FCC RF Test Report

APPLICANT	:	Motorola Mobility LLC
EQUIPMENT	:	Mobile Cellular Phone
BRAND NAME	:	Motorola
MODEL NAME	:	XT2341-3
FCC ID	:	IHDT56AM2
STANDARD	:	47 CFR Part 2, 22(H)
CLASSIFICATION	:	PCS Licensed Transmitter Held to Ear (PCE)
TEST DATE(S)	:	May 05, 2023 ~ May 06, 2023

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

This report contains data that were produced under subcontract by Sporton International Inc. (Shenzhen)

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

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG332010A	Rev. 01	Initial issue of report	May 30, 2023

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	-	Report Only	-
	§22.913(a)(5)	Effective Radiated Power	< 7 Watts	PASS	-
3.5	N/A	Peak-to-Average Ratio	< 13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
3.9	§2.1055 §22.355	Frequency Stability for Temperature & Voltage	< 2.5 ppm for Part 22	PASS	-
4.4	§2.1053; §22.917(a);	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 42.68 dB at 2509.20 MHz

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

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

1 General Description

1.1 Applicant

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

1.2 Manufacturer

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

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2341-3
FCC ID	IHDT56AM2
IMEI Code	Conducted: 356184890006556/356184890006564 Radiation: 356184890014436/356184890014444
HW Version	DVT2
SW Version	TLA33.30
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT, the sample 1 is 1st source + Battery 1 and the sample 2 is 2nd source + Battery 2. The difference could refer to the XT2341-3_Operational Description of Product Equality Declaration which is exhibit separately. According to the difference, we evaluate the sample 1 to perform full test.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	**GSM/GPRS/EDGE:** 850: 824 MHz ~ 849 MHz **WCDMA:** Band V: 824 MHz ~ 849 MHz
Rx Frequency	**GSM/GPRS/EDGE:** 850: 869 MHz ~ 894 MHz **WCDMA:** Band V: 869 MHz ~ 894 MHz
Maximum Output Power to Antenna	**GSM/GPRS/EDGE:**

	850: 31.92 dBm **WCDMA:** Band V: 22.48 dBm
Antenna Type	PIFA Antenna
Antenna Gain	Cellular Band: -5.4 dBi
Type of Modulation	GSM/ GPRS: GMSK EDGE: GMSK / 8PSK WCDMA : BPSK (Uplink) HSDPA/DC-HSDPA : QPSK (Uplink) HSUPA : QPSK (Uplink) HSPA+ : 16QAM(16QAM uplink is not supported) DC-HSDPA : 64QAM

1.5 Modification of EUT

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

1.6 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-201L
AC Adapter 1(EU)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-202L
AC Adapter 1(AR)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-206L
AC Adapter 1(BR)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-207L
AC Adapter 1(CHILE)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-209L
AC Adapter 2(US)	**Brand Name**	Motorola (aohai)	**Model Name**	MC-201L
AC Adapter 2(EU)	**Brand Name**	Motorola (aohai)	**Model Name**	MC-202L
AC Adapter 2(AR)	**Brand Name**	Motorola (aohai)	**Model Name**	MC-206L
AC Adapter 3(US)	**Brand Name**	Motorola (aohai)	**Model Name**	MC-101
AC Adapter 3(EU)	**Brand Name**	Motorola (aohai)	**Model Name**	MC-102
AC Adapter 3(UK)	**Brand Name**	Motorola (aohai)	**Model Name**	MC-103
AC Adapter 3(AU)	**Brand Name**	Motorola (aohai)	**Model Name**	MC-105
AC Adapter 4(US)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-101
AC Adapter 4(EU)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-102
AC Adapter 4(UK)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-103
AC Adapter 4(AU)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-105
AC Adapter 5(US)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-101
AC Adapter 5(EU)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-102
AC Adapter 5(UK)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-103
AC Adapter 5(AU)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-105
Battery 1	**Brand Name**	Motorola (ATL)	**Model Name**	PC50
Battery 2	**Brand Name**	Motorola (SCUD)	**Model Name**	PC50
Earphone 1	**Brand Name**	Motorola (New leader)	**Model Name**	NLD-EM313A-20SF
Earphone 2	**Brand Name**	Motorola (JWELL)	**Model Name**	JWEP1205-L20H
USB Cable 1	**Brand Name**	Motorola(SAIBAO)	**Model Name**	SLQ-A214A
USB Cable 2	**Brand Name**	Motorola(JWELL)	**Model Name**	ATOC

1.7 Maximum ERP Power, and Emission Designator

FCC Rule	Frequency Band	Frequency Range (MHz)	Type of Modulation	Maximum ERP (W)	Emission Designator
Part 22	GSM850 (GSM)	824.2 ~ 848.8	GMSK	0.2735	244KGXW
Part 22	GSM850 (EDGE)	824.2 ~ 848.8	8PSK	0.0820	235KG7W
Part 22	WCDMA Band V	826.4 ~ 846.6	BPSK	0.0311	4M16F9W

1.8 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-KS	CN1257	314309

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	CN1256	421272

1.9 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-SZ	AUDIX	E3	6.2009-8-24

1.10 Applicable Standards

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

- 47 CFR Part 2, 22(H)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

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

Radiated emissions were investigated as following frequency range:

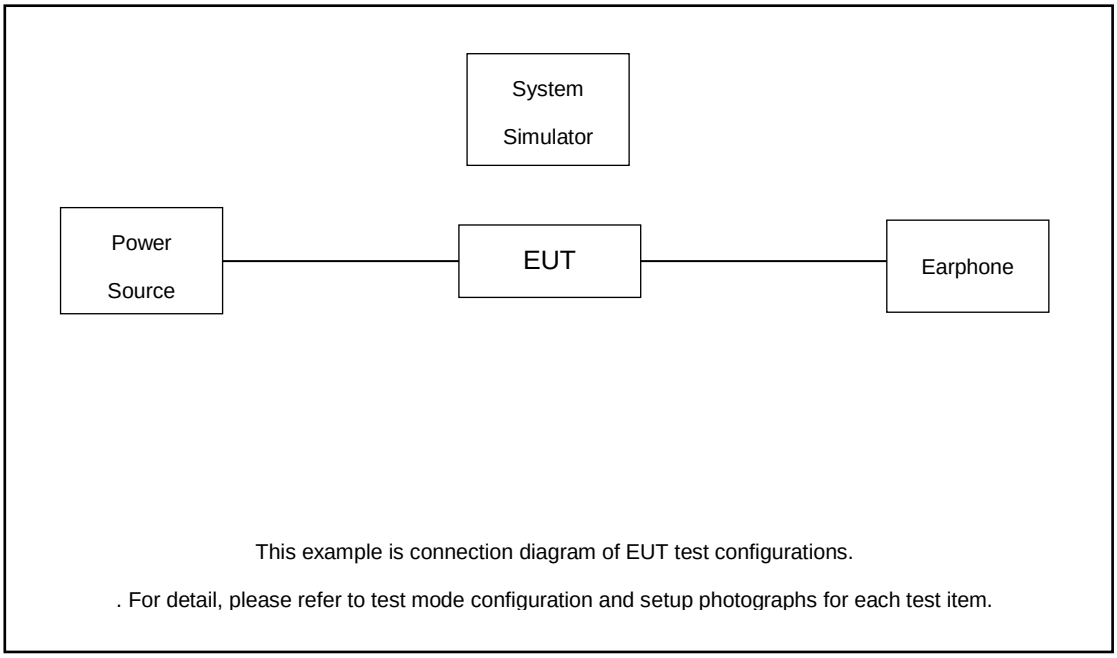
1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V.

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 ■ EDGE 1 Tx slots Link	■ GSM Link ■ EDGE 1 Tx slots Link
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



The EUT has been configuration operated in a manner tended to maximize its emission characteristics in a typical application.

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.	System Simulator	Agilent	E5515C	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 4.6 dB and a 10dB attenuator.

Example :

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

= 4.6 + 10 = 14.6 (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

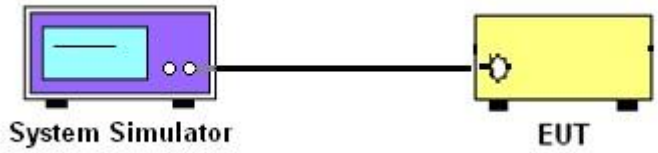
3 Conducted Test Result

3.1 Measuring Instruments

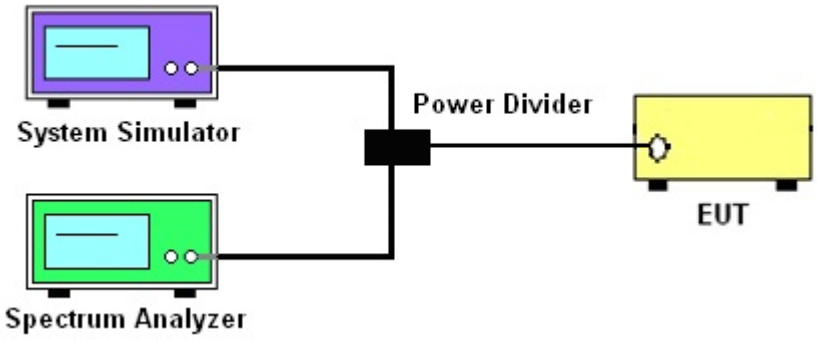
See list of measuring instruments of this test report.

3.2 Test Setup

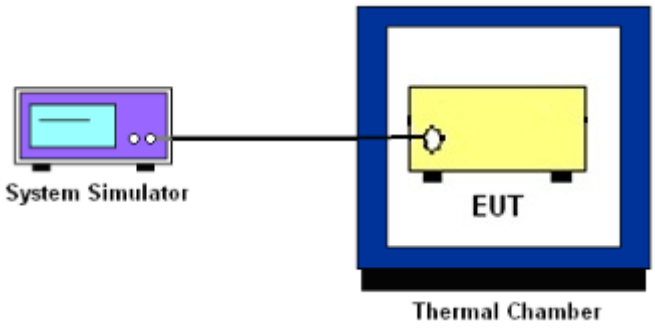
3.2.1 Conducted Output Power



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



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP

3.4.1 Description of the Conducted Output Power and ERP

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.

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T – L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

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

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

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

3.5.2 Test Procedures

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

3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement

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

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.6.2 Test Procedures

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

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

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

3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The band edges of low and high channels for the highest RF powers were measured.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

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

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

3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

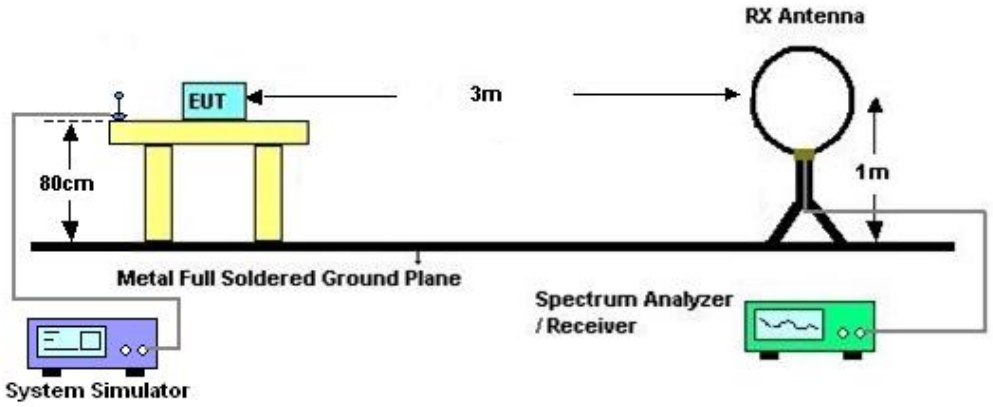
4 Radiated Test Items

4.1 Measuring Instruments

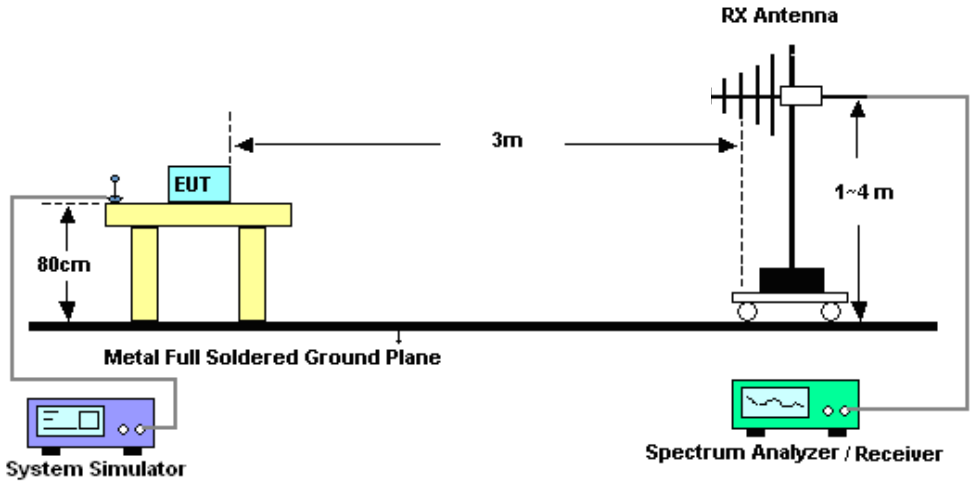
See list of measuring instruments of this test report.

4.2 Test Setup

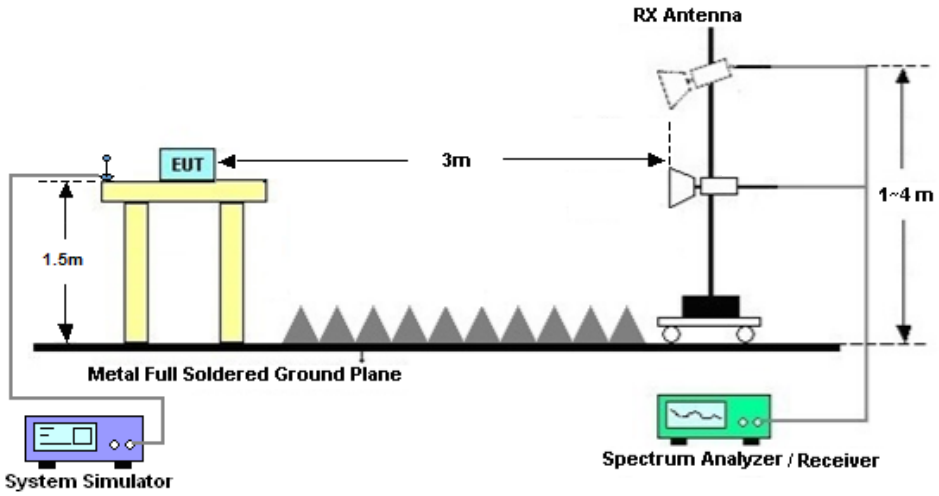
4.2.1 For radiated test below 30MHz



4.2.2 For radiated test from 30MHz to 1GHz



4.2.3 For radiated test above 1GHz



4.3 Test Result of Radiated Test

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

Please refer to Appendix B.

4.4 Field Strength of Spurious Radiation Measurement

4.4.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
12. ERP (dBm) = EIRP - 2.15
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 12, 2022	May 06, 2023	Oct. 11, 2023	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	NCR	May 06, 2023	NCR	Conducted (TH01-KS)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 15, 2022	May 06, 2023	Jul. 14, 2023	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Oct. 19, 2022	May 05, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 07, 2022	May 05, 2023	Jul. 06, 2023	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 28, 2022	May 05, 2023	Jun. 27, 2024	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	Apr. 26, 2023	May 05, 2023	Apr. 25, 2024	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1474	1GHz~18GHz	Jul. 07, 2022	May 05, 2023	Jul. 06, 2023	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Jul. 07, 2022	May 05, 2023	Jul. 06, 2023	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 19, 2022	May 05, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 19, 2022	May 05, 2023	Oct. 18, 2023	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 06, 2022	May 05, 2023	Jul. 05, 2023	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY57280136	500MHz~26.5GHz	Sep. 30, 2022	May 05, 2023	Sep. 29, 2023	Radiation (03CH04-SZ)
AC Power Source	APC	AFV-S-600B	F119050019	N/A	Nov. 10, 2022	May 05, 2023	Nov. 09, 2023	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	May 05, 2023	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	May 05, 2023	NCR	Radiation (03CH04-SZ)

NCR: No Calibration Required

6 Measurement Uncertainty

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

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±0.46 dB
Conducted Emissions	±0.48 dB
Occupied Channel Bandwidth	±0.1 %

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.8 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.1 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.9 dB

---------- THE END ----------

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power) and ERP

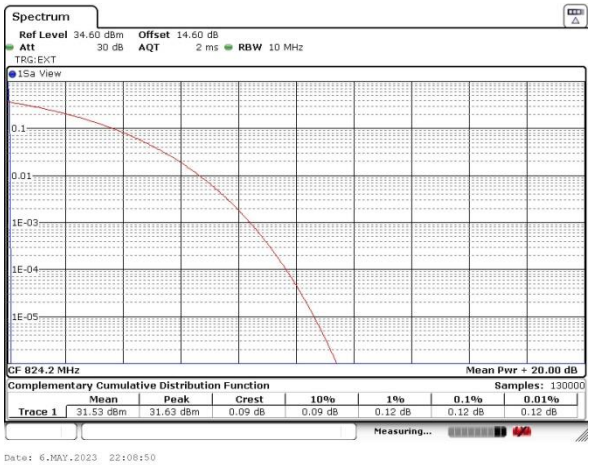
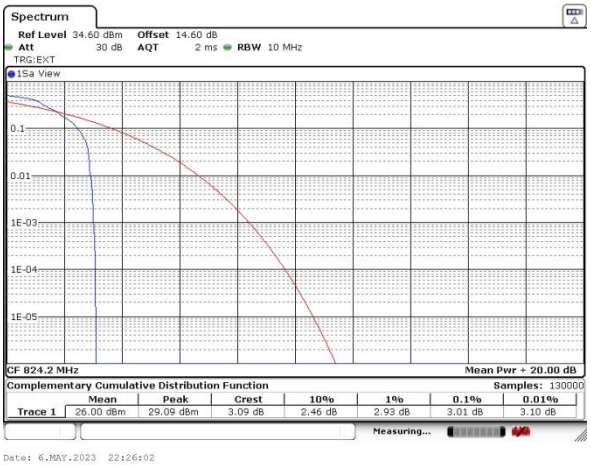
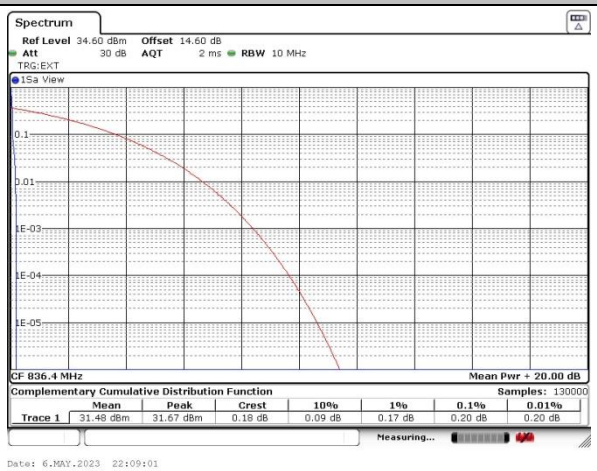
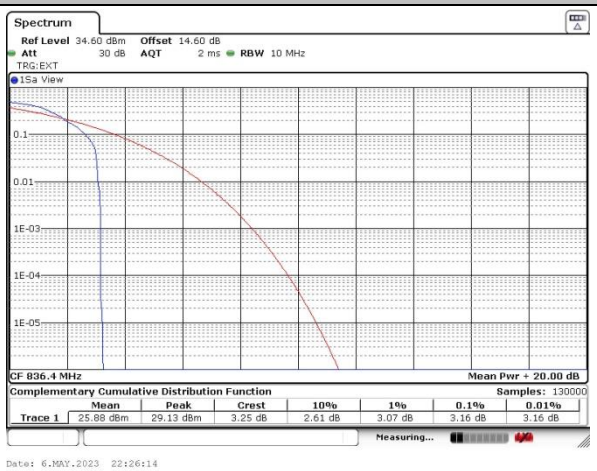
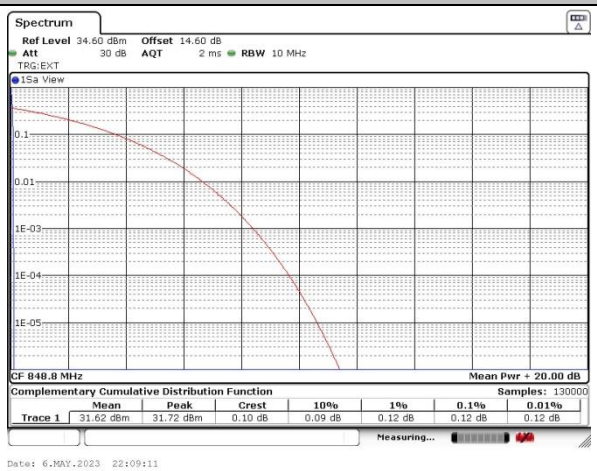
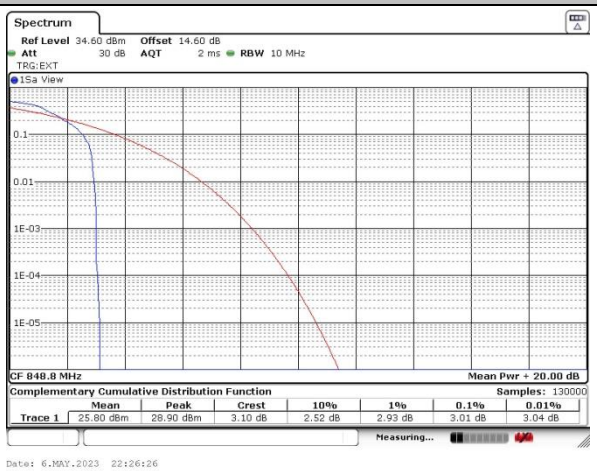
GSM850	Burst Average Power (dBm)			ERP(W)		
TX Channel	128	189	251			
Frequency (MHz)	824.2	836.4	848.8	L	M	H
GSM 1 Tx slot	31.88	31.92	31.75	0.2710	0.2735	0.2630
GPRS 1 Tx slot	31.87	31.90	31.74	0.2704	0.2723	0.2624
GPRS 2 Tx slots	30.26	30.30	30.27	0.1866	0.1884	0.1871
GPRS 3 Tx slots	28.35	28.39	28.25	0.1202	0.1213	0.1175
GPRS 4 Tx slots	26.26	26.42	26.30	0.0743	0.0771	0.0750
EDGE 1 Tx slot	26.69	26.68	26.59	0.0820	0.0818	0.0802
EDGE 2 Tx slots	24.54	24.59	24.59	0.0500	0.0506	0.0506
EDGE 3 Tx slots	22.55	22.65	22.62	0.0316	0.0324	0.0321
EDGE 4 Tx slots	20.86	20.97	20.89	0.0214	0.0220	0.0216

Band		WCDMA V			ERP(W)		
TX Channel		4132	4182	4233			
Rx Channel		4357	4407	4458			
Frequency (MHz)		826.4	836.4	846.6	L	M	H
3GPP Rel 99	AMR 12.2Kbps	22.46	22.45	22.44	0.0310	0.0309	0.0308
3GPP Rel 99	RMC 12.2Kbps	22.47	22.48	22.45	0.0310	0.0311	0.0309
3GPP Rel 6	HSDPA Subtest-1	21.43	21.48	21.51	0.0244	0.0247	0.0249
3GPP Rel 6	HSDPA Subtest-2	21.45	21.48	21.38	0.0245	0.0247	0.0242
3GPP Rel 6	HSDPA Subtest-3	20.87	20.92	20.90	0.0215	0.0217	0.0216
3GPP Rel 6	HSDPA Subtest-4	20.89	21.01	20.93	0.0216	0.0222	0.0218
3GPP Rel 8	DC-HSDPA Subtest-1	21.42	21.54	21.52	0.0244	0.0251	0.0249
3GPP Rel 8	DC-HSDPA Subtest-2	21.51	21.46	21.42	0.0249	0.0246	0.0244
3GPP Rel 8	DC-HSDPA Subtest-3	20.72	21.05	20.91	0.0207	0.0224	0.0217
3GPP Rel 8	DC-HSDPA Subtest-4	20.95	20.83	20.97	0.0219	0.0213	0.0220
3GPP Rel 6	HSUPA Subtest-1	21.51	21.40	21.36	0.0249	0.0243	0.0240
3GPP Rel 6	HSUPA Subtest-2	19.33	19.55	19.55	0.0151	0.0158	0.0158
3GPP Rel 6	HSUPA Subtest-3	20.48	20.58	20.55	0.0196	0.0201	0.0200
3GPP Rel 6	HSUPA Subtest-4	19.32	19.48	19.47	0.0150	0.0156	0.0156
3GPP Rel 6	HSUPA Subtest-5	21.50	21.62	21.34	0.0248	0.0255	0.0239

A1. GSM

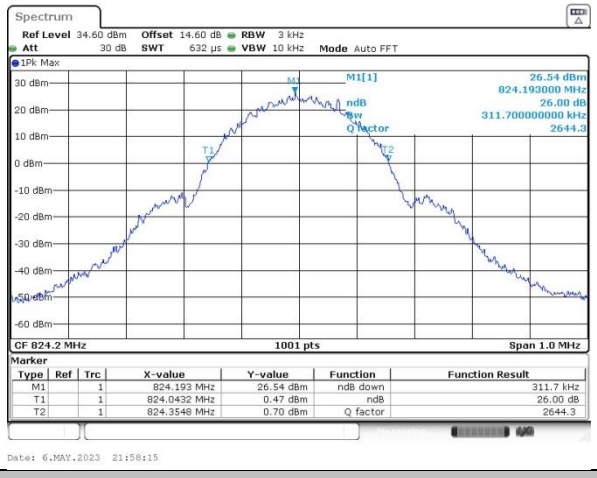
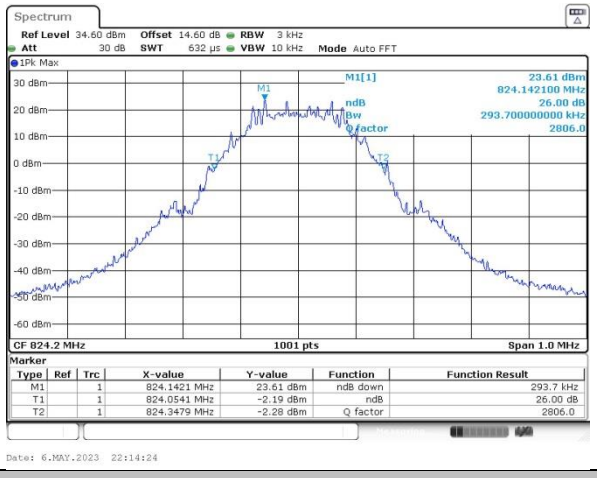
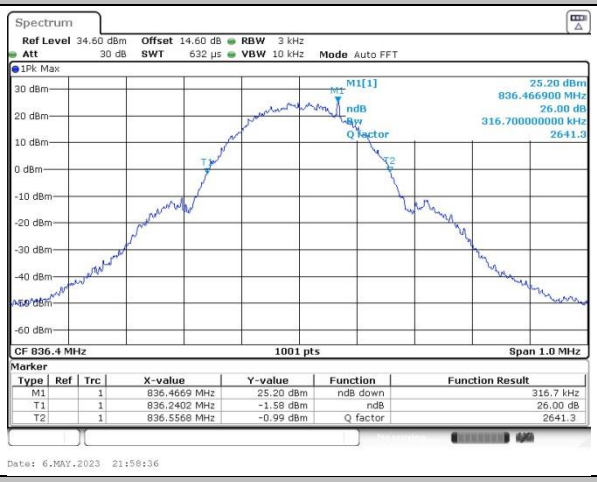
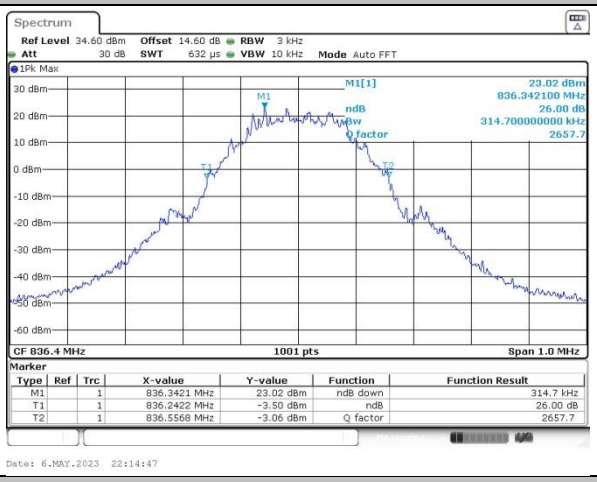
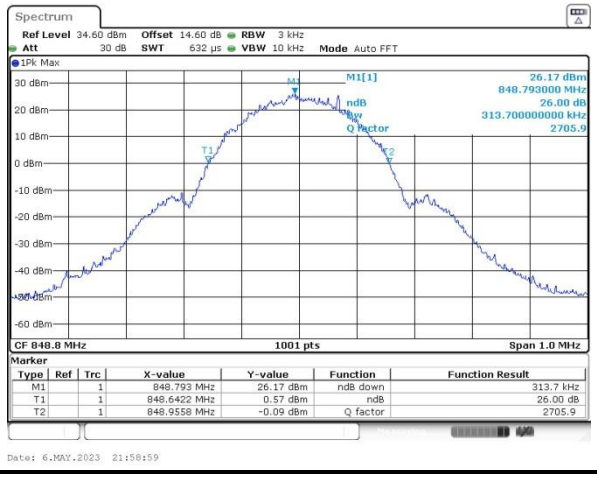
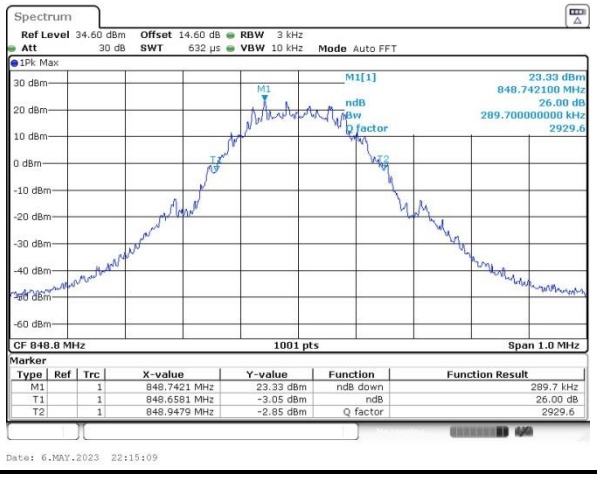
Peak-to-Average Ratio

Mode	GSM850		Limit: 13dB
Mod.	GSM	EDGE class 8	Result
Lowest CH	0.12	3.01	PASS
Middle CH	0.20	3.16	
Highest CH	0.12	3.01	

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

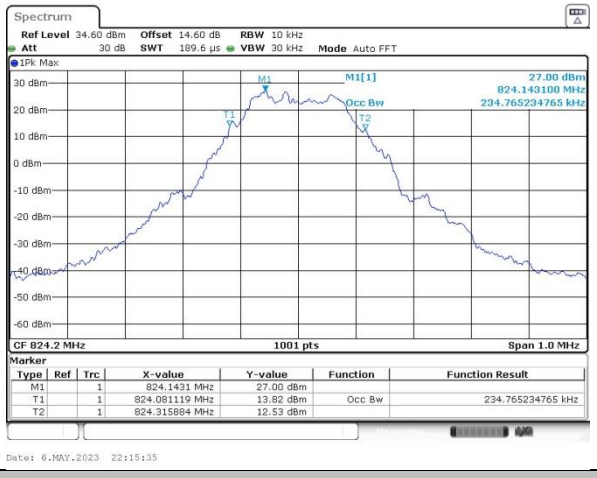
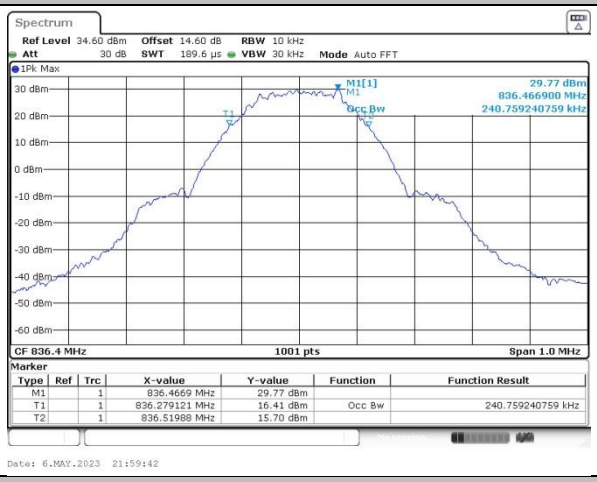
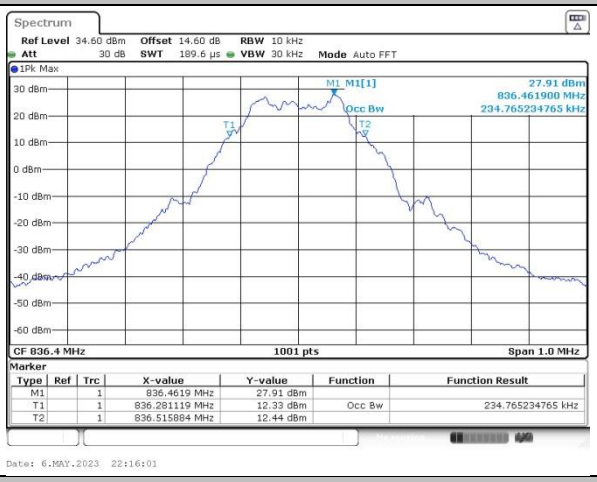
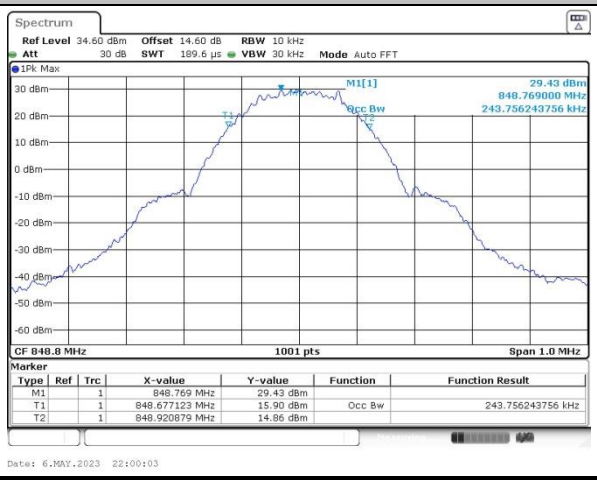
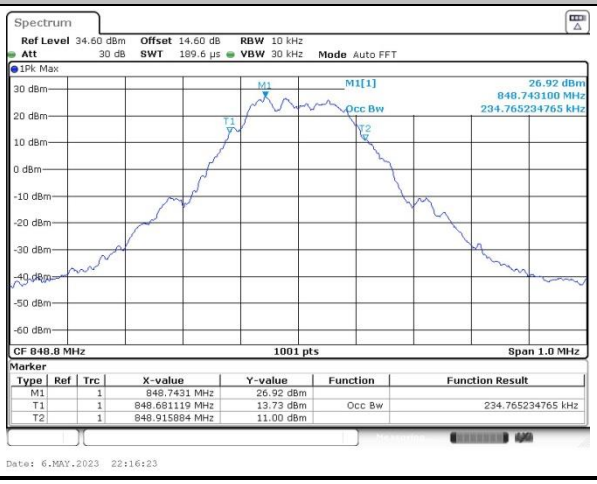
26dB Bandwidth

Mode	GSM850(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.312	0.094
Middle CH	0.317	0.315
Highest CH	0.314	0.290

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

Occupied Bandwidth

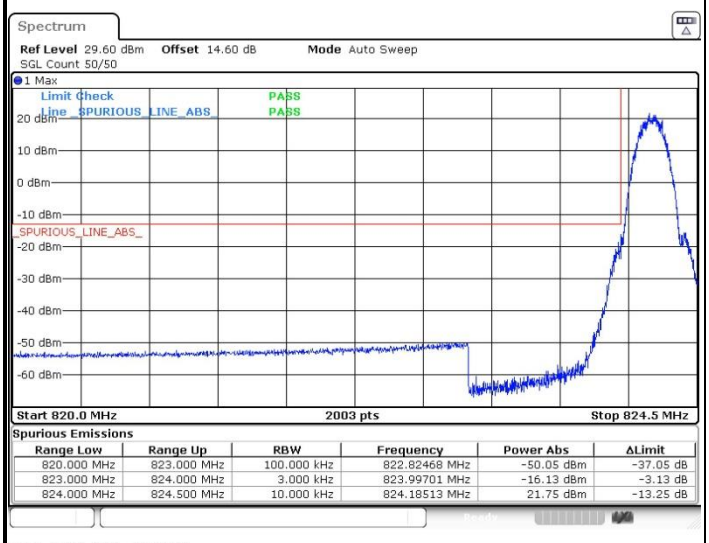
Mode	GSM850(MHz)	
Mod.	GSM	EDGE class 8
Lowest CH	0.243	0.235
Middle CH	0.241	0.235
Highest CH	0.244	0.235

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

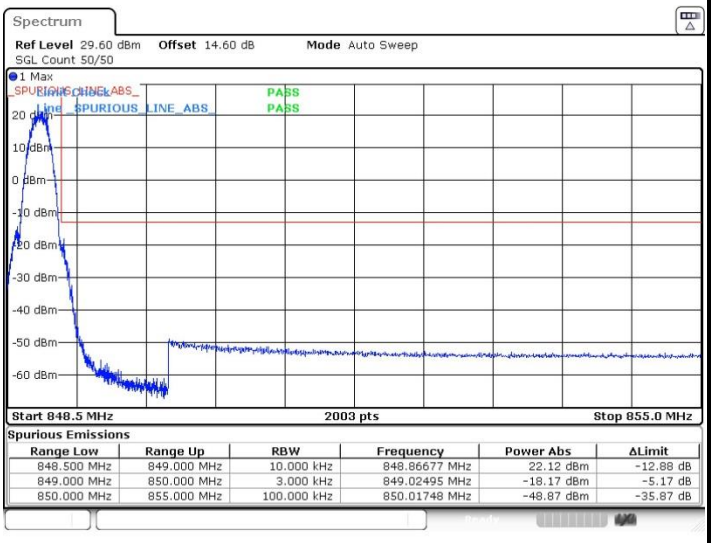
Conducted Band Edge

GSM850 (GSM)

Lowest Band Edge

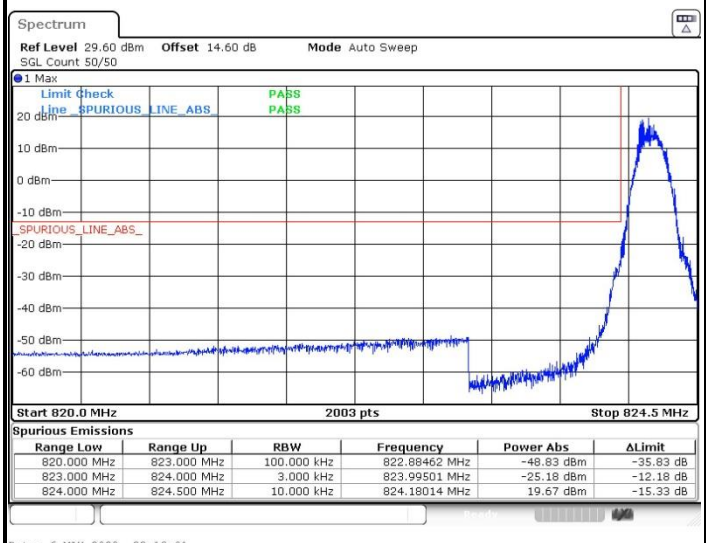


Highest Band Edge

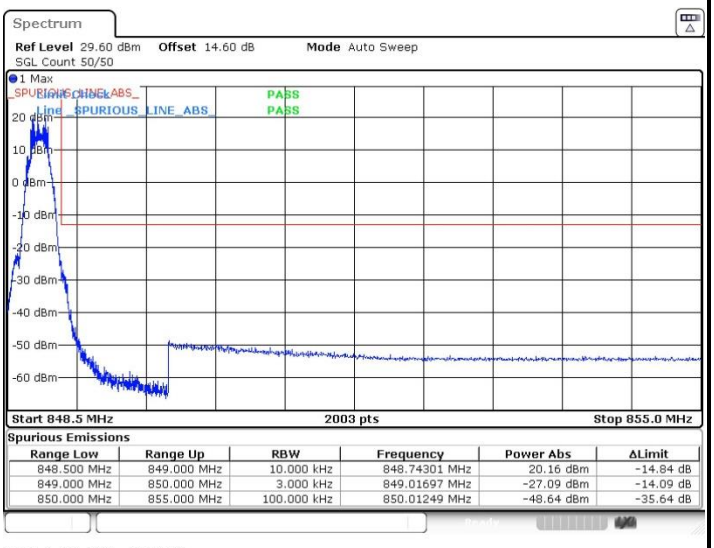


GSM850 (EDGE class 8)

Lowest Band Edge



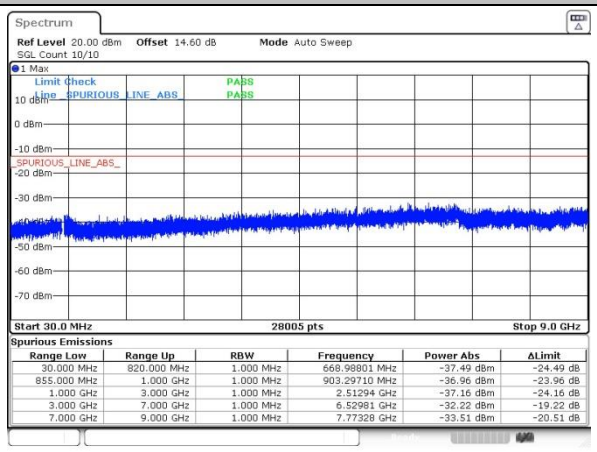
Highest Band Edge



Conducted Spurious Emission

GSM850 (GSM)

Lowest Channel

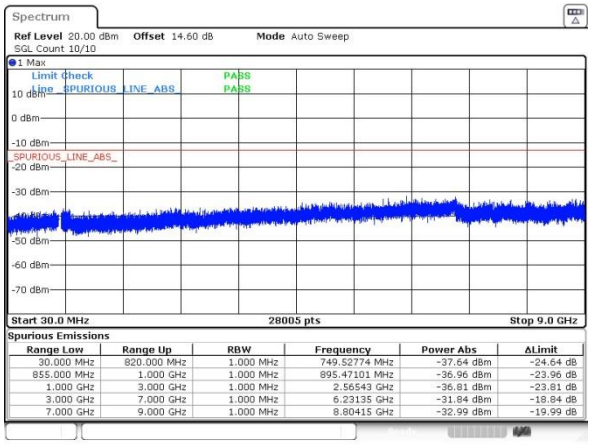


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	668.98801 MHz	-37.49 dBm	-24.49 dB
855.000 MHz	1.000 GHz	1.000 MHz	903.29710 MHz	-36.96 dBm	-23.96 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.51294 GHz	-37.16 dBm	-24.16 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.52981 GHz	-32.22 dBm	-19.22 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.77328 GHz	-33.51 dBm	-20.51 dB

Date: 6.MAY.2023 22:05:25

Middle Channel

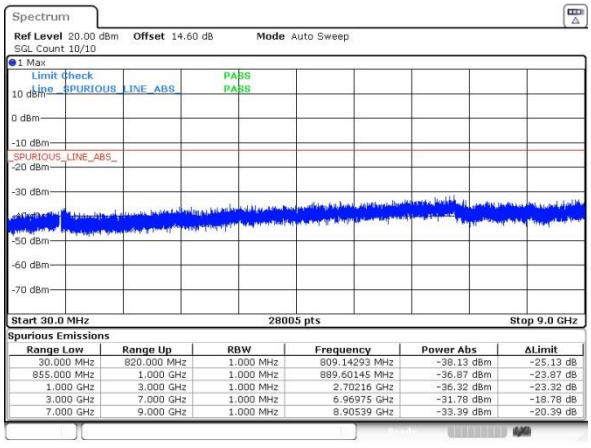


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	749.52774 MHz	-37.64 dBm	-24.64 dB
855.000 MHz	1.000 GHz	1.000 MHz	895.47101 MHz	-36.96 dBm	-23.96 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.56543 GHz	-36.81 dBm	-23.81 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.23135 GHz	-31.84 dBm	-18.84 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.80415 GHz	-32.99 dBm	-19.99 dB

Date: 6.MAY.2023 22:06:59

Highest Channel



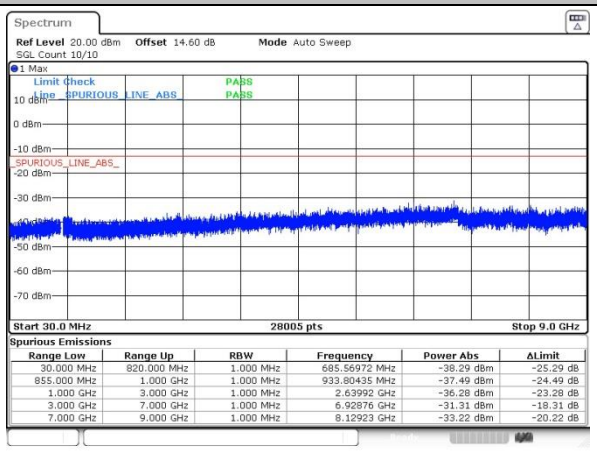
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	809.14293 MHz	-38.13 dBm	-25.13 dB
855.000 MHz	1.000 GHz	1.000 MHz	889.60145 MHz	-36.87 dBm	-23.87 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.70216 GHz	-36.32 dBm	-23.32 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.96975 GHz	-31.78 dBm	-18.78 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.90539 GHz	-33.39 dBm	-20.39 dB

Date: 6.MAY.2023 22:08:33

GSM850 (EDGE class 8)

Lowest Channel

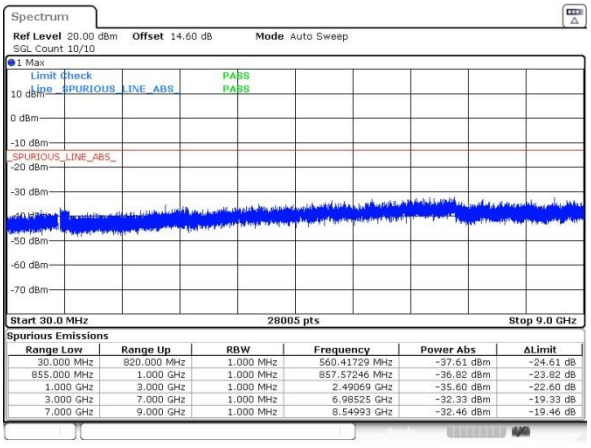


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	685.56972 MHz	-38.29 dBm	-25.29 dB
855.000 MHz	1.000 GHz	1.000 MHz	933.80435 MHz	-37.49 dBm	-24.49 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.63992 GHz	-36.28 dBm	-23.28 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.92876 GHz	-31.31 dBm	-18.31 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.12923 GHz	-33.22 dBm	-20.22 dB

Date: 6.MAY.2023 22:21:36

Middle Channel

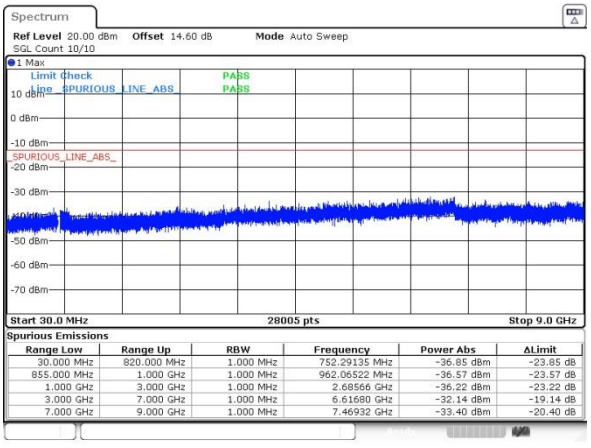


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	560.41729 MHz	-37.61 dBm	-24.61 dB
855.000 MHz	1.000 GHz	1.000 MHz	857.57246 MHz	-36.82 dBm	-23.82 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.49069 GHz	-35.60 dBm	-22.60 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.98525 GHz	-32.33 dBm	-19.33 dB
7.000 GHz	9.000 GHz	1.000 MHz	8.54993 GHz	-32.46 dBm	-19.46 dB

Date: 6.MAY.2023 22:23:11

Highest Channel



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	1.000 MHz	752.29135 MHz	-36.85 dBm	-23.85 dB
855.000 MHz	1.000 GHz	1.000 MHz	962.06522 MHz	-36.57 dBm	-23.57 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.68566 GHz	-36.22 dBm	-23.22 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.61680 GHz	-32.14 dBm	-19.14 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.46932 GHz	-33.40 dBm	-20.40 dB

Date: 6.MAY.2023 22:24:44

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	0.0042	0.0058	PASS
40	Normal Voltage	0.0517	0.0147	
30	Normal Voltage	0.0099	0.0562	
20(Ref.)	Normal Voltage	0.0000	0.0000	
10	Normal Voltage	0.0563	0.0428	
0	Normal Voltage	0.0182	0.0536	
-10	Normal Voltage	0.0059	0.0447	
-20	Normal Voltage	0.0139	0.0144	
-30	Normal Voltage	0.0174	0.0458	
20	Maximum Voltage	0.0455	0.0556	
20	Normal Voltage	0.0169	0.0139	
20	Battery End Point	0.0328	0.0238	

Note:

1. Normal Voltage = 3.91V ; Battery End Point (BEP) =3.4V. ; Maximum Voltage =4.5V
2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

A2. WCDMA

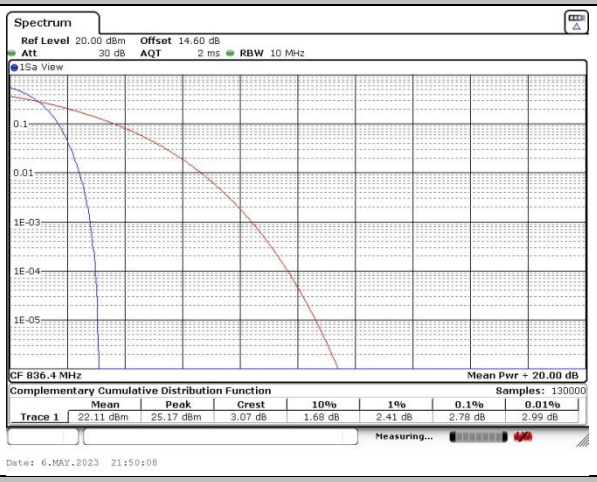
Peak-to-Average Ratio

Mode	WCDMA Band V	Limit: 13dB
Mod.	RMC 12.2Kbps	Result
Lowest CH	2.70	PASS
Middle CH	2.78	
Highest CH	2.64	

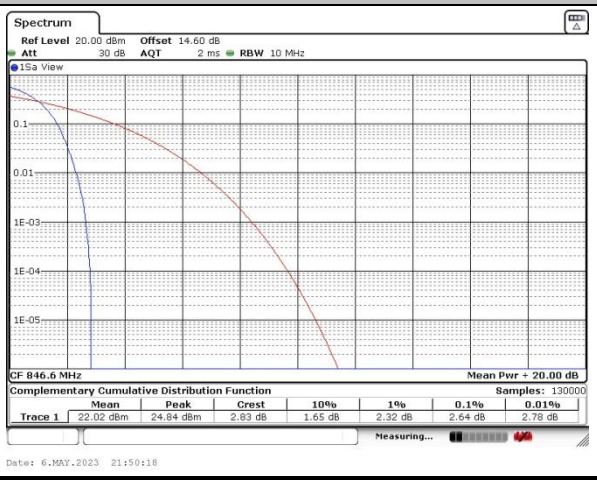
WCDMA Band V (RMC 12.2Kbps)

Lowest Channel

Middle Channel



Highest Channel

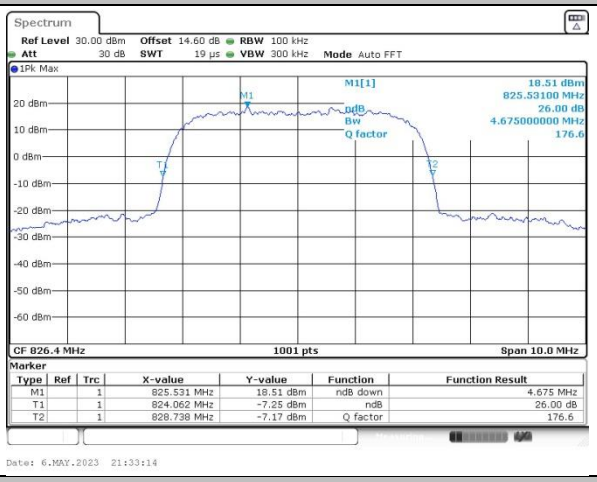


26dB Bandwidth

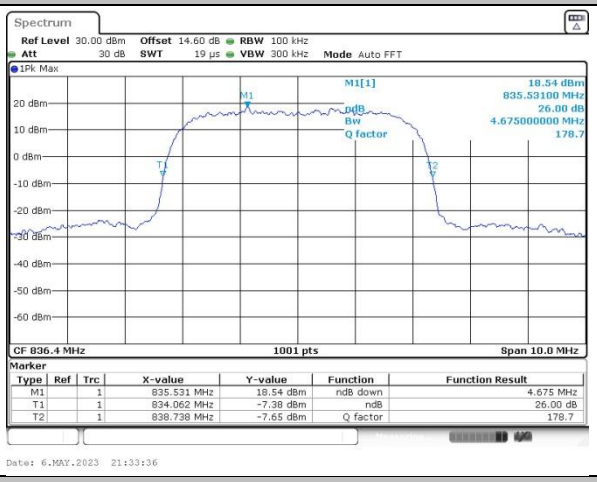
Mode	WCDMA Band V(MHz)
Mod.	RMC 12.2Kbps
Lowest CH	4.675
Middle CH	4.675
Highest CH	4.685

WCDMA Band V (RMC 12.2Kbps)

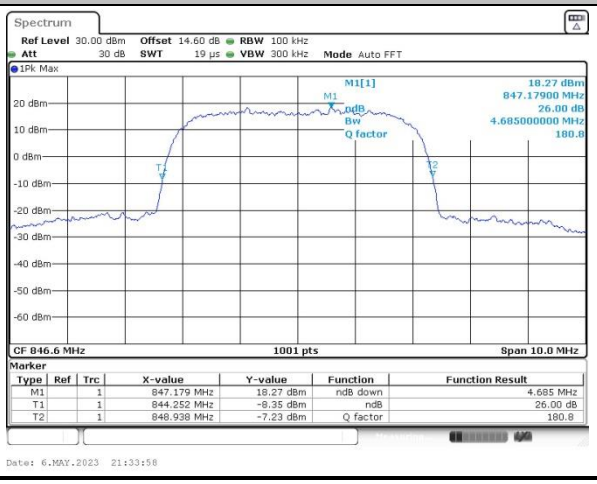
Lowest Channel



Middle Channl



Highest Channel

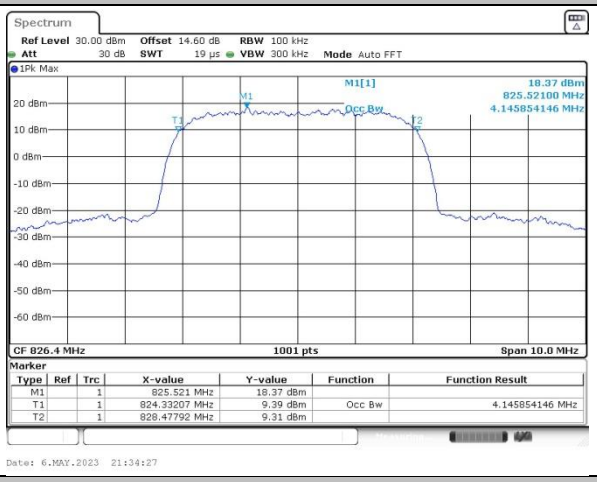


Occupied Bandwidth

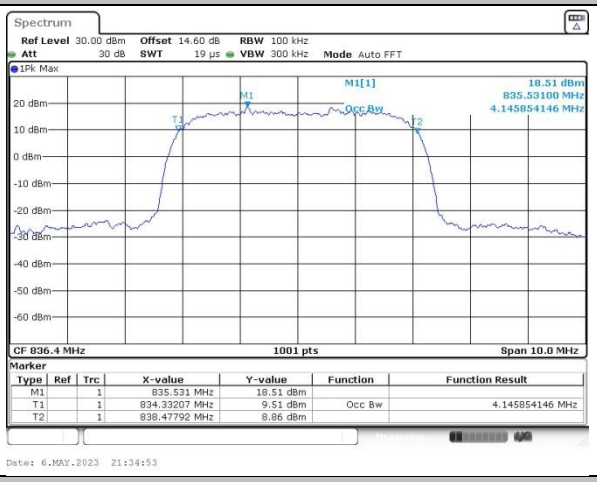
Mode	WCDMA Band V(MHz)
Mod.	RMC 12.2Kbps
Lowest CH	4.146
Middle CH	4.146
Highest CH	4.156

WCDMA Band V (RMC 12.2Kbps)

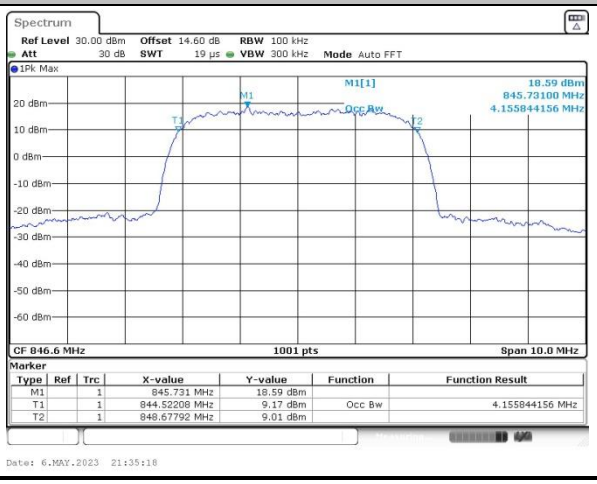
Lowest Channel



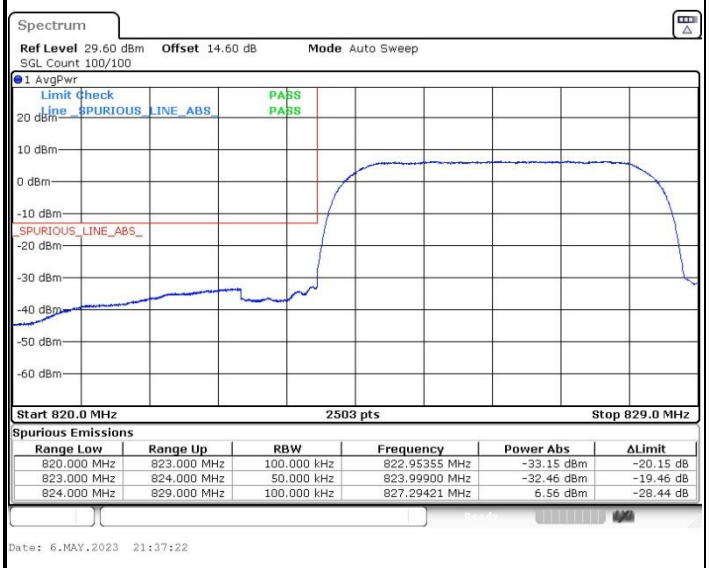
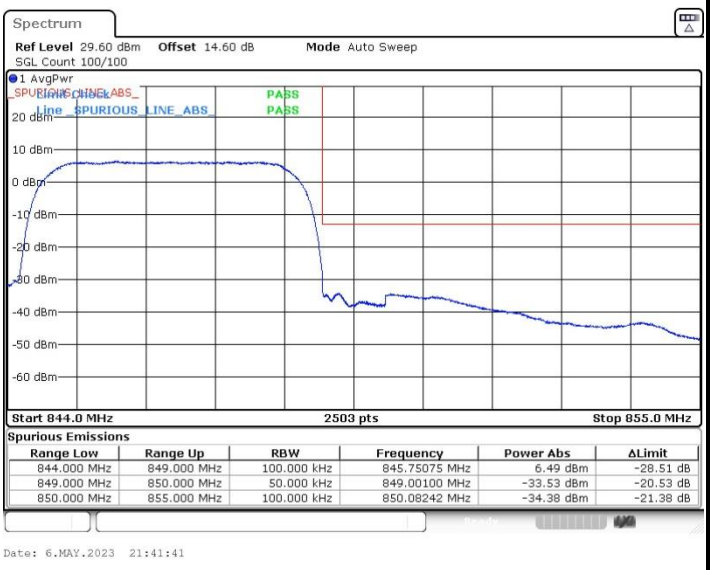
Middle Channel



Highest Channel



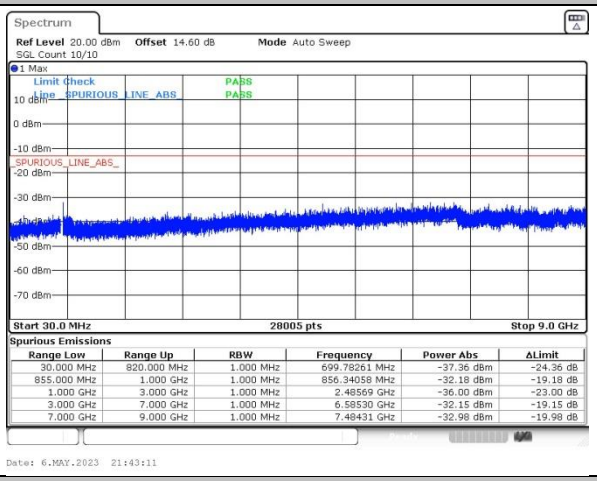
Conducted Band Edge

WCDMA Band V (RMC 12.2Kbps)	
Lowest Band Edge	**Highest Band Edge**
	

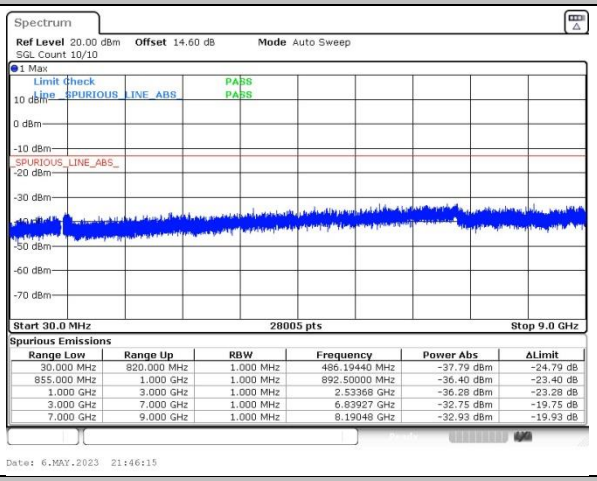
Conducted Spurious Emission

WCDMA Band V (RMC 12.2Kbps)

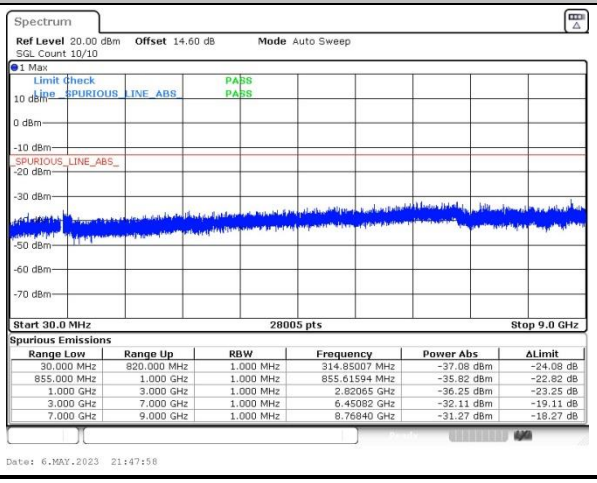
Lowest Channel



Middle Channel



Highest Channel



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	0.0058	PASS
40	Normal Voltage	0.0377	
30	Normal Voltage	0.0485	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0069	
0	Normal Voltage	0.0344	
-10	Normal Voltage	0.0063	
-20	Normal Voltage	0.0141	
-30	Normal Voltage	0.0325	
20	Maximum Voltage	0.0418	
20	Normal Voltage	0.0176	
20	Battery End Point	0.0063	

Note:

1. Normal Voltage = 3.91V ; Battery End Point (BEP) =3.4V. ; Maximum Voltage =4.5V
2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

Test Engineer :	Wenbo Xiao	Temperature :	22~25℃
		Relative Humidity :	48~52%

GSM850 (GSM)									
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)
Middle	1672.8	-64.45	-13	-51.45	-71.70	-67.70	4.00	9.40	H
	2509.2	-60.56	-13	-47.56	-72.03	-64.13	4.88	10.60	H
	3345.6	-63.93	-13	-50.93	-78.05	-68.86	5.52	12.60	H
	1672.8	-61.59	-13	-48.59	-69.03	-64.84	4.00	9.40	V
	2509.2	-55.68	-13	-42.68	-67.27	-59.25	4.88	10.60	V
	3345.6	-63.52	-13	-50.52	-77.66	-68.45	5.52	12.60	V

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

GSM850 (EDGE 1 Tx slots)									
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)
Middle	1672.8	-66.88	-13	-53.88	-74.13	-70.13	4.00	9.40	H
	2509.2	-65.36	-13	-52.36	-76.83	-68.93	4.88	10.60	H
	3345.6	-64.33	-13	-51.33	-78.45	-69.26	5.52	12.60	H
	1672.8	-62.35	-13	-49.35	-69.79	-65.60	4.00	9.40	V
	2509.2	-62.12	-13	-49.12	-73.71	-65.69	4.88	10.60	V
	3345.6	-64.28	-13	-51.28	-78.42	-69.21	5.52	12.60	V

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

WCDMA Band V(RMC 12.2Kbps)									
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)
Middle	1673.04	-69.16	-13	-56.16	-76.42	-72.41	4.00	9.40	H
	2509.56	-66.25	-13	-53.25	-77.72	-69.82	4.88	10.60	H
	3346.08	-64.52	-13	-51.52	-78.64	-69.45	5.52	12.60	H
	1673.04	-67.61	-13	-54.61	-75.06	-70.86	4.00	9.40	V
	2509.56	-66.12	-13	-53.12	-77.71	-69.69	4.88	10.60	V
	3346.08	-64.43	-13	-51.43	-78.57	-69.36	5.52	12.60	V

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