FCC RADIO TEST REPORT

FCC ID	:	**J9CQSIP7180**
Equipment	:	**7c Modular Platform**
Brand Name	:	**Qualcomm**
Model Name	:	**QSIP7180**
Applicant	:	**Qualcomm Technologies, Inc. 5775 Morehouse Dr.San Diego, CA 92121-1714 (USA)**
Manufacturer	:	**Qualcomm Technologies, Inc. 5775 Morehouse Dr.San Diego, CA 92121-1714 (USA)**
Standard	:	**FCC 47 CFR Part 2, 22(H), 24(E)**

The product was received on Apr. 20, 2020 and testing was started from May 25, 2020 and completed on Aug. 14, 2020. 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 of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FG042002A	01	Initial issue of report	Sep. 17, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Pass	-
	§22.913 (a)(2)	Effective Radiated Power (WCDMA Band V)		
	§24.232 (c)	Equivalent Isotropic Radiated Power (WCDMA Band II)		
3.3	§24.232 (d)	Peak-to-Average Ratio	Pass	
3.4	§2.1049 §22.917 (b) §24.238 (b)	Occupied Bandwidth (WCDMA Band V) (WCDMA Band II)	Pass	-
3.5	§2.1051 §22.917 (a) §24.238 (a)	Band Edge Measurement (WCDMA Band V) (WCDMA Band II)	Pass	-
3.6	§2.1051 §22.917 (a) §24.238 (a)	Conducted Emission (WCDMA Band V) (WCDMA Band II)	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 (WCDMA Band V) (WCDMA Band II)	Pass	Under limit 31.15 dB at 7410.000 MHz

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Ruby Zou

1 General Description

1.1 Product Feature of Equipment Under Test

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

Product Feature	
Antenna Type	**WWAN:** WCDMA Band 1: 5.0 dBi WCDMA Band 8: 0.8 dBi

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH03-HY	TH05-HY
Test Engineer	Louis Chung	Bryant Liu and Jacky Wang
Temperature	21~24℃	22~25 ℃
Relative Humidity	51~55%	51~55 %

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH12-HY
Test Engineer	Jack Cheng, Lance Chiang and Chuan Chu
Temperature	22.6~26.2℃
Relative Humidity	55.7~67.8%

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

FCC Designation No.: TW1190 and TW0007

1.4 Applicable Standards

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

- ANSI C63.26-2015
- ANSI / TIA-603-E
- 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 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.
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, pre-scanned in two degrees (0° or 90°). The worst cases (degree 0 for WCDMA Band II ; degree 90 for WCDMA Band V) were recorded in this report.

Radiated emissions were investigated as following frequency range:

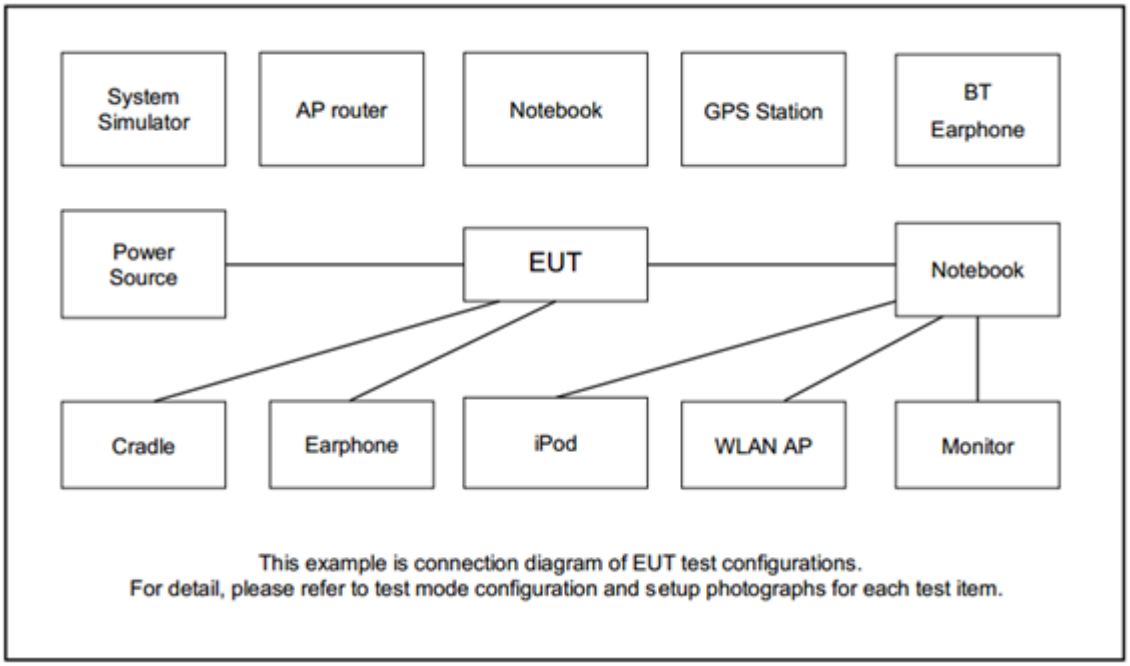
1. 30 MHz to 9000 MHz for WCDMA Band V1. 30 MHz to 19100 MHz for WCDMA Band II

All modes and data rates and positions were investigated.

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

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link
WCDMA Band II	■ 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.	System Simulator	Anritsu	8821C	N/A	N/A	Unshielded, 1.8 m
2.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
3.	Fixture	N/A	N/A	N/A	N/A	N/A

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.2 dB and a 10dB attenuator.

Example:

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**
WCDMA Band V	Channel	4132	4182	4233
	Frequency	826.4	836.4	846.6
WCDMA Band II	Channel	9262	9400	9538
	Frequency	1852.4	1880.0	1907.6

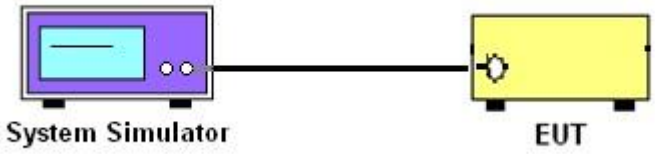
3 Conducted Test Result

3.1 Measuring Instruments

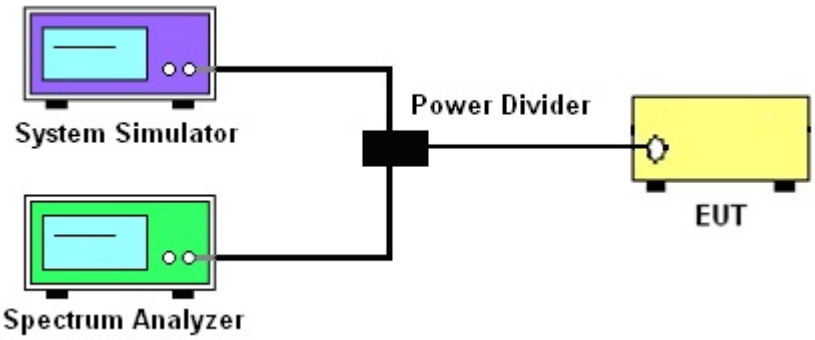
See list of measuring instruments of this test report.

3.1.1 Test Setup

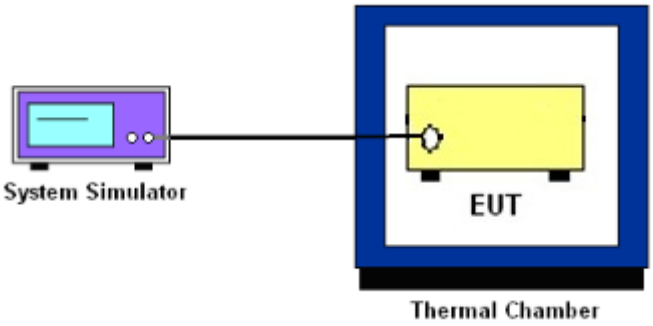
3.1.2 Conducted Output Power



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



3.1.4 Frequency Stability



3.1.5 Test Result of Conducted Test

Please refer to Appendix A.

3.2 Conducted Output Power and ERP/EIRP

3.2.1 Description of the Conducted Output Power and ERP/EIRP

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for WCDMA Band V

The EIRP of mobile transmitters must not exceed 2 Watts for WCDMA Band II

According to KDB 412172 D01 Power Approach,

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

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

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

3.2.2 Test Procedures

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

3.3 Peak-to-Average Ratio

3.3.1 Description of the PAR Measurement

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

3.3.2 Test Procedures

The testing follows ANSI C63.26-2015 Section 5.2.6

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

3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

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

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

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

3.4.2 Test Procedures

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

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

3.5 Conducted Band Edge

3.5.1 Description of Conducted Band Edge Measurement

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

3.5.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The band edges of low and high channels for the highest RF powers were measured.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
5. The limit line is derived from 43 + 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 was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from 43 + 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 was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C steps up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.7.3 Test Procedures for Voltage Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

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

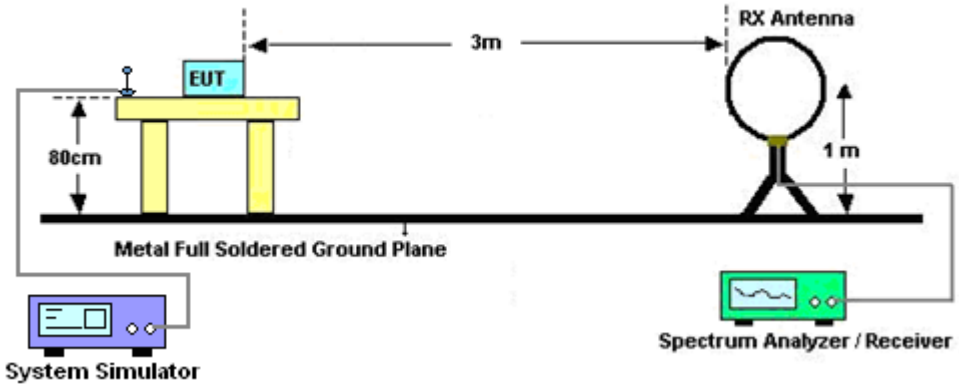
4 Radiated Test Items

4.1 Measuring Instruments

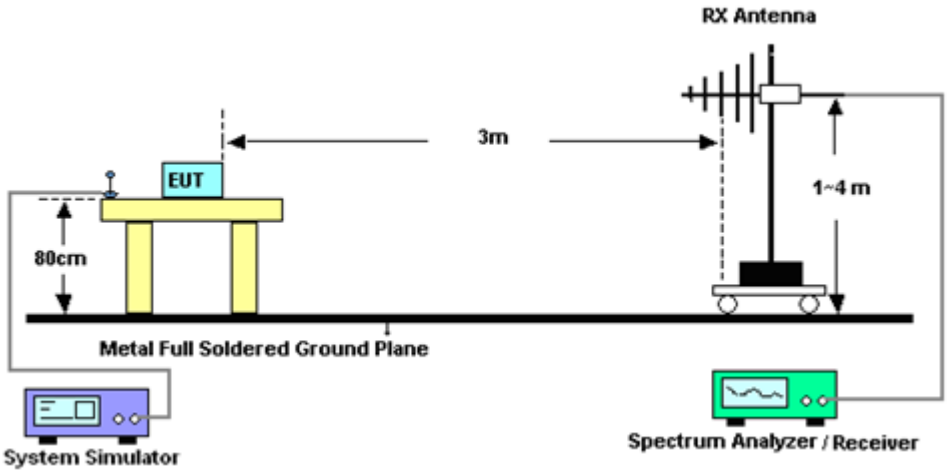
See list of measuring instruments of this test report.

4.2 Test Setup

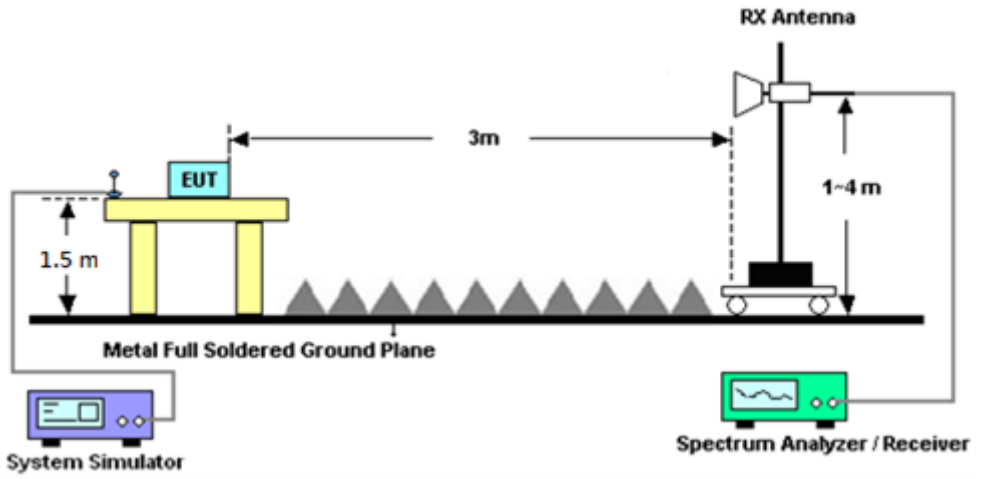
For radiated emissions below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

Note:

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.

There is a comparison data 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 was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from 43 + 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
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 26, 2020	May 25, 2020~ May 26, 2020	Mar. 25, 2021	Conducted (TH03-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Sep. 04, 2019	May 25, 2020~ May 26, 2020	Sep. 03, 2020	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30℃ ~70℃	Nov. 26, 2019	May 25, 2020~ May 26, 2020	Nov. 25, 2020	Conducted (TH03-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890001	1V~20V 0.5A~4A	Oct. 09, 2019	May 25, 2020~ May 26, 2020	Oct. 08, 2020	Conducted (TH03-HY)
Base Station	Anritsu	MT8820C	6201026480	-	Dec. 27, 2019	Jul. 19, 2020 ~ Aug. 25, 2020	Dec. 26, 2020	Conducted (TH05-HY)
Base Station	Anritsu	MT8821C	6201664755	-	Jul. 16, 2020	Jul. 19, 2020 ~ Aug. 25, 2020	Jul. 15, 2021	Conducted (TH05-HY)
Power Divider	Warison	WCOU-0.4-26.5S-20	#A	N/A	Nov. 06, 2019	May 25, 2020~ May 26, 2020	Nov. 05, 2020	Conducted (TH03-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Dec. 26, 2019	May 28, 2020~ Aug. 14, 2020	Dec. 25, 2020	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	37059 & 01	30MHz~1GHz	Oct. 12, 2019	May 28, 2020~ Aug. 14, 2020	Oct. 11, 2020	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1328	1GHz~18GHz	Nov. 14, 2019	May 28, 2020~ Aug. 14, 2020	Nov. 13, 2020	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz~40GHz	Dec. 10, 2019	May 28, 2020~ Aug. 14, 2020	Dec. 09, 2020	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 25, 2020	May 28, 2020~ Aug. 14, 2020	Mar. 24, 2021	Radiation (03CH12-HY)
Preamplifier	Agilent	8449B	3008A02375	1GHz~26.5GHz	Mar. 26, 2020	May 28, 2020~ Aug. 14, 2020	Mar. 25, 2021	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-303K	1710001800054002	1GHz~18GHz	Feb. 07, 2020	May 28, 2020~ Aug. 14, 2020	Feb. 06, 2021	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 13, 2019	May 28, 2020~ Aug. 14, 2020	Dec. 12, 2020	Radiation (03CH12-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	103738	10Hz~30GHz	May 14, 2020	May 28, 2020~ Aug. 14, 2020	May 13, 2021	Radiation (03CH12-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101756	10Hz~40GHz	Dec. 24, 2019	May 28, 2020~ Aug. 14, 2020	Dec. 23, 2020	Radiation (03CH12-HY)
Signal Generator	Rohde & Schwarz	SMB100A	101107	100kHz~40GHz	Aug. 27, 2019	May 28, 2020~ Aug. 14, 2020	Aug. 26, 2020	Radiation (03CH12-HY)
Filter	Wainwright	WLKS1200-12SS	SN2	1.2GHz Low Pass Filter	Mar. 21, 2020	May 28, 2020~ Aug. 14, 2020	Mar. 20, 2021	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN2	3GHz High Pass Filter	Jul. 15, 2019	May 28, 2020~ Jul. 13, 2020	Jul. 14, 2020	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN2	3GHz High Pass Filter	Jul. 14, 2020	Jul. 14, 2020~ Aug. 14, 2020	Jul. 13, 2021	Radiation (03CH12-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN2	6.75GHz High Pass Filter	Mar. 18, 2020	May 28, 2020~ Aug. 14, 2020	Mar. 17, 2021	Radiation (03CH12-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Notch Filter	Wainwright	WRCT/800/960-0.2/40-8SSK	SN11	GSM 850	Aug. 22, 2019	May 28, 2020~ Aug. 14, 2020	Aug. 21, 2020	Radiation (03CH12-HY)
Notch Filter	Wainwright	WRCD1700/2000-0.2/40-10SSK	SN37	DCS 1900	Aug. 22, 2019	May 28, 2020~ Aug. 14, 2020	Aug. 21, 2020	Radiation (03CH12-HY)
Notch Filter	Wainwright	WRCT700/915-20/40-8SSK	SN1	700-915	Mar. 06, 2020	May 28, 2020~ Aug. 14, 2020	Mar. 05, 2021	Radiation (03CH12-HY)
Notch Filter	Wainwright	WRCG1710/1755-1690/1775-45/7SS	SN2	AWS Band	Nov. 05, 2019	May 28, 2020~ Aug. 14, 2020	Nov. 04, 2020	Radiation (03CH12-HY)
Notch Filter	Wainwright	WTRCT10-2200-2700-100-170-40SSK	SN2	N/A	May 26, 2020	May 28, 2020~ Aug. 14, 2020	May 25, 2021	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 12, 2019	May 28, 2020~ Aug. 14, 2020	Dec. 11, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 25, 2020	May 28, 2020~ Aug. 14, 2020	Feb. 24, 2021	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz~40GHz	Feb. 25, 2020	May 28, 2020~ Aug. 14, 2020	Feb. 24, 2021	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	May 28, 2020~ Aug. 14, 2020	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	May 28, 2020~ Aug. 14, 2020	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	May 28, 2020~ Aug. 14, 2020	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	May 28, 2020~ Aug. 14, 2020	N/A	Radiation (03CH12-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))	**3.24**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.62**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.06**

Appendix A. Test Results of Conducted Test

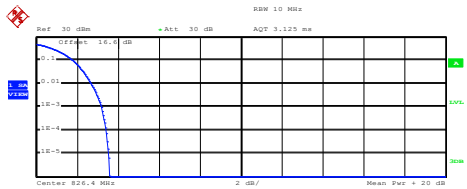
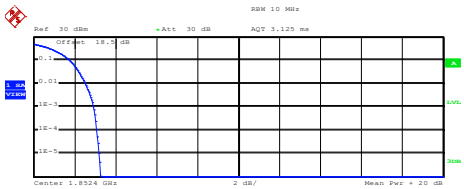
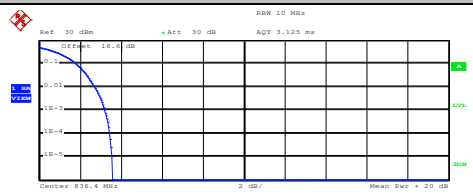
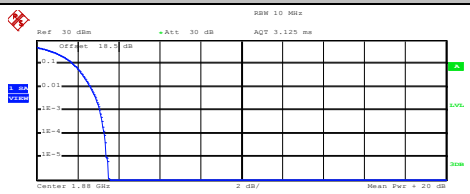
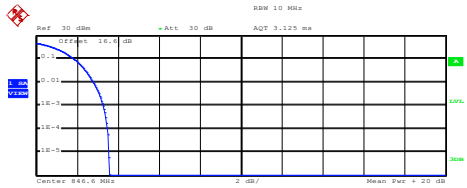
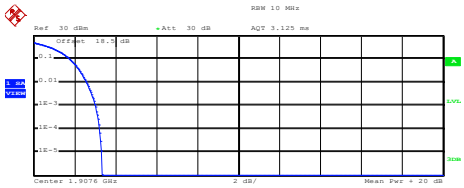
Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
RMC 12.2K	24.12	23.93	23.49	24.05	24.21	24.05
HSDPA Subtest-1	23.13	22.93	22.51	23.06	23.22	23.05
HSDPA Subtest-2	23.15	22.95	22.52	23.07	23.24	23.00
HSDPA Subtest-3	22.68	22.48	22.03	22.60	22.74	22.58
HSDPA Subtest-4	22.67	22.47	22.05	22.60	22.76	22.60
HSUPA Subtest-1	23.17	22.94	22.55	23.05	23.21	23.07
HSUPA Subtest-2	21.11	20.93	20.55	21.01	21.14	21.06
HSUPA Subtest-3	22.15	21.85	21.45	22.02	22.13	22.06
HSUPA Subtest-4	21.11	20.93	20.51	21.05	21.15	21.05
HSUPA Subtest-5	23.12	22.85	22.52	23.03	23.13	22.98

A2. WCDMA

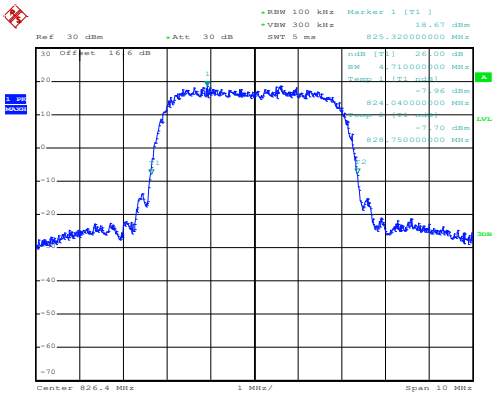
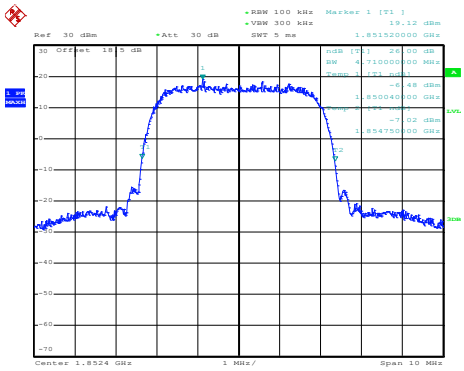
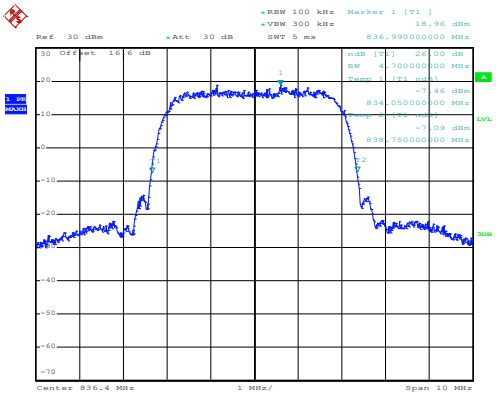
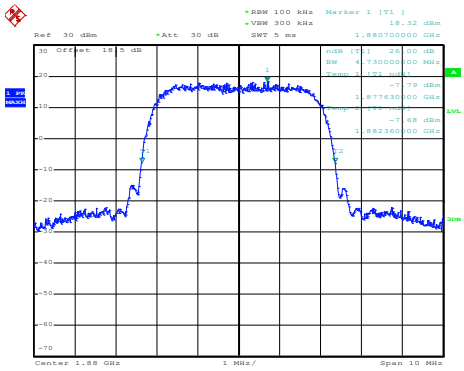
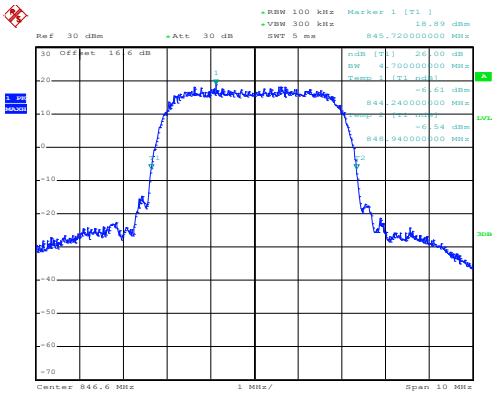
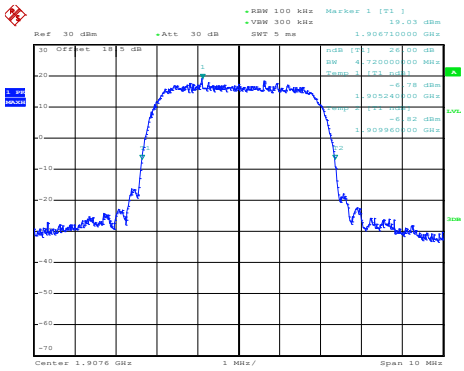
Peak-to-Average Ratio

Mode	WCDMA Band V	WCDMA Band II	Limit: 13dB
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	3.20	2.92	PASS
Middle CH	3.20	3.08	
Highest CH	3.28	3.04	

WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 23.05 dBm Peak 26.65 dBm Crest 3.60 dB 10 % 1.80 dB 1 % 2.68 dB .1 % 3.20 dB .01 % 3.44 dB	Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 22.68 dBm Peak 25.95 dBm Crest 3.27 dB 10 % 1.76 dB 1 % 2.52 dB .1 % 2.92 dB .01 % 3.08 dB
Date: 25.MAY.2020 19:35:49	Date: 25.MAY.2020 19:15:29
Middle Channel	**Middle Channel**
	
Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 22.92 dBm Peak 26.51 dBm Crest 3.59 dB 10 % 1.80 dB 1 % 2.72 dB .1 % 3.20 dB .01 % 3.44 dB	Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 22.99 dBm Peak 26.51 dBm Crest 3.52 dB 10 % 1.76 dB 1 % 2.64 dB .1 % 3.08 dB .01 % 3.32 dB
Date: 25.MAY.2020 19:36:11	Date: 25.MAY.2020 19:15:44
Highest Channel	**Highest Channel**
	
Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 22.60 dBm Peak 26.16 dBm Crest 3.56 dB 10 % 1.88 dB 1 % 2.80 dB .1 % 3.28 dB .01 % 3.48 dB	Complementary Cumulative Distribution Function (100000 samples) Trace 1 Mean 22.73 dBm Peak 26.09 dBm Crest 3.36 dB 10 % 1.76 dB 1 % 2.60 dB .1 % 3.04 dB .01 % 3.24 dB
Date: 25.MAY.2020 19:37:04	Date: 25.MAY.2020 19:15:54

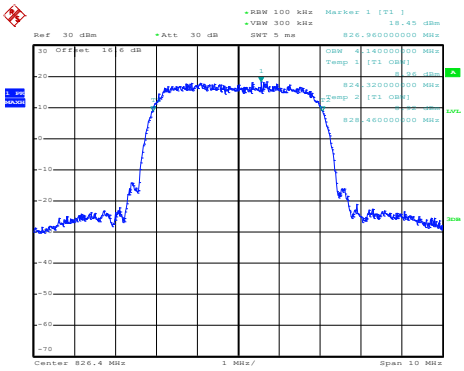
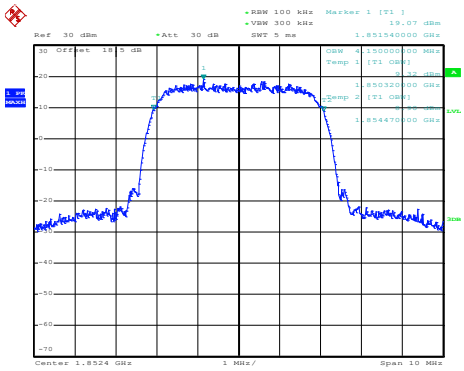
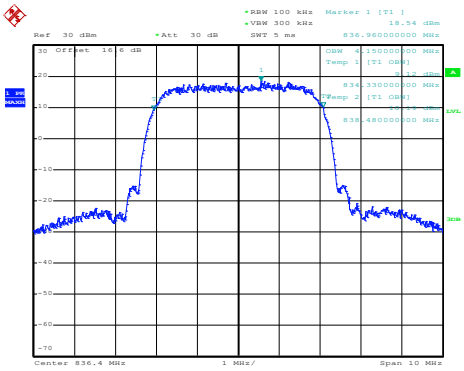
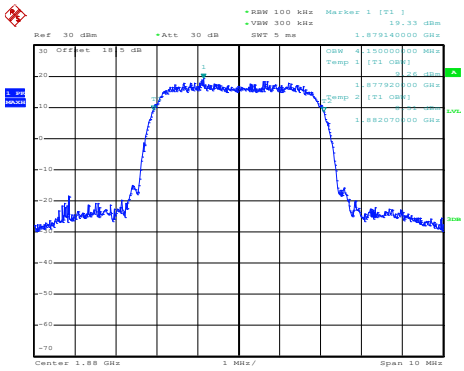
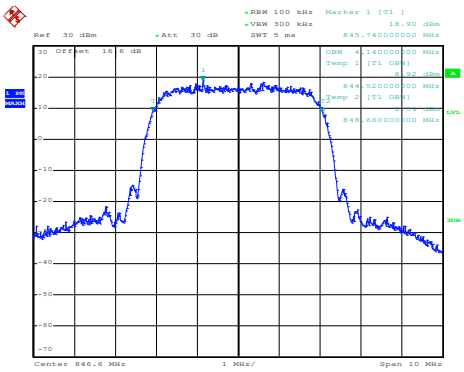
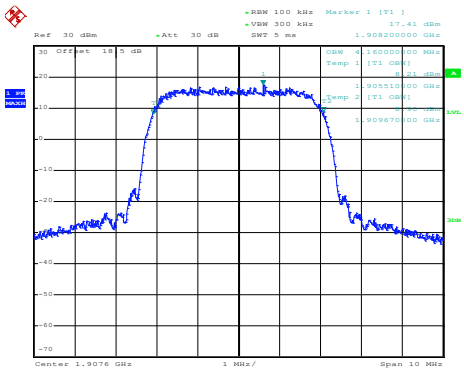
26dB Bandwidth

Mode	WCDMA Band V 26dB BW(MHz)	WCDMA Band II 26dB BW(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.71	4.71
Middle CH	4.70	4.73
Highest CH	4.70	4.72

WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Date: 25.MAY.2020 19:31:14	Date: 25.MAY.2020 19:11:05
Middle Channel	**Middle Channel**
	
Date: 25.MAY.2020 19:31:51	Date: 25.MAY.2020 19:11:41
Highest Channel	**Highest Channel**
	
Date: 25.MAY.2020 19:32:25	Date: 25.MAY.2020 19:12:18

Occupied Bandwidth

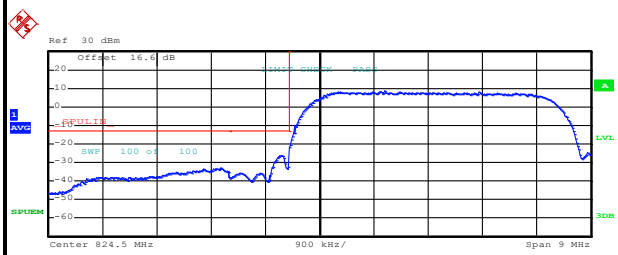
Mode	WCDMA Band V 99% OBW(MHz)	WCDMA Band II 99% OBW(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.14	4.15
Middle CH	4.15	4.15
Highest CH	4.14	4.16

WCDMA Band V (RMC 12.2Kbps)	WCDMA Band II (RMC 12.2Kbps)
Lowest Channel	**Lowest Channel**
	
Date: 25.MAY.2020 19:38:40	Date: 25.MAY.2020 19:16:53
Middle Channel	**Middle Channel**
	
Date: 25.MAY.2020 19:39:14	Date: 25.MAY.2020 19:17:22
Highest Channel	**Highest Channel**
	
Date: 25.MAY.2020 19:39:47	Date: 25.MAY.2020 19:17:56

Conducted Band Edge

WCDMA Band V (RMC 12.2Kbps)

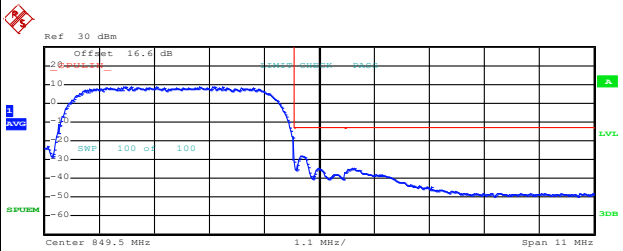
Lowest Band Edge



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
820.000 M	823.000 M	100.00 k	822.862000 M	-32.92	-19.92
823.000 M	824.000 M	50.00 k	823.848000 M	-26.54	-13.54
824.000 M	829.000 M	100.00 k	825.580000 M	8.76	-26.24

Date: 25.MAY.2020 19:42:39

Highest Band Edge

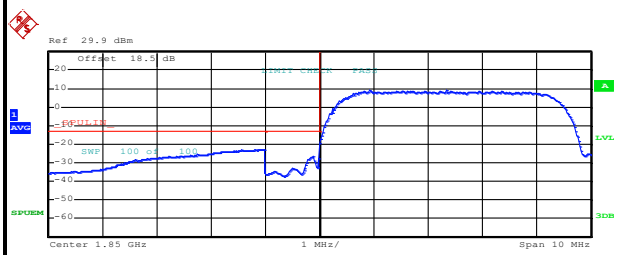


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
844.000 M	849.000 M	100.00 k	847.365000 M	8.82	-26.18
849.000 M	850.000 M	50.00 k	849.164000 M	-27.97	-14.97
850.000 M	855.000 M	100.00 k	850.145000 M	-34.60	-21.60

Date: 25.MAY.2020 19:45:34

WCDMA Band II (RMC 12.2Kbps)

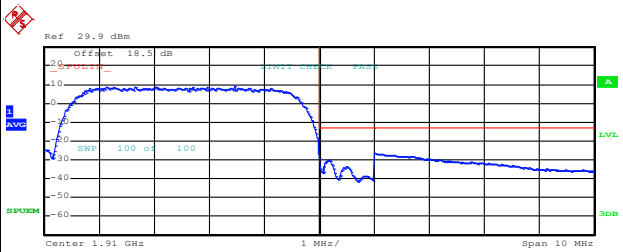
Lowest Band Edge



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.845 G	1.849 G	1.00 M	1.848864 G	-22.84	-9.84
1.849 G	1.850 G	50.00 k	1.849876 G	-26.72	-13.72
1.850 G	1.855 G	100.00 k	1.850920 G	9.40	-25.60

Date: 25.MAY.2020 19:20:56

Highest Band Edge



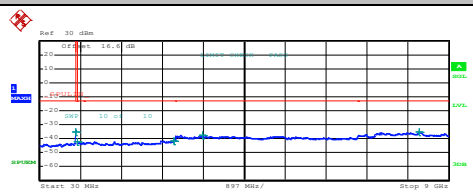
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
1.905 G	1.910 G	100.00 k	1.908455 G	8.89	-26.11
1.910 G	1.911 G	50.00 k	1.910004 G	-28.26	-15.26
1.911 G	1.915 G	1.00 M	1.911000 G	-26.62	-13.62

Date: 25.MAY.2020 19:23:45

Conducted Spurious Emission

WCDMA Band V (RMC 12.2Kbps)

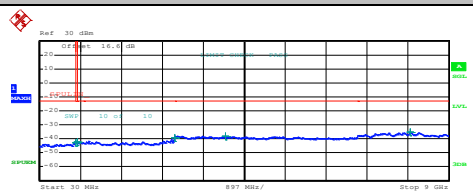
Lowest Channel



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	820.000 M	1.00 M	819.605000 M	-35.26	-22.36
855.000 M	1.000 G	1.00 M	863.555001 M	-42.06	-29.06
1.000 G	3.000 G	1.00 M	2.975000 G	-41.50	-28.50
3.000 G	7.000 G	1.00 M	3.605000 G	-37.34	-24.34
7.000 G	9.000 G	1.00 M	8.358500 G	-35.17	-22.17

Date: 25.MAY.2020 19:33:36

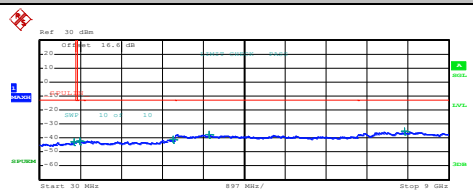
Middle Channel



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	820.000 M	1.00 M	812.100000 M	-42.83	-29.83
855.000 M	1.000 G	1.00 M	859.603750 M	-42.22	-29.22
1.000 G	3.000 G	1.00 M	2.989500 G	-39.47	-26.47
3.000 G	7.000 G	1.00 M	4.097000 G	-37.89	-24.89
7.000 G	9.000 G	1.00 M	8.150000 G	-35.50	-22.50

Date: 25.MAY.2020 19:34:28

Highest Channel

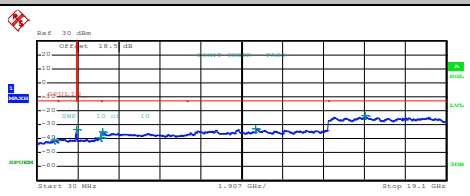


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	820.000 M	1.00 M	775.167500 M	-43.02	-30.02
855.000 M	1.000 G	1.00 M	911.985004 M	-42.20	-29.20
1.000 G	3.000 G	1.00 M	2.947500 G	-41.14	-28.14
3.000 G	7.000 G	1.00 M	3.752000 G	-37.65	-24.65
7.000 G	9.000 G	1.00 M	8.031500 G	-35.45	-22.45

Date: 25.MAY.2020 19:35:21

WCDMA Band II (RMC 12.2Kbps)

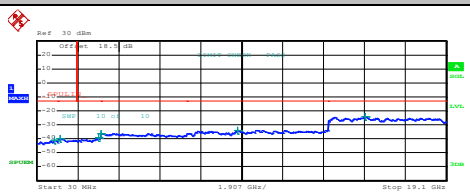
Lowest Channel



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	1.00 M	842.860000 M	-41.18	-28.18
1.000 G	1.845 G	1.00 M	1.843521 G	-33.25	-20.25
1.915 G	3.000 G	1.00 M	2.994575 G	-39.01	-26.01
3.000 G	7.000 G	1.00 M	3.099000 G	-35.49	-22.49
7.000 G	13.600 G	1.00 M	10.212550 G	-33.11	-20.11
13.600 G	19.100 G	1.00 M	15.312563 G	-23.70	-10.70

Date: 25.MAY.2020 19:13:17

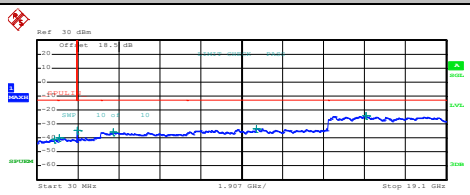
Middle Channel



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	1.00 M	813.517500 M	-40.92	-27.92
1.000 G	1.845 G	1.00 M	1.081331 G	-39.76	-26.76
1.915 G	3.000 G	1.00 M	2.892043 G	-39.11	-26.11
3.000 G	7.000 G	1.00 M	3.001000 G	-36.20	-23.20
7.000 G	13.600 G	1.00 M	9.383425 G	-33.77	-20.77
13.600 G	19.100 G	1.00 M	15.331875 G	-24.00	-11.00

Date: 25.MAY.2020 19:14:09

Highest Channel



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	1.00 M	844.315000 M	-40.91	-27.91
1.000 G	1.845 G	1.00 M	1.048165 G	-40.04	-27.04
1.915 G	3.000 G	1.00 M	1.915271 G	-34.43	-21.43
3.000 G	7.000 G	1.00 M	3.596000 G	-35.95	-22.95
7.000 G	13.600 G	1.00 M	10.233175 G	-33.16	-20.16
13.600 G	19.100 G	1.00 M	15.364125 G	-24.27	-11.27

Date: 25.MAY.2020 19:15:04

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	0.0024	PASS
40	Normal Voltage	0.0012	
30	Normal Voltage	0.0000	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0000	
0	Normal Voltage	0.0143	
-10	Normal Voltage	0.0143	
-20	Normal Voltage	0.0143	
-30	Normal Voltage	0.0143	
20	Maximum Voltage	0.0000	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0000	

Test Conditions	Middle Channel	WCDMA Band II (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0011	PASS
40	Normal Voltage	0.0005	
30	Normal Voltage	0.0011	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0005	
0	Normal Voltage	0.0005	
-10	Normal Voltage	0.0000	
-20	Normal Voltage	0.0005	
-30	Normal Voltage	0.0005	
20	Maximum Voltage	0.0005	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0005	

Note:

1. Normal Voltage = 3.8V. ；Battery End Point (BEP) = 3.4 V.；Maximum Voltage =4.8 V

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

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

ERP/EIRP

Channel	Mode	Conducted		ERP	
		Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Lowest	WCDMA Band V	24.12	0.2582	24.07	0.2553
Middle	RMC 12.2Kbps	23.93	0.2472	23.88	0.2443
Highest	(GT - LC = 2.1 dB)	23.49	0.2234	23.44	0.2208
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Conducted		EIRP	
		Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	WCDMA Band II	24.05	0.2541	29.05	0.8035
Middle	RMC 12.2Kbps	24.21	0.2636	29.21	0.8337
Highest	(GT - LC = 5 dB)	24.05	0.2541	29.05	0.8035
Limit	EIRP < 2W	Result		PASS	

Radiated Spurious Emission

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	1653	-58.92	-13	-45.92	-72.42	-64.53	0.92	8.68	H
	2479	-56.59	-13	-43.59	-74.91	-63.97	1.15	10.67	H
	3306	-54.92	-13	-41.92	-75.05	-63.48	1.33	12.03	H
									H
									H
									H
									H
	1653	-57.18	-13	-44.18	-70.13	-62.79	0.92	8.68	V
	2479	-56.24	-13	-43.24	-74.73	-63.62	1.15	10.67	V
	3306	-54.66	-13	-41.66	-75.25	-63.22	1.33	12.03	V
									V
									V
									V
									V
Middle	1673	-57.30	-13	-44.30	-70.85	-62.98	0.93	8.76	H
	2509	-56.62	-13	-43.62	-74.96	-64.03	1.15	10.71	H
	3346	-55.02	-13	-42.02	-75.05	-63.67	1.33	12.13	H
									H
									H
									H
									H
	1672	-57.75	-13	-44.75	-70.67	-63.43	0.93	8.75	V
	2509	-56.25	-13	-43.25	-74.79	-63.66	1.15	10.71	V
	3345	-54.36	-13	-41.36	-74.84	-63.01	1.33	12.13	V
									V

Highest	1693	-59.62	-13	-46.62	-73.22	-65.37	0.94	8.83	H
	2540	-57.11	-13	-44.11	-75.45	-64.55	1.16	10.75	H
	3386	-55.08	-13	-42.08	-75.02	-63.82	1.34	12.23	H
									H
									H
									H
									H
	1693	-58.93	-13	-45.93	-71.83	-64.68	0.94	8.83	V
	2540	-57.01	-13	-44.01	-75.47	-64.45	1.16	10.75	V
	3386	-54.59	-13	-41.59	-74.97	-63.33	1.34	12.23	V
									V
									V
									V
									V

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

WCDMA 1900

WCDMA 1900									
Channel	Frequency (MHz)	EIRP (dBm)	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	-52.35	-13	-39.35	-75.11	-63.56	1.41	12.62	H
	5556	-47.93	-13	-34.93	-75.63	-59.49	1.74	13.30	H
	7410	-44.15	-13	-31.15	-75.04	-53.45	1.94	11.24	H
									H
									H
									H
									H
	3702	-52.42	-13	-39.42	-75.33	-63.63	1.41	12.62	V
	5556	-48.24	-13	-35.24	-75.48	-59.80	1.74	13.30	V
	7410	-44.57	-13	-31.57	-75.31	-53.87	1.94	11.24	V
									V
									V
									V
									V
Middle	3762	-52.50	-13	-39.50	-75.47	-63.73	1.43	12.66	H
	5640	-47.96	-13	-34.96	-75.68	-59.53	1.73	13.30	H
	7518	-45.10	-13	-32.10	-75.43	-54.21	1.99	11.10	H
									H
									H
									H
									H
	3762	-52.16	-13	-39.16	-75.35	-63.39	1.43	12.66	V
	5640	-48.65	-13	-35.65	-75.96	-60.22	1.73	13.30	V
	7518	-44.56	-13	-31.56	-74.85	-53.67	1.99	11.10	V
									V
									V

Highest	3816	-49.10	-13	-36.10	-72.25	-60.35	1.44	12.69	H
	5724	-47.08	-13	-34.08	-75.16	-58.65	1.73	13.30	H
	7632	-45.11	-13	-32.11	-74.95	-54.23	2.01	11.13	H
									H
									H
									H
									H
	3816	-48.84	-13	-35.84	-72.23	-60.09	1.44	12.69	V
	5724	-47.43	-13	-34.43	-74.88	-59.00	1.73	13.30	V
	7632	-45.11	-13	-32.11	-74.86	-54.23	2.01	11.13	V
									V
									V
									V
									V

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