

Report No. : FR832801-05A



FCC RADIO TEST REPORT

FCC ID	: B32E280BTWFDB
Equipment	: Point of Sales Terminal
Brand Name	: Verifone
Model Name	: e280 DB
Applicant	: Verifone, Inc.
	88 West Plumeria Drive, San Jose, CA 95134, United States
Manufacturer	: Verifone, Inc.
Standard	: FCC Part 15 Subpart C §15.247

The product was received on Oct. 12, 2019 and testing was started from Oct. 12, 2019 and completed on Dec. 03, 2019. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Lunis Win

Reviewed by: Louis Wu SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FR832801-05A	01	Initial issue of report	Dec. 16, 2019



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(1)	Number of Channels	Pass	-
3.2	15.247(a)(1)	Hopping Channel Separation	Pass	-
3.3	15.247(a)(1)	Dwell Time of Each Channel	Pass	-
3.4	15.247(a)(1)	20dB Bandwidth	Pass	-
3.4	2.1049	99% Occupied Bandwidth	Reporting only	-
3.5	15.247(b)(1)	Peak Output Power	Pass	-
3.6	15.247(d)	Conducted Band Edges	Pass	-
3.7	15.247(d)	Conducted Spurious Emission	Pass	-
3.8	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 6.03 dB at 893.300 MHz
3.9	15.207	AC Conducted Emission	Pass	Under limit 10.63 dB at 13.487 MHz
3.10	15.203 & 15.247(b)	Antenna Requirement Pass		-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Cindy Liu



1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, and RFID.

Product Specification subjective to this standard				
	WLAN: Stamping Antenna			
Antenna Type	Bluetooth: Stamping Antenna			
	RFID: Loop Antenna			

	Specification of Accessory				
	Brand Name	Verifone			
	Manufacturer	Phihong			
AC Adapter	Model Name	PSAA05A-050QL6V			
AC Adapter	Power Rating	Input:100-240Vac, 50-60Hz 0.2A			
		Output: 5V/1A			
	Power Cord	N/A			
Pottony	Brand Name	Verifone			
Battery	Model Name	BPK087-700			
USB Cable	Brand Name	Verifone			
	Model Name	N/A			

1.2 Modification of EUT

No modifications are made to the EUT during all test items.



1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory			
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978			
Test Site No.	Sporton Site	e No.		
	TH05-HY	CO05-HY		

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory		
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855		
Test Site No.	Sporton Site No. 03CH12-HY		

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW0007

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013

Remark:

- 1. All test items were verified and recorded according to the standards and without any deviation during the test.
- 2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	0	2402	27	2429	54	2456
	1	2403	28	2430	55	2457
	2	2404	29	2431	56	2458
	3	2405	30	2432	57	2459
	4	2406	31	2433	58	2460
	5	2407	32	2434	59	2461
	6	2408	33	2435	60	2462
	7	2409	34	2436	61	2463
	8	2410	35	2437	62	2464
	9	2411	36	2438	63	2465
	10	2412	37	2439	64	2466
	11	2413	38	2440	65	2467
	12	2414	39	2441	66	2468
2400-2483.5 MHz	13	2415	40	2442	67	2469
	14	2416	41	2443	68	2470
	15	2417	42	2444	69	2471
	16	2418	43	2445	70	2472
	17	2419	44	2446	71	2473
	18	2420	45	2447	72	2474
	19	2421	46	2448	73	2475
	20	2422	47	2449	74	2476
	21	2423	48	2450	75	2477
	22	2424	49	2451	76	2478
	23	2425	50	2452	77	2479
	24	2426	51	2453	78	2480
	25	2427	52	2454	-	-
	26	2428	53	2455	-	-

2.2 Test Mode

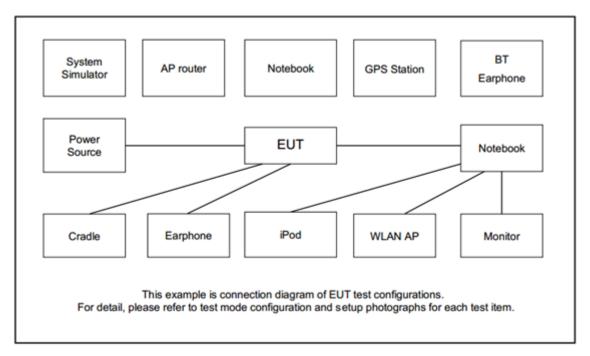
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report, and the worst mode of radiated spurious emissions is Bluetooth 1Mbps mode, and recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

	Summary table of Test Cases					
		Data Rate / Modulation				
Test Item	Bluetooth BR 1Mbps Bluetooth EDR 2Mbps Bluetooth EDR					
	GFSK	π /4-DQPSK	8-DPSK			
Conducted	Mode 1: CH00_2402 MHz	Mode 4: CH00_2402 MHz	Mode 7: CH00_2402 MHz			
	Mode 2: CH39_2441 MHz	Mode 5: CH39_2441 MHz	Mode 8: CH39_2441 MHz			
Test Cases	Mode 3: CH78_2480 MHz	Mode 6: CH78_2480 MHz	Mode 9: CH78_2480 MHz			
		Bluetooth BR 1Mbps GFSK				
Radiated	Radiated Mode 1: CH00_2402 MHz					
Test Cases		Mode 2: CH39_2441 MHz				
	Mode 3: CH78_2480 MHz					
AC	Mode 1 :Bluetooth Link + W		MSB + Smort Cord + LED			
Conducted		LAN (2.4GH) Link + RFID On				
Emission	+ buzzei/Speaker +	- Display + USB Cable (Charg	ing from AC Adapter)			
Remark: For ra	adiated test cases, the worst n	node data rate 1Mbps was rep	orted only since the highest			
RF output pow	er in the preliminary tests. The	e conducted spurious emission	s and conducted band edge			
measurement	for other data rates were not w	orse than 1Mbps, and no othe	er significantly frequencies			
found in condu	cted spurious emission.					

The following summary table is showing all test modes to demonstrate in compliance with the standard.



2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
2.	MSR Card	N/A	N/A	N/A	N/A	N/A
3.	Smart Card	N/A	N/A	N/A	N/A	N/A
4.	Notebook	DELL		FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m

2.5 EUT Operation Test Setup

The RF test items, utility "Broadcom Blue Tool" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to contact with base station to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.



2.6 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 attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)



3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedure

- 1. The testing follows ANSI C63.10-2013 clause 7.8.3.
- 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Enable the EUT hopping function.
- Use the following spectrum analyzer settings: Span = the frequency band of operation;
 RBW = 300kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
- 6. The number of hopping frequency used is defined as the number of total channel.
- 7. Record the measurement data derived from spectrum analyzer.

3.1.4 Test Setup



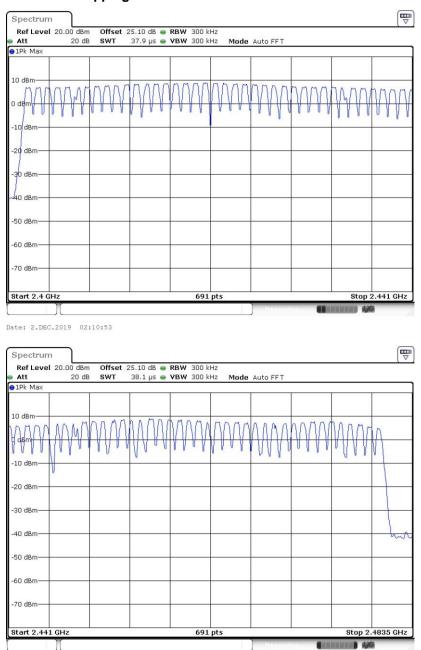
Spectrum Analyzer

EUT



3.1.5 Test Result of Number of Hopping Frequency

Please refer to Appendix A.



Number of Hopping Channel Plot on Channel 00 - 78

Date: 2.DEC.2019 02:11:05



3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

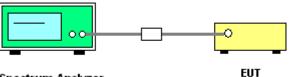
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.2.
- 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Enable the EUT hopping function.
- Use the following spectrum analyzer settings:
 Span = wide enough to capture the peaks of two adjacent channels;
 RBW = 300kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
- 6. Measure and record the results in the test report.

3.2.4 Test Setup



Spectrum Analyzer

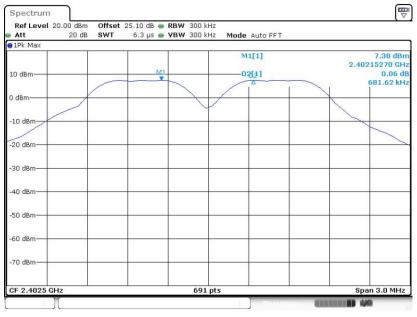
3.2.5 Test Result of Hopping Channel Separation

Please refer to Appendix A.



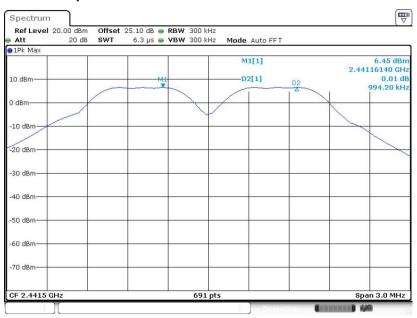
<1Mbps>

Channel Separation Plot on Channel 00 - 01



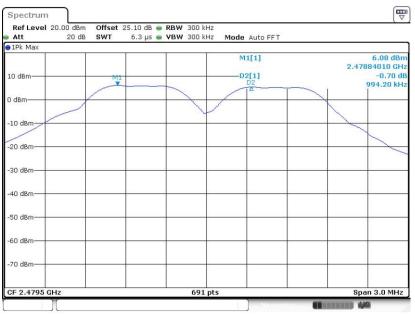
Date: 1.DEC.2019 22:39:52

Channel Separation Plot on Channel 39 - 40



Date: 1.DEC.2019 22:56:09



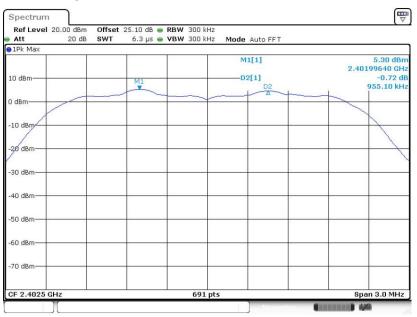


Channel Separation Plot on Channel 77 - 78

Date: 1.DEC.2019 23:47:12

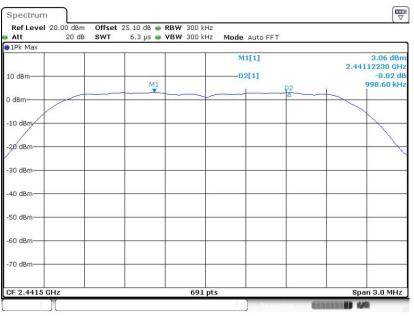
<2Mbps>

Channel Separation Plot on Channel 00 - 01



Date: 2.DEC.2019 07:24:53

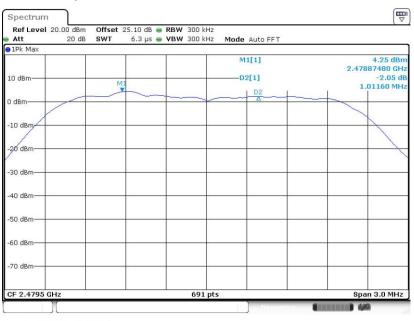




Channel Separation Plot on Channel 39 - 40

Date: 2.DEC.2019 02:26:31

Channel Separation Plot on Channel 77 - 78

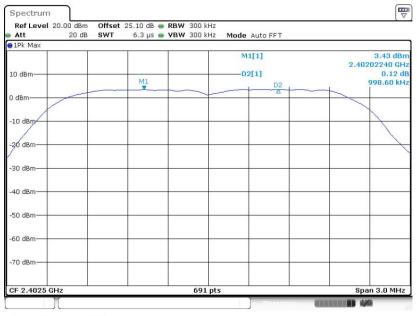


Date: 2.DEC.2019 02:32:39



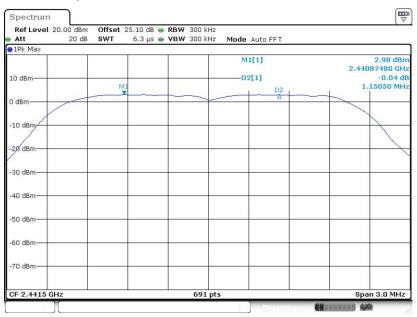
<3Mbps>

Channel Separation Plot on Channel 00 - 01



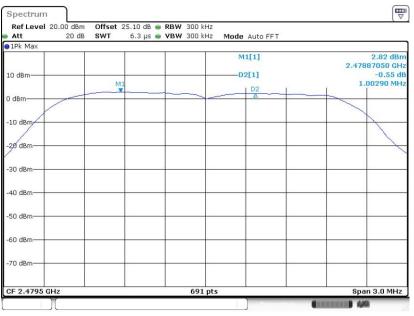
Date: 2.DEC.2019 02:44:16

Channel Separation Plot on Channel 39 - 40



Date: 2.DEC.2019 02:51:12





Channel Separation Plot on Channel 77 - 78

Date: 2.DEC.2019 02:56:58



3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

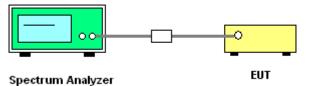
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.4.
- The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Enable the EUT hopping function.
- 5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
- 6. Measure and record the results in the test report.

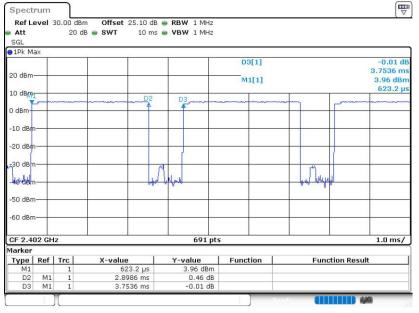
3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

Please refer to Appendix A.





Package Transfer Time Plot

Date: 20.NOV.2019 23:26:53

Remark:

1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4×79) (s),Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops.

2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels. With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4×20) (s), Hops Over Occupancy Time comes to $(800 / 6 / 20) \times (0.4 \times 20) = 53.33$ hops.

3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

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Report Template No.: BU5-FR15CBT Version 2.4	Report Version	: 01



3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

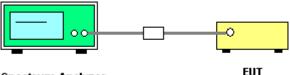
3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
- 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
 Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel;
 RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
 Trace = max hold.
- Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
 Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;
 RBW ≥ 1-5% of the 99% bandwidth; VBW ≥ 3 * RBW; Sweep = auto; Detector function = peak;
 Trace = max hold.
- 6. Measure and record the results in the test report.

3.4.4 Test Setup



Spectrum Analyzer

3.4.5 Test Result of 20dB Bandwidth

Please refer to Appendix A.



<1Mbps>

20 dB Bandwidth Plot on Channel 00



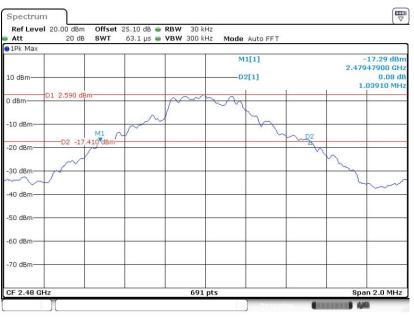
Date: 2.DEC.2019 07:11:10

20 dB Bandwidth Plot on Channel 39



Date: 2.DEC.2019 02:05:50



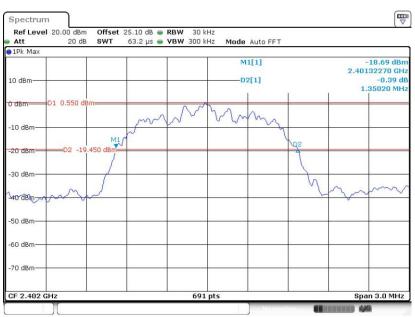


20 dB Bandwidth Plot on Channel 78

Date: 1.DEC.2019 23:50:17

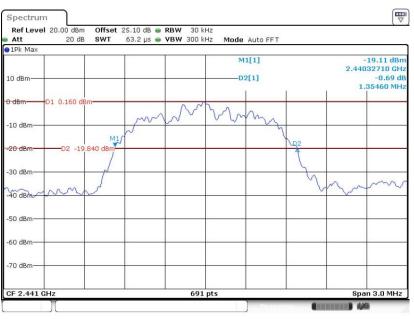
<2Mbps>

20 dB Bandwidth Plot on Channel 00



Date: 2.DEC.2019 02:23:41

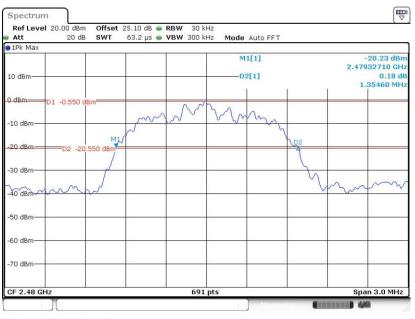




20 dB Bandwidth Plot on Channel 39

Date: 2.DEC.2019 02:28:44

20 dB Bandwidth Plot on Channel 78

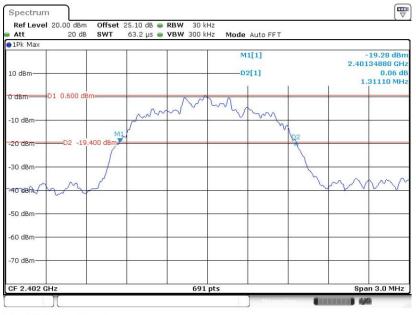


Date: 2.DEC.2019 02:35:32



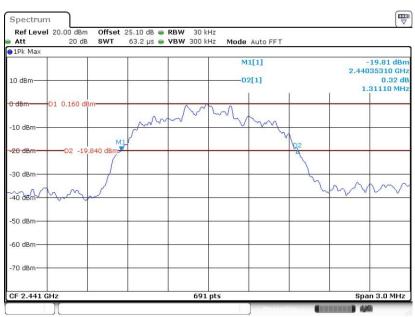
<3Mbps>

20 dB Bandwidth Plot on Channel 00



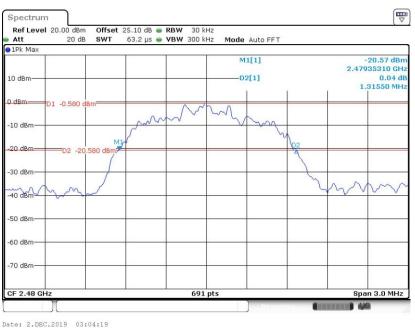
Date: 2.DEC.2019 02:45:52

20 dB Bandwidth Plot on Channel 39



Date: 2.DEC.2019 02:53:37





20 dB Bandwidth Plot on Channel 78

3.4.6 Test Result of 99% Occupied Bandwidth

Please refer to Appendix A.

<1Mbps>

99% Occupied Bandwidth Plot on Channel 00



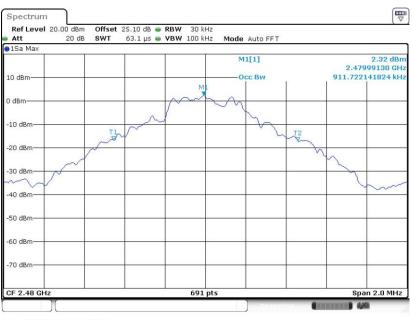




99% Occupied Bandwidth Plot on Channel 39

Date: 1.DEC.2019 23:39:05



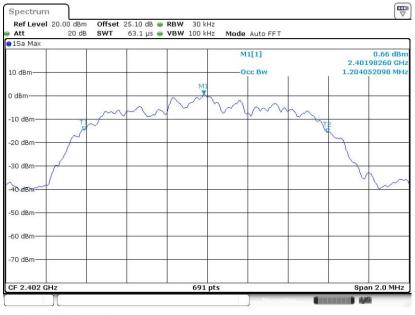


Date: 2.DEC.2019 01:59:35



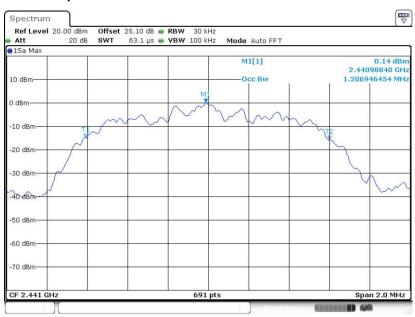
<2Mbps>

99% Occupied Bandwidth Plot on Channel 00



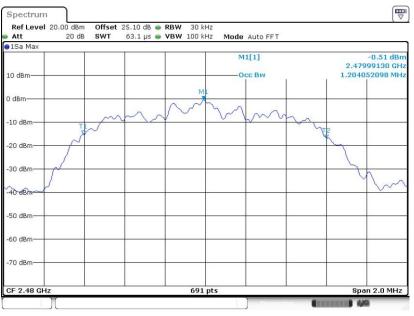
Date: 2.DEC.2019 02:20:13

99% Occupied Bandwidth Plot on Channel 39



Date: 2.DEC.2019 02:29:27



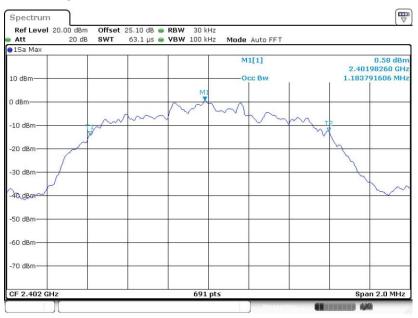


99% Occupied Bandwidth Plot on Channel 78

Date: 2.DEC.2019 02:37:07

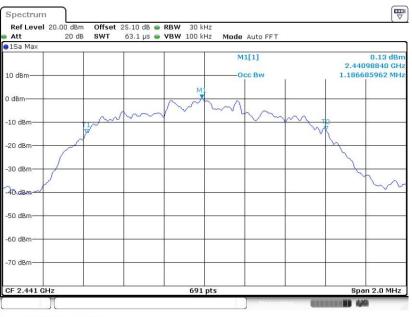
<3Mbps>

99% Occupied Bandwidth Plot on Channel 00



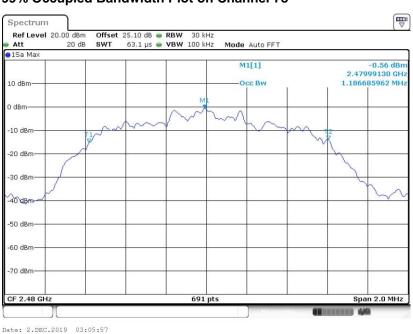
Date: 2.DEC.2019 02:47:13





99% Occupied Bandwidth Plot on Channel 39

Date: 2.DEC.2019 02:54:15



99% Occupied Bandwidth Plot on Channel 78

Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



3.5 Output Power Measurement

3.5.1 Limit of Output Power

The maximum peak conducted output power of the intentional radiator shall not exceed the following: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.

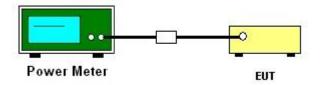
3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.5.
- 2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- 4. Measure the conducted output power with cable loss and record the results in the test report.
- 5. Measure and record the results in the test report.

3.5.4 Test Setup



3.5.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.5.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.



3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

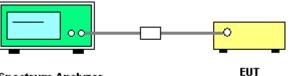
3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 Test Procedures

- 1. The testing follows ANSI C63.10-2013 clause 7.8.6.
- 2. Set to the maximum power setting and enable the EUT transmit continuously.
- 3. Set RBW = 100kHz, VBW = 300kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
- 4. Enable hopping function of the EUT and then repeat step 2. and 3.
- 5. Measure and record the results in the test report.

3.6.4 Test Setup



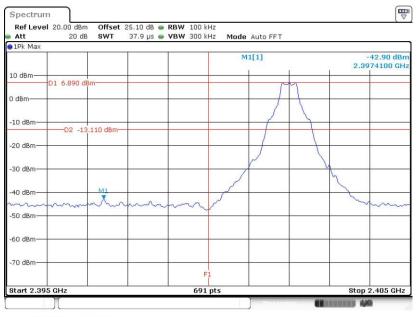
Spectrum Analyzer



3.6.5 Test Result of Conducted Band Edges

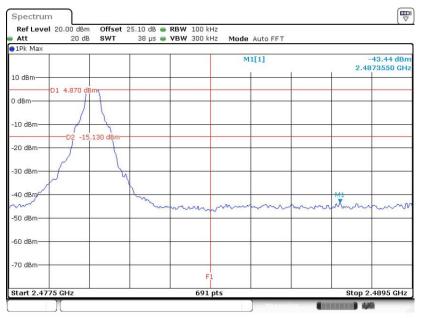
<1Mbps>

Low Band Edge Plot on Channel 00



Date: 2.DEC.2019 02:07:06

High Band Edge Plot on Channel 78

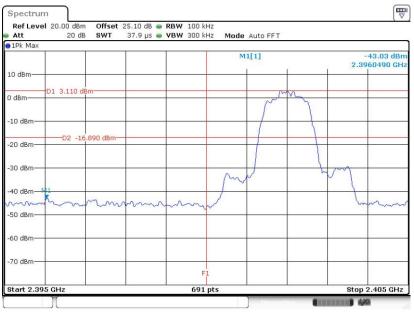


Date: 2.DEC.2019 02:09:07



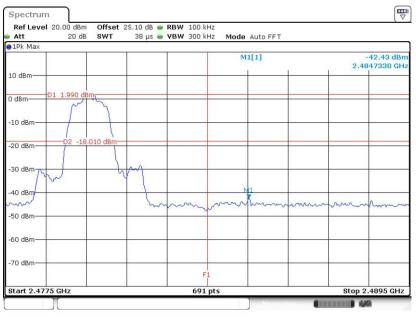
<2Mbps>

Low Band Edge Plot on Channel 00



Date: 2.DEC.2019 02:24:15

High Band Edge Plot on Channel 78

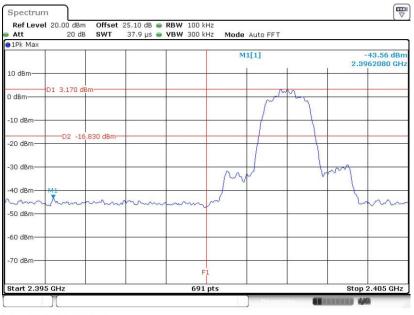


Date: 2.DEC.2019 02:36:21



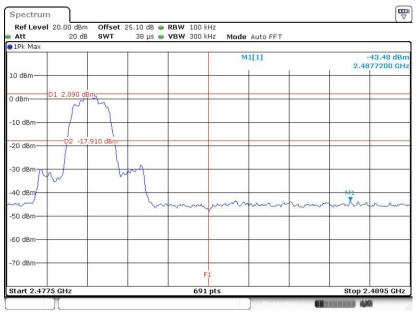
<3Mbps>

Low Band Edge Plot on Channel 00



Date: 2.DEC.2019 02:46:36

High Band Edge Plot on Channel 78

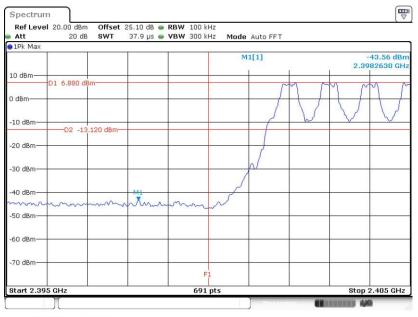


Date: 2.DEC.2019 03:04:56

3.6.6 Test Result of Conducted Hopping Mode Band Edges

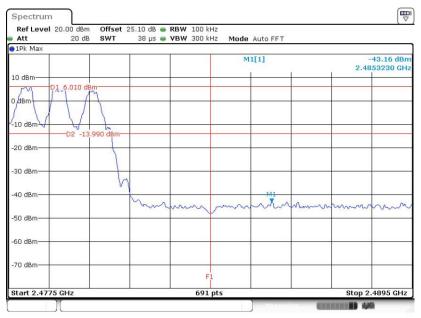
<1Mbps>

Hopping Mode Low Band Edge Plot



Date: 2.DEC.2019 02:10:07

Hopping Mode High Band Edge Plot

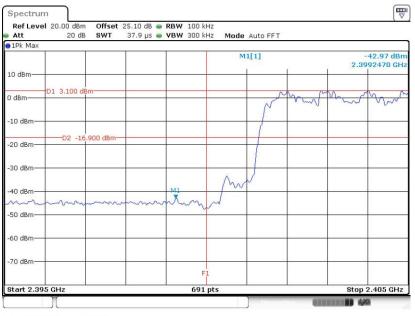


Date: 2.DEC.2019 02:11:54



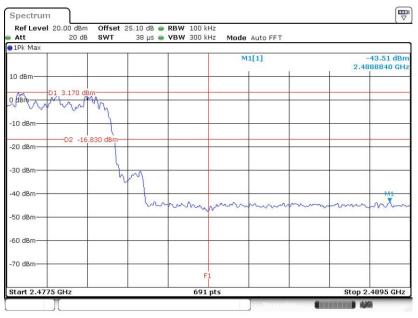
<2Mbps>

Hopping Mode Low Band Edge Plot



Date: 2.DEC.2019 02:40:23

Hopping Mode High Band Edge Plot

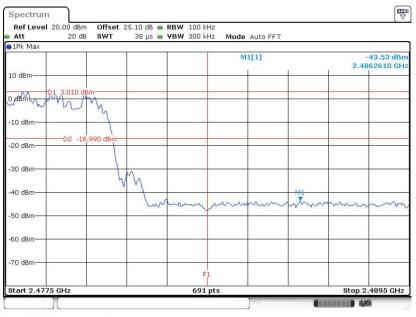


Date: 2.DEC.2019 02:39:09



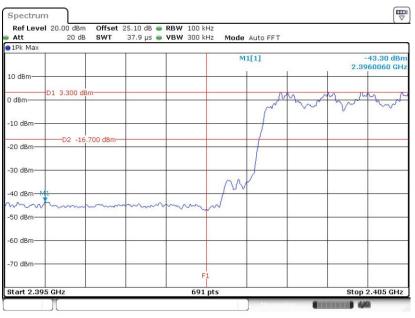
<3Mbps>

Hopping Mode Low Band Edge Plot



Date: 2.DEC.2019 02:42:49

Hopping Mode High Band Edge Plot



Date: 2.DEC.2019 02:41:26

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

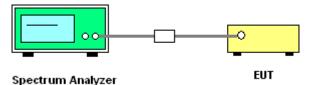
3.7.2 Measuring Instruments

See list of measuring equipment of this test report.

3.7.3 Test Procedure

- 1. The testing follows ANSI C63.10-2013 clause 7.8.8.
- 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. Set to the maximum power setting and enable the EUT transmit continuously.
- Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
- 5. Measure and record the results in the test report.
- 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.7.4 Test Setup

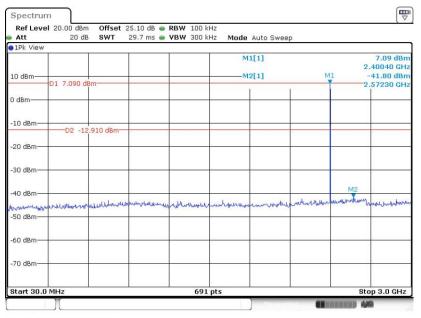


TEL : 886-3-327-3456 FAX : 886-3-328-4978 Report Template No.: BU5-FR15CBT Version 2.4

3.7.5 Test Result of Conducted Spurious Emission

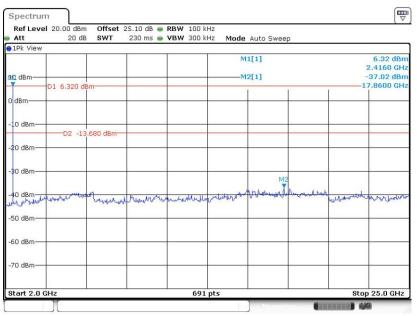
<1Mbps>

CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 1.DEC.2019 22:51:56

1Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 1.DEC.2019 22:52:29



Att	20 dB	SWT	29.7 ms 👄	VBW 300 k	Hz Mode	Auto Swee	D		
1Pk View									
					M	1[1]			6.04 dBn 2.43910 GH
10 dBm					M	2[1]		M1	-40.84 dBr
	D1 6.040 dBr	m		-		1	1	T	2.49930 GH
0 dBm			-						
-10 dBm—									
	D2 -13.9	960 dBm—							
20 dBm—			-	-	-				
-30 dBm—			-		-				
-40 dBm—	++		-	-				M2	
	hunan when the horas	ununun	mount	mulloutreon	and mander a	unhullehunden	annumentation	alabelande	Mansurannender
-50 dBm-							-		
-60 dBm—			-	-					
-70 dBm—									_
					-				

CSE Plot on Ch 39 between 30MHz ~ 3 GHz

Date: 1.DEC.2019 23:41:20

CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

Att	el 20.00 dBm 20 dB	SWT	25.10 dB 👄 230 ms 👄	VBW 300 k		Auto Swee	р		
1Pk View						1[1] 2[1]			6.18 dBr 2.4490 GH -37.04 dBr
dBm	D1 6.180 dB	m							15.7300 GH
10 dBm—	D2 -13	820 dBm-							
20 dBm—	D2 -13.	620 Ubiii							
30 dBm—					M	2			
40 dBm-	and the contraction of	ng Wenndlin	na Angula and	munihidentis			han have been	harmon	al white
50 dBm—									
60 dBm—									
70 dBm—									
Start 2.0	CH3			601	pts			Sto	p 25.0 GHz

Date: 1.DEC.2019 23:44:31



Att	20 dB	SWT	29.7 ms (> VBW 300 k	Hz Mode	Auto Sweep				
1Pk View				-						
					M	11[1]			4.64 c 2.47780	
10 dBm					N	2[1]			-40.13 (
	D1 4.640 dB	1.00						M1	2.38750	
0 dBm	D1 4.040 dt	sm								
o donn										
-10 dBm										
10 dbin										
-20 dBm		.360 dBm-								
-20 00111										
-30 dBm										
-50 dbiii										
-40 dBm							M			
	a that is	I MADON	Lasperennanul	un Manuman and Maria	Andreak subrest for	de a considerational	ananahard	melan	hours request	when
-50 dBm-										
-SO GBIII										
-60 dBm										
oo abiii										
-70 dBm										
20 dolli										
Start 30.0										
				691	nte				Stop 3.0 G	11-

CSE Plot on Ch 78 between 30MHz ~ 3 GHz

Date: 2.DEC.2019 02:00:29

CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

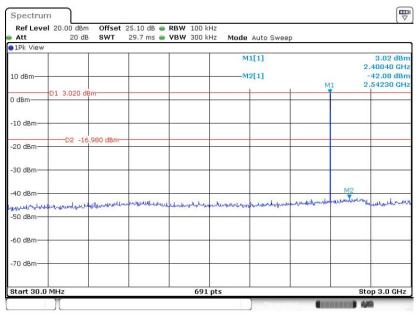
M1[1] M2[1]	4.46 2.4830 -36.79 17.8600
1 1 1	
M2	
of the second of the second of	Wednesser worman warmen
	M Manufal and Manufal and a second

Date: 2.DEC.2019 02:01:48



<2Mbps>

CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 2.DEC.2019 02:20:55

CSE Plot on Ch 00 between 2 GHz ~ 25 GHz

Att 1Pk View	20 di	B SWT	230 ms 🖷	VBW 300 k	Hz Mode	Auto Sweep	0		
0 dBm						11[1]			2.13 dBn 2.4160 GH -36.85 dBn 7.8600 GH
dBm	D1 2.130 d	Bm							
.0 dBm									
20 dBm	D2 -1	7.870 dBm-					2		
30 dBm						M2			
10 dBm	www.whole	Warner	atward	hormon	attention	granna	har an in the second	and water	munimur
50 dBm		-	<u></u>				2		
60 dBm							-		
70 dBm									

Date: 2.DEC.2019 02:21:32



Att	20 dB	SWT	29.7 ms 🦷	• VBW 300	kHz Mode	Auto Swee	р		
1Pk View									
					M	11[1]			2.41 dBr 2.43910 GH
10 dBm					N	12[1]			-41.93 dBr
to abiii								M1	2.79150 GH
) dBm	D1 2.410 de	3m				-		T	
Jubin									
10 10									
-10 dBm									
	D2 -17	.590 dBm-		-					
-20 dBm									
-30 dBm									
									M2
-40 dBm		11724.13	Contract of				1		
	hen ment that	monter	habertanteen	Munder where	wholenchuse	re-la verseauchike	Mulanan	110V.00-	barry huber of
-50 dBm								+	
-60 dBm—	-					-	-	-	
-70 dBm—	-			-	-	-		-	
Start 30.0				60	1 pts		-		Stop 3.0 GHz

CSE Plot on Ch 39 between 30MHz ~ 3 GHz

Date: 2.DEC.2019 02:30:45

CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

Att 20 d	B SWT 230 n	ns 🖷 VBW 300 kHz	Mode Auto Sweep	
1Pk View			M1[1] ——M2[1]	2.00 di 2.4490 di -36.34 di
11 dBm D1 2.000 c	IBm			15.7630 G
10 dBm				
20 dBm	8.000 dBm			
30 dBm			M2	
10 dBm	Margaret and	an emericana	and party added	be dia consider a new market and the second
50 dBm				
70 dBm				

Date: 2.DEC.2019 02:31:13



Att	20 dB	SWT	29.7 ms 👄	VBW 300 k	Hz Mode	Auto Swee	5		
1Pk View									
					M	1[1]			2.00 dBn 2.48210 GH
10 dBm					M	2[1]			-41.74 dBr
10 00111					1.000				2.56800 GH
0 dBm	D1 2.000 dB	m					6	T	
Jubin									
10 dBm									
10 0011									
-20 dBm	D2 -18	.000 dBm-							
20 0011									
-30 dBm							~		
SO GDIII									
-40 dBm								M2	
-to abili	p-undertriftener	1. Heating in Ander	Junraly Marine	his blance	A MARALLA MA	- to up to be to the	dypeter of the weeks	malunation	worther average
-50 dBm	hand the number of the second s	duale a .							
SO GBII									
-60 dBm				2	2				
oo abiii									
70 dBm									
yo dom									
Start 30.0	MHz			691	pts			St	op 3.0 GHz
								DESCRIPTION OF	

CSE Plot on Ch 78 between 30MHz ~ 3 GHz

Date: 2.DEC.2019 02:37:45

CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

Att 20 dB	SWT 230	0 ms 👄 VBW 30	10 kHz Mode	Auto Sweep	1		
10 dBm				1[1] 2[1]			1.39 dBr 2.4830 GH -36.94 dBr 17.8270 GH
DdBm D1 1.390 db	Bm						
10 dBm							-
20 dBm	.610 dBm						
30 dBm				M2			
40 dBm	Murrante	anner the market	www.walasto		Josephilic Marked	m when to have	manne
50 dBm					2		
60 dBm							
70 dBm							
Start 2.0 GHz			i91 pts				op 25.0 GH

Date: 2.DEC.2019 02:38:22



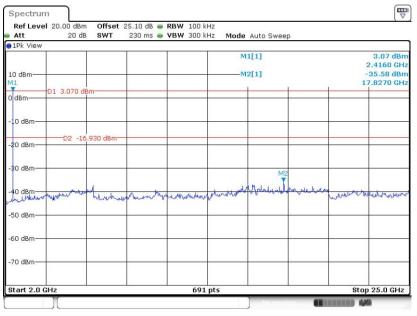
<3Mbps>

CSE Plot on Ch 00 between 30MHz ~ 3 GHz

Att	20 dB	SWT	29.7 ms 🦷	VBW 300	kHz Mode	Auto Sweep		
1Pk View	8							
					IV	11[1]		3.01 dBn 2.40040 GH
10 dBm					N	2[1]		-41.80 dBr
						1 1	MI	2.52940 GH
0 dBm	D1 3.010 dB	im-		-	-			
-10 dBm—								
	D2 -16	.990 dBm-						
-20 dBm			+	+				
-30 dBm—				1				
-40 dBm—							M	2
-40 aBm			A rawines	be a shart of an	at his count of	and when the state of the second	de welighter wild	human and have been also
-50 dBm	her wanter and	Martine 1.0		ALCO MARK	and the contract			
oo abiii								
-60 dBm			-	-				
-70 dBm—			-	-	-			
Start 30.0	1		-	1	01 pts			Stop 3.0 GHz

Date: 2.DEC.2019 02:48:55

CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 2.DEC.2019 02:49:24



Att	20.00 dBm 20 dB			RBW 100 VBW 300		Auto Swee	р			
1Pk View							2			
					M	11[1]			2.00	0 dBn
10 dBm					M	2[1]			-42.2	
to abiii								M1	2.9678	
) dBm	D1 2.000 d	Bm-						T		
) ubiii										
-10 dBm										
-10 UBIII-										
20 dBm	D2 -18	.000 dBm-		_			2			
20 uBili-										
-30 dBm										
-30 ubiii										
-40 dBm										M
40 UBIII		Ou with	Alexe splaces	Le concerno de	withmenu		- an realized	anderen	himmy haden	Jam
-50 dBm-	and when the	- and the second		and the man	of the second	Actual cont				
-50 asm										
-60 dBm										
-60 aBm										
70 dBm							8			
vo usm										
Start 30.0	541.1-			60	1 pts				Stop 3.0	CHT

CSE Plot on Ch 39 between 30MHz ~ 3 GHz

Date: 2.DEC.2019 02:55:18

CSE Plot on Ch 39 between 2 GHz ~ 25 GHz

Att	el 20.00 dBm 20 dB		25.10 dB 🖷 230 ms 🖷	VBW 300 k		Auto Swee	р		
1Pk View				1		4543			o or in
					M	1[1]			2.25 dBr 2.4490 GH
LO dBm	-		-		M	2[1]			-37.22 dBr
11						1	1	1	8.1600 GH
dBm	D1 2.250 dE	3m-							
10 dBm—									~
20 dBm—	D2 -17	.750 dBm					8		
30 dBm—							12		
40 dBm	- the	-			1 10 000	Laplin sel	-		
hours	mutant	hourses	retholistouries	al water and the	- martin	A CALCERCOME OF		when a a	abulungung
50 dBm—							· · · · · · · · · · · · · · · · · · ·		
60 dBm									-
70 dBm—									
tart 2 0	CH2			601	nts			Stor	25.0.04
Start 2.0	GHz			691	pts			Stop	o 25.0 (

Date: 2.DEC.2019 02:55:47



Ref Level Att	20 dB			RBW 100		Auto Swee	эр			
1Pk View										
					N	1[1]				1.94 dBn
10 dBm					N	2[1]				.47780 GH -41.89 dBn
LO GDIII								. M1	0	.57230 GH
D dBm	1 1.940 de	3m-						T		
, ubili										
10 dBm										
-10 UBIII										
20 dBm	D2 -18	.060 dBm-								2
20 UBIII										
30 dBm										
SU UBIII										
40 dBm									M2	
40 UBIII		A	a sharehouse	1 minut	a flashe and	a see He Brig	a Juliet have	hur	dulian	all a la particular
50 dBm	and the second second	- when the co			March a Lanco	1.000-00000				
-60 dBm										
-60 uBm										
70 dBm						-				
20 UBIII										
Start 30.0 N	41.1-			60.	l pts				Ot.	op 3.0 GHz

CSE Plot on Ch 78 between 30MHz ~ 3 GHz

Date: 2.DEC.2019 03:09:03

CSE Plot on Ch 78 between 2 GHz ~ 25 GHz

10 dBm M2[1] 2.48 M1 07Bm 01 1.120 dBm 01 1		C17107075)dB SWT 230 m	ns 🖷 VBW 300 kHz	Mode Auto Sweep	
M1 0 dBm D1 1.120 dBm -10 dBm -20 dBm - D2 -18.880 dBm 	dBm					2.4830 GF -36.50 dB
20 dBm D2 -18.880 dBm	M2		0 dBm			17.8600 GH
-30 dBm	M2	-10 dBm				
M2	A BALL AND A	20 dBmD2	-18.880 dBm			
10 dm when we have a should be the search when a should be a shoul					T	
50 dBm			mentionent	w the manufacture	www.alleland	and a manufacture and a second
60 dBm						
70 dBm		70 dBm			_	

Date: 2.DEC.2019 03:12:04

3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 - 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.8.2 Measuring Instruments

See list of measuring equipment of this test report.



3.8.3 Test Procedures

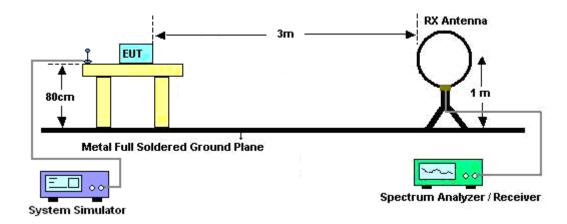
- 1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
- 2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 4. Set to the maximum power setting and enable the EUT transmit continuously.
- 5. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
 - (3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds On time = N₁*L₁+N₂*L₂+...+N_{n-1}*LN_{n-1}+N_n*L_n Where N₁ is number of type 1 pulses, L₁ is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
- 6. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level
- 7. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
- 8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.76dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

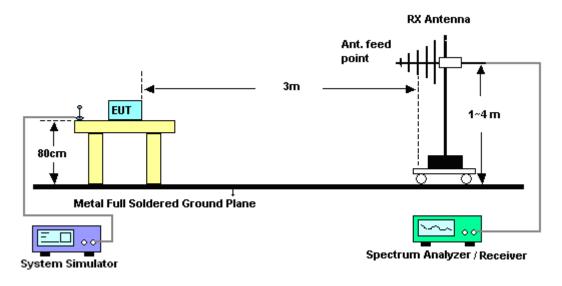


3.8.4 Test Setup

For radiated emissions below 30MHz



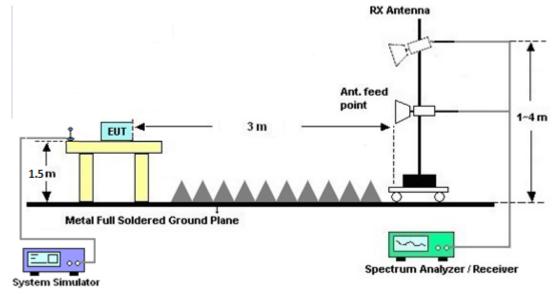
For radiated emissions from 30MHz to 1GHz



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Report Template No.: BU5-FR15CBT Version 2.4	Report Version	: 01



For radiated emissions above 1GHz



3.8.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 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 line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

3.8.7 Duty Cycle

Please refer to Appendix E.

3.8.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.



3.9 AC Conducted Emission Measurement

3.9.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBµV)		
Frequency of emission (MHZ)	Quasi-peak	Average	
0.15-0.5	66 to 56*	56 to 46*	
0.5-5	56	46	
5-30	60	50	

*Decreases with the logarithm of the frequency.

For terminal test result, the testing follows FCC KDB 174176.

3.9.2 Measuring Instruments

See list of measuring equipment of this test report.

3.9.3 Test Procedures

- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.