TEST REPORT

D	Dt&C	

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 N	lo: DRTFCC2005-0145(1)					
2. Custome	r					
• Name :	LG Electronics USA, Inc.					
• Addres	s : 111 Sylvan Avenue, North Building Englewood Cliffs, NJ 07632					
3. Use of Re	eport : FCC Original Grant					
	Name / Model Name : Mobile Phone / LM-G910HMW ZNFG910HMW					
5. Test Meth	nod Used : KDB558074 D01v05r02, ANSI C63.10-2013					
Test Spec	cification : FCC Part 15 Subpart C.247					
6. Date of T	est : 2020.04.16 ~ 2020.05.19					
7. Location	of Test : X Permanent Testing Lab Cn Site Testing					
8. Testing E	nvironment : Refer to appended test report.					
9. Test Resu	ult : Refer to the attached test result.					
The results sl	hown in this test report refer only to the sample(s) tested unless otherwise stated.					
Affirmation	Tested by Reviewed by					
	Name : InHee Bae					
2020.06.08.						
DT&C Co., Ltd.						
Not abided by KS Q ISO / IEC 17025 and KOLAS accreditation.						
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
DRTFCC2005-0145	May. 29, 2020	Initial issue	InHee Bae	GeunKi Son
DRTFCC2005-0145(1)	Jun. 08, 2020	Revised the section 1.7	InHee Bae	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

www.dtnc.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

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	0.9 dB (The confidence level is about 95 %, $k = 2$)
AC conducted emission	3.6 dB (The confidence level is about 95 %, k=2)
Radiated spurious emission (1 GHz Below)	4.9 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz ~ 18 GHz)	5.0 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	:	111 Sylvan Avenue, North Building Englewood Cliffs, NJ 07632
Contact person	:	Kyung-Su Han

1.5 Description of EUT

EUT	Mobile Phone
Model Name	LM-G910HMW
Add Model Name	LMG910HMW, G910HMW, LM-G910HM, LMG910HM, G910HM
Serial Number	Identical prototype
Power Supply	DC 3.87 V
Frequency Range	2402 MHz ~ 2480 MHz
Max. RF Output Power	7.45 dBm
Modulation Technique	GFSK
Antenna Specification	Antenna Type: PIFA Antenna Gain: -2.43 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	19/12/16	20/12/16	MY50410357
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	MY43000211
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	19/09/18	20/09/18	N/A
HYGROMETER	TESTO	608-H1	20/01/21	21/01/21	34862883
Loop Antenna	Schwarzbeck	FMZB1513	20/02/19	22/02/19	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	19/04/23	21/04/23	9160-3362
Horn Antenna	ETS-Lindgren	3115	20/01/30	22/01/30	6419
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	Pass Filter Wainwright Instruments		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 &	Apritou	ML2488B MA2491A	20/01/02	21/01/02	0846002
Wide Bandwidth Sensor	Anritsu		20/01/02	21/01/02	0845295
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-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 FCC 15.209 limits Emission Limits)		Radiated	C Note 3,4
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.

Note 4: This device supports wireless charging capability & Can use Dual Screen.

So per KDB648474 D03v01r04, the radiated test items were performed all not charging, charging and Dual Screen conditions, the handset is placed on the representative charging pad under normal conditions and in a simulated call configuration.

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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.

Test Mode	_	Frequency [MHz]			
	Description	Lowest Frequency	Middle Frequency	Highest Frequency	
TM 1	BT LE(1Mbps)	2402	2440	2480	
TM 2	BT LE(2Mbps)	2402	2440	2480	
TM 3	BT LE(1Mbps) with WPC	2402	2440	2480	
TM 4	BT LE(2Mbps) with WPC	2402	2440	2480	
TM 5	BT LE(2Mbps) with Dual Display	2402	2440	2480	
TM 6	BT LE(2Mbps) with Dual Display+WPC	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 $VBW \ge 3 \times RBW$. 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 Chaimer	dBm	dBm
	Lowest	6.98	7.37
TM 1	Middle	6.46	6.56
	Highest	5.50	5.63
	Lowest	6.97	7.45
TM 2	Middle	6.46	6.72
	Highest	5.45	5.65

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.

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2.402000000 GHz

Start Freq 2.397000000 GHz

Stop Freq 2.407000000 GHz

CF Step 1.000000 MHz Man

Freq Offset 0 Hz

<u>Auto</u>

Peak Output Power

RI

10 dB/div

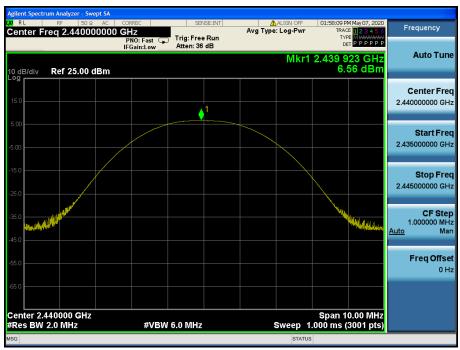




Peak Output Power

TM 1 Test Channel : Middle

Span 10.00 MHz Sweep 1.000 ms (3001 pts)







Peak Output Power

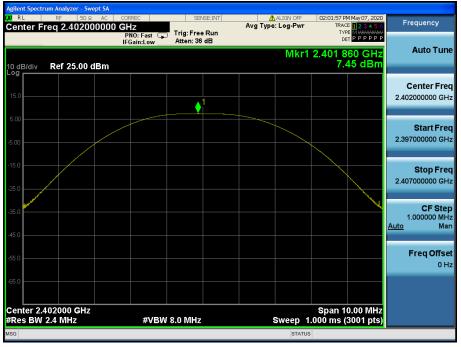
TM 1 Test Channel : Highest



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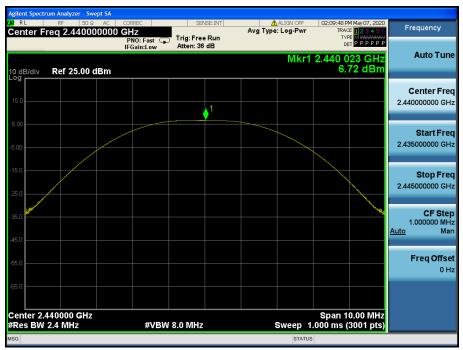
Peak Output Power





Peak Output Power

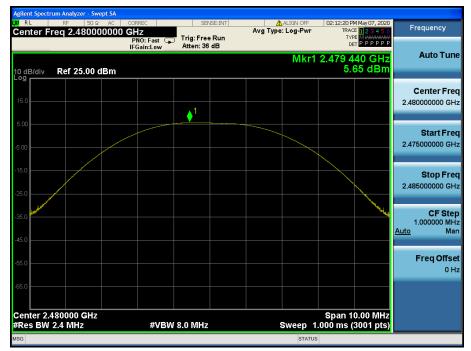
TM 2 Test Channel : Middle





Peak Output Power

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

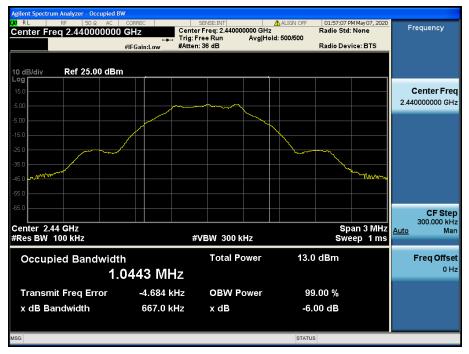
Test Mode	Tested Channel	Test Results [MHz]
	Lowest	0.671
TM 1	Middle	0.667
	Highest	0.668
	Lowest	1.138
TM 2	Middle	1.170
	Highest	1.147

TM 1 Test Channel : Lowest

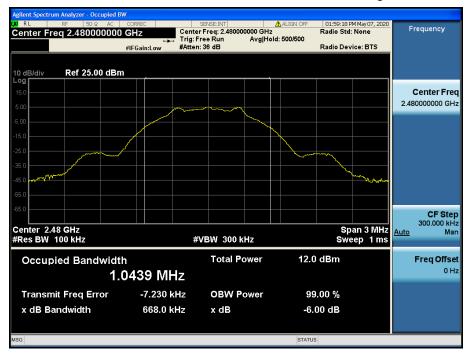


6 dB Bandwidth

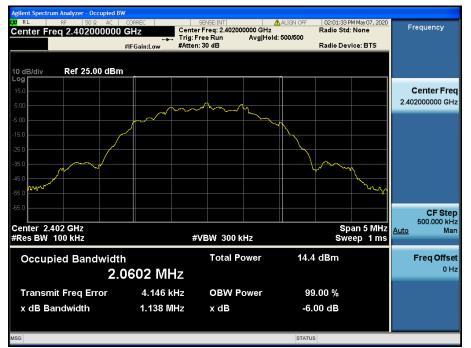
TM 1 Test Channel : Middle



TM 1 Test Channel : Highest





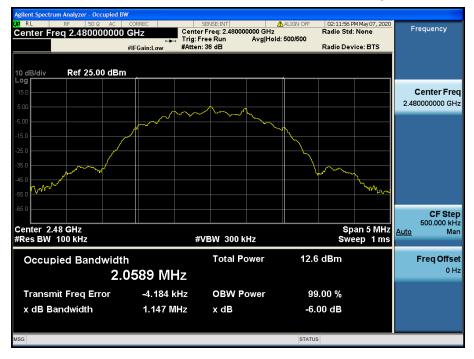


6 dB Bandwidth

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

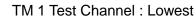
Method PKPSD (peak PSD)

- 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 ≤ 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 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	-8.81
TM 1	Middle	-9.71
	Highest	-10.77
	Lowest	-11.32
TM 2	Middle	-12.02
	Highest	-13.25

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Maximum PKPSD

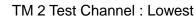
TM 1 Test Channel : Middle



TM 1 Test Channel : Highest



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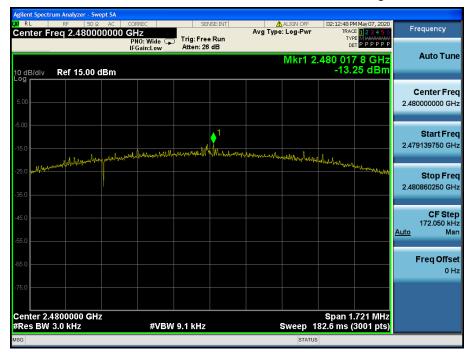


Maximum PKPSD

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.

 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.

FCC ID: ZNFG910HMW

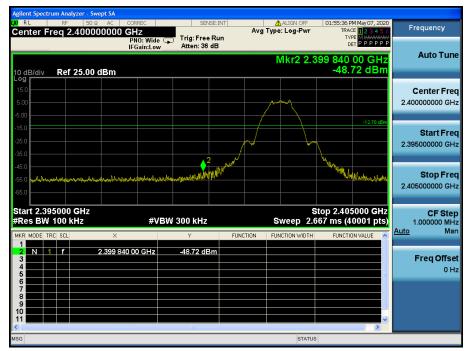
3.4.3 Test Results

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TM 1 Reference (Test Channel : Lowest)

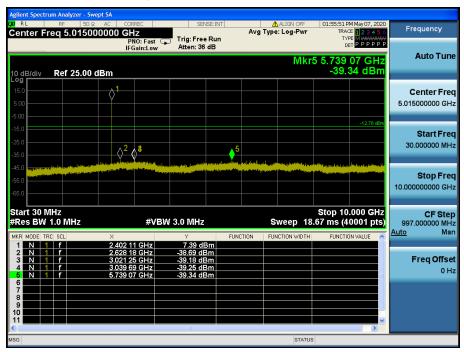
TM 1 Low Band-edge (Test Channel : Lowest)



RL RF	alyzer - Swep 50 Ω 🖉		ORREC	SEN	ISE:INT		ALIGN OFF	01:55:43 P	M May 07, 2020	-
enter Freq		00 MHz	PNO: Fast (Run		e: Log-Pwr	TRAC	E 1 2 3 4 5 6 PE MWAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	Frequency
0 dB/div Re	f 25.00 d		FGain:Low	Atten: 36	dВ		Γ	/kr1 29	3.9 kHz 11 dBm	Auto Tun
6 g 15.0 5.00										Center Fre 15.004500 M⊦
5.0									-12.78 dBm	Start Fre 9.000 k⊦
5.0	un andressi da an san gan gan gan gan gan gan gan gan gan g	bili alwanda ada	Hadron (Intelligence	pinantatan ang pangang	erny arrighter	u, der för store store som	****	Mallythered Million	ungeliseline av et som type	Stop Fre 30.000000 MH
tart 9 kHz Res BW 100	kHz		#VB	W 300 kHz			weep 5.3	Stop 3 33 ms (4		CF Ste 2.999100 MH
KR MODE TRC SCI		× 29	3.9 kHz	۲ -51.11 dE		ICTION FL	NCTION WIDTH	FUNCTIO		<u>Auto</u> Ma
2 3 3 4 5 6										Freq Offs 0 F
6										
7 B 9										
8									×	

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

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



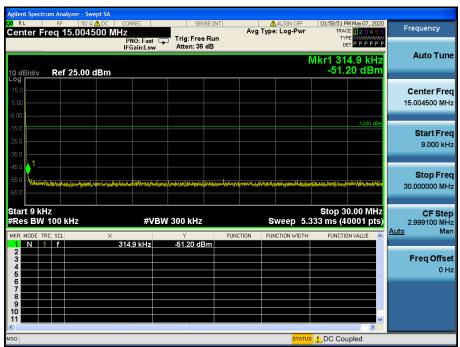
RL RF 50 enter Freg 17.500	Ω AC CORREC	SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	01:55:59 PM May 07, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast C IFGain:Low	Trig: Free Run Atten: 36 dB			
dB/div Ref 25.00	dBm		Mkr3 2	4.746 500 GHz -31.66 dBm	Auto Tur
5 .0 .00 .00					Center Fre 17.500000000 GH
5.0				-12.78 dBm	Start Fre 10.000000000 GF
5.0					Stop Fre 25.000000000 GH
tart 10.000 GHz Res BW 1.0 MHz	#VB	W 3.0 MHz	-	Stop 25.000 GHz .00 ms (40001 pts)	CF Ste 1.500000000 GF Auto Ma
KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 N 1 f 4	× 24.845 875 GHz 24.245 875 GHz 24.746 500 GHz	Y FUN -31.23 dBm -31.61 dBm -31.66 dBm -31.66 dBm	NCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offs
5 6 7 8 9 9					
				×	

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



TM 1 Reference (Test Channel : Middle)

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





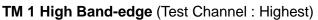
TM 1 Conducted Spurious Emissions 2 (Test Channel : Middle)

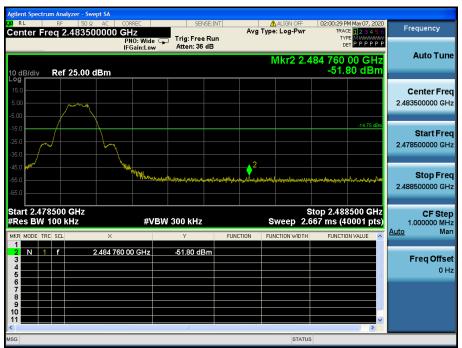
TM 1 Conducted Spurious Emissions 3 (Test Channel : Middle)





TM 1 Reference (Test Channel : Highest)

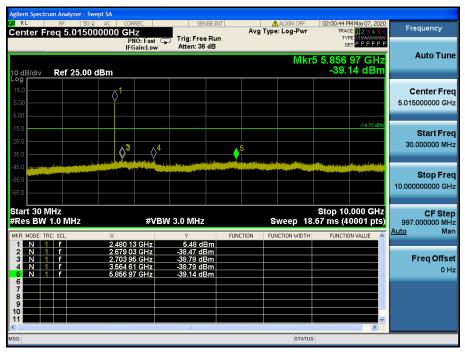




X RL I	Analyzer - Swe		CORREC	SE	NSE:INT		ALIGN	DEE	02:00:36 0	M May 07, 2020	
Center Freq			Z PNO: Fast	Trig: Fre	e Run	Avg	Type: Log-		TRA		Frequency
			IFGain:Low	Atten: 3	6 dB			N		1.9 kHz	Auto Tup
0 dB/div R	ef 25.00 (dBm								51 dBm	
15.0											Center Fre
5.00											15.004500 MH
5.00										-14.75 dBm	
25.0											Start Fre
35.0											9.000 kH
45.0											Stop Fre
55.0	adjua, inny hard danage	ewernites	an a	dependence	hitsforforme/vicineed	un an	ilatating the second second	anside say	and states in such	hender her her her her her her her her her h	30.000000 MH
									04	0.00 5411-	
Start 9 kHz Res BW 10	0 kHz		#VB	W 300 kHz	2		Sweep	5.3	33 ms (4	0.00 MHz 0001 pts)	2.999100 MH
MKR MODE TRC S		X	281.9 kHz	۲ -49.51 d		NCTION	FUNCTION V	/IDTH	FUNCTI	DN VALUE	Auto Ma
2			.01.3 RHZ								Freq Offse
3 4											0 H
5										======	
7 8											
9											
10										~	
				111				_		>	
SG							5	TATUS	DC Co	upled	

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

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



	Ω AC CORREC	SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	02:00:52 PM May 07, 2020 TRACE 1 2 3 4 5 6	Frequency
enter Freq 17.50	PNO: Fast C IFGain:Low	Trig: Free Run Atten: 36 dB	Avg Type. Log-Fwi	TYPE M WAAWAAA DET P P P P P P	
dB/div Ref 25.0	0 dBm		Mkr3 2	1.167 125 GHz -31.81 dBm	Auto Tur
99 5.0 00 00					Center Fre 17.500000000 GH
5.0 5.0 5.0		they take a second state of the second s		-14.75 dBm	Start Fr 10.000000000 GI
5.0 (addring for the different for the second					Stop Fr 25.000000000 GI
art 10.000 GHz tes BW 1.0 MHz	#VB	W 3.0 MHz	-	Stop 25.000 GHz 00 ms (40001 pts)	CF Ste 1.500000000 G Auto M
R MODE TRC SCL 1 1 f 1 f 2 N 1 f 1 3 N 1 f 1 4	× 24.731 875 GHz 24.304 000 GHz 21.167 125 GHz	-30.97 dBm -31.78 dBm -31.81 dBm	NCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offs
				~	

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



TM 2 Reference (Test Channel : Lowest)

TM 2 Low Band-edge (Test Channel : Lowest)



RL			ORREC	SEI	NSE:INT		ALIGN OFF		M May 07, 2020	Frequency
nter Fr	eq 15.004		PNO: Fast ⊂ FGain:Low	Trig: Free Atten: 36			ve. Log-r wi	TYI		
dB/div	Ref 25.00	dBm					Ν		1.9 kHz 27 dBm	Auto Tur
g i.o oo 										Center Fr 15.004500 MI
i.0									-12.88 dBm	Start Fr 9.000 ki
.0	yaan hiyo dabil daba dabaa ya qo	affadiplutestfresterster		Managan San San San San San San San San San S	ngdhatingi jadh ng/Al	henneddarann	Loosility of the state of the s	shadi Kabanga kalanti	danter and second	
art 9 kH tes BW	z 100 kHz			W 300 kHz			Sweep 5.3	Stop 3 33 ms (4	0.00 MHz 0001 pts)	30.000000 M CF Sto 2.999100 M
art 9 kH	z 100 kHz	×			FUN			Stop 3 33 ms (4	0.00 MHz 0001 pts)	30.000000 M CF Str 2.999100 M <u>Auto</u> M
art 9 kH tes BW	z 100 kHz	×	#VB1	W 300 KHz Y	FUN		Sweep 5.3	Stop 3 33 ms (4	0.00 MHz 0001 pts)	30.000000 M CF Str 2.999100 M <u>Auto</u> M Freq Offs
art 9 kH tes BW	z 100 kHz	×	#VB1	W 300 KHz Y	FUN		Sweep 5.3	Stop 3 33 ms (4	0.00 MHz 0001 pts)	Stop Fro 30.000000 M 2.999100 M Auto M Freq Offs 0 1

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

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

Agilent Spectrum Analyzer - Swep	ot SA					
RL RF 50 Ω Center Freq 5.015000		SENSE:INT		ALIGN OFF	02:03:07 PM May 07, 202 TRACE 12345	
	PNO: Fast C IFGain:Low	Trig: Free Run Atten: 36 dB		<i>// U</i>	TYPE MUMMMM DET PPPPP	2
10 dB/div Ref 25.00 d	Bm			Mkr	5 3.189 99 GH: -39.47 dBr	
15.0 5.00 -5.00	1					Center Freq 5.015000000 GHz
-16.0 -25.0 -35.0	425!				-12.88 dBr	Start Freq 30.000000 MHz
-45.0 -65.0 -65.0					¹⁰⁰ State and State State and State and State State and State and State and State	Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VB	N 3.0 MHz		Sweep 18	Stop 10.000 GHz .67 ms (40001 pts	CF Step 997.000000 MHz Auto Man
MKR MODE TRC SCL	× 2.402 61 GHz	Y 7.23 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	3.283 46 GHz 3.071 60 GHz 2.974 89 GHz 3.189 99 GHz	-39.30 dBm -39.41 dBm -39.43 dBm -39.47 dBm				Freq Offset 0 Hz
6 7 8 9 9						
					>	
MSG				STATUS		

	iO Ω AC CORREC	SENSE:INT	ALIGN OFF	02:03:15 PM May 07, 2020	Frequency
enter Freq 17.50	100000000 GHz PNO: Fast IFGain:Low		Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW DET PPPPP	
dB/div Ref 25.0	0 dBm		Mkr3 2	4.695 500 GHz -31.79 dBm	Auto Tur
6 15.0 5.00 5.00					Center Fre 17.500000000 G⊦
5.0		gingu ^{funduk} i ^{funduk} i yang	مربع المراجع ا	-12.88 dBm	Start Fre 10.000000000 GH
5.0 (1) 5.0 5.0 					Stop Fre 25.000000000 GR
tart 10.000 GHz Res BW 1.0 MHz		BW 3.0 MHz	-	Stop 25.000 GHz .00 ms (40001 pts)	CF Ste 1.500000000 GF Auto Ma
KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 N 1 f 4	× 24.931 375 GHz 24.213 625 GHz 24.695 500 GHz	Y F -30.99 dBm -31.76 dBm -31.79 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offs
6 7 8 9 0					
1				~	

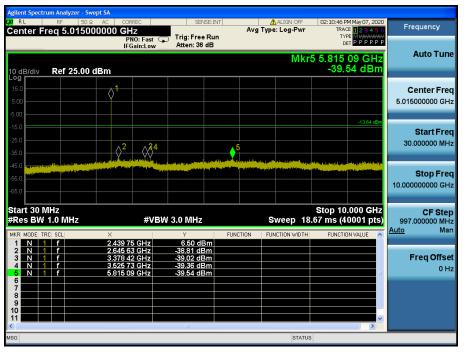
TM 2 Conducted Spurious Emissions 3 (Test Channel : Lowest)



TM 2 Reference (Test Channel : Middle)

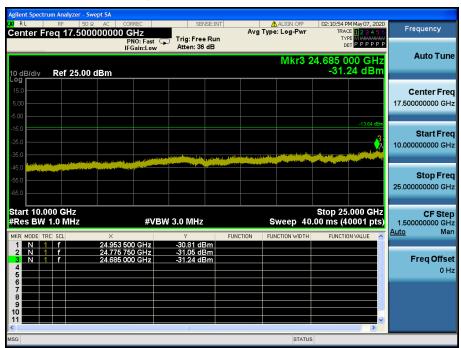
TM 2 Conducted Spurious Emissions 1 (Test Channel : Middle)

RL RF	50 Ջ <u>∧</u> DC 15.004500 M	CORREC	SENSE	Avg	ALIGN OFF	02:10:38 PM May 07, 2020 TRACE 1 2 3 4 5 6	Frequency
		PNO: Fast IFGain:Low				DET PPPPP	
0 dB/div Rel	f 25.00 dBm					4 Wkr1 293.9 kHz -50.25 dBm	Auto Tune
.og 15.0 5.00							Center Fre 15.004500 MH
5.00 15.0 25.0 35.0						-13.64 dBm	Start Fre 9.000 kH
45.0							Stop Fre
TO CHEMICAL MARK	operious de la figlie freu transfi	eniel paris prostaternales	diregen, altaistiftelis ganzait spillanas	al fotbatter spatisfer blantsetage	anan a tha an	arantaattangalangkalangkalandangkaskattanantiky	
65.0 Start 9 kHz #Res BW 100	kHz		BW 300 kHz		Sweep 5.3	Stop 30.00 MHz 333 ms (40001 pts)	30.000000 MH
65.0	kHz ×			FUNCTION		Stop 30.00 MHz	30.000000 Mi CF Ste 2.999100 Mi



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

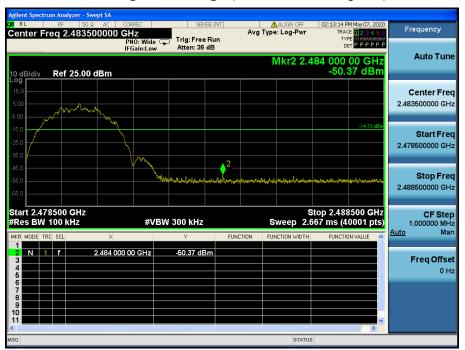
TM 2 Conducted Spurious Emissions 3 (Test Channel : Middle)





TM 2 Reference (Test Channel : Highest)

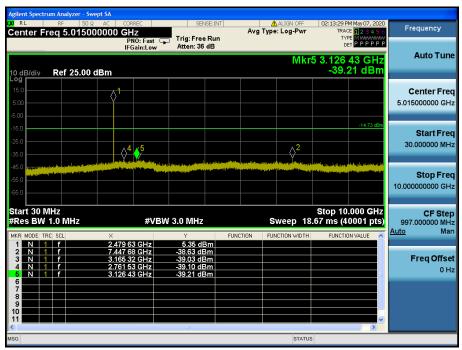
TM 2 High Band-edge (Test Channel : Highest)



K/RL	RF 50	Ω 🛕 DC 🛛 C	ORREC	SEN:	SE:INT		ALIGN OFF	02:13:21 P	M May 07, 2020	-
enter Fr	eq 15.004	500 MHz	Z PNO:Fast ⊂ FGain:Low	Trig: Free Atten: 36		Avg Type		TRAC	E 1 2 3 4 5 6 E MWWWWWW P P P P P P	Frequency
10 dB/div	Ref 25.00		Call.Low				r		1.9 kHz 86 dBm	Auto Tune
.og 15.0 5.00										Center Free 15.004500 MH
15.0 25.0 35.0									-14.73 dBm	Start Fre 9.000 kH
45.0 1	MalainesMalaataasa/	anglesson, the state of the sta	<u>المراجع ومواد المراجع وماما مام</u>	ورواري والمروارين	later and an	hath bire down or fi	gh/qnanhaandaarah	U fakir Brury Afrikaan	narjalju ostablizanja dalj	Stop Fre 30.000000 MH
tart 9 kH Res BW			#VBV	V 300 kHz		s	weep 5.3			CF Ste 2.999100 M⊦
	C SCL	х		Y	FUNCT	ION FUN	CTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u> Ma
1 N 1	f	28	31.9 kHz	-50.86 dB	m					
1 N 1 2		26	31.9 KHZ	-50.86 dB	.m					
2 3 4	f	28	31.9 KHZ	-50.86 dB						
1 N 1 2 3 4 4 5 5 6 7 8		28		-\$U.86 dB						Freq Offse 0 H

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

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



RL RF	50 Ω AC CORRI		SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	02:13:37 PM May 07, 2020 TRACE 1 2 3 4 5 6	Frequency
enter Freq 17): Fast 😱 Trig:	Free Run n:36 dB	Avg Type. Log-Fwi	TYPE MWWWWWW DET PPPPP	
0 dB/div Ref 2	5.00 dBm			Mkr3 :	24.517 000 GHz -32.24 dBm	Auto Tur
og 15.0 5.00						Center Fre 17.500000000 GF
5.0 5.0 5.0		and a start of the particular distance of the start of th	مالعليم بمريا القدريس الكاهياتيا	and the system of the system o	-14.73 dBm	Start Fre 10.000000000 GH
5.0 4499-1449-1449 5.0 5.0						Stop Fre 25.000000000 GF
tart 10.000 GH Res BW 1.0 MH	lz	#VBW 3.0 N		-	Stop 25.000 GHz).00 ms (40001 pts)	CF Ste 1.50000000 GF Auto Ma
IKR MODE TRC SCL 1 N 1 f 2 N 1 f 3 N 1 f 4	× 24.746 125 24.181 000 24.517 000	GHz -31.0	7 dBm 3 dBm 4 dBm	CTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offs
6 7 8 9 9						
1					×	

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

3.5 Unwanted Emissions (Radiated)

I 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.

• FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below	v :
--	------------

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 ≥ $3 \times RBW$.
- 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	85.63	2.145	2.505	0.67
TM 2	57.75	1.080	1.870	2.38

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

3.5.3 Test Results

- Test Notes
- 1. The radiated emissions were investigated 9kHz to 25GHz. And no other spurious and harmonic emissions were found below 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

 $\label{eq:Where, T.F = Total Factor, \quad AF = Antenna \ Factor, \quad CL = Cable \ Loss, \quad AG = Amplifier \ Gain,$

DCF = Duty Cycle Correction Factor.

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)
2389.92	V	Z	PK	49.36	4.80	N/A	N/A	54.16	74.00	19.84
2389.92	V	Z	AV	38.62	4.80	0.67	N/A	44.09	54.00	9.91
4803.94	V	Y	PK	50.12	0.78	N/A	N/A	50.90	74.00	23.10
4803.71	V	Y	AV	38.64	0.78	0.67	N/A	40.09	54.00	13.91

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)
4879.97	V	Y	PK	50.39	1.31	N/A	N/A	51.70	74.00	22.30
4879.67	V	Y	AV	39.40	1.31	0.67	N/A	41.38	54.00	12.62

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)
2483.72	V	Z	PK	48.87	5.25	N/A	N/A	54.12	74.00	19.88
2483.63	V	Z	AV	39.16	5.25	0.67	N/A	45.08	54.00	8.92
4959.90	V	Y	PK	49.54	1.61	N/A	N/A	51.15	74.00	22.85
4959.96	V	Y	AV	38.99	1.61	0.67	N/A	41.27	54.00	12.73

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)
2389.78	V	Y	PK	48.82	4.80	N/A	N/A	53.62	74.00	20.38
2389.86	V	Y	AV	38.32	4.80	2.38	N/A	45.50	54.00	8.50
4803.64	V	Y	PK	48.98	0.78	N/A	N/A	49.76	74.00	24.24
4803.92	V	Y	AV	38.81	0.78	2.38	N/A	41.97	54.00	12.03

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)
4879.60	V	Y	PK	50.07	1.31	N/A	N/A	51.38	74.00	22.62
4879.95	V	Y	AV	39.38	1.31	2.38	N/A	43.07	54.00	10.93

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)
2483.71	V	Y	PK	49.82	5.25	N/A	N/A	55.07	74.00	18.93
2483.68	V	Y	AV	38.75	5.25	2.38	N/A	46.38	54.00	7.62
4959.95	V	Y	PK	49.01	1.61	N/A	N/A	50.62	74.00	23.38
4959.65	V	Y	AV	38.81	1.61	2.38	N/A	42.80	54.00	11.20



Frequency Range : 9 kHz ~ 25 GHz _TM 3_Wireless Charging

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)
2483.81	Н	Х	PK	48.94	5.26	N/A	N/A	54.20	74.00	19.80
2483.73	Н	Х	AV	38.78	5.25	0.67	N/A	44.70	54.00	9.30
4959.63	Н	Х	PK	49.23	1.61	N/A	N/A	50.84	74.00	23.16
4959.87	Н	Х	AV	39.02	1.61	0.67	N/A	41.30	54.00	12.70

Frequency Range : 9 kHz ~ 25 GHz _TM 4_Wireless Charging

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)
2483.86	V	Х	PK	49.43	5.26	N/A	N/A	54.69	74.00	19.31
2483.79	V	Х	AV	38.84	5.26	2.38	N/A	46.48	54.00	7.52
4959.95	V	Х	PK	50.16	1.61	N/A	N/A	51.77	74.00	22.23
4959.61	V	Х	AV	38.83	1.61	2.38	N/A	42.82	54.00	11.18

Frequency Range : 9 kHz ~ 25 GHz _TM 5_ With Dual Display

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)
2484.10	V	Y	PK	49.92	5.26	N/A	N/A	55.18	74.00	18.82
2484.07	V	Y	AV	39.18	5.26	2.37	N/A	46.81	54.00	7.19
4960.32	V	Y	PK	49.96	1.61	N/A	N/A	51.57	74.00	22.43
4960.02	V	Y	AV	38.89	1.61	2.37	N/A	42.87	54.00	11.13
7439.93	V	Y	PK	46.96	9.18	N/A	N/A	56.14	74.00	17.86
7439.87	V	Y	AV	36.16	9.18	2.37	N/A	47.71	54.00	6.29

Frequency Range : 9 kHz ~ 25 GHz _TM 6_ With Dual Display + WPC

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)
2483.90	V	Х	PK	49.59	5.26	N/A	N/A	54.85	74.00	19.15
2483.97	V	Х	AV	39.24	5.26	2.37	N/A	46.87	54.00	7.13
4959.54	V	Х	PK	49.23	1.61	N/A	N/A	50.84	74.00	23.16
4959.97	V	Х	AV	38.95	1.61	2.37	N/A	42.93	54.00	11.07
7440.16	V	Х	PK	47.04	9.18	N/A	N/A	56.22	74.00	17.78
7440.05	V	Х	AV	36.33	9.18	2.37	N/A	47.88	54.00	6.12



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.

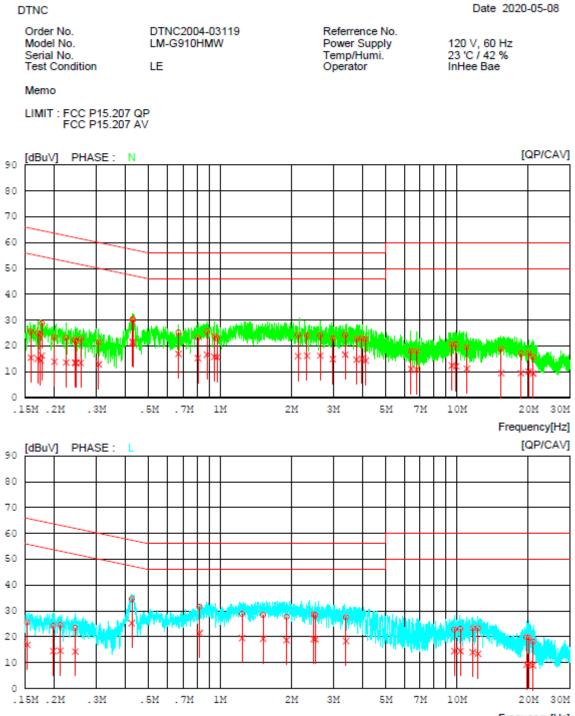
- The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
- 2. The EUT was connected 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

Refer to the next page. (The worst case data was reported. The worst data is TM 1 & Middle)

AC Line Conducted Emissions (Graph)

Results of Conducted Emission



Frequency[Hz]

AC Line Conducted Emissions (List)

Results of Conducted Emission

DTNC			Date 2020-05-08
Order No. Model No. Serial No. Test Condition	DTNC2004-03119 LM-G910HMW LE	Referrence No. Power Supply Temp/Humi. Operator	120 V, 60 Hz 23 'C / 42 % InHee Bae
Memo			
LIMIT : FCC P15 FCC P15			
NO FREQ	READING C.FACTOR QP CAV [dBuV][dBuV] [dB]	RESULT LIMIT QP CAV QP CAV [dBuV][dBuV][dBuV][dBuV]	MARGIN PHASE QP CAV [dBuV][dBuV]
1 0.15894 2 0.16998 3 0.17465 4 0.17694 5 0.1994 5 0.22391 7 0.24386 8 0.24717 9 0.25816 10 0.30742 11 0.42675 12 0.42984 13 0.66703 14 0.80607 15 0.88050 16 0.94589 17 0.97205 18 2.13555 19 2.32864 20 2.64881 21 2.99294 22 3.37865 23 3.76741 24 3.97367 25 4.12237 26 6.40490 27 6.76358 28 9.51794 29 9.93158 30 11.02023 31 15.38763 32 18.65245 33 20.10087 34 21.00926 35 0.15356 36 0.19764 37 0.21172 38 0.15356 36 0.19764 37 0.21172 38 0.15356 36 0.19764 37 0.21172 38 0.42387 40 0.81850 41 1.23789 42 1.52132 43 1.91039 44 2.4822	15.68 5.50 10.00 14.98 5.01 10.02 14.53 4.45 10.02 14.53 4.45 10.02 18.72 6.35 10.02 13.42 3.90 10.02 13.42 3.90 10.02 12.24 3.56 10.03 11.67 3.42 10.03 12.65 3.48 10.03 12.65 3.48 10.03 14.92 90 10.03 20.16 11.63 10.06 20.05 13.16 5.21 10.06 15.17 6.97 10.05 13.83 5.82 10.05 13.02 5.54 10.06 14.11 5.95 10.11 13.94 6.01 10.13 13.96 6.11 10.14 12.74 4.76 10.15 14.00 6.50 10.17 12.60 4.49 10.19 12.47 4.18 10.19 12.47 </td <td>25.6815.50 65.52 55.52</td> <td>39.84 40.02 N 39.96 39.93 N 40.19 40.27 N 35.89 38.26 N 40.18 39.70 N 39.55 39.03 N 39.69 38.37 N 40.15 38.40 N 38.81 37.98 N 38.52 37.11 N 27.10 25.63 N 27.15 26.03 N 30.78 28.98 N 32.78 30.73 N 30.46 29.40 N 32.12 30.13 N 31.93 29.86 N 31.90 29.75 N 33.11 31.09 N 31.93 29.86 N 31.90 29.75 N 33.11 31.09 N 31.83 29.33 N 32.96 30.95 N 33.21 31.32 N 32.96 30.95 N 33.34 31.63 N 42.01 38.93 N 41.96 39.17 N 39.46 37.85 N 40.47 38.74 N 41.10 40.49 N 42.97 40.49 N 42.97 39.88 N 44.20 40.67 N 40.32 38.98 L 39.57 39.31 L 38.67 38.59 L 38.67 38.59 L 38.67 38.59 L 38.67 38.59 L 38.67 38.59 L 27.58 26.75 L 28.30 27.33 L 27.36 26.94 L</td>	25.6815.50 65.52 55.52	39.84 40.02 N 39.96 39.93 N 40.19 40.27 N 35.89 38.26 N 40.18 39.70 N 39.55 39.03 N 39.69 38.37 N 40.15 38.40 N 38.81 37.98 N 38.52 37.11 N 27.10 25.63 N 27.15 26.03 N 30.78 28.98 N 32.78 30.73 N 30.46 29.40 N 32.12 30.13 N 31.93 29.86 N 31.90 29.75 N 33.11 31.09 N 31.93 29.86 N 31.90 29.75 N 33.11 31.09 N 31.83 29.33 N 32.96 30.95 N 33.21 31.32 N 32.96 30.95 N 33.34 31.63 N 42.01 38.93 N 41.96 39.17 N 39.46 37.85 N 40.47 38.74 N 41.10 40.49 N 42.97 40.49 N 42.97 39.88 N 44.20 40.67 N 40.32 38.98 L 39.57 39.31 L 38.67 38.59 L 38.67 38.59 L 38.67 38.59 L 38.67 38.59 L 38.67 38.59 L 27.58 26.75 L 28.30 27.33 L 27.36 26.94 L
47 9.76487	12.37 4.10 10.34	22.7114.44 60.00 50.00 22.9814.48 60.00 50.00	37.2935.56 L

AC Line Conducted Emissions (List)

NO	FREQ	READING QP AV	C.FACTOR	RESULT QP AV	LIMIT QP AV	MARGIN QP AV	PHASE
	[MHz]	[dBuV] [dBuV] [dB]	[dBuV] [dBu	V] [dBuV][dBuV] [dBuV][dBuV	'I
49	11.67256	12.91 3.58	10.37	23.28 13.95	60.00 50.00	36.7236.05	L
50 3	12.29301	12.86 2.97	10.38	23.2413.35	60.00 50.00	36.7636.65	L
51 3	19.66773	9.19-1.36	10.50	19.69 9.14	60.00 50.00	40.31 40.86	L
52 3	20.19936	9.22-1.16	10.50	19.72 9.34	60.00 50.00	40.28 40.66	L
53 3	20.96213	7.55-1.62	10.51	18.06 8.89	60.00 50.00	41.94 41.11	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

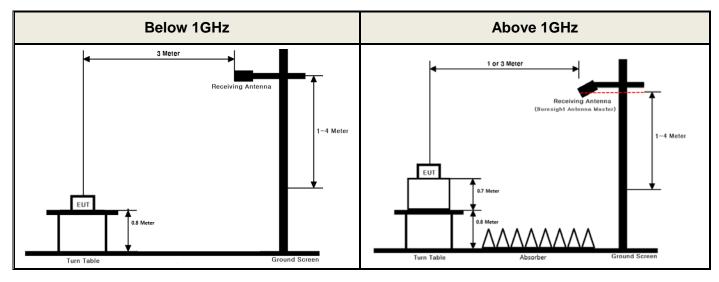
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient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

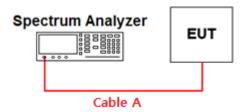
APPENDIX I

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	2.87
1	0.69	20	3.25
2.402 & 2.440 & 2.480	1.10	25	3.76
5	1.80	-	-
10	2.15	-	-

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

APPENDIX II

Duty cycle plots

Test Procedure

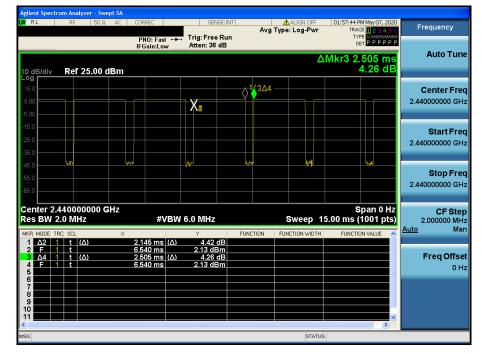
Duty Cycle was measured using Section 6.0 b) of KDB558074 D01v05r02 :

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.)

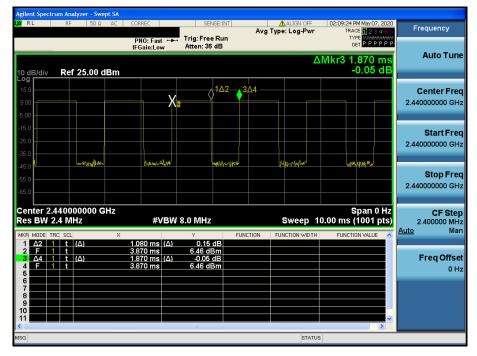
Duty Cycle

TM 1 Test Channel : Middle





TM 2 Test Channel : Middle



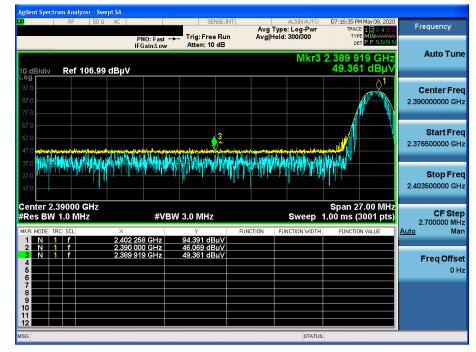
Duty Cycle

APPENDIX III

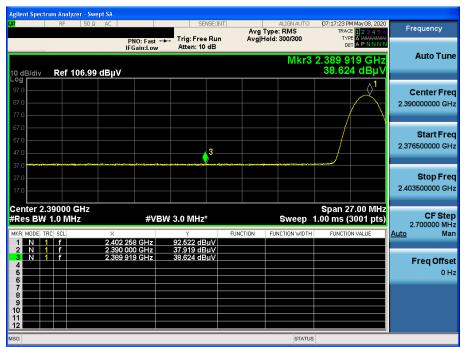
Unwanted Emissions (Radiated) Test Plot

TM1 & Lowest & Z & Ver





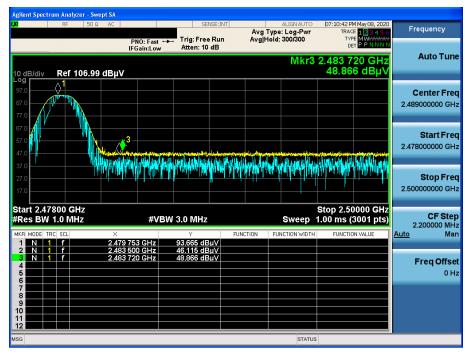
TM1 & Lowest & Z & Ver





TM1 & Highest & Z & Ver

Detector Mode : PK

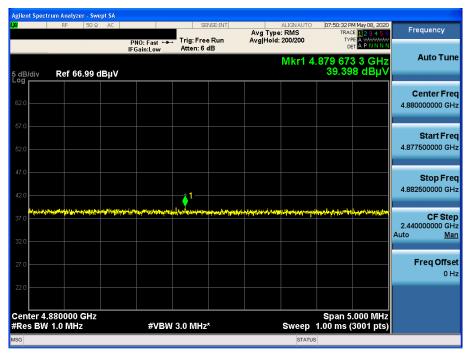


TM1 & Highest & Z & Ver

Analyzer - Swept SA Frequency Avg Type: RMS Avg|Hold: 300/300 Trig: Free Run Atten: 10 dB APNN PNO: Fast ↔→→ IFGain:Low Auto Tune Mkr3 2.483 632 GHz 39.155 dBµ\ Ref 106.99 dBµV 10 dB/div Center Freq 2.489000000 GHz Start Freq 2.478000000 GHz **3** Stop Freq 2.50000000 GHz Start 2.47800 GHz #Res BW 1.0 MHz Stop 2.50000 GHz 1.00 ms (3001 pts) CF Step 2.200000 MHz #VBW 3.0 MHz* Sweep Man Auto 38.546 dBµ\ 39.155 dBµ\ .483 500 GHz .483 632 GHz Freq Offset 0 Hz STATUS



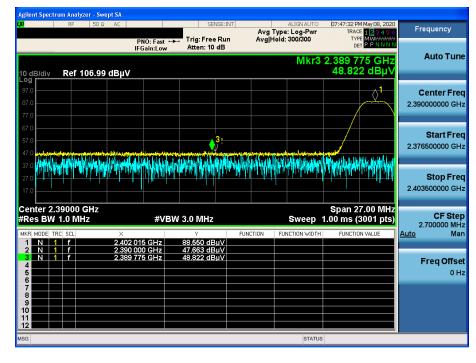
TM1 & Middle & Y & Ver





TM2 & Lowest & Y & Ver

Detector Mode : PK



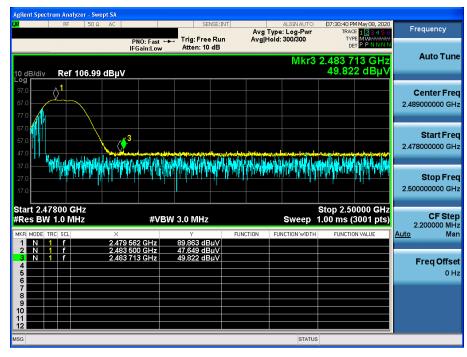
TM2 & Lowest & Y & Ver

t Spectrum Analyzer -Frequency Avg Type: RMS Avg|Hold: 300/300 Trig: Free Run Atten: 10 dB TYPE DE1 PNO: Fast IFGain:Low APNN Auto Tune Mkr3 2.389 856 GH: 38.319 dBµ\ Ref 106.99 dBµV dBidis **Center Freq** \Diamond^1 2.39000000 GHz Start Freq 2.376500000 GHz Stop Freq 2.403500000 GHz Center 2.39000 GHz #Res BW 1.0 MHz Span 27.00 MHz Sweep 1.00 ms (3001 pts) CF Step 2.700000 MHz Man #VBW 3.0 MHz* Auto FUNCTION 84.229 dBμV 37.810 dBμV 38.319 dBμV Freq Offset 0 Hz STATUS



TM2 & Highest & Y & Ver

Detector Mode : PK



TM2 & Highest & Y & Ver

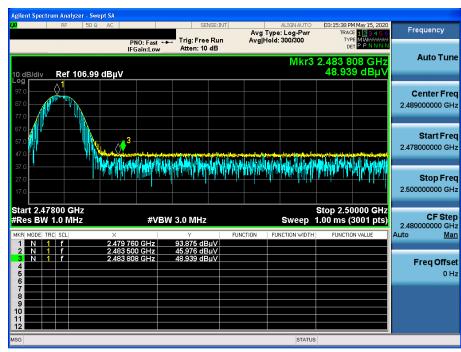
Analyzer - Swept SA Frequency Avg Type: RMS Avg|Hold: 300/300 Trig: Free Run Atten: 10 dB APNN PNO: Fast +++ IFGain:Low Auto Tune Mkr3 2.483 683 GHz 38.750 dBµ\ Ref 106.99 dBµV dB/div Center Freq 2.489000000 GHz Start Freq 2.478000000 GHz _∢∮3 Stop Freq 2.50000000 GHz Start 2.47800 GHz #Res BW 1.0 MHz Stop 2.50000 GHz 1.00 ms (3001 pts) CF Step 2.200000 MHz #VBW 3.0 MHz* Sweep Man <u>Auto</u> 38.352 dBµ\ 38.750 dBµ\ .483 500 GHz .483 683 GHz Freq Offset 0 Hz STATUS



TM2 & Middle & Y & Ver

KI	RF	50 Ω	AC		SE	NSE:INT		ALIGN AUTO	08:12:34 PM	4 May 08, 2020	
				PNO: Fast ↔	Trig: Fre			ype: RMS old: 200/200	TYP	E A 23456 E A WWWWWW T A P N N N N	Frequency
dB/div	Ref 6	6.99 d	Βμν	II Gameow				Mkr1 4	.879 945 39.37	5 0 GHz 5 dBµV	Auto Tui
. ^{og}											0
52.0											Center Fr 4.880000000 G
											4.88000000 G
57.0											
											Start Fr
52.0											4.877500000 G
47.0											Stop Fr
42.0											4.882500000 G
) 					
37.0	and the second	ayar yayar	(ipalwith)	and the second secon	entry and the state of the	and a state of the	nterneting why	and all constructions and a second second	and the participation of the p	enter fillen veret	CF St
											2.440000000 G Auto M
32.0											Auto <u>M</u>
											_
27.0											Freq Offs 0
~											0
22.0											
	.880000 1.0 MH			#VB	V 3.0 MHz	*		Sweep	Span 5. 1.00 m <u>s (</u>	.000 MHz 3001 pts)	
SG								STATUS			

Unwanted Emissions (Radiated) Test Plot_Wireless Charging



TM3 & Highest & X & Hor

🛈 Dt&C

Detector Mode : PK

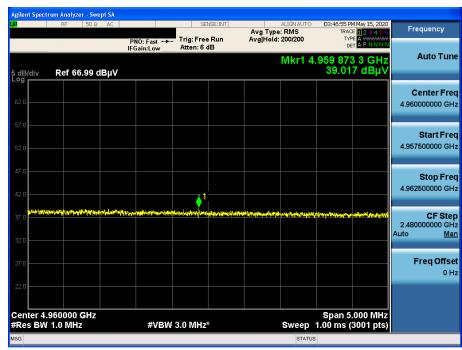
Detector Mode : AV

TM3 & Highest & X & Hor





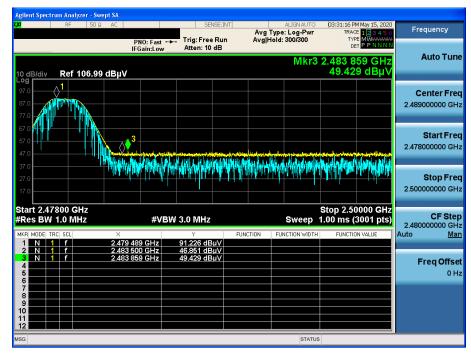
TM3 & Highest & X & Hor





TM4 & Highest & X & Hor

Detector Mode : PK



TM4 & Highest & X & Hor

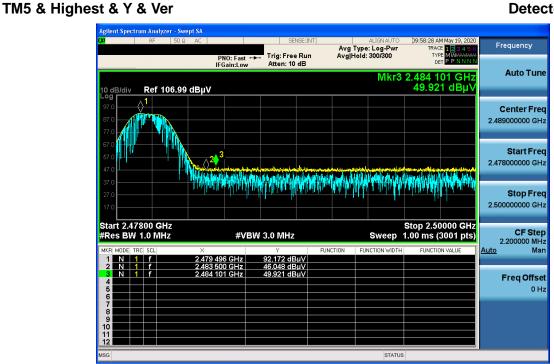




TM4 & Highest & X & Hor

Avg Type: RMS Avg Hold: 200/200 TRACE 12 3 4 5 0 TYPE & P NNHH Freque Mkr1 4.959 611 7 GHz 38.830 dBµV Auto 4.9600000	o Tui
38.830 dBµV	
	er Fr
4.960000	
	100 G
4.9575000	00 6
	F St 000 C
Freq	Off 0
Span 5.000 MHz Sweep 1.00 ms (3001 pts)	
	2.4800000 Auto Freq Span 5.000 MHz

Unwanted Emissions (Radiated) Test Plot_With Dual Display



Detector Mode : PK

Detector Mode : AV

TM5 & Highest & Y & Ver

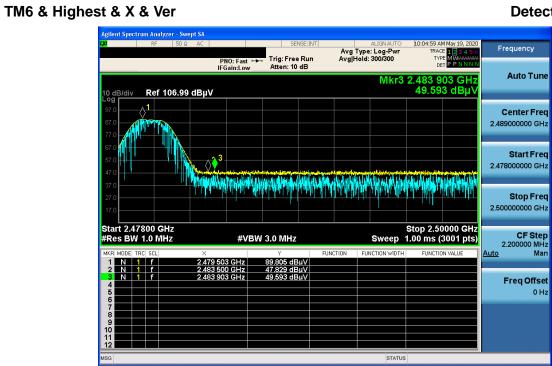




TM5 & Highest & Y & Ver

XI	RF 50Ω AC	PNO: Fast 🕶	SENSE:INT Trig: Free Run Atten: 6 dB	ALIGNAUTO Avg Type: RMS Avg Hold: 200/200	04:22:40 PM May 15, 2020 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A P N N N N	Frequency
5 dB/div	Ref 66.99 dBµ\	IFGain:Low	Atten: 0 dB	Mkr1 7	.439 865 0 GHz 36.158 dBµV	Auto Tui
62.0						Center Fr 7.440000000 G
57.0						Start Fr 7.437500000 G
47.0						Stop Fr 7.442500000 G
37.0 <mark>519 %</mark>	i <u>ry</u> an ^{tar} o ^t atus (1997-1997) Iryantarota	uthadetsist _e nthasperingsonage	€ มาประ/พ⊒โมระสารฎรสมร _า ณ	the entry in a transference of the ball is the only a company of	hinterintinterinterinterinterint	CF St 2.480000000 G Auto <u>N</u>
27.0						Freq Off 0
Center 7.	440000 GHz 1.0 MHz	#VBW	/ 3.0 MHz*	Sweep	Span 5.000 MHz 1.00 ms (3001 pts)	

Unwanted Emissions (Radiated) Test Plot_With Dual Display+WPC



Detector Mode : PK

Detector Mode : AV

TM6 & Highest & X & Ver

	50Ω AC		SENSE:I		ALIGN AUTO ype: RMS	10:08:02 AM May 19, 20 TRACE 1 2 3 4 5	
		PNO: Fast ← FGain:Low	 Trig: Free Run Atten: 10 dB 	n Avg H	old: 300/300	TRACE 12349 TYPE A WANNA DET A P N N N	
dB/div Ref 106	.99 dBµV				Mkr3	2.483 969 GH 39.239 dBµ	Z
Pg 7.0 7.0 7.0							Center Fre 2.489000000 GF
7.0		3					Start Fr 2.478000000 G
7.0							Stop Fr 2.500000000 G
tart 2.47800 GHz Res BW 1.0 MHz		#VB	₩ 3.0 MHz*		Sweep	Stop 2.50000 GH 1.00 ms (3001 pts	s) CF Sto 2.200000 M
KR MODE TRC SCL	× 2.479 5 2.483 5	03 GHz 00 GHz	γ 84.111 dBμV 38.327 dBμV	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto M
<mark>3 N 1 f</mark> 4	2.483 9	69 GHz	39.239 dBµV				Freq Offs 0
5 6							



TM6 & Highest & X & Ver

xI	RF	50Ω A	c		SENSE:INT		ALIGN AUTO	04:53:25 PM May 15, 2020	
	_		PNO: Fa IFGain:L		ree Run : 6 dB	Avg Type Avg Hold:		TRACE 12345 TYPE A WWWWW DET A P N N N	
og	Ref 66.	.99 dBµ	v				Mkr1 7.	440 045 0 GHz 36.332 dBμ√	Auto Tu
62.0									Center Fr 7.440000000 G
57.0 52.0									Start Fr 7.437500000 G
47.0									Stop Fr 7.442500000 G
37.0 ******	na and the states	upuluduland	ngfanilletetenisertete	dafatar jegeçetenter	n 1 Server and the second	the false that we have	allioghinan Ireidhof	โรงใหล่จะๆๆๆๆๆสัญ ¹⁸ ลุ่งงๆๆระไม่เ ¹ ต่างหล่าง	CF St 2.480000000 G Auto <u>M</u>
27.0									Freq Offs 0
	.440000 (Span 5.000 MHz	
Res BW 1.0 MHz				VBW 3.0 M	Hz*		Sweep		