RF TEST REPORT

Test item	:	Telematics Modem
Model No.	:	LTD-VL1000
Order No.	:	DTNC1503-01507
Date of receipt	:	2015-03-31
Test duration	:	2015-04-06 ~ 2015-04-14
Date of issue	:	2015-04-17
Use of report	:	Class II Permissive Change for FCC

Applicant : LG Innotek Co.,Ltd.
978-1, Jangduk-dong, Gwangsan-gu, Gwangju-City, South Korea

Test laboratory : DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification	:	FCC Part 27
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

Tested by:

Engineer
Chulmin Kim

Reviewed by:

Technical Manager
Bongjin Kim

Test Report Version

Test Report No.	Date	Description
DRTFCC1504-0083	Apr. 15, 2015	Initial issue
DRTFCC1504-0083(1)	Apr. 17, 2015	Added the note of test case and modified output power of B13

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1. GENERAL INFORMATION

Applicant Name: **LG Innotek Co.,Ltd.**

Address: **978-1, Jangduk-dong, Gwangsan-gu, Gwangju-City, South Korea**

FCC ID	:	YZP-VL1000
FCC Classification	:	PCS Licensed Transmitter (PCB)
EUT Type	:	Telematics Modem
Model Name	:	LTD-VL1000
Add Model Name	:	LTD-VL1110, LTD-VL1200
Supplying power	:	DC 3.8V
Antenna Type	:	Cellular & PCS band for CDMA 1x EVDO(Rev. A) : External type LTE for Band 13 and Band 4 : External type

Mode	Tx Frequency (MHz)	Emission Designator	Modulation	Conducted output power	
				Max power(dBm)	Max power(W)
LTE Band 13	779.5 ~ 784.5	4M49G7D	QPSK	22.860	0.193
LTE Band 13	779.5 ~ 784.5	4M49W7D	16QAM	21.980	0.158
LTE Band 13	782	8M94G7D	QPSK	22.870	0.194
LTE Band 13	782	8M92W7D	16QAM	22.030	0.160
LTE Band 4	1710.7 ~ 1754.3	1M09G7D	QPSK	22.900	0.195
LTE Band 4	1710.7 ~ 1754.3	1M09W7D	16QAM	22.060	0.161
LTE Band 4	1711.5 ~ 1753.5	2M68G7D	QPSK	22.880	0.194
LTE Band 4	1711.5 ~ 1753.5	2M69W7D	16QAM	22.140	0.164
LTE Band 4	1712.5 ~ 1752.5	4M48G7D	QPSK	23.780	0.239
LTE Band 4	1712.5 ~ 1752.5	4M48W7D	16QAM	22.330	0.171
LTE Band 4	1715 ~ 1750	8M95G7D	QPSK	23.190	0.208
LTE Band 4	1715 ~ 1750	8M92W7D	16QAM	22.350	0.172
LTE Band 4	1717.5 ~ 1747.5	13M4G7D	QPSK	23.180	0.208
LTE Band 4	1717.5 ~ 1747.5	13M4W7D	16QAM	22.300	0.170
LTE Band 4	1720 ~ 1745	17M9G7D	QPSK	23.200	0.209
LTE Band 4	1720 ~ 1745	17M9W7D	16QAM	22.410	0.174

2. INTRODUCTION

2.1 EUT DESCRIPTION

- The Equipment Under Test(EUT) supports CDMA and EVDO(Rev. A) of Cellular/PCS bands and LTE(Band 4, 13). The EUT has below 2 transceivers.

1. CDMA 1x/ EVDO(Rev. A)
2. LTE

2.2 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.

2.3 TEST FACILITY

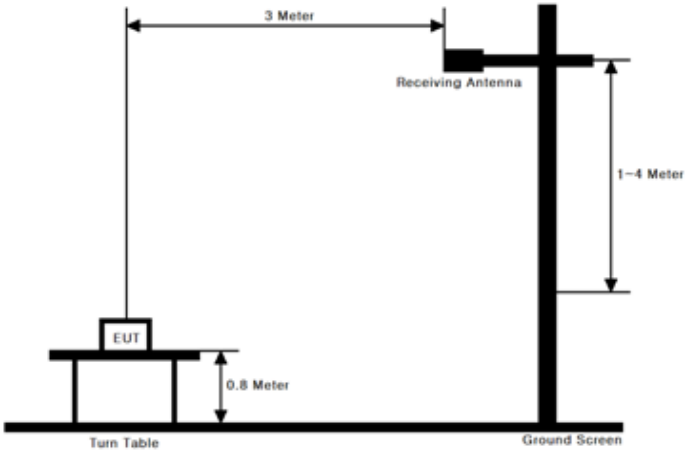
The 3M test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements.

- 3M test site registration Number: 165783

3. DESCRIPTION OF TESTS

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

Test Set-up



Test Procedure

- **ANSI/TIA-603-C-2004 - Section 2.2.17**
- **KDB971168 v02r02 - Section 5.2.1**

These measurements were performed at 3 &10 m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.

Test setting

1. Set span to at least 1.5 times the OBW.
2. Set RBW = 1-5 % of the OBW, not to exceed 1 MHz.
3. Set VBW ≥ 3 x RBW.
4. Set number of points in sweep ≥ 2 × span / RBW.
5. Sweep time = auto couple.
6. Detector = RMS (power averaging).
7. If the EUT can be configured to transmit continuously (i.e., burst duty cycle ≥ 98 %), then set the trigger to free run.
8. If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98 %), 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.
   Ensure that the sweep time is less than or equal to the transmission burst duration.
9. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges. If the instrument does not have a band 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 receive 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.

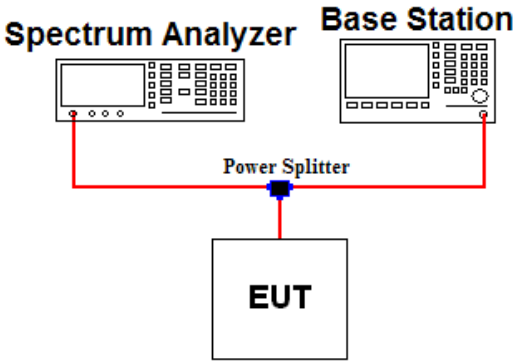
The ERP/EIRP is calculated using the following formula:

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 PEAK TO AVERAGE RATIO

Test set-up



Test Procedure

- **KDB971168 v02r02 - Section 5.7.1**

A peak to average ratio measurement is performed at the conducted port of the EUT.
The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The present of time the signal spends at or above the level defines the probability for that particular power level.

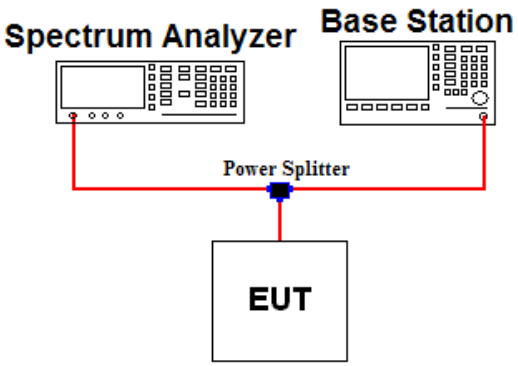
Test setting

The spectrum Analyzer`s CCDF measurement function is enabled.

1. Set resolution/measurement bandwidth ≥ signal`s occupied bandwidth.
2. Set the number of counts to a value that stabilizes the measured CCDF curve
3. Set the measurement interval as follows:
   1) For continuous transmissions, set to 1 ms.
   2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
4. Record the maximum PAPR level associated with a probability of 0.1 %

3.3 OCCUPIED BANDWIDTH.

Test set-up



Test Procedure

- **KDB971168 v02r02 - Section 4.2**

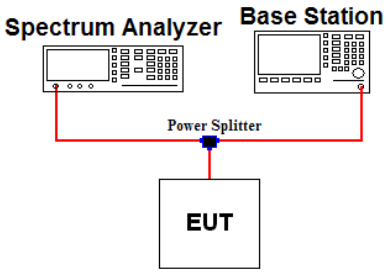
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission. And worst case data are reported in the plot.

Test setting

1. The signal analyzer`s automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 ~ 5 % of the expected OBW & VBW ≥ 3 X RBW
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within 1 ~ 5 % of the 99 % occupied bandwidth observed in step 6.

3.4 BAND EDGE EMISSIONS (Conducted)

Test set-up



Test Procedure

- **KDB971168 v02r02 - Section 6.0**

All out of band emissions are measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its lowest and highest channel with all bandwidths, modulations and RB configurations.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB or requirements on note 2 in case of band 7 and 41.

Test setting

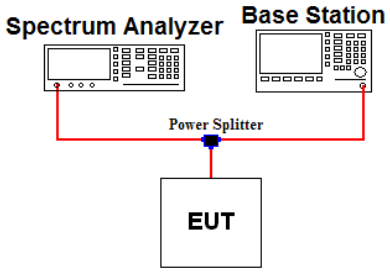
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1 % of the emission bandwidth or 2 % of the emission bandwidth (refer to note 2)
4. VBW ≥ 3 X RBW
5. Detector = RMS & Trace mode = Max hold
6. Sweep time = Auto couple or 1 s for band edge
7. Number of sweep point ≥ 2 X span / RBW
8. The trace was allowed to stabilize

Note 1: In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of **at least one percent** of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

Note 2: For part 27.53(m)(4) the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 MHz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 MHz and X MHz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X MHz from the channel edge, where X is the greater of 6 MHz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. For mobile digital stations, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of **at least two percent** may be employed, except when the 1 MHz band is 2495-2496 MHz, in which case a resolution bandwidth of **at least one percent** may be employed.

3.5 SPURIOUS AND HARMONIC EMISSIONS (Conducted)

Test set-up



Test Procedure

- **KDB971168 v02r02 - Section 6.0**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths, modulations and RB configurations. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB or 55 + 10 log(P) in case of band 7 and 41.

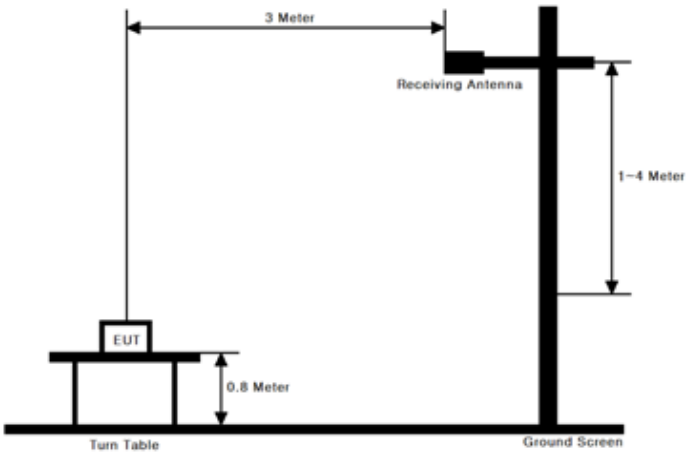
Test setting

1. RBW = 100 KHz or 1 MHz & VBW ≥ 3 X RBW (Refer to Note 1)
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point ≥ 2 X span / RBW
5. The trace was allowed to stabilize

Note 1: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22 and 1 MHz or greater for Part 24, 27.

3.6 UNDESIRABLE EMISSIONS (Radiated)

Test Set-up



Test Procedure

- **ANSI/TIA-603-C-2004 - Section 2.2.12**
- **KDB971168 v02r02 - Section 5.8**

These measurements were performed at 3 & 10m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna.

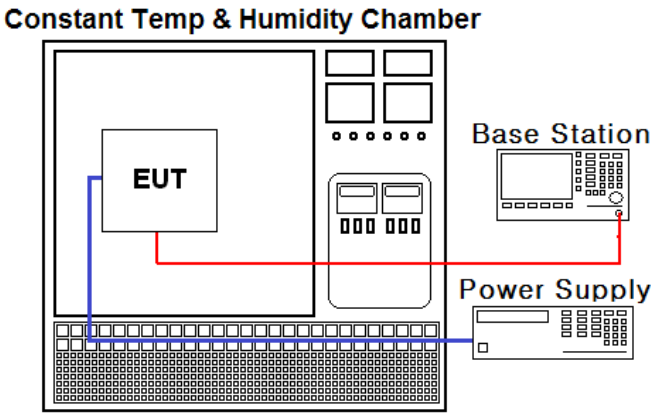
Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW ≥ 3 X RBW
2. Detector = Peak & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point ≥ 2 X 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.

3.7 FREQUENCY STABILITY

Test Set-up



Test Procedure

- **ANSI/TIA-603-C-2004**
- **KDB971168 v02r02 - Section 9.0**

The frequency stability of the transmitter is measured by:

a.) **Temperature:**
The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:**
The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block for Part 24. The frequency stability of the transmitter shall be maintained within ± 0.000 25 % (± 2.5 ppm) of the center frequency for Part 22.

Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature.
   (25 °C to provide a reference)

2. The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C.
   A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

4. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
Multimeter	Fluke	17B	14/05/12	15/05/12	26030065WS
DC Power Supply	Agilent	66332A	15/01/22	16/01/22	GB37470200
Power Splitter	Anritsu	K241B	14/10/21	15/10/21	1701101
Thermohygrometer	BODYCOM	BJ5478	15/02/26	16/02/26	1209
Temp &Humi Test Chamber	SJ Science	SJ-TH-S50	14/10/21	15/10/21	SJ-TH-S50-130930
MXA Signal Analyzer	Agilent	N9020A	14/08/21	15/08/21	MY49060056
Signal Generator	Rohde Schwarz	SMF100A	14/07/01	15/07/01	102341
Vector Signal Generator	Rohde Schwarz	SMBV100A	15/01/06	16/01/06	255571
Loop Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
Dipole Antenna	Schwarzbeck	VHA9103	13/10/24	15/10/24	2116
Dipole Antenna	Schwarzbeck	VHA9103	14/04/01	16/04/01	2117
Dipole Antenna	Schwarzbeck	UHA9105	13/10/24	15/10/24	2261
Dipole Antenna	Schwarzbeck	UHA9105	14/04/01	16/04/01	2262
Bilog Antenna	Schwarzbeck	VULB 9160	14/04/04	16/04/04	3357
HORN ANT	ETS	3115	15/02/09	17/02/09	00021097
HORN ANT	ETS	3117	14/05/12	16/05/12	140394
Low Noise Pre Amplifier	TSJ	MLA-010K01-B01-27	14/04/09	15/04/09	1844538
PreAmplifier	Agilent	8449B	14/11/06	15/11/06	3008A02108
PreAmplifier	A.H. SYSTEMS	PAM-1840VH	14/12/12	15/12/12	163
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	14/09/11	15/09/11	7
High-pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	14/09/11	15/09/11	3
High-pass filter	Wainwright	WHNX5.0	14/09/12	15/09/12	8
RadioCommunication Analyzer	Anritsu	MT8820C	15/01/09	16/01/09	6201274516

5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Status Note 1	Reference
2.1046	Conducted Output Power	N/A	Conducted	C	Section 7.1
2.1049	Occupied Bandwidth	N/A		NA Note 2	Section 7.2, 8.1, 8.2
24.232(d)	Peak to Average Ratio	< 13dB		NA Note 2	Section 7.3, 8.3, 8.4
2.1051 27.53(c.2) 27.53(h)	Undesirable Emissions at band edge and for all out-of-band emissions	< 43+10log$_{10}$(P) dB		NA Note 2	Section 7.4, 8.5, 8.6
27.53(c.4)	Undesirable Emissions in 763 ~ 775MHz & 793 ~ 805MHz	< 65+10log$_{10}$(P) dB		NA Note 2	Section 7.4, 8.5
2.1055 27.54	Frequency Stability	Fundamental emissions must stay within authorized frequency block		NA Note 2	Section 7.8
27.50(b.10)	Effective Radiated Power	< 3W ERP	Radiated	NA Note 2	Section 7.5
27.50(d.4)	Equivalent Isotropic Radiated Power	< 1W EIRP		NA Note 2	Section 7.6
2.1051 27.53(c.2) 27.53(h)	Undesirable Emissions at band edge and for all out-of-band emissions	< 43+10log$_{10}$(P) dB		C	Section 7.7
27.53(f)	Undesirable Emissions in 1559 ~ 1610MHz	< -70dBW/MHz (-40dBm/MHz)		C	Section 7.7
27.53(c.4)	Undesirable Emissions in 763 ~ 775MHz & 793 ~ 805MHz	< 65+10log$_{10}$(P) dB		C	Section 7.7

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable
Note 2: This test item was performed at the worst case mode when original grant.
Therefore this test item is not performed for this class II permissive change.

The sample was tested according to the following specification:
ANSI/TIA/EIA-603-C-2004 and KDB 971168 D01 v02r02

6. SAMPLE CALCULATION

A. Emission Designator

LTE Band 13(QPSK)

Emission Designator = **8M94G7D**
LTE OBW = 8.944 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 13(16QAM)

Emission Designator = **8M92W7D**
LTE OBW = 8.921 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 4(QPSK)

Emission Designator = **17M88G7D**
LTE OBW = 17.880 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data Transmission

LTE Band 4(16QAM)

Emission Designator = **17M87W7D**
LTE OBW = 17.872 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data Transmission

B. RADIATED SPURIOUS EMISSIONS Sample Calculation

Test Freq. (MHz)	RB Size/ Offset	Test Mode	Spectrum Reading		EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result	
			Freq.(MHz)	Value (dBm)					(dBm)	Margin (dB)
782	**1/25**	**QPSK**	1564.21	-47.46	Y	H	-47.67	6.54	-41.13	28.13

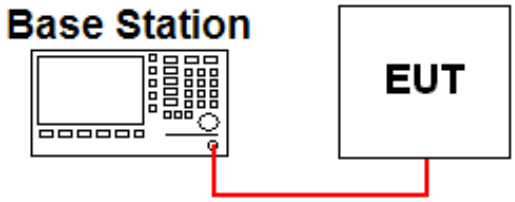
RADIATED SPURIOUS EMISSIONS = @ Ant Terminal LEVEL(dBm) + Ant. Gain

1) The EUT mounted on a non-conductive turntable is 0.8 meter above test site ground level.
2) During the test, the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain is the rating of RADIATED SPURIOUS EMISSIONS.

7. TEST DATA

7.1 CONDUCTED OUTPUT POWER

A base station simulator was used to establish communication with the EUT. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



▪ Band 13

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
10	782	QPSK	22.770	22.870	22.570	21.690	21.650	21.620	21.530
		16QAM	21.910	22.030	21.780	20.800	20.790	20.770	20.540
5	779.5	QPSK	22.780	22.860	22.810	21.910	21.750	21.720	21.850
		16QAM	21.900	21.920	21.960	20.730	20.820	20.830	20.800
	784.5	QPSK	22.850	22.700	22.570	21.800	21.720	21.720	21.610
		16QAM	21.980	21.840	21.750	20.830	20.780	20.710	20.650

Note 1: The conducted output power was measured using the Anritsu MT8820C
Note 2: The number of Mid RB are used 25,12 for 10,5MHz B.W
Note 3: The EUT was investigated both LTD-VL1110, LTD-VL1200 and the data of worst case was reported in the table above.

▪ Band 4

Conducted Power [dBm]									
RB Alloc			1 RB			MID RB			FULL RB
B.W(MHz)	Freq.(MHz)	Modulation	LOW	MID	HIGH	LOW	MID	HIGH	
20	1720	QPSK	22.780	23.080	23.020	21.850	21.880	21.820	21.800
		16QAM	21.950	22.320	22.410	20.850	21.020	20.930	20.960
	1732.5	QPSK	23.200	22.880	22.610	21.890	21.640	22.720	21.650
		16QAM	22.360	22.080	21.880	20.960	20.790	20.630	20.920
	1745	QPSK	22.790	22.830	22.720	21.470	21.640	21.660	21.680
		16QAM	21.960	22.080	21.920	20.640	20.740	20.770	22.060
15	1717.5	QPSK	22.660	23.180	23.170	21.770	21.950	21.900	21.850
		16QAM	21.900	22.300	22.210	20.760	21.120	21.140	20.830
	1732.5	QPSK	23.160	22.850	22.690	21.940	21.700	21.630	21.710
		16QAM	22.290	22.050	21.890	21.090	21.570	20.680	20.720
	1747.5	QPSK	22.870	23.040	22.720	21.660	21.780	21.770	21.600
		16QAM	21.980	22.130	21.910	20.810	21.040	20.880	20.700
10	1715	QPSK	22.580	22.980	23.000	21.640	21.820	21.980	21.730
		16QAM	21.840	22.240	22.240	20.670	20.960	21.110	20.850
	1732.5	QPSK	23.190	22.800	22.690	21.880	21.660	21.490	21.610
		16QAM	22.350	22.090	21.860	21.020	20.910	20.810	20.780
	1750	QPSK	22.950	22.990	22.720	21.900	21.800	21.660	21.690
		16QAM	22.080	22.190	21.860	20.990	20.990	20.780	20.790
5	1712.5	QPSK	22.630	22.600	22.930	21.560	21.500	21.690	21.580
		16QAM	21.810	21.910	22.120	20.740	20.680	20.790	20.640
	1732.5	QPSK	22.990	22.840	23.780	21.770	21.700	21.700	21.750
		16QAM	22.330	22.090	21.960	21.020	20.990	20.890	20.870
	1752.5	QPSK	22.980	22.780	22.640	21.730	21.760	21.580	21.620
		16QAM	22.230	22.090	21.980	20.950	20.860	20.900	20.800
3	1711.5	QPSK	22.620	22.530	22.650	21.540	21.460	21.530	21.490
		16QAM	21.830	21.740	21.790	20.600	20.630	20.640	20.660
	1732.5	QPSK	22.860	22.880	22.760	21.720	21.760	21.650	21.700
		16QAM	22.030	22.030	21.920	20.900	20.930	20.790	20.930
	1753.5	QPSK	22.840	22.740	22.630	21.670	21.720	21.600	21.650
		16QAM	22.140	21.910	21.780	20.800	20.780	20.720	20.850
1.4	1710.7	QPSK	22.750	22.490	22.750	22.690	22.470	22.450	21.440
		16QAM	21.830	21.740	21.790	21.820	21.620	21.750	20.710
	1732.5	QPSK	22.900	22.830	22.770	22.850	22.810	22.760	21.750
		16QAM	22.030	22.020	22.010	22.060	22.040	21.990	21.040
	1754.3	QPSK	22.740	22.630	22.600	22.660	22.610	22.670	21.640
		16QAM	21.940	21.820	21.810	21.890	21.830	21.780	20.810

Note 1: The conducted output power was measured using the Anritsu MT8820C.
Note 2: The number of Mid RB are used 50,36,25,12,8,3 for 20,15,10,5,3,1.4MHz B.W
Note 3: The EUT was investigated both LTD-VL1110, LTD-VL1200 and the data of worst case was reported in the table above.

7.2 OCCUPIED BANDWIDTH

- Not Applicable

7.3 PEAKTOAVERAGERATIO

- Not Applicable

7.4 BAND EDGE EMISSIONS (Conducted)

- Not Applicable

7.5 SPURIOUS AND HARMONICS EMISSIONS (Conducted)

- Not Applicable

7.6 EFFECTIVE RADIATED POWER (LTE Band 13)

- Not Applicable

7.7 EQUIVALENT ISOTROPIC RADIATED POWER (LTE Band 4)

- Not Applicable

7.8 UNDESIRABLE EMISSIONS (RADIATED)

7.8.1 UNDESIRABLE EMISSIONS (LTE Band 13)

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result (dBm)	Margin (dB)	Limit (dBm)
10	782	1/25	QPSK	1564.21	Y	H	-47.67	6.54	-41.13	28.13	-13
				3123.30	Y	H	-55.13	7.64	-47.49	34.49	
5	779.5	1/12	QPSK	1559.24	Y	H	-48.93	6.54	-42.39	29.39	
				3118.97	Y	H	-54.81	7.63	-47.18	34.18	
	784.5	1/0	QPSK	1564.66	Y	H	-47.51	6.54	-40.97	27.97	
				3129.33	Y	H	-54.69	7.64	-47.05	34.05	

Note 1: Limit Calculation= 43 + $10\log_{10}(P_{[Watts]})$
Note 2: This device was tested under all modulations, RB size and RB offsets and the data of worst case was reported in the table above. (The worst case mode is the QPSK modulation type with RB Size 1)
Note 3: No other spurious and harmonic emissions were reported greater than listed emissions above table.
Note 4: The EUT was investigated both LTD-VL1110, LTD-VL1200 and the data of worst case was reported in the table above.

7.8.2 UNDESIRABLE EMISSIONS IN 763 ~ 775 MHz & 793 ~ 805 MHz(LTE Band 13)

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result (dBm)	Margin (dB)	Limit (dBm)
10	782	1/0	QPSK	774.25	X	H	-44.31	1.34	-42.97	7.97	-35
				801.30	X	H	-51.25	1.34	-49.91	14.91	
5	779.5	1/0	QPSK	774.31	X	H	-43.94	1.34	-42.60	7.60	
				800.81	X	H	-50.77	1.35	-49.42	14.42	
	784.5	1/0	QPSK	773.92	X	H	-50.74	1.34	-49.40	14.40	
				795.52	X	H	-51.22	1.37	-49.85	14.85	

Note 1: This device was tested under all modulations, RB size and RB offsets and the worst case data are reported in the table above. (The worst case mode is the QPSK modulation type with RB Size 1)
Note 2: For part 27.53(c)(4) measurement, the FCC limit is 65 + $10\log_{10}(P_{[Watts]})$= -35dBm in a 6.25kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25kHz with the available equipment, a bandwidth of 10kHz was used instead to show compliance. By using a 10kHz bandwidth, the result was adjusted by $10\log_{10}$ (10kHz/6.25kHz) = 2.04dB.
Note 3: No other spurious and harmonic emissions were reported greater than listed emissions above table.
Note 4: The EUT was investigated both LTD-VL1110, LTD-VL1200 and the data of worst case was reported in the table above.

7.8.3 UNDESIRABLE EMISSIONS IN 1559 ~ 1610 MHz(LTE Band 13)

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	EUT (Axis)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result (dBm)	Margin (dB)	Limit (dBm/MHz)
10	782	1/25	QPSK	1564.30	Y	H	-56.58	6.54	-50.04	10.04	-40.00
5	779.5	1/12	QPSK	1559.41	Y	H	-56.64	6.54	-50.10	10.10	
	784.5	1/0	QPSK	1564.71	Y	H	-57.84	6.54	-51.30	11.30	

Note 1: This device was tested under all modulations, RB size and RB offsets and the worst case data are reported in the table above. (The worst case mode is the QPSK modulation type with RB Size 1 and Full RB)
Note 2: No other spurious and harmonic emissions were reported greater than listed emissions above table.
Note 3: The EUT was investigated both LTD-VL1110, LTD-VL1200 and the data of worst case was reported in the table above.

7.8.4 UNDESIRABLE EMISSIONS (LTE Band 4)

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	EUT Axis	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result (dBm)	Margin (dB)	Limit (dBm)
20	1720	1/50	QPSK	3440.08	Y	H	-48.70	10.06	-38.64	25.64	-13
				5160.33	Y	H	-52.39	10.75	-41.64	28.64	
	1745	1/50	QPSK	3490.17	Y	H	-49.24	10.10	-39.14	26.14	
				5235.41	Y	H	-51.83	10.78	-41.05	28.05	
15	1717.5	1/37	QPSK	3435.36	Y	H	-49.21	10.05	-39.16	26.16	
				5153.10	Y	H	-51.01	10.75	-40.26	27.26	
	1732.5	1/0	QPSK	3451.69	Y	H	-49.60	10.07	-39.53	26.53	
				5177.39	Y	H	-50.81	10.76	-40.05	27.05	
	1747.5	1/37	QPSK	3495.23	Y	H	-48.25	10.11	-38.14	25.14	
				5243.04	Y	H	-50.56	10.79	-39.77	26.77	
10	1715	1/49	QPSK	3438.87	Y	H	-49.15	10.06	-39.09	26.09	
				5158.28	Y	H	-50.51	10.75	-39.76	26.76	
	1732.5	1/0	QPSK	3456.21	Y	H	-49.15	10.07	-39.08	26.08	
				5184.55	Y	H	-51.12	10.76	-40.36	27.36	
	1750	1/25	QPSK	3500.14	Y	H	-49.66	10.11	-39.55	26.55	
				5250.21	Y	H	-49.06	10.79	-38.27	25.27	
5	1712.5	1/24	QPSK	3429.44	Y	H	-48.95	10.05	-38.90	25.90	
				5143.97	Y	H	-51.70	10.74	-40.96	27.96	
	1732.5	1/24	QPSK	3469.33	Y	H	-50.70	10.08	-40.62	27.62	
				5203.95	Y	H	-50.84	10.77	-40.07	27.07	
	1752.5	1/0	QPSK	3500.74	Y	H	-48.86	10.11	-38.75	25.75	
				5251.23	Y	H	-51.33	10.79	-40.54	27.54	
3	1711.5	1/14	QPSK	3425.61	Y	H	-48.59	10.05	-38.54	25.54	
				5138.12	Y	H	-51.10	10.74	-40.36	27.36	
	1732.5	1/7	QPSK	3465.41	Y	H	-48.96	10.08	-38.88	25.88	
				5198.09	Y	H	-51.34	10.77	-40.57	27.57	
	1753.5	1/0	QPSK	3504.49	Y	H	-48.99	10.11	-38.88	25.88	
				5256.65	Y	H	-52.35	10.79	-41.56	28.56	
1.4	1710.7	1/0	QPSK	3420.44	Z	H	-50.18	10.04	-40.14	27.14	
				5130.80	Z	H	-51.02	10.74	-40.28	27.28	
	1732.5	1/0	QPSK	3464.13	Z	H	-47.63	10.08	-37.55	24.55	
				5196.12	Z	H	-51.34	10.77	-40.57	27.57	
	1754.3	1/0	QPSK	3507.71	Z	H	-49.17	10.10	-39.07	26.07	
				5261.24	Z	H	-52.43	10.79	-41.64	28.64	

Note 1: Limit Calculation= 43 + $10\log_{10}(P_{[Watts]})$
Note 2: This device was tested under all modulations, RB size and RB offsets and the worst case data are reported in the table above. (The worst case mode is the QPSK modulation type with RB Size 1)
Note 3: No other spurious and harmonic emissions were reported greater than listed emissions above table.
Note 4: The EUT was investigated both LTD-VL1110, LTD-VL1200 and the data of worst case was reported in the table above.