FCC RF Test Report

APPLICANT	**:**	**Huawei Technologies Co., Ltd.**
EQUIPMENT	**:**	**Smart Phone**
BRAND NAME	**:**	**HUAWEI**
MODEL NAME	**:**	**GLK-LX1U**
FCC ID	**:**	**QISGLK-LX1U**
STANDARD	**:**	**47 CFR Part 2, 22(H), 24(E), 27(L)**
CLASSIFICATION	**:**	**PCS Licensed Transmitter Held to Ear (PCE)**

The product was received on Mar. 28, 2019 and completely tested on Apr. 26, 2019. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 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 (Shenzhen) Inc., the test report shall not be reproduced except in full.

Eric Shih

NVLAP TESTING
NVLAP LAB CODE 600156-0

Approved by: Eric Shih / Manager

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG932820A	Rev. 01	Initial issue of report	Apr. 30, 2019

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(5)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power	< 1 Watts	PASS	-
3.5	§24.232(d)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(h)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(h)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22	PASS	-
	§2.1055 §24.235 §27.54		Within Authorized Band		
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(h)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 30.47 dB at 1672.800 MHz

1 General Description

1.1 Applicant

Huawei Technologies Co., Ltd.
Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.2 Manufacturer

Huawei Technologies Co., Ltd.
Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart Phone
Brand Name	HUAWEI
Model Name	GLK-LX1U
FCC ID	QISGLK-LX1U
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/HSPA+(16 QAM Uplink is not supported)/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE FM Receiver/GNSS
IMEI Code	Conducted: 867285040040346/867285040041591 Radiation: 867285040041104/867285040042359
HW Version	HL7SENEM
SW Version	9.1.0.102(C900E102R1P1)

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

Standards-related Product Specification	
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	**Top Antenna:** **GSM/GPRS/EDGE:** 850: 31.79 dBm 1900: 30.19 dBm **WCDMA:** Band V: 23.82 dBm Band II: 23.20 dBm Band IV: 22.01 dBm **Bottom Antenna:** **GSM/GPRS/EDGE:** 850: 32.75 dBm 1900: 30.19 dBm **WCDMA:** Band V: 23.91 dBm Band II: 23.88 dBm Band IV: 22.02 dBm
Antenna Type	Internal Antenna
Antenna Gain	**Top Antenna:** **GSM/GPRS/EDGE:** 850: -2.90 dBi 1900: -2.80 dBi **WCDMA:** Band V: -2.90 dBi Band II: -2.80 dBi Band IV: -3.00 dBi **Bottom Antenna:** **GSM/GPRS/EDGE:** 850: -6.20 dBi

	1900: -1.20 dBi **WCDMA:** Band V: -6.20 dBi Band II: -1.20 dBi Band IV: -2.00 dBi
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK WCDMA : BPSK (Uplink) HSDPA/DC-HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM (16QAM uplink is not supported) DC-HSDPA : 64QAM

Note: The Maximum ERP/EIRP is calculated from Max Output power and Max antenna gain.

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) for Top Antenna	Maximum ERP/EIRP (W) for Bottom Antenna	Frequency Tolerance (ppm)	Emission Designator
Part 22	GSM850 GPRS class 8	GMSK	0.4721	0.2754	0.0573 ppm	243KGXW
Part 22	GSM850 EDGE class 8	8PSK	0.0998	0.0628	0.0538 ppm	250KG7W
Part 22	WCDMA Band V RMC 12.2Kbps	BPSK	0.0753	0.0360	0.0442 ppm	4M16F9W
Part 24	GSM1900 GPRS class 8	GMSK	-	0.7925	0.0218 ppm	250KGXW
Part 24	GSM1900 EDGE class 8	8PSK	-	0.2661	0.0255 ppm	251KG7W
Part 24	WCDMA Band II RMC 12.2Kbps	BPSK	-	0.1854	0.0239 ppm	4M16F9W
Part 27	WCDMA Band IV RMC 12.2Kbps	BPSK	-	0.1005	0.0167 ppm	4M17F9W

1.7 Specification of Accessory

AC Adapter 1	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 2	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: BYD	SN	
AC Adapter 3	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: HUNTKEY	SN	
AC Adapter 4	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200U02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: PHIHONG	SN	
AC Adapter 5	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 6	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: BYD	SN	
AC Adapter 7	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: HUNTKEY	SN	
AC Adapter 8	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200E02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: PHIHONG	SN	
AC Adapter 9	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 10	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: BYD	SN	
AC Adapter 11	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: HUNTKEY	SN	
AC Adapter 12	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200B02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: PHIHONG	SN	
AC Adapter 13	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200A02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: Salcomp	SN	
AC Adapter 14	Brand Name	Huawei Technologies Co., Ltd.	Model Name	HW-050200A02
	Power Rating	I/P: 100 - 240 Vac, 500 mA, O/P: 5 Vdc, 2000 mA		
	Manufacturer	Manufacturer: BYD	SN	
USB Cable 1	Brand Name	Ningbo Broad Telecommunication Co., Ltd	Model Name	WA0020
	Signal Line	1 meter, non-shielded cable, with w/o ferrite core		

USB Cable 2	Brand Name	Dongguan Mingji Electronics Technology Group Co.,Ltd	Model Name	203-1572-0
	Signal Line	1 meter, non-shielded cable, with w/o ferrite core		
USB Cable 3	Brand Name	Freeport Resources Enterprises (Jiangxi) Co.,Ltd	Model Name	18-93C2CHO-001HF
	Signal Line	1 meter, non-shielded cable, with w/o ferrite core		
USB Cable 4	Brand Name	HONGFUJIN PRECISION IND USTRIAL(SHENZHEN).LTD	Model Name	CUDU01B-HC295-EH
	Signal Line	1 meter, non-shielded cable, with w/o ferrite core		
USB Cable 5	Brand Name	LUXSHARE Precision Industry Co., Ltd.	Model Name	L99UC131-CS-H
	Signal Line	1 meter, non-shielded cable, with w/o ferrite core		
USB Cable 6	Brand Name	HUIZHOU DEHONG TECHNOLOGY CO.,LTD.	Model Name	330-50507
	Signal Line	1 meter, non-shielded cable, with w/o ferrite core		
Earphone 1	Brand Name	HONGFUJIN PRECISION INDUSTRIAL(SHENZHEN).LTD	Model Name	EPAB542-2WH06-DH
	Signal Line	1.1 meter, non-shielded cable, with w/o ferrite core		
Earphone 2	Brand Name	HONGFUJIN PRECISION INDUSTRIAL(SHENZHEN).LTD	Model Name	EPAB542-2WH05-DH
	Signal Line	1.1 meter, non-shielded cable, with w/o ferrite core		
Earphone 3	Brand Name	Boluo County Quancheng Electronic Co., Ltd.	Model Name	1293-3283-3.5MM-322
	Signal Line	1.1 meter, non-shielded cable, with w/o ferrite core		
Earphone 4	Brand Name	Jiangxi Lianchuang Hongsheng Electronic Co., LTD.	Model Name	MEND1532B528A02
	Signal Line	1.1 meter, non-shielded cable, with w/o ferrite core		
Earphone 5	Brand Name	Jiangxi Lianchuang Hongsheng Electronic Co., LTD.	Model Name	MEND1532B528B00
	Signal Line	1.1 meter, non-shielded cable, with w/o ferrite core		
Battery	Brand Name	HuaweiTechnologies Co., Ltd.	Model Name	HB446486ECW
	Power Rating	3.82 Vdc, 3900 mAh	Type	Li-ion, Yes

1.8 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China TEL : 86-512-57900158 FAX : 86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC designation No.**	**FCC Test Firm Registration No.**
	TH01-KS	CN5013	630927

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0).

Test Site	Sporton International (Shenzhen) Inc.		
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District, Shenzhen City, Guangdong Province 518055, China TEL: +86-755- 3320-2398		
Test Site No.	**Sporton Site No.**	**FCC designation No.**	**FCC Test Firm Registration No.**
	03CH02-SZ	CN5019	577730

1.9 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 C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP 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 v03r01 with maximum output power.

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

Radiated emissions were investigated as following frequency range:

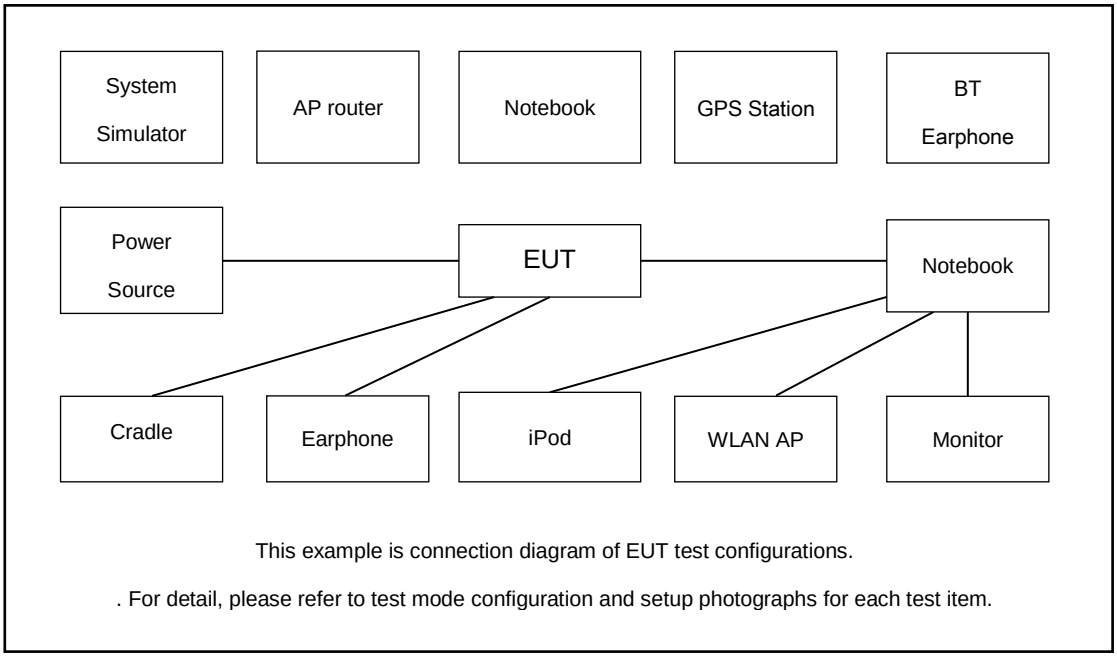
1. 30 MHz to 10th harmonic for GSM850 and WCDMA Band V.
2. 30 MHz to 10th harmonic for WCDMA Band IV.
3. 30 MHz to 10th harmonic for GSM1900 and WCDMA Band II.

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



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	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 4.5 dB and a 10dB attenuator.

Example :

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

= 4.5 + 10 = 14.5 (dB)

2.5 Frequency List of Low/Middle/High Channels

Frequency List				
Band	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
GSM850	Channel	128	189	251
	Frequency	824.2	836.4	848.8
WCDMA Band V	Channel	4132	4182	4233
	Frequency	826.4	836.4	846.6
GSM1900	Channel	512	661	810
	Frequency	1850.2	1880.0	1909.8
WCDMA Band II	Channel	9262	9400	9538
	Frequency	1852.4	1880.0	1907.6
WCDMA Band IV	Channel	1312	1413	1513
	Frequency	1712.4	1732.6	1752.6

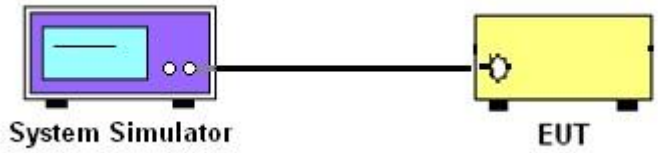
3 Conducted Test Result

3.1 Measuring Instruments

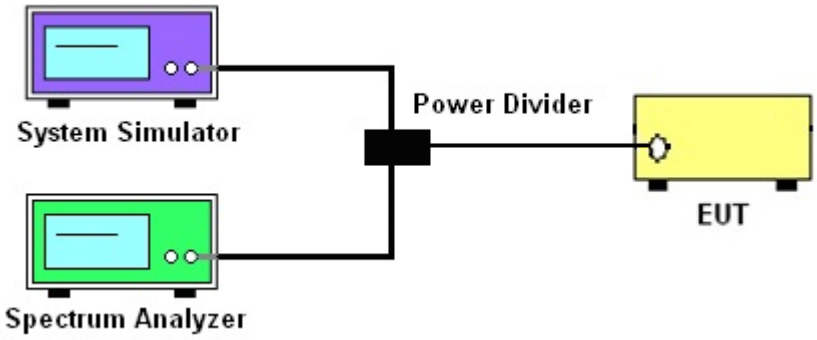
See list of measuring instruments of this test report.

3.2 Test Setup

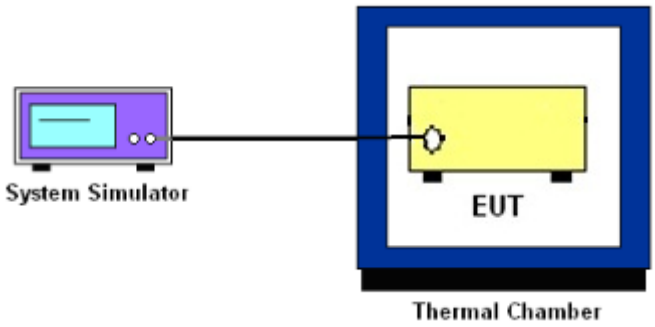
3.2.1 Conducted Output Power



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 testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

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 ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement

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

3.6.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace. (this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

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 ANSI C63.26 section 5.7
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)

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 ANSI C63.26 section 5.7
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)

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 ANSI C63.26 section 5.6.4
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 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.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at 20±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 for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

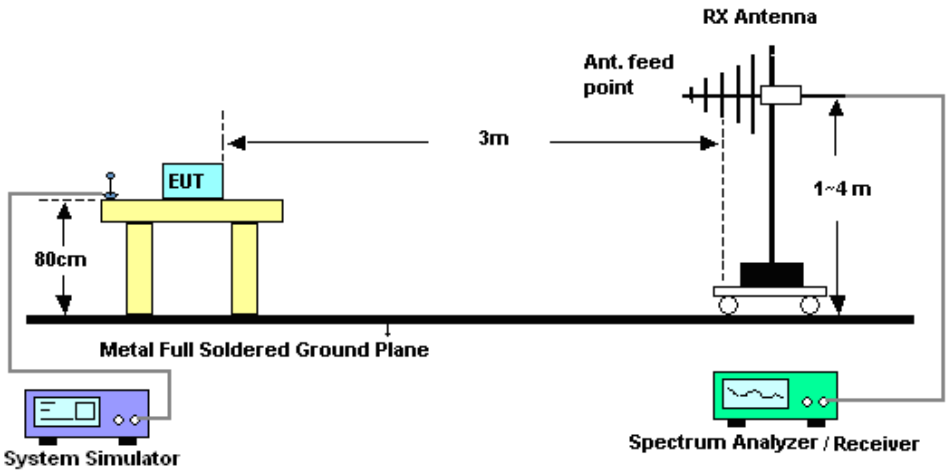
4 Radiated Test Items

4.1 Measuring Instruments

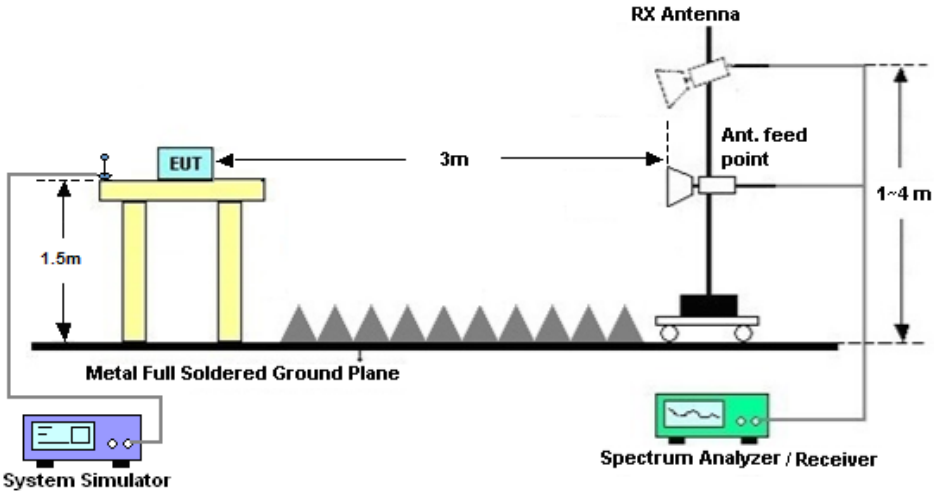
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Field Strength of Spurious Radiation Measurement

4.4.1 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.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz 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)

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 07, 2018	Apr. 26, 2019	Aug. 06, 2019	Conducted (TH01-KS)
Thermal Chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jun. 27, 2018	Apr. 26, 2019	Jun. 26, 2019	Conducted (TH01-KS)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz	Apr. 18, 2019	Apr. 23, 2019	Apr. 17, 2020	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Jun. 05, 2018	Apr. 23, 2019	Jun. 04, 2019	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1285	1GHz~18GHz	Jan. 07, 2019	Apr. 23, 2019	Jan. 06, 2020	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35 -HG	1871923	18GHz~40GHz	Jul. 16, 2018	Apr. 23, 2019	Jul. 25, 2019	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Mar. 30, 2019	Apr. 23, 2019	Mar. 29, 2020	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 18, 2018	Apr. 23, 2019	Oct. 18, 2019	Radiation (03CH02-SZ)
HF Amplifier	Agilent	8449B	3008A01023	1GHz~26.5GHz	Oct. 18, 2018	Apr. 23, 2019	Oct. 17, 2019	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	NCR	Apr. 23, 2019	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Apr. 23, 2019	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Apr. 23, 2019	NCR	Radiation (03CH02-SZ)

NCR: No Calibration Required

6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.5dB**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.3dB**

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.7dB**

Appendix A. Test Results of Conducted Test

Conducted Output Power (Average power)

Top Antenna:

Conducted Power (*Unit: dBm)			
Band	GSM850		
Channel	128	189	251
Frequency	824.2	836.4	848.8
GSM	31.70	31.74	31.78
GPRS class 8	31.71	31.75	31.79
GPRS class 10	28.71	28.73	28.74
GPRS class 11	26.92	26.94	27.05
GPRS class 12	25.66	25.69	25.79
EGPRS class 8	24.96	25.03	25.04
EGPRS class 10	21.80	21.83	21.90
EGPRS class 11	19.91	19.93	20.02
EGPRS class 12	18.78	18.75	18.71

Conducted Power (*Unit: dBm)			
Band	WCDMA Band V		
Channel	4132	4182	4233
Frequency	826.4	836.4	846.6
AMR 12.2K	23.64	23.80	23.70
RMC 12.2K	23.68	23.82	23.71
HSDPA Subtest-1	22.96	23.01	23.05
HSDPA Subtest-2	22.99	23.04	23.06
HSDPA Subtest-3	22.90	22.94	22.91
HSDPA Subtest-4	22.86	22.93	22.93
DC-HSDPA Subtest-1	22.99	23.04	23.01
DC-HSDPA Subtest-2	22.95	22.97	23.00
DC-HSDPA Subtest-3	22.93	22.90	22.94
DC-HSDPA Subtest-4	22.80	22.91	22.88
HSUPA Subtest-1	22.44	22.32	22.28
HSUPA Subtest-2	21.35	21.25	21.22
HSUPA Subtest-3	22.19	22.19	22.66
HSUPA Subtest-4	21.26	21.23	21.01
HSUPA Subtest-5	23.30	23.30	23.40

Remark：

The conducted power (GSM1900 and WCDMA B2/4) of top antenna is less than the bottom antenna, so for top antenna only show the power of GSM850/WCDMA B5 on the report.

Although top antenna conducted power (GSM850/WCDMA B5) is less than the power of bottom antenna, but top antenna gain is higher than the bottom antenna gain, it will affect the maximum ERP calculation, so GSM850/WCDMA B5 power and ERP will show on the report.

Bottom Antenna:

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**
GSM	32.73	32.72	32.70	30.18	30.02	30.06
GPRS class 8	**32.75**	32.71	32.71	**30.19**	30.03	30.07
GPRS class 10	29.91	29.90	29.97	27.38	27.35	27.39
GPRS class 11	28.17	28.13	28.17	25.55	25.56	25.62
GPRS class 12	26.89	26.86	26.91	24.30	24.30	24.38
EGPRS class 8	26.32	26.33	26.14	25.30	25.35	25.45
EGPRS class 10	23.14	23.21	23.06	22.10	22.19	22.28
EGPRS class 11	21.35	21.27	21.20	20.21	20.18	20.37
EGPRS class 12	20.03	20.07	19.89	18.86	18.78	19.01

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**
AMR 12.2K	23.78	23.90	23.82	23.61	23.72	23.85	22.01	21.93	21.99
RMC 12.2K	23.89	**23.91**	23.76	23.64	23.78	**23.88**	**22.02**	21.94	22.00
HSDPA Subtest-1	23.32	23.25	23.32	22.94	22.95	23.04	21.36	21.39	21.46
HSDPA Subtest-2	23.39	23.24	23.36	22.57	22.70	22.78	21.06	21.13	21.17
HSDPA Subtest-3	23.18	23.15	23.29	22.34	22.43	22.53	20.86	20.94	21.00
HSDPA Subtest-4	23.18	23.15	23.30	22.36	22.45	22.54	20.91	20.92	20.98
DC-HSDPA Subtest-1	23.25	23.19	23.29	22.90	22.93	22.99	21.28	21.33	21.41
DC-HSDPA Subtest-2	23.29	23.20	23.31	22.52	22.73	22.72	21.00	21.10	21.11
DC-HSDPA Subtest-3	23.14	23.08	23.25	22.28	22.47	22.50	20.81	20.85	20.96
DC-HSDPA Subtest-4	23.13	23.06	23.24	22.30	22.39	22.48	20.86	20.87	20.92
HSUPA Subtest-1	22.73	22.38	22.82	21.49	21.39	21.61	20.48	20.43	20.51
HSUPA Subtest-2	21.78	21.36	21.85	20.12	20.28	20.56	20.02	20.03	20.01
HSUPA Subtest-3	22.40	22.37	22.57	21.82	21.80	21.47	20.46	20.42	20.58
HSUPA Subtest-4	21.47	21.52	21.72	20.97	21.11	21.38	19.44	19.46	19.55
HSUPA Subtest-5	23.60	23.50	23.60	23.20	23.30	23.30	21.70	21.60	21.70

ERP/EIRP

Top Antenna:

GSM850 (G_T - L_C= -2.90 dB)			
Channel	128	189	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.4	848.8
Conducted Power (dBm)	31.71	31.75	31.79
Conducted Power (Watts)	1.4825	1.4962	1.5101
ERP(dBm)	26.66	26.70	26.74
ERP(Watts)	0.4634	0.4677	0.4721

EDGE850 (G_T - L_C= -2.90 dB)			
Channel	128	189	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.4	848.8
Conducted Power (dBm)	24.96	25.03	25.04
Conducted Power (Watts)	0.3133	0.3184	0.3192
ERP(dBm)	19.91	19.98	19.99
ERP(Watts)	0.0979	0.0995	0.0998

WCDMA Band V (G_T - L_C = -2.90 dB)			
Channel	4132	4182	4233
	(Low)	(Mid)	(High)
Frequency (MHz)	826.4	836.4	846.6
Conducted Power (dBm)	23.68	23.82	23.71
Conducted Power (Watts)	0.2333	0.2410	0.2350
ERP(dBm)	18.63	18.77	18.66
ERP(Watts)	0.0729	0.0753	0.0735

Bottom Antenna:

GSM850 (G_T - L_C= -6.20 dB)			
Channel	128	189	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.4	848.8
Conducted Power (dBm)	32.75	32.71	32.71
Conducted Power (Watts)	1.8836	1.8664	1.8664
ERP(dBm)	24.40	24.36	24.36
ERP(Watts)	0.2754	0.2729	0.2729

EDGE850 (G_T - L_C= -6.20 dB)			
Channel	128	189	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.4	848.8
Conducted Power (dBm)	26.32	26.33	26.14
Conducted Power (Watts)	0.4285	0.4295	0.4111
ERP(dBm)	17.97	17.98	17.79
ERP(Watts)	0.0627	0.0628	0.0601

Bottom Antenna:

GSM1900 (G_T - L_C= -1.20 dB)			
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency (MHz)	1850.2	1880	1909.8
Conducted Power (dBm)	30.19	30.03	30.07
Conducted Power (Watts)	1.0447	1.0069	1.0162
EIRP(dBm)	28.99	28.83	28.87
EIRP(Watts)	0.7925	0.7638	0.7709

EDGE1900 (G_T - L_C= -1.20 dB)			
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency (MHz)	1850.2	1880	1909.8
Conducted Power (dBm)	25.30	25.35	25.45
Conducted Power (Watts)	0.3388	0.3428	0.3508
EIRP(dBm)	24.10	24.15	24.25
EIRP(Watts)	0.2570	0.2600	0.2661

Bottom Antenna:

WCDMA Band V (G_T - L_C = -6.20 dB)			
Channel	4132	4182	4233
	(Low)	(Mid)	(High)
Frequency (MHz)	826.4	836.4	846.6
Conducted Power (dBm)	23.89	23.91	23.76
Conducted Power (Watts)	0.2449	0.2460	0.2377
ERP(dBm)	15.54	15.56	15.41
ERP(Watts)	0.0358	0.0360	0.0348

WCDMA Band II (G_T - L_C = -1.20 dB)			
Channel	9262	9400	9538
	(Low)	(Mid)	(High)
Frequency (MHz)	1852.4	1880	1907.6
Conducted Power (dBm)	23.64	23.78	23.88
Conducted Power (Watts)	0.2312	0.2388	0.2443
EIRP(dBm)	22.44	22.58	22.68
EIRP(Watts)	0.1754	0.1811	0.1854

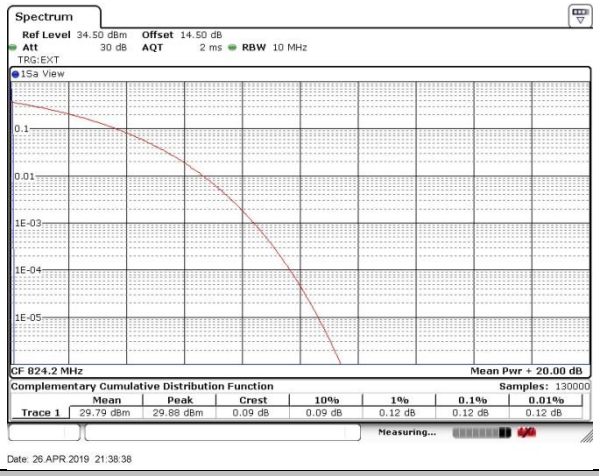
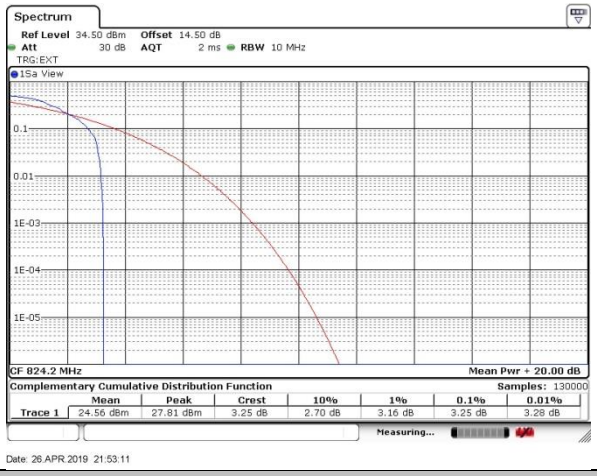
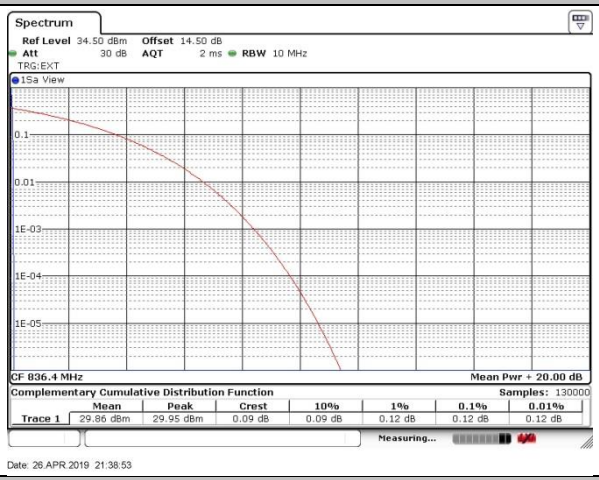
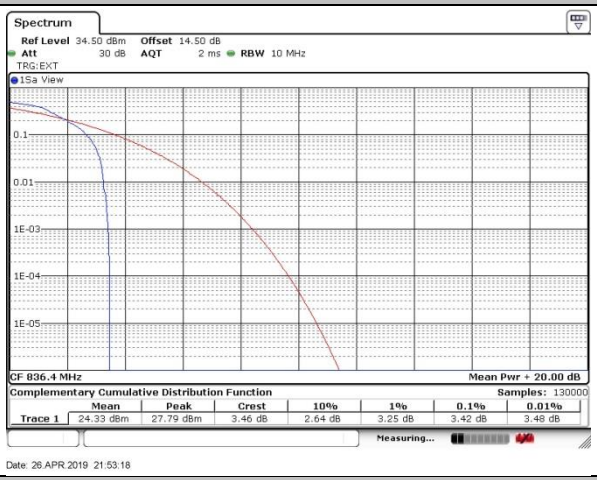
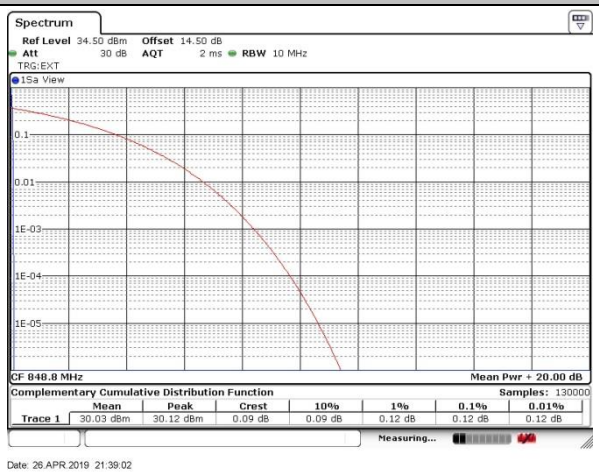
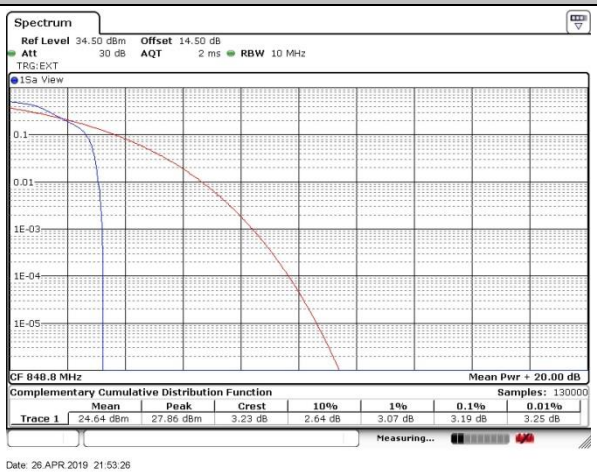
WCDMA Band IV (G_T - L_C = -2.00 dB)			
Channel	1312	1413	1513
	(Low)	(Mid)	(High)
Frequency (MHz)	1712.4	1732.6	1752.6
Conducted Power (dBm)	22.02	21.94	22.00
Conducted Power (Watts)	0.1592	0.1563	0.1585
EIRP(dBm)	20.02	19.94	20.00
EIRP(Watts)	0.1005	0.0986	0.1000

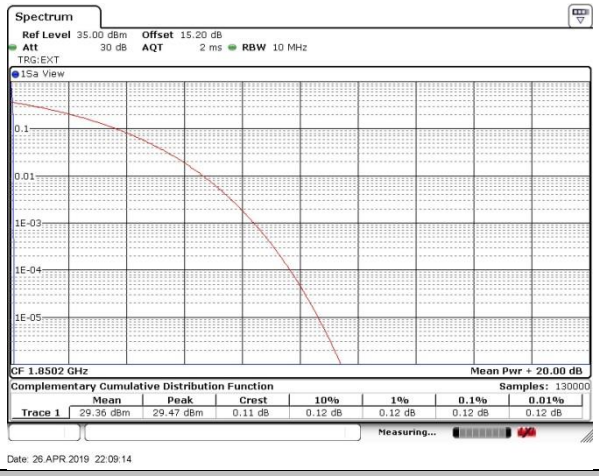
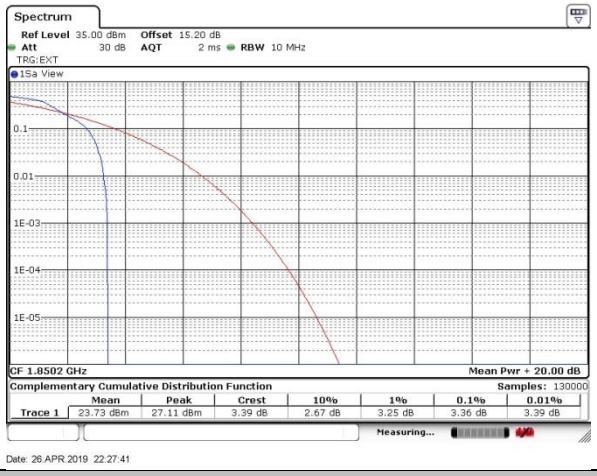
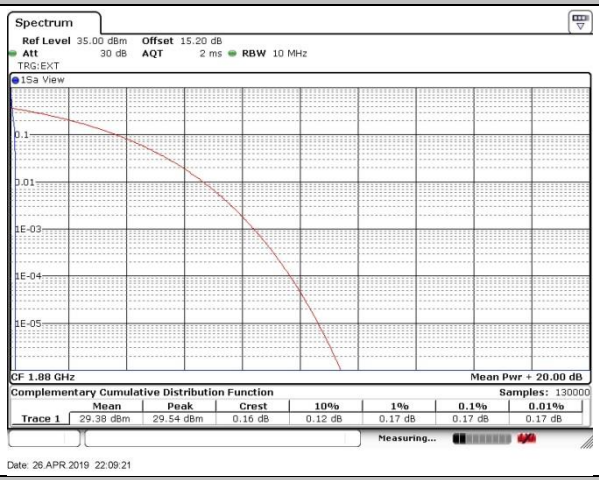
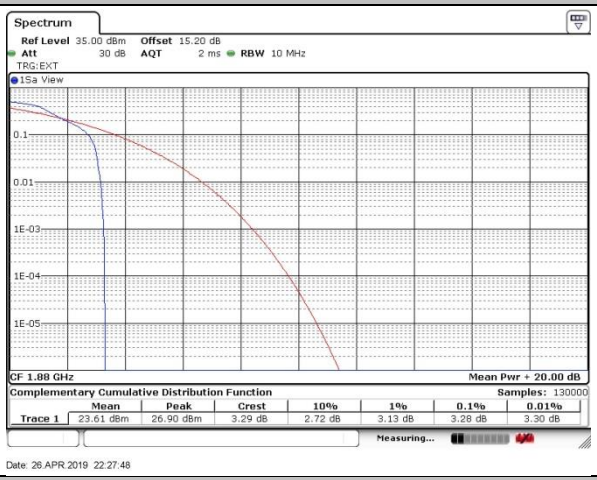
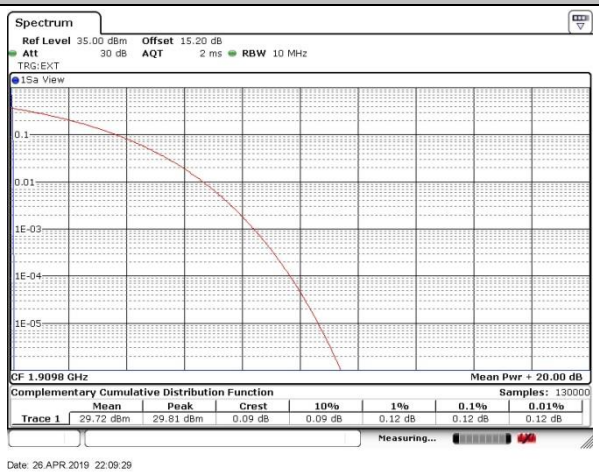
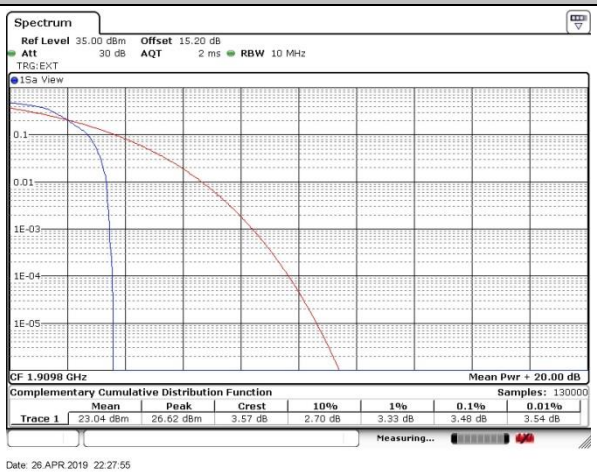
Peak-to-Average Ratio

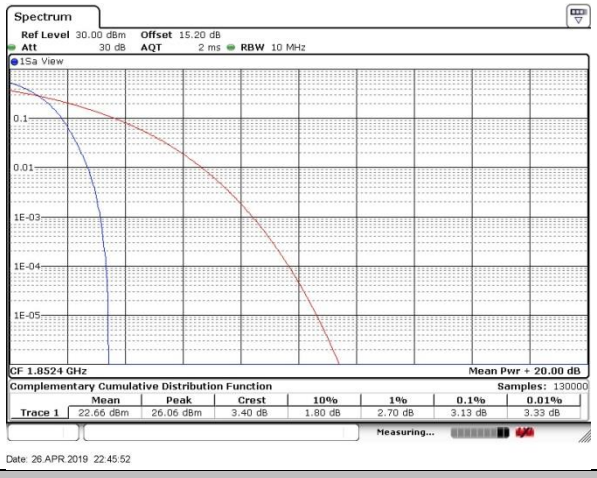
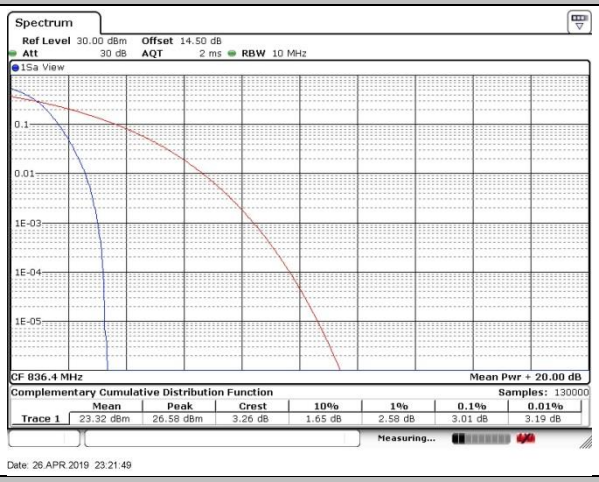
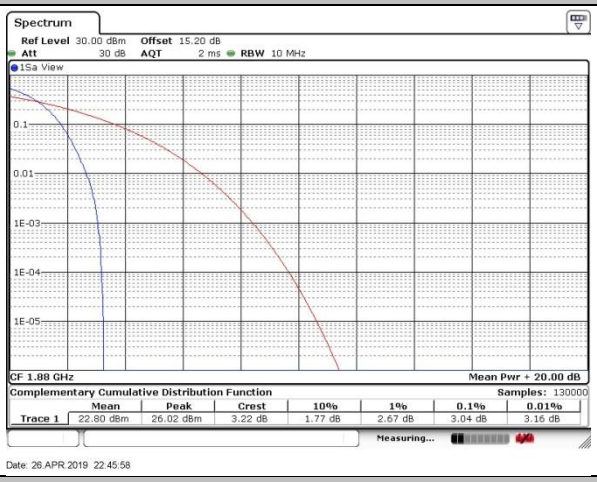
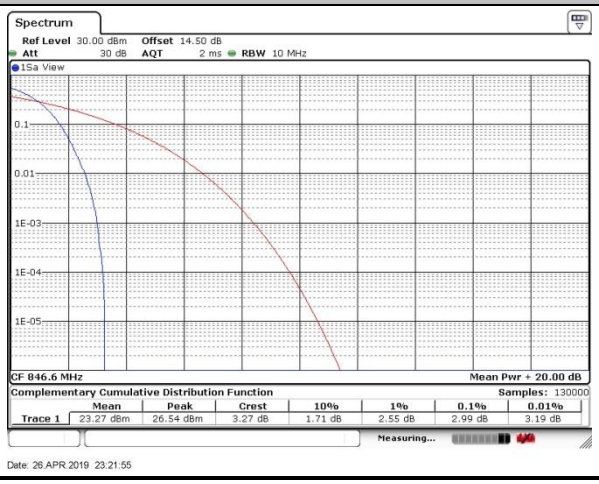
Mode	GSM850		Limit: 13dB
Mod.	GPRS class 8	EDGE class 8	Result
Lowest CH	0.12	3.25	PASS
Middle CH	0.12	3.42	
Highest CH	0.12	3.19	

Mode	GSM1900		Limit: 13dB
Mod.	GPRS class 8	EDGE class 8	Result
Lowest CH	0.12	3.36	PASS
Middle CH	0.17	3.28	
Highest CH	0.12	3.48	

Mode	WCDMA Band V	WCDMA Band II	WCDMA Band IV	Limit: 13dB
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	2.93	3.13	2.84	PASS
Middle CH	3.01	3.04	2.87	
Highest CH	2.99	2.93	3.07	

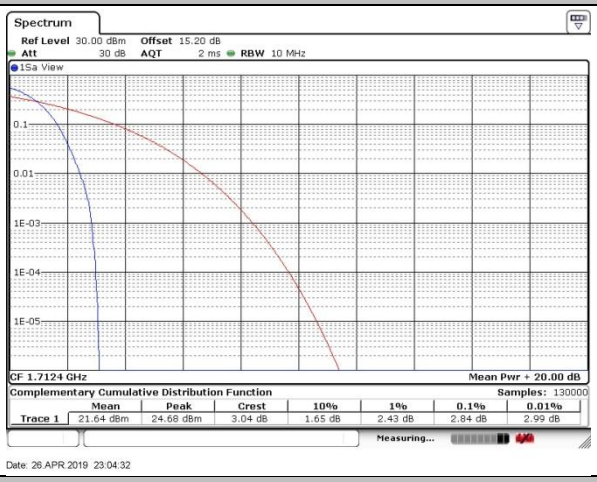
GSM850 (GPRS class 8))	GSM850 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

GSM1900 (GPRS class 8))	GSM1900 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

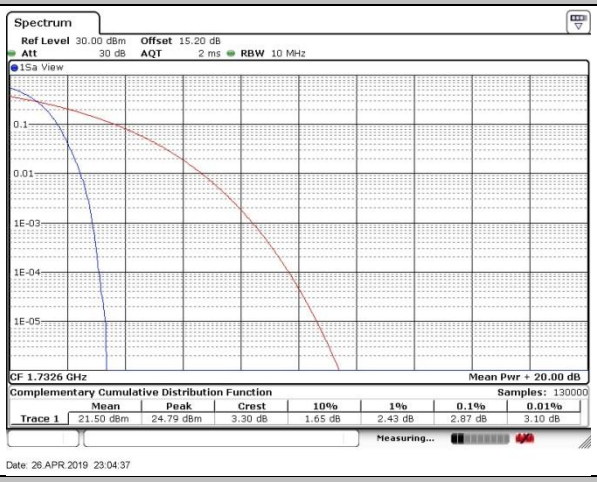
WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

WCDMA Band IV (RMC 12.2Kbps)

Lowest Channel



Middle Channel



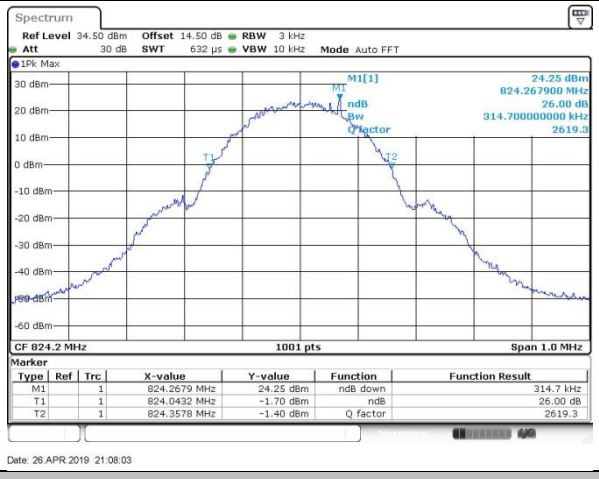
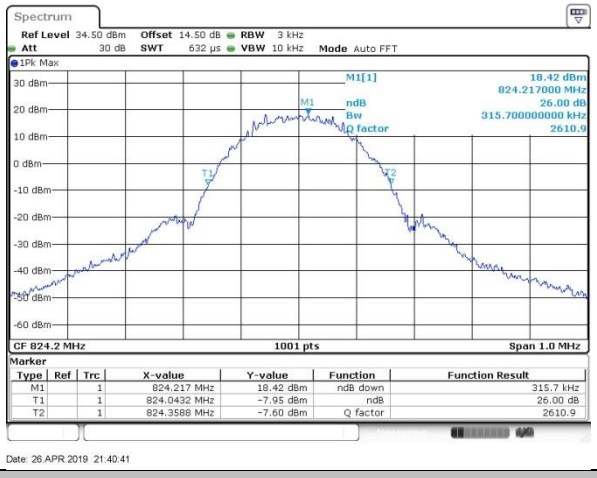
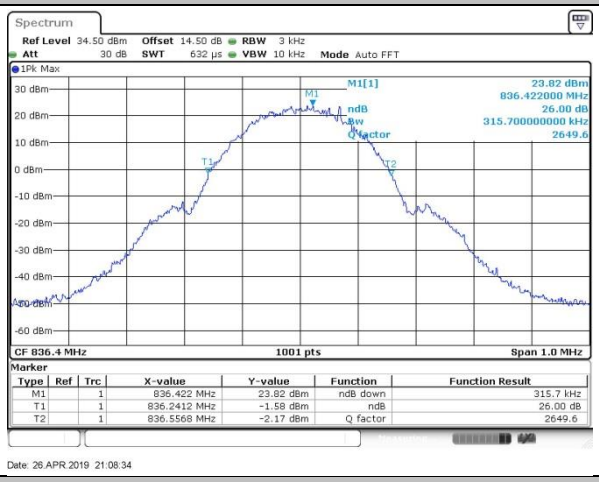
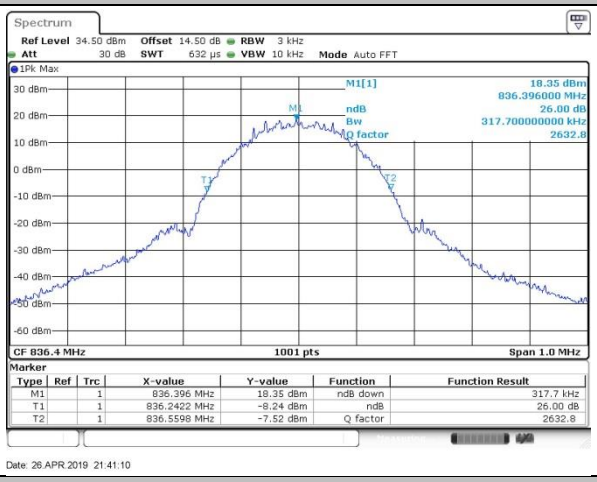
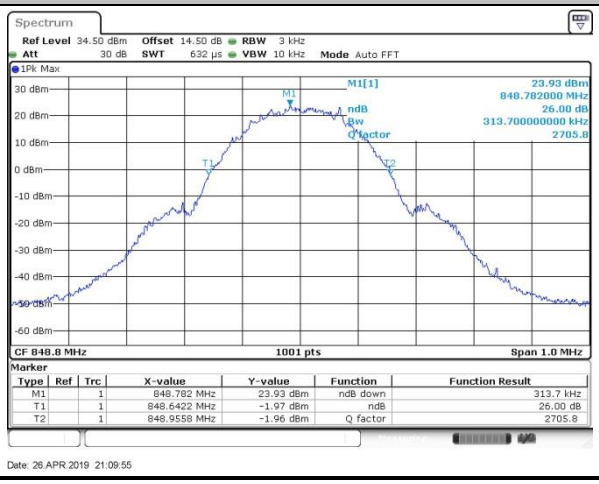
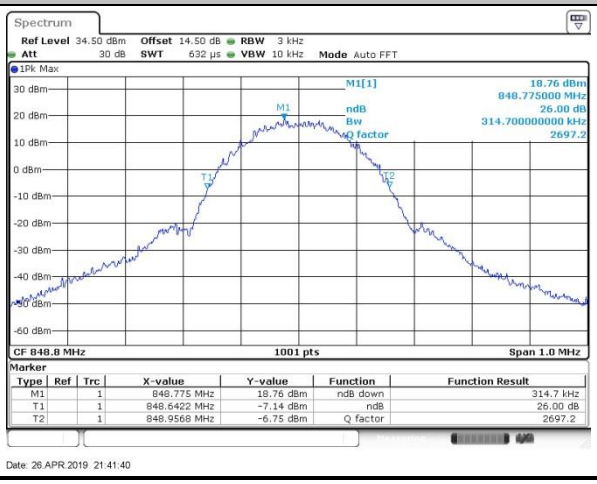
Highest Channel

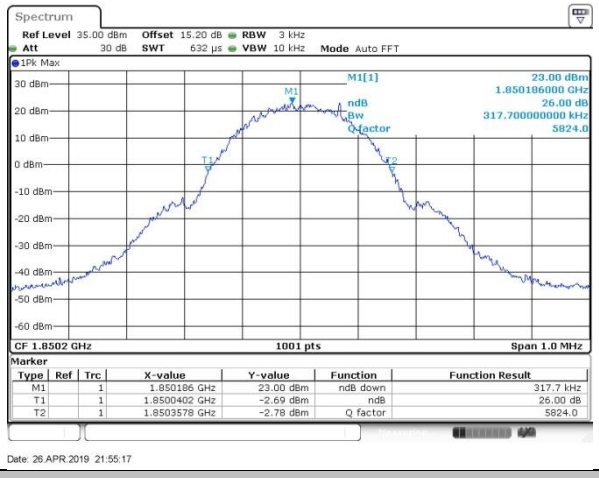
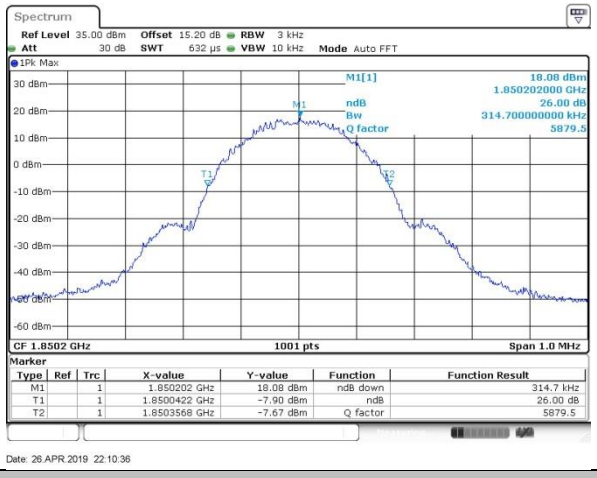
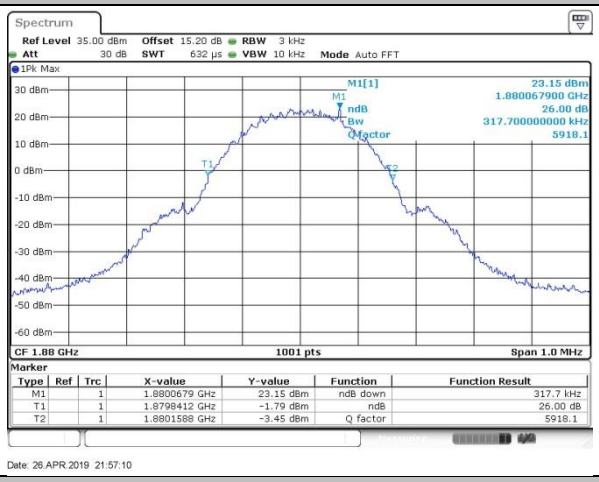
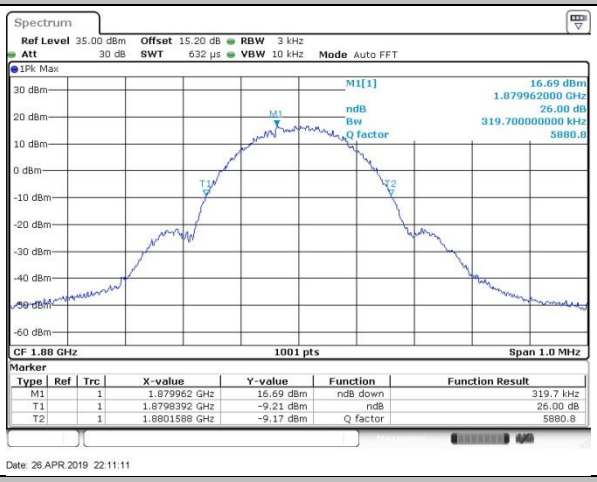
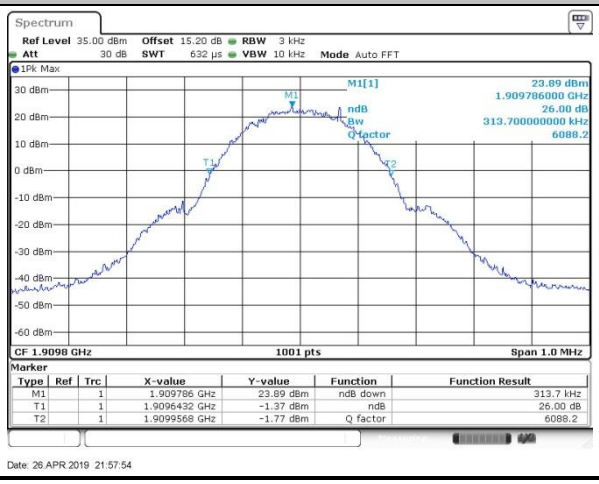
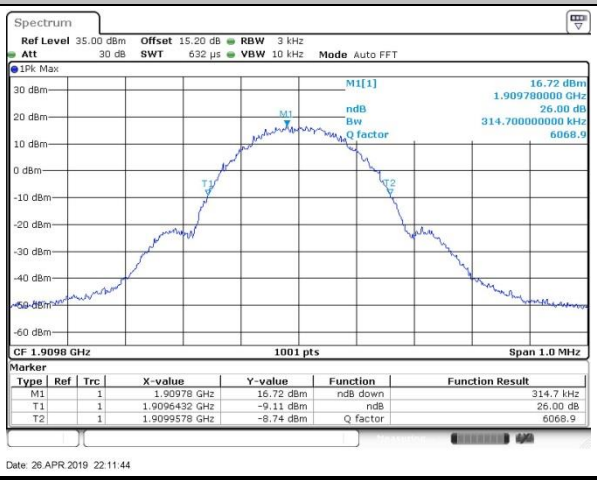
26dB Bandwidth

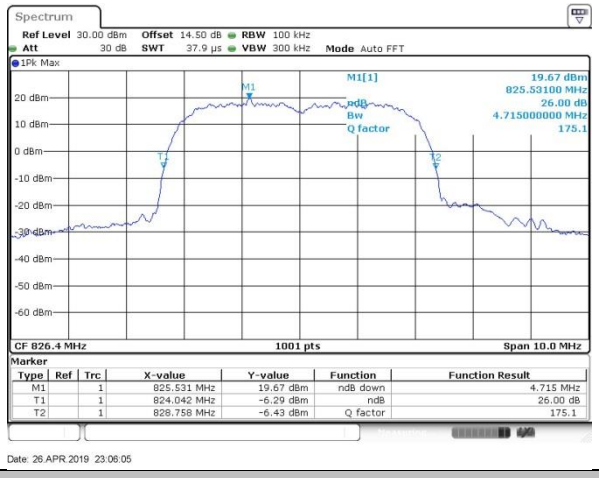
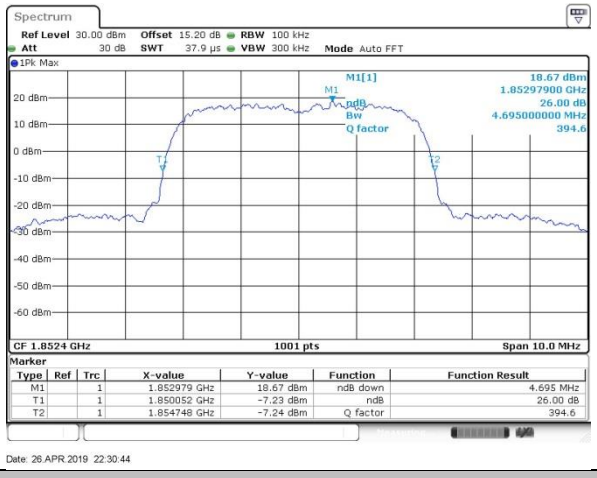
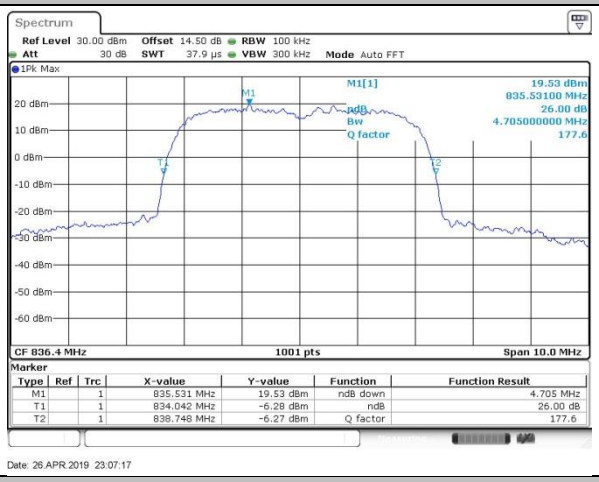
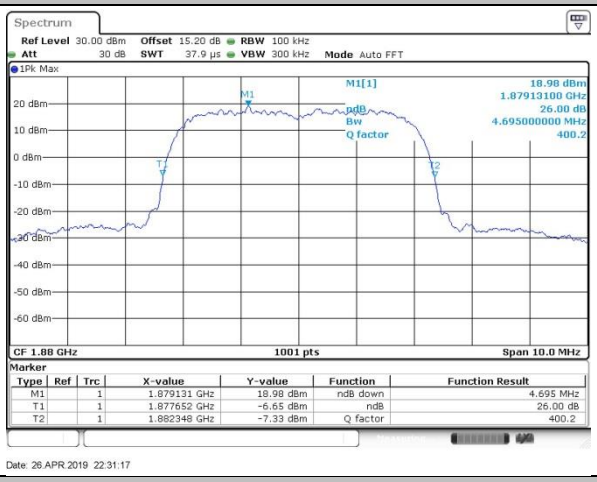
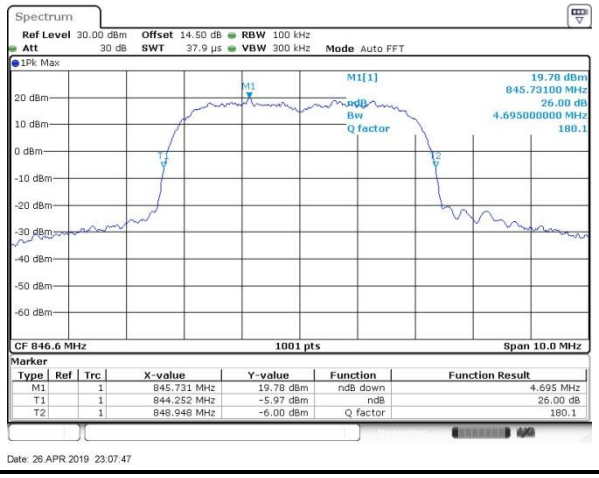
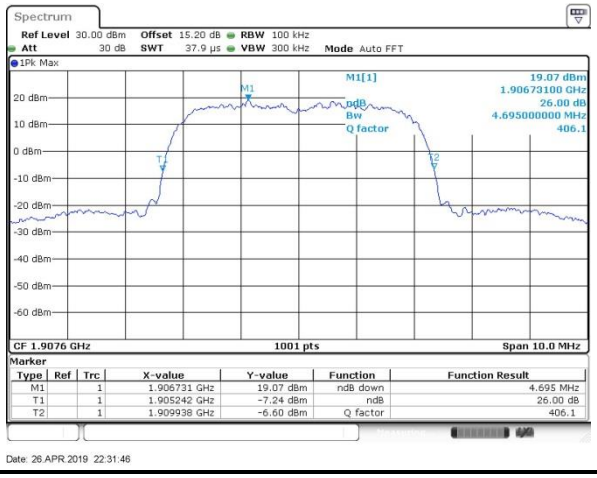
Mode	GSM850	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	0.315	0.316
Middle CH	0.316	0.318
Highest CH	0.314	0.315

Mode	GSM1900	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	0.318	0.315
Middle CH	0.318	0.320
Highest CH	0.314	0.315

Mode	WCDMA Band V	WCDMA Band II	WCDMA Band IV
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.715	4.695	4.715
Middle CH	4.705	4.695	4.725
Highest CH	4.695	4.695	4.705

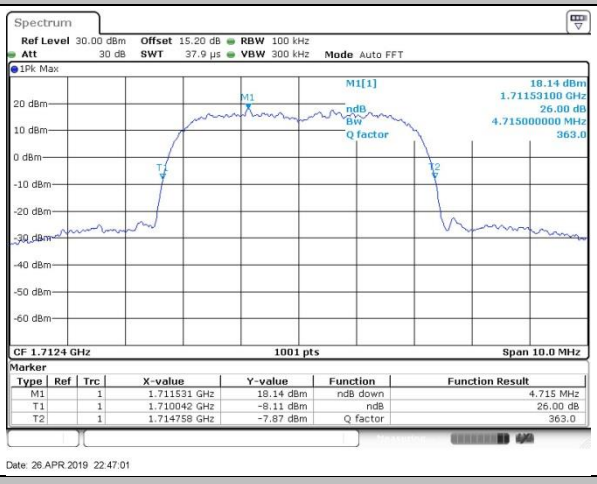
GSM850 (GPRS class 8)	GSM850 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

GSM1900 (GPRS class 8))	GSM1900 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

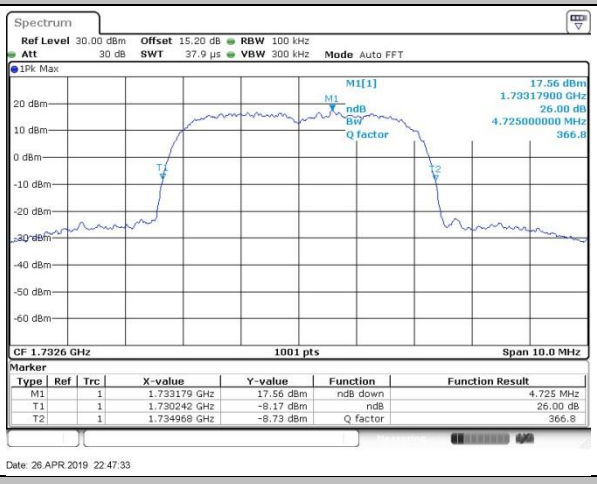
WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**
	

WCDMA Band IV (RMC 12.2Kbps)

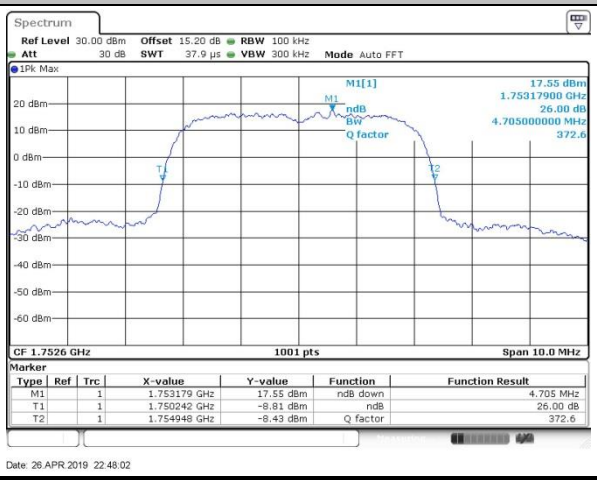
Lowest Channel



Middle Channel



Highest Channel

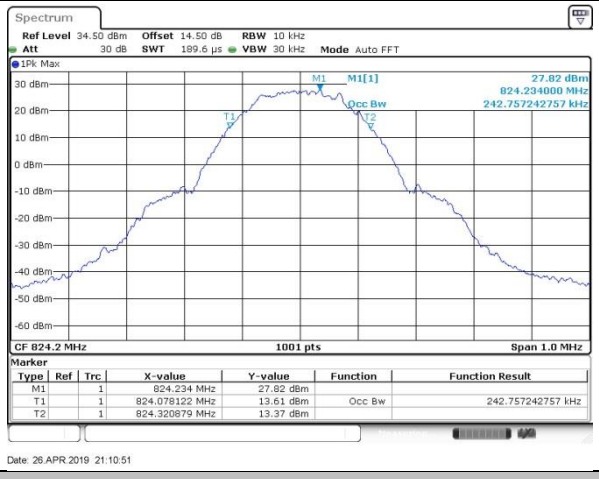
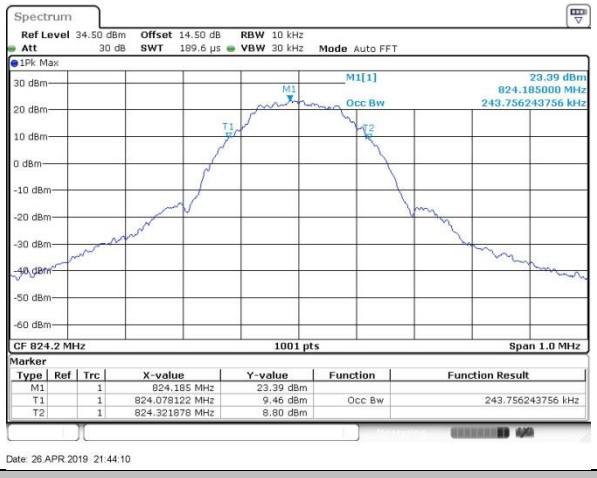
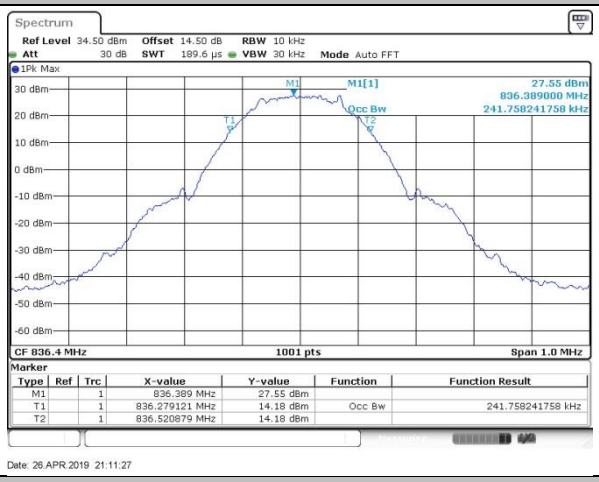
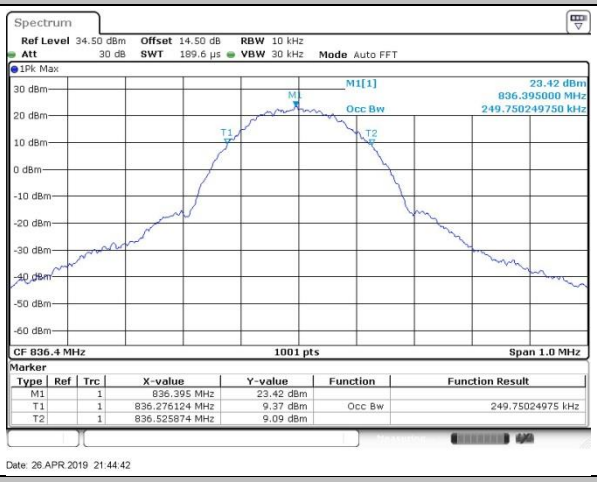


Occupied Bandwidth

Mode	GSM850	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	0.243	0.244
Middle CH	0.242	0.250
Highest CH	0.242	0.248

Mode	GSM1900	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	0.242	0.246
Middle CH	0.243	0.250
Highest CH	0.250	0.251

Mode	WCDMA Band V	WCDMA Band II	WCDMA Band IV
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.156	4.156	4.166
Middle CH	4.156	4.146	4.156
Highest CH	4.146	4.146	4.156

GSM850 (GPRS class 8))	GSM850 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Middle Channel	**Middle Channel**
	
Highest Channel	**Highest Channel**