

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

**Test Report No.** : OT-212-RWD-084  
**Reception No.** : 2101000293  
**Applicant** : LG Electronics USA  
**Address** : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States  
**Manufacturer** : LG Electronics Inc.  
**Address** : 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Korea  
**Type of Equipment** : DISPLAY ASM-VIDEO  
**FCC ID.** : BEJIR12PT-TS  
**Model Name** : IR12PT-TS  
**Serial number** : N/A  
**Total page of Report** : 9 pages (including this page)  
**Date of Incoming** : January 11, 2021  
**Date of issue** : February 19, 2021

## SUMMARY

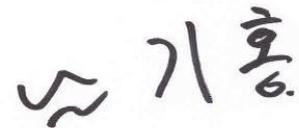
The equipment complies with the regulation; *FCC PART 15 SUBPART C Section 15.247*  
 This test report only contains the result of a single test of the sample supplied for the examination.  
 It is not a generally valid assessment of the features of the respective products of the mass-production.



Tested by  
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**Revision History**

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-212-RWD-084	February 19, 2021	Initial Release	All

## 1. VERIFICATION OF COMPLIANCE

Applicant : LG Electronics USA  
 Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States  
 Contact Person : Dae Woong, Kim / Director, Regulatory and Environmental Affairs  
 Telephone No. : +201-266-2215  
 FCC ID : BEJIR12PT-TS  
 Model Name : IR12PT-TS  
 Brand Name : -  
 Serial Number : N/A  
 Date : February 19, 2021

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
E.U.T. DESCRIPTION	DISPLAY ASM-VIDEO
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

## 2. GENERAL INFORMATION

### 2.1 Product Description

The LG Electronics USA, Model IR12PT-TS (referred to as the EUT in this report) is a DISPLAY ASM-VIDEO. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	DISPLAY ASM-VIDEO		
Temperature Range	-40 °C ~ 85 °C		
OPERATING FREQUENCY	2 402 MHz ~ 2 480 MHz		
MODULATION TYPE	GFSK for 1 Mbps, $\pi/4$ -DQPSK for 2 Mbps, 8-DPSK for 3 Mbps		
RF OUTPUT POWER	Antenna 0	1 Mbps	0.74 dBm
		2 Mbps	3.10 dBm
		3 Mbps	3.57 dBm
	Antenna 1	1 Mbps	1.97 dBm
		2 Mbps	4.29 dBm
		3 Mbps	4.75 dBm
ANTENNA TYPE	Metal Antenna		
ANTENNA GAIN	Antenna 0	5.21 dBi	
	Antenna 1	3.33 dBi	
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	20 MHz, 24 MHz, 25 MHz		

### 2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

## 3. EUT MODIFICATIONS

-. None

## 4. MAXIMUM PERMISSIBLE EXPOSURE

### 4.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are  $f/1500$  mW/cm<sup>2</sup> for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm<sup>2</sup> for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm<sup>2</sup> exposure is calculated as follows:

$$E = \sqrt{(30 * P * G) / d}, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

S = Power density in mW/cm<sup>2</sup>, Z = Impedance of free space, 377 Ω

E = Electric field strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 0.01 \* d (m)

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm<sup>2</sup>

### 4.2 EUT Description

Kind of EUT	DISPLAY ASM-VIDEO
Device Category	<input type="checkbox"/> Portable (< 20 cm separation) <input type="checkbox"/> Mobile (> 20 cm separation) <input checked="" type="checkbox"/> Others
Exposure Evaluation Applied	<input checked="" type="checkbox"/> MPE <input type="checkbox"/> SAR <input type="checkbox"/> N/A

### 4.3 Calculated MPE Safe Distance for Bluetooth

#### 4.3.1 DATA for Antenna 0

According to above equation, the following result was obtained.

Operating Mode	Channel	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation	Limit (mW/ cm <sup>2</sup> )
			(dBm)	(mW)	Log	Linear			
1 Mbps	Low	0.0 ± 1.0	1.00	1.26	5.21	3.32	0.58	0.000 8	1.00
	Middle	0.0 ± 1.0	1.00	1.26			0.58	0.000 8	
	High	-2.0 ± 1.0	-1.00	0.79			0.46	0.000 5	
2 Mbps	Low	3.0 ± 1.0	4.00	2.51			0.81	0.001 7	
	Middle	2.0 ± 1.0	3.00	2.00			0.73	0.001 3	
	High	0.0 ± 1.0	1.00	1.26			0.58	0.000 8	
3 Mbps	Low	3.0 ± 1.0	4.00	2.51			0.81	0.001 7	
	Middle	2.0 ± 1.0	3.00	2.00			0.73	0.001 3	
	High	1.0 ± 1.0	2.00	1.58			0.65	0.001 0	

According to above table, for 2 402 ~ 2480 MHz Band(2 Mbps Low Channel), safe distance,

$$D = 0.282 * \sqrt{(2.51 * 3.32)/1.00} = 0.81 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 2.51 * 3.32 / (4 * \pi * 20^2) = 0.001 7$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

### 4.3.2 DATA for Antenna 1

According to above equation, the following result was obtained.

Operating Mode	Channel	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation	Limit (mW/ cm <sup>2</sup> )
			(dBm)	(mW)	Log	Linear			
1 Mbps	Low	2.0 ± 1.0	3.00	2.00	3.33	2.15	0.58	0.000 9	1.00
	Middle	1.0 ± 1.0	2.00	1.58			0.52	0.000 7	
	High	0.0 ± 1.0	1.00	1.26			0.46	0.000 5	
2 Mbps	Low	4.0 ± 1.0	5.00	3.16			0.74	0.001 4	
	Middle	3.0 ± 1.0	4.00	2.51			0.66	0.001 1	
	High	2.0 ± 1.0	3.00	2.00			0.58	0.000 9	
3 Mbps	Low	4.0 ± 1.0	5.00	3.16			0.74	0.001 4	
	Middle	4.0 ± 1.0	5.00	2.51			0.66	0.001 1	
	High	3.0 ± 1.0	4.00	2.51			0.66	0.001 1	

According to above table, for 2 402 ~ 2480 MHz Band(2 Mbps Low Channel), safe distance,

$$D = 0.282 * \sqrt{(3.16 * 2.15)/1.00} = 0.74 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 3.16 * 2.15 / (4 * \pi * 20^2) = 0.001 4$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

#### 4.4 DATA for Intermodulation Transmit

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation	Sum Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation	Limit (mW/cm <sup>2</sup> )
			(dBm)	(mW)			
Antenna 0 + Antenna 1	Bluetooth (2 Mbps Low Channel)	3.0 ± 1.0	4.00	2.51	0.001 7	0.003 1	1.00
	Bluetooth (2 Mbps Low Channel)	4.0 ± 1.0	5.00	3.16	0.001 4		