Radio Test Report

Equipment	:	**OBD dongle**
Brand Name	:	**AUTOMATIC**
Model No.	:	**Link-v3**
FCC ID	:	**2AAC6-B11**
FCC Standard	:	**47 CFR FCC Part 22(H), 24(E)**
WCDMA Band	:	**II, V**
GSM Band	:	**850, 1900**
FCC Classification	:	**PCB**
Applicant	:	**Automatic Labs, Inc.** 575 Florida Street, Suite 100, SF, CA 94110
Manufacturer		**Maintek Computer** No.233 Jin Feng Road Suzhou New District China

The product sample received on Jan. 26, 2015 and completely tested on Apr. 15, 2015. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI/TIA-603-D-2010, ANSI C63.4 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:

Kevin Liang / Assistant Manager

Testing Laboratory
1190

Table of Contents

1 GENERAL DESCRIPTION 5

1.1 Information 5
1.2 Support Equipment 7
1.3 Testing Applied Standards 7
1.4 Testing Location Information 7
1.5 Measurement Uncertainty 8

2 TEST CONFIGURATION OF EUT 9

2.1 The Worst Case Measurement Configuration 9
2.2 Test Setup Diagram 10

3 TRANSMITTER TEST RESULT 11

3.1 Emission Bandwidth 11
3.2 Transmitter Conducted Output Power 14
3.3 Effective Radiated Power 17
3.4 Effective Isotropic Radiated Power 19
3.5 Transmitter Conducted Unwanted Emissions 21
3.6 Transmitter Conducted Bandedge Emissions 24
3.7 Transmitter Radiated Unwanted Emissions 28
3.8 Frequency Stability 40

4 TEST EQUIPMENT AND CALIBRATION DATA 42

APPENDIX A. TEST PHOTOS

APPENDIX B. PHOTOGRAPHS OF EUT

Summary of Test Result

Test Specifications					
Report Clause	**FCC Std. Clause**	**Description**	**Measured**	**Limit**	**Result**
3.1	2.1049 22.917(a) 24.238(a) 27.53(h)	Emission Bandwidth	Bandwidth GXW=247kHz F9W=4.093MHz	Information for Emission Designator	Complied
3.1.6	2.1047	Emission Designator	GXW, F9W	Information only	Complied
3.2	2.1046	Transmitter Conducted Output Power	Conducted Power [dBm] Cellular: 33.6 PCS: 29.2	Information for RF exposure	Complied
3.2.7	24.232(d) 27.50(d)	Peak to Average Ratio	3.52dB	≤13dB	Complied
3.3	22.913(a)	Effective Radiated Power (ERP)	ERP [dBm] Cellular: 31.60	≤7W[38.45dBm]	Complied
3.4	24.232(c) 27.50(d)	Effective Isotropic Radiated Power (EIRP)	EIRP [dBm] PCS: 27.87	PCS: ≤2W[33.01dBm] AWS: ≤1W[30.00dBm]	Complied
3.5	2.1051 22.917(a) 24.238(a) 27.53(h)	Transmitter Conducted Unwanted Emissions	refer to test data	≤43+10log(P) [-13dBm] P=TX Power in Watts	Complied
3.6	2.1051 22.917(a) 24.238(a) 27.53(h)	Transmitter Conducted Bandedge Emissions	refer to test data	≤43+10log(P) [-13dBm] P=TX Power in Watts	Complied
3.7	2.1053 22.917(a) 24.238(a) 27.53(h)	Transmitter Radiated Unwanted Emissions	[dBm]: 39.700MHz 30.17 (Margin 9.83dB)	≤43+10log(P) [-13dBm] P=TX Power in Watts	Complied
3.8	2.1055 22.355 24.353 27.54	Frequency Stability	Cellular: -0.0172ppm PCS: 0.0179ppm	≤2.5ppm within band	Complied

Revision History

Report No.	Version	Description	Issued Date
FG512311	Rev. 01	Initial issue of report	May 14, 2015

1 General Description

1.1 Information

1.1.1 RF General Information

Function	Class/Category	
☒ GPRS	Multi-Slot Class	12
☒ EDGE	Multi-Slot Class	12
☒ HSDPA	Category	8
☒ HSUPA	Category	6

RF General Information							
Freq. Band	Mode	TX Ch. Freq. (MHz)	Channel Number	BW (MHz)	Emission Designator	Max. ERP/EIRP	
						(dBm)	(W)
Cellular	GSM850	824.2-848.8	128-251	0.317	246KGXW	31.60	1.445
Cellular	WCDMA850	826.4-846.6	4132-4233	4.686	4M09F9W	18.57	0.072
PCS	GSM1900	1850.2-1909.8	512-810	0.314	247KGXW	27.87	0.612
PCS	WCDMA1900	1852.4-1907.6	9262-9538	4.668	4M08F9W	18.03	0.064

Note 1: GPRS/EDGE mode consists of GMSK modulation.
Note 2: WCDMA Rel.99 mode consists of QPSK modulation and HSDPA Rel.7mode consists of QPSK and 16QAM modulation.
Note 3: WCDMA850 (WCDMA Band V), WCDMA1900 (WCDMA Band II)

1.1.2 Antenna Information

Antenna Category	
☒	Integral antenna (antenna permanently attached)
	☐ Temporary RF connector provided
	☒ No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.

Antenna General Information				
Operating Band	**Ant. Cat.**	**Ant. Type**	**Connector**	**Gain (dBi)**
850/Band V	Integral	Printed	Spring contact	-1.8
1900/Band II	Integral	Printed	Spring contact	-2

1.1.3 Type of EUT

Identify EUT	
Presentation of Equipment	☐ Production ; ☐ Pre-Production ; ☒ Prototype
Type of EUT	
☒	Stand-alone
☐	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: …
☐	Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: …
☐	Other:

1.1.4 EUT Operational Condition

Supply Voltage	☒ AC mains	☐ DC	
Type of DC Source	☐ Internal DC supply	☒ AC adapter	☐ From System
Test Voltage	☒ Vnom (12 V)	☒ Vmax (16 V)	☒ Vmin (9 V)
Test Climatic	☒ Tnom (20°C)	☒ Tmax (55°C)	☒ Tmin (-30°C)

1.2 Support Equipment

Support Equipment - Radiated Emission			
No.	**Equipment**	**Brand Name**	**Model Name**
1	2G/3G Station	Agilent	8960

1.3 Testing Applied Standards

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

- FCC Part 22(H), 24(E)
- ANSI/TIA-603-D-2010
- FCC KDB 971168
- FCC KDB 662911
- FCC KDB 412172

1.4 Testing Location Information

Testing Location							
☒	HWA YA	ADD	:	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	:	886-3-327-0973
Test Site Registration Number: FCC 636805							
Test Condition		**Test Site No.**		**Test Engineer**		**Test Environment**	
RF Conducted		TH01-HY		Candy		22.6°C / 66%	
Radiated Emission		03CH03-HY		Daniel		23.9°C / 51%	

1.5 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty		
Test Item		**Uncertainty**
AC power-line conducted emissions		±2.2 dB
Emission bandwidth		±1.4 %
RF output power, conducted		±0.6 dB
Unwanted emissions, conducted	30 – 1000 MHz	±0.5 dB
	1 – 18 GHz	±0.6 dB
	18 – 40 GHz	±0.8 dB
	40 – 200 GHz	N/A
All emissions, radiated	30 – 1000 MHz	±2.5 dB
	1 – 18 GHz	±3.5 dB
	18 – 40 GHz	±3.8 dB
	40 – 200 GHz	N/A
Temperature		±0.8 ℃
Humidity		±3 %
DC and low frequency voltages		±3 %
Time		±1.4 %
Duty Cycle		±1.4 %

2 Test Configuration of EUT

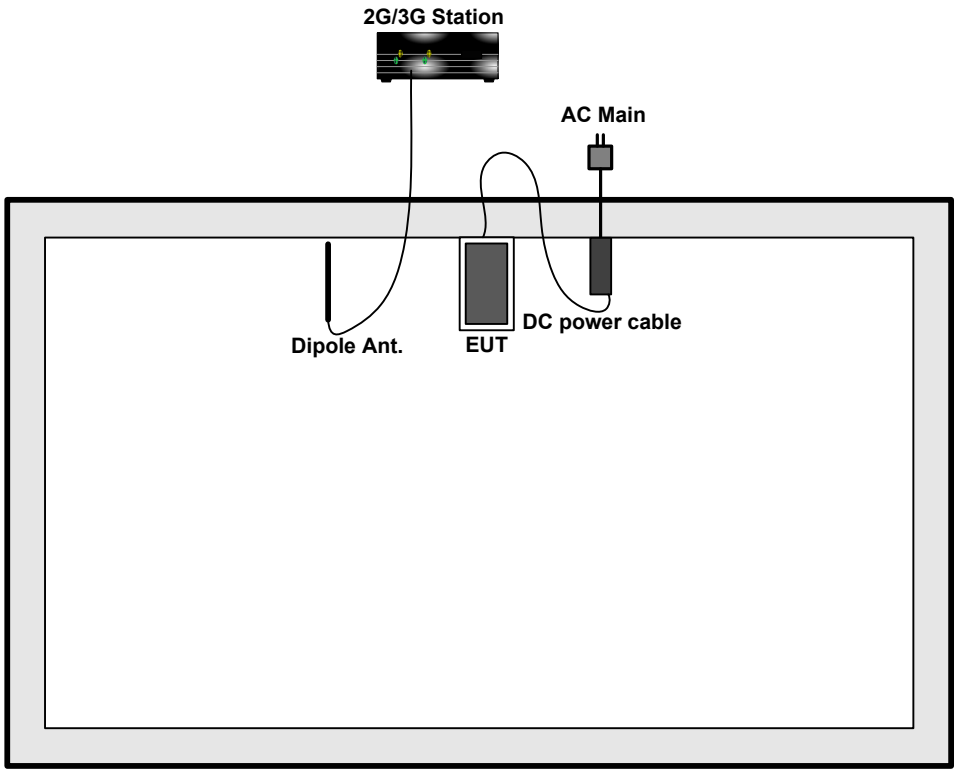
2.1 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emission Bandwidth, Transmitter Conducted Output Power, Peak-Average Ratio, Transmitter Conducted Bandedge Emissions Transmitter Conducted Unwanted Emissions, Frequency Stability
Test Condition	Conducted measurement at transmit chains
Modulation Mode	GSM, WCDMA

The Worst Case Mode for Following Conformance Tests			
Tests Item	Effective Radiated Power (ERP) Effective Isotropic Radiated Power (EIRP) Transmitter Radiated Unwanted Emissions		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
Modulation Mode	GSM, WCDMA		
User Position	☐ EUT will be placed in fixed position.		
	☒ EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes.		
	☐ EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
Worst Planes of EUT	V		

2.2 Test Setup Diagram

Test Setup Diagram - Radiated Test



3 Transmitter Test Result

3.1 Emission Bandwidth

3.1.1 Emission Bandwidth Limit

Emission Bandwidth Limit
Information for Emission Designator.
Note 1: The 99% occupied bandwidth is the frequency bandwidth of the signal power at the 99% channel power of occupied bandwidth when resolution bandwidth should be approximately 1 % to 5 % of the span. These measurements shall also be performed at normal test conditions.

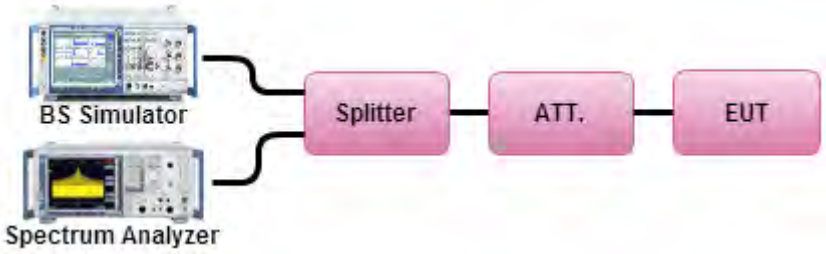
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method			
☒	For the emission bandwidth shall be measured using one of the options below:		
	☒	Refer as ANSI/TIA-603-D, clause 1.3.4.4 for test bandwidth.	
	☒	Refer as KDB 971168, clause 3 for signal bandwidth.	
	☒	Refer as IC RSS-Gen, clause 6.4 for emission bandwidth.	
☒	For conducted measurement.		
	☒	If EUT supports single transmit chain and measurements performed on this transmit chain.	
	☒	If EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.	
	☒	If EUT supports multiple transmit chains using options given below:	
		☒	Option 1: Multiple transmit chains measurements need to be performed on one of the active transmit chains (antenna outputs). All measurement had be performed on transmit chains 1.
		☐	Option 2: Multiple transmit chains measurements need to be performed on each transmit chains individually (antenna outputs). All measurement had be performed on all transmit chains.
☐	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.		

3.1.4 Test Setup

Emission Bandwidth


3.1.5 Test Result of Emission Bandwidth

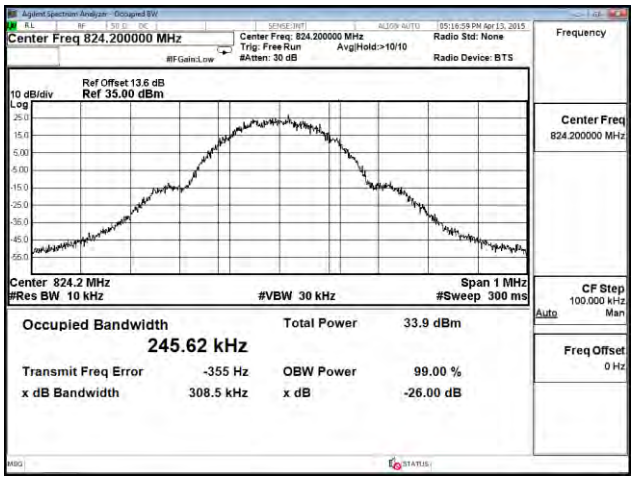
Emission Bandwidth Result				
Mode	**Ch.**	**Freq. (MHz)**	**26dB Bandwidth (MHz)**	**99% Bandwidth (MHz)**
GSM850	128	824.2	0.309	0.246
	189	836.4	0.317	0.242
	251	848.8	0.316	0.246
WCDMA 850	4132	826.4	4.686	4.093
	4182	836.4	4.686	4.091
	4233	846.6	4.665	4.079
GSM1900	512	1850.2	0.314	0.244
	661	1880	0.314	0.247
	810	1909.8	0.313	0.243
WCDMA1900	9262	1852.4	4.668	4.077
	9400	1880	4.640	4.078
	9538	1907.6	4.667	4.078
Limit			**N/A**	
Result			**Complied**	

3.1.6 Emission Designator

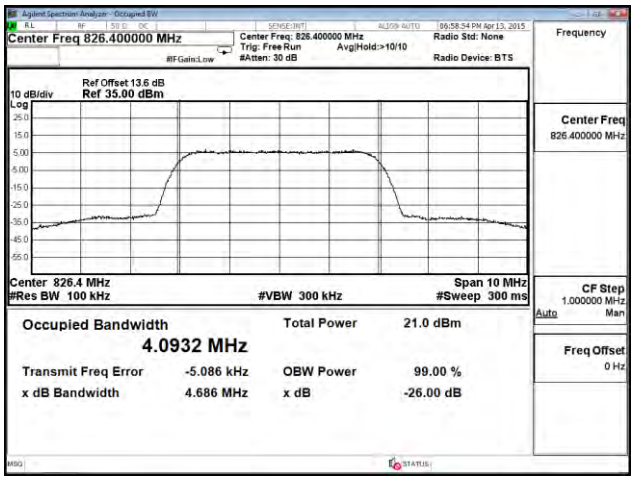
Emission Designator	
Mode	**Emission Designator**
GSM850	246KGXW
WCDMA850	4M09F9W
GSM1900	247KGXW
WCDMA1900	4M08F9W
Note 1: GPRS BW=99% BW, G=Phase Modulation, X=Cases not otherwise covered, W=Combination (Audio/Data) Note 2: WCDMA 99% BW, F = Frequency Modulation, 9 = Composite Digital Info, W = Combination (Audio/Data)	

Emission Bandwidth Plots

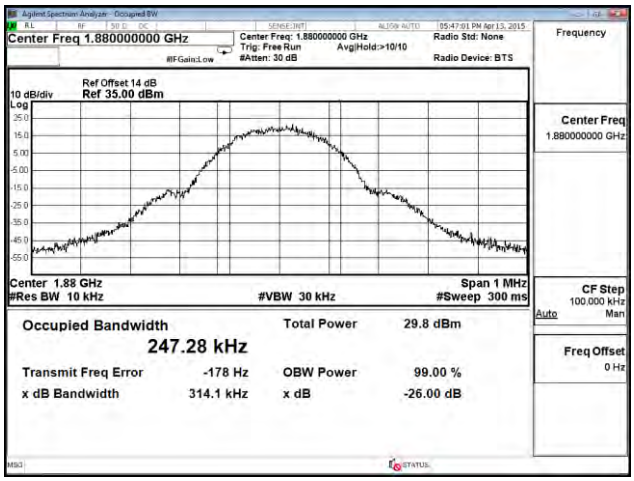
GSM850



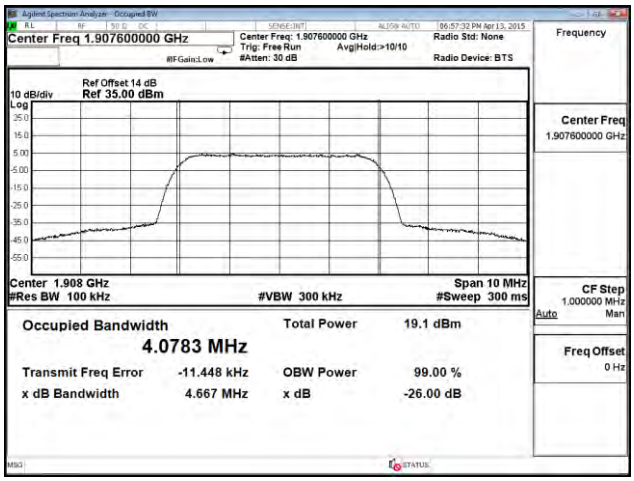
GSM1900



WCDMA850



WCDMA1900



3.2 Transmitter Conducted Output Power

3.2.1 Transmitter Conducted Output Power Limit

Transmitter Conducted Output Power Limit
Information for RF exposure

3.2.2 Transmitter Peak to Average Ratio Limit

Transmitter Peak to Average Ratio Limit
PAR ≤ 13dB

3.2.3 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.4 Test Procedures

Test Method		
☒	Transmitter Conducted Output Power	
	☒	Refer as FCC KDB 941225 D03 for GSM GPRS EDGE modes.
	☐	Refer as FCC KDB 941225 D04 for GSM/(E)GPRS Dual Transfer Mode.
	☒	Refer as FCC KDB 941225 D01 for 3G device modes.
	☐	Refer as FCC KDB 941225 D02 for 3GPP R6 and R7 additional information.
	☐	Refer as FCC KDB 941225 D05 for LTE modes.
	☒	Refer as RSS-Gen, clause 4.8 for power measurement.
☒	Transmitter Peak-Average Ratio	
	☒	For WCDMA signals refer as KDB 971168, clause 6 for CCDF function.
	☒	For GSM signals refer average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power.
☒	For conducted measurement.	
	☒	If EUT supports single transmit chain and measurements performed on this transmit chain.
	☒	If EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.
	☒	If EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.

3.2.5 Test Setup

Transmitter Conducted Output Power

3.2.6 Test Result of Transmitter Conducted Output Power

GSM/GPRS/EDGE Worst Modulation for Output Power	
Mode Class	
GPRS Multi-slot Class	12 (max 4 Tx Uplink slots)
EDGE Multi-slot Class	12 (max 4 Tx Uplink slots)

Band	**GPRS/EDGE 850**			**GPRS/EDGE 1900**		
Channel	**128**	**189**	**251**	**512**	**661**	**810**
Frequency (MHz)	**824.2**	**836.4**	**848.8**	**1850.2**	**1880**	**1909.8**
GPRS 8(1TX Slot)	33.60	33.59	33.56	29.20	29.09	28.98
GPRS 10(2TX Slot)	33.58	33.57	33.54	29.19	29.08	28.97
GPRS 11(3TX Slot)	33.09	33.07	32.97	28.89	28.70	28.73
GPRS 12(4TX Slot)	31.86	31.83	31.71	27.72	27.53	27.56
EDGE 8(1TX Slot) – MCS 1	28.31	28.27	28.22	26.17	25.99	26.01
EDGE 10(2TX Slot) – MCS 1	28.30	28.27	28.24	26.16	25.97	26.01
EDGE 11(3TX Slot – MCS 1	28.31	28.28	28.24	26.14	25.96	26.00
EDGE 12(1TX Slot) – MCS 1	28.27	28.22	28.18	26.14	25.95	25.98

Source-Based Time-Averaged Power						
Band	**GPRS/EDGE 850**			**GPRS/EDGE 1900**		
Channel	**128**	**189**	**251**	**512**	**661**	**810**
Frequency (MHz)	**824.2**	**836.4**	**848.8**	**1850.2**	**1880**	**1909.8**
GPRS 8(1TX Slot)	24.60	24.59	24.56	20.20	20.09	19.98
GPRS 10(2TX Slot)	27.58	27.57	27.54	23.19	23.08	22.97
GPRS 11(3TX Slot)	28.83	28.81	28.71	24.63	24.44	24.47
GPRS 12(4TX Slot)	28.86	28.83	28.71	24.72	24.53	24.56
EDGE 8(1TX Slot) – MCS 1	19.31	19.27	19.22	17.17	16.99	17.01
EDGE 10(2TX Slot) – MCS 1	22.30	22.27	22.24	20.16	19.97	20.01
EDGE 11(3TX Slot – MCS 1	24.05	24.02	23.98	21.88	21.70	21.74
EDGE 12(1TX Slot) – MCS 1	25.27	25.22	25.18	23.14	22.95	22.98

WCDMA Worst Modulation for Output Power		
3GPP Release Ver.	**Mode**	**Configuration**
99	WCDMA	12.2kbps RMC
5	HSDPA	Subtest 1 ~ Subtest 4
6	HSUPA	Subtest 1 ~ Subtest 5

Mode	**Subtest**	**RF Output Power [dBm]**					
		Band V (Cellular)			**Band II (PCS)**		
		4132	**4182**	**4233**	**9262**	**9400**	**9538**
WCDMA	12.2 kbps RMC	22.52	22.65	22.66	22.29	22.24	22.05
HSDPA	Subtest 1	22.52	22.64	22.62	22.23	22.09	21.96
	Subtest 2	22.23	22.42	22.39	22.02	21.85	21.63
	Subtest 3	21.97	22.16	22.10	21.75	21.54	21.38
	Subtest 4	21.70	21.91	21.89	21.53	21.28	21.04
HSUPA	Subtest 1	21.23	21.49	21.42	21.08	20.91	20.69
	Subtest 2	20.17	20.44	20.40	20.08	19.80	19.53
	Subtest 3	21.01	21.34	21.28	20.94	20.67	20.47
	Subtest 4	20.49	20.75	20.66	20.30	19.87	19.73
	Subtest 5	20.97	21.17	21.15	20.76	20.73	20.68

3.2.7 Test Result of Transmitter Peak to Average Ratio

Transmitter Peak to Average Ratio Result			
Mode	**Ch.**	**Freq. (MHz)**	**Peak to Average Ratio (dB)**
GSM850	128	824.2	0.10
GSM850	189	836.4	0.11
GSM850	251	848.8	0.12
WCDMA850	4132	826.4	3.18
WCDMA850	4182	836.4	3.26
WCDMA850	4233	846.6	3.41
GSM1900	512	1850.2	0.09
GSM1900	661	1880.0	0.09
GSM1900	810	1909.8	0.09
WCDMA1900	9262	1852.4	3.39
WCDMA1900	9400	1880.0	3.52
WCDMA1900	9538	1907.6	3.48
Limit			**13**
Result			**Complied**

3.3 Effective Radiated Power

3.3.1 Effective Radiated Power Limit

Cellular Band Effective Radiated Power (ERP) Limit
ERP ≤ 7W [38.45dBm] (EIRP 40.6dBm [135.8 dBuV/m at 3m]).

3.3.2 Measuring Instruments

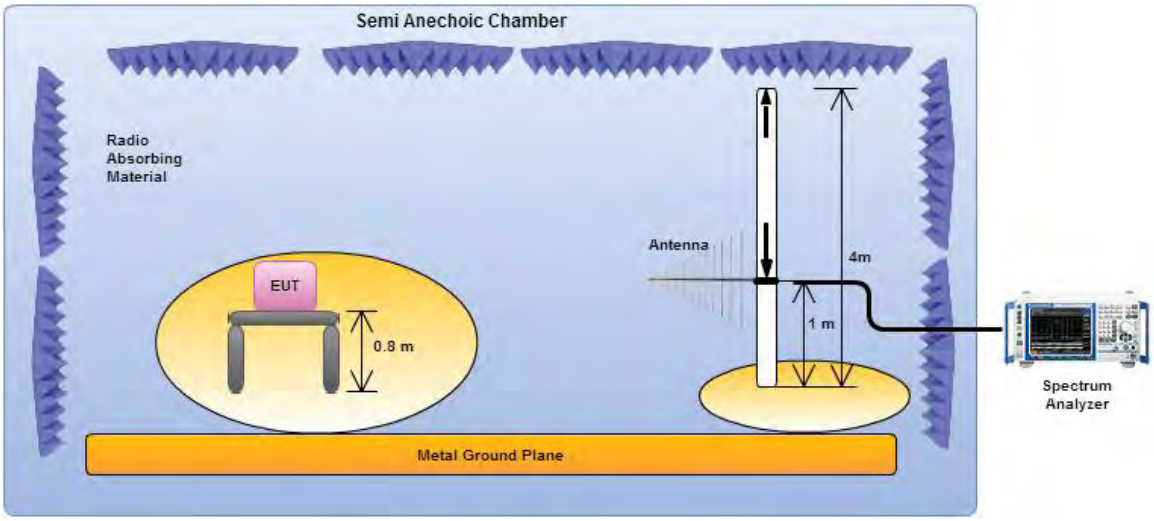
Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method	
☒	For wideband (> 1 MHz) digital transmission systems power measure following as KDB 971168.
☒	Effective Radiated Power (ERP)
☐	Refer as KDB 412172, clause 1.3.2 following as power approach. e.i.r.p.= P_T+G_T.
☒	Refer as KDB 412172, clause 1.3.1 following as field strength approach. e.i.r.p.= $(E \times d)^2 / 30$.
☒	Refer as KDB 412172, clause 1.4.4 ERP = EIRP - 2.15 dB.
☐	For radiated measurement.
☐	Refer as KDB 412172, clause 2.2 following eirp can be used radiated test configuration.
☒	Refer as KDB 412172, clause 5 following eirp can be directly determined using the field strength.
☐	Refer as KDB 412172, clause 6 following eirp can be used signal/antenna substitution techniques.
☐	Refer as ANSI/TIA-603-D-2010, clause 2.2.17 for radiated measurement.
☒	Refer as RSS-Gen, clause 4.8 for power measurement.

3.3.4 Test Setup

Effective Radiated Power



Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna and the frequency range of 1 GHz to 40 GHz using a calibrated horn antenna.

3.3.5 Test Result of Effective Radiated Power

E-Field method / Substitute method

Mode	Ch.	Freq. [MHz]	E-Field [dBuV/m] @3m	ERP [dBm]	ERP [W]	ERP Limit [dBm]	Margin [dB]	Pol [H/V]
GSM850	128	824.2	127.07	29.72	0.938	38.45	-8.73	H
	189	836.4	127.42	30.07	1.016	38.45	-8.38	H
	251	848.8	128.95	31.60	1.445	38.45	-6.85	H

Note 1: EUT was tested in all GPRS configurations and the highest power is reported in 1 Tx Slot GPRS mode.
Note 2: EUT was tested with its standard battery.
Note 3: Measurement worst emissions of receive antenna polarization.
Note 4: ERP [dBm] = E-Field [dBuV/m] - 95.2 - 2.15; E-Field [dBuV/m] = Raw [dBuV] + Factor [dB]

Mode	Ch.	Freq. [MHz]	E-Field [dBuV/m] @3m	ERP [dBm]	ERP [W]	ERP Limit [dBm]	Margin [dB]	Pol [H/V]
WCDMA850	4132	826.4	114.29	16.94	0.049	38.45	-21.51	H
	4182	836.4	115.07	17.72	0.059	38.45	-20.73	H
	4233	846.6	115.92	18.57	0.072	38.45	-19.88	H

Note 1: EUT was tested in all WCDMA configurations and the highest power is reported in 12.2 kbps RMC and TPC bits all set “1”.
Note 2: EUT was tested with its standard battery.
Note 3: Measurement worst emissions of receive antenna polarization.
Note 4: ERP [dBm] = E-Field [dBuV/m] - 95.2 - 2.15; E-Field [dBuV/m] = Raw [dBuV] + Factor [dB]

3.4 Effective Isotropic Radiated Power

3.4.1 Effective Isotropic Radiated Power Limit

PCS Band and AWS Band Effective Isotropic Radiated Power (EIRP) Limit
PCS Band: EIRP ≤ 2W [33.01dBm] (128.2 dBuV/m at 3m) AWS Band: EIRP ≤ 1W [30.00dBm] (125.2 dBuV/m at 3m)

3.4.2 Measuring Instruments

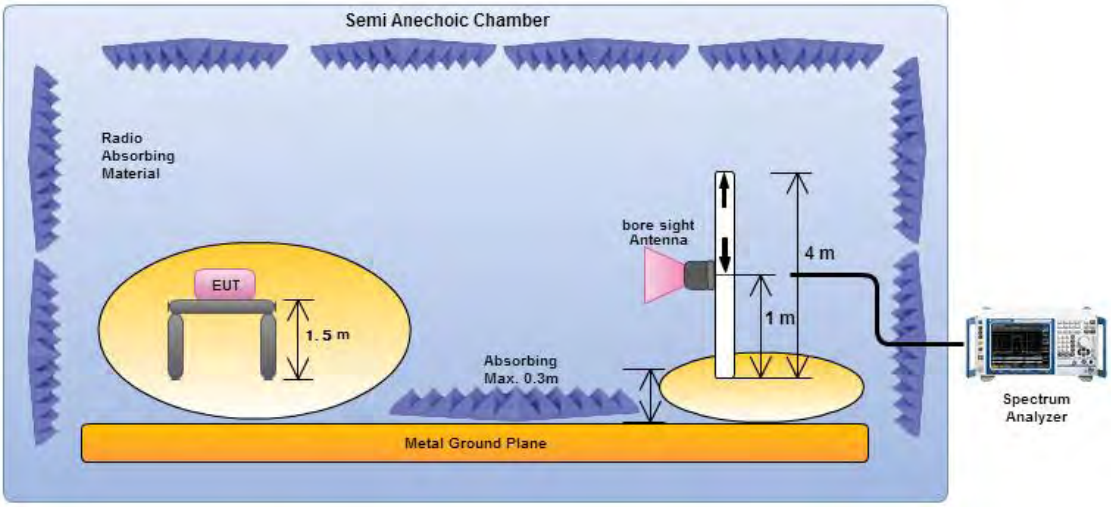
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method	
☒	For wideband (> 1 MHz) digital transmission systems power measure following as KDB 971168.
☒	Effective Isotropic Radiated Power (EIRP)
	☐ Refer as KDB 412172, clause 1.3.2 following as power approach. e.i.r.p.= P_T+G_T.
	☒ Refer as KDB 412172, clause 1.3.1 following as field strength approach. e.i.r.p.= $(E \times d)^2 / 30$.
☐	For radiated measurement.
	☐ Refer as KDB 412172, clause 2.2 following eirp can be used radiated test configuration.
	☒ Refer as KDB 412172, clause 5 following eirp can be directly determined using the field strength.
	☐ Refer as KDB 412172, clause 6 following eirp can be used signal/antenna substitution techniques.
	☐ Refer as ANSI/TIA-603-D-2010, clause 2.2.17 for radiated measurement.
	☒ Refer as RSS-Gen, clause 4.8 for power measurement.

3.4.4 Test Setup

Effective Isotropic Radiated Power



Electric field tests shall be performed in the frequency range of 30 MHz to 1000 MHz using a calibrated bi-log antenna and the frequency range of 1 GHz to 40 GHz using a calibrated horn antenna.

3.4.5 Test Result of Effective Isotropic Radiated Power

E-Field method / Substitute method

Mode	Ch.	Freq. [MHz]	E-Field [dBuV/m] @3m	ERIP [dBm]	ERIP [W]	ERIP Limit [dBm]	Margin [dB]	Pol [H/V]
GSM1900	512	1850.2	120.81	25.61	0.364	33.01	-7.40	H
	661	1880	121.57	26.37	0.434	33.01	-6.64	H
	810	1909.8	123.07	27.87	0.612	33.01	-5.14	H

Note 1: EUT was tested in all GPRS configurations and the highest power is reported in 1 Tx Slot GPRS mode.
Note 2: EUT was tested with its standard battery.
Note 3: Measurement worst emissions of receive antenna polarization.
Note 4: EIRP [dBm] = E-Field [dBuV/m] - 95.2; E-Field [dBuV/m] = Raw [dBuV] + Factor [dB]

Mode	Ch.	Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	EIRP [W]	EIRP Limit [dBm]	Margin [dB]	Pol [H/V]
WCDMA1900	9262	1852.4	111.27	16.07	0.040	33.01	-16.94	H
	9400	1880	113.23	18.03	0.064	33.01	-14.98	H
	9538	1907.6	112.31	17.11	0.051	33.01	-15.90	H

Note 1: EUT was tested in all WCDMA configurations and the highest power is reported in 12.2 kbps RMC and TPC bits all set “1”.
Note 2: EUT was tested with its standard battery.
Note 3: Measurement worst emissions of receive antenna polarization.
Note 4: EIRP [dBm] = E-Field [dBuV/m] - 95.2; E-Field [dBuV/m] = Raw [dBuV] + Factor [dB]

3.5 Transmitter Conducted Unwanted Emissions

3.5.1 Transmitter Conducted Unwanted Emissions Limit

Transmitter Conducted Unwanted Emissions Limit
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)] (-13dBm).

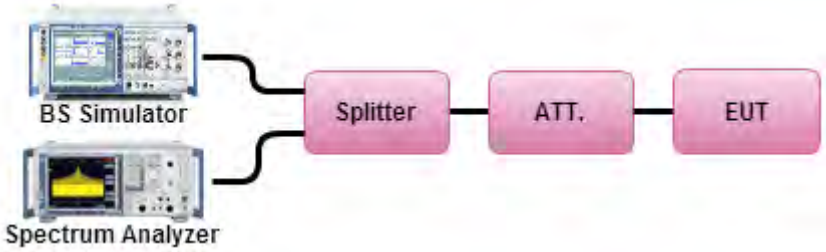
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

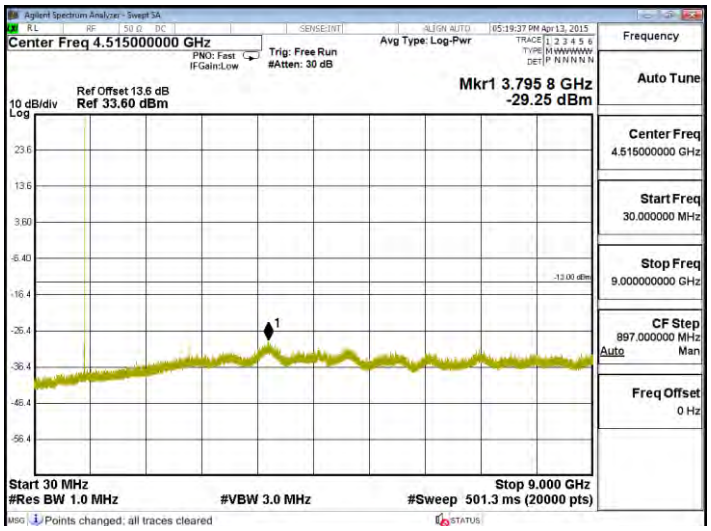
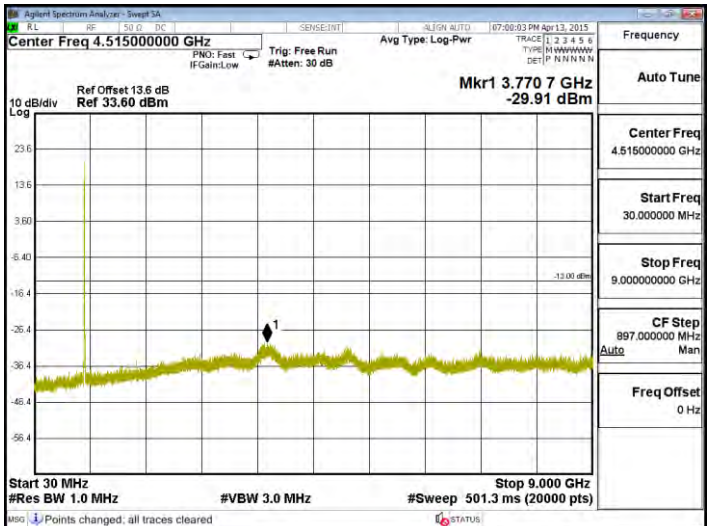
3.5.3 Test Procedures

Test Method			
☒	Refer as ANSI/TIA-603-D-2010, clause 3.2.13 for conducted measurement.		
☒	Refer as RSS-Gen, clause 4.9 for transmitter unwanted emissions measurement.		
☐	In case a narrower measurement bandwidth was used, the following conversion formula has to be applied: (e.g. if reference bandwidth 1 MHz and measurement bandwidth 100 kHz, then measurement bandwidth conversion factor is 10 dB); B = A + 10 log (BW_{ref} / $BW_{measured}$) • A is the value at the narrower measurement bandwidth; • B is the value referred to the reference bandwidth; • Correction Factor(dB)= 10log(1% Emission BW/RBW);		
☒	For conducted measurement.		
	☒	For conducted measurements on devices with single transmit chain.	
	☐	For conducted measurements on devices with multiple transmit chains using options given below:	
		☐	Option 1: measure and sum the spectra across the transmitter outputs.
		☐	Option 2: N transmitter outputs, then spurious emissions limits on each individual output. Measure and add 10 log (N) dB.

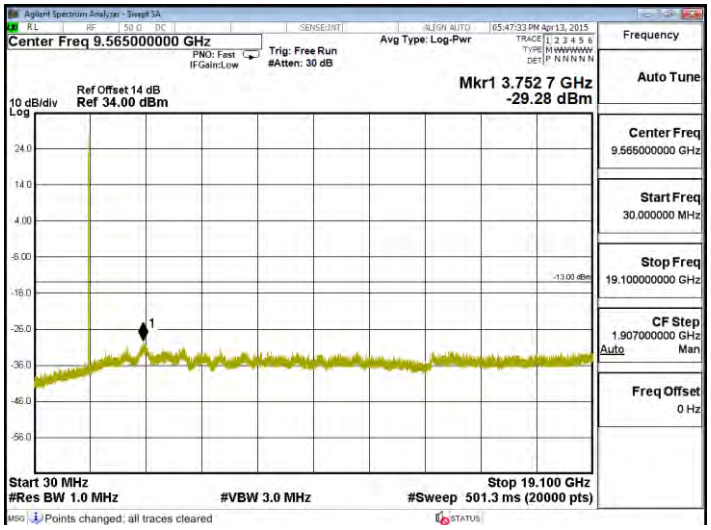
3.5.4 Test Setup

Transmitter Conducted Unwanted Emissions


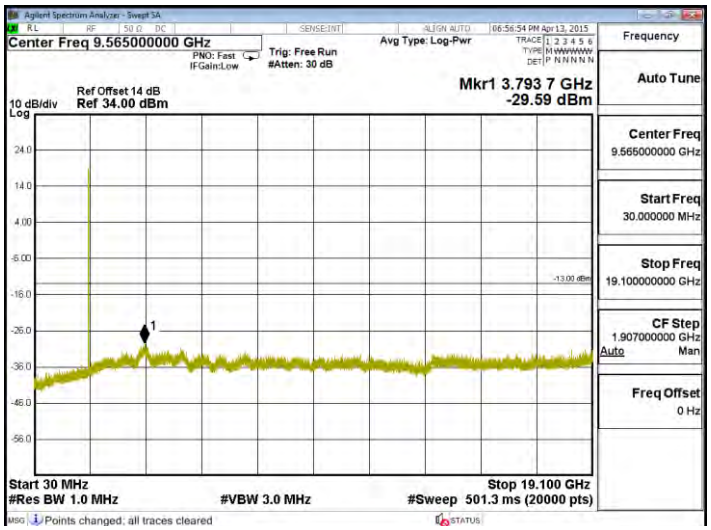
3.5.5 Test Result of Transmitter Conducted Unwanted Emissions

Transmitter Conducted Unwanted Emissions	
Mode / Channel	**GSM850 / 189**
	
Mode / Channel	**WCDMA850 / 4182**
	

Transmitter Conducted Unwanted Emissions	
Mode / Channel	**GSM1900 / 661**



Mode / Channel	WCDMA1900 / 9400



3.6 Transmitter Conducted Bandedge Emissions

3.6.1 Transmitter Conducted Bandedge Emissions Limit

Transmitter Conducted Bandedge Emissions Limit
Cellular Band: (i) In the first 1.0 MHz band immediately outside frequency block, the power of emissions per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log(P) (watts) (-13dBm). (ii) After the first 1.0 MHz immediately outside frequency block, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log(P) (watts) (-13dBm). If the measurement is performed using 1% of the emission bandwidth, power integration over 100 kHz is required. PCS/AWS Band: (i) In the 1.0 MHz bands immediately outside frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log(P) (watts) (-13dBm). (ii) After the first 1.0 MHz immediately outside frequency block, the power of emissions in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log(P) (watts) (-13dBm). If the measurement is performed using 1% of the occupied bandwidth, power integration over 1 MHz is required.

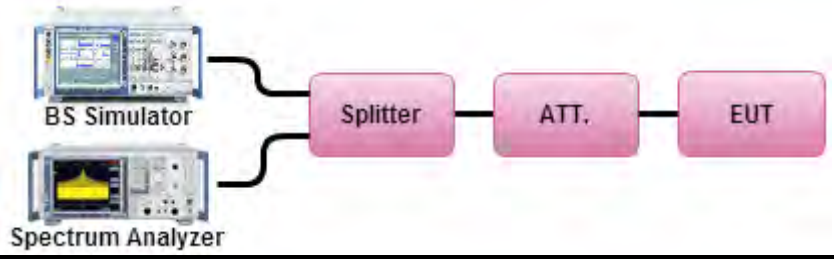
3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

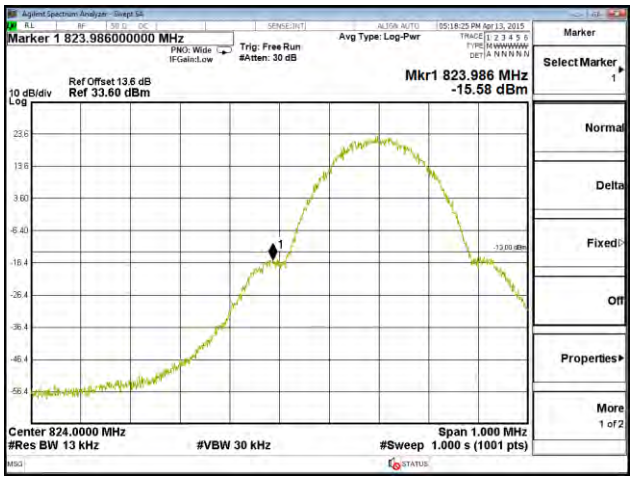
Test Method			
☒	Refer as ANSI/TIA-603-D-2010, clause 3.2.13 for conducted measurement.		
☒	Refer as RSS-Gen, clause 4.9 for transmitter unwanted emissions measurement.		
☒	In case a narrower measurement bandwidth was used, the following conversion formula has to be applied: (e.g. if reference bandwidth 1 MHz and measurement bandwidth 100 kHz, then measurement bandwidth conversion factor is 10 dB); B = A + 10 log (BW_{ref} / $BW_{measured}$) • A is the value at the narrower measurement bandwidth; • B is the value referred to the reference bandwidth; • Correction Factor(dB)= 10log(1% Emission BW/RBW);		
☒	For conducted measurement.		
	☒	For conducted measurements on devices with single transmit chain.	
	☐	For conducted measurements on devices with multiple transmit chains using options given below:	
		☐	Option 1: measure and sum the spectra across the transmitter outputs.
		☐	Option 2: N transmitter outputs, then spurious emissions limits on each individual output. Measure and add 10 log (N) dB.

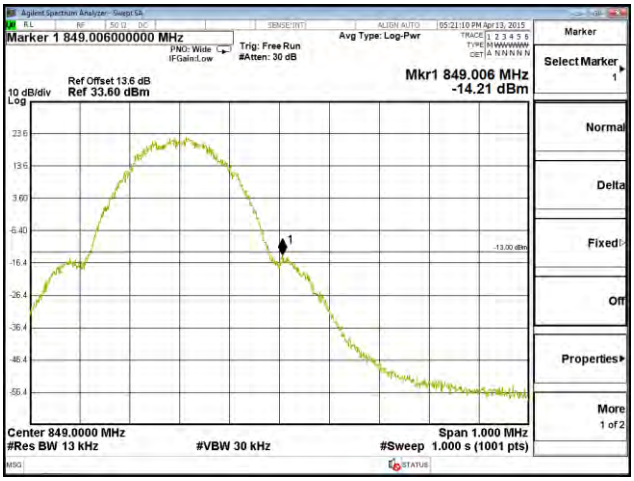
3.6.4 Test Setup

Transmitter Conducted Bandedge Emissions


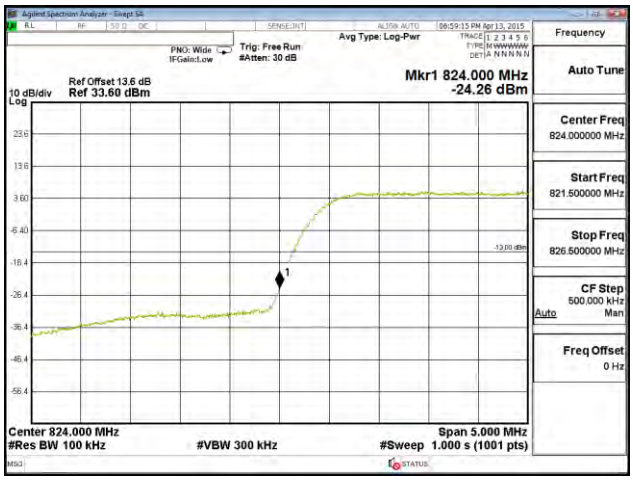
3.6.5 Test Result of Transmitter Conducted Bandedge Emissions

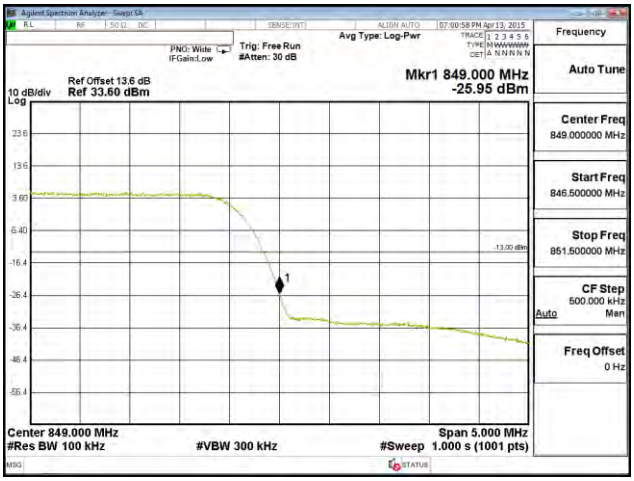
Transmitter Conducted Bandedge Emissions	Mode/Channel	GSM850/(128,251)



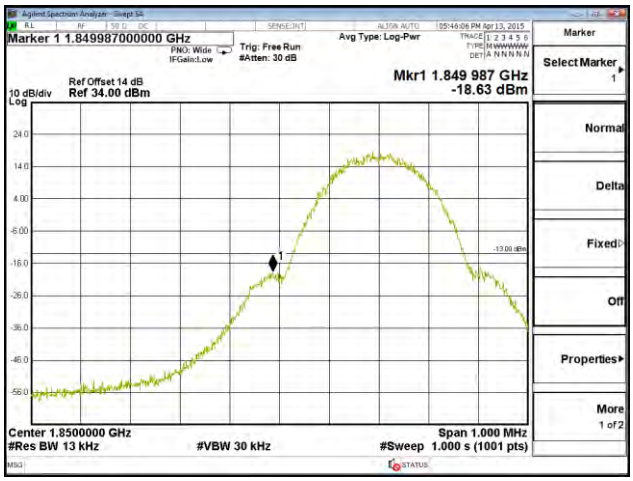


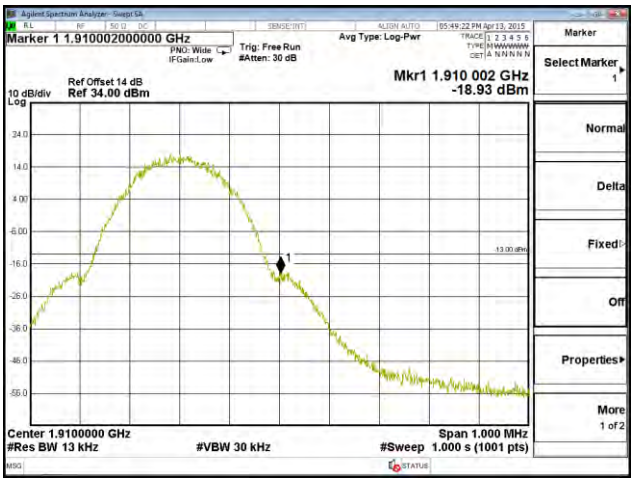
Transmitter Conducted Bandedge Emissions	Mode/Channel	WCDMA850/(4132,4233)



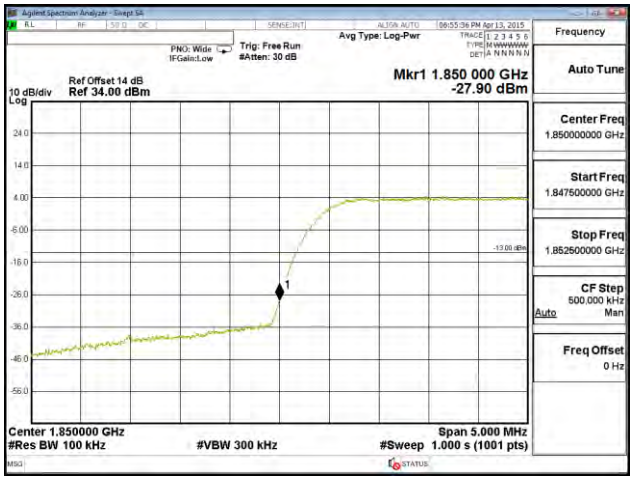


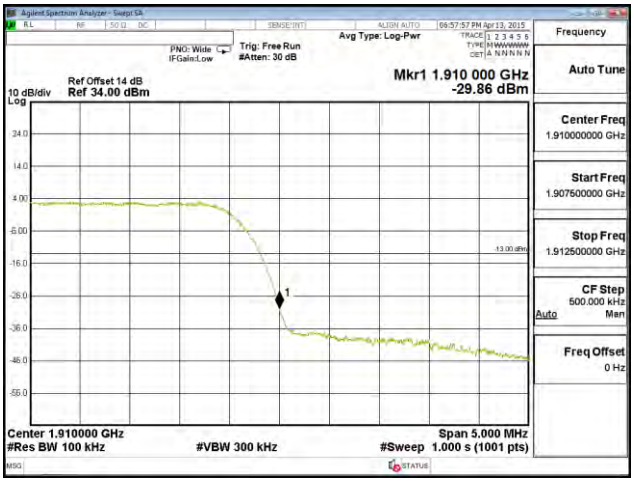
Transmitter Conducted Bandedge Emissions	Mode/Channel	GSM1900/(512,810)





Transmitter Conducted Bandedge Emissions	Mode/Channel	WCDMA1900/(9262,9538)





3.7 Transmitter Radiated Unwanted Emissions

3.7.1 Transmitter Radiated Unwanted Emissions Limit

Transmitter Radiated Unwanted Emissions Limit
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)] (EIRP -13dBm).

3.7.2 Measuring Instruments

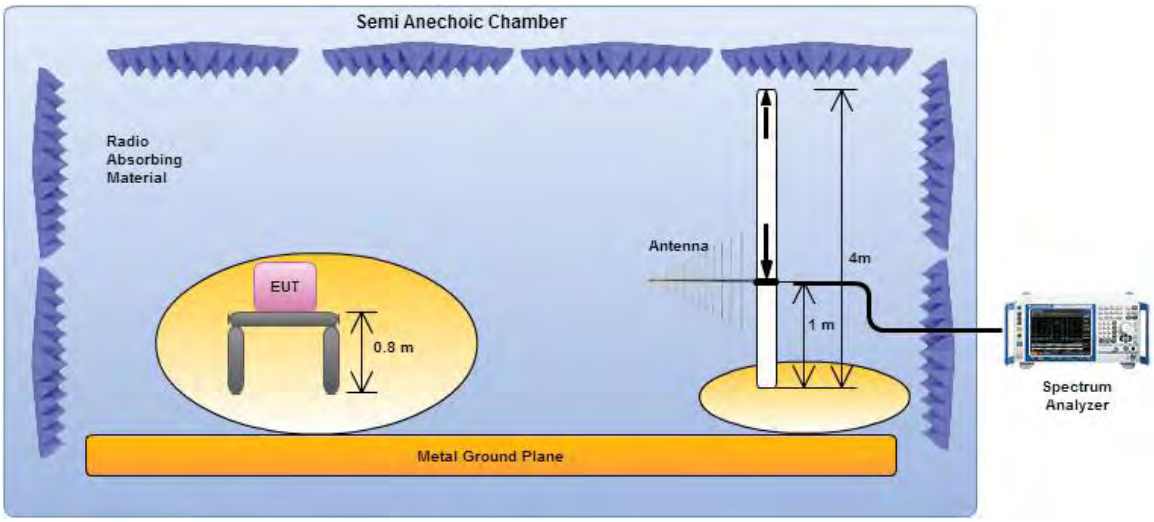
Refer a test equipment and calibration data table in this test report.

3.7.3 Test Procedures

	Test Method
☒	Refer as ANSI/TIA-603-D-2010, clause 3.2.12 for radiated measurement.
☒	Refer as RSS-Gen, clause 4.9 for transmitter unwanted emissions measurement.
☐	In case a narrower measurement bandwidth was used, the following conversion formula has to be applied: (e.g. if reference bandwidth 1 MHz and measurement bandwidth 100 kHz, then measurement bandwidth conversion factor is 10 dB) $B = A + 10 \log (BW_{ref} / BW_{measured})$ • A is the value at the narrower measurement bandwidth; • B is the value referred to the reference bandwidth; • Correction Factor(dB)= 10log(1% Emission BW/RBW);
☒	Effective Isotropic Radiated Power (EIRP)
	☐ Refer as KDB 412172, clause 1.3.2 following as power approach. e.i.r.p.= P_T+G_T.
	☒ Refer as KDB 412172, clause 1.3.1 following as field strength approach. e.i.r.p.= $(E \times d)^2 / 30$.
☐	For radiated measurement.
	☐ Refer as KDB 412172, clause 2.2 following eirp can be used radiated test configuration.
	☒ Refer as KDB 412172, clause 5 following eirp can be directly determined using the field strength.
	☐ Refer as KDB 412172, clause 6 following eirp can be used signal/antenna substitution techniques.
	☐ Refer as ANSI/TIA-603-D-2010, clause 2.2.12 for radiated measurement.

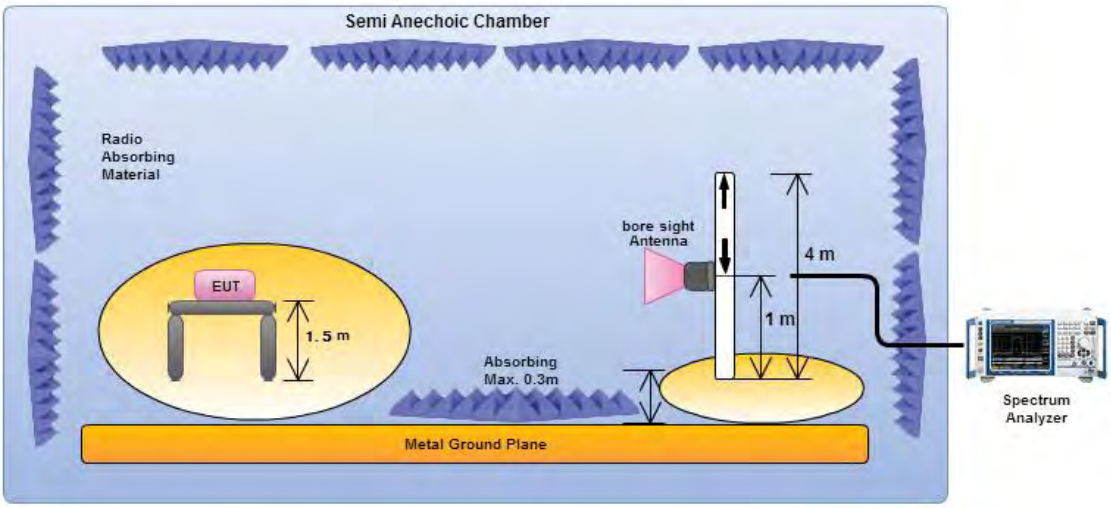
3.7.4 Test Setup

Transmitter Radiated Unwanted Emissions (below 1GHz)



Electric field tests shall be performed in the frequency range of 1 GHz to 10th harmonic of highest fundamental frequency or 40 GHz using a calibrated horn antenna

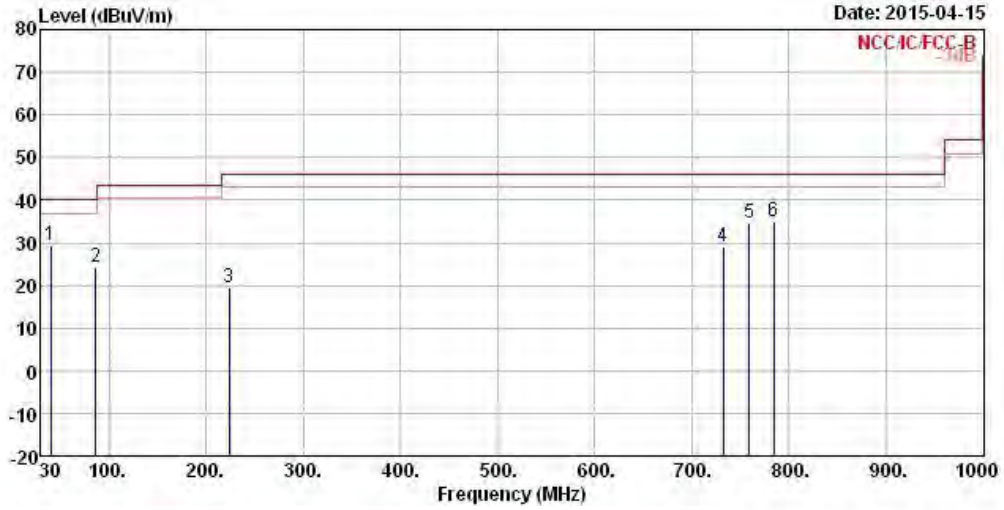
Transmitter Radiated Unwanted Emissions (Above 1GHz)



Electric field tests shall be performed in the frequency range of 1 GHz to 10th harmonic of highest fundamental frequency or 40 GHz using a calibrated horn antenna.

3.7.5 Test Result of Transmitter Radiated Unwanted Emissions

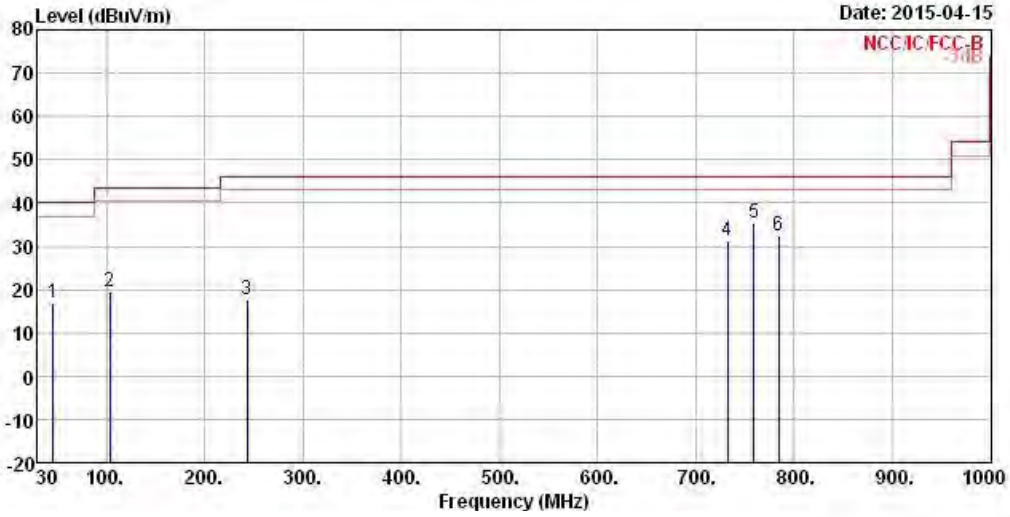
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	GSM850	**Polarization**	V
Operating Function	EUT with Adapter Mode		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	39.700	29.43	-10.57	40.00	42.99	12.72	1.02	27.30	Peak
2	86.260	24.42	-15.58	40.00	42.50	7.70	1.52	27.30	Peak
3	224.000	19.56	-26.44	46.00	34.83	9.29	2.46	27.02	Peak
4	732.280	29.08	-16.92	46.00	32.89	19.31	4.62	27.74	Peak
5	759.440	34.67	-11.33	46.00	38.26	19.39	4.71	27.69	Peak
6	784.660	35.16	-10.84	46.00	38.50	19.47	4.84	27.65	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

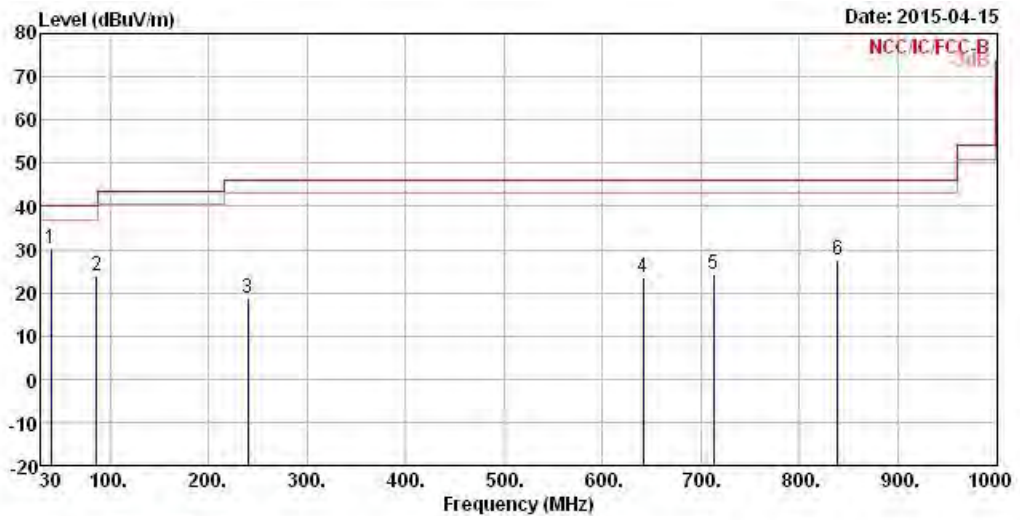
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	GSM850	**Polarization**	H
Operating Function	EUT with Adapter Mode		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	45.520	17.01	-22.99	40.00	33.95	9.33	1.09	27.36	Peak
2	103.720	19.59	-23.91	43.50	34.04	11.11	1.63	27.19	Peak
3	243.400	17.81	-28.19	46.00	30.68	11.50	2.57	26.94	Peak
4	732.280	31.42	-14.58	46.00	35.23	19.31	4.62	27.74	Peak
5	759.440	35.21	-10.79	46.00	38.80	19.39	4.71	27.69	Peak
6	784.660	32.54	-13.46	46.00	35.88	19.47	4.84	27.65	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

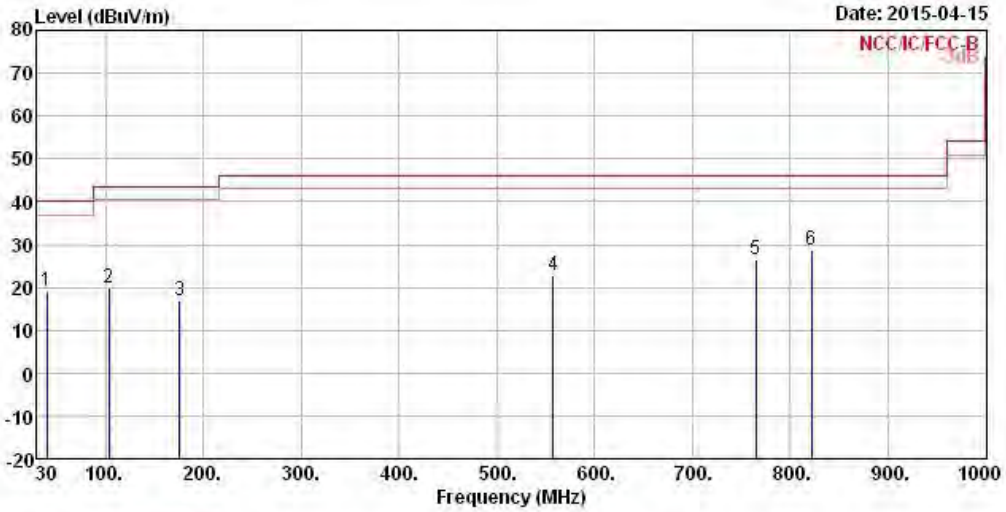
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	GSM1900	**Polarization**	V
Operating Function	EUT with Adapter Mode		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	39.700	30.17	-9.83	40.00	43.73	12.72	1.02	27.30	Peak
2	86.260	24.04	-15.96	40.00	42.12	7.70	1.52	27.30	Peak
3	239.520	18.85	-27.15	46.00	32.11	11.14	2.55	26.95	Peak
4	641.100	23.38	-22.62	46.00	28.28	18.56	4.31	27.77	Peak
5	712.880	24.33	-21.67	46.00	28.81	18.70	4.59	27.77	Peak
6	838.980	27.72	-18.28	46.00	30.42	19.87	4.93	27.50	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

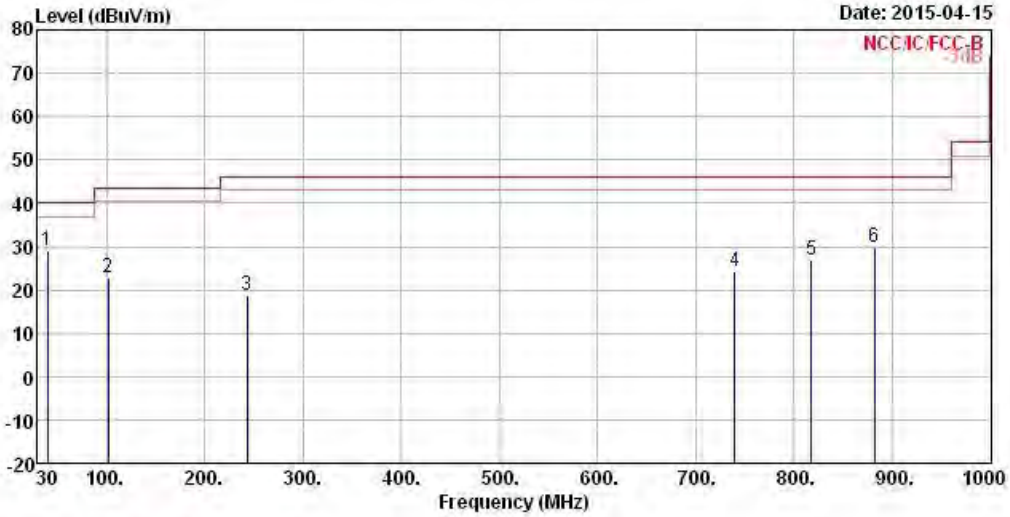
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	GSM1900	**Polarization**	H
Operating Function	EUT with Adapter Mode		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	39.700	19.16	-20.84	40.00	32.72	12.72	1.02	27.30	Peak
2	103.720	19.71	-23.79	43.50	34.16	11.11	1.63	27.19	Peak
3	175.500	17.01	-26.49	43.50	32.80	9.18	2.17	27.14	Peak
4	557.680	22.65	-23.35	46.00	28.25	18.29	3.96	27.85	Peak
5	765.260	26.41	-19.59	46.00	29.92	19.43	4.74	27.68	Peak
6	821.520	28.72	-17.28	46.00	31.64	19.71	4.92	27.55	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

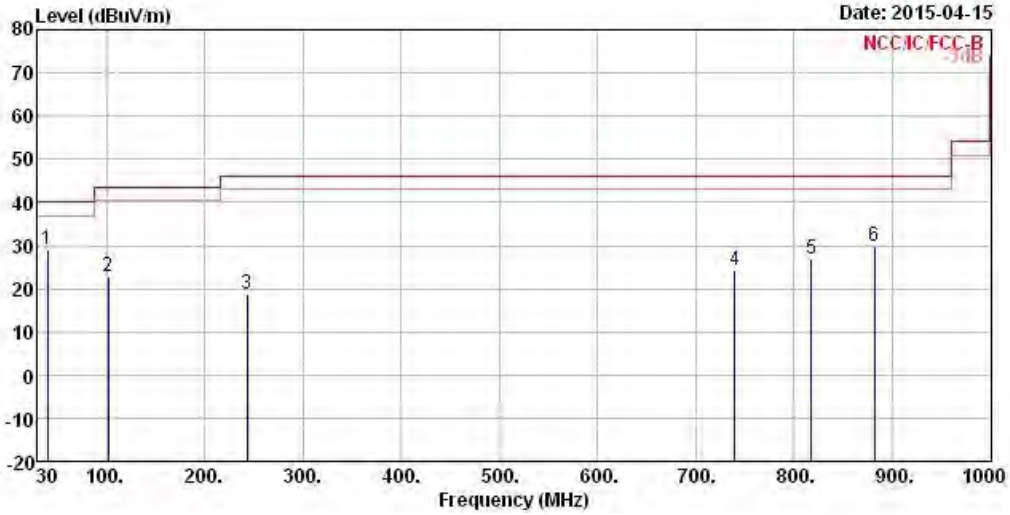
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	WCDMA 850	**Polarization**	V
Operating Function	EUT with Adapter Mode		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	39.700	29.09	-10.91	40.00	42.65	12.72	1.02	27.30	Peak
2	101.780	22.64	-20.86	43.50	37.40	10.82	1.61	27.19	Peak
3	243.400	18.90	-27.10	46.00	31.77	11.50	2.57	26.94	Peak
4	740.040	24.15	-21.85	46.00	27.59	19.65	4.64	27.73	Peak
5	817.640	26.76	-19.24	46.00	29.76	19.65	4.92	27.57	Peak
6	881.660	29.83	-16.17	46.00	32.09	19.99	5.10	27.35	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

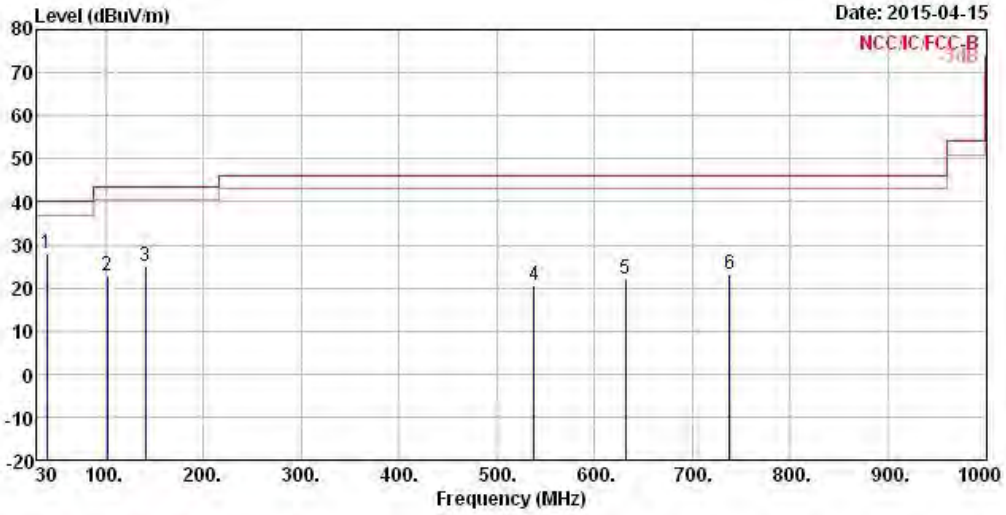
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	WCDMA 850	**Polarization**	H
Operating Function	EUT with Adapter Mode		



	Freq	Level	Over Limit	Limit Line	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	39.700	29.09	-10.91	40.00	42.65	12.72	1.02	27.30	Peak
2	101.780	22.64	-20.86	43.50	37.40	10.82	1.61	27.19	Peak
3	243.400	18.90	-27.10	46.00	31.77	11.50	2.57	26.94	Peak
4	740.040	24.15	-21.85	46.00	27.59	19.65	4.64	27.73	Peak
5	817.640	26.76	-19.24	46.00	29.76	19.65	4.92	27.57	Peak
6	881.660	29.83	-16.17	46.00	32.09	19.99	5.10	27.35	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

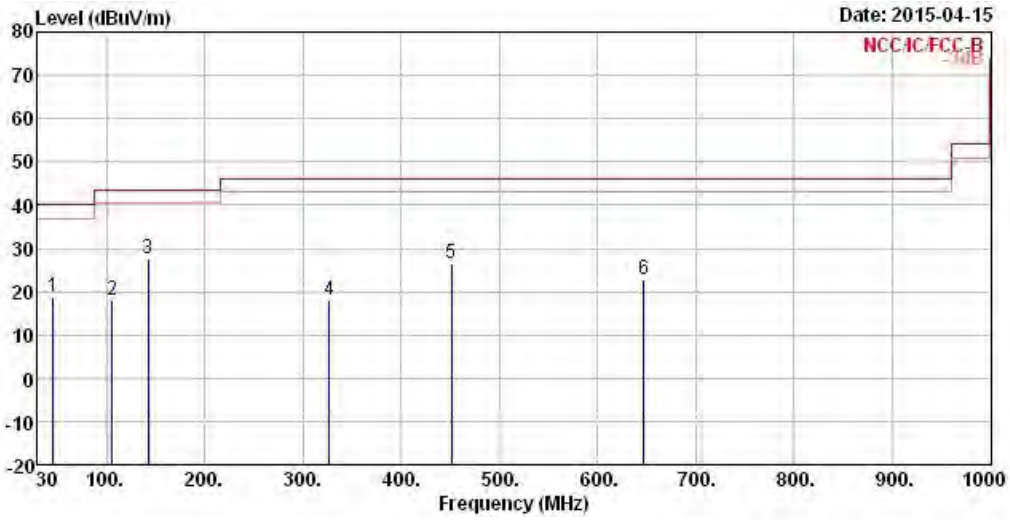
Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	WCDMA 1900	**Polarization**	V
Operating Function	EUT with Adapter Mode		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	39.700	28.03	-11.97	40.00	41.59	12.72	1.02	27.30	Peak
2	101.780	22.97	-20.53	43.50	37.73	10.82	1.61	27.19	Peak
3	140.580	25.03	-18.47	43.50	39.18	11.05	1.97	27.17	Peak
4	538.280	20.76	-25.24	46.00	26.59	18.17	3.89	27.89	Peak
5	631.400	22.17	-23.83	46.00	27.09	18.58	4.27	27.77	Peak
6	738.100	23.02	-22.98	46.00	26.55	19.56	4.64	27.73	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	WCDMA 1900	**Polarization**	H
Operating Function	EUT with Adapter Mode		



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	45.520	18.81	-21.19	40.00	35.75	9.33	1.09	27.36	Peak
2	105.660	17.98	-25.52	43.50	32.08	11.44	1.65	27.19	Peak
3	142.520	27.51	-15.99	43.50	41.87	10.82	1.98	27.16	Peak
4	326.820	18.01	-27.99	46.00	28.48	13.36	3.02	26.85	Peak
5	450.980	26.36	-19.64	46.00	34.27	16.23	3.51	27.65	Peak
6	646.920	22.97	-23.03	46.00	27.86	18.54	4.34	27.77	Peak

Note 1: “>20dB” means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: “N/F” means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

3.7.6 Test Result of Transmitter Radiated Unwanted Emissions (Above 1GHz)

E-Field method / Substitute method

Mode	GSM850			Mode	GSM850			Mode	GSM850		
Ch.	128			Ch.	189			Ch.	251		
Freq.	824.2			Freq.	836.4			Freq.	848.8		
Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]	Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]	Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]
1648.4	63.13	-32.07	H	1672.8	63.83	-31.37	H	1697.6	59.33	-35.87	H
2472.6	64.51	-30.69	H	2509.2	51.44	-43.76	H	2546.4	51.63	-43.57	H
3296.8	44.07	-51.13	H	3345.6	42.14	-53.06	H	3395.2	43.43	-51.77	H
4121	-	-	-	4182	-	-	-	4244	-	-	-
4945.2	-	-	-	5018.4	-	-	-	5092.8	-	-	-
5769.4	-	-	-	5854.8	-	-	-	5941.6	-	-	-
6593.6	-	-	-	6691.2	-	-	-	6790.4	-	-	-
7417.8	-	-	-	7527.6	-	-	-	7639.2	-	-	-
8242	-	-	-	8364	-	-	-	8488	-	-	-
Limit [dBm]		-13		Limit [dBm]		-13		Limit [dBm]		-13	

Note 1: Measurement worst emissions of receive antenna polarization
Note 2: EIRP [dBm] = E-Field [dBuV/m] - 95.2; E-Field [dBuV/m] = Raw [dBuV] + Factor [dB]
Note 3: Other spurious emissions (30MHz - 10th harmonic) that exceed the level of 20 dB below the applicable limit.

Mode	WCDMA850(BAND5)			Mode	WCDMA850(BAND5)			Mode	WCDMA850(BAND5)		
Ch.	4132			Ch.	4182			Ch.	4233		
Freq.	826.4			Freq.	836.6			Freq.	846.6		
Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]	Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]	Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]
1652.8	49.08	-46.12	H	1673.2	53.05	-42.15	H	1693.2	47.37	-47.83	V
2479.2	41.56	-53.64	H	2509.8	45.22	-49.98	V	2539.8	42.50	-52.70	V
3305.6	34.01	-61.19	H	3346.4	32.94	-62.26	V	3386.4	32.30	-62.90	V
4132	-	-	-	4183	-	-	-	4233	-	-	-
4958.4	-	-	-	5019.6	-	-	-	5079.6	-	-	-
5784.8	-	-	-	5856.2	-	-	-	5926.2	-	-	-
6611.2	-	-	-	6692.8	-	-	-	6772.8	-	-	-
7437.6	-	-	-	7529.4	-	-	-	7619.4	-	-	-
8264	-	-	-	8366	-	-	-	8466	-	-	-
Limit [dBm]		-13		Limit [dBm]		-13		Limit [dBm]		-13	

Note 1: Measurement worst emissions of receive antenna polarization
Note 2: EIRP [dBm] = E-Field [dBuV/m] - 95.2; E-Field [dBuV/m] = Raw [dBuV] + Factor [dB]
Note 3: Other spurious emissions (30MHz - 10th harmonic) that exceed the level of 20 dB below the applicable limit.

Mode	GSM1900			Mode	GSM1900			Mode	GSM1900		
Ch.	512			Ch.	661			Ch.	810		
Mode	GSM1900			Mode	GSM1900			Mode	GSM1900		
Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]	Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]	Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]
3700.4	52.36	-42.84	H	3760	68.66	-26.54	H	3819.6	48.65	-46.55	H
5550.6	60.34	-34.86	H	5640	72.59	-22.61	H	5729.4	49.85	-45.35	V
7400.8	42.92	-52.28	H	7520	76.80	-18.40	V	7639.2	41.82	-53.38	V
Limit [dBm]		-13		Limit [dBm]		-13		Limit [dBm]		-13	

Note 1: Measurement worst emissions of receive antenna polarization
Note 2: EIRP [dBm] = E-Field [dBuV/m] - 95.2; E-Field [dBuV/m] = Raw [dBuV] + Factor [dB]
Note 3: Other spurious emissions (30MHz - 10th harmonic) that exceed the level of 20 dB below the applicable limit.

Mode	WCDMA1900(BAND2)			Mode	WCDMA1900(BAND2)			Mode	WCDMA1900(BAND2)		
Ch.	9262			Ch.	9400			Ch.	9538		
Freq.	1852.4			Freq.	1880			Freq.	1907.6		
Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]	Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]	Freq. [MHz]	E-Field [dBuV/m] @3m	EIRP [dBm]	Pol [H/V]
3704.8	38.55	-56.65	H	3760	37.41	-57.79	H	3815.2	36.86	-58.34	H
5557.2	33.09	-62.11	V	5640	34.83	-60.37	V	5722.8	34.41	-60.79	H
7409.6	33.38	-61.82	V	7520	32.98	-62.22	V	7630.4	33.46	-61.74	H
Limit [dBm]		-13		Limit [dBm]		-13		Limit [dBm]		-13	

Note 1: Measurement worst emissions of receive antenna polarization
Note 2: EIRP [dBm] = E-Field [dBuV/m] - 95.2; E-Field [dBuV/m] = Raw [dBuV] + Factor [dB]
Note 3: Other spurious emissions (30MHz - 10th harmonic) that exceed the level of 20 dB below the applicable limit.

3.8 Frequency Stability

3.8.1 Frequency Stability Limit

Frequency Stability Limit	
☒	The transmitter center frequency stability shall be ± 2.5 ppm maximum. The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.
☒	Temperature:
	☒ -30°C to +50°C in 10°C step.
	☒ If the EUT cannot be turned on at -30°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.
☒	Voltage:
	☒ For non hand-carried battery and AC powered equipment: 85% to 115% of the nominal value
	☒ For hand-carried, battery-powered equipment: Voltage is reduced to the battery operating end point which shall be specified by the manufacturer.
Note 1: These measurements shall also be performed at normal and extreme test conditions.	

3.8.2 Measuring Instruments

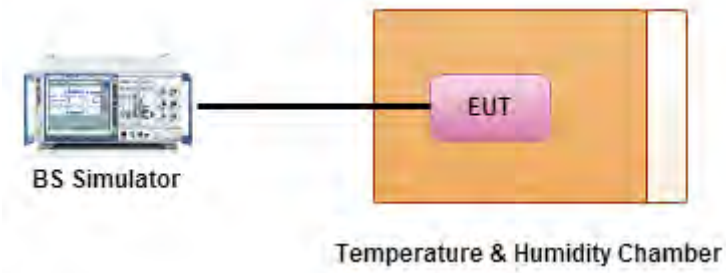
Refer a test equipment and calibration data table in this test report.

3.8.3 Test Procedures

Test Method	
☒	Refer as ANSI/TIA-603-D-2010, clause 3.2.2 for frequency stability tests
☒	Refer as RSS-Gen, clause 4.7 for transmitter frequency stability measurement.
	☒ Frequency stability with respect to ambient temperature
	☒ Frequency stability when varying supply voltage
☒	For conducted measurement.
	☒ For conducted measurements on devices with multiple transmit chains: Measurements need only to be performed on one of the active transmit chains (antenna outputs)
☐	For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level.

3.8.4 Test Setup

Frequency Stability



3.8.5 Test Result of Frequency Stability

Mode		GSM850		WCDMA850	
Channel		189		4182	
Frequency (MHz)		836.4		836.4	
Temp. (°C)	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (Hz)	Frequency Error (ppm)
50	12	-10.08	-0.0121	-3.5	-0.0042
40	12	-11.91	-0.0142	-3.32	-0.0040
30	12	-12.42	-0.0148	-3.47	-0.0041
20	12	-14.39	-0.0172	-5.42	-0.0065
10	12	-13.12	-0.0157	-4.39	-0.0052
0	12	-11.76	-0.0141	-5.05	-0.0060
-10	12	-10.46	-0.0125	-3.94	-0.0047
-20	12	-10.43	-0.0125	-4.5	-0.0054
-30	12	-5.43	-0.0065	-4.27	-0.0051
20	16	-8.19	-0.0098	-4.96	-0.0059
20	12	-11.21	-0.0134	-2.7	-0.0032
20	9	-12.01	-0.0144	-4.26	-0.0051
Limit [ppm]		± 2.5			

Mode		GSM1900		WCDMA1900	
Channel		661		9400	
Frequency (MHz)		1880		1880	
Temp. (°C)	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (Hz)	Frequency Error (ppm)
50	12	33.72	0.0179	-9.96	-0.0053
40	12	28.23	0.0150	-7.62	-0.0041
30	12	30.09	0.0160	-6.29	-0.0033
20	12	29.52	0.0157	-6.96	-0.0037
10	12	18.97	0.0101	-7.85	-0.0042
0	12	19.82	0.0105	-7.56	-0.0040
-10	12	20.63	0.0110	-7.91	-0.0042
-20	12	23.52	0.0125	-3.33	-0.0018
-30	12	18.96	0.0101	-1.35	-0.0007
20	16	25.21	0.0134	-6.24	-0.0033
20	12	26.9	0.0143	-8.22	-0.0044
20	9	26.09	0.0139	-4.88	-0.0026
Limit [ppm]		± 2.5			

4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101514	9KHz~40GHz	Jun. 13, 2014	RF Conducted
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jul. 31, 2014	RF Conducted
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	Jan. 28, 2014	RF Conducted
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	Jan. 28, 2014	RF Conducted

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Nov. 29, 2014	Radiation
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May 05, 2014	Radiation
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	Sep. 01, 2014	Radiation
Spectrum	R&S	FSV40	101514	10Hz ~ 40GHz	Jun. 13, 2014	Radiation
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 20, 2014	Radiation
Horn Antenna	ETS・LINDGREN	3115	6741	1GHz ~ 18GHz	Jul. 11, 2014	Radiation
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz ~ 40GHz	Jan. 27, 2015	Radiation
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 15, 2014	Radiation
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec. 12, 2014	Radiation
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiation
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiation

Note: Calibration Interval of instruments listed above is one year.