

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

	OF
Applicant:	TomTom International B.V. De Ruijterkade 154, 1011 AC Amsterdam, 1011 AC, The Netherlands
Product Name:	GPS Navigation System
Brand Name:	TomTom
Model No.:	4BA53
Model Difference:	N/A
FCC ID:	S4L4BA53
IC:	5767A-4BA53
Report No.:	E2/2018/10099
FCC Rule Part:	§15.247, Cat: DSS
IC Rule Part:	RSS-247 issue 2 Feb. 2017
Issue Date:	Feb. 14, 2018
Date of Test:	Jan. 17, 2018 ~ Feb. 07, 2018
Data of EUT Bassivadu	lan 17 9019

Date of EUT Received: Jan. 17, 2018

We hereby certify that:

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

Prepared By:

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Approved By:

Jim Chang / Manager



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Revision History

Report Number	Revision	Description	Issue Date
E2/2018/10099	Rev.00	Initial creation of document	Feb. 14, 2018

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GENERAL INFORMATION 1

1.1 Product description

General:

Product Name:	GPS Navig	ation System	
Brand Name:	TomTom		
Model No.:	4BA53		
Model Difference:	N/A		
Product SW/HW version:	18.100.0010 / MP		
Radio SW/HW version:	N/A / N/A		
Test SW Version:	N/A		
RF power setting in TEST SW:	N/A		
Power Supply:	3.7Vdc from Rechargeable Li-ion Battery		
Power Supply:	Battery:	Mode No.: VF6F, Supplier: TomTom	

Bluetooth_BR+EDR:

Bluetooth Version	BT V4.1 (dual mode)	
Channel number:	79 channels	
Modulation type:	GFSK + π/4DQPSK + 8DPSK	
Transmit Power:	2.71dBm	
Frequency Range:	2.402GHz – 2.480GHz	
Antenna Designation:	PIFA Antenna, Gain: -3dBi	

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

RSS-247 issue 2 Feb. 2017

RSS-Gen issue 4 Nov. 2014

ANSI C63.10:2013

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

1.3 Test Facility

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

FCC Registration Numbers are: 735305 / TW0002

Canada Registration Number: 4620A-5.

1.4 Special Accessories

There is no special accessory used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Radiated Emissions

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

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

2.4 Measurement Results Explanation Example

For all conducted test items:

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

The enectrum enclyze

The spectrum analyzer offset is derived from RF cable loss 0.6dB.

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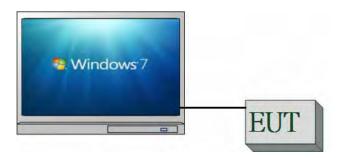
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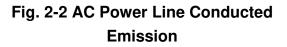


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2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission





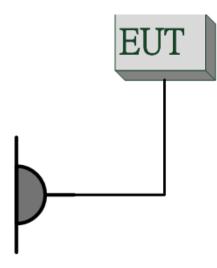


Fig. 2-3 Conducted (Antenna Port) Emission



Item	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.	Bluetooth Tester	Anritsu	MT8852B	1329002	N/A	N/A
3.	Notebook	Lenovo	L430	PK-OCGFF	N/A	N/A

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SUMMARY OF TEST RESULTS 3

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

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DESCRIPTION OF TEST MODES 4

4.1 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

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

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4.2 The Worst Test Modes and Channel Details

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

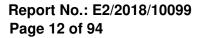
RADIATED TEST					
	Radiatec	I Emission Test	(BELOW 1 GHz) (We	orst case)	
MODE	AVAILABLE	TESTED	MODULATION	PACKET	
NODE	CHANNEL	CHANNEL	WODULATION	TYPE	
Bluetooth	0 to 78	0,39,78	8-DPSK	3DH5	
	Radiated	d Emission Test	(ABOVE 1 GHz) (Wo	orst case)	
MODE	AVAILABLE	TESTED	MODULATION	PACKET	
NODL	CHANNEL	CHANNEL	NODULATION	TYPE	
Bluetooth	0 to 78	0,39,78	8-DPSK	3DH5	
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 EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth BR+EDR Transmitter for channel Low, Mid and High, the worst case H position was reported.

ANTENNA PORT CONDUCTED TEST						
	F	Peak Output Pov	ver, 20dB Band Wid	th		
MODE	AVAILABLE	TESTED	MODULATION	PACKET		
WICDL	CHANNEL	CHANNEL	MODULATION	TYPE		
	0 to 78	0,39,78	GFSK	DH5		
Bluetooth	0 to 78	0,39,78	π/4-DQPSK	DH5		
	0 to 78	0,39,78	8-DPSK	DH5		
		Band Edge & C	onducted Emission	I		
Bluetooth	0 to 78	0,78	GFSK	DH5		
Bluetooth	0 to 78	0,78	8-DPSK	3DH5		
		Frequen	cy Separation			
Bluetooth	Bluetooth 0 to 78 0,		8-DPSK	3DH5		
		Number of h	opping frequency			
Bluetooth	0 to 78	0 to 78	8-DPSK	3DH5		
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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MEASUREMENT 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
Measurement uncertainty (Polarization : Vertical)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

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

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

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CONDUCTED EMISSION TEST 6

6.1 Standard Applicable

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

Frequency range	Lin dB(nits ′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	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	MODEL SERIAL		CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
EMI Test Receiver	R&S	ESCI 7	100950	12/24/2017	12/23/2018				
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	08/30/2017	08/29/2018				
LISN	Schwarzbeck	NSLK 8127	8127-648	06/18/2017	06/17/2018				
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.				

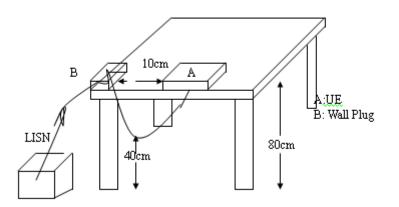
6.3 EUT Setup

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

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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

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

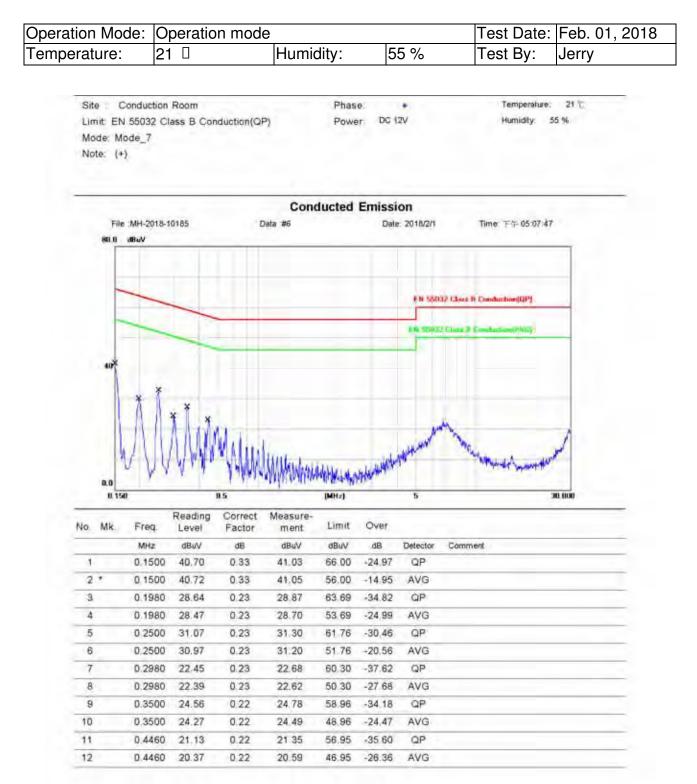
6.6 Measurement Result

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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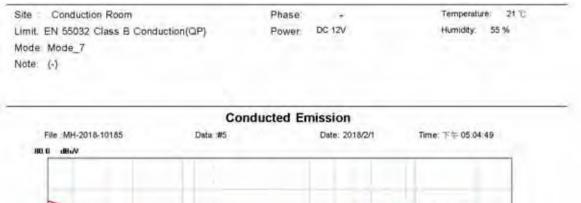
AC POWER LINE CONDUCTED EMISSION TEST DATA

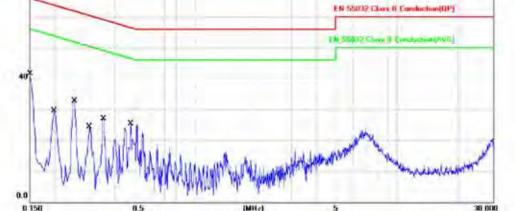


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No	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	41.26	0.39	41.65	66.00	-24,35	QP	
2	•	0.1500	41.13	0.39	41.52	56.00	-14.48	AVG	
3		0.1980	28.51	0.24	28.75	63.69	-34.94	QP	
4		0.1980	28.70	0.24	28.94	53.69	-24.75	AVG	
5		0.2500	32.22	0.22	32.44	61.76	-29.32	QP	
6		0.2500	31.73	0.22	31.95	51 76	-19.81	AVG	
7		0.2980	22.81	0.21	23.02	60.30	-37.28	QP	
В		0.2980	22.50	0.21	22.71	50.30	-27.59	AVG	
9		0.3500	24.95	0.19	25.14	58.96	-33.82	QP	
10		0.3500	24.75	0.19	24.94	48.96	-24.02	AVG	
11		0.4780	22.80	0.18	22.98	56.37	-33 39	QP	
12		0.4780	21.70	0 18	21.88	46.37	-24.49	AVG	
_									

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PEAK OUTPUT POWER MEASUREMENT 7

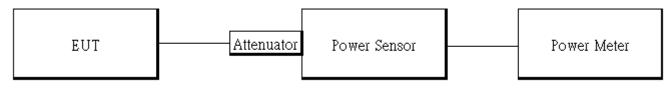
7.1 Standard Applicable

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

7.2 Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
ТҮРЕ		NUMBER	NUMBER	CAL.				
Power Meter	Anritsu	ML2496A	1326001	06/23/2017	06/22/2018			
Power Sensor	Anritsu	MA2411B	1315048	06/23/2017	06/22/2018			
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018			
DC Block	PASTERNACK	PE8210	RF29	12/24/2017	12/23/2018			

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):

1M BR mode (Average):

СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)	СН	Freq. (MHz)	Max. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	1.42	1.387	1000	0	2402	0.01	1.002	1000
39	2441	1.40	1.380	1000	39	2441	-0.02	0.995	1000
78	2480	1.42	1.387	1000	78	2480	0.00	1.000	1000

2M EDR mode (Peak):

Peak Output Limit Freq. Output CH Power (MHz) Power (mW)(mW) (dBm) 2402 2.26 1.683 125 0 2441 2.23 1.671 125 39 2480 2.28 1.690 125 78

2M EDR mode (Average):

СН	Freq. (MHz)	Max. Avg.Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	-1.45	0.716	125
39	2441	-1.46	0.714	125
78	2480	-1.45	0.716	125

3M EDR mode (Peak):

СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402	2.68	1.854	125
39	2441	2.64	1.837	125
78	2480	2.71	1.866	125

3M EDR mode (Average):

		· • •			
		Max.			
C	Frec			Limit	
	[¬] (MH:	z) tune up	(mW)	(mW)	
		tolerance	(11100)		
		Power (dBm)			
0	2402	-1.43	0.719	125	
39) 244 ⁻	-1.44	0.718	125	
78	3 2480) -1.45	0.716	125	
		• · · · · · · ·		-	

*Note: Max. Output include tune up tolerance Power measured by using average detector.

NOTE: cable loss as 0.6dB that offsets in the spectrum

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EIRP

1M BR mode EIRP

Channel	Frequency (MHz)	Max. Output include tune up tolerance Power (dBm)	Antenna Gain (dBi)	EIRP (mW)	Limit (mW)
0	2402	0.01	-3.00	0.502	4000
39	2441	-0.02	-3.00	0.499	4000
78	2480	0.00	-3.00	0.501	4000

2M EDR mode EIRP

		Max.			
		Avg.Output			
Channel	Frequency	include	Antenna	EIRP	Limit
Channel	(MHz)	tune up	Gain (dBi)	(mW)	(mW)
		tolerance			
		Power (dBm)			
0	2402	-1.45	-3.00	0.359	4000
39	2441	-1.46	-3.00	0.358	4000
78	2480	-1.45	-3.00	0.359	4000

3M EDR mode EIRP

		Max.			
		Avg.Output			
Channel	Frequency	include	Antenna	EIRP	Limit
Channel	(MHz)	tune up	Gain (dBi)	(mW)	(mW)
		tolerance			
		Power (dBm)			
0	2402	-1.43	-3.00	0.361	4000
39	2441	-1.44	-3.00	0.360	4000
78	2480	-1.45	-3.00	0.359	4000

* Note: EIRP = Average Power + Gain

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8 20DB & 99% BANDWIDTH MEASUREMENT

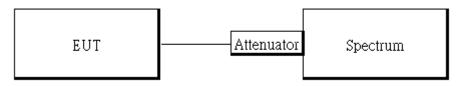
8.1 Standard Applicable

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

8.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
ТҮРЕ		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018		
DC Block	PASTERNACK	PE8210	RF29	12/24/2017	12/23/2018		
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018		

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.
- 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. Turn on the 99% bandwidth function, max reading.
- 7. Repeat above procedures until all test default channel is completed

NOTE:

1. For the plot of bandwidth measurement, the marker of the 20dB BW is arrow-mark.

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8.5 Measurement Result

GFSK	Σ.		π/4-D	π/4-DQPSK			8-DPSK		
СН	20 dB BW	2/3 BW	СН	20 dB BW	2/3 BW	СН	20 dB BW	2/3 BW	
	(MHz)	(MHz)		(MHz)	(MHz)		(MHz)	(MHz)	
Low	0.925	0.62	Low	1.315	0.88	Low	1.269	0.85	
Mid	0.925	0.62	Mid	1.315	0.88	Mid	1.267	0.84	
High	0.925	0.62	High	1.313	0.88	High	1.267	0.84	

GFSK		π/4-DQPS	K	8-DPSK	
	99%		99%		99%
СН	Bandwidth	СН	Bandwidth	СН	Bandwidth
	(MHz)		(MHz)		(MHz)
Low	0.89422	Low	1.1692	Low	1.1762
Mid	0.89283	Mid	1.1699	Mid	1.1744
High	0.88961	High	1.1696	High	1.1729

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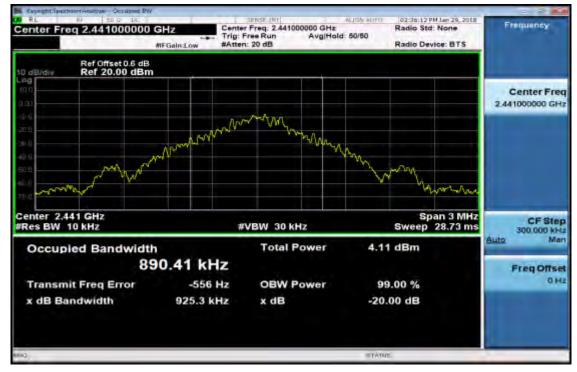
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20dB Band Width Test Data CH-Low (GFSK mode)



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



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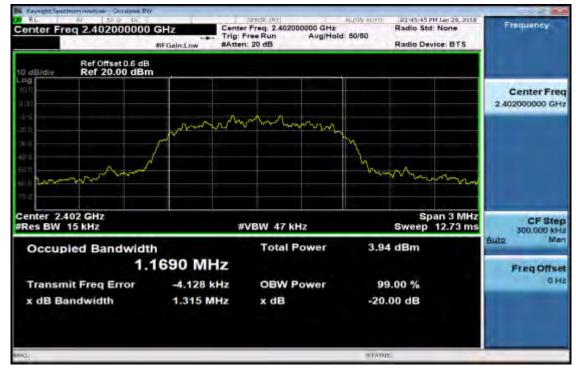
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20dB Band Width Test Data CH-High (GFSK mode)



20dB Band Width Test Data CH-Low ($\pi/4$ -DQPSK mode)



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

RI Center Freq: 2.441000000 GHz Trig: Free Run AvgiHol #Atten: 20 dB 02:46:46 PH Jan 29, 2018 Radio Std: None Center Freq 2.441000000 GHz Frequency MFGain:Low Avg|Hold: 50/50 Radio Device: BTS Ref Offset 0.6 dB Ref 20.00 dBm 0 dEvdi Center Freq 2 441000000 GHt Center 2.441 GHz #Res BW 15 kHz Span 3 MHz Sweep 12.73 ms **CF** Step #VBW 47 kHz 300.000 kH Auto Occupied Bandwidth **Total Power** 3.81 dBm 1.1686 MHz Freq Offset 0 HI Transmit Freq Error -3.764 kHz **OBW Power** 99.00 % x dB Bandwidth 1.315 MHz x dB -20.00 dB STATUS

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



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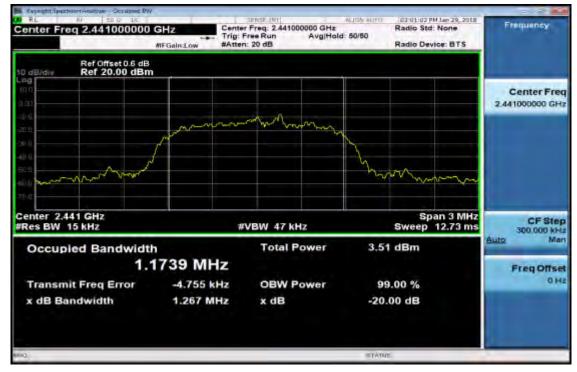
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20dB Band Width Test Data CH-Low (8-DPSK mode)



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



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



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



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



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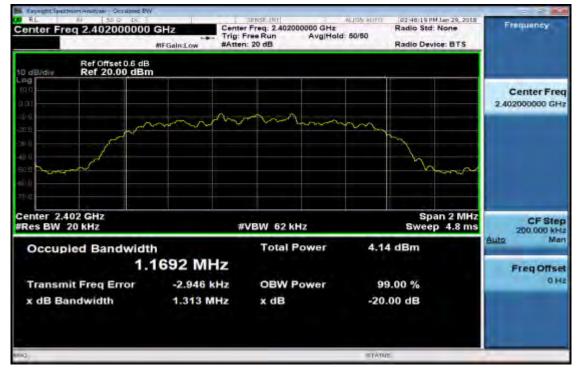
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99% Band Width Test Data CH-High (GFSK mode)



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



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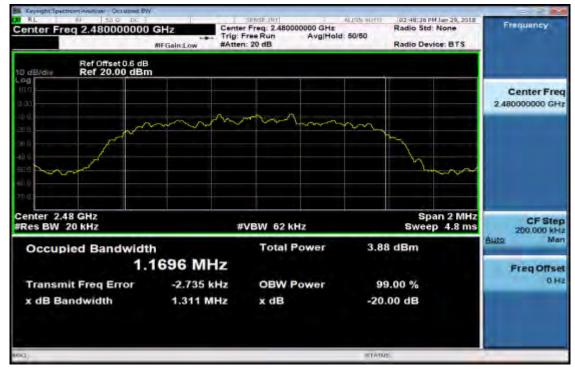
pearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



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

BL 02-47:34 PM Jan 29, 2018 Radio Std: None Center Freq: 2.441000000 GHz Trig: Free Run AvgiHol #Atten: 20 dB Center Freq 2.441000000 GHz Frequency MFGaln:Low Avg|Hold: 50/50 Radio Device: BTS Ref Offset 0.6 dB Ref 20.00 dBm 0 dB/di Center Freq 2 441000000 GHt Center 2.441 GHz #Res BW 20 kHz Span 2 MHz Sweep 4.8 ms CF Step #VBW 62 kHz 200.000 kH. Mer Auto Occupied Bandwidth **Total Power** 3.97 dBm 1.1699 MHz Freq Offset 0 HI **Transmit Freg Error** -2.568 kHz **OBW Power** 99.00 % x dB Bandwidth 1.313 MHz x dB -20.00 dB TADAT

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



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



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

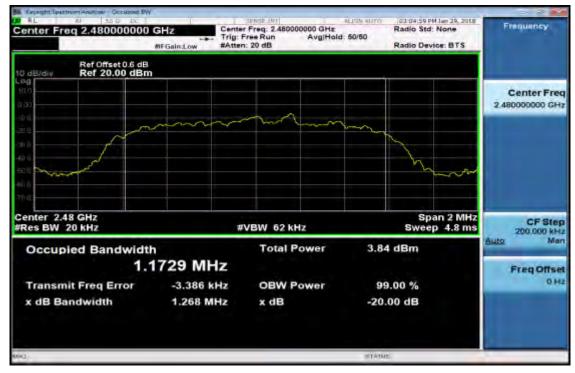


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99% Band Width Test Data CH-High (8-DPSK mode)



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CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT 9

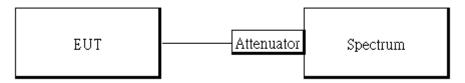
9.1 Standard Applicable

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

9.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL SERIAL		LAST	CAL DUE.		
ТҮРЕ		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018		
DC Block	PASTERNACK	PE8210	RF29	12/24/2017	12/23/2018		
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018		

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
- 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

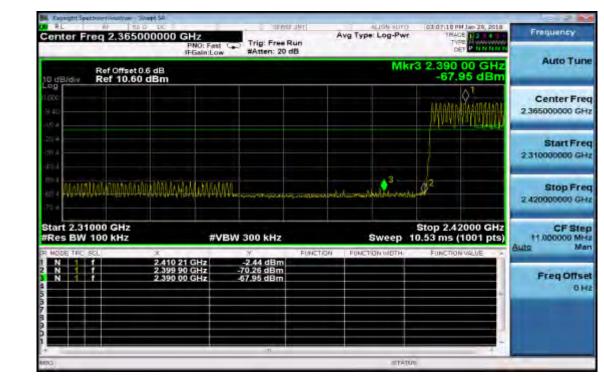
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

1. The occurrence of the spike on the conducted emission is the signal of the fundamental emission.

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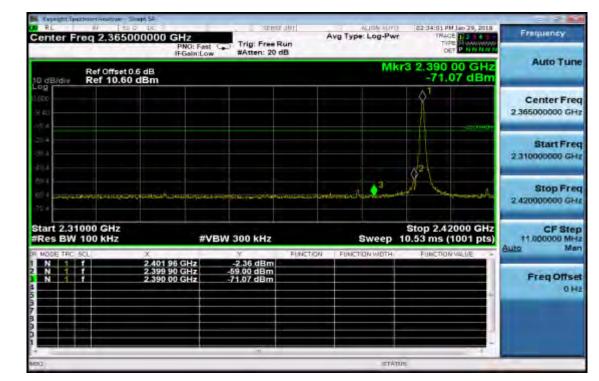
Band Edges Test Data CH-Low (Hopping mode) (GFSK mode)

Band Edges Test Data CH-High



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

Band Edges Test Data CH-High



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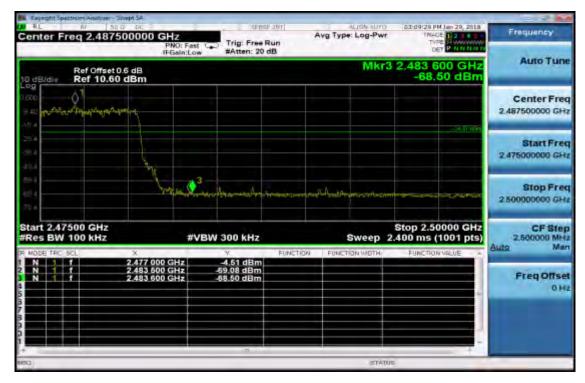
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Band Edges Test Data CH-Low (Hopping mode) (8-DPSK mode)

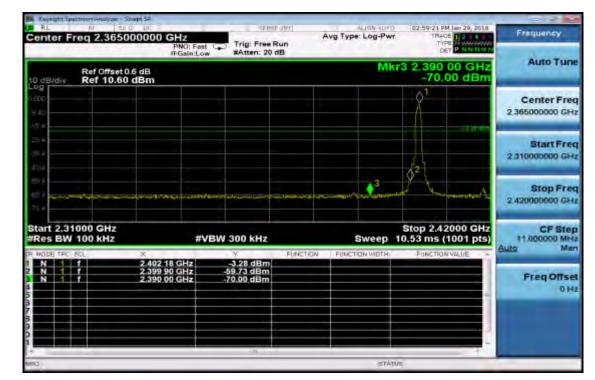
Band Edges Test Data CH-High



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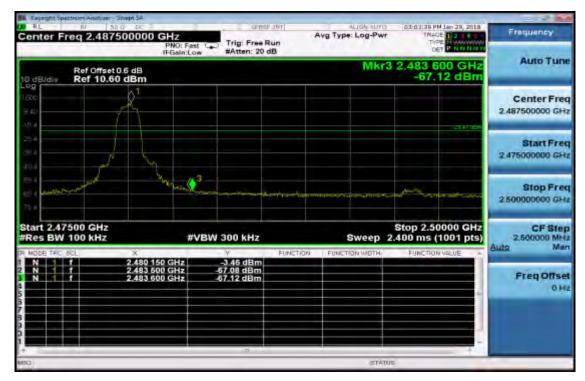
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Band Edges Test Data CH-Low (Non-Hopping mode) (8-DPSK mode)

Band Edges Test Data CH-High



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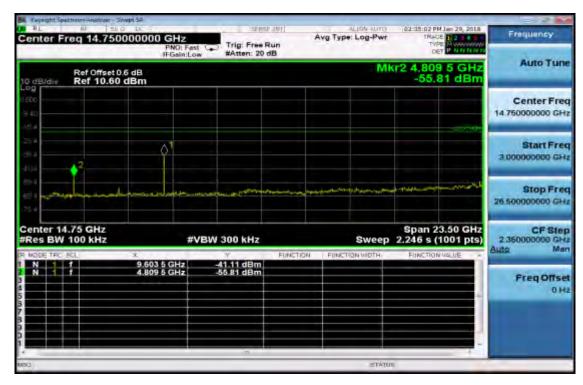
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Conducted Spurious Emission Measurement Result (GFSK mode) Ch Low 30MHz – 3GHz

Frequency	DET PM Jam 25, 2018 TRACE 1 2 4 4 4 4 TYPE 1 2 4 4 4 4 DET 1 10 10 10 10	TRU	NLIGS SURG			IZ NO: Fast C	p	eq 1.5150	RL Center F
AutoTun	403 0 GHz -2.57 dBm		MK					Ref Offset 0 Ref 10.60	0 dB/div
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Start Free 30 000000 MH									54 964 661
Stop Fre 3.000000000 GH	- deserver	chandrated	and the second second	£-4-545 11-1644≥	-fr-constants	ويحمد ومروحه والمريقة	والله وتحسم ويرون	ne n	10 4 10 4 15 4
CF Step 297,000000 MH Auto Mar	p 3.000 GHz hs (1001 pts)	283.9 ms	Sweep 2	FLINCTION	300 kHz Y	#VBW	×	100 kHz	Res BW
Freq Offse 0 H	+				-2.57 dBm	3Hz	2,403 0 (r	N _1.
		IS	státús						93

Ch Low 3GHz – 26.5GHz





Ch Mid 30MHz – 3GHz

Keyeight Spactoserr Analyzer - Skept SA			
Center Freq 1.51500000	PNO: Fast Trig: Free Run #Reain: Low #Atten: 20 dB	Avg Type: Log-Pwr TRACE 124 TYPE Log-Pwr TRACE 124 TYPE TO TRACE	Frequency
Ref Offset 0.6 dB	H CONTLOOR	Mkr1 2,441 6 GH -3,13 dBn	
6g (800 3140			Center Fre 1.515000000 GF
25 A 91 A 2014			Start Fre 30,000000 MP
1894 2013 4 2013 - Antonio Antonio 2013 - A	Blagard - 1 for land la galet to care of the set of the	and the second	Stop Fre 3.000000000 GH
Start 30 MHz Res BW 100 kHz	#VBW 300 kHz	Stop 3.000 GH Sweep 283.9 ms (1001 pts	
	441 6 GHz -3.13 dBm		Freq Offse
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Ch Mid 3GHz – 26.5GHz



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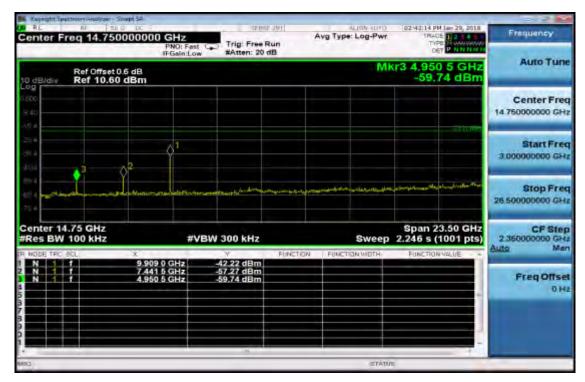
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Ch High 30MHz – 3GHz

RL R/ Support Strept SA	10 02-42:15 PM Jan 29, 2018
enter Freg 1.51500000	WY TRACE IN A CONTRACT FREQUENCY
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25.4	Start Free 30.000000 MHz
ED 4 pression interference and pression i	Stop Free 3.00000000 GH
Start 30 MHz #Res BW 100 kHz	Stop 3,000 GHz 283,9 ms (1001 pts) EmicTion viewe
N 1 f 245	Freq Offse

Ch High 3GHz – 26.5GHz

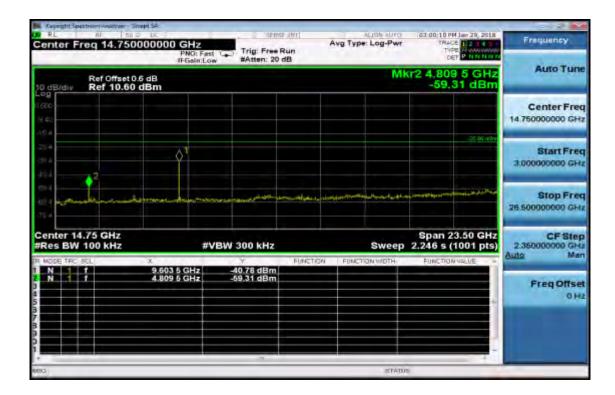


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Conducted Spurious Emission Measurement Result (8DPSK mode) Ch Low 30MHz – 3GHz

enter Fr		00000 GHz PNO IFGal		ree Run 20 dB	Avg Type	Log-Pwr	TRAC	4 Jan 29, 2018 26 1 2 3 4 3 4 29 14 20 14 14 14 20 14 14 14 14 14 21 14 14 14 14 14	Frequency
0 dB/div	Ref Offset 0. Ref 10.60					M	(r1 2,40) -5,	3 0 GHz 96 dBm	Auto Tune
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94 94 94								25 96 a Ba	Start Free
8,4 194			وور مور ما المر معرف	-				Journalies	Stop Free
tart 30 M Res BW	1Hz		#VBW 300 kH					.000 GHz	3,00000000 GH CF Step 297,00000 MH Auto Me
NODE TRC S		× 2.403 0 GH	¥ -5,96 dt	FLINET	ON FUNCTION	ON WIDTH	FUNCTION	VVALUE ·	Freq Offse
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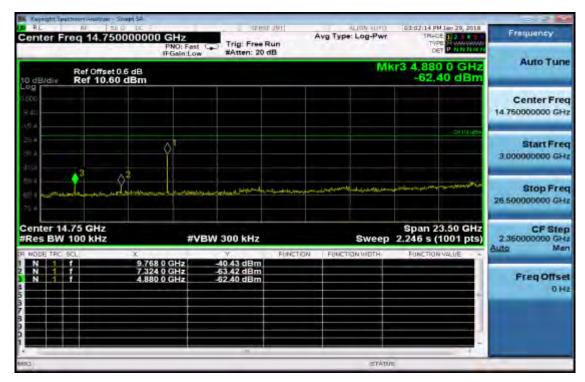
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Ch Mid 30MHz – 3GHz

Keynight Spectrom Analyzer - Skept SA RL Al			
Center Freq 1.51500000	PNO: Fast Trig: Free Run FGain: Low #Atten: 20 dB	Avg Type: Log-Pwr TRACE 12 Avg Type: Log-Pwr TRACE 12 TYPE 100 OCT P N	Frequency
Ref Offset 0.6 dB	1 Sector	Mkr1 2.441 6 0 -6.03 d	BHZ Auto Tuni Bm
6g 1800 9 40			Center Fre 1.515000000 GH
25.4			Start Fre 30.000000 MH
	والمتعادية والمستنج والمتعالية المتعاط والمتعالية والمتعا	and the second	Stop Fre 3.00000000 GH
Start 30 MHz Res BW 100 kHz	#VBW 300 kHz	Stop 3.000 Sweep 283.9 ms (1001	pts) 297.000000 MH
N 1 1 24	41 5 GHz6.03 dBm		Freq Offse 0 H

Ch Mid 3GHz – 26.5GHz



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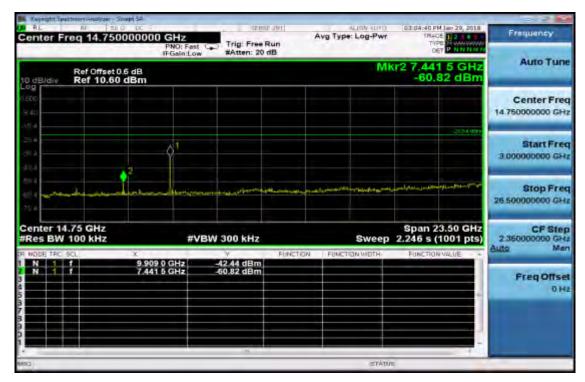
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Ch High 30MHz – 3GHz

Koperghit Spectr	RF 54.0				ALION NUTO		M Jan 29, 2518	
	q 1.515000		Trig: Free F	Run	vg Type: Log-Pwr	TR4		Frequency
10 dB/div	Ref Offset 0.6 d Ref 10.60 dB	2			M	kr1 2.48 -5.	0 3 GHz 53 dBm	Auto Tuni
.og (300) 3(40)						1		Center Fre 1.515000000 GH
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69.4 69.4 75.4		-		anonatananah	annin ann an a	in the	and an	Stop Fre 3.000000000 GH
Start 30 MH #Res BW 1	00 kHz		300 kHz	FUNCTION	Sweep	Stop 3 283.9 ms	3.000 GHz (1001 pts)	CF Ste 297,000000 MH Auto Ma
N 1 1		2.480 3 GHz	-6.53 dBm				-	Freq Offse 0 H
eo.	*		m			us	- 1	

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 966 Chamber No.C										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.					
TYPE		NUMBER	NUMBER	CAL.						
EMI Test Receiver	R&S	ESU 40	100363	04/18/2017	04/17/2018					
Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2017	12/22/2018					
Broadband Antenna	TESEQ	CBL 6112D	35240	11/03/2017	11/02/2018					
Horn Antenna	ETS-Lindgren	3117	00143272	12/15/2017	12/16/2018					
Horn Antenna	Schwarzbeck	BBHA9170	185	08/01/2017	07/31/2018					
Pre Amplifier	EMC Instruments	EMC330	980096	12/24/2017	12/23/2018					
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/24/2017	12/23/2018					
Pre Amplifier	R&S	SCU-18	10204	12/24/2017	12/23/2018					
Pre Amplifier	R&S	SCU-26	100780	12/24/2017	12/23/2018					
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/24/2017	12/23/2018					
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/24/2017	12/23/2018					
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/24/2017	12/23/2018					
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/24/2017	12/23/2018					
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/24/2017	12/23/2018					
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/24/2017	12/23/2018					
Attenuator	WOKEN	218FS-10	RF27	12/24/2017	12/23/2018					
Site NSA	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018					
Site VSWR	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018					
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2017	05/03/2018					
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.					
Antenna Master	MF	N/A	N/A	N.C.R.	N.C.R.					
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.					
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.					

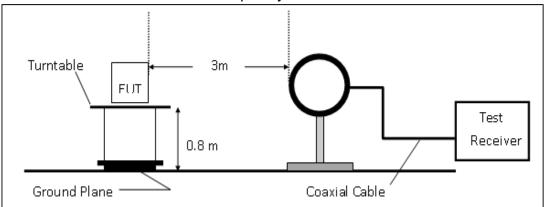
Note: N.C.R refers to Not Calibrated Required.

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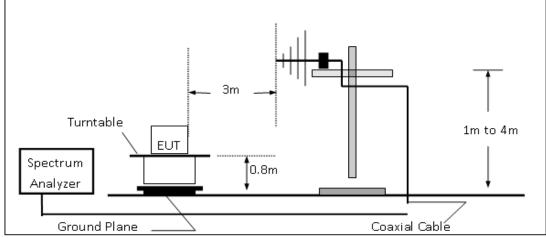


10.3 Test SET-UP

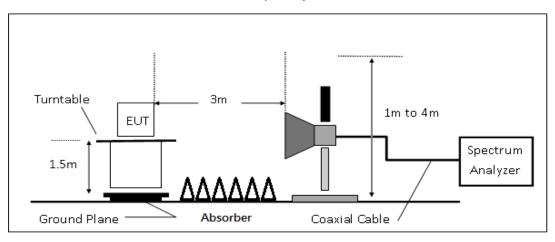
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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10.4 Measurement Procedure

Radiated Emission

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

Duty Cycle = On time/100 milliseconds

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

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

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

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

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10.5 Field Strength Calculation

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

FS = RA + AF + CL - AG

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

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

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

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

Note :

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

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

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

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

10.7 Measurement Result

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

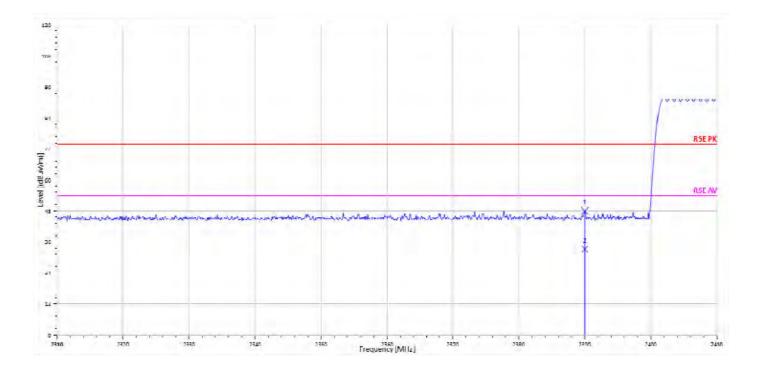
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Radiated Band Edge Measurement Result: (Hopping Mode)

Operation Mode :	BT BR Hopping	Test Date :	2018/1/24
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
	Mode		Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	54.86	-6.84	48.01	74	-25.99
2390.00	Е	Average	40.02	-6.84	33.18	54	-20.82

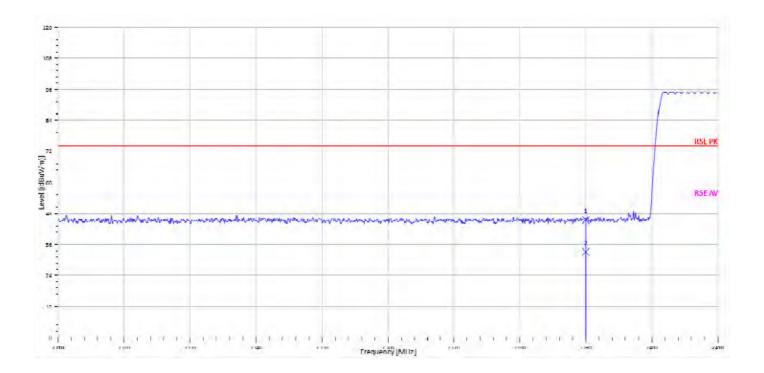
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BT BR Hopping 2402 MHz **BE CH Low** н

Test Date : Temp. / Humi. : **Test Engineer :** Measurement Antenna Pol. : 2018/1/24 22.7deg C/57RH Jerry Horizontal



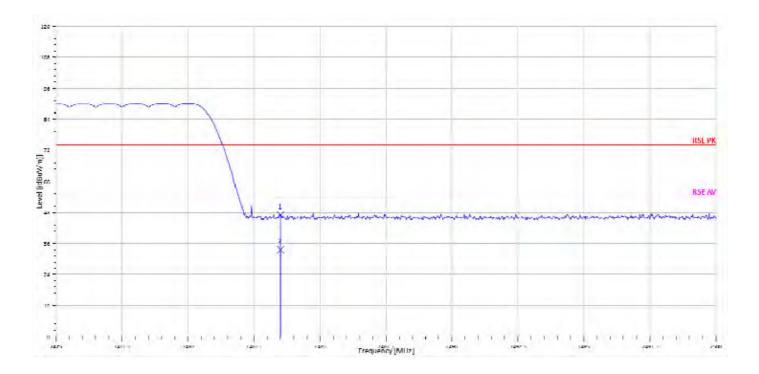
	Freq.	Note	Detector	Spectum	Factor	Actual FS	Limit	Margin
			Mode	Reading Level		F9	@3m	
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
_	2390.00	E	Peak	52.41	-6.84	45.56	74	-28.44
	2390.00	Е	Average	40.00	-6.84	33.16	54	-20.84

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BT BR Hopping 2480 MHz **BE CH High** Н

Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. : 2018/1/24 22.7deg C/57RH Jerry Vertical



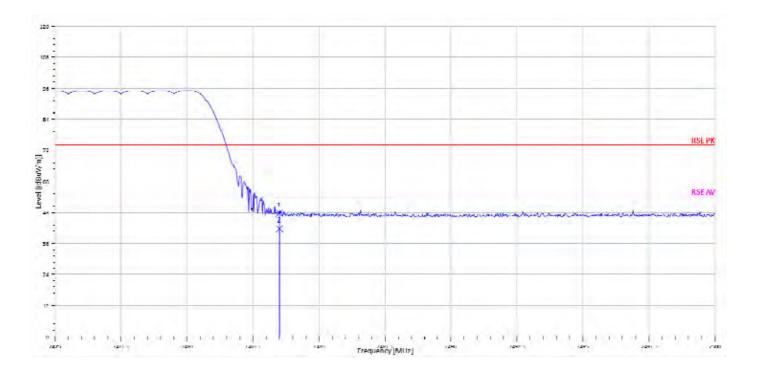
	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
•	2483.50	E	Peak	53.37	-6.38	46.98	74	-27.02
	2483.50	E	Average	39.96	-6.38	33.58	54	-20.42

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BT BR Hopping 2480 MHz **BE CH High** Н

Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. : 2018/1/24 22.7deg C/57RH Jerry Horizontal



	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
-	2483.50	E	Peak	54.06	-6.38	47.68	74	-26.32
	2483.50	Е	Average	48.10	-6.38	41.72	54	-12.28

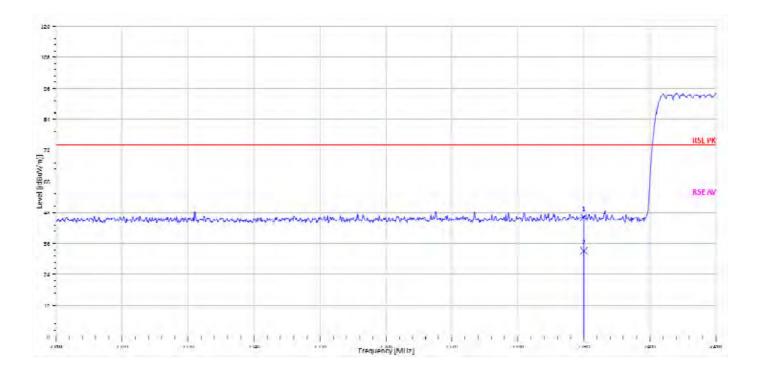
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Operation Mode :
Fundamental Frequency :
Operation Band :
EUT Pol. :

BT EDR Hopping 2402 MHz **BE CH Low** н

Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. : 2018/1/24 22.7deg C/57RH Jerry Vertical



	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
-	2390.00	E	Peak	52.90	-6.84	46.05	74	-27.95
	2390.00	Е	Average	40.03	-6.84	33.19	54	-20.81

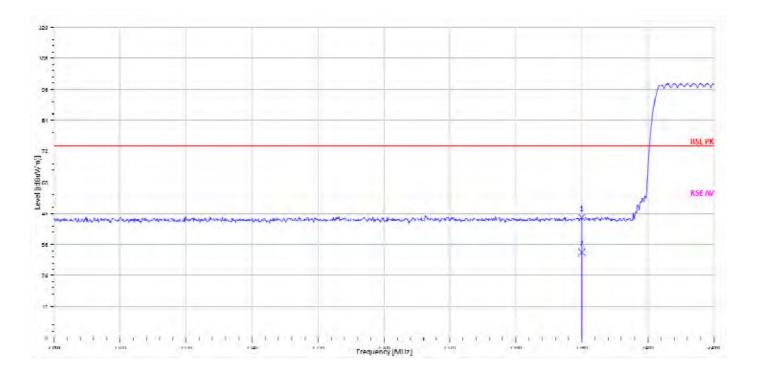
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Operation Mode :	
Fundamental Frequency	
Operation Band :	
EUT Pol. :	

BT EDR Hopping 2402 MHz **BE CH Low** Н

Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. : 2018/1/24 22.7deg C/57RH Jerry Horizontal



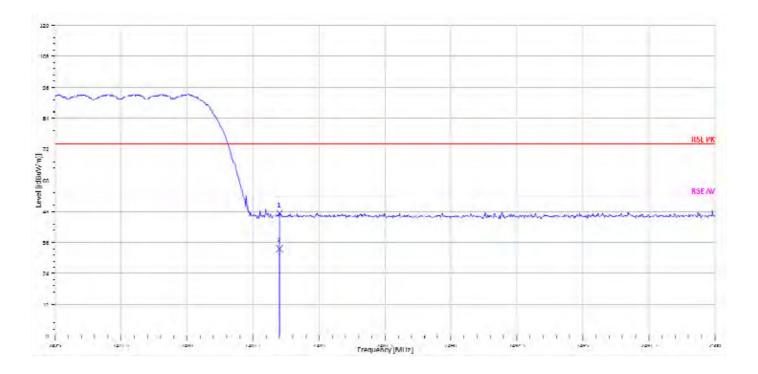
	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
-	2390.00	E	Peak	53.25	-6.84	46.40	74	-27.60
	2390.00	Е	Average	39.91	-6.84	33.07	54	-20.93

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BT EDR Hopping 2480 MHz **BE CH High** Н

Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. : 2018/1/24 22.7deg C/57RH Jerry Vertical



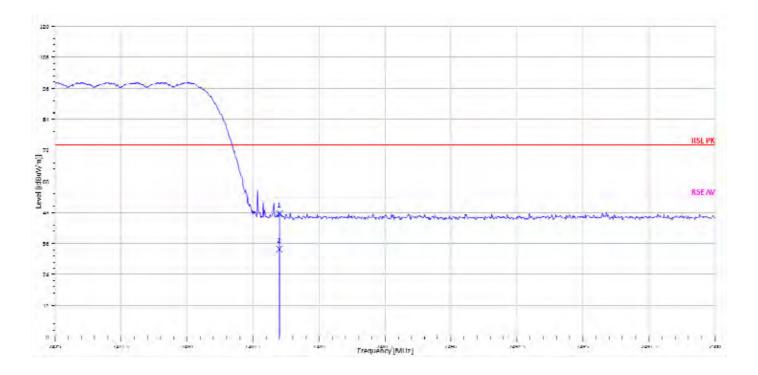
	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
-	2483.50	E	Peak	53.64	-6.38	47.25	74	-26.75
	2483.50	Е	Average	39.95	-6.38	33.57	54	-20.43

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BT EDR Hopping 2480 MHz **BE CH High** Н

Test Date : Temp. / Humi. : Test Engineer : Measurement Antenna Pol. : 2018/1/24 22.7deg C/57RH Jerry Horizontal



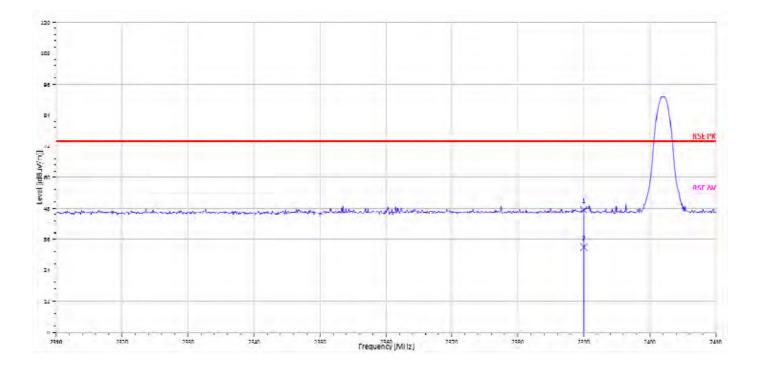
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	53.79	-6.38	47.41	74	-26.59
2483.50	Е	Average	40.20	-6.38	33.82	54	-20.18

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

Operation Mode :	BT BR	Test Date :	2018/1/24
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



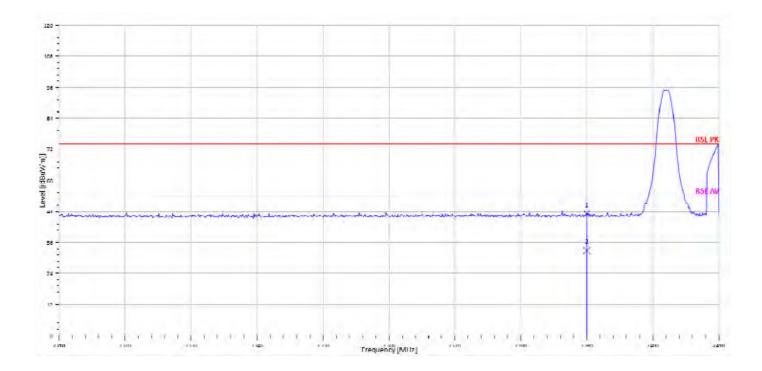
	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
-	2390.00	E	Peak	54.21	-6.84	47.36	74	-26.64
	2390.00	Е	Average	39.76	-6.84	32.92	54	-21.08

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 cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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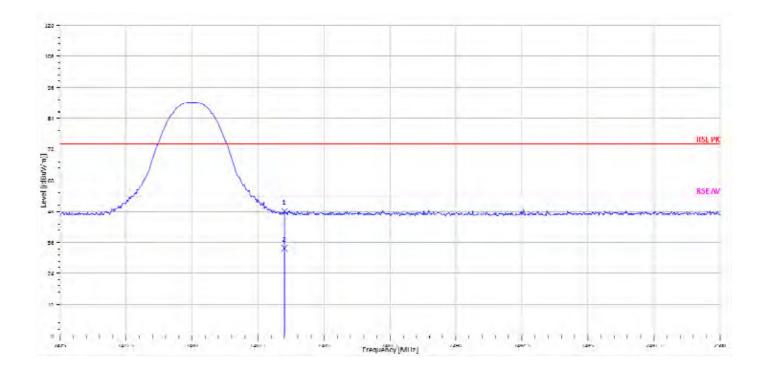
Operation Mode :	BT BR	Test Date :	2018/1/24
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
_	2390.00	E	Peak	54.03	-6.84	47.19	74	-26.81
	2390.00	Е	Average	39.73	-6.84	32.89	54	-21.11



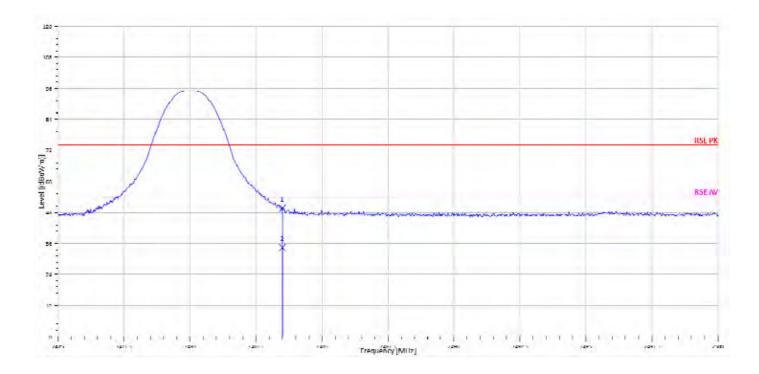
Operation Mode :		Test Date :	2018/1/24
Fundamental Frequency : Operation Band :	2480 MHz BE CH High	Temp. / Humi. : Test Engineer :	22.7deg_C/57RH Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
_	2483.50	E	Peak	54.48	-6.38	48.10	74	-25.90
	2483.50	Е	Average	40.15	-6.38	33.77	54	-20.23



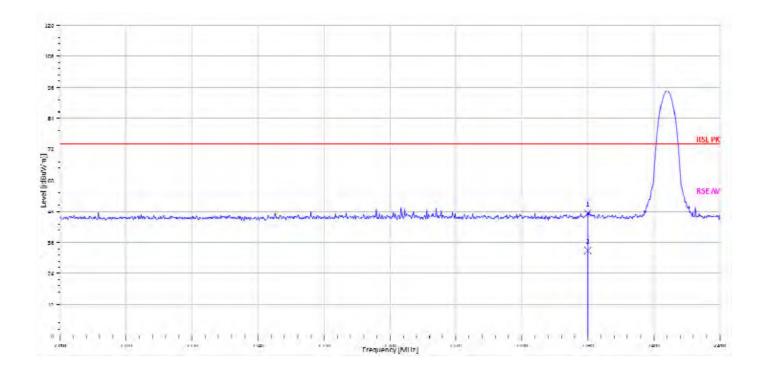
Operation Mode :	BT BR	Test Date :	2018/1/24
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH High	Test Engineer :	Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal



	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
_	2483.50	E	Peak	55.93	-6.38	49.55	74	-24.45
	2483.50	Е	Average	40.81	-6.38	34.43	54	-19.57



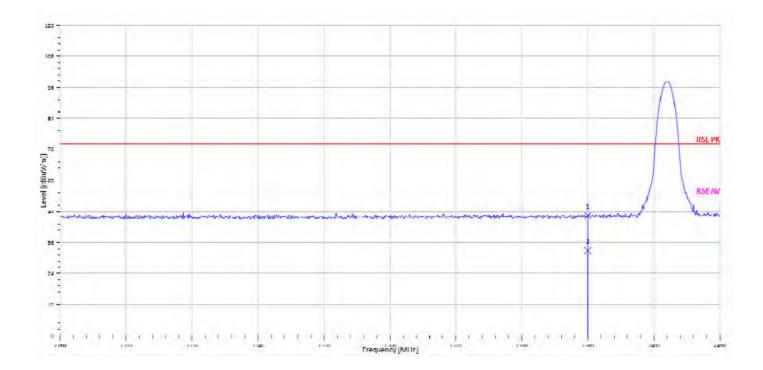
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
-	2390.00	E	Peak	54.15	-6.84	47.30	74	-26.70
	2390.00	Е	Average	39.81	-6.84	32.97	54	-21.03



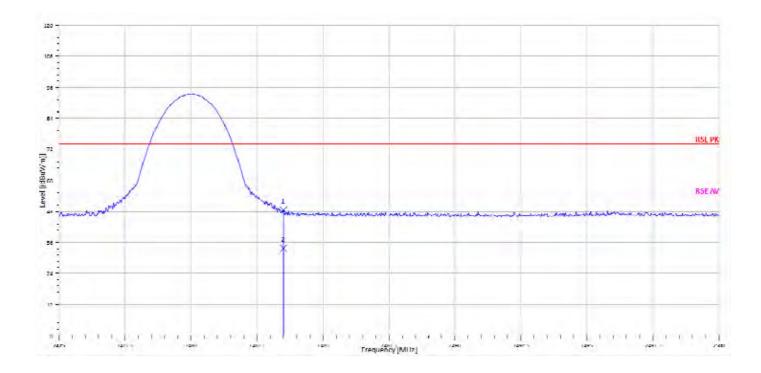
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	BE CH Low	Test Engineer :	Jerry
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
-	2390.00	E	Peak	53.21	-6.84	46.37	74	-27.63
	2390.00	Е	Average	39.77	-6.84	32.93	54	-21.07



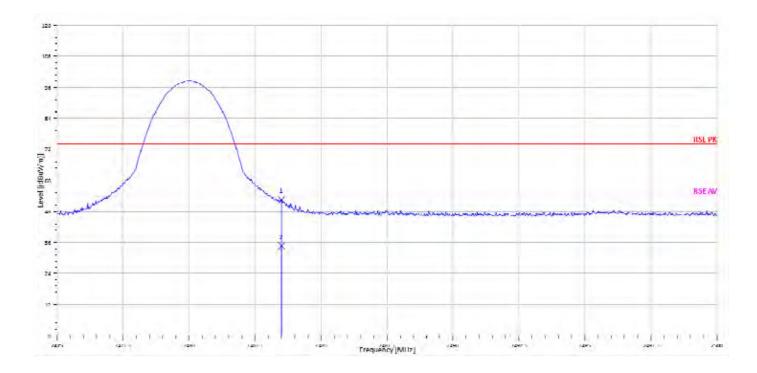
Operation Mode :		Test Date :	2018/1/24
Fundamental Frequency : Operation Band :	2480 MHz BE CH High	Temp. / Humi. : Test Engineer :	22.7deg_C/57RH Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	54.92	-6.38	48.53	74	-25.47
2483.50	E	Average	40.13	-6.38	33.75	54	-20.25



Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	BE CH High	Test Engineer :	Jerry
EUT Pol. :		Measurement Antenna Pol. :	Horizontal

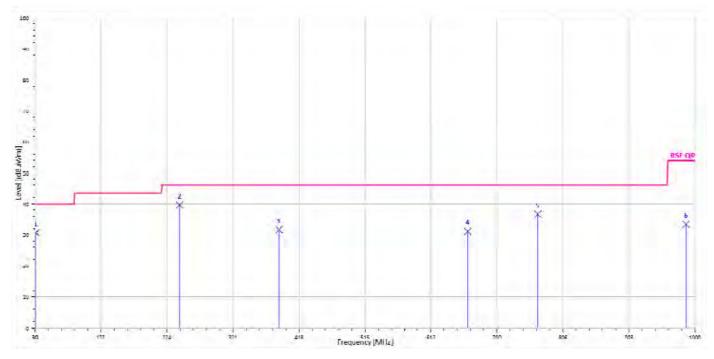


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	58.84	-6.38	52.45	74	-21.55
2483.50	E	Average	41.09	-6.38	34.71	54	-19.29



Radiated Spurious Emission Measurement Result: (Worst Case)

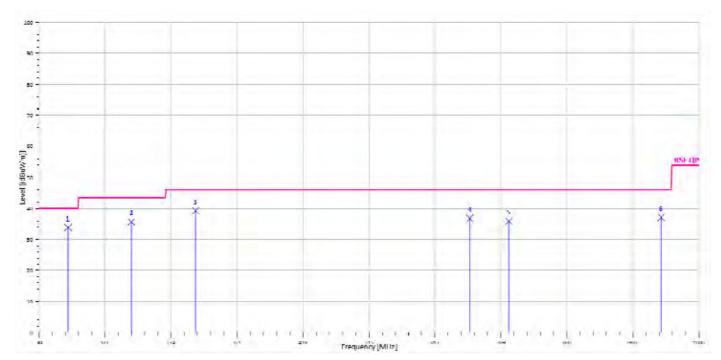
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.97	S	Peak	49.03	-18.30	30.73	40	-9.27
242.43	S	Peak	56.66	-16.99	39.67	46	-6.33
388.90	S	Peak	44.82	-13.13	31.69	46	-14.31
666.32	S	Peak	39.62	-8.48	31.14	46	-14.86
769.14	S	Peak	42.93	-6.28	36.65	46	-9.35
987.39	S	Peak	37.48	-4.08	33.40	54	-20.60



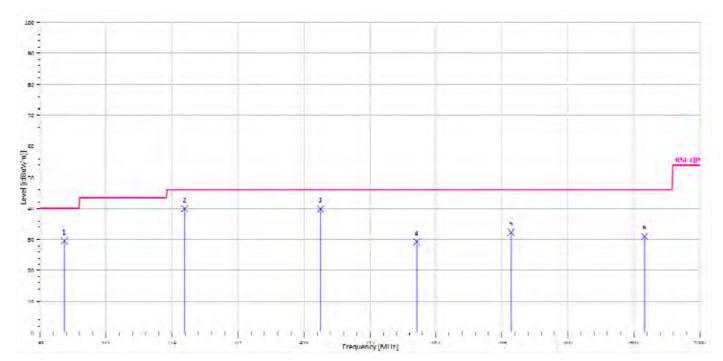
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
72.68	S	Peak	53.63	-19.79	33.84	40	-6.16
165.80	S	Peak	51.75	-16.07	35.68	43.5	-7.82
259.89	S	Peak	56.41	-17.13	39.28	46	-6.72
663.41	S	Peak	45.15	-8.32	36.83	46	-9.17
720.64	S	Peak	43.46	-7.54	35.92	46	-10.08
944.71	S	Peak	41.71	-4.59	37.12	46	-8.88



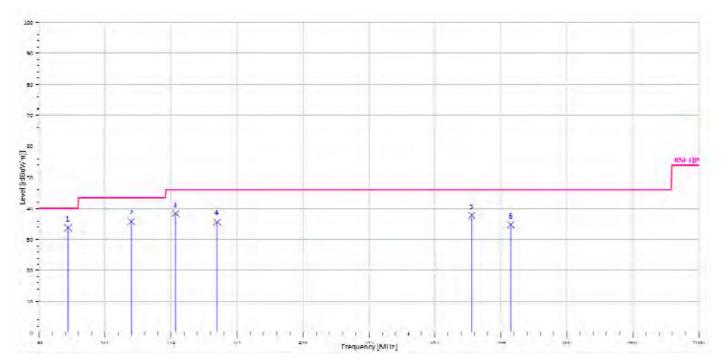
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Jerry
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
65.89	S	Peak	48.28	-18.77	29.51	40	-10.49
242.43	S	Peak	56.88	-16.99	39.90	46	-6.10
442.25	S	Peak	52.22	-12.41	39.81	46	-6.19
583.87	S	Peak	38.06	-8.83	29.23	46	-16.77
722.58	S	Peak	39.91	-7.58	32.32	46	-13.68
918.52	S	Peak	36.11	-5.10	31.01	46	-14.99



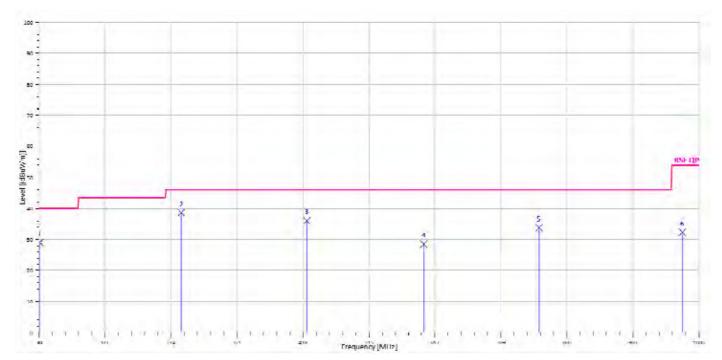
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Jerry
	H	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
72.68	S	Peak	53.56	-19.79	33.77	40	-6.23
165.80	S	Peak	51.94	-16.07	35.87	43.5	-7.63
230.79	S	Peak	55.99	-17.65	38.34	46	-7.66
291.90	S	Peak	51.10	-15.45	35.66	46	-10.34
666.32	S	Peak	46.25	-8.48	37.77	46	-8.23
723.55	S	Peak	42.38	-7.60	34.77	46	-11.23



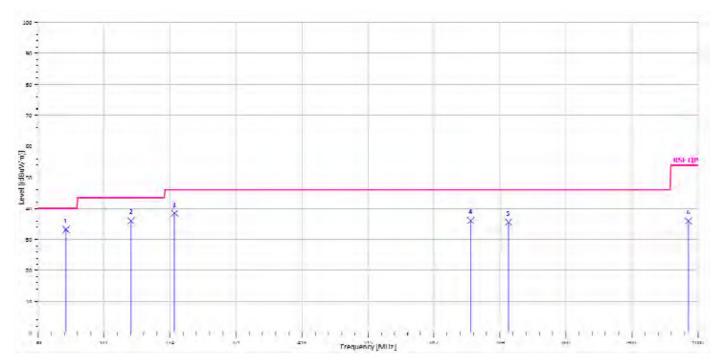
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	Tx CH High	Test Engineer :	Jerry
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.97	S	Peak	47.32	-18.30	29.02	40	-10.98
238.84	S	Peak	55.66	-17.05	38.60	46	-7.40
423.82	S	Peak	48.33	-12.26	36.07	46	-9.93
595.51	S	Peak	37.59	-9.10	28.49	46	-17.51
765.26	S	Peak	40.03	-6.25	33.77	46	-12.23
975.75	S	Peak	36.40	-4.06	32.34	54	-21.66



Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	Tx CH High	Test Engineer :	Jerry
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal

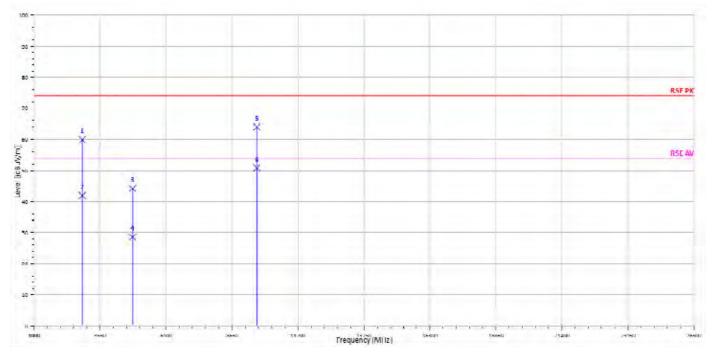


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
71.22	S	Peak	52.76	-19.53	33.23	40	-6.77
166.77	S	Peak	52.17	-16.16	36.01	43.5	-7.49
230.59	S	Peak	56.09	-17.67	38.43	46	-7.57
666.32	S	Peak	44.60	-8.48	36.12	46	-9.88
721.61	S	Peak	43.17	-7.56	35.60	46	-10.40
986.42	S	Peak	40.06	-4.08	35.98	54	-18.02



Radiated Spurious Emission Measurement Result: (Worst Case) For Frequency above 1 GHz

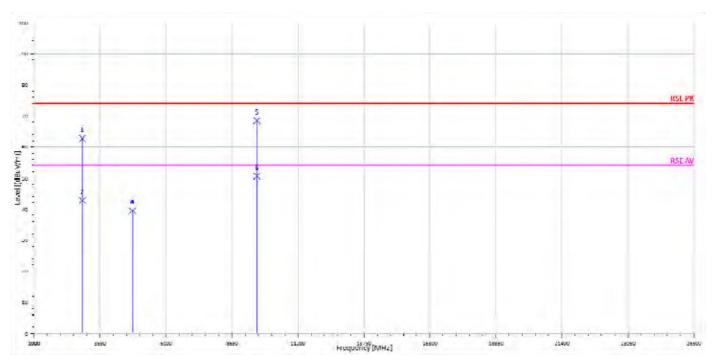
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2862.00	S	Peak	65.32	-5.40	59.92	74	-14.08
2862.00	S	Average	47.35	-5.40	41.95	54	-12.05
4804.00	Н	Peak	45.31	-1.16	44.15	74	-29.85
4804.00	Н	Average	29.73	-1.16	28.57	54	-25.43
9608.00	Н	Peak	55.27	8.73	63.99	74	-10.01
9608.00	Н	Average	42.10	8.73	50.83	54	-3.17



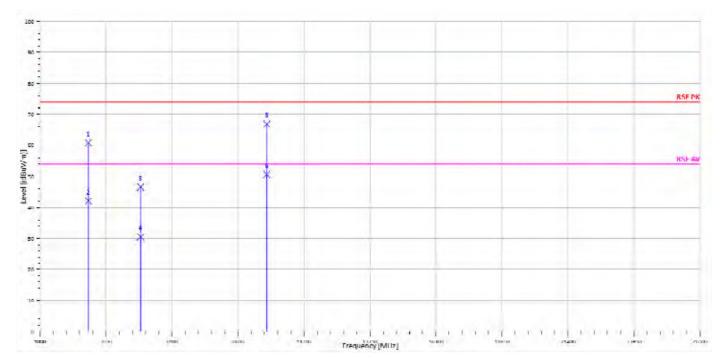
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2402 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Jerry
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2862.00	S	Peak	68.10	-5.40	62.70	74	-11.30
2862.00	S	Average	48.14	-5.40	42.74	54	-11.26
4804.00	Н	Peak	40.71	-1.16	39.55	74	-34.45
4804.00	Н	Average	40.71	-1.16	39.55	54	-14.45
9610.00	Н	Peak	59.71	8.72	68.43	74	-5.57
9610.00	Н	Average	41.90	8.72	50.62	54	-3.38



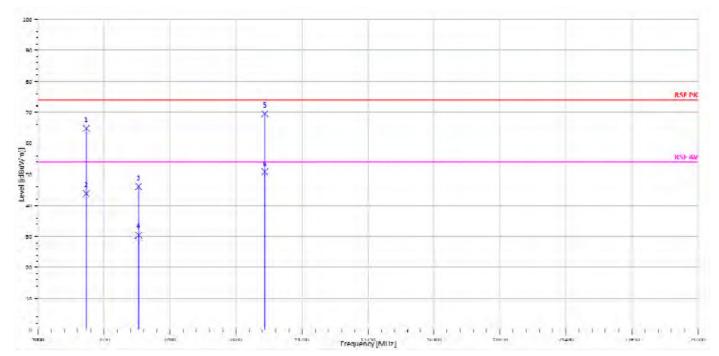
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Jerry
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2862.00) S	Peak	66.21	-5.40	60.81	74	-13.19
2862.00) S	Average	47.53	-5.40	42.13	54	-11.87
4882.00) Н	Peak	47.28	-0.70	46.58	74	-27.42
4882.00) Н	Average	31.22	-0.70	30.52	54	-23.48
9764.00) Н	Peak	58.32	8.54	66.86	74	-7.14
9764.00) Н	Average	42.13	8.54	50.67	54	-3.33



Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2441 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Jerry
EUT Pol. :	H	Measurement Antenna Pol. :	Horizontal



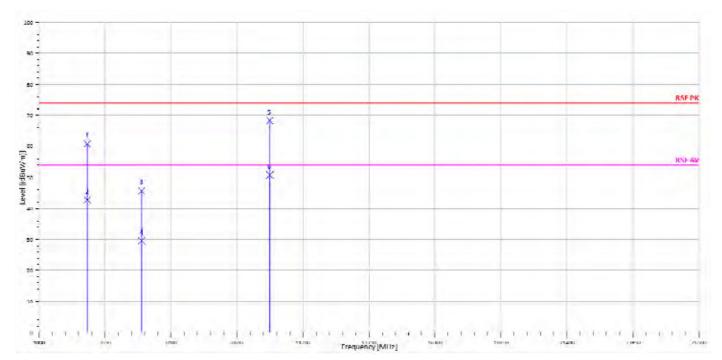
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2862.00	Н	Peak	70.22	-5.40	64.82	74	-9.18
2862.00	Н	Average	49.23	-5.40	43.83	54	-10.17
4882.00	Н	Peak	46.83	-0.70	46.13	74	-27.87
4882.00	Н	Average	31.11	-0.70	30.41	54	-23.59
9764.00	Н	Peak	60.99	8.54	69.53	74	-4.47
9764.00	Н	Average	42.28	8.54	50.82	54	-3.18

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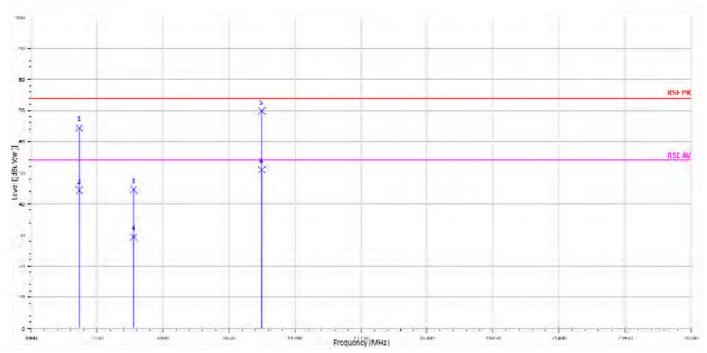
Operation Mode :	BT EDR	Test Date :	2018/1/24
Fundamental Frequency :	2480 MHz	Temp. / Humi. :	22.7deg C/57RH
Operation Band :	Tx CH High	Test Engineer :	Jerry
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2862.00	S	Peak	66.17	-5.40	60.77	74	-13.23
2862.00	S	Average	48.12	-5.40	42.72	54	-11.28
4960.00	Н	Peak	46.27	-0.66	45.61	74	-28.39
4960.00	Н	Average	30.22	-0.66	29.56	54	-24.44
9920.00	Н	Peak	59.63	8.64	68.27	74	-5.73
9920.00	Н	Average	42.11	8.64	50.75	54	-3.25



Fundamental Frequency : 24	FEDR Test Date : 180 MHz Temp. / Humi. : 190 CH High Test Engineer : 190 Measurement Antenna P	2018/1/24 22.7deg_C/57RH Jerry Pol. : Horizontal
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Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2862.00	S	Peak	69.83	-5.40	64.43	74	-9.57
2862.00	S	Average	49.79	-5.40	44.39	54	-9.61
4960.00	Н	Peak	45.27	-0.66	44.61	74	-29.39
4960.00	Н	Average	30.02	-0.66	29.36	54	-24.64
9920.00	Н	Peak	61.21	8.64	69.85	74	-4.15
9920.00	Н	Average	42.30	8.64	50.94	54	-3.06

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11 FREQUENCY SEPARATION

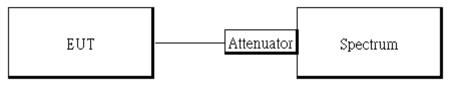
11.1 Standard Applicable

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

11.2 Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT	EQUIPMENT MFR MODEL SERIAL LAST (
ТҮРЕ		NUMBER	NUMBER	CAL.				
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018			
DC Block	PASTERNACK	PE8210	RF29	12/24/2017	12/23/2018			
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018			

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 C63.10:2013 section 7.8.2.
- 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

Frequency	CICCOST PM Jan 29, 2018 TRACE 12 2 4 4 1 TYPE PLONOMOUNT OFT PLONOMOUNT	Avg Type: Log-Pwr	Trig: Free Run #Atten: 20 dB	DC 00000 GHz PNO: Wide C IFGain:Low	reg 2.403
Auto Tun	kr3 1.000 MHz 0.13 dB	ΔN			Ref Offset Ref 10.60
Center Fre 2.403000000 GH		304	142		
Start Fre 2.400500000 GH					manuel
Stop Fre 2.405500000 GH					
CF Ste 500.000 kH Auto Ma	top 2.405500 GHz 000 ms (1001 pts) Function value	Sweep 1.	100 kHz	#VBV	00500 GHz 100 kHz
Freq Offse			-1.06 dB -8.62 dBm 0.13 dB -9.58 dBm	1,000 MHz (Δ) 2,402 000 GHz 1,000 MHz (Δ) 2,403 000 GHz	1 (Δ) 1 1 (Δ) 1
			-		
6		STATUS			

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12 NUMBER OF HOPPING FREQUENCY

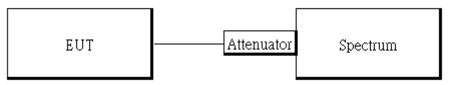
12.1 Standard Applicable

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

12.2 Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
TYPE		NUMBER	NUMBER	CAL.				
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018			
DC Block	PASTERNACK	PE8210	RF29	12/24/2017	12/23/2018			
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018			

12.3 Test Set-up



12.4 Measurement Procedure

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

12.5 Measurement Result

Tabular Data of Total Channel Number

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

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Channel Number

Frequency	CIEDUIZI PH Lee 29, 2018 TRACE 1 2014 11 TVPE PLOTONICS	Type: Log-Pwr		NO: Fast	0000 GH	2.42050	er Freq	ent
Auto Tur	2.402 000 GHz -3.62 dBm	Mkr1			dB Bm	f Offset 0.6 f 10.60 d	div Re	U dEV
Center Fra 2.420500000 Gi	Mary Mary and and	nonon	-			You the state	And the	67
Start Fre 2,400000000 Gi								9.40 15-4 -
Stop Fre 2.441000000 Gi								9.4 -
CF Ste 4.100000 Mi Autor Mi							l	5.4
Freq Offs 01								छन् -
	Stop 2.44100 GHz						2.40000	
	000 ms (1001 pts)	Sweep 1	1.5 MHz	#VBW		kHz	BW 430	Res

2.4 GHz - 2.441GHz

2.441 GHz - 2.4835GHz

Frequency	14.00		104:80:655 1447 17 0	Log-Pwr				NO: Fast C	0000 G	2.46225	r Freq	ent
Auto Tun	GHz IBm	0 0 .73	480 00	Mkr1 2					Ref Offset 0.6 dB dB/dly Ref 10.60 dBm			
Center Fre 2.462250000 GH	_	2	1	100m	innin	mini	\/~\/~\~\/	فالعابدة		الملاك السالمان	y m	300
Start Fre 2.441000000 GH												49 84 -
Stop Fre 2.483500000 GH												4
CF Ste 4 250000 Mil Auto: Ma												14
Freq Offse 0 H	'H.J.											54
	GHz pts)	8350 (100	Stop 2.4	Sweep 1.			1.5 MHz	#VBW			.44100 3W 430	

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13 TIME OF OCCUPANCY (DWELL TIME)

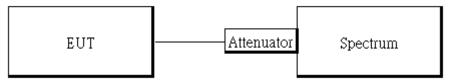
13.1 Standard Applicable

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

13.2 Measurement Equipment Used

Conducted Emission Test Site										
EQUIPMENT	EQUIPMENT MFR MODEL SERIAL LAST									
TYPE		NUMBER	NUMBER	CAL.						
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018					
DC Block	PASTERNACK	PE8210	RF29	12/24/2017	12/23/2018					
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018					

13.3 Test Set-up



13.4 Measurement Procedure

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

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

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

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

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

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

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

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

GF3K (TMbps)			
Channel	PACKET TYPE	Measurement Result	Limit
		(ms)	(ms)
	DH1	121.92	400ms
0	DH3	256.32	400ms
	DH5	301.23	400ms
	DH1	121.92	400ms
39	DH3	256.32	400ms
	DH5	302.61	400ms
	DH1	121.92	400ms
78	DH3	257.60	400ms
	DH5	302.61	400ms

13.5 Tabular Result of the Measurement

GESK (1Mbns)

$\pi/4$ DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	2DH1	118.27	400ms
39	2DH3	256.32	400ms
	2DH5	302.61	400ms

8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)
	3DH1	119.68	400ms
39	3DH3	257.12	400ms
	3DH5	302.61	400ms



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

GFSK (1Mbps):

CH Low	DH1 time slot = DH3 time slot =		· /		121.92 (ms) 256.32 (ms)
	DH5 time slot =	2.824 *	(1600/6/79) *	31.6 =	301.23 (ms)
CH Mid	DH1 time slot =	0.381 *	(1600/2/79) *	31.6 =	121.92 (ms)
	DH3 time slot =	1.602 *	(1600/4/79) *	31.6 =	256.32 (ms)
	DH5 time slot =	2.837 *	(1600/6/79) *	31.6 =	302.61 (ms)
CH High	DH1 time slot =	0.381 *	(1600/2/79) *	31.6 =	121.92 (ms)
	DH3 time slot =	1.610 *	(1600/4/79) *	31.6 =	257.60 (ms)
	DH5 time slot =	2.837 *	(1600/6/79) *	31.6 =	302.61 (ms)

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

CH Mid	2DH1 time slo =	0.370	*	(1600/2/79) *	31.6 =	118.27 (ms)
	2DH3 time slo =	1.602	*	(1600/4/79) *	31.6 =	256.32 (ms)
	2DH5 time slo =	2.837	*	(1600/6/79) *	31.6 =	302.61 (ms)

8-DPSK (3Mbps):

CH Mid	3DH1 time slo =	0.374 *	(1600/2/79) *	31.6 =	119.68 (ms)
	3DH3 time slo =	1.607 *	(1600/4/79) *	31.6 =	257.12 (ms)
	3DH5 time slo =	2.837 *	(1600/6/79) *	31.6 =	302.61 (ms)



GFSK (1Mbps) for AFH Mode									
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)						
20	DH5	151.31	400ms						
π/4 DQPSK (2Mbps) for AFH Mode									
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)						
20	2DH5	151.31	400ms						
	8-DPSK (3Mbps	s) for AFH Mode							
Hopping Channel Number	PACKET TYPE	Measurement Result (ms)	Limit (ms)						
20	3DH5	151.31	400ms						

GFSK (1Mbps):

DH5 time s =	2.837	(ms)	*	(800/6/20)	* 8 =	151.31	(ms)
$\pi/4$ -DQPSK (2Mbp:							
2DH5 time =	2.837	(ms)	*	(800/6/20)	* 8 =	151.31	(ms)
8-DPSK (3Mbps):							
3DH5 time =	2.837	(ms)	*	(800/6/20)	* 8 =	151.31	(ms)

13.6 Measurement Result

Note: Refer to next page for plots.

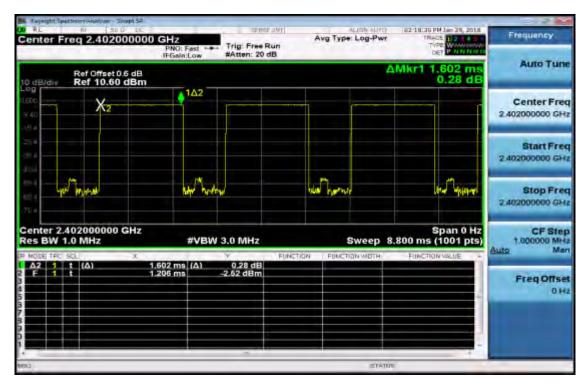
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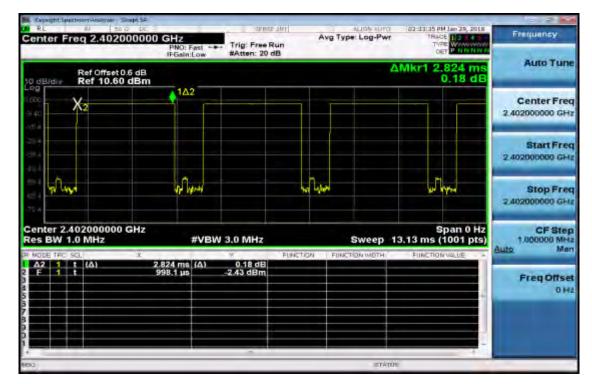
CH-Low DH1

Repercht Spe	uctratory -	Anual/241 - Silver		-	-	and		ALION AUTO			012 0
0.34	114	and the	0000 GHz	ast	Trig: Free R #Atten: 20 d	un	Avg Typ	e: Log-Pwr	TRADE	1an 28, 2518 1 2 3 4 3 Westerneted P. N. P. D. C. C.	Frequency
0 dB/div		Offset 0.6 f 10.60 d	dB	.08	HISTORY AND			L	MKr1 3	81.0 µs .20 dB	Auto Tun
600 8 40				X		1Δ2					Center Fre 2.402000000 GH
294 294 294											Start Fre 2.402000000 GH
69 4 69 4 7 5 4		allamed	rand torological	hiption		kristika	hutter hutter	alternar fetade		-	Stop Fre 2,402000000 GH
Center 2. Res BW 1		00000 G Hz		#VBW	3.0 MHz			Sweep 3.	S) 000 ms (1	oan 0 Hz 001 pts)	CF Ste 1.000000 MH Auto Ma
KR MODE TH			× 381.0 µ		0.20 dE	FLAC	TION FU	NETIEN WEITH	FUNCTIO	N VALUE	Auto Ma
	Ť		1.170 m		-2.61 dBm					+	Freq Offse 0 P
7 8 9 10											
0					-	_		STATUS	_	- 4	

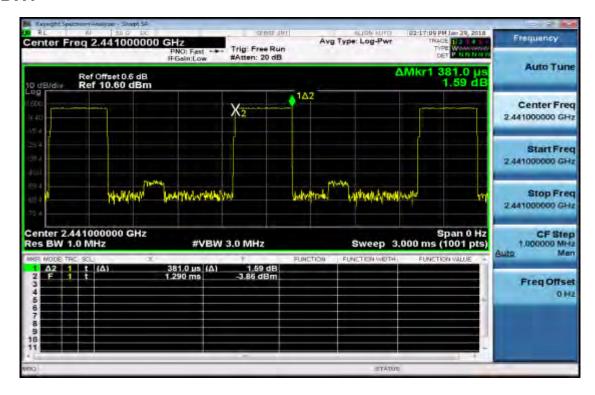
DH3



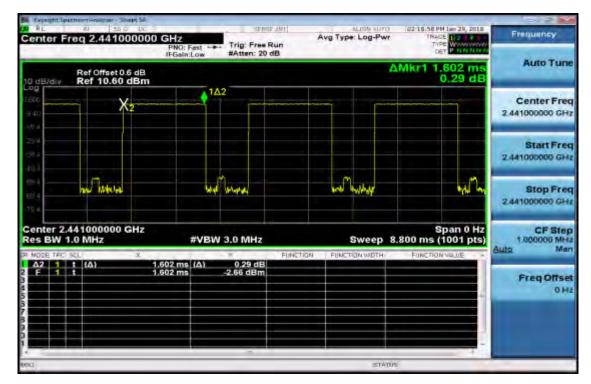




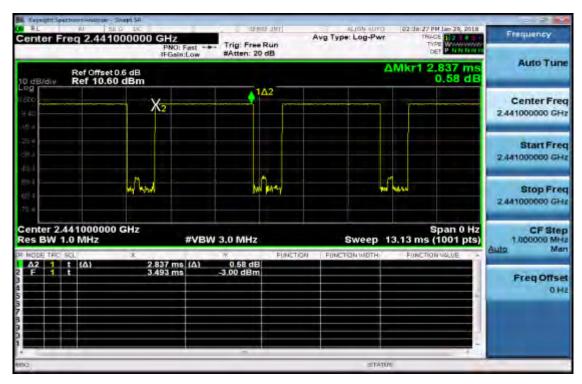
CH-Mid DH1







DH5



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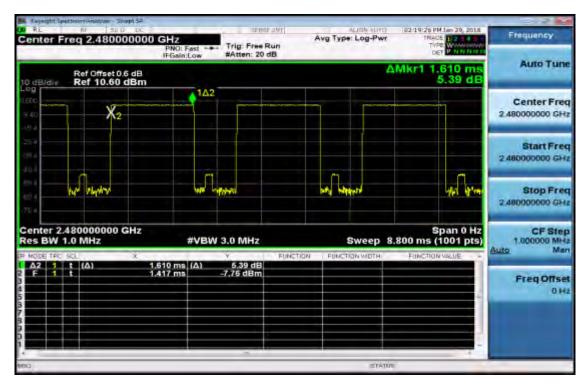
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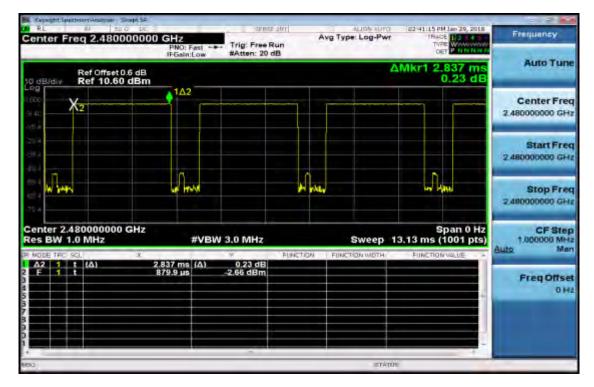
CH-High DH1

Keynight Spectromer-Analyzer - Skept SA					
enter Freq 2.480000000	GHz PNO: Fast	Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pwr	62-17:56 PM Jan 29, 2018 TRADE 12 2 4 4 5 TYPE WOMMONT	Frequency
Ref Offset 0.6 dB	I CONLON		l	Mkr1 381.0 µs 0.50 dB	Auto Tun
600 (40)	X ₂	142			Center Fre 2.48000000 GH
					Start Fre 2.48000000 GH
Marganta linestyte	krođen	Hallward	bolondobrua	- man -	Stop Fre 2.480000000 GH
enter 2.480000000 GHz es BW 1.0 MHz	#VBW :	3.0 MHz		Span 0 Hz 000 ms (1001 pts) FUNCTION VALUE	CF Ste 1.00000 Mit Auto Mit
Δ2 1 t (Δ) 34	81,0 μs (Δ) 96.0 μs -	0.50 dB 2.79 dBm			Freq Offse
50)		-	STATUS	11	

DH3





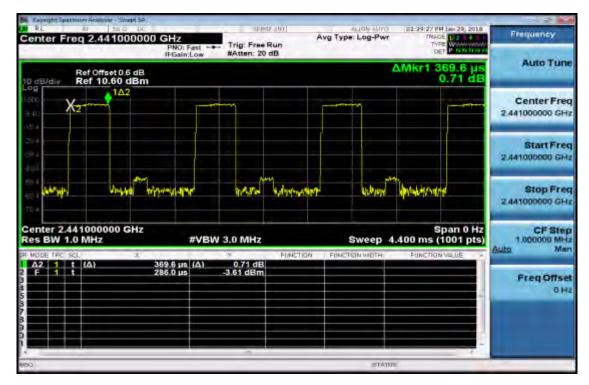


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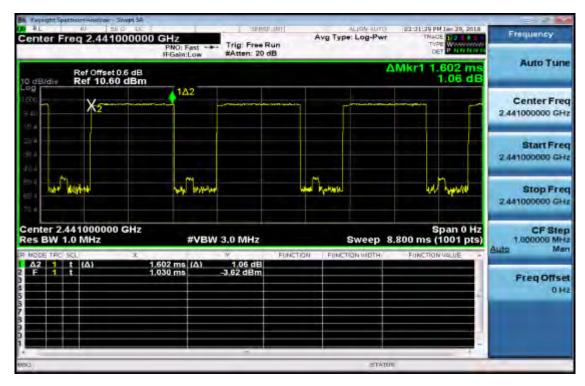
SGS Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號



CH-Mid 2DH1



2DH3





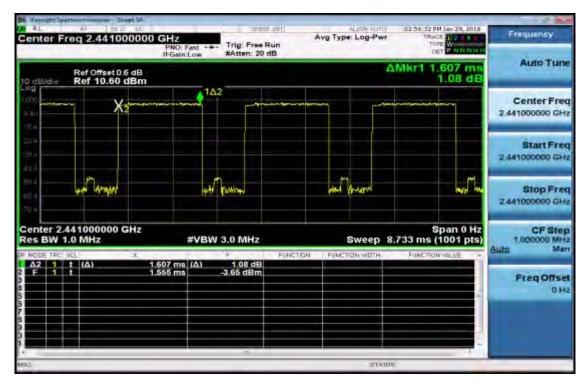
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CH-Mid 3DH1

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3DH3





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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.

According to RSS-GEN 8.3

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.9 When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

14.2 Antenna Connected Construction

An embedded-in antenna design is used.

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

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

~ End of Report ~

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