

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

	OF			
Brand Name:	Sony			
FCC ID:	PY7-46331W			
Report No.:	ER/2017/20023			
Issue Date:	Aug. 30, 2017			
FCC Rule Part:	§15.247, Cat: DSS			
Prepared for: Prepared by:	Sony Mobile Communications Inc. 4-12-3, Higashi-Shinagawa, Shinagawa-ku, Tokyo, 140-0002 Japan SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial			
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VERIFICATION OF COMPLIANCE

Applicant:	Sony Mobile Communications Inc. 4-12-3, Higashi-Shinagawa, Shinagawa-ku, Tokyo, 140-0002 Japan
Brand Name:	Sony
FCC ID:	PY7-46331W
Report Number:	ER/2017/20023
Date of Test:	Dec. 12, 2016 ~ Dec. 29, 2016 (Conducted) Feb. 06, 2017 ~ Fed. 16, 2017 (Radiated)
Date of EUT Received:	Dec. 12, 2016

We hereby certify that:

Α

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:	louis Chen	Date:	Aug. 30, 2017
Prepared By:	Louis Chen/Engineer Vroletta Tang	Date:	Aug. 30, 2017
Approved By: 	Violetta Tang / Clerk Jim Chang	Date:	Aug. 30, 2017

Jim Chang / Asst. Manager

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Revision History

Report Number	Revision	Description	Issue Date
ER/2017/20023	Rev.00	Initial creation of document	Feb. 21, 2017
ER/2017/20023	Rev.01	Update general information	Mar. 16, 2017
ER/2017/20023	Rev.02	Update conducted setup photo	Apr. 05, 2017
ER/2017/20023	Rev.03	Update description, measurement plots & setup photo	Jul. 13, 2017
ER/2017/20023	Rev.04	Update description and configuration of test system.	Aug. 15, 2017
ER/2017/20023	Rev.05	Update measurement plots of radi- ated emission.	Aug. 21, 2017
ER/2017/20023 Rev.06		Add description for the test mode; update configuration & setup photos of test system and MPE evaluation.	Aug. 30, 2017

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GENERAL INFORMATION 1

1.1 Product description

General:

Brand Name:	Sony			
Hardware Version:	A	A		
Software Version:	0.5			
Data Cable (USB):	Model No.:	Model No.: UCB20, Supplier: Sony, Length: 100cm		
Power Supply:	Battery: Model No.: N/A, Supplier: N/A			
	Adapter : Model No.: ACH10E, Supplier: Sony			

Bluetooth_BR+EDR:

Frequency Range:	2.402GHz – 2.480GHz
Bluetooth Version BT V4.2 dual mode	
Channel number:	79 channels
Modulation type:	GFSK + π/4DQPSK + 8DPSK
Transmit Power:	7.47dBm (Peak)
Antenna Designation:	Internal Antenna, Gain: 2.1dBi

1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) supports below functions.

Product Feature			
Bluetooth Version V4.2 dual mode			
Wi-Fi- Specification 802.11a/b/g/n/ac			
NFC Specification NFC			

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

FCC Part 15, Subpart C §15.247

FCC Public Notice DA 00-705 Measurement Guidelines

ANSI C63.10:2013

Note:

All test items have been performed and record as per the above standards.

1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 (TAF code 0513)

OATS: SGS Far East Limited Taiwan EMC Laboratory

No.34-2, Dingfu, Linkou Dist., New Taipei City 24442, Taiwan (R.O.C.)

FCC Registration Numbers are: 509634

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 transmitter (EUT) was rotated through one orthogonal axe 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 and attenuator factor.

Following shows an offset computation example with cable loss 0.7dB and 10dB attenuator. **Offset:**

= RF cable loss (dB)+ attenuation factor(dB) dB =10.7dB

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2.5 Configuration of Tested System Fig. 2-1 Radiated Emission & AC Power Line Conducted Emission Configuration

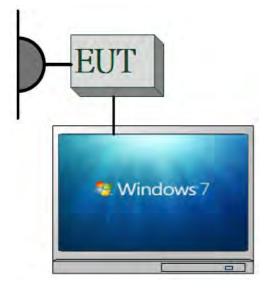
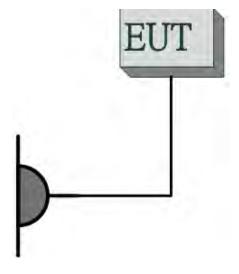
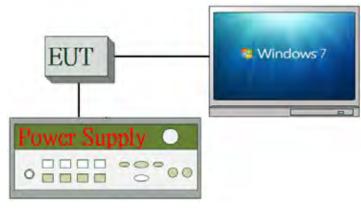


Fig. 2-2 Radiated Emission & AC Power Line Conducted Emission Configuration



Conducted (Antenna Port) Configuration



ltem	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	R400	7440AV6	N/A	Un-shield
3.	DC Power Supply	Agilent	E3640A	KR93300208	N/A	N/A
4.	Data Cable (USB)	Sony	UCB20	N/A	N/A	N/A

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SUMMARY OF TEST RESULTS 3

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b)(1)	Peak Output Power	Compliant
§15.247(a)(1)	20dB Bandwidth	Compliant
§15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.247(a)(1)	Frequency Separation	Compliant
§15.247(a)(1)(iii)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii)	Time of Occupancy	Compliant
§15.203 §15.247(b)	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		

4.2 The Worst Test Modes and Channel Details

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

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RADIATED TEST							
	Radiated Emission Test (BELOW 1 GHz) (Worst case)						
MODE	AVAILABLE	TESTED	MODULATION	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			
WIODE	CHANNEL	CHANNEL	WODULATION	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	3DH5			

Note:

The field strength of radiation emission was measured as Bluetooth BR+EDR Transmitter for channel Low, Mid and High, the worst case was reported.

Note:

The test result of test setup without the accessories is chosen as the worst case to be presented in the test report.

	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	2DH5			
	0 to 78	0,39,78	8-DPSK	3DH5			
		Band Edge & C	onducted Emission				
Bluetooth	0 to 78	0,78	GFSK	DH5			
Bluetooth	0 to 78	0,78	8-DPSK	3DH5			
		Frequen	cy Separation				
Bluetooth	0 to 78	0,39,78	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 (Polarization : Horizontal)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	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	ESCI7	100760	05/10/2016	05/09/2017		
LISN	SCHWARZBECK	NSLK 8127	8127-649	05/16/2016	05/15/2017		
LISN	MESS TEC	FCC-LISN-50/250 -25-2-01	4034	05/16/2016	05/15/2017		
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2016	11/25/2017		

6.3 EUT Setup

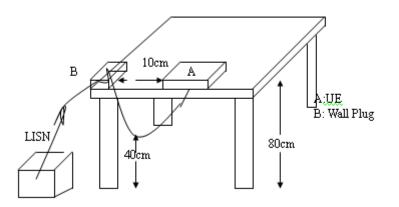
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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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

Note: Refer to next page for measurement data and plots. Note2: The * reveals the worst-case results that closet to the limit

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AC POWER LINE CONDUCTED EMISSION TEST DATA



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Temperature'

20 C

Site Conduction Room Phase N AC 120V/60Hz 58 % Limit FCC Class B Conduction(QP) Power: Humidity: Mode: Opertion Conducted Emission Date: 2017/2/13 File 20024 Data #1 Time: F= 08:35 14 80.0 dBuV FCC Close B Conduction(OP) 0.0 0 150 0.5 (MHz) 5 30.000 Reading Correct Measure-No Mk. Freq Limit Over Level Factor ment MHz dBuV dB dBuV dBuV dB Detector Comment 1.* 0.1620 48.00 0.07 48.07 65.36 -17.29 peak 2 0.08 46.10 64.04 -17.94 0,1900 46.02 peak 3 0.2180 43.58 0.08 43.66 62.89 -19.23 peak 4 41.22 60 76 0.2820 41.13 0.09 -19.54 peak 5 0.4580 36.15 0.10 36.25 56.73 -20.48 peak 6 3,1780 37.43 0.20 37 63 56.00 -18.37 peak

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7 PEAK OUTPUT POWER MEASUREMENT

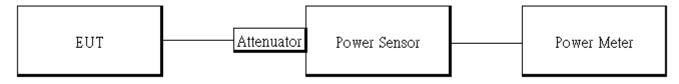
7.1 Standard Applicable

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

SGS Conducted Room						
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.	
TYPE		NUMBER	NUMBER	CAL.		
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017	
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017	
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	02/26/2016	02/25/2017	
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017	
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/02/2016	01/01/2017	
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2016	01/01/2017	
Splitter	Agilent	11636B	N/A	01/02/2016	01/01/2017	
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017	
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2016	05/16/2017	

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):
	21	model	i oung.

СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	6.93	4.932	125
39	2441	7.47	5.585	125
78	2480	6.06	4.036	125

1M BR mode (Average):

СН	Freq. (MHz)	Avg. Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	5.95	3.936	125
39	2441	6.28	4.246	125
78	2480	4.84	3.048	125

2M EDR mode (Peak):

СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	5.65	3.673	125
39	2441	6.01	3.990	125
78	2480	4.43	2.773	125

2M EDR mode (Average):

СН	Freq. (MHz)	Avg. Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	2.42	1.746	125
39	2441	2.53	1.791	125
78	2480	1.43	1.390	125

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3M EDR mode (Peak):

C	СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
	0	2402	5.63	3.656	125
3	39	2441	5.98	3.963	125
7	78	2480	4.41	2.761	125

3M EDR mode (Average):

СН	Freq. (MHz)	Avg. Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	2.23	1.671	125
39	2441	2.52	1.786	125
78	2480	1.34	1.361	125

NOTE: cable loss as 10.7dB that offsets in the spectrum

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20DB BANDWIDTH MEASUREMENT 8

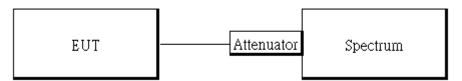
8.1 Standard Applicable

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

8.2 Measurement Equipment Used

SGS Conducted Room								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
TYPE		NUMBER	NUMBER	CAL.				
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017			
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017			
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	02/26/2016	02/25/2017			
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017			
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/02/2016	01/01/2017			
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2016	01/01/2017			
Splitter	Agilent	11636B	N/A	01/02/2016	01/01/2017			
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017			
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2016	05/16/2017			

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

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8.5 Measurement Result

GFSK

	20 dB	2/3
СН	BW BW	
	(MHz)	(MHz)
Low	0.774	0.52
Mid	0.773	0.52
High	0.769	0.51

π/4-DQPSK

	20 dB	2/3
СН	BW	BW
	(MHz)	(MHz)
Low	1.279	0.85
Mid	1.280	0.85
High	1.280	0.85

8-DPSK

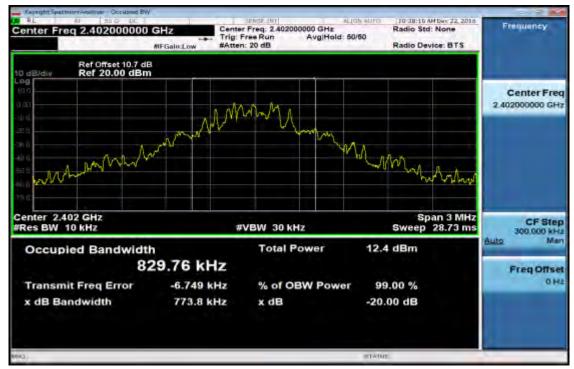
	20 dB	2/3	
СН	BW	BW	
	(MHz)	(MHz)	
Low	1.272	0.85	
Mid	1.271	0.85	
High	1.272	0.85	

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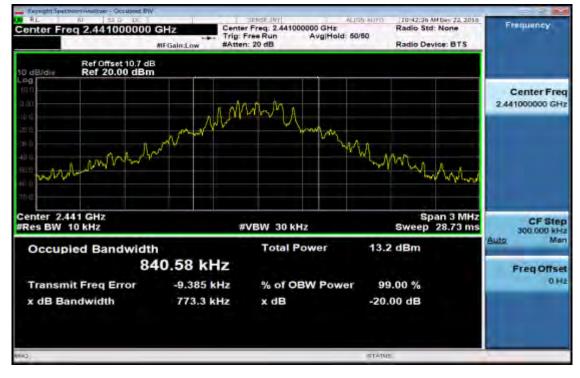
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20dB Band Width Test Data CH-Low (GFSK mode)



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



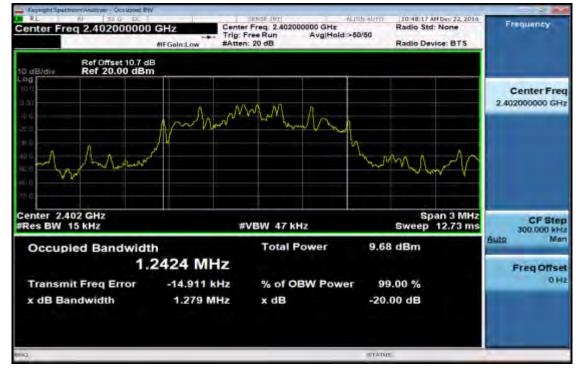
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20dB Band Width Test Data CH-High (GFSK mode)



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)



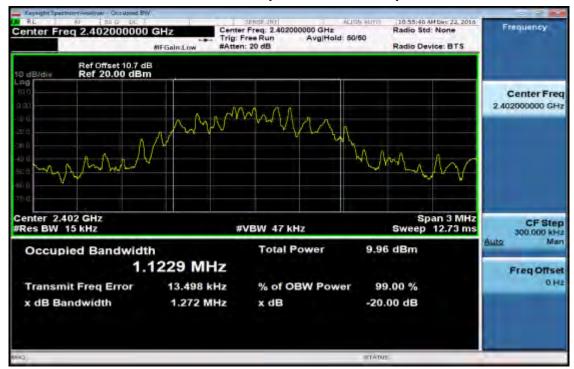
20dB Band Width Test Data CH-High (π/4-DQPSK mode)



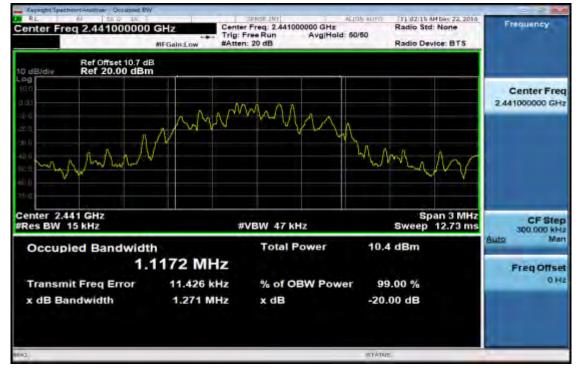
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20dB Band Width Test Data CH-Low (8-DPSK mode)



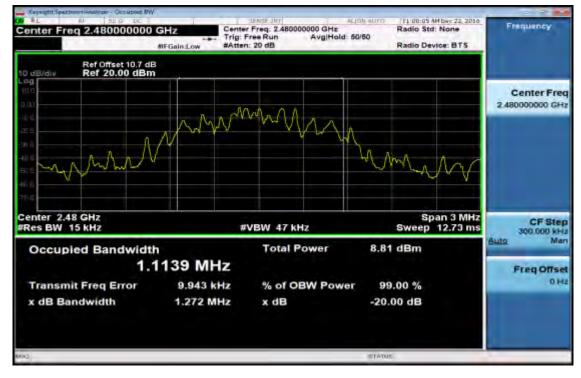
20dB Band Width Test Data CH-Mid (8-DPSK mode)



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



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9 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

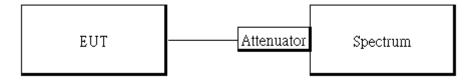
9.1 Standard Applicable

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).

SGS Conducted Room								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
TYPE		NUMBER	NUMBER	CAL.				
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017			
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017			
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	02/26/2016	02/25/2017			
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017			
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/02/2016	01/01/2017			
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2016	01/01/2017			
Splitter	Agilent	11636B	N/A	01/02/2016	01/01/2017			
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017			
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2016	05/16/2017			

9.2 Measurement Equipment Used

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 10.7dB 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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nter Freq 2,3650000		Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr	11 de 28 AM Dec 22, 2016 TRACE 2 2 4 4 TYPE HUMAN	Frequency
Ref Offset 10.7 d dB/div Ref 20.00 dBr	B	Including by the	Mkr	3 2.390 00 GHz -61.58 dBm	Auto Tune
					Center Free 2.365000000 GH
D ()					Start Free 2.310000000 GH
D D <mark>post a margine state providente state</mark> D		nad dama tan mikapati an	cholesance and the lateral	\$ ²	Stop Free 2.420000000 GH
art 2.31000 GHz les BW 100 kHz R MODE TRC: SCU	#VBV	V 300 kHz		Stop 2.42000 GHz .000 ms (1001 pts)	CF Step 11.000000 MH Auto Ma
	2.418 13 GHz 2.399 90 GHz 2.390 00 GHz	7.87 dBm -57.82 dBm -61.58 dBm		-	Freq Offse 0 H
					Scale Type
			STATU		

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

Band Edges Test Data CH-High



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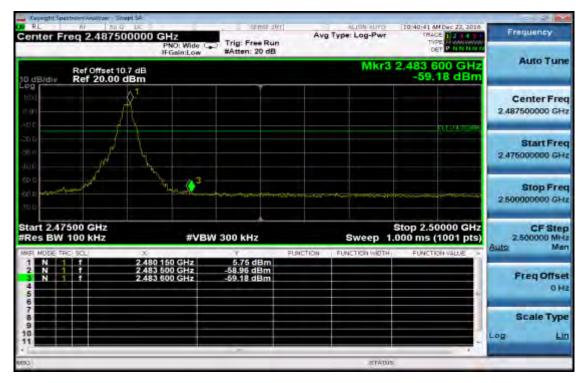
Chiefs あるはのいき Stated the testing south in this test report feer only to the sample(s) tested and such sample(s) are relained to 90 days only. 除非 ある 就可 。 大報告は果 使 對剤試之 様品 身、同時比核品 僅保留 90 天。本報告未提本 公司 書 面許可 ,不可部 份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms</u> and <u>conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms</u> e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits 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 context or ap-compand is underwised and built and offenders more the parties to a transaction form exercising all their rights and obligations under the transaction documents. This document is underwised to the private activate of the hour. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



	Dec 22, 2016	10:38:47 M	ALIGN AUTO	SPREP JUT	-		Anunyter - Skrept SA Al- Sta G- DC	RL
Frequency	E 2 3 4 9 E Distancestrate P N N N M P		Type: Log-Pwr	Trig: Free Run #Atten: 20 dB	st 😱	PNO: Fast IFGain:Low	1 2,36500000	nter Fr
Auto Tuni	00 GHz 52 dBm	3 2.390	Mkr				ef Offset 10.7 dB	dB/div
Center Free 2.365000000 GH								
Start Fre 2.310000000 GH								0 0
Stop Fre 2.420000000 GH		\$ ²	•	hayrain qərdər qərəyə qərəyə	veniori		and construction and	0 Dageniego D
CF Ste 11.000000 Mit Auto Ma	2000 GHz 1001 pts)		Sweep 1.	00 kHz	VBW 3	#VE	0 kHz	es BW
Freq Offse 0 H		PONCIN	PORCTONING	6.87 dBm -53.63 dBm -61.52 dBm		2.402 18 GHz 2.399 90 GHz 2.390 00 GHz	t 2. t 2.	N 1 N 1 N 1
Scale Typ								
_		_	STATUS	-	_			_

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

Band Edges Test Data CH-High



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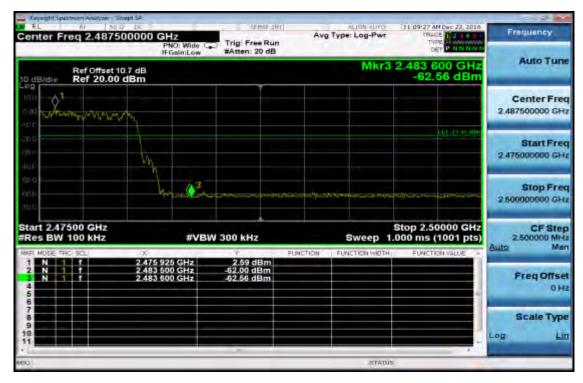
Chiefs あるはのいき Stated the testing south in this test report feer only to the sample(s) tested and such sample(s) are relained to 90 days only. 除非 ある 就可 。 大報告は果 使 對剤試之 様品 身、同時比核品 僅保留 90 天。本報告未提本 公司 書 面許可 ,不可部 份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms</u> and <u>conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms</u> e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits 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 context or ap-compand is underwised and built and offenders more the parties to a transaction form exercising all their rights and obligations under the transaction documents. This document is underwised to the private activate of the hour. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



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

RL AI 50 C D		a company start	at the second	11:09:09 AM Dec 22, 2016	
enter Freq 2,3650000		Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr	TRACE 1 2 4 4 1 TYPE PROVIDENT	Frequency
Ref Offset 10.7 d dB/div Ref 20.00 dB			Mk	r3 2.390 00 GHz -62.11 dBm	Auto Tune
				mainmon	Center Free 2.365000000 GH
000				DL1-IS760.00	Start Free 2.310000000 GH
0 0 0 0 1000 1000 1000 1000 1000 1000 1	and the state of the	10-04-04,00-04-04-04-04-04-04-04-04-04-04-04-04-0	ananan ang anan	\$ ²	Stop Fre 2.420000000 GH
Res BW 100 GHz	#VBW	300 kHz	Sweep	Stop 2.42000 GHz 1.000 ms (1001 pts)	CF Ster 11.000000 MH Auto Ma
1 N 1 F N 1 F N 1 F N 1 F	2.419 01 GHz 2.399 90 GHz 2.390 00 GHz	3.74 dBm -66.36 dBm -62.11 dBm			Freq Offse 0 H
					Scale Type
83			STATE	15	

Band Edges Test Data CH-High



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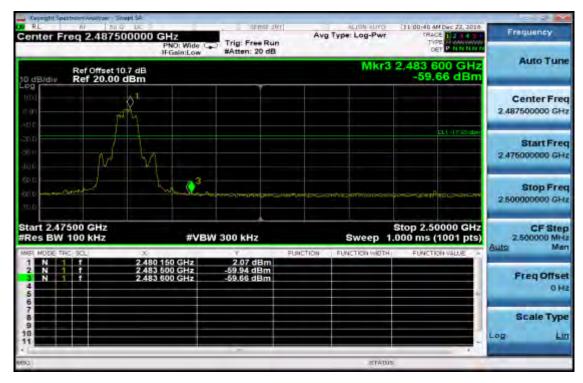
Chiefs あるはのいき Stated the testing south in this test report feer only to the sample(s) tested and such sample(s) are relained to 90 days only. 除非 ある 就可 。 大報告は果 使 對剤試之 様品 身、同時比核品 僅保留 90 天。本報告未提本 公司 書 面許可 ,不可部 份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms</u> and <u>conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms</u> e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits 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 context or ap-compand is underwised and built and offenders more the parties to a transaction form exercising all their rights and obligations under the transaction documents. This document is underwised to the private activate of the hour. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



RL A/ Succession Analyzer - Strept SA		SPRSP JWT	ALIGN AUTO	10:57:03 AM Dwc 22, 2016	2012
nter Freq 2.36500000	PN0: Fast C	1.000 C	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 TYPE NUMBER OF DET P NIN NUMBER	Frequency
Ref Offset 10.7 dB Ref 20.00 dBm			Mki	r3 2.390 00 GHz -61.28 dBm	Auto Tune
				Å'	Center Free 2.365000000 GH
					Start Free 2.310000000 GH
		datela mizilarangi izar za pos		ge la companya de la	Stop Fre 2.420000000 GH
rt 2.31000 GHz PS BW 100 kHz	#VBV	/ 300 kHz	Sweep 1	Stop 2.42000 GHz 1.000 ms (1001 pts)	CF Ster 11.000000 MH Auto Ma
N 1 7 2/ N 1 7 2/	402 18 GHz 399 90 GHz 390 00 GHz	3.47 dBm -54.54 dBm -61.28 dBm		FUNCTION VALUE	Freq Offse 0 H
					Scale Type
			státu	15	_

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

Band Edges Test Data CH-High



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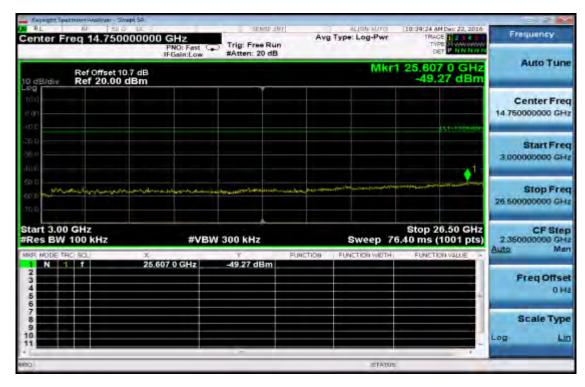
Chiefs あるはのいき Stated the testing south in this test report feer only to the sample(s) tested and such sample(s) are relained to 90 days only. 除非 ある 就可 。 大報告は果 使 對剤試之 様品 身、同時比核品 僅保留 90 天。本報告未提本 公司 書 面許可 ,不可部 份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms</u> and <u>conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms</u> e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits 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 context or ap-compand is underwised and built and offenders more the parties to a transaction form exercising all their rights and obligations under the transaction documents. This document is underwised to the private activate of the hour. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



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

Frequency	10-39:05 AMDec 22, 2016 FRACE 1, 2, 3, 4, 9, 4 TVPE, N. W.	ALIGN ALITS Type: Log-Pwr	A	Trig: Free Ru #Atten: 20 dE	Z D: Fast 😱 alin:Low	0000 GH		
Auto Tuni	1 2.403 0 GHz 6.96 dBm	Mki				7 dB 1Bm	ef Offset 10 ef 20.00	Re Re
Center Free 1.515000000 GH								
Start Free 30,000000 MH								
Stop Free 3.000000000 GH	and the second	- Lines of the second			يەرەر _م اھىرى			م مار بینی و ان زیر
CF Step 297.000000 MH Auto Mar	Stop 3.000 GHz 67 ms (1001 pts)	Sweep 9.0	FUNCTION	300 kHz	#VBW	x	0 kHz	0.030 G BW 100
Freq Offse 0 H	-			6.96 dBm) GHz	2.403 (N 1 1
Scale Type								
	-	STATUS		-				

Ch Low 3GHz – 26.5GHz



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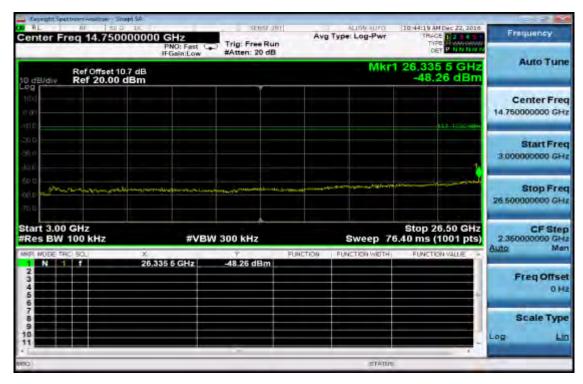
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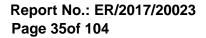
Ch Mid 30MHz – 3GHz

Corjectit Spectroler Analyzer - Skept SA					10.2 M
Center Freq 1.515000000	PNO: East () In	g: Free Run tten: 20 dB	Avg Type: Log-Pwr	10:44:00 AM Dwc 22, 2016 TRACE 1 2 3 4 5 1 TYPE N MANUAL OF DET P N N N M 1	Frequency
Ref Offset 10.7 dB	TO CONTRACTOR INC.		Mk	1 2.441 6 GHz 7.68 dBm	Auto Tune
-eg 1001 000					Center Fre 1.515000000 GH
20 0 90 0 40 0					Start Fre 30.000000 MH
60 0 60 0 70 0	1				Stop Fre 3.000000000 GH
Start 0.030 GHz #Res BW 100 kHz	#VBW 300	kHz		Stop 3.000 GHz 667 ms (1001 pts)	CF Ste 297,000000 MH Auto Me
	441 6 GHz 7	.68 dBm		_	Freq Offse 0 H
6 7 8 9 10					Scale Typ
		-	STATUS		

Ch Mid 3GHz – 26.5GHz



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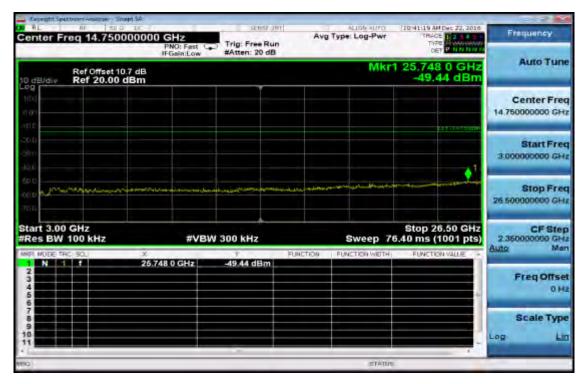




Ch High 30MHz – 3GHz

Keynight Spectroler - Shapt SA					13.2.8
enter Freq 1.515000000	GHz PNO: Fast	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr	10:41:02 AM Dec 22, 2016 TRAGE 1 2 3 4 5 TYPE PROVIDENT	Frequency
Ref Offset 10.7 dB	1 CONLOR		Mk	r1 2,480 3 GHz 5,85 dBm	Auto Tun
eg 1001 1001				•	Center Fre 1.515000000 GH
900 900 900					Start Fre 30,000000 MH
50 0 50 0 70 0		and interview of the state of the	مىلى ئىلى ئىلى تەك		Stop Fre 3.000000000 GH
Start 0.030 GHz Res BW 100 kHz	#VBW	300 kHz		Stop 3.000 GHz 667 ms (1001 pts)	CF Ste 297.000000 MH Auto Ma
MRR.MODE TRC SCL X 1 N 1 f 2 3 4 5 6	480 3 GHz	5.85 dBm	NCTION FUNCTION WIETH	FUNCTION VALUE	Freq Offse 0 H
7 8 9 10					Scale Typ
			STATUS		

Ch High 3GHz – 26.5GHz



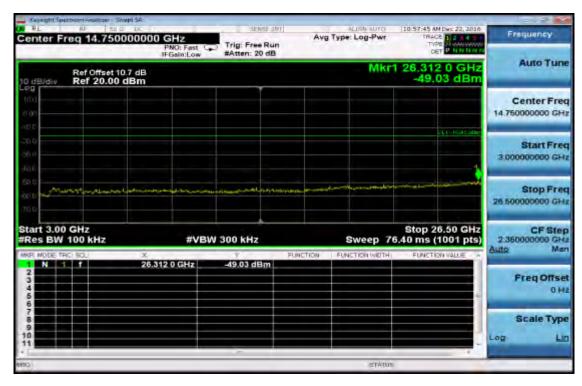
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Conducted Spurious Emission Measurement Result (EDR mode) Ch Low 30MHz – 3GHz

Frequency	10-57:26 AM Dwc 22, 2016 TRAGE 1 2 3 4 3 4 TYPE NORMALINE DET P. NIN RAUER	Type: Log-Pwr	un i	Trig: Free I #Atten: 20	NO: Fast 😱	F	ng 1.5150	RL enter Fr
Auto Tun	2.403 0 GHz 3.55 dBm	Mkr					Ref Offset 1 Ref 20.00	dB/div
Center Fre 1.515000000 GH		•						99 101 01
Start Fre 30,000000 MH	Stir-factories							
Stop Fre 3,000000000 GH		والمستخفر والمستعد والمستعد والمستعد					-	0 0 0
CF Ste 297,000000 MH Auto Ma	Stop 3.000 GHz 7 ms (1001 pts)	Sweep 9.6	FUNCTIO	300 kHz	#VBW	×	00 kHz	art 0.030 Res BW
Freq Offse 0 H	-			3.55 dBr	0 GHz	2.403	1	N 1
Scale Typ								
		STATUS	_					a)

Ch Low 3GHz – 26.5GHz



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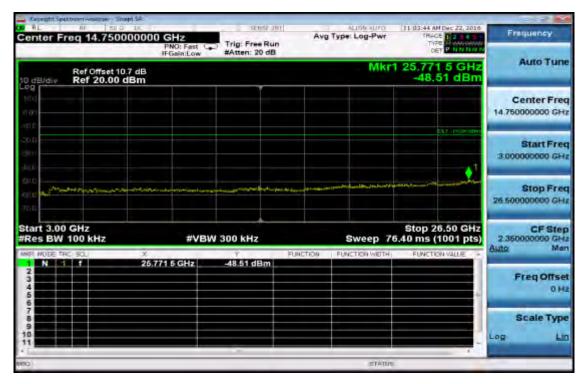
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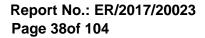
Ch Mid 30MHz – 3GHz

Expendit Spectrem Analyzer - Strept SA					1 2 2 R
Center Freq 1.515000000	GHz PNO: Fast	Trig: Free Run	Avg Type: Log-Pwr	11:02:50 AM Dwc 22, 2016 TRACE 1 2 3 4 3 TYPE POWER 100 DET P N N 1100	Frequency
Ref Offset 10.7 dB	T CONTLON		M	(r1 2.441 6 GHz 3.94 dBm	
-09 101 001				•1	Center Fre 1.51500000 GH
95				KLL-(5.00000)	Start Fre 30,000000 MH
	11) agreed & Talaga Parata Saraha Saraha S	- Contractor and a Prince	la and a star star star the star of the	Join	Stop Fre 3,00000000 Gi
start 0.030 GHz Res BW 100 kHz	#VBW	300 kHz	Sweep 9	Stop 3.000 GHz .667 ms (1001 pts)	CF Ste 297.000000 Mit Auto Mi
NR MODE TRC SCL X	441 6 GHz	1 F. 3.94 dBm	INCTION : FUNCTION WIDTH	FUNCTION VALUE	Freq Offs 01
					Scale Typ
83 I			STATU	6	-

Ch Mid 3GHz – 26.5GHz



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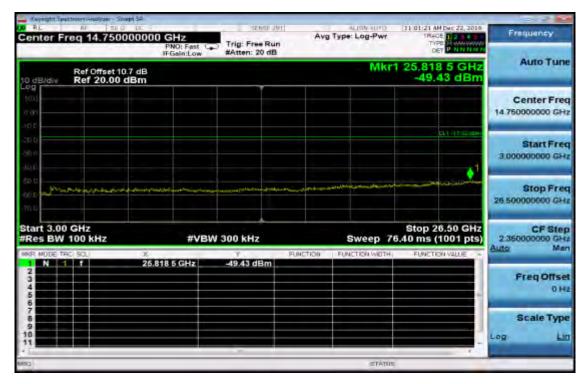




Ch High 30MHz – 3GHz

Conjunghit Spacebalant Anual year - Sylvept SA					
Center Freq 1.51500000	PNO: Fast	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr	11:01:03 AM Dec 22, 2016 TRACE 1 2 3 4 5 TYPE PLOTON	Frequency
Ref Offset 10.7 dE			Mk	r1 2.480 3 GHz 2.18 dBm	Auto Tun
.eg 1011 0 01				• ¹	Center Fre 1.515000000 GH
400				GL (- 17.02.00m)	Start Fre 30,000000 MH
60 0 60 0 70 0	149-14-14-14-14-24		المرويسية والمراجع فرحمه والم		Stop Fre 3,000000000 GH
Start 0.030 GHz #Res BW 100 kHz	#VBW	300 kHz	Sweep 9	Stop 3.000 GHz .667 ms (1001 pts)	CF Ste 297.000000 MH Auto Ma
MRR MODE TRC SCL 33	2.480 3 GHz	7 FU 2.18 dBm	NETION : FUNCTION WIDTH:	FUNCTION VALUE	Freq Offse 0 H
7 8 9 10 11					Scale Typ
			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

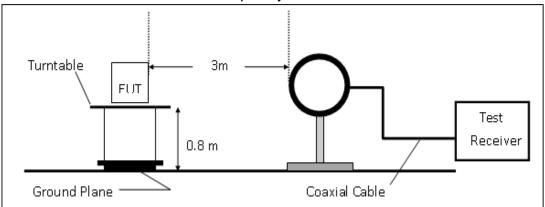
SGS SAC-III							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
EMI Test Receiver	R&S	ESCI7	100760	05/10/2016	05/09/2017		
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/29/2017	01/28/2018		
Loop Antenna	ETS-Lindgren	6502	148045	09/20/2016	09/19/2017		
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017		
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/01/2016	07/31/2017		
Pre-Amplifier	Agilent	8447D	2944A07676	01/05/2017	01/04/2018		
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/05/2017	01/04/2018		
Turn Table	HD	DT420	N/A	N.C.R	N.C.R		
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R		
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R		
Low Loss Cable	Huber Suhner	966_RX	9	01/05/2017	01/04/2018		
3m Site NSA	SGS	966 chamber	N/A	07/01/2016	06/30/2017		
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018		
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2016	12/11/2017		
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/05/2017	01/04/2018		

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

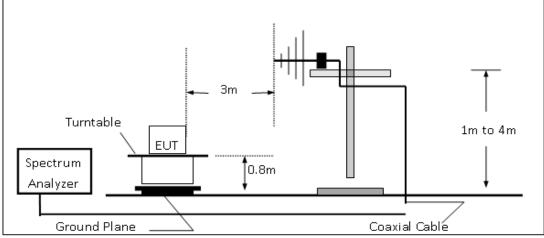


10.3 Test SET-UP

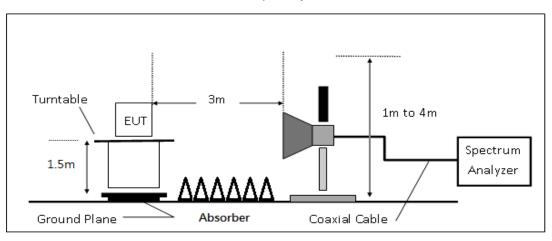
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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 1.5m 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)

 $20^{\circ}\log(duty cycle) = 20^{\circ}\log(2^{\circ}2.8/100) = 25.04$

- 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($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + 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.

Note: For measurement plot of radiation revealing the compliance of 15.247, please refer to Appendix I.

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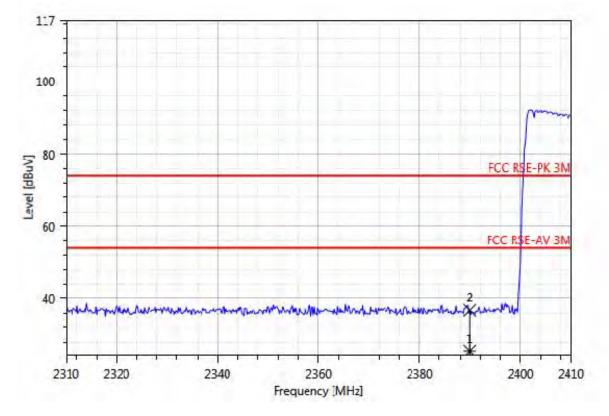
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Operation Mode :	BR Hopping	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL

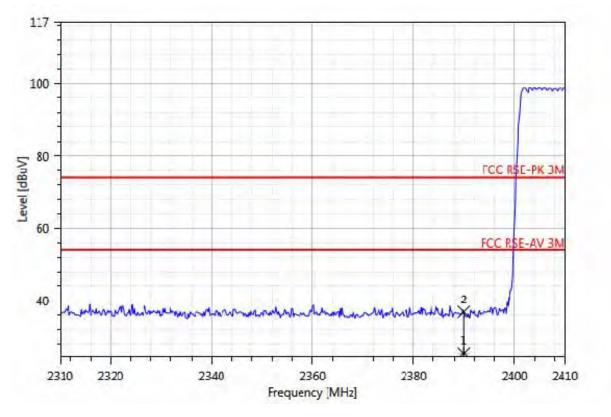
Radiated Band Edge Measurement Result: (Hopping Mode)



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2390.00	Е	Peak	11.79			54.00	-42.21
2390.00	Е	Peak	36.83	38.58	-1.74	74.00	-37.17



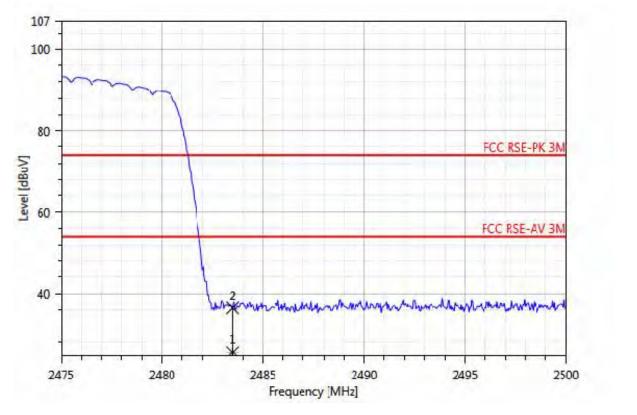
Operation Mode :	BR Hopping	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2390.00	Е	Peak	11.91			54.00	-42.09
2390.00	Е	Peak	36.95	38.70	-1.74	74.00	-37.05



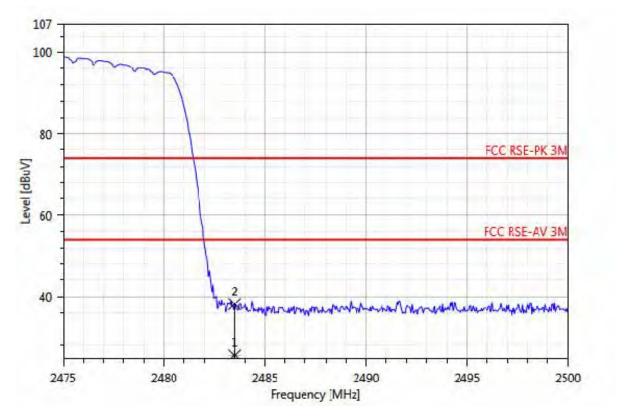
Operation Mode :	BR Hopping	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2483.50	Е	Peak	11.41			54.00	-42.59
2483.50	Е	Peak	36.45	38.07	-1.62	74.00	-37.55



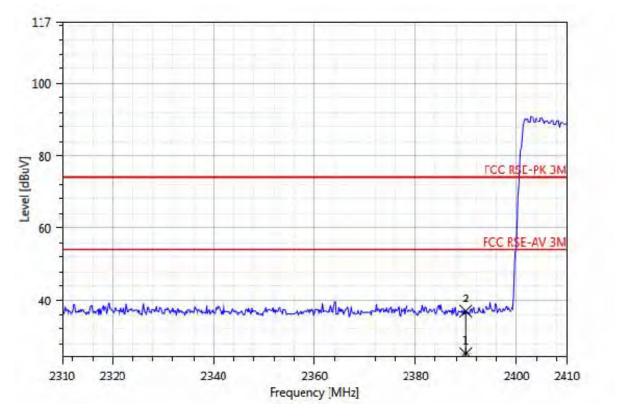
Operation Mode :	BR Hopping	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2483.50	Е	Peak	13.15			54.00	-40.85
2483.50	Е	Peak	38.19	39.81	-1.62	74.00	-35.81



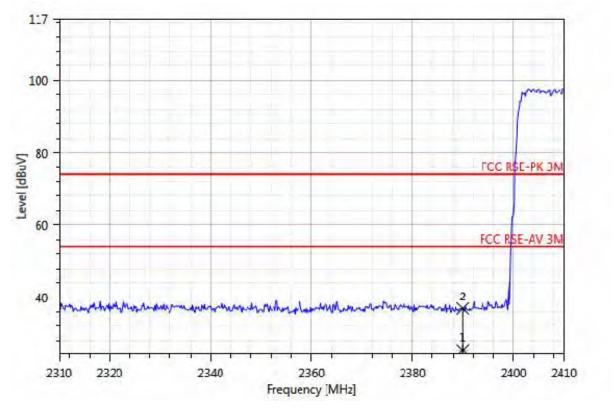
Operation Mode :	EDR Hopping	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2390.00	Е	Peak	11.93			54.00	-42.07
2390.00	Е	Peak	36.97	38.71	-1.74	74.00	-37.03



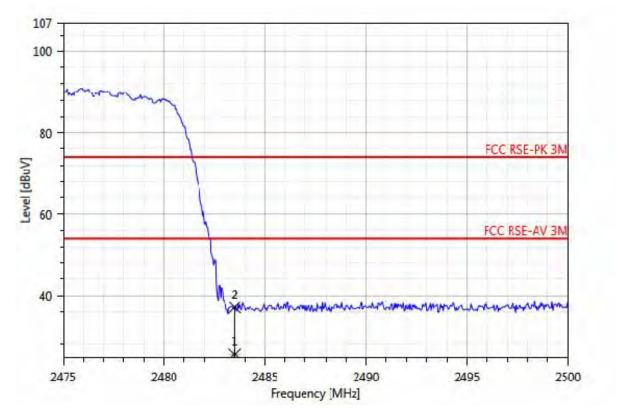
Operation Mode :	EDR Hopping	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2390.00	Е	Peak	11.91			54.00	-42.09
2390.00	Е	Peak	36.95	38.69	-1.74	74.00	-37.05



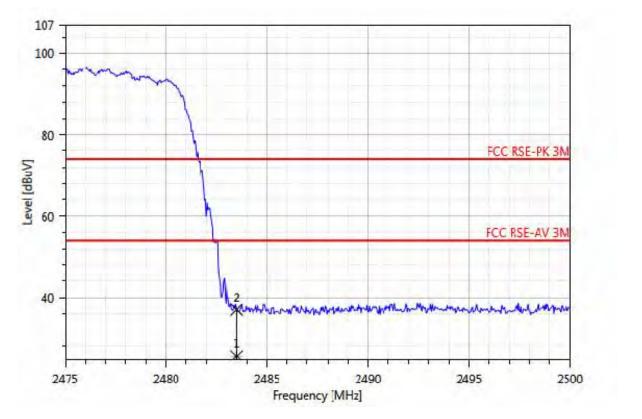
Operation Mode :	EDR Hopping	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2483.50	Е	Peak	12.02			54.00	-41.98
2483.50	Е	Peak	37.06	38.67	-1.62	74.00	-36.94



Operation Mode :	EDR Hopping	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL

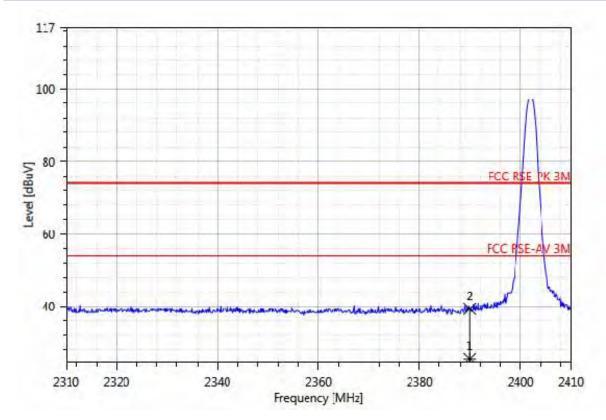


Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2483.50	Е	Peak	11.94			54.00	-42.06
2483.50	Е	Peak	36.98	38.59	-1.62	74.00	-37.02



Radiated Emission – Band Edge (Non-Hopping Mode):

Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL

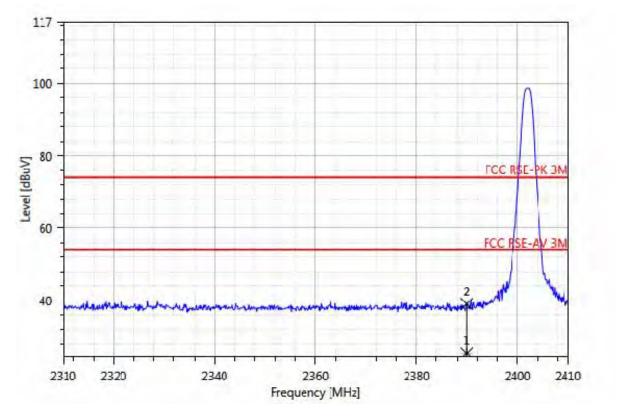


Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2390.00	Е	Peak	14.31			54.00	-39.69
2390.00	Е	Peak	39.35	41.09	-1.74	74.00	-34.65

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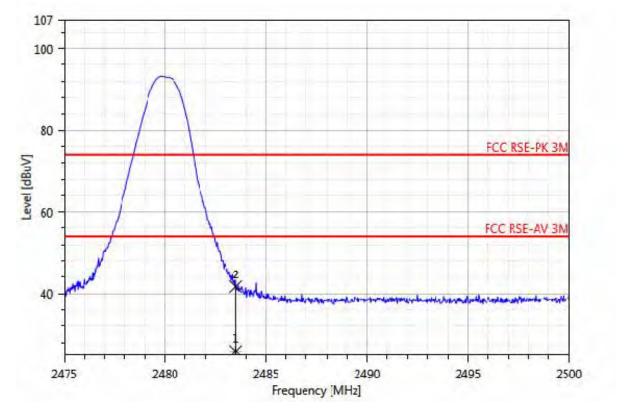
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2390.00	Е	Peak	14.05			54.00	-39.95
2390.00	Е	Peak	39.09	40.83	-1.74	74.00	-34.91



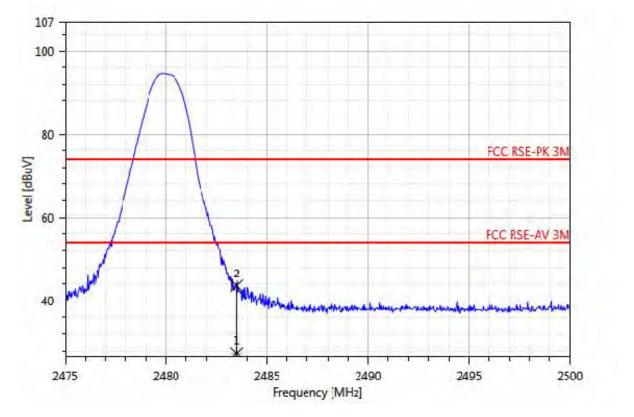
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2483.50	Е	Peak	16.68			54.00	-37.32
2483.50	Е	Peak	41.72	43.33	-1.62	74.00	-32.28



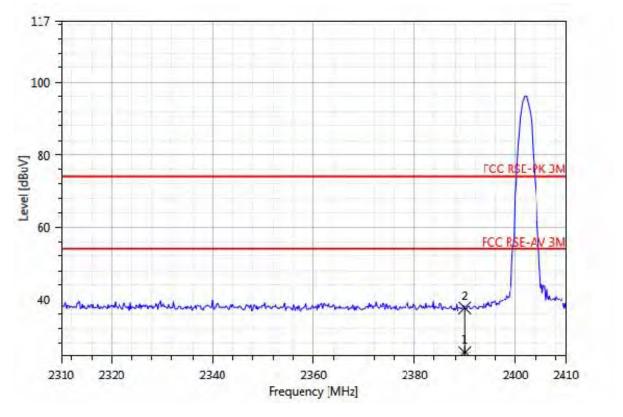
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2483.50	Е	Peak	18.57			54.00	-35.43
2483.50	Е	Peak	43.61	45.23	-1.62	74.00	-30.39



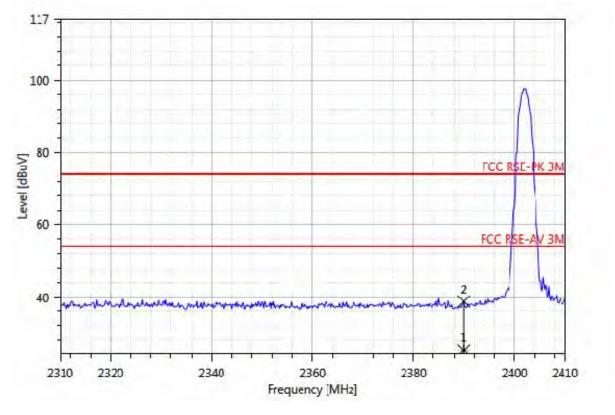
Operation Mode :	EDR(3M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2390.00	Е	Peak	12.65			54.00	-41.35
2390.00	Е	Peak	37.69	39.44	-1.74	74.00	-36.31



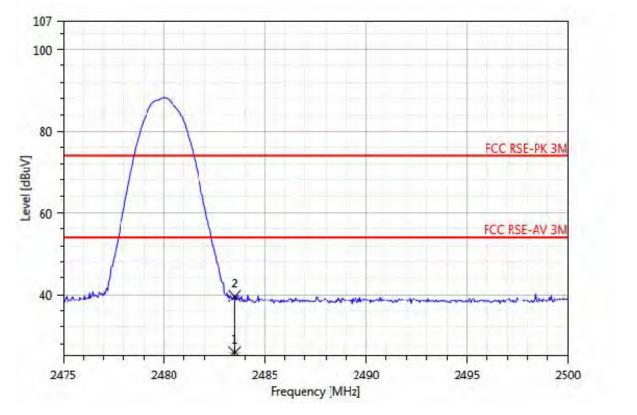
Operation Mode :	EDR(3M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2390.00	Е	Peak	13.70			54.00	-40.30
2390.00	Е	Peak	38.74	40.49	-1.74	74.00	-35.26



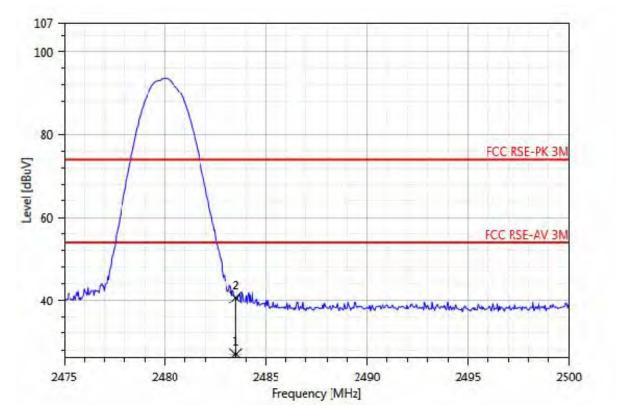
Operation Mode :	EDR(3M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2483.50	Е	Peak	14.58			54.00	-39.42
2483.50	Е	Peak	39.62	41.24	-1.62	74.00	-34.38



Operation Mode :	EDR(3M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Bandedge CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL

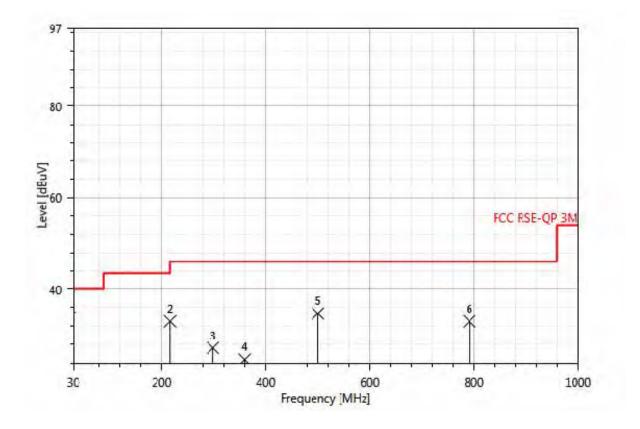


Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
2483.50	E	Peak	15.61			54.00	-38.39
2483.50	Е	Peak	40.65	42.26	-1.62	74.00	-33.35



Radiated Spurious Emission Measurement Result: (Worst Case) For Frequency form 30MHz to 1000MHz

Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL

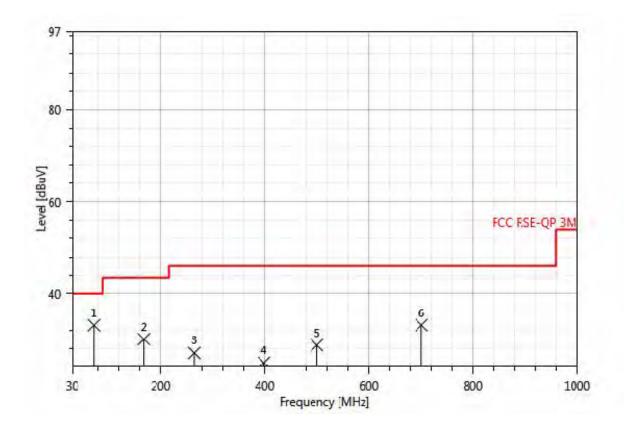


Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
30.00	S	Peak	32.99	42.18	-9.19	40.00	-7.01
216.24	S	Peak	32.99	42.41	-9.43	46.00	-13.01
298.69	S	Peak	27.20	33.16	-5.95	46.00	-18.80
359.80	S	Peak	24.68	29.48	-4.80	46.00	-21.32
500.45	S	Peak	34.71	37.40	-2.69	46.00	-11.29
791.45	S	Peak	32.97	30.08	2.89	46.00	-13.03

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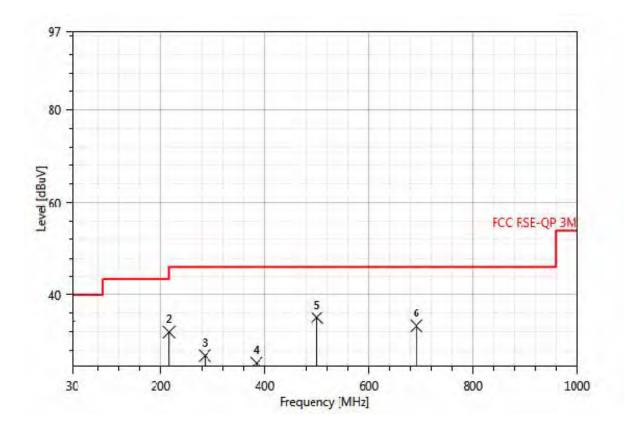
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
71.71	S	Peak	33.15	43.77	-10.62	40.00	-6.85
167.74	S	Peak	30.13	37.59	-7.46	43.50	-13.37
264.74	S	Peak	27.14	34.20	-7.06	46.00	-18.86
398.60	S	Peak	25.00	28.97	-3.97	46.00	-21.00
500.45	S	Peak	28.84	31.53	-2.69	46.00	-17.16
701.24	S	Peak	33.19	31.76	1.43	46.00	-12.81



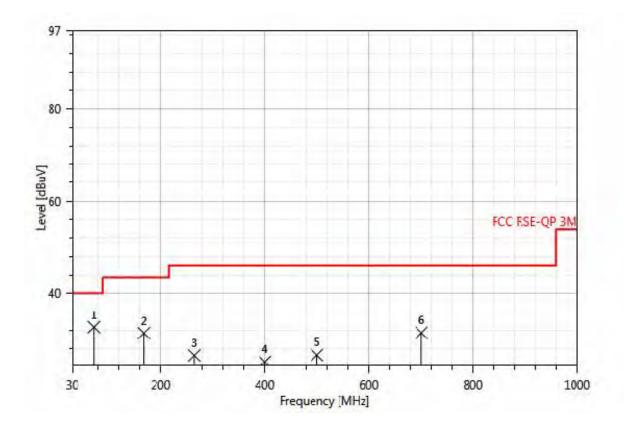
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
30.00	S	Peak	32.25	41.44	-9.19	40.00	-7.75
216.24	S	Peak	32.01	41.44	-9.43	46.00	-13.99
285.11	S	Peak	26.88	33.12	-6.24	46.00	-19.12
384.05	S	Peak	25.32	29.67	-4.35	46.00	-20.68
500.45	S	Peak	35.07	37.76	-2.69	46.00	-10.93
691.54	S	Peak	33.31	31.85	1.47	46.00	-12.69



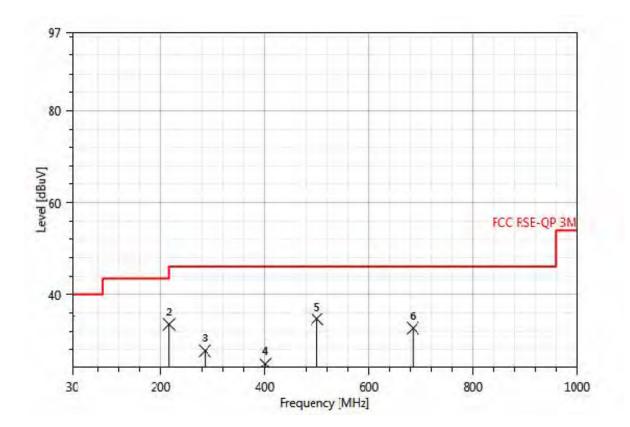
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
71.71	S	Peak	32.71	43.33	-10.62	40.00	-7.29
167.74	S	Peak	31.40	38.87	-7.46	43.50	-12.10
264.74	S	Peak	26.59	33.65	-7.06	46.00	-19.41
400.54	S	Peak	25.19	29.13	-3.94	46.00	-20.81
500.45	S	Peak	26.66	29.35	-2.69	46.00	-19.34
701.24	S	Peak	31.48	30.05	1.43	46.00	-14.52



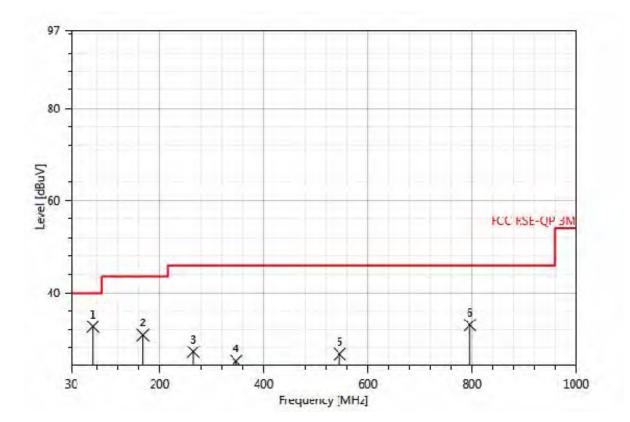
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
30.00	S	Peak	33.29	42.48	-9.19	40.00	-6.71
216.24	S	Peak	33.49	42.92	-9.43	46.00	-12.51
285.11	S	Peak	27.74	33.97	-6.24	46.00	-18.26
401.51	S	Peak	24.93	28.88	-3.95	46.00	-21.07
500.45	S	Peak	34.65	37.33	-2.69	46.00	-11.35
684.75	S	Peak	32.69	31.40	1.29	46.00	-13.31



Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL

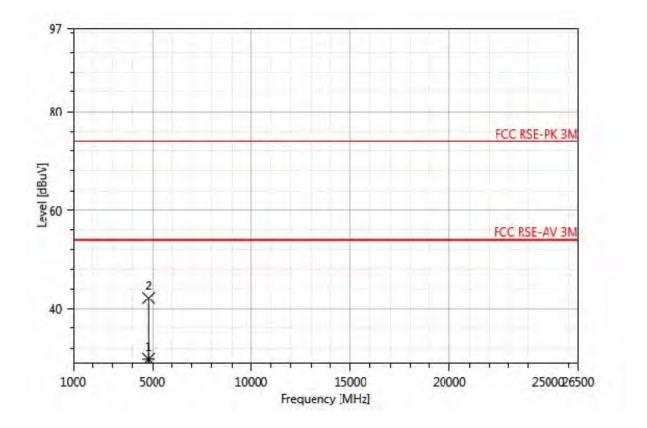


Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
71.71	S	Peak	32.64	43.26	-10.62	40.00	-7.36
167.74	S	Peak	30.84	38.30	-7.46	43.50	-12.66
264.74	S	Peak	27.18	34.24	-7.06	46.00	-18.82
347.19	S	Peak	25.18	30.13	-4.96	46.00	-20.82
546.04	S	Peak	26.66	28.21	-1.55	46.00	-19.34
796.30	S	Peak	33.03	30.02	3.01	46.00	-12.97



Radiated Spurious Emission Measurement Result: For Frequency above 1 GHz

Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL

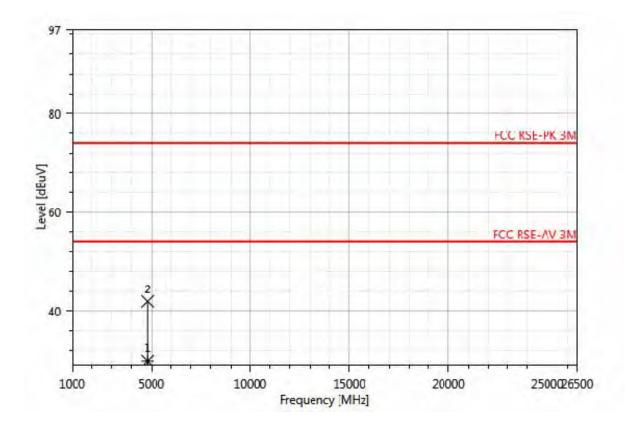


Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
4804.00	Н	Peak	16.88			54.00	-37.12
4804.00	Н	Peak	42.17	37.25	4.92	74.00	-31.83

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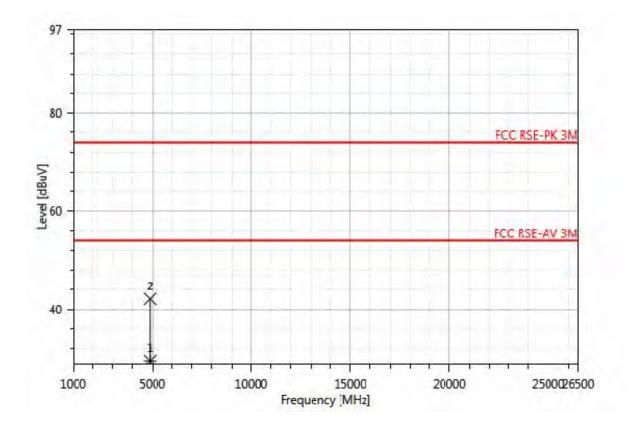
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
4804.00	Н	Peak	16.88			54.00	-37.12
4804.00	Н	Peak	41.92	37.00	4.92	74.00	-32.08



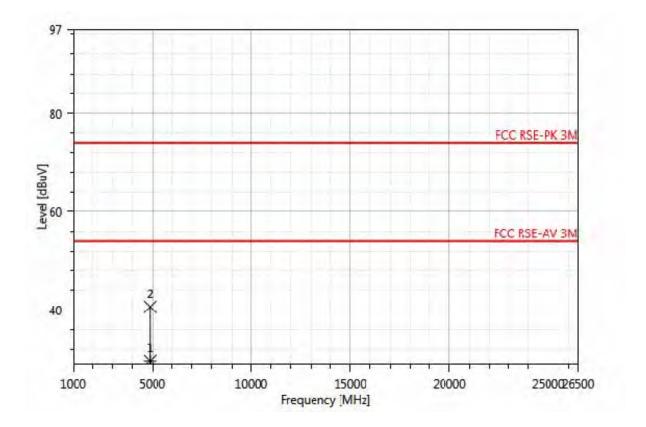
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
4882.00	Н	Peak	17.09			54.00	-36.91
4882.00	Н	Peak	42.13	36.94	5.18	74.00	-31.87



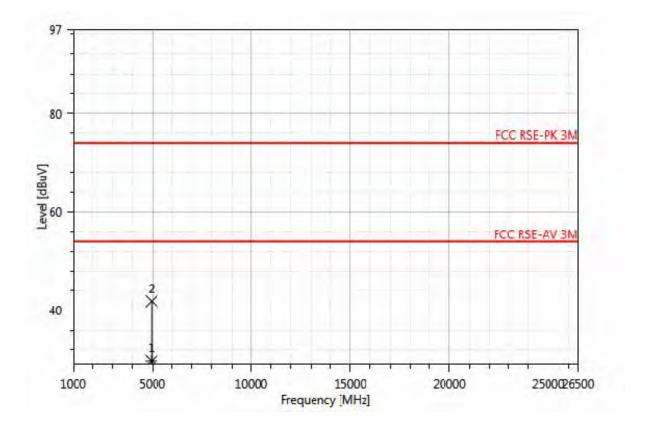
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
4882.00	Н	Peak	15.64			54.00	-38.36
4882.00	Н	Peak	40.68	35.50	5.18	74.00	-33.32



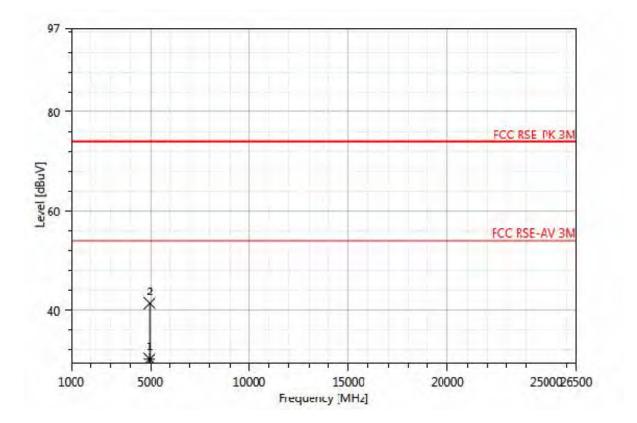
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
		Mode	Reading Level	FS		@3m	
MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
4960.00	Н	Peak	16.85			54.00	-37.15
4960.00	Н	Peak	41.89	36.60	5.29	74.00	-32.11



Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL



F	Freq.	Note	Decetor	Actual	Spectrum	Factor	Limit	Margin
			Mode	Reading Level	FS		@3m	
	MHz	F/H/E/S	QP/AV/PK	dBµV/m	dBµV/m	dB	dBuV/m	dB
49	60.00	Н	Peak	16.29			54.00	-37.71
49	60.00	Н	Peak	41.33	36.04	5.29	74.00	-32.67



11 FREQUENCY SEPARATION

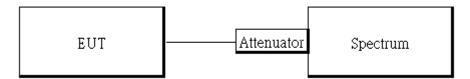
11.1 Standard Applicable

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

SGS Conducted Room										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.					
ТҮРЕ		NUMBER	NUMBER	CAL.						
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017					
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017					
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	02/26/2016	02/25/2017					
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017					
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/02/2016	01/01/2017					
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2016	01/01/2017					
Splitter	Agilent	11636B	N/A	01/02/2016	01/01/2017					
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017					
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2016	05/16/2017					

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.

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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



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12 NUMBER OF HOPPING FREQUENCY

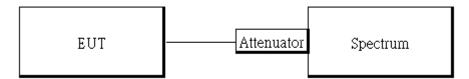
12.1 Standard Applicable

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

12.2 Measurement Equipment Used

SGS Conducted Room									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017				
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017				
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	02/26/2016	02/25/2017				
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017				
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/02/2016	01/01/2017				
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2016	01/01/2017				
Splitter	Agilent	11636B	N/A	01/02/2016	01/01/2017				
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017				
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2016	05/16/2017				

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.

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12.5 Measurement Result

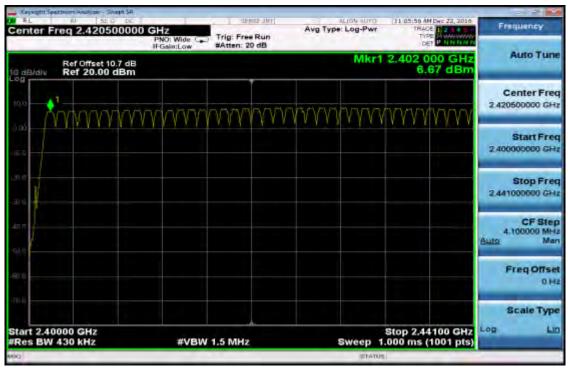
Tabular Data of Total Channel Number

	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



2.4 GHz – 2.441GHz

2.441 GHz – 2.4835GHz



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13 TIME OF OCCUPANCY (DWELL TIME)

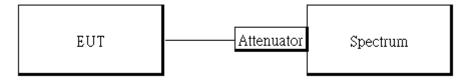
13.1 Standard Applicable

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

SGS Conducted Room									
EQUIPMENT	MFR MODEL		SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017				
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017				
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	02/26/2016	02/25/2017				
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2016	01/01/2017				
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/02/2016	01/01/2017				
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2016	01/01/2017				
Splitter	Agilent	11636B	N/A	01/02/2016	01/01/2017				
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017				
Temperature Chamber	TERCHY	MHG-120LF	911009	05/17/2016	05/16/2017				

13.3 Test Set-up



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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 = 2~8ms.
- 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

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.

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13.5 Tabular Result of the Measurement

GFSK (1Mbps)

Channel	PACKET TYPE	Measurement Result	Limit
Channel		(ms)	(ms)
	DH1	112.00	400ms
0	DH3	256.00	400ms
	DH5	304.00	400ms
39	DH1	112.00	400ms
	DH3	257.60	400ms
	DH5	304.00	400ms
	DH1	108.80	400ms
78	DH3	256.00	400ms
	DH5	304.00	400ms

π/4 DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	DH1	112.00	400ms
39	DH3	257.60	400ms
	DH5	304.00	400ms

8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	DH1	112.00	400ms
39	DH3	257.60	400ms
	DH5	305.07	400ms

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

GFSK (1Mbps):

CH Low	DH1 time slot = DH3 time slot = DH5 time slot =	1.600 *	(1600/4/79) *	31.6 =	112.00 (ms) 256.00 (ms) 304.00 (ms)
CH Mid	DH1 time slot = DH3 time slot = DH5 time slot =	0.350 * 1.610 *	(1600/2/79) * (1600/4/79) *	31.6 = 31.6 =	112.00 (ms) 257.60 (ms) 304.00 (ms)
CH High	DH1 time slot = DH3 time slot = DH5 time slot =	1.600 *	(1600/2/79) * (1600/4/79) * (1600/6/79) *	31.6 =	108.80 (ms) 256.00 (ms) 304.00 (ms)

π/4 -DQPSK (2Mbps):

CH Mid	2DH1 time slo =	0.350	*	(1600/2/79) *	31.6 =	112.00 (ms)
	2DH3 time slo =	1.610	*	(1600/4/79) *	31.6 =	257.60 (ms)
	2DH5 time slo =	2.850	*	(1600/6/79) *	31.6 =	304.00 (ms)

8-DPSK (3Mbps):

CH Mid	3DH1 time slo =	0.350	*	(1600/2/79) *	31.6 =	112.00 (ms)
	3DH3 time slo =	1.610	*	(1600/4/79) *	31.6 =	257.60 (ms)
	3DH5 time slo =	2.860	*	(1600/6/79) *	31.6 =	305.07 (ms)

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GFSK (1Mbps) for AFH Mode					
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)		
20	DH5	152.00	400ms		
	π/4 DQPSK (2	Ibps) for Mode			
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)		
20	DH5	152.00	400ms		
8-DPSK (3Mbps) for AFH Mode					
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)		
20	DH5	152.53	400ms		

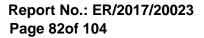
GFSK (1Mbps):

DH5 time sI=	2.850	(ms)	*	(800/6/20)	* 8 =	152.00	(ms)
π/4 -DQPSK (2Mbp:							
2DH5 time =	2.850	(ms)	*	(800/6/20)	* 8 =	152.00	(ms)
8-DPSK (3Mbps):							
3DH5 time =	2.860	(ms)	*	(800/6/20)	* 8 =	152.53	(ms)

13.6 Measurement Result

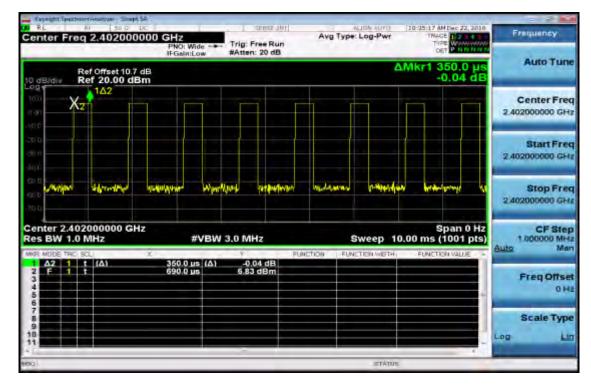
Note: Refer to next page for plots.

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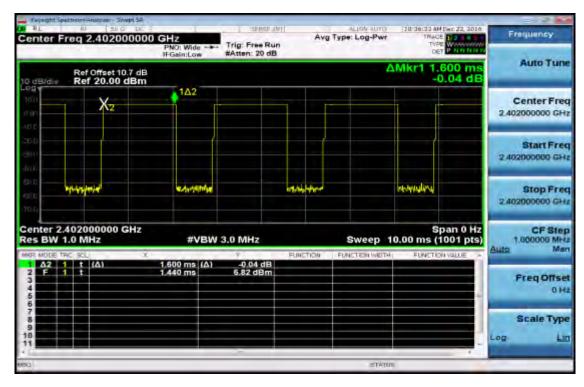




CH-Low DH1



DH3



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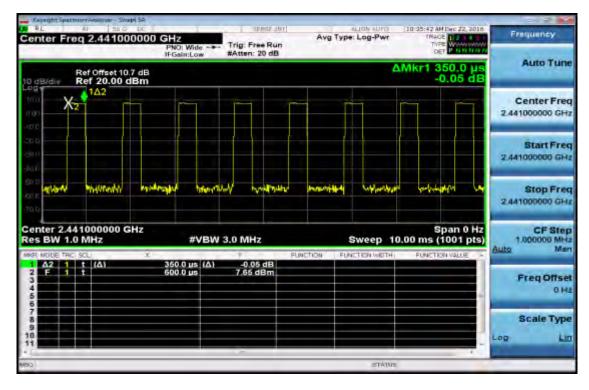


DH5

enter Freq 2		Wide Trig: F	Free Run	Avg Type: Log-F	WY THADE	34.21	Frequency
	Offset 10.7 dB 20.00 dBm	n:Low #Atten	: 20 dB		ΔMkr1 2.850 -0.00	0 ms 5 dB	Auto Tune
	×	2	1	Δ2		Ŧ	Center Fre 2.402000000 GH
							Start Fre 2.402000000 GH
0.0 0.0 0.0	HADWHA		-	hagrande		w	Stop Fre 2,402000000 GH
enter 2.4020 es BW 1.0 M		#VBW 3.0 M	Hz		Span p 10.00 ms (100 6041 FUNCTION VAL	1 pts)	CF Ste 1.000000 MH Auto Md
1 A2 1 t 2 F 1 t 3 4 5 6	(Δ) 2.850 3.010		05 dB dBm				Freq Offse 0 H
							Scale Typ
2					TATUS		-

CH-Mid

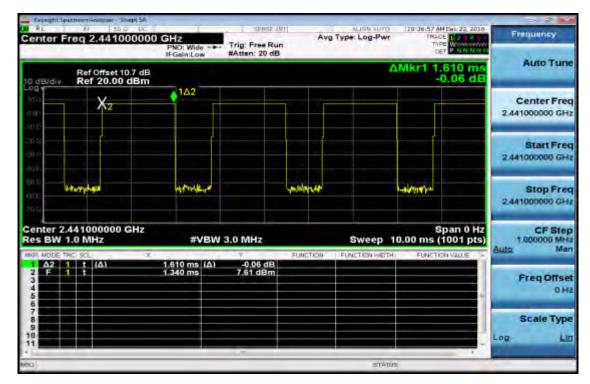
DH1



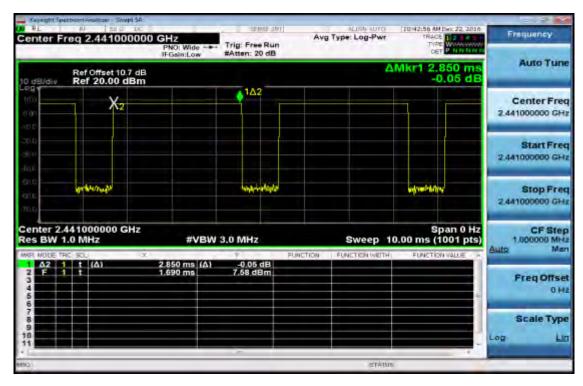
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DH3



DH5

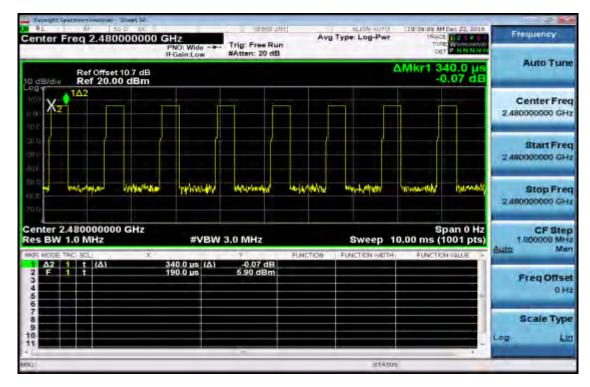


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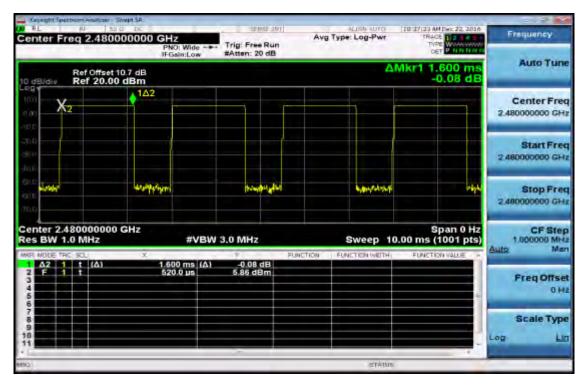
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CH-High DH1



DH3



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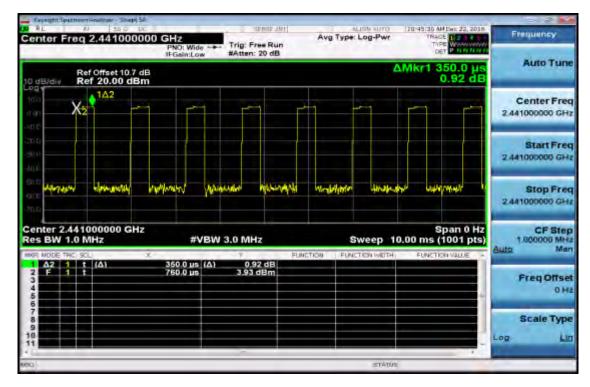
DH5

RL AF 50 G DC		THE BRIES	ALION NUTO	[10:40:23 AM Dec 22, 2016	-
enter Freq 2.48000000	PNO: Wide	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr		Frequency
Ref Offset 10.7 dB			Δ	Mkr1 2.850 ms -0.06 dB	Auto Tun
X2		142			Center Fre 2.480000000 GH
					Start Fre 2.48000000 GF
		in the state of		handAlidana	Stop Fre 2.480000000 Gi
enter 2.480000000 GHz es BW 1.0 MHz		3.0 MHz		Span 0 Hz 0.00 ms (1001 pts)	CF Ste 1.000000 Mi Auto M
RR MODE TRC SCL X	2.850 ms (A)	-0.06 dB	ICTION FUNCTION WOTH	FUNCTION VALUE -	
2 F 1 t 3 4 5 6	1.840 ms	5.85 dBm		+	Freq Offs 01
					Scale Typ
		-		-	Log
Q1			STÁTUS		

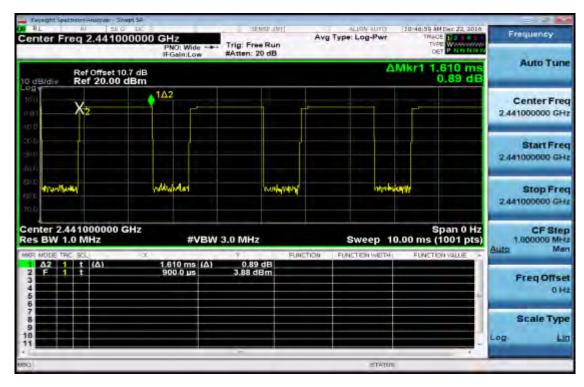
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CH-Mid 2DH1



2DH3



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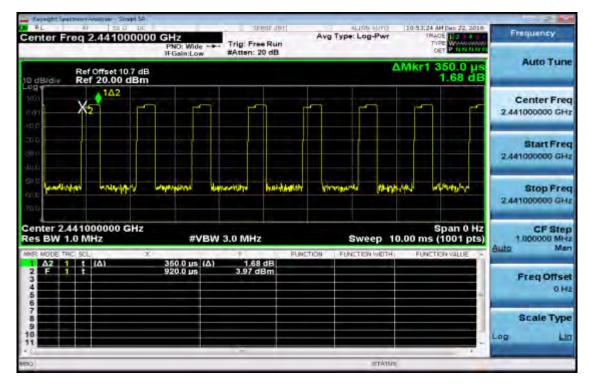
2DH5

0000 GHz PNO: Wide IFGain:Low 7 dB	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr	THACE I 2 CONTRACTOR	Frequency
	HAUREN. 20 OD		DET P 14 14 14 14 14	
Bm			AMkr1 2.850 ms 0.88 dB	Auto Tun
X2		1Δ2		Center Fre 2.441000000 GH
				Start Fre 2,441000000 GH
n Verangeres		No.		Stop Fre 2.441000000 GH
	3.0 MHz	Sweep	Span 0 Hz 10.00 ms (1001 pts)	CF Ste 1.000000 MH
2.850 ms (Δ) 3.510 ms	0.88 dB 3.88 dBm	RETION L FUNCTION WET	HI FUNCTION VALUE	Freq Offse 0 H Scale Typ
			 .	Log L
	Hz 2.850 ms (Δ)	Hz #VBW 3.0 MHz 2.850 ms ((A) 0.88 dB)	Х2 У солучили и нучили и и солучили и Hz #VBW 3.0 MHz Sweep × Ý FUNCTION FUNCTION 3.610 ms 3.88 dBm 3.810 ms 3.88 dBm	X2 Span 0 Hz #VBW 3.0 MHz Sweep 10.00 ms (1001 pts) X Y PUNCTION FUNCTION WEITH X Y 2.850 ms (IA) 0.88 dB

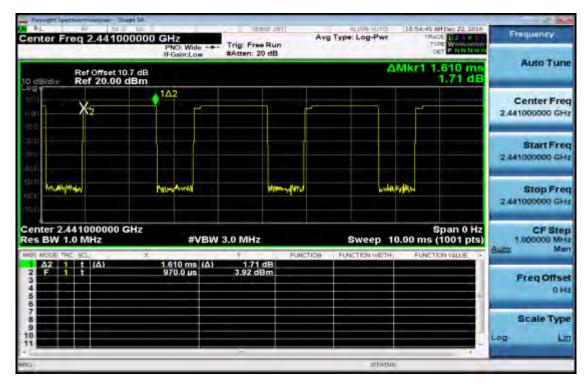
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CH-Mid **3DH1**



3DH3



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3DH5

Repergitt Spectrem - Anumater - Silve RL N/ Start		SPREE SWIT	ALIGN AUTO	(11-02:28 AM Dec 22, 2016	
enter Freq 2.44100	PNO: Wide	Trig: Free Run	Avg Type: Log-Pwr	TRACE 12 3 4 5	Frequency
Ref Offset 10 Ref 20.00		#Atten: 20 dB	۵	Mkr1 2.860 ms 1.76 dB	Auto Tun
	1/2 1/2	12			Center Fre 2.441000000 GF
00					Start Fre 2.441000000 Gi
a a			ayoya	///	Stop Fr 2.441000000 G
enter 2.441000000 C es BW 1.0 MHz	#VBW	3.0 MHz	Sweep 1	Span 0 Hz 0.00 ms (1001 pts) FUNCTION VALUE	CF Ste 1.000000 Mit Auto M
1 Δ2 1 t (Δ) 2 F 1 t 3 4 5 5	2.850 ms (A) 820.0 µs	1.76 dB 3.87 dBm			Freq Offs 01
					Scale Typ
83			STATUS		

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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.

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APPENDIX 1 MEASUREMENT PLOT OF RADIATED SPURIOUS **EMISSION**

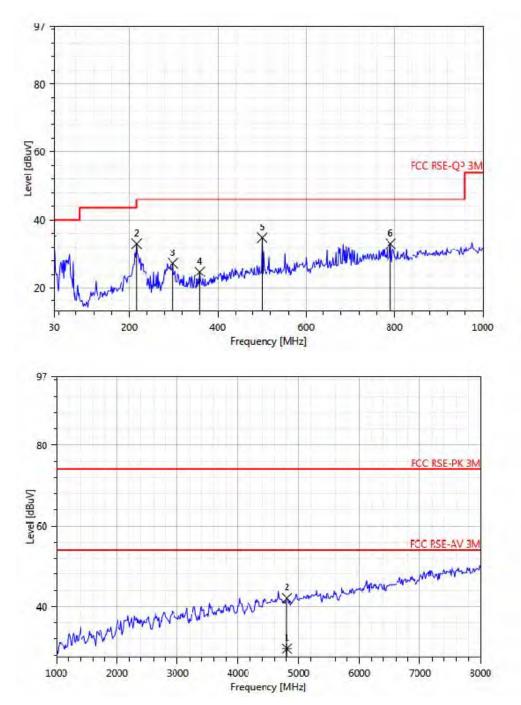
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Radiated Spurious Emission Measurement Photos Result Note: The trace on RE (radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

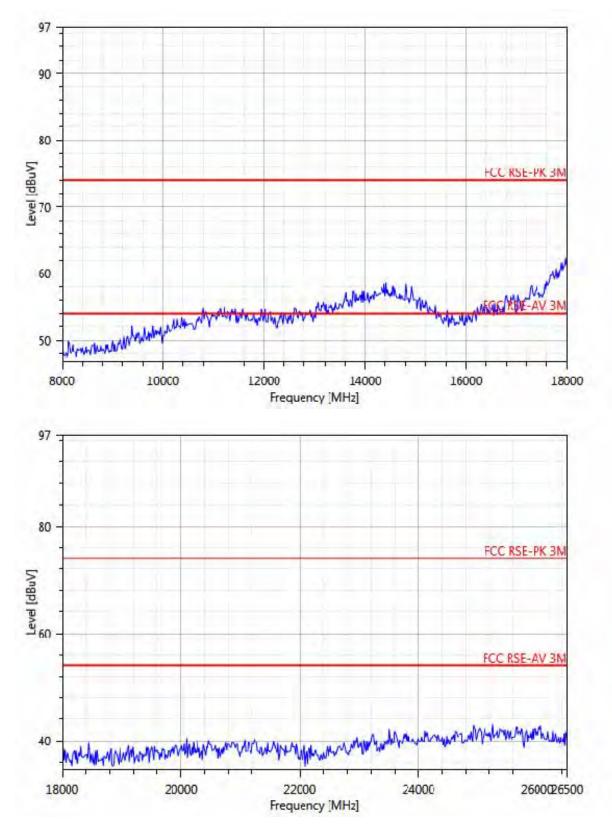
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL



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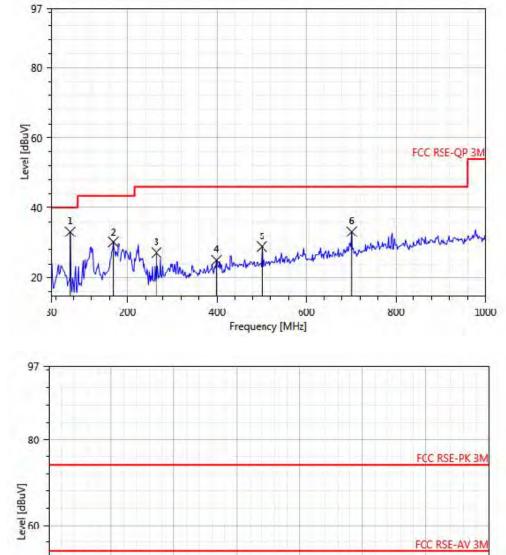


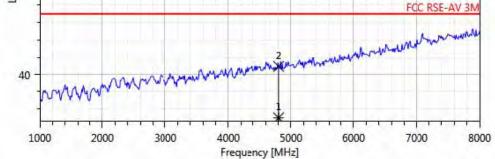
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Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH LOW	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL

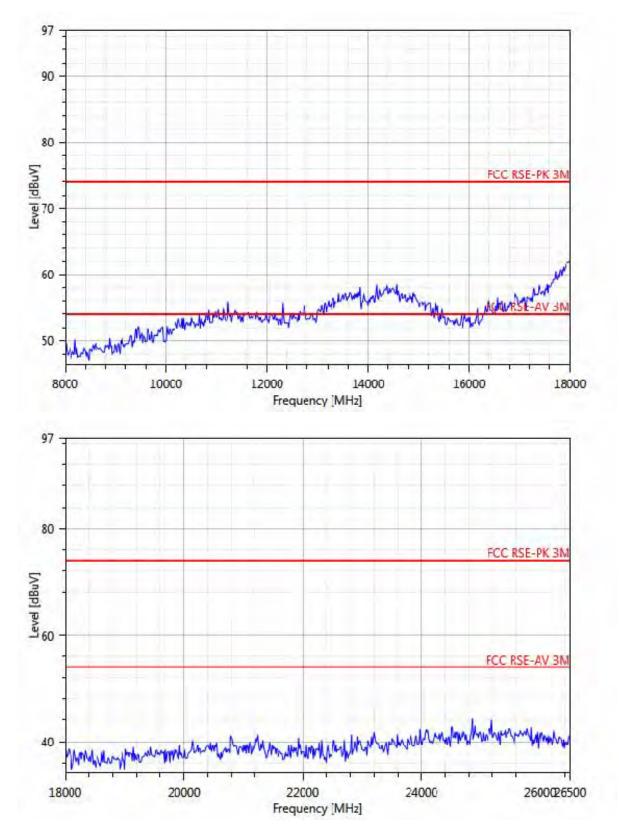




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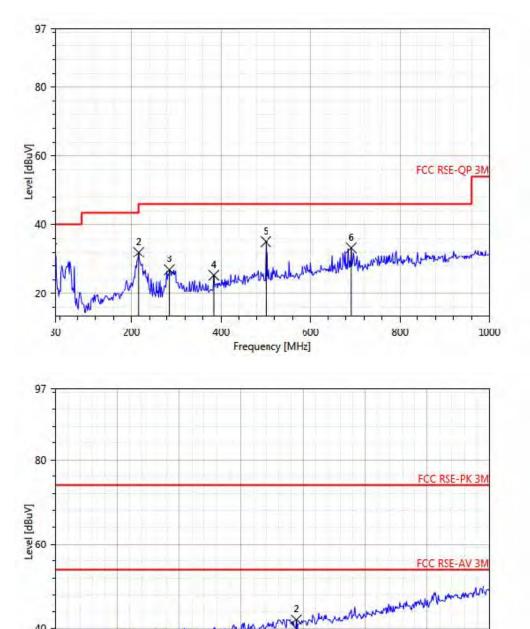


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Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL

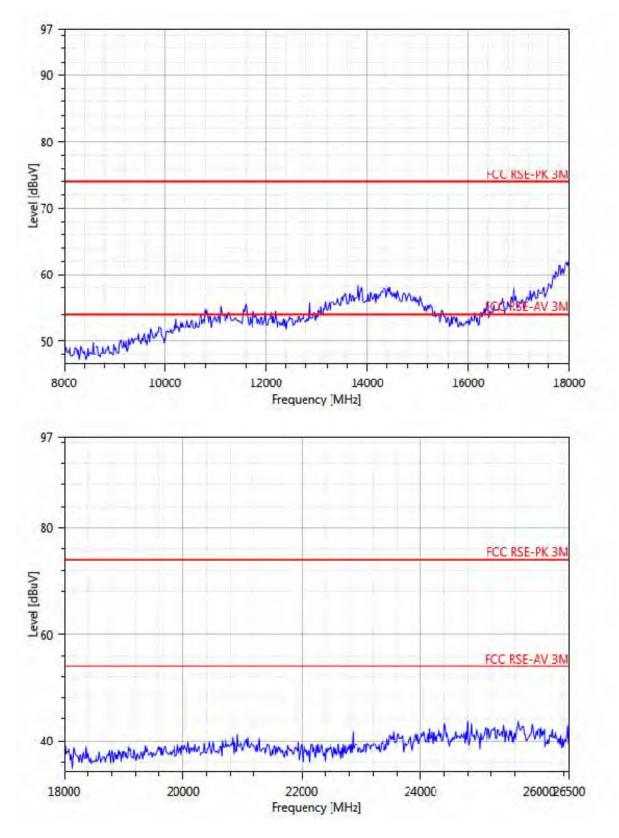


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1000	2000	3000	4000	5000	6000	7000	

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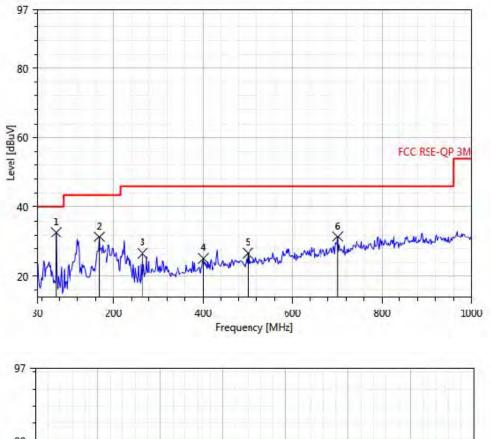


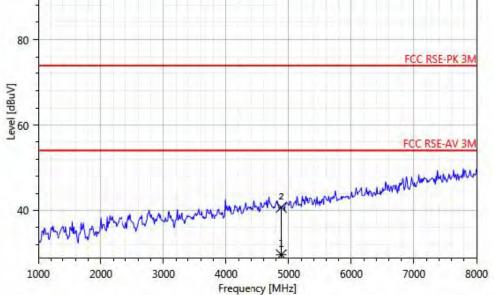
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Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH MID	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL

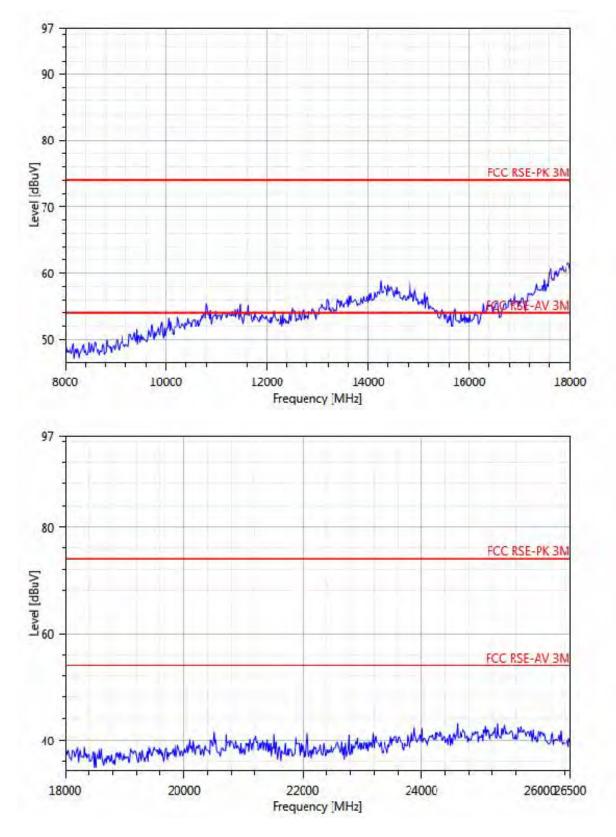




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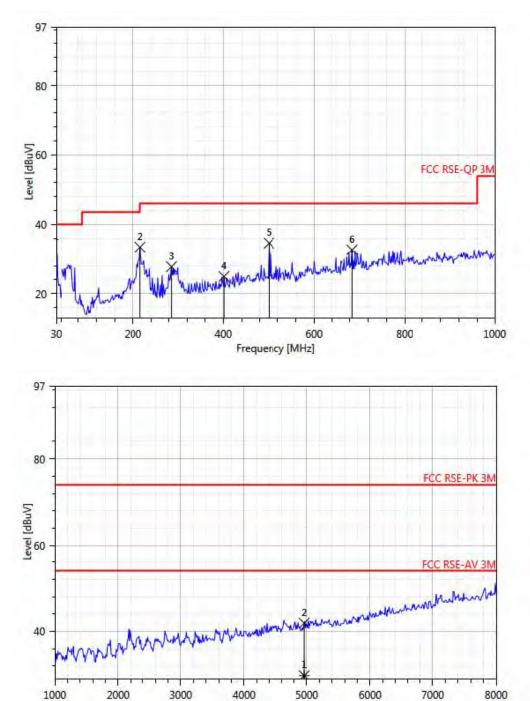


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Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	VERTICAL

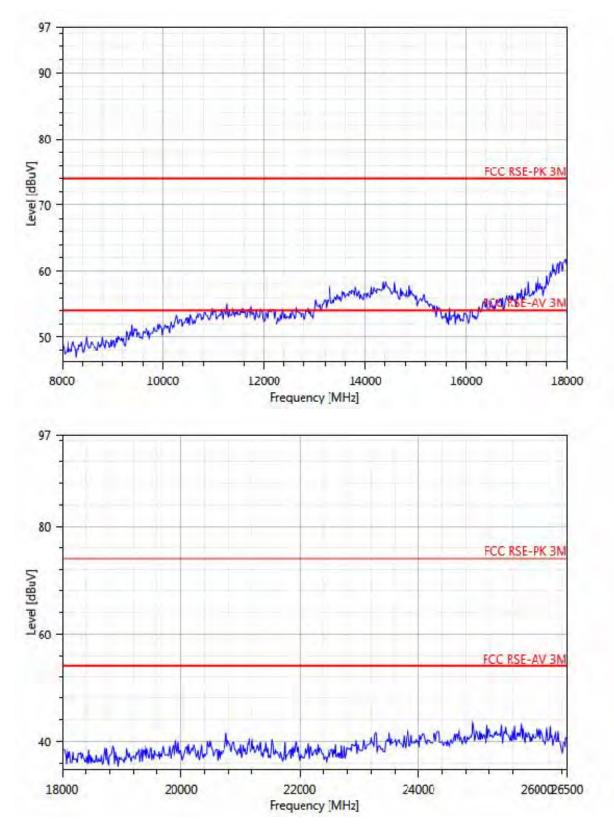


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Frequency [MHz]

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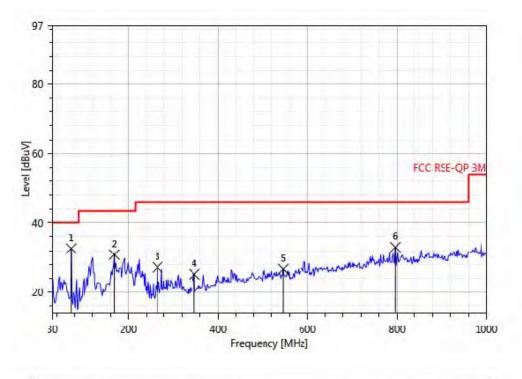


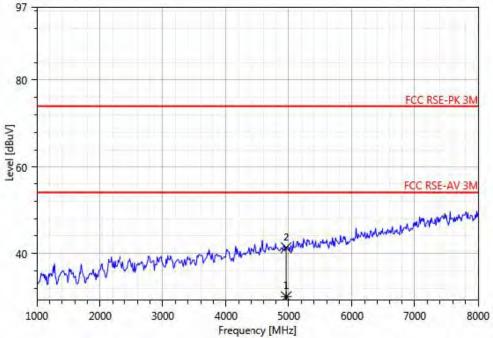
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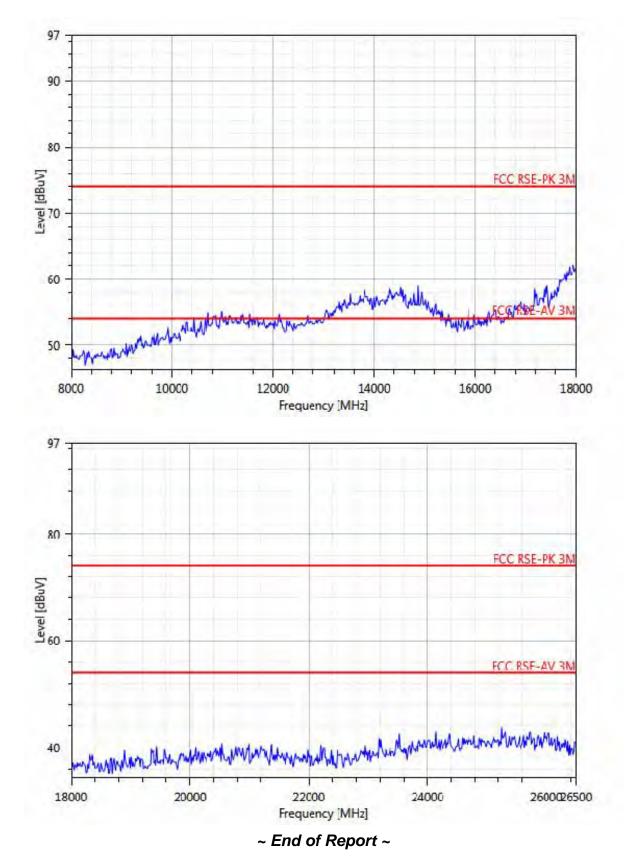
Operation Mode :	BR(1M)	Test Date :	02/07/2017
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22 deg_C / 61 RH
Operation Band :	Tx CH HIGH	Test Engineer :	Tin
EUT Pol. :	E2 Plane	Measurement Antenna Pol. :	HORIZONTAL





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. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms_and_conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms_e-document.htm</u></u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits 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 is advised any the protective at the transaction from exercising all their rights and obligations under the transaction documents is unavity and offenders may be protected to the fulle at vertent of the law. pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.





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