TEST REPORT

DT&C Co., Ltd.

42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea,17042 Tel : 031-321-2664, Fax : 031-321-1664

1. Report No: DRTFCC2003-0055

Dt&C

- 2. Customer
 - Name : LG Electronics USA, Inc.
 - Address : 1000 Sylvan Ave. Englewood Cliffs, New Jersey, United States 07632
- 3. Use of Report : FCC Original Grant
- 4. Product Name / Model Name : Mobile Phone / OA2006
 - FCC ID : ZNFOA2006
- 5. Test Method Used : KDB558074 D01v05r02, ANSI C63.10-2013

Test Specification : FCC Part 15 Subpart C.247

- 6. Date of Test : 2020.02.10 ~ 2020.02.20
- 7. Testing Environment : Refer to appended test report.
- 8. Test Result : Refer to the attached test result.

Affirmation	Tested by		Reviewed by	Ato
	Name : JungWoo Kim	State)	Name : GeunKi Son	(Signature)

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.

2020.03.05.

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	Revised by	Reviewed by
DRTFCC2003-0055	Mar. 05, 2020	Initial issue	JungWoo Kim	GeunKi Son

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1. General Information

1.1 Testing Laboratory

DT&C Co., Ltd.

The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of § 2.948 according to ANSI C63.4-2014.

- FCC MRA Accredited Test Firm No. : KR0034

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Telephone	:	+ 82-31-321-2664
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1.2 Test Environment

Ambient Condition	
 Temperature 	+20 °C ~ +25 °C
 Relative Humidity 	35 % ~ 45 %

1.3 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014 and ANSI C63.10-2013. 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	1.0 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 %, $k = 2$)



1.4 Details of Applicant

Applicant	:	LG Electronics USA, Inc.
Address	:	1000 Sylvan Ave. Englewood Cliffs, New Jersey, United States 07632
Contact person	:	Kyung-Su Han

1.5 Description of EUT

EUT	Mobile Phone
Model Name	OA2006
Add Model Name	NA
Serial Number	Identical prototype
Power Supply	DC 3.87 V
Frequency Range	2402 MHz ~ 2480 MHz
Max. RF Output Power	6.14 dBm
Modulation Technique	GFSK
Antenna Specification	Antenna Type: PIFA Antenna Gain: -3.07 dBi (PK)

1.6 Declaration by the applicant / manufacturer

N/A

1.7 Test Equipment List

Туре	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	19/06/26	20/06/26	US47360812
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48011700
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48010133
DC power supply	Agilent Technologies	66332A	19/06/25	20/06/25	MY43001172
Multimeter	FLUKE	17B	19/12/16	20/12/16	26030065WS
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	ANRITSU	MG3695C	19/12/16	20/12/16	173501
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-1
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-2
Thermohygrometer	BODYCOM	BJ5478	19/07/03	20/07/03	N/A
Loop Antenna	ETS-Lindgren	6502	19/09/18	21/09/18	00226186
BILOG ANTENNA	Schwarzbeck	VULB 9160	19/04/23	21/04/23	9160-3362
Horn Antenna	ETS-Lindgren	3115	19/01/11	21/01/11	9202-3820
Horn Antenna	A.H.Systems Inc.	SAS-574	19/07/03	21/07/03	155
PreAmplifier	tsj	MLA-0118-B01-40	19/12/16	20/12/16	1852267
PreAmplifier	tsj	MLA-1840-J02-45	19/06/27	20/06/27	16966-10728
PreAmplifier	H.P	8447D	19/12/16	20/12/16	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935-1000- 15000-40SS	19/06/26	20/06/26	8
High Pass Filter	Wainwright Instruments	WHKX10-2838- 3300-18000-60SS	19/06/26	20/06/26	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	19/06/27	20/06/27	3
Attenuator	Hefei Shunze	SS5T2.92-10-40	19/06/27	20/06/27	16012202
Attenuator	SRTechnology	F01-B0606-01	19/06/27	20/06/27	13092403
Attenuator	Aeroflex/Weinschel	20515	19/06/27	20/06/27	Y2370
Attenuator	SMAJK	SMAJK-2-3	19/06/27	20/06/27	2
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A MA2490A	19/06/24	20/06/24	1306007 1249001
EMI Receiver	ROHDE&SCHWARZ	ESW44	19/07/30	20/07/30	101645
HYGROMETER	TESTO	608-H1	20/01/21	21/01/21	34862883
EMI Test Receiver	Rohde Schwarz	ESCI7	20/01/20	21/01/20	100910
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	19/09/17	20/09/17	101333
LISN	SCHWARZBECK	NNLK 8121	19/05/23	20/05/23	6183
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-04
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-07
Cable	DT&C	Cable	20/01/13	21/01/13	G-13
Cable	DT&C	Cable	20/01/13	21/01/13	G-14
Cable	HUBER+SUHNER	SUCOFLEX 104	20/01/13	21/01/13	G-15
Cable	Radiall	TESTPRO3	20/01/16	21/01/16	M-01
Cable	Junkosha	MWX315	20/01/16	21/01/16	M-05
Cable	Junkosha	MWX221	20/01/16	21/01/16	M-06
Cable	DT&C	Cable	20/01/16	21/01/16	RF-09
Cable	DT&C	Cable	20/01/16	21/01/16	RF-82

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

1.8 Summary of Test Results

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 %)	NA		NA
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	-	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.					

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2. 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.

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 that intends to maximize its emission characteristics in a continuous normal application.

2.2 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.

2.3 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 as stated on section 12.1 of the KDB558074 D01v05r02.

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.

2.4 Description of Test Modes

The EUT has been tested with the operating condition for maximizing the emission characteristics. A test program is used to control the EUT for staying in continuous transmitting. The Bluetooth low energy mode with below low, middle and high channels were tested and reported.

		Frequency [MHz]			
Test Mode	Description	Lowest Frequency	Middle Frequency	Highest Frequency	
TM 1	BT LE(1Mbps)	2402	2440	2480	
TM 2	BT LE(2Mbps)	2402	2440	2480	

2.5 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.



3. Test Result

3.1 Maximum Peak Conducted Output Power

Test Requirements and limit, §15.247(b) & RSS-247 [5.4]

A transmitter antenna terminal of EUT is connected to the input of a spectrum analyzer.

Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

3.1.1 Test Setup

Refer to the APPENDIX I.

3.1.2 Test Procedures

- KDB558074 D01v05r02 Section 8.3.1.3
- ANSI C63.10-2013 Section 11.9.1.1

RBW ≥ DTS bandwidth

- 1. Set the RBW ≥ DTS bandwidth. Actual RBW = 2 MHz & 2.4 MHz
- 2. Set VBW \ge 3 x RBW. Actual VBW = 6 MHz & 8 MHz
- 3. Set span ≥ 3 x RBW.
- 4. Sweep time = **auto couple**
- 5. Detector = **peak**
- 6. Trace mode = **max hold**
- 7. Allow trace to fully stabilize
- 8. Use peak marker function to determine the peak amplitude level.

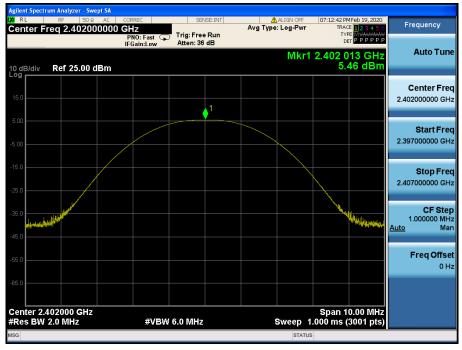
3.1.3 Test Results

Test mode	Tested Channel	Burst Average Output Power	Peak Output Power
Test mode	Testeu Channer	dBm	dBm
	Lowest	5.18	5.46
TM 1	Middle	5.51	5.97
	Highest	4.60	5.32
	Lowest	5.15	5.52
TM 2	Middle	5.51	6.14
	Highest	4.62	5.58

Note 1 : The Burst average output power was tested using an average power meter for reference only. Note 2 : See next pages for actual measured spectrum plots..







Peak Output Power

TM 1 Test Channel : Middle

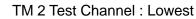


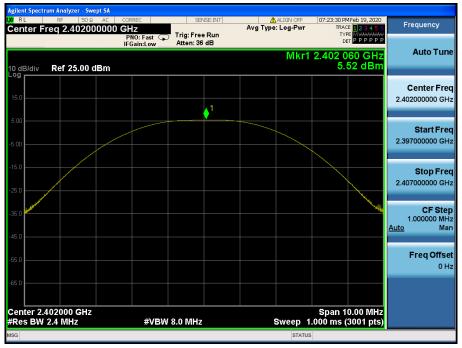


TM 1 Test Channel : Highest



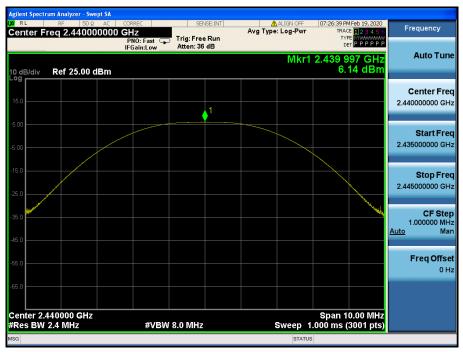






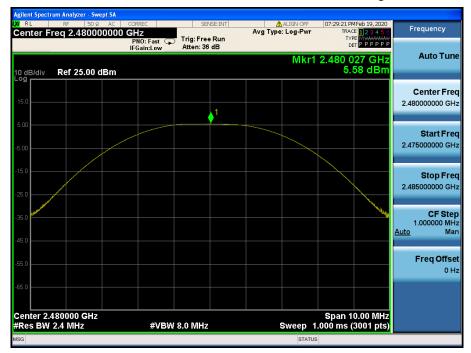
Peak Output Power

TM 2 Test Channel : Middle





TM 2 Test Channel : Highest



3.2 6 dB Bandwidth Measurement

Test Requirements and limit, §15.247(a) & RSS-247 [5.2]

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

The minimum permissible 6 dB bandwidth is 500 kHz.

3.2.1 Test Setup

Refer to the APPENDIX I.

3.2.2 Test Procedures

- 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. Option 1 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.

Option 2 - The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW \ge 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \ge 6 dB.

3.2.3 Test Results

Test Mode	Tested Channel	Test Results [MHz]
	Lowest	0.667
TM 1	Middle	0.667
	Highest	0.669
	Lowest	1.146
TM 2	Middle	1.159
	Highest	1.164

TM 1 Test Channel : Lowest



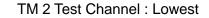
6 dB Bandwidth

TM 1 Test Channel : Middle



TM 1 Test Channel : Highest







6 dB Bandwidth

TM 2 Test Channel : Middle



TM 2 Test Channel : Highest





3.3 Maximum Power Spectral Density.

Test requirements and limit, §15.247(e) & RSS-247 [5.2]

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard

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

3.3.1 Test Setup

Refer to the APPENDIX I.

3.3.2 Test Procedures

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

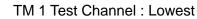
Method PKPSD (peak PSD)

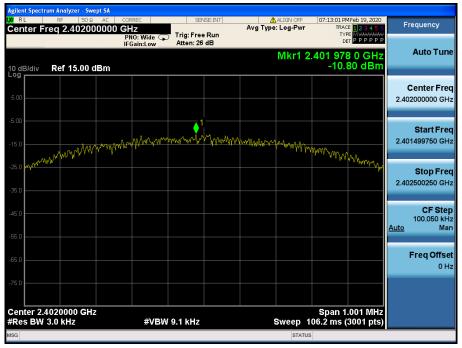
- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. Set the span to **1.5 times** the DTS bandwidth.
- 3. Set the RBW : 3 kHz \leq RBW \leq 100 kHz.
- 4. Set the VBW \geq 3 x RBW.
- 5. Detector = **peak.**
- 6. Sweep time = **auto couple.**
- 7. Trace mode = **max hold.**
- 8. Allow trace to fully stabilize.
- 9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

3.3.3 Test Results

Test Mode	Tested Channel	PKPSD [dBm]
	Lowest	-10.80
TM 1	Middle	-10.31
	Highest	-10.78
	Lowest	-13.29
TM 2	Middle	-12.70
	Highest	-13.36

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Maximum PKPSD

TM 1 Test Channel : Middle



TM 1 Test Channel : Highest

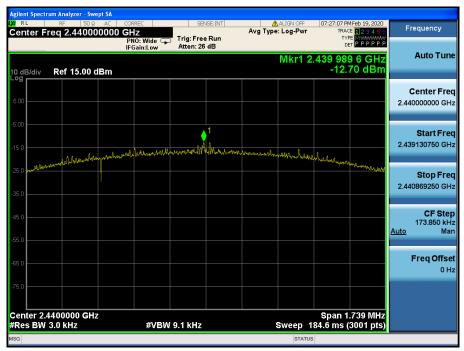






Maximum PKPSD

TM 2 Test Channel : Middle



TM 2 Test Channel : Highest





3.4 Unwanted Emissions (Conducted)

Test requirements and limit, §15.247(d) & RSS-247 [5.5]

§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 inband average PSD level.

In either case, attenuation to levels below the general emission limits specified in §15.209(a) is not required.

3.4.1 Test Setup

Refer to the APPENDIX I including path loss

3.4.2 Test Procedures

- 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 LIMIT LINE = 20 dB below of the reference 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 ≥ 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	RBW	VBW	Detector	Trace	Sweep Point
9 kHz ~ 30 MHz	100 kHz	300 kHz			
30 MHz ~ 10 GHz	1 MHz	3 MHz	Peak	Max Hold	40001
10 GHz ~ 25 GHz	1 MHz	3 MHz			

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.

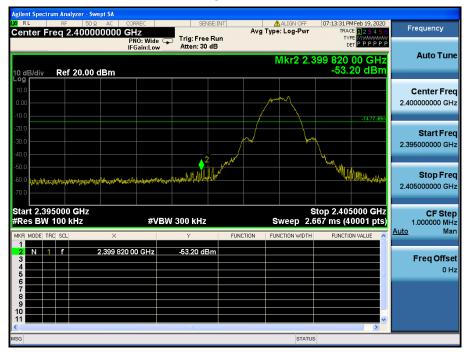
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3.4.3 Test Results

RL	um Analyzer - Swept SA RF 50 Ω AC	CORREC	SENSE:INT	ALIGN OFF	07:13:15 PM Feb 19, 2020	Frequency
enter Fr	req 2.4020000	PNO: Wide 🖕	Trig: Free Run	Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW DET PPPPP	Frequency
0 dB/div	Ref 20.00 dBm	IFGain:Low	Atten: 30 dB	Mkr1 2	.402 242 5 GHz 5.24 dBm	Auto Tun
10.0	Jorger	nMagna		1-		Center Fre 2.402000000 GH
0.0						Start Fre 2.401499750 G⊦
0.0						Stop Fre 2.402500250 GF
0.0						CF Ste 100.050 k⊦ <u>Auto</u> Ma
0.0						Freq Offs 0 F
0.0						
enter 2.4 Res BW	1020000 GHz 100 kHz	#VBW	/ 300 kHz	Sweep 1	Span 1.001 MHz .000 ms (3001 pts)	
G				STATUS		

TM 1 Reference (Test Channel : Lowest)

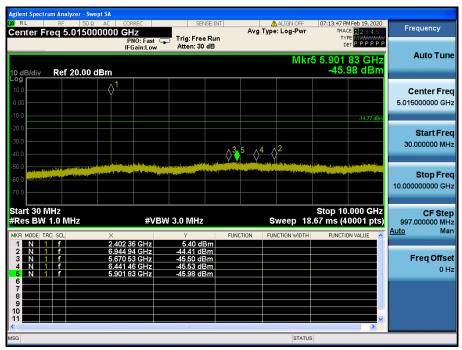
TM 1 Low Band-edge (Test Channel : Lowest)



RL RF 5	DΩ 🧘 DC 📔 CC	ORREC	SENS			ALIGN OFF		4Feb 19, 2020	E
enter Freq 15.00	F	PNO: Fast 🕞 Gain:Low	Trig: Free F	Run	/g Type:	Log-Pwr	TY	E 1 2 3 4 5 6 E M WWWWW T P P P P P P	Frequency
dB/div Ref 20.0		Gain:Low	Atten: 50 d			Ν		6.4 kHz 14 dBm	Auto Tur
99 0.0 00 0.0									Center Fre 15.004500 MH
0.0 0.0 0.0								-14.77 dBm	Start Fre 9.000 ki
0.0 0.0 0.0	aling and an an an an an	hayaddayd yw landaro	bellegensigtinismetrifictual	high such is the advertised on the back is the	ndarilladisetter	u (fal fal fal fan fan fan fan fan fan fan fan fal fan	hinterson forthe forthe	dystadia), di ferrenzy,	Stop Fre 30.000000 MH
art 9 kHz		#VBN	/ 300 kHz		Sv	/eep 5.3	Stop 3 33 ms (4	0.00 MHz 0001 pts)	CF Ste 2.999100 MI
Les BW 100 KHZ									Auto Ma
Res BW 100 kHz R MODE TRC SCL N 1 f	× 280	6.4 kHz	۲ -53.14 dBr	FUNCTION	FUNC	TION WIDTH	FUNCTIO	ON VALUE 🔥	
R MODE TRC SCL N 1 f 3 a a a 4 a a a a		6.4 kHz			FUNC	TION WIDTH	FUNCTIO	N VALUE	Freq Offs
		6.4 kHz			FUNC	TION WIDTH	FUNCTI	ON VALUE	Freq Offs
R MODE TRC SCL		6.4 kHz			FUNC	TION WIDTH	FUNCTIO	N VALUE	Freq Offs

TM 1 Conducted Spurious Emissions 1 (Test Channel : Lowest)

TM 1 Conducted Spurious Emissions 2 (Test Channel : Lowest)



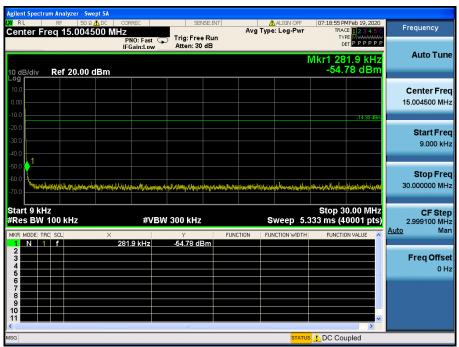
RI	m Analyzer - 1 RF 50		RREC	SENSE:	INIT	A al	IGN OFF	07:13:55 P	MFeb 19, 2020	
enter Fro		0000000			in /	Avg Type: L		TRAC	CE 123456 PE MWWWWWW ET P P P P P P	Frequency
0 dB/div	Ref 20.0		Gain:Low	Atten: 30 dL		N	/lkr3 2		00 GHz 61 dBm	Auto Tun
°g 10.0									-14.77 dBm	Center Fre 17.500000000 GH
20.0 30.0 40.0				alf (material parts a stable based					320	Start Fre 10.000000000 G⊦
50.0 (11) 11 11 50.0 (11) 70.0 (11)										Stop Fre 25.000000000 GF
tart 10.00 Res BW 1	.0 MHz		#VB\	W 3.0 MHz		Swe	ep 40.	00 ms (4	.000 GHz 0001 pts)	CF Ste 1.50000000 GF Auto Ma
KR MODE TRO 1 N 1 2 N 1 3 N 1 4	f f f	× 24.869 87 24.201 62 23.924 50	25 GHz	√ -30.01 dBm -31.57 dBm -32.61 dBm	FUNCTIO	N FUNCTI	ON WIDTH	FUNCTIO	DN VALUE	Freq Offso 0 H
6										
8 9 0 1									~	

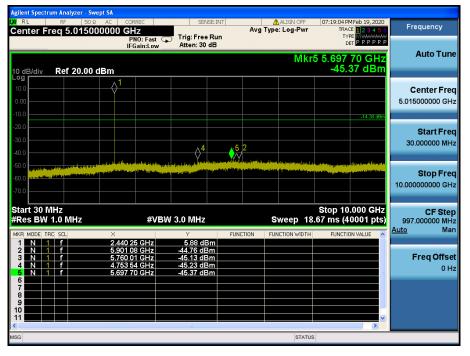
TM 1 Conducted Spurious Emissions 3 (Test Channel : Lowest)



TM 1 Reference (Test Channel : Middle)

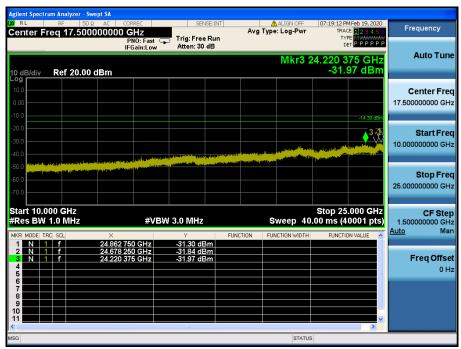
TM 1 Conducted Spurious Emissions 1 (Test Channel : Middle)





TM 1 Conducted Spurious Emissions 2 (Test Channel : Middle)

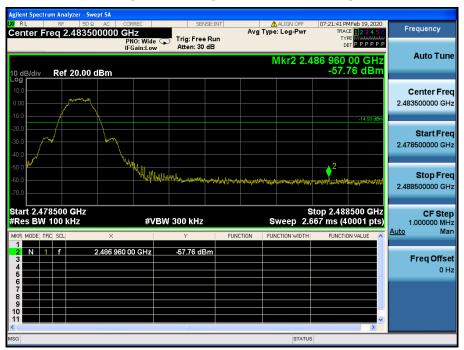
TM 1 Conducted Spurious Emissions 3 (Test Channel : Middle)





TM 1 Reference (Test Channel : Highest)

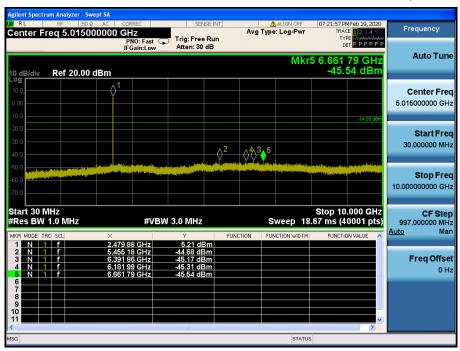
TM 1 High Band-edge (Test Channel : Highest)



Agilent Spectrum Analyzer - Swi						
		SENSE:INT	A	ALIGN OFF Type: Log-Pwr	07:21:49 PM Feb 19, 2020 TRACE 1 2 3 4 5 6	Frequency
Center Freq 15.0045	PNO: Fast IFGain:Low	Trig: Free Run Atten: 30 dB	Avg	Type: Log-Pwr		
10 dB/div Ref 20.00	dBm			Γ	//kr1 281.9 kHz -54.87 dBm	Auto Tune
-09 10.0 0.00 					-14.93 dBm	Center Free 15.004500 MH
20.0 30.0 40.0					-14,35 00m	Start Free 9.000 kH
50.0	เขาะเขาะระไปที่เสรียงเหตุที่ระบบกุบ	landrigthansat (Mantheod Inservictors	na hin	atherna las ferencias for a las	h _{dia} tomastentotraatumaanatut	Stop Free 30.000000 MH
Start 9 kHz Res BW 100 kHz	#VB	W 300 kHz		Sweep 5.3	Stop 30.00 MHz 33 ms (40001 pts)	CF Ste 2.999100 MH
MKR MODE TRC SCL	× 281.9 kHz	⊻ -54.87 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma
2 3 4 5						Freq Offse 0 H
6 7 8 9						
					×	
SG				STATUS	L DC Coupled	

TM 1 Conducted Spurious Emissions 1 (Test Channel : Highest)

TM 1 Conducted Spurious Emissions 2 (Test Channel : Highest)

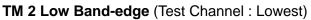


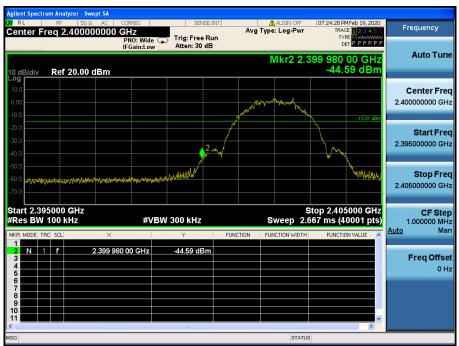
RL RE 50	Ω AC CORREC	SENSE:INT	ALIGN OFF	07:22:05 PM Feb 19, 2020	
enter Freq 17.500			Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWW DET PPPPP	Frequency
0 dB/div Ref 20.00) dBm		Mkr3 2	24.744 250 GHz -30.89 dBm	Auto Tun
•g 10.0 0.00 10.0				-14 93 dBm	Center Fre 17.500000000 GH
20.0 30.0 40.0	المراجع	Act Press and press and the first of the second			Start Fre 10.000000000 GH
50.0 					Stop Fre 25.000000000 GH
tart 10.000 GHz Res BW 1.0 MHz	#VB	W 3.0 MHz	Sweep 40	Stop 25.000 GHz .00 ms (40001 pts)	CF Ste 1.50000000 GH
IKR MODE TRC SCL	× 24.821 875 GHz	-29.52 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma
3 N 1 F 4 5	24.798 250 GHz 24.744 250 GHz	-30.61 dBm -30.89 dBm		11	FreqOffse 0 ⊦
6 7 8 9					
				~	
G			STATUS		

TM 1 Conducted Spurious Emissions 3 (Test Channel : Highest)



TM 2 Reference (Test Channel : Lowest)

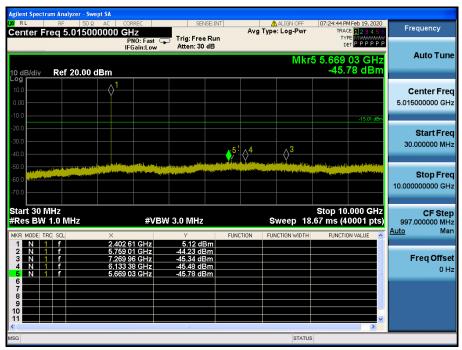




LXI RL	um Analyzer - Swept SA RF 50 Ω ⚠ DC req 15.004500 N		SENSE:I	Avg	ALIGN OFF	TRACE	Feb 19, 2020	Frequency
10 dB/div	Ref 20.00 dBm	PNO: Fast 🖵 IFGain:Low	Atten: 30 dB	n		Vikr1 28 [.]	PPPPPP 1.9 kHz 9 dBm	Auto Tune
10.0 0.00 -10.0								Center Fred 15.004500 MHz
-10.0							-15.01 dBm	Start Freq 9.000 kHz
-50.0 1	tsjolarythyticsilisinestysen-reduktelyticse	hunsed when an applications of	n an	ing the state of the	inervision of the line of the section of the sectio	halyleterpownerien	linnelynniù	Stop Free 30.000000 MH:
Start 9 kH #Res BW	100 kHz		¥ 300 kHz	FUNCTION	Sweep 5.3			CF Stej 2.999100 MH Auto Ma
1 N 1 2 3 4 5 6		281.9 kHz	-56.29 dBm					Freq Offse 0 H:
7 8 9 10 11								
< ISG			80		STATUS	DC Cou	pled	

TM 2 Conducted Spurious Emissions 1 (Test Channel : Lowest)

TM 2 Conducted Spurious Emissions 2 (Test Channel : Lowest)



RL	RF 5	OΩ AC O	ORREC	SENSE	INT		ALIGN OFF	07:24:52 P	MFeb 19, 2020	
enter Fr		0000000			un		e: Log-Pwr	TRAC		Frequency
0 dB/div	Ref 20.0		FGain:Low	Atten: 50 u			Mkr3 2		00 GHz 79 dBm	Auto Tun
.og 10.0 0.00									-15.01 dBm	Center Fre 17.500000000 GH
20.0 30.0 40.0			والمراجع المراجع المراجع	Clife bester die andere andere bester andere die andere die andere die andere die andere die andere die andere					32	Start Fre 10.000000000 G⊦
50.0 50.0 70.0 			<u>لەنە ۋە ھەتتە</u>							Stop Fre 25.00000000 GF
tart 10.0 Res BW	1.0 MHz		#VB1	N 3.0 MHz			weep 40	.00 ms (4		CF Ste 1.50000000 GF Auto Ma
KR MODE TF 1 N 1 2 N 1 3 N 1 4 5 5	C SCL f f f	× 24.820 7 24.150 6 23.998 0	25 GHz	Y -31.36 dBm -32.77 dBm -32.79 dBm		TION FU	NCTION WIDTH	FUNCTIO	DN VALUE	Freq Offso 0 H
6 7 8 9 9 0 1										
									>	

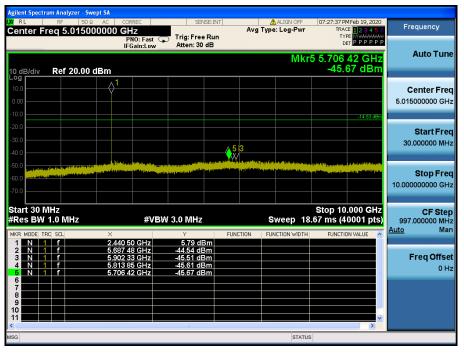
TM 2 Conducted Spurious Emissions 3 (Test Channel : Lowest)



TM 2 Reference (Test Channel : Middle)

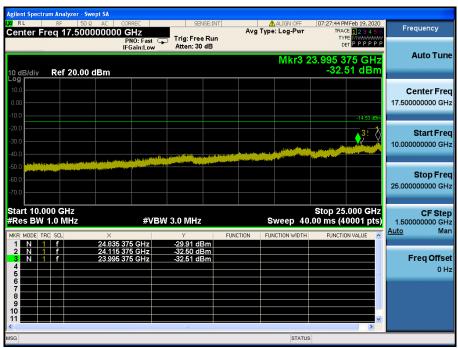
TM 2 Conducted Spurious Emissions 1 (Test Channel : Middle)

	vept SA 2 ▲ DC CORREC	SENSE		ALIGN OFF	07:27:28 PM Feb 19, 2020 TRACE 12 3 4 5 6	Frequency
enter Freq 15.004		ast 🖵 Trig: Free R Low Atten: 30 di	un	iype: Log-Pwr	TYPE WWWWWW DET PPPPP	
0 dB/div Ref 20.00	dBm			I	//kr1 281.9 kHz -54.65 dBm	auto Tun
og 10.0 0.00 10.0						Center Fre 15.004500 MH
20.0 30.0 40.0					-14.53 dBm	Start Fre 9.000 kł
0.0 0.0 0.0	RANNAMINAN AND AND AND AND AND AND AND AND AND	فيرادون والمراجع والمعارين ومعاول والمعارية والمعارية والمعارية والمعارية والمعارية والمعارية والمعارية والمعا	yahla da ana ang kana ana ang kana ang	iktrational and the state of the	dern förred vill bliv i ogsattigt attend	
art 9 kHz Res BW 100 kHz		haman and a star and a star a star #VBW 300 kHz	ye,H.,deseedeflywe,eiddaetd		Stop 30.00 MHz 33 ms (40001 pts)	2.999100 M
		#VBW 300 kHz	FUNCTION		Stop 30.00 MHz	30.000000 M



TM 2 Conducted Spurious Emissions 2 (Test Channel : Middle)

TM 2 Conducted Spurious Emissions 3 (Test Channel : Middle)





TM 2 Reference (Test Channel : Highest)

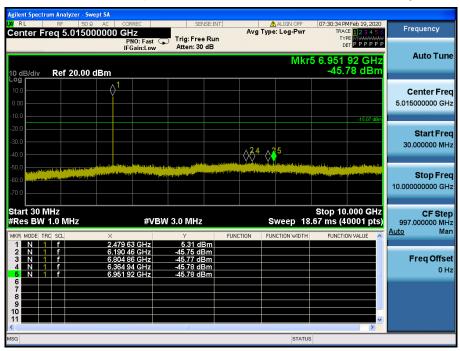
TM 2 High Band-edge (Test Channel : Highest)



RL RF	zer - Swept SΛ 50 Ω ⚠️ DC	CORREC	SENSE	INT	ALIGN OFF	07:30:25 PM Feb 19, 202	
enter Freq 1		PNO: Fast 🗔	Trig: Free F	lun	g Type: Log-Pwr	TRACE 2345 TYPE MWWWW DET P P P P P	44
0 dB/div Ref	20.00 dBm	IFGain:Low	Atten: 30 d	3		Mkr1 286.4 kH: -55.09 dBn	Auto Tun
							Center Fre 15.004500 MH
0.0						-15.07 dBr	Start Fre 9.000 k⊦
50.0	Maria Isaddar aitherian ar	ipt for the standard and the standard	lige tanget by white the lenges of	shiqoful/witanifrantaaa	hand	Again Baharan tan Ingili ta Anai 1990	Stop Fre 30.000000 MH
tart 9 kHz Res BW 100 k	Hz	#VBV	V 300 kHz		Sweep 5.3	Stop 30.00 MH 333 ms (40001 pts	2.999100 MH
KR MODE TRC SCL	×	286.4 kHz	∨ -55.09 dBn	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Ma
2 3 4 5							Freq Offs 0 F
6 7 8 9							
0							

TM 2 Conducted Spurious Emissions 1 (Test Channel : Highest)

TM 2 Conducted Spurious Emissions 2 (Test Channel : Highest)



gilent Spectrum Analyzer - 1					
enter Freq 17.50		SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	07:30:42 PM Feb 19, 2020 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
	PNO: Fast IFGain:Low	Atten: 30 dB		DETPPPPP	
			Mkr3 2	23.998 750 GHz	Auto Tun
0 dB/div Ref 20.0	0 dBm			-31.85 dBm	
.og					Center Fre
0.00					17.500000000 GH
10.0					17.300000000 GP
				-15.07 dBm	
20.0				3 🦓	Start Fre
30.0			المعققة ويرورني .	a substantial data in the second stranger	10.00000000 GH
40.0	and the second				
	Salar State				Stop Fre
60.0					25.00000000 GH
70.0					
tart 10.000 GHz				Stop 25.000 GHz	05.04
Res BW 1.0 MHz	#VE	3W 3.0 MHz	Sweep 40	.00 ms (40001 pts)	CF Ste 1.50000000 GH
IKR MODE TRC SCL	×	Y FI	JNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma
1 N 1 f	24.858 625 GHz	-30.97 dBm			
2 N 1 f 3 N 1 f	24.699 250 GHz 23.998 750 GHz	-31.34 dBm -31.85 dBm			Freq Offs
4					0 F
6					
8					
9					
1				~	
				>	
G			STATUS		

TM 2 Conducted Spurious Emissions 3 (Test Channel : Highest)

3.5 Unwanted Emissions (Radiated)

Test Requirements and limit,

§15.247(d), §15.205, §15.209 & RSS-247 [5.5], RSS-Gen [8.9], RSS-Gen [8.10]

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed.

• FCC Part 15.209(a) and (b)

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
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

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 MHz, 76 ~ 88 MHz, 174 ~ 216 MHz or 470 ~ 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~ 156.52525	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.7 ~ 156.9	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	162.0125 ~ 167.17	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	167.72 ~ 173.2	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	240 ~ 285	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	322 ~ 335.4	2690 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	960 ~ 1240	3345.8 ~ 3358		
			3600 ~ 4400		

• FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.



3.5.1 Test Setup

Refer to the APPENDIX I.

3.5.2 Test Procedures

- 1. 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.
- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 6. Repeat above procedures until the measurements for all frequencies are complete.

Note: Measurement Instrument Setting for Radiated Emission Measurements.

- KDB558074 D01v05r02 Section 8.6
- ANSI C63.10-2013 Section 11.12
- 1. Frequency Range Below 1 GHz

RBW = 100 or 120 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak

- 2. Frequency Range > 1 GHz
 - Peak Measurement > 1 GHz

RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Sweep time = Auto, Trace mode = Max Hold until the trace stabilizes

Average Measurement> 1GHz

- 1. RBW = 1 MHz (unless otherwise specified).
- 2. VBW \geq 3 x RBW.
- 3. Detector = RMS (Number of points ≥ 2 x Span / RBW)
- 4. Averaging type = power (i.e., RMS).
- 5. Sweep time = auto.
- 6. Perform a trace average of at least 100 traces.
- 7. A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
- 1) If power averaging (RMS) mode was used in step 4, then the applicable correction factor is 10 log(1/x), where x is the duty cycle.
- 2) If linear voltage averaging mode was used in step 4, then the applicable correction factor is 20 log(1/x), where x is the duty cycle.
- 3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

Test Mode	Duty Cycle (%)	T _{on} (ms)	T _{on} + T _{off} (ms)	DCF = 10 log(1/Duty) (dB)	
TM 1	85.20	2.145	2.505	0.67	
TM 2	57.41	1.077	1.876	2.41	

Note : Refer to appendix II for duty cycle measurement procedure and plots



3.5.3 Test Results

Frequency Range : 9 kHz ~ 25 GHz _TM 1_Nomal

Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2388.33	Н	Х	PK	51.72	5.22	N/A	N/A	56.94	74.00	17.06
2389.37	Н	Х	AV	41.07	5.23	0.67	N/A	46.97	54.00	7.03
4804.43	V	Z	PK	50.05	1.47	N/A	N/A	51.52	74.00	22.48
4803.67	V	Z	AV	39.08	1.47	0.67	N/A	41.22	54.00	12.78

Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4880.45	V	Z	PK	50.60	1.97	N/A	N/A	52.57	74.00	21.43
4880.24	V	Z	AV	39.61	1.96	0.67	N/A	42.24	54.00	11.76

Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.78	Н	Х	PK	51.31	5.80	N/A	N/A	57.11	74.00	16.89
2483.90	Н	Х	AV	41.10	5.81	0.67	N/A	47.58	54.00	6.42
4960.23	V	Z	PK	49.31	2.13	N/A	N/A	51.44	74.00	22.56
4960.54	V	Z	AV	38.70	2.13	0.67	N/A	41.50	54.00	12.50

Note.

1. The radiated emissions were investigated 9kHz to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3 m to 1 m. In this case, the distance factor (-9.54 dB) is applied to the result.

- Calculation of distance factor = 20 log(applied distance / required distance) = 20 log(1 m / 3 m) = -9.54 dB

When distance factor is "N/A", the distance is 3 m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit - Result / Result = Reading + T.F + D.C.F / T.F = AF + CL - AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.

Frequency Range : 9 kHz ~ 25 GHz _TM 2_Nomal

Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.25	Н	Х	PK	52.22	5.23	N/A	N/A	57.45	74.00	16.55
2389.38	Н	Х	AV	40.79	5.23	2.41	N/A	48.43	54.00	5.57
4803.75	V	Z	PK	49.85	1.47	N/A	N/A	51.32	74.00	22.68
4804.22	V	Z	AV	39.19	1.47	2.41	N/A	43.07	54.00	10.93

Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4879.74	V	Z	PK	50.18	1.95	N/A	N/A	52.13	74.00	21.87
4879.58	V	Z	AV	39.43	1.94	2.41	N/A	43.78	54.00	10.22

Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.08	Н	Х	PK	51.17	5.81	N/A	N/A	56.98	74.00	17.02
2483.79	Н	Х	AV	40.94	5.80	2.41	N/A	49.15	54.00	4.85
4959.71	V	Z	PK	49.20	2.13	N/A	N/A	51.33	74.00	22.67
4959.49	V	Z	AV	38.93	2.13	2.41	N/A	43.47	54.00	10.53

Note.

1. The radiated emissions were investigated 9kHz to 25GHz. And no other spurious and harmonic emissions were found above listed frequencies.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3 m to 1 m. In this case, the distance factor (-9.54 dB) is applied to the result.

- Calculation of distance factor = 20 log(applied distance / required distance) = 20 log(1 m / 3 m) = -9.54 dB

When distance factor is "N/A", the distance is 3 m and distance factor is not applied.

3. Sample Calculation.

Margin = Limit - Result / Result = Reading + T.F + D.C.F / T.F = AF + CL - AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,

DCF = Duty Cycle Correction Factor.



3.6 Power line Conducted Emissions

Test Requirements and limit, §15.207 & RSS-Gen [8.8]

For an intentional radiator 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, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

	Conducted Limit (dBuV)				
Frequency Range (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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

3.6.1 Test Setup

See test photographs for the actual connections between EUT and support equipment.

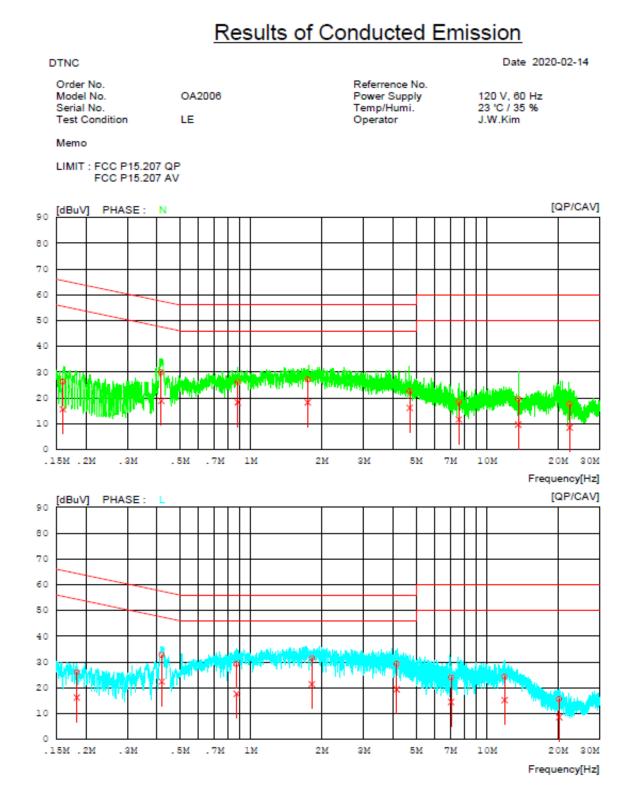
3.6.2 Test Procedures

Conducted emissions from the EUT were measured according to the ANSI C63.10-2013.

- The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
- 2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
- 3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
- 4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

3.6.3 Test Results

AC Line Conducted Emissions (Graph)



AC Line Conducted Emissions (List)

Results of Conducted Emission

DTNC			Date 2020-02-14
Order No. Model No. OA2006 Serial No. Test Condition LE		Referrence No. Power Supply Temp/Humi. Operator	120 V, 60 Hz 23 'C / 35 % J.W.Kim
Memo			
LIMIT : FCC P15 FCC P15			
NO FREQ	READING C.FACTOR		MARGIN PHASE
[MHz]	QP CAV [dBuV][dBuV] [dB]	QP CAV QP CAV [dBuV][dBuV] [dBuV][dBuV]	QP CAV [dBuV][dBuV]
	16.28 5.61 9.94		39.2539.92 N
2 0.41732			27.6328.70 N
3 0.88015 4 1.74358		26.1218.21 56.00 46.00 26.9918.22 56.00 46.00	29.8827.79 N 29.0127.78 N
5 4.70694		22.5016.04 56.00 46.00	29.0127.76 N 33.5029.96 N
6 7.59333	8.07 1.33 10.24	18.31 11.57 60.00 50.00	41.6938.43 N
7 13.55692	9.07-0.85 10.44	19.51 9.59 60.00 50.00	40.4940.41 N
8 22.37895		17.53 8.45 60.00 50.00	42.4741.55 N
9 0.18320	15.96 6.22 9.94	25.9016.16 64.34 54.34	38.4438.18 L
10 0.41950	22.7112.38 9.95	32.6622.33 57.46 47.46	24.8025.13 L
11 0.86998	19.24 7.66 9.97	29.2117.63 56.00 46.00	26.7928.37 L
	21.4211.29 10.02		24.5624.69 L
13 4.14327			26.8626.65 L
14 7.04156		23.9314.42 60.00 50.00	36.0735.58 L
15 11.87309		24.3215.17 60.00 50.00	35.6834.83 L
16 20.20210	5.00-1.99 10.53	15.53 8.54 60.00 50.00	44.4741.46 L

3.7 Occupied Bandwidth

Test Requirements, RSS-Gen [6.7]

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99 % emission bandwidth, as calculated or measured.

3.7.1 Test Setup

-NA

3.7.2 Test Procedures

The 99 % power bandwidth was measured with a calibrated spectrum analyzer.

The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3 × RBW.

Spectrum analyzer plots are included on the following pages.

3.7.3 Test Results

-NA

4. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203

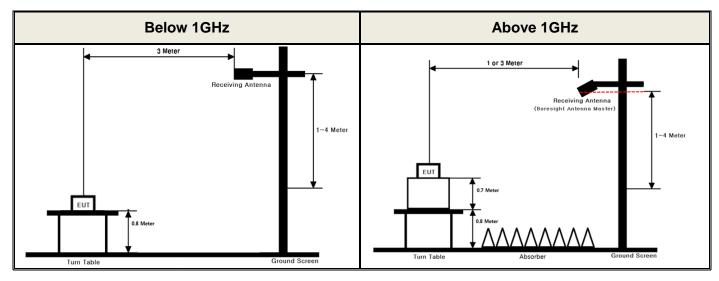
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient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

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

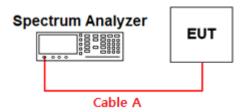
APPENDIX I

Test set up diagrams

Radiated Measurement



Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	0.34	15	3.20
1	0.74	20	6.72
2.402 & 2.440 & 2.480	1.28	25	8.65
5	2.05	-	-
10	2.99	-	-

Note 1: The path loss from EUT to Spectrum analyzer was measured and used for test.

Path loss (S/A's correction factor) = Cable A

(Attenuator, Applied only when it was used externally)

APPENDIX II

Duty cycle plots

Test Procedure

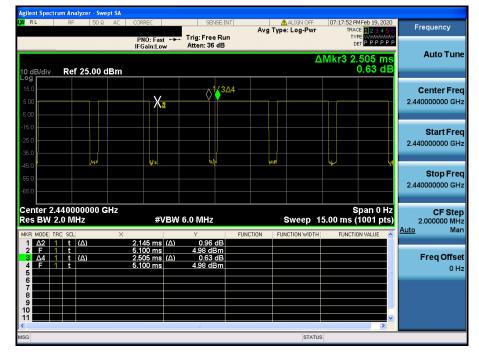
Duty Cycle was measured using Section 6.0 b) of KDB558074 D01v05r02 :

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW \geq OBW if possible; otherwise, set RBW to the largest available value. Set VBW \geq RBW. Set detector = peak or average.

The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T \leq 16.7 microseconds.)

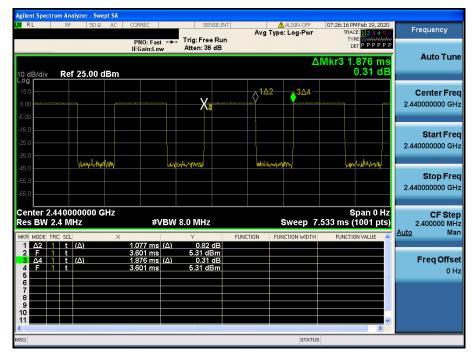
Duty Cycle

TM 1 Test Channel : Middle





TM 2 Test Channel : Middle



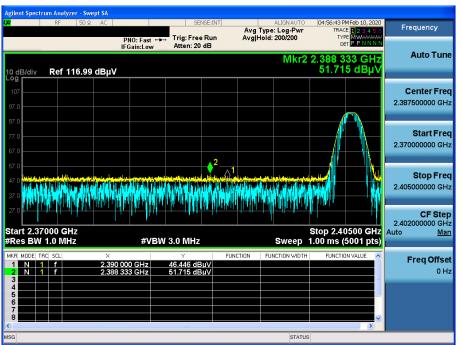
Duty Cycle

Detector Mode : PK

APPENDIX III

Unwanted Emissions (Radiated) Test Plot

TM1 & Lowest & X & Hor



TM1 & Lowest & X & Hor

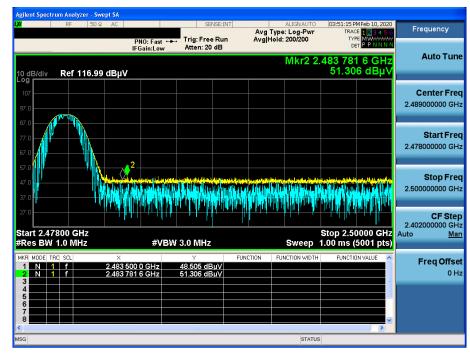
um Analyzer -Swept SA eh 10, 20 Frequency Avg Type: RMS Avg|Hold: 200/200 Trig: Free Run Atten: 20 dB TYPE DET PNO: Fast 🔸 Auto Tune Mkr2 2.389 369 GH 41.065 dBµ\ Ref 116.99 dBµV 0 dB/div **Center Freq** 2.387500000 GHz Start Freq 2.370000000 GHz Stop Freq <mark>♦</mark>21 2.405000000 GHz CF Step 2.40200000 GHz Stop 2.40500 GHz 1.00 ms (5001 pts) Start 2.37000 GHz #Res BW 1.0 MHz Auto Man #VBW 3.0 MHz* Sweep FUNCTION Freq Offset 2.390 000 GHz 2.389 369 GHz 39.732 dBµV 41.065 dBµV 1 f 1 f Ň 0 Hz STATUS



TM1 & Highest & X & Hor

🛈 Dt&C

Detector Mode : PK



TM1 & Highest & X & Hor





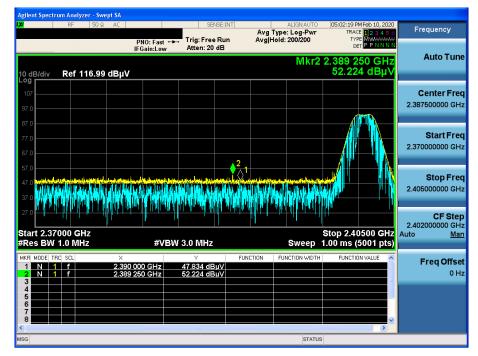
TM1 & Middle & Z & Ver

KI .	RF	50 Ω	AC			ENSE:INT		ALIGN AUTO ype: RMS	TRACE	IFeb 10, 2020	Frequency
				PNO: Fast ← IFGain:Low	Trig: Fre Atten: 6		Avg Ho	old: 200/200	TYPE DE1	A P N N N N	
dB/div	Ref 6	6.99 d	IBμV					Mkr1	4.880 23 39.610	39 GHz) dBµV	Auto Tur
°g											Center Fre
52.0											4.880000000 G
57.0											
57.0											Start Fr
52.0											4.877500000 G
47.0											Stop Fr
42.0						<u>^</u> 1-					4.882500000 G
Kyrywytr		-	an a	ninhan an ann an	, have not right a staffe	and a starte way to re-		waynyddi marthydyn	Manin Marille	and an international state	CF St
37.0											2.440000000 G
32.0											Auto <u>M</u>
											F === 0#=
27.0											Freq Offs 0
22.0											
	.880000									000 MHz	
Res BW	1.0 MH	z		#VB	W 3.0 MH:	Z*		Sweep	1.00 ms (5	001 pts)	



TM2 & Lowest & X & Hor

Detector Mode : PK



TM2 & Lowest & X & Hor

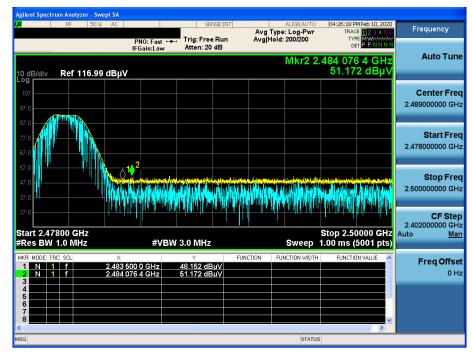




TM2 & Highest & X & Hor

🛈 Dt&C

Detector Mode : PK



TM2 & Highest & X & Hor





TM2 & Middle & Z & Ver

C RF 50 Ω A		SENSE:INT	ALIGNAUTO Avg Type: RMS Avg Hold: 200/200	05:30:11 PM Feb 10, 2020 TRACE 1 2 3 4 5 6 TYPE A WWWWW	Frequency
i dB/div Ref 66.99 dB	PNO: Fast ↔→ IFGain:Low	Atten: 6 dB	-	4.879 582 GHz 39.430 dBμV	Auto Tur
	14				
62.0					Center Fre 4.880000000 Gi
57.0					
52.0					Start Fr 4.877500000 G
47.0					Stop Fr
42.0		<u>_</u> 1			4.882500000 G
37.0 32.0	eryddiadau farfaddiadau yn araendiadau		nenefine redenis interación provinsión		CF St e 2.440000000 G Auto <u>M</u>
27.0					Freq Offs 0
22.0					
Center 4.880000 GHz Res BW 1.0 MHz	#VBW	3.0 MHz*	Sweep	Span 5.000 MHz 1.00 ms (5001 pts)	