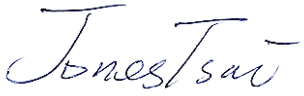
FCC RF Test Report

APPLICANT	:	Super Micro Computer, Inc.
EQUIPMENT	:	IoT Gateway System
BRAND NAME	:	Super Micro Computer, Inc
MODEL NAME	:	SYS-E100-8Q-THAW/SYS-E100-8QE-THAW
FCC ID	:	2AEVX-E100THAW
STANDARD	:	FCC 47 CFR Part 2, 22(H), 24(E), 27(L)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)

The product was received on Jun. 08, 2015 and testing was completed on Jul. 22, 2015. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-C-2004 and has been in 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 District, Tao Yuan City, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG560818	Rev. 01	Initial issue of report	Aug. 28, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.4	§2.1046	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.5)	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(2)	RSS-132(5.4) SRSP-503(5.1.3)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
	§27.50(d)(4)	RSS-139 (6.5) SRSP-513(5.1.2)	Equivalent Isotropic Radiated Power	< 1 Watts	PASS	-
3.5	§24.232(d)	RSS-132 (5.4) RSS-133 (6.4) RSS-139 (6.5)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.6	§2.1049	RSS-GEN(6.6) RSS-132 (3.1) RSS-133 (3.1) RSS-139 (3.1)	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(h)	RSS-132 (5.5) RSS-133 (6.5) RSS-139 (6.6)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(h)	RSS-132 (5.5) RSS-133 (6.5) RSS-139 (6.6)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	RSS-GEN(6.11) RSS-132 (5.3)	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22	PASS	-
	§2.1055 §24.235 §27.54	RSS-GEN(6.11) RSS-133 (6.3) RSS-139 (6.4)		Within Authorized Band		
4.2	§2.1053 §22.917(a) §24.238(a) §27.53(h)	RSS-132 (5.5) RSS-133 (6.5) RSS-139 (6.6)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 13.89 dB at 2480 MHz

1 General Description

1.1 Applicant

Super Micro Computer, Inc.
980 Rock Ave., San Jose, CA, 95131, USA

1.2 Manufacturer

Super Micro Computer, Inc.
980 Rock Ave., San Jose, CA, 95131, USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	IoT Gateway System
Brand Name	Super Micro Computer, Inc
Model Name	SYS-E100-8Q-THAW/SYS-E100-8QE-THAW
FCC ID	2AEVX-E100THAW
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA WLAN 11b/g/n HT20/HT40
HW Version	Module: HE910-D: 0, A1SQN-E/A1SQN MB V1.02
SW Version	Module: firmware 12.00.026, system:RCPL23
EUT Stage	Pre-Production

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 subjective to this standard

Product Specification subjective to this standard	
Tx Frequency	**GSM/GPRS/EDGE:** 850: 824.2 MHz ~ 848.8 MHz 1900: 1850.2 MHz ~ 1909.8MHz **WCDMA:** Band V: 826.4 MHz ~ 846.6 MHz Band II: 1852.4 MHz ~ 1907.6 MHz Band IV: 1712.4 MHz ~ 1752.6 MHz
Rx Frequency	**GSM/GPRS/EDGE:** 850: 869.2 MHz ~ 893.8 MHz 1900: 1930.2 MHz ~ 1989.8 MHz **WCDMA:** Band V: 871.4 MHz ~ 891.6 MHz Band II: 1932.4 MHz ~ 1987.6 MHz Band IV: 2112.4 MHz ~ 2152.6 MHz
Maximum Output Power to Antenna	**GSM/GPRS/EDGE:** 850: 32.39 dBm 1900: 29.46 dBm **WCDMA:** Band V: 22.24 dBm Band II: 22.46 dBm Band IV: 22.52 dBm
Antenna Type	Dipole Antenna
Antenna Gain	Cellular Band: 2.10 dBi PCS Band: 2.80 dBi AWS Band: 2.00 dBi
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK WCDMA: QPSK (Uplink) HSDPA: 64QAM (Downlink) HSUPA: QPSK (Uplink)

1.5 Modification of EUT

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

1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22	GSM850 GPRS class 8	GMSK	1.714	0.0108 ppm	245KGXW
Part 22	GSM850 EDGE class 8	8PSK	0.468	0.0371 ppm	254KG7W
Part 22	WCDMA Band V RMC 12.2Kbps	QPSK	0.166	0.0155 ppm	4M09F9W
Part 24	GSM1900 GPRS class 8	GMSK	1.683	0.0191 ppm	245KGXW
Part 24	GSM1900 EDGE class 8	8PSK	0.728	0.0037 ppm	249KG7W
Part 24	WCDMA Band II RMC 12.2Kbps	QPSK	0.336	0.0144 ppm	4M09F9W
Part 27	WCDMA Band IV RMC 12.2Kbps	QPSK	0.283	0.0139 ppm	4M09F9W

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 District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH03-HY	03CH07-HY

1.8 Applicable Standards

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

- 47 CFR Part 2, 22(H), 24(E), 27(L)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02
- FCC KDB 412172 D01 Determining ERP and ERIP v01r01

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 were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated emissions were investigated as following frequency range:

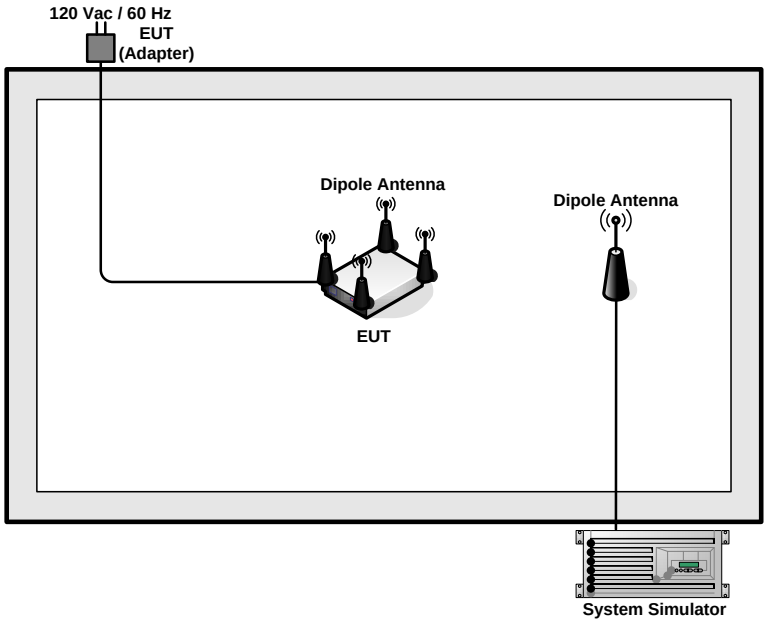
1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V.
2. 30 MHz to 18000 MHz for WCDMA Band IV.
3. 30 MHz to 19000 MHz for GSM1900 and WCDMA Band II.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
GSM 850	■ GPRS class 8 Link ■ EDGE class 8 Link	■ GPRS class 8 Link ■ EDGE class 8 Link
GSM 1900	■ GPRS class 8 Link ■ EDGE class 8 Link	■ GPRS class 8 Link ■ EDGE class 8 Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band IV	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

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.	System Simulator	R&S	CMU 200	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)

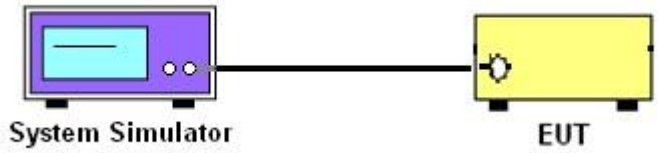
3 Conducted Test Result

3.1 Measuring Instruments

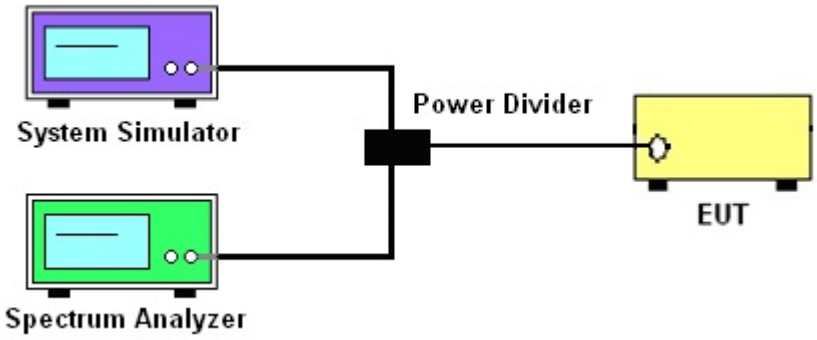
See list of measuring instruments of this test report.

3.2 Test Setup

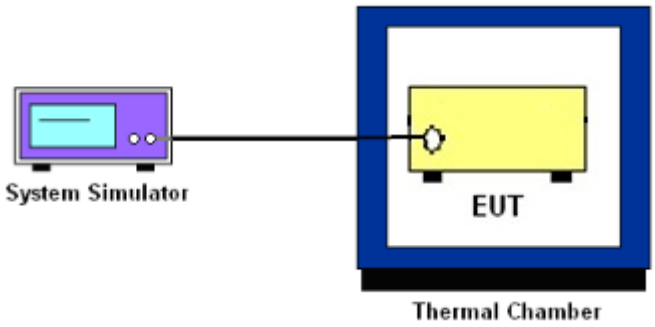
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power and ERP/EIRP

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

The ERP of mobile transmitters must not exceed 7 Watts for GSM850 and WCDMA Band V.

The EIRP of mobile transmitters must not exceed 2 Watts for GSM1900 and WCDMA Band II.

The EIRP of mobile transmitters must not exceed 1 Watts for WCDMA Band IV.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, 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

3.4.2 Test Procedures

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

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.5.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.7.1.
1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. Set EUT to transmit at maximum output power.
3. When the duty cycle is less than 98%, then signal gating will be implemented on the spectrum analyzer by triggering from the system simulator.
4. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer. Record the maximum PAPR level associated with a probability of 0.1%.

3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.6.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The 99% 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 emission bandwidth is defined as the width of the signal between two points, located at the two sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

3.6.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 4.2.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold.
5. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge 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.

3.7.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The band edges of low and high channels for the highest RF powers were measured.
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.

3.8 Conducted Spurious Emission

3.8.1 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 30 MHz up to a frequency including its 10^{th} harmonic.

3.8.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
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.

3.9 Frequency Stability

3.9.1 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.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 D01 v02r02 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. 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.
4. With power OFF, the temperature was raised in 10°C steps 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.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 D01 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.

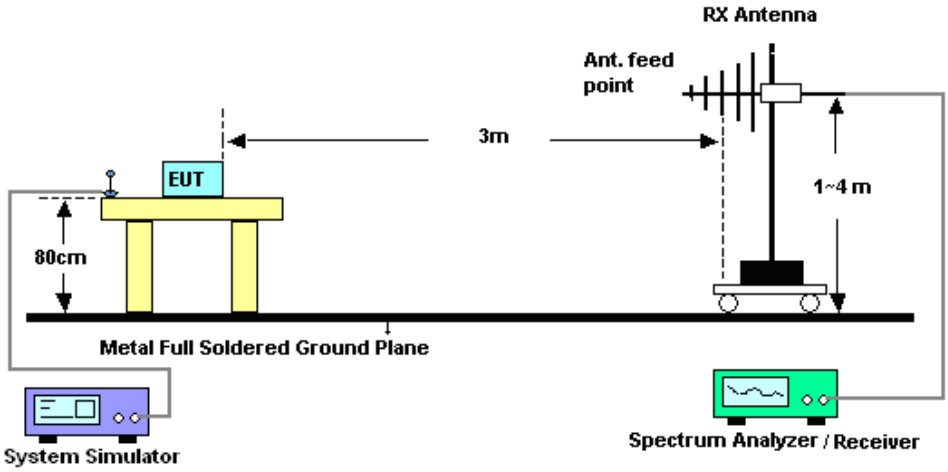
4 Radiated Test Items

4.1 Radiated Test Items Measuring Instruments

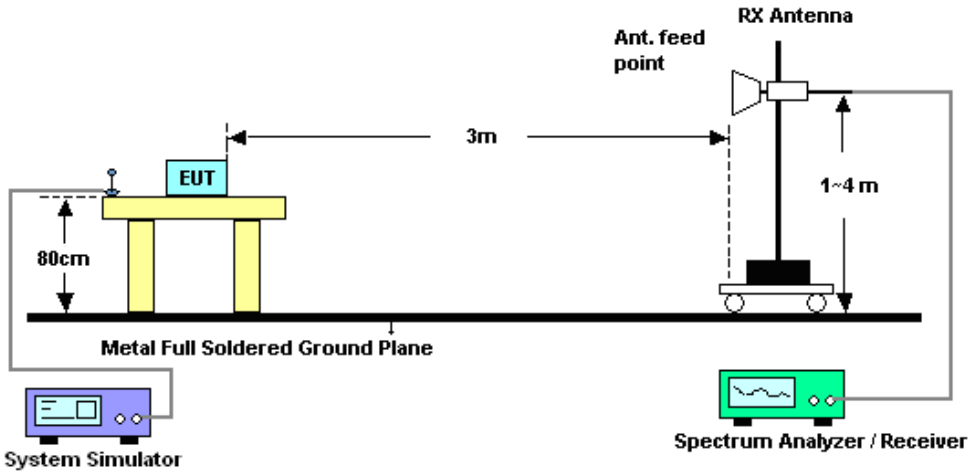
See list of measuring instruments of this test report.

4.1.1 Test Setup

For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

4.2 Field Strength of Spurious Radiation Measurement

4.2.1 Description of Field Strength of Spurious Radiated Measurement

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.

4.2.2 Test Procedures

1. The testing follows FCC KDB 971168 D01 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters above the 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 for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking 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. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
12. ERP (dBm) = EIRP - 2.15
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. 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.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Jun. 24, 2015	Jul. 22, 2015	Jun. 23, 2016	Conducted (TH03-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL883644	Voltage:0~20V;Current:0~5A	Dec. 01, 2014	Jul. 22, 2015	Nov. 30, 2015	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30~70°	Dec. 01, 2014	Jul. 22, 2015	Nov. 30, 2015	Conducted (TH03-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Sep. 27, 2014	Jul. 16, 2015~ Jul. 17, 2015	Sep. 26, 2015	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2014	Jul. 16, 2015~ Jul. 17, 2015	Aug. 18, 2015	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2014	Jul. 16, 2015~ Jul. 17, 2015	Aug. 29, 2015	Radiation (03CH07-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Nov. 05, 2014	Jul. 16, 2015~ Jul. 17, 2015	Nov. 04, 2015	Radiation (03CH07-HY)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 03, 2014	Jul. 16, 2015~ Jul. 17, 2015	Nov. 02, 2015	Radiation (03CH07-HY)
Hygrometer	Testo	608-H1	34897197	N/A	May. 04, 2015	Jul. 16, 2015~ Jul. 17, 2015	May. 03, 2016	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1000MHz	Mar. 12, 2015	Jul. 16, 2015~ Jul. 17, 2015	Mar. 11, 2016	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Oct. 21, 2014	Jul. 16, 2015~ Jul. 17, 2015	Oct. 20, 2015	Radiation (03CH07-HY)
Signal Analyzer	Rohde & Schwarz	FSV 30	101749	10Hz~30GHz	Mar. 10, 2015	Jul. 16, 2015~ Jul. 17, 2015	Mar. 09, 2016	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Jul. 16, 2015~ Jul. 17, 2015	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 degree	N/A	Jul. 16, 2015~ Jul. 17, 2015	N/A	Radiation (03CH07-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	May 22, 2015	Jul. 16, 2015~ Jul. 17, 2015	May 21, 2016	Radiation (03CH07-HY)

6 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**

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GPRS class 8	32.37	32.25	32.39	29.36	29.46	29.32
GPRS class 10	32.35	32.23	32.37	29.35	29.45	29.31
EGPRS class 8	26.71	26.62	26.75	25.45	25.57	25.43
EGPRS class 10	26.68	26.59	26.74	25.70	25.82	25.69

Conducted Power (*Unit: dBm)									
Band	WCDMA Band V			WCDMA Band II			WCDMA Band IV		
Channel	4132	4182	4233	9262	9400	9538	1312	1413	1513
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6	1712.4	1732.6	1752.6
RMC 12.2K	22.18	22.24	22.14	22.46	22.43	22.30	22.37	22.52	22.01
HSDPA Subtest-1	21.92	22.01	21.90	22.28	22.23	22.17	22.13	22.27	21.73
HSDPA Subtest-2	20.96	20.98	20.87	21.30	21.27	21.16	21.20	21.28	20.74
HSDPA Subtest-3	20.64	20.73	20.62	21.01	21.00	20.91	20.89	21.03	20.49
HSDPA Subtest-4	20.46	20.53	20.43	20.83	20.76	20.67	20.71	20.84	20.30
HSUPA Subtest-1	20.89	21.01	20.86	21.27	21.25	21.18	21.08	21.26	20.67
HSUPA Subtest-2	18.76	18.98	18.66	19.15	18.90	18.81	19.20	19.31	19.10
HSUPA Subtest-3	19.67	19.78	19.67	19.99	20.01	19.97	19.85	20.06	19.50
HSUPA Subtest-4	19.13	19.25	19.10	19.45	19.52	19.46	19.37	19.61	19.00
HSUPA Subtest-5	21.09	21.17	21.04	21.40	21.35	21.29	21.29	21.43	20.90

Cellular Band (G_T - L_C = 2.10 dB)									
Modes	GSM850 (GPRS class 8)			GSM850 (EDGE class 8)			WCDMA Band V (RMC 12.2Kbps)		
Channel	128 (Low)	189 (Mid)	251 (High)	128 (Low)	189 (Mid)	251 (High)	4132 (Low)	4182 (Mid)	4233 (High)
Frequency (MHz)	824.2	836.4	848.8	824.2	836.4	848.8	826.4	836.4	846.6
Conducted Power P_T (dBm)	32.37	32.25	32.39	26.71	26.62	26.75	22.18	22.24	22.14
Conducted Power P_T (Watts)	1.73	1.68	1.73	0.47	0.46	0.47	0.17	0.17	0.16
ERP(dBm)	32.32	32.20	32.34	26.66	26.57	26.70	22.13	22.19	22.09
ERP(Watts)	1.706	1.660	1.714	0.463	0.454	0.468	0.163	0.166	0.162

PCS Band (G_T - L_C = 2.80 dB)									
Modes	GSM1900 (GPRS class 8)			GSM1900 (EDGE class 8)			WCDMA Band II (RMC 12.2Kbps)		
Channel	512 (Low)	661 (Mid)	810 (High)	512 (Low)	661 (Mid)	810 (High)	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8	1852.4	1880	1907.6
Conducted Power P_T (dBm)	29.36	29.46	29.32	25.7	25.82	25.69	22.46	22.43	22.3
Conducted Power P_T (Watts)	0.86	0.88	0.86	0.37	0.38	0.37	0.18	0.17	0.17
EIRP(dBm)	32.16	32.26	32.12	28.50	28.62	28.49	25.26	25.23	25.10
EIRP(Watts)	1.644	1.683	1.629	0.708	0.728	0.706	0.336	0.333	0.324

Note: maximum burst average power for GSM, and maximum average power for WCDMA.

EIRP = P_T + G_T – L_C, ERP = EIRP -2.15, 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

AWS Band (G_T - L_C = 2.00 dB)			
Modes	**WCDMA Band IV (RMC 12.2Kbps)**		
Channel	**1312 (Low)**	**1413 (Mid)**	**1513 (High)**
Frequency (MHz)	**1712.4**	**1732.6**	**1752.6**
Conducted Power P_T (dBm)	22.37	22.52	22.01
Conducted Power P_T (Watts)	0.17	0.18	0.16
EIRP(dBm)	24.37	24.52	24.01
EIRP(Watts)	0.274	0.283	0.252

Note: maximum burst average power for GSM, and maximum average power for WCDMA.

EIRP = P_T + G_T – L_C, ERP = EIRP -2.15, 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

Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

GSM850 (GPRS class 8)									
Channel	Frequency (MHz)	ERP (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	1648	-60.15	-13	-47.15	-71.03	-61.91	0.98	4.89	H
	2472	-46.34	-13	-33.34	-62.67	-48.22	1.28	5.32	H
	3296	-59.81	-13	-46.81	-77.23	-63.22	1.54	7.10	H
	1648	-60.79	-13	-47.79	-72.6	-62.55	0.98	4.89	V
	2472	-39.78	-13	-26.78	-57.6	-41.66	1.28	5.32	V
	3296	-56.47	-13	-43.47	-75.33	-59.88	1.54	7.10	V
	4944	-50.89	-13	-37.89	-75.28	-56.02	2.30	9.59	V
Middle	1672	-58.83	-13	-45.83	-70.08	-60.51	0.99	4.82	H
	2512	-43.84	-13	-30.84	-60.49	-45.81	1.29	5.41	H
	3344	-59.41	-13	-46.41	-76.71	-63.02	1.56	7.31	H
	1672	-60.03	-13	-47.03	-72.03	-61.71	0.99	4.82	V
	2512	-36.95	-13	-23.95	-54.99	-38.92	1.29	5.41	V
	3344	-56.41	-13	-43.41	-75.23	-60.02	1.56	7.31	V
	5016	-50.87	-13	-37.87	-75.28	-56.07	2.35	9.70	V
Highest	1696	-54.91	-13	-41.91	-66.66	-56.51	1.00	4.75	H
	2544	-41.11	-13	-28.11	-57.79	-43.09	1.30	5.44	H
	3392	-59.41	-13	-46.41	-77.12	-63.21	1.57	7.52	H
	1696	-55.52	-13	-42.52	-68	-57.12	1.00	4.75	V
	2544	-35.01	-13	-22.01	-53.24	-36.99	1.30	5.44	V
	3392	-55.22	-13	-42.22	-74.03	-59.02	1.57	7.52	V
	5096	-49.92	-13	-36.92	-74.49	-55.08	2.39	9.70	V

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

GSM850 (EDGE class 8)									
Channel	Frequency (MHz)	ERP (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	1648	-63.89	-13	-50.89	-74.94	-65.65	0.98	4.89	H
	2472	-57.33	-13	-44.33	-73.7	-59.21	1.28	5.32	H
	3296	-59.62	-13	-46.62	-77.03	-63.03	1.54	7.10	H
	1648	-63.02	-13	-50.02	-74.89	-64.78	0.98	4.89	V
	2472	-52.71	-13	-39.71	-70.55	-54.59	1.28	5.32	V
	3296	-58.51	-13	-45.51	-77.3	-61.92	1.54	7.10	V
Middle	1672	-64.65	-13	-51.65	-75.81	-66.33	0.99	4.82	H
	2512	-55.04	-13	-42.04	-71.57	-57.01	1.29	5.41	H
	3344	-59.51	-13	-46.51	-77.1	-63.12	1.56	7.31	H
	1672	-63.43	-13	-50.43	-75.4	-65.11	0.99	4.82	V
	2512	-47.75	-13	-34.75	-65.78	-49.72	1.29	5.41	V
	3344	-58.38	-13	-45.38	-77.18	-61.99	1.56	7.31	V
Highest	1696	-63.31	-13	-50.31	-74.94	-64.91	1.00	4.75	H
	2544	-51.94	-13	-38.94	-68.38	-53.92	1.30	5.44	H
	3392	-59.71	-13	-46.71	-77.42	-63.51	1.57	7.52	H
	1696	-62.91	-13	-49.91	-75.29	-64.51	1.00	4.75	V
	2544	-47.09	-13	-34.09	-65.22	-51.22	1.30	5.44	V
	3392	-58.37	-13	-45.37	-77.3	-64.32	1.57	7.52	V

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

GSM1900 (GPRS class 8)									
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	3700	-57.94	-13	-44.94	-77.13	-64.51	1.67	8.24	H
	5548	-50.55	-13	-37.55	-75.31	-57.62	2.65	9.72	H
	7400	-52.67	-13	-39.67	-78.95	-61.81	2.46	11.60	H
	3700	-51.94	-13	-38.94	-72.11	-58.51	1.67	8.24	V
	5548	-39.95	-13	-26.95	-65.85	-47.02	2.65	9.72	V
	7400	-50.94	-13	-37.94	-79.26	-60.08	2.46	11.60	V
Middle	3760	-58.96	-13	-45.96	-78.33	-65.59	1.69	8.31	H
	5640	-54.76	-13	-41.76	-79.25	-61.81	2.71	9.76	H
	7520	-53.04	-13	-40.04	-80.14	-62.43	2.42	11.81	H
	3760	-53.59	-13	-40.59	-74.19	-60.22	1.69	8.31	V
	5640	-48.41	-13	-35.41	-74.1	-55.46	2.71	9.76	V
	7520	-51.42	-13	-38.42	-80.12	-60.81	2.42	11.81	V
Highest	3819	-54.44	-13	-41.44	-75.27	-61.12	1.70	8.38	H
	5730	-54.19	-13	-41.19	-78.94	-61.22	2.76	9.79	H
	7639	-51.58	-13	-38.58	-79.08	-61.08	2.38	11.88	H
	3819	-47.91	-13	-34.91	-69.23	-54.59	1.70	8.38	V
	5730	-52.33	-13	-39.33	-78.02	-59.36	2.76	9.79	V
	7639	-49.79	-13	-36.79	-78.95	-59.29	2.38	11.88	V

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

GSM1900 (EDGE class 8)									
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	3700	-59.02	-13	-46.02	-78.14	-65.59	1.67	8.24	H
	5550	-54.05	-13	-41.05	-78.61	-61.12	2.65	9.72	H
	7400	-52.55	-13	-39.55	-79.1	-61.69	2.46	11.60	H
	3700	-57.45	-13	-44.45	-77.39	-64.02	1.67	8.24	V
	5550	-51.64	-13	-38.64	-77.53	-58.71	2.65	9.72	V
	7400	-50.97	-13	-37.97	-79.14	-60.11	2.46	11.60	V
Middle	3763	-58.06	-13	-45.06	-77.88	-64.69	1.69	8.32	H
	5640	-54.03	-13	-41.03	-78.79	-61.08	2.71	9.76	H
	7520	-52.16	-13	-39.16	-79.22	-61.55	2.42	11.81	H
	3763	-57.39	-13	-44.39	-77.78	-64.02	1.69	8.32	V
	5640	-52.83	-13	-39.83	-78.56	-59.88	2.71	9.76	V
	7520	-50.43	-13	-37.43	-79.17	-59.82	2.42	11.81	V
Highest	3819	-56.81	-13	-43.81	-77.7	-63.49	1.70	8.38	H
	5729	-54.05	-13	-41.05	-78.79	-61.08	2.76	9.79	H
	7639	-51.31	-13	-38.31	-78.81	-60.81	2.38	11.88	H
	3819	-56.44	-13	-43.44	-77.53	-63.12	1.70	8.38	V
	5729	-53.19	-13	-40.19	-78.82	-60.22	2.76	9.79	V
	7639	-49.89	-13	-36.89	-79.05	-59.39	2.38	11.88	V

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

WCDMA Band V(RMC 12.2Kbps)									
Channel	Frequency (MHz)	ERP (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	1653	-64.16	-13	-51.16	-75.33	-65.9	0.98	4.87	H
	2480	-34.89	-13	-21.89	-51.28	-36.8	1.28	5.34	H
	3305	-59.85	-13	-46.85	-77.44	-63.3	1.54	7.14	H
	1653	-62.76	-13	-49.76	-74.91	-64.5	0.98	4.87	V
	2480	-26.89	-13	-13.89	-44.94	-28.8	1.28	5.34	V
	3305	-58.65	-13	-45.65	-77.33	-62.1	1.54	7.14	V
Middle	1672	-64.65	-13	-51.65	-75.81	-66.33	0.99	4.82	H
	2512	-35.15	-13	-22.15	-51.78	-37.12	1.29	5.41	H
	3344	-60.18	-13	-47.18	-77.49	-63.79	1.56	7.31	H
	1672	-63.34	-13	-50.34	-75.27	-65.02	0.99	4.82	V
	2512	-29.94	-13	-16.94	-47.83	-31.91	1.29	5.41	V
	3344	-58.42	-13	-45.42	-77.13	-62.03	1.56	7.31	V
Highest	1696	-64.01	-13	-51.01	-75.71	-65.61	1.00	4.75	H
	2544	-38.11	-13	-25.11	-54.79	-40.09	1.30	5.44	H
	3392	-59.52	-13	-46.52	-77.21	-63.32	1.57	7.52	H
	1696	-63.61	-13	-50.61	-76.01	-65.21	1.00	4.75	V
	2544	-31.23	-13	-18.23	-49.44	-33.21	1.30	5.44	V
	3392	-58.71	-13	-45.71	-77.6	-62.51	1.57	7.52	V

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

WCDMA Band II(RMC 12.2Kbps)									
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	3705	-57.62	-13	-44.62	-77.12	-64.2	1.67	8.25	H
	5557	-53.44	-13	-40.44	-78.23	-60.5	2.66	9.72	H
	7410	-52.44	-13	-39.44	-78.98	-61.6	2.46	11.62	H
	3705	-49.92	-13	-36.92	-70.27	-56.5	1.67	8.25	V
	5557	-50.54	-13	-37.54	-75.98	-57.6	2.66	9.72	V
	7410	-50.84	-13	-37.84	-79.08	-60	2.46	11.62	V
Middle	3763	-58.17	-13	-45.17	-78.02	-64.8	1.69	8.32	H
	5639	-53.15	-13	-40.15	-77.66	-60.2	2.71	9.76	H
	7520	-52.11	-13	-39.11	-79.15	-61.5	2.42	11.81	H
	3763	-55.57	-13	-42.57	-76.42	-62.2	1.69	8.32	V
	5639	-46.55	-13	-33.55	-72.61	-53.6	2.71	9.76	V
	7520	-50.41	-13	-37.41	-79.22	-59.8	2.42	11.81	V
Highest	3815	-56.13	-13	-43.13	-77.31	-62.8	1.70	8.38	H
	5723	-54.16	-13	-41.16	-78.94	-61.2	2.75	9.79	H
	7630	-51.31	-13	-38.31	-79.1	-60.8	2.39	11.88	H
	3815	-53.83	-13	-40.83	-75.21	-60.5	1.70	8.38	V
	5723	-52.76	-13	-39.76	-78.45	-59.8	2.75	9.79	V
	7630	-50.11	-13	-37.11	-79.11	-59.6	2.39	11.88	V

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

WCDMA Band IV(RMC 12.2Kbps)									
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	3427	-50.50	-13	-37.50	-68.05	-56.6	1.58	7.68	H
	5137	-55.22	-13	-42.22	-78.64	-62.5	2.42	9.70	H
	6850	-52.02	-13	-39.02	-78.44	-60	2.64	10.62	H
	3427	-41.50	-13	-28.50	-60.32	-47.6	1.58	7.68	V
	5137	-53.52	-13	-40.52	-77.89	-60.8	2.42	9.70	V
	6850	-51.12	-13	-38.12	-78.6	-59.1	2.64	10.62	V
Middle	3469	-51.83	-13	-38.83	-69.36	-58.1	1.59	7.86	H
	5198	-54.25	-13	-41.25	-78.33	-61.5	2.45	9.70	H
	6931	-52.50	-13	-39.50	-78.97	-60.6	2.61	10.72	H
	3469	-41.93	-13	-28.93	-60.95	-48.2	1.59	7.86	V
	5198	-51.85	-13	-38.85	-76.28	-59.1	2.45	9.70	V
	6931	-51.50	-13	-38.50	-78.82	-59.6	2.61	10.72	V
Highest	3504	-50.80	-13	-37.80	-68.51	-57.2	1.61	8.00	H
	5257	-54.39	-13	-41.39	-78.61	-61.6	2.49	9.70	H
	7010	-52.57	-13	-39.57	-78.61	-60.8	2.59	10.82	H
	3504	-41.20	-13	-28.20	-60.37	-47.6	1.61	8.00	V
	5257	-51.69	-13	-38.69	-77.02	-58.9	2.49	9.70	V
	7010	-51.67	-13	-38.67	-78.87	-59.9	2.59	10.82	V

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

Appendix C. Test Setup Photographs