

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C AND INDUSTRY CANADA RSS 247 REQUIREMENT

	OF		
Product Name:	Panasonic FA-170-BCAR-HS		
Brand Name:	Panasonic		
Model No.:	FA-170-BCAR-HS		
Model Difference:	N/A		
FCC ID:	ACJ-FA-170-BCARHS		
IC:	216B-FA170BCARHS		
Report No.:	E2/2016/30083		
Issue Date:	Jul. 01, 2016		
FCC Rule Part:	§15.247, Cat: DSS		
IC Rule:	RSS-247 issue 1 May 2015		
Prepared for (FCC):	Panasonic Corporation of North America Two Riverfront Plaza, 9th Floor, Newark, New Jersey, 07102-5490, USA		
Prepared for (IC):	Panasonic Automotive Systems Company of America 776 Highway 74 South Peachtree City GA 30269 USA		
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VERIFICATION OF COMPLIANCE

Applicant (FCC):	Panasonic Corporation of North America Two Riverfront Plaza, 9th Floor, Newark, New Jersey, 07102-5490, USA
Applicant (IC):	Panasonic Automotive Systems Company of America 776 Highway 74 South Peachtree City GA 30269 USA
Product Name:	Panasonic FA-170-BCAR-HS
Brand Name:	Panasonic
Model No.:	FA-170-BCAR-HS
Model Difference:	N/A
FCC ID:	ACJ-FA-170-BCARHS
IC :	216B-FA170BCARHS
Report Number:	E2/2016/30083
Date of test:	Mar. 24, 2016 ~ Jun. 29, 2016
Date of EUT Received:	Mar. 24, 2016
We have by contify th	

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Test By:	Aken Huang	Date:	Jul. 01, 2016
– Prepared By:	Aken Huang/Engineer Uroletta Tang	Date:	Jul. 01, 2016
Approved By:	Violetta Tang / Clerk Jim Ch ang	Date:	Jul. 01, 2016
	Jim Chang / Asst. Manager		

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Revision History

Report Number	Revision	Description	Issue Date	
E2/2016/30083 Rev.00		Initial creation of document	Jul. 01, 2016	

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GENERAL INFORMATION 1

1.1 Product description

General:

Product Name:	Panasonic FA-170-BCAR-HS
Brand Name:	Panasonic
Model No.:	FA-170-BCAR-HS
Model Difference:	N/A
Product SW/HW version:	FA-170-BCAR-HS / FA-170-BCAR-HS
Radio SW/HW version:	FA-170-BCAR-HS / FA-170-BCAR-HS
Test SW Version:	NeoViEngine GUi 1.4.0.0
RF power setting in TEST SW:	default
Power Supply:	12V from DC Power Supply

Bluetooth_BR+EDR:

Bluetooth Version	BT V2.1 single mode + EDR	
Channel number:	79 channels	
Modulation type:	GFSK + π/4DQPSK + 8DPSK	
Transmit Power:	4.78dBm	
Type of Emission 99%:	839KFID / 1M18G1D	
Frequency Range:	2.402GHz – 2.480GHz	
Antenna Designation:	PCB Antenna, Gain: 2dBi	

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1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is Panasonic FA-170-BCAR-HS, supporting below features.

Product Feature			
Product Name: Panasonic FA-170-BCAR-HS			
Brand Name:	Panasonic		
Model No.:	FA-170-BCAR-HS		
Model Difference:	N/A		
FCC ID:	ACJ-FA-170-BCARHS		
IC :	216B-FA170BCARHS		
Bluetooth Version:	BT V2.1 single mode + EDR		
Wi-Fi- Specification:	802.11a/b/g/n		
GPS:	GPS		

Note: The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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1.3 Test Methodology of Applied Standards

Canada RSS-247 issue 1: 2015

RSS-Gen Issue 4:2014

FCC Part 15, Subpart C §15.247

FCC Public Notice DA 00-705 Measurement Guidelines

ANSI C63.10:2013

Note:

- 1. All test items have been performed and record as per the above standards.
- 2. The composite system is compliance with FCC Subpart B is authorized under a DoC procedure.

1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333 (TAF code 0513)

F CC Registration Numbers are: 735305

Canada Registration Number: 4620A-5.

1.5 Special Accessories

There is no special accessory used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plan. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated

emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level. **Note:**

The spectrum analyzer offset is derived from RF cable loss 4.7dB.

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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission & Conducted (Antenna Port) Configuration

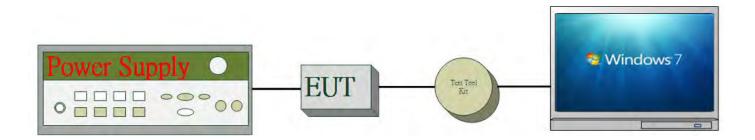


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	BT Test Software	N/A	N/A	N/A	N/A	N/A
2	Notebook	Lenovo	L420	LR-6MEX0	Shielded	Unshielded
3.	DC Power Supply	Agilent	E3634A	MY40015159	N/A	N/A
4.	Test Tool Kit	N/A	N/A	N/A	N/A	N/A

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SUMMARY OF TEST RESULTS 3

FCC Rules	IC Rules	Description Of Test	Result
§15.207(a)	RSS-Gen §8.8	AC Power Line Conducted Emission	N/A
§15.247(b)(1)	RSS-247 §5.4 (2)	Peak Output Power	Compliant
§15.247(a)(1)	RSS-247 §5.1 (1) RSS-Gen §6.6	20dB & 99% Bandwidth	Compliant
§15.247(d)	RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.247(a)(1)	RSS-247 §5.1 (2)	Frequency Separation	Compliant
§15.247(a)(1)(iii)	RSS-247 §5.1 (4)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii)	RSS-247 §5.1 (4)	Time of Occupancy	Compliant
§15.203 §15.247(b)	RSS- Gen §8.3	Antenna Requirement	Compliant

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DESCRIPTION OF TEST MODES 4

4.1 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

СН	FREQUENCY	СН	FREQUENCY	СН	FREQUENCY	СН	FREQUENCY
0	2402 MHz	20	2422 MHz	40	2442 MHz	70	2462 MHz
1	2403 MHz	21	2423 MHz	41	2443 MHz	71	2463 MHz
2	2404 MHz	22	2424 MHz	42	2444 MHz	72	2464 MHz
3	2405 MHz	23	2425 MHz	43	2445 MHz	73	2465 MHz
4	2406 MHz	24	2426 MHz	44	2446 MHz	74	2466 MHz
5	2407 MHz	25	2427 MHz	45	2447 MHz	75	2467 MHz
6	2408 MHz	26	2428 MHz	46	2448 MHz	76	2468 MHz
7	2409 MHz	27	2429 MHz	47	2449 MHz	77	2469 MHz
8	2410 MHz	28	2430 MHz	48	2450 MHz	78	2470 MHz
9	2411 MHz	29	2431 MHz	49	2451 MHz	79	2471 MHz
10	2412 MHz	30	2432 MHz	50	2452 MHz	70	2472 MHz
11	2413 MHz	31	2433 MHz	51	2453 MHz	71	2473 MHz
12	2414 MHz	32	2434 MHz	52	2454 MHz	72	2474 MHz
13	2415 MHz	33	2435 MHz	53	2455 MHz	73	2475 MHz
14	2416 MHz	34	2436 MHz	54	2456 MHz	74	2476 MHz
15	2417 MHz	35	2437 MHz	55	2457 MHz	75	2477 MHz
16	2418 MHz	36	2438 MHz	56	2458 MHz	76	2478 MHz
17	2419 MHz	37	2439 MHz	57	2459 MHz	77	2479 MHz
18	2420 MHz	38	2440 MHz	58	2460 MHz	78	2480 MHz
19	2421 MHz	39	2441 MHz	59	2461 MHz		

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4.2 The Worst Test Modes and Channel Details

- The EUT has been tested under operating condition. 1
- Test program used to control the EUT for staying in continuous transmitting and receiving 2 mode is programmed.
- 3 Investigation has been done on all the possible configurations for searching the worst case.

	RADIATED TEST					
	Radiated	I Emission Test	(BELOW 1 GHz) (Wo	orst case)		
MODE	AVAILABLE	TESTED		PACKET		
NODE	CHANNEL	CHANNEL	MODULATION	TYPE		
Bluetooth	0 to 78	0,39,78	GFSK	DH5		
	Radiated Emission Test (ABOVE 1 GHz) (Worst case)					
MODE	AVAILABLE	TESTED	MODULATION	PACKET		
NODL	CHANNEL	CHANNEL	NODULATION	TYPE		
Bluetooth	0 to 78	0,39,78	GFSK	DH5		
Band Edge						
Bluetooth	0 to 78	0,78	GFSK	DH5		
Bluetooth	0 to 78	0,78	8-DPSK	DH5		

Note: The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth BR+EDR Transmitter for channel Low, Mid and High, the worst case H position was reported.

ANTENNA PORT CONDUCTED TEST							
	Peak Output Power, 20dB Band Width						
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE			
	0 to 78	0,39,78	GFSK	DH5			
Bluetooth	0 to 78	0,39,78	π/4-DQPSK	DH5			
	0 to 78	0,39,78	8-DPSK	DH5			
	Band Edge & Conducted Emission						
Bluetooth	0 to 78	0,78	GFSK	DH5			
Bluetooth	0 to 78	0,78	8-DPSK	DH5			
		Frequen	cy Separation				
Bluetooth	0 to 78	0,1,2	GFSK	DH5			
		Number of h	opping frequency				
Bluetooth	0 to 78	0 to 78	GFSK	DH5			
	Time of Occupancy (Dwell time)						
Bluetooth	0 to 78	0,39,78	GFSK	DH1/DH3/DH5			
Bluetooth	0 to 78	39	π/4-DQPSK	DH1/DH3/DH5			
Bluetooth	0 to 78	39	8-DPSK	DH1/DH3/DH5			

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ASUREMENT UNCERTAINTY 5

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
20dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Frequency Separation	+/- 51.33 Hz
Number of hopping frequency	+/- 51.33 Hz
Time of Occupancy	+/- 51.33 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 180MHz: +/- 3.37dB
Measurement uncertainty	180MHz -417MHz: +/- 3.19dB
(Polarization : Vertical)	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
(Polarization : Horizontal)	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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CONDUCTED EMISSION TEST 6

6.1 Standard Applicable

Frequency within 150 kHz to 30MHz shall not exceed the limit table as below.

Frequency range	Limits dB(uV)				
MHz	Quasi-peak	Average			
0.15 to 0.50	66 to 56	56 to 46			
0.50 to 5	56	46			
5 to 30	60	50			
Note					
1. The lower limit shall apply at the transition frequencies					

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

6.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
EMI Test Receiver	R&S	ESCI 7	100950	12/12/2015	12/11/2016		
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	02/07/2016	02/06/2017		
LISN	Schwarzbeck	NSLK 8127	8127-648	06/09/2015	06/08/2016		
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.		

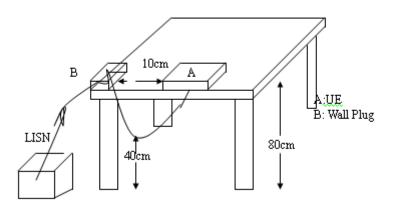
6.3 EUT Setup

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

- 1. The EUT was placed on a table which is 0.8m above ground plan.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.

6.6 Measurement Result

N/A, the device is powered by DC 12V.

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PEAK OUTPUT POWER MEASUREMENT 7

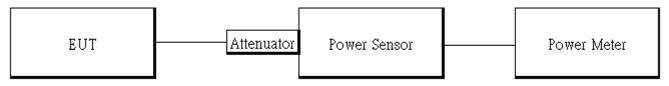
7.1 Standard Applicable

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels. The Limit: 1Watt. For all other frequency hopping systems in the 2400 -2483.5MHz band: The Limit: 0.125 Watts. The power limit for 1Mbps is 1watt, and 2Mbps, 3Mbps and AFH mode are 0.125 watts.

7.2 Measurement Equipment Used

Conducted Emission Test Site						
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.	
ТҮРЕ		NUMBER	NUMBER	CAL.		
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016	
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016	
Power Sensor	Anritsu	MA2411B	1315049	06/23/2015	06/22/2016	
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2015	12/11/2016	
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016	
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016	
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017	

7.3 Test Set-up:



7.4 Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max Hold, Detector = Peak, RBW >= 20dB bandwidth)
- 4. Record the max. reading.
- 5. Repeat above procedures until all default test channel is completed.

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7.5 Measurement Result

1M BR mode (Peak):

Channel	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	1.36	1.368	1000
39	2441.00	3.81	2.404	1000
78	2480.00	1.89	1.545	1000

1M BR mode (Average): Tune up tolerance ± dBm

Channel	Frequency (MHz)	Max. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	0.15	1.035	1000
39	2441.00	2.48	1.770	1000
78	2480.00	0.73	1.183	1000

2M EDR mode (Peak):

Channel	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	1.79	1.510	125
39	2441.00	4.24	2.655	125
78	2480.00	2.35	1.718	125

2M EDR mode (Average): Tune up tolerance ± dBm

Channel	Frequency (MHz)	Max. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	-2.02	0.628	125
39	2441.00	0.52	1.127	125
78	2480.00	-1.37	0.729	125

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3M EDR mode (Peak):

Channel	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	2.36	1.722	125
39	2441.00	4.78	3.006	125
78	2480.00	2.90	1.950	125

3M EDR mode (Average): Tune up tolerance ± dBm

Channel	Frequency (MHz)	Max. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	-1.88	0.649	125
39	2441.00	0.44	1.107	125
78	2480.00	-1.40	0.724	125

NOTE: cable loss as 4.7dB that offsets in the spectrum

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8 20DB & 99% BANDWIDTH MEASUREMENT

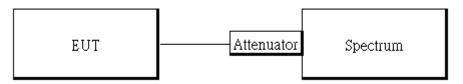
8.1 Standard Applicable

For frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

8.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017

8.3 Test Set-up



8.4 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set the spectrum analyzer as RBW=10 kHz (1 % of 20 dB Bandwidth.), VBW = 30 kHz, Span= 3MHz, Sweep=auto, Detector = Peak, and Max hold for 20dB Bandwidth test.
- 5. Mark the peak frequency and –20dB (upper and lower) frequency
- 6. Repeat above procedures until all test default channel is completed

NOTE:

- 1. cable loss as 4.7dB that offsets in the spectrum
- 2. For the plot of bandwidth measurement, the marker of the 20dB BW is arrow-mark.



8.5 Measurement Result

20dB Bandwidth

GFSK

Channel	20 dB Bandwidth	2/3 Bandwidth	Cha
	(MHz)	(MHz)	
Low	0.9203	0.61	Lo
Mid	0.9201	0.61	N
High	0.9203	0.61	Hi

	20 dB	2/3			
Channel	Bandwidth	Bandwidth			
	(MHz)	(MHz)			
Low	1.310	0.87			
Mid	1.312	0.87			
High	1.313	0.88			

8-DPSK

Channel	20 dB Bandwidth (MHz)	2/3 Bandwidth (MHz)	
Low	1.266	0.84	
Mid	1.267	0.84	
High	1.268	0.85	

π/4-DQPSK

99% Bandwidth

GFSK		π/4-DQPSk	κ	8-DPSK	
СН	99% Bandwidth (MHz)	СН	99% Bandwidth (MHz)	СН	99% Bandwidth (MHz)
Low	0.83885	Low	1.1700	Low	1.1705
Mid	0.83545	Mid	1.1743	Mid	1.1818
High	0.83945	High	1.1759	High	1.1795

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20dB Band Width Test Data CH-Low (GFSK mode)



20dB Band Width Test Data CH-Mid (GFSK mode)



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20dB Band Width Test Data CH-High (GFSK mode)



20dB Band Width Test Data CH-Low (π/4-DQPSK mode)



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20dB Band Width Test Data CH-Mid (π /4-DQPSK mode)



20dB Band Width Test Data CH-High (π/4-DQPSK mode)



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20dB Band Width Test Data CH-Low (8-DPSK mode)



20dB Band Width Test Data CH-Mid (8-DPSK mode)



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20dB Width Test Data CH-High (8-DPSK mode)



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99% Band Width Test Data CH-Low (GFSK mode)



99% Band Width Test Data CH-Mid (GFSK mode)



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99% Band Width Test Data CH-High (GFSK mode)



99% Band Width Test Data CH-Low (π/4-DQPSK mode)



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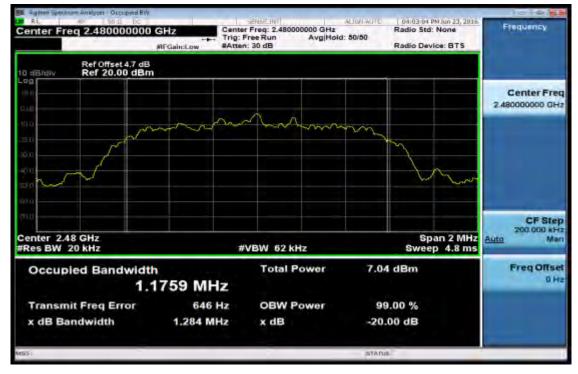
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99% Band Width Test Data CH-Mid (π /4-DQPSK mode)



99% Band Width Test Data CH-High (π /4-DQPSK mode)



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99% Band Width Test Data CH-Low (8-DPSK mode)



99% Band Width Test Data CH-Mid (8-DPSK mode)



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99% Band Width Test Data CH-High (8-DPSK mode)



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CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT 9

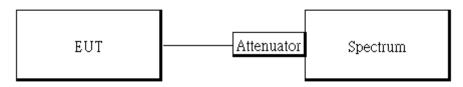
9.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

9.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016
DC Power Supply	Agilent	E3640A	MY53140006	05/04/2016	05/03/2017

9.3 Test SET-UP



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9.4 Measurement Procedure

Conducted Band Edge:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set center frequency of spectrum analyzer = operating frequency.
- 5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Sweep = auto
- 6. Mark Peak, 2.3999GHz and 2.4836GHz and record the max. level.
- 7. Repeat above procedures until all frequency measured were complete.

Conducted Spurious Emission:

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 3. Set RBW = 100 kHz & VBW = 300 kHz, Detector =Peak, Sweep = Auto
- 4. Allow trace to fully stabilize.
- 5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
- 6. Repeat above procedures until all default test channel measured were complete.

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

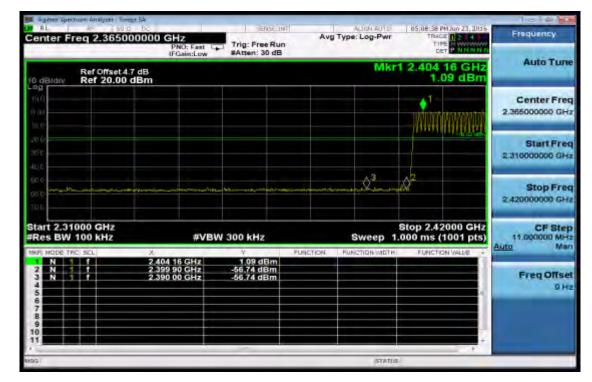
9.5 Measurement Result

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

- 1. Cable loss as 4.7dB that offsets in the spectrum
- 2. The occurrence of the spike on the conducted emission is the signal of the fundamental emission.

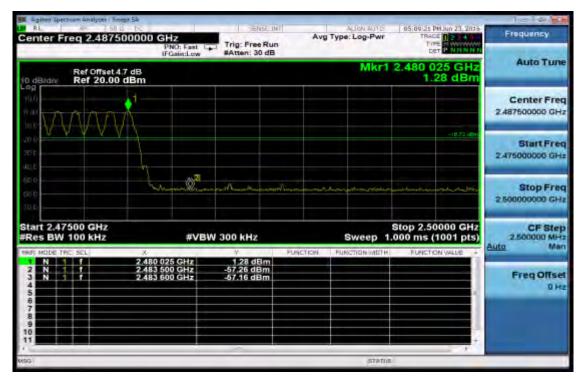
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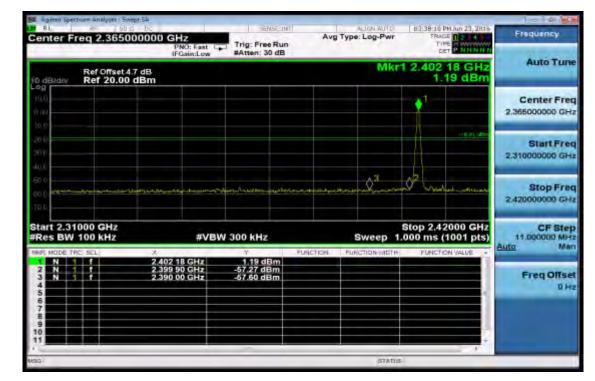
Band Edges Test Data CH-Low (Hopping mode) (GFSK mode)

Band Edges Test Data CH-High



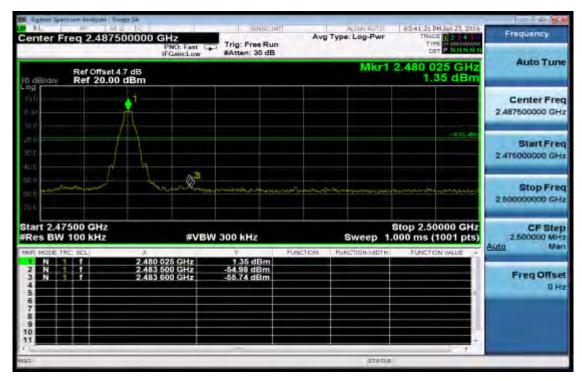
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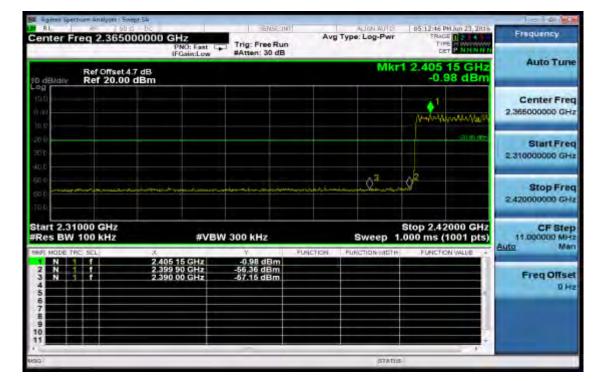
Band Edges Test Data CH-Low (Non-Hopping mode) (GFSK mode)

Band Edges Test Data CH-High



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Band Edges Test Data CH-Low (Hopping mode) (8-DPSK mode)

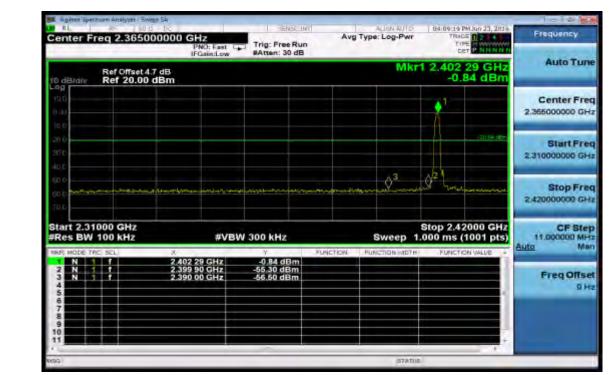
Band Edges Test Data CH-High



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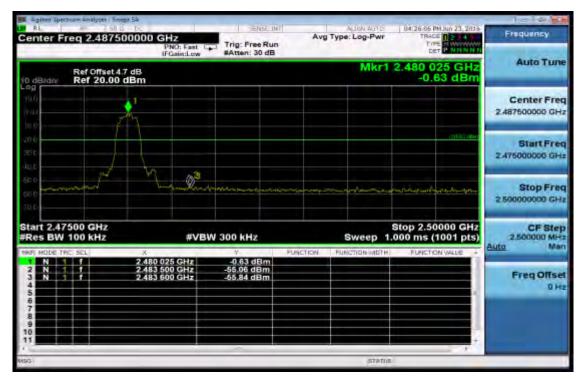
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Band Edges Test Data CH-Low (Non-Hopping mode) (8-DPSK mode)

Band Edges Test Data CH-High



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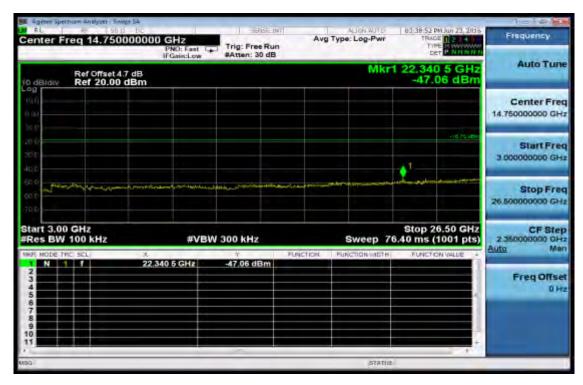
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Conducted Spurious Emission Measurement Result (GFSK mode) Ch Low 30MHz – 3GHz

Frequency	03136135 PMJun 23, 2056 TRACE 1 2 1 4 5 TITE 1 2 1 4 5 DET 1 1010 111	ALIGN AUTO Type: Log-Pwr	A	Trig: Free Run #Atten: 30 dB	GHz PNO: Fast	1.515000000 C	RL
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Stop Fre 3.000000000 GH	مەر يېرىزىيە قاھەللىلە ھاھرەتىرى		- بەرچەنھە يەر 1	lastaanti-anti-an	et - The section of the	مايستنق مستقصي والم	60 0 60 0 70 0
CF Ste 297.000000 MH <u>Auto</u> Ma	Stop 3.000 GHz 367 ms (1001 pts)	Sweep 9.	Puniction	300 kHz Y		L X	Start 30 MHz Res BW 10
Freq Offse DH				1.26 dBm	03 0 GHz	2.45	1 N 1 2 3 4 5 6 7 7 8 9 9 10
		STATUS					(G)

Ch Low 3GHz – 26.5GHz



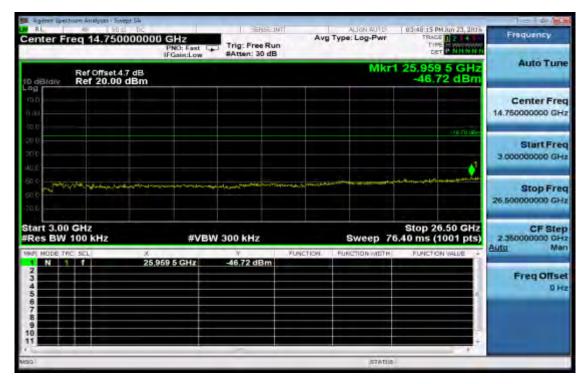
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Ch Mid 30MHz – 3GHz

Agitent Spectrum, Analyzet - Swept 54						10 4 6
Center Freq 1.515000000	GHz PNO: Fast L	Trig: Free Run #Atten: 30 dB	Avg	ALIGN MITO Type: Log-Pwr	03:39:58 PMJun 23, 2056 TRACE 2 3 4 1 TITE DET NINNIN	Frequency
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60 0 60 0 70 0	am-i-packin	Anno ann ann ann ann ann ann ann ann ann	*******************************	4-447-47-5	United States of	Stop Freq 3.00000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBW	/ 300 kHz	PUNICTION	Sweep 9.6	Stop 3.000 GHz 67 ms (1001 pts)	CF Step 297.000000 MHz Auto Man
	441 6 GHz	3,30 dBm			1	Freq Offset 0 Hz
7 8 9 10 11						
MBG				STATUS		

Ch Mid 3GHz – 26.5GHz



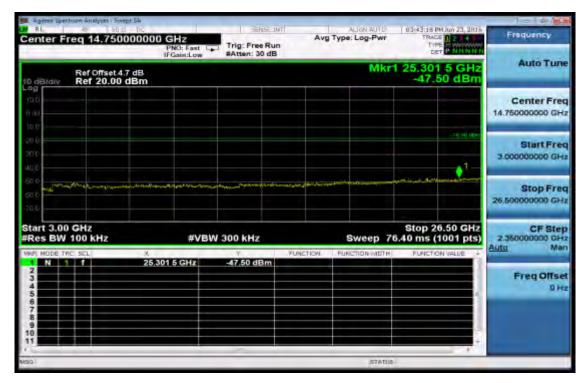
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Ch High 30MHz – 3GHz

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Center F	req 1.51500		Trig: Free Run #Atten: 30 dB		Type: Log-Pwr	03:4136 PM Jun 23, 2056 TRACE 2 2 4 1 TITE DET P NNNNT	Frequency
10 dB/div	Ref Offset 4.7 Ref 20.00 d				Mk	r1 2.480 3 GHz 1.43 dBm	Auto Tune
190 190						• ¹	Center Freq 1.515000000 GHz
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50.0 60.0		فترجي والمراجب والمراجب	al yes a first state of the sta				Stop Freq 3.00000000 GHz
Start 30 M #Res BW	100 kHz	#VE	W 300 KHz	FUNCTION	Sweep 9.	Stop 3.000 GHz 667 ms (1001 pts)	CF Step 297.000000 MHz Auto Man
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een -					STATUS		

Ch High 3GHz – 26.5GHz



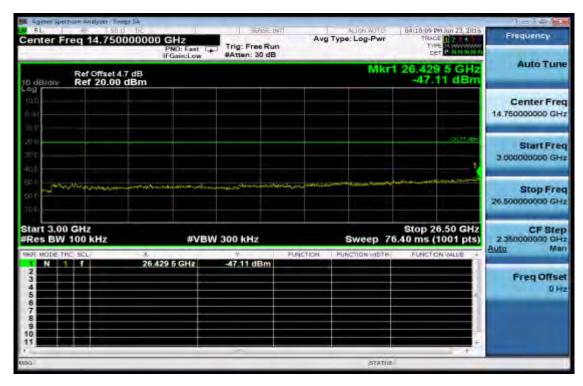
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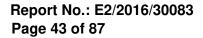
Conducted Spurious Emission Measurement Result (8DPSK mode) Ch Low 30MHz – 3GHz

RL Analyzes Swept SA	Since in		04:09:54 PMJun 23, 2015	10100
Center Freq 1.515000000 GHz		Avg Type: Log-Pwr		Frequency
Ref Offset 4.7 dB		Mk	r1 2.403 0 GHz -0.77 dBm	Auto Tuni
190 190			1	Center Free 1.515000000 GH
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60 0 GCD	and the case of the second sector sectors	والمعاومة ومعالم أوار المادور والمراجع والمعاومة	la yrinay (tay in African Saya) yr Afri	Stop Fre 3.000000000 GH
Start 30 MHz #Res BW 100 kHz		Sweep 9	Stop 3.000 GHz 667 ms (1001 pts)	CF Ste 297.000000 MH <u>Auto</u> Ma
1 N 1 / 2,403 0 2 3 4 5 5 6 7 7 8 9 9 10	IGHz -0,77 dBm			Freq Offse 0 H
99)		STATUS	- , *	

Ch Low 3GHz – 26.5GHz



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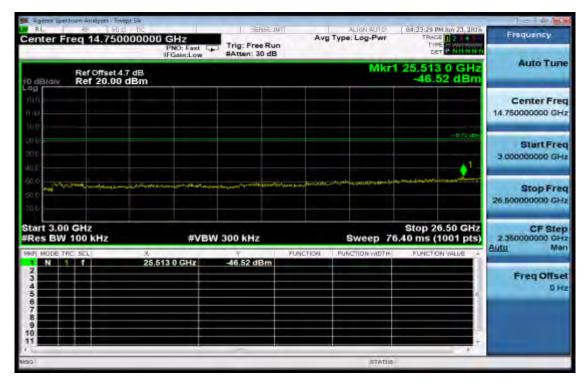




Ch Mid 30MHz – 3GHz

Agreen Spectrum Analyzes / Swept S4				10 4 10
Center Freq 1.515000000	GHz PNO: Fast C Trig: Free F IFGain:Low #Atten: 30	Avg Type: Log-Pwr Run	04:22:55 PMJun 23, 2056 TRACE 2 3 4 5 Free P NNIN N 1	Frequency
Ref Offset 4.7 dB		Mk	r1 2.441 6 GHz 1.28 dBm	Auto Tune
15.0 0 da			• ¹	Center Fred 1.515000000 GH
000			-10 /2 (By)	Start Free 30.000000 MH:
	and the second secon	p	Al halo as a second from a base of farm	Stop Free 3 00000000 GH
tart 30 MHz Res BW 100 kHz	#VBW 300 kHz	Sweep 9.	Stop 3.000 GHz 667 ms (1001 pts)	CF Step 297.000000 MHs Auto Mer
	441 6 GHz 1.28 dBr		PORCHORVALDE	Freq Offset 0 Hz
8 9 10 11 11		STATUS	, . , .	

Ch Mid 3GHz – 26.5GHz



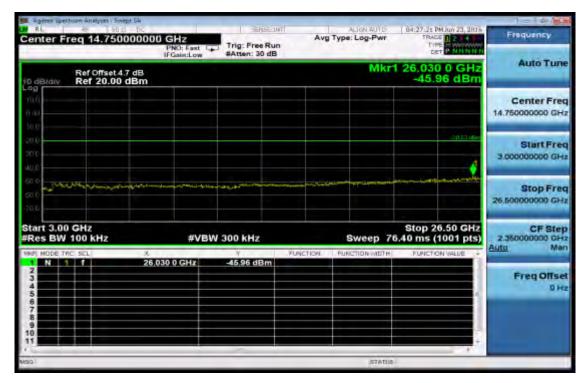
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Ch High 30MHz – 3GHz

Ref Offset 4.7 dB	ast Trig: Free Run Action: 30 dB	Avg	ALIGN AUTO Type: Log-Pwr Mike	1 2.480 3 GHz -0.53 dBm	Frequency Auto Tune Center Freq
Ref Offset 4.7 dB 10 dB/dev Ref 20.00 dBm 10 dB/dev Ref 20.00 dBm			Mkr		
				•1	Center Freq
200					1.515000000 GHz
				and let refer	Start Freq 30.000000 MHz
ED D COLD and and a feat of the standard states of the Space 7D D	and the gate of the state of the		وراك غاريده ورويد ومورد		Stop Freq 3.00000000 GHz
Start 30 MHz	#VBW 300 kHz	PUNCTION	Sweep 9.0	Stop 3.000 GHz 367 ms (1001 pts)	CF Step 297.000000 MHz Auto Man
N 1 7 2,480.3 G 2 3 4 4 5 6 7	Hz -0,53 dBm				Freq Offset 0 Hz
8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9			STATUS		

Ch High 3GHz – 26.5GHz



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10 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 limit as below.

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level $(dB\mu V/m) = 20 \log Emission level (dB\mu V/m)$

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10.2 Measurement Equipment Used

		966 Chambe	r		
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
EMI Test Receiver	R&S	ESU 40	100363	04/12/2016	04/11/2017
Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2015	12/22/2016
Broadband Antenna	TESEQ	CBL 6112D	35240	10/28/2015	10/27/2016
Horn Antenna	ETS-Lindgren	3117	00143272	12/16/2015	12/15/2016
Horn Antenna	Schwarzbeck	BBHA9170	185	07/24/2015	07/23/2016
Pre Amplifier	EMC Instruments	EMC330	980096	12/12/2015	12/11/2016
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2015	12/11/2016
Pre Amplifier	R&S	SCU-18	10204	12/12/2015	12/11/2016
Pre Amplifier	R&S	SCU-26	100780	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/12/2015	12/11/2016
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/12/2015	12/11/2016
Attenuator	WOKEN	218FS-10	RF27	12/12/2015	12/11/2016
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2016	05/03/2017
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

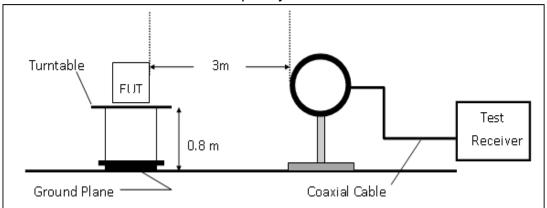
Note: N.C.R refers to Not Calibrated Required.

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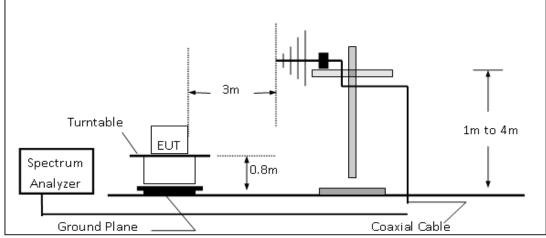


10.3 Test SET-UP

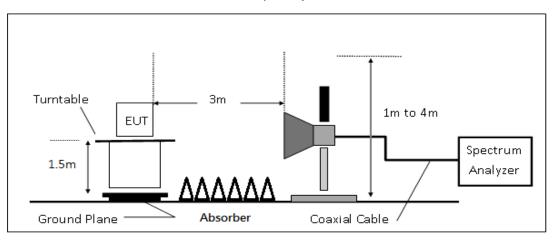
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency form 30MHz to 1000MHz



(C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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10.4 Measurement Procedure

Radiated Emission

- 1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 0.8m for frequency> 1GHz above ground plan.
- 3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 5. Use the follow spectrum analyzer setting:
 - (1) Span = wide enough to fully capture the emission being measured
 - (2) RBW = 1 MHz for $f \ge 1$ GHz, 100 kHz for f < 1 GHz, VBW \ge RBW, Sweep = auto, Detector function = peak, Trace = max hold
 - (3) For average measurement: use duty cycle correction factor method per 15.35(c) Duty Cycle = On time/100 milliseconds

On time = N1*L1=N2*L2+...+N(n-1)*LN(n-1)+N(n)*L(n)

Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.

Average Emission Level = Peak Emission Level + 20*log (duty Cycle)

- 6. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 7. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 8. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 9. Repeat above procedures until all frequency of the interest measured were complete.

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10.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

The limit of the emission level is expressed in dBuV/m, which converts 20*log(uV/m)

Actual FS(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note :

"F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

10.6 Test Results of Radiated Spurious Emissions form 9 KHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

10.7 Measurement Result

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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Radiated Band Edge Measurement Result: (Hopping Mode)

Fi Oj	peration Moo Indamental Deration Bar JT Pol. :	Frequency :	BT BR Ho 2402 MHz BE CH Lo H				enna Pol. :	2016/6/2 22.7deg_ Pony Vertical	
	Freq.	Note	Detector Mode	Spec Reading		Factor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP/AV	dB	•	dB	dBµV/m	dBµV/m	dB
-	2346.00	S	Peak	46.	55	0.73	47.28	74	-26.72
	2346.00	S	Average	32.0	63	0.73	33.36	54	-20.64
	2390.00	E	Peak	43.8	83	0.92	44.75	74	-29.25
	2390.00	E	Average	32.0	60	0.92	33.52	54	-20.48
Fi Oj	Deration Moo Indamental Deration Bar JT Pol. :	Frequency : nd :	BT BR Ho 2402 MHz BE CH Lo H		Test Da Temp. / Test Eng Measure	Humi.:	enna Pol. :	2016/6/2 22.7deg_ Pony Horizonta	_C/57RH al
	Freq.	Note	Detector Mode	Spec Reading		Factor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP/AV	dB	•	dB	dBµV/m	dBµV/m	dB
-	2390.00	E	Peak	43.4		0.92	44.38	74	-29.62
	2390.00	E	Average	32.		0.92	33.64	54	-20.36
			0						

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Operation Mode : Fundamental Frequency : Operation Band : EUT Pol. :	BT BR Ho 2480 MHz BE CH Hig H	Temp. / gh Test En	Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. : ectum Factor Actual		2016/6/2 22.7deg_ Pony Vertical	
Freq. Note	Detector	Spectum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50 E	Peak	46.35	1.16	47.51	74	-26.49
2483.50 E	Average	33.78	1.16	34.94	54	-19.06
2483.58 S	Peak	47.58	1.16	48.74	74	-25.26
2483.58 S	Average	33.56	1.16	34.72	54	-19.28
Operation Mode : Fundamental Frequency : Operation Band : EUT Pol. :	BE CH Hig H	Temp. / gh Test En Measur	Humi. : gineer : ement Ante	enna Pol. :	2016/6/2 22.7deg_ Pony Horizonta	_C/57RH al
Freq. Note	Detector	Spectum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50 E	Peak	48.78	1.16	49.94	74	-24.06
2483.50 E	Average	34.41	1.16	35.57	54	-18.43



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Fi Of	peration Mo undamental peration Bar JT Pol. :	Frequency :	BT EDR H 2402 MHz BE CH Lo H	2	Test E	/ Humi. : Ingineer :	itenna Pol. :	/22 g_C/57RH I	
	Freq.	Note	Detector Mode	Spectu Reading I		Factor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP/AV	dBµ∖		dB	dBµV/m	dBµV/m	dB
-	2390.00	E	Peak	43.91		0.92	44.83	74	-29.17
	2390.00	E	Average	32.65	5	0.92	33.57	54	-20.43
-									
Fi Of	peration Mo undamental peration Bar JT Pol. :	Frequency :	BT EDR H 2402 MHz BE CH Lo H	2	Test E	/ Humi. : Ingineer :	itenna Pol. :	2016/6/ 22.7deg Pony Horizor	g_C/57RH
Fi Of	und amental peration Bar	Frequency :	2402 MHz BE CH Lo	2	Temp. Test E Measu	/ Humi. : Ingineer :	itenna Pol. : Actual	22.7deg Pony	g_C/57RH
Fi Of	undamental peration Bar JT Pol. :	Frequency : nd :	2402 MHz BE CH Lo H	<u>x</u> w	Temp. Test E Measu Im	/ Humi. : Ingineer : urement Ar		22.7deg Pony Horizor	g_C/57RH ntal
Fi Of	undamental peration Bar JT Pol. :	Frequency : nd :	2402 MHz BE CH Lo H Detector	Spectu	Temp. Test E Measu Im Level	/ Humi. : Ingineer : urement Ar	Actual	22.7deg Pony Horizor Limit	g_C/57RH ntal
Fi Of	undamental peration Bar JT Pol. : Freq.	Frequency : nd : Note	2402 MHz BE CH Lo H Detector Mode	Spectu Reading I	Temp. Test E Measu Im Level	/ Humi. : Engineer : urement Ar Factor	Actual FS	22.7deg Pony Horizor Limit @3m	g_C/57RH ntal Margin
Fi Of	undamental peration Bar JT Pol. : Freq. MHz	Frequency : nd : Note <u>F/H/E/S</u> S	2402 MHz BE CH Lo H Detector Mode PK/QP/AV	Spectu Reading I dBµV	Temp. Test E Measu Im Level /	/ Humi. : Engineer : urement Ar Factor dB	Actual FS dBµV/m	22.7deg Pony Horizor Limit @3m dBµV/m	g_C/57RH ntal Margin dB
Fi Of	undamental peration Bar JT Pol. : Freq. <u>MHz</u> 2350.20	Frequency : nd : Note <u>F/H/E/S</u> S	2402 MHz BE CH Lo H Detector Mode PK/QP/AV Peak	Spectu Reading I dBµV 46.33	Temp. Test E Measu Im Level / 3	/ Humi. : Engineer : urement Ar Factor dB 0.72	Actual FS dBµV/m 47.05	22.7deg Pony Horizor Limit @3m dBµV/m 74	g_C/57RH ntal Margin dB -26.95

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Operation Mode : Fundamental Frequency Operation Band :			BT EDR Hopping 2480 MHz BE CH High		Test Date : Temp. / Humi. : Test Engineer :		2016/6/22 22.7deg_C/57RH Pony		
EUT Pol. :			Н	0		Measurement Antenna Pol. :			I
	Freq.	Note	Detector Mode	Spectu Reading		Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dBµ\	V	dB	dBµV/m	dBµV/m	dB
-	2483.50	E	Peak	48.07	7	1.16	49.23	74	-24.77
	2483.50	E	Average	34.14	4	1.16	35.30	54	-18.70
Operation Mode : Fundamental Frequency :		11 5							
					Test D Temp	Date : . / Humi. :		2016/6/ 22.7de	/22 g_C/57RH
Fu		Frequency :		2	Temp				
Fi Oj	Indamental	Frequency :	2480 MHz	2	Temp Test E	. / Humi. : Engineer :	itenna Pol. :	22.7de	g_C/57RH
Fi Oj	undamental peration Bar	Frequency :	2480 MHz BE CH Hi	2	Temp Test E Measu	. / Humi. : Engineer :	ntenna Pol. : Actual	22.7de Pony	g_C/57RH
Fi Oj	Indamental peration Bar JT Pol. :	Frequency : nd :	2480 MHz BE CH Hi H	z gh	Temp Test E Measu um	. / Humi. : Engineer : urement Ar		22.7de Pony Horizor	g_C/57RH ntal
Fi Oj	Indamental peration Bar JT Pol. :	Frequency : nd : Note F/H/E/S	2480 MHz BE CH Hi H Detector	gh Spectu	Temp Test E Measu um Level	. / Humi. : Engineer : urement Ar	Actual	22.7de Pony Horizor Limit	g_C/57RH ntal
Fi Oj	Indamental peration Bar JT Pol. : Freq.	Frequency : nd : Note	2480 MHz BE CH Hi H Detector Mode	gh Spectu Reading	Temp Test E Measu um Level	. / Humi. : Engineer : urement Ar Factor	Actual FS	22.7de Pony Horizor Limit @3m	g_C/57RH ntal Margin



Radiated Band Edge Measurement Result: (Non-Hopping Mode)

Operation Mode : Fundamental Frequency Operation Band : EUT Pol. :	BT BR 2402 MHz BE CH Lo H	w Test Engi	Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. :			/57RH
Freq. Note	Detector	Spectum	Factor	Actual	Limit	Margin
	Mode F	Reading Level		FS	@3m	
MHz F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2385.30 S	Peak	45.57	0.85	46.43	74	-27.57
2385.30 S	Average	32.59	0.85	33.44	54	-20.56
2390.00 E	Peak	43.78	0.92	44.70	74	-29.30
2390.00 E	Average	32.60	0.92	33.52	54	-20.48
Operation Mode : Fundamental Frequency Operation Band : EUT Pol. :	BT BR / : 2402 MHz BE CH Lo H	w Test Engi	lumi. :	na Pol. :	2016/6/22 22.7deg_C Pony Horizontal	/57RH
Freq. Note	Detector Mode F	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00 E	Peak	44.08	0.92	45.00	74	-29.00
2390.00 E			0.92	33.62	54	-20.38

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Operation M Fundamenta Operation B EUT Pol. :	al Frequency	BE CH High Test I		e : Humi. : gineer : ement Anten	na Pol. :	2016/6/22 22.7deg_C Pony Vertical	/57RH
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	47.41	1.16	48.57	74	-25.43
2483.50	E	Average	41.14	1.16	42.30	54	-11.70
Operation M Fundamenta Operation B EUT Pol. :	al Frequency	BT BR / : 2480 M BE CH H	High Test Eng	Humi. :	na Pol. :	2016/6/22 22.7deg_C Pony Horizontal	:/57RH
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	49.84	1.16	51.00	74	-23.00
2483.50	E	Average	43.57	1.16	44.73	54	-9.27



Operation Mode : Fundamental Frequency Operation Band : EUT Pol. :		BT EDR 2402 MH BE CH L H	lz Temp./H ow Test Engi	Test Date : Temp. / Humi. : Test Engineer : Measurement Anteni		2016/6/22 22.7deg_C Pony Vertical	:/57RH
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2359.30	S	Peak	45.03	0.69	45.72	74	-28.28
2359.30	S	Average	32.56	0.69	33.25	54	-20.75
2390.00	E	Peak	43.29	0.92	44.21	74	-29.79
2390.00	E	Average	32.61	0.92	33.53	54	-20.47
Operation M Fundamenta Operation B EUT Pol. :	al Frequency	BT EDR y : 2402 MH BE CH L H	ow Test Engi	lumi. :	na Pol. :	2016/6/22 22.7deg_C Pony Horizontal	:/57RH
Freq. MHz	Note F/H/E/S	Detector Mode PK/QP/AV	Spectum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2373.80	S	Peak	46.31	0.73	47.03	74	-26.97
2373.80	S	Average	32.61	0.73	33.34	54	-20.66
2390.00	E	Peak	43.45	0.92	44.38	74	-29.62
2390.00	E	Average	32.63	0.92	33.55	54	-20.45
2000.00	–	, wor ago	02.00	0.02	00.00	01	20.10

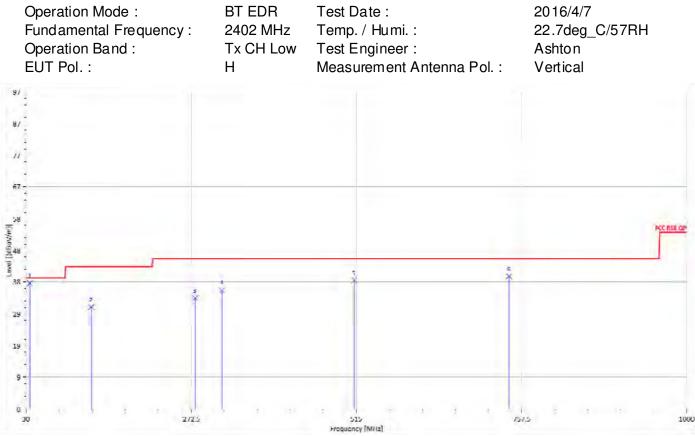


Operation M	ode :	BT EDF	Т γ	est Date	:		2016/6/22	
Fundamenta	I Frequency	/: 2480 M	Hz T	emp. / H	umi. :		22.7deg_C	/57RH
Operation Ba	and :	BE CH	High T	est Engi	neer:		Pony	
EUT Pol. : H		N	leasuren	nent Anten	na Pol. :	Vertical		
Freq.	Note	Detector	Spec	tum	Factor	Actual	Limit	Margin
		Mode	Reading	g Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dB	μV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	49.	14	1.16	50.30	74	-23.70
2483.50	Е	Average	41.	06	1.16	42.22	54	-11.78
Operation M	ode :	BT EDF	к Т	est Date	:		2016/6/22	
Fundamenta	I Frequency	/: 2480 M	/Hz Temp. / Humi. :				22.7deg_C	/57RH
Operation Ba	and :	BE CH	High T	est Engi	neer:	Pony		
EUT Pol. :		Н	N	leasuren	nent Anten	na Pol. :	Horizontal	
Freq.	Note	Detector	Spec	tum	Factor	Actual	Limit	Margin
		Mode	Reading	g Level		FS	@3m	c
MHz	F/H/E/S	PK/QP/AV	dB	μV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	52.	64	1.16	53.80	74	-20.20
2483.50	Е	Average			1.16	44.85	54	-9.15



Radiated Spurious Emission Measurement Result: (Worst Case)

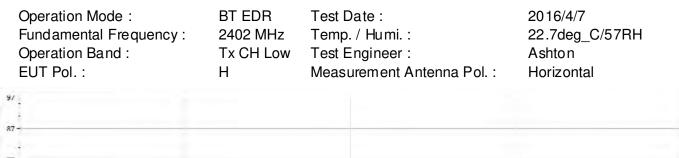
For Frequency form 30MHz to 1000MHz

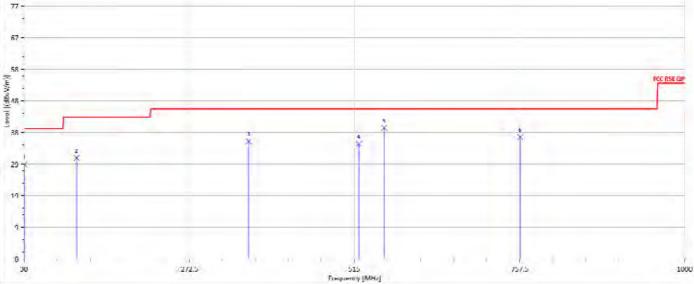


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
35.82	S	QP	48.77	-10.35	38.43	40	-1.57
126.03	S	Peak	46.88	-15.65	31.23	43.5	-12.27
278.32	S	Peak	47.69	-13.65	34.04	46	-11.96
318.09	S	Peak	48.70	-12.30	36.40	46	-9.60
512.09	S	Peak	46.87	-7.51	39.37	46	-6.63
739.07	S	Peak	44.62	-4.04	40.57	46	-5.43

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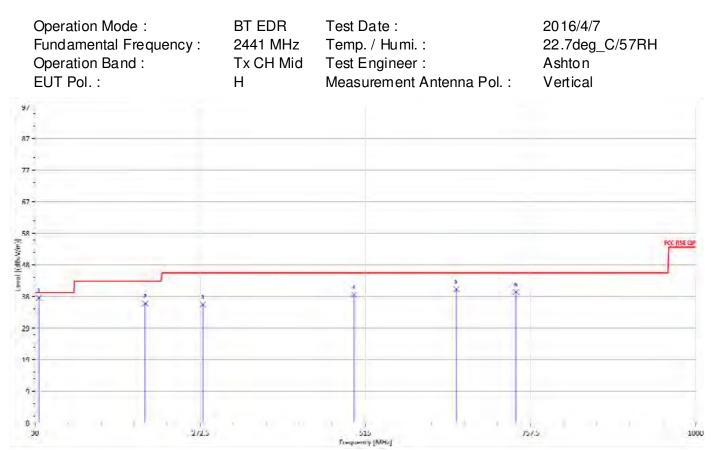






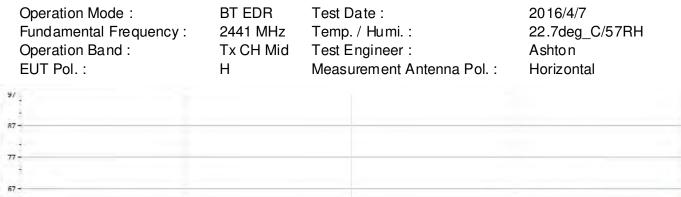
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.97	S	QP	36.65	-7.70	28.95	40	-11.05
107.60	S	Peak	47.72	-16.77	30.95	43.5	-12.55
359.80	S	Peak	47.29	-11.20	36.09	46	-9.91
521.79	S	Peak	42.58	-7.26	35.33	46	-10.67
558.65	S	Peak	47.06	-6.78	40.28	46	-5.72
758.47	S	Peak	41.53	-4.11	37.42	46	-8.58

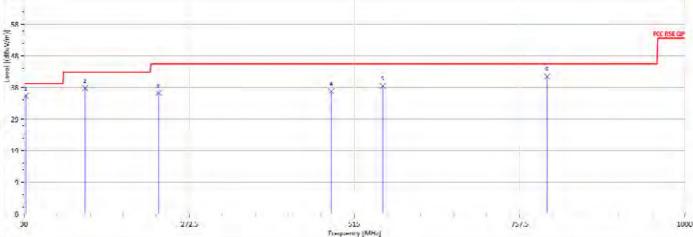




Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
36.00	S	QP	48.89	-10.46	38.43	40	-1.57
191.99	S	Peak	54.79	-18.13	36.66	43.5	-6.84
276.38	S	Peak	50.13	-13.74	36.39	46	-9.61
498.51	S	Peak	47.14	-7.73	39.41	46	-6.59
648.86	S	Peak	46.17	-5.07	41.11	46	-4.89
736.16	S	Peak	44.71	-4.44	40.28	46	-5.72

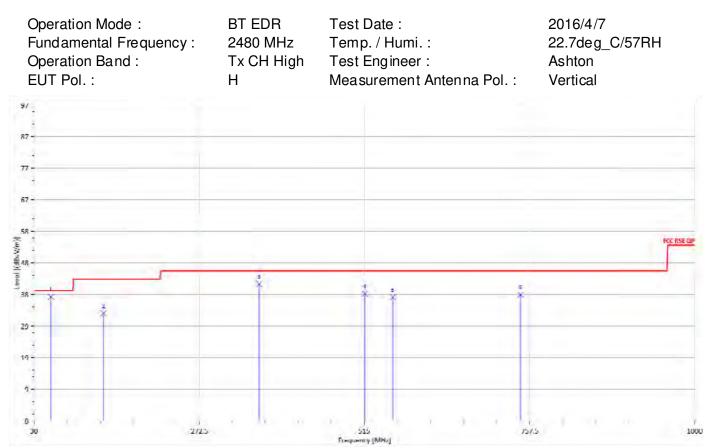






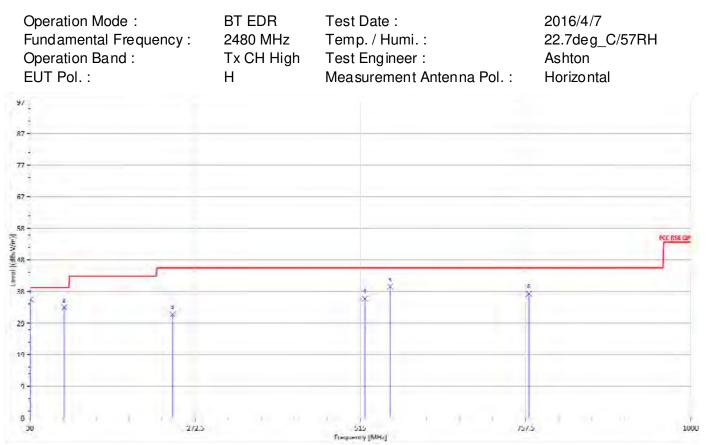
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
32.91	S	Peak	45.05	-8.75	36.30	40	-3.70
120.21	S	Peak	54.49	-15.84	38.65	43.5	-4.85
227.88	S	Peak	53.64	-16.47	37.17	46	-8.83
481.05	S	Peak	45.60	-7.88	37.72	46	-8.28
556.71	S	Peak	46.27	-6.96	39.31	46	-6.69
798.24	S	Peak	46.12	-3.91	42.22	46	-3.78





Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
55.25	S	QP	59.36	-21.26	38.11	40	-1.89
131.85	S	Peak	48.73	-15.71	33.02	43.5	-10.48
360.77	S	Peak	53.23	-11.17	42.06	46	-3.94
515.97	S	Peak	46.76	-7.67	39.09	46	-6.91
556.71	S	Peak	44.96	-6.96	38.00	46	-8.00
743.92	S	Peak	43.15	-4.35	38.79	46	-7.21





Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.97	S	Peak	44.15	-7.70	36.44	40	-3.56
80.44	S	Peak	54.79	-20.88	33.91	40	-6.09
239.52	S	Peak	47.05	-15.28	31.77	46	-14.23
521.79	S	Peak	43.90	-7.26	36.64	46	-9.36
558.65	S	Peak	47.10	-6.78	40.33	46	-5.67
762.35	S	Peak	42.32	-4.17	38.15	46	-7.85



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Radiated Spurious Emission Measurement Result: For Frequency above 1 GHz

on Mode: lental Frequency: on Band: I.:	BT EDR 2402 MHz Tx CH Low H	Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. :	2016/6/22 22.7deg_C/57RH Pony Vertical
			HERE 9K
			PCC RSE AV
· *			
÷.			
	ental Frequency : on Band :	ental Frequency: 2402 MHz on Band: Tx CH Low	ental Frequency : 2402 MHz Temp. / Humi. : on Band : Tx CH Low Test Engineer :

Freq. Note Detector Spectum Factor Actual Limit Margin Mode **Reading Level** FS @3m MHz F/H/E/S PK/QP/AV dBµV dB dBµV/m dBµV/m dB 4804.00 34.97 7.66 Н Peak 42.63 74 -31.37 4804.00 7.66 32.23 -21.77 Н Average 24.57 54 7206.00 Peak 14.95 74 -26.73 Н 32.32 47.27 7206.00 Н 22.74 14.95 37.69 54 -16.31 Average

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v [MH/]

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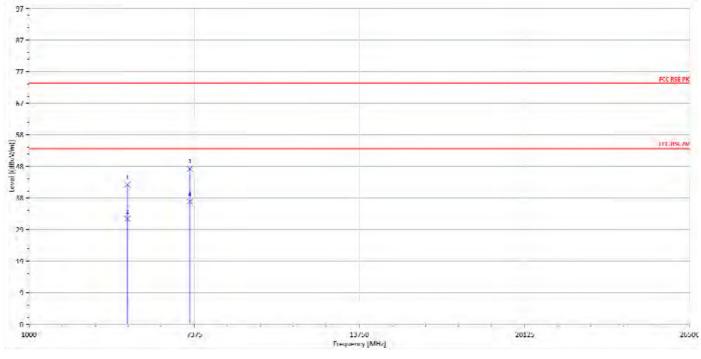
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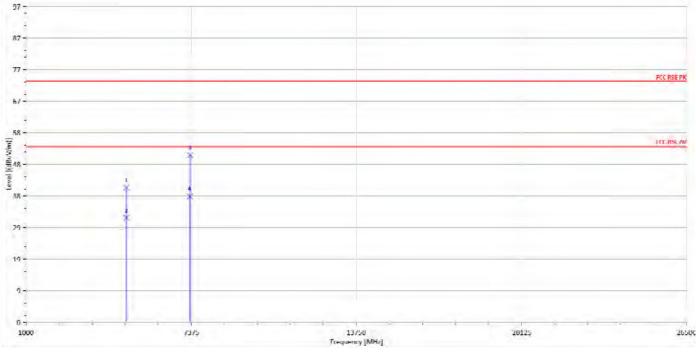
Operation Mode :	BT EDR	Test Date :	2016/6/22
Fundamental Frequency:	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Pony
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4804.00	Н	Peak	35.18	7.66	42.84	74	-31.16
4804.00	Н	Average	24.74	7.66	32.40	54	-21.60
7206.00	Н	Peak	32.82	14.95	47.76	74	-26.24
7206.00	Н	Average	22.77	14.95	37.72	54	-16.28



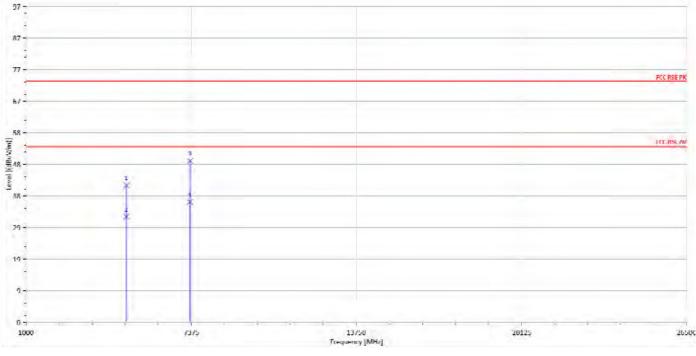
Operation Mode :	BT EDR	Test Date :	2016/6/22
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Pony
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4882.00	Н	Peak	33.64	7.70	41.34	74	-32.66
4882.00	Н	Average	24.38	7.70	32.08	54	-21.92
7323.00	Н	Peak	36.63	14.79	51.42	74	-22.58
7323.00	Н	Average	23.91	14.79	38.70	54	-15.30



Operation Mode :	BT EDR	Test Date :	2016/6/22
Fundamental Frequency:	2441 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Pony
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4882.00	Н	Peak	34.30	7.70	42.00	74	-32.00
4882.00	Н	Average	24.75	7.70	32.45	54	-21.55
7323.00	Н	Peak	34.81	14.79	49.60	74	-24.40
7323.00	Н	Average	22.23	14.79	37.02	54	-16.98



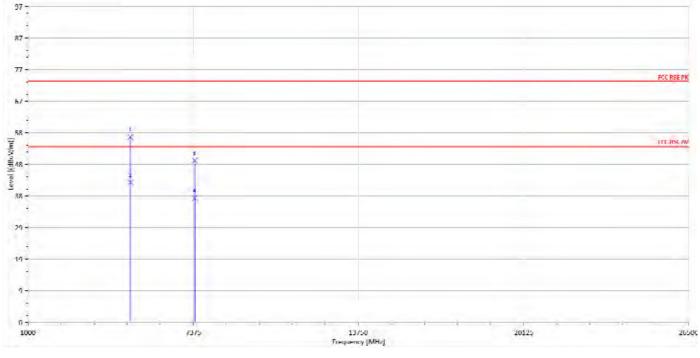
Operation Mode:	BT EDR	Test Date :	2016/6/22
Fundamental Frequency:	2480 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	Tx CH High	Test Engineer :	Pony
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical

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Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.00	Н	Peak	44.70	7.69	52.39	74	-21.61
4960.00	Н	Average	31.48	7.69	39.17	54	-14.83
7440.00	Н	Peak	36.97	15.43	52.40	74	-21.60
7440.00	Н	Average	22.66	15.43	38.09	54	-15.91



Operation Mode:	BT EDR	Test Date :	2016/6/22
Fundamental Frequency:	2480 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	Tx CH High	Test Engineer :	Pony
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4960.00	Н	Peak	49.14	7.69	56.83	74	-17.17
4960.00	Н	Average	35.20	7.69	42.89	54	-11.11
7440.00	Н	Peak	34.29	15.43	49.72	74	-24.28
7440.00	Н	Average	22.77	15.43	38.20	54	-15.80



11 FREQUENCY SEPARATION

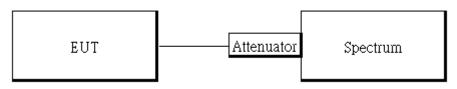
11.1 Standard Applicable

Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25 kHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

11.2 Measurement Equipment Used

Conducted Emission Test Site									
EQUIPMENT	MFR	MODEL SERIAL		LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017				
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016				
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016				

11.3 Test Set-up



11.4 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set center frequency of spectrum analyzer = middle of hopping channel.
- 5. Set the spectrum analyzer as RBW, VBW=100 kHz, Adjust Span to 5MHz, Sweep = auto.
- 6. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

Weif S data was stated the results stated the results state provide the state of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law

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11.5 Measurement Result

Channel separation (MHz)	Limit	Result
1	>=25 kHz or 2/3 times 20dB bandwidth	PASS

Frequency Separation Test Data

RL 50.0 bc Senter Freq 2.403000000 GHz PNC: W IF Galad	Ade Trig: Pree Run BAtten: 30 dB	AUGH AUTO Avg Type: Log-Pwr	05:17:45 PMJun 23, 2056 TRACE 2 2 4 1 TIPE Distance DET P Mit Act 1	Frequency
Ref Offset 4.7 dB 0 dBrdiv Ref 20.00 dBm		ΔN	kr3 1.000 MHz -0.01 dB	Auto Tuni
	142 	364		Center Fre 2.403000000 GH
			2	Start Fre 2.400500000 GH
				Stop Fre 2,405600000 GH
KR: MODE TRIC SCL X		Sweep 1.	top 2.405500 GHz 000 ms (1001 pts)	CF Ste 500.000 kF Auto Mi
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	iz -0.91 dBm iz (Δ) -0.01 dB			Freq Offse
/ 8				

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12 NUMBER OF HOPPING FREQUENCY

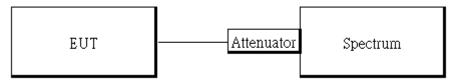
12.1 Standard Applicable

Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

12.2 Measurement Equipment Used

Conducted Emission Test Site						
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.	
TYPE		NUMBER	NUMBER	CAL.		
Spectrum Analyzer	Agilent	N9010A	MY50420195	12/21/2015	12/20/2016	
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017	
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2016	01/01/2017	

12.3 Test Set-up



12.4 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
- 5. Set the spectrum analyzer as RBW=430 kHz, VBW=1.5MHz., Detector = Peak
- 6. Max hold, view and count how many channel in the band.

12.5 Measurement Result

Tabular Data of Total Channel Number

	Channel Number	Limit
2.4 GHz – 2.441GHz	40	
2.441 GHz – 2.4835GHz	39	>15
2.4GHz ~2.4835GHz	(40+39) = 79	

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Channel Number

Trig: Free Run #Atten: 30 dB	AUGH AUTO Avg Type: Log-Pwr	05:11:28 PM Jun 23, 2016 TRACE 0 2 1 4 TITLE 0 2 1 4 TITLE 0 2 1 1 1	Frequency
	Mkr1 :	2.402 000 GHz -0.95 dBm	Auto Tune
			Center Free 2.420500000 GH
			Start Free 2.400000000 GH
			Stop Fre 2.441000000 GH
			CF Ste 4.100000 MH Auto Ma
			Freq Offse 0 H
W 1.5 MHz	Sweep 1.0	Stop 2.44100 GHz 200 ms (1001 pts)	
	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Trig: Free Run SAtten: 30 dB Mikr1 :	Avg Type: Log-Pwr Trig: Free Run BAtten: 30 dB Mkr1 2.402 000 GHz -0.95 dBm

2.4 GHz - 2.441GHz

2.441 GHz – 2.4835GHz



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13 TIME OF OCCUPANCY (DWELL TIME)

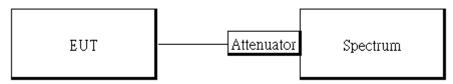
13.1 Standard Applicable

Frequency hopping systems operating in the 2400MHz-2483.5MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

13.2 Measurement Equipment Used

Conducted Emission Test Site									
EQUIPMENT	EQUIPMENT MFR MODEL SERIAL LAST CAL DU								
TYPE		NUMBER	NUMBER	CAL.					
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2016	04/13/2017				
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016				
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016				

13.3 Test Set-up



13.4 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set center frequency of spectrum analyzer = operating frequency.
- 5. Set the spectrum analyzer as RBW, VBW=1MHz, 3MHz, Span = 0Hz , Detector = Peak, Adjust Sweep = $2 \sim 8ms$.
- 6. Repeat above procedures until all frequency of the interest measured were complete.

Formula Deduced: time occupancy of one time slot X Hopping rate / total slot in one channel / total channel that hops X period of working channels.

Where, standard hopping rate is 1600 hops/s, slot in one channel for DH1, DH3, and DH5 is 2, 4, and 6, respectively.

DH1 consists of single time slot of the uplink, and one slot of the downlink Total Slot: 2

DH3 consists of three time slot of the uplink, and one slot of the downlink. Total Slot: 4

DH5 consists of five time slot of the uplink, and one slot of the downlink. Total Slot: 6

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In AFH mode, hopping rate is 800 hop/s with 6 slots in 20 hopping channels with channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 * 20) (S), Hop Over Occupancy Time comes to (800 / 6 / 20)*(0.4 *20) =53.33

Note: the result of the complete test default channel at 1Mbps is recorded on the test report, 2Mbps, and 3Mbps only records the measurement result at middle channel that reveals no much deviation.

GL2K (IMDb2)			
Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	DH1	130.56	400ms
0	DH3	265.12	400ms
	DH5	309.55	400ms
	DH1	127.36	400ms
39	DH3	265.92	400ms
	DH5	309.76	400ms
	DH1	128.00	400ms
78	DH3	266.08	400ms
	DH5	312.32	400ms

13.5 Tabular Result of the Measurement

GESK (1Mbns)

$\pi/4$ DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	DH1	130.24	400ms
39	DH3	265.92	400ms
	DH5	309.76	400ms

8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	DH1	130.56	400ms
39	DH3	265.92	400ms
	DH5	310.08	400ms



A period time = 0.4 (s) * 79 = 31.6 (s)

GFSK (1Mbps):

CH Low	DH1 time slot =	0.408 *	(1600/2/79) *	31.6 =	130.56 (ms)
	DH3 time slot =	1.657 *	(1600/4/79) *	31.6 =	265.12 (ms)
	DH5 time slot =	2.902 *	(1600/6/79) *	31.6 =	309.55 (ms)
CH Mid	DH1 time slot =	0.398 *	(1600/2/79) *	31.6 =	127.36 (ms)
	DH3 time slot =	1.662 *	(1600/4/79) *	31.6 =	265.92 (ms)
	DH5 time slot =	2.904 *	(1600/6/79) *	31.6 =	309.76 (ms)
CH High	DH1 time slot =	0.400 *	(1600/2/79) *	31.6 =	128.00 (ms)
	DH3 time slot =	1.663 *	(1600/4/79) *	31.6 =	266.08 (ms)
	DH5 time slot =	2.928 *	(1600/6/79) *	31.6 =	312.32 (ms)

$\pi/4$ -DQPSK (2Mbps):

CH Mid	2DH1 time slot=	0.407 *	(1600/2/79) *	31.6 =	130.24 (ms)
	2DH3 time slot=	1.662 *	(1600/4/79) *	31.6 =	265.92 (ms)
	2DH5 time slot=	2.904 *	(1600/6/79) *	31.6 =	309.76 (ms)

8-DPSK (3Mbps):

CH Mid	3DH1 time slot=	0.408 *	(1600/2/79) *	31.6 =	130.56 (ms)
	3DH3 time slot=	1.662 *	(1600/4/79) *	31.6 =	265.92 (ms)
	3DH5 time slot=	2.907 *	(1600/6/79) *	31.6 =	310.08 (ms)



GFSK (1Mbps) for AFH Mode								
Hopping Channel NumberPACKET TYPEMeasurement Result (ms)Li (n								
20	DH5	156.16	400ms					
$\pi/4$ DQPSK (2Mbps) for Mode								
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)					
20	DH5	154.88	400ms					
	8-DPSK (3Mbps) for AFH Mode							
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)					
20	DH5	155.04	400ms					

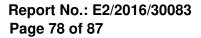
GFSK (1Mbps):

DH5 time sI =	2.928	(ms)	*	(800/6/20)	* 8 =	156.16	(ms)
π/4 -DQPSK (2Mbps							
2DH5 time :=	2.904	(ms)	*	(800/6/20)	* 8 =	154.88	(ms)
8-DPSK (3Mbps):							
3DH5 time :=	2.907	(ms)	*	(800/6/20)	* 8 =	155.04	(ms)

13.6 Measurement Result

Note: Refer to next page for plots.

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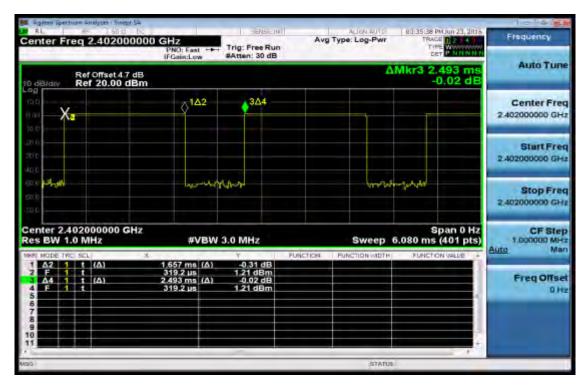




CH-Low DH1

Agreen Spectrum Analyzes I Swept SA					0
enter Freq 2.40200000	PNO East +++ T	Trig: Free Run	Avg Type: Log-Pwr	03:34:38 PMJun 23, 2136 TRACE D 2 14 D TIRE WINNER	Frequency
Ref Offset 4.7 dB 0 dB/div Ref 20.00 dBm	I GAILLON		ΔN	lkr3 1.255 ms 6.23 dB	Auto Tur
		344			Center Fre 2.402000000 GF
					Start Fr 2.402000000 G
20 20 20 20 20 20 20 20 20 20 20 20 20 2	- with the	rear and the second	-support	wind then	Stop Fr 2,402000000 G
enter 2.402000000 GHz es BW 1.0 MHz	#VBW 3.0			Span 0 Hz 080 ms (401 pts)	CF St 1.000000 M Auto W
MMC MODE TRC: SCL X 1 Δ2 1 t (Δ) 2 F 1 t (Δ) 3 Δ4 1 t (Δ) 4 F 1 t 5	408.0 μs (Δ) 1.010 ms 1.255 ms (Δ)	7 Funici 5.90 dB -4.99 dBm 6.23 dB -4.99 dBm	ION PUNCTION WETH	FUNCTION VALUE	Freq Offs 0

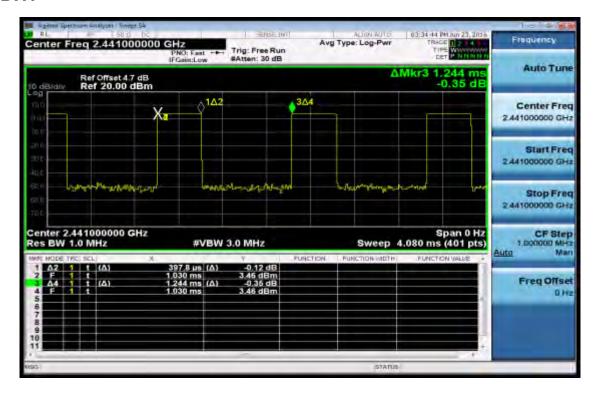
DH3



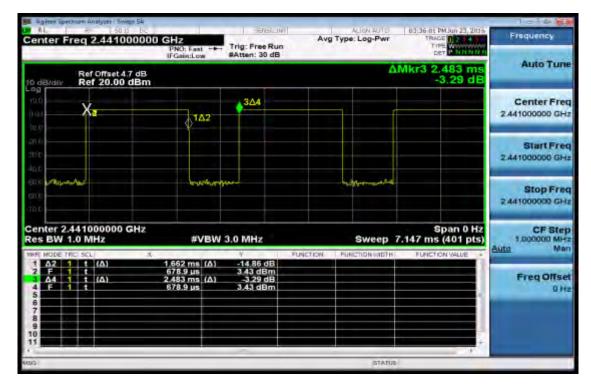


Ref Offset 4.7 dB Ref Offset 4.7 dB Ref 20.00 dBm	PNO East -P- Tri	ig: Free Run Atten: 30 dB	Avg	Type: Lo		TRACI TIP DE	734 ms 0.02 dB	Frequency Auto Tun Center Fre 2.40200000 GH
Ref Offset 4.7 dB Ref 20.00 dBm					Δħ			Center Fre
1950 1949 Xa 1950 2010 2010 2010	√1∆2 3∆4							T 7 0 0 0 0 0 0 0 0 0 0
20 0) 20 0 40,0								2.40200000 G
								Start Fr 2.402000000 G
90 (t) 70 C	manuel			www.				Stop Fr 2,402000000 G
Center 2.402000000 GHz Res BW 1.0 MHz	#VBW 3.0	MHz		Sv	veep 10	S).75 ms	pan 0 Hz (401 pts)	CF St. 1.000000 M
NER MODE THE SEL X	2.902 ms (A)	γ -0.08 dB	FUNCTION	Functio	NUMBTR	FUNCTIO	IN VALUE	Auto M
2 F 1 t Δ4 1 t (Δ)	429.9 μs 3.734 ms (Δ)	-0.08 dB 1.20 dBm -0.02 dB 1.20 dBm						Freq Offs 0
7 8 9 10								
90)		_			STATUS		- F	

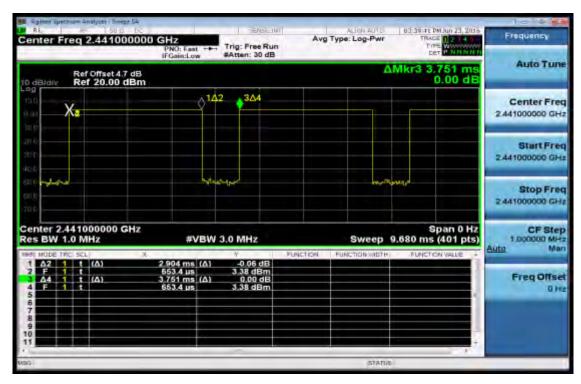
CH-Mid DH1







DH5



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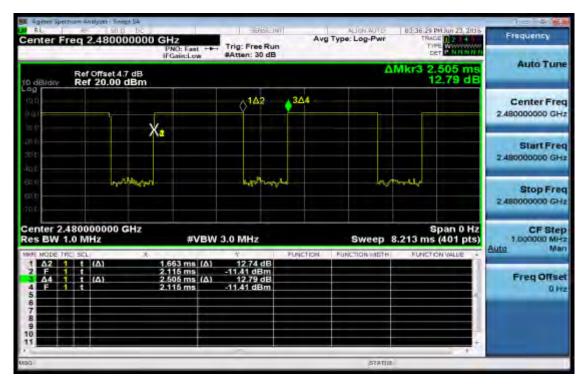
No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號 SGS Taiwan Ltd.



CH-High DH1

RL &	50 m DC	Sense IVI	ALIGN 4UT 5	03:35:18 PMJun 23, 2116	1 - 1 - 4 - 1 - 1
enter Freq 2.48	PNO: Fast +++	Trig: Free Run	Avg Type: Log-Pwr	TRACE 2 140	Frequency
Ref Offse		#Atten: 30 dB	Δ	Mkr3 1.243 ms -0.03 dB	Auto Tun
		304			Center Fre 2.48000000 GF
					Start Fre 2.480000000 GH
ai hertettyhou ai	mal warden	rineithealth	Line der angle and a	here works	Stop Fre 2,49000000 GP
enter 2.48000000 es BW 1.0 MHz		3.0 MHz	Sweep 4	Span 0 Hz .213 ms (401 pts)	CF Sto 1.000000 M Auto M
T A2 1 C (A)	X 400.3 μs (Δ)	7 P	UNICTION FUNCTION WETH	FUNCTION VALUE	CHER MI
2 F 1 t Δ4 1 t (Δ) 4 F 1 t	874.3 μs 1.243 ms (Δ) 874.3 μs	1.42 dBm -0.03 dB 1.42 dBm			Freq Offs 0)
7 8 9 0 1					

DH3





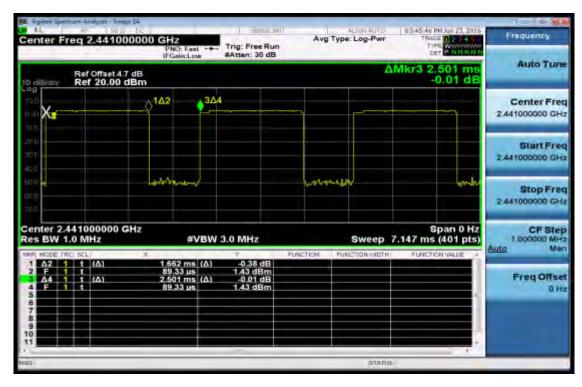
Agrent Spectrum Analyzes Swept SA	The second s		0 0 0
Center Freq 2.480000000 GHz	Avg T Trig: Free Run #Atten: 30 dB	ALIGN AUTO 03/41/05 PMJun 23, 28: ype: Log-Pwr Trace 02:14 Trace 02:14 Trace 02:14 Trace 02:14	Frequency
10 dB/div Ref 20.00 dBm		ΔMkr3 3.751 m 0.14 di	
	162 364		Center Freq 2.480000000 GHz
20 0 20 0 40 0			Start Freq 2.480000000 GHz
ει ο	and the	hrand	Stop Freq 2,488000000 GHz
	3.0 MHz	Span 0 H Sweep 9.680 ms (401 pts	CF Step 1.000000 MHz Auto Man
MARE MODE THE: SEL X 1 Δ2 1 t (Δ) 2.928 ms (Δ) 2 F 1 t 1.936 ms (Δ) 3 Δ4 1 t (Δ) 3.761 ms (Δ) 4 F 1 t 1.936 ms 5 6 6 7 7 8 9 9 10 </td <td>* Function -0.19 dB 1.20 dBm 0.14 dB 1.20 dBm</td> <td>PUNCTION VALUE</td> <td>Freq Offset 0 Hz</td>	* Function -0.19 dB 1.20 dBm 0.14 dB 1.20 dBm	PUNCTION VALUE	Freq Offset 0 Hz
		STATUS	-



CH-Mid 2DH1

Agitent Spectrum Analy	T 50 D DC		Sense	and the second second	- Alexandre	ALION ALITS	125.11.55	MJun 23, 2036	10 4 10
enter Freq 2.4	441000000 G	PNO: Fast ++++	-V. 2.3.2	un A		e: Log-Pwr	TRAC		Frequency
0 dBidiy Ref 2	ffset 4.7 dB 20.00 dBm	IFGain:Low	SAtten: ou dr	,		۵	Mkr3 1	-	Auto Tun
X	······································	2		344	7				Center Fre 2.441000000 GH
ος σύ:									Start Fr 2.441000000 G
a o ganoringoo a b		landilayinnan	whiteward		VM	horman	galen	r.	Stop Fr 2 441000000 G
enter 2.441000 es BW 1.0 MHz		#VBW	3.0 MHz			Sweep	S 3.013 ms	pan 0 Hz (401 pts)	CF St. 1.000000 M
I A2 1 L U	X (A)	406.8 µs (Δ)	γ -0.12 dB		E Fut	NCTION WETH	FUNCTO	ON VALUE	Auto M
2 F T t A4 T T U 4 F T T	Δ) 1	331.5 μs 1.251 ms (Δ) 331.5 μs	1.42 dBm 0.01 dB 1.42 dBm	1					Freq Offs 0
9 9									
						STATU		- +	

2DH3





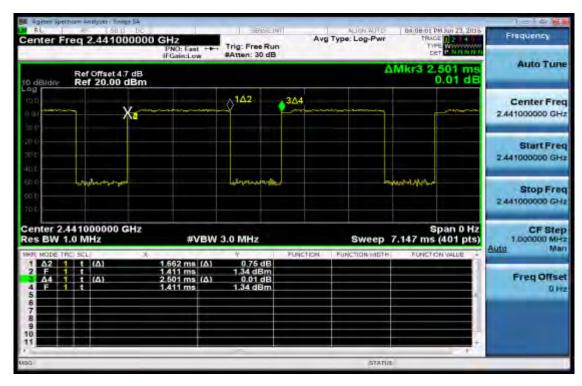
Agitent Spectrum Analyzer / Swept SA			10 0 0
Center Freq 2.4410000	PNO: Fant +++ Trig: Free Run	Aug Type: Log-Pwr TRACE D2140159 PMJun 23, 2016	Frequency
Ref Offset 4.7 dB	I GREAT AND A REAL	ΔMkr3 3.751 ms -0.01 dB	Auto Tune
	↓ ^{1Δ2} ↓ ^{3Δ4}		Center Free 2.441000000 GH
200 300			Start Fre 2.441000000 GH
50.0 (0) 700	www		Stop Fre 2.441000000 GH
Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Span 0 Hz Sweep 9.680 ms (401 pts)	CF Ste 1.000000 Mi Auto Mi
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.904 ms (Δ) 0.94 dB 1.283 ms 1.42 dBm 3.751 ms (Δ) -0.01 dB 1.283 ms 1.42 dBm		Freq Olfse 0 F
9 10 11		STATUE	



CH-Mid **3DH1**

Agitent Spectrum Analyzer Swept SA			ALIGN MITS		
enter Freg 2.441000000	PNO: Fast ++++ 1	Trig: Free Run	Avg Type: Log-Pwr	04:06:37 PMJun 23, 2036 TRACE 0 2 1 4 TITLE WARDED	Frequency
Ref Offset 4.7 dB 0 dB/dry Ref 20.00 dBm	IFGain:Low #	Atten: 30 dB	۵	Mkr3 1.244 ms -6.19 dB	Auto Tun
X		304	-		Center Fre 2.441000000 GH
					Start Fre 2.441000000 Gi
a a part of the second of the	henderpren	is and	water water with the	man	Stop Fr 2 44100000 G
enter 2.441000000 GHz es BW 1.0 MHz	#VBW 3.	0 MHz	Sweep 4	Span 0 Hz 4.080 ms (401 pts)	CF Sto 1.000000 M Auto M
MODE TRC SCL X. 1 Δ2 1 t (Δ) 2 F 1 t (Δ) 3 Δ4 1 t (Δ) 4 F 1 t (Δ) 5	408.0 μs (Δ) 795.6 μs 1.244 ms (Δ) 796.6 μs	-0.15 dB 1.39 dBm -5.19 dB 1.39 dBm	NCTION PUNCTION NETTH	FUNCTION VALUE	Freq Offs
8 9 9 1 1			STATUS	, - , -	

3DH3





		10 4 6
PNO: Fast +++ Trig: Free Run	Ave Type: Log-Pwr TRACE	Frequency
IT CARRIELON	ΔMkr3 3.747	Auto Tune
Δ ^{1Δ2} 3Δ4		Center Free 2.441000000 GH
		Start Free 2.441000000 GH
(any and	the start of the s	Stop Fre 2,441000000 GH
#VBW 3.0 MHz	Sweep 8.613 ms (401	pts) 1.000000 MH
2.907 ms (Δ) 0.89 dB 344.5 μs 1.33 dBm 3.747 ms (Δ) 0.00 dB 344.5 μs 1.33 dBm		Freq Offse
	#VBW 3.0 MHz #VBW 3.0 MHz 7 71 3.747 ms (Δ) 0.89 dB 3.747 ms (Δ) 0.89 dB	ID GHz PNO: Faat Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr Trig: Free Run #Atten: 30 dB Trig: Free Run Trig: Free Run #Atten: 30 dB ΔMKr3 3.747 0.00 ΔMKr3 3.747 0.00 #VBW 3.0 MHz Sweep 8.613 ms (401 3.44.5 μs 1.33 dBm 3.747 ms (Δ) System



14 ANTENNA REQUIREMENT

14.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

14.2 Antenna Connected Construction

An embedded-in antenna design is used.

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo and antenna spec. for details.

The antenna gain is less than 6dBi. Therefore, it is not necessary to reduce maximum output power limit.

~ End of Report ~

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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