FCC RADIO TEST REPORT

FCC ID	:	LHJ-FE5RW0D31
Equipment	:	FE5RW0D31
Brand Name	:	Continental
Model Name	:	FE5RW0D31
Applicant	:	Continental Automotive Systems, Inc. 21440 W Lake Cook Rd., Deer Park, IL 60010, USA
Manufacturer	:	Continental Automotive Systems, Inc. 21440 W Lake Cook Rd., Deer Park, IL 60010, USA
Standard	:	FCC 47 CFR Part 2, 22(H), 24(E)

The product was received on Nov. 26, 2021 and testing was performed from Jan. 21, 2022 to Apr. 27, 2022. 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 test results in this report apply exclusively to the tested model / sample. Without written approval from 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 333, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issue Date
FG1N2419-01A	01	Initial issue of report	May 26, 2022
FG1N2419-01A	02	1. Revise antenna gain and appendix A1 2. Add remark in Section 1.1	Jun. 06, 2022

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)(5)	Effective Radiated Power (GSM850) (WCDMA Band V)		
	§24.232 (c)	Equivalent Isotropic Radiated Power (GSM1900)		
	-	Equivalent Isotropic Radiated Power		
3.3	§24.232 (d)	Peak-to-Average Ratio	Pass	-
3.4	§2.1049 §22.917 (b) §24.238 (b)	Occupied Bandwidth (GSM850) (WCDMA Band V) (GSM1900)	Pass	-
3.5	§2.1051 §22.917 (a) §24.238 (a)	Band Edge Measurement (GSM850) (WCDMA Band V) (GSM1900)	Pass	-
3.6	§2.1051 §22.917 (a) §24.238 (a)	Conducted Emission (GSM850) (WCDMA Band V) (GSM1900)	Pass	-
3.7	§2.1055 §22.355 §24.235	Frequency Stability Temperature & Voltage	Pass	-
4.4	§2.1053 §22.917 (a) §24.238 (a)	Field Strength of Spurious Radiation (GSM850) (WCDMA Band V) (GSM1900)	Pass	31.64 dB under the limit at 7404.000 MHz

Declaration of Conformity:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
   It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to this report "Uncertainty of Evaluation".

Comments and Explanations:

The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Yun Huang

Report Producer: Vivian Hsu

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	FE5RW0D31
Brand Name	Continental
Model Name	FE5RW0D31
FCC ID	LHJ-FE5RW0D31
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/5G NR/GNSS
HW Version	P2
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer.
2. The test antenna TAOGLAS TG.55.8113W provided by the applicant is used for the purpose of radiated testing. The EUT is not equipped with an antenna.

1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard	
Tx Frequency	**GSM/GPRS/EDGE:** 850: 824.2 MHz ~ 848.8 MHz 1900: 1850.2 MHz ~ 1909.8 MHz **WCDMA:** Band V: 826.4 MHz ~ 846.6 MHz
Rx Frequency	**GSM/GPRS/EDGE:** 850: 869.2 MHz ~ 893.8 MHz 1900: 1930.2 MHz ~ 1989.8 MHz **WCDMA:** Band V: 871.4 MHz ~ 891.6 MHz
Maximum Output Power to Antenna	**GSM/GPRS/EDGE:** 850: 32.03 dBm 1900: 28.91 dBm **WCDMA:** Band V: 23.00 dBm
Antenna Type	Fixed External Antenna
Antenna Gain	Cellular Band : 4.5 dBi PCS Band: 2.5 dBi
Type of Modulation	GSM / GPRS: GMSK EDGE(MCS 0-4): GMSK/(MCS 5-9): 8PSK WCDMA: QPSK (Uplink) HSDPA: 64QAM (Downlink) HSUPA : QPSK (Uplink)

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.3 Modification of EUT

No modifications made to the EUT during the testing.

1.4 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH03-HY
Test Engineer	Oscar Chi
Temperature (℃)	21~24
Relative Humidity (%)	51~55

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH12-HY (TAF Code: 3786)
Test Engineer	Jack Cheng, Lance Chiang and Chuan Chu
Temperature (℃)	21.4~23.8
Relative Humidity (%)	54.7~69.3
Remark	The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory

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

FCC Designation No.: TW1190 and TW3786

1.5 Applicable Standards

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

- ANSI C63.26-2015
- ANSI / TIA-603-E
- FCC 47 CFR Part 2, 22(H), 24(E)
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- FCC KDB 414788 D01 Radiated Test Site v01r01

Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.
3. The TAF code is not including all the FCC KDB listed without accreditation.

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, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in two Config (Ant. Degree 0 and Ant. Degree 90), and adjusting the measurement antenna orientation, following C63.26 exploratory test procedures and find Ant. Degree 0 as worst plane.

Radiated emissions were investigated as following frequency range:

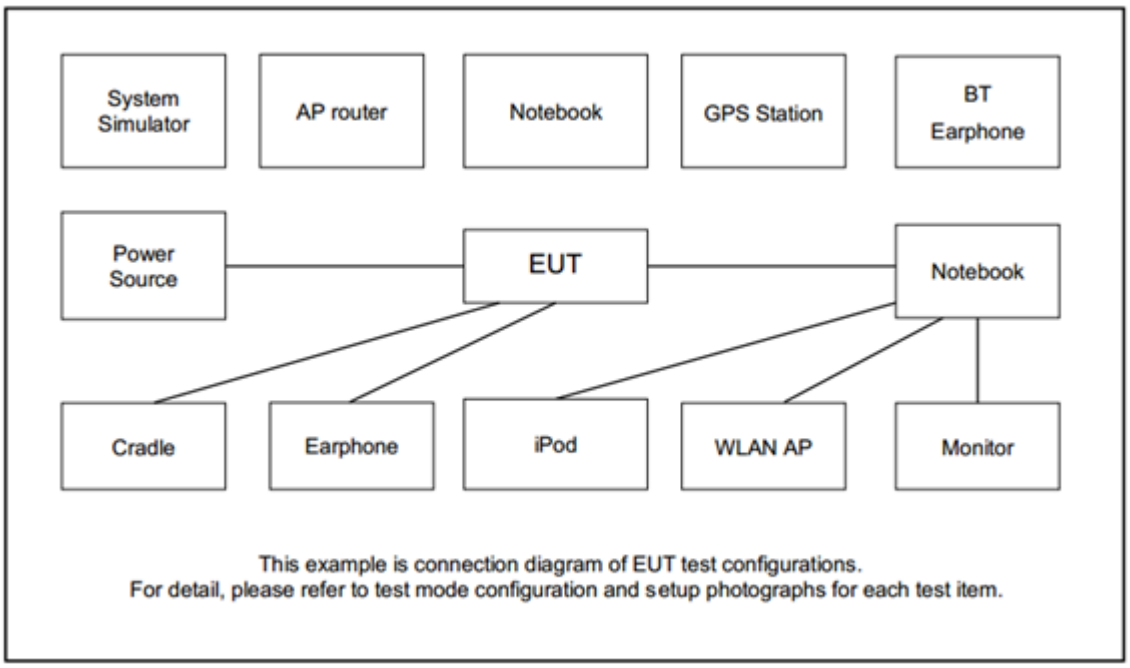
1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V
2. 30 MHz to 19100 MHz for GSM1900

All modes, 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 ■ EDGE Class 8 Link	■ GPRS Class 8 Link ■ EDGE Class 8 Link
GSM1900	■ GPRS Class 8 Link ■ EDGE Class 8 Link	■ GPRS Class 8 Link ■ EDGE Class 8 Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Brand Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Antenna	Taoglas	TG.55.8113	N/A	N/A	N/A
2.	DC Power Supply	GW Instek	GEU810960	N/A	N/A	N/A
3.	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 10 dB attenuator.

Example:

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

= 4.2 + 10 = 14.2 (dB)

2.5 Frequency List of Low/Middle/High Channels

Frequency List				
Band	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
GSM850	Channel	128	189	251
	Frequency	824.2	836.4	848.8
WCDMA Band V	Channel	4132	4182	4233
	Frequency	826.4	836.4	846.6
GSM1900	Channel	512	661	810
	Frequency	1850.2	1880.0	1909.8

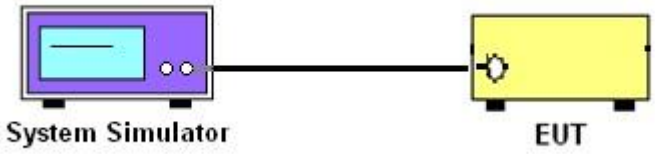
3 Conducted Test Result

3.1 Measuring Instruments

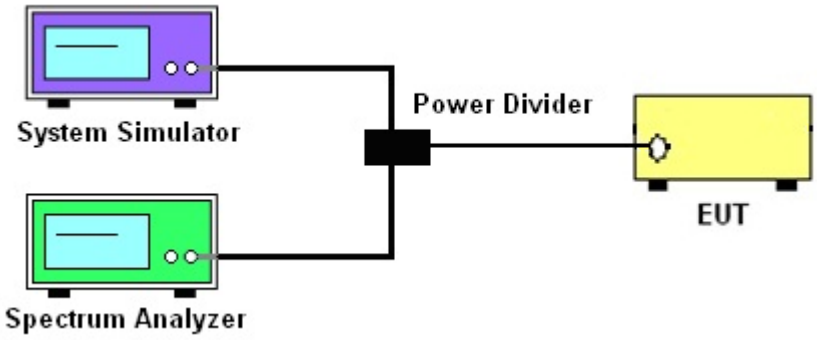
Please refer to the measuring equipment list in this test report.

3.1.1 Test Setup

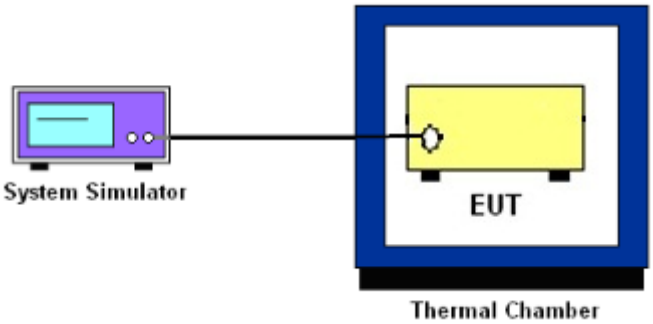
3.1.2 Conducted Output Power



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

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 is connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select the lowest, middle, and the 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 is 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 is 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 is connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT is connected to the spectrum analyzer by an RF cable and attenuator. The path loss is compensated to the results for each measurement.
3. The band edges of low and high channels for the highest RF powers are measured.
4. The RF fundamental frequency shall be excluded against the limit line in the operating frequency band.
5. The limit line is derived from 43 + 10log(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 10^{th} harmonic.

3.6.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

1. The EUT is connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT is connected to the spectrum analyzer by an RF cable and attenuator. The path loss is compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency is measured.
4. The conducted spurious emission for the whole frequency range is taken.
5. The RF fundamental frequency shall be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

3.7 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 ±0.00025% (±2.5ppm) of the center frequency.

24.235

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 is set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature is decreased to -30°C and the EUT is stabilized before testing. Power is applied and the maximum change in frequency is recorded within one minute.
3. With power OFF, the temperature is raised in 10°C steps up to 50°C. The EUT is stabilized at each step for at least half an hour. Power is applied and the maximum frequency change is 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 is placed in a temperature chamber at 20±5° C and connected with the system simulator.
2. The power supply voltage to the EUT is varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency is measured for the worst case.

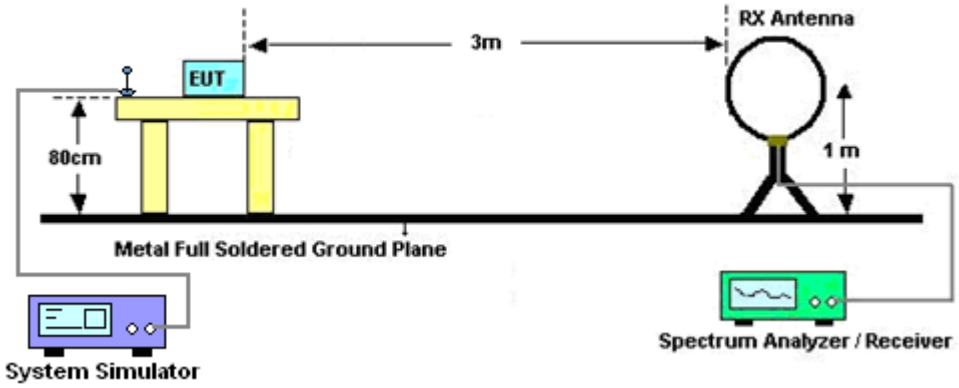
4 Radiated Test Items

4.1 Measuring Instruments

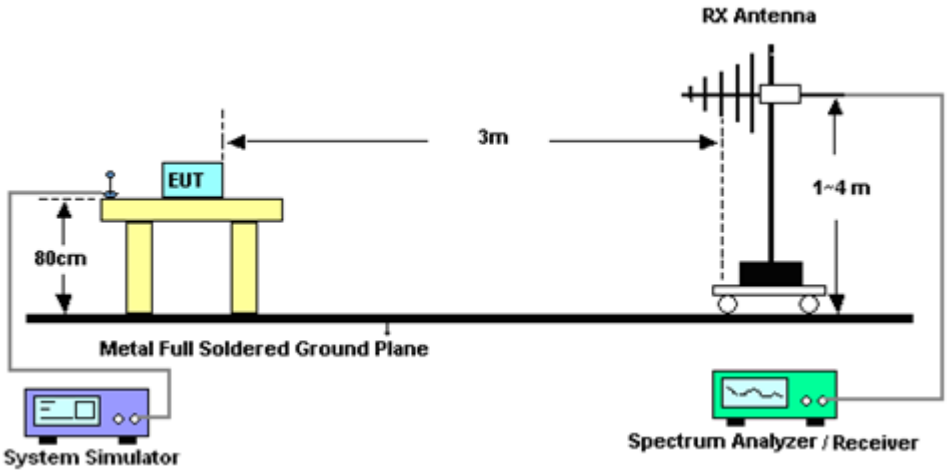
Please refer to the measuring equipment list in this test report.

4.2 Test Setup

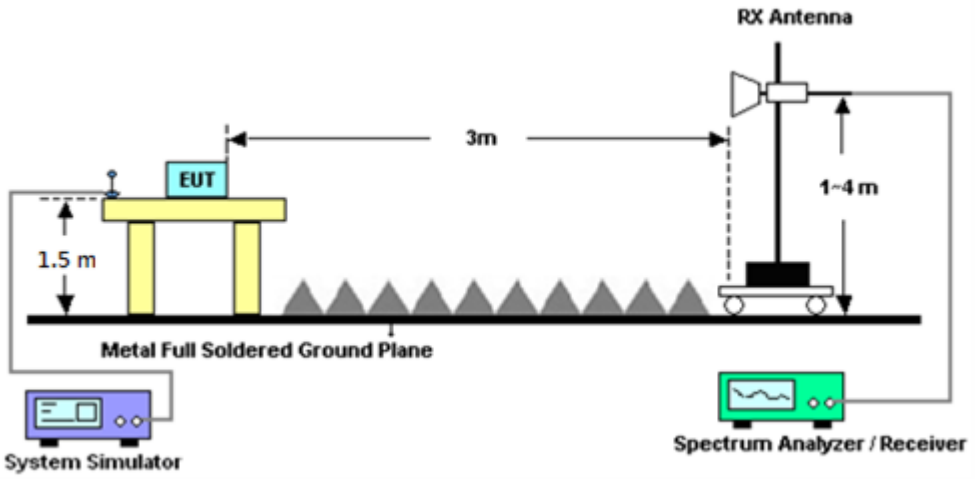
For radiated test below 30MHz



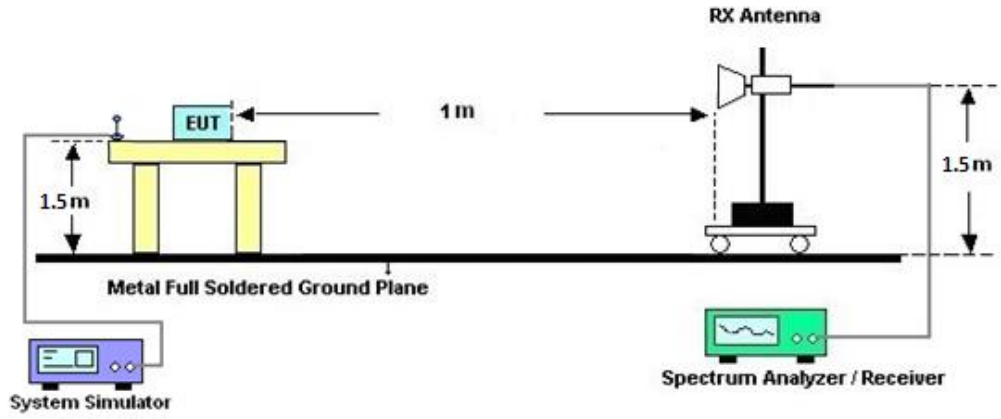
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

Note:

The low frequency, which starts from 9 kHz to 30 MHz, is pre-scanned and the result which is 20 dB lower than the limit line is not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

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 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT is placed on a rotatable wooden table 0.8 meters for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz above the ground.
2. The EUT is set 3 meters away from the receiving antenna, which is mounted on the antenna tower.
3. The table is 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 = 1 MHz, VBW = 3 MHz, taking record of maximum spurious emission.
6. A horn antenna is substituted in place of the EUT and is driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Take the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency shall be excluded against the limit line in the operating frequency band.
13. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

5 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 07, 2021	Feb. 09, 2022~ Apr. 27, 2022	Sep. 06, 2022	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	37059 & 01	30MHz~1GHz	Oct. 09, 2021	Feb. 09, 2022~ Apr. 27, 2022	Oct. 08, 2022	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 09, 2021	Feb. 09, 2022~ Apr. 27, 2022	Oct. 08, 2022	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz~18GHz	Oct. 25, 2021	Feb. 09, 2022~ Apr. 27, 2022	Oct. 24, 2022	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1212	1GHz~18GHz	May 18, 2021	Feb. 09, 2022~ Apr. 27, 2022	May 17, 2022	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Nov. 30, 2021	Feb. 09, 2022~ Apr. 27, 2022	Nov. 29, 2022	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz~40GHz	May 21, 2021	Feb. 09, 2022~ Apr. 27, 2022	May 20, 2022	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 24, 2021	Feb. 09, 2022~ Mar. 22, 2022	Mar. 23, 2022	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 23, 2022	Mar. 23, 2022~ Apr. 27, 2022	Mar. 22, 2023	Radiation (03CH12-HY)
Preamplifier	Aglient	8449B	3008A02375	1GHz~26.5GHz	May 25, 2021	Feb. 09, 2022~ Apr. 27, 2022	May 24, 2022	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-303K	1710001800054002	1GHz~18GHz	Jun. 16, 2021	Feb. 09, 2022~ Apr. 27, 2022	Jun. 15, 2022	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 22, 2021	Feb. 09, 2022~ Apr. 27, 2022	Jun. 21, 2022	Radiation (03CH12-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Jan. 12, 2022	Feb. 09, 2022~ Apr. 27, 2022	Jan. 11, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 11, 2021	Feb. 09, 2022~ Mar. 09, 2022	Mar. 10, 2022	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 10, 2022	Mar. 10, 2022~ Apr. 27, 2022	Mar. 09, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 10, 2021	Feb. 09, 2022~ Apr. 27, 2022	Dec. 09, 2022	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 22, 2021	Feb. 09, 2022~ Feb. 20, 2022	Feb. 21, 2022	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 21, 2022	Feb. 21, 2022~ Apr. 27, 2022	Feb. 20, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz~40GHz	Feb. 22, 2021	Feb. 09, 2022~ Feb. 20, 2022	Feb. 21, 2022	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz~40GHz	Feb. 21, 2022	Feb. 21, 2022~ Apr. 27, 2022	Feb. 20, 2023	Radiation (03CH12-HY)
Filter	Wainwright	WLKS1200-12SS	SN2	1.2GHz Low Pass Filter	Mar. 17, 2021	Feb. 09, 2022~ Mar. 14, 2022	Mar. 16, 2022	Radiation (03CH12-HY)
Filter	Wainwright	WLKS1200-12SS	SN2	1.2GHz Low Pass Filter	Mar. 15, 2022	Mar. 15, 2022~ Apr. 27, 2022	Mar. 14, 2023	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-1080-1200-15000-60SS	SN1	1.2GHz High Pass Filter	Mar. 17, 2021	Feb. 09, 2022~ Mar. 14, 2022	Mar. 16, 2022	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-1080-1200-15000-60SS	SN1	1.2GHz High Pass Filter	Mar. 15, 2022	Mar. 15, 2022~ Apr. 27, 2022	Mar. 14, 2023	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN2	3GHz High Pass Filter	Jul. 12, 2021	Feb. 09, 2022~ Apr. 27, 2022	Jul. 11, 2022	Radiation (03CH12-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	TECPEL	DTM-303B	TP140349	N/A	Sep. 30, 2021	Feb. 09, 2022~ Apr. 27, 2022	Sep. 29, 2022	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Feb. 09, 2022~ Apr. 27, 2022	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Feb. 09, 2022~ Apr. 27, 2022	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Feb. 09, 2022~ Apr. 27, 2022	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Feb. 09, 2022~ Apr. 27, 2022	N/A	Radiation (03CH12-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 01, 2021	Jan. 21, 2022	Feb. 28, 2022	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Sep. 30, 2021	Jan. 21, 2022	Sep. 29, 2022	Conducted (TH03-HY)
Temperature & Humidity Cabinet Chamber	ESPEC	LHU-113	1012005860	-20℃~85℃	Dec. 09, 2021	Jan. 21, 2022	Dec. 08, 2022	Conducted (TH03-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890001	1V~20V 0.5A~4A	Oct. 06, 2021	Jan. 21, 2022	Oct. 05, 2022	Conducted (TH03-HY)
Base Station (Measure)	Rohde & Schwarz	CMU200	117995	GSM / GPRS / WCDMA / CDMA	Jul. 13, 2021	Jan. 21, 2022	Jul. 12, 2022	Conducted (TH03-HY)
Power Divider	Warison	WCOU-0.4-26. 5S-20	#A	N/A	Nov. 01, 2021	Jan. 21, 2022	Oct. 31, 2022	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))	**3.10 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.39 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.34 dB**

Appendix A. Test Results of Conducted Test

Conducted Output Power (Average power) & ERP / EIRP

GSM850 Maximum Average Power [dBm] (GT - LC = 4.5 dB)					
Channel	128	189	251	ERP (dBm)	ERP (W)
Frequency	824.2	836.4	848.8		
GPRS class 8	**32.03**	32.00	31.94	34.38	2.7416
GPRS class 10	29.88	29.88	29.44		
GPRS class 11	28.77	28.79	28.29		
GPRS class 12	26.65	26.77	26.56		
EGPRS class 8	26.21	**26.40**	26.20	28.75	0.7499
EGPRS class 10	25.02	25.04	25.07		
EGPRS class 11	23.91	23.93	23.76		
EGPRS class 12	22.84	22.85	22.67		
Limit	ERP < 7W			Result	Pass

GSM1900 Maximum Average Power [dBm] (GT - LC = 2.5 dB)					
Channel	512	661	810	EIRP (dBm)	EIRP (W)
Frequency	1850.2	1880	1909.8		
GPRS class 8	28.76	**28.91**	28.82	31.41	1.3836
GPRS class 10	26.11	26.32	26.00		
GPRS class 11	24.58	24.74	24.63		
GPRS class 12	23.93	24.13	24.08		
EGPRS class 8	25.08	**25.29**	25.16	27.79	0.6012
EGPRS class 10	24.06	24.07	24.04		
EGPRS class 11	22.61	22.74	22.52		
EGPRS class 12	21.53	21.63	21.36		
Limit	EIRP < 2W			Result	Pass

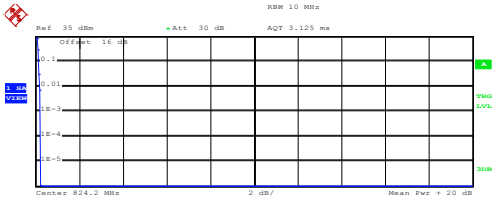
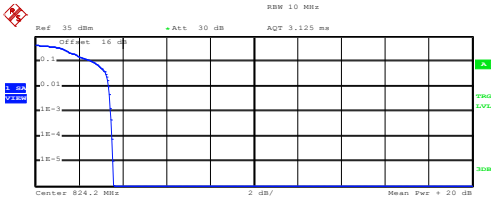
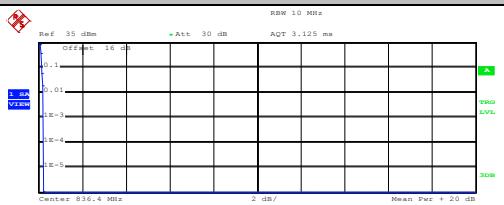
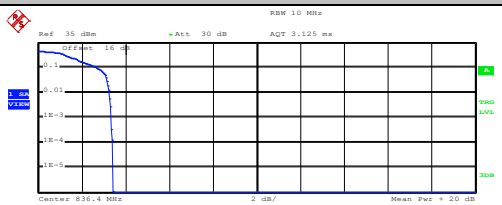
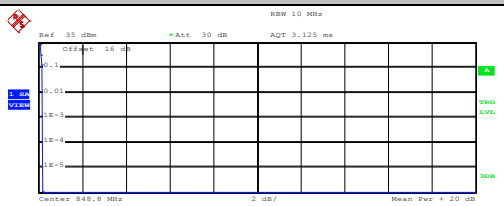
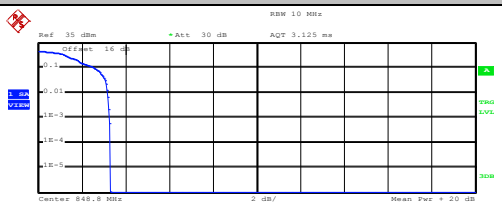
WCDMA Band V Maximum Average Power [dBm] (GT - LC = 4.5 dB)					
Channel	4132	4182	4233	ERP (dBm)	ERP (W)
Frequency	826.4	836.4	846.6		
RMC 12.2K	22.88	22.90	**23.00**	25.35	0.3428
HSDPA Subtest-1	21.89	21.91	21.90		
HSDPA Subtest-2	21.91	21.90	21.90		
HSDPA Subtest-3	21.40	21.41	21.40		
HSDPA Subtest-4	21.40	21.40	21.41		
HSUPA Subtest-1	21.90	21.92	21.91		
HSUPA Subtest-2	19.90	19.92	19.92		
HSUPA Subtest-3	20.80	20.96	21.01		
HSUPA Subtest-4	19.76	19.96	19.87		
HSUPA Subtest-5	21.85	21.95	21.87		
Limit	ERP < 7W			Result	Pass

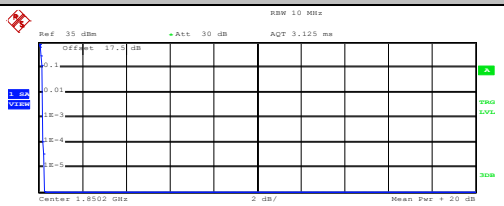
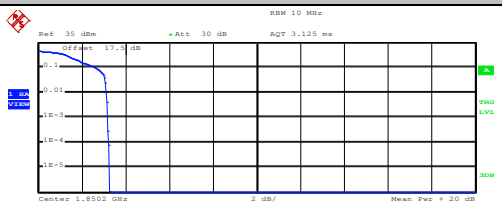
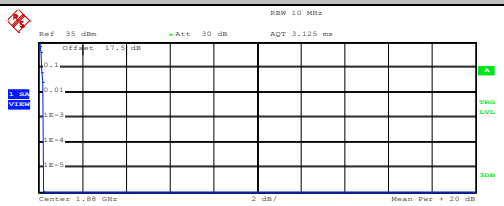
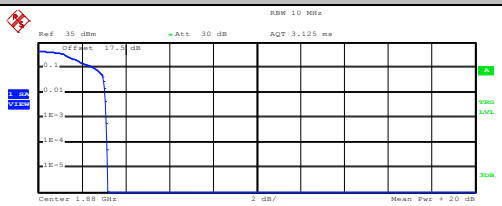
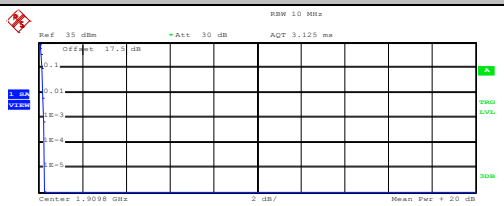
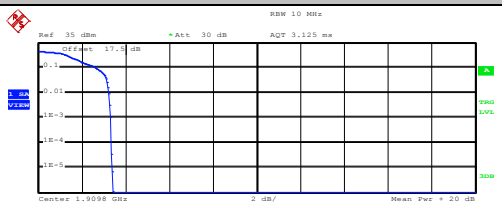
A2. GSM

Peak-to-Average Ratio

Mode	GSM850		Limit: 13dB
Mod.	GPRS class 8	EDGE class 8	Result
Lowest CH	0.24	3.44	PASS
Middle CH	0.24	3.36	
Highest CH	0.20	3.28	

Mode	GSM1900		Limit: 13dB
Mod.	GPRS class 8	EDGE class 8	Result
Lowest CH	0.20	3.20	PASS
Middle CH	0.24	3.12	
Highest CH	0.24	3.32	

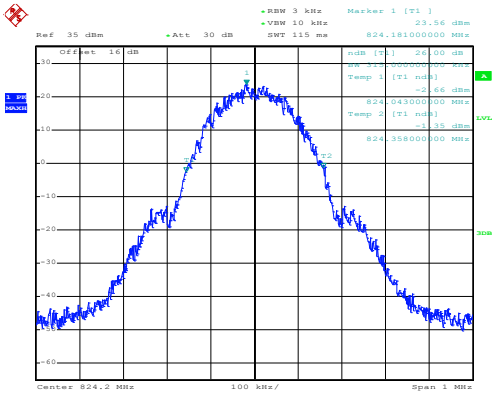
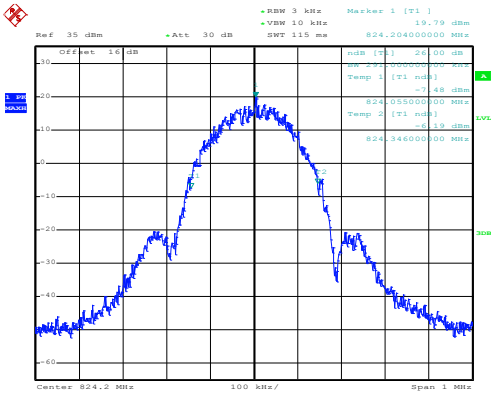
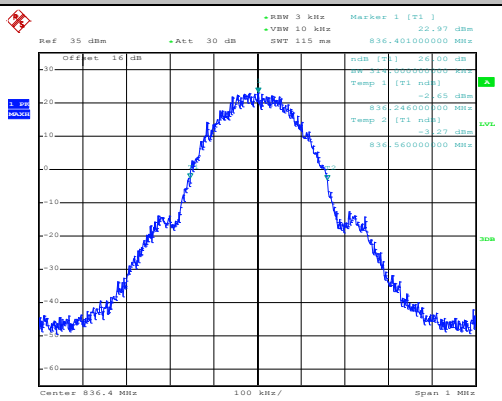
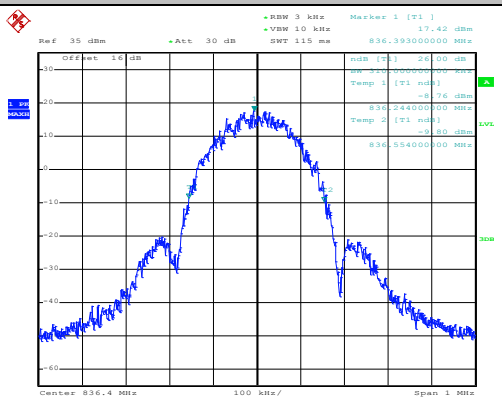
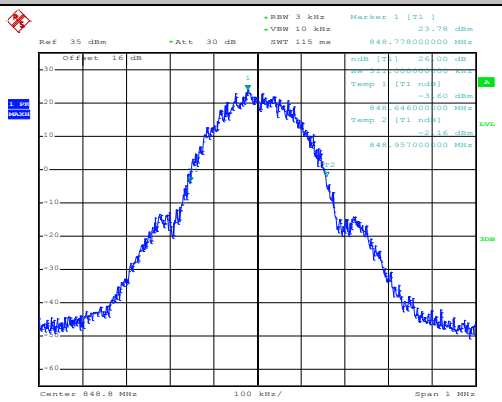
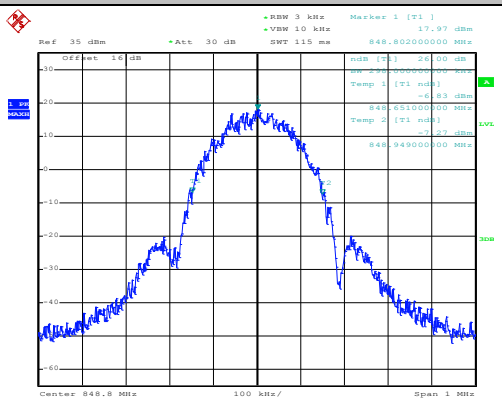
GSM850 (GPRS class 8)	GSM850 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 31.72 dBm Peak 31.94 dBm Crest 0.21 dB 10 % 0.16 dB 1 % 0.20 dB .1 % 0.24 dB .01 % 0.24 dB	Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 25.77 dBm Peak 29.33 dBm Crest 3.56 dB 10 % 2.64 dB 1 % 3.36 dB .1 % 3.44 dB .01 % 3.52 dB
Date: 21.JAN.2022 15:54:20	Date: 21.JAN.2022 16:10:26
Middle Channel	**Middle Channel**
	
Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 31.58 dBm Peak 31.80 dBm Crest 0.22 dB 10 % 0.16 dB 1 % 0.20 dB .1 % 0.24 dB .01 % 0.24 dB	Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 25.84 dBm Peak 29.26 dBm Crest 3.42 dB 10 % 2.72 dB 1 % 3.24 dB .1 % 3.36 dB .01 % 3.40 dB
Date: 21.JAN.2022 15:54:39	Date: 21.JAN.2022 16:10:44
Highest Channel	**Highest Channel**
	
Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 31.53 dBm Peak 31.73 dBm Crest 0.20 dB 10 % 0.16 dB 1 % 0.20 dB .1 % 0.20 dB .01 % 0.20 dB	Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 25.68 dBm Peak 28.97 dBm Crest 3.29 dB 10 % 2.60 dB 1 % 3.16 dB .1 % 3.28 dB .01 % 3.32 dB
Date: 21.JAN.2022 15:54:57	Date: 21.JAN.2022 16:11:02

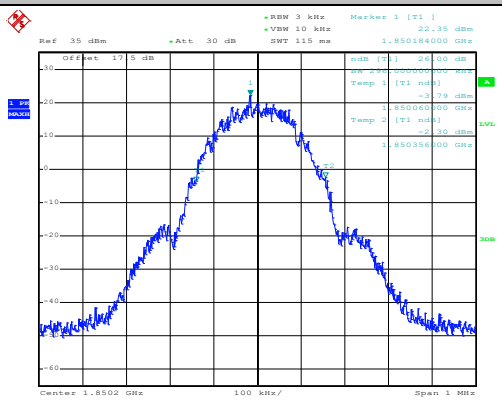
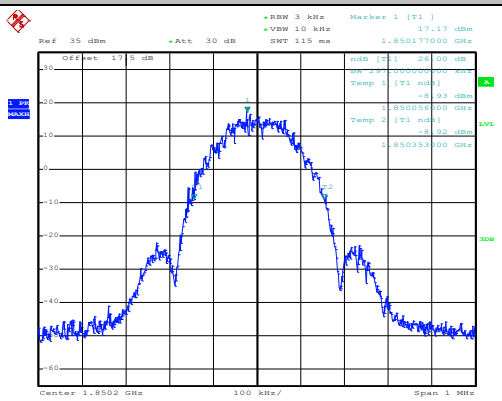
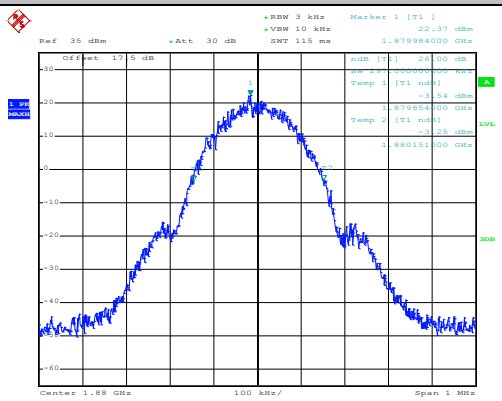
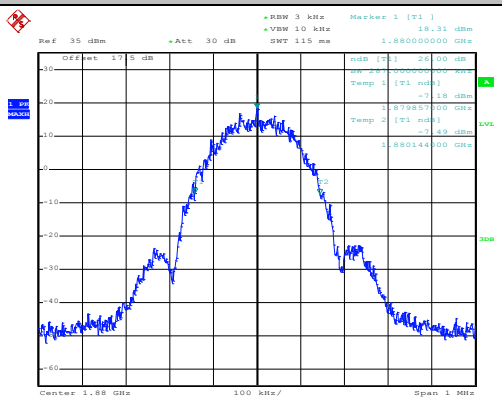
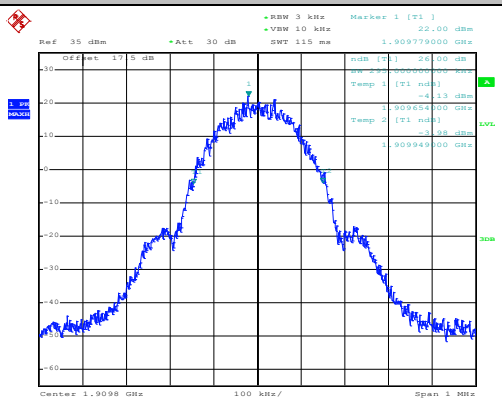
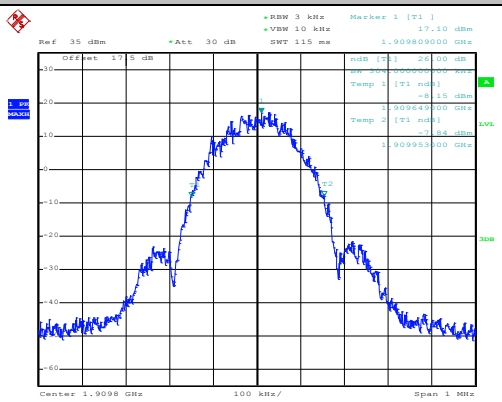
GSM1900 (GPRS class 8)	GSM1900 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 28.50 dBm Peak 28.76 dBm Crest 0.26 dB 10 % 0.16 dB 1 % 0.20 dB .1 % 0.20 dB .01 % 0.20 dB	Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 24.60 dBm Peak 27.84 dBm Crest 3.25 dB 10 % 2.64 dB 1 % 3.12 dB .1 % 3.20 dB .01 % 3.24 dB
Date: 21.JAN.2022 16:25:36	Date: 21.JAN.2022 16:40:09
Middle Channel	**Middle Channel**
	
Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 28.53 dBm Peak 28.76 dBm Crest 0.23 dB 10 % 0.16 dB 1 % 0.24 dB .1 % 0.24 dB .01 % 0.24 dB	Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 24.76 dBm Peak 27.92 dBm Crest 3.16 dB 10 % 2.56 dB 1 % 3.04 dB .1 % 3.12 dB .01 % 3.16 dB
Date: 21.JAN.2022 16:25:58	Date: 21.JAN.2022 16:40:26
Highest Channel	**Highest Channel**
	
Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 28.38 dBm Peak 28.62 dBm Crest 0.24 dB 10 % 0.16 dB 1 % 0.20 dB .1 % 0.24 dB .01 % 0.28 dB	Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 24.37 dBm Peak 27.77 dBm Crest 3.40 dB 10 % 2.68 dB 1 % 3.24 dB .1 % 3.32 dB .01 % 3.36 dB
Date: 21.JAN.2022 16:26:15	Date: 21.JAN.2022 16:40:43

26dB Bandwidth

Mode	GSM850: 26dB BW(MHz)	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	0.315	0.291
Middle CH	0.314	0.310
Highest CH	0.311	0.298

Mode	GSM1900: 26dB BW(MHz)	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	0.296	0.297
Middle CH	0.297	0.287
Highest CH	0.295	0.304

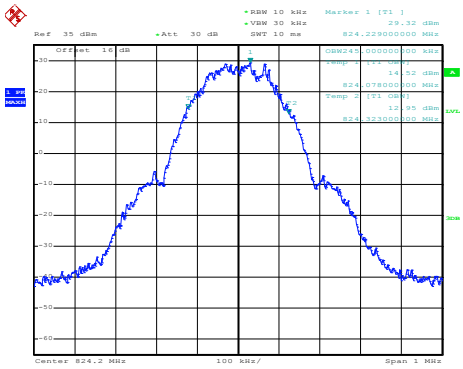
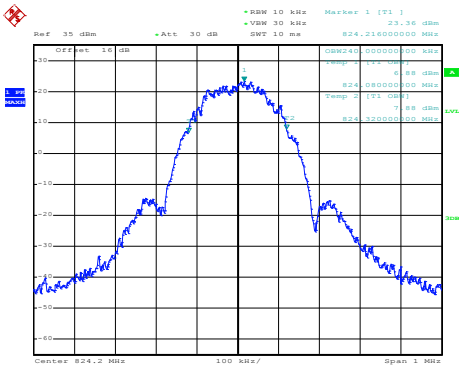
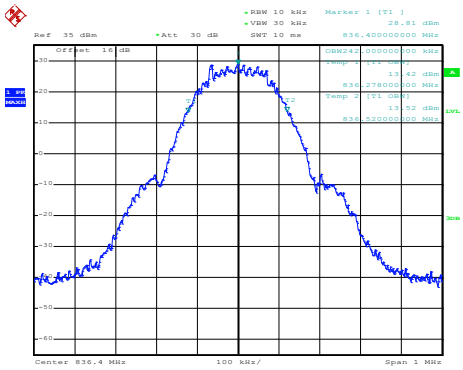
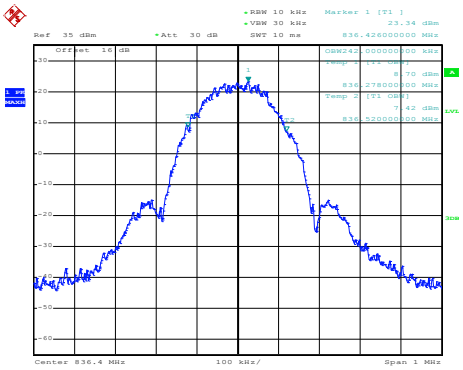
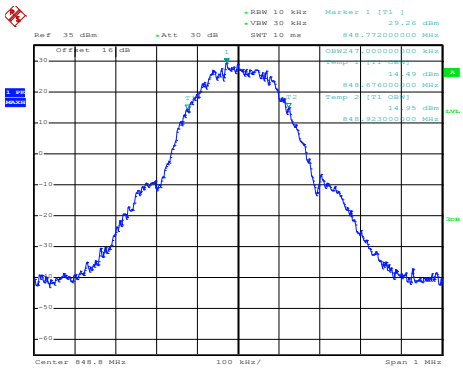
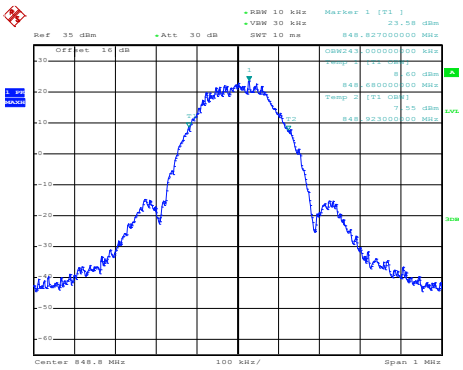
GSM850 (GPRS class 8)	GSM850 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Date: 21.JAN.2022 15:43:46	Date: 21.JAN.2022 16:00:02
Middle Channel	**Middle Channel**
	
Date: 21.JAN.2022 15:44:32	Date: 21.JAN.2022 16:00:38
Highest Channel	**Highest Channel**
	
Date: 21.JAN.2022 15:45:15	Date: 21.JAN.2022 16:01:12

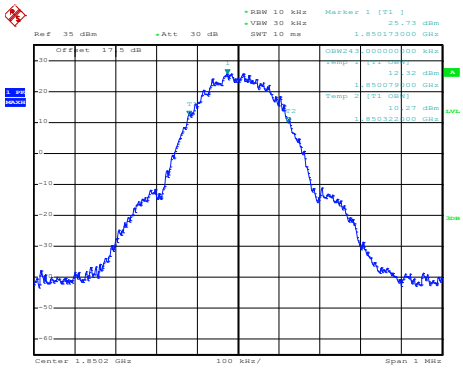
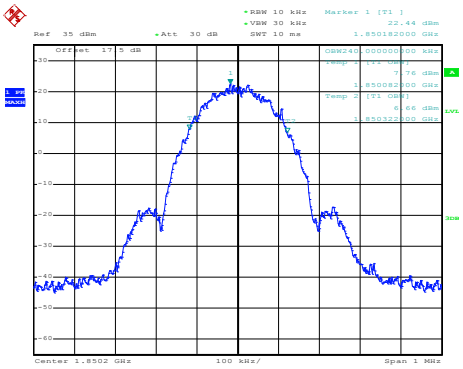
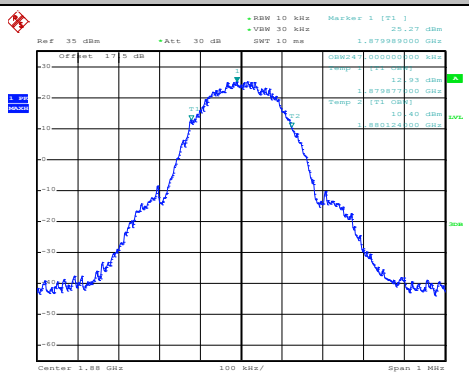
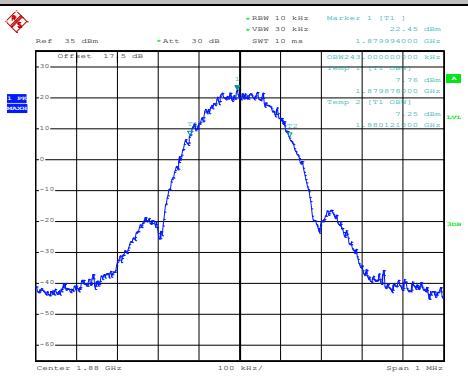
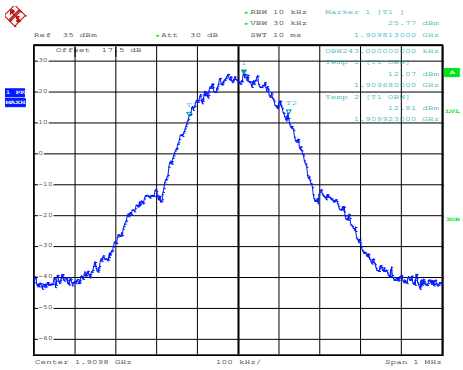
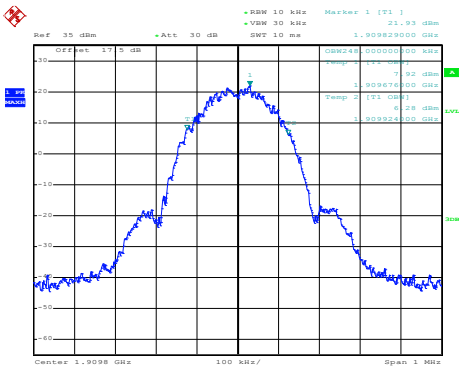
GSM1900 (GPRS class 8)	GSM1900 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Date: 21.JAN.2022 16:13:33	Date: 21.JAN.2022 16:28:40
Middle Channel	**Middle Channel**
	
Date: 21.JAN.2022 16:14:08	Date: 21.JAN.2022 16:29:17
Highest Channel	**Highest Channel**
	
Date: 21.JAN.2022 16:14:42	Date: 21.JAN.2022 16:29:56

Occupied Bandwidth

Mode	GSM850: 99% OBW (MHz)	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	0.245	0.240
Middle CH	0.242	0.242
Highest CH	0.247	0.243

Mode	GSM1900: 99% OBW (MHz)	
Mod.	GPRS class 8	EDGE class 8
Lowest CH	0.243	0.240
Middle CH	0.247	0.243
Highest CH	0.243	0.248

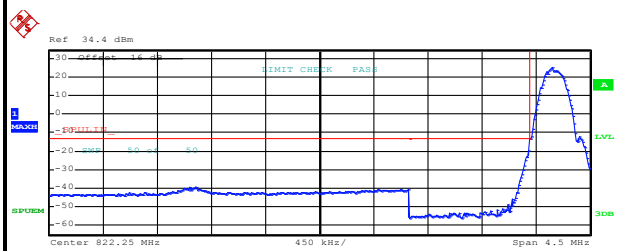
GSM850 (GPRS class 8)	GSM850 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Date: 21.JAN.2022 15:49:29	Date: 21.JAN.2022 16:04:38
Middle Channel	**Middle Channel**
	
Date: 21.JAN.2022 15:50:03	Date: 21.JAN.2022 16:05:12
Highest Channel	**Highest Channel**
	
Date: 21.JAN.2022 15:50:38	Date: 21.JAN.2022 16:05:49

GSM1900 (GPRS class 8)	GSM1900 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Date: 21.JAN.2022 16:18:18	Date: 21.JAN.2022 16:34:47
Middle Channel	**Middle Channel**
	
Date: 21.JAN.2022 16:20:50	Date: 21.JAN.2022 16:35:26
Highest Channel	**Highest Channel**
	
Date: 21.JAN.2022 16:21:24	Date: 21.JAN.2022 16:36:08

Conducted Band Edge

GSM850 (GPRS class 8)

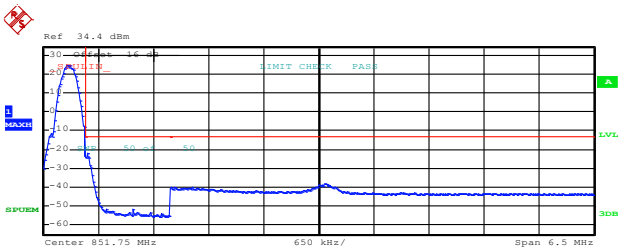
Lowest Band Edge



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
820.000 M	823.000 M	100.00 k	821.224000 M	-39.48	-26.48
823.000 M	824.000 M	3.00 k	823.988000 M	-21.30	-8.30
824.000 M	824.500 M	10.00 k	824.186000 M	25.35	-9.65

Date: 21.JAN.2022 15:52:16

Highest Band Edge

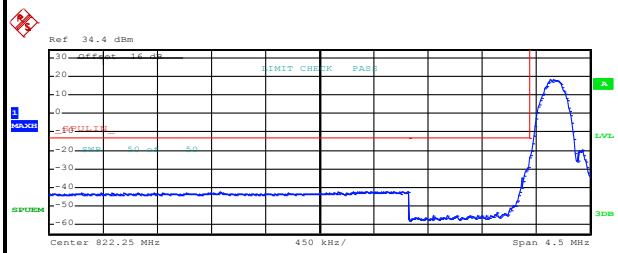


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
848.500 M	849.000 M	10.00 k	848.781500 M	24.77	-10.23
849.000 M	850.000 M	3.00 k	849.020000 M	-22.31	-9.31
850.000 M	855.000 M	100.00 k	851.825000 M	-38.24	-25.24

Date: 21.JAN.2022 15:53:51

GSM850 (EDGE class 8)

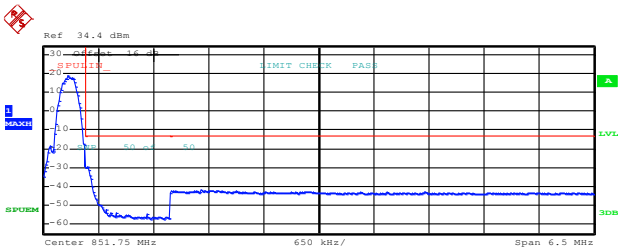
Lowest Band Edge



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
820.000 M	823.000 M	100.00 k	822.565000 M	-42.26	-29.26
823.000 M	824.000 M	3.00 k	823.980000 M	-29.23	-16.23
824.000 M	824.500 M	10.00 k	824.170500 M	18.21	-16.79

Date: 21.JAN.2022 16:07:47

Highest Band Edge

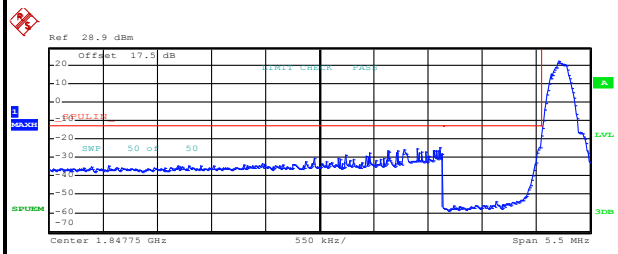


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
848.500 M	849.000 M	10.00 k	848.787500 M	18.86	-16.14
849.000 M	850.000 M	3.00 k	849.012000 M	-28.91	-15.91
850.000 M	855.000 M	100.00 k	850.360000 M	-42.21	-29.21

Date: 21.JAN.2022 16:09:20

GSM1900 (GPRS class 8)

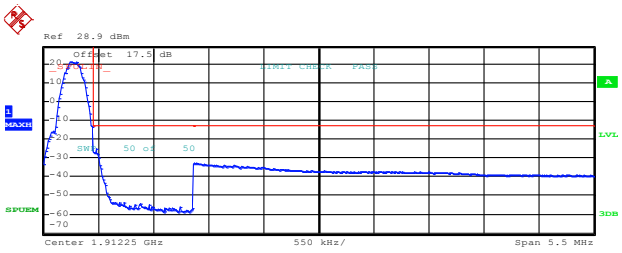
Lowest Band Edge



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.845 G	1.849 G	1.00 M	1.848972 G	-24.86	-11.86
1.849 G	1.850 G	3.00 k	1.849988 G	-24.45	-11.45
1.850 G	1.851 G	10.00 k	1.850181 G	22.22	-12.78

Date: 21.JAN.2022 16:23:18

Highest Band Edge

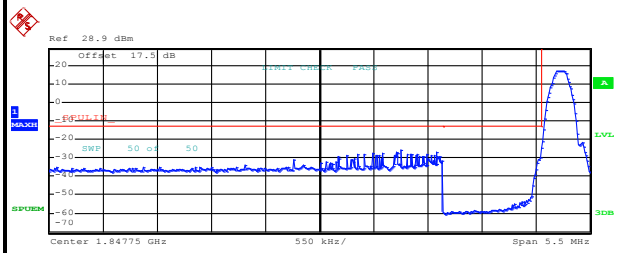


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.910 G	1.910 G	10.00 k	1.909776 G	21.09	-13.91
1.910 G	1.911 G	3.00 k	1.910020 G	-25.36	-12.36
1.911 G	1.915 G	1.00 M	1.911028 G	-32.92	-19.92

Date: 21.JAN.2022 16:25:03

GSM1900 (EDGE class 8)

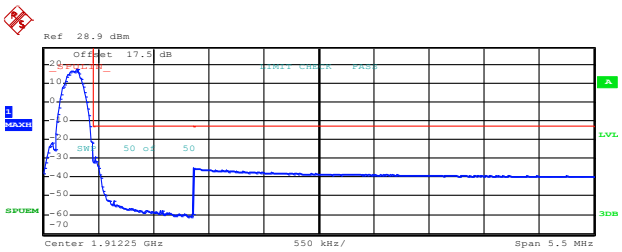
Lowest Band Edge



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.845 G	1.849 G	1.00 M	1.848576 G	-25.95	-12.95
1.849 G	1.850 G	3.00 k	1.849992 G	-30.10	-17.10
1.850 G	1.851 G	10.00 k	1.850228 G	17.02	-17.98

Date: 21.JAN.2022 16:37:47

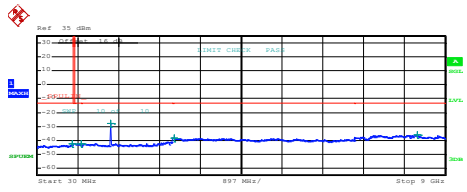
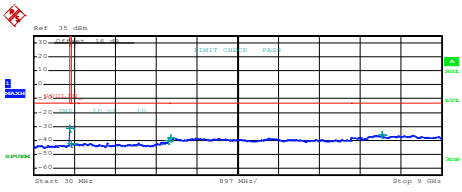
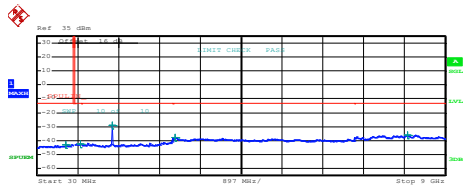
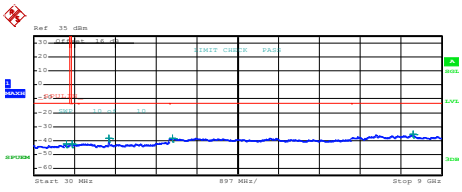
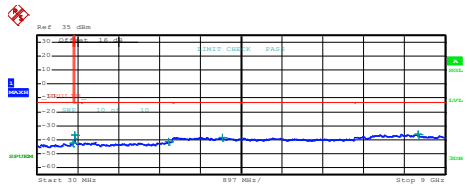
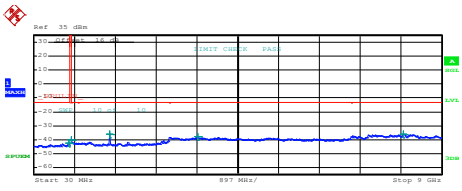
Highest Band Edge

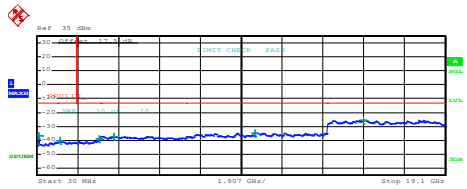
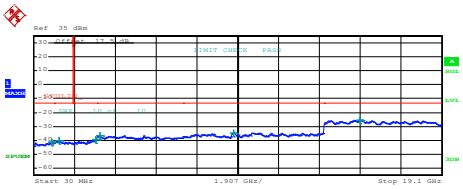
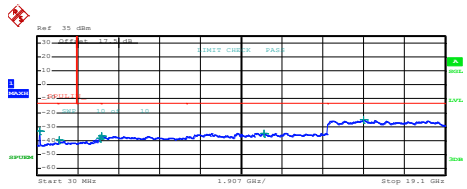
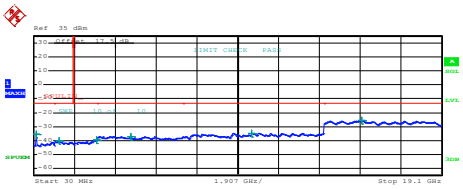
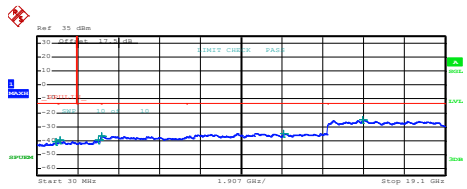
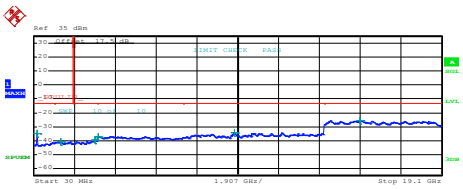


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.910 G	1.910 G	10.00 k	1.909825 G	17.24	-17.76
1.910 G	1.911 G	3.00 k	1.910008 G	-29.04	-16.04
1.911 G	1.915 G	1.00 M	1.911000 G	-35.36	-22.36

Date: 21.JAN.2022 16:39:21

Conducted Spurious Emission

GSM850 (GPRS class 8)	GSM850 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Start [Hz] / Stop [Hz] / RBW [Hz] / Freq [Hz] / PwrAbs [dBm] / ΔLimit [dB] 30.000 M / 820.000 M / 1.00 M / 797.287500 M / -42.69 / -29.69 855.000 M / 1.000 G / 1.00 M / 997.390010 M / -42.32 / -29.32 1.000 G / 3.000 G / 1.00 M / 1.648500 G / -28.11 / -15.11 3.000 G / 7.000 G / 1.00 M / 3.038000 G / -38.41 / -25.41 7.000 G / 9.000 G / 1.00 M / 8.391500 G / -36.34 / -23.34	Start [Hz] / Stop [Hz] / RBW [Hz] / Freq [Hz] / PwrAbs [dBm] / ΔLimit [dB] 30.000 M / 820.000 M / 1.00 M / 819.802500 M / -31.52 / -18.52 855.000 M / 1.000 G / 1.00 M / 858.117500 M / -42.35 / -29.35 1.000 G / 3.000 G / 1.00 M / 2.999000 G / -40.43 / -27.43 3.000 G / 7.000 G / 1.00 M / 3.041000 G / -38.19 / -25.19 7.000 G / 9.000 G / 1.00 M / 7.694500 G / -35.84 / -22.84
Date: 21.JAN.2022 15:46:51	Date: 21.JAN.2022 16:02:11
Middle Channel	**Middle Channel**
	
Start [Hz] / Stop [Hz] / RBW [Hz] / Freq [Hz] / PwrAbs [dBm] / ΔLimit [dB] 30.000 M / 820.000 M / 1.00 M / 660.815000 M / -43.03 / -30.03 855.000 M / 1.000 G / 1.00 M / 981.113759 M / -42.34 / -29.34 1.000 G / 3.000 G / 1.00 M / 1.673000 G / -29.03 / -16.03 3.000 G / 7.000 G / 1.00 M / 3.063000 G / -37.92 / -24.92 7.000 G / 9.000 G / 1.00 M / 8.170500 G / -36.08 / -23.08	Start [Hz] / Stop [Hz] / RBW [Hz] / Freq [Hz] / PwrAbs [dBm] / ΔLimit [dB] 30.000 M / 820.000 M / 1.00 M / 750.480000 M / -42.45 / -29.45 855.000 M / 1.000 G / 1.00 M / 866.527501 M / -42.48 / -29.48 1.000 G / 3.000 G / 1.00 M / 1.672500 G / -38.25 / -25.25 3.000 G / 7.000 G / 1.00 M / 3.088000 G / -38.45 / -25.45 7.000 G / 9.000 G / 1.00 M / 8.366500 G / -35.64 / -22.64
Date: 21.JAN.2022 15:47:44	Date: 21.JAN.2022 16:03:03
Highest Channel	**Highest Channel**
	
Start [Hz] / Stop [Hz] / RBW [Hz] / Freq [Hz] / PwrAbs [dBm] / ΔLimit [dB] 30.000 M / 820.000 M / 1.00 M / 814.667500 M / -42.32 / -29.32 855.000 M / 1.000 G / 1.00 M / 855.036250 M / -36.78 / -23.78 1.000 G / 3.000 G / 1.00 M / 2.932000 G / -41.19 / -28.19 3.000 G / 7.000 G / 1.00 M / 4.094000 G / -38.26 / -25.26 7.000 G / 9.000 G / 1.00 M / 8.413000 G / -36.14 / -23.14	Start [Hz] / Stop [Hz] / RBW [Hz] / Freq [Hz] / PwrAbs [dBm] / ΔLimit [dB] 30.000 M / 820.000 M / 1.00 M / 807.557500 M / -42.44 / -29.44 855.000 M / 1.000 G / 1.00 M / 855.036250 M / -40.20 / -27.20 1.000 G / 3.000 G / 1.00 M / 1.697500 G / -36.06 / -23.06 3.000 G / 7.000 G / 1.00 M / 3.641000 G / -37.94 / -24.94 7.000 G / 9.000 G / 1.00 M / 8.157000 G / -36.16 / -23.16
Date: 21.JAN.2022 15:48:43	Date: 21.JAN.2022 16:03:56

GSM1900 (GPRS class 8)	GSM1900 (EDGE class 8)
Lowest Channel	**Lowest Channel**
	
Date: 21.JAN.2022 16:15:50	Date: 21.JAN.2022 16:31:04
Middle Channel	**Middle Channel**
	
Date: 21.JAN.2022 16:16:43	Date: 21.JAN.2022 16:33:02
Highest Channel	**Highest Channel**
	
Date: 21.JAN.2022 16:17:38	Date: 21.JAN.2022 16:33:55

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	0.0132	0.0084	PASS
40	Normal Voltage	0.0072	0.0072	
30	Normal Voltage	0.0060	0.0048	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0012	0.0048	
0	Normal Voltage	0.0036	0.0096	
-10	Normal Voltage	0.0096	0.0108	
-20	Normal Voltage	0.0179	0.0132	
-30	Normal Voltage	0.0203	0.0167	
20	Maximum Voltage	0.0060	0.0096	
20	Normal Voltage	0.0000	0.0000	
20	Battery End Point	0.0120	0.0036	
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	0.0122	0.0309	PASS
40	Normal Voltage	0.0074	0.0261	
30	Normal Voltage	0.0032	0.0202	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0032	0.0207	
0	Normal Voltage	0.0074	0.0229	
-10	Normal Voltage	0.0112	0.0271	
-20	Normal Voltage	0.0170	0.0298	
-30	Normal Voltage	0.0197	0.0319	
20	Maximum Voltage	0.0021	0.0043	
20	Normal Voltage	0.0000	0.0000	
20	Battery End Point	0.0011	0.0037	

Note:

1. Normal Voltage = 14 V. ；Battery End Point (BEP) = 12 V.；Maximum Voltage =16 V

2. The frequency fundamental emissions stay within the authorized frequency block.

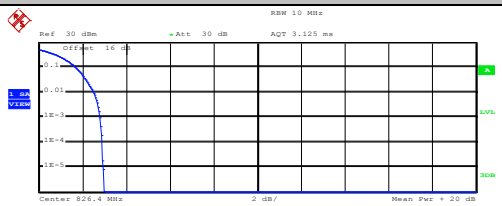
A3. WCDMA

Peak-to-Average Ratio

Mode	WCDMA Band V	Limit: 13dB
Mod.	RMC 12.2Kbps	Result
Lowest CH	2.80	PASS
Middle CH	2.84	
Highest CH	2.88	

WCDMA Band V (RMC 12.2Kbps)

Lowest Channel

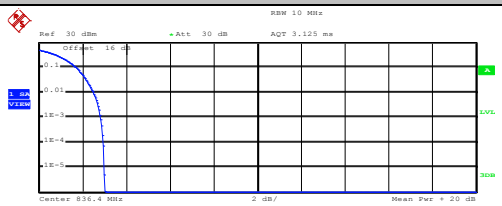


Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	21.77 dBm
Peak	24.75 dBm
Crest	2.98 dB
10 %	1.68 dB
1 %	2.52 dB
.1 %	2.80 dB
.01 %	2.92 dB

Date: 21.JAN.2022 17:30:14

Middle Channel

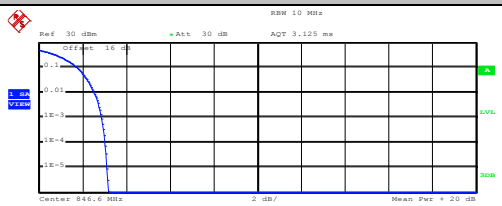


Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	21.75 dBm
Peak	24.75 dBm
Crest	3.00 dB
10 %	1.72 dB
1 %	2.52 dB
.1 %	2.84 dB
.01 %	2.96 dB

Date: 21.JAN.2022 17:30:30

Highest Channel



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	21.71 dBm
Peak	24.89 dBm
Crest	3.18 dB
10 %	1.76 dB
1 %	2.52 dB
.1 %	2.88 dB
.01 %	3.04 dB

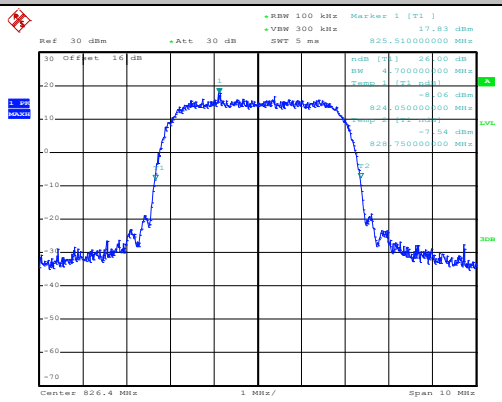
Date: 21.JAN.2022 17:30:46

26dB Bandwidth

Mode	WCDMA Band V: 26dB BW(MHz)
Mod.	RMC 12.2Kbps
Lowest CH	4.70
Middle CH	4.73
Highest CH	4.73

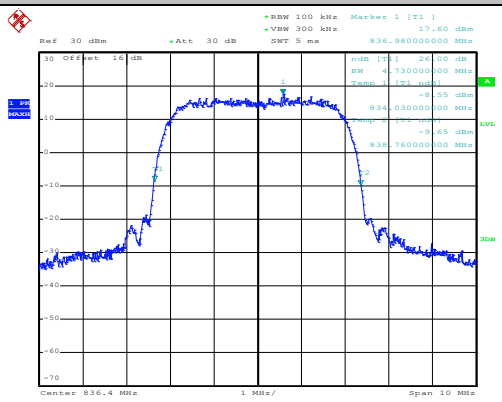
WCDMA Band V (RMC 12.2Kbps)

Lowest Channel



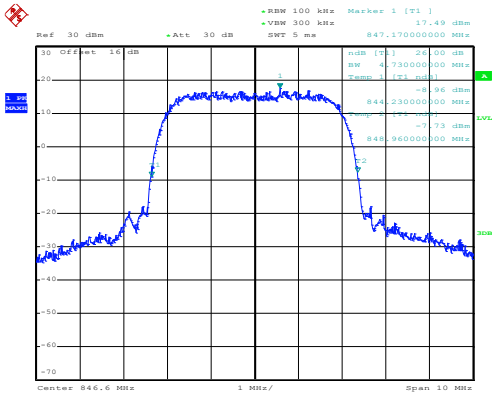
Date: 21.JAN.2022 17:17:21

Middle Channel



Date: 21.JAN.2022 17:18:05

Highest Channel



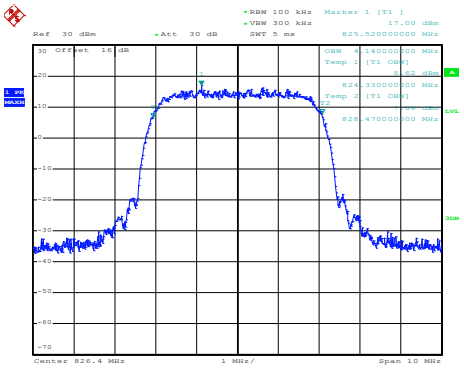
Date: 21.JAN.2022 17:18:41

Occupied Bandwidth

Mode	WCDMA Band V: 99% OBW (MHz)
Mod.	RMC 12.2Kbps
Lowest CH	4.14
Middle CH	4.16
Highest CH	4.15

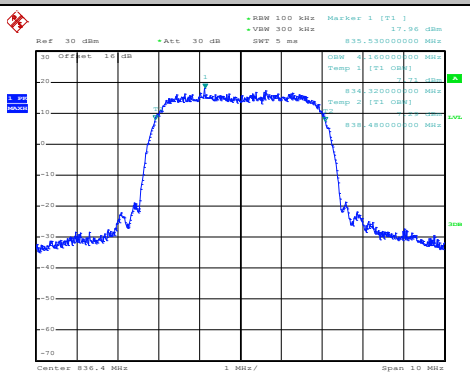
WCDMA Band V (RMC 12.2Kbps)

Lowest Channel



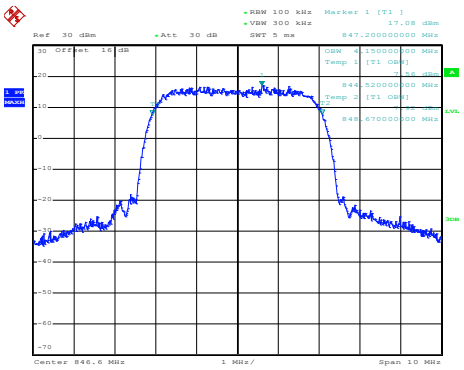
Date: 21.JAN.2022 17:22:23

Middle Channel



Date: 21.JAN.2022 17:23:00

Highest Channel

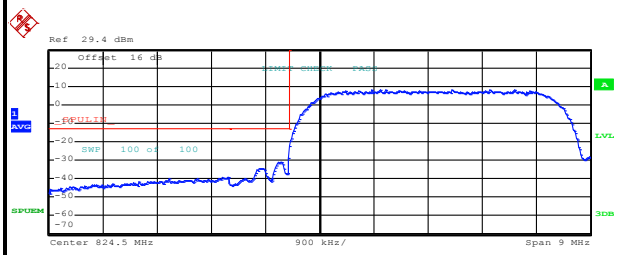


Date: 21.JAN.2022 17:23:36

Conducted Band Edge

WCDMA Band V (RMC 12.2Kbps)

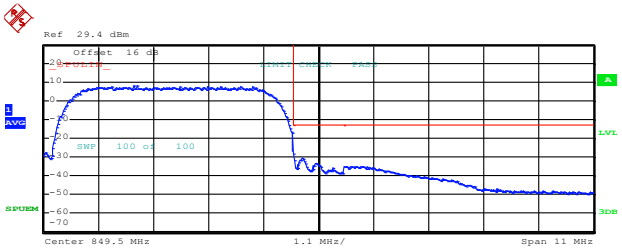
Lowest Band Edge



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
820.000 M	823.000 M	100.00 k	822.976000 M	-39.04	-26.04
823.000 M	824.000 M	50.00 k	823.996000 M	-29.26	-16.26
824.000 M	829.000 M	100.00 k	827.320000 M	8.07	-26.93

Date: 21.JAN.2022 17:26:39

Highest Band Edge



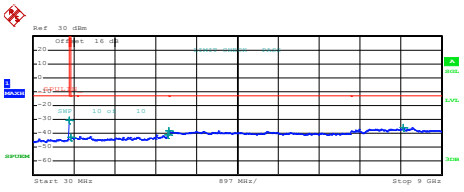
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
844.000 M	849.000 M	100.00 k	845.870000 M	7.82	-27.18
849.000 M	850.000 M	50.00 k	849.008000 M	-29.00	-16.00
850.000 M	855.000 M	100.00 k	850.350000 M	-35.01	-22.01

Date: 21.JAN.2022 17:29:36

Conducted Spurious Emission

WCDMA Band V (RMC 12.2Kbps)

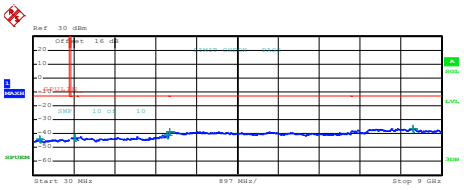
Lowest Channel



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	820.000 M	1.00 M	819.407500 M	-30.66	-17.66
855.000 M	1.000 G	1.00 M	862.793751 M	-42.59	-29.59
1.000 G	3.000 G	1.00 M	2.997000 G	-40.87	-27.87
3.000 G	7.000 G	1.00 M	3.017000 G	-38.03	-25.03
7.000 G	9.000 G	1.00 M	8.153500 G	-35.99	-22.99

Date: 21.JAN.2022 17:19:50

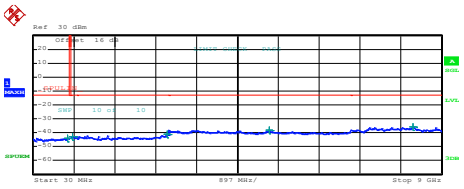
Middle Channel



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	820.000 M	1.00 M	170.027500 M	-43.97	-30.97
855.000 M	1.000 G	1.00 M	939.861256 M	-43.08	-30.08
1.000 G	3.000 G	1.00 M	2.976500 G	-40.89	-27.89
3.000 G	7.000 G	1.00 M	3.020000 G	-38.61	-25.61
7.000 G	9.000 G	1.00 M	8.374000 G	-36.25	-23.25

Date: 21.JAN.2022 17:20:44

Highest Channel



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	820.000 M	1.00 M	791.955000 M	-43.81	-30.81
855.000 M	1.000 G	1.00 M	889.111252 M	-42.73	-29.73
1.000 G	3.000 G	1.00 M	2.973000 G	-41.24	-28.24
3.000 G	7.000 G	1.00 M	5.221000 G	-38.04	-25.04
7.000 G	9.000 G	1.00 M	8.374000 G	-36.02	-23.02

Date: 21.JAN.2022 17:21:39

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	0.0215	PASS
40	Normal Voltage	0.0191	
30	Normal Voltage	0.0179	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0167	
0	Normal Voltage	0.0167	
-10	Normal Voltage	0.0191	
-20	Normal Voltage	0.0120	
-30	Normal Voltage	0.0155	
20	Maximum Voltage	0.0179	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0108	

Note:

1. Normal Voltage = 14 V. ；Battery End Point (BEP) = 12 V.；Maximum Voltage =16 V

2. The frequency fundamental emissions stay within the authorized frequency block.

Appendix B. Test Results of Radiated Test

GPRS 850

GPRS 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	-61.67	-13	-48.67	-71.32	-67.26	0.92	8.66	H
	2472	-57.52	-13	-44.52	-71.47	-64.89	1.14	10.66	H
	3296	-55.47	-13	-42.47	-71.53	-64.01	1.32	12.01	H
									H
									H
									H
	1648	-62.27	-13	-49.27	-71.39	-67.86	0.92	8.66	V
	2472	-55.93	-13	-42.93	-70.03	-63.30	1.14	10.66	V
	3296	-55.31	-13	-42.31	-71.85	-63.85	1.32	12.01	V
									V
									V
									V
Middle	1672	-61.28	-13	-48.28	-70.99	-66.96	0.93	8.75	H
	2512	-57.15	-13	-44.15	-71.1	-64.56	1.15	10.71	H
	3344	-55.51	-13	-42.51	-71.49	-64.15	1.33	12.13	H
									H
									H
									H
	1672	-61.69	-13	-48.69	-70.77	-67.37	0.93	8.75	V
	2512	-53.06	-13	-40.06	-67.21	-60.47	1.15	10.71	V
	3344	-54.83	-13	-41.83	-71.26	-63.47	1.33	12.13	V
									V
									V
									V

Highest	1696	-61.44	-13	-48.44	-71.22	-67.20	0.94	8.84	H
	2544	-57.07	-13	-44.07	-71.04	-64.51	1.16	10.75	H
	3395	-54.27	-13	-41.27	-70.16	-63.03	1.34	12.25	H
									H
									H
									H
	1696	-61.62	-13	-48.62	-70.68	-67.38	0.94	8.84	V
	2544	-57.25	-13	-44.25	-71.32	-64.69	1.16	10.75	V
	3395	-55.22	-13	-42.22	-71.54	-63.98	1.34	12.25	V
									V
									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)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3702	-49.89	-13	-36.89	-68.45	-61.10	1.41	12.62	H
	5550	-47.39	-13	-34.39	-70.3	-58.95	1.74	13.30	H
	7404	-44.64	-13	-31.64	-71.65	-53.96	1.94	11.25	H
									H
									H
									H
	3702	-51.60	-13	-38.60	-70.31	-62.81	1.41	12.62	V
	5550	-49.39	-13	-36.39	-71.82	-60.95	1.74	13.30	V
	7404	-45.11	-13	-32.11	-71.94	-54.43	1.94	11.25	V
									V
									V
									V
Middle	3762	-47.67	-13	-34.67	-66.37	-58.90	1.43	12.66	H
	5640	-46.19	-13	-33.19	-69.14	-57.76	1.73	13.30	H
	7518	-45.23	-13	-32.23	-71.72	-54.34	1.99	11.10	H
									H
									H
									H
	3762	-51.60	-13	-38.60	-70.52	-62.83	1.43	12.66	V
	5640	-48.70	-13	-35.70	-71.24	-60.27	1.73	13.30	V
	7518	-45.49	-13	-32.49	-71.94	-54.60	1.99	11.10	V
									V
									V
									V

Highest	3822	-47.28	-13	-34.28	-66.08	-58.53	1.44	12.69	H
	5730	-47.77	-13	-34.77	-71.15	-59.34	1.73	13.30	H
	7639	-45.79	-13	-32.79	-71.86	-54.91	2.01	11.13	H
									H
									H
									H
	3822	-50.58	-13	-37.58	-69.61	-61.83	1.44	12.69	V
	5730	-48.79	-13	-35.79	-71.53	-60.36	1.73	13.30	V
	7638	-45.61	-13	-32.61	-71.59	-54.73	2.01	11.13	V
									V
									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)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1656	-61.34	-13	-48.34	-71.01	-66.96	0.92	8.69	H
	2480	-56.87	-13	-43.87	-70.81	-64.25	1.15	10.67	H
	3305	-55.32	-13	-42.32	-71.37	-63.88	1.32	12.03	H
									H
									H
									H
	1656	-61.67	-13	-48.67	-70.77	-67.29	0.92	8.69	V
	2480	-57.13	-13	-44.13	-71.24	-64.51	1.15	10.67	V
	3305	-54.72	-13	-41.72	-71.24	-63.28	1.32	12.03	V
									V
									V
									V
Middle	1672	-60.72	-13	-47.72	-70.44	-66.40	0.93	8.75	H
	2512	-57.27	-13	-44.27	-71.23	-64.68	1.15	10.71	H
	3344	-55.05	-13	-42.05	-71.03	-63.69	1.33	12.13	H
									H
									H
									H
	1672	-61.19	-13	-48.19	-70.28	-66.87	0.93	8.75	V
	2512	-56.88	-13	-43.88	-71.03	-64.29	1.15	10.71	V
	3344	-54.81	-13	-41.81	-71.24	-63.45	1.33	12.13	V
									V
									V
									V

Highest	1696	-61.29	-13	-48.29	-71.06	-67.05	0.94	8.84	H
	2536	-57.10	-13	-44.10	-71.06	-64.53	1.16	10.74	H
	3384	-55.20	-13	-42.20	-71.1	-63.93	1.34	12.22	H
									H
									H
									H
	1696	-61.85	-13	-48.85	-70.91	-67.61	0.94	8.84	V
	2539	-57.00	-13	-44.00	-71.09	-64.44	1.16	10.75	V
	3384	-54.86	-13	-41.86	-71.2	-63.59	1.34	12.22	V
									V
									V
									V

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