

TEST REPORT



DT&C Co., Ltd.

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

1. Report No : DRTFCC2209-0146

2. Customer

- Name (FCC) : LG Electronics USA / Name (IC) : LG ELECTRONICS INC
- Address (FCC) : 111 Sylvan Avenue North Building, Englewood Cliffs, New Jersey, United States 07632
Address (IC) : 222, LG-ro, Jinwi-myeon Pyeongtaek-si, Gyeonggi-do 451-713 Korea (Republic Of)

3. Use of Report : FCC & IC Class II Permissive Change

4. Product Name / Model Name : Telematics / TLVHM3IU-N

FCC ID : BEJTLVHM3IU-N

IC : 2703H-TLVHM3IUN

5. FCC Regulation(s): Part 2, 22, 24, 27

IC Standard(s): RSS-Gen Issue 5, 130 Issue 2, 132 Issue 3, 133 Issue 6, 139 Issue 3

Test Method Used : KDB971168 D01v03, ANSI/TIA-603-E-2016, ANSI C63.26-2015

6. Date of Test : 2022.06.14 ~ 2022.06.25

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

8. Testing Environment : See appended test report.

9. Test Result : Refer to attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

This test report is not related to KOLAS accreditation.

Affirmation	Tested by	Technical Manager
	Name : JaeHyeok Bang 	Name : JaeJin Lee 

2022 . 09 . 06 .

DT&C Co., Ltd.

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

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2209-0146	Sep. 06, 2022	Initial issue	JaeHyeok Bang	JaeJin Lee

Table of Contents

1. GENERAL INFORMATION	4
2. INTRODUCTION.....	6
2.1 EUT DESCRIPTION	6
2.2 TESTING ENVIRONMENT	6
2.3 MEASURING INSTRUMENT CALIBRATION.....	6
2.4 MEASUREMENT UNCERTAINTY	6
2.5 TEST FACILITY.....	6
3. DESCRIPTION OF TESTS	7
3.1 ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)	7
3.2 UNDESIRABLE EMISSIONS	9
4. LIST OF TEST EQUIPMENT.....	9
5. SUMMARY OF TEST RESULTS.....	11
6. SAMPLE CALCULATION	12
7. TEST DATA.....	13
7.1 ERP & EIRP	13
7.1.1 LTE Band 12(17)	13
7.1.2 LTE Band 12.....	13
7.1.3 LTE Band 13.....	14
7.1.4 LTE Band 5.....	14
7.1.5 LTE Band 4.....	15
7.1.6 LTE Band 2.....	16
7.2 UNDESIRABLE EMISSIONS (Radiated).....	17
7.2.1 LTE Band 12(17)	17
7.2.2 LTE Band 12.....	17
7.2.3 LTE Band 13.....	18
7.2.4 LTE Band 5.....	19
7.2.5 LTE Band 4.....	20
7.2.6 LTE Band 2.....	21

1. GENERAL INFORMATION

FCC Classification	PCS Licensed Transmitter (PCB)
FCC ID	BEJTLVHM3IU-N
IC	2703H-TLVHM3IUN
Product Name	Telematics
Model Name	TLVHM3IU-N
Add Model Name	-
FVIN(Firmware Version Identification Number)	X322
EUT Serial Number	Conducted & Radiated : 015279005802601
Supplying power	DC 12 V
Antenna Information	Antenna Type: External Antenna (Model : 5Q0.035.507.AJ / PN : 35219102) Antenna gain(including connected cable loss between transmitter and antenna): -1.68 dBi (Band 12,17), -2.27 dBi (Band 13), -1.52 dBi (Band 5), -2.07 dBi (Band 4), -1.45 dBi (Band 2)

Mode	TX Frequency (MHz)	Modulation	ERP(FCC&IC)		EIRP	
			Max power (dBm)	Max power (W)	Max power (dBm)	Max power (W)
LTE Band 12(17)	704 ~ 711	QPSK	15.85	0.038	-	-
LTE Band 12(17)	704 ~ 711	16QAM	15.04	0.032	-	-
LTE Band 12(17)	701.5 ~ 713.5	QPSK	16.30	0.043	-	-
LTE Band 12(17)	701.5 ~ 713.5	16QAM	15.55	0.036	-	-
LTE Band 12	700.5 ~ 714.5	QPSK	16.37	0.043	-	-
LTE Band 12	700.5 ~ 714.5	16QAM	15.55	0.036	-	-
LTE Band 12	699.7 ~ 715.3	QPSK	16.18	0.041	-	-
LTE Band 12	699.7 ~ 715.3	16QAM	15.51	0.036	-	-
LTE Band 13	782 ~ 782	QPSK	16.22	0.042	-	-
LTE Band 13	782 ~ 782	16QAM	15.41	0.035	-	-
LTE Band 13	779.5 ~ 784.5	QPSK	16.32	0.043	-	-
LTE Band 13	779.5 ~ 784.5	16QAM	15.35	0.034	-	-

Mode	TX Frequency (MHz)	Modulation	ERP(For FCC)		EIRP(For IC)	
			Max power (dBm)	Max power (W)	Max power (dBm)	Max power (W)
LTE Band 5	829 ~ 844	QPSK	14.51	0.028	16.66	0.046
LTE Band 5	829 ~ 844	16QAM	13.62	0.023	15.77	0.038
LTE Band 5	826.5 ~ 846.5	QPSK	14.41	0.028	16.56	0.045
LTE Band 5	826.5 ~ 846.5	16QAM	13.48	0.022	15.63	0.037
LTE Band 5	825.5 ~ 847.5	QPSK	14.30	0.027	16.45	0.044
LTE Band 5	825.5 ~ 847.5	16QAM	13.41	0.022	15.56	0.036
LTE Band 5	824.7 ~ 848.3	QPSK	13.79	0.024	15.94	0.039
LTE Band 5	824.7 ~ 848.3	16QAM	12.96	0.020	15.11	0.032

Mode	TX Frequency (MHz)	Modulation	EIRP(FCC & IC)	
			Max power(dBm)	Max power(W)
LTE Band 4	1 720 ~ 1 745	QPSK	20.37	0.109
LTE Band 4	1 720 ~ 1 745	16QAM	19.60	0.091
LTE Band 4	1 717.5 ~ 1 747.5	QPSK	20.20	0.105
LTE Band 4	1 717.5 ~ 1 747.5	16QAM	19.34	0.086
LTE Band 4	1 715 ~ 1 750	QPSK	20.43	0.110
LTE Band 4	1 715 ~ 1 750	16QAM	19.77	0.095
LTE Band 4	1 712.5 ~ 1 752.5	QPSK	20.36	0.109
LTE Band 4	1 712.5 ~ 1 752.5	16QAM	19.39	0.087
LTE Band 4	1 711.5 ~ 1 753.5	QPSK	21.06	0.128
LTE Band 4	1 711.5 ~ 1 753.5	16QAM	20.09	0.102
LTE Band 4	1 710.7 ~ 1 754.3	QPSK	20.76	0.119
LTE Band 4	1 710.7 ~ 1 754.3	16QAM	19.83	0.096
LTE Band 2	1 860 ~ 1 900	QPSK	21.42	0.139
LTE Band 2	1 860 ~ 1 900	16QAM	20.49	0.112
LTE Band 2	1 857.5 ~ 1 902.5	QPSK	21.41	0.138
LTE Band 2	1 857.5 ~ 1 902.5	16QAM	20.51	0.112
LTE Band 2	1 855 ~ 1 905	QPSK	21.61	0.145
LTE Band 2	1 855 ~ 1 905	16QAM	20.68	0.117
LTE Band 2	1 852.5 ~ 1 907.5	QPSK	21.45	0.140
LTE Band 2	1 852.5 ~ 1 907.5	16QAM	20.80	0.120
LTE Band 2	1 851.5 ~ 1 908.5	QPSK	21.23	0.133
LTE Band 2	1 851.5 ~ 1 908.5	16QAM	20.41	0.110
LTE Band 2	1 850.7 ~ 1 909.3	QPSK	22.26	0.168
LTE Band 2	1 850.7 ~ 1 909.3	16QAM	21.50	0.141

2. INTRODUCTION

2.1 EUT DESCRIPTION

The Equipment Under Test (EUT) supports 850/1900 GPRS, 850/1700/1900 WCDMA, Multi-band LTE.

2.2 TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+21 °C ~ +25 °C
▪ Relative Humidity	42 % ~ 45 %

2.3 MEASURING 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.

2.4 MEASUREMENT UNCERTAINTY

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

Parameter	Measurement uncertainty
Radiated Disturbance (Below 1 GHz)	4.9 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.0 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (Above 18 GHz)	5.3 dB (The confidence level is about 95 %, $k = 2$)

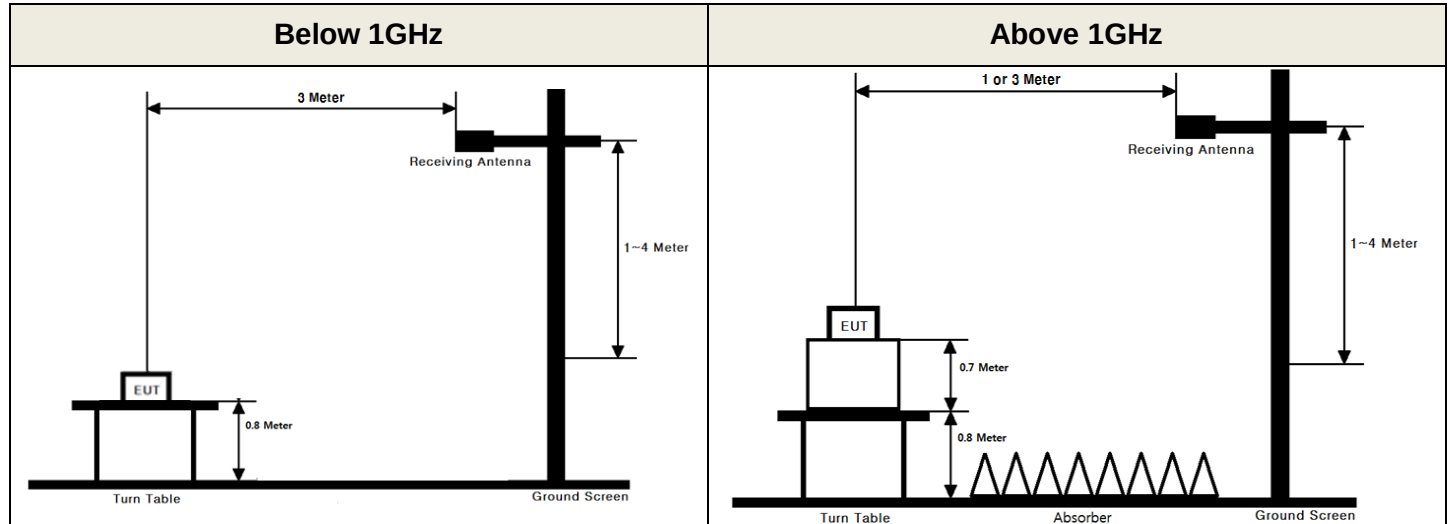
2.5 TEST FACILITY

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 comply with the requirements of § 2.948 according to ANSI 63.4-2014.		
- FCC & IC MRA Designation No. : KR0034		
- ISSED #: 5740A		
www.dtnc.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

3. DESCRIPTION OF TESTS

3.1 ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)

Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.17
- KDB971168 D01v03 - Section 5.2.2
- ANSI C63.26-2015 – Section 5.2.4.4.1

Test setting

1. Set span to 2 x to 3 x the OBW.
2. Set RBW = 1 % to 5 % of the OBW.
3. Set VBW $\geq$ 3 x RBW.
4. Set number of points in sweep $\geq$ 2 $\times$ span / RBW.
5. Sweep time:
 - 1) Set = auto-couple, or
 - 2) Set $\geq$ $[10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6. Detector = power averaging (rms).
7. If the EUT can be configured to transmit continuously, then set the trigger to free run.
8. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.

10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The receiver antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

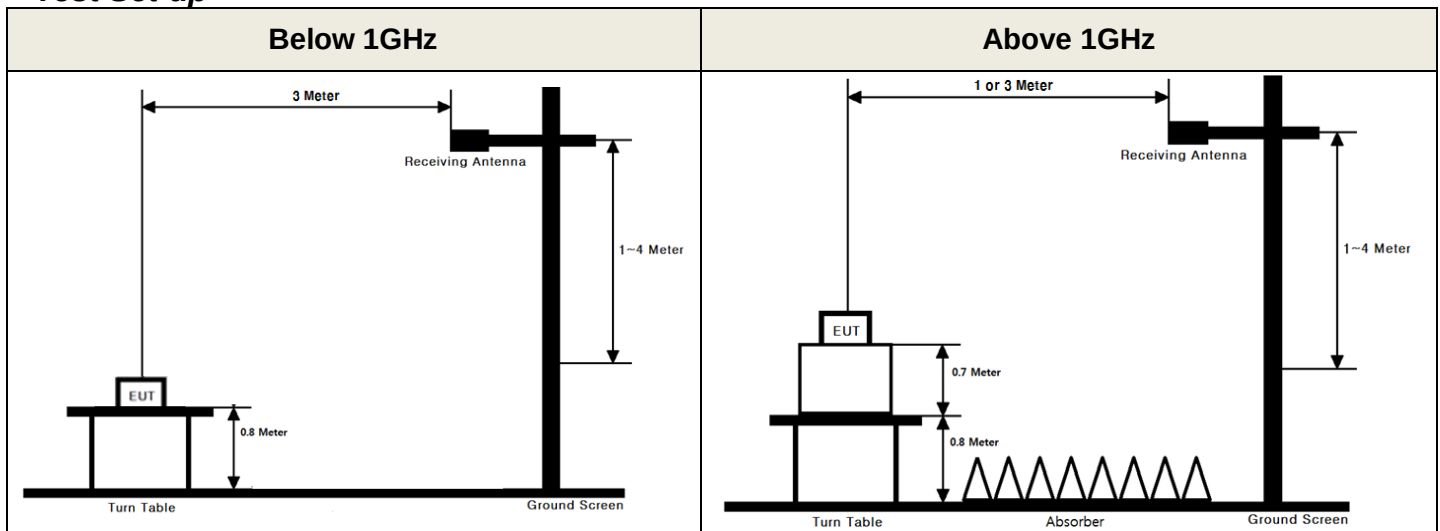
The ERP/EIRP is calculated using the following formula:

ERP/EIRP = The conducted power at the substitute antenna's terminal [dBm] + Substitute Antenna gain [dBd for ERP , dBi for EIRP]

For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn antenna and an isotropic antenna are taken into consideration.

3.2 UNDESIRABLE EMISSIONS

Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Test Procedure

- **ANSI/TIA-603-E-2016 - Section 2.2.12**
- **KDB971168 D01v03 - Section 5.8**
- **ANSI C63.26-2015 – Section 5.5**

Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW $\geq 3 \times$ RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point $\geq 2 \times$ span / RBW
5. The trace was allowed to stabilize

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.

For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration. This measurement was performed with the EUT oriented in 3 orthogonal axis.

4. LIST OF TEST EQUIPMENT

This test report is prohibited to copy or reissue in whole or in part without the approval of DT&C Co., Ltd.

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	21/12/16	22/12/16	MY46471172
Spectrum Analyzer	Agilent Technologies	N9020A	22/04/04	23/04/04	MY50410163
DC power supply	SM techno	SDP30-5D	22/06/24	23/06/24	305DMG305
DC power supply	Agilent Technologies	66332A	22/06/24	23/06/24	US37474125
Multimeter	FLUKE	17B+	21/12/16	22/12/16	36390701WS
Radio Communication Analyzer	Agilent Technologies	MT8820C	22/06/24	23/06/24	6200951873
Thermohygrometer	BODYCOM	BJ5478	21/12/16	22/12/16	120612-2
Thermohygrometer	BODYCOM	BJ5478	21/12/16	22/12/16	120612-1
Signal Generator	Rohde Schwarz	SMBV100A	21/12/16	22/12/16	255571
Signal Generator	ANRITSU	MG3695C	21/12/16	22/12/16	173501
Loop Antenna	ETS-Lindgren	6502	21/01/28	23/01/28	00226186
Bilog Antenna	Schwarzbeck	VULB 9160	21/12/16	22/12/16	3362
Dipole Antenna	A.H.Systems Inc.	FCC-4	20/12/16	22/12/16	710A
Dipole Antenna	Schwarzbeck	UHA9105	21/12/16	23/12/16	2262
HORN ANT	ETS	3117	21/12/16	22/12/16	00140394
HORN ANT	ETS	3117	22/06/24	23/06/24	00143278
HORN ANT	A.H.Systems	SAS-574	22/06/24	23/06/24	154
HORN ANT	A.H.Systems	SAS-574	22/06/24	23/06/24	155
Amplifier	EMPOWER	BBS3Q7ELU	22/06/24	23/06/24	1020
PreAmplifier	H.P	8447D	21/12/16	22/12/16	2944A07774
PreAmplifier	Agilent	8449B	22/06/24	23/06/24	3008A02108
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	22/06/24	23/06/24	7
High-pass filter	Wainwright	WHKX10-2838-3300-18000-60SS	22/06/24	23/06/24	2
High-pass filter	Wainwright	WHKX6-6320-8000-26500-40CC	22/06/24	23/06/24	2
Cable	JUNFLON	MWX241/B	22/01/04	23/01/04	M-3
Cable	JUNFLON	MWX221	22/01/04	23/01/04	M-4
Cable	JUNFLON	MWX221	22/01/04	23/01/04	M-5
Cable	DTNC	Cable	22/01/04	23/01/04	M-6
Cable	JUNFLON	J12J101757-00	22/01/04	23/01/04	M-7
Cable	HUBER+SUHNER	SUCOFLEX104	22/01/04	2301/04	M-8
Cable	Junkosha	MWX342	22/01/04	23/01/04	RFC-72

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.

5. SUMMARY OF TEST RESULTS

FCC Part	RSS Section(s)	Test Description	Test Limit	Test Condition	Status Note 1
27.50(b.10) 27.50(c.10)	RSS-130 [4.6]	Radiated Output Power (B12, 17, 13)	< 3 Watts max. ERP (FCC &IC)	Radiated	C Note2
22.913(a.5)	RSS-132 [5.4]	Radiated Output Power (B5)	< 7 Watts max. ERP (FCC) < 11.5 Watts max. EIRP (IC)		C Note2
27.50(d.4)	RSS-139 [6.5]	Radiated Output Power (B4)	< 1 Watts max. EIRP (FCC &IC)		C Note2
24.232(c)	RSS-133 [6.4]	Radiated Output Power(B2)	< 2 Watts max. EIRP (FCC &IC)		C Note2
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	RSS-130 [4.7] RSS-132 [5.5] RSS-133 [6.5] RSS-139 [6.6]	Undesirable Emissions	> 43 + 10log ₁₀ (P) dB for all out-of-band emissions		C Note2
27.53(f)	RSS-130 [4.7]	Undesirable Emissions in 1559 ~ 1610MHz	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions of less than 700 Hz bandwidth)		C Note2
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable Note 2: This test item was performed in three orthogonal EUT positions and the worst case data was reported.					

6. SAMPLE CALCULATION

A. For substitution method

- 1) The EUT was placed on a turntable with 0.8 meter height for frequency below 1 GHz and 1.5 meter height for frequency above 1 GHz respectively above ground.
- 2) The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
- 3) During the test, the turn table is rotated until the maximum signal is found.
- 4) Record the field strength meter's level. (ex. Spectrum reading level is -8.5 dBm)
- 5) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 6) Increase the signal generator output till the field strength meter's level is equal to the item (4).
(ex. Signal generator level is -18.04 dBm)
- 7) The gain of the cable and amplifier between the signal generator and terminals of substituted antenna is 46.92 dB at test frequency.
- 8) Record the level at substituted antenna terminal. (ex. 28.88 dBm)
- 9) The result is calculated as below;

$$\text{EIRP(dBm)} = \text{LEVLE@ANTENNA TERMINAL} + \text{TX Antenna Gain (dBi)}$$

$$\text{ERP(dBm)} = \text{LEVLE@ANTENNA TERMINAL} + \text{TX Antenna Gain (dBd)}$$

$$\text{Where, TX Antenna Gain (dBd)} = \text{TX Antenna Gain (dBi)} - 2.15 \text{ dB}$$

7. TEST DATA

7.1 ERP & EIRP

- Test Notes

- 1) This is device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the below table.

7.1.1 LTE Band 12(17)

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	704	QPSK	1/49	H	15.93	-0.63	15.30	0.034
		16QAM	1/49	H	15.14	-0.63	14.51	0.028
	711	QPSK	1/0	H	16.47	-0.62	15.85	0.038
		16QAM	1/0	H	15.66	-0.62	15.04	0.032
5	701.5	QPSK	1/24	H	15.54	-0.63	14.91	0.031
		16QAM	1/24	H	14.70	-0.63	14.07	0.026
	707.5	QPSK	1/0	H	16.18	-0.62	15.56	0.036
		16QAM	1/0	H	15.32	-0.62	14.70	0.030
	713.5	QPSK	1/24	H	16.92	-0.62	16.30	0.043
		16QAM	1/24	H	16.17	-0.62	15.55	0.036

7.1.2 LTE Band 12

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
3	700.5	QPSK	1/14	H	15.52	-0.63	14.89	0.031
		16QAM	1/14	H	14.79	-0.63	14.16	0.026
	707.5	QPSK	1/7	H	16.37	-0.62	15.75	0.038
		16QAM	1/7	H	15.58	-0.62	14.96	0.031
	714.5	QPSK	1/7	H	16.99	-0.62	16.37	0.043
		16QAM	1/7	H	16.17	-0.62	15.55	0.036
1.4	699.7	QPSK	1/2	H	15.30	-0.63	14.67	0.029
		16QAM	1/2	H	14.52	-0.63	13.89	0.024
	707.5	QPSK	1/2	H	16.14	-0.62	15.52	0.036
		16QAM	1/2	H	15.43	-0.62	14.81	0.030
	715.3	QPSK	1/0	H	16.80	-0.62	16.18	0.041
		16QAM	1/0	H	16.13	-0.62	15.51	0.036

7.1.3 LTE Band 13

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	782	QPSK	1/0	H	16.80	-0.58	16.22	0.042
		16QAM	1/0	H	15.99	-0.58	15.41	0.035
5	779.5	QPSK	1/0	H	16.79	-0.58	16.21	0.042
		16QAM	1/0	H	15.93	-0.58	15.35	0.034
	784.5	QPSK	1/24	H	16.90	-0.58	16.32	0.043
		16QAM	1/24	H	15.84	-0.58	15.26	0.034

7.1.4 LTE Band 5

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	829	QPSK	1/0	H	15.30	-0.79	14.51	0.028
		16QAM	1/0	H	14.41	-0.79	13.62	0.023
	836.5	QPSK	1/0	H	14.51	-0.85	13.66	0.023
		16QAM	1/0	H	14.00	-0.85	13.15	0.021
	844	QPSK	1/0	H	14.11	-0.91	13.20	0.021
		16QAM	1/0	H	13.31	-0.91	12.40	0.017
5	826.5	QPSK	1/0	H	15.19	-0.78	14.41	0.028
		16QAM	1/0	H	14.19	-0.78	13.41	0.022
	836.5	QPSK	1/0	H	14.70	-0.85	13.85	0.024
		16QAM	1/0	H	13.82	-0.85	12.97	0.020
	846.5	QPSK	1/24	H	15.17	-0.93	14.24	0.027
		16QAM	1/24	H	14.41	-0.93	13.48	0.022
3	825.5	QPSK	1/0	H	14.94	-0.77	14.17	0.026
		16QAM	1/0	H	14.01	-0.77	13.24	0.021
	836.5	QPSK	1/7	H	14.66	-0.85	13.81	0.024
		16QAM	1/7	H	13.82	-0.85	12.97	0.020
	847.5	QPSK	1/7	H	15.24	-0.94	14.30	0.027
		16QAM	1/7	H	14.35	-0.94	13.41	0.022
1.4	824.7	QPSK	1/5	H	14.45	-0.76	13.69	0.023
		16QAM	1/5	H	13.61	-0.76	12.85	0.019
	836.5	QPSK	1/0	H	13.68	-0.85	12.83	0.019
		16QAM	1/0	H	12.76	-0.85	11.91	0.016
	848.3	QPSK	1/2	H	14.74	-0.95	13.79	0.024
		16QAM	1/2	H	13.91	-0.95	12.96	0.020

7.1.5 LTE Band 4

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)
20	1 720	QPSK	1/0	V	14.33	6.04	20.37	0.109
		16QAM	1/0	V	13.56	6.04	19.60	0.091
	1 732.5	QPSK	1/0	V	12.46	5.96	18.42	0.070
		16QAM	1/0	V	11.71	5.96	17.67	0.058
	1 745	QPSK	1/0	V	12.12	5.88	18.00	0.063
		16QAM	1/0	V	10.95	5.88	16.83	0.048
15	1 717.5	QPSK	1/0	V	14.14	6.06	20.20	0.105
		16QAM	1/0	V	13.28	6.06	19.34	0.086
	1 732.5	QPSK	1/0	V	12.43	5.96	18.39	0.069
		16QAM	1/0	V	11.53	5.96	17.49	0.056
	1 747.5	QPSK	1/36	V	12.47	5.87	18.34	0.068
		16QAM	1/36	V	11.56	5.87	17.43	0.055
10	1 715	QPSK	1/0	V	14.36	6.07	20.43	0.110
		16QAM	1/0	V	13.70	6.07	19.77	0.095
	1 732.5	QPSK	1/0	V	12.75	5.96	18.71	0.074
		16QAM	1/0	V	11.85	5.96	17.81	0.060
	1 750	QPSK	1/49	V	13.56	5.85	19.41	0.087
		16QAM	1/49	V	12.73	5.85	18.58	0.072
5	1 712.5	QPSK	1/0	V	14.27	6.09	20.36	0.109
		16QAM	1/0	V	13.30	6.09	19.39	0.087
	1 732.5	QPSK	1/0	V	13.08	5.96	19.04	0.080
		16QAM	1/0	V	12.01	5.96	17.97	0.063
	1 752.5	QPSK	1/24	V	13.73	5.82	19.55	0.090
		16QAM	1/24	V	13.02	5.82	18.84	0.077
3	1 711.5	QPSK	1/0	V	14.96	6.10	21.06	0.128
		16QAM	1/0	V	13.99	6.10	20.09	0.102
	1 732.5	QPSK	1/0	V	13.65	5.96	19.61	0.091
		16QAM	1/0	V	12.87	5.96	18.83	0.076
	1 753.5	QPSK	1/7	V	15.02	5.81	20.83	0.121
		16QAM	1/7	V	13.81	5.81	19.62	0.092
1.4	1 710.7	QPSK	1/0	V	14.66	6.10	20.76	0.119
		16QAM	1/0	V	13.73	6.10	19.83	0.096
	1 732.5	QPSK	1/0	V	13.77	5.96	19.73	0.094
		16QAM	1/0	V	12.85	5.96	18.81	0.076
	1 754.3	QPSK	1/0	V	14.87	5.80	20.67	0.117
		16QAM	1/0	V	13.99	5.80	19.79	0.095

7.1.6 LTE Band 2

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)
20	1 860	QPSK	1/0	V	16.40	5.02	21.42	0.139
		16QAM	1/0	V	15.47	5.02	20.49	0.112
	1 880	QPSK	1/0	V	16.11	4.83	20.94	0.124
		16QAM	1/0	V	15.46	4.83	20.29	0.107
	1 900	QPSK	1/0	V	15.12	4.64	19.76	0.095
		16QAM	1/0	V	14.63	4.64	19.27	0.085
15	1 857.5	QPSK	1/36	V	16.36	5.05	21.41	0.138
		16QAM	1/36	V	15.46	5.05	20.51	0.112
	1 880	QPSK	1/0	V	16.27	4.83	21.10	0.129
		16QAM	1/0	V	15.36	4.83	20.19	0.104
	1 902.5	QPSK	1/0	V	15.46	4.65	20.11	0.103
		16QAM	1/0	V	14.86	4.65	19.51	0.089
10	1 855	QPSK	1/25	V	16.52	5.07	21.59	0.144
		16QAM	1/25	V	15.52	5.07	20.59	0.115
	1 880	QPSK	1/0	V	16.78	4.83	21.61	0.145
		16QAM	1/0	V	15.85	4.83	20.68	0.117
	1 905	QPSK	1/0	V	15.37	4.66	20.03	0.101
		16QAM	1/0	V	14.64	4.66	19.30	0.085
5	1 852.5	QPSK	1/24	V	16.04	5.10	21.14	0.130
		16QAM	1/24	V	15.35	5.10	20.45	0.111
	1 880	QPSK	1/0	V	16.62	4.83	21.45	0.140
		16QAM	1/0	V	15.97	4.83	20.80	0.120
	1 907.5	QPSK	1/0	V	15.81	4.67	20.48	0.112
		16QAM	1/0	V	14.78	4.67	19.45	0.088
3	1 851.5	QPSK	1/7	V	15.78	5.11	20.89	0.123
		16QAM	1/7	V	14.90	5.11	20.01	0.100
	1 880	QPSK	1/7	V	16.40	4.83	21.23	0.133
		16QAM	1/7	V	15.58	4.83	20.41	0.110
	1 908.5	QPSK	1/7	V	15.59	4.67	20.26	0.106
		16QAM	1/7	V	14.57	4.67	19.24	0.084
1.4	1 850.7	QPSK	1/2	V	15.87	5.11	20.98	0.125
		16QAM	1/2	V	15.09	5.11	20.20	0.105
	1 880	QPSK	1/2	V	17.43	4.83	22.26	0.168
		16QAM	1/2	V	16.67	4.83	21.50	0.141
	1 909.3	QPSK	1/2	V	17.16	4.68	21.84	0.153
		16QAM	1/2	V	16.39	4.68	21.07	0.128

7.2 UNDESIRABLE EMISSIONS (Radiated)

- Test Notes

- 1) This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported.
- 2) The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter.
No other spurious and harmonic emissions were reported greater than listed emissions.
- 3) Limit Calculation for Band 2/4/12(17)/5 = $43 + 10 \log_{10}(P[\text{Watts}])$
- 4) Limit Calculation for 1 559 MHz ~ 1 610 MHz in Band 13 = -70 dBW/MHz (equivalent isotropically radiated power for wideband signals)

7.2.1 LTE Band 12(17)

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
10	704	1/49	QPSK	1 416.70	V	-63.56	2.92	-60.64	75.94	28.30
				2 125.29	V	-62.68	3.02	-59.66	74.96	
				2 833.82	V	-61.53	5.21	-56.32	71.62	
				3 542.10	H	-64.31	6.45	-57.86	73.16	
		1/49	16QAM	1 416.97	V	-65.14	2.92	-62.22	76.73	27.51
				2 125.15	V	-61.36	3.02	-58.34	72.85	
				2 833.65	V	-62.81	5.21	-57.60	72.11	
				3 542.26	H	-64.84	6.45	-58.39	72.90	
	711	1/0	QPSK	1 413.33	V	-64.42	2.88	-61.54	77.39	28.85
				2 119.79	V	-60.89	3.00	-57.89	73.74	
				2 826.50	V	-62.11	5.18	-56.93	72.78	
				3 532.91	H	-65.26	6.47	-58.79	74.64	
		1/0	16QAM	1 413.30	V	-65.36	2.88	-62.48	77.52	28.04
				2 119.89	V	-61.55	3.00	-58.55	73.59	
				2 826.14	V	-62.85	5.18	-57.67	72.71	
				3 532.79	H	-64.88	6.47	-58.41	73.45	

7.2.2 LTE Band 12

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
3	714.5	1/7	QPSK	1 428.93	V	-60.42	3.33	-57.09	73.46	29.37
				2 143.40	V	-57.98	3.32	-54.66	71.03	
				2 858.13	V	-61.56	5.13	-56.43	72.80	
				3 572.61	H	-63.18	6.68	-56.50	72.87	
		1/7	16QAM	1 428.94	V	-61.21	3.33	-57.88	73.43	28.55
				2 143.44	V	-59.09	3.32	-55.77	71.32	
				2 857.91	V	-62.10	5.13	-56.97	72.52	
				3 572.46	H	-63.69	6.68	-57.01	72.56	

7.2.3 LTE Band 13

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
10	782	1/0	QPSK	1 555.05	V	-56.54	3.16	-53.38	69.60	29.22
				2 332.82	H	-49.00	4.06	-44.94	61.16	
				3 110.35	V	-64.63	4.55	-60.08	76.30	
				3 888.53	H	-65.37	7.09	-58.28	74.50	
			16QAM	1 555.22	V	-55.90	3.16	-52.74	68.15	28.41
				2 332.74	H	-59.07	4.06	-55.01	70.42	
				3 110.35	V	-64.83	4.55	-60.28	75.69	
				3 887.94	H	-65.94	7.09	-58.85	74.26	
5	784.5	1/24	QPSK	2 359.96	H	-56.29	4.19	-52.10	68.42	29.32
				3 146.55	V	-64.49	5.73	-58.76	75.08	
				3 932.10	H	-67.12	7.23	-59.89	76.21	
			16QAM	2 360.15	H	-60.51	4.19	-56.32	71.58	28.26
				3 146.37	V	-65.01	5.73	-59.28	74.54	
				3 930.30	H	-66.98	7.24	-59.74	75.00	

UNDESIRABLE EMISSIONS IN 1 559~1 610 MHz (LTE Band 13)

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result	Margin	Limit (dBm/MHz)
								(dBm)	(dB)	
10	782	1/25	QPSK	1 564.19	V	-56.46	6.01	-50.45	10.45	-40.00
			16QAM	1 564.19	V	-57.06	6.01	-51.05	11.05	-40.00
5	784.5	1/24	QPSK	1 573.19	V	-53.34	6.06	-47.28	7.28	-40.00
			16QAM	1 573.32	V	-54.30	6.06	-48.24	8.24	-40.00

7.2.4 LTE Band 5

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result		Limit (dBc)
								(dBm)	(dBc)	
10	829	1/0	QPSK	1 649.24	H	-62.37	3.82	-58.55	73.06	27.51
				2 473.94	V	-62.08	3.79	-58.29	72.80	
				3 298.42	V	-63.85	5.53	-58.32	72.83	
				4 123.02	H	-67.10	7.17	-59.93	74.44	
				4 933.61	H	-67.86	7.88	-59.98	74.49	
		1/0	16QAM	1 649.15	H	-62.91	3.82	-59.09	72.71	26.62
				2 473.79	V	-62.84	3.79	-59.05	72.67	
				3 298.52	V	-63.97	5.53	-58.44	72.06	
				4 123.17	H	-67.42	7.17	-60.25	73.87	
				4 936.41	H	-67.87	7.90	-59.97	73.59	
	836.5	1/0	QPSK	1 664.16	H	-58.10	3.88	-54.22	67.88	26.66
				2 496.38	V	-60.56	3.68	-56.88	70.54	
				3 328.36	V	-63.98	5.79	-58.19	71.85	
				4 160.35	H	-66.83	7.07	-59.76	73.42	
				5 000.00	H	-66.64	8.21	-58.43	72.09	
		1/0	16QAM	1 664.01	H	-62.13	3.88	-58.25	71.40	26.15
				2 496.23	V	-62.14	3.68	-58.46	71.61	
				3 328.24	V	-64.10	5.79	-58.31	71.46	
				4 160.73	H	-67.19	7.07	-60.12	73.27	
				5 000.22	H	-67.37	8.21	-59.16	72.31	
	844	1/0	QPSK	1 679.27	H	-59.61	3.94	-55.67	68.87	26.20
				2 518.69	V	-58.36	3.63	-54.73	67.93	
				3 358.41	V	-63.38	6.04	-57.34	70.54	
				4 197.95	H	-66.99	6.97	-60.02	73.22	
				5 032.82	H	-67.85	8.36	-59.49	72.69	
		1/0	16QAM	1 679.23	H	-60.34	3.94	-56.40	68.80	25.40
				2 518.73	V	-59.00	3.63	-55.37	67.77	
				3 358.23	V	-63.94	6.04	-57.90	70.30	
				4 197.92	H	-67.33	6.97	-60.36	72.76	
				5 036.13	H	-67.82	8.38	-59.44	71.84	

7.2.5 LTE Band 4

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result		Limit (dBc)
								(dBm)	(dBc)	
20	1 720	1/0	QPSK	3 419.66	H	-66.16	8.59	-57.57	77.94	33.37
			16QAM	3 411.48	H	-66.29	8.56	-57.73	77.33	32.60
	1 732.5	1/0	QPSK	3 447.26	H	-66.02	8.70	-57.32	75.74	31.42
			16QAM	3 439.72	H	-66.43	8.67	-57.76	75.43	30.67
	1 745	1/0	QPSK	3 472.32	H	-65.81	8.70	-57.11	75.11	31.00
			16QAM	3 471.83	H	-66.23	8.70	-57.53	74.36	29.83
3	1 711.5	1/0	QPSK	3 420.33	H	-65.74	8.64	-57.10	78.16	34.06
			16QAM	3 420.49	H	-65.90	8.64	-57.26	77.35	33.09

7.2.6 LTE Band 2

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result		Limit (dBc)
								(dBm)	(dBc)	
20	1 860	1/0	QPSK	3 702.23	V	-64.80	8.06	-56.74	78.16	34.42
				5 553.29	H	-62.47	10.79	-51.68	73.10	
		1/0	16QAM	3 702.33	V	-65.46	8.07	-57.39	77.88	33.49
				5 553.47	H	-63.02	10.79	-52.23	72.72	
	1 880	1/0	QPSK	3 742.04	V	-62.06	8.15	-53.91	74.85	33.94
				5 613.01	H	-68.01	10.98	-57.03	77.97	
		1/0	16QAM	3 742.07	V	-62.88	8.15	-54.73	75.02	33.29
				5 605.87	H	-67.94	10.97	-56.97	77.26	
	1 900	1/0	QPSK	3 782.04	V	-62.70	8.41	-54.29	74.05	32.76
				5 678.51	H	-67.74	11.08	-56.66	76.42	
		1/0	16QAM	3 782.27	V	-63.41	8.41	-55.00	74.27	32.27
				5 662.20	H	-67.79	11.06	-56.73	76.00	
1.4	1 880	1/2	QPSK	3 759.80	V	-62.35	8.92	-53.43	75.69	35.26
				5 640.94	H	-67.79	11.06	-56.73	78.99	
		1/2	16QAM	3 759.92	V	-62.75	8.92	-53.83	75.33	34.50
				5 638.59	H	-67.79	11.06	-56.73	78.23	