

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Applicant:	CASTLES TECHNOLOGY CO., LTD. 6F, NO. 207-5, SEC. 3, BEIXIN RD., XINDIAN DISTRICT, NEW TAIPEI CITY 23143, TAIWAN (R. O. C.)
Product Name:	Mobile POS
Brand Name:	CASTLES TECHNOLOGY
Model No.:	MP200
Model Difference:	N/A
FCC ID:	WIYMP200SERIES
Report Number:	E2/2018/50096
FCC Rule Part:	§15.247, Cat: DSS
Issue Date:	Jul. 13, 2018
Date of Test:	May 31, 2018~ Jul. 05, 2018
Date of EUT Re- ceived:	May 31, 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.

Tested By:

Aken Huang / Engineer



Approved By:

Jim Chang / Manager

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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/50096	Rev.00	Initial creation of docu- ment	All	Jul. 13, 2018	Stefanie Yu / Clerk

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GENERAL INFORMATION 1

1.1 Product description

General:

Product Name:	Mobile POS			
Brand Name:	CASTLES TEC	CASTLES TECHNOLOGY		
Model No.:	MP200			
Model Difference:	N/A			
Hardware Version:	MP200-HW-v1.05			
Software Version:	001x-001x-002x-002x-0027			
	3.75V from rechargeable Li-ion battery or 5V from AC Adapter			
Power Supply:	Battery: Model No.: MP200, Supplier: KAYO BATTERY CO., LTD.			
	Adapter:	Model No.: 1A81-UB, Supplier: Lucent Trans Electronics Co., Ltd.		

Bluetooth_BR only:

Bluetooth Version:	V2.1 Dual mode
Channel number:	79 channels
Modulation type:	GFSK + π/4DQPSK + 8DPSK
Transmit Power:	11.77 dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	<= 0.4s
Antenna Designation:	PIFA Antenna, Gain: -0.61 dBi

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247 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 Number and Designation are: 735305 / TW 0002

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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SYSTEM TEST CONFIGURATION 2

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Radiated Emissions

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

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2.5 Configuration of Tested System Fig. 2-1 Radiated Emission

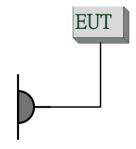


Fig. 2-2 Conducted (Antenna Port) Configuration



Remote Side

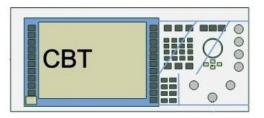


Table 2-1 Equipment Used in Tested System

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 Test Set	Anritsu	MT8852B	6k00006107	Shielded	Unshielded

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UMMARY OF TEST RESULTS 3

FCC Rules	Description Of Test	Result	
§15.207(a)	AC Power Line Conducted Emission Complia		
§15.247(b)(1)	Peak Output Power	Compliant	
§15.247(a)(1)	20dB & 99% Bandwidth	Compliant	
§15.247(d)	Conducted Band Edge and Spurious Emission	Compliant	
§15.247(d)	Radiated Band Edge and Spurious Emission	Compliant	
§15.247(a)(1)	Frequency Separation	Compliant	
§15.247(a)(1)(iii)	Number of hopping frequency	Compliant	
§15.247(a)(1)(iii)	Time of Occupancy	Compliant	
§15.203 §15.247(b)	Antenna Requirement	Compliant	

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DESCRIPTION OF TEST MODES 4

4.1 Operated in 2400 ~ 2483.5MHz Band

79 channels are provided for Bluetooth

ltem	FREQUENCY	ltem	FREQUENCY	ltem	FREQUENCY	ltem	FREQUENCY
1	2402 MHz	21	2422 MHz	41	2442 MHz	71	2462 MHz
2	2403 MHz	22	2423 MHz	42	2443 MHz	72	2463 MHz
3	2404 MHz	23	2424 MHz	43	2444 MHz	73	2464 MHz
4	2405 MHz	24	2425 MHz	44	2445 MHz	74	2465 MHz
5	2406 MHz	25	2426 MHz	45	2446 MHz	75	2466 MHz
6	2407 MHz	26	2427 MHz	46	2447 MHz	76	2467 MHz
7	2408 MHz	27	2428 MHz	47	2448 MHz	77	2468 MHz
8	2409 MHz	28	2429 MHz	48	2449 MHz	78	2469 MHz
9	2410 MHz	29	2430 MHz	49	2450 MHz	79	2470 MHz
10	2411 MHz	30	2431 MHz	50	2451 MHz	70	2471 MHz
11	2412 MHz	31	2432 MHz	51	2452 MHz	71	2472 MHz
12	2413 MHz	32	2433 MHz	52	2453 MHz	72	2473 MHz
13	2414 MHz	33	2434 MHz	53	2454 MHz	73	2474 MHz
14	2415 MHz	34	2435 MHz	54	2455 MHz	74	2475 MHz
15	2416 MHz	35	2436 MHz	55	2456 MHz	75	2476 MHz
16	2417 MHz	36	2437 MHz	56	2457 MHz	76	2477 MHz
17	2418 MHz	37	2438 MHz	57	2458 MHz	77	2478 MHz
18	2419 MHz	38	2439 MHz	58	2459 MHz	78	2479 MHz
19	2420 MHz	39	2440 MHz	59	2460 MHz	79	2480 MHz
20	2421 MHz	40	2441 MHz	60	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.
- Investigation has been done on all the possible configurations for searching the worst 3 case.

RADIATED EMISSION TEST:

	RADIATED EMISSION TEST (BELOW 1 GHz)					
MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	PACKET TYPE		
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5		
	RADIATED EMISSION TEST (ABOVE 1 GHz)					
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5		

Note:

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

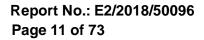
ANTENNA PORT CONDUCTED MEASUREMENT:

	CONDUCTED TEST				
		Peak Output Power,	20dB Band Width		
MODE	AVAILABLE FREQUENCY (MHz)	TESTED FREQUENCY (MHz)	MODULATION	PACKET TYPE	
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK, π/4-DQPSK, 8-DQPK	DH5	
	Band Edge				
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5	
		Frequency S	Separation		
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5	
	Number of hopping frequency				
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK	DH5	
	Time of Occupancy (Dwell time)				
Bluetooth	2402 to 2480	2402, 2441, 2480	GFSK, π/4-DQPSK, 8-DQPK	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
	30MHz - 180MHz: +/- 3.37dB
Measurement uncertainty	180MHz -417MHz: +/- 3.19dB
(Polarization : Vertical)	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

	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	Limits dB(uV)				
MHz	Quasi-peak	Average			
0.15 to 0.50	66 to 56	56 to 46			
0.50 to 5	56	46			
5 to 30	60	50			

Note

1. The lower limit shall apply at the transition frequencies

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

6.2 Measurement Equipment Used

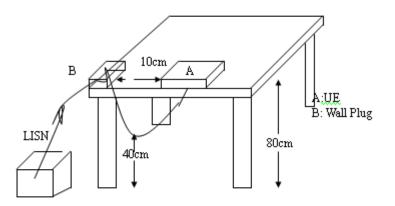
	Conducted Emission Test Site							
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.			
LISN	TESEQ	NNB 51	36076	2018/02/14	2019/2/13			
EMI Test Re- ceiver	R&S	ESCI	101300	2017/11/02	2018/11/1			
Notebook	Lenovo	L420	S001246 7	N/A	N/A			

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.



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

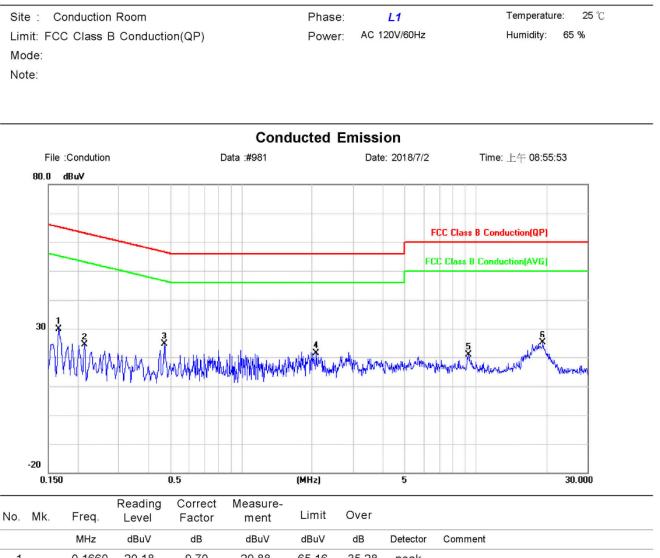
Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit

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AC POWER LINE CONDUCTED EMISSION TEST DATA

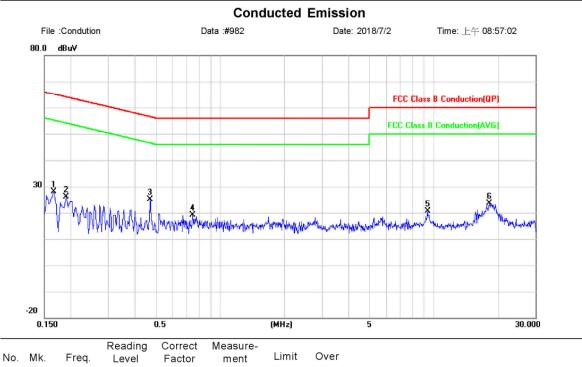


1	0.1660	20.18	9.70	29.88	65.16	-35.28	peak	
2	0.2140	14.60	9.73	24.33	63.05	-38.72	peak	
3 *	0.4700	14.40	10.16	24.56	56.51	-31.95	peak	
4	2.0900	10.79	10.57	21.36	56.00	-34.64	peak	
5	9.3220	10.95	9.91	20.86	60.00	-39.14	peak	
6	19.3500	15.17	9.90	25.07	60.00	-34.93	peak	

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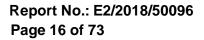


Site : Conduction Room	Phase:	N	Temperature: 25 °C
Limit: FCC Class B Conduction(QP)	Power:	AC 120V/60Hz	Humidity: 65 %
Mode:			
Note:			



		Lover	1 dotor	mont				
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.1660	18.52	9.70	28.22	65.16	-36.94	peak	
2	0.1900	16.51	9.70	26.21	64.04	-37.83	peak	
3 *	0.4700	15.03	10.16	25.19	56.51	-31.32	peak	
4	0.7460	9.02	10.03	19.05	56.00	-36.95	peak	
5	9.3700	10.66	9.91	20.57	60.00	-39.43	peak	
6	18.2740	13.70	9.90	23.60	60.00	-36.40	peak	

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PEAK OUTPUT POWER MEASUREMENT 7

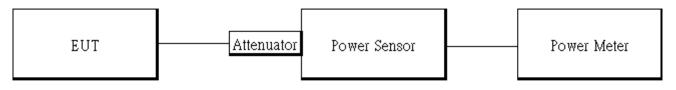
7.1 Standard Applicable

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.			
TYPE		NUMBER	NUMBER	CAL.				
Power Meter	Anritsu	ML2496A	1326001	2017/07/26	2018/7/25			
Power Sensor	Anritsu	MA2411B	1315048	2017/07/26	2018/7/25			
Power Sensor	Anritsu	MA2411B	1315049	2017/07/26	2018/7/25			
Bluetooth Test Set	R&S	CBT	101140	2018/04/17	2019/4/16			
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25			
Splitter	RF-LAMBAD	RFLT2W1G18 G	RF35	2017/12/26	2018/12/25			

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 B	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	10.58	11.429	1000	0	2402	9.24	8.395	1000	
39	2441	10.51	11.246	1000	39	2441	9.13	8.185	1000	
78	2480	10.52	11.272	1000	78	2480	9.15	8.222	1000	
2M EI	OR mode (Peak):			2M E	DR mode (A	Average):			
СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)	СН	Freq. (MHz)	Max. Avg.Output include tune up tolerance	Output Power (mW)	Limit (mW)	
0	2402	11.42	13.868	125	0	2402	7.88	6.138	125	
39	2441	11.34	13.614	125	39	2441	7.84	6.081	125	
78	2480	11.36	13.677	125	78	2480	7.78	5.998	125	
3M EI	OR mode (Peak):			3M E	DR mode (A	Average):			
СН	Freq. (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)	СН	Freq. (MHz)	Max. Avg.Output include tune up tolerance	Output Power (mW)	Limit (mW)	
0	2402	11.77	15.031	125	0	2402	7.89	6.152	125	
39	2441	11.69	14.757	125	39	2441	7.85	6.095	125	
78	2480	11.70	14.791	125	78	2480	7.81	6.039	125	

NOTE: cable loss as 14dB that offsets in the sp

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

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.



20DB BANDWIDTH MEASUREMENT 8

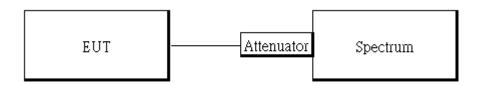
8.1 Standard Applicable

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

8.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL SERIAL		LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/6/19		
Bluetooth Test Set	R&S	CBT	101140	2018/04/17	2019/4/16		
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25		
Splitter	RF-LAMBAD	RFLT2W1G18 G	RF35	2017/12/26	2018/12/25		

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 ANSI C63.10:2013.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set the spectrum analyzer as RBW=10 kHz (1 % of 20 dB Bandwidth.), VBW = 30 kHz, Span= 3MHz, Sweep=auto, Detector = Peak, and Max hold for 20dB Bandwidth test.
- 5. Mark the peak frequency and -20dB (upper and lower) frequency
- 6. Repeat above procedures until all test default channel is completed

NOTE:

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

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8.5 Measurement Result

GFSK

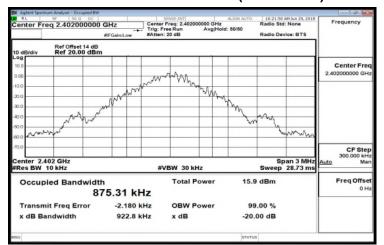
π/4-DQPSK

8-DPSK

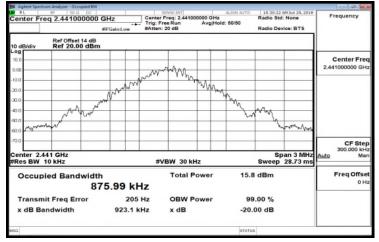
СН	20 dB BW (MHz)	2/3 BW (MHz)	СН	20 dB BW (MHz)	2/3 BW (MHz)	СН	20 dB BW (MHz)	2/3 BW (MHz
Low	0.923	0.62	Low	1.310	0.87	Low	1.249	0.83
Mid	0.923	0.62	Mid	1.310	0.87	Mid	1.266	0.84
High	0.923	0.62	High	1.310	0.87	High	1.266	0.84

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

SGS



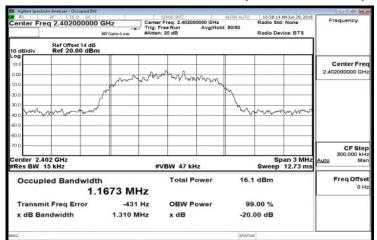
20dB Band Width Test Data CH-Mid (GFSK mode)



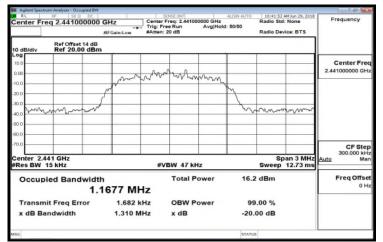
20dB Band Width Test Data CH-High (GFSK mode)



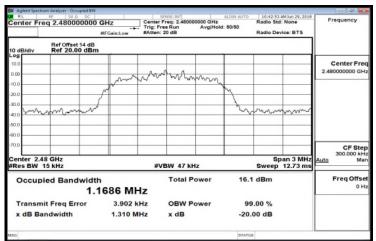
20dB Band Width Test Data CH-Low (π/4-DQPSK mode)



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



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



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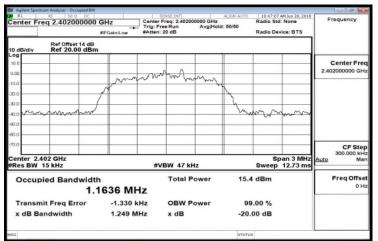
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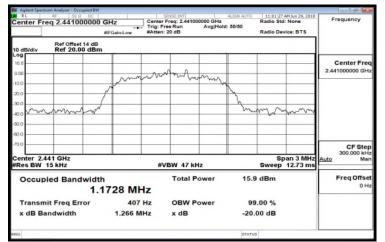
f (886-2) 2298-0488



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



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



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



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CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT 9

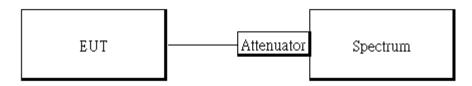
9.1 Standard Applicable

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 TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.					
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/6/19					
Bluetooth Test Set	R&S	CBT	101140	2018/04/17	2019/4/16					
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25					
Splitter	RF-LAMBAD	RFLT2W1G18 G	RF35	2017/12/26	2018/12/25					

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 ANSI C63.10:2013.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set center frequency of spectrum analyzer = operating frequency.
- 5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Sweep = auto
- 6. Mark Peak, 2.3999GHz and 2.4836GHz and record the max. level.
- 7. Repeat above procedures until all frequency measured were complete.

Conducted Spurious Emission:

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows ANSI C63.10:2013.
- 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 seqment 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:

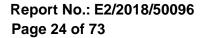
FS = RA + AF + CL - AG

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 for plots.

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.





Band Edges Test Data CH-Low (Hopping mode)

	estrum Analyzer - Si				where the last in the second second	
RL Center F	reg 2 3650	0 DC 000000 GHz	SENSE	Avg Type: Log-Pv	TRACE 1 2 3 4 5 6	Frequency
uniter i	104 21000	PNO: Fast IFGain:Los	#Atten: 20 dB	in 3	DET P NNNNN	
0 dB/div	Ref Offset			м	kr3 2.390 00 GHz -48.00 dBm	Auto Tur
10.0					Q1	Center Fre
0.00					AWWWWWWWW	2.36500000 GH
10.0					-10.23 (89)	
0.0			_			Start Fre
30.0						2.310000000 GH
40.0				▲3		
50.D			_	INANA ANALY		Stop Fre
50.0	- Horizonta	a destruction and destruction	mendationen	ALMAN ALALANA MURIN	4114	2.420000000 GH
70,0		-				
	1000 GHz				Stop 2.42000 GHz	CF Ste
	100 kHz		BW 300 kHz		1.000 ms (1001 pts)	11.000000 MH Auto Ma
1 N	1 1	2.405 26 GHz	9.77 dBm	FUNCTION FUNCTION WE	TH FUNCTION VALUE -	
2 N		2.399 90 GHz 2.390 00 GHz	-51.78 dBm -48.00 dBm			Freq Offs
4 5		A.020 CU 0114	40.00 0.011			0 H
6					1	
7 8						
9						
11					· · ·	
56				51/	tus	

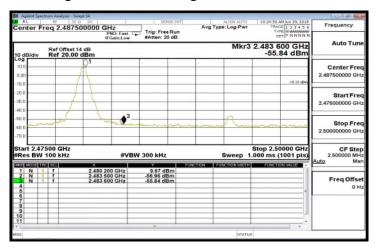
Band Edges Test Data CH-High

Agilent Spectrum Analyzer - Swept SA				
RL RF 50 D DC Center Freq 2.487500000 GHz	SENSEIINT	ALIEN AUTO Avg Type: Log-Pwr	11:27:53 AM Jun 29, 2018 TRACE 1 2 3 4 5 6	Frequency
PNO: Fant L IFGain:Low	Trig: Free Run #Atten: 20 dB		DET P NNNNN	Auto Tur
Ref Offset 14 dB 0 dB/div Ref 20.00 dBm		MKr3 2	483 600 GHz -57.94 dBm	
			-10.61 mbm	Center Fre 2.487500000 GF
				Start Fre 2.475000000 GH
50.0 50.0 70.0	mm	m	manne	Stop Fre 2.500000000 GH
Start 2.47500 GHz Res BW 100 KHz #VBW	300 kHz		op 2.50000 GHz 00 ms (1001 pts)	CF Ste 2.500000 MH Auto Mi
1 N 1 F 2.480.050 GHz 2 N 1 F 2.483.500 GHz 3 N 1 F 2.483.600 GHz 4 5 6 6	9.39 dBm -58.08 dBm -57.94 dBm			Freq Offs 0 F
7 8 8 9 10 11				
e a companya		STATUS	,	

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

						rum Analyzer - Swe	
Frequency	10:22:27 AMJun 29, 2018	OTUA NOLLA	SENSE: INT	_	DC	RF 50 Ω	RI.
requercy	TIPE NNNNN	g Type: Log-Pwr	Free Run n: 20 dB	÷	er Freq 2.365000000 GHz		nter F
Auto Tun	2.390 00 GHz -58.36 dBm	Mkr3				Ref Offset 14	Bidiv
Center Fre	Q1						
2.365000000 GH		_	-	-		_	0
	-10.32 iBn						
Start Fre 2.310000000 GH				-			
Stop Fre	Q ²	3	فسيسمعه				
2.420000000 GH					the property of the second	a channel	
CF Ste 11.000000 MH Auto Ma	Stop 2.42000 GHz 000 ms (1001 pts)	Sweep 1.	Hz	BW 3	#VB	000 GHz 100 kHz	
Hure ma	FUNCTION VALUE ·	FUNCTION MOTH			×	1	N
Freq Offse			8 dBm 5 dBm 5 dBm		2.402 29 GHz 2.399 90 GHz 2.390 00 GHz	1	2 2 2
	•	1 1					
		STATUS					

Band Edges Test Data CH-High



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Conducted Spurious Emission Measurement Result

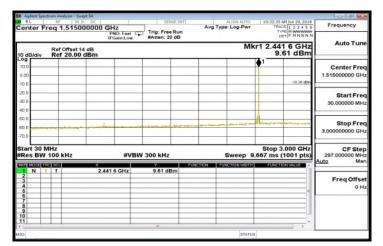
Ch Low 30MHz - 3GHz

Agilent Spectrum Analyzer - Swe					
RL RF 50 S	00000 GHz	Trig: Free Run	Aug Type: Log-Pwr	10:23:01 AM Jun 29, 2018 TRACE 1 2 3 4 5 6	Frequency
Ref Offset 1		#Atten: 20 dB	Mk	r1 2.403 0 GHz	Auto Tuni
0 dB/div Ref 20.00	dBm			9.37 dBm	Center Free
0.00				-10.63 dbm	1.515000000 GH
20.0					Start Free
40.0					30.000000 MH
50.0		and the second states of the		er-shandland an arranged and an	Stop Fre 3.000000000 GH
Res BW 100 kHz	#VBW	/ 300 kHz	Sweep 9.	Stop 3.000 GHz 667 ms (1001 pts)	CF Ste 297.000000 MH Auto Ma
NOR MORE THE SEL	2.403 0 GHz	9,37 dBm	INCTION FUNCTION WOTH	FUNCTION VALUE	Auto Ma
3 4 5					Freq Offse 0 H
6 7 8 9					
9 10 11		-			
sa			STATUS		

Ch Low 3GHz - 26.5GHz

00000000 GHz PNO: Fast	SENSEONT	ALIGN AUTO Avg Type: Log-Pwr	10:23:18 AM Jun 29, 2018	Frequency
	Trig: Free Run	was apper coller mi	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P NNNNN	risquericy
IFGain:Low 14 dB 0 dBm	#Atten: 20 dB	M	r1 7.206 5 GHz -45.72 dBm	Auto Tun
			-10.53 dBm	Center Fre 14.750000000 GF
A1				Start Fre 3.000000000 GH
	des managers (^d er stick angeles in grig			Stop Fre 26.50000000 G
			1 1 1	CF Ste 2.350000000 Gi Auto M
7.206 5 GHz	-45.72 dBm			Freq Offs 01
	-		· · ·	
	0 dBm	0 dBm	0 dBm	0 dBm -45.72 dBm

Ch Mid 30MHz - 3GHz



Ch Mid 3GHz - 26.5GHz

						Analyzer - Swept SA	restrum A		
Frequency	10:33:42 AM Jun 29, 2018 TRACE 1 2 3 4 5 6 TIPE M WWWWW	ALIGN AUTO		Trig: Free Ru	000 GHz	14.7500000	Freq		R en
Auto Tun	DET P NNNN N			#Atten: 20 dE	PNO: Fant C, IFGain:Low				
	r1 7.324 0 GHz -46.74 dBm	MK			n	f Offset 14 dB		BJdiv	D d
Center Fre									0.0
14.750000000 GH	-10.39 (Br)								.00 0.0
Start Fre					_			⊢	0.0
3.000000000 GH						A1			0.0
Stop Fre		and the second second second second	all and and a	man maneres	-	mentione	www	to	0.0
26.50000000 GH									0,0 0,0
CF Ste	Stop 26.50 GHz						0 GH		
2.350000000 GH Auto Ma	5.40 ms (1001 pts)	Sweep /	FUNCT	V 300 kHz			V 100		_
				-46.74 dBm	7.324 0 GHz		1 1	N	123
Freq Offse 0 H							+	-	3 4 5
									6
							+	-	8 9 0
						-		_	1
		STATUS							6

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Ch High 30MHz - 3GHz

					_		alyzer - Swee		ent Spe	
Frequency	10:25:10 AM Jun 29, 2018 TRACE 1 2 3 4 5 6	ALIGN AUTO		SENSE:1	7	0000 GH	50.0	iF reg 1	er F	RL
Auto Tune	DET P NNNNN			Trig: Free Ru #Atten: 20 dB	req 1.515000000 GHz PNO: Fast F IFGain:Low		icq i			
	1 2.480 3 GHz 9.47 dBm	Mk					Offset 14		Udiv	0 dE
Contra Fra	♦ 1									og 10.0
Center Fre 1.515000000 GH										0.00
1.515000000 GP	-10.53 dBm									10.0
Start Fre								-		20,0
30.000000 M										30,0 40,0
Oton Fra								_		50.D
Stop Fre 3.000000000 GH		- the second and	armed restored	dimental address						60.0 70.0
CF Ste 297.000000 MH Auto Ma	Stop 3.000 GHz 667 ms (1001 pts)	Sweep 9.		300 kHz	#VBW		kHz	MHz 100 I	1 30 BW	star
Auto Ma	PUNCTION VALUE	UNCTION WIDTH	FUNCTION	9.47 dBm	GHz	2,480 3		1 1		ika i
Freq Offs 0 F										2345
									+	6 7 8
					_				+	9 10 11
		-			,					
		STATUS								96

Ch High 3GHz – 26.5GHz

10 A							nalyzer - Swe	estrum A		
Frequency	10:26:47 AM Jun 29, 2018 TRACE 1 2 3 4 5 6 Type M Water	ALIGN AUTO Type: Log-Pwr		SENS	Hz	00000 G	14.7500	Freq		Cent
Auto Tune	26.382 5 GHz -45.98 dBm	Mkr1		#Atten: 20	vO: Fant Le.	dB	Offset 14		BJdiv	10 dE
Center Fred 14.750000000 GHz	-10.53 dBm								_	10.0 0.00
Start Free 3.000000000 GH	-								_	20.0 30.0 40.0
Stop Free 26.50000000 GH			tan/t-t-in	un			معييسا	10,000	سرل ہ	50.0 60.0
CF Step 2.350000000 GH Auto Mar	Stop 26.50 GHz 10 ms (1001 pts)	Sweep 76	FUNCTO	300 kHz	#VBW	×	kHz	0 GH2 V 100	s BV	Res
Freq Offse 0 H				-45.98 dBr	5.GHz	26,382		1 1		1 2 3 4 5 6
				m						7 9 10 11
		STATUS								45G

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10 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

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

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

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

Note:

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

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10.2 Measurement Equipment Used

	966 Chamber											
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.							
Broadband An- tenna	SCHWAZBECK	VULB 9168	9168-617	2017/10/27	2018/10/26							
Horn Antenna	Schwarzbeck	BBHA9120D	1341	2018/06/07	2019/6/6							
Loop Antenna	ETS.LINDGREN	6502	148045	2017/09/26	2018/9/25							
3m Site NSA	SGS	966 chamber D	N/A	2018/07/06	2019/7/5							
EMI Test Receiver	R&S	ESU 40	100363	2018/04/11	2019/4/10							
Pre-Amplifier	EMC Instru- ments	EMC184045B	980135	2017/10/27	2018/10/26							
Pre-Amplifier	EMC Instru- ments	EMC9135	980234	2017/12/26	2018/12/25							
Pre-Amplifier	EMC Instru- ments	EMC12630SE	980271	2017/12/26	2018/12/25							
Attenuator	Marvelous	WATT-218FS-10	RF246	2017/12/26	2018/12/25							
Highpass Filter	Micro Tronics	BRM50701-01	G008	2017/12/26	2018/12/25							
Coaxial Cable	Huber Suhner	EMC106-SM-S M-7200	150703	2017/12/26	2018/12/25							
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	2017/12/26	2018/12/25							

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

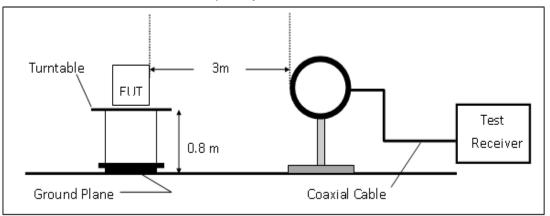
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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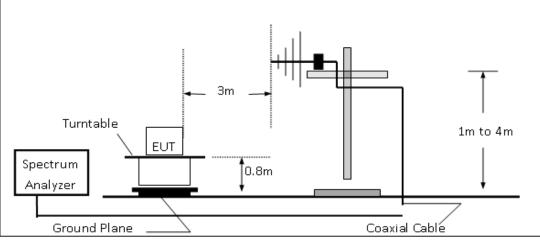


10.3 Test SET-UP

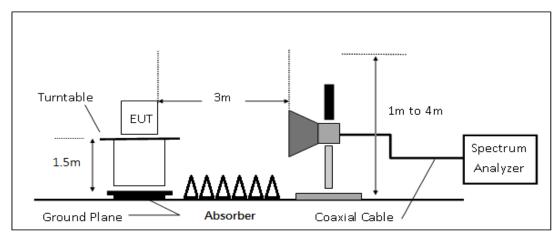
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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.



10.4 Measurement Procedure

Radiated Emission

- The testing follows the Measurement Procedure of ANSI C63.10:2013. 1.
- 2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plan.
- 3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 5. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
- 6. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
- 7. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
- 8. 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.
- 9. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
- 11. Repeat above procedures until all default test channel 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	5	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)

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.

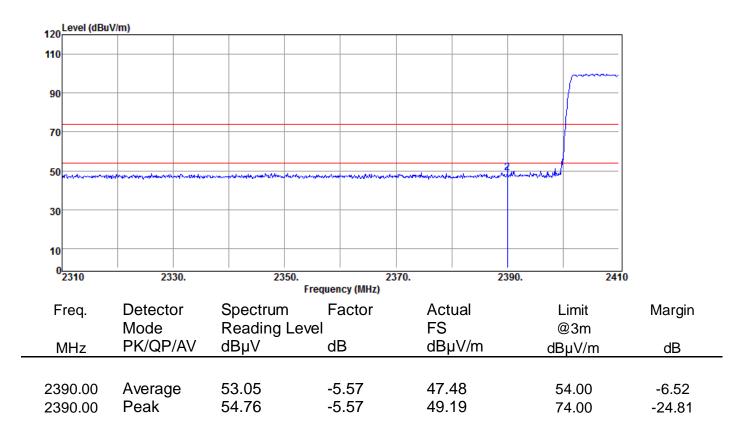
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Radiated Band Edge Measurement Result: (Hopping Mode)

Operation Mode	:BT BR Hopping	Test Date	:2018-06-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2402 MHz	Engineer	:Jerry
lest Channel	:2402 MHz	Engineer	Jeny



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

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Test I EUT	ation Mo Mode Pol Channel	de	:BE :E1	BR Hoppin CH Low Plan 02 MHz	ng	Test Date Temp./Humi. Antenna Pol. Engineer					:2018-06-22 :25/60 :HORIZONTAL :Jerry
120	Level (dBuV/r	m)									_
110											
90										∦	
70											
50									Fundantinte		
50	ann habendara	havenserversetternation	-and the holder	172-949 6 0.4680.444-4460.	la Radoord States	*********		Andrew Strategy and	Adventional de la defi-		
30											
10											
0	2310	2330	0.	23	350.		70.	2	390.	24	」 10
						ncy (MHz)					
F	req.	Detec		Spectr		Factor		Actual		Limit	Margin
N	MHz	Mod PK/QP	-	Reading dBµ ^v		dB		FS dBuV/m		@3m	dB
I		FIVQF	/AV	ubμ	v	uD		dBµV/m	UL	3µV/m	UD
22	90.00	Avera	ana	53.0	8	-5.57		47.51	5	64.00	-6.49
	90.00	Pea		54.7		-5.57		49.22		4.00 4.00	-24.78
			-		-				-		•

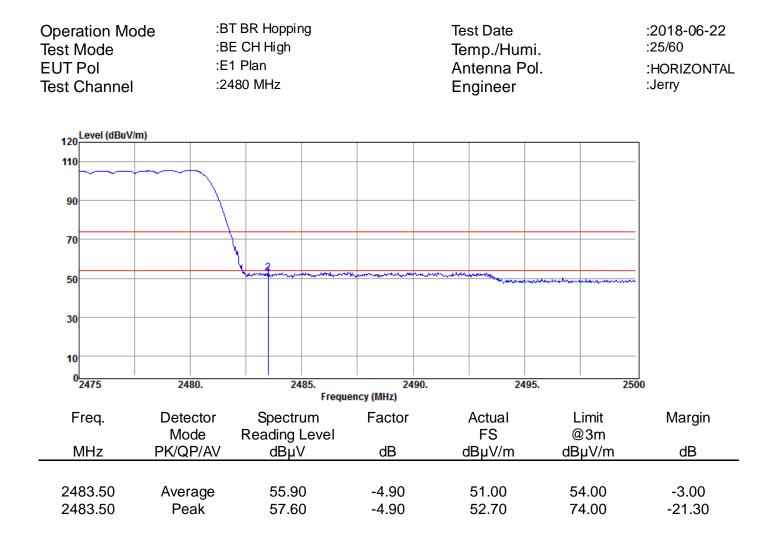
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Operation Mo Test Mode EUT Pol Test Channel	:B :E	T BR Hopping E CH High 1 Plan 480 MHz		Test Date Temp./Humi Antenna Pol Engineer		:2018-06-22 :25/60 :VERTICAL :Jerry		
120 Level (dBuV/r	n)					7		
110								
90								
70								
,,,		$\langle \rangle$						
50		how with the second second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and the second defendence of the second s	an a			
30								
10								
⁰ 2475 2480. 2485. 2490. 2495. 2500 Frequency (MHz)								
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin		
	Mode	Reading Level		FS	@3m			
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB		
2483.50	Average	52.46	-4.90	47.56	54.00	-6.44		
2483.50	Peak	54.16	-4.90	49.26	74.00	-24.74		

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

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Operation Mo Test Mode EUT Pol Test Channel	:B :E	T EDR Hopping E CH Low 1 Plan 402 MHz		:2018-06-22 :25/60 :VERTICAL :Jerry					
120 Level (dBuV	/m)								
110									
						~~			
90									
70									
10									
50	and an and the second	******		and a second and a second s	Aurona and a second				
30									
10									
0	2220	2250	0070		200	2440			
0 2310 2330. 2350. 2370. 2390. 2410 Frequency (MHz)									
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin			
N 41 1	Mode	Reading Level	dD	FS	@3m	dD			
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB			
2390.00	Average	53.86	-5.57	48.29	54.00	-5.71			
2390.00	Peak	55.56	-5.57	49.99	74.00	-24.01			

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Operation Mode:BT EDR HoppingTest Mode:BE CH LowEUT Pol:E1 PlanTest Channel:2402 MHz						Test Date Temp./Humi. Antenna Pol. Engineer					:2018-06-22 :25/60 :HORIZONTAL :Jerry
120	Level (dBuV/r	m)								1	
110											
										m	
90											
										<u> </u>	
70											
50				- Hu di su sa dua ba i bui		و الم الم الم الم الم الم	under an		-		
30											
10											
U	2310	2330.		2350.	Frequency (I	237 MHz)	0.	23	390.	241	0
F	req.	Detect		Spectrum		actor		Actual		_imit	Margin
N	ЛНz	Mode PK/QP/		eading Lev dBµV		dB	-	FS IBul//m		2∂3m	dB
IV			AV	υ¤μν		uD		lBµV/m	UE	βµV/m	UD
23	90.00	Averag	pe	53.00	-	5.57		47.43	5	4.00	-6.57
	90.00	Peak		54.71		5.57		49.14		4.00	-24.86

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Operation Mo Test Mode EUT Pol Test Channel	:E :E	BT EDR Hopping BE CH High E1 Plan 2480 MHz	:2018-06-22 :25/60 :VERTICAL :Jerry			
120 Level (dBuV/	m)				1	_
110						_
-						
90	\rightarrow					_
						_
70		\mathbf{N}				—
		- Nu2 -				_
50		Watermanner	and the second	lestere landar and second second and	ilen det som segeral production in the second	α. A
30						_
10						_
0 2475	2480.	2485.	24	00 2/	 495. 2	500
2413	2400.		requency (MHz)	50. Z	133. Z	300
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Leve		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
				1	- /	
2483.50	Average	52.74	-4.90	47.84	54.00	-6.16
2483.50	Peak	54.43	-4.90	49.53	74.00	-24.47

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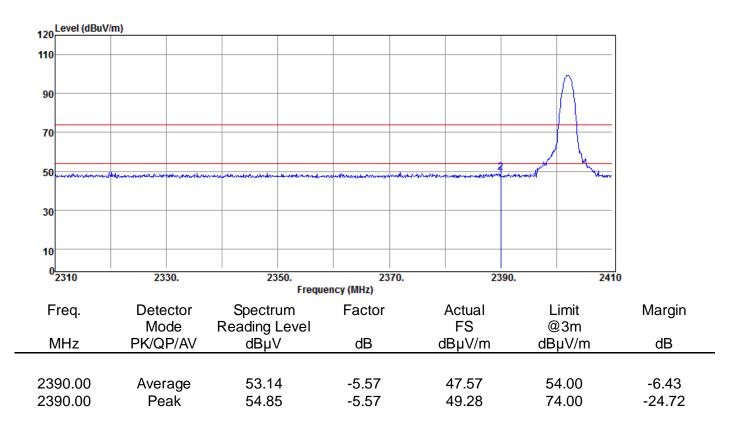


Operation I Test Mode EUT Pol Test Chann	ΓPol :E1 Plan Antenna Pol.					
120 Level (dE	BuV/m)					_
110						_
90						_
70						_
50		W Warner warner	nia kanimikakan kasara majani	and a second and a s	ang Makalaka kana dalam kana kana kana kana kana kana kana ka	
30						-
10						_
0 ^L 2475	2480.	2485. Frequ	2490. iency (MHz)	2495.	2	 500
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
2483.50 2483.50	Average Peak	55.47 57.16	-4.90 -4.90	50.57 52.26	54.00 74.00	-3.43 -21.74



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

Operation Mode	:BT BR	Test Date	:2018-06-22
Test Mode	:BE CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2402 MHz	Engineer	:Jerry
		5	



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

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Operation Mo Test Mode EUT Pol Test Channel	:B :E :2	T BR E CH Low 1 Plan 402 MHz		:2018-06-22 :25/60 :HORIZONTAL :Jerry		
120 Level (dBuV/	/m)					-
110						-
90						-
70						_
50	and a second as a	pares marter and a marter and	no manager and the second s	and the product of the second second	ammedd When	~
30						-
10						_
0						
⁰ 2310	2330.	2350. Freque	2370. ency (MHz)	239	0. 24	10
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
	_					
2390.00	Average	53.19	-5.57	47.62	54.00	-6.38
2390.00	Peak	54.90	-5.57	49.33	74.00	-24.67

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Operation M Test Mode EUT Pol Test Channe		:E1 F	CH High		Test Date Temp./Humi. Antenna Pol. Engineer					:2018-06-22 :25/60 :VERTICAL :Jerry
120 Level (dBu)	//m)									_
110										-
90										-
70	1									-
50	, d	,	Winner and a second	Allowhore	and and an and a second second	have a subscription of the second			and a filled to develop and the start of	•
30										-
10										-
0 <mark>2475</mark>	24	480.	24	185.	249	90.	24	495.	25	00
					ency (MHz)					
Freq.		ector	Spectr		Factor		Actual FS		.imit	Margin
MHz		ode l P/AV	Reading dBµ\		dB	С	гъ IBµV/m		03m μV/m	dB
		-	1						•	
2483.50	Ave	rage	53.7	8	-4.90		48.88	5	4.00	-5.12
2483.50		eak	55.4		-4.90		50.58		4.00	-23.42
2492.68		rage	54.9		-4.82		50.10		4.00	-3.90
2492.68	Pe	eak	56.6	3	-4.82		51.81	7	4.00	-22.19

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Operation Mo Test Mode EUT Pol Test Channel		:E1 F	CH High		Test Date Temp./Humi. Antenna Pol. Engineer				:2018-06-22 :25/60 :HORIZONTAL :Jerry
120 Level (dBuV	/m)								
110									
90									
70	1								
	1	\ \	2				4		
50 martine					wenther many the second	and the second		the store and the start of the	and the second
30									
10									
0 <mark>2475</mark>	24	180.	24	185.	249	0.	24	195.	2500
					ency (MHz)				
Freq.		ector	Spectr		Factor	1	Actual	Limi	5
MHz	Mc PK/O	P/AV	Reading dBµ\		dB	Ь	FS BµV/m	@3r dBµV	
			JOP	v		u	<u>- p v/m</u>	ubp v,	
2483.50	Ave	rage	54.7	5	-4.90		49.85	54.0	0 -4.15
2483.50		eak	56.4		-4.90		51.55	74.0	
2492.90	Ave	0	54.9		-4.82		50.10	54.0	
2492.90	Pe	eak	56.6	2	-4.82	:	51.80	74.0	0 -22.20



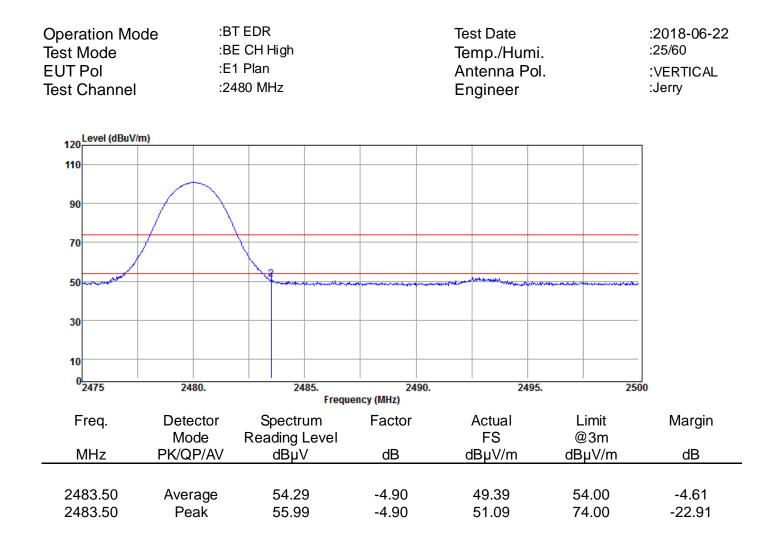
Operation Mo Test Mode EUT Pol Test Channel	:B :E	T EDR E CH Low 1 Plan 402 MHz		:2018-06-22 :25/60 :VERTICAL :Jerry		
120 Level (dBuV	/m)					
110						_
					\land	
90						-
70						-
50	and an a second and a second dependence of the			and the second second second second	where the second s	
30						-
10						-
0 2310	2330.	2350. Freque	2370. ency (MHz)	2390.	24	10
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
		ασμν				
2390.00	Average	53.44	-5.57	47.87	54.00	-6.13
2390.00	Peak	55.14	-5.57	49.57	74.00	-24.43



Test N EUT I		le	:BT EDR :BE CH Low :E1 Plan :2402 MHz		:2018-0 :25/60 :HORIZC :Jerry	-		
120	Level (dBuV/m	1)						
120								
110								
90								
70								
						4		
50	an and a second s	- Jahr- 1. Jan 1	and the second second	hann Marthana an	war properties and the model of the	wenturned	Non	
30								
10								
0	2310	2330.	235	50. Frequency (MHz)	2370.	2390.	2410	
F	req.	Detecto					mit Marg	gin
	<u> // -</u>	Mode			FS	-	3m	
N	ЛНz	PK/QP/A	V dBµV	dB	dBµV	an ar	IV/m dB	
23	90.00	Average	e 52.09	9 -5.57	46 .5	52 54	.00 -7.4	.8
23	90.00	Peak	53.80) -5.57	′ 48.2	23 74	.00 -25.7	77

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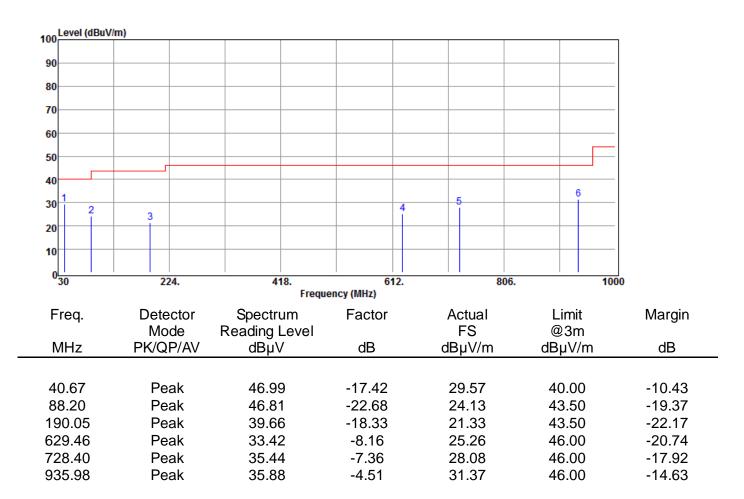
Operation M Test Mode EUT Pol Test Channe		:E1	CH High	Test Date Temp./Humi. Antenna Pol. Engineer					:2018-06-22 :25/60 :HORIZONTAL :Jerry	
120 Level (dBu)	//m)									
110										
90										
70			2							
50			Mulakes	martine	and and a second se	and the second second second	and the second second	man non	on an an all and the second	
30										
10										
0 ^L 2475	24	180.	24	485. Freque	249 ency (MHz)	0.	24	195.	250	0
Freq.		ector	Spectr		Factor	A	ctual		mit	Margin
MHz	Mc PK/Q		Reading dBµ`		dB	dF	FS 3µV/m	-	3m IV/m	dB
	1170	, <i>, </i>	αυμ	v		UL	~~~~	JUD	• • / • • •	
2483.50		rage	55.7		-4.90	5	50.89		.00	-3.11
2483.50	-	eak	57.4	-	-4.90		52.58		.00	-21.42
2493.18		rage	54.7		-4.82		19.91		.00	-4.09
2493.18	Pe	eak	56.4	3	-4.82	5	51.61	74	.00	-22.39



Radiated Spurious Emission Measurement Result:

For Frequency form 30MHz to 1000MHz

Operation Mode Test Mode	:BT EDR :Tx CH Low	Test Date Temp./Humi.	:2018-06-22 :25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2402 MHz	Engineer	:Jerry



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Operation Mo Test Mode EUT Pol Test Channel	:T :E	T EDR x CH Low 1 Plan 402 MHz		Test Date Temp./Humi. Antenna Pol. Engineer				
100 Level (dBuV/	m)							
90						-		
80						-		
70						-		
60						-		
50						-		
40						-		
	1				5 6			
30	2		3	4				
20						-		
10						-		
030	224.	418.	612.	806.	10	00		
			ency (MHz)					
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin		
N 41 1	Mode	Reading Level	5	FS	@3m			
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB		
100.05	Peak		10.00	00.04	40.50	45.00		
190.05 266.68	Peak	46.57 41.61	-18.36 -16.38	28.21 25.23	43.50 46.00	-15.29 -20.77		
579.99	Peak	35.19	-8.95	26.24	46.00	-19.76		
689.60	Peak	34.45	-7.43	27.02	46.00	-18.98		
870.99	Peak	35.03	-4.90	30.13	46.00	-15.87		
963.14	Peak	35.10	-3.84	31.26	54.00	-22.74		

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Operation Mode Test Mode EUT Pol Test Channel	:Tx :E^	T EDR C CH Mid 1 Plan 141 MHz	Test Date Temp./Humi. Antenna Pol. Engineer			:2018-06-22 :25/60 :VERTICAL :Jerry
100 Level (dBuV/m	1)					
90						_
80						-
70						-
60						-
50						-
40						-
30 1				4	5 6	_
20	3					_
10						_
030	224.	418. Eroqui	612. ency (MHz)	806	. 10	000
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
rieq.	Mode	Reading Level	T actor	FS	@3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
40.67	Peak	47.04	-17.42	29.62	40.00	-10.38
86.26	Peak	46.15	-22.42	23.73	40.00	-16.27
190.05	Peak	39.73	-18.33	21.40	43.50	-22.10
687.66	Peak	34.17	-7.51	26.66	46.00	-19.34
863.23	Peak	35.51	-5.23	30.28	46.00	-15.72
980.60	Peak	34.87	-3.50	31.37	54.00	-22.63

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Operation M Test Mode EUT Pol Test Channe	:T. :E	T EDR x CH Mid 1 Plan 441 MHz	Test Date Temp./Humi. Antenna Pol. Engineer			:2018-06-22 :25/60 :HORIZONTAL :Jerry
100	V/m)					
]
90						
80						
70						
60						
50						
40						
30	2				5 6	
1			4			
20						
10						
030	224.	418.	612.	806.	100	0
			ency (MHz)			
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
	FNQF/AV	ubµv	UD	ασμν/π	ubμv/m	UD
70.74	Peak	43.31	-20.13	23.18	40.00	-16.82
190.05	Peak	46.43	-18.36	28.07	43.50	-15.43
266.68	Peak	40.80	-16.38	24.42	46.00	-21.58
649.83	Peak	34.42	-8.62	25.80	46.00	-20.20
865.17	Peak	35.94	-5.12	30.82	46.00	-15.18
984.48	Peak	34.67	-3.65	31.02	54.00	-22.98

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Operation Moo Test Mode EUT Pol Test Channel	:T: :E	T EDR x CH High 1 Plan 480 MHz		Test Date Temp./Humi Antenna Po Engineer		:2018-06-22 :25/60 :VERTICAL :Jerry
100 Level (dBuV/n	n)					_
90						_
80						_
70						
60						_
50						_
40					5 6	_
30 2	3		4			_
20						_
10						_
030	224.	418. Erogu	612. ency (MHz)	806.	1(000
F ree r	Detector			Astual	Lingit	Manain
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
				-	-	
40.67	Peak	46.81	-17.42	29.39	40.00	-10.61
88.20	Peak	46.69	-22.68	24.01	43.50	-19.49
190.05	Peak	40.75	-18.33	22.42	43.50	-21.08
641.10	Peak	34.08	-8.19	25.89	46.00	-20.11
870.99	Peak	36.01	-4.90	31.11	46.00	-14.89
978.66	Peak	34.99	-3.46	31.53	54.00	-22.47

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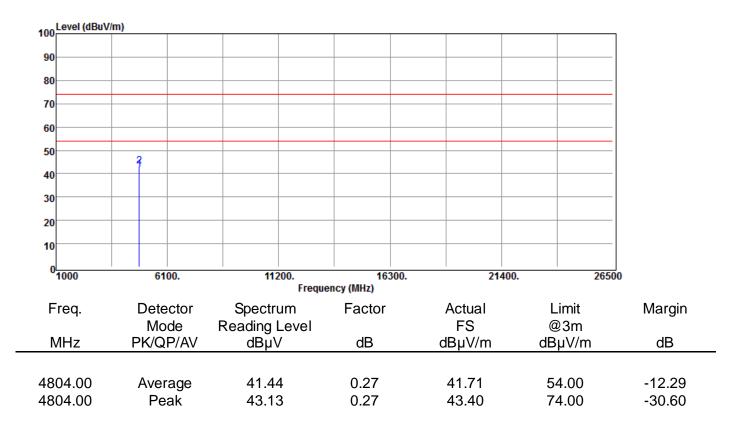
Operation Mo Test Mode EUT Pol Test Channel		:BT ED :Tx CH :E1 Pla :2480 I	l High an			Te Ai	est Date emp./Hui ntenna F ngineer			:2018-06-22 :25/60 :HORIZONTAL :Jerry
100 Level (dBuV	/m)							1		
90										
80										
70										
60										_
50	ſ									—
40								5	6	—
30 1	2	3					4	Ĭ		—
20										—
10										—
030	224		418	J.	61	2.	8	06.	<u> </u>	1000
				Frequenc	cy (MHz)					
Freq.	Detec		Spectru		Factor		Actual		_imit	Margin
MHz	Mod PK/QP		eading Lo dBµV	evel	dB		FS dBµV/m		⊉3m 8µV/m	dB
		/AV	ubµv		uВ		μν/m	UL	μν/Π	UD
70.74	Pea	k	42.99		-20.13		22.86	4	0.00	-17.14
190.05	Pea		46.29		-18.36		27.93		3.50	-15.57
266.68	Pea		41.65		-16.38		25.27		6.00	-20.73
731.31	Pea		34.85		-7.24		27.61		6.00	-18.39
870.99	Pea		34.90		-4.90		30.00		6.00	-16.00
967.99	Pea	k	34.53		-3.45		31.08	5	4.00	-22.92



Radiated Spurious Emission Measurement Result:

For Frequency above 1 GHz

Operation Mode	:BT EDR	Test Date	:2018-06-22
Test Mode	:Tx CH Low	Temp./Humi.	:25/60
EUT Pol	:E1 Plan	Antenna Pol.	:VERTICAL
Test Channel	:2402 MHz	Engineer	:Jerry



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

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Operation Test Mode EUT Pol Test Chan	:: :E	BT EDR Fx CH Low E1 Plan 2402 MHz		:2018-06-22 :25/60 :HORIZONTAL :Jerry		
100 Level (d	BuV/m)					-
90						_
80						_
70						-
60						-
50	2					-
40						_
30						-
20						-
10						-
0 <mark></mark>	6100.	11200. Freque	16300 ency (MHz)	. 21400). 265	500
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
4804.00	Average	42.51	0.27	42.78	54.00	-11.22
4804.00	0	44.19	0.27	44.46	74.00	-29.54

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Operation Mo Test Mode EUT Pol Test Channel	:T: :E	T EDR x CH Mid 1 Plan 441 MHz		:2018-06-22 :25/60 :VERTICAL :Jerry		
100 Level (dBuV/i	m)					_
90						_
80						-
70						-
60						_
50	2					-
40						_
30						-
20						-
10						-
0 1000	6100.	11200. Freque	16300. ency (MHz)	21400.	265	 00
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
4882.00 4882.00	Average Peak	42.20 43.89	0.71 0.71	42.91 44.60	54.00 74.00	-11.09 -29.40

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Test N EUT F		de	:E1 F	H Mid		Test Date Temp./Humi. Antenna Pol. Engineer				:2018-06-22 :25/60 :HORIZONTAL :Jerry	
100	Level (dBuV/m)									
90											
80											
70											
60											
50		2									_
40											
30											
20											
10											—
0	1000	6100).	112	200. Freque	163 ncy (MHz)	300.	21	400.	20	6500
F	req.	Detec		Spectr		Factor		Actual		Limit	Margin
N	/IHz	Mode PK/QP		Reading I dBµ\		dB		FS dBµV/m	d	@3m BµV/m	dB
	82.00	Avera		43.52		0.71		44.23		54.00	-9.77
488	82.00	Peal	k	45.22	2	0.71		45.93		74.00	-28.07

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_ _ _ _

Operation Mo Test Mode EUT Pol Test Channel	:T) E:	T EDR < CH High 1 Plan 480 MHz		:2018-06-22 :25/60 :VERTICAL :Jerry		
100 Level (dBuV/r	m)					7
90						_
80						_
70						-
60						_
50	3					-
40						-
30						-
20						-
10						-
0 1000	6100.	11200. Freque	16300. ency (MHz)	21400.	265	500
Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
4960.00 4960.00	Average Peak	42.44 44.13	1.24 1.24	43.68 45.37	54.00 74.00	-10.32 -28.63
50 40 30 20 10 0 1000 Freq. MHz 4960.00	Detector Mode PK/QP/AV Average	Freque Spectrum Reading Level dBµV 42.44	Factor dB 1.24	Actual FS dBµV/m 43.68	Limit @3m dBµV/m 54.00	Margin dB -10.32

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Operatic Test Moo EUT Pol Test Cha	de I		:BT EDR :Tx CH High :E1 Plan :2480 MHz		Test Date Temp./Humi. Antenna Pol. Engineer				:2018-06-22 :25/60 :HORIZONTAL :Jerry	
100	el (dBuV/m)									7
90										-
80										_
70										-
60										-
50		3								-
40										-
30										-
20										-
10										-
0 <mark></mark>	0	6100.	112	200. Frequei	163 ncy (MHz)	300.	21	400.	265	 00
Freq	4.	Detector	1		Factor		Actual		Limit	Margin
MHz	z l	Mode PK/QP/A	Reading I / dBµ∖		dB		FS dBµV/m		@3m 3µV/m	dB
4960.	00	Average	43.95	5	1.24		45.19	5	54.00	-8.81
4960.		Peak	45.63		1.24		46.87		4.00	-27.13



11 FREQUENCY SEPARATION

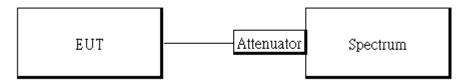
11.1 Standard Applicable

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 TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.				
Spectrum Analyzer	Agilent	-	MY51440113	2018/06/20	2019/6/19				
Bluetooth Test Set	R&S	CBT	101140	2018/04/17	2019/4/16				
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25				
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	2017/12/26	2018/12/25				

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 ANSI C63.10:2013.
- 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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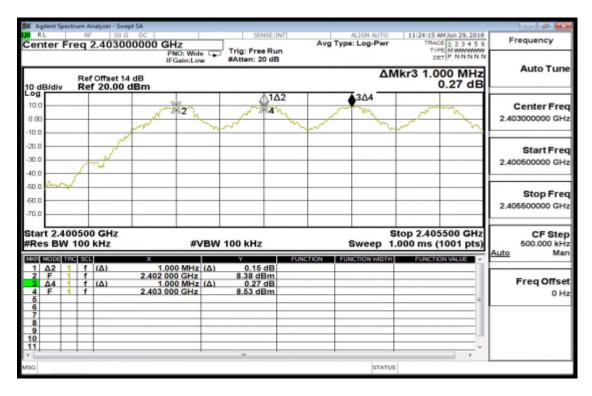
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



11.5 Measurement Result

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

Frequency Separation Test Data



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.



12 NUMBER OF HOPPING FREQUENCY

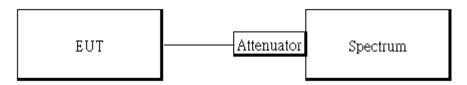
12.1 Standard Applicable

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

12.2 Measurement Equipment Used

	Conducte	ed Emission ⁻	Test Site		
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/6/19
Bluetooth Test Set	R&S	CBT	101140	2018/04/17	2019/4/16
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
Splitter	RF-LAMBAD	RFLT2W1G18 G	RF35	2017/12/26	2018/12/25

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 ANSI C63.10:2013.
- 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.

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.



12.5 Measurement Result

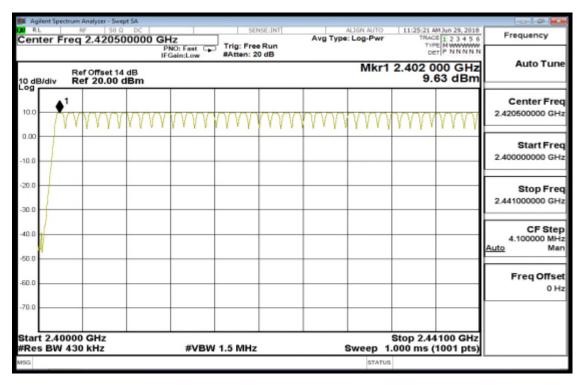
Tabular Data of Total Channel Number

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

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.

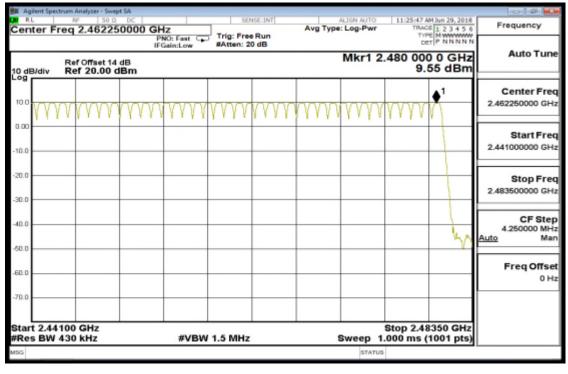


Channel Number



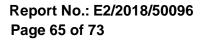
2.4GHz - 2.441GHz

2.441 GHz - 2.4835GHz



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TIME OF OCCUPANCY (DWELL TIME) 13

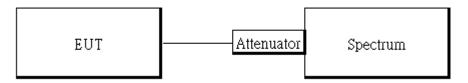
13.1 Standard Applicable

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

	Conducte	ed Emission ⁻	Test Site		
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51440113	2018/06/20	2019/6/19
Bluetooth Test Set	R&S	CBT	101140	2018/04/17	2019/4/16
Attenuator	Marvelous	MVE2213-10	RF30	2017/12/26	2018/12/25
Splitter	RF-LAMBAD	RFLT2W1G18 G	RF35	2017/12/26	2018/12/25

13.3 Test Set-up



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13.4 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows ANSI C6310:2015.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set center frequency of spectrum analyzer = operating frequency.
- 5. Set the spectrum analyzer as RBW, VBW=1MHz, 3MHz, Span = 0Hz, Detector = Peak, Adjust Sweep = 2~8ms.

6. Repeat above procedures until all frequency of the interest measured were complete.

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

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

DH1 consists of single time slot of the uplink, and one slot of the downlink Total Slot: 2 DH3 consists of three time slot of the uplink, and one slot of the downlink. Total Slot: 4 DH5 consists of five time slot of the uplink, and one slot of the downlink. Total Slot: 6

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

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

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13.5 Tabular Result of the Measurement

GFSK (1Mbps)

Channel	PACKET TYPE Me DH1 2 DH3 2 DH5 2 DH1 2 DH3 2 DH5 2 DH1 2 DH3 2	Measurement Result (ms)	Limit (ms)	1/T (kHz)	VBW setting (kHz)
	DH1	116.80	400ms	2.74	3.00
0	DH3	256.32	400ms	0.62	1.00
	DH5	302.61	400ms	0.35	1.00
	DH1	117.12	400ms	2.73	3.00
39	DH3	256.32	400ms	0.62	1.00
	DH5	302.61	400ms	0.35	1.00
	DH1	117.12	400ms	2.73	3.00
78	DH3	256.32	400ms	0.62	1.00
	DH5	302.61	400ms	0.00	1.00

$\pi/4$ DQPSK (2Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)	1/T (kHz)	VBW setting (kHz)
	2DH1	119.68	400ms	2.67	3.00
39	2DH3	256.32	400ms	0.62	1.00
	2DH5	302.61	400ms	0.35	1.00

8-DPSK (3Mbps)

Channel	PACKET TYPE	Measurement Result (ms)	Limit (ms)	1/T (kHz)	VBW setting (kHz)
	3DH1	119.68	400ms	2.67	3.00
39	3DH3	257.12	400ms	0.62	1.00
	3DH5	302.61	400ms	0.35	1.00

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.



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

GFSK (1Mbps):

CH Low	DH1 time slot = DH3 time slot = DH5 time slot =	1.602 *	(1600/2/79) * (1600/4/79) * (1600/6/79) *	31.6 =	116.80 (ms) 256.32 (ms) 302.61 (ms)
CH Mid	DH1 time slot = DH3 time slot = DH5 time slot =	1.602 *	(1600/2/79) * (1600/4/79) * (1600/6/79) *	31.6 =	117.12 (ms) 256.32 (ms) 302.61 (ms)
CH High	DH1 time slot = DH3 time slot = DH5 time slot =	1.602 *	(1600/2/79) * (1600/4/79) * (1600/6/79) *		117.12 (ms) 256.32 (ms) 302.61 (ms)

π/4 -DQPSK (2Mbps):

CH Mid	2DH1 time slo =	0.374 *	(1600/2/79) *	31.6 =	119.68 (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)

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.



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

GFSK (1Mbps):

DH5 time s =	2.837	(ms)	*	(800/6/20 * 8 =	151.31	(ms)
π/4 -DQPSK (2Mbps						
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.

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.



CH-Low DH1

CH-Mid DH1

Agilent Spe																t Spectrum	n Anal	lyzer - Swept												
Center F		2.4020	00000 G	Hz PNO: Fast			INSE:INT	Av	g Type:	IGN AUTO	10:06:37 TRA	AMJun 29, 2018	Frequency		nte	r Free	q 2.	50 Q		GHz		Trig: Fr	ENSE INT			Log-Pwr		TRACE 1 2	3456	Frequency
10 dB/div		f Offset 1	4 dB	FGain:Lov		Atten:	20 dB			-		65.2 µs		10	dBJd			offset 14 20.00 d		IFGain	Low	#Atten:	20 dB				ΔMkr	Det P N 1 366.3 -0.03	3 µs	Auto Tune
10.0 0.00	*	2	162			1			-			- [Center Freq 2.402000000 GHz		0				2	×2	● 1∆	2			1					Center Free 2.441000000 GH
-20.0	U												Start Freq 2.402000000 GHz																	Start Fre 2.441000000 GH
50.0 60.0 70.0	yêt		(nurselan A)	unipatrus		ηA	ytranik-m	literente		rymu	huquluulintibe	nhv	Stop Freq 2,402000000 GHz	-50. -60. -70.			ndahi	neenptice	in the second	-	ph si	hydrige Alland	N H-VH		N.M.	and an	bealty	Hu	, MART	Stop Fre 2.441000000 GP
Center 2 Res BW	1.0 M	IHz	GHz	#V	/BW 3.	.0 MHz		North N		weep 4	.400 ms	5pan 0 Hz 1001 pts)		Re	s B	r 2.44 W 1.0	мн	0000 G z	Hz		#VBW	/ 3.0 MH		FUNCTION		Sweep		Span ns (1001	pts)	CF Ste 1.000000 MH Auto Mi
1 Δ2 2 F 3 4 5			2	165.2 µs 187.2 µs	(<u>A</u>)	-0.05 8.97 d							Freq Offset 0 Hz	23	F	2 1	t (Δ)		366.3 1.233 r	us (A) ns	9,02								Freq Offse 0 H
6 7 8 9 10	-													6 7 8 9																
2	-					m	-			1				1	-		-					ill.					-		, "	
										STATUS				A45/G												STAT	10-			

CH-Low DH3

CH-Mid DH3

🛍 Agilent Spectrum Analyzer - Swept SA		🗱 Agitent Spectrum Analyzer - Swept SA	
M № 50.0 DC SErvisionT Allen Autr Center Freq 2.402000000 GHz PN0: Faat. +++ Trig: Free Run Avg Type: Log-Pw		02 RL RF 50.0 DC SENSE.INT Center Freq 2.441000000 GHz PN0: Fast →→ Trig: Free Run	ALIGN AUTO 10:08:52 AM JUN 29, 2018 Avg Type: Log-Pwr TYPE[Wwwwww DET[P N N N N
IFGain:Low #Atten: 20 dB	ΔMkr1 1.602 ms -0.01 dB	IFGain:Low #Atten: 20 dB Ref Offset 14 dB 10 dB/div Ref 20.00 dBm	ΔMkr1 1.602 ms -0.01 dB
	Center Freq 2.402000000 GHz		Center Freq 2.441000000 GHz
	Start Freq 2.402000000 GHz	200 30D 400	Start Freq 2.44100000 GHz
500	Stop Freq 2,402000000 GHz	50.0 Vicultivity Washington	វេតុក្រុង(ក្រុង) Stop Freq 2,44100000 GHz
Center 2.402000000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Sweep	8.800 ms (1001 pts) 1.000000 MHz	Center 2.441000000 GHz Res BW 1.0 MHz #VBW 3.0 MHz 1000 M0038 M051 State X Y 2005	Span 0 Hz CF Step Sweep 8.800 ms (1001 pts) 1.000000 MHz Auto Man
Δ2 f t 1.802 ms (Δ) -0.01 dB 2 F t 1.998 ms 8.94 dBm 4 4 4 4 4	Freq Offset 0 Hz	Δ2 1 t (Δ) 1.802 ms (Δ) -0.01 dB 2 F t 2.473 ms 8.97 dBm 3 - - - - 4 - - - - 5 - - - - -	Freq Offset
9		9	
4 min sta	rus	NSG III	STATUS

CH-Low DH5

CH-Mid DH5

Agtent Spectrum Analyzer - Songet SA	
RL RF Sel 0 Sende INT Align Autro 10/2/29 M Mn 78, 2018 Frequency M RF So 0 Sende INT Align Autro 10/3/29 M Mn 78, 2018 Inter Freq 2.402000000 GHz Avg Type: Log-Pwr Trace []/2 3 4 5 6 Frequency Center Freq 2.441000000 GHz Avg Type: Log-Pwr Trace []/2 3 4 5 6 Trace []/2 3 4 5 6	Frequency
IFGaintow #Atten: 20 dB Ext Ormatil dB Auto Tune Auto Tune Auto Tune ΔMkr1 2.837 ms	Auto Tune
dB/div Ref 20.00 dBm 0.04 dB 0.04 dB 0.06 dB 0.06 dB	
Δ2 Δ2 Δ2 Δ2 0 2.402000000 GHz 0.0 10.0 3.2 10.0 10.	Center Freq 2.441000000 GHz
0 Start Freq 200 2.40200000 GHz 300	Start Freq 2.441000000 GHz
0 400	Stop Freq 2.441000000 GHz
nter 2.402000000 GHz s BW 1.0 MHz #VBW 3.0 MHz Sweep 13.13 ms (1001 pts) uto MHz #VBW 3.0 MHz Sweep 13.13 ms (1001 pts)	CF Step 1.000000 MHz Auto Man
Concernence X Y Postation worth Postation	Freq Offset 0 Hz
Role (a) 2 837 ms (a) 0.04 dB Role (a) (a) 2 837 ms (a) 0.04 dB Role (a)	
STATUS MSG STATUS	

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CH-High DH1

CH-Mid 2DH1

	et Spectru	an Ana									_											御川 A	Ágét	ent Spectr	um An							_	_								_				10	- (-4) - 23
Cente	er Fre	q 2.	4800	0000	00 0	SHz	Fast +		_	SENS			Avg		Lign AU		10:07	TRACE	Jun 29, 201	6	Frequency	Ce	RI.	er Fre	eq 2		50 g 1000		GH	z		Tele	SER	SE:INT		Avg	д Тур	e: Log	g-Pwr	1	TR	ACE 1	234	5.6	Frequ	iency
10 dBJ	div	Ref C	20.00	14 dB D dBn		IFGai	: Fast + in:Low		#Atte	in: 20	dB					Δ		1 36	66.3 µs	a	Auto Tune	10 0	dB.	Vdiv	Ref Ref	Offsel	00 dE	Bm	IFGa	0: Fast sin:Lov	w		en: 2							ΔМ	kr1	374 -0.5	.0 μ	us	A	ito Tune
10.0 0.00			2	2	•	142									-						Center Freq 2.48000000 GHz	10.0	.0		*	2	∮ ¹²	12			-	*****						-	1				F	\$		obbo GHz
-20,0 -30.0 -40.0		-				+		-	l		+	_			t		-	-			Start Freq 2.480000000 GHz	-20. -30. -40.	0		l						L								-	-			L			tart Freq 0000 GHz
-50.0 -60.0 -70.0	dyratella	Antoni	iveling.		_	ih par	irir/~*/	Krept M	et aut	+	-	vikae	righty.	anta	W		i hior	-	Muhhayati		Stop Freq 2.480000000 GHz	-50. (60, (70.)	- N	it all the design of the desig	1		W	it and	erner	4.arpa	N.		wh	ni Cin	tion (han			HIN	malan	N/ with	#- * *	-			top Freq 0000 GHz
	BW 1.0	D MH	z	GHz	×		#VB		Ŷ			UNCT	ION	_	weep	_		is (1	oan 0 Ha 001 pts		CF Step 1.000000 MHz Suto Man	Re	s E	ODE THE	D MI	Hz	0 GH	Hz ×			/BW	Y			FUNC	TION		_		4.400) ms	Spar (100	01 pt	ts)	1.00 Auto	CF Step 0000 MHz Man
1 A 2 F 3 4 5	2	t (Δ)			366. 821.	3 µ8 (Δ 9 µs	*)	6,6	2.29 d 6 dB	m		_						=		Freq Offset 0 Hz	1 2 3 4 5		52 1 F	t	(Δ)			374	.0 µs .6 µs	(Δ)	9	0.50 15 dE	dB 3m									_		Fre	q Offset 0 Hz
6 7 8 9 10																						6 7 8 9 10								_																
+ L	Istang																																													

CH-High DH3

CH-Mid 2DH3

	Spectrum Analyzer - S								0 4 1	🌒 Agè	lent Spectr	um An	alyzer - Swept SA						-			
Center	Freq 2.480		GHz PNO: Fast +	_	ee Run	Avg Type	Log-Pwr	10:09:10 AM Jun 29, 2018 TRACE 1 2 3 4 5 TITE WWWWWW	Frequency	Cent		eq 2	50 0 DC	10 GH	z	Trig: Free R			e: Log-Pwr	TR	AMJun 29, 2018 ACE 1 2 3 4 5 6 YPE WWWWWWWW DET P NNNNN	Frequency
10 dB/div	Ref Offset		IFGain:Low	#Atten:	20 dB		Δ	Mkr1 1.602 ms -0.04 dB	Auto Tune	10 dB	3/div	Ref (Offset 14 dB 20.00 dBm	IFG	ain:Low	#Atten: 20 d	В		4	Mkr1 1	.602 ms -0.37 dB	Auto Tune
10.0 0.00	- ×2		1Δ2						Center Freq 2.480000000 GHz	10.0 0.00		2		1∆2								Center Freq 2.441000000 GHz
-20,0							1		Start Freq 2.48000000 GHz	-20.0 -30.0												Start Freq 2.441000000 GHz
-50.0	unterne		hand	han -		younted	-	sotiarilipadi	Stop Freq 2.48000000 GHz	-50.0 c	and -			hinter	ww		ensited.	, <u> </u>		Normany	W	Stop Freq 2.441000000 GHz
Res BW	2.480000000 V 1.0 MHz) GHz	#VB	W 3.0 MH				Span 0 Hz 800 ms (1001 pts)	CF Step 1.000000 MHz Auto Man	Res		0 MH			#VB	W 3.0 MHz		_	Sweep 8	3.800 ms	Span 0 Hz (1001 pts)	CF Step 1.000000 MHz Auto Man
1 Δ2 2 F 3 4 5	t (Δ)	^ 	1,602 ms (A 1,267 ms) -0.0 9,01	4 dB			PONE 1011 2000	Freq Offset 0 Hz	1 / 2 3 4 5	Δ2 1	t	(Δ)	1,60 554	2 ms (Δ .4 µs) -0.37 dB 9,11 dBm						Freq Offset 0 Hz
8 9 10										6 7 8 9 10 11											_	
A MSG				т			STATUS	•		MSG						m			STATU	6	,	

CH-High DH5

CH-Mid 2DH5

M Agient	B: Agtent Spectrum Analysis - Sengt 54. Strike 1WT ALIGN AUTO 10/24131 AMJ/m B: A.L. B: B.G. Strike 1WT ALIGN AUTO 10/24131 AMJ/m Center Freq 2.480000000 GHz Trace Even Bun Avg Type: Log-Pwr Trace Even Bun								RACE 1 2 3 4 5	Frequency	130 F	R I.	1		50 😟		Hz	5	ENSEINT	Avg Typ	ALIGN A		TRAC	MJun 29, 2018	Frequency					
Conten					PNO: F	ast + Low	F ;	Trig: Fr #Atten:	20 dB					2.837 ms			nor	Trog	2.40			PNO: Fast FGain:Low	#Atten:					De	616 ms	
10 dB/d	iv	Ref Ref	Offset 14 d	iB Bm		A 1/							AWKET	-0.09 dE		10 c	B/div	R	ef Offs ef 20.	et 14 .00 d	^{dB} Bm							-	0.28 dB	
10.0			×2								-				Center Freq 2.480000000 GHz					-	×2		1Δ2							Center Freq 2.480000000 GHz
-20,0 -30.0							-								Start Freq 2.480000000 GHz					_										Start Freq 2.480000000 GHz
-50.0 -60.0		wije pe	ņ⊿			Red	tornely				aten	-		kutajanya	Stop Freq 2,48000000 GHz	-50.0	0 0 0		-	ft de la constantion de la constantion Constantion de la constantion de la const			ertra and			an may	w		V A46	Stop Freq 2,48000000 GHz
_	_	_	00000 GI Hz	Hz	_	#VB	w 3	.0 MH					13.13 ms	Span 0 Hz s (1001 pts	CF Step 1.000000 MHz Auto Man	Res	s BW	1.0		00 G	Hz	#VE	3W 3.0 MH					733 ms (pan 0 Hz 1001 pts)	CF Step 1.000000 MHz Auto Man
1 Δ2 2 F 3 4		t t	(۵)	×	2.837 n 1.839 n	18 (A 15)	-0.0 9,73	9 dB dBm	FUNCTIO	N PU	NCTION WOTH	FUNC	CTION VALUE	Freq Offset 0 Hz	1	A2 F				× 1	616 ms () 825 ms	Δ) -0.2 9,14 (B dB 1Bm	CTION FL	INCTIONY	MDTH	FUNCTR	N VALUE	Freq Offset 0 Hz
1 Δ2 2 F 3 4 5 6 7 8 9 10 11																6 7 8 9 10														
- L	'							111						- ·		• I							m			-				
MSG												STATU	5			MSG										5	STATUS			

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CH-Mid 3DH1

Certer Pred 2.44100000 GMz Trig: Free Run IFCaint.ow T		strum Analyzer - Swept Si	4				
Ref Offset 14 dB AMkr1 374.0 µs Auto 10 dB/div Ref 20.00 dBm -0.81 dB -0.81 dB Center 10 dB/div Ref 20.00 dBm -0.81 dB -0.81 dB Center 10 dB/div Ref 20.00 dBm -0.81 dB -0.81 dB Center 000 -0.81 dB -0.81 dB -0.81 dB Center 000 -0.81 dB -0.81 dB -0.81 dB Center 000 -0.81 dB -0.81 dB -0.81 dB Stor 200 -0.81 dB -0.81 dB -0.81 dB Center 24100000 -0.81 dB -0.81 dB -0.81 dB Stor 200 -0.91 dB -0.91 dB -0.91 dB -0.91 dB 200 -0.91 dB -0.91 dB -0.91 dB -0.91 dB -0.91 dB 200 -0.91 dB 201 -0.91 dB -0.91 d			000 GHz	Trig: Free Run		TRACE 1 2 3 4 5 6	Frequency
100 102 102 Center 000 100 <th></th> <th></th> <th>IFGain:Low</th> <th>#Atten: 20 dB</th> <th></th> <th>ΔMkr1 374.0 μs</th> <th>Auto Tun</th>			IFGain:Low	#Atten: 20 dB		ΔMkr1 374.0 μs	Auto Tun
300 300 <td>0.00</td> <td>×2</td> <td></td> <td></td> <td></td> <td>~</td> <td>Center Fre 2.441000000 GH</td>	0.00	×2				~	Center Fre 2.441000000 GH
CP Provide Fight (normality) Provide Fight (normality) Provide Fight (normality) Provide Fight (normality) Stop 2.44100000 2:0 2:0 2:0 2:0 2:0 2:0 2:0 2:0 2:0 2:0 2:0 2:0 2:0 2:0 0:0 <t< td=""><td>20,0</td><td></td><td></td><td></td><td></td><td></td><td>Start Fre 2.441000000 GH</td></t<>	20,0						Start Fre 2.441000000 GH
es BW 1.0 MHz #VBW 3.0 MHz Sweep 4.400 ms (1001 pts) 24 M026 M26 H29 H29 H2	50,0	perophy.	ntropped with the state	water way	regeneration and the	publismingerselbergenserses	Stop Fr 2.441000000 G
or Mode Inter Set X X Y Y FulleTion Uniterion Worth FulleTion Value Co. 1 Δ2 1 1 (Δ) 374.0 μa (Δ) -0.81 dB 2 F 1 t 712.8 μs 9.15 dBm 4 5				3.0 MHz	Sweep 4	Span 0 Hz .400 ms (1001 pts)	CF Sto 1.000000 M Auto M
9	1 Δ2 2 F 3 4	t (Δ)	374.0 µs (Δ)	-0.81 dB	PUNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offs
7 8 9 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6 7 8 9						
		1.1		m		*	

CH-Mid 3DH3

									inalyzer - Swe	ipectrum 4		
Frequency	MJun 29, 2018	TRAC	Log-Pwr		SE:INT	1	z	00000 GH	2.44100	Freq		Cen
Auto Tun	.607 ms 0.31 dB	Mkr1 1	Δ		dB	#Atten: 20	iO:Fast ↔ lain:Low	dB	f Offset 14		B/div	10 di
Center Fre 2.441000000 GH	-colarcologia y majel									(<u></u>	**	.og 10.0 0.00
Start Fre 2.441000000 GH												0.0
Stop Fre 2.441000000 GH		evaluation			i destiler former for		W.	anataliyalar			n.	50.0 50.0
CF Ste 1.000000 MH Auto Ma	ipan 0 Hz 1001 pts)	.733 ms (3.0 MHz	#VBW			1.0 N	BW	es
Freq Offse	AN WALLIE	FUNCTI	CHONMOTH	TION FUN		-0.31 (9.10 dE	07 ms (Δ) 9.5 μs	× 1,6 27	(<u>A</u>)	1102 935 1 t 1 t	Δ2 F	
0 H												4 5 6
												7 8 9 10
					-	т	-				- '	(I.m.
		F.	STATUS									9G

CH-Mid 3DH5

Frequency	3456	20 AMJun RACE 1 2	TF	-Pwr	ALS: Type: Lo	Avg		SENSE	1	_	GHz	00000	2.4800	eq 2	er Fre	RL.
Auto Tur		1.607	Mkr1	Δ					#Atten		PNO: Fast IFGain:Lov		Offset			
Center Fre 2.48000000 GH	1 dB	-0.3	~~~~~						*****	1	142		f 20.00		/div	9 00
Start Fre 2.480000000 GF								-								0
Stop Fre 2.480000000 GH		the tay	-10			eprodut	pice.	+		-	or you for the local sectors in the local sectors i	-		-	acculut	0
CF Ste 1.000000 MH Auto Ma	1 pts)	Span s (100	733 ms		Sw		£1.05	Hz	3.0 M	/BW	#V	GHz		0 M	er 2.43 BW 1.0	s
Freq Offs 0 F	_							31 dB 3 dBm	-0.3	(Δ)	1.607 ms 733.6 µs		(Δ)		12 1 F 1	4
	. .	_					_	_	111	_						

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14 ANTENNA REQUIREMENT

14.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device. If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

14.2 Antenna Connected Construction

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

~ End of Report ~

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