FCC RF Test Report

APPLICANT	:	MitraStar Technology Corporation
EQUIPMENT	:	M4G-3401 LTE Outdoor CPE
BRAND NAME	:	MitraStar
MODEL NAME	:	M4G-3401-IDU, M4G-3401-ODU
MARKETING NAME		M4G-3401-IDU, M4G-3401-ODU
FCC ID	:	ZMYM4G3401
STANDARD	:	FCC 47 CFR Part 2, and 90(Z)
CLASSIFICATION	:	Licensed Non-Broadcast Station Transmitter (TNB)

The product was received on Nov. 13, 2014 and testing was completed on Jan. 21, 2015. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG3N3019-01	Rev. 01	Initial issue of report	Jan. 16, 2015
FG3N3019-01	Rev. 02	Revising frequency range and updating test data.	Jan. 21, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power And EIRP Power	25W / 25MHz EIRP	PASS	-
3.2	§90.1321	Peak EIRP Density	1 W / MHz EIRP	PASS	-
3.3	§2.1049 §90.1323	Occupied Bandwidth	(Reporting only)	PASS	-
3.4	§2.1051 §90.1323	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.5	§90.210	Emission Mask	Mask B	PASS	
3.6	§2.1051 §90.1323	Conducted Spurious Emission	< 43+10log10(P[Watts])	PASS	
3.7	§2.1053 §90.1323	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 26.35 dB at 7330.000 MHz
3.8	§2.1055	Frequency Stability for Temperature & Voltage	Within Operating Band	PASS	-

1 General Description

1.1 Applicant

MitraStar Technology Corporation
No. 6, Innovation Rd II, Science-Based Industrial, Hsin-Chu, Taiwan

1.2 Manufacturer

MitraStar Technology Corporation
No. 6, Innovation Rd II, Science-Based Industrial, Hsin-Chu, Taiwan

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	M4G-3401 LTE Outdoor CPE
Brand Name	MitraStar
Model Name	M4G-3401-IDU, M4G-3401-ODU
Marketing Name	M4G-3401-IDU, M4G-3401-ODU
FCC ID	ZMYM4G3401
EUT supports Radios application	LTE/WLAN 11bgn (HT20/HT40)
HW Version	IDU: ABB(Rework to ACB) ODU: ABB(Rework to ACB)
SW Version	ODU: B022 IDU: SPC120
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx Frequency	3660 MHz ~ 3665 MHz
Rx Frequency	3660 MHz ~ 3665 MHz
Bandwidth	20MHz
Maximum Output Power to Antenna	22.38 dBm
Antenna Type	DUAL POLARIZATION PATCH Antenna
Type of Modulation	QPSK / 16QAM

Remark: This test report recorded only product characteristics and test results of Licensed Non-Broadcast Station Transmitter (TNB).

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Emission Designator

LTE Band 43	QPSK			16QAM		
BW(MHz)	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum Conducted Power (W)**	**Emission Designator (99%OBW)**	**Frequency Tolerance (ppm)**	**Maximum Conducted Power (W)**
20	18.52	0.0112	0.1730	18.48	-	0.1390

1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH02-HY	03CH07-HY

1.8 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR Part 2, 90
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02
- FCC KDB 412172 D01 Determining ERP and EIRP v01
- FCC KDB 552295 D01 CBP Guidance for 3650 3700 Band v02r02

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

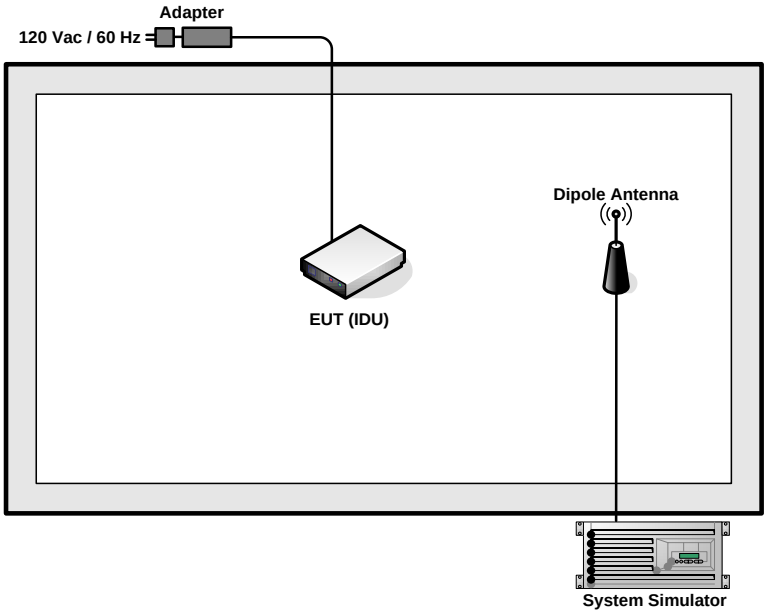
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	43	-	-	-	-	-	v	v	v	-	-	v	v	v	v
Peak EIRP Density	43	-	-	-	-	-	v	v	v	-	-	v	v	v	v
26dB and 99% Bandwidth	43	-	-	-	-	-	v	v	v	-	-	v	v	v	v
Conducted Band Edge	43	-	-	-	-	-	v	v	v	-	-	v	v		v
Emission Mask	43	-	-	-	-	-	v	v	v	-	-	v	v	v	v
Conducted Spurious Emission	43	-	-	-	-	-	v	v	v	-	-	v	v	v	v
E.I.R.P.	43	-	-	-	-	-	v	v	v	-	-	v	v	v	v
Radiated Spurious Emission	43	-	-	-	-	-	v	v		-	-	v	v	v	v
Frequency Stability	43	-	-	-	-	-	v	v		-	-	v		v	
Note	1. The mark "v" means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported.														

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.2 dB and a 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 Conducted Output Power and ERP/EIRP

3.1.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The EIRP of mobile transmitters must not exceed 25 Watts/25MHz for LTE Band 43.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, where

P_T = transmitter output power in dBm

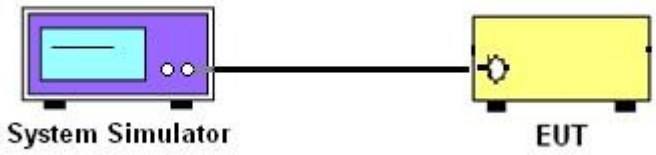
G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.1.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

3.1.3 Test Setup



3.1.4 Test Result of Conducted Output Power

LTE Band 43 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20	100	0	QPSK	22.31	22.36	22.38
20	100	0	16QAM	21.43	21.41	21.36

3.1.5 Test Result of Conducted Output Power and EIRP

(G_T - L_C = 16.00 dB)						
Modes	LTE Band 43 (QPSK,BW=20M)			LTE Band 43 (16QAM,BW=20M)		
Channel	44190 (Low)	44215 (Mid)	44240 (High)	44190 (Low)	44215 (Mid)	44240 (High)
Frequency (MHz)	3660	3662.5	3665	3660	3662.5	3665
Conducted Power P_T (dBm)	22.31	22.36	22.38	21.43	21.41	21.36
Conducted Power P_T (Watts)	0.17	0.17	0.17	0.14	0.14	0.14
EIRP(dBm)	38.31	38.36	38.38	37.43	37.41	37.36
EIRP(Watts)	6.776	6.855	6.887	5.534	5.508	5.445

3.2 Peak EIRP Density

3.2.1 Description of the Peak EIRP Density

In any event, the peak EIRP power density shall not exceed 1 Watt in any one-megahertz slice of spectrum.

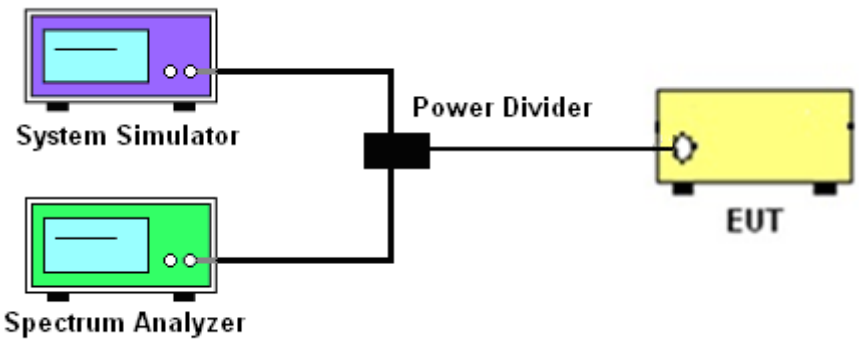
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. Set instrument center frequency to OBW center frequency.
2. Set span to at least 1.5 times the OBW.
3. Set the RBW to the specified reference bandwidth (often 1 MHz).
4. Set VBW ≥ 3 × RBW.
5. Detector = RMS (power averaging).
6. Ensure that the number of measurement points in the sweep ≥ 2 × span/RBW.
7. Spectrum is configured to trigger a sweep at the beginning of each transmission burst
8. Sweep time = auto couple.
9. Employ trace averaging (RMS) mode over a minimum of 100 traces.
10. Use the peak marker function to determine the maximum amplitude level within the reference bandwidth (PSD).
11. Determine the EIRP by adding the effective antenna gain to the adjusted power level.

3.2.4 Test Setup



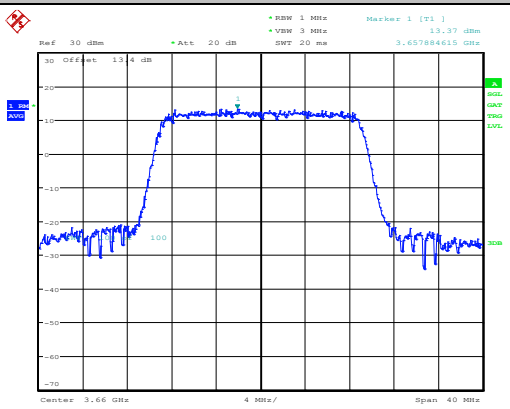
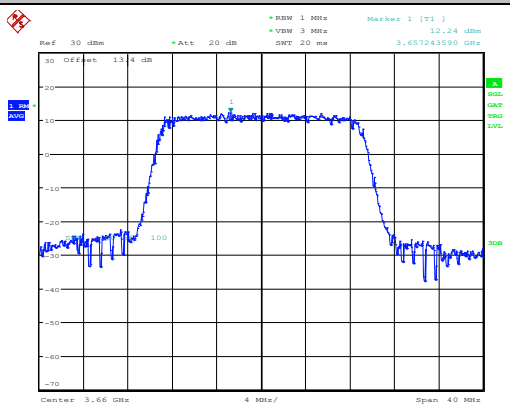
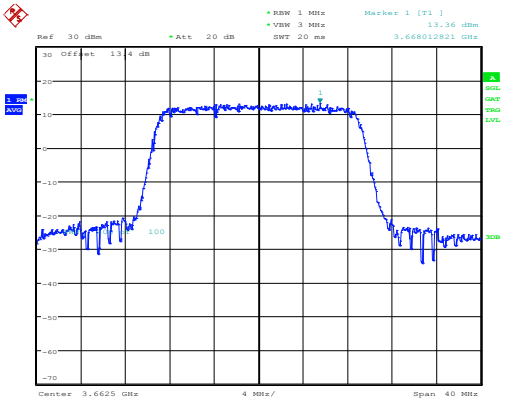
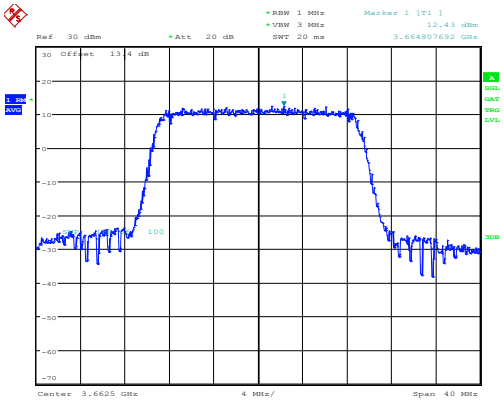
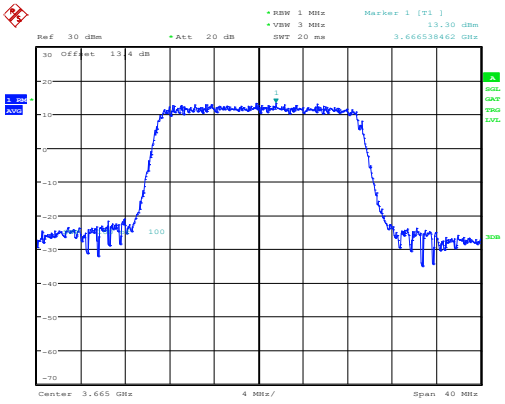
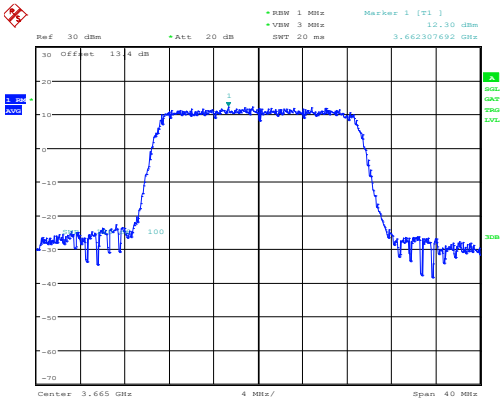
3.2.5 Test Result of Peak EIRP Density

Mode	LTE Band 43 : Peak Conducted Power Density (dBm/MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Lowest CH	13.37	12.24
Middle CH	13.36	12.43
Highest CH	13.3	12.3

Mode	LTE Band 43 : Peak EIRP Density (dBm/MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Lowest CH	29.37	28.24
Middle CH	29.36	28.43
Highest CH	29.3	28.3
Antenna Gain	16dBi	
Limit	1W / MHz = 30dBm / MHz	
Result	Pass	

Peak EIRP Density (dBm/MHz) = Peak Conducted Power Density (dBm/MHz) + Antenna Gain

3.2.6 Test Result (Plots) of Peak EIRP Density

LTE Band 43	
Lowest Channel / 20MHz / QPSK	**Lowest Channel / 20MHz / 16QAM**
	
Middle Channel / 20MHz / QPSK	**Middle Channel / 20MHz / 16QAM**
	
Highest Channel / 20MHz / QPSK	**Highest Channel / 20MHz / 16QAM**
	

3.3 Bandwidth Limitations Measurement

3.3.1 Description of (Occupied) Bandwidth Limitations Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

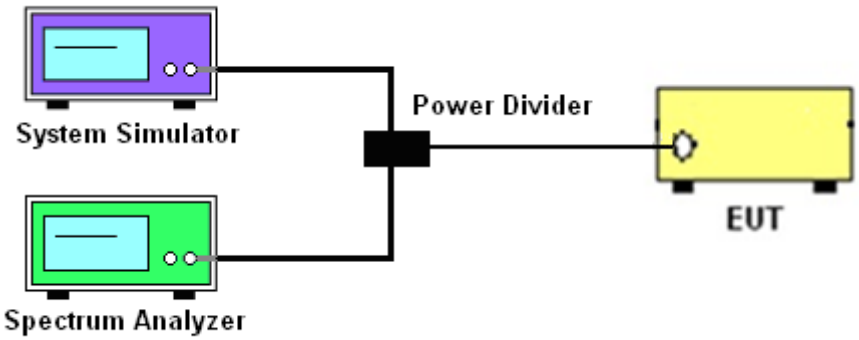
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 4.2.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.

3.3.4 Test Setup

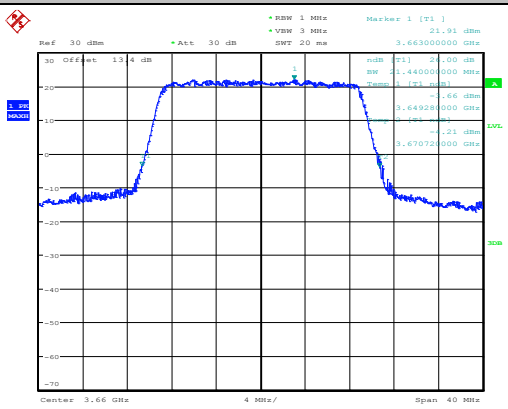
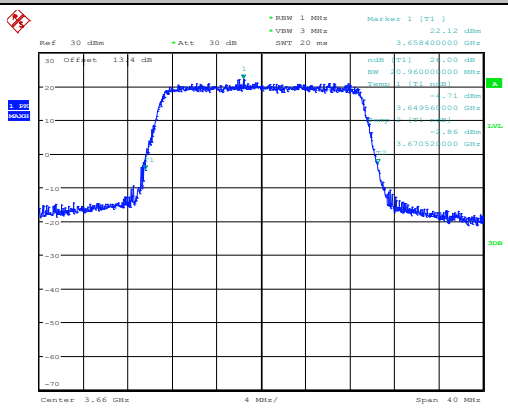


3.3.5 Test Result of 26dB Bandwidth and Occupied Bandwidth

Mode	LTE Band 43 : 26dB BW(MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Lowest CH	21.44	20.96
Middle CH	21.12	20.84
Highest CH	21.04	20.84

Mode	LTE Band 43 : 99%OBW(MHz)	
BW	20MHz	
Mod.	QPSK	16QAM
Lowest CH	18.44	18.48
Middle CH	18.52	18.48
Highest CH	18.52	18.48

3.3.6 Test Result (Plots) of 26dB Bandwidth

LTE Band 43	
Lowest Channel / 20MHz / QPSK	**Lowest Channel / 20MHz / 16QAM**
	
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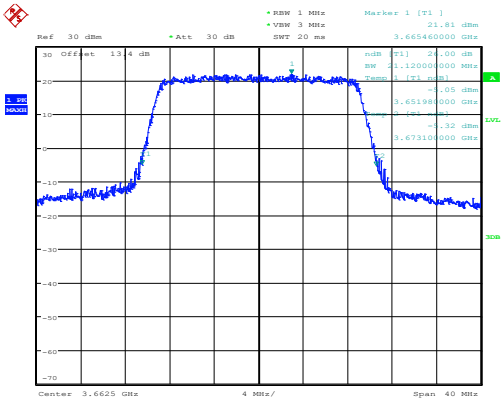
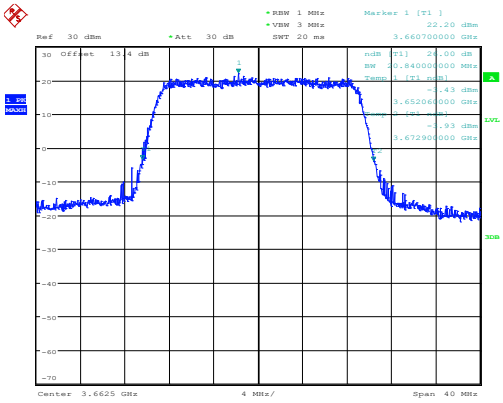
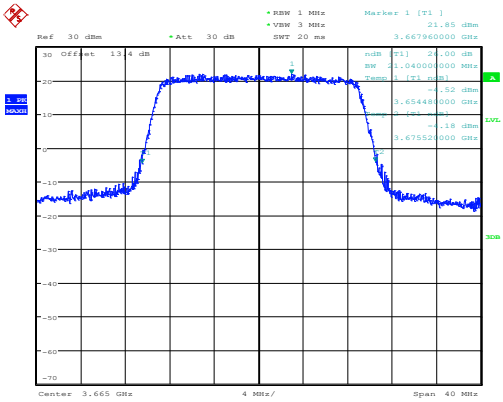
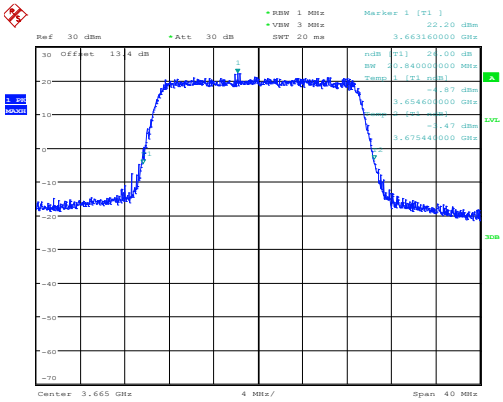
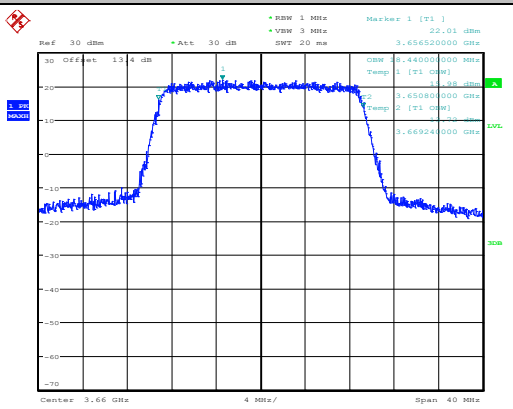
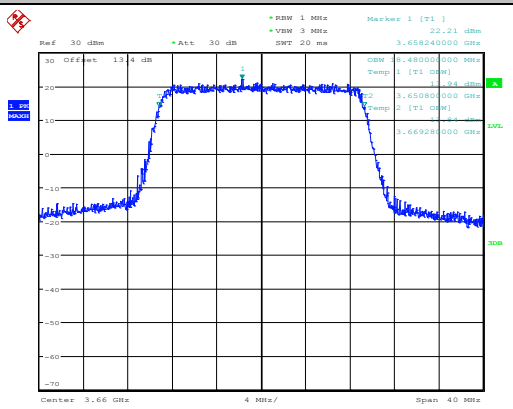
Middle Channel / 20MHz / QPSK	**Middle Channel / 20MHz / 16QAM**
	
Date: 21.JAN.2015 14:48:47	Date: 21.JAN.2015 14:50:31
Highest Channel / 20MHz / QPSK	**Highest Channel / 20MHz / 16QAM**
	
Date: 21.JAN.2015 14:52:13	Date: 21.JAN.2015 14:52:51

3.3.7 Test Result (Plots) of Occupied Bandwidth

LTE Band 43	
Lowest Channel / 20MHz / QPSK	**Lowest Channel / 20MHz / 16QAM**
	
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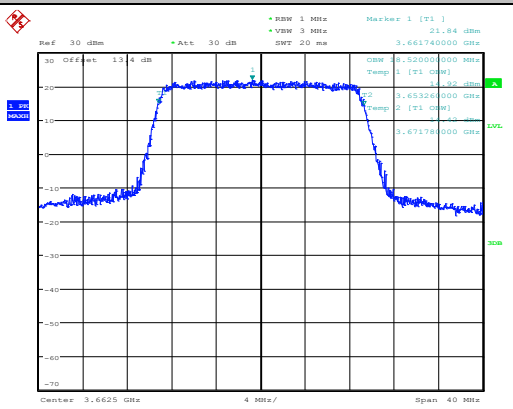
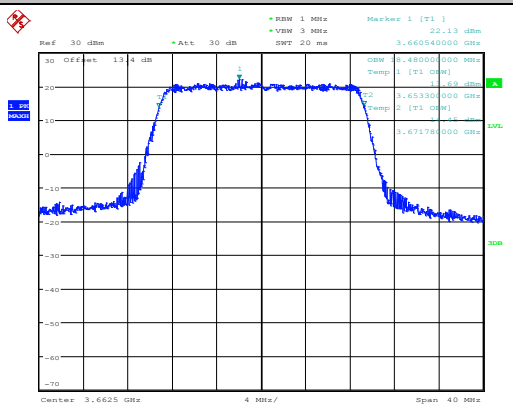
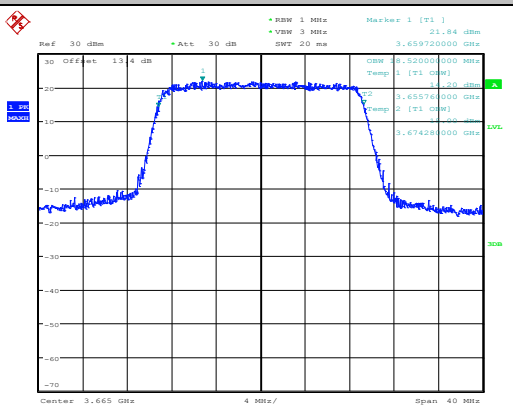
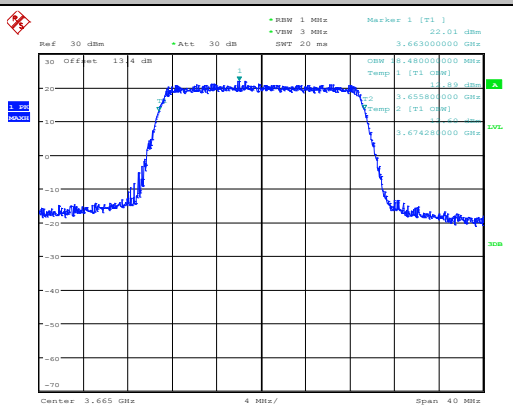
Middle Channel / 20MHz / QPSK	**Middle Channel / 20MHz / 16QAM**
	
Date: 21.JAN.2015 14:47:35	Date: 21.JAN.2015 14:49:36
Highest Channel / 20MHz / QPSK	**Highest Channel / 20MHz / 16QAM**
	
Date: 21.JAN.2015 14:51:42	Date: 21.JAN.2015 14:52:35

3.4 Conducted Band Edge

3.4.1 Description of Conducted Band Edge Measurement

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or less, but at least one percent of the emission bandwidth of the fundamental emission of the transmitter, provided the measured energy is integrated over a 1 MHz bandwidth.

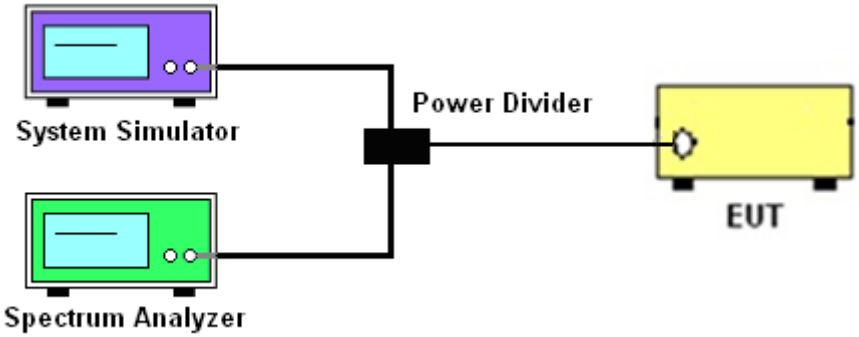
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

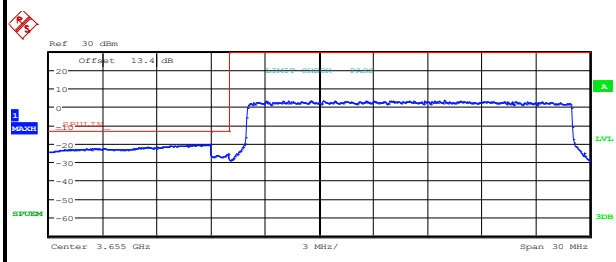
1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

3.4.4 Test Setup



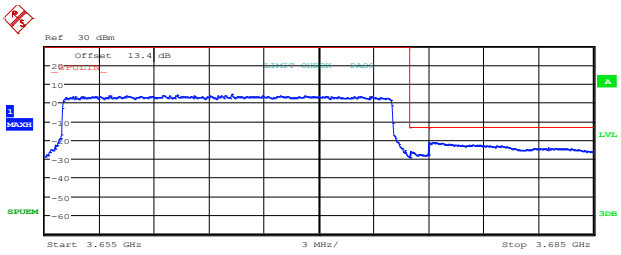
3.4.5 Test Result (Plots) of Conducted Band edge

LTE Band 43 / 20MHz / QPSK	
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
3.640 G	3.649 G	1.00 M	3.648937 G	-20.40	-7.40
3.649 G	3.650 G	200.00 k	3.649989 G	-25.64	-12.64
3.650 G	3.670 G	100.00 k	3.661900 G	3.29	-26.71

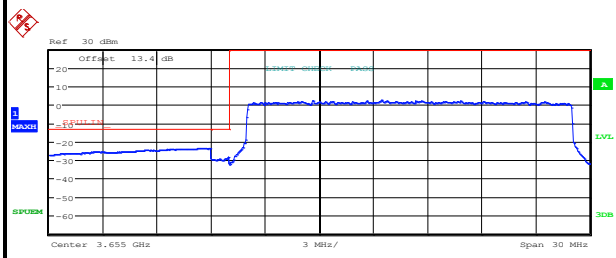
Date: 21.JAN.2015 14:56:25



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
3.655 G	3.675 G	100.00 k	3.665220 G	4.20	-25.80
3.675 G	3.676 G	200.00 k	3.675012 G	-26.25	-13.25
3.676 G	3.685 G	1.00 M	3.676225 G	-21.40	-8.40

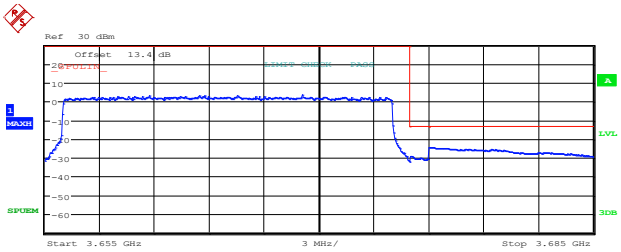
Date: 21.JAN.2015 15:05:52

LTE Band 43 / 20MHz / 16QAM	
Lowest Band Edge / Full RB	**Highest Band Edge / Full RB**



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
3.640 G	3.649 G	1.00 M	3.648550 G	-23.63	-10.63
3.649 G	3.650 G	200.00 k	3.649987 G	-28.64	-15.64
3.650 G	3.670 G	100.00 k	3.658460 G	2.33	-27.67

Date: 21.JAN.2015 14:57:01



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
3.655 G	3.675 G	100.00 k	3.669090 G	3.35	-26.65
3.675 G	3.676 G	200.00 k	3.675012 G	-29.17	-16.17
3.676 G	3.685 G	1.00 M	3.676095 G	-24.73	-11.73

Date: 21.JAN.2015 15:03:43

3.5 Emission Mask

3.5.1 Description of Emission Mask

The power of any emission must be attenuated below the unmodulated carrier power(P) as below:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but no more than 100 percent of the authorized bandwidth at least 25dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but no more than 250 percent of the authorized bandwidth at least 25dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth at least 43+10log(P) dB.

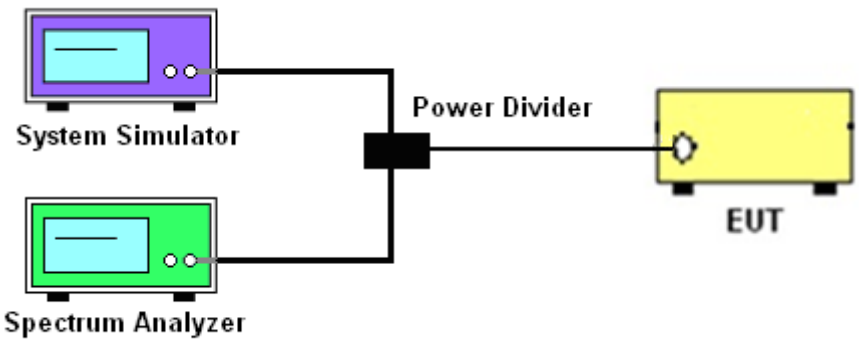
3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

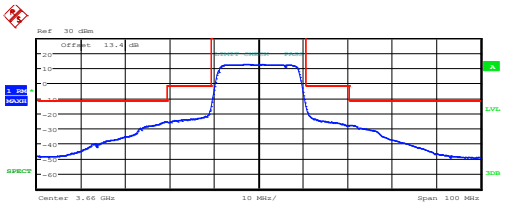
1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.5.4 Test Setup



LTE Band 43

Lowest Channel / 20MHz / QPSK

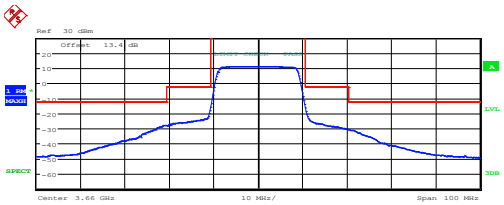


Tx Channel — Bandwidth 20 MHz — Power 23.44 dBm — Limit None

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Limit [dB]
-50.000 M	-20.500 M	1.00 M	3.639167 G	-25.69	-49.13	-14.13
-20.500 M	-10.500 M	1.00 M	3.649263 G	-15.10	-38.54	-13.54
10.500 M	20.500 M	1.00 M	3.670577 G	-13.52	-36.97	-11.97
20.500 M	50.000 M	1.00 M	3.680994 G	-27.82	-51.26	-16.26

Date: 21.JAN.2015 16:15:29

Lowest Channel / 20MHz / 16QAM

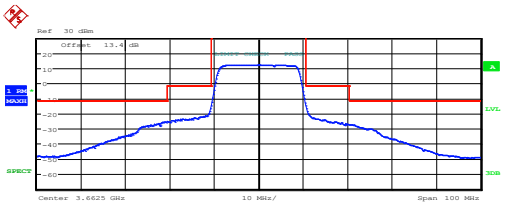


Tx Channel — Bandwidth 20 MHz — Power 22.38 dBm — Limit None

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Limit [dB]
-50.000 M	-20.500 M	1.00 M	3.639327 G	-27.79	-50.17	-15.17
-20.500 M	-10.500 M	1.00 M	3.649263 G	-15.94	-38.32	-13.32
10.500 M	20.500 M	1.00 M	3.670577 G	-14.42	-36.80	-11.80
20.500 M	50.000 M	1.00 M	3.680513 G	-30.88	-53.26	-18.26

Date: 21.JAN.2015 15:37:48

Middle Channel / 20MHz / QPSK

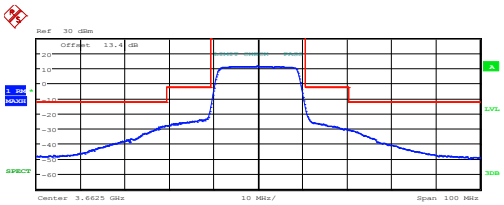


Tx Channel — Bandwidth 20 MHz — Power 23.35 dBm — Limit None

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Limit [dB]
-50.000 M	-20.500 M	1.00 M	3.641827 G	-25.35	-48.70	-13.70
-20.500 M	-10.500 M	1.00 M	3.651763 G	-14.87	-38.22	-13.22
10.500 M	20.500 M	1.00 M	3.673077 G	-13.32	-36.67	-11.67
20.500 M	50.000 M	1.00 M	3.683013 G	-27.33	-50.69	-15.69

Date: 21.JAN.2015 15:33:38

Middle Channel / 20MHz / 16QAM

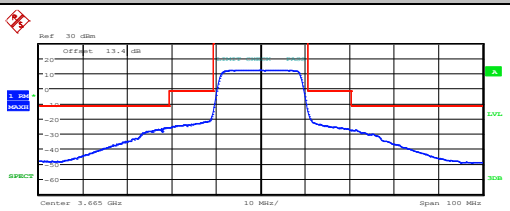


Tx Channel — Bandwidth 20 MHz — Power 22.34 dBm — Limit None

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Limit [dB]
-50.000 M	-20.500 M	1.00 M	3.641827 G	-28.15	-50.49	-15.49
-20.500 M	-10.500 M	1.00 M	3.651763 G	-15.97	-38.31	-13.31
10.500 M	20.500 M	1.00 M	3.673077 G	-14.53	-36.88	-11.87
20.500 M	50.000 M	1.00 M	3.683013 G	-30.78	-53.12	-18.11

Date: 21.JAN.2015 15:33:57

Highest Channel / 20MHz / QPSK

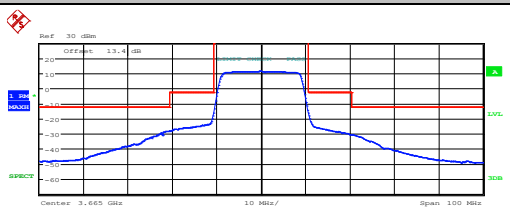


Tx Channel — Bandwidth 20 MHz — Power 23.35 dBm — Limit None

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Limit [dB]
-50.000 M	-20.500 M	1.00 M	3.644006 G	-25.89	-49.23	-14.23
-20.500 M	-10.500 M	1.00 M	3.654263 G	-15.18	-38.52	-13.52
10.500 M	20.500 M	1.00 M	3.675577 G	-13.86	-37.20	-12.20
20.500 M	50.000 M	1.00 M	3.685513 G	-27.68	-51.03	-16.03

Date: 21.JAN.2015 15:28:36

Highest Channel / 20MHz / 16QAM



Tx Channel — Bandwidth 20 MHz — Power 22.37 dBm — Limit None

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	PwrRel [dBc]	Limit [dB]
-50.000 M	-20.500 M	1.00 M	3.644327 G	-28.09	-50.47	-15.47
-20.500 M	-10.500 M	1.00 M	3.654263 G	-16.07	-38.44	-13.44
10.500 M	20.500 M	1.00 M	3.675577 G	-14.97	-37.34	-12.34
20.500 M	50.000 M	1.00 M	3.685513 G	-30.77	-53.14	-18.14

Date: 21.JAN.2015 15:30:13

3.6 Conducted Spurious Emission

3.6.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30MHz up to a frequency including its 10^{th} harmonic.

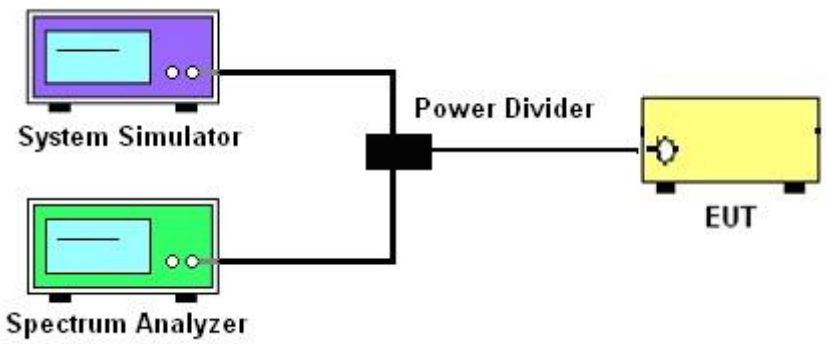
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

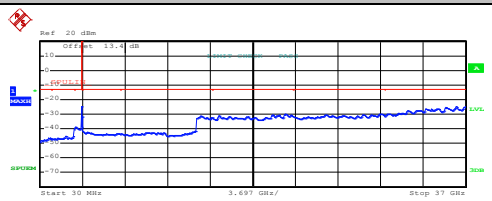
3.6.4 Test Setup



3.6.5 Test Result (Plots) of Conducted Spurious Emission

LTE Band 43

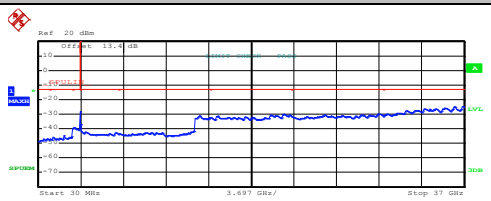
Lowest Channel / 20MHz / QPSK



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	1.00 M	912.215000 M	-46.20	-33.20
1.000 G	3.000 G	1.00 M	2.989000 G	-44.94	-31.94
3.000 G	3.640 G	1.00 M	3.638080 G	-25.00	-12.00
3.685 G	7.000 G	1.00 M	3.688315 G	-31.77	-18.77
7.000 G	15.000 G	1.00 M	14.012000 G	-31.45	-18.45
15.000 G	22.000 G	1.00 M	21.377000 G	-30.05	-17.05
22.000 G	30.000 G	1.00 M	29.612000 G	-29.84	-16.84
30.000 G	37.000 G	1.00 M	36.195000 G	-24.88	-11.88

Date: 21.JAN.2015 20:38:10

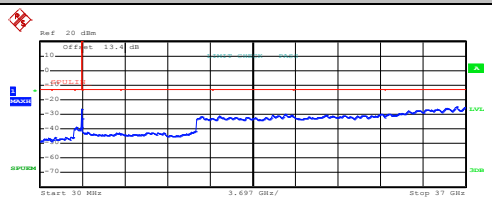
Lowest Channel / 20MHz / 16QAM



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	1.00 M	806.000000 M	-47.11	-34.11
1.000 G	3.000 G	1.00 M	2.235000 G	-44.40	-31.40
3.000 G	3.640 G	1.00 M	3.639360 G	-28.17	-15.17
3.685 G	7.000 G	1.00 M	3.686657 G	-38.26	-25.26
7.000 G	15.000 G	1.00 M	14.004000 G	-31.31	-18.31
15.000 G	22.000 G	1.00 M	21.384000 G	-29.91	-16.91
22.000 G	30.000 G	1.00 M	29.664000 G	-29.78	-16.78
30.000 G	37.000 G	1.00 M	36.877500 G	-24.90	-11.90

Date: 21.JAN.2015 20:38:55

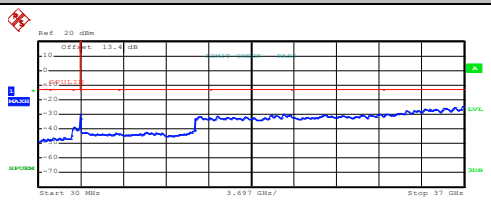
Middle Channel / 20MHz / QPSK



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	1.00 M	801.635000 M	-46.63	-33.63
1.000 G	3.000 G	1.00 M	2.969000 G	-45.52	-32.52
3.000 G	3.640 G	1.00 M	3.639040 G	-27.89	-14.89
3.685 G	7.000 G	1.00 M	3.688315 G	-32.86	-19.86
7.000 G	15.000 G	1.00 M	14.112000 G	-31.73	-18.73
15.000 G	22.000 G	1.00 M	21.394500 G	-30.02	-17.02
22.000 G	30.000 G	1.00 M	29.712000 G	-30.01	-17.01
30.000 G	37.000 G	1.00 M	36.230000 G	-24.90	-11.90

Date: 21.JAN.2015 20:39:57

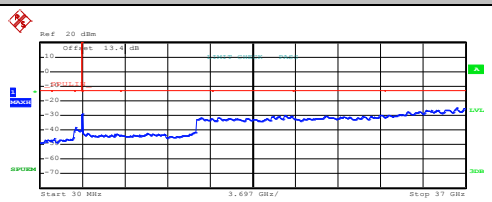
Middle Channel / 20MHz / 16QAM



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	1.00 M	509.180000 M	-46.91	-33.91
1.000 G	3.000 G	1.00 M	2.962000 G	-44.88	-31.88
3.000 G	3.640 G	1.00 M	3.639360 G	-30.03	-17.03
3.685 G	7.000 G	1.00 M	3.686657 G	-34.62	-21.62
7.000 G	15.000 G	1.00 M	13.992000 G	-31.59	-18.59
15.000 G	22.000 G	1.00 M	21.324500 G	-30.12	-17.12
22.000 G	30.000 G	1.00 M	29.640000 G	-29.89	-16.89
30.000 G	37.000 G	1.00 M	36.877500 G	-24.78	-11.78

Date: 21.JAN.2015 20:39:39

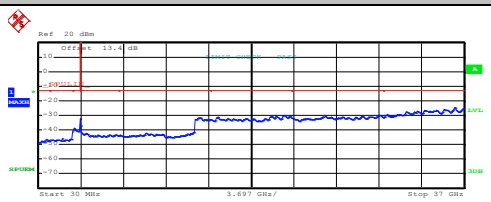
Highest Channel / 20MHz / QPSK



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	1.00 M	722.580000 M	-47.02	-34.02
1.000 G	3.000 G	1.00 M	3.000000 G	-45.19	-32.19
3.000 G	3.640 G	1.00 M	3.639680 G	-29.23	-16.23
3.685 G	7.000 G	1.00 M	3.686657 G	-29.36	-16.36
7.000 G	15.000 G	1.00 M	14.044000 G	-31.53	-18.53
15.000 G	22.000 G	1.00 M	21.342000 G	-30.27	-17.27
22.000 G	30.000 G	1.00 M	29.564000 G	-29.81	-16.81
30.000 G	37.000 G	1.00 M	36.244000 G	-24.98	-11.98

Date: 21.JAN.2015 20:40:39

Highest Channel / 20MHz / 16QAM



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	1.00 M	727.430000 M	-46.09	-33.09
1.000 G	3.000 G	1.00 M	2.130000 G	-46.04	-33.04
3.000 G	3.640 G	1.00 M	3.639040 G	-32.35	-19.35
3.685 G	7.000 G	1.00 M	3.689973 G	-37.00	-24.00
7.000 G	15.000 G	1.00 M	14.000000 G	-31.54	-18.54
15.000 G	22.000 G	1.00 M	21.366500 G	-29.98	-16.98
22.000 G	30.000 G	1.00 M	29.676000 G	-29.88	-16.88
30.000 G	37.000 G	1.00 M	36.223000 G	-24.66	-11.66

Date: 21.JAN.2015 20:41:04

3.7 Radiated Spurious Emission

3.7.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.
The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.7.2 Measuring Instruments

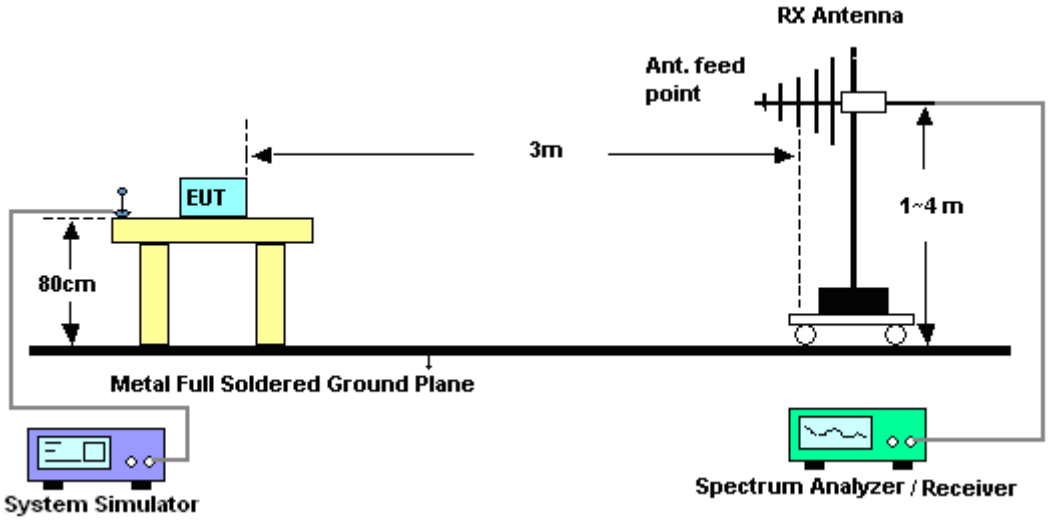
The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Procedures

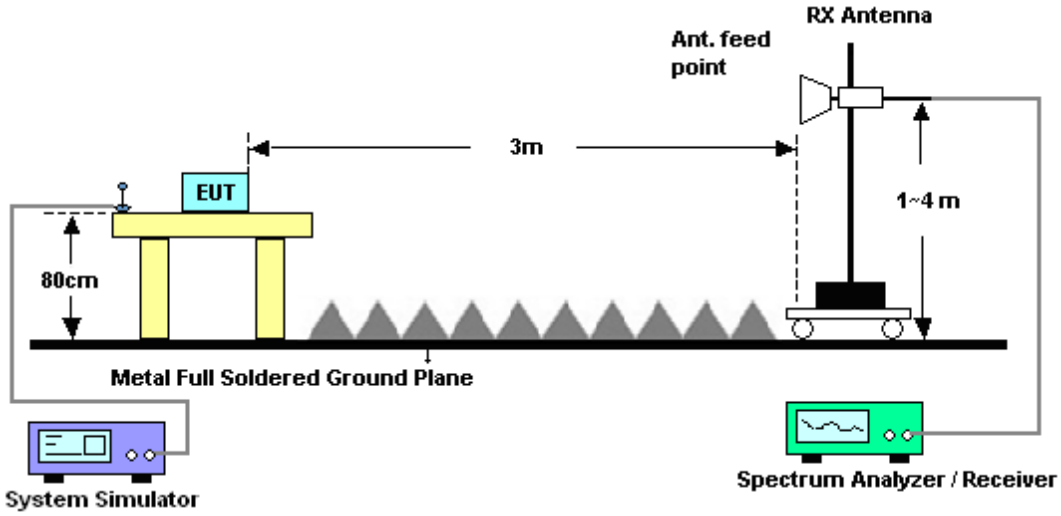
1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

3.7.4 Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.7.5 Test Result of Field Strength of Spurious Radiated

LTE Band 43 / 20MHz / QPSK / RB Size 100 Offset 0									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	7319	-40.48	-13	-27.48	-66.73	-46.99	5.42	11.93	H
	10982	-50.86	-13	-37.86	-81.13	-57.14	6.91	13.19	H
	14645	-47.65	-13	-34.65	-80.56	-53.14	8.45	13.94	H
									H
									H
									H
	7330	-39.35	-13	-26.35	-67.17	-45.86	5.42	11.93	V
	10982	-47.53	-13	-34.53	-81.14	-53.81	6.91	13.19	V
	14645	-45.68	-13	-32.68	-80.13	-51.17	8.45	13.94	V
									V
									V
									V
Middle	7352	-40.21	-13	-27.21	-66.75	-49.24	2.48	11.50	H
	10982	-50.52	-13	-37.52	-81.32	-60.33	2.69	12.50	H
	14656	-47.14	-13	-34.14	-80.36	-56.87	3.45	13.19	H
									H
									H
									H
	7352	-42.68	-13	-29.68	-70.02	-51.71	2.48	11.50	V
	10982	-47.63	-13	-34.63	-80.78	-57.44	2.69	12.50	V
	14660	-45.92	-13	-32.92	-80.87	-55.66	3.46	13.19	V
									V
									V
									V
Highest	7374	-40.51	-13	-27.51	-66.13	-49.59	2.47	11.55	H
	10960	-50.53	-13	-37.53	-80.68	-60.33	2.69	12.49	H
	14656	-47.14	-13	-34.14	-80.51	-56.87	3.45	13.19	H
									H
									H
									H
	7374	-41.59	-13	-28.59	-69.02	-50.67	2.47	11.55	V
	10960	-48.09	-13	-35.09	-81.19	-57.89	2.69	12.49	V
	14656	-46.13	-13	-33.13	-80.76	-55.86	3.45	13.19	V
									V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

3.8 Frequency Stability Measurement

3.8.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.8.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

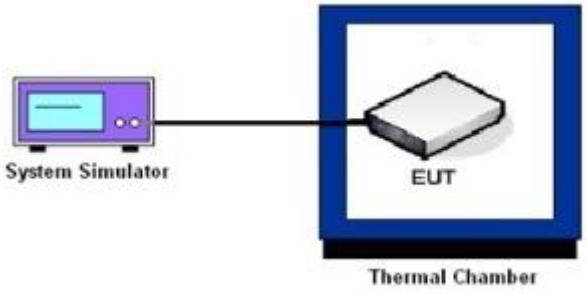
3.8.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.8.4 Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

3.8.5 Test Setup



3.8.6 Test Result of Temperature Variation and Voltage Variation

Test Conditions		LTE Band 43 (QPSK) / Middle Channel	Limit
Temperature (°C)	Voltage (Volt)	BW 20MHz	Note 2.
		Deviation (ppm)	Result
50	Normal Voltage	0.0103	PASS
40	Normal Voltage	0.0105	
30	Normal Voltage	0.0106	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0006	
0	Normal Voltage	0.0004	
-10	Normal Voltage	0.0099	
-20	Normal Voltage	0.0105	
-30	Normal Voltage	0.0003	
20	Maximum Voltage	0.0112	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0107	

Note:

1. Normal Voltage = 100-240V. ；Battery End Point (BEP) = 90.00 V.；Maximum Voltage =264.00 V
2. Note: The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
LTE Base Station	Anritsu	MT8820C	6201432821	GSM/GPRS/WCDMA/LTE	Oct. 27, 2014	Nov. 18, 2014 ~ Jan. 21, 2015	Oct. 26, 2015	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Nov. 18, 2014 ~ Jan. 21, 2015	Jun. 08, 2015	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 17, 2014	Nov. 18, 2014 ~ Jan. 21, 2015	Jul. 16, 2015	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	101749	10Hz ~ 30GHz	Feb. 10, 2014	Nov. 20, 2014 ~ Jan. 21, 2015	Feb. 09, 2015	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Sep. 27, 2014	Nov. 20, 2014 ~ Jan. 21, 2015	Sep. 26, 2015	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz~18GHz	Aug. 19, 2014	Nov. 20, 2014 ~ Jan. 21, 2015	Aug. 18, 2015	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Oct. 02, 2014	Nov. 20, 2014 ~ Jan. 21, 2015	Oct. 01, 2015	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz	Mar. 17, 2014	Nov. 20, 2014 ~ Jan. 21, 2015	Mar. 16, 2015	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1 GHz~26.5 GHz	Oct. 21, 2014	Nov. 20, 2014 ~ Jan. 21, 2015	Oct. 20, 2015	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Nov. 20, 2014 ~ Jan. 21, 2015	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Nov. 20, 2014 ~ Jan. 21, 2015	N/A	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.50**