

# FCC BT LE REPORT

### **FCC Certification**

#### **Applicant Name:**

LG Electronics MobileComm U.S.A., Inc.

#### Address:

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue: December 08, 2016 Test Site/Location: HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majangmyeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA Report No.: HCT-R-1612-F027 HCT FRN: 0005866421

# FCC ID : ZNFM250F

# APPLICANT : LG Electronics MobileComm U.S.A., Inc.

According to the Evaluation report, all of the data contained herein is reused from the reference FCC ID : ZNFM250H report.

Model(s):	LG-M250F
Additional Model(s)	LG-M250AR
EUT Type:	Portable Handset
<b>RF Peak Output Power:</b>	0.454 dBm (1.110 mW)
Frequency Range:	2402 MHz -2480 MHz
Modulation type	GFSK
FCC Classification:	Digital Transmission System(DTS)
FCC Rule Part(s):	Part 15.247

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by : Seul Ki Lee Test Engineer of RF Team

Approved by : Jong Seok Lee Manager of RF Team

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# <u>Version</u>

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1612-F027	December 08, 2016	- First Approval Report



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# **1. GENERAL INFORMATION**

Applicant:	LG Electronics MobileComm U.S.A., Inc.
Address:	1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID:	ZNFM250F
EUT Type:	Portable Handset
Model (s):	LG-M250F
Additional Model(s)	LG-M250AR
Date(s) of Tests:	October 20, 2016 ~ November 15, 2016
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Model	LG-M250F				
Additional Model(s)	LG-M250	AR			
EUT Type	Portable Handset				
Power Supply	DC 3.85 V				
Battery Infomation	Model: BL-46G1F Type: Li-ion Battery				
Frequency Range	TX: 2402 MHz ~ 2480 MHz RX: 2402 MHz ~ 2480 MHz				
Max, BE Output Dowor	Peak	0.454 dBm (1.110 mW)			
Max. RF Output Power	Average	0.220 dBm (1.052 mW)			
BT Operating Mode	BT_Low Energy Mode				
Modulation Type	GFSK				
Number of Channels	40 Channels				
	Manufact	urer: LS Mtron Co. Ltd.			
Antenna Specification	Antenna t	ype: INTERNAL ANTENNA			
	Peak Gai	n : -1.36 dBi			

# 2. EUT DESCRIPTION



# 3. TEST METHODOLOGY

FCC KDB 558074 D01 DTS Meas Guidance v03r05 dated April 8, 2016 entitled "Guidance for Performing Compliance Measurements on Digital Transmission Systems(DTS) and the measurement procedure described in ANSI C63.10(Version : 2013) 'the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices'.

# **3.1 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.

# 3.2 EUT EXERCISE

The EUT was operated in the engineering 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.

# 3.3 GENERAL TEST PROCEDURES

### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

#### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3.75 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 max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 8 of ANSI C63.10. (Version: 2013)

# Conducted Antenna Terminal

See Section from 9.1 to 9.2.(KDB 558074 v03r05)

# 3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed. Channel low, mid and high with highest data rate (worst case) is chosen for full testing.



# 4. 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 equipments, which is traceable to recognized national standards.

Espectially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

# **5. FACILITIES AND ACCREDITATIONS**

# 5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

# 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

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

# 6. 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 antennas of this E.U.T are permanently attached.

\*The E.U.T Complies with the requirement of §15.203



# 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	6.07



# 8. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§15.247(a)(2)	> 500 kHz		PASS
Conducted Maximum Peak Output Power	§15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§15.247(e)	< 8 dBm / 3 kHz Band	CONDUCTED	PASS
Band Edge(Out of Band Emissions)	§15.247(d)	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	§15.207	cf. Section 8.7		PASS
Radiated Spurious Emissions	§15.205, 15.209	cf. Section 8.6.1	RADIATED	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 8.6.2	RADIATED	PASS

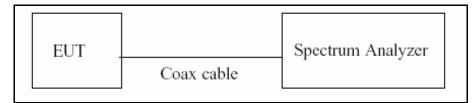


# 9. TEST RESULT 9.1 DUTY CYCLE

#### TEST PROCEDURE

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.)

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested accroding to the zerospan measurement method, 6.0)b) in KDB 558074 v03r05.

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if  $T \le 6.25$  microseconds. (50/6.25 = 8)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/T.

- 1. RBW = 8 MHz (the largest available value)
- 2. VBW = 8 MHz (≥ RBW)
- 3. SPAN = 0 Hz
- 4. Detector = Peak
- 5. Number of points in sweep > 100
- 6. Trace mode = Clear write
- 7. Measure  $T_{total} \,and \, T_{on}$
- 8. Calculate Duty Cycle =  $T_{on}/T_{total}$  and Duty Cycle Factor = 10\*log(1/Duty Cycle)

LE Mode	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor (dB)
	0.3787	0.6245	0.6065	2.17



#### RESULT PLOTS

RL		RF	50 Ω AC			SE	INSE:INT		ALIGN AUTO		MNov 03, 2016	Francisco
enter	Free	q 2.4	0200000	0 GHz PNO: Fast IFGain:Lov		Trig: Fre Atten: 16		#Avg	Type: Pwr(RMS)	TYP	E 1 2 3 4 5 6 E WWWWWWW T P N N N N N	Frequency
0 dB/div			et 10.7 dB . <b>00 dBm</b>						Δ	Mkr3 6 ⊰	24.5 µs 3.14 dB	Auto T
<b>°g</b> 5.00 5.00 5.00						>	< <mark>2</mark>			1∆2	<u>3∆4</u>	Center   2.402000000
25.0				whether	li li de frage	- upt-twittl				appeller the	hevilly highly have	Start I 2.402000000
5.0												Stop I 2.402000000
es BW	8 N	Hz	00 GHz	#\	'BW	8.0 MHz			Sweep 1.	267 ms ('		CF \$ 8.000000
KR MODE		t (Δ) t	Х	378.7 μs 623.2 μs	( <u></u> )	۲ -6.51 -1.46 d	dB	FUNCTION	FUNCTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u>
3 ∆4		t (∆) t		624.5 μs 623.2 μs	( <u>(</u> )	-3.14 -1.46 d	dB Bm					Freq O
4 F 5 6												
5												



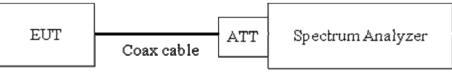
#### 9.2 6 dB BANDWIDTH MEASUREMENT

#### Test Requirements and limit, §15.247(a)(2)

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

The minimum permissible 6 dB bandwidth is 500 kHz.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 8.1 in KDB 558074 v03r05)

RBW = 100 kHz VBW  $\geq$  3 x RBW Detector = Peak Trace mode = max hold Sweep = auto couple Allow the trace to stabilize

Note : We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

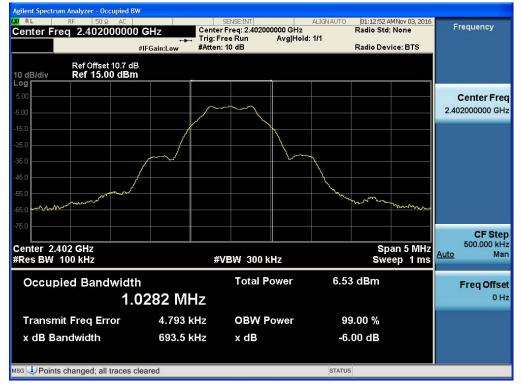
#### TEST RESULT

Mode	Channel	6 dB Bandwidth	Limit	Pass/Fail
	Channel	(kHz)	(kHz)	Pass/rall
BT LE	0	693.5		Pass
	19	696.6	> 500	Pass
	39	695.3		Pass



# RESULT PLOTS

6 dB Bandwidth plot (Low-CH 0)



#### 6 dB Bandwidth plot (Mid-CH 19)





Agilent Spectrum Analyzer - Occupied				
Center Freq 2.48000000			ALIGNAUTO  01:15:55 AMNov ( Radio Std: None d:>1/1 Radio Device: B	Frequency
Ref Offset 10.7 c 10 dB/div Ref 15.00 dBi Log				
-5.00		~~		Center Freq 2.480000000 GHz
-15.0			~	
-45.0 -55.0				
-75.0				CF Step
Center 2.48 GHz #Res BW 100 kHz	#\	/BW 300 kHz	Span 5 Sweep	
Occupied Bandwid	<sup>th</sup> 0269 MHz	Total Power	6.27 dBm	<b>Freq Offset</b> 0 Hz
Transmit Freq Error	2.902 kHz	OBW Power	99.00 %	
x dB Bandwidth	695.3 kHz	x dB	-6.00 dB	
MSG Deints changed; all traces	cleared		STATUS	

# 6 dB Bandwidth plot (High-CH 39)

### 9.3 OUTPUT POWER MEASUREMENT

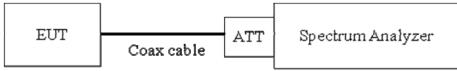
#### Test Requirements and limit, §15.247(b)(3)

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.

### **TEST CONFIGURATION**



#### TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We use the spectrum analyzer's integrated band power measurement function.

This EUT TX condition is actual operating mode by BT LE mode test program.

The Spectrum Analyzer is set to

Peak Power (Procedure 9.1.1 in KDB 558074 v03r05)

RBW ≥ DTS Bandwidth

- $VBW \ge 3 \times RBW$
- SPAN ≥ 3 x RBW

Detector Mode = Peak

Sweep = auto couple

Trace Mode = max hold

Allow trace to fully stabilize.

Use peak marker function to determine the peak amplitude level

Average Power (Procedure 9.2.2.4 in KDB 558074 v03r05)

Measure the duty cycle

Set span to at least 1.5 times the OBW

RBW = 1-5 % of the OBW, not to exceed 1 MHz.

VBW  $\geq$  3 x RBW.

Number of points in sweep  $\ge 2 x$  span / RBW. (This gives bin-to-bin spacing  $\le$  RBW/2,

so that narrowband signals are not lost between frequency bins.)

Sweep time = auto.

Detector = RMS(i.e., power averaging)

Do not use sweep triggering. Allow the sweep to "free run".

Trace average at least 100 traces in power averaging(RMS) mode.

Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.

Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

#### Sample Calculation

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor Output Power = 10 dBm + 10 dB + 0.8 dB + 0.2 dB = 21.0 dBm

Note :

- 1. Spectrum reading values are not plot data. The power results in plot is already including the actual values of loss for the attenuator and cable combination.
- 2. Spectrum offset = Attenuator loss + Cable loss
- 3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.7 dB is offset for 2.4 GHz Band.



### TEST RESULTS-Peak

#### Conducted Output Power Measurements

LE Mode		Measured	Limit	
Frequency[MHz]	Channel No.	Power(dBm)	(dBm)	
2402	0	0.020	30	
2440	19	0.454	30	
2480	39	-0.234	30	

### TEST RESULTS-Average

#### **Conducted Output Power Measurements**

LE Mode			Duty Cycle	Measured		
Frequency[MHz]	Channel No.	Measured Power(dBm)	Duty Cycle Factor (dB)	Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)	
2402	0	-2.35	2.17	-0.18	30	
2440	19	-1.95	2.17	0.22	30	
2480	39	-2.62	2.17	-0.45	30	



# RESULT PLOTS-Peak



## Conducted Output Power (Low-CH 0)

# Conducted Output Power (Mid-CH 19)

RL RF 50 Center Freq 2.440	Ω AC 000000 GHz PNO: Fast IEGain:Lov		ALIGNAUTO #Avg Type: Pwr(RMS) Avg Hold: 1/1	01:14:54 AMNov 03, 2016 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P	Frequency
Ref Offset 1 0 dB/div Ref 10.70	0.7 dB		Mkr1	2.439 842 GHz 0.454 dBm	Auto Tune
- <b>og</b> 0.700		<b>↓</b> 1			Center Fred 2.440000000 GHz
.19.3					Start Free 2.438500000 GH:
39.3					<b>Stop Fred</b> 2.441500000 GH
49.3 59.3					CF Stej 300.000 kH <u>Auto</u> Ma
69.3					<b>Freq Offse</b> 0 H
-79.3 Center 2.440000 GHz #Res BW 1.0 MHz		BW 3.0 MHz	Sweep 1	Span 3.000 MHz .07 ms (1000 pts)	



gilent Spectrum Analyzer - Swept SA						
Center Freq 2.480000000	PNO: Fast ++	. Trig: Free Ru Atten: 10 dB	#Avg Typ un Avg Hold	ALIGNAUTO e: Pwr(RMS) : 1/1	01:16:04 AMNov 03, 2016 TRACE 1 2 3 4 5 6 TYPE MWAWAAAA DET P P P P P P	Frequency
Ref Offset 10.7 dB 0 dB/div Ref 10.70 dBm	IFGain:Low	Aπen: 10 dB		Mkr1 :	2.479 839 GHz -0.234 dBm	Auto Tune
.700		<b>∳</b> <sup>1</sup>				Center Fred 2.480000000 GH:
9.30						Start Free 2.478500000 GH
39.3						<b>Stop Fre</b> 2.481500000 GH
49.3						CF Ste 300.000 kH <u>Auto</u> Ma
59.3						Freq Offse 0 ⊢
79.3 Center 2.480000 GHz Res BW 1.0 MHz	#\/B)A	3.0 MHz		Sween 1	Span 3.000 MHz .07 ms (1000 pts)	
sg Points changed; all traces c		5.V IMI12		STATUS	tor ins (1000 pts)	

# Conducted Output Power (High-CH 39)



# RESULT PLOTS-Average



# Conducted Output Power (Low-CH 0)

#### Conducted Output Power (Mid-CH 19)







#### **Conducted Output Power (High-CH 39)**

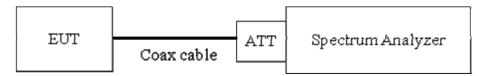
# 9.4 POWER SPECTRAL DENSITY

#### Test Requirements and limit, §15.247(e)

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 transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3kHz BW.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

We tested according to Procedure 10.2 in KDB 558074 v03r05

The spectrum analyzer is set to :

Set analyzer center frequency to DTS channel center frequency.

Span = 1.5 times the DTS channel bandwidth.

 $RBW = 3 kHz \le RBW \le 100 kHz.$ 

VBW  $\geq$  3 x RBW.

Sweep = auto couple

Detector = peak

Trace Mode = max hold

Allow trace to fully stabilize.

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

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

# Sample Calculation

PSD = Reading Value + ATT loss + Cable loss(1 ea) Output Power = -5 dBm + 10 dB + 0.8 dB = 5.8 dBm Note :

- 1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
- 2. Spectrum offset = Attenuator loss + Cable loss
- 3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So,10.7 dB is offset for 2.4 GHz Band.



## TEST RESULTS

Frequency Channel		Test Result				
Frequency (MHz)	No.	Mode	PSD	Limit	Pass/	
(11112)	NO.		(dBm)	(dBm)	Fail	
2402	0		-15.198	8	Pass	
2440	19	LE	-14.754	8	Pass	
2480	39		-15.459	8	Pass	

#### **Conducted Power Density Measurements**



# RESULT PLOTS

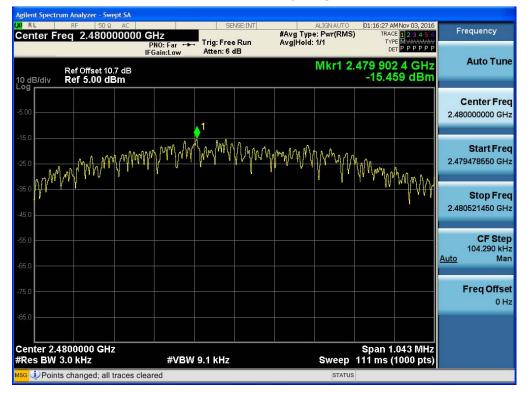


# Power Spectral Density (Low-CH 0)

# Power Spectral Density (Mid-CH 19)







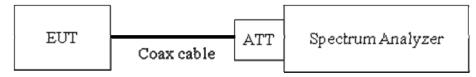
#### **Power Spectral Density (High-CH 39)**



# 9.5 OUT OF BAND EMISSIONS AT THE BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS Test Requirements and limit, §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.205(c)).

# Limit : 20 dBc TEST CONFIGURATION



# TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. (Procedure 11.0 in KDB 558074 v03r05)

RBW = 100 kHz

 $VBW \ge 3 \times RBW$ 

Set span to encompass the spectrum to be examined

Detector = Peak

Trace Mode = max hold

Sweep time = auto couple

Ensure that the number of measurement points ≥ 2\*Span/RBW

Allow trace to fully stabilize.

Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 10<sup>th</sup> harmonic range with the transmitter set to the lowest, middle, and highest channels.

Note :

1. The maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1(KDB558074 v03r05), so the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).



- 2. The band edge results in plot is already including the actual values of loss for the attenuator and cable combination.
- 3. Spectrum offset = Attenuator loss + Cable loss
- 4. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.7 dB is offset for 2.4 GHz Band.
- 5. In case of conducted spurious emissions test, please check factors blow table.
- 6. In order to simplify the report, attached plots were only the worst case channel and data rate.

Freq(MHz)	Factor(dB)
30	11.30
100	9.83
200	10.19
300	10.13
400	10.23
500	10.25
600	10.32
700	10.35
800	10.35
900	10.34
1000	10.39
2000	10.64
2400*	10.65
2500*	10.67
3000	10.68
4000	10.89
5000	11.07
6000	11.06
7000	11.35
8000	11.32
9000	11.48
10000	11.56
11000	11.56
12000	11.68
13000	11.83
14000	11.90
15000	11.98

#### **FACTORS FOR FREQUENCY**



#### Report No.: HCT-R-1612-F027

Model: LG-M250F

16000	12.04
17000	12.02
18000	12.08
19000	12.07
20000	12.14
21000	12.17
22000	12.31
23000	12.60
24000	12.34
25000	12.53
	-

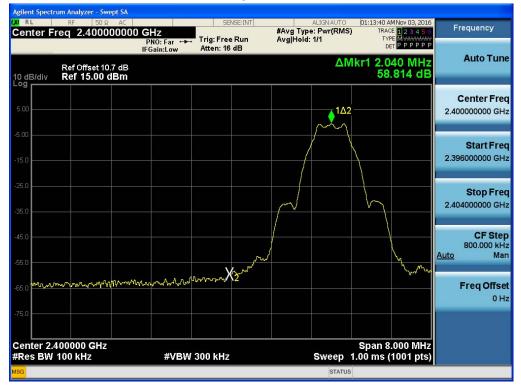
Note : 1. '\*' is fundamental frequency range.

2. Factor = Cable loss + Attenuator loss



# RESULT PLOTS

#### BandEdge (Low-CH 0)



# BandEdge (High-CH 39)



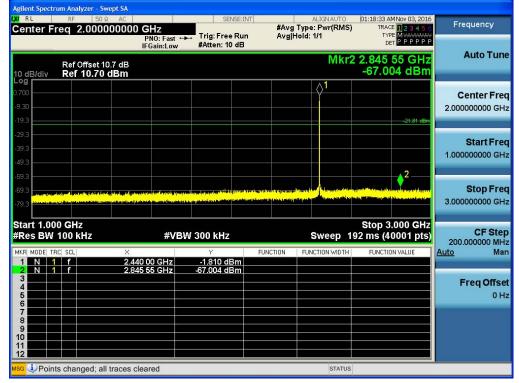


#### 30 MHz ~ 1 GHz

nt Spe 01:18:43 AMNov 03, 2016 TRACE 1 2 3 4 5 TYPE M W RL RF 50Ω AC Center Freq 515.000000 MHz PNO: Fast ↔→ IFGain:Low #Atten: 10 dB Frequency #Avg Type: Pwr(RMS) Avg|Hold: 1/1 PPPPP Auto Tune Mkr1 795.08 MHz -68.710 dBm Ref Offset 10.7 dB Ref 10.70 dBm 10 dB/div Log **Center Freq** 515 000000 MHz Start Freq 30.000000 MHz -21.81 dB Stop Freq 1.000000000 GHz **CF Step** 97.000000 MHz Man Auto **Freq Offset** أر أماري بمريد بيريين فتلايب إلي المان فيأسرونه والأرواوي الراوان أترا 0 Hz P. J. S. HILL distant data aist to. Start 30.0 MHz #Res BW 100 kHz Stop 1.0000 GHz Sweep 93.3 ms (20000 pts) #VBW 300 kHz Points changed; all traces cleared

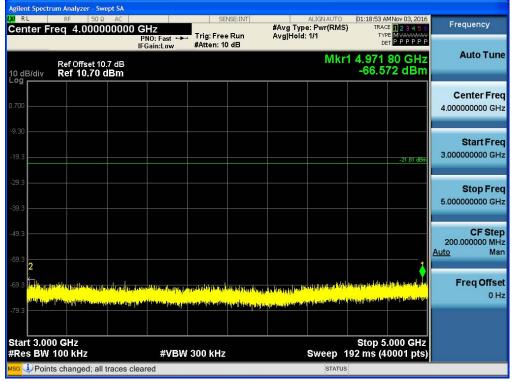
#### **Conducted Spurious Emission (Middle-CH 19)**

#### 1 GHz ~ 3 GHz





#### 3 GHz ~ 5 GHz



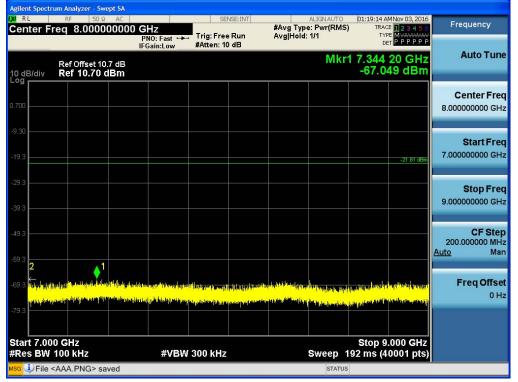
#### **Conducted Spurious Emission (Middle-CH 19)**

#### 5 GHz ~ 7 GHz





#### 7 GHz ~ 9 GHz



#### **Conducted Spurious Emission (Middle-CH 19)**

#### 9 GHz ~ 11 GHz





#### 11 GHz ~ 13 GHz

ent Spectr ABLE RF 50 Ω AC Center Freq 12.000000000 GHz PN0: Fast ↔→ IFGain:Low #Atten: 10 dB 34 AM Nov 03, 2016 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P P 01:19 Frequency #Avg Type: Pwr(RMS) Avg|Hold: 1/1 Auto Tune Mkr1 11.888 35 GHz -65.144 dBm Ref Offset 10.7 dB Ref 10.70 dBm 10 dB/div Log **Center Freq** 12.00000000 GHz Start Freq 11.00000000 GHz -21.81 dB Stop Freq 13.00000000 GHz **CF Step** 200.000000 MHz <u>ito</u> Man Auto **Freq Offset** 0 Hz Marghalapath Start 11.000 GHz #Res BW 100 kHz Stop 13.000 GHz Sweep 192 ms (40001 pts) #VBW 300 kHz File <AAA.PNG> saved STAT

#### Conducted Spurious Emission (Middle-CH 19)

#### 13 GHz ~ 15 GHz

	um Analyzer - Swept		00			
Center F	RF 50 Ω / req 14.00000	AC 0000 GHz	SENSE:INT	ALIGN AUTO #Avg Type: Pwr(RMS)	01:19:45 AMNov 03, 2016 TRACE 1 2 3 4 5 6	Frequency
	Ref Offset 10.7 of	PNO: Fast ↔ IFGain:Low	Trig: Free Run #Atten: 10 dB	Avg Hold: 1/1 Mkr1	түре Мунинин Det P P P P P P 14.971 95 GHz	Auto Tune
10 dB/div Log	Ref 10.70 dB				-64.176 dBm	
0.700						Center Freq 14.000000000 GHz
-9.30					-21.81 dBm	<b>Start Freq</b> 13.000000000 GHz
-29.3						<b>Stop Freq</b> 15.000000000 GHz
-49.3						CF Step 200.000000 MHz <u>Auto</u> Man
2 -69.3 <mark>Wa Luitu</mark>	la di se da di tri di manina il ita Antina parti di manina di tri di	and adjuster of the state		an and all the state of the fort of some state of a some state of the source of the so		Freq Offset 0 Hz
-79.3					Stop 15.000 GHz	
#Res BW		#VBW	300 kHz	Sweep 1	92 ms (40001 pts)	
MSG 🗘 File ·	<aaa.png> save</aaa.png>	d		STATUS		

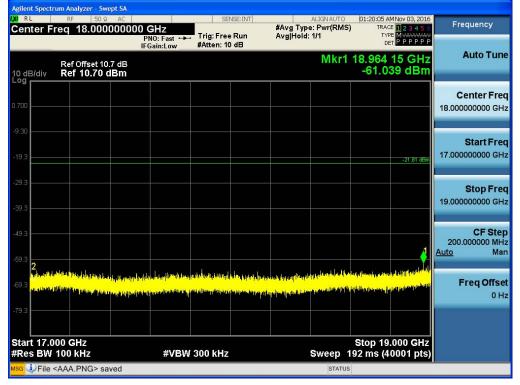


#### 15 GHz ~ 17 GHz

nt Spectr 55 AMNov 03, 2016 TRACE 1 2 3 4 5 6 TYPE MIANANANAN R 01:19 Frequency Center Freq 16.000000000 GHz #Avg Type: Pwr(RMS) Avg|Hold: 1/1 PNO: Fast ↔ IFGain:Low #Atten: 10 dB TYPE PPPPP Auto Tune Mkr1 16.408 55 GHz -61.516 dBm Ref Offset 10.7 dB Ref 10.70 dBm 10 dB/div Log **Center Freq** 16.00000000 GHz Start Freq 15.00000000 GHz -21.81 dB Stop Freq 17.00000000 GHz CF Step 200.000000 MHz Man 1 Auto **Freq Offset** 0 Hz Start 15.000 GHz #Res BW 100 kHz Stop 17.000 GHz Sweep 192 ms (40001 pts) #VBW 300 kHz File <AAA.PNG> saved

#### **Conducted Spurious Emission (Middle-CH 19)**

#### 17 GHz ~ 19 GHz





#### 19 GHz ~ 21 GHz

nt Spec Center Freq 20.000000000 GHz PN0: Fast ↔→ IFGain:Low #Atten: 10 dB D1:20:15 AMNov 03, 2016 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P P P P P P Frequency #Avg Type: Pwr(RMS) Avg|Hold: 1/1 TYPE Auto Tune Mkr1 20.973 00 GHz -58.677 dBm Ref Offset 10.7 dB Ref 10.70 dBm 10 dB/div Log **Center Freq** 20.00000000 GHz Start Freq 19.00000000 GHz -21.81 dE Stop Freq 21.00000000 GHz **CF Step** 200.000000 MHz <u>ito</u> Man Auto allest as to all a l the about he والمروا الشوارخان Saldill. n [e] **Freq Offset** 0 Hz Start 19.000 GHz #Res BW 100 kHz Stop 21.000 GHz Sweep 192 ms (40001 pts) #VBW 300 kHz File <AAA.PNG> saved

#### **Conducted Spurious Emission (Middle-CH 19)**

#### 21 GHz ~ 23 GHz

	um Analyzer - Swept					
	RF 50 Ω /	1.0	SENSE:INT	ALIGNAUTO #Avg Type: Pwr(RMS)	01:20:25 AMNov 03, 2016 TRACE 1 2 3 4 5 6	Frequency
		PNO: Fast ↔→ IFGain:Low	Trig: Free Run #Atten: 10 dB	Avg Hold: 1/1	туре Мужижи Det P P P P P P 21.010 15 GHz	Auto Tune
10 dB/div Log	Ref Offset 10.7 d Ref 10.70 dB				-58.308 dBm	
0.700						Center Freq
0.700						22.000000000 GHz
-9.30						Start Freq
-19.3					-21.81 dBm	21.000000000 GHz
-29.3						Stop Freq
-39.3	2	C			c	23.000000000 GHz
						OF Otom
-49.3						CF Step 200.000000 MHz Auto Man
-59.3 <mark>d po lia</mark>	alahida kater	ii koominiteeniliis aadaadaa aa	elliphan day day depin theored have	and the state of the second state of the secon	والمراجع والراو أوراده وتعاور والمعار المار وال	
-69.3	فالمحاط والمتحاول والمحاط والمحاط والمحاط والمحاط المحاط والمحاط والمحا	annya atalah kuta kutang palang	<mark>na da na dana sa kabupanyan jul</mark> ukan pada sa di	and and had to be a second to a second	in joint to be a first and an english the device year.	Freq Offset 0 Hz
-79.3						
Start 21.0 #Res BW		#\/B\M	300 kHz	Sween 1	Stop 23.000 GHz 92 ms (40001 pts)	
	<aaa.png> saved</aaa.png>		500 MI2	status	52 ms (4000 r pts)	
_						



### 23 GHz ~ 25 GHz

eq 24.000000		and the second s				
	PNO: Fast +++ Trig: Fro IFGain:Low #Atten:		#Avg Type: Pi Avg Hold: 1/1	wr(RMS)	TRACE 123456 TYPE MWWWWWW DET PPPPP	Frequency
Ref Offset 10.7 dB Ref 10.70 dBm					4.965 45 GHz -56.137 dBm	Auto Tune
						Center Freq 24.00000000 GHz
					-21.81 dBm	<b>Start Fred</b> 23.000000000 GHz
						Stop Fred 25.00000000 GHz
المحمد المراجع	Mathan In all and the place of a static back in the	and alter to a state of the start of	, jjuli i na <sup>j</sup> us kullatiku	k dalih di baalaharan	A hours a feed to part of an alter a feed to be a second of the	CF Step 200.000000 MHz <u>Auto</u> Mar
na za na	<mark>bet for an instruction president and an an and an an and an </mark>	<mark>ang ng n</mark>	<mark>ny dia silayo na banana bana bana bana bana bana ban</mark>	<sup>nalo</sup> no en la competencia	<sup>17</sup> [64 - 49 - 49 - 49 - 49 - 49 - 49 - 49 -	Freq Offset 0 Hz
00 GHz	#\/D\\\/ 200 \.\\					
	Ref 10.70 dBm	Ref 10.70 dBm           Image:	Ref 10.70 dBm         Image: Structure of the struc	Ref 10.70 dBm	Ref 10.70 dBm         Image:	Ref 10.70 dBm       -56.137 dBm         Image: State of the state of



# 9.6 RADIATED MEASUREMENT. 9.6.1 RADIATED SPURIOUS EMISSIONS.

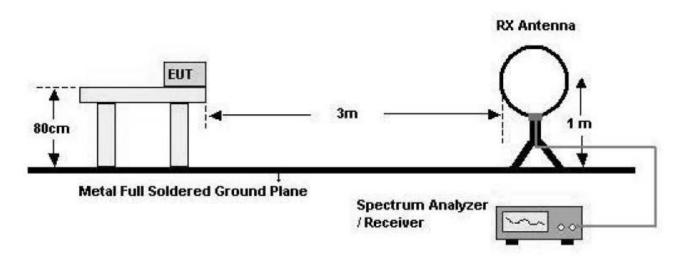
Test Requirements and limit, §15.205, §15.209

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

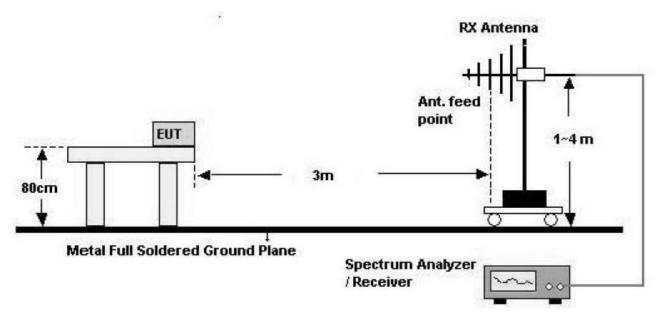


#### **Test Configuration**

#### Below 30 MHz

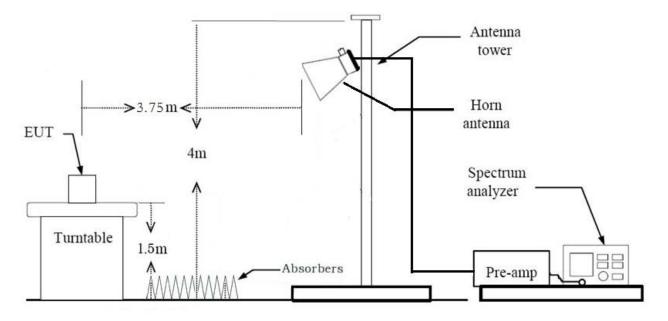


30 MHz - 1 GHz





#### Above 1 GHz



#### TEST PROCEDURE USED

Method 12.1 in KDB 558074 v03r05

#### Spectrum Setting

- Peak

Peak emission levels are measured by setting the instrument as follows:

RBW = cf. Table 1.

VBW  $\geq$  3 x RBW.

Detector = Peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweeps to continue until the trace stabilizes.

(Note that the required measurement time may be longer for low duty cycle applications).

	noquonoy
Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

#### Table 1 — RBW as a function of frequency



- Average (duty cycle < 98%, duty cycle variations are less than  $\pm 2\%$ )

Set RBW = 1 MHz

Set VBW ≥ 3 x RBW

Detector = RMS.

Averaging type = power (*i.e.*, RMS).

Sweep time = auto.

Trace mode = average (at least 100 traces).

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.

#### Note :

1. We are performed the RSE and radiated band edge using standard radiated method(RMS).

2. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor( reference distance : 3 m).

3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

LE Mode	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor (dB)
	0.3787	0.6245	0.6065	2.17



#### TEST RESULTS

#### 9 kHz – 30MHz

#### **Operation Mode:** Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin	
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB	
No Critical peaks found								

- 1. Measuring frequencies from 9 kHz to the 30MHz.
- 2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
- 3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
- 4. Limit line = specific Limits (dBuV) + Distance extrapolation factor
- 5. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



#### TEST RESULTS

#### Below 1 GHz

#### **Operation Mode:** Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin	
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB	
No Critical peaks found								

- 1. Measuring frequencies from 30 MHz to the 1 GHz.
- 2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
- 3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



### Above 1 GHz

**Operation Mode: CH.0** 

Frequency	Reading	Duty Cycle Factor	A.F.+C.LA.G.+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4804	48.90	0.00	-0.61	V	48.29	73.98	25.69	PK
4804	37.17	2.17	-0.61	V	38.73	53.98	15.25	AV
7206	45.73	0.00	8.78	V	54.51	73.98	19.47	PK
7206	34.22	2.17	8.78	V	45.17	53.98	8.81	AV
4804	49.24	0.00	-0.61	Н	48.63	73.98	25.35	PK
4804	37.14	2.17	-0.61	Н	38.7	53.98	15.28	AV
7206	45.81	0.00	8.78	Н	54.59	73.98	19.39	PK
7206	34.26	2.17	8.78	Н	45.21	53.98	8.77	AV

\*A.F. : Antenna Factor / C.L. : Cable Loss / A.G. : Amplifier Gain / D.F. : Distance Factor

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4. Total = Reading Value + Antenna Factor + Cable Loss Amp Gain + Distance Factor
   + Duty Cycle Factor
- 5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



Frequency	Reading	Duty Cycle Factor	A.F.+C.LA.G.+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4880	49.52	0.00	0.19	V	49.71	73.98	24.27	PK
4880	37.68	2.17	0.19	V	40.04	53.98	13.94	AV
7320	46.21	0.00	8.85	V	55.06	73.98	18.92	PK
7320	34.46	2.17	8.85	V	45.48	53.98	8.50	AV
4880	49.83	0.00	0.19	Н	50.02	73.98	23.96	PK
4880	37.72	2.17	0.19	Н	40.08	53.98	13.90	AV
7320	46.64	0.00	8.85	Н	55.49	73.98	18.49	PK
7320	34.59	2.17	8.85	Н	45.61	53.98	8.37	AV

#### Operation Mode: CH.19

- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4. Total = Reading Value + Antenna Factor + Cable Loss Amp Gain + Distance Factor
  + Duty Cycle Factor
- 5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



Frequency	Reading	Duty Cycle Factor	A.F.+C.LA.G.+D.F.	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dBm]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4960	49.54	0.00	0.92	V	50.46	73.98	23.52	PK
4960	37.72	2.17	0.92	V	40.81	53.98	13.17	AV
7440	46.12	0.00	9.03	V	55.15	73.98	18.83	PK
7440	34.12	2.17	9.03	V	45.32	53.98	8.66	AV
4960	49.68	0.00	0.92	Н	50.6	73.98	23.38	PK
4960	37.78	2.17	0.92	Н	40.87	53.98	13.11	AV
7440	46.78	0.00	9.03	Н	55.81	73.98	18.17	PK
7440	34.18	2.17	9.03	Н	45.38	53.98	8.60	AV

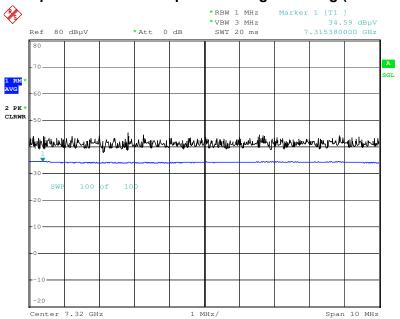
#### Operation Mode: CH.39

#### Notes:

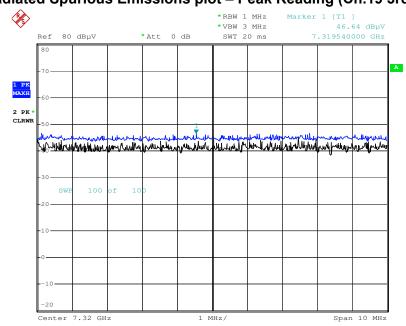
- 1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- 4. Total = Reading Value + Antenna Factor + Cable Loss Amp Gain + Distance Factor + Duty Cycle Factor
- 5. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
- 6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



#### RESULT PLOTS (Worst case : X-H) Radiated Spurious Emissions plot – Average Reading (Ch.19 3rd Harmonic)



Date: 9.NOV.2016 15:14:13



#### Radiated Spurious Emissions plot – Peak Reading (Ch.19 3rd Harmonic)

#### Note : Only the worst case plots for Radiated Spurious Emissions.

Date: 9.NOV.2016 15:17:02



## 9.6.2 RADIATED RESTRICTED BAND EDGES

#### Test Requirements and limit, §15.247(d) §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Operation Mode	BT_LE
Operating Frequency	2402 MHz
Channel No.	0

Frequency	Reading	Duty Cycle Factor	A.F.+C.L.+D.F.	Ant. Pol.	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2390.0	19.40	0.00	32.68	Н	52.08	73.98	21.90	PK
2390.0	8.29	2.17	32.68	н	43.14	53.98	10.84	AV
2390.0	19.58	0.00	32.68	V	52.26	73.98	21.72	PK
2390.0	8.54	2.17	32.68	V	43.39	53.98	10.59	AV

- 1. Frequency range of measurement = 2310 MHz ~ 2390 MHz
- 2. Total = Reading Value + Antenna Factor + Cable Loss + Duty Cycle Factor + Distance Factor
- 3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)
- 4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.



Operation Mode	BT_LE
Operating Frequency	2480 MHz
Channel No.	39

Frequency	Reading	Duty Cycle Factor	A.F.+C.L.+D.F.	Ant. Pol.	Total	Limit	Margin	Measurement
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
2483.5	19.66	0.00	33.05	Н	52.71	73.98	21.27	PK
2483.5	8.56	2.17	33.05	Н	43.78	53.98	10.20	AV
2483.5	20.26	0.00	33.05	V	53.31	73.98	20.67	PK
2483.5	8.75	2.17	33.05	V	43.97	53.98	10.01	AV

### Notes:

1. Frequency range of measurement = 2483.5 MHz ~ 2500 MHz

2. Total = Reading Value + Antenna Factor + Cable Loss + Duty Cycle Factor + Distance Factor

3. Distance extrapolation factor = 20 log (test distance / specific distance) (dB)

4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

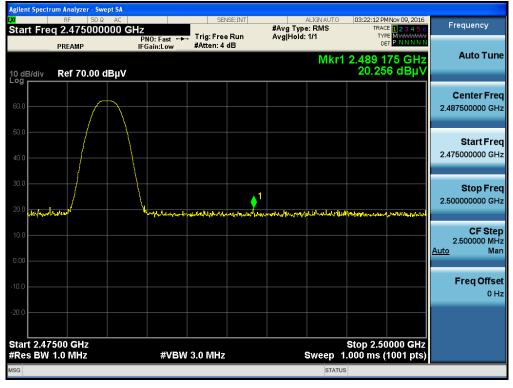


## RESULT PLOTS (Worst case : Z-V)

#### Radiated Restricted Band Edges plot – Average Reading (Ch.39)

Agilent Spectrum Analyzer	- Swept SA 50 Ω AC	SENSE:INT	ALIGNAUTO	03:23:03 PMNov 09, 2016	
Start Freq 2.4750	000000 GHz		#Avg Type: RMS Avg Hold: 100/100	TRACE 1 2 3 4 5 6 TYPE A WWW	Frequency
PREAMP	PNO: Fast ← IFGain:Low	#Atten: 4 dB		DET A N N N N N	
10 dB/div Ref 70.	00 dBµV		Mkr1	2.485 875 GHz 8.749 dBµV	Auto Tune
60.0					Center Freq 2.487500000 GHz
40.0					<b>Start Freq</b> 2.475000000 GHz
20.0					<b>Stop Freq</b> 2.50000000 GHz
0.00		1	an deresting allers the second successing produces	an a	<b>CF Step</b> 2.500000 MHz <u>Auto</u> Man
-10.0					Freq Offset 0 Hz
-20.0					
Start 2.47500 GHz #Res BW 1.0 MHz		W 3.0 MHz*	Sweep 1	Stop 2.50000 GHz .000 ms (1001 pts)	
MSG			STATUS		

#### Radiated Restricted Band Edges plot – Peak Reading (Ch.39)



Note : Only the worst case plots for Radiated Restricted Band Edges.



## 9.7 POWERLINE CONDUCTED EMISSIONS

#### Test Requirements and limit, §15.207

For an intentional radiator which 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 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

	Limits (dBµV)				
Frequency Range (MHz)	Quasi-peak	Average			
0.15 to 0.50	66 to 56	56 to 46			
0.50 to 5	56	46			
5 to 30	60	50			

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.

#### **Test Configuration**

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

#### **TEST PROCEDURE**

- 1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
- 2. The EUT is connected via LISN to a test power supply.
- 3. The measurement results are obtained as described below:
- 4. Detectors Quasi Peak and Average Detector.

#### Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor



# RESULT PLOTS Conducted Emissions (Line 1)

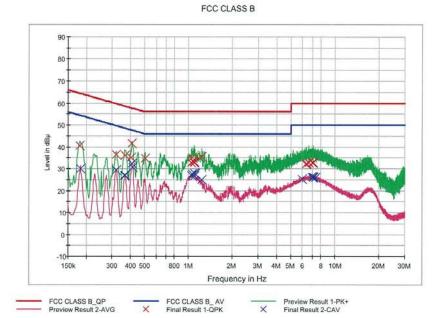
EMI Auto Test(3)

1/2

# **HCT TEST Report**

#### **Common Information**

EUT: Manufacturer: Test Site: Operating Conditions: LG-M250H LG SHIELD ROOM BT LE MODE



#### **Final Result 1**

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.180000	40.6	9.000	Off	L1	9.7	23.9	64.5
0.320000	36.6	9.000	Off	L1	9.7	23.1	59.7
0.368000	36.1	9.000	Off	L1	9.7	22.5	58.5
0.404000	35.1	9.000	Off	L1	9.7	22.7	57.8
0.412000	41.7	9.000	Off	L1	9.7	15.9	57.6
0.504000	34.8	9.000	Off	L1	9.7	21.2	56.0
1.048000	32.8	9.000	Off	L1	9.8	23.2	56.0
1.052000	35.1	9.000	Off	L1	9.8	20.9	56.0
1.086000	33.3	9.000	Off	L1	9.8	22.7	56.0
1.090000	32.7	9.000	Off	L1	9.8	23.3	56.0
1.094000	33.0	9.000	Off	L1	9.8	23.0	56.0
1.234000	35.4	9.000	Off	L1	9.8	20.6	56.0
6.346000	32.1	9.000	Off	L1	10.0	27.9	60.0
6.380000	32.3	9.000	Off	L1	10.0	27.7	60.0
6.620000	32.6	9.000	Off	L1	10.0	27.4	60.0
7.034000	32.6	9.000	Off	L1	10.0	27.4	60.0
7.112000	32.6	9.000	Off	L1	10.0	27.4	60.0
7.134000	32.6	9.000	Off	L1	10.0	27.4	60.0

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#### **Final Result 2**

Frequency	CAverage	Bandwidth	Filter	Line	Corr.	Margin	Limit 🦳
(MHz)	(dBuV)	(kHz) .	64.5-5	1.200	(dB)	(dB)	(dBuV)
0.182000	30.0	9.000	Off	L1	9.7	24.4	54.4
0.320000	29.4	9.000	Off	L1	9.7	20.3	49.7
0.366000	26.9	9.000	Off	L1	9.7	21.7	48.6
0.370000	27.1	9.000	Off	L1	9.7	21.4	48.5
0.412000	32.4	9.000	Off	L1	9.7	15.2	47.6
0.416000	30.8	9.000	Off	L1	9.7	16.7	47.5
1.048000	26.8	9.000	Off	L1	9.8	19.2	46.0
1.052000	27.5	9.000	Off	L1	9.8	18.5	46.0
1.090000	26.7	9.000	Off	L1	9.8	19.3	46.0
1.098000	27.8	9.000	Off	L1	9.8	18.2	46.0
1.102000	27.6	9.000	Off	L1	9.8	18.4	46.0
1.234000	24.9	9.000	Off	L1	9.8	21.1	46.0
5.996000	25.4	9.000	Off	L1	10.0	24.6	50.0
6.930000	26.2	9.000	Off	L1	10.0	23.8	50.0
7.112000	26.1	9.000	Off	L1	10.0	23.9	50.0
7.142000	26.1	9.000	Off	L1	10.0	23.9	50.0
7.336000	26.0	9.000	Off	L1	10.0	24.0	50.0
7.378000	26.0	9.000	Off	L1	10.0	24.0	50.0

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#### **Conducted Emissions (Line 2)**

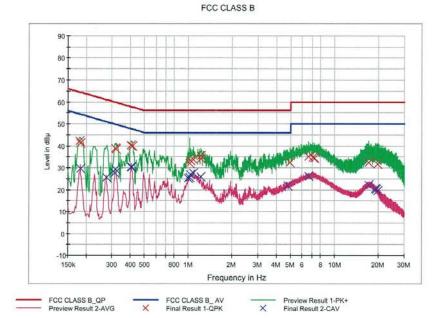
EMI Auto Test(3)

HCT TEST Report

#### Common Information EUT: Manufacturer: Toot Site:

Test Site: Operating Conditions: LG SHIELD ROOM BT LE MODE

LG-M250H



#### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.180000	42.3	9.000	Off	N	9.7	22.2	64.5
0.184000	41.1	9.000	Off	N	9.7	23.2	64.3
0.316000	39.0	9.000	Off	N	9.7	20.8	59.8
0.320000	38.3	9.000	Off	N	9.7	21.4	59.7
0.406000	40.3	9.000	Off	N	9.7	17.5	57.7
0.414000	39.7	9.000	Off	N	9.7	17.9	57.6
1.020000	32.1	9.000	Off	N	9.7	23.9	56.0
1.036000	33.5	9.000	Off	N	9.7	22.5	56.0
1.082000	33.7	9.000	Off	N	9.7	22.3	56.0
1.214000	34.0	9.000	Off	N	9.7	22.0	56.0
1.220000	35.5	9.000	Off	N	9.7	20.5	56.0
4.972000	32.4	9.000	Off	N	9.9	23.6	56.0
6.638000	35.1	9.000	Off	N	9.9	24.9	60.0
6.674000	35.1	9.000	Off	N	9.9	24.9	60.0
7.100000	34.8	9.000	Off	N	10.0	25.2	60.0
7.276000	34.5	9.000	Off	N	10.0	25.5	60.0
17.060000	32.5	9.000	Off	N	10.2	27.5	60.0
19.636000	31.8	9.000	Off	N	10.3	28.2	60.0

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EMI Auto Test(3)

#### **Final Result 2**

Frequency	. CAverage	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	* (dBuV)		و با علیه ماید ا	4.22 H	(dB)	(dB)	(dBuV)
0.182000	29.5	9.000	Off	N	9.7	24.9	54.4
0.274000	25.6	9.000	Off	N	9.7	25.3	51.0
0.314000	27.7	9.000	Off	N	9.7	22.2	49.9
0.318000	29.3	9.000	Off	N	9.7	20.5	49.8
0.406000	30.5	9.000	Off	N	9.7	17.2	47.7
0.410000	30.5	9.000	Off	N	9.7	17.2	47.6
0.996000	25.3	9.000	Off	N	9.7	20.7	46.0
1.020000	25.5	9.000	Off	N	9.7	20.5	46.0
1.036000	27.0	9.000	Off	N	9.7	19.0	46.0
1.080000	27.8	9.000	Off	N	9.7	18.2	46.0
1.214000	25.9	9.000	Off	N	9.7	20.1	46.0
4.794000	21.8	9.000	Off	N	9.9	24.2	46.0
6.644000	26.3	9.000	Off	N	9.9	23.7	50.0
6.674000	26.3	9.000	Off	N	9.9	23.7	50.0
17.060000	22.3	9.000	Off	N	10.2	27.7	50.0
19.110000	20.7	9.000	Off	N	10.3	29.3	50.0
19.320000	20.1	9.000	Off	N	10.3	29.9	50.0
19.636000	19.6	9.000	Off	N	10.3	30.4	50.0

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## 10. LIST OF TEST EQUIPMENT 10.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/28/2015	Annual	100073
Rohde & Schwarz	ESCI / Test Receiver	12/28/2015	Annual	100584
Agilent	N9020A / Signal Analyzer	06/24/2016	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/24/2015	Annual	MY49431210
Agilent	N1911A / Power Meter	03/11/2016	Annual	MY45100523
Agilent	N1921A / Power Sensor	03/11/2016	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/30/2015	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/14/2016	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	03/09/2016	Annual	KR75303962
Agilent	8493C / Attenuator(10 dB)	07/15/2016	Annual	07560
Rohde & Schwarz	CBT / Bluetooth Tester	05/16/2016	Annual	100422



## 10.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Audix	AM4000 / Antenna Position Tower	N/A	N/A	N/A
Audix	Turn Table	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Rohde & Schwarz	Loop Antenna	02/23/2016	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/15/2015	Biennial	255
Schwarzbeck	BBHA 9120D / Horn Antenna	05/07/2015	Biennial	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	09/03/2015	Biennial	BBHA9170541
Rohde & Schwarz	FSP / Spectrum Analyzer	09/10/2016	Annual	100688
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/23/2016	Annual	101068-SZ
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	06/24/2016	Annual	8
Wainwright Instruments	WHFX7.0/18G-8SS / High Pass Filter	05/13/2016	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	07/06/2016	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/26/2016	Annual	2
Agilent	8493C-10 / Attenuator(10 dB)	08/11/2016	Annual	76649
CERNEX	CBLU1183540 / Power Amplifier	07/15/2016	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/15/2016	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	07/11/2016	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	07/11/2016	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	04/01/2016	Annual	3000C000276