



FCC RF Test Report

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
FCC ID : IHDT56XJ1
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on May 15, 2018 and completely tested on May 29, 2018. We, Sporton International (Kunshan) 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.

This report contains data that were produced under subcontract by Laboratory SPORTON INTERNATIONAL INC.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.



Approved by: James Huang / Manager

Sporton International (Kunshan) Inc.

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China**



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APPENDIX A. TEST RESULTS OF CONDUCTED TEST

APPENDIX B. TEST RESULTS OF RADIATED TEST

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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	-
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)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22H	PASS	-
	§2.1055 §24.235		Within Authorized Band		
4.4	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 18.51 dB at 5724.00 MHz



1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
FCC ID	IHDT56XJ1
EUT supports Radios application	CDMA/EV-DO/GSM/GPRS/EGPRS/WCDMA/HSPA/ DC-HSDPA/HSPA+(16QAM uplink is not supported)/LTE/NFC WLAN 2.4GHz 802.11b/g/n HT20/ WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth v3.0 + EDR/Bluetooth v4.2 LE/ Bluetooth v5.0 LE
IMEI Code	Conducted: 355550090015731 Radiation: 355550090016168
HW Version	DVT2
SW Version	fastboot_messi_verizon_oem_vzw_userdebug_8.1.0_ODX28.5 6_50ee_intcfg-test-keys_vzw
EUT Stage	Identical Prototype

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



1.4 Product Specification of Equipment Under Test

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 CDMA2000: BC0: 824.70 MHz ~ 848.31 MHz BC1: 1851.25 MHz ~ 1908.75 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 CDMA2000: BC0: 869.70 MHz ~ 893.31 MHz BC1: 1931.25 MHz ~ 1988.75 MHz
Maximum Output Power to Antenna	GSM/GPRS/EDGE: 850: 33.49 dBm 1900: 29.99 dBm WCDMA: Band V: 23.30 dBm Band II: 23.52 dBm CDMA2000: BC0: 24.15 dBm BC1: 23.99 dBm
Antenna Type	Fixed Internal Antenna
Antenna Gain	Cellular Band: -1.80 dBi PCS Band: -0.50 dBi
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK WCDMA : BPSK (Uplink) HSDPA/DC-HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM (uplink is not supported) DC-HSDPA : 64QAM CDMA2000 1xRTT: QPSK CDMA2000 1xEV-DO: QPSK/8PSK



1.5 Modification of EUT

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

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

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22H	GSM850 GSM	GMSK	0.8995	0.0383 ppm	244KGXW
Part 22H	GSM850 EDGE class 8	8PSK	0.2056	0.0430 ppm	246KG7W
Part 22H	WCDMA Band V RMC 12.2Kbps	BPSK	0.0861	0.0514 ppm	4M12F9W
Part 22H	CDMA2000 BC0 1xRTT	QPSK	0.1047	0.0490 ppm	1M27F9W
Part 24E	GSM1900 GSM	GMSK	0.8892	0.0191 ppm	244KGXW
Part 24E	GSM1900 EDGE class 8	8PSK	0.3459	0.0207 ppm	249KG7W
Part 24E	WCDMA Band II RMC 12.2Kbps	BPSK	0.2004	0.0154 ppm	4M12F9W
Part 24E	CDMA2000 BC1 1xRTT	QPSK	0.2234	0.0277 ppm	1M27F9W



1.7 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No. is CN5013.

Test Site	Sporton International (Kunshan) Inc.	
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	Sporton Site No.	FCC Test Firm Registration No.
	TH01-KS	630927

Note: The test site complies with ANSI C63.4 2014 requirement.

SPORTON INTERNATIONAL INC. is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and under the FCC-recognized accredited testing laboratories by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist. Taoyuan City Taiwan Tel: 886-3-327-3456 FAX: +886-3-327-0978		
Test Site No.	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.
	03CH07-HY	TW1190	553509

Note:

1. The test site complies with ANSI C63.4 2014 requirement.
2. Test data subcontracted: radiated spurious emissions only in section 4.4 of this report

1.8 Specification of Accessory

Specification of Accessory				
AC Adapter 1	Brand Name	Motorola (Salom)	Model Name	SC-22
	Power Rating	I/P: 100-240 Vac, 500mA, O/P: 5Vdc,3000mA or 9Vdc,1600mA or 12Vdc,1200mA		
AC Adapter 2	Brand Name	Motorola (Chenyang)	Model Name	SC-22
	Power Rating	I/P: 100-240 Vac, 500mA, O/P: 5Vdc,3000mA or 9Vdc,1600mA or 12Vdc,1200mA		
AC Adapter 3	Brand Name	Motorola (Salom)	Model Name	SC-51
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5Vdc,3000mA or 9Vdc,2000mA or 12Vdc,1500mA		
AC Adapter 4	Brand Name	Motorola (Chenyang)	Model Name	SC-51
	Power Rating	I/P: 100-240 Vac, 600mA, O/P: 5Vdc,3000mA or 9Vdc,2000mA or 12Vdc,1500mA		
Battery	Brand Name	Motorola (Sunwoda)	Model Name	JS40
	Power Rating	3.8Vdc,3000mAh	Type	Li-ion
USB Cable 1	Brand Name	Motorola (Cabletech)	Model Name	SKN6473A
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		
USB Cable 2	Brand Name	Motorola (Luxshare)	Model Name	SKN6473A
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		
Audio Cable	Brand Name	Motorola (Luxshare)	Model Name	SC18C27844
	Signal Line Type	0.08 meter, shielded cable, without ferrite core		

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)
- 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:

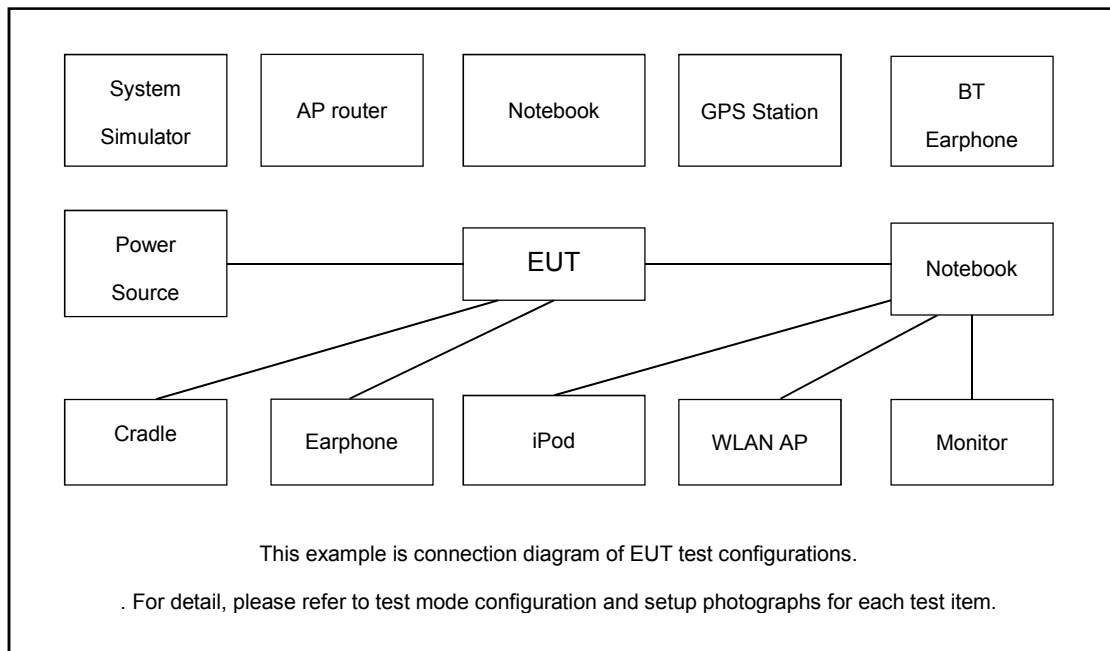
1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V and CDMA BC0.
2. 30 MHz to 19100 MHz for GSM1900 and WCDMA Band II and CDMA BC1.

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	<ul style="list-style-type: none"> ■ GSM Link ■ EDGE class 8 Link 	<ul style="list-style-type: none"> ■ GSM Link ■ EDGE class 8 Link
GSM 1900	<ul style="list-style-type: none"> ■ GSM Link ■ EDGE class 8 Link 	<ul style="list-style-type: none"> ■ GSM Link ■ EDGE class 8 Link
WCDMA Band V	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link 	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link
WCDMA Band II	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link 	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link
CDMA BC0	<ul style="list-style-type: none"> ■ 1xRTT Link 	<ul style="list-style-type: none"> ■ 1xRTT Link
CDMA BC1	<ul style="list-style-type: none"> ■ 1xRTTLink 	<ul style="list-style-type: none"> ■ 1xRTT Link

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m
3.	Earphone	Lenovo	LH102	N/A	Unshielded, 1.2m	N/A



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 :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.5 + 10 = 14.5 \text{ (dB)} \end{aligned}$$



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
CDMA200 BC0	Channel	1013	384	777
	Frequency	824.7	836.52	848.31
CDMA200 BC1	Channel	25	600	1175
	Frequency	1851.25	1880.0	1908.75

3 Conducted Test Result

3.1 Measuring Instruments

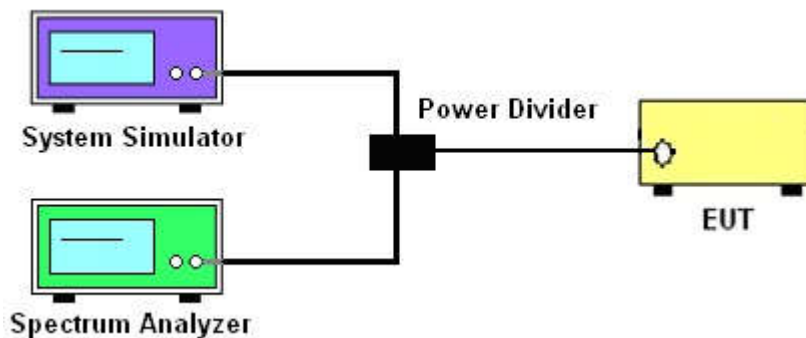
See list of measuring instruments of this test report.

3.2 Test Setup

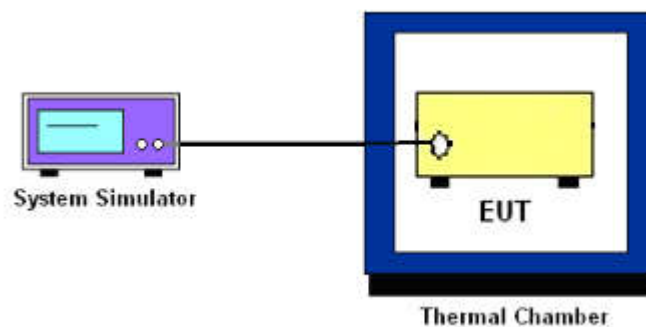
3.2.1 Conducted Output Power



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, CDMA BC0 and WCDMA Band V.

The EIRP of mobile transmitters must not exceed 2 Watts for GSM1900, CDMA BC1 and WCDMA Band II.

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 $43 + 10\log(P)$ 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 10th 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 $43 + 10\log(P)$ 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 $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) 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 $20\pm 5^{\circ}\text{C}$ 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.

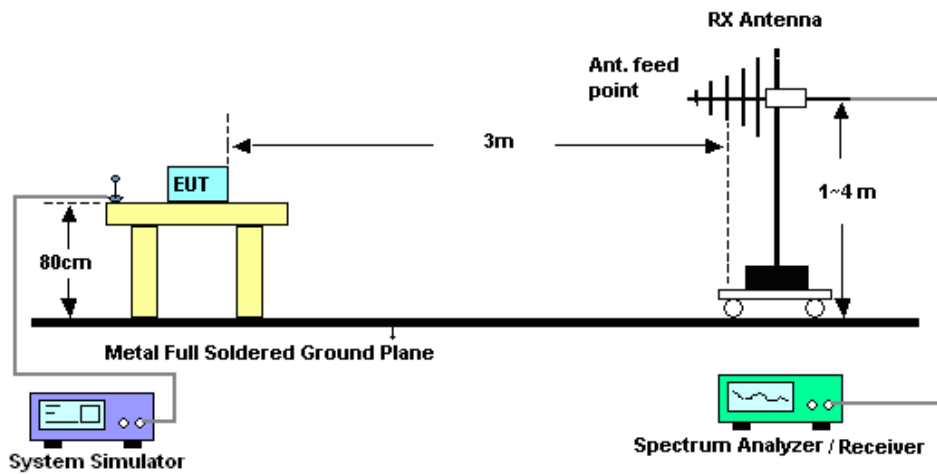
4 Radiated Test Items

4.1 Measuring Instruments

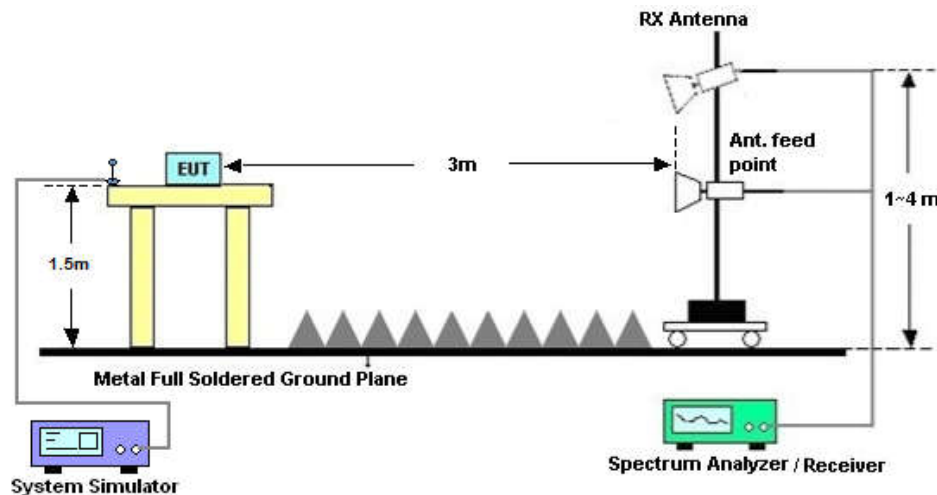
See list of measuring instruments of this test report.

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. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12. $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10\log(P)$ 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. 08, 2017	May 22, 2018 ~ May 29, 2018	Aug. 07, 2018	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 12, 2017	May 22, 2018 ~ May 29, 2018	Oct. 11, 2018	Conducted (TH01-KS)
Bilog Antenna	TESEQ	CBL 6111D&008 00N1D01N-	35419&03	30MHz to 1GHz	Dec. 18, 2017	May 24, 2018 ~ May 25, 2018	Dec. 17, 2018	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 23, 2017	May 24, 2018 ~ May 25, 2018	Aug. 22, 2018	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Oct. 30, 2017	May 24, 2018 ~ May 25, 2018	Oct. 29, 2018	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Apr. 17, 2018	May 24, 2018 ~ May 25, 2018	Apr. 16, 2019	Radiation (03CH07-HY)
Controller	ChainTek	Chaintek 3000	N/A	Control Turn table	NCR	May 24, 2018 ~ May 25, 2018	NCR	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	NCR	May 24, 2018 ~ May 25, 2018	NCR	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	NCR	May 24, 2018 ~ May 25, 2018	NCR	Radiation (03CH07-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz,VS WR : 2.5:1 max	Jul. 18, 2017	May 24, 2018 ~ May 25, 2018	Jul. 17, 2018	Radiation (03CH07-HY)
Amplifier	SONOMA	310N	187231	9kHz~1GHz	Jan. 08, 2018	May 24, 2018 ~ May 25, 2018	Jan. 07, 2019	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz to 26.5GHz	Jan. 16, 2018	May 24, 2018 ~ May 25, 2018	Jan. 15, 2019	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA917058 4	18GHz- 40GHz	Nov. 27, 2017	May 24, 2018 ~ May 25, 2018	Nov. 26, 2018	Radiation (03CH07-HY)

NCR: No Calibration Required



6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.1dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.4dB
---	-------

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.0dB
---	-------



Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM	33.20	33.17	33.49	29.83	29.95	29.99
GPRS class 8	33.18	33.15	33.48	29.81	29.93	29.99
GPRS class 10	31.92	31.96	32.33	28.48	28.66	28.72
GPRS class 11	29.83	29.92	30.31	26.67	26.82	26.87
GPRS class 12	27.86	28.24	28.30	24.78	24.91	25.05
EGPRS class 8	26.90	26.98	27.08	25.68	25.79	25.89
EGPRS class 10	25.46	25.57	25.68	24.22	24.36	24.47
EGPRS class 11	23.67	23.74	23.84	22.38	22.51	22.61
EGPRS class 12	21.81	21.88	22.02	20.50	20.65	20.81



Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
AMR 12.2K	23.19	23.29	23.13	23.14	23.16	23.51
RMC 12.2K	23.20	23.30	23.14	23.15	23.17	23.52
HSDPA Subtest-1	21.99	21.94	22.03	22.05	22.05	22.32
HSDPA Subtest-2	22.00	21.77	22.10	22.10	22.05	22.35
HSDPA Subtest-3	21.48	21.79	21.58	21.57	21.51	21.80
HSDPA Subtest-4	21.47	21.20	21.63	21.59	21.50	21.83
DC-HSDPA Subtest-1	21.49	21.44	21.53	21.55	21.55	21.82
DC-HSDPA Subtest-2	21.48	21.25	21.58	21.60	21.55	21.85
DC-HSDPA Subtest-3	20.96	21.27	21.06	20.97	20.91	21.20
DC-HSDPA Subtest-4	20.96	20.69	21.12	20.98	20.89	21.22
HSUPA Subtest-1	21.92	21.92	21.91	21.89	22.02	22.17
HSUPA Subtest-2	19.93	19.95	19.96	19.99	20.05	20.27
HSUPA Subtest-3	20.94	20.93	20.92	21.02	21.09	21.24
HSUPA Subtest-4	19.97	20.03	19.94	20.02	20.06	20.28
HSUPA Subtest-5	21.80	21.90	21.79	22.10	22.10	22.30

Conducted Power (*Unit: dBm)						
Band	CDMA 2000 BC0			CDMA 2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC1 SO55	23.94	24.09	24.14	23.79	23.83	23.99
1xRTT RC3 SO55	23.93	24.11	24.15	23.70	23.75	23.91
1xRTT RC3 SO32 (+ F-SCH)	23.92	24.08	24.14	23.70	23.74	23.81
1xRTT RC3 SO32 (+SCH)	23.82	23.97	24.06	23.68	23.74	23.90
1xEVDO RTAP 153.6Kbps	23.95	24.04	24.11	23.77	23.86	23.97
1xEVDO RETAP 4096Bits	23.84	24.02	24.10	23.76	23.87	23.96



ERP/EIRP

GSM850 (G_T - L_C= -1.80 dB)			
Channel	128	189	251
	(Low)	(Mid)	(High)
Frequency	824.2	836.4	848.8
(MHz)			
Conducted Power (dBm)	33.20	33.17	33.49
Conducted Power (Watts)	2.0893	2.0749	2.2336
ERP(dBm)	29.25	29.22	29.54
ERP(Watts)	0.8414	0.8356	0.8995

EDGE850 (G_T - L_C= -1.80 dB)			
Channel	128	189	251
	(Low)	(Mid)	(High)
Frequency	824.2	836.4	848.8
(MHz)			
Conducted Power (dBm)	26.90	26.98	27.08
Conducted Power (Watts)	0.4898	0.4989	0.5105
ERP(dBm)	22.95	23.03	23.13
ERP(Watts)	0.1972	0.2009	0.2056



GSM1900 (G _T - L _C = -0.50 dB)			
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency	1850.2	1880	1909.8
(MHz)			
Conducted Power (dBm)	29.83	29.95	29.99
Conducted Power (Watts)	0.9616	0.9886	0.9977
EIRP(dBm)	29.33	29.45	29.49
EIRP(Watts)	0.8570	0.8810	0.8892

EDGE1900 (G _T - L _C = -0.50 dB)			
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency	1850.2	1880	1909.8
(MHz)			
Conducted Power (dBm)	25.68	25.79	25.89
Conducted Power (Watts)	0.3698	0.3793	0.3882
EIRP(dBm)	25.18	25.29	25.39
EIRP(Watts)	0.3296	0.3381	0.3459



WCDMA Band V ($G_T - L_C = -1.80$ dB)			
Channel	4132	4182	4233
	(Low)	(Mid)	(High)
Frequency (MHz)	826.4	836.4	846.6
Conducted Power (dBm)	23.20	23.30	23.14
Conducted Power (Watts)	0.2089	0.2138	0.2061
ERP(dBm)	19.25	19.35	19.19
ERP(Watts)	0.0841	0.0861	0.0830

WCDMA Band II ($G_T - L_C = -0.50$ dB)			
Channel	9262	9400	9538
	(Low)	(Mid)	(High)
Frequency (MHz)	1852.4	1880	1907.6
Conducted Power (dBm)	23.15	23.17	23.52
Conducted Power (Watts)	0.2065	0.2075	0.2249
EIRP(dBm)	22.65	22.67	23.02
EIRP(Watts)	0.1841	0.1849	0.2004



CDMA 2000 BC0 ($G_T - L_C = -1.80$ dB)			
Channel	1013	384	777
	(Low)	(Mid)	(High)
Frequency	824.7	836.52	848.31
(MHz)			
Conducted Power (dBm)	23.93	24.11	24.15
Conducted Power (Watts)	0.2472	0.2576	0.2600
ERP(dBm)	19.98	20.16	20.20
ERP(Watts)	0.0995	0.1038	0.1047

CDMA 2000 BC1 ($G_T - L_C = -0.50$ dB)			
Channel	25	600	1175
	(Low)	(Mid)	(High)
Frequency	1851.25	1880	1908.75
(MHz)			
Conducted Power (dBm)	23.79	23.83	23.99
Conducted Power (Watts)	0.2393	0.2415	0.2506
EIRP(dBm)	23.29	23.33	23.49
EIRP(Watts)	0.2133	0.2153	0.2234



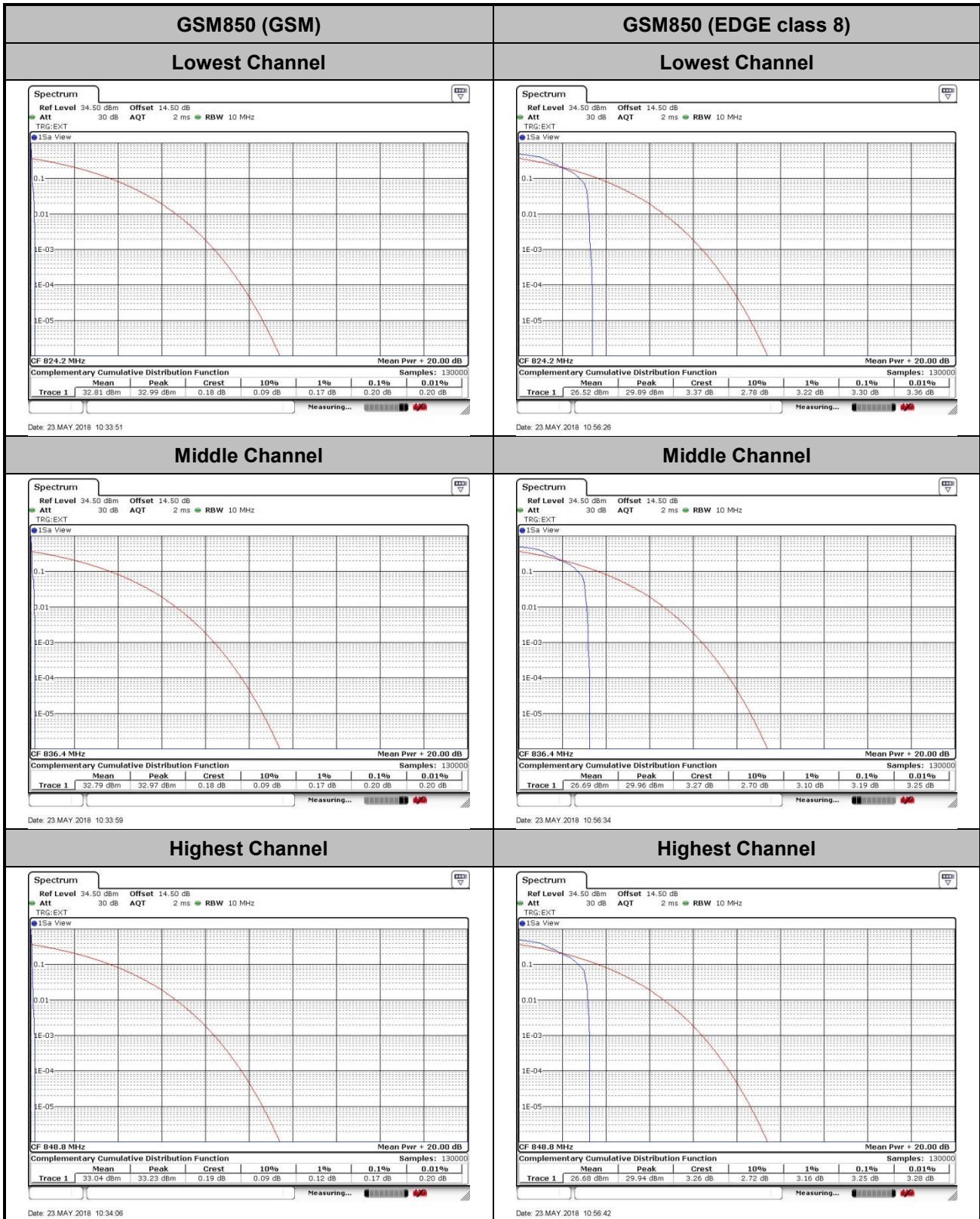
Peak-to-Average Ratio

Mode	GSM850(dB)		Limit: 13dB
Mod.	GSM	EDGE class 8	Result
Lowest CH	0.20	3.30	PASS
Middle CH	0.20	3.19	
Highest CH	0.17	3.25	

Mode	GSM1900(dB)		Limit: 13dB
Mod.	GSM	EDGE class 8	Result
Lowest CH	0.20	3.28	PASS
Middle CH	0.17	3.19	
Highest CH	0.20	3.19	

Mode	WCDMA Band V(dB)	WCDMA Band II(dB)	Limit: 13dB
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	2.78	3.42	PASS
Middle CH	2.87	3.42	
Highest CH	3.07	3.39	

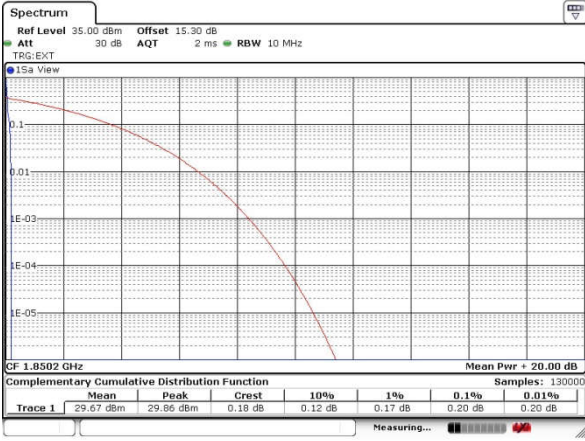
Mode	CDMA BC0(dB)	CDMA BC1(dB)	Limit: 13dB
Mod.	1xRTT	1xRTT	Result
Lowest CH	4.38	4.52	PASS
Middle CH	4.70	4.87	
Highest CH	4.35	4.23	





GSM1900 (GSM)

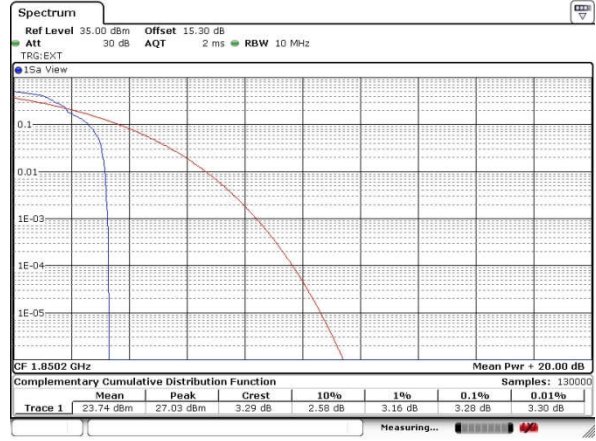
Lowest Channel



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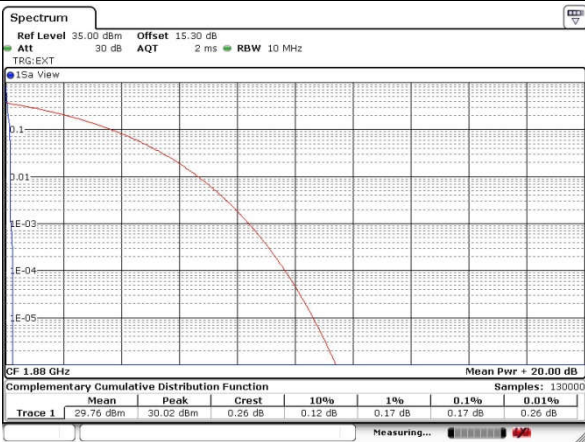
GSM1900 (EDGE class 8)

Lowest Channel



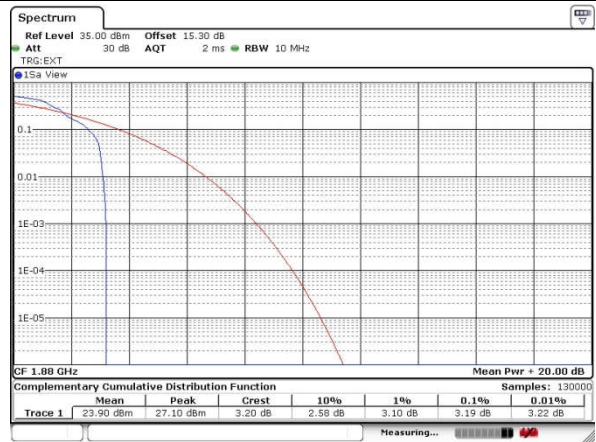
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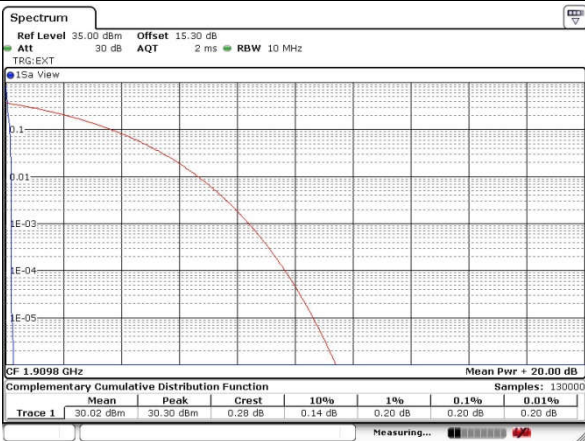
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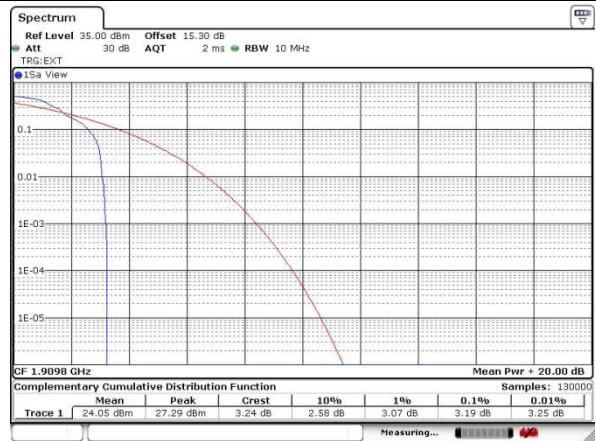
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Highest Channel

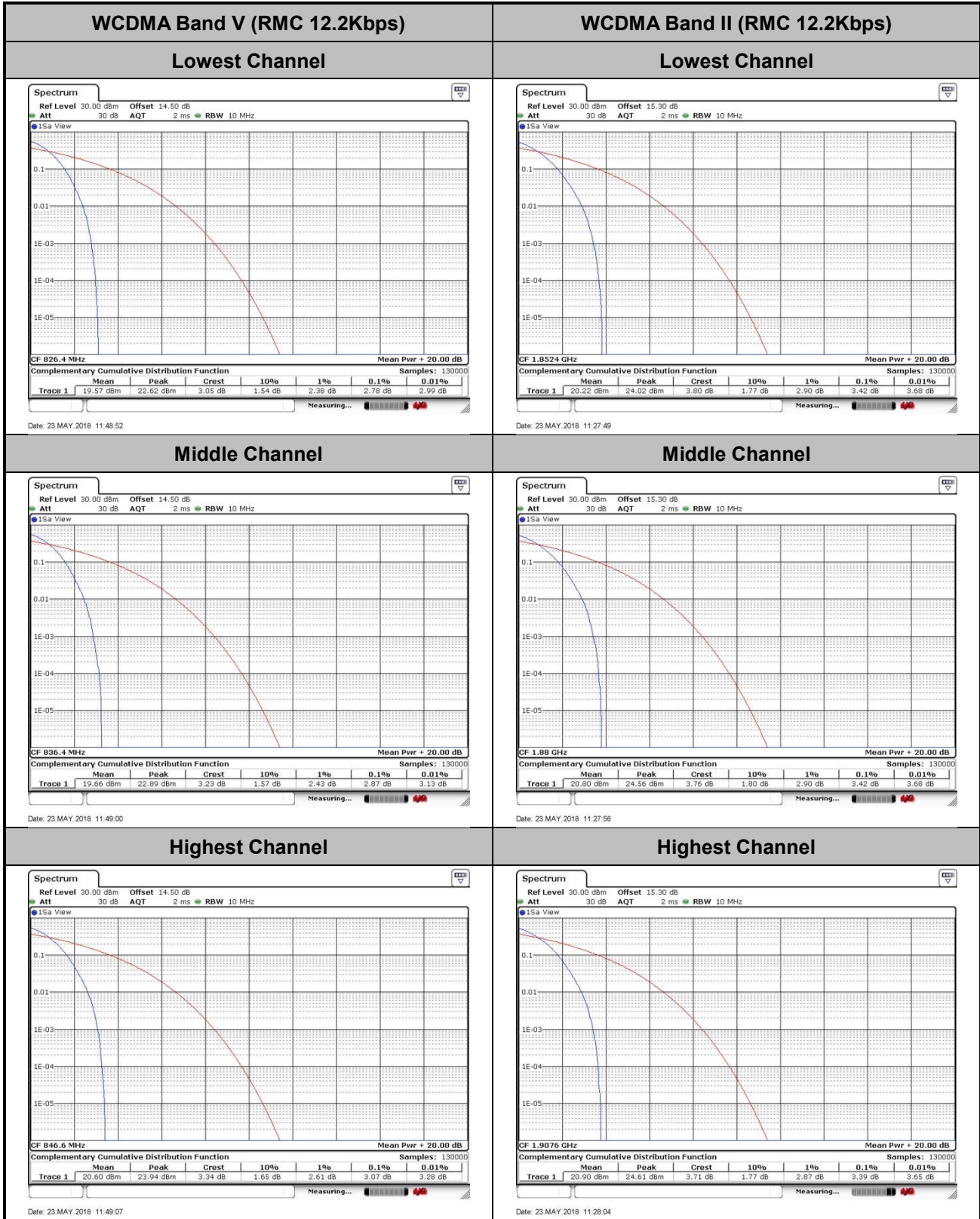


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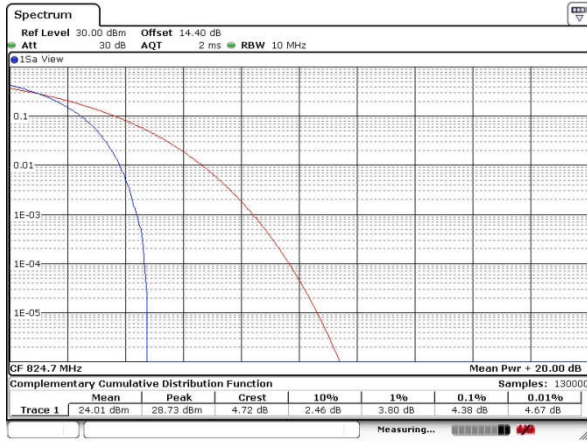
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CDMA BC0 (1xRTT)

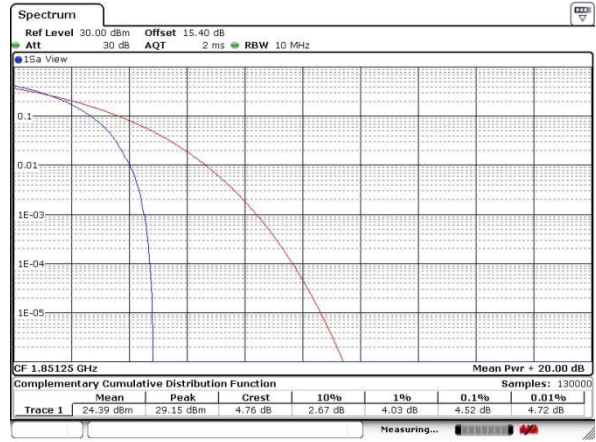
Lowest Channel



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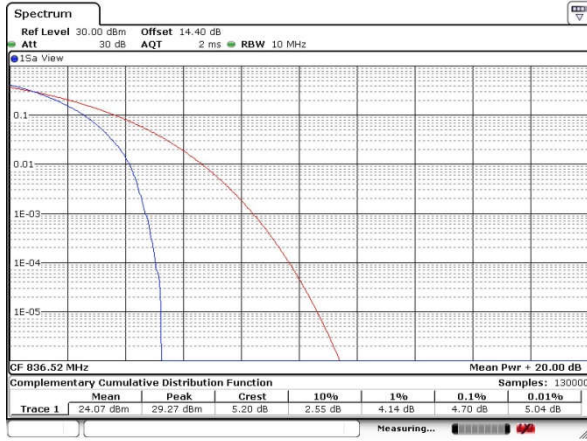
CDMA BC1 (1xRTT)

Lowest Channel



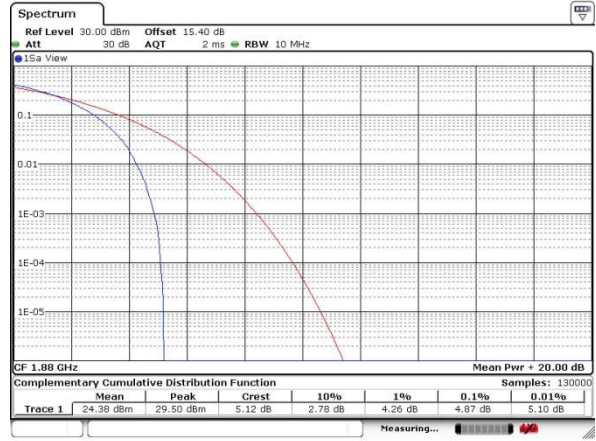
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Middle Channel



Date: 29 MAY 2018 15:02:04

Middle Channel



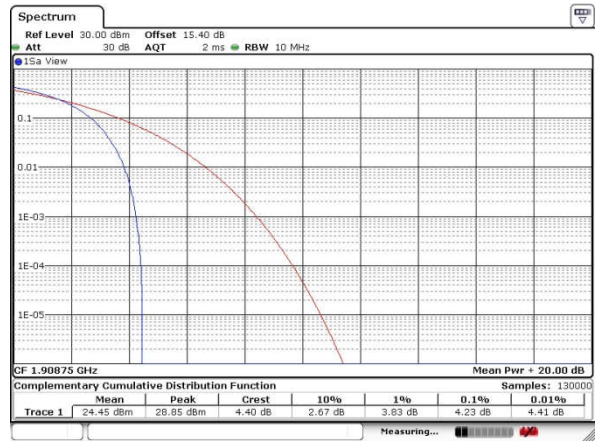
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Highest Channel



Date: 29 MAY 2018 15:02:11

Highest Channel



Date: 22 MAY 2018 21:55:55



26dB Bandwidth

Mode	GSM850(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.316	0.304
Middle CH	0.315	0.305
Highest CH	0.320	0.314

Mode	GSM1900(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.315	0.313
Middle CH	0.316	0.310
Highest CH	0.321	0.311

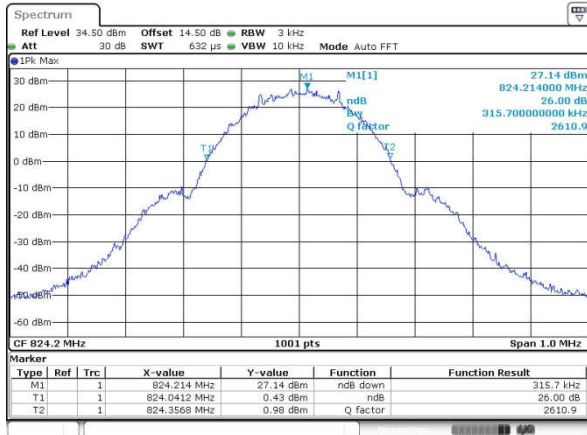
Mode	WCDMA Band V(MHz)	WCDMA Band II(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.73	4.70
Middle CH	4.73	4.68
Highest CH	4.71	4.69

Mode	CDMA BC0(MHz)	CDMA BC1(MHz)
Mod.	1xRTT	1xRTT
Lowest CH	1.43	1.42
Middle CH	1.43	1.42
Highest CH	1.42	1.43



GSM850 (GSM)

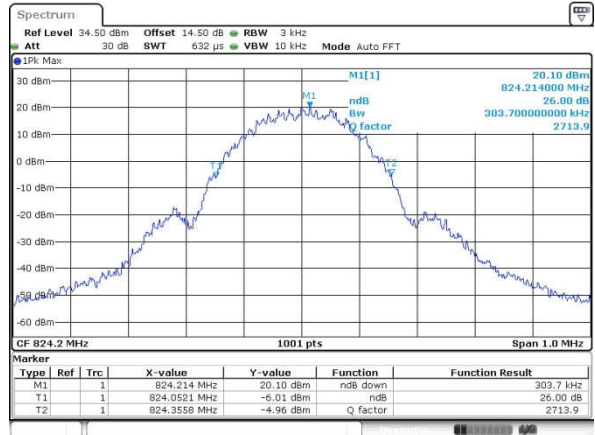
Lowest Channel



Date: 23 MAY 2018 10:29:37

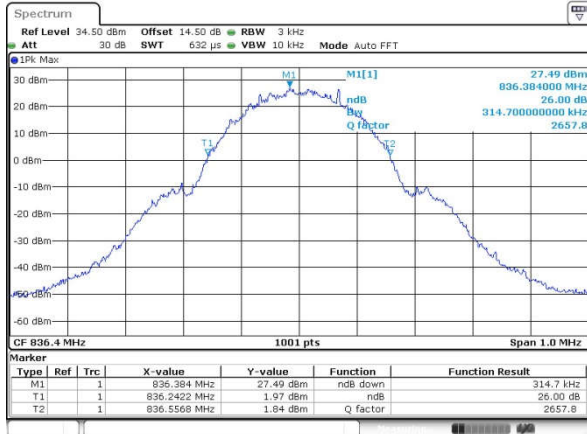
GSM850 (EDGE class 8)

Lowest Channel



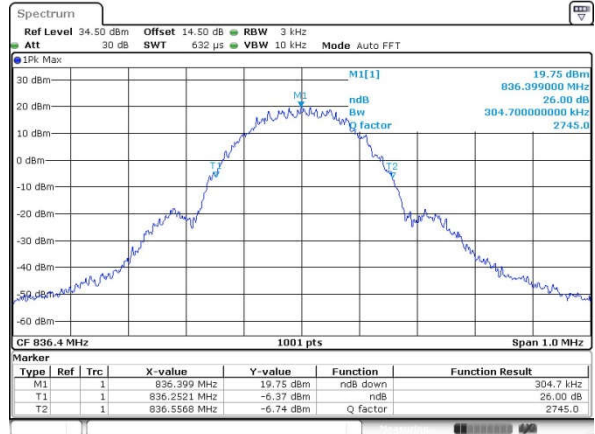
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Middle Channel



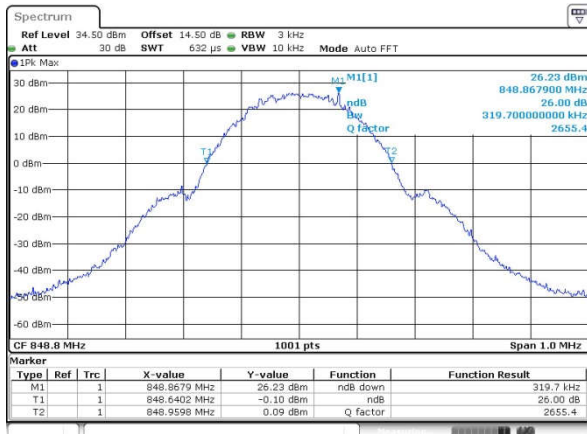
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Middle Channel



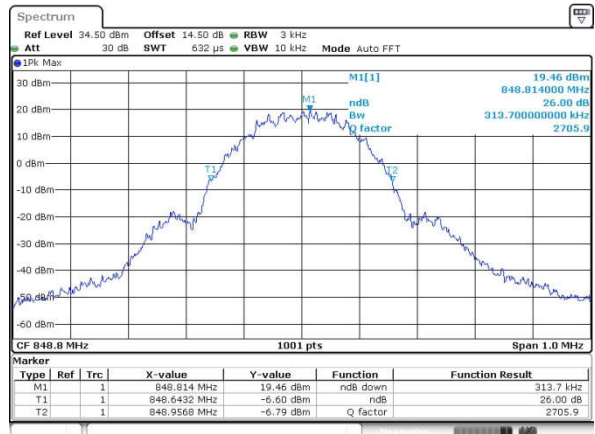
Date: 23 MAY 2018 10:41:40

Highest Channel



Date: 23 MAY 2018 10:30:34

Highest Channel

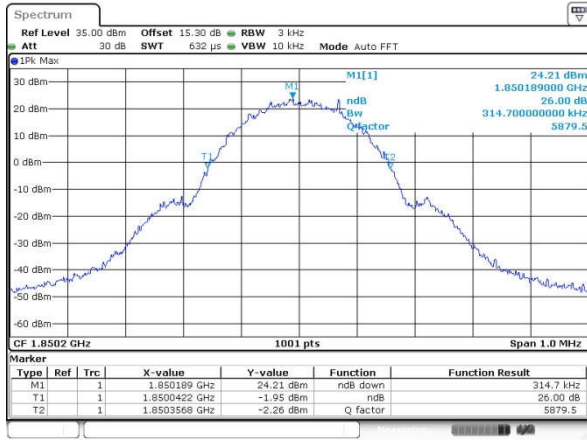


Date: 23 MAY 2018 10:42:11



GSM1900 (GSM)

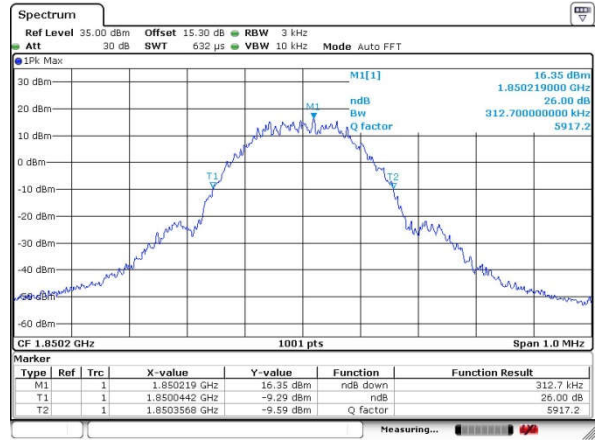
Lowest Channel



Date: 23 MAY 2018 11:00:42

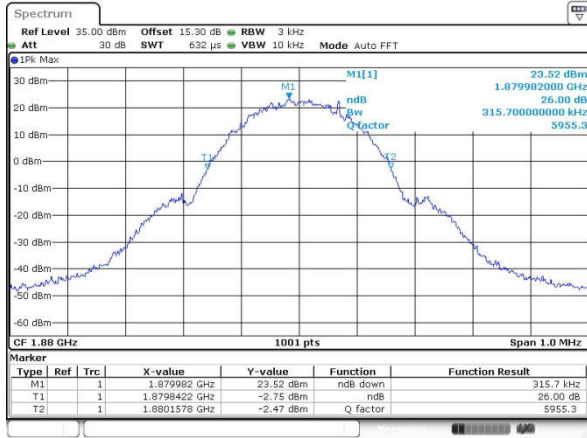
GSM1900 (EDGE class 8)

Lowest Channel



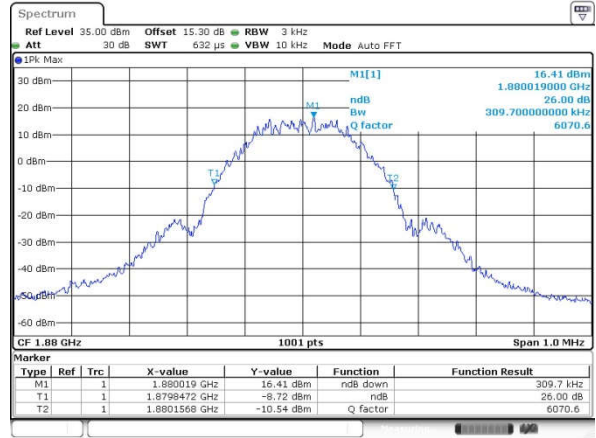
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Middle Channel



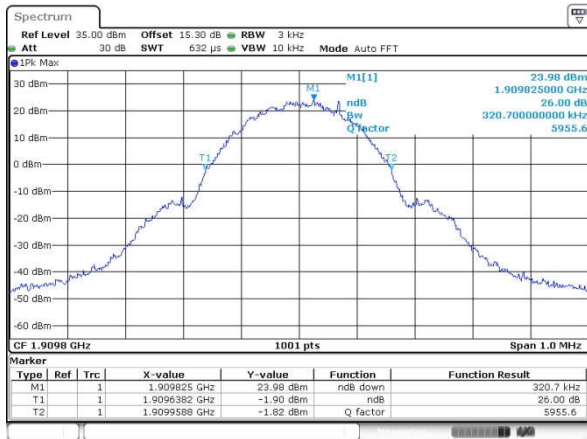
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Middle Channel



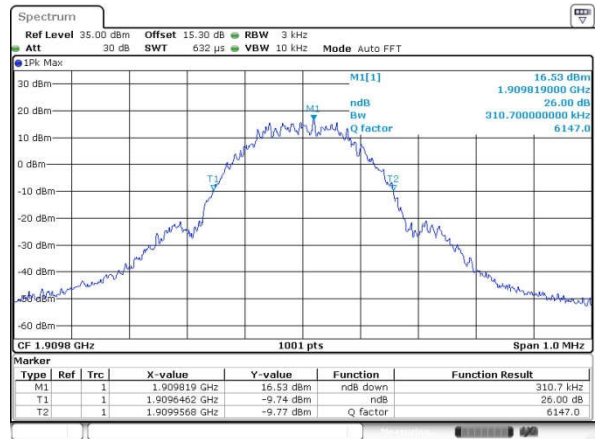
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Highest Channel



Date: 23 MAY 2018 11:01:38

Highest Channel

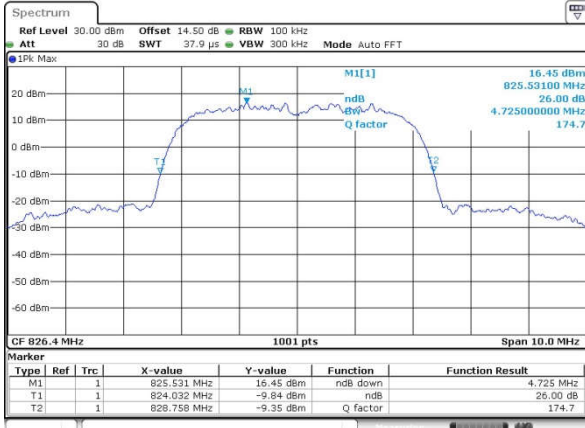


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WCDMA Band V (RMC 12.2Kbps)

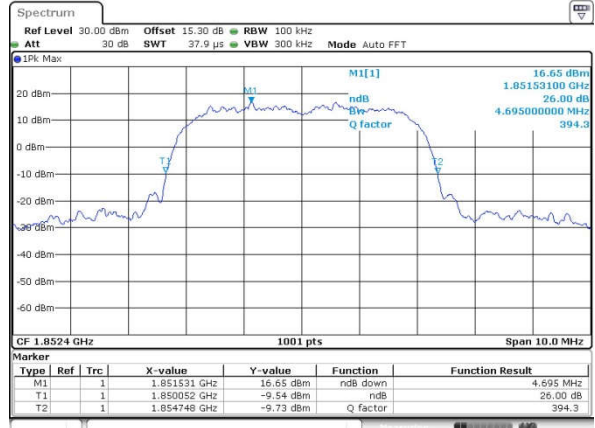
Lowest Channel



Date: 23 MAY 2018 11:38:59

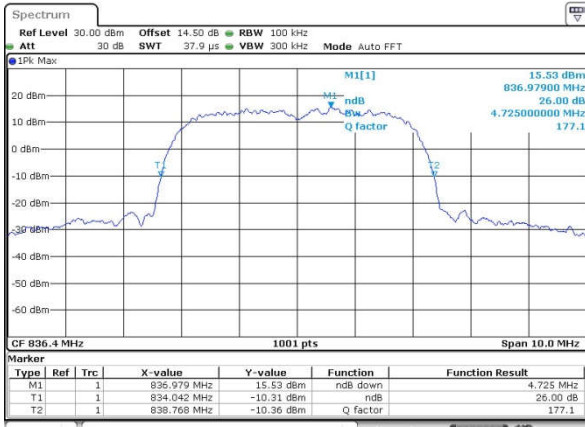
WCDMA Band II (RMC 12.2Kbps)

Lowest Channel



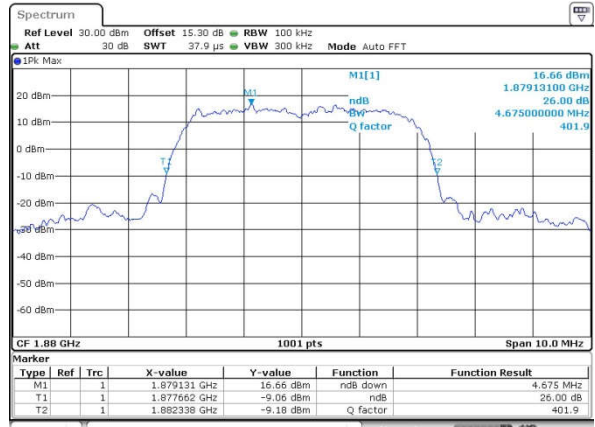
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Middle Channel



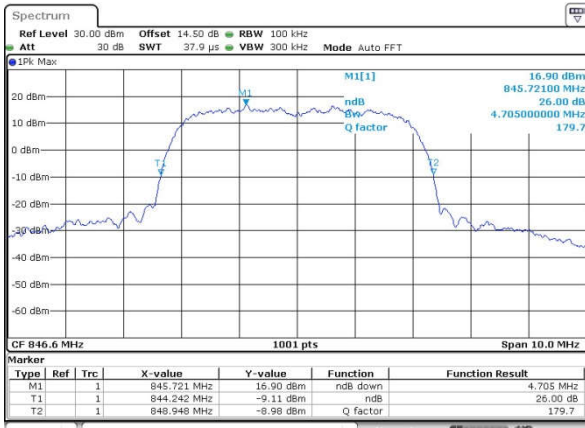
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Middle Channel



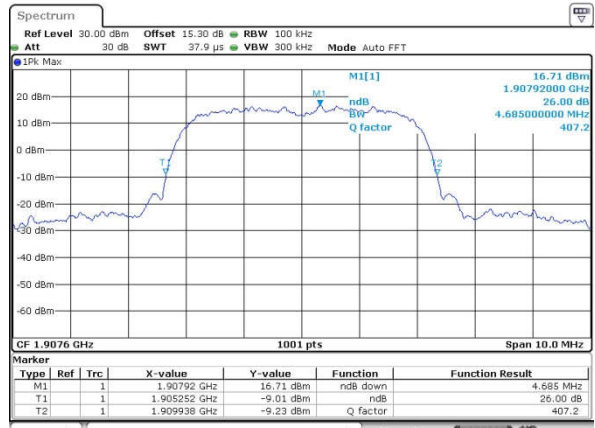
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Highest Channel



Date: 23 MAY 2018 11:39:55

Highest Channel

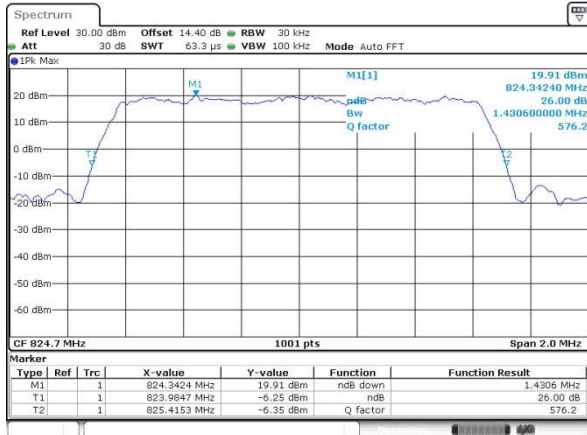


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CDMA BC0 (1xRTT)

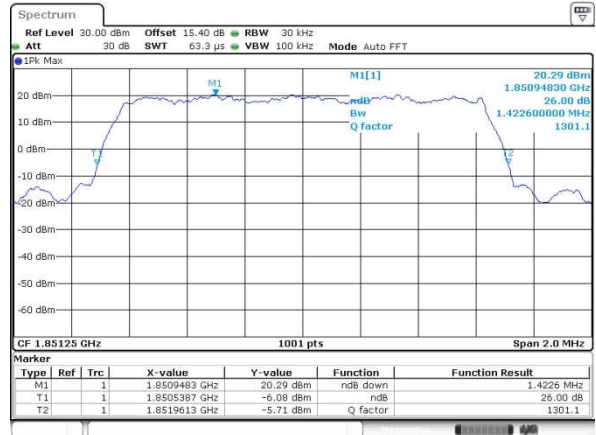
Lowest Channel



Date: 29 MAY 2018 14:34:29

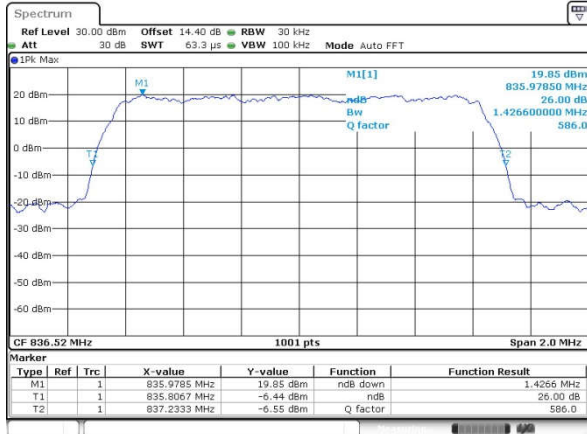
CDMA BC1 (1xRTT)

Lowest Channel



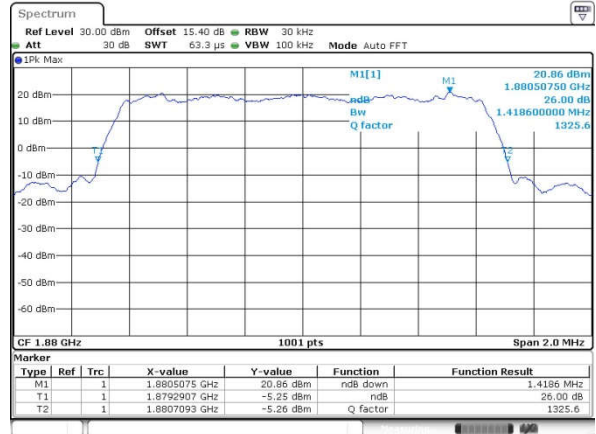
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Middle Channel



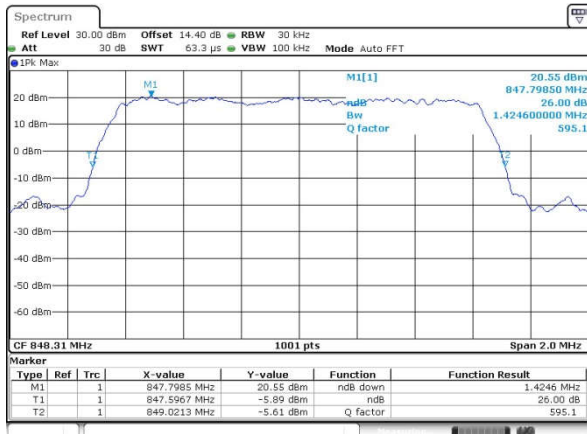
Date: 29 MAY 2018 14:34:57

Middle Channel



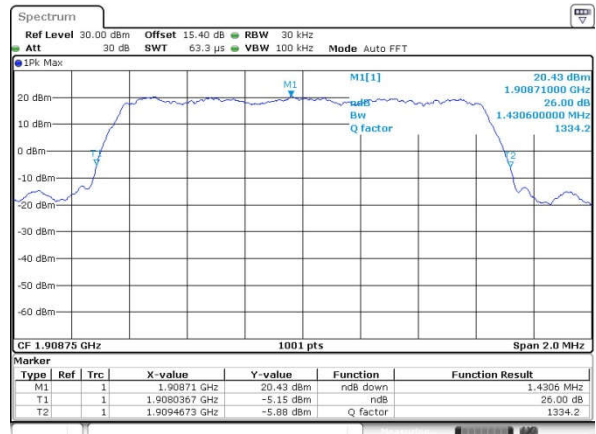
Date: 22 MAY 2018 21:22:42

Highest Channel



Date: 29 MAY 2018 14:35:26

Highest Channel



Date: 22 MAY 2018 21:23:36



Occupied Bandwidth

Mode	GSM850(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.244	0.245
Middle CH	0.242	0.243
Highest CH	0.243	0.246

Mode	GSM1900(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.244	0.247
Middle CH	0.241	0.247
Highest CH	0.243	0.249

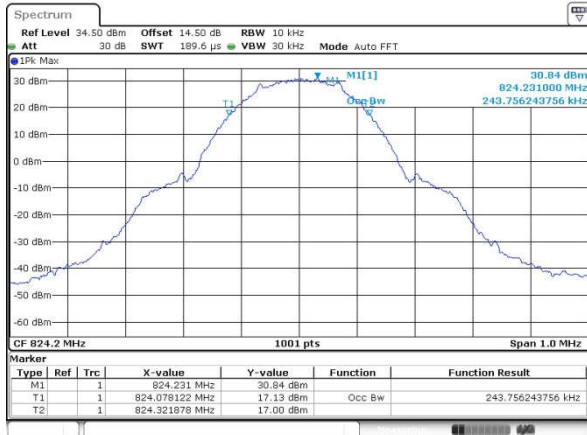
Mode	WCDMA Band V(MHz)	WCDMA Band II(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.12	4.11
Middle CH	4.12	4.12
Highest CH	4.12	4.11

Mode	CDMA BC0(MHz)	CDMA BC1(MHz)
Mod.	1xRTT	1xRTT
Lowest CH	1.27	1.27
Middle CH	1.27	1.27
Highest CH	1.27	1.27



GSM850 (GSM)

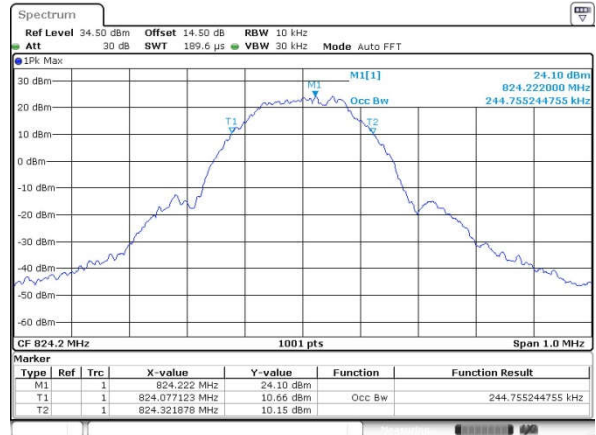
Lowest Channel



Date: 23 MAY 2018 10:22:52

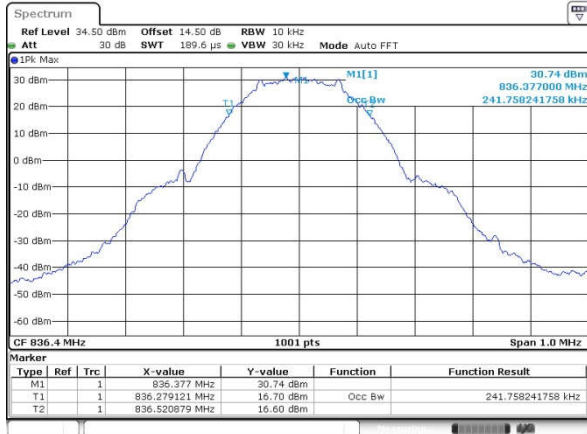
GSM850 (EDGE class 8)

Lowest Channel



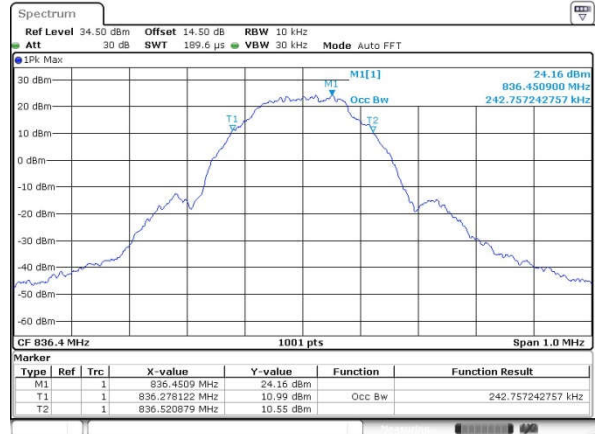
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Middle Channel



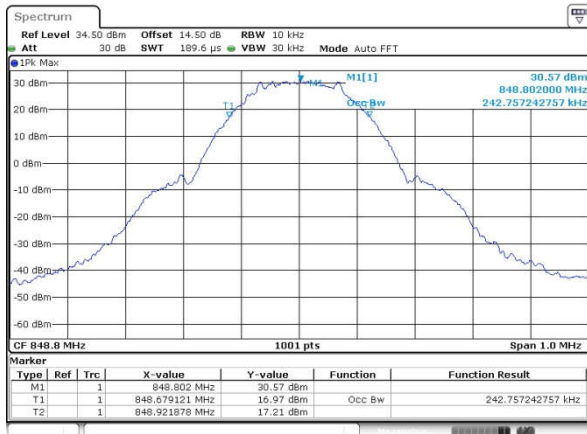
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Middle Channel



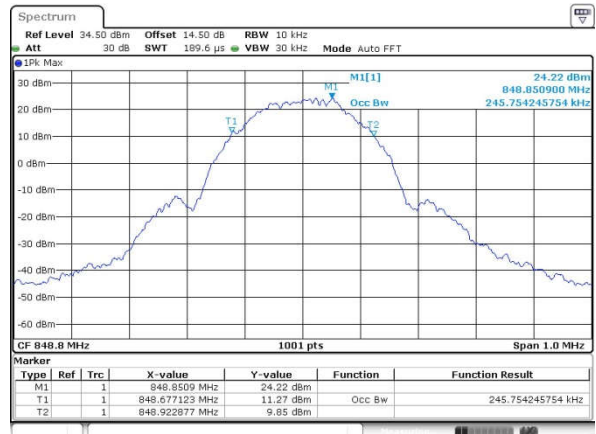
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Highest Channel



Date: 23 MAY 2018 10:23:48

Highest Channel

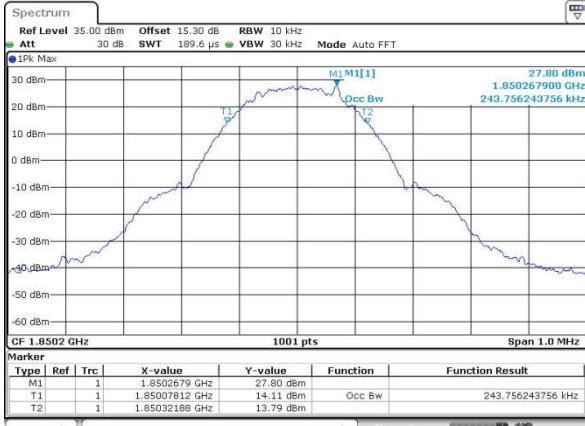


Date: 23 MAY 2018 10:56:08



GSM1900 (GSM)

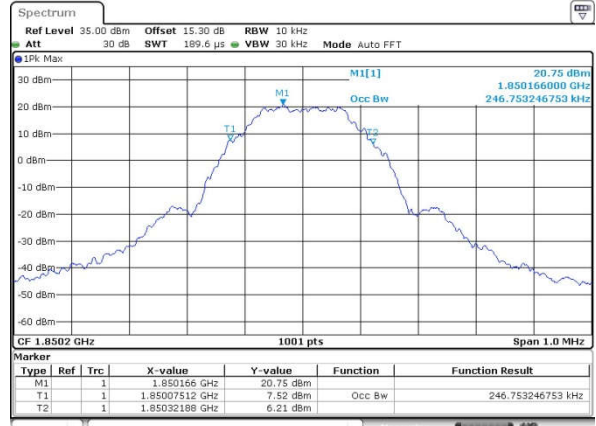
Lowest Channel



Date: 23 MAY 2018 11:03:48

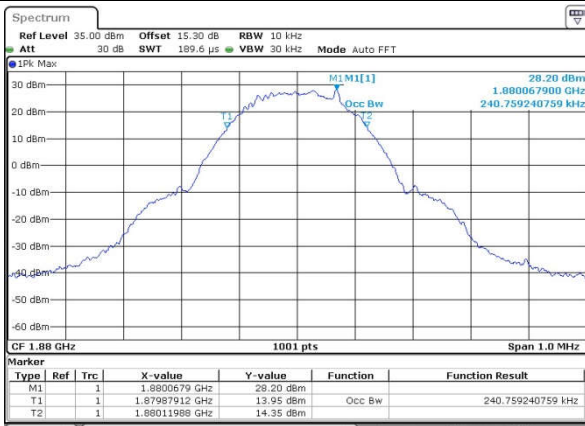
GSM1900 (EDGE class 8)

Lowest Channel



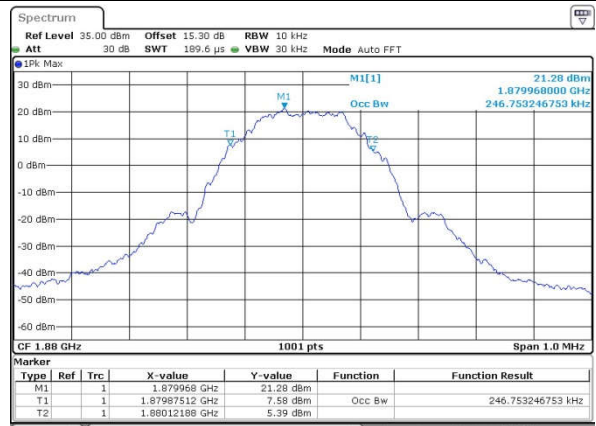
Date: 23 MAY 2018 13:53:01

Middle Channel



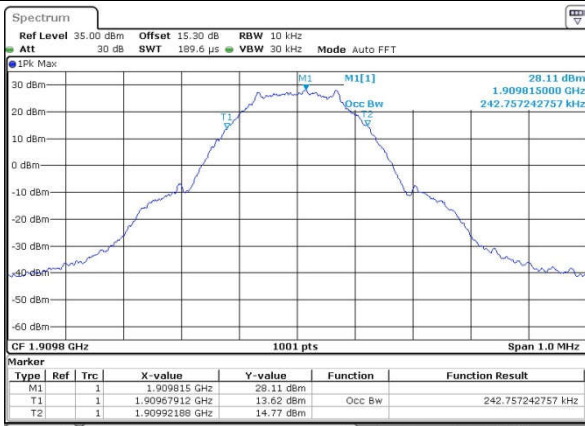
Date: 23 MAY 2018 11:04:16

Middle Channel



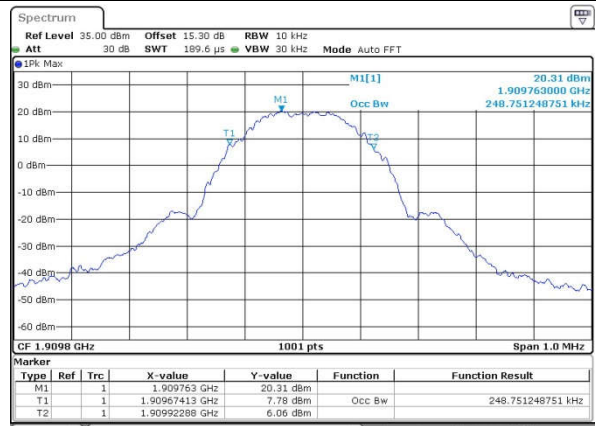
Date: 23 MAY 2018 13:53:51

Highest Channel



Date: 23 MAY 2018 11:04:44

Highest Channel

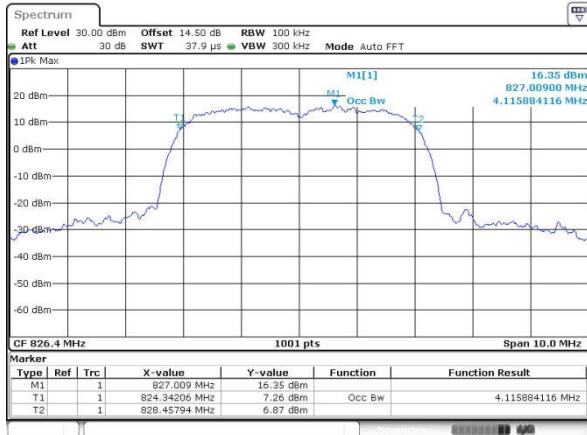


Date: 23 MAY 2018 13:54:38



WCDMA Band V (RMC 12.2Kbps)

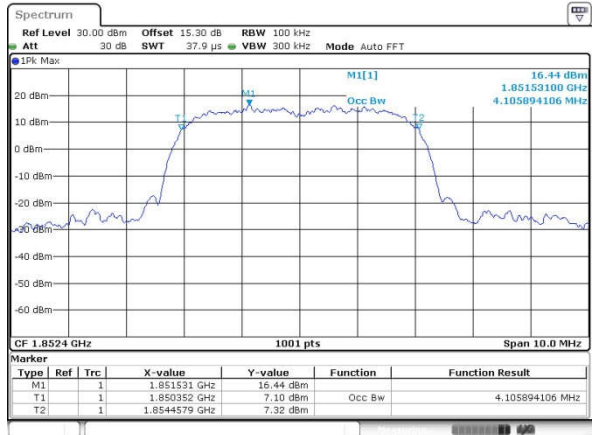
Lowest Channel



Date: 23 MAY 2018 11:42:34

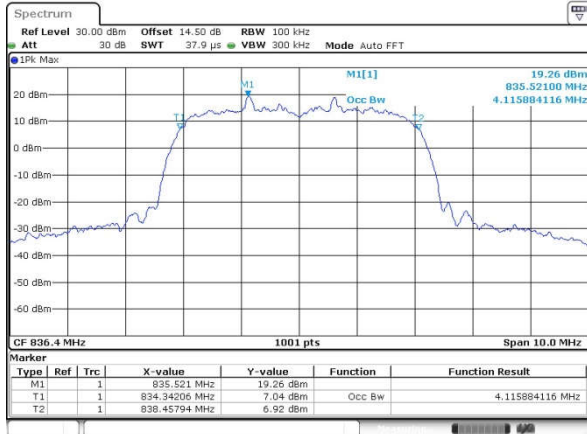
WCDMA Band II (RMC 12.2Kbps)

Lowest Channel



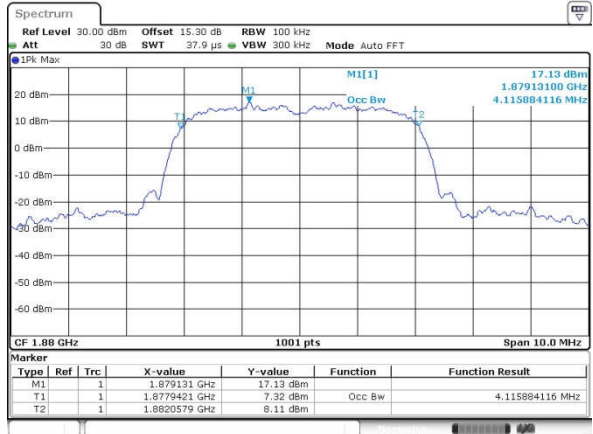
Date: 23 MAY 2018 11:28:26

Middle Channel



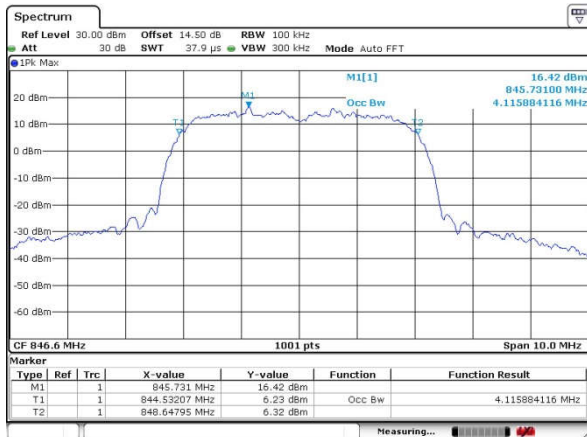
Date: 23 MAY 2018 11:43:02

Middle Channel



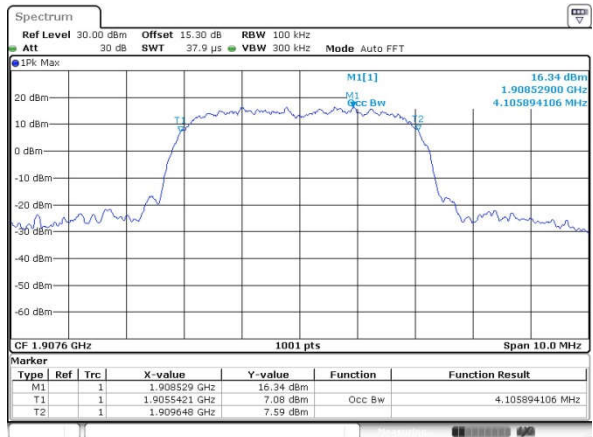
Date: 23 MAY 2018 11:28:54

Highest Channel



Date: 23 MAY 2018 11:48:37

Highest Channel

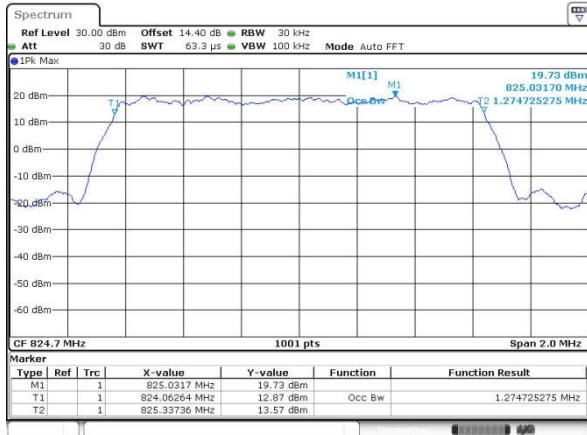


Date: 23 MAY 2018 11:27:22



CDMA BC0 (1xRTT)

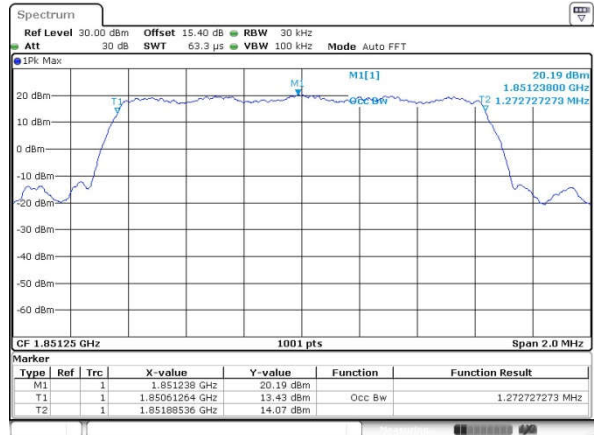
Lowest Channel



Date: 29 MAY 2018 14:56:38

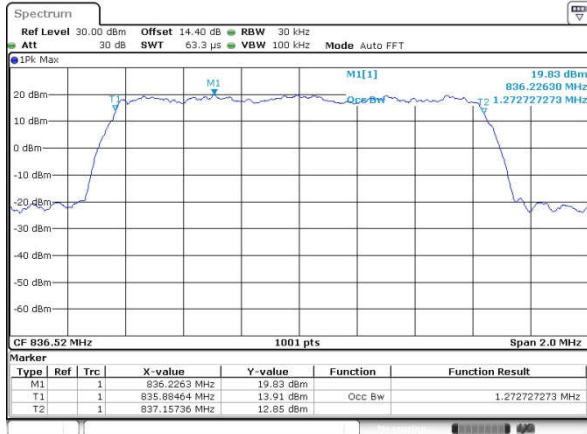
CDMA BC1 (1xRTT)

Lowest Channel



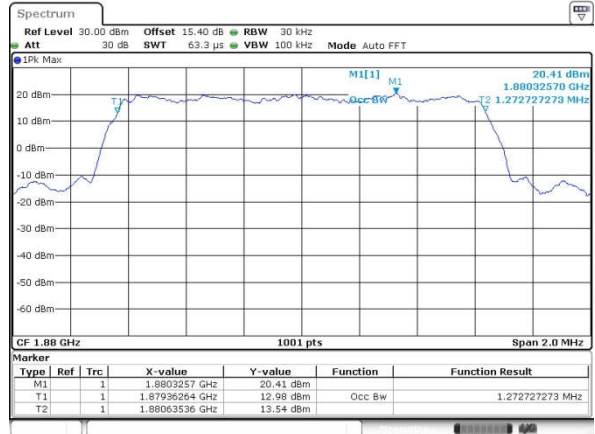
Date: 22 MAY 2018 21:27:15

Middle Channel



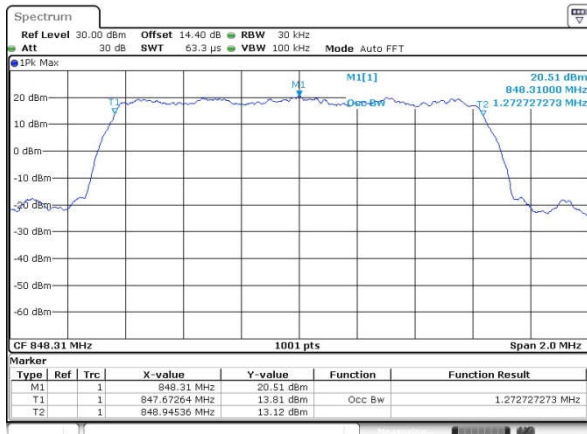
Date: 29 MAY 2018 14:57:06

Middle Channel



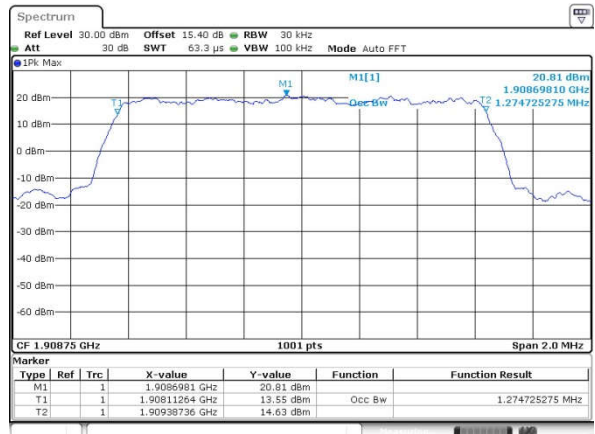
Date: 22 MAY 2018 21:27:51

Highest Channel



Date: 29 MAY 2018 14:57:34

Highest Channel



Date: 22 MAY 2018 21:28:27



Conducted Band Edge

