



FCC RADIO TEST REPORT

FCC ID : 2AUWUFAIRPHONE3
Equipment : Smart Phone
Brand Name : Fairphone
Model Name : Fairphone 3
Marketing Name : Fairphone 3
Applicant : FairPhone B.V.
Jollemanhof 17, 1019 GW, Amsterdam, the Netherlands
Manufacturer : FairPhone B.V.
Jollemanhof 17, 1019 GW, Amsterdam, the Netherlands
Standard : 47 CFR Part 2, 22(H), 24(E), 27(L)

The product was received on Oct. 23, 2019 and testing was started from Nov. 05, 2019 and completed on Dec. 05, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FG9O2328A	01	Initial issue of report	Feb. 12, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Pass	-
	§22.913 (a)(2)	Effective Radiated Power (GSM850) (WCDMA Band V)		
	§24.232 (c)	Equivalent Isotropic Radiated Power (GSM1900) (WCDMA Band II)		
	§27.50 (d)(4)	Equivalent Isotropic Radiated Power (WCDMA Band IV)		
3.3	§24.232 (d)	Peak-to-Average Ratio	Pass	
3.4	§2.1049 §22.917 (b) §24.238 (b) §27.53 (g)	Occupied Bandwidth (GSM850) (WCDMA Band V) (GSM1900) (WCDMA Band II) (WCDMA Band IV)	Pass	-
3.5	§2.1051 §22.917 (a) §24.238 (a) §27.53 (g)	Band Edge Measurement (GSM850) (WCDMA Band V) (GSM1900) (WCDMA Band II) (WCDMA Band IV)	Pass	-
3.6	§2.1051 §22.917 (a) §24.238 (a) §27.53 (g)	Conducted Emission (GSM850) (WCDMA Band V) (GSM1900) (WCDMA Band II) (WCDMA Band IV)	Pass	-
3.7	§2.1055 §22.355 §24.235 §27.54	Frequency Stability Temperature & Voltage	Pass	-
4.4	§2.1053 §22.917 (a) §24.238 (a) §27.53 (h)	Field Strength of Spurious Radiation (GSM850) (WCDMA Band V) (GSM1900) (WCDMA Band II) (WCDMA Band IV)	Pass	Under limit 25.06 dB at 5556.000 MHz

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Dara Chiu



1 General Description

1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, NFC, and GNSS.

Product Specification subjective to this standard	
Sample 1	EUT with 1st source
Sample 2	EUT with 2nd source
Antenna Type	WWAN: PIFA Antenna WLAN: Embedded Inverted-F Antenna Bluetooth: Embedded Inverted-F Antenna GPS / Glonass / BDS: PIFA Antenna NFC: Loop Antenna

Remark: All test items were performed with Sample 1.

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. TH03-HY
Test Engineer	Louis Chung
Temperature	21~24°C
Relative Humidity	51~55%

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

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. 03CH11-HY
Test Engineer	Cookie Ku, Fu Chen, and Troye Hsieh
Temperature	20.2~26.3°C
Relative Humidity	44.0~68.1%

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

FCC Designation No.: TW1190 and TW0007

1.4 Applicable Standards

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

- ♦ ANSI C63.26-2015
- ♦ ANSI / TIA-603-E
- ♦ 47 CFR Part 2, 22(H), 24(E), 27(L)
- ♦ 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.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane for Cellular Band; Y Plane for PCS Band and AWS Band) were recorded in this report.

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V
2. 30 MHz to 18000 MHz for WCDMA Band IV
3. 30 MHz to 19100 MHz for GSM1900 and WCDMA Band II

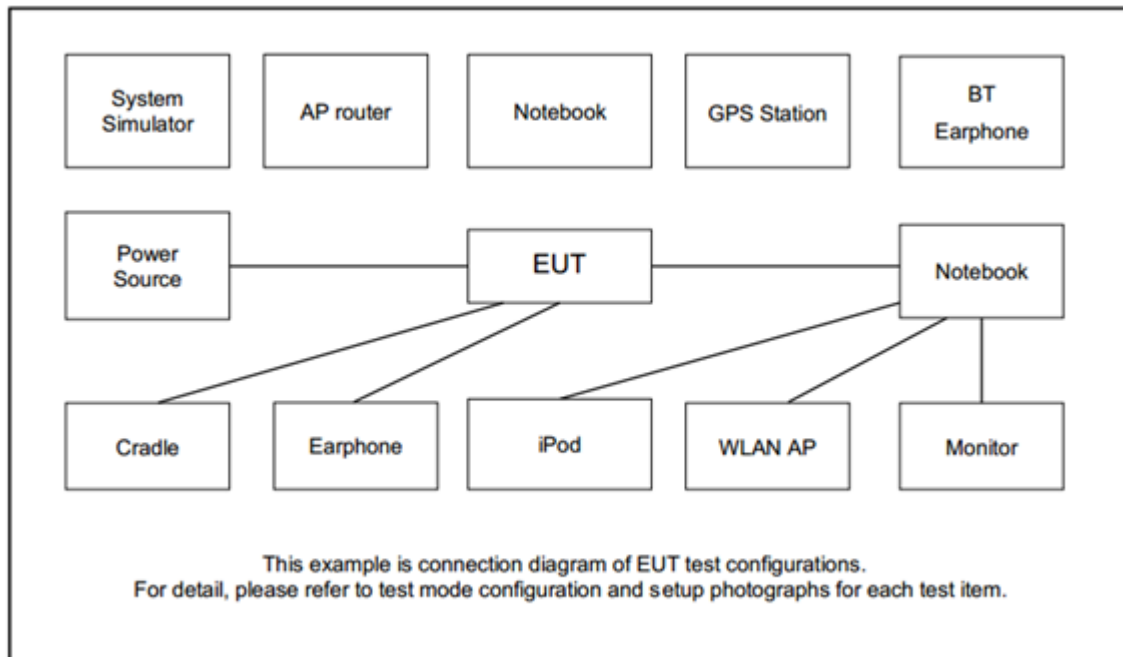
All modes and data rates and positions were investigated.

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

Test Modes		
Band	Radiated TCs	Conducted TCs
GSM850	■ GPRS Class 8 Link	■ GPRS Class 8 Link
	■ EDGE Class 8 Link	■ EDGE Class 8 Link
GSM1900	■ GPRS Class 8 Link	■ GPRS Class 8 Link
	■ EDGE 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

Remark: All the radiated test cases were performed with Sample 1 and SIM 1.

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.	AC adapter	Samsung	EP-TA20JWS	N/A	N/A	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 4.2 dB and a 10dB attenuator.

Example:

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$



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
WCDMA Band IV	Channel	1312	1413	1513
	Frequency	1712.4	1732.6	1752.6

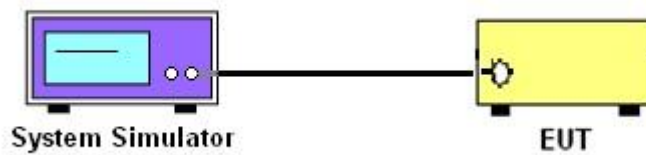
3 Conducted Test Result

3.1 Measuring Instruments

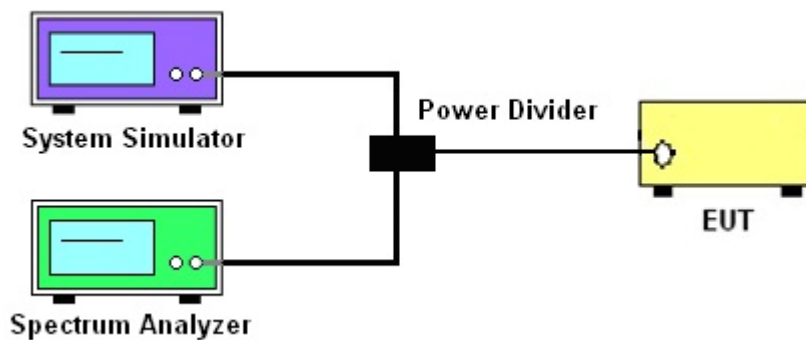
See list of measuring instruments of this test report.

3.1.1 Test Setup

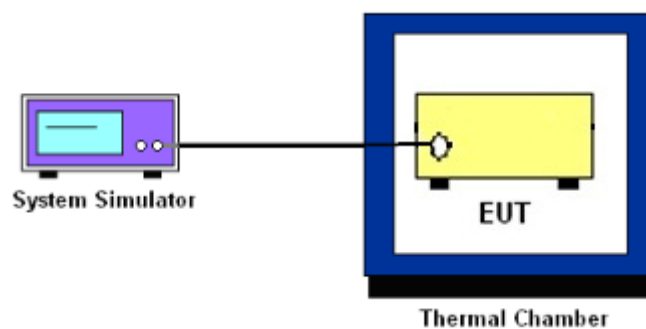
3.1.2 Conducted Output Power



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



3.1.4 Frequency Stability



3.1.5 Test Result of Conducted Test

Please refer to Appendix A.



3.2 Conducted Output Power and ERP/EIRP

3.2.1 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

3.2.2 Test Procedures

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



3.3 Peak-to-Average Ratio

3.3.1 Description of the PAR Measurement

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

3.3.2 Test Procedures

The testing follows ANSI C63.26-2015 Section 5.2.6

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

3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.4.1 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.

3.4.2 Test Procedures

The testing follows ANSI C63.26-2015 Section 5.4.3 (26dB) and Section 5.4.4 (99OB)

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. 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.
3. 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.
4. Set the detection mode to peak, and the trace mode to max hold.
5. 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)
6. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
7. 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.
8. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.



3.5 Conducted Band Edge

3.5.1 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.

3.5.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. 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.
3. The band edges of low and high channels for the highest RF powers were measured.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
5. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

3.6 Conducted Spurious Emission

3.6.1 Description of Conducted Spurious Emission Measurement

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

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

3.6.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. 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.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. 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)

3.7 Frequency Stability

3.7.1 Description of Frequency Stability Measurement

22.355

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.

24.235 & 27.54

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

3.7.2 Test Procedures for Temperature Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

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

3.7.3 Test Procedures for Voltage Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

1. The EUT was placed in a temperature chamber at $20\pm 5^{\circ}\text{C}$ and connected with the system simulator.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

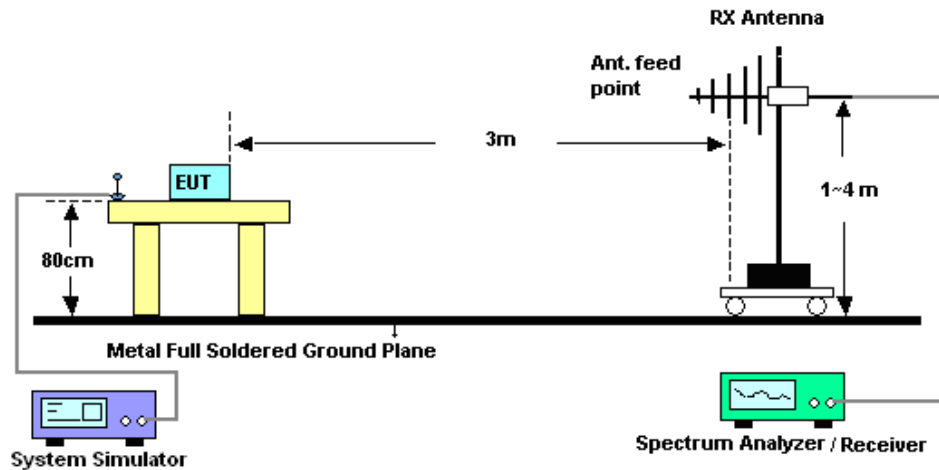
4 Radiated Test Items

4.1 Measuring Instruments

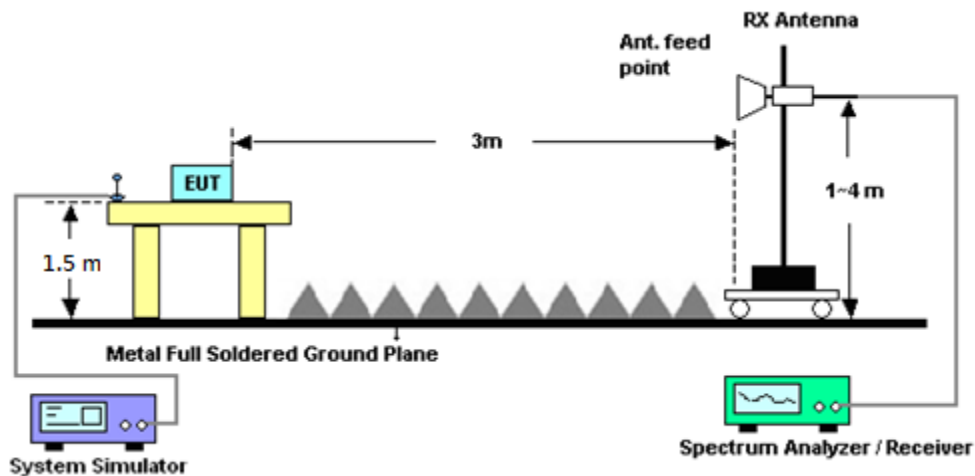
See list of measuring instruments of this test report.

4.2 Test Setup

For radiated test from 30MHz to 1GHz



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 radiated spurious emission was measured by direct field strength method according to ANSI C63.26-2015. 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.

4.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26-2015 subclause 5.2.7.

1. 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.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. When using the direct field strength method and the EUT is manipulated through three different orientations, then the scan height range of the measurement antenna is limited to 2.5 m, or 0.5 m above the top of the EUT, whichever is higher
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$E \text{ (dB}\mu\text{V/m)} = \text{Measured amplitude level (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$

$\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log D - 104.8$; where D is the measurement distance in meters

$\text{ERP} = \text{EIRP} - 2.15 \text{ (dB)}$; where ERP and EIRP are expressed in consistent units.



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Nov. 05, 2019 ~ Nov. 16, 2019	Dec. 05, 2019	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 04, 2018	Nov. 05, 2019 ~ Nov. 16, 2019	Dec. 03, 2019	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 12, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Oct. 11, 2020	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1GHz ~ 18GHz	Sep. 19, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Sep. 18, 2020	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1212	1GHz ~ 18GHz	May 14, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	May 13, 2020	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 07, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Jan. 06, 2020	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 14, 2018	Nov. 05, 2019 ~ Nov. 16, 2019	Nov. 13, 2019	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 13, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Nov. 12, 2020	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 28, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Oct. 27, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-1080-1200-15000-6 OSS	SN2	1.2GHz High Pass Filter	Sep. 15, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Sep. 14, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-6 OSS	SN3	3GHz High Pass Filter	Sep. 15, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Sep. 14, 2020	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Nov. 05, 2019 ~ Nov. 16, 2019	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Nov. 05, 2019 ~ Nov. 16, 2019	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Nov. 05, 2019 ~ Nov. 16, 2019	N/A	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY55420170	20MHz~8.4GHz	Mar. 08, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Mar. 07, 2020	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Dec. 05, 2018	Nov. 05, 2019 ~ Nov. 16, 2019	Dec. 04, 2019	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Nov. 05, 2019 ~ Nov. 16, 2019	N/A	Radiation (03CH11-HY)
Hygrometer	TECEPEL	DTN-303B	TP140325	N/A	Oct. 25, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Oct. 24, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz-30MHz	Mar. 13, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 13, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	30M-18G	Mar. 13, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz-40GHz	Mar. 13, 2019	Nov. 05, 2019 ~ Nov. 16, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 06, 2019	Dec. 05, 2019	Mar. 05, 2020	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Sep. 04, 2019	Dec. 05, 2019	Sep. 03, 2020	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Nov. 26, 2019	Dec. 05, 2019	Nov. 25, 2020	Conducted (TH03-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890001	1V~20V 0.5A~4A	Oct. 09, 2019	Dec. 05, 2019	Oct. 08, 2020	Conducted (TH03-HY)
Base Station (Measure)	Rohde & Schwarz	CMU200	117995	GSM / GPRS / WCDMA / CDMA	Aug. 23, 2019	Dec. 05, 2019	Aug. 22, 2020	Conducted (TH03-HY)
Power Divider	Warison	WCOU-0.4-26.5S-20	#A	N/A	Nov. 06, 2019	Dec. 05, 2019	Nov. 05, 2020	Conducted (TH03-HY)

6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.37
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.67
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.03
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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	1909.8
GSM	32.82	32.95	32.99	30.05	30.00	30.18
GPRS class 8	32.88	32.99	33.00	30.13	30.05	30.21
GPRS class 10	29.14	29.25	29.27	27.20	27.20	27.10
GPRS class 11	27.64	27.69	27.75	25.55	25.47	25.39
GPRS class 12	26.36	26.56	26.54	24.15	24.04	24.03
EGPRS class 8	26.25	26.44	26.48	25.55	25.56	25.64
EGPRS class 10	23.65	23.61	23.62	22.95	22.56	22.57
EGPRS class 11	22.39	22.47	22.44	20.99	20.70	20.71
EGPRS class 12	21.37	21.47	21.67	19.96	19.64	19.63

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
RMC 12.2K	22.78	22.75	22.82	21.81	21.78	21.85
HSDPA Subtest-1	21.72	21.77	21.82	20.65	20.67	20.71
HSDPA Subtest-2	21.71	21.78	21.86	20.65	20.73	20.68
HSDPA Subtest-3	21.22	21.16	21.30	20.19	20.19	20.30
HSDPA Subtest-4	21.21	21.20	21.31	20.17	20.31	20.27
HSUPA Subtest-1	21.71	21.68	21.82	20.70	20.78	20.74
HSUPA Subtest-2	19.71	19.65	19.78	18.66	18.83	18.70
HSUPA Subtest-3	20.73	20.66	20.83	19.77	19.82	19.77
HSUPA Subtest-4	19.68	19.64	19.80	18.74	18.76	18.70
HSUPA Subtest-5	21.70	21.70	21.80	20.80	20.80	20.75

Conducted Power (*Unit: dBm)			
Band	WCDMA Band IV		
Channel	1312	1413	1513
Frequency	1712.4	1732.6	1752.6
RMC 12.2K	23.15	23.12	23.14
HSDPA Subtest-1	21.94	21.99	22.04
HSDPA Subtest-2	21.92	22.03	22.07
HSDPA Subtest-3	21.56	21.52	21.59
HSDPA Subtest-4	21.55	21.54	21.61
HSUPA Subtest-1	21.93	22.11	22.02
HSUPA Subtest-2	20.05	20.02	20.00
HSUPA Subtest-3	21.06	21.04	21.00
HSUPA Subtest-4	20.04	20.00	20.01
HSUPA Subtest-5	22.10	22.00	21.60



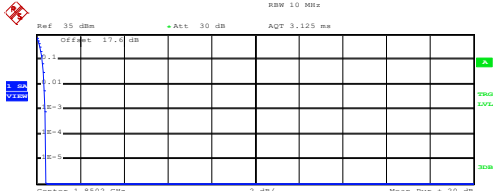
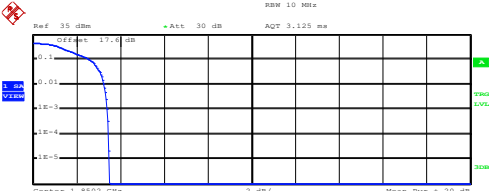
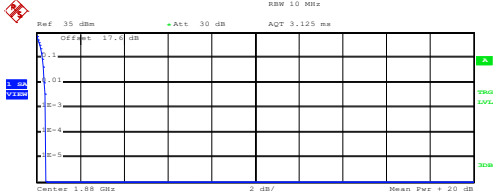
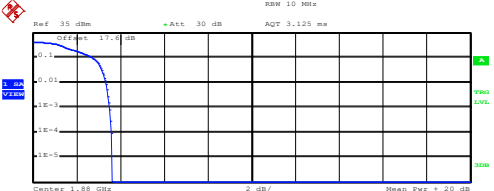
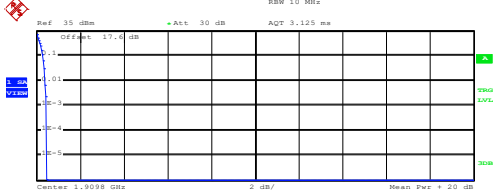
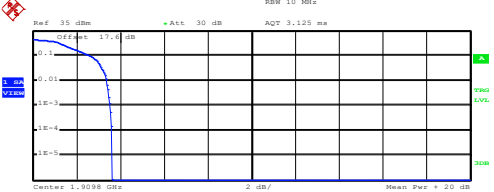
A2. GSM

Peak-to-Average Ratio

Mode	GSM850		Limit: 13dB
Mod.	GPRS class 8	EDGE class 8	Result
Lowest CH	0.24	3.28	PASS
Middle CH	0.24	3.28	
Highest CH	0.24	3.20	
Mode	GSM1900		Limit: 13dB
Mod.	GPRS class 8	EDGE class 8	Result
Lowest CH	0.40	3.40	PASS
Middle CH	0.44	3.52	
Highest CH	0.48	3.52	

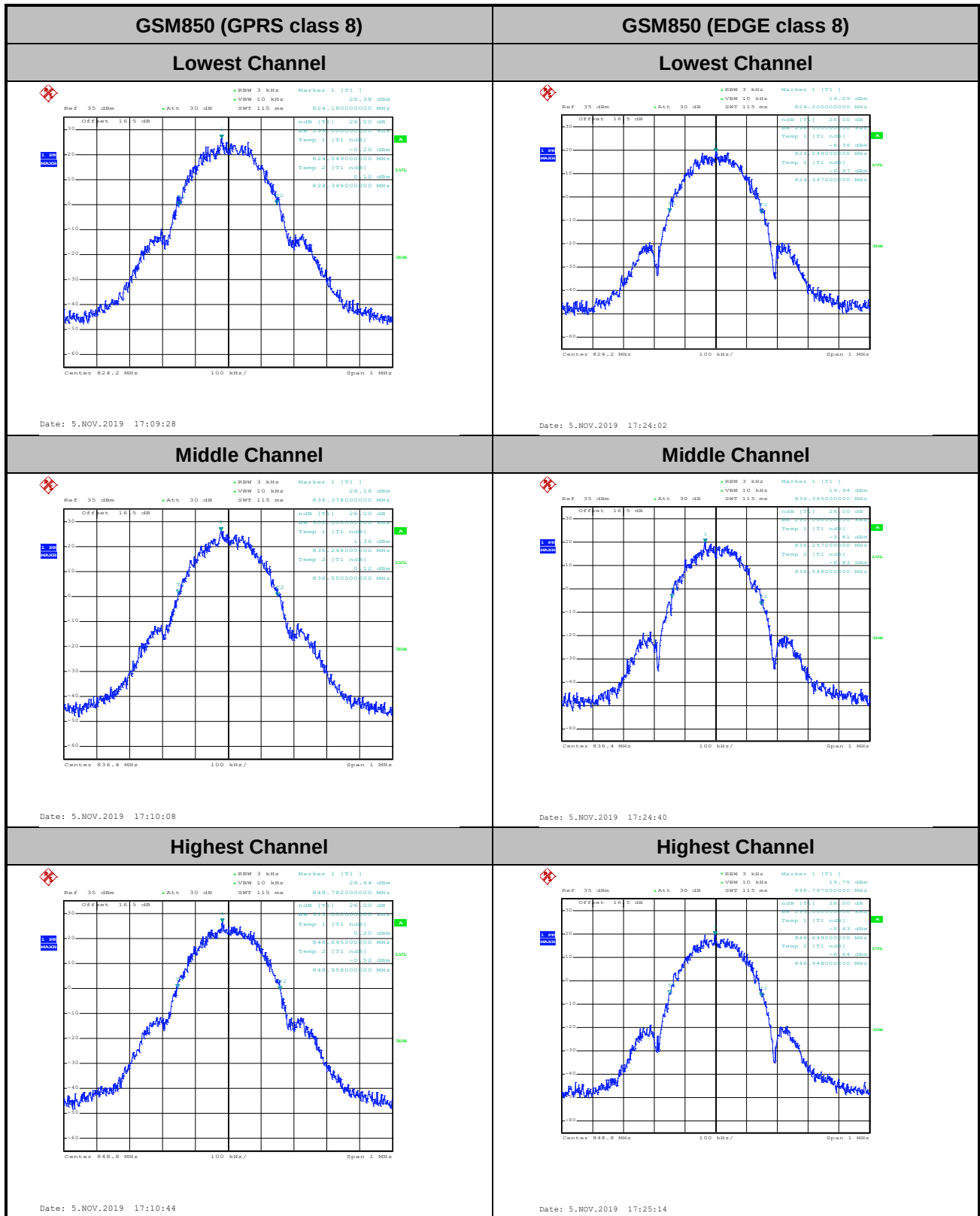


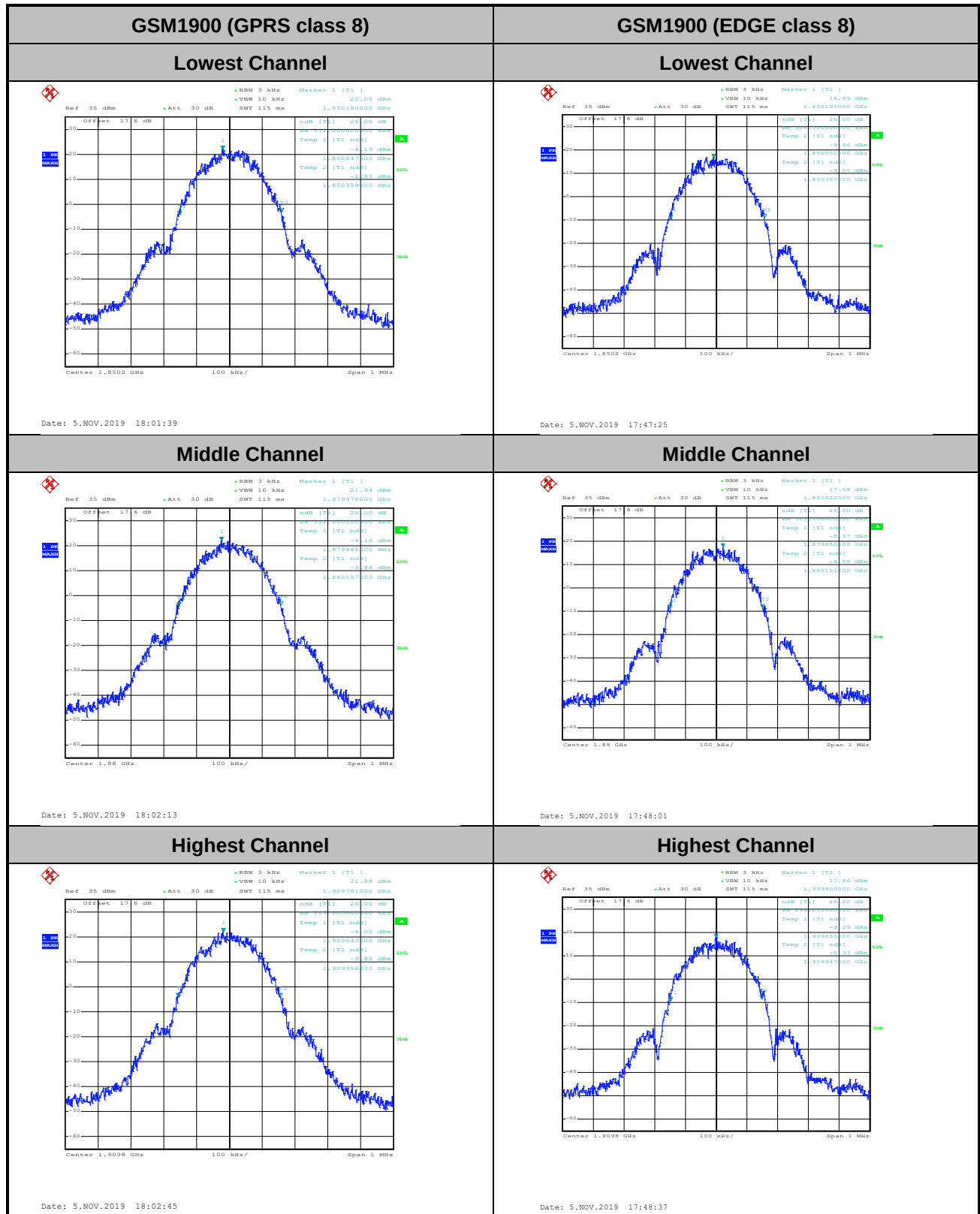
GSM850 (GPRS class 8)		GSM850 (EDGE class 8)	
Lowest Channel		Lowest Channel	

GSM1900 (GPRS class 8)	GSM1900 (EDGE class 8)
Lowest Channel	Lowest Channel
 Ref: 35 dBm Att: 30 dB RBW: 10 MHz AQT: 3.125 ms Center: 1.8502 GHz 2 dB/ Mean Pwr: +20 dB Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 29.74 dBm Peak: 30.17 dBm Crest: 0.44 dB 10 %: 0.28 dB 1 %: 0.36 dB .1 %: 0.40 dB .01 %: 0.44 dB Date: 5.NOV.2019 18:11:30	 Ref: 35 dBm Att: 30 dB RBW: 10 MHz AQT: 3.125 ms Center: 1.8502 GHz 2 dB/ Mean Pwr: +20 dB Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 25.22 dBm Peak: 28.69 dBm Crest: 3.48 dB 10 %: 2.60 dB 1 %: 3.24 dB .1 %: 3.40 dB .01 %: 3.48 dB Date: 5.NOV.2019 17:58:27
Middle Channel	Middle Channel
 Ref: 35 dBm Att: 30 dB RBW: 10 MHz AQT: 3.125 ms Center: 1.88 GHz 2 dB/ Mean Pwr: +20 dB Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 29.68 dBm Peak: 30.10 dBm Crest: 0.42 dB 10 %: 0.28 dB 1 %: 0.36 dB .1 %: 0.44 dB .01 %: 0.44 dB Date: 5.NOV.2019 18:11:50	 Ref: 35 dBm Att: 30 dB RBW: 10 MHz AQT: 3.125 ms Center: 1.88 GHz 2 dB/ Mean Pwr: +20 dB Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 24.99 dBm Peak: 28.62 dBm Crest: 3.63 dB 10 %: 2.72 dB 1 %: 3.36 dB .1 %: 3.52 dB .01 %: 3.60 dB Date: 5.NOV.2019 17:58:44
Highest Channel	Highest Channel
 Ref: 35 dBm Att: 30 dB RBW: 10 MHz AQT: 3.125 ms Center: 1.9098 GHz 2 dB/ Mean Pwr: +20 dB Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 29.71 dBm Peak: 30.17 dBm Crest: 0.46 dB 10 %: 0.28 dB 1 %: 0.40 dB .1 %: 0.48 dB .01 %: 0.48 dB Date: 5.NOV.2019 18:12:03	 Ref: 35 dBm Att: 30 dB RBW: 10 MHz AQT: 3.125 ms Center: 1.9098 GHz 2 dB/ Mean Pwr: +20 dB Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 24.87 dBm Peak: 28.48 dBm Crest: 3.61 dB 10 %: 2.64 dB 1 %: 3.36 dB .1 %: 3.52 dB .01 %: 3.60 dB Date: 5.NOV.2019 17:59:07

**26dB Bandwidth**

Mode	GSM850	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	299.00	298.00
Middle CH	302.00	291.00
Highest CH	313.00	299.00
Mode	GSM1900	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	312	305
Middle CH	312	301
Highest CH	313	296

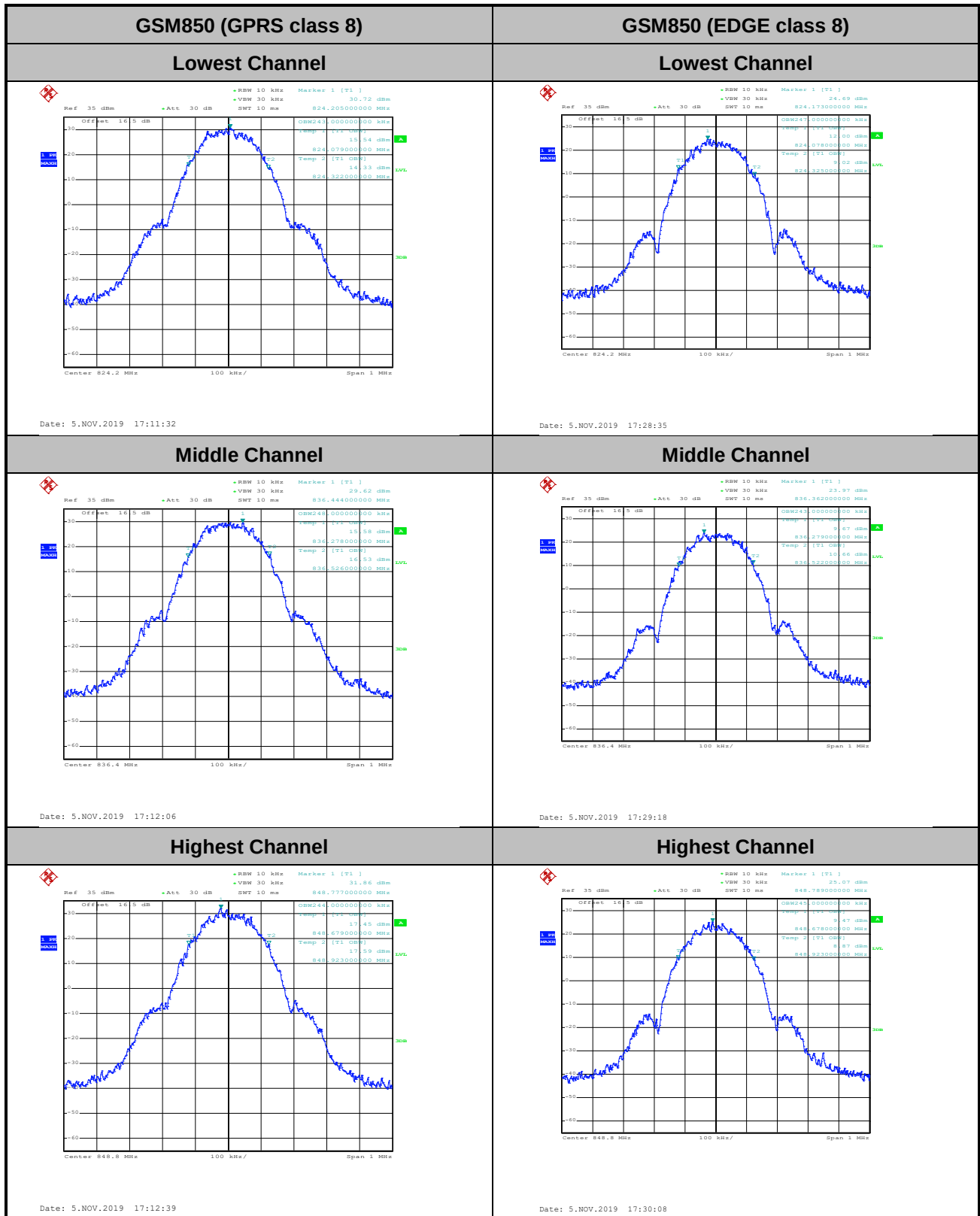


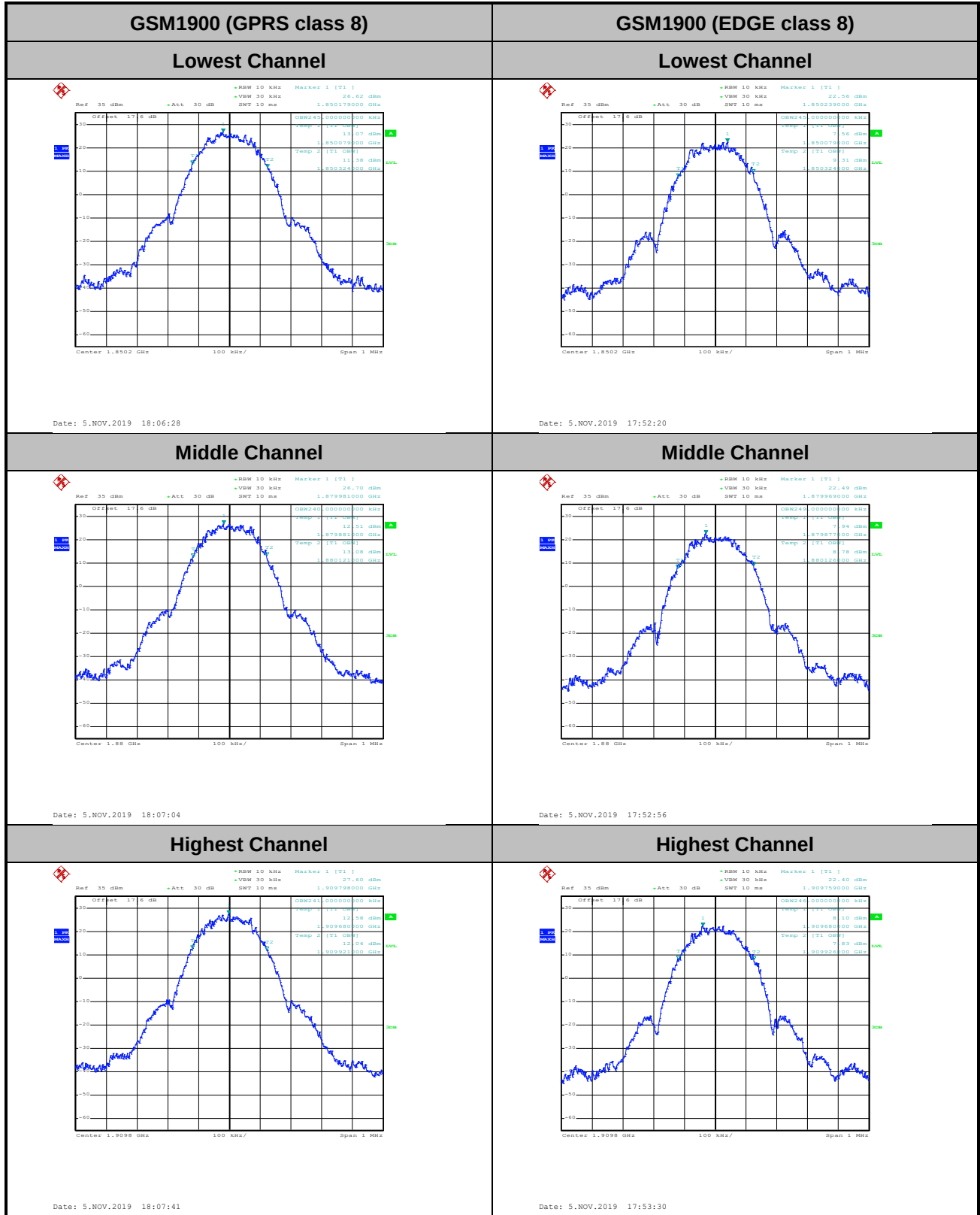


**Occupied Bandwidth**

Mode	GSM850	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	243	247
Middle CH	248	243
Highest CH	244	245

Mode	GSM1900	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	245	245
Middle CH	240	249
Highest CH	241	246



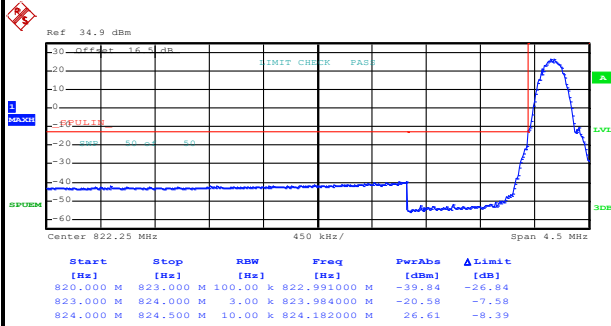




Conducted Band Edge

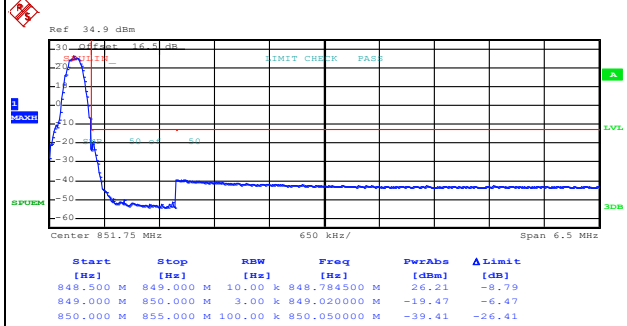
GSM850 (GPRS class 8)

Lowest Band Edge



Date: 5.NOV.2019 17:14:17

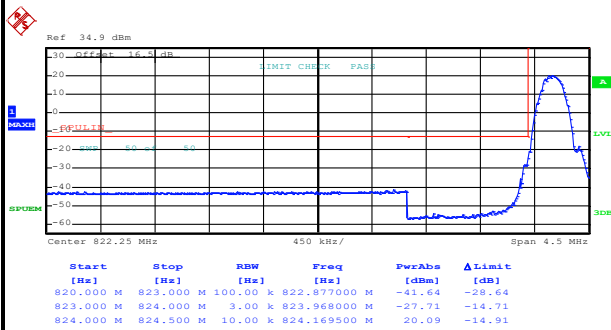
Highest Band Edge



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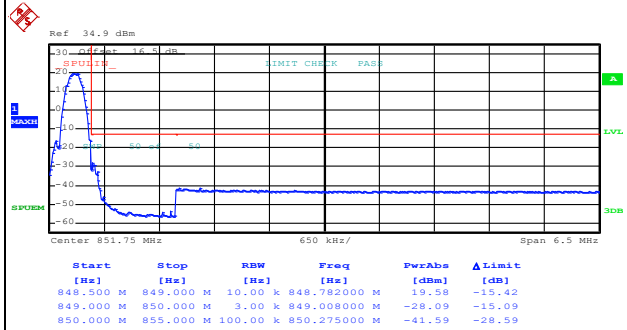
GSM850 (EDGE class 8)

Lowest Band Edge



Date: 5.NOV.2019 17:31:48

Highest Band Edge

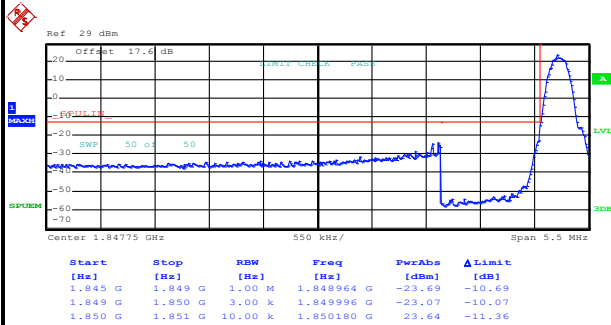


Date: 5.NOV.2019 17:33:26



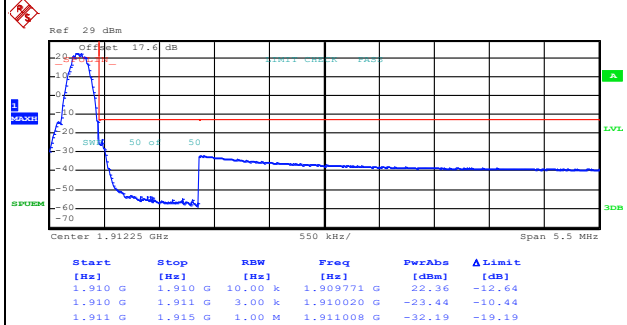
GSM1900 (GPRS class 8)

Lowest Band Edge



Date: 5.NOV.2019 18:09:20

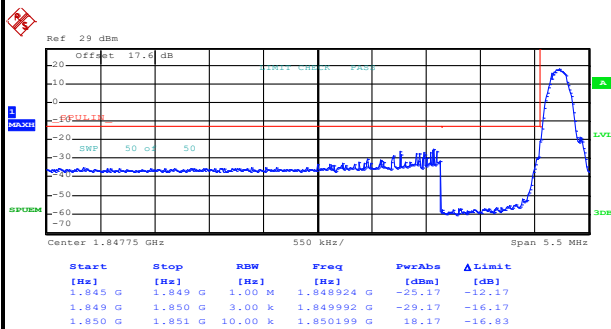
Highest Band Edge



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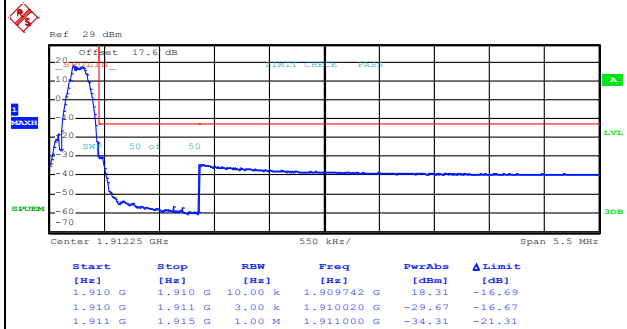
GSM1900 (EDGE class 8)

Lowest Band Edge



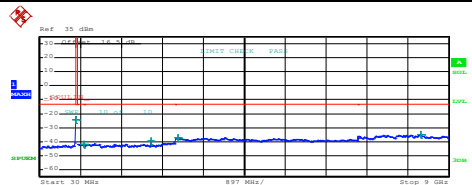
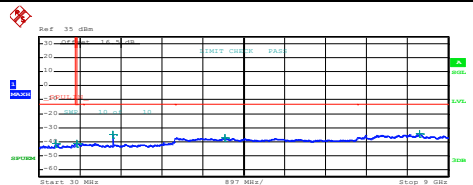
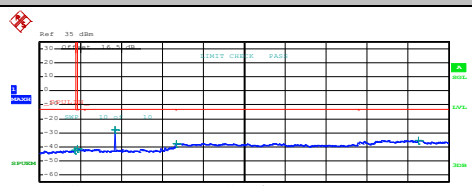
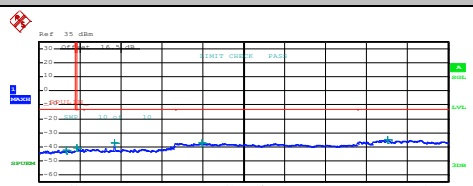
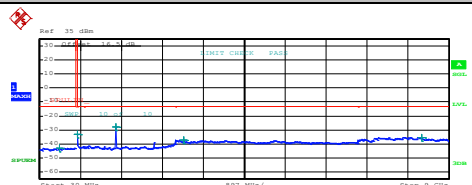
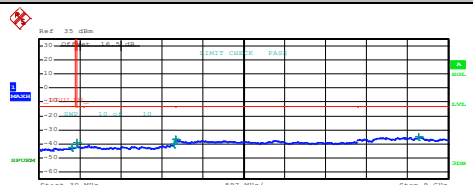
Date: 5.NOV.2019 17:55:18

Highest Band Edge



Date: 5.NOV.2019 17:57:46

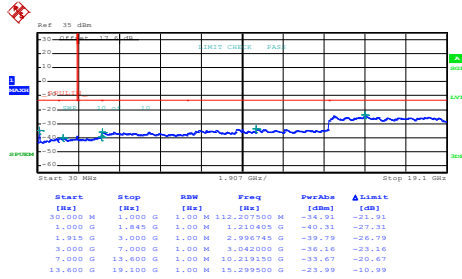
**Conducted Spurious Emission**

GSM850 (GPRS class 8)		GSM850 (EDGE class 8)																																																																																					
Lowest Channel		Lowest Channel																																																																																					
<table><tr><th>Start</th><th>Stop</th><th>RBW</th><th>Freq</th><th>PerAve</th><th>Δ Limit</th></tr><tr><th>[Hz]</th><th>[Hz]</th><th>[Hz]</th><th>[Hz]</th><th>[dBm]</th><th>[dB]</th></tr><tr><td>30.000 M</td><td>820.000 M</td><td>1.00 M</td><td>819.802500 M</td><td>-24.97</td><td>-11.97</td></tr><tr><td>850.000 M</td><td>1.000 G</td><td>1.00 M</td><td>996.338760 M</td><td>-41.67</td><td>-28.67</td></tr><tr><td>1.000 G</td><td>3.000 G</td><td>1.00 M</td><td>2.473000 G</td><td>-39.27</td><td>-26.27</td></tr><tr><td>3.000 G</td><td>7.000 G</td><td>1.00 M</td><td>3.067000 G</td><td>-37.21</td><td>-24.21</td></tr><tr><td>7.000 G</td><td>9.000 G</td><td>1.00 M</td><td>8.397000 G</td><td>-35.02</td><td>-22.02</td></tr></table> Date: 5.NOV.2019 17:17:51		Start	Stop	RBW	Freq	PerAve	Δ Limit	[Hz]	[Hz]	[Hz]	[Hz]	[dBm]	[dB]	30.000 M	820.000 M	1.00 M	819.802500 M	-24.97	-11.97	850.000 M	1.000 G	1.00 M	996.338760 M	-41.67	-28.67	1.000 G	3.000 G	1.00 M	2.473000 G	-39.27	-26.27	3.000 G	7.000 G	1.00 M	3.067000 G	-37.21	-24.21	7.000 G	9.000 G	1.00 M	8.397000 G	-35.02	-22.02	<table><tr><th>Start</th><th>Stop</th><th>RBW</th><th>Freq</th><th>PerAve</th><th>Δ Limit</th></tr><tr><th>[Hz]</th><th>[Hz]</th><th>[Hz]</th><th>[Hz]</th><th>[dBm]</th><th>[dB]</th></tr><tr><td>30.000 M</td><td>820.000 M</td><td>1.00 M</td><td>396.955000 M</td><td>-41.31</td><td>-28.31</td></tr><tr><td>850.000 M</td><td>1.000 G</td><td>1.00 M</td><td>856.196250 M</td><td>-41.46</td><td>-28.46</td></tr><tr><td>1.000 G</td><td>3.000 G</td><td>1.00 M</td><td>1.648500 G</td><td>-34.66</td><td>-22.66</td></tr><tr><td>3.000 G</td><td>7.000 G</td><td>1.00 M</td><td>4.095000 G</td><td>-37.24</td><td>-24.24</td></tr><tr><td>7.000 G</td><td>9.000 G</td><td>1.00 M</td><td>8.365000 G</td><td>-34.19</td><td>-21.19</td></tr></table> Date: 5.NOV.2019 17:26:08		Start	Stop	RBW	Freq	PerAve	Δ Limit	[Hz]	[Hz]	[Hz]	[Hz]	[dBm]	[dB]	30.000 M	820.000 M	1.00 M	396.955000 M	-41.31	-28.31	850.000 M	1.000 G	1.00 M	856.196250 M	-41.46	-28.46	1.000 G	3.000 G	1.00 M	1.648500 G	-34.66	-22.66	3.000 G	7.000 G	1.00 M	4.095000 G	-37.24	-24.24	7.000 G	9.000 G	1.00 M	8.365000 G	-34.19	-21.19
Start	Stop	RBW	Freq	PerAve	Δ Limit																																																																																		
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Start	Stop	RBW	Freq	PerAve	Δ Limit																																																																																		
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3.000 G	7.000 G	1.00 M	3.595000 G	-37.17	-24.17																																																																																		
7.000 G	9.000 G	1.00 M	7.864500 G	-35.16	-22.16																																																																																		
Highest Channel		Highest Channel																																																																																					
<table><tr><th>Start</th><th>Stop</th><th>RBW</th><th>Freq</th><th>PerAve</th><th>Δ Limit</th></tr><tr><th>[Hz]</th><th>[Hz]</th><th>[Hz]</th><th>[Hz]</th><th>[dBm]</th><th>[dB]</th></tr><tr><td>30.000 M</td><td>820.000 M</td><td>1.00 M</td><td>466.672500 M</td><td>-42.81</td><td>-29.81</td></tr><tr><td>850.000 M</td><td>1.000 G</td><td>1.00 M</td><td>850.036250 M</td><td>-33.25</td><td>-20.25</td></tr><tr><td>1.000 G</td><td>3.000 G</td><td>1.00 M</td><td>1.698000 G</td><td>-27.93</td><td>-14.93</td></tr><tr><td>3.000 G</td><td>7.000 G</td><td>1.00 M</td><td>3.183000 G</td><td>-37.34</td><td>-24.34</td></tr><tr><td>7.000 G</td><td>9.000 G</td><td>1.00 M</td><td>8.405500 G</td><td>-35.24</td><td>-22.24</td></tr></table> Date: 5.NOV.2019 17:19:37		Start	Stop	RBW	Freq	PerAve	Δ Limit	[Hz]	[Hz]	[Hz]	[Hz]	[dBm]	[dB]	30.000 M	820.000 M	1.00 M	466.672500 M	-42.81	-29.81	850.000 M	1.000 G	1.00 M	850.036250 M	-33.25	-20.25	1.000 G	3.000 G	1.00 M	1.698000 G	-27.93	-14.93	3.000 G	7.000 G	1.00 M	3.183000 G	-37.34	-24.34	7.000 G	9.000 G	1.00 M	8.405500 G	-35.24	-22.24	<table><tr><th>Start</th><th>Stop</th><th>RBW</th><th>Freq</th><th>PerAve</th><th>Δ Limit</th></tr><tr><th>[Hz]</th><th>[Hz]</th><th>[Hz]</th><th>[Hz]</th><th>[dBm]</th><th>[dB]</th></tr><tr><td>30.000 M</td><td>820.000 M</td><td>1.00 M</td><td>751.685000 M</td><td>-42.95</td><td>-29.95</td></tr><tr><td>850.000 M</td><td>1.000 G</td><td>1.00 M</td><td>850.108750 M</td><td>-38.95</td><td>-25.95</td></tr><tr><td>1.000 G</td><td>3.000 G</td><td>1.00 M</td><td>2.995000 G</td><td>-40.30</td><td>-27.30</td></tr><tr><td>3.000 G</td><td>7.000 G</td><td>1.00 M</td><td>3.029000 G</td><td>-36.85</td><td>-23.85</td></tr><tr><td>7.000 G</td><td>9.000 G</td><td>1.00 M</td><td>8.360000 G</td><td>-34.94</td><td>-21.94</td></tr></table> Date: 5.NOV.2019 17:27:54		Start	Stop	RBW	Freq	PerAve	Δ Limit	[Hz]	[Hz]	[Hz]	[Hz]	[dBm]	[dB]	30.000 M	820.000 M	1.00 M	751.685000 M	-42.95	-29.95	850.000 M	1.000 G	1.00 M	850.108750 M	-38.95	-25.95	1.000 G	3.000 G	1.00 M	2.995000 G	-40.30	-27.30	3.000 G	7.000 G	1.00 M	3.029000 G	-36.85	-23.85	7.000 G	9.000 G	1.00 M	8.360000 G	-34.94	-21.94
Start	Stop	RBW	Freq	PerAve	Δ Limit																																																																																		
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7.000 G	9.000 G	1.00 M	8.360000 G	-34.94	-21.94																																																																																		



GSM1900 (GPRS class 8)

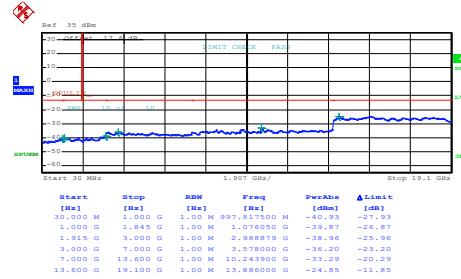
Lowest Channel



Date: 5.NOV.2019 18:03:42

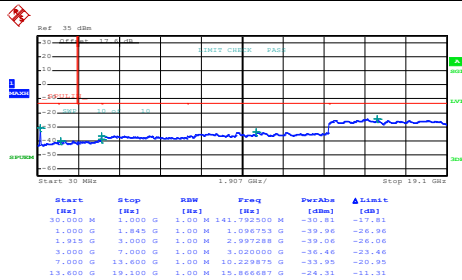
GSM1900 (EDGE class 8)

Lowest Channel



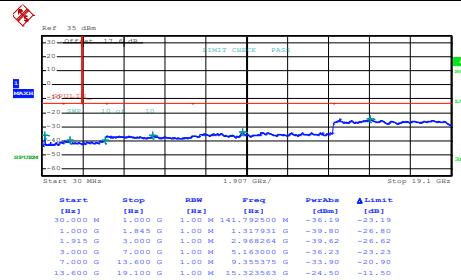
Date: 5.NOV.2019 17:49:38

Middle Channel



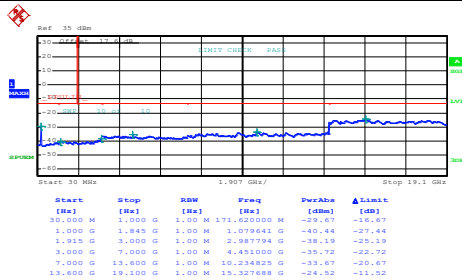
Date: 5.NOV.2019 18:04:34

Middle Channel



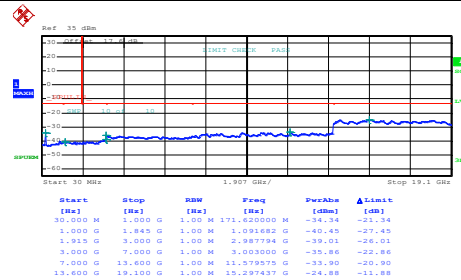
Date: 5.NOV.2019 17:50:32

Highest Channel



Date: 5.NOV.2019 18:05:28

Highest Channel



Date: 5.NOV.2019 17:51:33

Frequency Stability

Test Conditions	Middle Channel	GSM850 (GPRS class 8)	GSM850 (EDGE class 8)	Limit 2.5ppm
Temperature (°C)	Voltage (Volt)	Deviation (ppm)		Result
50	Normal Voltage	0.0060	0.0120	PASS
40	Normal Voltage	0.0311	0.0430	
30	Normal Voltage	0.0311	0.0430	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0311	0.0430	
0	Normal Voltage	0.0311	0.0430	
-10	Normal Voltage	0.0311	0.0430	
-20	Normal Voltage	0.0084	0.0060	
-30	Normal Voltage	n/a	n/a	
20	Maximum Voltage	0.0108	0.0108	
20	Normal Voltage	0.0000	0.0000	
20	Battery End Point	0.0215	0.0120	

Test Conditions	Middle Channel	GSM1900 (GPRS class 8)	GSM1900 (EDGE class 8)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)		Result
50	Normal Voltage	0.0096	0.0117	PASS
40	Normal Voltage	0.0117	0.0101	
30	Normal Voltage	0.0053	0.0085	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0037	0.0090	
0	Normal Voltage	0.0064	0.0021	
-10	Normal Voltage	0.0106	0.0053	
-20	Normal Voltage	0.0080	0.0064	
-30	Normal Voltage	n/a	n/a	
20	Maximum Voltage	0.0080	0.0037	
20	Normal Voltage	0.0000	0.0000	
20	Battery End Point	0.0059	0.0005	

Note:

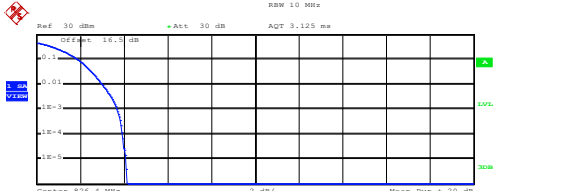
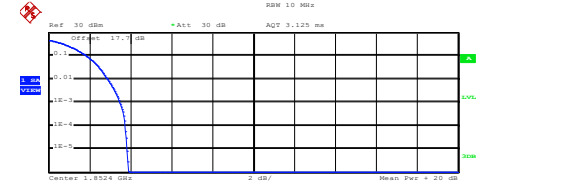
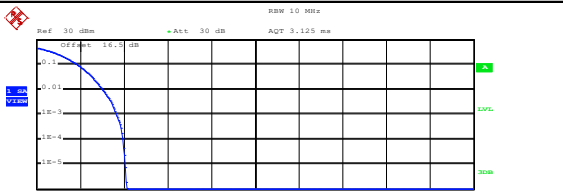
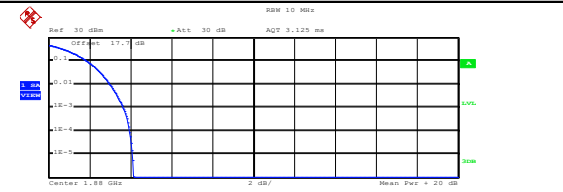
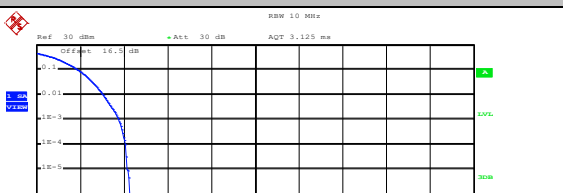
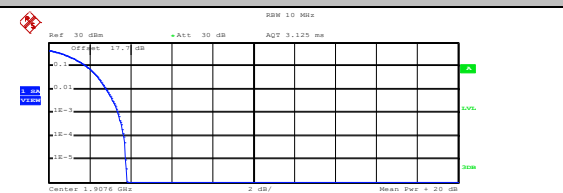
1. Normal Voltage = 3.85V. ; Battery End Point (BEP) = 3.5 V. ; Maximum Voltage =4.2 V
2. The frequency fundamental emissions stay within the authorized frequency block.
3. By manufacturer declaration, EUT will automatically inhibit from operating outside the lesser temperature range. (when temperature lower than -20 °C, EUT will be shut down automatically)



A3. WCDMA

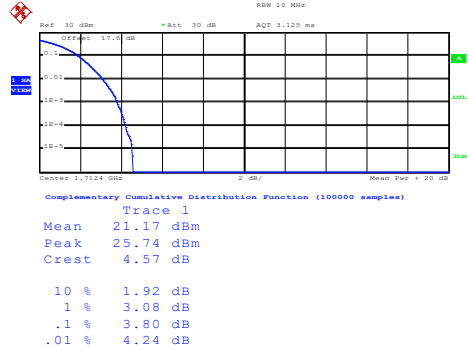
Peak-to-Average Ratio

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	3.68	3.48	3.80	PASS
Middle CH	3.68	3.64	4.12	
Highest CH	3.76	3.40	3.84	

WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	Lowest Channel
 Center 826.4 MHz Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 23.23 dBm Peak 27.36 dBm Crest 4.13 dB 10 % 1.92 dB 1 % 3.00 dB .1 % 3.68 dB .01 % 3.92 dB Date: 5.NOV.2019 17:04:30	 Center 1.8524 GHz Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 22.27 dBm Peak 26.16 dBm Crest 3.89 dB 10 % 1.84 dB 1 % 2.88 dB .1 % 3.48 dB .01 % 3.76 dB Date: 4.NOV.2019 19:04:05
Middle Channel	Middle Channel
 Center 836.6 MHz Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 22.88 dBm Peak 27.01 dBm Crest 4.13 dB 10 % 1.92 dB 1 % 3.04 dB .1 % 3.68 dB .01 % 3.96 dB Date: 5.NOV.2019 17:04:42	 Center 1.85 GHz Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 22.01 dBm Peak 26.16 dBm Crest 4.15 dB 10 % 1.88 dB 1 % 3.00 dB .1 % 3.64 dB .01 % 3.96 dB Date: 4.NOV.2019 19:04:19
Highest Channel	Highest Channel
 Center 846.6 MHz Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 22.81 dBm Peak 27.08 dBm Crest 4.27 dB 10 % 1.92 dB 1 % 3.04 dB .1 % 3.76 dB .01 % 4.08 dB Date: 5.NOV.2019 17:04:53	 Center 1.9076 GHz Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 21.99 dBm Peak 25.81 dBm Crest 3.82 dB 10 % 1.84 dB 1 % 2.80 dB .1 % 3.40 dB .01 % 3.68 dB Date: 4.NOV.2019 19:04:35

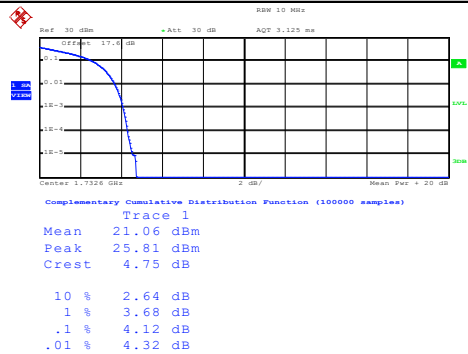
WCDMA Band IV (RMC 12.2Kbps)

Lowest Channel



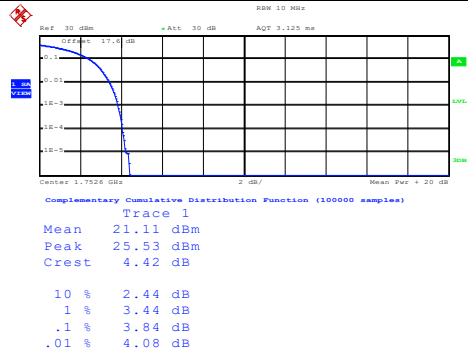
Date: 5.NOV.2019 16:28:26

Middle Channel



Date: 5.NOV.2019 16:28:43

Highest Channel



Date: 5.NOV.2019 16:28:58

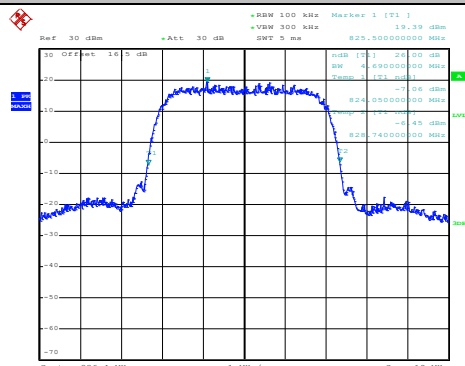
**26dB Bandwidth**

Mode	WCDMA Band V	WCDMA Band II	WCDMA Band IV
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.69	4.7	4.72
Middle CH	4.69	4.72	4.7
Highest CH	4.69	4.71	4.71



WCDMA Band V (RMC 12.2Kbps)

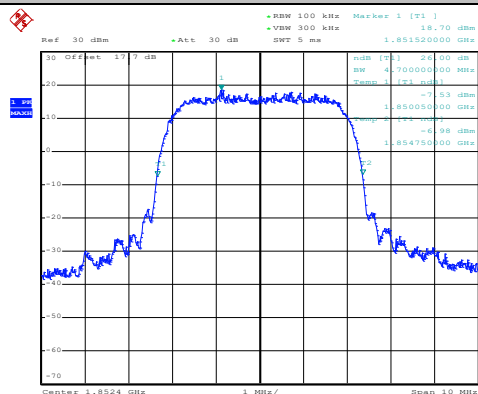
Lowest Channel



Date: 5.NOV.2019 16:51:27

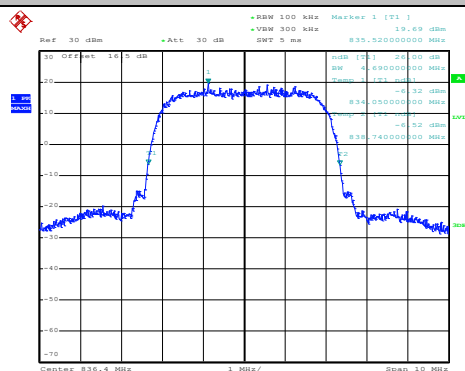
WCDMA Band II (RMC 12.2Kbps)

Lowest Channel



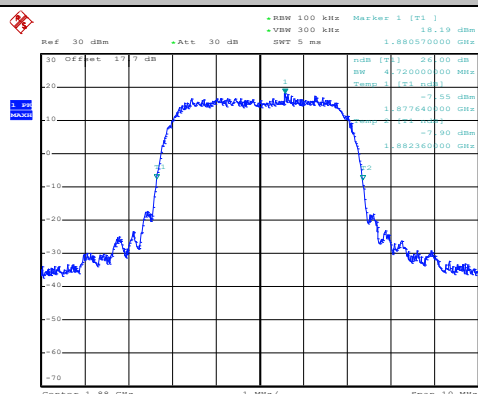
Date: 4.NOV.2019 18:50:30

Middle Channel



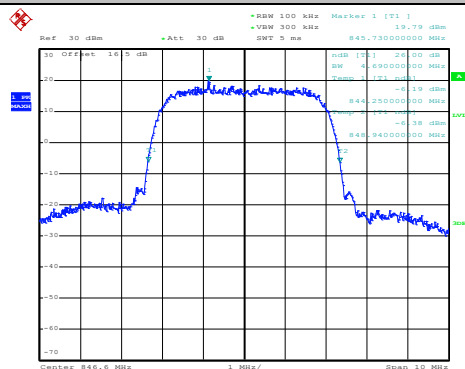
Date: 5.NOV.2019 16:51:59

Middle Channel



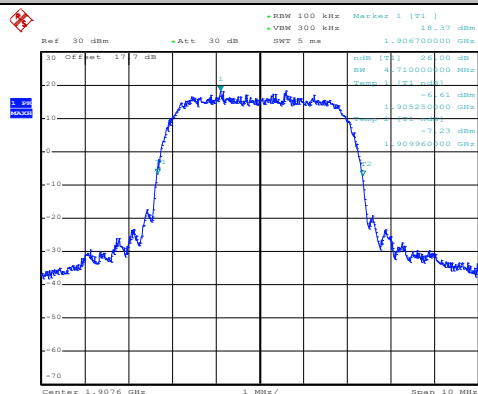
Date: 4.NOV.2019 18:51:07

Highest Channel



Date: 5.NOV.2019 16:52:32

Highest Channel

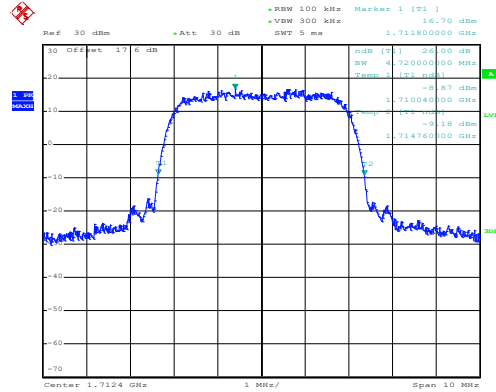


Date: 4.NOV.2019 18:51:53



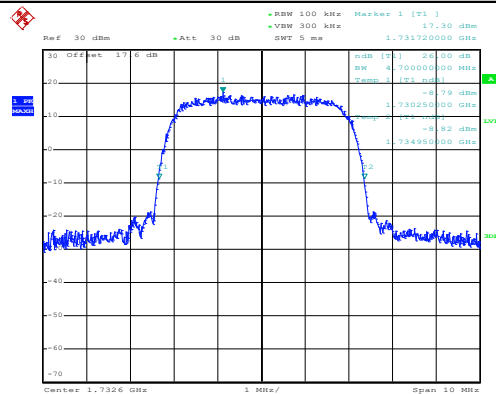
WCDMA Band IV (RMC 12.2Kbps)

Lowest Channel



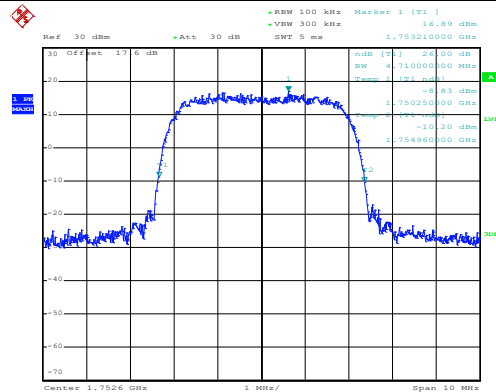
Date: 5.NOV.2019 16:15:03

Middle Channel



Date: 5.NOV.2019 16:15:36

Highest Channel



Date: 5.NOV.2019 16:16:08

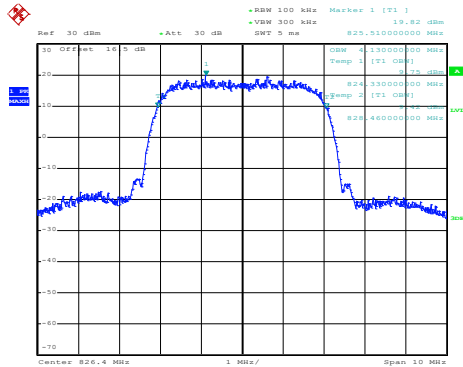
**Occupied Bandwidth**

Mode	WCDMA Band V	WCDMA Band II	WCDMA Band IV
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.13	4.15	4.14
Middle CH	4.14	4.16	4.14
Highest CH	4.15	4.14	4.13



WCDMA Band V (RMC 12.2Kbps)

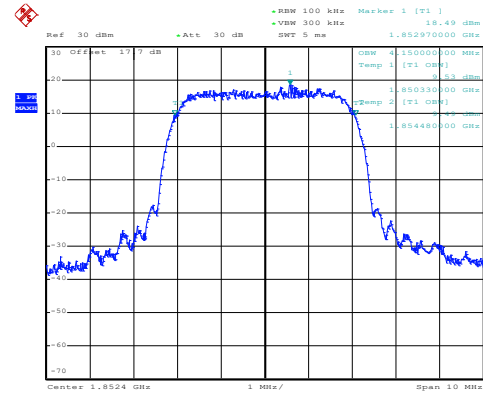
Lowest Channel



Date: 5.NOV.2019 16:55:48

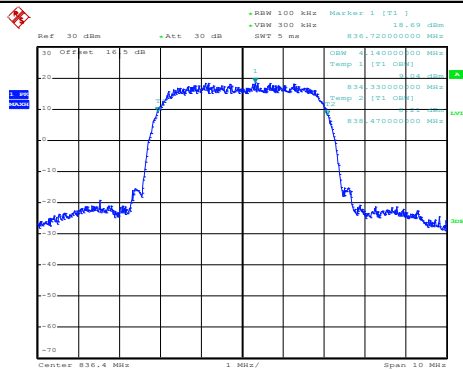
WCDMA Band II (RMC 12.2Kbps)

Lowest Channel



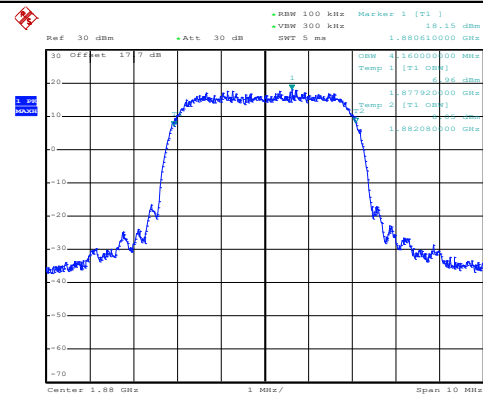
Date: 4.NOV.2019 18:58:43

Middle Channel



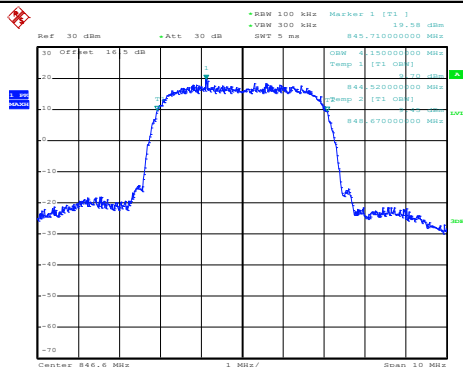
Date: 5.NOV.2019 16:56:21

Middle Channel



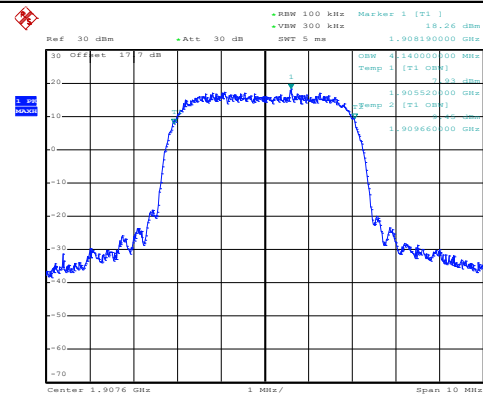
Date: 4.NOV.2019 18:59:28

Highest Channel



Date: 5.NOV.2019 16:56:56

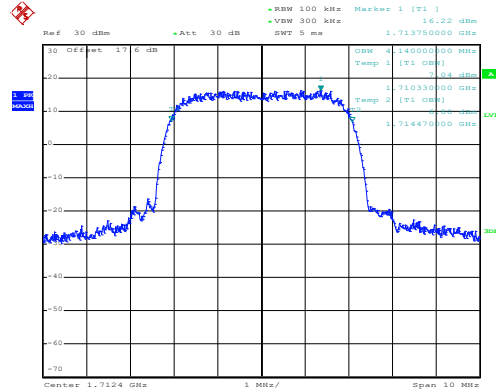
Highest Channel



Date: 4.NOV.2019 19:00:21

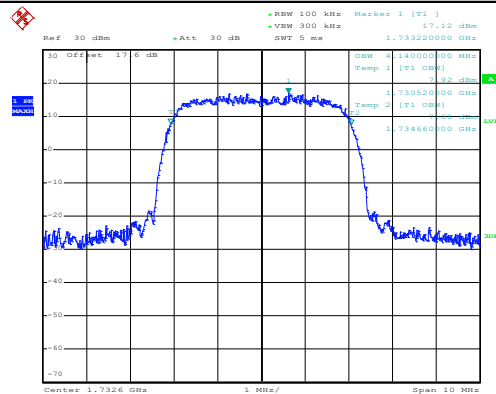
WCDMA Band IV (RMC 12.2Kbps)

Lowest Channel



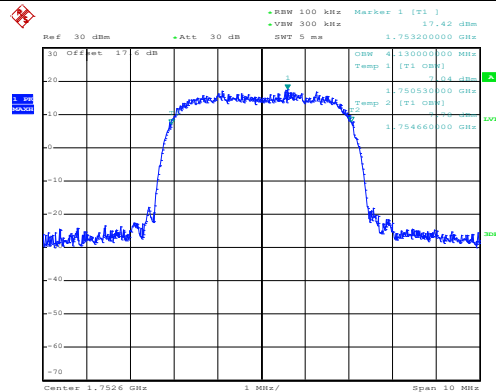
Date: 5.NOV.2019 16:24:08

Middle Channel



Date: 5.NOV.2019 16:24:41

Highest Channel



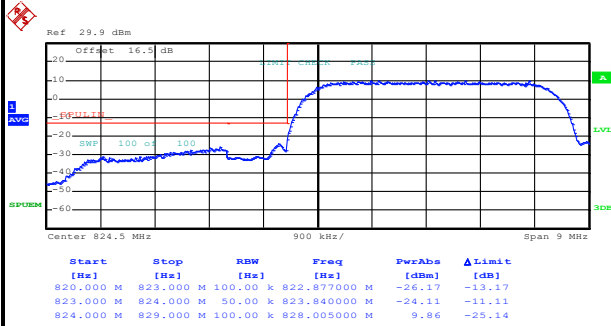
Date: 5.NOV.2019 16:25:14



Conducted Band Edge

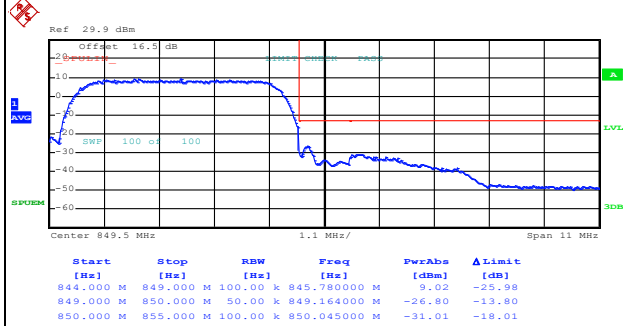
WCDMA Band V (RMC 12.2Kbps)

Lowest Band Edge



Date: 5.NOV.2019 17:00:13

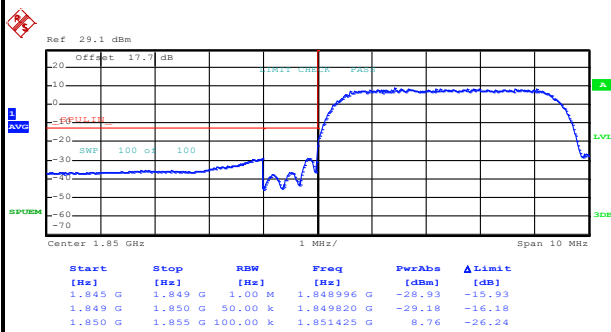
Highest Band Edge



Date: 5.NOV.2019 17:03:03

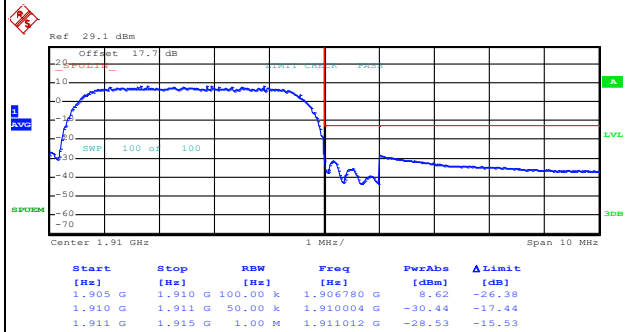
WCDMA Band II (RMC 12.2Kbps)

Lowest Band Edge



Date: 4.NOV.2019 18:54:49

Highest Band Edge

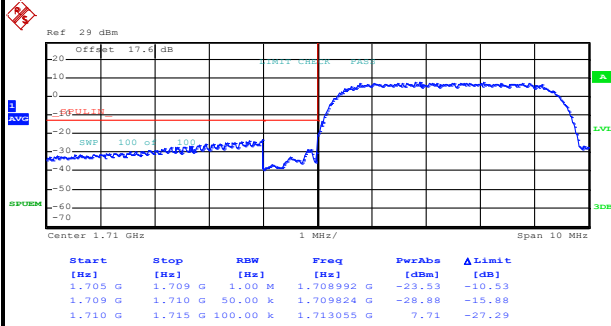


Date: 4.NOV.2019 18:57:58



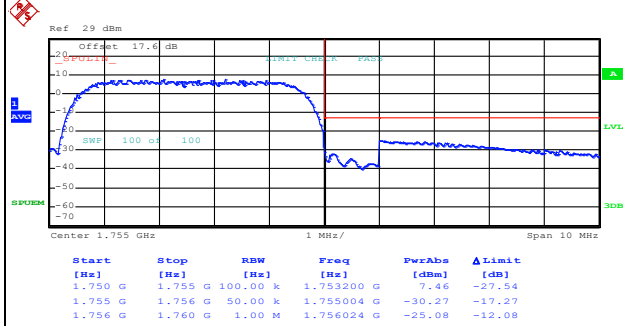
WCDMA Band IV (RMC 12.2Kbps)

Lowest Band Edge



Date: 5.NOV.2019 16:18:58

Highest Band Edge



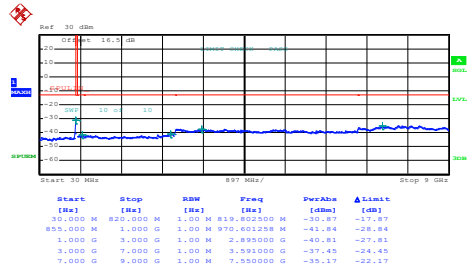
Date: 5.NOV.2019 16:21:50



Conducted Spurious Emission

WCDMA Band V (RMC 12.2Kbps)

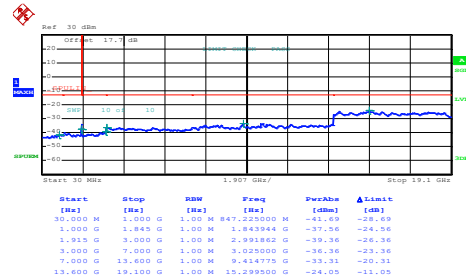
Lowest Channel



Date: 5.NOV.2019 16:53:25

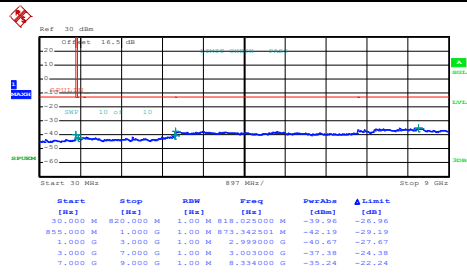
WCDMA Band II (RMC 12.2Kbps)

Lowest Channel



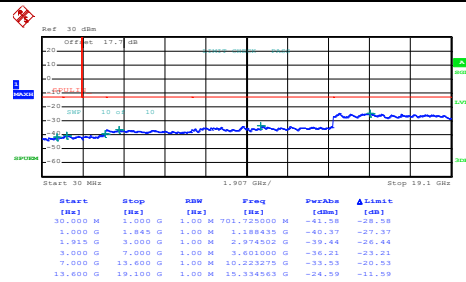
Date: 4.NOV.2019 19:01:31

Middle Channel



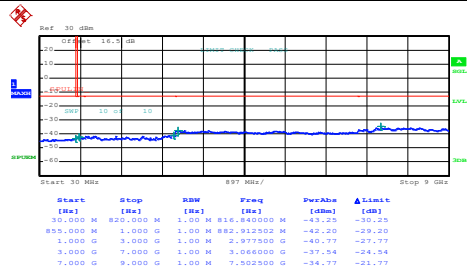
Date: 5.NOV.2019 16:54:16

Middle Channel



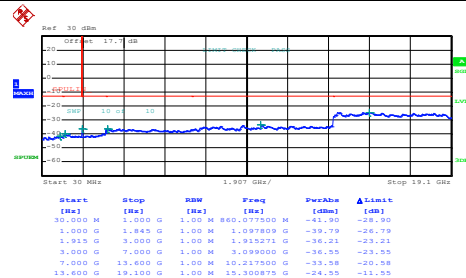
Date: 4.NOV.2019 19:02:34

Highest Channel



Date: 5.NOV.2019 16:55:08

Highest Channel

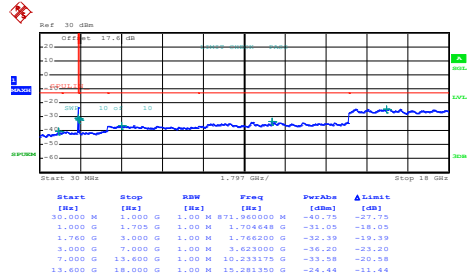


Date: 4.NOV.2019 19:03:27



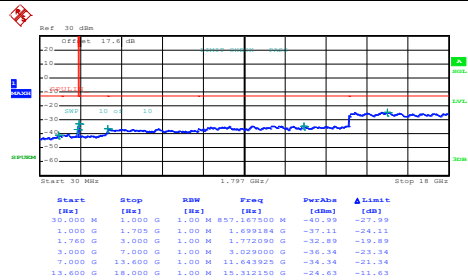
WCDMA Band IV (RMC 12.2Kbps)

Lowest Channel



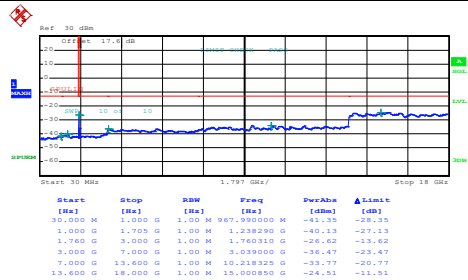
Date: 5.NOV.2019 16:26:17

Middle Channel



Date: 5.NOV.2019 16:27:08

Highest Channel



Date: 5.NOV.2019 16:27:59

Frequency Stability

Test Conditions	Middle Channel	WCDMA Band V (RMC 12.2Kbps)	Limit 2.5ppm
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0108	PASS
40	Normal Voltage	0.0120	
30	Normal Voltage	0.0000	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0012	
0	Normal Voltage	0.0012	
-10	Normal Voltage	0.0024	
-20	Normal Voltage	0.0036	
-30	Normal Voltage	n/a	
20	Maximum Voltage	0.0132	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0012	

Test Conditions	Middle Channel	WCDMA Band II (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0074	PASS
40	Normal Voltage	0.0074	
30	Normal Voltage	0.0074	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0000	
0	Normal Voltage	0.0000	
-10	Normal Voltage	0.0005	
-20	Normal Voltage	0.0005	
-30	Normal Voltage	n/a	
20	Maximum Voltage	0.0005	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0069	

Test Conditions	Middle Channel	WCDMA Band IV (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0052	PASS
40	Normal Voltage	0.0069	
30	Normal Voltage	0.0029	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0017	
0	Normal Voltage	0.0012	
-10	Normal Voltage	0.0023	
-20	Normal Voltage	0.0035	
-30	Normal Voltage	n/a	
20	Maximum Voltage	0.0006	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0006	

Note:

1. Normal Voltage = 3.85V. ; Battery End Point (BEP) = 3.5V. ; Maximum Voltage =4.2 V
2. The frequency fundamental emissions stay within the authorized frequency block.
3. By manufacturer declaration, EUT will automatically inhibit from operating outside the lesser temperature range. (when temperature lower than -20 °C, EUT will be shut down automatically)

**Appendix B. Test Results of ERP/EIRP and Radiated Test****ERP/EIRP**

Channel	Mode	Conducted		ERP	
		Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Lowest	GSM850 GPRS class 8 (GT - LC = -2.5 dB)	32.88	1.9409	28.23	0.6653
Middle		32.99	1.9907	28.34	0.6823
Highest		33.00	1.9953	28.35	0.6839
Lowest	GSM850 EDGE class 8 (GT - LC = -2.5 dB)	26.25	0.4217	21.60	0.1445
Middle		26.44	0.4406	21.79	0.1510
Highest		26.48	0.4446	21.83	0.1524
Lowest	WCDMA Band V RMC 12.2Kbps (GT - LC = -2.5 dB)	22.78	0.1897	18.13	0.0650
Middle		22.75	0.1884	18.10	0.0646
Highest		22.82	0.1914	18.17	0.0656
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Conducted		EIRP	
		Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	GSM1900 GPRS class 8 (GT - LC = 1.7 dB)	30.13	1.0304	31.83	1.5241
Middle		30.05	1.0116	31.75	1.4962
Highest		30.21	1.0495	31.91	1.5524
Lowest	GSM1900 EDGE class 8 (GT - LC = 1.7 dB)	25.55	0.3589	27.25	0.5309
Middle		25.56	0.3597	27.26	0.5321
Highest		25.64	0.3664	27.34	0.5420
Lowest	WCDMA Band II RMC 12.2Kbps (GT - LC = 1.7 dB)	21.81	0.1517	23.51	0.2244
Middle		21.78	0.1507	23.48	0.2228
Highest		21.85	0.1531	23.55	0.2265
Limit	EIRP < 2W	Result		PASS	

Channel	Mode	Conducted		EIRP	
		Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	WCDMA Band IV RMC 12.2Kbps (GT - LC = 1.7 dB)	23.15	0.2065	24.85	0.3055
Middle		23.12	0.2051	24.82	0.3034
Highest		23.14	0.2061	24.84	0.3048
Limit	EIRP < 1W	Result		PASS	

Radiated Spurious Emission

GPRS 850

GPRS 850									
Channel	Frequency (MHz)	ERP (dBm)	Over Limit (dB)	Limit (dBm)	Read Level (dBm)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Polarization (H/V)
Lowest	1648	-46.71	-33.71	-13	-53.47	25.1	15.87	34.21	H
	2472	-41.78	-28.78	-13	-52.55	27.5	16.87	33.6	H
	3296	-60.17	-47.17	-13	-72.92	28.42	17.8	33.47	H
									H
	1648	-41.97	-28.97	-13	-48.73	25.1	15.87	34.21	V
	2472	-39.24	-26.24	-13	-50.01	27.5	16.87	33.6	V
	3296	-61.01	-48.01	-13	-73.76	28.42	17.8	33.47	V
									V
Middle	1672	-42.77	-29.77	-13	-49.61	25.14	15.88	34.18	H
	2512	-45.82	-32.82	-13	-56.66	27.5	16.93	33.59	H
	3344	-61.61	-48.61	-13	-74.36	28.31	17.89	33.45	H
									H
	1672	-42.43	-29.43	-13	-49.27	25.14	15.88	34.18	V
	2512	-41.79	-28.79	-13	-52.63	27.5	16.93	33.59	V
	3344	-60.37	-47.37	-13	-73.12	28.31	17.89	33.45	V
									V
Highest	1696	-47.17	-34.17	-13	-54.11	25.19	15.9	34.15	H
	2544	-44.25	-31.25	-13	-55.13	27.5	16.97	33.59	H
	3392	-59.6	-46.6	-13	-72.53	28.38	17.99	33.44	H
									H
	1696	-44.25	-31.25	-13	-51.19	25.19	15.9	34.15	V
	2544	-42.94	-29.94	-13	-53.82	27.5	16.97	33.59	V
	3392	-59.44	-46.44	-13	-72.37	28.38	17.99	33.44	V
									V
Remark	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								

EDGE 850

EDGE 850									
Channel	Frequency (MHz)	ERP (dBm)	Over Limit (dB)	Limit (dBm)	Read Level (dBm)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Polarization (H/V)
Lowest	1648	-44.96	-31.96	-13	-51.72	25.1	15.87	34.21	H
	2472	-45.41	-32.41	-13	-56.18	27.5	16.87	33.6	H
	3296	-61.6	-48.6	-13	-74.35	28.42	17.8	33.47	H
									H
	1648	-43.72	-30.72	-13	-50.48	25.1	15.87	34.21	V
	2472	-42.81	-29.81	-13	-53.58	27.5	16.87	33.6	V
	3296	-60.62	-47.62	-13	-73.37	28.42	17.8	33.47	V
									V
Middle	1672	-44.25	-31.25	-13	-51.09	25.14	15.88	34.18	H
	2512	-41.63	-28.63	-13	-52.47	27.5	16.93	33.59	H
	3344	-61.32	-48.32	-13	-74.07	28.31	17.89	33.45	H
									H
	1672	-42.9	-29.9	-13	-49.74	25.14	15.88	34.18	V
	2512	-38.12	-25.12	-13	-48.96	27.5	16.93	33.59	V
	3344	-61.13	-48.13	-13	-73.88	28.31	17.89	33.45	V
									V
Highest	1696	-43.3	-30.3	-13	-50.24	25.19	15.9	34.15	H
	2544	-41.62	-28.62	-13	-52.5	27.5	16.97	33.59	H
	3392	-60.52	-47.52	-13	-73.45	28.38	17.99	33.44	H
									H
	1696	-44.16	-31.16	-13	-51.1	25.19	15.9	34.15	V
	2544	-41.69	-28.69	-13	-52.57	27.5	16.97	33.59	V
	3392	-59.36	-46.36	-13	-72.29	28.38	17.99	33.44	V
									V
Remark	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								

WCDMA 850

WCDMA 850									
Channel	Frequency (MHz)	ERP (dBm)	Over Limit (dB)	Limit (dBm)	Read Level (dBm)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Polarization (H/V)
Lowest	1648	-64.65	-51.65	-13	-71.41	25.1	15.87	34.21	H
	2480	-60.79	-47.79	-13	-71.57	27.5	16.88	33.6	H
	3296	-61.73	-48.73	-13	-74.48	28.42	17.8	33.47	H
									H
	1648	-63.77	-50.77	-13	-70.53	25.1	15.87	34.21	V
	2480	-46.42	-33.42	-13	-57.2	27.5	16.88	33.6	V
	3296	-61.89	-48.89	-13	-74.64	28.42	17.8	33.47	V
									V
Middle	1672	-59.03	-46.03	-13	-65.87	25.14	15.88	34.18	H
	2512	-48.89	-35.89	-13	-59.73	27.5	16.93	33.59	H
	3344	-61.32	-48.32	-13	-74.07	28.31	17.89	33.45	H
									H
	1672	-58.73	-45.73	-13	-65.57	25.14	15.88	34.18	V
	2512	-56.04	-43.04	-13	-66.88	27.5	16.93	33.59	V
	3344	-59.57	-46.57	-13	-72.32	28.31	17.89	33.45	V
									V
Highest	1696	-57.8	-44.8	-13	-64.74	25.19	15.9	34.15	H
	2544	-61.15	-48.15	-13	-72.03	27.5	16.97	33.59	H
	3392	-61.21	-48.21	-13	-74.14	28.38	17.99	33.44	H
									H
	1696	-58.94	-45.94	-13	-65.88	25.19	15.9	34.15	V
	2544	-57.52	-44.52	-13	-68.4	27.5	16.97	33.59	V
	3392	-60.17	-47.17	-13	-73.1	28.38	17.99	33.44	V
									V
Remark	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								

GPRS 1900

GPRS 1900									
Channel	Frequency (MHz)	EIRP (dBm)	Over Limit (dB)	Limit (dBm)	Read Level (dBm)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Polarization (H/V)
Lowest	3702	-50.15	-37.15	-13	-77.16	48.58	11.76	33.33	H
	5550	-45.7	-32.7	-13	-77.83	53.5	11.76	33.13	H
	7398	-53.58	-40.58	-13	-89.05	57.78	11.76	34.07	H
									H
	3702	-54.97	-41.97	-13	-83.15	49.75	11.76	33.33	V
	5550	-44.74	-31.74	-13	-76.96	53.59	11.76	33.13	V
	7398	-53.97	-40.97	-13	-89.23	57.57	11.76	34.07	V
									V
Middle	3762	-55.25	-42.25	-13	-82.45	48.75	11.76	33.31	H
	5640	-44.7	-31.7	-13	-76.73	53.42	11.76	33.15	H
	7520	-53.46	-40.46	-13	-88.72	57.64	11.76	34.14	H
									H
	3762	-54.02	-41.02	-13	-82.43	49.96	11.76	33.31	V
	5640	-45.33	-32.33	-13	-77.53	53.59	11.76	33.15	V
	7518	-53.68	-40.68	-13	-88.99	57.69	11.76	34.14	V
									V
Highest	3822	-55.86	-42.86	-13	-83.2	48.87	11.76	33.29	H
	5730	-52.78	-39.78	-13	-84.85	53.49	11.76	33.18	H
	7638	-53.03	-40.03	-13	-88.51	57.92	11.76	34.2	H
									H
	3822	-53.84	-40.84	-13	-82.4	50.09	11.76	33.29	V
	5730	-42.51	-29.51	-13	-74.79	53.7	11.76	33.18	V
	7638	-52.74	-39.74	-13	-87.97	57.67	11.76	34.2	V
									V
Remark	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								

EDGE 1900

EDGE 1900									
Channel	Frequency (MHz)	EIRP (dBm)	Over Limit (dB)	Limit (dBm)	Read Level (dBm)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Polarization (H/V)
Lowest	3702	-51.94	-38.94	-13	-78.95	48.58	11.76	33.33	H
	5556	-40.68	-27.68	-13	-72.77	53.46	11.76	33.13	H
	7398	-53.87	-40.87	-13	-89.34	57.78	11.76	34.07	H
									H
	3702	-54.19	-41.19	-13	-82.37	49.75	11.76	33.33	V
	5556	-38.06	-25.06	-13	-70.27	53.58	11.76	33.13	V
	7398	-52.92	-39.92	-13	-88.18	57.57	11.76	34.07	V
									V
Middle	3762	-53.11	-40.11	-13	-80.31	48.75	11.76	33.31	H
	5640	-42.15	-29.15	-13	-74.18	53.42	11.76	33.15	H
	7518	-53.51	-40.51	-13	-88.77	57.64	11.76	34.14	H
									H
	3762	-54.72	-41.72	-13	-83.13	49.96	11.76	33.31	V
	5640	-40.97	-27.97	-13	-73.17	53.59	11.76	33.15	V
	7518	-53.6	-40.6	-13	-88.91	57.69	11.76	34.14	V
									V
Highest	3822	-54.82	-41.82	-13	-82.16	48.87	11.76	33.29	H
	5730	-49.56	-36.56	-13	-81.63	53.49	11.76	33.18	H
	7638	-52.78	-39.78	-13	-88.26	57.92	11.76	34.2	H
									H
	3822	-53.57	-40.57	-13	-82.13	50.09	11.76	33.29	V
	5730	-48.16	-35.16	-13	-80.44	53.7	11.76	33.18	V
	7638	-52.21	-39.21	-13	-87.44	57.67	11.76	34.2	V
									V
Remark	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								

WCDMA 1900

WCDMA 1900									
Channel	Frequency (MHz)	EIRP (dBm)	Over Limit (dB)	Limit (dBm)	Read Level (dBm)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Polarization (H/V)
Lowest	3708	-55.52	-42.52	-13	-72.39	29.32	20.88	33.33	H
	5556	-52.14	-39.14	-13	-73.52	31.9	22.61	33.13	H
	7404	-42.4	-29.4	-13	-69.23	36.61	24.29	34.07	H
	9262.5	-41.39	-28.39	-13	-72.33	38.93	26.1	34.09	H
	3708	-53.38	-40.38	-13	-70.25	29.32	20.88	33.33	V
	5556	-53.52	-40.52	-13	-74.9	31.9	22.61	33.13	V
	7404	-46	-33	-13	-72.83	36.61	24.29	34.07	V
	9262.5	-44.46	-31.46	-13	-75.4	38.93	26.1	34.09	V
Middle	3756	-53.86	-40.86	-13	-70.87	29.42	20.9	33.31	H
	5646	-49.58	-36.58	-13	-71.03	31.9	22.71	33.16	H
	7524	-41.06	-28.06	-13	-67.99	36.65	24.42	34.14	H
	9399	-40.75	-27.75	-13	-72.41	39	26.69	34.03	H
	3756	-53.76	-40.76	-13	-70.77	29.42	20.9	33.31	V
	5646	-51.86	-38.86	-13	-73.31	31.9	22.71	33.16	V
	7524	-45.75	-32.75	-13	-72.68	36.65	24.42	34.14	V
	9399	-43.8	-30.8	-13	-75.46	39	26.69	34.03	V
Highest	3816	-50.8	-37.8	-13	-68.09	29.63	20.95	33.29	H
	5718	-49.29	-36.29	-13	-70.88	32.04	22.73	33.18	H
	7626	-40.59	-27.59	-13	-67.42	36.5	24.53	34.2	H
	9535.5	-41.16	-28.16	-13	-73.18	38.87	27.12	33.97	H
	3816	-51.48	-38.48	-13	-68.77	29.63	20.95	33.29	V
	5718	-51.39	-38.39	-13	-72.98	32.04	22.73	33.18	V
	7626	-45.61	-32.61	-13	-72.44	36.5	24.53	34.2	V
	9535.5	-43.41	-30.41	-13	-75.43	38.87	27.12	33.97	V
Remark	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								

WCDMA 1700

WCDMA 1700									
Channel	Frequency (MHz)	EIRP (dBm)	Over Limit (dB)	Limit (dBm)	Read Level (dBm)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Polarization (H/V)
Lowest	3424.8	-58.12	-45.12	-13	-73.96	28.45	20.82	33.43	H
	5136	-51.3	-38.3	-13	-72.54	32.07	22.29	33.12	H
	6852	-45.32	-32.32	-13	-71.06	34.91	24.58	33.75	H
	8568	-44.3	-31.3	-13	-72.34	37.24	25.18	34.38	H
	3424.8	-58.27	-45.27	-13	-74.11	28.45	20.82	33.43	V
	5136	-49.12	-36.12	-13	-70.36	32.07	22.29	33.12	V
	6852	-47.6	-34.6	-13	-73.34	34.91	24.58	33.75	V
	8568	-45.35	-32.35	-13	-73.39	37.24	25.18	34.38	V
Middle	3468	-57.99	-44.99	-13	-74.01	28.61	20.83	33.42	H
	5197.8	-54.21	-41.21	-13	-75.27	31.81	22.37	33.12	H
	6930.4	-48.2	-35.2	-13	-74.3	35.28	24.61	33.79	H
	3468	-58.22	-45.22	-13	-74.24	28.61	20.83	33.42	V
	5197.8	-54.87	-41.87	-13	-75.93	31.81	22.37	33.12	V
	6930.4	-49.8	-36.8	-13	-75.9	35.28	24.61	33.79	V
Highest	3504	-58.4	-45.4	-13	-74.63	28.82	20.82	33.41	H
	5256	-52.41	-39.41	-13	-73.15	31.49	22.36	33.11	H
	7008	-41.5	-28.5	-13	-67.93	35.63	24.63	33.83	H
	8760	-43.14	-30.14	-13	-71.93	37.74	25.36	34.31	H
	10522.5	-43.07	-30.07	-13	-76.14	40	26.83	33.76	H
	3504	-58.66	-45.66	-13	-74.89	28.82	20.82	33.41	V
	5256	-53.68	-40.68	-13	-74.42	31.49	22.36	33.11	V
	7008	-44.07	-31.07	-13	-70.5	35.63	24.63	33.83	V
	8760	-44.3	-31.3	-13	-73.09	37.74	25.36	34.31	V
	10522.5	-41.84	-28.84	-13	-74.91	40	26.83	33.76	V
Remark	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								