



FCC RADIO TEST REPORT

FCC ID : 2AJOTTA1140
Equipment : Smart Phone
Brand Name : NOKIA
Model Name : TA1140, TA1141
Applicant : HMD Global Oy
Bertel Jungin aukio 9, 02600 Espoo, Finland
Manufacturer : HMD Global Oy
Bertel Jungin aukio 9, 02600 Espoo, Finland
Standard : 47 CFR Part 2, 22(H), 24(E), 27(L)

The product was received on Oct. 11, 2018 and testing was started from Oct. 20, 2018 and completed on Jan. 09, 2019. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-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.

Approved by: Joseph Lin

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
FG8O1133A	01	Initial issue of report	Jan. 21, 2019

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		
	§24.232 (c)	Equivalent Isotropic Radiated Power		
	§27.50 (d)(4)	Equivalent Isotropic Radiated Power		
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	Pass	-
3.5	§2.1051 §22.917 (a) §24.238 (a) §27.53 (g)	Band Edge Measurement	Pass	-
3.6	§2.1051 §22.917 (a) §24.238 (a) §27.53 (g)	Conducted Emission	Pass	-
3.7	§2.1055 §22.355	Frequency Stability Temperature & Voltage	Pass	-
	§2.1055 §24.235 §27.54			-
4.4	§2.1053 §22.917 (a) §24.238 (a) §27.53 (h)	Field Strength of Spurious Radiation	Pass	Under limit 23.30 dB at 1648.000 MHz

Reviewed by: Wii Chang

Report Producer: Polly Tsai

1 General Description

1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, FM Receiver, and GNSS

Product Specification subjective to this standard	
Sample 1	EUT with PCB 1 and Battery 1
Sample 2	EUT with PCB 2 and Battery 2
Antenna Type	WWAN: PIFA Antenna WLAN: Monopole Antenna Bluetooth: Monopole Antenna GPS/Glonass: PIFA Antenna FM: using earphone as antenna

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.
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

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

Test Site	SPORTON INTERNATIONAL INC.
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. 03CH13-HY

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 (X plane and Y plane) 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.

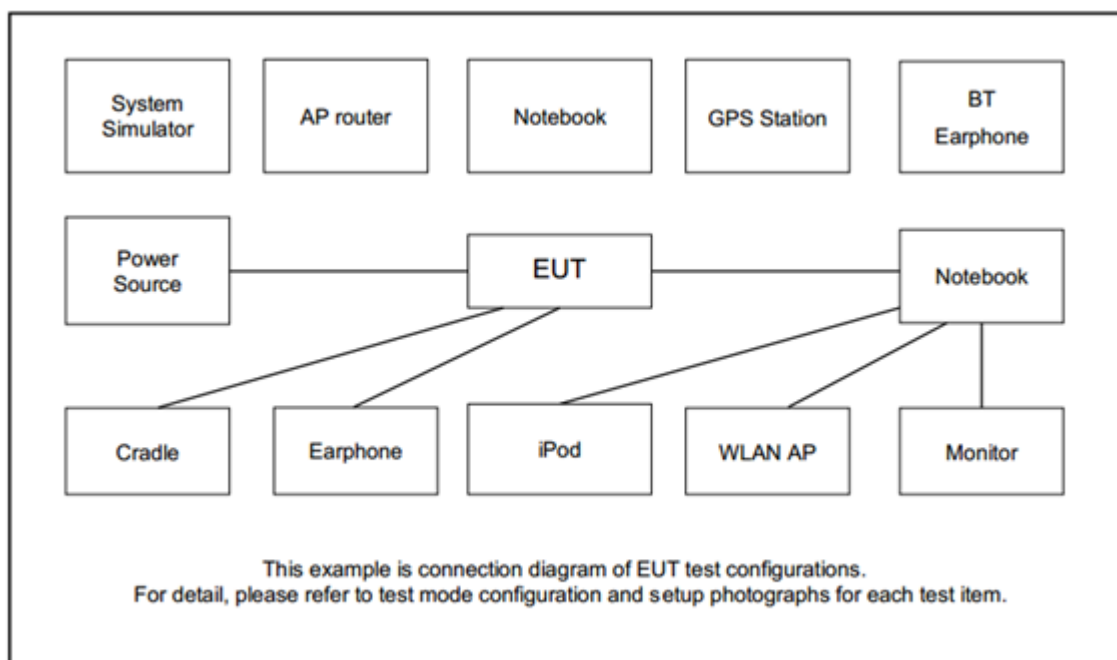
All modes and data rates and positions were investigated.

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

Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 850	■ GSM Link	■ GSM Link
	■ EDGE Class 8 Link	■ EDGE Class 8 Link
GSM 1900	■ GSM Link	■ GSM 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 Adapter 1 and Battery 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

2.4 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

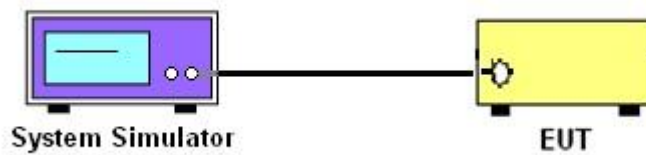
3 Conducted Test Result

3.1 Measuring Instruments

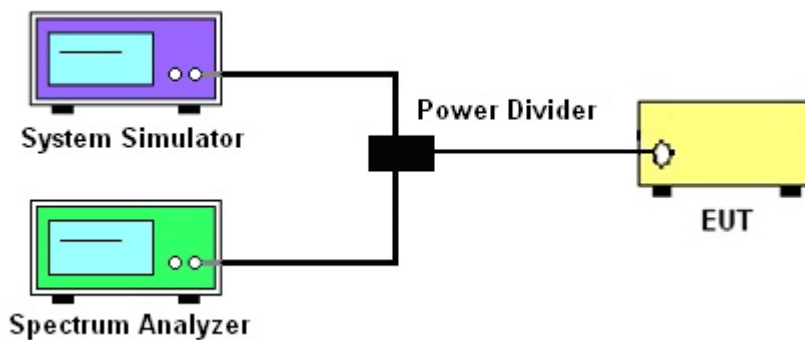
See list of measuring instruments of this test report.

3.1.1 Test Setup

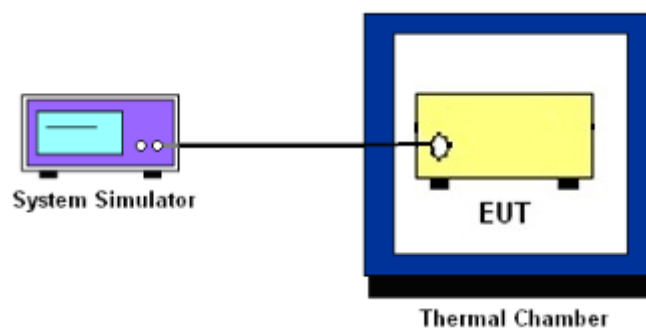
3.1.2 Conducted Output Power



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 FCC KDB 971168 D01 v03r01 Section 5.7.1

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. Set EUT to transmit at maximum output power.
3. When the duty cycle is less than 98%, then signal gating will be implemented on the spectrum analyzer by triggering from the system simulator.
4. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer.
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 FCC KDB 971168 D01 v03r01 Section 4.2

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 6.0.

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 6.0.

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.

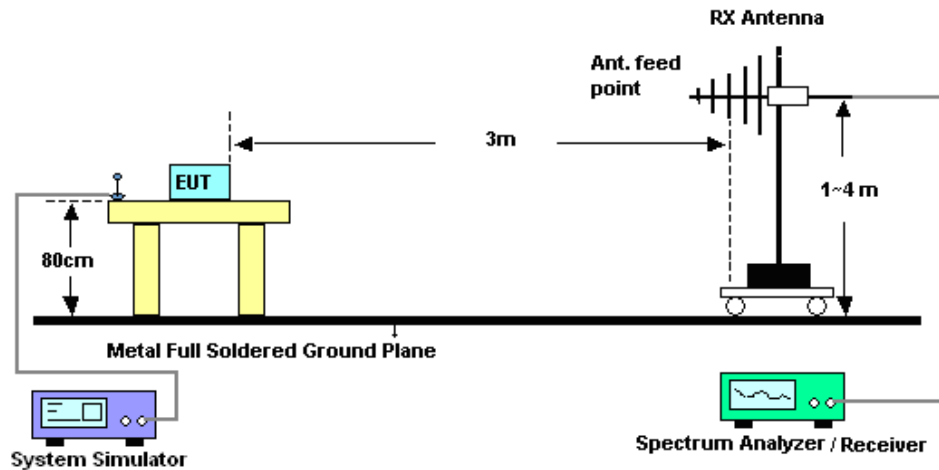
4 Radiated Test Items

4.1 Measuring Instruments

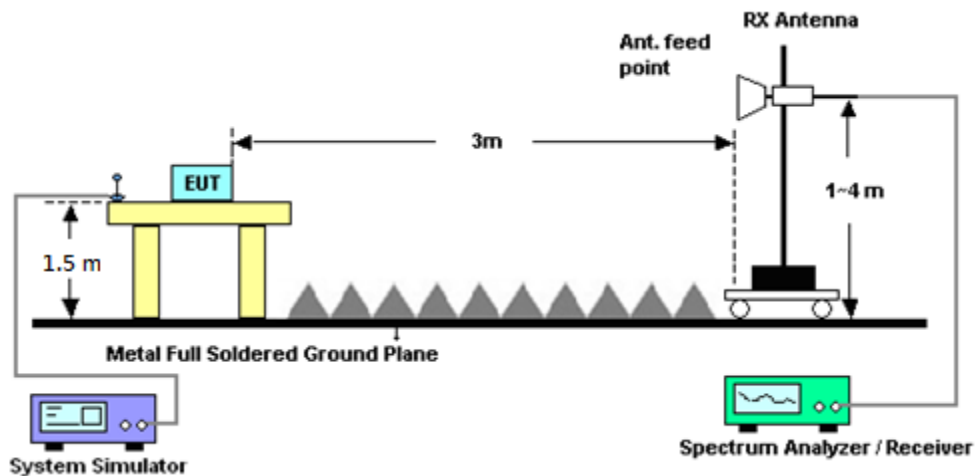
See list of measuring instruments of this test report.

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 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

The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI / TIA-603-E Section 2.2.12.

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. 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.
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. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. 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	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Jun. 29, 2018	Oct. 22, 2018~ Nov. 01, 2018	Jun. 28, 2019	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Dec. 06, 2017	Oct. 22, 2018~ Nov. 01, 2018	Dec. 05, 2019	Conducted (TH03-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL883644	Voltage:0~20V; Current:0~5A	Dec. 06, 2017	Oct. 22, 2018~ Nov. 01, 2018	Dec. 05, 2019	Conducted (TH03-HY)
Base Station (Measure)	Rohde & Schwarz	CMU200	117995	GSM / GPRS / WCDMA / CDMA	Aug. 10, 2018	Oct. 22, 2018~ Nov. 01, 2018	Aug. 09, 2019	Conducted (TH03-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2017	Oct. 20, 2018~ Oct. 22, 2018	Nov. 22, 2018	Radiation (03CH13-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2018	Jan. 08, 2019~ Jan. 09, 2019	Nov. 22, 2019	Radiation (03CH13-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 16, 2018	Oct. 20, 2018~ Jan. 09, 2019	Jul. 15, 2019	Radiation (03CH13-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Dec. 21, 2016	Oct. 20, 2018~ Oct. 22, 2018	Dec. 20, 2018	Radiation (03CH13-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Dec. 18, 2018	Jan. 08, 2019~ Jan. 09, 2019	Dec. 17, 2019	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D& 00800N1D01 N-06	40103&07	30MHz to 1GHz	Jan. 10, 2018	Oct. 20, 2018~ Oct. 22, 2018	Jan. 09, 2019	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D& N-6-06	35414&AT- N0602	30MHz to 1GHz	Oct. 13, 2018	Jan. 08, 2019~ Jan. 09, 2019	Oct. 12, 2019	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D- 1241	1GHz ~ 18GHz	Jun. 29, 2018	Oct. 20, 2018~ Jan. 09, 2019	Jun. 28, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WLK4-1000- 1530-8000- 40SS	SN1	1G Low pass Filter	Sep. 17, 2018	Oct. 20, 2018~ Jan. 09, 2019	Sep. 16, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-270 0-3000-18000 -60SS	SN2	3G High Pass	Sep. 17, 2018	Oct. 20, 2018~ Oct. 22, 2018	Sep. 16, 2019	Radiation (03CH13-HY)
Filter	Microwave	H3G018G1	SN477219	3.0G High Pass	Nov. 02, 2018	Jan. 08, 2019~ Jan. 09, 2019	Nov. 01, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-108 0-1200-15000 -60ST	SN3	1.2 GHz High pass	Jul. 05, 2018	Oct. 20, 2018~ Oct. 22, 2018	Jul. 04, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WLKS1200-8 SS	SN3	1.2G Low Pass	Nov. 02, 2018	Jan. 08, 2019~ Jan. 09, 2019	Nov. 01, 2019	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 251	18GHz- 40GHz	Nov. 10, 2017	Oct. 20, 2018~ Oct. 22, 2018	Nov. 09, 2018	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 584	18GHz- 40GHz	Nov. 20, 2018	Jan. 08, 2019~ Jan. 09, 2019	Nov. 19, 2019	Radiation (03CH13-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03	171000180 0054001	1GHz~18GHz	Apr. 16, 2018	Oct. 20, 2018~ Oct. 22, 2018	Apr. 15, 2019	Radiation (03CH13-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590074	1GHz~18GHz	May 21, 2018	Jan. 08, 2019~ Jan. 09, 2019	May 20, 2019	Radiation (03CH13-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Preamplifier	Keysight	83017A	MY532701 47	1GHz~26.5GHz	Feb. 02, 2018	Oct. 20, 2018~ Jan. 09, 2019	Feb. 01, 2019	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY553705 26	10Hz~44GHz	Mar. 15, 2018	Oct. 20, 2018~ Jan. 09, 2019	Mar. 14, 2019	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Oct. 20, 2018~ Jan. 09, 2019	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Oct. 20, 2018~ Jan. 09, 2019	N/A	Radiation (03CH13-HY)
Signal Generator	Anritsu	MG3694C	163401	0.1Hz~40GHz	Jan. 15, 2018	Oct. 20, 2018~ Jan. 09, 2019	Jan. 14, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30M-18G	Jan. 22, 2018	Oct. 20, 2018~ Jan. 09, 2019	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	335041/4	30M-18G	Jan. 22, 2018	Oct. 20, 2018~ Jan. 09, 2019	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24961/ 4	30M~18GHz	Jan. 22, 2018	Oct. 20, 2018~ Jan. 09, 2019	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30M~40GHz	Mar. 14, 2018	Oct. 20, 2018~ Jan. 09, 2019	Mar. 13, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30M~40GHz	Mar. 14, 2018	Jan. 08, 2019~ Jan. 09, 2019	Mar. 13, 2019	Radiation (03CH13-HY)
Software	AUDIX	E3 6.2009-8-24c	RK-001124	N/A	N/A	Oct. 20, 2018~ Jan. 09, 2019	N/A	Radiation (03CH13-HY)

6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.07
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.48
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.92
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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	32.58	32.34	32.45	29.29	29.56	29.66
GPRS class 8	32.34	32.39	32.53	29.34	29.59	29.60
GPRS class 10	31.77	31.86	32.13	29.18	29.48	29.50
EGPRS class 8	26.32	26.35	26.31	25.69	25.83	25.75
EGPRS class 10	25.04	25.08	25.16	24.58	24.73	24.68

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	23.94	23.86	23.87	23.98	24.12	24.02
HSDPA Subtest-1	23.32	23.30	23.36	23.13	23.22	23.05
HSDPA Subtest-2	23.42	23.28	23.35	23.09	23.21	23.15
HSDPA Subtest-3	23.42	23.27	23.35	23.06	23.20	23.14
HSDPA Subtest-4	23.41	23.27	23.34	23.14	23.19	23.12
HSUPA Subtest-1	22.18	22.59	22.16	22.26	22.36	22.62
HSUPA Subtest-2	21.57	21.35	21.80	21.94	21.83	21.99
HSUPA Subtest-3	21.60	21.49	21.54	21.53	21.72	21.91
HSUPA Subtest-4	21.90	22.32	22.38	22.06	22.28	22.14
HSUPA Subtest-5	22.70	22.80	22.80	22.90	23.10	23.00

Conducted Power (*Unit: dBm)			
Band	WCDMA Band IV		
Channel	1312	1413	1513
Frequency	1712.4	1732.6	1752.6
RMC 12.2K	24.20	24.13	24.21
HSDPA Subtest-1	23.29	23.32	23.31
HSDPA Subtest-2	23.29	23.31	23.29
HSDPA Subtest-3	23.29	23.31	23.39
HSDPA Subtest-4	23.28	23.31	23.38
HSUPA Subtest-1	22.98	23.02	22.60
HSUPA Subtest-2	21.62	21.93	21.83
HSUPA Subtest-3	21.75	21.77	21.84
HSUPA Subtest-4	22.32	22.03	22.40
HSUPA Subtest-5	23.10	23.10	23.10



A2. GSM

Peak-to-Average Ratio

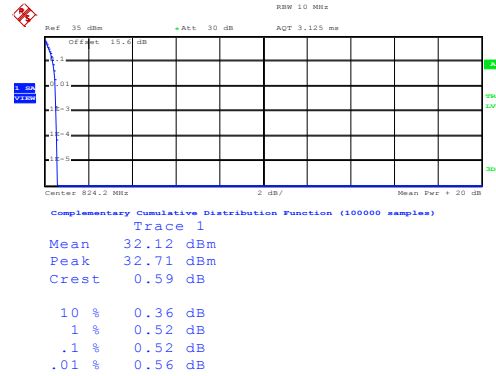
Mode	GSM850		Limit: 13dB
Mod.	GSM	EDGE class 8	Result
Lowest CH	0.52	3.48	PASS
Middle CH	0.56	3.8	
Highest CH	0.52	3.48	

Mode	GSM1900		Limit: 13dB
Mod.	GSM	EDGE class 8	Result
Lowest CH	0.48	3.44	PASS
Middle CH	0.44	3.52	
Highest CH	0.48	3.60	



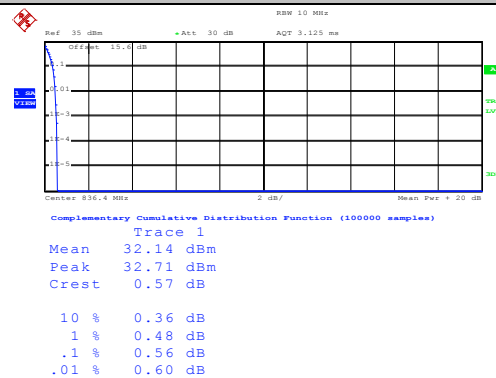
GSM850 (GSM)

Lowest Channel



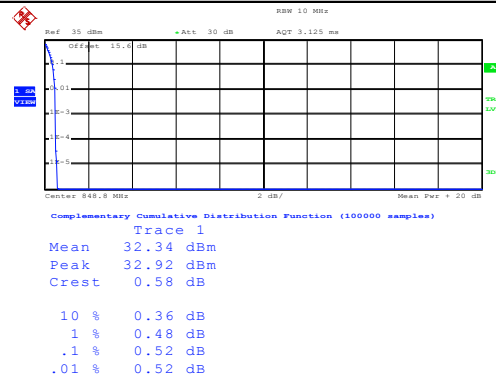
Date: 22.OCT.2018 10:26:42

Middle Channel



Date: 22.OCT.2018 10:27:00

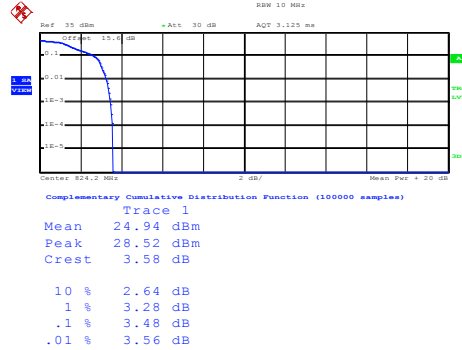
Highest Channel



Date: 22.OCT.2018 10:27:23

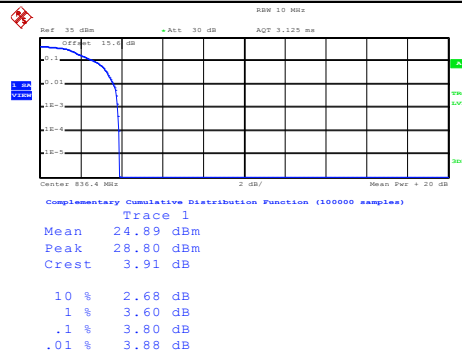
GSM850 (EDGE class 8)

Lowest Channel



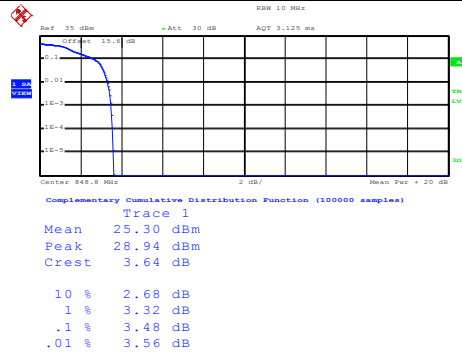
Date: 1.NOV.2018 20:47:04

Middle Channel



Date: 1.NOV.2018 20:47:17

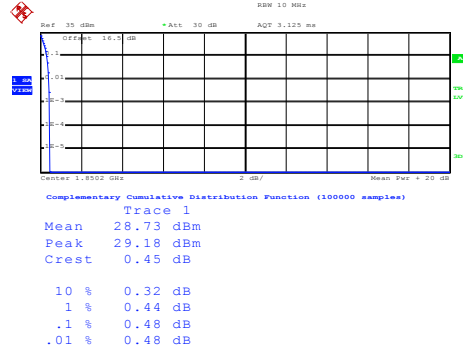
Highest Channel



Date: 1.NOV.2018 20:47:29

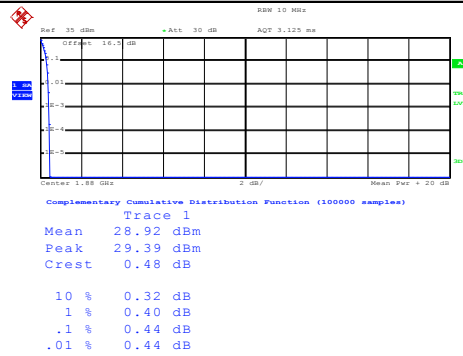
GSM1900 (GSM)

Lowest Channel



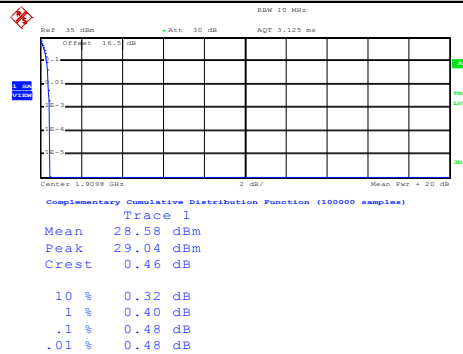
Date: 22.OCT.2018 10:11:52

Middle Channel



Date: 22.OCT.2018 10:12:03

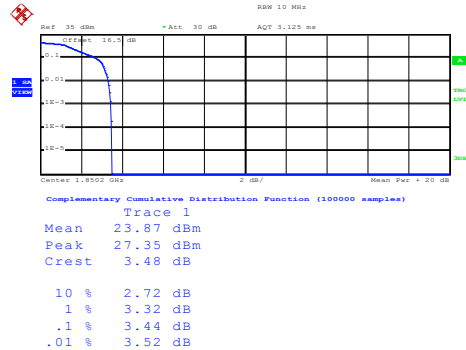
Highest Channel



Date: 22.OCT.2018 10:12:14

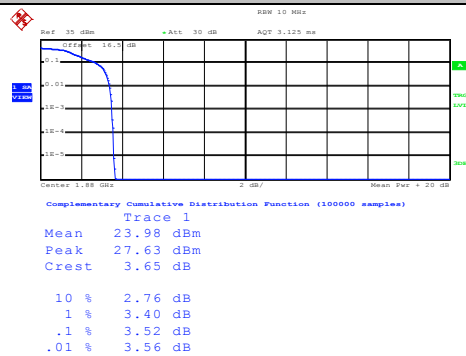
GSM1900 (EDGE class 8)

Lowest Channel



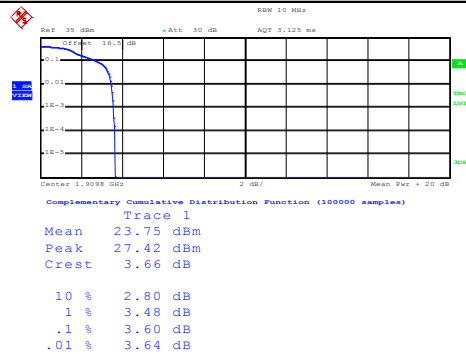
Date: 22.OCT.2018 11:04:52

Middle Channel



Date: 22.OCT.2018 11:05:10

Highest Channel



Date: 22.OCT.2018 11:05:29

**26dB Bandwidth**

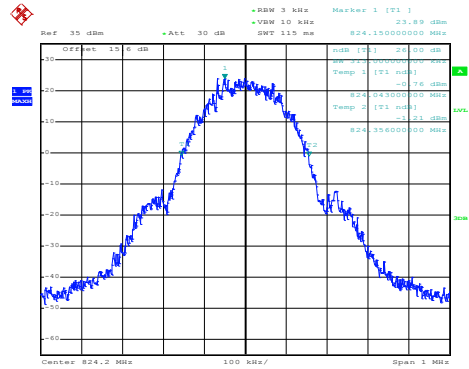
Mode	GSM850	
Mod.	GSM	EDGE class 8
Lowest CH	0.313	0.292
Middle CH	0.315	0.285
Highest CH	0.309	0.289

Mode	GSM1900	
Mod.	GSM	EDGE class 8
Lowest CH	0.305	0.298
Middle CH	0.297	0.302
Highest CH	0.310	0.302



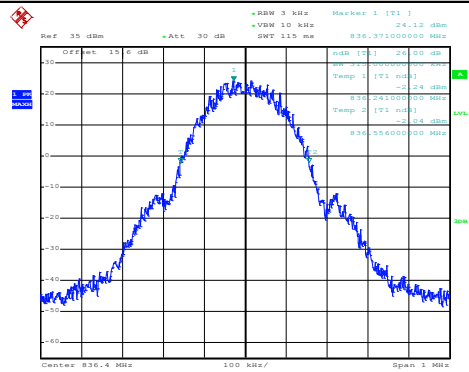
GSM850 (GSM)

Lowest Channel



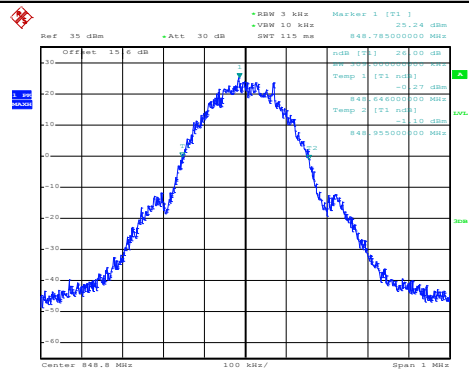
Date: 22.OCT.2018 10:16:01

Middle Channel

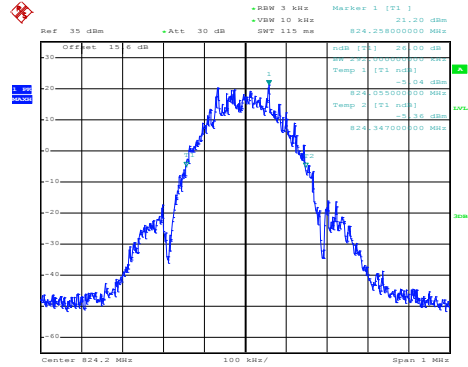


Date: 22.OCT.2018 10:16:36

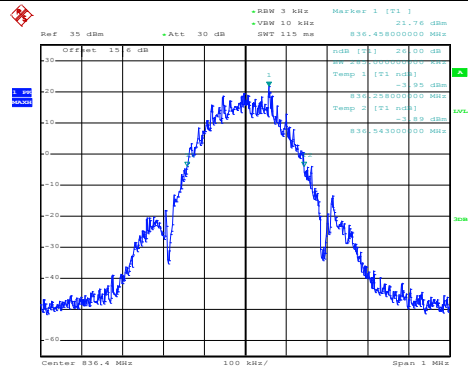
Highest Channel



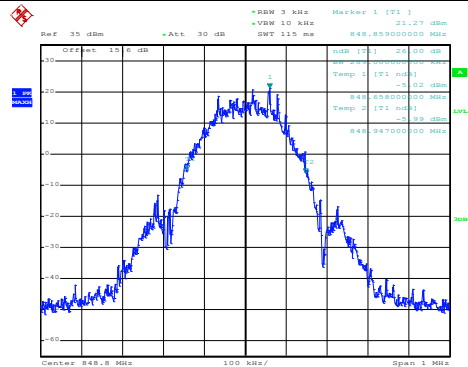
Date: 22.OCT.2018 10:17:08

GSM850 (EDGE class 8)
Lowest Channel


Date: 22.OCT.2018 11:08:25

Middle Channel


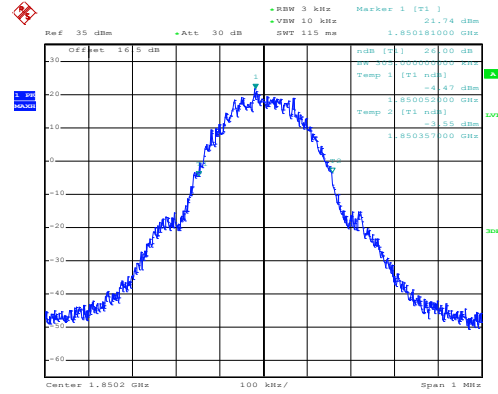
Date: 22.OCT.2018 11:08:58

Highest Channel


Date: 22.OCT.2018 11:09:30

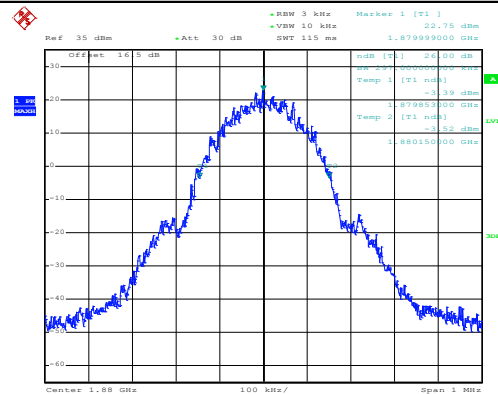
GSM1900 (GSM)

Lowest Channel



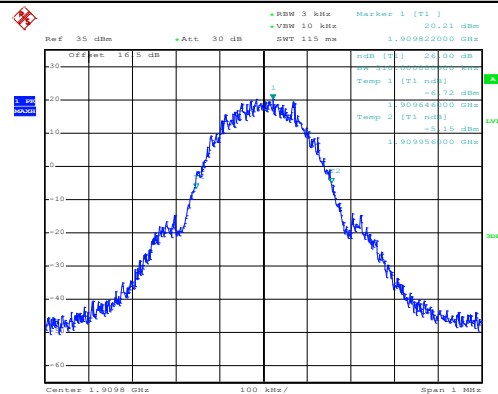
Date: 22.OCT.2018 10:00:18

Middle Channel



Date: 22.OCT.2018 10:00:51

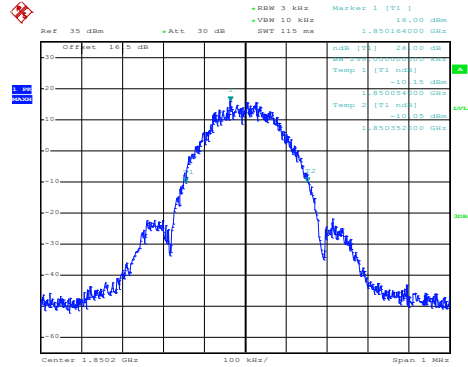
Highest Channel



Date: 22.OCT.2018 10:01:22

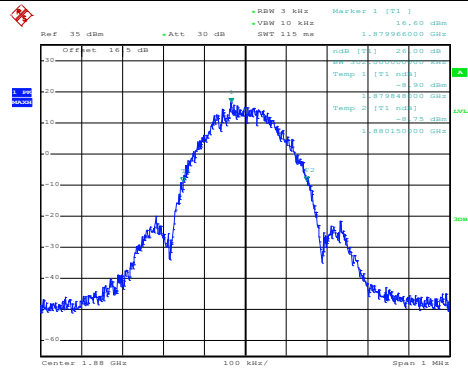
GSM1900 (EDGE class 8)

Lowest Channel



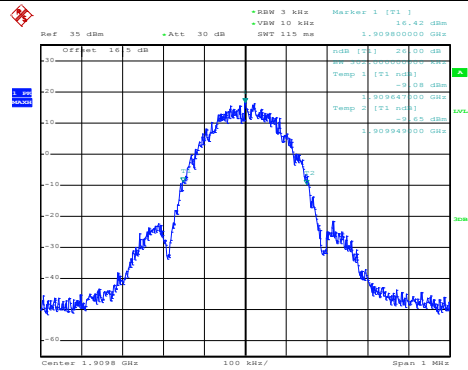
Date: 22.OCT.2018 10:50:46

Middle Channel



Date: 22.OCT.2018 10:51:50

Highest Channel



Date: 22.OCT.2018 10:52:23

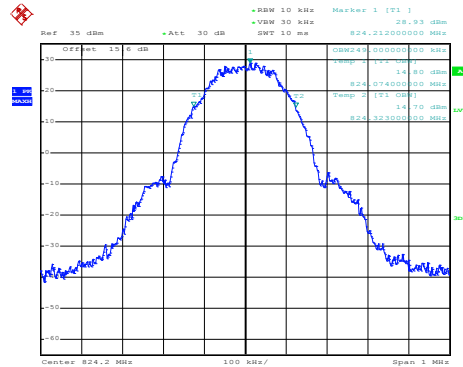
**Occupied Bandwidth**

Mode	GSM850	
Mod.	GSM	EDGE class 8
Lowest CH	0.249	0.250
Middle CH	0.246	0.235
Highest CH	0.240	0.243

Mode	GSM1900	
Mod.	GSM	EDGE class 8
Lowest CH	0.244	0.244
Middle CH	0.246	0.244
Highest CH	0.244	0.246

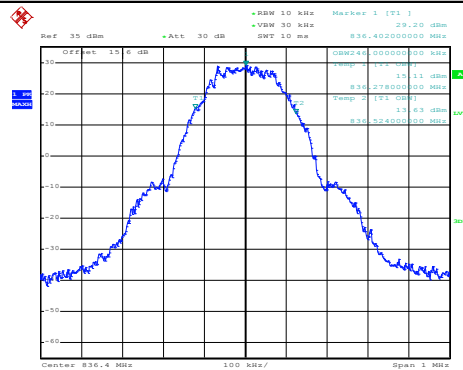
GSM850 (GSM)

Lowest Channel



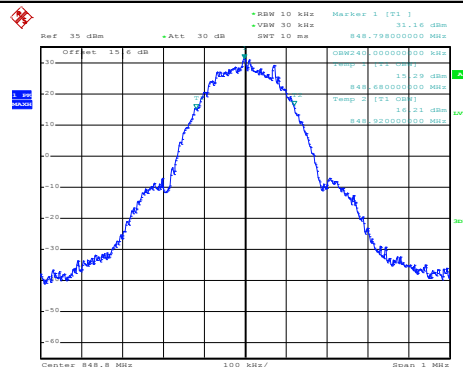
Date: 22.OCT.2018 10:18:09

Middle Channel



Date: 22.OCT.2018 10:18:49

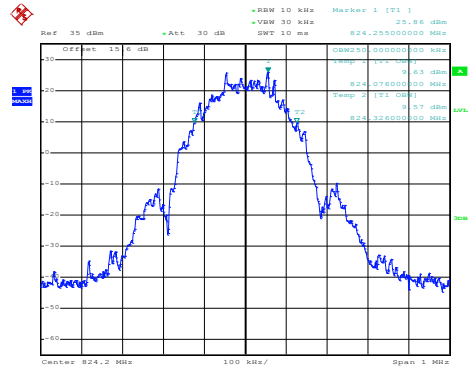
Highest Channel



Date: 22.OCT.2018 10:20:32

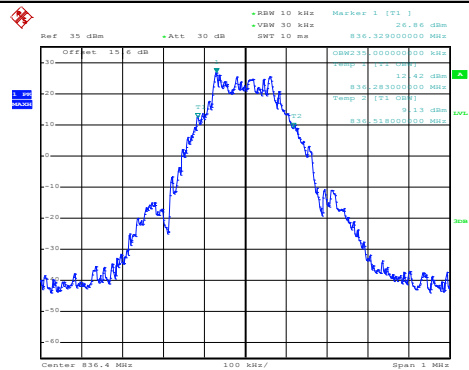
GSM850 (EDGE class 8)

Lowest Channel



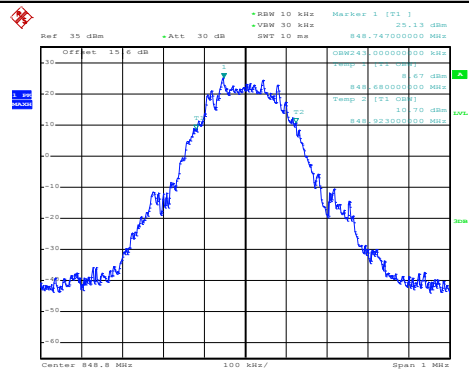
Date: 22.OCT.2018 11:10:10

Middle Channel



Date: 22.OCT.2018 11:10:46

Highest Channel

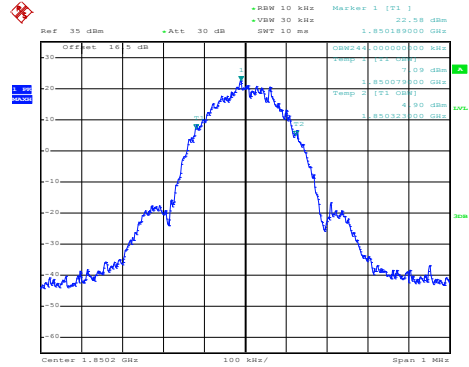


Date: 22.OCT.2018 11:12:59



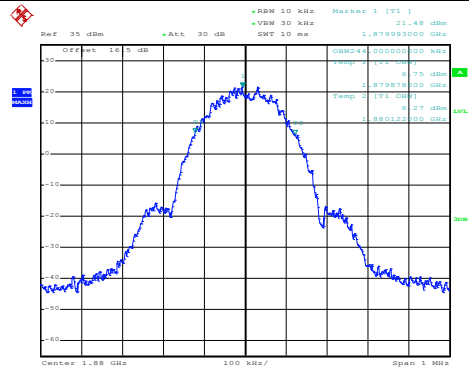
GSM1900 (EDGE class 8)

Lowest Channel



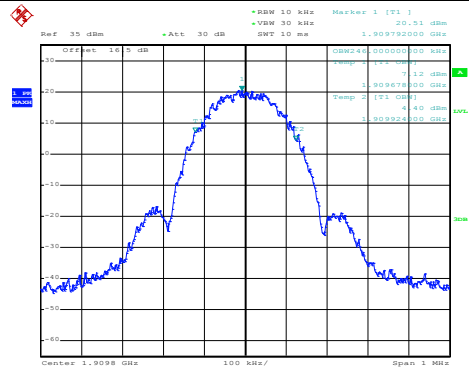
Date: 22.OCT.2018 10:53:00

Middle Channel



Date: 22.OCT.2018 10:53:37

Highest Channel



Date: 22.OCT.2018 10:57:21

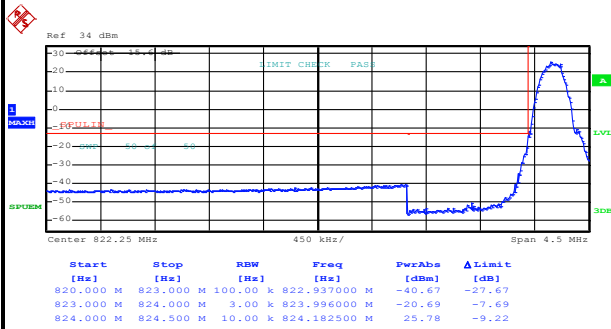


Conducted Band Edge



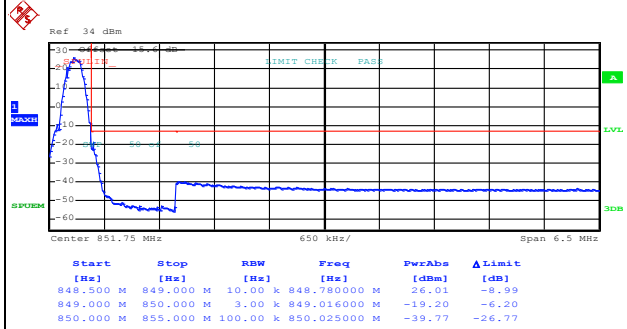
GSM850 (GSM)

Lowest Band Edge



Date: 22.OCT.2018 10:23:28

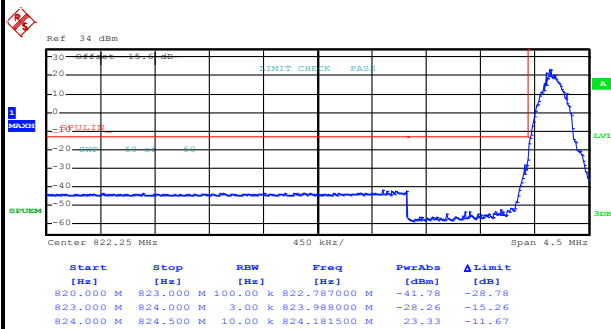
Highest Band Edge



Date: 22.OCT.2018 10:26:00

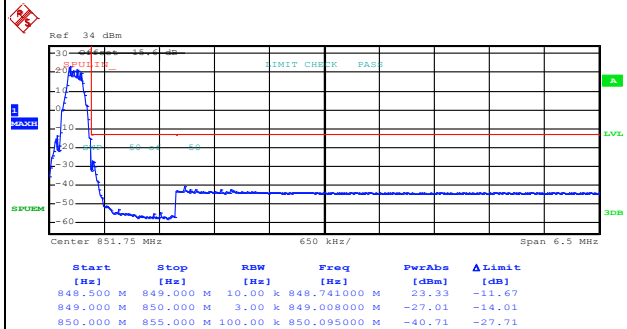
GSM850 (EDGE class 8)

Lowest Band Edge



Date: 22.OCT.2018 11:15:11

Highest Band Edge

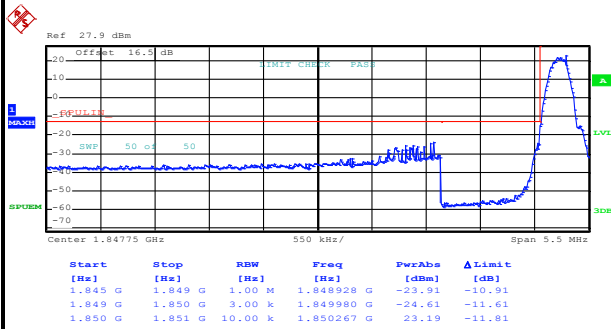


Date: 22.OCT.2018 11:16:44



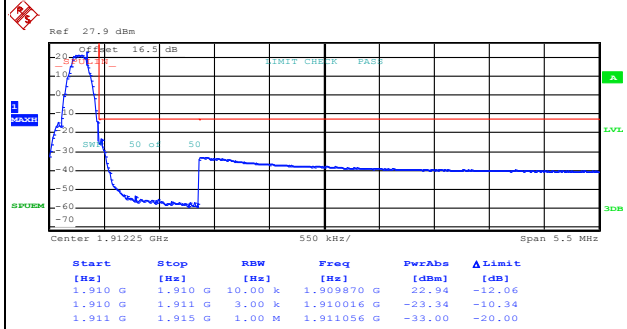
GSM1900 (GSM)

Lowest Band Edge



Date: 22.OCT.2018 10:03:06

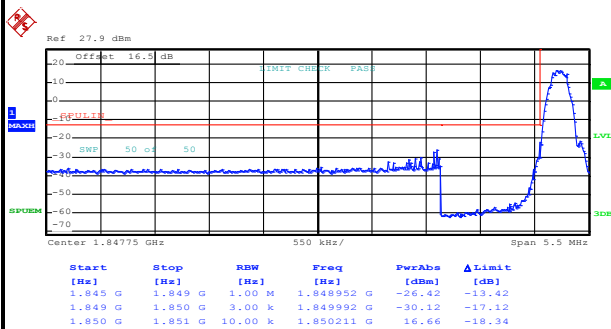
Highest Band Edge



Date: 22.OCT.2018 10:06:02

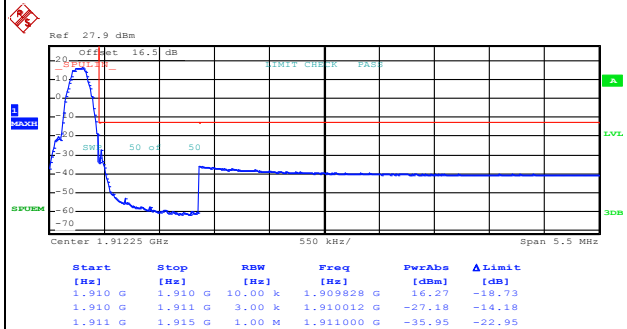
GSM1900 (EDGE class 8)

Lowest Band Edge



Date: 22.OCT.2018 10:58:57

Highest Band Edge



Date: 22.OCT.2018 11:00:40

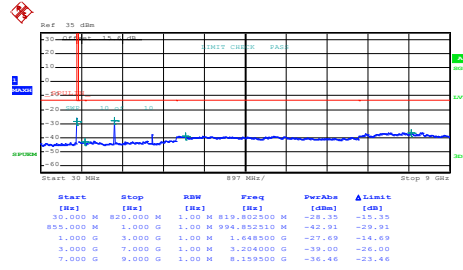


Conducted Spurious Emission



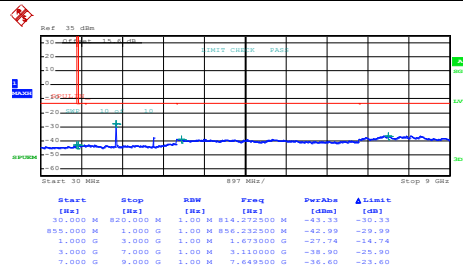
GSM850 (GSM)

Lowest Channel



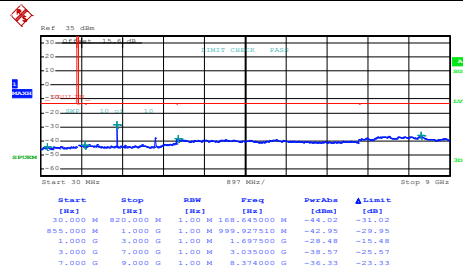
Date: 22.OCT.2018 10:39:42

Middle Channel



Date: 22.OCT.2018 10:40:31

Highest Channel

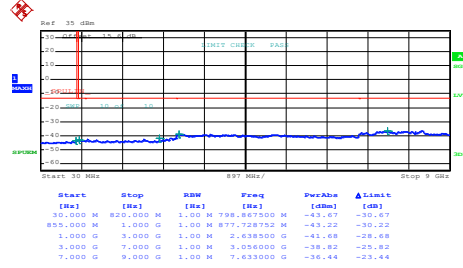


Date: 22.OCT.2018 10:41:17



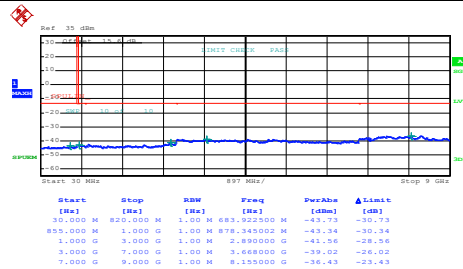
GSM850 (EDGE class 8)

Lowest Channel



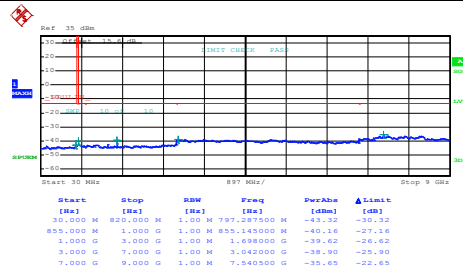
Date: 22.OCT.2018 11:17:38

Middle Channel



Date: 22.OCT.2018 11:18:32

Highest Channel

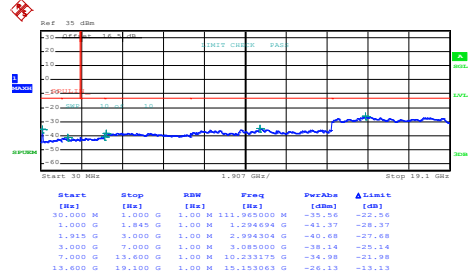


Date: 22.OCT.2018 11:19:18



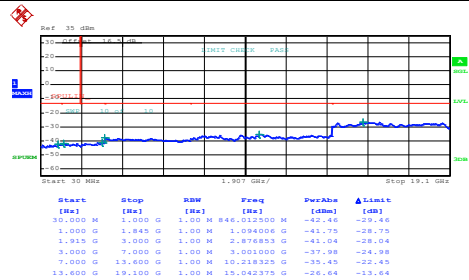
GSM1900 (GSM)

Lowest Channel



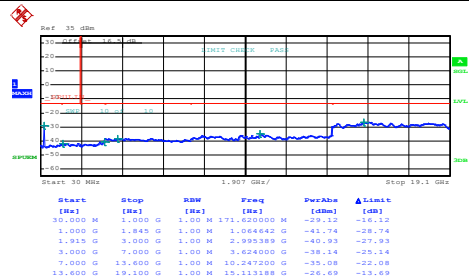
Date: 22.OCT.2018 10:08:49

Middle Channel



Date: 22.OCT.2018 10:10:09

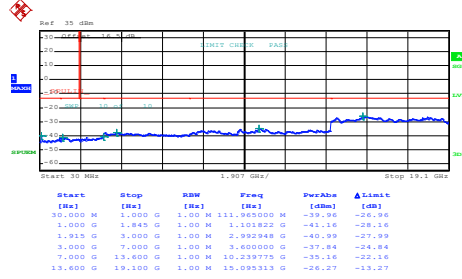
Highest Channel



Date: 22.OCT.2018 10:11:15

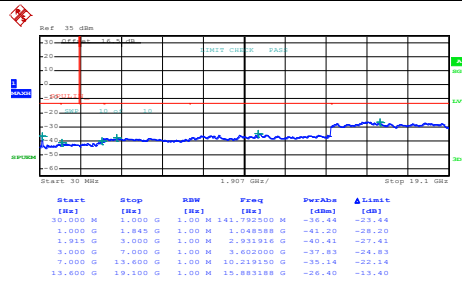
GSM1900 (EDGE class 8)

Lowest Channel



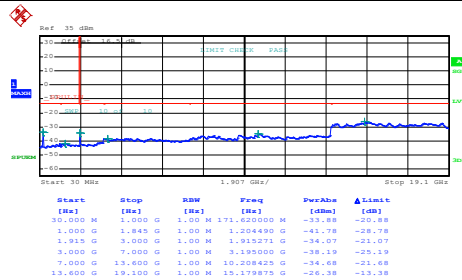
Date: 22.OCT.2018 11:01:36

Middle Channel



Date: 22.OCT.2018 11:03:37

Highest Channel



Date: 22.OCT.2018 11:04:28

Frequency Stability

Test Conditions	Middle Channel	GSM850 (GSM)	GSM850 (EDGE class 8)	Limit 2.5ppm
Temperature (°C)	Voltage (Volt)	Deviation (ppm)		Result
50	Normal Voltage	0.0084	0.0036	PASS
40	Normal Voltage	0.0000	0.0012	
30	Normal Voltage	0.0060	0.0012	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0012	0.0072	
0	Normal Voltage	0.0012	0.0096	
-10	Normal Voltage	0.0203	0.0287	
-20	Normal Voltage	0.0036	0.0096	
-30	Normal Voltage	0.0215	0.0287	
20	Maximum Voltage	0.0048	0.0072	
20	Normal Voltage	0.0000	0.0000	
20	Battery End Point	0.0167	0.0060	

Test Conditions	Middle Channel	GSM1900 (GSM)	GSM1900 (EDGE class 8)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)		Result
50	Normal Voltage	0.0016	0.0011	PASS
40	Normal Voltage	0.0021	0.0027	
30	Normal Voltage	0.0005	0.0011	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0027	0.0016	
0	Normal Voltage	0.0021	0.0021	
-10	Normal Voltage	0.0032	0.0154	
-20	Normal Voltage	0.0053	0.0250	
-30	Normal Voltage	0.0053	0.0255	
20	Maximum Voltage	0.0005	0.0160	
20	Normal Voltage	0.0000	0.0000	
20	Battery End Point	0.0032	0.0005	

Note:

1. Normal Voltage = 3.8V. ; Battery End Point (BEP) = 3.5 V. ; Maximum Voltage =4.2 V
2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

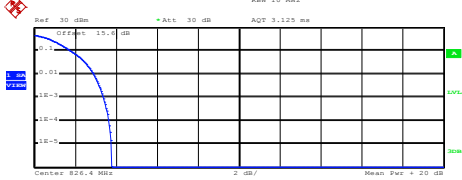
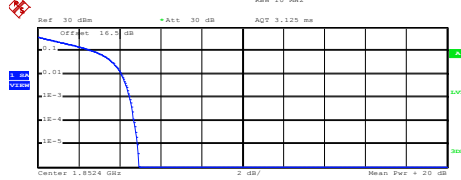
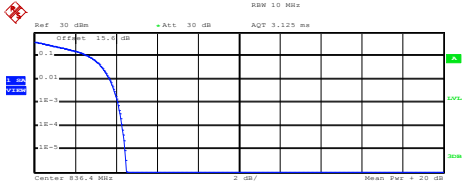
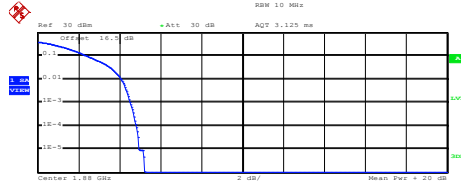
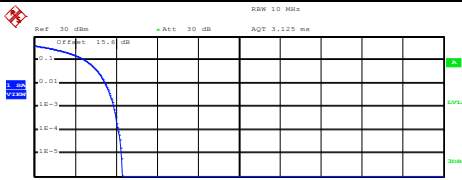
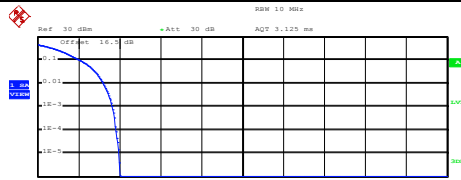


A3. WCDMA

Peak-to-Average Ratio

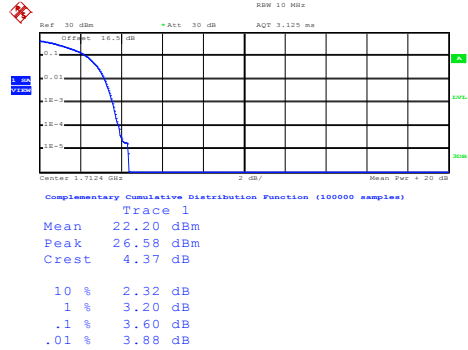
Mode	WCDMA Band V	WCDMA Band II	WCDMA Band IV	Limit: 13dB
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	3.40	4.52	3.60	PASS
Middle CH	4.08	4.52	4.12	
Highest CH	3.88	3.64	4.40	



WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)																
Lowest Channel	Lowest Channel																
 <p>Ref: 30 dBm, Att: 30 dB, AQT: 3.125 ms, RSW: 10 MHz Center: 826.4 MHz, 2 dB/</p> <p>Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 22.44 dBm Peak: 26.23 dBm Crest: 3.79 dB</p> <table><tr><td>10 %</td><td>1.80 dB</td></tr><tr><td>1 %</td><td>2.92 dB</td></tr><tr><td>.1 %</td><td>3.40 dB</td></tr><tr><td>.01 %</td><td>3.64 dB</td></tr></table> <p>Date: 22.OCT.2018 13:34:45</p>	10 %	1.80 dB	1 %	2.92 dB	.1 %	3.40 dB	.01 %	3.64 dB	 <p>Ref: 30 dBm, Att: 30 dB, AQT: 3.125 ms, RSW: 10 MHz Center: 1.8524 GHz, 2 dB/</p> <p>Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 21.50 dBm Peak: 26.44 dBm Crest: 4.94 dB</p> <table><tr><td>10 %</td><td>2.76 dB</td></tr><tr><td>1 %</td><td>4.08 dB</td></tr><tr><td>.1 %</td><td>4.52 dB</td></tr><tr><td>.01 %</td><td>4.72 dB</td></tr></table> <p>Date: 22.OCT.2018 11:31:08</p>	10 %	2.76 dB	1 %	4.08 dB	.1 %	4.52 dB	.01 %	4.72 dB
10 %	1.80 dB																
1 %	2.92 dB																
.1 %	3.40 dB																
.01 %	3.64 dB																
10 %	2.76 dB																
1 %	4.08 dB																
.1 %	4.52 dB																
.01 %	4.72 dB																
Middle Channel	Middle Channel																
 <p>Ref: 30 dBm, Att: 30 dB, AQT: 3.125 ms, RSW: 10 MHz Center: 830.4 MHz, 2 dB/</p> <p>Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 22.22 dBm Peak: 26.72 dBm Crest: 4.50 dB</p> <table><tr><td>10 %</td><td>2.68 dB</td></tr><tr><td>1 %</td><td>3.68 dB</td></tr><tr><td>.1 %</td><td>4.08 dB</td></tr><tr><td>.01 %</td><td>4.28 dB</td></tr></table> <p>Date: 22.OCT.2018 13:34:55</p>	10 %	2.68 dB	1 %	3.68 dB	.1 %	4.08 dB	.01 %	4.28 dB	 <p>Ref: 30 dBm, Att: 30 dB, AQT: 3.125 ms, RSW: 10 MHz Center: 1.85 GHz, 2 dB/</p> <p>Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 21.99 dBm Peak: 27.21 dBm Crest: 5.22 dB</p> <table><tr><td>10 %</td><td>2.48 dB</td></tr><tr><td>1 %</td><td>4.08 dB</td></tr><tr><td>.1 %</td><td>4.52 dB</td></tr><tr><td>.01 %</td><td>4.84 dB</td></tr></table> <p>Date: 22.OCT.2018 11:31:21</p>	10 %	2.48 dB	1 %	4.08 dB	.1 %	4.52 dB	.01 %	4.84 dB
10 %	2.68 dB																
1 %	3.68 dB																
.1 %	4.08 dB																
.01 %	4.28 dB																
10 %	2.48 dB																
1 %	4.08 dB																
.1 %	4.52 dB																
.01 %	4.84 dB																
Highest Channel	Highest Channel																
 <p>Ref: 30 dBm, Att: 30 dB, AQT: 3.125 ms, RSW: 10 MHz Center: 846.6 MHz, 2 dB/</p> <p>Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 22.55 dBm Peak: 26.86 dBm Crest: 4.31 dB</p> <table><tr><td>10 %</td><td>2.48 dB</td></tr><tr><td>1 %</td><td>3.48 dB</td></tr><tr><td>.1 %</td><td>3.88 dB</td></tr><tr><td>.01 %</td><td>4.12 dB</td></tr></table> <p>Date: 22.OCT.2018 13:35:04</p>	10 %	2.48 dB	1 %	3.48 dB	.1 %	3.88 dB	.01 %	4.12 dB	 <p>Ref: 30 dBm, Att: 30 dB, AQT: 3.125 ms, RSW: 10 MHz Center: 1.9076 GHz, 2 dB/</p> <p>Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean: 22.15 dBm Peak: 26.16 dBm Crest: 4.01 dB</p> <table><tr><td>10 %</td><td>2.08 dB</td></tr><tr><td>1 %</td><td>3.20 dB</td></tr><tr><td>.1 %</td><td>3.64 dB</td></tr><tr><td>.01 %</td><td>3.84 dB</td></tr></table> <p>Date: 22.OCT.2018 11:31:34</p>	10 %	2.08 dB	1 %	3.20 dB	.1 %	3.64 dB	.01 %	3.84 dB
10 %	2.48 dB																
1 %	3.48 dB																
.1 %	3.88 dB																
.01 %	4.12 dB																
10 %	2.08 dB																
1 %	3.20 dB																
.1 %	3.64 dB																
.01 %	3.84 dB																

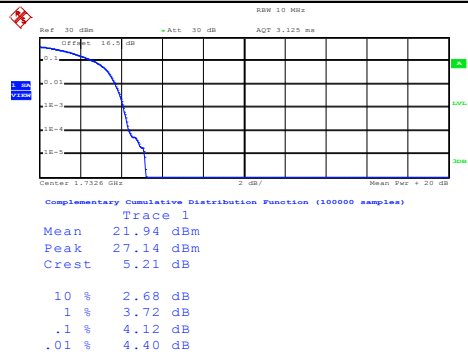
WCDMA Band IV (RMC 12.2Kbps)

Lowest Channel



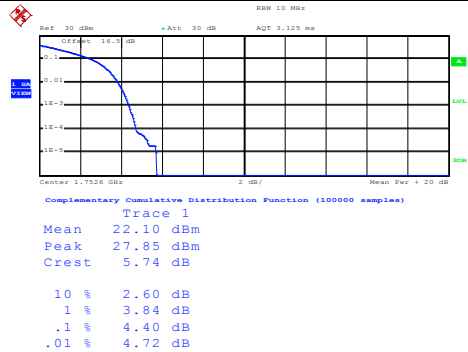
Date: 22.OCT.2018 11:47:37

Middle Channel



Date: 22.OCT.2018 11:47:51

Highest Channel



Date: 22.OCT.2018 11:48:03

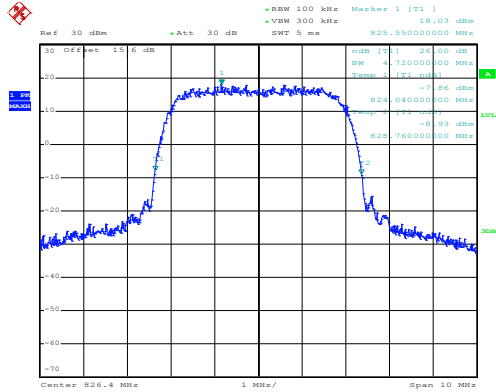
**26dB Bandwidth**

Mode	WCDMA Band V	WCDMA Band II	WCDMA Band IV
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.72	4.72	4.69
Middle CH	4.69	4.74	4.70
Highest CH	4.69	4.70	4.73



WCDMA Band V (RMC 12.2Kbps)

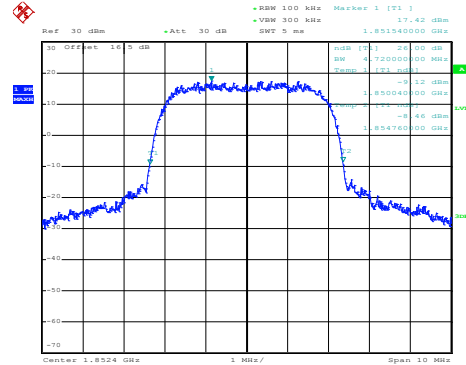
Lowest Channel



Date: 22.OCT.2018 11:55:39

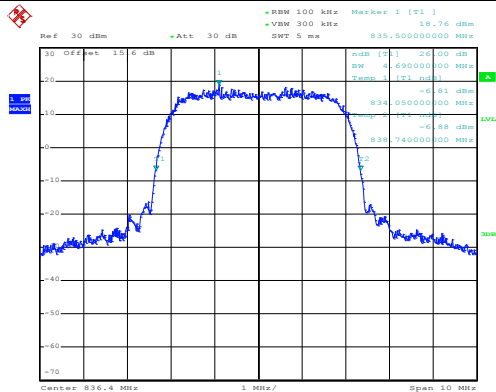
WCDMA Band II (RMC 12.2Kbps)

Lowest Channel



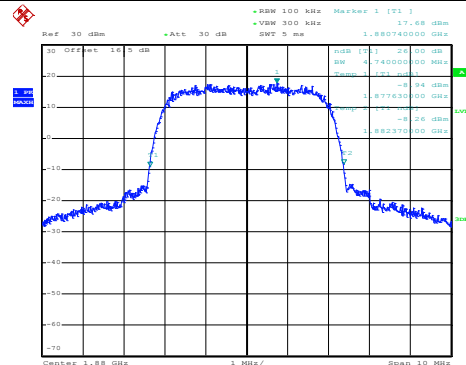
Date: 22.OCT.2018 11:24:54

Middle Channel



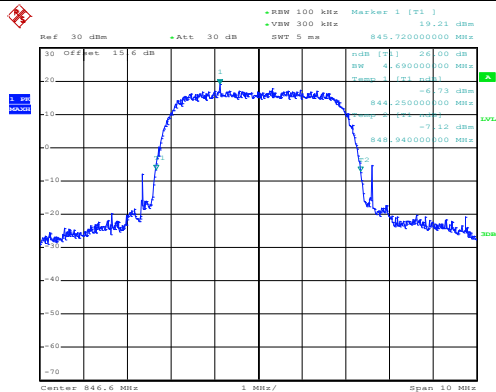
Date: 22.OCT.2018 13:29:22

Middle Channel



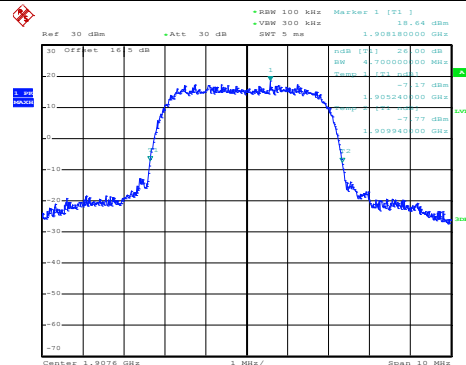
Date: 22.OCT.2018 11:25:31

Highest Channel



Date: 22.OCT.2018 13:29:57

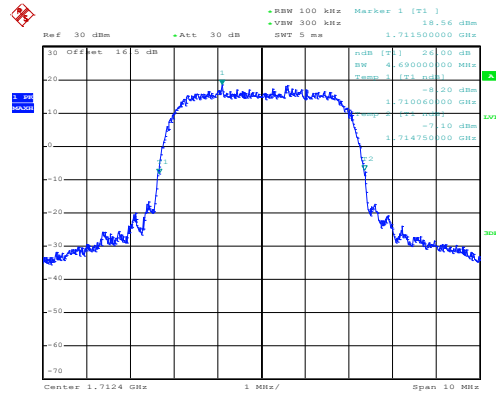
Highest Channel



Date: 22.OCT.2018 11:26:09

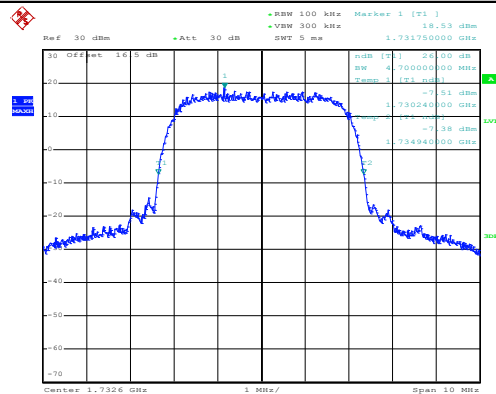
WCDMA Band IV (RMC 12.2Kbps)

Lowest Channel



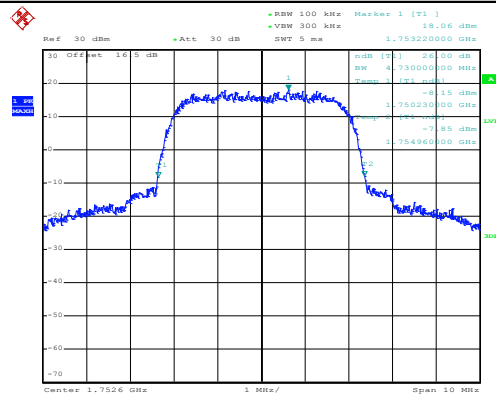
Date: 22.OCT.2018 11:41:07

Middle Channel



Date: 22.OCT.2018 11:41:47

Highest Channel



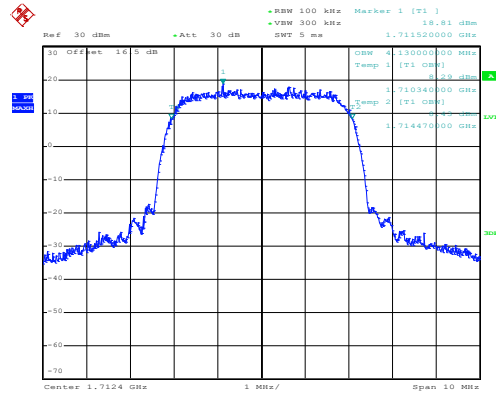
Date: 22.OCT.2018 11:42:22

**Occupied Bandwidth**

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

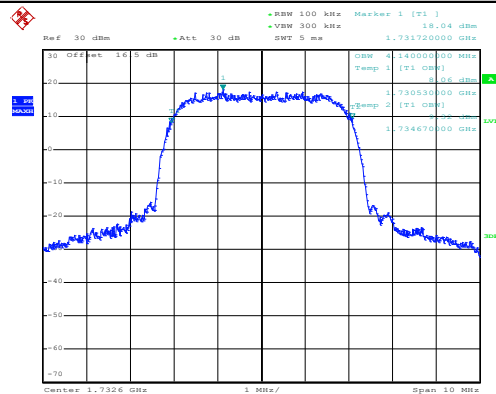
WCDMA Band IV (RMC 12.2Kbps)

Lowest Channel



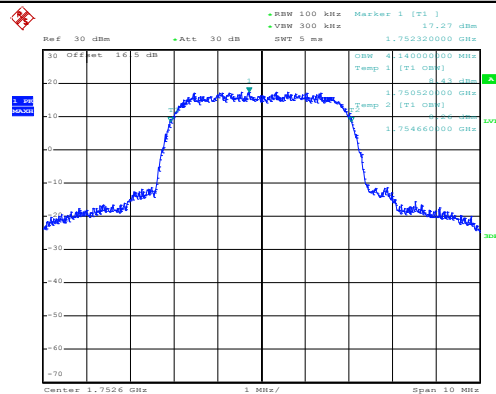
Date: 22.OCT.2018 11:42:58

Middle Channel



Date: 22.OCT.2018 11:43:29

Highest Channel



Date: 22.OCT.2018 11:44:02

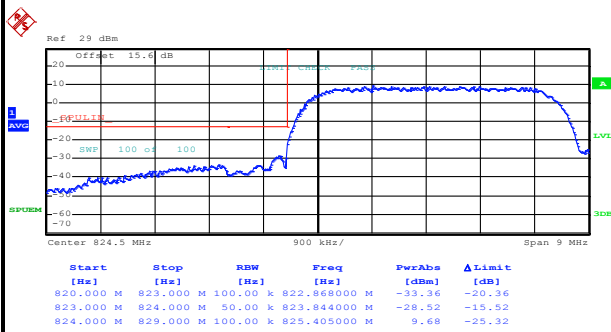


Conducted Band Edge



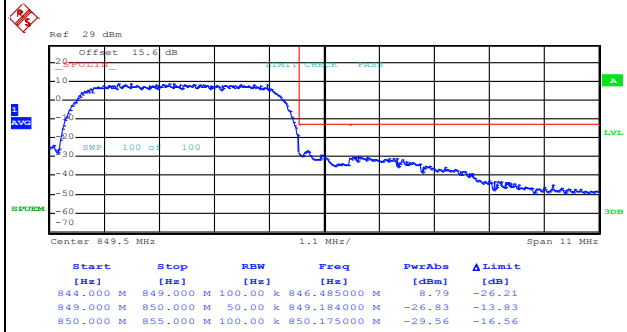
WCDMA Band V (RMC 12.2Kbps)

Lowest Band Edge



Date: 22.OCT.2018 13:37:57

Highest Band Edge

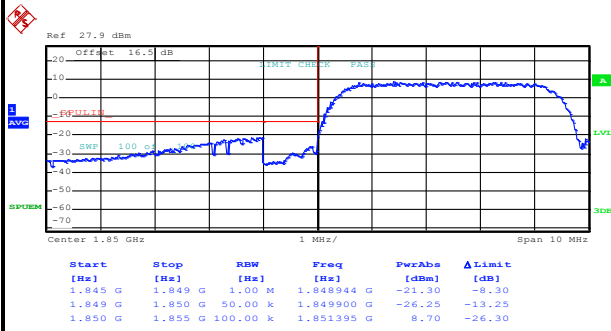


Date: 22.OCT.2018 13:40:50



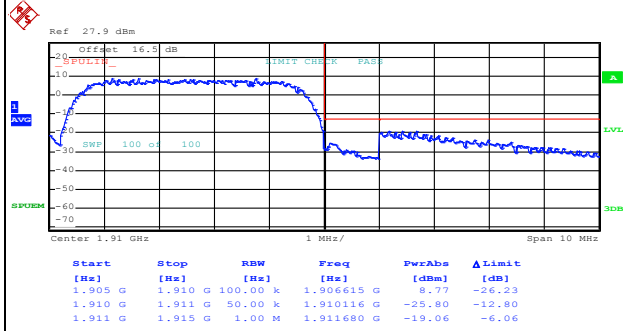
WCDMA Band II (RMC 12.2Kbps)

Lowest Band Edge



Date: 22.OCT.2018 11:34:27

Highest Band Edge

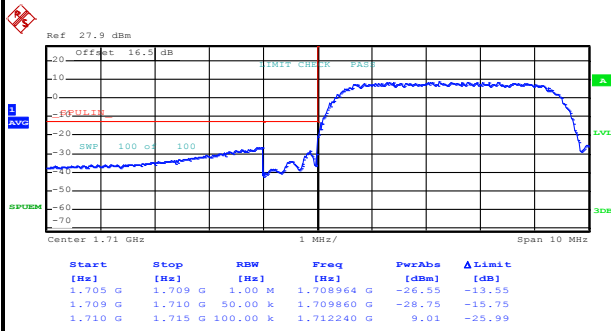


Date: 22.OCT.2018 11:39:36



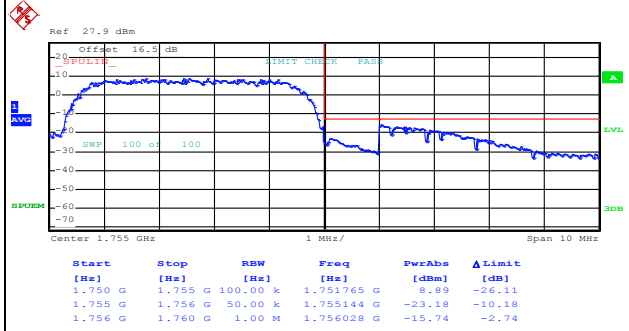
WCDMA Band IV (RMC 12.2Kbps)

Lowest Band Edge



Date: 22.OCT.2018 11:51:16

Highest Band Edge



Date: 22.OCT.2018 11:54:03

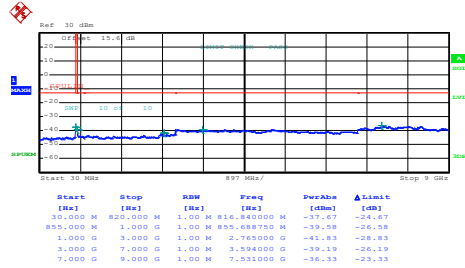


Conducted Spurious Emission



WCDMA Band V (RMC 12.2Kbps)

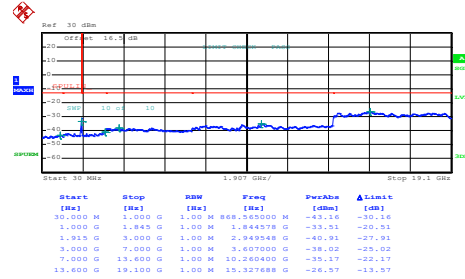
Lowest Channel



Date: 22.OCT.2018 13:32:51

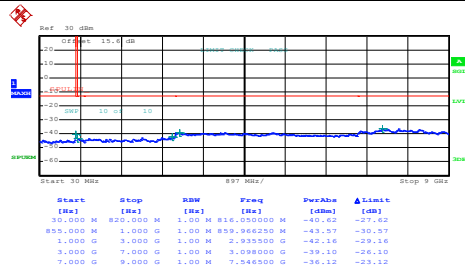
WCDMA Band II (RMC 12.2Kbps)

Lowest Channel



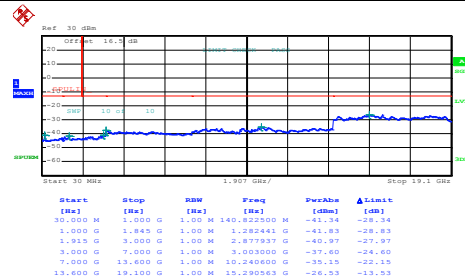
Date: 22.OCT.2018 11:28:56

Middle Channel



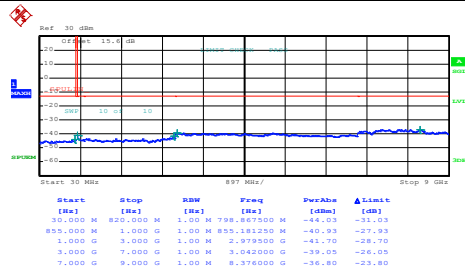
Date: 22.OCT.2018 13:33:42

Middle Channel



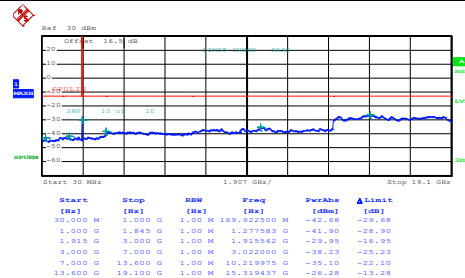
Date: 22.OCT.2018 11:29:48

Highest Channel



Date: 22.OCT.2018 13:34:34

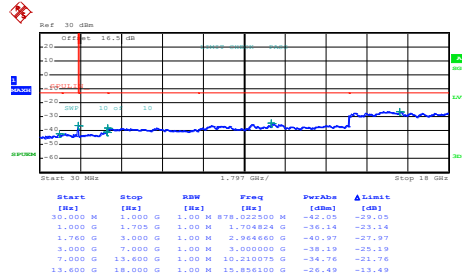
Highest Channel



Date: 22.OCT.2018 11:30:39

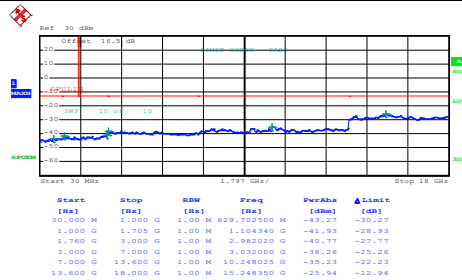
WCDMA Band IV (RMC 12.2Kbps)

Lowest Channel



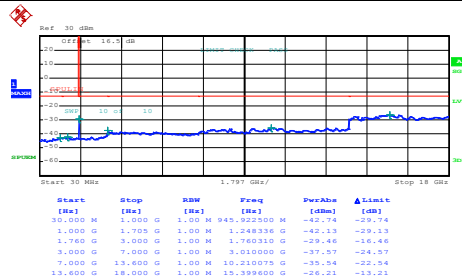
Date: 22.OCT.2018 11:44:56

Middle Channel



Date: 22.OCT.2018 11:45:49

Highest Channel



Date: 22.OCT.2018 11:46:43

**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	0.0132	PASS
40	Normal Voltage	0.0120	
30	Normal Voltage	0.0000	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0000	
0	Normal Voltage	0.0024	
-10	Normal Voltage	0.0036	
-20	Normal Voltage	0.0036	
-30	Normal Voltage	0.0036	
20	Maximum Voltage	0.0024	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0072	

Test Conditions	Middle Channel	WCDMA Band II (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0011	PASS
40	Normal Voltage	0.0011	
30	Normal Voltage	0.0000	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0016	
0	Normal Voltage	0.0000	
-10	Normal Voltage	0.0032	
-20	Normal Voltage	0.0021	
-30	Normal Voltage	0.0027	
20	Maximum Voltage	0.0011	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0011	



Test Conditions	Middle Channel	WCDMA Band IV (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0104	PASS
40	Normal Voltage	0.0087	
30	Normal Voltage	0.0087	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0000	
0	Normal Voltage	0.0006	
-10	Normal Voltage	0.0023	
-20	Normal Voltage	0.0081	
-30	Normal Voltage	0.0115	
20	Maximum Voltage	0.0040	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0035	

Note:

1. Normal Voltage = 3.8V. ; Battery End Point (BEP) = 3.5 V. ; Maximum Voltage =4.2 V
2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

**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	32.58	1.8113	27.85	0.6095
Middle	GSM	32.34	1.7140	27.61	0.5768
Highest	GT - LC = -2.58 dB	32.45	1.7579	27.72	0.5916
Lowest	GSM850	26.32	0.4285	21.59	0.1442
Middle	EDGE class 8	26.35	0.4315	21.62	0.1452
Highest	GT - LC = -2.58 dB	26.31	0.4276	21.58	0.1439
Lowest	WCDMA Band V	23.94	0.2477	19.21	0.0834
Middle	RMC 12.2Kbps	23.86	0.2432	19.13	0.0818
Highest	GT - LC = -2.58 dB	23.87	0.2438	19.14	0.0820
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Conducted		EIRP	
		Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	GSM1900	29.29	0.8492	31.48	1.4060
Middle	GSM	29.56	0.9036	31.75	1.4962
Highest	(GT - LC = 2.19 dB)	29.66	0.9247	31.85	1.5311
Lowest	GSM1900	25.69	0.3707	27.88	0.6138
Middle	EDGE class 8	25.83	0.3828	28.02	0.6339
Highest	(GT - LC = 2.19 dB)	25.75	0.3758	27.94	0.6223
Lowest	WCDMA Band II	23.98	0.2500	26.17	0.4140
Middle	RMC 12.2Kbps	24.12	0.2582	26.31	0.4276
Highest	(GT - LC = 2.19 dB)	24.02	0.2523	26.21	0.4178
Limit	EIRP < 2W	Result		PASS	

Channel	Mode	Conducted		EIRP	
		Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	WCDMA Band IV	24.20	0.2630	25.81	0.3811
Middle	RMC 12.2Kbps	24.13	0.2588	25.74	0.3750
Highest	(GT - LC = 1.61 dB)	24.21	0.2636	25.82	0.3819
Limit	EIRP < 1W	Result		PASS	

**Radiated Spurious Emission**

<Sample 1>

Part22H GSM 850

GSM 850									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1648	-36.30	-13	-23.30	-48.82	-41.69	1.23	8.76	H
	2472	-46.81	-13	-33.81	-62.14	-53.70	1.44	10.48	H
	3296	-58.65	-13	-45.65	-75.72	-66.59	1.70	11.79	H
									H
									H
									H
									H
	1648	-41.01	-13	-28.01	-51.24	-46.40	1.23	8.76	V
	2472	-48.23	-13	-35.23	-62.95	-55.12	1.44	10.48	V
	3296	-59.51	-13	-46.51	-76.13	-67.45	1.70	11.79	V
									V
									V
									V
									V



Middle	1672	-40.04	-13	-27.04	-52.8	-45.51	1.24	8.85	H
	2512	-44.81	-13	-31.81	-59.96	-51.73	1.44	10.51	H
	3344	-55.53	-13	-42.53	-72.47	-63.57	1.74	11.93	H
									H
									H
									H
									H
	1672	-42.19	-13	-29.19	-52.53	-47.66	1.24	8.85	V
	2512	-51.34	-13	-38.34	-66.04	-58.26	1.44	10.51	V
	3344	-59.52	-13	-46.52	-76	-67.56	1.74	11.93	V
									V
									V
									V
									V
Highest	1696	-44.91	-13	-31.91	-58.11	-50.46	1.24	8.94	H
	2544	-48.24	-13	-35.24	-63.27	-55.18	1.44	10.54	H
	3392	-54.78	-13	-41.78	-71.51	-62.92	1.78	12.08	H
									H
									H
									H
									H
	1696	-47.07	-13	-34.07	-57.61	-52.62	1.24	8.94	V
	2544	-52.19	-13	-39.19	-66.88	-59.13	1.44	10.54	V
	3392	-59.85	-13	-46.85	-76.12	-67.99	1.78	12.08	V
									V
									V
									V
									V

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

**Part22H EDGE 850**

EDGE 850									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1648	-43.97	-13	-30.97	-56.49	-49.36	1.23	8.76	H
	2472	-56.82	-13	-43.82	-72.15	-63.71	1.44	10.48	H
	3296	-59.47	-13	-46.47	-76.54	-67.41	1.70	11.79	H
									H
									H
									H
									H
									V
	1648	-46.32	-13	-33.32	-56.55	-51.71	1.23	8.76	V
	2472	-56.64	-13	-43.64	-71.36	-63.53	1.44	10.48	V
	3296	-59.68	-13	-46.68	-76.3	-67.62	1.70	11.79	V
									V
									V
									V
Middle	1672	-44.69	-13	-31.69	-57.45	-50.16	1.24	8.85	H
	2512	-55.04	-13	-42.04	-70.19	-61.96	1.44	10.51	H
	3344	-59.09	-13	-46.09	-76.03	-67.13	1.74	11.93	H
									H
									H
									H
									H
	1672	-48.89	-13	-35.89	-59.23	-54.36	1.24	8.85	V
	2512	-55.49	-13	-42.49	-70.19	-62.41	1.44	10.51	V
	3344	-60.12	-13	-47.12	-76.6	-68.16	1.74	11.93	V
									V
									V
									V
									V



Highest	1696	-47.49	-13	-34.49	-60.69	-53.04	1.24	8.94	H
	2544	-58.83	-13	-45.83	-73.86	-65.77	1.44	10.54	H
	3392	-59.76	-13	-46.76	-76.49	-67.90	1.78	12.08	H
									H
									H
									H
									H
	1696	-50.86	-13	-37.86	-61.4	-56.41	1.24	8.94	V
	2544	-58.89	-13	-45.89	-73.58	-65.83	1.44	10.54	V
	3392	-60.25	-13	-47.25	-76.52	-68.39	1.78	12.08	V
									V
									V
									V
									V

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

**Part22H WCDMA 850**

WCDMA 850									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1652	-62.86	-13	-49.86	-75.41	-68.26	1.23	8.78	H
	2479	-60.74	-13	-47.74	-76.07	-67.64	1.44	10.48	H
	3305	-59.71	-13	-46.71	-76.78	-67.66	1.71	11.82	H
									H
									H
									H
									H
	1652	-65.05	-13	-52.05	-75.31	-70.45	1.23	8.78	V
	2479	-61.69	-13	-48.69	-76.41	-68.59	1.44	10.48	V
	3305	-59.82	-13	-46.82	-76.44	-67.77	1.71	11.82	V
									V
									V
									V
									V
Middle	1672	-62.17	-13	-49.17	-74.93	-67.64	1.24	8.85	H
	2512	-60.63	-13	-47.63	-75.78	-67.55	1.44	10.51	H
	3344	-59.35	-13	-46.35	-76.29	-67.39	1.74	11.93	H
									H
									H
									H
									H
	1672	-64.92	-13	-51.92	-75.26	-70.39	1.24	8.85	V
	2512	-61.45	-13	-48.45	-76.15	-68.37	1.44	10.51	V
	3344	-60.06	-13	-47.06	-76.54	-68.10	1.74	11.93	V
									V
									V
									V
									V



Highest	1693	-61.52	-13	-48.52	-74.72	-67.06	1.24	8.93	H
	2539	-60.85	-13	-47.85	-75.88	-67.79	1.44	10.53	H
	3386	-59.43	-13	-46.43	-76.16	-67.56	1.78	12.06	H
									H
									H
									H
									H
	1693	-64.67	-13	-51.67	-75.21	-70.21	1.24	8.93	V
	2539	-61.11	-13	-48.11	-75.8	-68.05	1.44	10.53	V
	3386	-59.89	-13	-46.89	-76.16	-68.02	1.78	12.06	V
									V
									V
									V
									V

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

**Part24E GSM 1900**

GSM 1900									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3700	-59.11	-13	-46.11	-76.97	-69.42	1.97	12.28	H
	5550	-55.79	-13	-42.79	-77.08	-65.92	2.14	12.27	H
	7400	-51.42	-13	-38.42	-76.18	-59.42	2.18	10.18	H
									H
									H
									H
									H
	3700	-59.59	-13	-46.59	-76.85	-69.90	1.97	12.28	V
	5550	-55.71	-13	-42.71	-77.24	-65.84	2.14	12.27	V
	7400	-52.10	-13	-39.10	-75.92	-60.10	2.18	10.18	V
									V
									V
									V
									V
Middle	3763	-58.49	-13	-45.49	-76.15	-68.73	2.01	12.24	H
	5639	-56.05	-13	-43.05	-77.22	-66.32	2.12	12.39	H
	7520	-50.99	-13	-37.99	-76.48	-58.95	2.11	10.07	H
									H
									H
									H
									H
	3763	-59.35	-13	-46.35	-76.51	-69.59	2.01	12.24	V
	5639	-55.97	-13	-42.97	-77.33	-66.24	2.12	12.39	V
	7520	-51.72	-13	-38.72	-76.45	-59.68	2.11	10.07	V
									V
									V
									V
									V



Highest	3820	-59.06	-13	-46.06	-76.68	-69.23	2.04	12.21	H
	5730	-56.05	-13	-43.05	-77.27	-66.47	2.10	12.52	H
	7640	-51.32	-13	-38.32	-76.55	-59.71	2.11	10.50	H
									H
									H
									H
									H
	3820	-59.59	-13	-46.59	-76.77	-69.76	2.04	12.21	V
	5730	-55.55	-13	-42.55	-76.9	-65.97	2.10	12.52	V
	7640	-51.31	-13	-38.31	-76.12	-59.70	2.11	10.50	V
									V
									V
									V
									V

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

**Part24E EDGE 1900**

EDGE 1900									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3700	-59.10	-13	-46.10	-76.96	-69.41	1.97	12.28	H
	5548	-56.31	-13	-43.31	-77.6	-66.43	2.14	12.27	H
	7403	-51.00	-13	-38.00	-75.76	-59.00	2.17	10.17	H
									H
									H
									H
									H
	3699	-59.30	-13	-46.30	-76.56	-69.61	1.97	12.28	V
	5548	-55.95	-13	-42.95	-77.48	-66.07	2.14	12.27	V
	7397	-52.37	-13	-39.37	-76.19	-60.38	2.18	10.19	V
									V
									V
									V
									V
Middle	3763	-58.69	-13	-45.69	-76.35	-68.93	2.01	12.24	H
	5639	-56.19	-13	-43.19	-77.36	-66.46	2.12	12.39	H
	7519	-51.06	-13	-38.06	-76.55	-59.01	2.11	10.07	H
									H
									H
									H
									H
	3763	-59.58	-13	-46.58	-76.74	-69.82	2.01	12.24	V
	5639	-55.82	-13	-42.82	-77.18	-66.09	2.12	12.39	V
	7519	-51.87	-13	-38.87	-76.6	-59.82	2.11	10.07	V
									V
									V
									V
									V



Highest	3820	-58.63	-13	-45.63	-76.25	-68.80	2.04	12.21	H
	5730	-55.66	-13	-42.66	-76.88	-66.08	2.10	12.52	H
	7640	-50.99	-13	-37.99	-76.22	-59.38	2.11	10.50	H
									H
									H
									H
									H
	3820	-59.54	-13	-46.54	-76.72	-69.71	2.04	12.21	V
	5730	-55.07	-13	-42.07	-76.42	-65.49	2.10	12.52	V
	7640	-51.58	-13	-38.58	-76.39	-59.97	2.11	10.50	V
									V
									V
									V
									V

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

**Part24E WCDMA 1900**

WCDMA 1900									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3707	-59.11	-13	-46.11	-76.91	-69.41	1.98	12.28	H
	5555	-56.21	-13	-43.21	-77.49	-66.34	2.14	12.28	H
	7410	-51.64	-13	-38.64	-76.54	-59.63	2.17	10.16	H
									H
									H
									H
									H
	3707	-59.97	-13	-46.97	-77.2	-70.27	1.98	12.28	V
	5555	-56.08	-13	-43.08	-77.6	-66.21	2.14	12.28	V
	7410	-52.46	-13	-39.46	-76.44	-60.45	2.17	10.16	V
									V
									V
									V
									V
Middle	3760	-58.94	-13	-45.94	-76.6	-69.18	2.01	12.24	H
	5640	-56.05	-13	-43.05	-77.22	-66.32	2.12	12.40	H
	7520	-50.99	-13	-37.99	-76.48	-58.95	2.11	10.07	H
									H
									H
									H
									H
	3760	-59.75	-13	-46.75	-76.91	-69.99	2.01	12.24	V
	5640	-56.04	-13	-43.04	-77.4	-66.31	2.12	12.40	V
	7520	-51.48	-13	-38.48	-76.21	-59.44	2.11	10.07	V
									V
									V
									V
									V



Highest	3812	-59.15	-13	-46.15	-76.7	-69.33	2.03	12.21	H
	5723	-55.42	-13	-42.42	-76.64	-65.83	2.10	12.51	H
	7627	-51.04	-13	-38.04	-76.27	-59.38	2.11	10.46	H
									H
									H
									H
									H
	3812	-59.49	-13	-46.49	-76.6	-69.67	2.03	12.21	V
	5723	-55.91	-13	-42.91	-77.26	-66.32	2.10	12.51	V
	7627	-51.44	-13	-38.44	-76.25	-59.78	2.11	10.46	V
									V
									V
									V
									V

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

**Part27L WCDMA 1700**

WCDMA 1700									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3427	-58.74	-13	-45.74	-75.58	-69.11	1.81	12.18	H
	5135	-56.03	-13	-43.03	-76.65	-65.85	2.30	12.13	H
	6850	-53.10	-13	-40.10	-76.53	-61.78	2.37	11.05	H
									H
									H
									H
									H
	3427	-59.18	-13	-46.18	-75.55	-69.55	1.81	12.18	V
	5135	-56.53	-13	-43.53	-77.09	-66.35	2.30	12.13	V
	6850	-53.81	-13	-40.81	-76.52	-62.49	2.37	11.05	V
									V
									V
									V
									V
Middle	3462	-57.82	-13	-44.82	-75.01	-68.27	1.84	12.29	H
	5198	-56.79	-13	-43.79	-77.45	-66.65	2.28	12.14	H
	6930	-52.88	-13	-39.88	-76.68	-61.45	2.40	10.97	H
									H
									H
									H
									H
	3462	-59.06	-13	-46.06	-75.79	-69.51	1.84	12.29	V
	5198	-56.67	-13	-43.67	-77.22	-66.53	2.28	12.14	V
	6930	-53.75	-13	-40.75	-76.64	-62.32	2.40	10.97	V
									V
									V
									V
									V



Highest	3510	-57.02	-13	-44.02	-74.64	-67.54	1.88	12.39	H
	5258	-56.57	-13	-43.57	-77.32	-66.47	2.25	12.15	H
	7010	-52.47	-13	-39.47	-76.65	-60.94	2.41	10.88	H
									H
									H
									H
									H
	3510	-58.57	-13	-45.57	-75.69	-69.09	1.88	12.39	V
	5258	-56.64	-13	-43.64	-77.39	-66.54	2.25	12.15	V
	7010	-53.71	-13	-40.71	-76.8	-62.18	2.41	10.88	V
									V
									V
									V
									V
									V
									V

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



<Sample 2>

Part22H GSM 850

GSM 850									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1648	-42.01	-13	-29.01	-54.53	-47.40	1.23	8.76	H
	2472	-45.38	-13	-32.38	-60.71	-52.27	1.44	10.48	H
	3296	-59.51	-13	-46.51	-76.58	-67.45	1.70	11.79	H
									H
									H
									H
									H
	1648	-54.79	-13	-41.79	-65.02	-60.18	1.23	8.76	V
	2472	-45.06	-13	-32.06	-59.78	-51.95	1.44	10.48	V
	3296	-59.80	-13	-46.80	-76.42	-67.74	1.70	11.79	V
									V
									V
									V
									V

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

**Part24E WCDMA 1900**

WCDMA 1900									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3760	-58.66	-13	-45.66	-76.32	-68.90	2.01	12.24	H
	5640	-55.95	-13	-42.95	-77.12	-66.22	2.12	12.40	H
	7520	-50.74	-13	-37.74	-76.23	-58.70	2.11	10.07	H
									H
									H
									H
									H
	3760	-59.35	-13	-46.35	-76.51	-69.59	2.01	12.24	V
	5640	-55.69	-13	-42.69	-77.05	-65.96	2.12	12.40	V
	7520	-51.42	-13	-38.42	-76.15	-59.38	2.11	10.07	V
									V
									V
									V
									V

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