

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

OF

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS 210

Product Name:	PeopleNet Connected Tablet
Brand Name:	PeopleNet
Model No.:	MS5
Model Difference:	N/A
FCC ID:	NKS-MS5N
Report No.:	E2/2015/10033-01
Issue Date:	Jan. 04, 2017
FCC Rule Part:	§15.247, Cat: DSS
Prepared for:	PEOPLENET 4400 Baker Road, Minnetonka, MN 55343, USA
Prepared by:	SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333
TAF DEC-MRA Testing Laboratory	Note: This report shall not be reproduced except in full, without the written approval of SGS Taiwan Ltd. This document may be altered or revised by SGS Taiwan Ltd. personnel only, and shall be noted in the revision section of the

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document.



VERIFICATION OF COMPLIANCE

Applicant:	PEOPLENET 4400 Baker Road, Minnetonka, MN 55343, USA
Product Name:	PeopleNet Connected Tablet
Brand Name:	PeopleNet
Model No.:	MS5
Model Difference:	N/A
FCC ID:	NKS-MS5N
File Number:	E2/2015/10033-01
Date of test: Date of EUT Received:	Jan. 30, 2015 ~ Mar. 11, 2015 Jan. 30, 2015

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 C63.4:2014 the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

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

Test By:	Marcus Tse	Mg Date:	Jan. 04, 2017
Prepared By:	Marcus Tseng / Engi Allen Ts	neer	Jan. 04, 2017
Approved By:	Allen Tsai /Engine	er ng Date:	Jan. 04, 2017

Jim Chang / Supervisor



Version

Version No.	Date	Description
00	Jan. 04, 2017	Initial creation of document



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1. GENERAL INFORMATION

1.1. Product description

General:

Product Name:	PeopleNet	Connected Tablet	
Brand Name:	PeopleNet		
Model No.:	MS5		
Model Difference:	N/A		
Hardware Version:	N/A		
Software Version:	N/A		
Tablet Docking Station	Model No.: MS-57602, Supplier: MSI		
Power Cable	P/N: L016-0576, Supplier: ELECTRI-CORD MFG.CO.		
Power Supply:	7.4Vdc from LITHIUM-ION rechargeable battery or 12/24Vdc from DC Car battery		
	Battery:	ž	

Bluetooth:

Bluetooth Version:	Bluetooth V4.0 (dual mode) + HS
Channel number:	79 channels
Modulation type:	GFSK +π/4DQPSK+8DPSK
Transmit Power:	2 dBm (Peak)
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	<= 0.4s
Antenna Designation:	PIFA Antenna, Gain: 0.76dBi

The report applied for Bluetooth BR+EDR.



1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID:** <u>NKS-MS5N</u> filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with FCC part 15; Subpart B is authorized under a Doc procedure.

1.3. Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4:2014 and ANSI C63.10:2013. Radiated testing was performed at an antenna to EUT distance 3 meters. Tested in accordance with FCC Public Notice DA 00-705 – Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan, which is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2014 & ANSI C63.10:2013. FCC Registration Numbers are: 628985, Canada Registration Number: 4620A-4.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan Township, Taoyuan County, Taiwan, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 455997.

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.



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 plane. According to the general criterion in Section 7.1 of ANSI C63.4:2014 & 6.2 ANSI C63.10:2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz, and the measurement procedure 7.3 in ANSI C63.4:2014 & 6.2.2, and 6.2.3 in ANSI C63.10:2013 is followed to carry out the test. The CISPR Quasi-Peak and Average detector mode is employed according to §15.107

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. 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 according to the requirements in Section 8 and 13 and of ANSI C63.4:2014, & Section 6.3, 6.4, 6.5, and 6.6 of ANSI C63.10:2013.



2.4. Configuration of Tested System

Fig. 2-1 Radiated & Conducted Emission

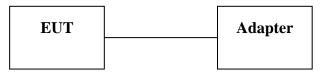


Fig. 2-2 Conducted (Antenna Port)

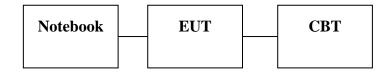


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/	Series No.	Data Cable	Deres Card
	Type No.		Series 110.		Power Cord	
1	Bluetooth Test Software	Tera Term	N/A	N/A	N/A	N/A
2.	Bluetooth Test Set	R&S	CBT	101140	N/A	unshielded
3.	Notebook	Lenovo	L430	R9-YYG88	N/A	Unshielded



3. SUMMARY OF TEST RESULTS

FCC/IC 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)	100 kHz Bandwidth Of Frequency Band Edges	Compliant
\$15.247(d) \$15.209(a) (f)	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	Antenna Requirement	Compliant



4. DESCRIPTION OF TEST MODES

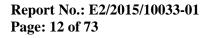
The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel Low, Mid and High with highest rated data rate were chosen as worst case for full testing. The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth Transmitter for channel Low, Mid and High the worst case E2 position was reported.

Channel Low: channel 0 at 2402MHz Channel Mid: channel 39 at 2441MHz Channel High: channel 78 at 2480MHz

In comparison with BR and EDR mode, emission carried out by EDR is chosen as the most representative measurement to perform measurement of radiated spurious emission pursuant to Part 15C.Modulation, EDR, is selected to be performed for 100 kHz Bandwidth Band Edge, Conducted Spurious Emission, Frequency Separation, Number of hopping frequency due to its characteristics of wider bandwidth.

Data type being used to conduct the measurement: DH1/DH3/DH5 (GFSK) with 1Mbps 2DH1/2DH3/2DH5 (/4 DQPSK) with 2Mbps 3DH1/3DH3/3DH5 (8DPSK) with 3Mbps





5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 1.55 dB
20dB Bandwidth & 99% Power Bandwidth	+/- 123.36 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 1.55 dB
Frequency Separation	+/- 123.36 Hz
Number of hopping frequency	+/- 123.36 Hz
Time of Occupancy	+/- 123.36 Hz
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC= +/- 0.2%

Radiated Spurious Emission:

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

	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.



6. CONDUCTED EMISSION TEST

6.1. Standard Applicable

According to §15.207, 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	e logarithm of the frequency in the	range 0.15 MHz to 0.50 MHz.		

6.2. Measurement Equipment Used:

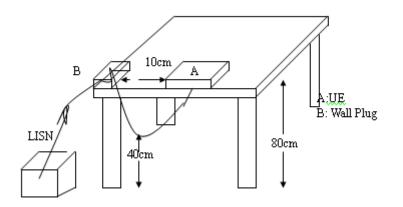
SGS Conducted Emission Test Site No.A						
Name of Equipment	Manufacturar	Manufacturer Model Se		Calibration	Calibration	
Name of Equipment		WIUUCI	Serial Number	Date	Due	
EMI Test Receiver	R&S	ESCI 3	101311	06/20/2014	06/19/2015	
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	01/06/2015	01/07/2016	
LISN	Schwarzbeck	NSLK 8127	8127-648	06/10/2014	06/09/2015	
LISN	Rolf-Heine	NNB-2/16Z	99012	03/26/2014	03/25/2015	
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 C63.4:2014.
- 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.

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 plane.
- 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



AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode			Test Date:	Feb. 26, 2015
Temperature:	23	Humidity:	58 %	Test By:	Vito
Probe:	L1				
0 dBuV					
			CISPR	13 / CISPR 22 Cond	duction(QP)
1 X			CISPR 1	3 / CISPR 22 Condu	uction(AVG)
		h Âd ÂA.	\$	an wanter and	MANNALANAMANA
		WW ALAN IN			
150	0.5	(MHz)	5		30.00

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		(MHz)	dBuV	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1660	52.15	0.05	52.20	65.16	-12.96	peak	
2		0.2260	47.72	0.05	47.77	62.60	-14.83	peak	
- 3	*	0.5580	45.17	0.20	45.37	56.00	-10.63	peak	
4		1.6140	38.24	0.45	38.69	56.00	-17.31	peak	
- 5		2.3180	36.43	0.51	36.94	56.00	-19.06	peak	
6		4.2860	41.89	0.50	42.39	56.00	-13.61	peak	



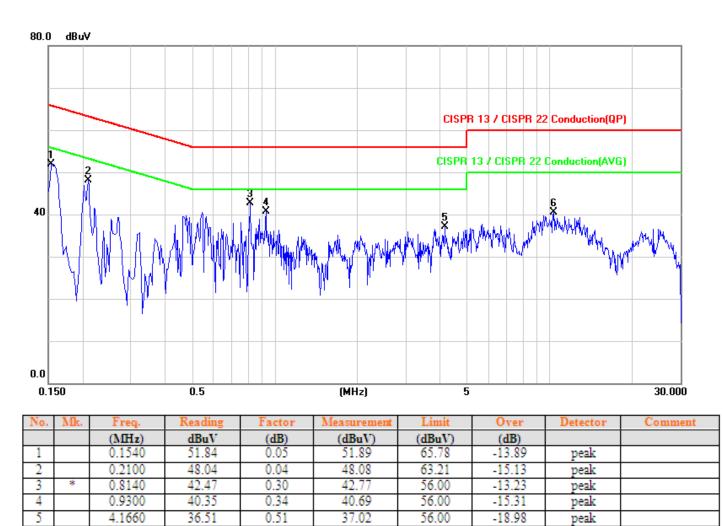
6

10.3620

39.97

0.47

Operation Mode:	Operation Mode			Test Date:	Feb. 26, 2015
Temperature:	23	Humidity:	58 %	Test By:	Vito
Probe:	Ν				



40.44

60.00

-19.56

peak



7. PEAK OUTPUT POWER MEASUREMENT

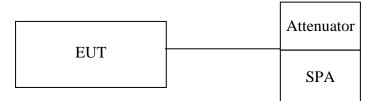
7.1. Standard Applicable

According to \$15.247(b)(1), 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 - 2483.5 MHz band: The Limit: 0.125 Watts.

7.2. Measurement Equipment Used

SGS Conducted Room(ALL)						
EQUIPMENT MFR		MODEL	SERIAL	LAST	CAL DUE.	
ТҮРЕ		NUMBER	NUMBER	CAL.		
Spectrum Analyzer	Agilent	N9010A	MY53400256	10/15/2014	10/14/2015	
Power Meter	Anritsu	ML2496A	1326001	06/21/2014	06/20/2015	
Power Sensor	Anritsu	MA2411B	1315048	06/21/2014	06/20/2015	
Power Sensor	Anritsu	MA2411B	1315049	06/21/2014	06/20/2015	
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/19/2014	12/18/2015	
DC Block	PASTERNACK	PE8210	RF29	12/19/2014	12/18/2015	
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/19/2014	12/18/2015	
Attenuator	WOKEN	218FS-10	RF23	12/19/2014	12/18/2015	
DC Power Supply	Agilent	E3640A	MY53140006	05/31/2014	05/30/2015	

7.3. Test Set-up:





7.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 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)
- 3. Record the max. reading.
- 4. Repeat above procedures until all default test channel is completed.

NOTE: cable loss as 4.43dB that offsets in the spectrum

7.5. Measurement Result

1M BR mode (GFSK):

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
2402.00	-2.63	0.00055	1
2441.00	-0.64	0.00086	1
2480.00	-1.22	0.00075	1

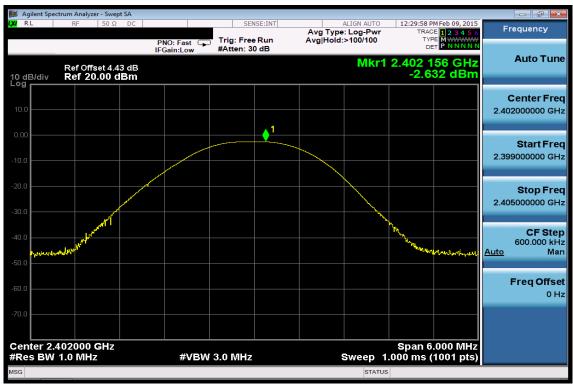
2M EDR mode (π /4DQPSK):

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
2402.00	-0.27	0.00094	0.125
2441.00	1.44	0.00139	0.125
2480.00	0.97	0.00125	0.125

3M EDR mode (8DPSK):

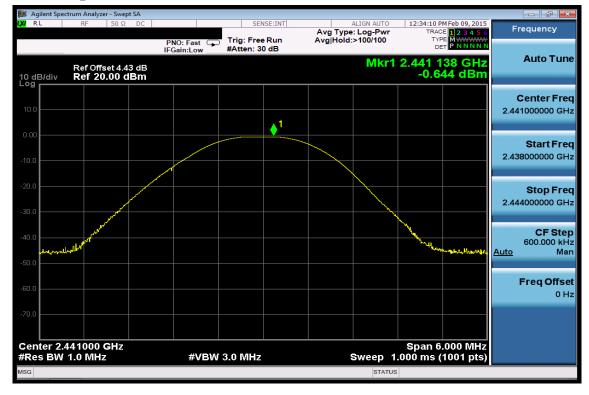
Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
2402.00	0.32	0.00108	0.125
2441.00	2.00	0.00159	0.125
2480.00	1.53	0.00142	0.125



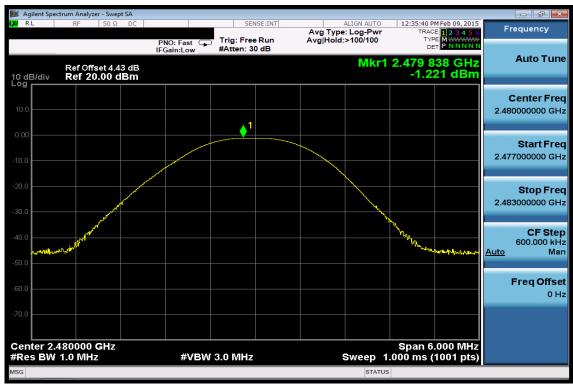


Peak Power Output Data Plot (CH Low) (1M BR mode)

Peak Power Output Data Plot (CH Mid) (1M BR mode)

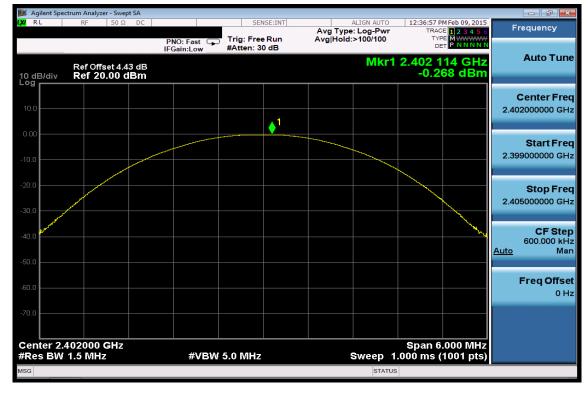






Peak Power Output Data Plot (CH High) (1M BR mode)

Peak Power Output Data Plot (CH Low) (2M EDR mode)

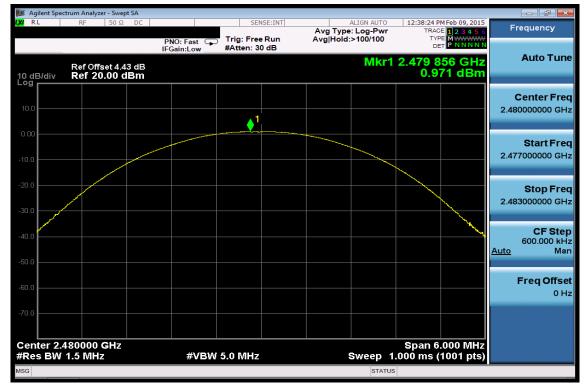




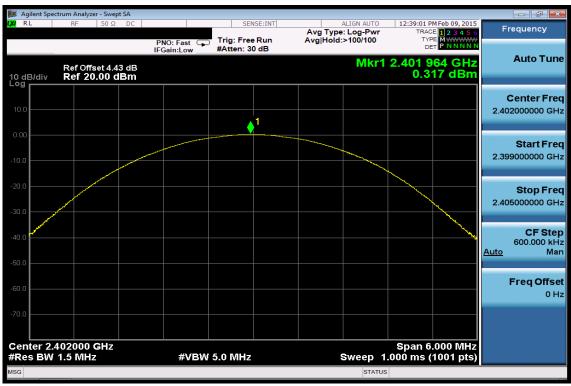
J Agilent Spectrum Analyzer - Swept SA Frequency Avg Type: Log-Pwr Avg|Hold:>100/100 RACE 12345 TYPE M DET P NNNN Trig: Free Run PNO: Fast IFGain:Low #Atten: 30 dB Auto Tune Mkr1 2.441 126 GHz 1.436 dBm Ref Offset 4.43 dB Ref 20.00 dBm 10 dB/div Log Center Freq 2.441000000 GHz ♦1 Start Freq 2.438000000 GHz Stop Freq 2.444000000 GHz CF Step 600.000 kHz Auto Man **Freq Offset** 0 Hz Center 2.441000 GHz #Res BW 1.5 MHz Span 6.000 MHz Sweep 1.000 ms (1001 pts) #VBW 5.0 MHz SG

Peak Power Output Data Plot (CH Mid) (2M EDR mode)

Peak Power Output Data Plot (CH High) (2M EDR mode)

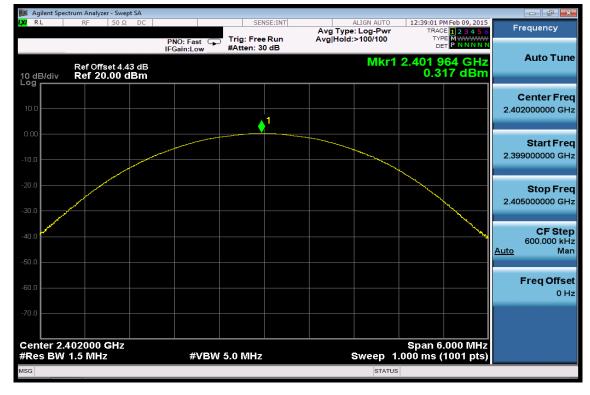


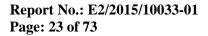




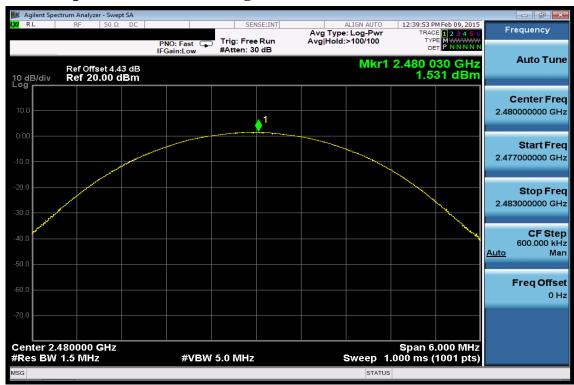
Peak Power Output Data Plot (CH Low) (3M EDR mode)

Peak Power Output Data Plot (CH Mid) (3M EDR mode)









Peak Power Output Data Plot (CH High) (3M EDR mode)



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8. 20dB BANDWIDTH

8.1. Standard Applicable

For 20dB Bandwidth

According to §15.247(a)(1) for frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

8.2. Measurement Equipment Used

Refer to section 7.2 for details.

8.3. Test Set-up

Refer to section 7.3 for details.

8.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. 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.
- 4. Mark the peak frequency and -20dB (upper and lower) frequency
- 5. Repeat above procedures until all test default channel is completed

NOTE: cable loss as 4.43dB that offsets in the spectrum



8.5. Measurement Result:

1M BR mode:

СН	Bandwidth
	(MHz)
Low	0.92
Mid	0.92
High	0.92

2M EDR mode:

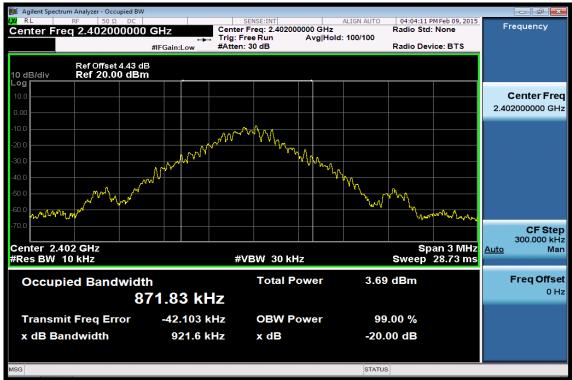
СН	Bandwidth	2/3 Bandwidth
	(MHz)	(MHz)
Low	1.32	0.88
Mid	1.33	0.89
High	1.33	0.89

3M EDR mode:

СН	Bandwidth	2/3 Bandwidth
	(MHz)	(MHz)
Lower	1.34	0.89
Mid	1.31	0.87
High	1.31	0.87

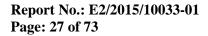


20dB Band Width Test Data CH-Low (1M BR mode)



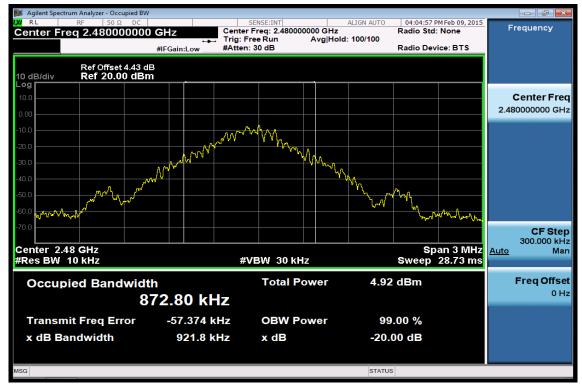
20dB Band Width Test Data CH-Mid (1M BR mode)



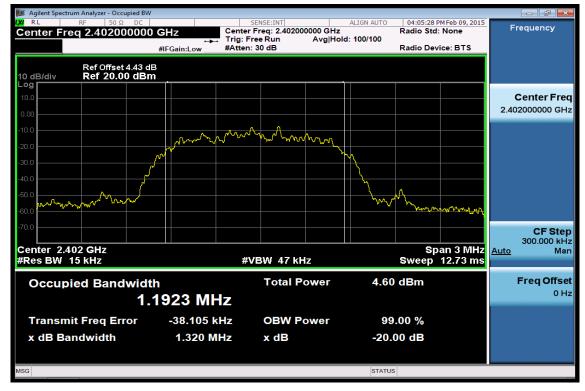




20dB Width Test Data CH-High (1M BR mode)



20dB Band Width Test Data CH-Low (2M EDR mode)

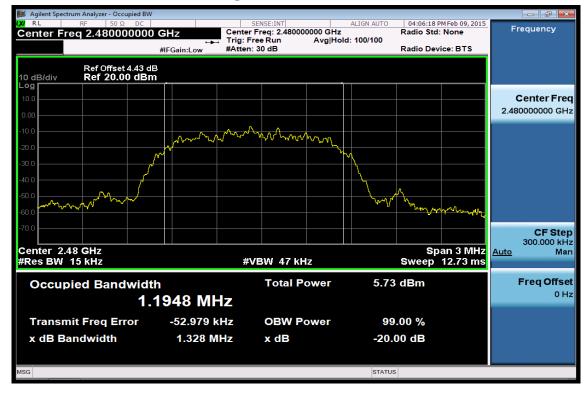




20dB Band Width Test Data CH-Mid (2M EDR mode)



20dB Band Width Test Data CH-High (2M EDR mode)





20dB Band Width Test Data CH-Low (3M EDR mode)

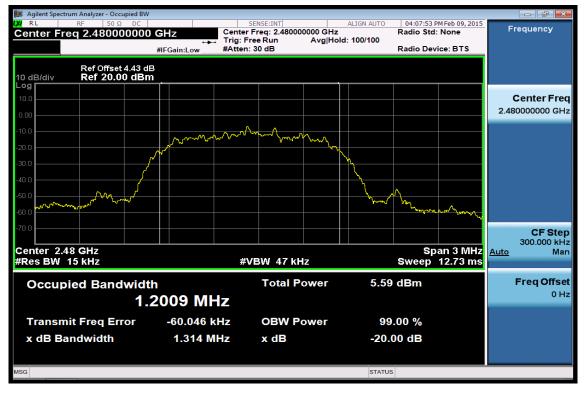


20dB Band Width Test Data CH-Mid (3M EDR mode)





20dB Width Test Data CH-High (3M EDR mode)





9. BAND EDGES EMISSION MEASUREMENT

9.1. Standard Applicable

According to \$15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

9.2. Measurement Equipment Used

9.2.1. Conducted Emission at antenna port:

Refer to section 7.2 for details.

9.3. Test SET-UP:

9.3.1. Conducted Emission at antenna port: Refer to section 7.3 for details.



9.4. Measurement Procedure

100 kHz BANDWIDTH OF BAND EDGES:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = operating frequency.
- 4. Set the spectrum analyzer as RBW, VBW=300 kHz, Sweep = auto
- 5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
- 6. Repeat above procedures until all frequency measured were complete.

Out-Of-Band EMISSION

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. Set RBW = 100K & VBW = 300K on Spectrum.
- 3. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30MHz to 3G, 3G to 8G, 8G to 13G, 13G to 18G and 18G to 26.5GHz
- 4. Via Software, combine 5 spans of frequency range into two plots containing the range of 30MHz to 3GHz, and 3GHz to 26.5GHz.

9.5. 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:

$\mathbf{FS} = \mathbf{RA} + \mathbf{AF} + \mathbf{CL} - \mathbf{AG}$

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

9.6. Measurement Result -1 Out-Of-Band EMISSION:

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

NOTE: cable loss as 4.43dB that offsets in the spectrum

NOTE: the occurrence of the spike on the conducted emission is the signal of the fundamental emission.



9.7 Measurement Result -1 Conducted Spurious Emission Measurement Result (Worst: EDR mode)

Ch Low 30MHz - 3GHz

 Agilent Spectrum Analyzer - Swept SA
 RL RF 50.0 0 05:05:23 PM Feb 09, 2015 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N Center Freq 1.515000000 GHz PNO: Fast IFGain:Low ALIGN AUTO Avg Type: Log-Pwr Frequency Trig: Free Run #Atten: 30 dB Auto Tune Mkr1 2.403 0 GHz -2.61 dBm Ref Offset 4.43 dB Ref 20.00 dBm 10 dB/div Log **Center Freq** 1.515000000 GHz Start Freq 30.000000 MHz Stop Freq 3.000000000 GHz CF Step 297.000000 MHz Ito Man Start 30 MHz #Res BW 100 kHz Stop 3.000 GHz Sweep 9.667 ms (1001 pts) #VBW 300 kHz <u>Auto</u> FUNCTION FUN 2.403 0 GHz -2.61 dBm Ν 1 f **Freq Offset** 0 Hz 10 STATUS

Ch Low <u>3GHz – 26.5GHz</u>

	ctrum Analyzer - Swept SA	A					
LXI RL	RF 50 Ω [DC	SENSE	Avg	ALIGN AUTO Type: Log-Pwr	05:05:47 PM Feb 09, 2015 TRACE 1 2 3 4 5 6	Frequency
10 dB/div	Ref Offset 4.43 Ref 20.00 dB				Mkr	1 25.724 5 GHz -47.43 dBm	Auto Tune
Log 10.0 0.00 -10.0							Center Freq 14.750000000 GHz
-20.0 -30.0 -40.0							Start Freq 3.000000000 GHz
-60.0		ational accounts alwortherized	when by the the strange	Million and a second second	an de la companya de La companya de la comp	ور بر محمد معرف می می می می اور این می می اور این می	Stop Freq 26.50000000 GHz
Start 3.00 #Res BW	100 kHz	#V ×	BW 300 kHz Y	FUNCTION	Sweep 7	Stop 26.50 GHz 6.40 ms (1001 pts)	CF Step 2.350000000 GHz <u>Auto</u> Man
1 N 1 2 3 4 5 6		25.724 5 GHz	-47.43 dBm				Freq Offset 0 Hz
7 8 9 10 11 4			III			-	
MSG					STATUS		

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Ch Mid 30MHz – 3GHz

	trum Analyzer - Swept S	5A						
Center Fi	RF 50 Ω req 1.515000	DC 000 GHz	SENSE	Avg	ALIGN AUTO Type: Log-Pwr	TRAC	M Feb 09, 2015	Frequency
10 dB/div	Ref Offset 4.43 Ref 20.00 dE	PNO: Fast IFGain:Lov			Mk	r1 2.44	[™] PNNNNN 16GHz 07dBm	Auto Tune
10.0 0.00						♦ ¹		Center Freq 1.515000000 GHz
-20.0 ===== -30.0 =====							21.07.dBm	Start Freq 30.000000 MHz
-50.0 -60.0	lana, a lander of the second	and and a state of the second	ang	ม _{ายใก} สีรัฐมูโอขูกไรที่ เหตุสรีสีกรรรด	tratelsen monoritemen	And a second and a second at the second at t	ะมาการีสุขมากสถุงรัญกับปร	Stop Freq 3.000000000 GHz
Start 30 M #Res BW	100 kHz	# \	/BW 300 kHz	FUNCTION	Sweep 9	.667 ms (.000 GHz 1001 pts)	CF Step 297.000000 MHz <u>Auto</u> Man
1 N 1 2 3 4 5		2.441 6 GHz	-1.07 dBn	n			=	Freq Offset 0 Hz
6 7 8 9 10 11								
MSG			m		STATUS	3	•	

Ch Mid 3GHz – 26.5GHz

🎉 Agilent Spec	ctrum Analyzer - Swept	SA					
(X/ RL	RF 50 Ω		Trig: Free R	Avg	ALIGN AUTO Type: Log-Pwr	05:06:31 PM Feb 09, 2015 TRACE 1 2 3 4 5 6 TYPE M WWWWW	Frequency
10 dB/div Log	Ref Offset 4.43 Ref 20.00 di		ч р •		Mkr	1 26.241 5 GHz -47.08 dBm	
10.0 0.00 -10.0							Center Freq 14.750000000 GHz
-20.0 -30.0 -40.0						-21.07 dBm	Start Freq 3.000000000 GHz
-60.0		Lydowedd yw ar a fallon yw ar a fallon yw ar a fallon a f Ar fallon a f	alan Pangalyen Malann	hiyayida alarayon anya ing ang ang ang ang ang ang ang ang ang a	and the second	² تە ^{رىمى} ئىرىمى بىرىمى بىر	Stop Freq 26.50000000 GHz
Start 3.00 #Res BW	100 kHz	#V × 26.241 5 GHz	BW 300 kHz Y -47.08 dBm	FUNCTION	Sweep 7	Stop 26.50 GHz 6.40 ms (1001 pts) FUNCTION VALUE	
2 3 4 5 6 7 8 9 9		20.241 5 GHZ	-4/.08 dBm				Freq Offset 0 Hz
A MSG			m		STATUS	• • • •	

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Ch High 30MHz – 3GHz

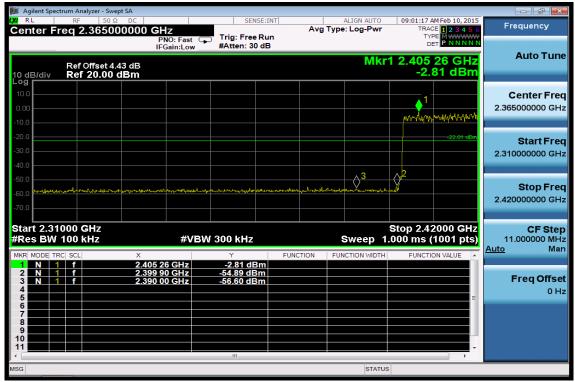
📁 Agilent Spectrum Analyzer - Swept SA			
M RL RF 50 Ω DC Center Freq 1.515000000		ALIGN AUTO 05:08:00 PM Feb 09, 2015 Avg Type: Log-Pwr TRACE 12 3 4 5 6 TYPE MWWWW	Frequency
Ref Offset 4.43 dB 10 dB/div Ref 20.00 dBm	PNO: Fast Fig: Free Run IFGain:Low #Atten: 30 dB	Mkr1 2.480 3 GHz -1.60 dBm	Auto Tune
Log 10.0 0.00 -10.0			Center Freq 1.515000000 GHz
-20.0		-21.60.dBm	Start Freq 30.000000 MHz
-50.0 -60.0	and a second		Stop Freq 3.000000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBW 300 kHz	Stop 3.000 GHz Sweep 9.667 ms (1001 pts)	CF Step 297.000000 MHz <u>Auto</u> Man
	480 3 GHz -1.60 dBm		Freq Offset 0 Hz
MSG		STATUS	

Ch High 3GHz – 26.5GHz

Agilent Spectrum Analyzer - Swept SA					
LXIRL RF 50Ω DC	SENSE	Avg Type	Log-Pwr TRAC	M Feb 09, 2015 E 1 2 3 4 5 6 E M WWWWW	Frequency
Ref Offset 4.43 dB 10 dB/div Ref 20.00 dBm	PNO: Fast Trig: Free F IFGain:Low #Atten: 30 o		Mkr1 25.560		Auto Tune
10.0 0.00 					Center Freq 14.750000000 GHz
-20.0				60 dBm	Start Freq 3.000000000 GHz
-50.0 -70.0 -70.0	nesector stronget lenge	Bourg Alephanether Bernet Marketter and Participant	(۱۹۵۵) اللي الميان الميت المياني الميان المياني المياني المياني المياني المياني المياني المياني المياني المياني المياني المياني	lan, side sonial sandarn	Stop Freq 26.50000000 GHz
Start 3.00 GHz #Res BW 100 kHz	#VBW 300 kHz		weep 76.40 ms (CF Step 2.350000000 GHz <u>Auto</u> Man
MKR MODE TRC SCL X 1 N 1 f 25. 2 3 - - - 4 - - - - 5 - - - - 7 - - - - 9 - - - - 11 - - - -	560 0 GHz -47.16 dBn		FUNCTION WIDTH FUNCTION		Freq Offset 0 Hz
MSG			STATUS		



9.7 Measurement Result -2 100 kHz BANDWIDTH OF BNAD EDGE: Band Edges Test Data CH-Low (Worst: EDR mode)(Hopping)



Band Edges Test Data CH-High

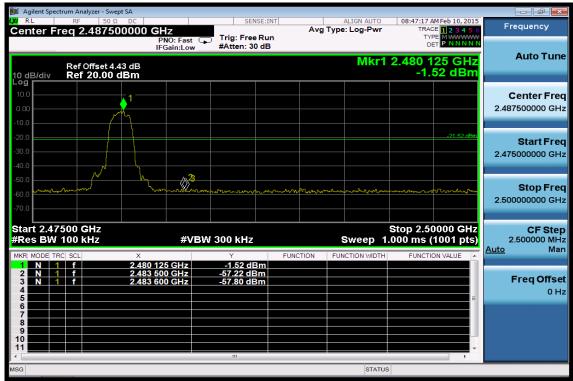
🎉 Agilent Spectrum Analyzer - Swept SA						
		SENSE:I		ALIGN AUTO	09:01:33 AM Feb 10, 201 TRACE 1 2 3 4 5	
Center Freq 2.487500000 Ref Offset 4.43 dB 10 dB/div Ref 20.00 dBm	PNO: Fast IFGain:Low	Trig: Free Ru #Atten: 30 dB	n		2.478 150 GH: -1.88 dBn	Auto Tune
10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0						Center Freq 2.487500000 GHz
-20.0					-21.88 dB	Start Freq 2.475000000 GHz
-50.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	on the second	when and the second	ᢗ᠆᠕᠕᠃᠂᠂	an and a second and a	Stop Freq 2.500000000 GHz
Start 2.47500 GHz #Res BW 100 kHz	#VBW	300 kHz		Sweep 1	Stop 2.50000 GH: .000 ms (1001 pts	CF Step 2.500000 MHz Auto Man
2 N 1 f 2.483	150 GHz 500 GHz 600 GHz	Y -1.88 dBm -57.29 dBm -58.05 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Freq Offset 0 Hz
MSG				STATUS		



	trum Analyzer - Sw	vept SA							
LXI RL	RF 50	ΩDC		SENSE		ALIGN AUTO		M Feb 10, 2015	E
Center F	reg 2.3650	00000 0	SHz			Type: Log-Pwr		E 1 2 3 4 5 6	Frequency
Conton			PNO: Fast	Trig: Free R				PE M WWWWW	
			IFGain:Low	#Atten: 30 c	IB		DI	PNNNN	
						Miles	4 0 400		Auto Tune
	Ref Offset 4	1.43 dB				IVIKE		29 GHz	
10 dB/div	Ref 20.00						-2.	84 dBm	
Log									
10.0									Center Freq
10.0							1		
0.00							⊢ ♥──		2.365000000 GHz
							A		
-10.0									
-20.0								-22:04 dBm	
-20.0								-22.04 dDm	Start Freq
-30.0							+		2.310000000 GHz
									2.010000000000112
-40.0									
-50.0							<u>√</u> 2 \		
						Viene and A Viene and		un ranting	Stop Freq
-60.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and the second	***************************************		have a set of the second se	- The subsection of the second			2.420000000 GHz
70.0									2.42000000 GHz
-70.0									
Start 2.31	000 GHz						Stop 2.42	2000 GHz	CF Step
#Res BW	100 kHz		#VB	W 300 kHz		Sweep 1	.000 ms (1001 pts)	11.000000 MHz
									Auto Man
MKR MODE TR	C SCL	Х		Y	FUNCTION	FUNCTION WIDTH	FUNCTION	ON VALUE 🔺	
1 N 1	f	2.402	2 29 GHz	-2.84 dBn	۱				
2 N 1	f	2.399	90 GHz	-56.83 dBn	1				
3 N 1	f	2.390) 00 GHz	-56.90 dBm	1				Freq Offset
4									0 Hz
5								=	
6									
7									
8									
9									
10									
11								~	
								•	
MSG						STATUS	5		

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

Band Edges Test Data CH-High





10. SPURIOUS RADIATED EMISSION TEST

10.1. Standard Applicable

According to §15.247(d),

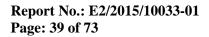
Emission at antenna port:

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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Radiated Spurious Emission

Attenuation below the general limits specified in § 15.209(a) is not required. 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) (see § 15.205(c)).

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.





10.2. Measurement Equipment Used:

10.2.1. Radiated emission:

	5	SGS 966 Chamber	No.C		
Name of Equipment	Manufacturer	Model	Serial Number	Calibration	
EMI Test Receiver	R&S	ESU 40	100363	Date 04/12/2014	Due 04/11/2015
Loop Antenna	ETS-Lindgren	6502	00143303	12/09/2014	12/08/2015
Broadband Antenna	TESEQ	CBL 6112D	35240	12/05/2014	12/04/2015
Horn Antenna	ETS-Lindgren	3117	00143272	12/08/2014	12/07/2015
Horn Antenna	ETS-Lindgren	3160-09	00117911	11/13/2014	11/12/2015
Horn Antenna	ETS-Lindgren	3160-10	00117783	11/13/2014	11/12/2015
Pre Amplifier	EMC Instruments	EMC330	980096	12/19/2014	12/18/2015
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-18	10204	12/19/2014	12/18/2015
Pre Amplifier	R&S	SCU-26	100780	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/19/2014	12/18/2015
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/19/2014	12/18/2015
Attenuator	WOKEN	218FS-10	RF27	12/19/2014	12/18/2015
Site NSA	SGS	966 Chamber C	SAC-C	03/05/2014	03/05/2015
Site VSWR	SGS	966 Chamber C	SAC-C	04/10/2014	04/09/2015
DC Power Supply	HOLA	DP-3003	D7070035	05/31/2014	05/30/2015
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.

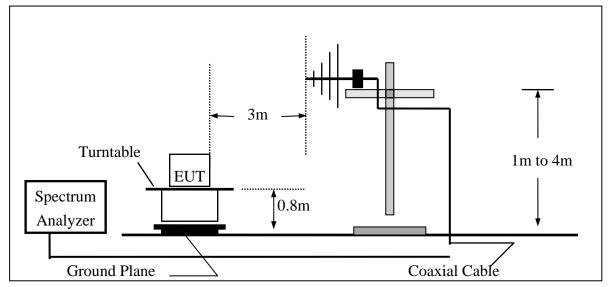
NOTE: N.C.R refers to Not Calibrated Required.



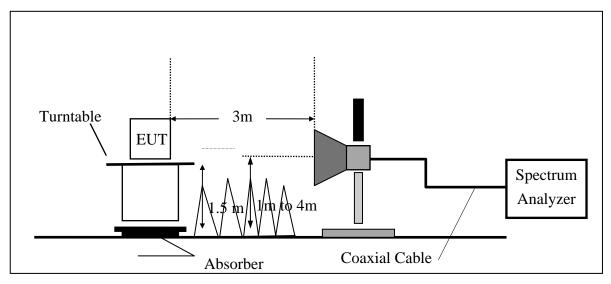
10.3. Test SET-UP:

10.3.1. Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



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





10.4. Measurement Procedure:

Radiated Emission:

- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 4. 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.
- 5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7. Repeat above procedures until all frequency of the interest measured were complete.

Auxiliary Procedure (Setting on Spectrum to capture the reading of emission level):

$$\begin{split} &Span = wide \ enough \ to \ fully \ capture \ the \ emission \ being \ measured \\ &RBW = 1 \ MHz \ for \ f \geq 1 \ GHz, \ 100 \ kHz \ for \ f < 1 \ GHz \\ &VBW \geq RBW \\ &Sweep = auto \\ &Detector \ function = peak \\ &Trace = max \ hold \end{split}$$



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:

 $\mathbf{FS} = \mathbf{RA} + \mathbf{AF} + \mathbf{CL} - \mathbf{AG}$

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

Remark:

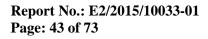
- 1. The limit of the emission level is expressed in dBuV/m, which converts 20*log(uV/m)
- 2. Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) Pre_Amplifier Gain(dB)

10.6. 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 15.209, please refer to Appendix I.

Note: For the tabular table as presents below, "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency. "E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency. "---" : denotes Noise Floor





10.6.1 Radiated Emission Band Edge: (Worst: EDR mode)(Hopping)

peration Band undamental Frequency peration Mode UT Pol.	:EDR :2402 MHz :BANDEDGE LOW :E2 Plane	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2015-02-22 :18.5 deg_C/ 56 RH : Ashton :VERTICAL
120 -			
1			
108 -			
3			
96 -			
84			
			human
72 -			FCC RSE PH
60			
			FCC RSE AV
48 - Martin Martin Martin Martin	man man man mar and mar market and the second s	Manufacture and the second of the second sec	water where we was a set of the se
36 -			
36			*
4			
24			
1			
12			
3			
0		and a second the second s	the second

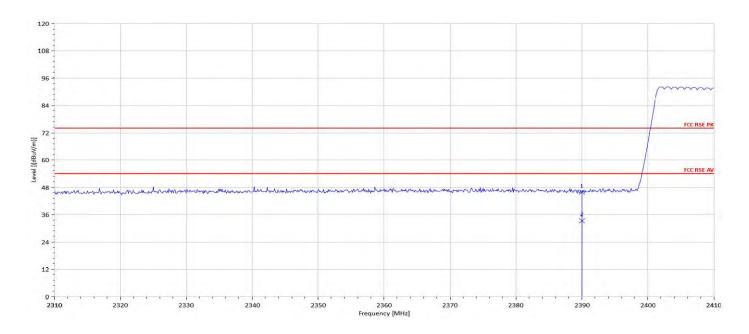
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	39.82	6.36	46.18	74	-27.82
2390.00	Е	Average	26.99	6.36	33.35	54	-20.65

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Operation Band Fundamental Frequency Operation Mode EUT Pol.

:EDR :2402 MHz :BANDEDGE LOW :E2 Plane Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2015-02-22 :18.5 deg_C/ 56 RH : Ashton :HORIZONTAL



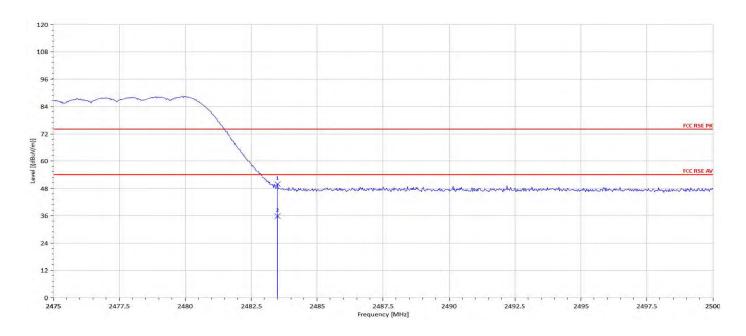
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	39.80	6.36	46.16	74	-27.84
2390.00	E	Average	26.96	6.36	33.32	54	-20.68

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Operation Band Fundamental Frequency Operation Mode EUT Pol.

:EDR :2480 MHz :BANDEDGE HIGH :E2 Plane Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2015-02-22 :18.5 deg_C/ 56 RH : Ashton :VERTICAL



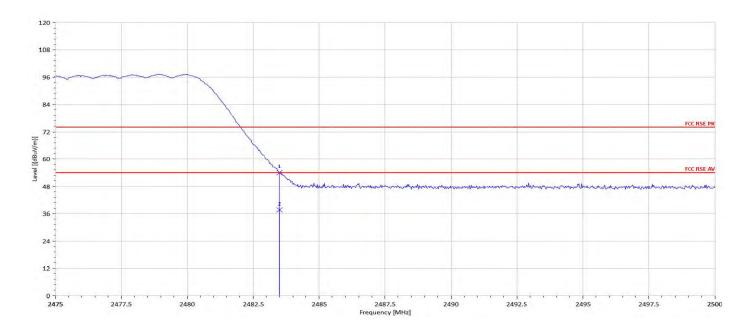
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Peak	42.70	7.14	49.83	74	-24.17
2483.50	E	Average	28.65	7.14	35.79	54	-18.21

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Operation Band Fundamental Frequency Operation Mode EUT Pol.

:EDR :2480 MHz :BANDEDGE HIGH :E2 Plane Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2015-02-22 :18.5 deg_C/ 56 RH : Ashton :HORIZONTAL



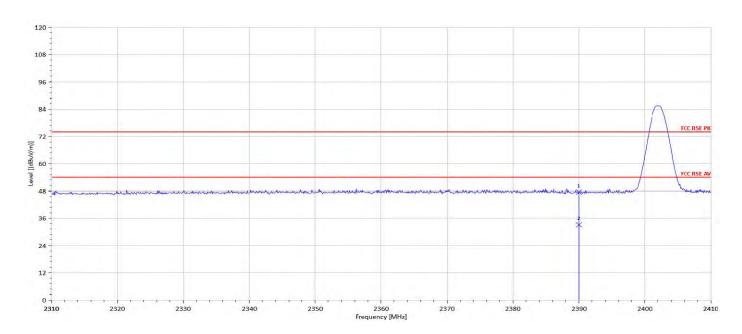
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	46.89	7.14	54.03	74	-19.97
2483.50	E	Average	30.51	7.14	37.65	54	-16.35

Report No.: E2/2015/10033-01 Page: 47 of 73



Band Edge: (Worst: EDR mode)(Non-Hopping)

Operation Band Fundamental Frequency Operation Mode EUT Pol. :EDR :2402 MHz :BANDEDGE LOW :E2 Plane Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2015-02-22 :18.5 deg_C/ 56 RH : Ashton : VERTICAL



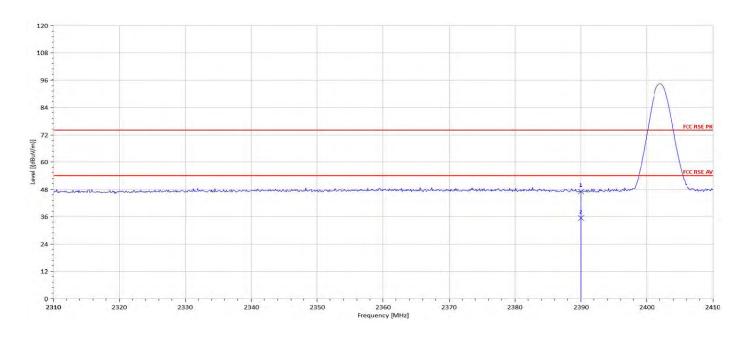
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	41.13	6.36	47.49	74	-26.51
2390.00	E	Average	26.76	6.36	33.12	54	-20.88

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Operation Band Fundamental Frequency Operation Mode EUT Pol.

:EDR :2402 MHz :BANDEDGE LOW :E2 Plane Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2015-02-22 :18.5 deg_C/ 56 RH : Ashton :HORIZONTAL



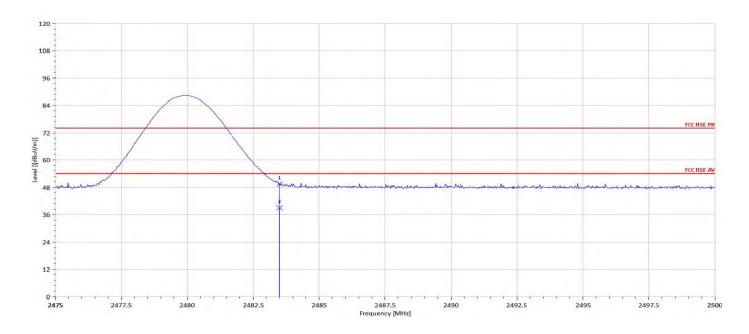
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	40.69	6.36	47.05	74	-26.95
2390.00	E	Average	29.06	6.36	35.42	54	-18.58

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Operation Band Fundamental Frequency Operation Mode EUT Pol.

:EDR :2480 MHz :BANDEDGE HIGH :E2 Plane Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2015-02-22 :18.5 deg_C/ 56 RH : Ashton :VERTICAL



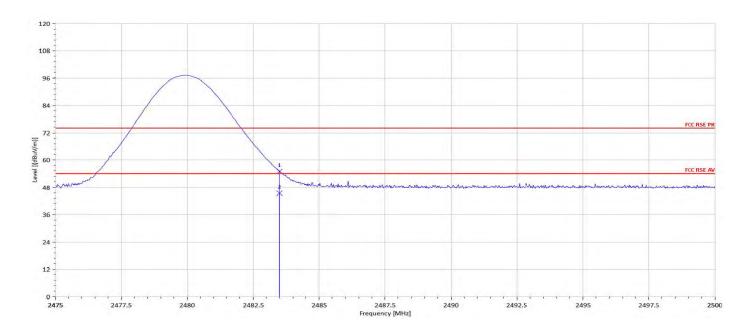
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Peak	42.33	7.14	49.46	74	-24.54
2483.50	E	Average	31.85	7.14	38.99	54	-15.01

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Operation Band Fundamental Frequency Operation Mode EUT Pol.

:EDR :2480 MHz :BANDEDGE HIGH :E2 Plane Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2015-02-22 :18.5 deg_C/ 56 RH : Ashton :HORIZONTAL



Freq.	Note	Detector	Spectrum	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	Е	Peak	47.84	7.14	54.98	74	-19.02
2483.50	E	Average	38.27	7.14	45.41	54	-8.59



10.6.2 Radiated Spurious Emission Measurement Result (worst case EDR mode)							
Operation Band	t	:EDR	Test	Date		:2015-02-22	
Fundamental F	requency	:2402 MHz	402 MHz Temp./Humi.			:18.5 deg_C/ 56 RH	
Operation Mod	le	:TX LOW	Eng	ineer		: Ashton	
EUT Pol.		:E2 Plane	Mea	surement An	tenna Pol.	:VERTICAL	
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV∕m	dB
33.88	S	Peak	48.15	-15.22	32.93	40	-7.07
47.46	S	Peak	49.41	-23.95	25.46	40	-14.54
100.81	S	Peak	52.76	-23.69	29.08	43.5	-14.42
352.04	S	Peak	39.27	-17.31	21.96	46	-24.04
452.92	S	Peak	39.10	-14.83	24.27	46	-21.73
503.36	S	Peak	38.99	-14.15	24.85	46	-21.15
4804.00	Н	Peak	37.47	10.98	48.45	74	-25.55
4804.00	Н	Average	25.72	10.98	36.70	54	-17.30
7206.00	Н	Peak	-	-	-	-	-
9608.00	Η	Peak	-	-	-	-	-
12010.00	Η	Peak	-	-	-	-	-
14412.00	Н	Peak	-	-	-	-	-
16814.00	Н	Peak	-	-	-	-	-
19216.00	Η	Peak	-	-	-	-	-
21618.00	Н	Peak	-	-	-	-	-
24020.00	Н	Peak	-	-	-	-	-

10.6.2 Radiated Spurious Emission Measurement Result (worst case EDR mode)



Operation Ban Fundamental F Operation Mod EUT Pol.	Frequency	:EDR :2402 MHz :TX LOW :E2 Plane	Tem Eng	t Date np./Humi. ineer asurement An	tenna Pol.	:2015-02-22 :18.5 deg_C/ : Ashton :HORIZONT.	
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
101.78	S	Peak	54.26	-23.54	30.72	43.5	-12.78
172.59	S	Peak	52.55	-23.96	28.59	43.5	-14.91
503.36	S	Peak	43.61	-14.15	29.46	46	-16.54
576.11	S	Peak	41.93	-12.45	29.48	46	-16.52
672.14	S	Peak	40.40	-11.68	28.71	46	-17.29
720.64	S	Peak	38.80	-10.77	28.03	46	-17.97
4804.00	Н	Peak	36.52	10.98	47.50	74	-26.50
4804.00	Н	Average	26.30	10.98	37.28	54	-16.72
7206.00	Н	Peak	-	-	-	-	-
9608.00	Н	Peak	-	-	-	-	-
12010.00	Н	Peak	-	-	-	-	-
14412.00	Н	Peak	-	-	-	-	-
16814.00	Н	Peak	-	-	-	-	-
19216.00	Н	Peak	-	-	-	-	-
21618.00	Н	Peak	-	-	-	-	-
24020.00	Н	Peak	-	-	-	-	-



Operation Ban Fundamental F Operation Mod EUT Pol.	Frequency	:EDR :2441 MHz :TX MID :E2 Plane	Test Date Temp./Humi. Engineer Measurement Antenna Pol.			:2015-02-22 :18.5 deg_C/ 56 RH : Ashton :VERTICAL	
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
50.37	S	Peak	59.60	-25.65	33.95	40	-6.05
103.72	S	Peak	53.36	-23.24	30.12	43.5	-13.38
352.04	S	Peak	42.38	-17.31	25.07	46	-20.93
503.36	S	Peak	39.51	-14.15	25.36	46	-20.64
576.11	S	Peak	37.10	-12.45	24.64	46	-21.36
720.64	S	Peak	35.06	-10.77	24.29	46	-21.71
4882.00	Н	Peak	36.65	10.91	47.56	74	-26.44
4882.00	Н	Average	26.31	10.91	37.22	54	-16.78
7323.00	S	Peak	-	-	-	-	-
9764.00	Н	Peak	-	-	-	-	-
12205.00	Н	Peak	-	-	-	-	-
14646.00	Н	Peak	-	-	-	-	-
17087.00	Н	Peak	-	-	-	-	-
19528.00	Н	Peak	-	-	-	-	-
21969.00	Н	Peak	-	-	-	-	-
24410.00	Н	Peak	-	-	-	-	-



Operation Ban Fundamental I Operation Mod EUT Pol.	Frequency	:EDR :2441 MHz :TX MID :E2 Plane	Test Date Temp./Humi. Engineer Measurement Antenna Pol.			:2015-02-22 :18.5 deg_C/ 56 RH : Ashton :HORIZONTAL	
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
33.88	S	Peak	39.64	-15.22	24.42	40	-15.58
100.81	S	Peak	55.71	-23.69	32.02	43.5	-11.48
172.59	S	Peak	52.29	-23.96	28.33	43.5	-15.17
503.36	S	Peak	42.71	-14.15	28.56	46	-17.44
576.11	S	Peak	41.71	-12.45	29.25	46	-16.75
720.64	S	Peak	39.16	-10.77	28.38	46	-17.62
4882.00	Н	Peak	37.45	10.91	48.36	74	-25.64
4882.00	Н	Average	26.83	10.91	37.74	54	-16.26
7323.00	Н	Peak	-	-	-	-	-
9764.00	Н	Peak	-	-	-	-	-
12205.00	Н	Peak	-	-	-	-	-
14646.00	Н	Peak	-	-	-	-	-
17087.00	Н	Peak	-	-	-	-	-
19528.00	Н	Peak	-	-	-	-	-
21969.00	Н	Peak	-	-	-	-	-
24410.00	Н	Peak	-	-	-	-	-



Operation Ban Fundamental F Operation Moo EUT Pol.	Frequency	:EDR :2480 MHz :TX HIGH :E2 Plane	Test Date Temp./Humi. Engineer Measurement Antenna Pol.			:2015-02-22 :18.5 deg_C/ 56 RH : Ashton :VERTICAL	
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
61.04	S	Peak	64.19	-28.42	35.77	40	-4.23
96.93	S	Peak	54.30	-24.36	29.94	43.5	-13.56
352.04	S	Peak	42.81	-17.31	25.50	46	-20.50
503.36	S	Peak	40.06	-14.15	25.91	46	-20.09
576.11	S	Peak	38.21	-12.45	25.75	46	-20.25
672.14	S	Peak	36.33	-11.68	24.65	46	-21.35
4960.00	Н	Peak	36.91	10.99	47.90	74	-26.10
4960.00	Н	Average	26.62	10.99	37.61	54	-16.39
7440.00	S	Peak	-	-	-	-	-
9920.00	Н	Peak	-	-	-	-	-
12400.00	Н	Peak	-	-	-	-	-
14880.00	Н	Peak	-	-	-	-	-
17360.00	Н	Peak	-	-	-	-	-
19840.00	Н	Peak	-	-	-	-	-
22320.00	Н	Peak	-	-	-	-	-
24800.00	Н	Peak	-	-	-	-	-



Operation Ban Fundamental F Operation Mod EUT Pol.	Frequency	:EDR :2480 MHz :TX HIGH :E2 Plane	Test Date Temp./Humi. Engineer Measurement Antenna Pol.			:2015-02-22 :18.5 deg_C/ 56 RH : Ashton :HORIZONTAL	
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
100.81	S	Peak	54.18	-23.69	30.49	43.5	-13.01
166.77	S	Peak	51.17	-23.63	27.53	43.5	-15.97
352.04	S	Peak	42.60	-17.31	25.29	46	-20.71
503.36	S	Peak	42.30	-14.15	28.15	46	-17.85
576.11	S	Peak	40.98	-12.45	28.53	46	-17.47
672.14	S	Peak	41.07	-11.68	29.39	46	-16.61
4960.00	Н	Peak	36.96	10.99	47.96	74	-26.04
4960.00	Н	Average	26.06	10.99	37.05	54	-16.95
7440.00	Н	Peak	-	-	-	-	-
9920.00	Н	Peak	-	-	-	-	-
12400.00	Н	Peak	-	-	-	-	-
14880.00	Н	Peak	-	-	-	-	-
17360.00	Н	Peak	-	-	-	-	-
19840.00	Н	Peak	-	-	-	-	-
22320.00	Н	Peak	-	-	-	-	-
24800.00	Н	Peak	-	-	-	-	-



11. FREQUENCY SEPARATION

11.1. Standard Applicable

According to \$15.247(a)(1), 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:

Refer to section 7.2 for details.

11.3. Test Set-up:

Refer to section 7.3 for details.

11.4. Measurement Procedure:

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

11.5. Measurement Result:

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

Note: Refer to next page for plots.



Frequency Separation Test Data





12. NUMBER OF HOPPING FREQUENCY

12.1. Standard Applicable

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

12.2. Measurement Equipment Used:

Refer to section 7.2 for details.

12.3. Test Set-up:

Refer to section 7.3 for details.

12.4. Measurement Procedure:

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

12.5. Measurement Result:

Note: Refer to next page for plots.



Channel Number

🃁 Agilent Spectrum Analyzer - Swept SA				
XX RL RF 50 Ω DC		SE:INT Avg Type		M Feb 09, 2015 E 1 2 3 4 5 6 Frequency
Center Freq 2.420500000 Ref Offset 4.43 dB	PNO: Fast Trig: Free IFGain:Low #Atten: 30	Run	TYP DE Mkr1 2.402 0	
10 dB/div Ref 20.00 dBm			-2.4	
10.0				Center Fred 2.420500000 GH:
0.00 .10.0	ar the and the stand and the stan	᠆᠆ᢧ᠆᠂ᢧᡊᢧᢛᡗ᠆ᡐ᠆ᢉ᠉ᡧ	᠁ᠰᢛᢣᡊ᠕᠁ᢣᢛᠾᡊ᠉ᠬ	Start Free 2.400000000 GH:
-20.0				Stop Fred 2.441000000 GH;
-40.0				CF Step 4.100000 MH <u>Auto</u> Mar
-60.0				Freq Offse 0 H:
-70.0				
Start 2.40000 GHz #Res BW 430 kHz	#VBW 1.5 MHz		Stop 2.44 Sweep 1.000 ms (100 GHz 1001 pts)
MSG			STATUS	

2.4 GHz – 2.441GHz

2.441 GHz – 2.4835GHz

	ctrum Analyzer - Swept									
Center F	RF 50 Ω req 2.462250		z		NSE:INT		ALIGN AUTO	TRAC	M Feb 09, 2015 E 1 2 3 4 5 6	Frequency
10 dB/div Log	Ref Offset 4.43 Ref 20.00 dE	PN IFG	lO: Fast ⊊ ain:Low	Trig: Free #Atten: 3			Mkr1 2	.480 00	0 0 GHz 39 dBm	Auto Tuno
10.0									<u> </u>	Center Fre 2.462250000 GH
0.00 \	<u> </u>	ᠧ᠆ᢕ᠆᠋ᡝ᠆ᡝ᠆ᠰ᠆ᠰ	ᠯᡁᢝᡗ᠆ᠰ᠆᠋ᡃᠰ	᠊᠕ᡊᡣᠯᡔ᠆ᠾᠬᢦᡧ <i>ᢁ</i>	ᡀᢇ᠋ᠾ᠉᠕ᠬᠬ	مریب <i>کریم کریم کر</i> ین	nymywyw	مراب به المرباني المربيني المربيني المربيني المربيني المربينين المربينين المربينين المربينين المربي المربي الم مربقة المربيني المربيني المربيني المربيني المربيني المربيني المربينين المربينين المربينين المربينين المربينين ال		Start Fre 2.441000000 GF
30.0										Stop Fre 2.483500000 GH
40.0									Lalatop	CF Ste 4.250000 Mi <u>Auto</u> Mi
50.0										Freq Offs 0 I
	1100 GHz							Stop 2.48	350 GHz	
#Res BW	430 kHz		#VBW	1.5 MHz			Sweep 1		1001 pts)	



13. TIME OF OCCUPANCY (DWELL TIME)

13.1. Standard Applicable

According to \$15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. 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:

Refer to section 7.2 for details.

13.3. Test Set-up:

Refer to section 7.3 for details.

13.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = operating frequency.
- 4. Set the spectrum analyzer as RBW, VBW=1MHz, 3MHz, Span = 0Hz, Detector = Peak, Adjust Sweep = 2~7ms.
- 5. 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

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.



13.5. Tabular Result of the Measurement:

1Mbps (GFSK):

Test Channel:	Mode:	Measurement Result (ms):	Limit (ms):
Low:	DH1	0.382	400ms
	DH3	1.64	400ms
	DH5	2.885	400ms
Middle:	DH1	0.382	400ms
	DH3	1.64	400ms
	DH5	2.885	400ms
High:	DH1	0.382	400ms
	DH3	1.64	400ms
	DH5	2.885	400ms

2Mbps (/4 DQPSK):

Test Channel:	Mode:	Measurement Result (ms):	Limit (ms):
Middle:	2DH1	0.382	400ms
	2DH3	1.64	400ms
	2DH5	2.885	400ms

3Mbps (8DPSK):

Test Channel:	Mode:	Measurement Result (ms):	Limit (ms):
Middle:	3DH1	0.382	400
	3DH3	1.64	400
	3DH5	2.885	400



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

1Mbps:

CH Low	DH1 time slot $= 0.38$	(ms) * (1600/2/79) * 31.6 = 122.24	(ms)
	DH3 time slot $= 1.64$	(ms) * (1600/4/79) * 31.6 = 262.40	(ms)
	DH5 time slot $= 2.88$	(ms) * (1600/6/79) * 31.6 = 307.73	(ms)

CH Mid DH1 time slot =
$$0.382$$
 (ms) * $(1600/2/79)$ * $31.6 = 122.24$ (ms)
DH3 time slot = 1.64 (ms) * $(1600/4/79)$ * $31.6 = 262.40$ (ms)
DH5 time slot = 2.885 (ms) * $(1600/6/79)$ * $31.6 = 307.73$ (ms)

CH High DH1 time slot =
$$0.382$$
 (ms) * $(1600/2/79)$ * $31.6 = 122.24$ (ms)
DH3 time slot = 1.64 (ms) * $(1600/4/79)$ * $31.6 = 262.40$ (ms)
DH5 time slot = 2.885 (ms) * $(1600/6/79)$ * $31.6 = 307.73$ (ms)

2Mbps:

	CH Mid	2DH1 time slot = 0.382	(ms) * (1600/2/79)	* 31.6 = 122.24	(ms)
		2DH3 time slot = 1.64	(ms) * (1600/4/79)	* 31.6 = 262.40	(ms)
		2DH5 time slot = 2.885	(ms) * (1600/6/79)	* 31.6 = 307.73	(ms)
3Mbps:					
	CH Mid	3DH1 time slot = 0.382	(ms) * (1600/2/79)	* 31.6 = 122.24	(ms)
		3DH3 time slot = 1.64	(ms) * (1600/4/79)	* 31.6 = 262.40	(ms)
		3DH5 time slot = 2.885	(ms) * (1600/6/79)	* 31.6 = 307.73	(ms)

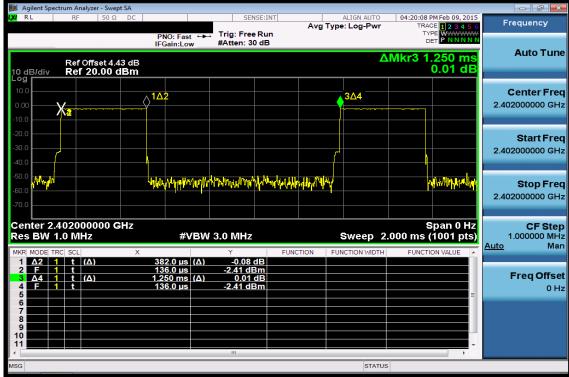
13.6. Measurement Result:

Note: Refer to next page for plots.



CH-Low





📕 Agilent Spectrur										- ē <mark>-</mark>
KI RL	RF 5	50Ω DC			SENSE:IN	Avg T	ALIGN AUTO	04:29:18 PM Fe TRACE	23456	Frequency
			PNO: Fast		Free Run n: 30 dB				N N N N N	
10 dB/div		t 4.43 dB 00 dBm					Δ	Mkr3 2.50 0.0	00 ms 04 dB	Auto Tur
10.0	Xa			^1/	2	3∆4				Center Fre 2.402000000 GH
-20.0										Start Fre 2.402000000 GF
-50.0 <mark></mark>					hter of the second s	1pmula			north the second second	Stop Fr 2.402000000 Gi
Center 2.40 Res BW 1.0	MHz	0 GHz	#VB	W 3.0 M	Hz	FUNCTION	Sweep 5	Spa .000 ms (10		CF St 1.000000 M <u>Auto</u> M
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	t (Δ) t t (Δ) t		1.640 ms (Δ 545.0 μs 2.500 ms (Δ 545.0 μs	() 0 -2.4 () 0	05 dB 3 dBm 04 dB 3 dBm	Forceron		Forcentry		Freq Offs 0
6 7 8 9 10 11										
				m			STATUS	1	F	
SG										



DH5

📕 Agilent Spectrum Analyzer - Swept SA					
LXI R L RF 50 Ω DC	SENSE:	Avg Typ	ALIGN AUTO 04: De: Log-Pwr	36:41 PM Feb 09, 2015 TRACE 1 2 3 4 5 6 TYPE WWWWWW	Frequency
Ref Offset 4.43 dB 10 dB/div Ref 20.00 dBm	PNO: Fast Ing: Free Ru IFGain:Low #Atten: 30 dE		ΔMkı	r3 3.752 ms -0.01 dB	Auto Tune
		3 ∆4			Center Freq 2.402000000 GHz
-20.0					Start Freq 2.402000000 GHz
-60.0 0000000000000000000000000000000000	apytread first	₩ 		vik, hyvetyp	Stop Freq 2.402000000 GHz
Center 2.402000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz		Sweep 7.533		CF Step 1.000000 MHz Auto Man
MKR MODE TRC SCL X	2.885 ms (Δ) -0.06 dB	FUNCTION FU	INCTION WIDTH	FUNCTION VALUE	Adto Wall
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.885 ms (Δ) -0.06 dB 391.7 μs -2.28 dBm 3.752 ms (Δ) -0.01 dB 391.7 μs -2.28 dBm			E	Freq Offset 0 Hz
6 7 8 9 10					
MSG	m		STATUS	4	

CH-Mid

🗾 Agilent Spectrum Analyzer - Swept SA				
LX/RL RF 50Ω DC	SENSE:I	ALIGN AUTO Avg Type: Log-Pwr	04:24:19 PM Feb 09, 2015 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 4.43 dB	PNO: Fast +++ Trig: Free Ru IFGain:Low #Atten: 30 dB	n 571 5	Mkr3 1.250 ms 0.00 dB	Auto Tune
10.0 -10.0	1Δ2	3∆4		Center Freq 2.441000000 GHz
-20.0 -30.0 -40.0				Start Freq 2.441000000 GHz
-60.0 WWW -60.0	dyoyddoridlaefelydroiorddogae	th/handsentational	ywyndrol 	Stop Freq 2.441000000 GHz
Center 2.44100000 GHz Res BW 1.0 MHz MKR MODE TRC SCL X	#VBW 3.0 MHz 382.0 μs (Δ) -0.51 dB	Sweep 2	Span 0 Hz .000 ms (1001 pts)	CF Step 1.000000 MHz <u>Auto</u> Man
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	202.0 μs -0.52 dBm 1.250 ms (Δ) 0.00 dB 202.0 μs -0.52 dBm		=	Freq Offset 0 Hz
7 9 10 11				
MSG		STATUS	3	



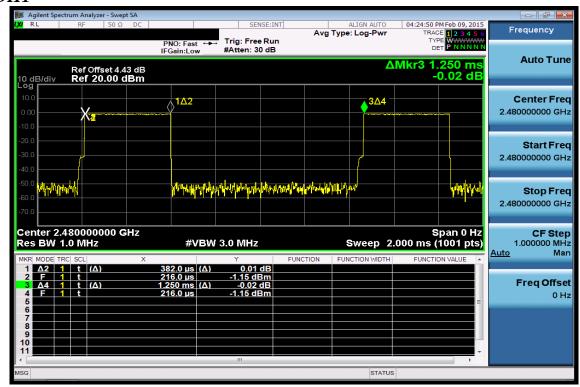
DH3

📕 Agilent Spectrum Analyzer - Swept SA				
LX/ RL RF 50 Ω DC	PNO: East +++ Trig: Free Rur	Avg Type: Log-Pwr	04:32:57 PM Feb 09, 2015 TRACE 1 2 3 4 5 6 TYPE WWWWW	Frequency
Ref Offset 4.43 dB 10 dB/div Ref 20.00 dBm	PNO: Fast Trig: Free Rur IFGain:Low #Atten: 30 dB		Mkr3 2.500 ms 0.00 dB	Auto Tune
10.0 X2	↓1∆2	3 ∆4		Center Freq 2.441000000 GHz
-20.0				Start Freq 2.441000000 GHz
-50.0	10kg11 ^{v4} v ¹ x	http://halv	photo	Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 5.	Span 0 Hz 000 ms (1001 pts)	CF Step 1.000000 MHz <u>Auto</u> Man
1 Δ2 1 t (Δ) 2 F 1 t	1.640 ms (Δ) 0.01 dB 670.0 μs -0.47 dBm 2.500 ms (Δ) 0.00 dB 670.0 μs -0.47 dBm			Freq Offset 0 Hz
MSG		STATUS		

Old RF 50 Ω DC SENSE:INT ALIGN AUTO 04:40:47 PM Feb 09,2015 Frequency PNO: Fast → Trig: Free Run IFGain:Low Trig: Free Run Atten: 30 dB Avg Type: Log-Pwr Trace Trace Auto Tu 0 dB/div Ref Offset 4.43 dB 0.03 dB 0.03 dB Center Fr 10 dB/div dAuto Tu 3Δ4 Center Fr 2.44100000 G 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4 10.0 4 4 4 4 4 4
PNO: Fast → Trig: Free Run IFGain:Low Atten: 30 dB 10 dB/div Ref 20.00 dBm 10 dB/div Ref 20.
Ref Offset 4.43 dB ΔMkr3 3.752 ms 0.03 dB Auto Tu 10 dB/div Ref 20.00 dBm 1Δ2 3Δ4 Center Fr 2.44100000 G 100 X2 1Δ2 3Δ4 Start Fr
Ref Offset 4.43 dB ΔΜΚΓ3 3.752 ms 10 dB/div Ref 20.00 dBm 100 112 100 12 100 2.44100000 G 100 100
Log Δα Δα Center Fr 10.0 Δα
10.0 10.0 10.0 10.0 10.0 20.0
10.0 2.44100000 G
-100
Start Fr
Start Fr
2.441000000 G
-40.0
^{-50.0} Manya
+60.0 2.441000000 G
Center 2.441000000 GHz CF St
Res BW 1.0 MHz VBW 1.0 MHz Sweep 7.533 ms (1001 pts) 1.00000 M
1 Δ2 1 t (Δ) 2.885 ms (Δ) -0.16 dB
2 F 1 t 474.6 μs -0.33 dBm Freq Offs
4 F 1 t 474.6 µs -0.33 dBm 0
MSG STATUS



CH-High DH1



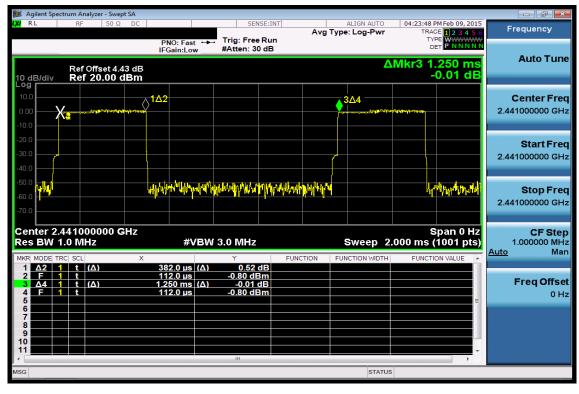
	trum Analyzer - Sw									
<mark>()</mark> RL	RF 50 \$	Ω DC			NSE:INT	Avg Typ	ALIGN AUTO e: Log-Pwr	TRAC	M Feb 09, 2015	Frequency
			PNO: Fast IFGain:Low	Trig: Free #Atten: 3				TYI Di	PE WWWWWWW ET P N N N N N	
			in Guineon				Δ	Mkr3 2	.500 ms	Auto Tu
I0 dB/div	Ref Offset 4 Ref 20.00								0.01 dB	
-og 10.0										Center Fr
				<mark>142</mark>	3∆4					2.48000000 G
0.00 X .			انعنى ك							2.4000000000
20.0										
30.0										Start Fr 2.480000000 G
40.0										2.48000000 G
50.0 				and databat to this	in lu				the state of the state	
60.0				entil market for the last	l en el			T	n alata an	Stop Fr
70.0										2.48000000 G
enter 2.4 tes BW 1	480000000 0 MHz	GHZ	#\/F	3W 3.0 MHz			Sweep 5	000 ms (pan 0 Hz	CF St 1.000000 M
		X	<i></i>	элт 0.0 типт2 Ү			NCTION WIDTH			Auto M
							NCHON METH	roncin	ON VALUE	
1 A2 1	t (Δ)		1.640 ms (/							
	t (Δ) t t (Δ)		1.640 ms(/ 200.0 µs 2.500 ms(/	-1.07 d	Bm					Freq Offs
1 Δ2 1 2 F 1 3 Δ4 1 4 F 1	t	2	200.0 µs	-1.07 d	Bm dB					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	t	2	200.0 µs 2.500 ms (/	<u>-1.07 dl</u> Δ) -0.01	Bm dB				= = =	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	t	2	200.0 µs 2.500 ms (/	<u>-1.07 dl</u> Δ) -0.01	Bm dB				======================================	Freq Offs 0
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	t	2	200.0 µs 2.500 ms (/	<u>-1.07 dl</u> Δ) -0.01	Bm dB				E	
1 Δ2 1 2 F 1 3 Δ4 1 4 F 1 5 6 7 8 9	t	2	200.0 µs 2.500 ms (/	<u>-1.07 dl</u> Δ) -0.01	Bm dB				E	



		Spect			yzer -		t SA																- ¢ 론
l,XI RI			F	ſF	5	Ω 0	DC					SE	NSE:IN	IT	Av		ALIGN AUTO			eb 09, 201		Fre	equency
									IO: Fas Sain:Lo	st ⊶⊷ w		g: Fre ten: 3		ו		5 ·) [· ·			TYPE DET	PNNNN	Ň		
10 dE Log	3/di	v					3 dB Bm										A	Mkr3		52 ms 02 dE			Auto Tun
10.0 0.00 -10.0		X	<u>21</u>								0	1∆2		∮ 3∆	4								enter Fre
-20.0 -30.0 -40.0																						2.480	Start Fre
-50.0 -60.0 -70.0	nsh	Ņ									Y	ነ ትለሳተ	V ologi ^N	Ŋ						M. May May		2.480	Stop Fre 0000000 GH
Cen Res	BV	V 1.	.0 P	ЛH		0 G			V	BW 1							Sweep 7		ns (İ0)	1 uto	CF Stej 000000 MH Ma
MKR I			_	:L 1	<u> </u>		Х	2.8	35 ms	(A)		Y -0.11	dB	FUN	CTION	FUN	NCTION WIDTH	FU	NCTION	VALUE	i 🗖		
2	F	1	t		A)			39	1.7 µs 52 ms		-(0.02 0.02	Bm									F	Freq Offse
4	F	1	t		Δ)				1.7 µs		-(0.02).97 d											0 H
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10		\vdash	-	+																			
•												ш								•			
MSG																	STATUS	5					



CH-Mid 2DH1



🔰 Agilent Spectrum Analyzer - Swept SA			
KI RF 50Ω DC	SENSE:INT	ALIGN AUTO 04:32:16 PM Feb 09, Avg Type: Log-Pwr TRACE 23	
	PNO: Fast +++ Trig: Free Run	TYPE WWW	www.
	IFGain:Low #Atten: 30 dB	,	
Ref Offset 4.43 dB		ΔMkr3 2.500 r	
10 dB/div Ref 20.00 dBm		0.00 (ab
			Center Freq
			2.441000000 GHz
	الأندر المراجع والمتحد والأختفان الأد		2.441000000 GH2
-10.0			
-20.0			Start Freq
-30.0			2.441000000 GHz
-40.0			
-50.0	und when the second of the sec		ut/te
-60.0	and the second s	tu ki vi vi	
-70.0			2.441000000 GHz
Center 2.441000000 GHz		Span 0	Hz CF Step
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 5.000 ms (1001 p	ts) 1.000000 MHz Auto Man
MKR MODE TRC SCL X	Y FUNCT	ION FUNCTION WIDTH FUNCTION VALUE	Auto
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1.640 ms (Δ) 0.72 dB 240.0 μs -0.76 dBm		
3 Δ4 1 t (Δ)	2.500 ms (Δ) 0.00 dB		Freq Offset
4 F 1 t	240.0 µs -0.76 dBm		= 0 Hz
6			
8			
9			
10			.
•	m		
MSG		STATUS	



🎉 Agilent Spe	ctrum Ana	alyzer - Sw	ept SA										
(X/RL	RF	50 9	Ω DC		SEI	NSE:INT		Ave 1	ALIGN AUTO		0 PM Feb 09, 2015		Frequency
				PNO: Fast IFGain:Low	Trig: Fre #Atten: 3			Avg	ype. Log-r wi				
10 dB/div		Offset 4 20.00								ΔMkr3	3.752 ms 0.04 dB		Auto Tune
Log 10.0 0.00	(<u>.</u>	مرور میکند. مرور میکند میکند.	•••••••		 		3∆4 ,				~~	2	Center Freq 2.441000000 GHz
-20.0												2	Start Freq 2.441000000 GHz
-50.0 <mark>palet p</mark> -60.0 -70.0					a panghaya	mpyant					- Lydydywy	2	Stop Freq 2.441000000 GHz
Center 2. Res BW	1.0 MH		GHz ×		3.0 MHz		FUNC	TION	Sweep	7.533 ms	Span 0 Hz (1001 pts)	Au	CF Step 1.000000 MHz <u>to</u> Man
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		(Δ) (Δ)		2.885 ms 391.7 µs 3.752 ms 391.7 µs	0.69 -0.68 dl 0.04 -0.68 dl	Bm dB					=		Freq Offset 0 Hz
6 7 8 9 10 11													
					m						•		
MSG									STAT	us			

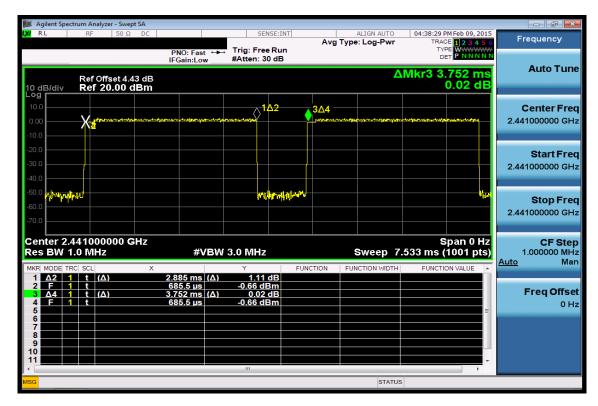


CH-Mid 3DH1

🎉 Agilent Spectrum Analyzer - Swept SA				
LXIRL RF 50ΩDC		ALIGN AUTO 04:23:11 PM Feb 09, 2015 ype: Log-Pwr TRACE 1 2 3 4 5 6 TYPE WWWWWWWW	Frequency	
IFGai Ref Offset 4.43 dB 10 dB/div Ref 20.00 dBm	:Fast -→→ Trig:FreeRun n:Low #Atten:30 dB	ΔMkr3 1.250 ms -0.01 dB	Auto Tune	
10.0 0.00 -10.0			Center Freq 2.441000000 GHz	
-20.0		Ţ	Start Freq 2.441000000 GHz	
-50.0 44776177 541047 -60.0 -70.0	qo/modrupadu/hoti.co.thqld.co.urjoup.linedup.drawly	n	Stop Freq 2.441000000 GHz	
Center 2.441000000 GHz Res BW 1.0 MHz	CF Step 1.000000 MHz Auto Man			
2 F 1 t 154.0	0 μs (Δ) 1.90 dB 0 μs -0.83 dBm ms (Δ) -0.01 dB	FUNCTION WIDTH FUNCTION VALUE	Freq Offset 0 Hz	
MSG Alignment Completed				

🎉 Agilent Spectrum Analyzer - Swept SA				
IXI RL RF 50 Ω DC	SENSE:IN	T ALIGN AUTO Avg Type: Log-Pwr	04:31:28 PM Feb 09, 2015 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast +++ Trig: Free Run			
	IFGain:Low #Atten: 30 dB			Auto Tune
Ref Offset 4.43 dB 10 dB/div Ref 20.00 dBm		Δ	Mkr3 2.500 ms- -0.02 dB	Auto Tune
10 dB/div Ref 20.00 dBm				
10.0	1Δ2	▲ 3△4		Center Freq
	mush and a second se		the second s	2.441000000 GHz
-10.0				
-20.0				Otort From
-30.0				Start Freq 2.441000000 GHz
-40.0				2.441000000 GH2
50.0			1.1.1.1	
-50.0	and the start of the	M I I I I I I I I I I I I I I I I I I I	alar and the second	Stop Freq
				2.441000000 GHz
-70.0				
Center 2.441000000 GHz			Span 0 Hz	CF Step
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 5	.000 ms (1001 pts)	1.000000 MHz
MKR MODE TRC SCL X	Y	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 <u>Δ2</u> 1 t (Δ)	1.640 ms (Δ) 0.99 dB			
2 F 1 t $3 \Delta 4 1 t (\Delta)$	295.0 μs -0.69 dBm 2.500 ms (Δ) -0.02 dB			Freq Offset
4 F 1 t	295.0 µs -0.69 dBm			0 Hz
6			=	
7				
9				
10				
•	m		•	
MSG JAlignment Completed STATUS				







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.

14.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 0.76 dBi, and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

~ End of Report ~