TEST REPORT

Dt&C

DT&C Co., Ltd.

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- 1. Report No : DRTFCC2002-0021
- 2. Customer
 - Name : BLUEBIRD INC.
 - Address : (Dogok-dong, SEI Tower 13,14) 39, Eonjuro30-gil, Gangnam-gu, Seoul, South Korea
- 3. Use of Report : FCC & IC Original Grant
- 4. Product Name / Model Name : Smart Rugged Tablet Computer / ST102 FCC ID : SS4ST102 / IC : 22515-ST102
- 5. Test Method Used : KDB558074 D01v05r02, ANSI C63.10-2013 Test Specification : FCC Part 15.247

RSS-247 Issue 2, RSS-GEN Issue 5

- 6. Date of Test : 2019.09.26 ~ 2019.11.26
- 7. Testing Environment : See appended test report.
- 8. Test Result : Refer to the attached test result.



The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

2020.02.03.

DT&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Tested by	Reviewed by
DRTFCC2002-0021	Feb. 03, 2020	Initial issue	InHee Bae	JaeJin Lee



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1. EUT DESCRIPTION

FCC Equipment Class	Digital Transmission System(DTS)
Product	Smart Rugged Tablet Computer
Model Name	ST102
Add Model Name	NA
Hardware Version	2.0
Software Version	Windows 10 Enterprise LTSC 2019
Serial Number	Radiated: ST102W4LANSSIBA008 Conducted: ST102W4LALSSHBA042
Power Supply	DC 3.8 V
Frequency Range	• 802.11b/g/n(20 MHz) : 2412 MHz ~ 2462 MHz • 802.11n(40 MHz) : 2422 MHz ~ 2452 MHz
Max. RF Output Power	2.4GHz Band • 802.11b : 18.55 dBm • 802.11g : 23.81 dBm • 802.11n (HT20) : 22.55 dBm • 802.11n (HT40) : 23.18 dBm
Modulation Type	• 802.11b: CCK, DSSS • 802.11g/n/ac: OFDM
Antenna Specification	Antenna type: Internal Antenna Antenna gain: 3.53 dBi

2. INFORMATION ABOUT TESTING

2.1 Test mode

Test	Worst case data rate	Tested Frequency(MHz)				
mode		Lowest	Middle	Highest		
TM 1	802.11b 5.5 Mbps	2412	2437	2462		
TM 2	802.11g 6 Mbps	2412	2437	2462		
ТМ 3	802.11n(HT20) MCS 0	2412	2437	2462		
TM 4	802.11n(HT40) MCS 0	2422	2437	2452		

Note 1: The worst case data rate is determined as above test mode according to the power measurements. Note 2: The power measurement results for all modes and data rate were reported.

2.2 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.3 Tested environment

Temperature	:	20 °C ~ 25 °C
Relative humidity content	:	35 % ~ 45 %
Details of power supply	:	DC 3.80 V

2.4 EMI suppression Device(s) / Modifications

EMI suppression device(s) added and/or modifications made during testing \rightarrow None

2.5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014 and ANSI C 63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

Test items	Measurement uncertainty
Transmitter Output Power	0.9 dB (The confidence level is about 95 %, $k = 2$)
Conducted spurious emission	0.9 dB (The confidence level is about 95 %, $k = 2$)
AC conducted emission	2.4 dB (The confidence level is about 95 %, $k = 2$)
Radiated spurious emission (1 GHz Below)	5.1 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz ~ 18 GHz)	5.4 dB (The confidence level is about 95 %, $k = 2$)
Radiated spurious emission (18 GHz Above)	5.3 dB (The confidence level is about 95 %, k = 2)

3. SUMMARY OF TESTS

FCC Part	RSS Std.	Parameter	Limit	Test Condition	Status Note 1
15.247(a)	RSS-247 [5.2]	6 dB Bandwidth	> 500 kHz		С
15.247(b)	RSS-247 [5.4]	Transmitter Output Power	< 1 Watt		С
15.247(d)	RSS-247 [5.5]	Out of Band Emissions / Band Edge	20 dBc in any 100 kHz BW	Conducted	С
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8 dBm/3 kHz		С
-	RSS-Gen [6.7]	Occupied Bandwidth (99 %)	RSS-Gen(6.7)		С
15.247(d) 15.205 15.209	RSS-247 [5.5] RSS-GEN [8.9] RSS-GEN [8.10]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	FCC 15.209 limits	Radiated	C Note 3
15.207	RSS-Gen [8.8]	AC Line Conducted Emissions	FCC 15.207 limits	AC Line Conducted	С
15.203	RSS-Gen [8.3]	Antenna Requirements	FCC 15.203	-	С

Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable

Note 2: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS.

Note 3: This test item was performed in each axis and the worst case data was reported.

4. TEST METHODOLOGY

The measurement procedures described in the ANSI C63.10-2013 and the guidance provided in KDB558074 D01v05r02 were used in measurement of the EUT.

The EUT was tested per the guidance of KDB558074 D01v05r02. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

4.1 EUT configuration

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

4.2 EUT exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

4.3 General test procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB558074 D01v05r02.

So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector

Radiated Emissions

Basically the radiated tests were performed with KDB558074 D01v05r02. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10-2013.

The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m 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 highest emission, the relative positions of the EUT were rotated through three orthogonal axes.



4.4 Description of test modes

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics. A test program is used to control the EUT for staying in continuous transmitting mode.

Operation test setup for EUT

- Test Software Version: QNavigator / V1.5
- Power setting:

Mode	Frequency [MHz]	Max Target [dBm]	Power Setting
	2412	16.0	35
802.11b	2437	16.0	35
	2462	16.0	35
	2412	15.0	25
802.11g	2437	15.0	25
	2462	15.0	25
	2412	14.0	21
802.11n (HT20)	2437	14.0	21
(1120)	2462	14.0	21
	2422	14.0	25
802.11n (HT40)	2437	14.0	25
(2452	14.0	25



5. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

6. FACILITIES AND ACCREDITATIONS

6.1 Facilities

DT&C Co., Li	d.	
The 3 m test si	te and	conducted measurement facility used to collect the radiated data are located at the
42, Yurim-ro, 1	54beor	n-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.
The test site co	mplies	with the requirements of § 2.948 according to ANSI C63.4-2014.
- FCC MRA	Accre	dited Test Firm No. : KR0034
- IC Test sit	e No. :	5740A
www.dtnc.net		
Telephone	:	+ 82-31-321-2664
FAX		+ 82-31-321-1664

6.2 Equipment

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, loop, horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

7. ANTENNA REQUIREMENTS

7.1 According to FCC 47 CFR §15.203

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna is attached on the device by means of unique coupling method. Therefore this E.U.T Complies with the requirement of §15.203

8. TEST RESULT

8.1 6dB bandwidth

Test Requirements and limit, §15.247(a)

The bandwidth at 6 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration:

Refer to the APPENDIX I.

Test Procedure:

- KDB558074 D01v05r02 Section 8.2
- ANSI C63.10-2013 Section 11.8.2
- 1. Set resolution bandwidth (RBW) = 100 kHz.
- 2. Set the video bandwidth (VBW) \ge 3 x RBW.
- (<u>RBW : 100 kHz / VBW : 300 kHz</u>)
- 3. Detector = **Peak**.
- 4. Trace mode = **Max hold**.
- 5. Sweep = Auto couple.
- 6. Allow the trace to stabilize.
- 7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
- Test Results: Comply(Refer to next page.)

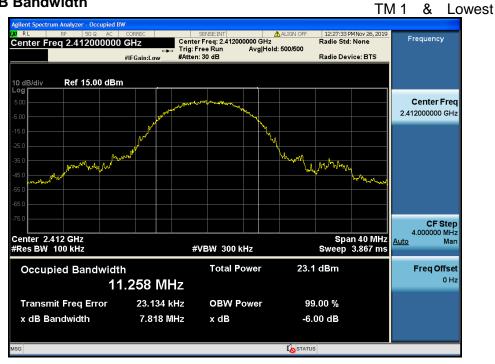


Test Mode	Frequency	Test Results[MHz]
	Lowest	7.82
TM 1	Middle	8.08
	Highest	7.99
	Lowest	16.32
TM 2	Middle	16.32
	Highest	15.81
	Lowest	17.06
ТМ 3	Middle	17.33
	Highest	15.77
	Lowest	35.60
TM 4	Middle	35.87
	Highest	35.51



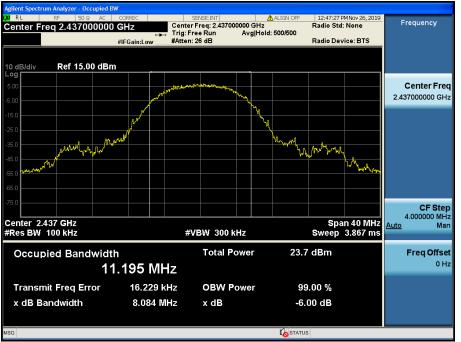
RESULT PLOTS

6 dB Bandwidth



6 dB Bandwidth

TM 1 & Middle

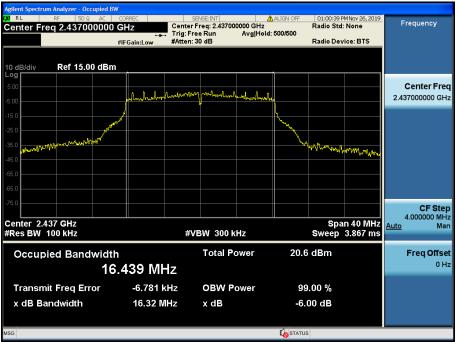




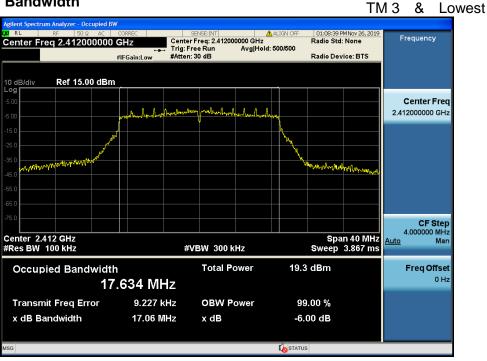


6 dB Bandwidth





TM 2 & Highest upied BV SENSE:INT ALIGN OFF Center Freq: 2.462000000 GHz Trig: Free Run Avg|Hold: 500/500 #Atten: 30 dB 01:04:35 PM Nov 26, 2019 Radio Std: None Frequency Center Freq 2.462000000 GHz #IFGain:Low Radio Device: BTS Ref 15.00 dBm 0 dB/div .og **Center Freq** 2.462000000 GHz -URA m who have CF Step 4.000000 MHz Man Center 2.462 GHz #Res BW 100 kHz Span 40 MHz Sweep 3.867 ms <u>Auto</u> #VBW 300 kHz 20.9 dBm Freq Offset Total Power **Occupied Bandwidth** 0 Hz 16.397 MHz Transmit Freq Error 4.411 kHz **OBW Power** 99.00 % x dB Bandwidth 15.81 MHz x dB -6.00 dB



6 dB Bandwidth





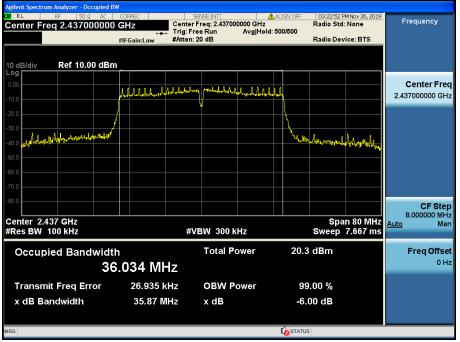
TM 3 & Highest upied BV SENSE:INT ALIGN OF Center Freq: 2.462000000 GHz Trig: Free Run Avg|Hold: 500/500 #Atten: 30 dB 03:12:40 PM Nov 26, 2019 Radio Std: None Frequency Center Freq 2.462000000 GHz Radio Device: BTS #IFGain:Low Ref 15.00 dBm 0 dB/div .og **Center Freq** . Indert molen A. A. A. 2.462000000 GHz LL MA word from the word CF Step 4.000000 MHz Man Center 2.462 GHz #Res BW 100 kHz Span 40 MHz Sweep 3.867 ms <u>Auto</u> #VBW 300 kHz 19.8 dBm Freq Offset Total Power **Occupied Bandwidth** 0 Hz 17.580 MHz Transmit Freq Error 12.230 kHz **OBW Power** 99.00 % x dB Bandwidth 15.77 MHz x dB -6.00 dB

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Bandwidth				Т	™4 & Lo	owest
Agilent Spectrum Analyzer - Occupied B Agilent Spectrum Analyzer - Occupied B Carter Freq 2.4220000000		SENSE:INT Center Freq: 2.422000 Trig: Free Run #Atten: 30 dB	ALIGN OFF 000 GHz Avg[Hold: 500/500	03:17:00 PMNov 26, 20 Radio Std: None Radio Device: BTS	119 Frequency	
10 dB/div Ref 10.00 dBm						
-10.0	Kalahahahamahaha	Laberton Josephale labert	Laugh A. A. A. A. A.		Center Freq 2.422000000 GHz	
-20.0						
-40.0 million and a start and a start and a start a st				alanandikilala laana do	μγN	
-60.0						
Center 2.422 GHz #Res BW 100 kHz		#VBW 300 kH	Iz	Span 80 Mł Sweep 7.667 n	Hz Auto Auto Man	
Occupied Bandwidt	^h 5.040 MH	Total Po Z	wer 20.1	dBm	Freq Offset 0 Hz	
Transmit Freq Error x dB Bandwidth	27.648 kH 35.60 MH			.00 % 00 dB		
			Lo STATUS			
			<u> </u>			

6 dB Bandwidth





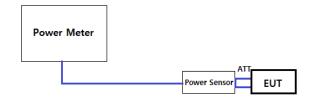
TM 4 & Highest ied BV GHZ Center Freq: 2.45200000 GHz Trig: Freq Run Avg|Hold: 500/500 #IFGain:Low #Atten: 30 dB 02:14:50 PM Nov 26, 2019 Radio Std: None Frequency Center Freq 2.452000000 GHz Radio Device: BTS Ref 10.00 dBm 0 dB/div .og **Center Freq** molal half and a start of the s 2.452000000 GHz holes of heles manager and when the harmon spitched by the second CF Step 8.000000 MHz Man Center 2.452 GHz #Res BW 100 kHz Span 80 MHz Sweep 7.667 ms <u>Auto</u> #VBW 300 kHz 20.6 dBm **Total Power Occupied Bandwidth** Freq Offset 0 Hz 36.051 MHz Transmit Freq Error 9.568 kHz **OBW Power** 99.00 % x dB Bandwidth 35.51 MHz x dB -6.00 dB

8.2 Maximum peak conducted output power

Test Requirements and limit, §15.247(b)

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

1. PKPM1 Peak power meter method of KDB558074 D01V05R02

The maximum conducted output powers were measured using a broadband peak RF power meter which has greater video bandwidth than DUT's DTS bandwidth and utilize a fast-responding diode detector.

2. Method AVGPM-G (Measurement using a gated RF average power meter) of KDB558074 D01V05R02

The average conducted output powers were measured using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.



Test Results: Comply

From		Maximum Peak Conducted Output Power (dBm) for <u>802.11b</u>										
Freq. (MHz)	Det.	Data Rate [Mbps]										
		1	2	5.5	11	-	-	-	-			
2412	PK	18.06	18.40	18.43	18.41	-	-	-	-			
2412	AV	14.97	15.40	15.72	15.55	-	-	-	-			
2437	PK	17.96	18.33	18.35	18.31	-	-	-	-			
2437	AV	14.93	15.34	15.61	15.42	-	-	-	-			
2462	PK	18.23	18.51	18.55	18.52	-	-	-	-			
	AV	15.22	15.42	15.73	15.59	-	-	-	-			

F ace			Maxim	um Peak Co	nducted Ou	tput Power	(dBm) for <u>8</u>	02.11g				
Freq. (MHz)	Det.	Data Rate [Mbps]										
		6	9	12	18	24	36	48	54			
2412	PK	23.54	23.45	23.42	23.44	23.26	22.87	23.26	22.94			
2412	AV	14.64	14.56	14.52	14.50	14.43	14.36	14.38	14.37			
2437	PK	23.75	23.62	23.59	23.61	23.48	23.08	23.42	23.11			
2437	AV	14.54	14.45	14.40	14.39	14.33	14.23	14.27	14.24			
2462	PK	23.81	23.70	23.66	23.67	23.45	23.01	23.48	23.20			
2462	AV	14.66	14.58	14.51	14.48	14.40	14.29	14.32	14.28			

F ace		Maximum Peak Conducted Output Power (dBm) for 802.11n(HT20)									
Freq. (MHz)	Det.										
		0	1	2	3	4	5	6	7		
2412	PK	22.55	22.33	22.37	22.38	22.33	22.46	22.14	22.37		
2412	AV	13.65	13.40	13.43	13.47	13.50	13.53	13.26	13.37		
2437	PK	22.28	22.06	22.11	22.13	22.07	22.18	21.95	22.20		
2437	AV	13.54	13.38	13.41	13.44	13.48	13.52	13.22	13.31		
2462	PK	22.43	22.24	22.29	22.32	22.25	22.36	22.08	22.28		
2462	AV	13.72	13.52	13.56	13.60	13.62	13.69	13.40	13.48		



F ire a			Maximum	Peak Cond	ucted Output	t Power (dBr	n) for <u>802.1</u>	1n(HT40)			
Freq. (MHz)	Det.	Data Rate [MCS]									
		0	1	2	3	4	5	6	7		
2422	PK	23.18	23.05	23.12	23.08	23.11	22.96	22.77	22.81		
2422	AV	13.67	13.44	13.45	13.47	13.57	13.55	13.40	13.42		
2437	PK	22.98	22.83	22.90	22.84	22.89	22.77	22.68	22.73		
2437	AV	13.62	13.42	12.44	12.48	12.55	12.52	12.44	12.47		
2452	PK	23.11	23.04	23.07	23.01	23.04	22.90	22.74	22.79		
	AV	13.59	13.37	13.40	13.43	13.49	13.45	13.37	13.41		

8.3 Maximum power spectral density

Test requirements and limit, §15.247(e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Configuration:

Refer to the APPENDIX I.

Test Procedure

- KDB558074 D01v05r02 Section 8.4
- ANSI C63.10-2013 Section 11.10.2

Method PKPSD (peak PSD)

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to 1.5 times the DTS bandwidth.
- 3. Set the RBW to : $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- 4. Set the VBW \geq 3 x RBW
- 5. Detector = **Peak**
- 6. Sweep time = **Auto couple**
- 7. Trace mode = **Max hold.**
- 8. Allow trace to fully stabilize.

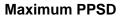
9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.

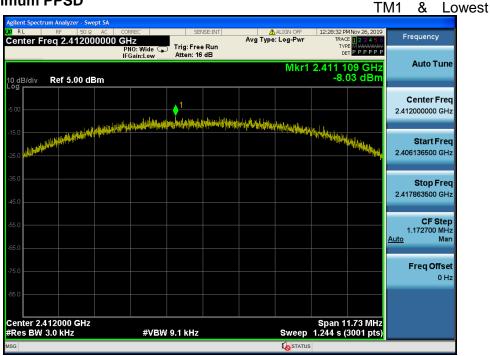
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Results: Comply

Test Mode	Frequency	RBW	PKPSD [dBm]
	Lowest	3 kHz	-8.03
TM 1	Middle	3 kHz	-7.17
	Highest	3 kHz	-7.40
	Lowest	3 kHz	-10.05
TM 2	Middle	3 kHz	-9.52
	Highest	3 kHz	-9.02
	Lowest	3 kHz	-11.75
ТМ 3	Middle	3 kHz	-10.66
	Highest	3 kHz	-10.14
	Lowest	3 kHz	-13.12
TM 4	Middle	3 kHz	-12.66
	Highest	3 kHz	-14.19

RESULT PLOTS

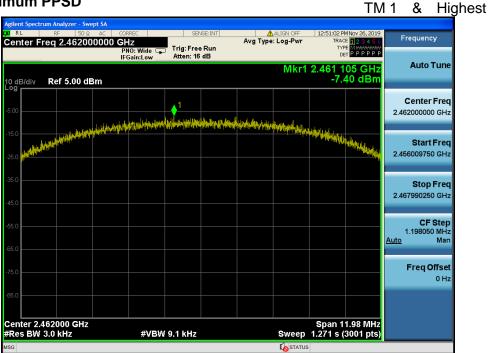


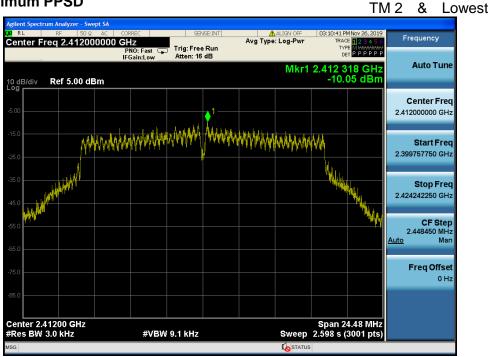


Maximum PPSD

TM 1 & Middle

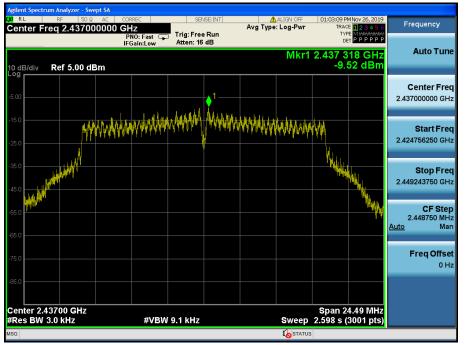


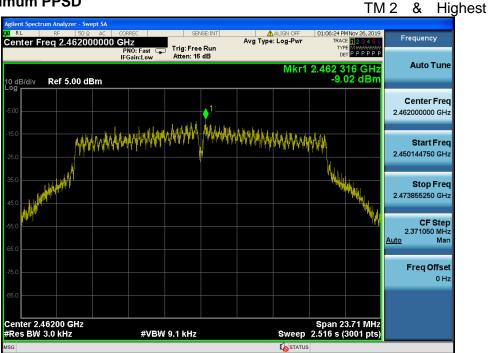




Maximum PPSD

TM 2 & Middle







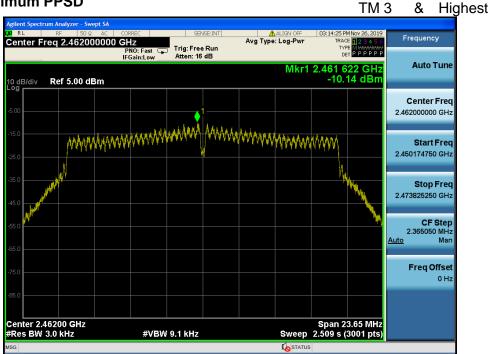
Maximum PPSD

TM 3 & Middle



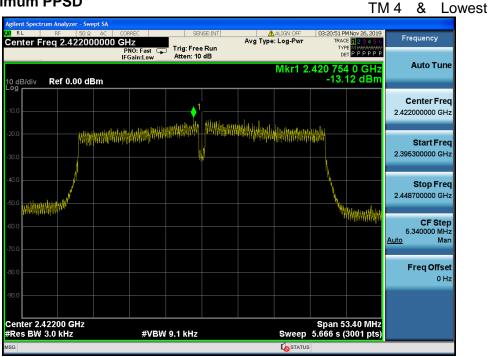
TDt&C

Maximum PPSD



🛈 Dt&C

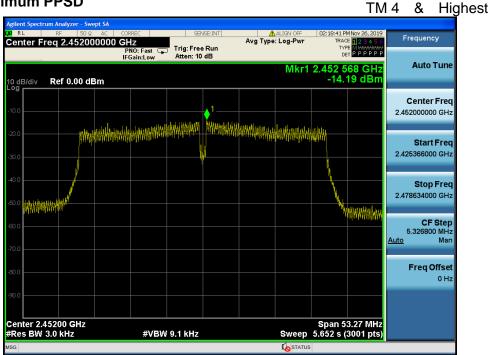
Maximum PPSD



Maximum PPSD

TM 4 & Middle





8.4 Out of band emissions at the band edge / conducted spurious emissions

Test requirements and limit, §15.247(d)

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

If **the peak output power procedure** is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated **by at least 20 dB** relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in band average PSD level. In either case, attenuation to levels below the general emission limits specified in §15.209(a) is not required.

Test Configuration:

Refer to the APPENDIX I.

Test Procedure

- KDB558074 D01v05r02 Section 8.5
- ANSI C63.10-2013 Section 11.11

- Reference level measurement

- 1. Set instrument center frequency to DTS channel center frequency.
- 2. Set the span to \geq 1.5 times the DTS bandwidth.
- 3. Set the RBW = 100 kHz.
- 4. Set the VBW \geq 3 x RBW.
- 5. Detector = **Peak.**
- 6. Sweep time = **Auto couple.**
- 7. Trace mode = **Max hold.**
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum PSD level.

- Emission level measurement

- 1. Set the center frequency and span to encompass frequency range to be measured.
- 2. Set the RBW = 100 kHz. (Actual 1 MHz , See below note)
- 3. Set the VBW ≥ 3 x RBW. (Actual 3 MHz, See below note)
- 4. Detector = **Peak**.
- 5. Ensure that the number of measurement points \geq Span / RBW.
- 6. Sweep time = **Auto couple.**
- 7. Trace mode = **Max hold.**
- 8. Allow the trace to stabilize. (this may take some time, depending on the extent of the span)
- 9. Use the peak marker function to determine the maximum amplitude level.

Note : The conducted spurious emission was tested with below settings. Frequency range: 9 kHz ~ 30 MHz RBW = 100 kHz, VBW = 300 kHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

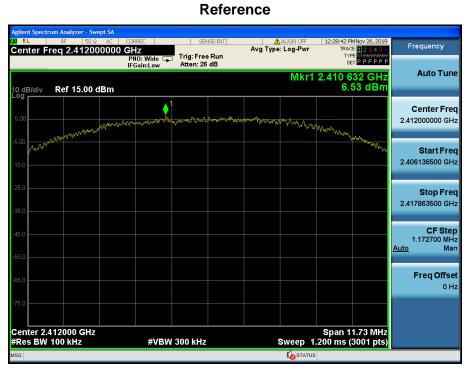
Frequency range: 30 MHz ~ 10 GHz, 10 GHz ~25 GHz RBW = 1 MHz, VBW = 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)

If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

RESULT PLOTS

TM 1 & Lowest



Low Band-edge



Conducted Spurious Emissions

Agilent Spectru	ເ <mark>m Analyzer - Swe</mark> j RF 50 ຊ /		FC	SEN	SE:INT		ALIGN OFF	12:29:16.0	MNov 26, 2019	
Center Fr	eq 15.0045	00 MHz	D:Fast	Trig: Free			e: Log-Pwr	TRA		Frequency
			ain:Low	Atten: 26	dB					Auto Tune
10 dB/div	Ref 15.00 d	Bm						Mkr1 28 -52.	1.9 kHz 13 dBm	
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-5.00									-13.47 dBm	15.004500 MHz
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MSG								<mark>is</mark> 🚹 DC Co	upled	

Agilent Spectrum Analyzer - Swept SA										
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	PNO: Fast Trig: Fre IFGain:Low Atten: 26			DET PPPPP	Auto Tune					
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Log X 1				-13.47 dBm	Center Freq 5.015000000 GHz					
-25.0 -35.0 -45.0		5		sig of a local state of the state	Start Freq 30.000000 MHz					
-55.0					Stop Freq 10.000000000 GHz					
Start 30 MHz #Res BW 1.0 MHz	#VBW 3.0 MHz	2		top 10.000 GHz ′ ms (40001 pts)	CF Step 997.000000 MHz Auto Man					
MKR MODE TRC SCL X	412 83 GHz 11.09 d		FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man					
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7 8 9 10 11										
K MSG				>						

Conducted Spurious Emissions



TM 1 & Middle

Reference



9	um Analyzer - Sv						
Center F	RF 50 s reg 15.004	$2 \triangle DC CORREC 500 MHz$	SE	NSE:INT AV	ALIGN OFF	12:49:19 PM Nov 26, 20 TRACE 1234	Frequency
		PNO: IFGain	Fast 😱 Trig: Free Low Atten: 26			DET P P P P	Auto Tune
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Start 9 kH #Res BW	100 kHz	×	#VBW 300 kHz	FUNCTION	Sweep 5.	Stop 30.00 MH 333 ms (40001 pt FUNCTION VALUE	
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Agilent Spect							_		
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-5.00									17.500000000 GHz
-15.0							····	13.05 dBm	
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-45.0	and a start from the second		and the second sec		a manager and a manager a				10.000000000 GHz
-55.0									04 E
-65.0									Stop Fred 25.00000000 GHz
-75.0									
Start 10.0 #Res BW			#VB	W 3.0 MHz		Sweep 40	Stop 25.00 00 ms (4000		CF Step 1.50000000 GHz
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TM 1 & Highest

Reference



High Band-edge



	DC CORREC	SENSE:INT	ALIGN OFF	12:51:46 PM Nov 26, 2019	Frequency
Center Freq 15.0045	OO MHZ PNO: Fast C IFGain:Low	Trig: Free Run Atten: 26 dB	Avg Type: Log-Pwr	TRACE 123456 TYPE MWARAAAA DET PPPPP	
10 dB/div Ref 15.00 d	Bm			Mkr1 281.9 kHz -51.42 dBm	Auto Tune
5.00 -5.00 -15.0				-12.65 dBm	Center Freq 15.004500 MHz
-25.0 -35.0 -45.0					Start Freq 9.000 kHz
-55.0 -65.0 -75.0	54,96,9194449,99449,99449,99449,999449,99944	สารใหญ่สามมีเป็นที่มีรูปหนึ่งที่สามมีสารไปสารไปสารได้	andaran salaran karan karan yang karang k T	en andre beneral service of the service and the service and the service of the service and the service and the	Stop Freq 30.000000 MHz
Start 9 kHz #Res BW 100 kHz	#VB	W 300 kHz	Sweep 5.	Stop 30.00 MHz 333 ms (40001 pts) FUNCTION VALUE	CF Step 2.999100 MHz Auto Man
1 N 1 F 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	281.9 kHz	-51.42 dBm			Freq Offset 0 Hz
6 7 8 9 10 11					
MSG		UU		DC Coupled	

Agilent Spectrum Analyzer - Swep	t SA AC CORREC	SENSE: INT	ALIGN OFF	12:51:54 PM Nov 26, 2019	
Center Freq 5.015000		Trig: Free Run Atten: 26 dB	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P P	Frequency
10 dB/div Ref 15.00 dl			Mkr	5 3.224 89 GHz -39.43 dBm	Auto Tune
5.00 -5.00 -15.0	¥1			-12.65 dBm	Center Freq 5.015000000 GHz
-25.0 -35.0 -45.0				a hite () and a second	Start Freq 30.000000 MHz
-55.0					Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBV	V 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz Auto Man
1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f 6	2.461 68 GHz 2.700 71 GHz 3.172 05 GHz 5.759 01 GHz 3.224 89 GHz	11.67 dBm -38.96 dBm -39.03 dBm -39.14 dBm -39.43 dBm		FUNCTION VALUE	Freq Offset 0 Hz
7 9 10 11 <				~	
MSG			STATUS		



TM 2 & Lowest

Reference



Low Band-edge



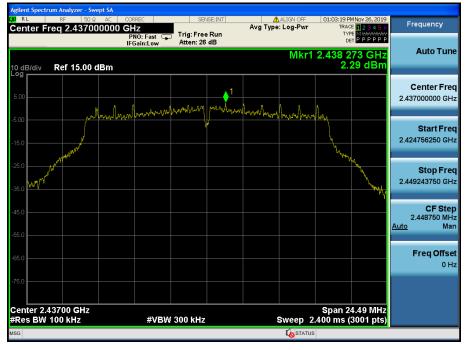
Center Pred 13.004500 MHZ Trig: Free Run IFGain:Low Trig: Free Run Atten: 26 dB Mkr1 292.4 kHZ Auto Tune 10 dB/div Ref 15.00 dBm -51.34 dBm -51.34 dBm -600 </th <th>Agilent Spectrum Analyzer - Swept SA</th> <th>CORREC SENSE</th> <th>INT ALIGN OFF</th> <th></th> <th></th>	Agilent Spectrum Analyzer - Swept SA	CORREC SENSE	INT ALIGN OFF		
Image: Description Milling of B 10 dB/div Ref 15.00 dBm -51.34 dBm 500 -51.34 dBm -51.34 dBm 500 -50.34 dBm -51.34 dBm 500 -50.33 ms (40001 pts) -51.34 dBm 510 -50.33 ms (40001 pts) -51.34 dBm 510 -50.33 ms (40001 pts) -51.34 dBm 10 N 1 1 -232.4 kHz -51.34 dBm	Center Freq 15.004500 N			TRACE 123456 TYPE MWAWAAA	Frequency
Center Freq 1 -51.34 dBm		IFGain:Low Atten: 26 dl	8		
500 5	10 dB/div Ref 15.00 dBm				Auto Tune
6:00 15:004500 MHz 15:004500 MHz 15:004500 MHz 15:004500 MHz 15:004500 MHz 10:004500 MHz 10:004500 MHz 10:005 THC SCL X Y 10:005 THC SCL X <t< td=""><td></td><td></td><td></td><td></td><td>Center Freg</td></t<>					Center Freg
2260 350	-5.00				
360 1 360 1 360 1 360 <td>-15.0</td> <td></td> <td></td> <td>-10.13 dDm</td> <td></td>	-15.0			-10.13 dDm	
460 1 9,000 kHz 9,000 kHz 850 1 1 1 1 1 1 1 1 1 1 1 2 2,232,4 kHz 51,34 dBm 51,34 dBm 9,000 kHz 9,000 kHz 1 1 1 1 1 1 1 2,232,4 kHz 51,34 dBm 1 1 1 1 1 1 1 2,232,4 kHz 51,34 dBm 1	-25.0				Start Freq
-60 -					9.000 kHz
E65 Stop Freq 750 30.000000 MHz Start 9 kHz Stop 30.00 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 5.333 ms (40001 pts) MKR MODE TRC Scl X 1 1 1 1 2 2					
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#Res BW 100 kHz #VBW 300 kHz Sweep 5.333 ms (40001 pts) 2.999100 MHz MKR MODE TRC SCL X Y FUNCTION FUNCTION VIDTH FUNCTION VALUE Man 1 N 1 f 292.4 kHz -51.34 dBm Man					
MR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 1 N 1 f 292.4 kHz -51.34 dBm 2		#VBW 300 kHz	Sweep 5		2.999100 MHz
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	2	292.4 kHz -51.34 dBm			
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Agilent Spectrum Analyzer - Swept	SA AC CORREC	SENSE:INT		LIGN OFF	03:11:34 PM Nov 26, 2019	
Center Freq 5.015000		Trig: Free Run	Avg Type: L		TRACE 1 2 3 4 5 6 TYPE MWAWAWA DET P P P P P	Frequency
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-65.0 -75.0						Stop Freq 10.000000000 GHz
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MKR MODE TRC SCL	X		FUNCTION FUNCT	ION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
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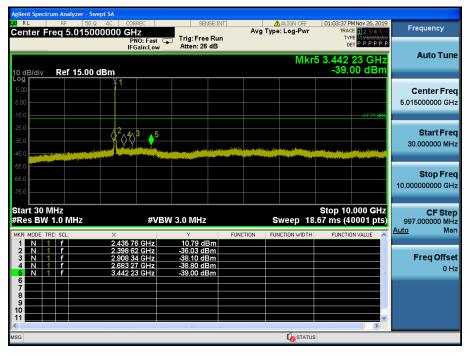


TM 2 & Middle

Reference



Agilent Spectrum Analyzer - Swept SA				
Center Freq 15.004500 MHz		Avg Type: Log-Pwr	01:03:26 PM Nov 26, 2019 TRACE 1 2 3 4 5 6 TYPE M WARMAN	Frequency
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Start 9 kHz #Res BW 100 kHz	#VBW 300 kHz	· · ·	Stop 30.00 MHz 333 ms (40001 pts)	CF Step 2.999100 MHz Auto Man
MKR MODE TRC SCL X 1 N 1 f 306. 2 - - - 3 - - -	7 kHz -52.49 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offset
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Agilent Spect	rum Anal	yzer - Swep	ot SA								
L <mark>XI</mark> RL	RF	50 Ω		RREC	SEN	ISE:INT		ALIGN OFF		1Nov 26, 2019	Frequency
Center F	req 1	7.50000			Trig: Free	Run	Avg	Type: Log-Pwr	TYP	123456 Mwwwww	rioquonoy
			P IFi	NO: Fast Gain:Low	Atten: 26				DE	PPPPP	
								Mkr2 2	24.350 8	75 CH7	Auto Tune
	D -6	45.00 -11	B					WIKIO 2		2 dBm	
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a second second	الأر فيستك										
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High Band-edge



Agilent Spectr	um Analyzer - Swep RF 50 Q /			NSE:INT	ALIGN OFF	01:07:07 PMNov 26, 2019	
	req 15.0045	00 MHz	ast		Avg Type: Log-Pwr		Frequency
		IFGain:	Low Atten: 20	dB			Auto Tune
10 dB/div	Ref 15.00 d	Bm				Mkr1 288.7 kHz -51.73 dBm	
Log 5.00							Center Freq
-5.00							15.004500 MHz
-15.0						-17.11.dBm	
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-65.0							30.000000 MHz
Start 9 kH #Res BW		:	#VBW 300 kHz		Sweep 5	Stop 30.00 MHz 5.333 ms (40001 pts)	CF Step 2.999100 MHz
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2		200.7 KF	-12 -51.75 u	ыш			Freq Offset
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K MSG					The STAT	US ! DC Coupled	

Agilent Spectrum Analyzer - Sw	ept SA AC CORREC	SENSE:INT	ALIGN OFF	01:07:16 PM Nov 26, 2019	
Center Freq 5.01500	00000 GHz		Avg Type: Log-Pwr	TRACE 122456	Frequency
	PNO: Fast G IFGain:Low	Atten: 26 dB		TYPE MWAWAAA DET PPPPP	
10 dB/div Ref 15.00			Mkr	5 3.163 82 GHz -39.47 dBm	Auto Tune
5.00 -5.00 -15.0	¥1			17.11-cBm	Center Freq 5.015000000 GHz
-25.0 -35.0 -45.0	<u>24</u> <u>5</u>			an an fall an	Start Freq 30.000000 MHz
-55.0 -65.0 -75.0					Stop Freq 10.00000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VB\	V 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz Auto Man
MKR MODE TRC SCL	× 2.461 18 GHz	Y FUN 11.30 dBm	ICTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	2.461 18 GHZ 2.496 58 GHZ 6.974 11 GHZ 2.646 38 GHZ 3.163 82 GHZ	-37.89 dBm -39.08 dBm -39.33 dBm -39.47 dBm			Freq Offset 0 Hz
10 11				×	
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TM 3 & Lowest

Reference



Low Band-edge

