.000	On	L1	10.0	17.2	46.0
2.319000	31.6	1000.0	9.000	On	L1	9.9	14.4	46.0
2.373000	30.4	1000.0	9.000	On	L1	9.9	15.6	46.0
4.425000	32.9	1000.0	9.000	On	L1	9.8	13.1	46.0
4.663500	33.2	1000.0	9.000	On	L1	9.8	12.8	46.0
6.801000	38.1	1000.0	9.000	On	L1	9.7	11.9	50.0
6.972000	38.1	1000.0	9.000	On	L1	9.7	11.9	50.0

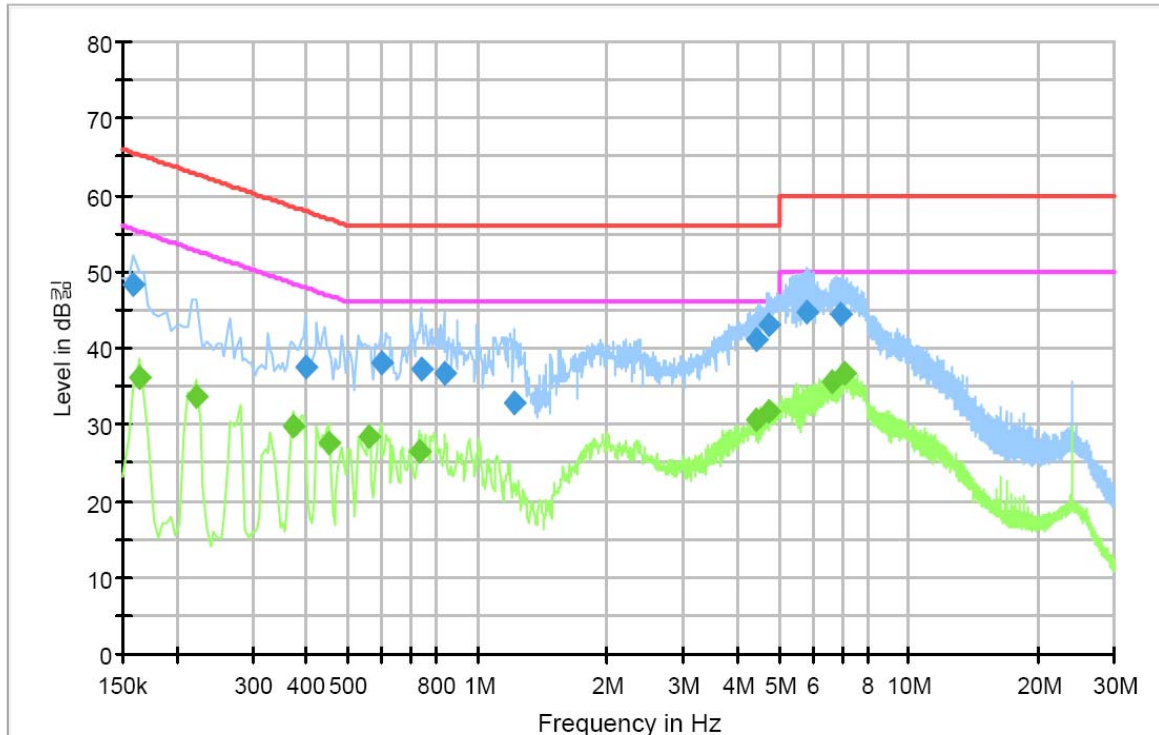


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[NEUTRAL]



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.159000	48.3	1000.0	9.000	On	N	10.1	17.2	65.5
0.397500	37.6	1000.0	9.000	On	N	10.0	20.3	57.9
0.595500	38.1	1000.0	9.000	On	N	10.0	17.9	56.0
0.739500	37.3	1000.0	9.000	On	N	10.1	18.7	56.0
0.834000	36.6	1000.0	9.000	On	N	10.1	19.4	56.0
1.216500	32.7	1000.0	9.000	On	N	10.0	23.3	56.0
4.447500	41.2	1000.0	9.000	On	N	9.8	14.8	56.0
4.717500	43.0	1000.0	9.000	On	N	9.8	13.0	56.0
5.824500	44.7	1000.0	9.000	On	N	9.8	15.3	60.0
6.945000	44.5	1000.0	9.000	On	N	9.7	15.5	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.163500	36.3	1000.0	9.000	On	N	10.0	19.0	55.3
0.222000	33.6	1000.0	9.000	On	N	10.2	19.2	52.7
0.375000	29.7	1000.0	9.000	On	N	10.0	18.7	48.4
0.451500	27.6	1000.0	9.000	On	N	9.9	19.3	46.8
0.559500	28.3	1000.0	9.000	On	N	10.0	17.7	46.0
0.730500	26.4	1000.0	9.000	On	N	10.1	19.6	46.0
4.420500	30.6	1000.0	9.000	On	N	9.8	15.4	46.0
4.717500	31.6	1000.0	9.000	On	N	9.8	14.4	46.0
6.634500	35.5	1000.0	9.000	On	N	9.7	14.5	50.0
7.134000	36.7	1000.0	9.000	On	N	9.7	13.3	50.0



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APPENDIX A – Test Equipment Used For Tests

Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Signal Analyzer	Agilent	N9020A	MY48011598	2012-11-10
Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2012-11-10
EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2012-07-07
ULTRA Broadband Antenna	Rohde & Schwarz	HL562	100203	2013-07-05
LOOP ANTENNA	EMCO	6502	9107-2652	2012-10-29
Attenuator	HP	8494A	3308A33351	2012-11-14
EPM Series Power Meter	HP	E4418A	GB38272734	2012-11-10
Power Sensor	HP	8487A	3318A03524	2012-07-07
Audio Analyzer	HP	8903B	2747A03432	2012-11-10
ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2012-11-21
SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2012-11-10
Modulation Analyzer	HP	8901B	3438A05228	2012-11-18
Attenuator	BIRD	1000-WA-MFN-30	236	2012-11-14
Temp&Humi Chamber	Kunpoong	JT-TH-556-1	9QE5-002	2012-01-14
DC POWER SUPPLY	Agilent	E3632A	MY40011638	2012-11-10
EMC Analyzer	Agilent	E7405A	MY45110859	2012-02-11
Horn Antenna	ETS-Lindgren	3115	00078894	2013-03-22
Horn Antenna	ETS-Lindgren	3115	00078895	2013-03-22
Antenna(Biconical)	EMCO	3110	9202-1510	2012-06-10
Antenna(Log Periodic)	EMCO	3146	9607-4567	2012-06-10
OPT H64 AMPLIFIER	HP	8447F	3113A06814	2012-03-31
PREAMPLIFIER	Agilent	8449B	3008A02307	2012-11-17
EMI Test Receiver	Rohde & Schwarz	ESHS30	828144/022	2012-02-09
LISN	Rohde & Schwarz	ENV216	101150	2012-02-10
EMI Test Receiver	Rohde & Schwarz	ESCI3	100032	2012-02-09
AC Power Source	California Instruments	2001RP	08770	2012-02-09