RF TEST REPORT

FCC ID: 2AV3B-SP5705

Product Name	:	Tablet
Test Model	:	SP5705
Brand Name	:	ADVANCE
Applicant	:	TECHNOSOURCE HK LIMITED
Address	:	2F, Building B, Sulandscape Industrial park, Shiyan Town, Bao an District, Shenzhen China
Date of Receipt	:	Jun. 26, 2024
Date of Test	:	Jun. 26, 2024 ~ July 08, 2024
Issued Date	:	July 08, 2024
Report Version	:	V1.0
Test Sample	:	AiTSZ-240626006-1
Standard(s)	:	FCC Part 22H & 24E Rules; ANSI C63.26:2015

Lab: B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Tel.: +86 0755-230967639 Fax.: +86 0755-230967639

This device described above has been tested by Guangdong Asia Hongke Test Technology Limited and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

Reviewed by: Leon Yi ____________ Leon.yi

Approved by: Sean She ____________ Sean She

GUANGDONG ASIA HONGKE TEST TECHNOLOGY CO.,LTD · AiT · TEST REPORT

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	July 08, 2024	Valid	Initial Release

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1. GENERAL INFORMATION

Manufacturer	TECHNOSOURCE HK LIMITED
Address	2F, Building B, Sulandscape Industrial park, Shiyan Town, Bao an District, Shenzhen China
Product Designation	Tablet
Test Model	SP5705
Brand Name	ADVANCE
Serial model	N/A
Model Different	N/A
Power supply	Input: 100-240V~50/60Hz 0.45A Output: 5V⎓2000mA
Deviation	No any deviation from the test method.
Condition of Test Sample	Normal
Test Result	Pass

Note:

For a more detailed features description, please refer to the manufacturer’ s specifications or the User's Manual.

2. PRODUCT INFORMATION

2.1 PRODUCT TECHNICAL DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Tablet	
Hardware Version:	N/A	
Software Version:	N/A	
Support Networks:	GSM,GPRS, EDGE, WCDMA, HSDPA, HSUPA	
Frequency Bands:	☒GSM 850 ☒PCS1900 (U.S. Bands) ☐GSM 900 ☐DCS 1800 (Non-U.S. Bands) ☒UMTS FDD Band II ☐UMTS FDD Band IV ☒UMTS FDD Band V (U.S. Bands) ☐UMTS FDD Band I ☐UMTS FDD Band VIII (Non-U.S. Bands)	
Type of Modulation:	GMSK,8PSK Modulation For GSM/GPRS/EDGE	
	BPSK,QPSK Modulation For WCDMA/HSDPA/HSUPA	
Frequency Range:	GSM/GPRS/EDGE 850: 824.2MHz-848.8 MHz	
	GSM/GPRS/EDGE 1900: 1850.2MHz-1909.8 MHz	
	WCDMA Band II: 1852.4MHz-1907.6 MHz	
	WCDMA Band V: 826.4-846.6 MHz	
Emission Designator:	GSM/GPRS:	247KGXW
	EDGE 850:	258KG7W
	GSM/GPRS 1900:	249KGXW
	EDGE 1900:	293KG7W
	WCDMA Band II:	7M54F9W
	WCDMA Band V:	4M25F9W
Antenna Type:	PIFA antenna	
Antenna gain:	GSM850: 1.04dBi	PCS1900: 1.73dBi
	WCDMA850: 1.04dBi	WCDMA 1900: 1.73dBi
Battery parameter:	Input: 100-240V~50/60Hz 0.45A Output: 5V⎓2000mA	
Dual Card:	GSM /WCDMA Card Slot	
Extreme Temp. Tolerance	-10 °C to +50 °C	
Temperature range:	0℃ to +30℃	

2.2 TEST METHODOLOGY

The tests were performed according to following standards:

No.	Identity	Document Title
1	47 CFR FCC Part 2	Frequency allocations and radio treaty matters, general rules and regulations.
2	47 CFR FCC Part 22	Public Mobile Services.
3	47 CFR FCC Part 24	Personal Communications Services.
4	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
5	ANSI/TIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
6	KDB 971168	D01 v03r01 Measurement Guidance For Certification Of Licensed Digital Transmitters.

2.3 DEVICE CAPABILITIES

850/1900 GSM/GPRS/EGPRS,850/1900 WCDMA/HSPA, Multi-Band LTE,802.11 b/g/nfor WLAN,Bluetooth (1X,EDR,LE),GPS.

For emissions from 1GHz – 18GHz, low, mid, and high channels were tested with highest power and worst case configuration.

The emissions below 1GHz and above 18GHz were tested with the highest transmitting power channel and the worst case configuration.

The EUT was manipulated through three orthogonal planes of X-orientation (flatbed), Y-orientation (landscape),and Z-orientation (portrait) during the testing. Only the worst case emissions were reported in this test report.

2.4 SPECIAL ACCESSORIES

The battery wassupplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

2.5 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.7 EMISSION DESIGNATOR

GSM Emission Designator

Emission Designator = 249KGXW

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W

GSM BW = 249 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D

LTE BW = 4.48 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

QAM Modulation

Emission Designator = 4M48W7D

LTE BW = 4.48 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

3.TEST ENVIRONMENT

3.1 ADDRESS OF THE TEST LABORATORY

Company:	Guangdong Asia Hongke Test Technology Limited
Address:	B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
A2LA Registration Number:	7133.01
FCC Accredited Lab. Designation Number:	CN1376
FCC Test Firm Registration Number:	251906

3.3 ENVIRONMENTAL CONDITIONS

	NORMAL CONDITIONS	EXTREME CONDITIONS
Temperature range	15~35℃	-10℃~50℃
Humidty range	20 % to 75 %.	20 % to 75 %.
Pressure range	86-106kPa	86-106kPa
Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.		

3.4 MEASUREMENT UNCERTAINTY

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)
Radio Frequency	± 6.5 x 10-8	(1)
RF Power, Conducted	± 0.9 dB	(1)

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5 LIST OF TEST EQUIPMENT

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	R&S	FSV40	101470	2023.09.08	2024.09.07
2	Spectrum Analyzer	Keysight	N9020A	MY51280643	2023.09.08	2024.09.07
3	EMI Measuring Receiver	R&S	ESR	101660	2023.09.08	2024.09.07
4	Low Noise Pre-Amplifier	HP	HP8447E	1937A01855	2023.09.08	2024.09.07
5	Low Noise Pre-Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2023.09.08	2024.09.07
6	Passive Loop	ETS	6512	00165355	2022.09.04	2024.09.03
7	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2021.08.29	2024.08.28
8	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2021.08.29	2024.08.28
9	SHF-EHF Horn Antenna 15-40GHz	SCHWARZBECK	BBHA9170	BBHA9170367d	2021.08.29	2024.08.28
10	EMI Measuring Receiver	R&S	ESR	101160	2023.09.13	2024.09.12
11	LISN	SCHWARZBECK	NNLK 8129	8130179	2023.10.29	2024.10.28
12	Pulse Limiter	R&S	ESH3-Z2	102789	2023.09.13	2024.09.12
13	Pro.Temp&Humi.chamber	MENTEK	MHP-150-1C	MAA08112501	2023.09.08	2024.09.07
14	RF Automatic Test system	MW	MW100-RFCB	21033016	2023.09.08	2024.09.07
15	Signal Generator	Agilent	N5182A	MY50143009	2023.09.08	2024.09.07
16	Wideband Radio communication tester	R&S	CMW500	1201.0002K50	2023.09.08	2024.09.07
17	RF Automatic Test system	MW	MW100-RFCB	21033016	2023.09.08	2024.09.07
18	DC power supply	ZHAOXIN	RXN-305D-2	28070002559	N/A	N/A
19	RE Software	EZ	EZ-EMC_RE	Ver.AIT-03A	N/A	N/A
20	CE Software	EZ	EZ-EMC_CE	Ver.AIT-03A	N/A	N/A
21	RF Software	MW	MTS 8310	2.0.0.0	N/A	N/A
22	temporary antenna connector(Note)	NTS	R001	N/A	N/A	N/A
Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.						

4. SYSTEM TEST CONFIGURATION

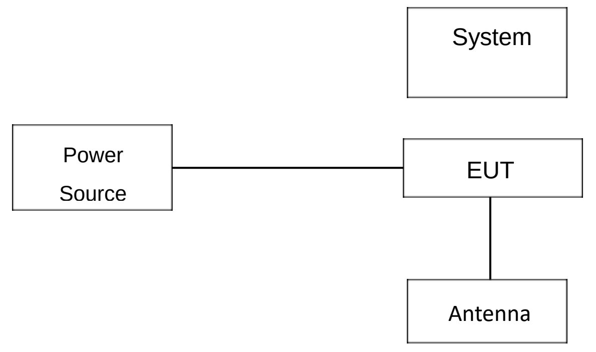
4.1 EUT CONFIGURATION

The EUTconfiguration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

4.3 CONFIGURATION OF EUT SYSTEM



This example is connection diagram of EUT test configurations.

Table 2-1 Equipment Used in EUT System

4.4 EQUIPMENT USED IN TESTED SYSTEM

The Following Peripheral Devices And Interface Cables Were Connected During The Measurement:

☐Test Accessories Come From The Laboratory

☒Test Accessories Come From The Manufacturer

Item	Equipment	Model No.	Identifier	Note
1	tablet PC	ONQTAB115	--	EUT
2	Adapter	HJ-FC001K7-US	N/A	EUT

5.SUMMARY OF TEST RESULTS

5.1 TEST CONDITION : CONDUCTED TEST

Item	Test Description	FCC Rules	Result
1	Occupied Bandwidth	§2.1049	Pass
2	Band Edge / Spurious andHarmonic Emissions at Antenna Terminal	§2.1051, §22.917(a), §24.238(a)	Pass
5	Conducted Output Power	§2.1046	Pass
6	Frequency stability / variation of ambient temperature	§2.1055, § 22.355, §24.235	Pass
7	Peak- to- Average Ratio	§24.232(d)	Pass

5.2 TEST CONDITION : RADIATED TEST

Item	Test Description	FCC Rules	Result
1	Effective Radiated Power	§22.913(a)(5)	Pass
2	Equivalent Isotropic Radiated Power	§24.232(c)	Pass
3	Radiated Spurious and Harmonic Emissions	§2.1053, §22.917(a), §24.238(a),	Pass

Note:

1.The measurement uncertainty is not included in the test result.

2.Antenna gain values are provided by the customer and are not claimed by the laboratory.

6. DESCRIPTION OF TEST MODES

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/ EDGE850	TX (824 MHz ~ 849 MHz)	Channel 128	Channel 190	Channel 251
		824.2 MHz	836.6 MHz	848.8 MHz
WCDMA band V	TX (824 MHz ~ 849 MHz)	Channel 4132	Channel 4182	Channel 4233
		826.4 MHz	836.4 MHz	846.6 MHz

Bands	Tx/Rx Frequency	RF Channel		
		Low(L)	Middle(M)	High(H)
GSM/GPRS/ EDGE1900	TX (1850 MHz-1910 MHz)	Channel 512	Channel 661	Channel 810
		1850.2 MHz	1880.0 MHz	1909.8 MHz
WCDMA Band II	TX (1850 MHz-1910 MHz)	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the worse mode applicability and tested channel detail as below:

Band	Radiated	Conducted
GSM/GPRS/ EDGE 850/1900	GSM (GMSK, 1Tx-slot)Link GPRS (GMSK, 1Tx-slot)Link EDGE (8PSK, 1Tx-slot)Link	GSM (GMSK,1Tx-slot)Link GPRS (GMSK, 1Tx-slot)Link EDGE (8PSK, 1Tx-slot)Link
WCDMA Band II/V	RMC 12.2kbps Link	RMC 12.2kbps Link

ACCORDING TO 3GPP 25.101 SUB-CLAUSE 6.2.2, THE MAXIMUM OUTPUT POWER IS ALLOWED TO BE REDUCED BY FOLLOWING THE TABLE.

Table 6.1aA: UE maximum output power with HS-DPCCH and E-DCH

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH	0≤ CM≤3.5	MAX(CM-1,0)
Note: CM=1 for β_c/β_d=12/15, β_{hs}/β_c=24/15.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensate for the power back-off by increasing the gain of TX_ in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

7. OUTPUT POWER

7.1 LIMIT

The substitution method, in ANSI/TIA-603-E-2016, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v03. The ERP of mobile transmitters must not exceed 7 Watts (Cellular Band) and the EIRP of mobile transmitters are limited to 2 Watts (PCS Band).

Mode	Nominal Peak Power
GSM 850	< 7 Watts max. ERP (38.45dBm)
PCS 1900	< 2 Watts max. EIRP (33dBm)
WCDMA Band II	< 2 Watts max. EIRP (33dBm)
WCDMA Band V	< 7 Watts max. ERP (38.45dBm)

7.2 PROVISIONS APPLICABLE

The conduction test is carried out in a shielded room.

According to the test, connect the device under test to the antenna port on the non-conductive platform directly to the test device for evaluation and measurement (ANSI-C63.26-2015 Clause 5.4)

7.3 MEASUREMENT METHOD

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.

TRANSMITTER RADIATED POWER (EIRP/ERP)

Determining ERP and/or EIRP from conducted RF output power measurements according to ANSI C63.26 2015 Section 5.2.5.5.

In many cases, RF output power limits are specified in terms of the ERP or the EIRP. Typically, ERP is specified when the operating frequency is less than or equal to 1 GHz and EIRP is specified when the operating frequency is greater than 1 GHz. Both are defined as the product of the power supplied to the antenna and its gain (relative to a dipole antenna in the case of ERP, and relative to an isotropic antenna in the case of EIRP); however, when working in decibels (i.e., logarithmic scale), the ERP and EIRP represent the sum of the transmit antenna gain (in dBd or dBi, respectively) and the conducted RF output power (expressed in dB relative to watts or milliwatts).

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation (1) as follows:

ERP or EIRP = PMeas + GT

ERP= EIRP-2.15

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively

(expressed in the same units as PMeas, e.g., dBm or dBW)

PMeas measured transmitter output power or PSD, in dBm or dBW

GT gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

For devices utilizing multiple antennas, see 6.4 for guidance with respect to determining the effective array transmit antenna gain term to be used in the above equation.

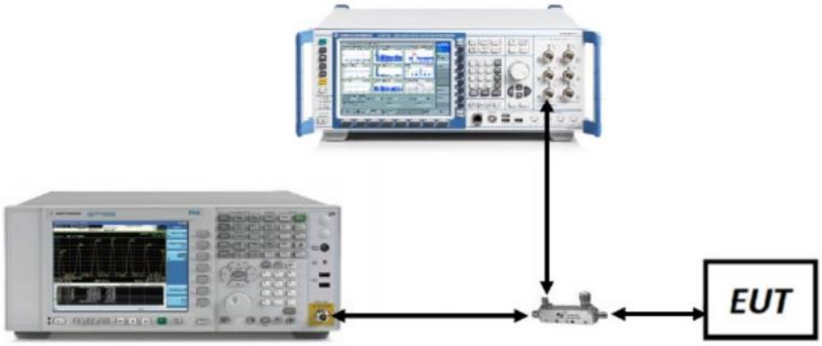
The following equations demonstrate the mathematical relationship between ERP and EIRP:

a) ERP = EIRP − 2.15, where ERP and EIRP are expressed in consistent units.

b) EIRP = ERP + 2.15, where ERP and EIRP are expressed in consistent units.

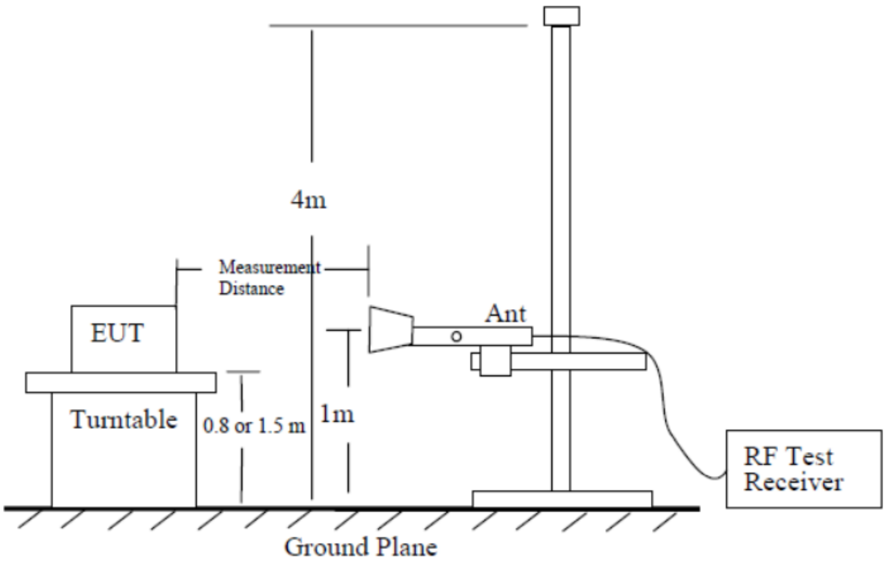
7.4 MEASUREMENT SETUP

Conducted method:

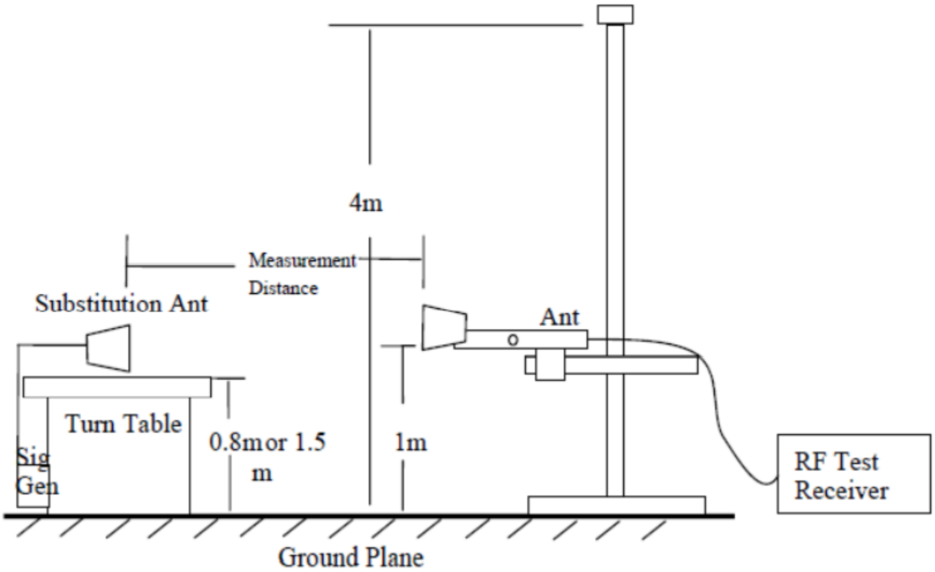


Radiated method:

Test site-up for radiated ERP and/or EIRP measurements



Substitution method set-up for radiated emission



7.5 MEASUREMENT RESULT

Please refer to AiTSZ-240626006FW6_ Appendix GSM and Appendix WCDMA.

8. PEAK-TO-AVERAGE RATIO

8.1 PROVISIONS APPLICABLE

This is the test for the Peak-to-Average Ratio from the EUT.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

8.2 MEASUREMENT METHOD

CCDF Procedure for PAPR :

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Set the measurement interval as follows:

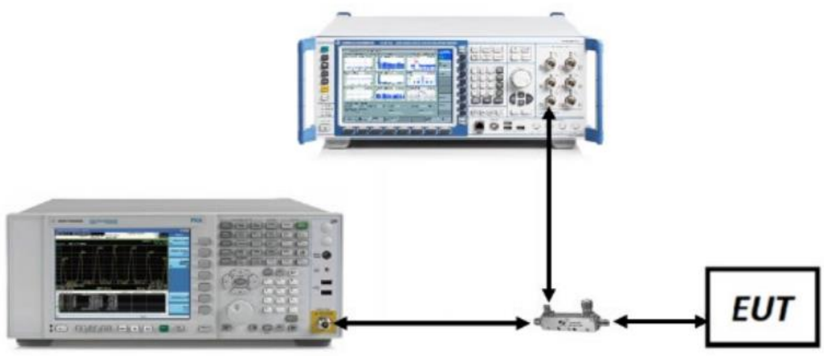
-for continuous transmissions, set to 1 ms,

-or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time

that is less than or equal to the burst duration.

4. Record the maximum PAPR level associated with a probability of 0.1%.

8.3 MEASUREMENT SETUP



8.4 MEASUREMENT RESULT

Please refer to AiTSZ-240626006FW6_ Appendix GSM and Appendix WCDMA.

9. OCCUPIED BANDWIDTH

9.1 PROVISIONS APPLICABLE

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emittedare each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.

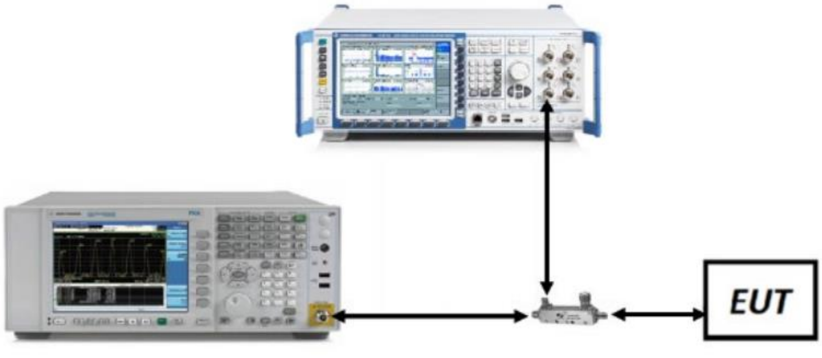
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base stationand spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission modeand specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupiedbandwidth

9.2 MEASUREMENT METHOD

1. The signal analyzer’s automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

9.3 MEASUREMENT SETUP



9.4 MEASUREMENT RESULT

Please refer to AiTSZ-240626006FW6_ Appendix GSM and Appendix WCDMA.

10. BAND EDGEEMISSIONSAT ANTENNA TERMINAL

10.1 MEASUREMENT OVERVIEW

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while theEUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates wereinvestigated to determine the worst case configuration. All modes of operation were investigated and the worst caseconfiguration results are reported in this section.

10.2 MEASUREMENT METHOD

GSM:

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1% of the emission bandwidth = 10KHZ
4. VBW > 3 x RBW =30KHZ
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW = 1001
7. Trace mode = trace average
8. Sweep time = 2ms
9. Sweep =Single

WCDMA:

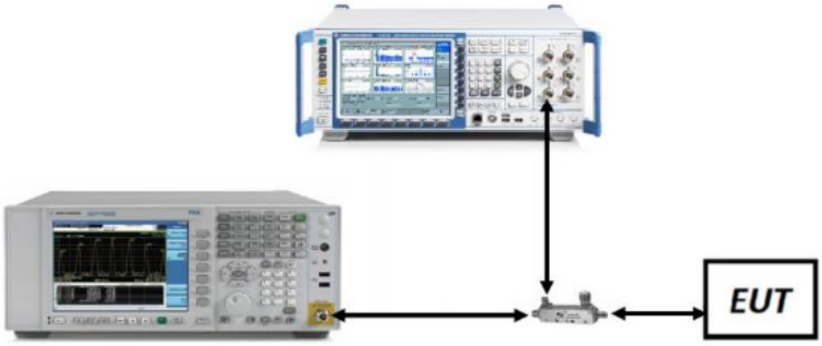
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1% of the emission bandwidth = 100KHZ
4. VBW > 3 x RBW =300KHZ
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW = 1001
7. Trace mode = trace average
8. Sweep time = 1.01ms
9. Sweep =Single

TEST NOTE

According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of The authorized operatingfrequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percentof the emission bandwidth of the fundamental emission of the transmitter may be employed.All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station andspectrum analyzer.

10.3 MEASUREMENT METHOD



10.4 MEASUREMENT RESULT

Please refer to AiTSZ-240626006FW6_ Appendix GSM and Appendix WCDMA.

11. SPURIOUS EMISSIONSAT ANTENNA TERMINAL

11.1 PROVISIONS APPLICABLE

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

11.2 MEASUREMENT METHOD

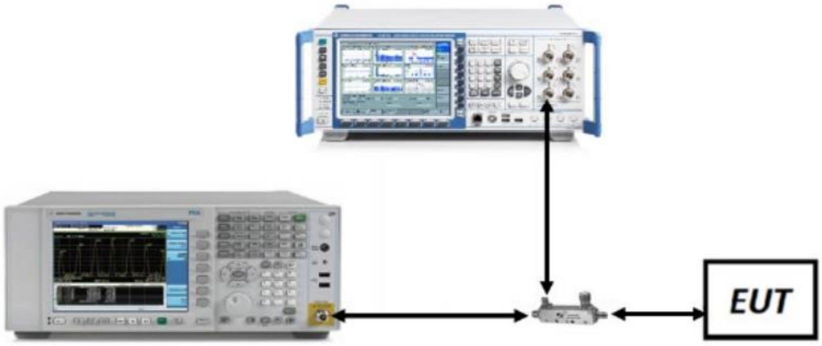
Test Settings (GSM)

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = RMS
4. Trace Mode = Trace average
5. Sweep time > (number of points in sweep) × (symbol period)
6. Number of points in sweep ≥ 2 x Span / RBW
7. Sweep =Single

Test Settings (WCDMA)

1. RBW = 1 MHz
2. VBW ≥ 3 MHz
3. Detector = RMS
4. Trace Mode = trace average
5. Sweep time > (number of points in sweep) × (symbol period)
6. Number of points in sweep ≥ 2 x Span / RBW
7. Sweep =Single

12.3 MEASUREMENT SETUP



11.4 MEASUREMENT RESULT

Please refer to AiTSZ-240626006FW6_ Appendix GSM and Appendix WCDMA.

12. RADIATED SPURIOUS EMISSION

12.1. PROVISIONS APPLICABLE

(A) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm.

At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

(B) For specific criteria, please refer to the description in section 9.2 of the report for corresponding evaluation.

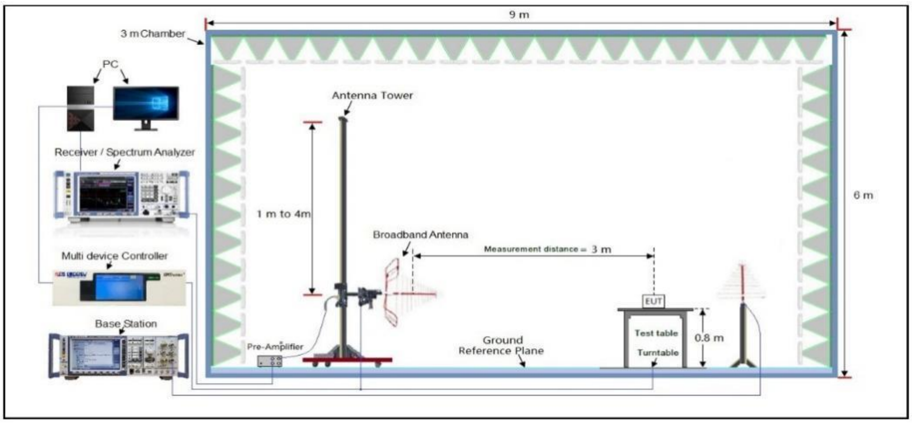
12.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.

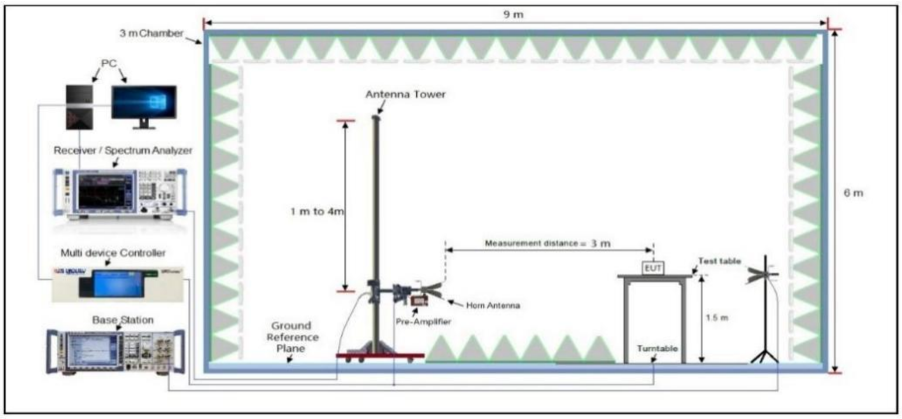
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.
11. For spurious emissions above 1GHz, a horn antenna is substituted in place of the EUT.
 The substitute antenna is drivenby a signal generator and the previously recorded signal was duplicated.
 The spurious emissions is calculated by the following formula;
 Result(dBm) = Pg(dBm) +Factor(dB)
 Factor(dB) = Ant Gain(dB)-Cable Loss(dB) + Power Splitter(dB) (Above 1GHz)
 Factor(dB) = Ant Gain(dB)-Cable Loss(dB) (Below 1GHz)
 Where: Pgis the generator output power into the substitution antenna.
 If the fundalmatal frequency is below 1GHz, RF output power has been converted to EIRP.
 EIRP(dBm) = ERP(dBm) + 2.15

12.3. MEASUREMENT setup

Radiated Emissions 30MHz to 1GHz Test setup



Radiated Emissions Above 1GHz Test setup



12.4 MEASUREMENT RESULT

GSM:

GSM 850: (30-9000)MHz							
The Worst Test Results Channel 128/824.2 MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1648.29	-40.71	9.40	4.75	-36.06	-13.00	-23.06	H
2472.47	-39.59	10.60	8.39	-37.38	-13.00	-24.38	H
3296.65	-30.88	12.00	11.79	**-30.67**	-13.00	-17.67	H
1648.29	-44.36	9.40	4.75	-39.71	-13.00	-26.71	V
2472.47	-44.89	10.60	8.39	-42.68	-13.00	-29.68	V
3296.65	-42.62	12.00	11.79	-42.41	-13.00	-29.41	V
The Worst Test Results Channel 190/836.6 MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1673.05	-41.22	9.50	4.76	-36.48	-13.00	-23.48	H
2509.79	-39.25	10.70	8.40	-36.95	-13.00	-23.95	H
3346.40	-32.31	12.20	11.80	**-31.91**	-13.00	-18.91	H
1673.05	-43.49	9.40	4.75	-38.84	-13.00	-25.84	V
2509.79	-43.96	10.60	8.39	-41.75	-13.00	-28.75	V
3346.40	-42.76	12.20	11.82	-42.38	-13.00	-29.38	V
The Worst Test Results Channel 251/848.8 MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1697.54	-40.49	9.60	4.77	-35.66	-13.00	-22.66	H
2546.12	-40.55	10.80	8.50	-38.25	-13.00	-25.25	H
3395.27	-32.12	12.50	11.90	**-31.52**	-13.00	-18.52	H
1697.54	-44.01	9.60	4.77	-39.18	-13.00	-26.18	V
2546.12	-44.86	10.80	8.50	-42.56	-13.00	-29.56	V
3395.27	-43.79	12.50	11.90	-43.19	-13.00	-30.19	V

PCS 1900: (30-20000)MHz							
The Worst Test Results for Channel 512/1850.2MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
3700.29	-34.22	12.60	12.93	**-34.55**	-13.00	-21.55	H
5550.24	-35.19	13.10	17.11	-39.20	-13.00	-26.20	H
7400.58	-32.64	11.50	22.20	-43.34	-13.00	-30.34	H
3700.29	-35.29	12.60	12.93	-35.62	-13.00	-22.62	V
5550.24	-34.07	13.10	17.11	-38.08	-13.00	-25.08	V
7400.58	-32.64	11.50	22.20	-43.34	-13.00	-30.34	V
The Worst Test Results for Channel 661/1880.0MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
3760.08	-33.94	12.60	12.93	**-34.27**	-13.00	-21.27	H
5640.28	-35.17	13.10	17.11	-39.18	-13.00	-26.18	H
7520.01	-33.52	11.50	22.20	-44.22	-13.00	-31.22	H
3760.08	-35.33	12.60	12.93	-35.66	-13.00	-22.66	V
5640.28	-34.46	13.10	17.11	-38.47	-13.00	-25.47	V
7520.01	-32.01	11.50	22.20	-42.71	-13.00	-29.71	V
The Worst Test Results for Channel 810/1909.8MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
3819.45	-33.71	12.60	12.93	**-34.04**	-13.00	-21.04	H
5729.45	-34.37	13.10	17.11	-38.38	-13.00	-25.38	H
7639.23	-32.90	11.50	22.20	-43.60	-13.00	-30.60	H
3819.45	-35.54	12.60	12.93	-35.87	-13.00	-22.87	V
5729.45	-34.65	13.10	17.11	-38.66	-13.00	-25.66	V
7639.23	-32.56	11.50	22.20	-43.26	-13.00	-30.26	V

GPRS 850: (30-9000)MHz							
The Worst Test Results Channel 128/824.2 MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1648.32	-41.57	9.40	4.75	-36.92	-13.00	-23.92	H
2472.33	-40.33	10.60	8.39	-38.12	-13.00	-25.12	H
3296.54	-32.30	12.00	11.79	**-32.09**	-13.00	-19.09	H
1648.32	-44.01	9.40	4.75	-39.36	-13.00	-26.36	V
2472.33	-45.09	10.60	8.39	-42.88	-13.00	-29.88	V
3296.54	-43.48	12.00	11.79	-43.27	-13.00	-30.27	V
The Worst Test Results Channel 190/836.6 MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1673.20	-40.43	9.50	4.76	-35.69	-13.00	-22.69	H
2509.60	-40.30	10.70	8.40	-38.00	-13.00	-25.00	H
3346.00	-30.90	12.20	11.80	**-30.50**	-13.00	-17.50	H
1673.20	-43.15	9.40	4.75	-38.50	-13.00	-25.50	V
2509.60	-44.27	10.60	8.39	-42.06	-13.00	-29.06	V
3346.00	-42.59	12.20	11.82	-42.21	-13.00	-29.21	V
The Worst Test Results Channel 251/848.8 MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1697.46	-40.87	9.60	4.77	-36.04	-13.00	-23.04	H
2546.34	-39.35	10.80	8.50	-37.05	-13.00	-24.05	H
3394.96	-32.23	12.50	11.90	**-31.63**	-13.00	-18.63	H
1697.46	-44.47	9.60	4.77	-39.64	-13.00	-26.64	V
2546.34	-44.65	10.80	8.50	-42.35	-13.00	-29.35	V
3394.96	-42.61	12.50	11.90	-42.01	-13.00	-29.01	V

GPRS1900: (30-20000)MHz							
The Worst Test Results for Channel 512/1850.2MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
3700.46	-34.92	12.60	12.93	**-35.25**	-13.00	-22.25	H
5550.32	-34.43	13.10	17.11	-38.44	-13.00	-25.44	H
7400.67	-33.15	11.50	22.20	-43.85	-13.00	-30.85	H
3700.46	-35.54	12.60	12.93	-35.87	-13.00	-22.87	V
5550.32	-34.96	13.10	17.11	-38.97	-13.00	-25.97	V
7400.67	-32.74	11.50	22.20	-43.44	-13.00	-30.44	V
The Worst Test Results for Channel 661/1880.0MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
3759.98	-34.24	12.60	12.93	**-34.57**	-13.00	-21.57	H
5640.19	-34.15	13.10	17.11	-38.16	-13.00	-25.16	H
7519.96	-32.90	11.50	22.20	-43.60	-13.00	-30.60	H
3759.98	-35.85	12.60	12.93	-36.18	-13.00	-23.18	V
5640.19	-34.57	13.10	17.11	-38.58	-13.00	-25.58	V
7519.96	-32.53	11.50	22.20	-43.23	-13.00	-30.23	V
The Worst Test Results for Channel 810/1909.8MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
3819.49	-33.54	12.60	12.93	**-33.87**	-13.00	-20.87	H
5729.45	-34.76	13.10	17.11	-38.77	-13.00	-25.77	H
7638.95	-32.82	11.50	22.20	-43.52	-13.00	-30.52	H
3819.49	-34.54	12.60	12.93	-34.87	-13.00	-21.87	V
5729.45	-34.67	13.10	17.11	-38.68	-13.00	-25.68	V
7638.95	-33.01	11.50	22.20	-43.71	-13.00	-30.71	V

WCDMA:

WCDMA Band 2: (30-20000)MHz							
The Worst Test Results for Channel 9262/1852.4MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
3704.49	-33.78	12.60	12.93	**-34.11**	-13.00	-21.11	H
5557.18	-34.03	13.10	17.11	-38.04	-13.00	-25.04	H
7409.61	-32.42	11.50	22.20	-43.12	-13.00	-30.12	H
3704.49	-35.69	12.60	12.93	-36.02	-13.00	-23.02	V
5557.18	-35.16	13.10	17.11	-39.17	-13.00	-26.17	V
7409.61	-32.53	11.50	22.20	-43.23	-13.00	-30.23	V
The Worst Test Results for Channel 9400/1880MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
3759.93	-33.67	12.60	12.93	**-34.00**	-13.00	-21.00	H
5639.83	-34.57	13.10	17.11	-38.58	-13.00	-25.58	H
7520.21	-33.23	11.50	22.20	-43.93	-13.00	-30.93	H
3759.93	-35.39	12.60	12.93	-35.72	-13.00	-22.72	V
5639.83	-33.77	13.10	17.11	-37.78	-13.00	-24.78	V
7520.21	-32.97	11.50	22.20	-43.67	-13.00	-30.67	V
The Worst Test Results for Channel 9538/1907.6MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
3815.24	-33.72	12.60	12.93	**-34.05**	-13.00	-21.05	H
5722.70	-34.17	13.10	17.11	-38.18	-13.00	-25.18	H
7630.31	-32.97	11.50	22.20	-43.67	-13.00	-30.67	H
3815.24	-35.23	12.60	12.93	-35.56	-13.00	-22.56	V
5722.70	-34.45	13.10	17.11	-38.46	-13.00	-25.46	V
7630.31	-32.81	11.50	22.20	-43.51	-13.00	-30.51	V

WCDMA Band 5: (30-9000)MHz							
The wost testresults channel 4132/826.4MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1652.81	-41.40	9.40	4.75	-36.75	-13.00	-23.75	H
2479.33	-40.24	10.60	8.39	-38.03	-13.00	-25.03	H
3305.52	-32.25	12.00	11.79	**-32.04**	-13.00	-19.04	H
1652.81	-44.37	9.40	4.75	-39.72	-13.00	-26.72	V
2479.33	-45.22	10.60	8.39	-43.01	-13.00	-30.01	V
3305.52	-43.30	12.00	11.79	-43.09	-13.00	-30.09	V
The Worst Test Results Channel 4182/836.4MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1672.95	-40.96	9.40	4.75	-36.31	-13.00	-23.31	H
2509.13	-40.56	10.60	8.39	-38.35	-13.00	-25.35	H
3345.49	-31.40	12.00	11.79	**-31.19**	-13.00	-18.19	H
1672.95	-44.40	9.40	4.75	-39.75	-13.00	-26.75	V
2509.13	-44.56	10.60	8.39	-42.35	-13.00	-29.35	V
3345.49	-43.08	12.00	11.79	-42.87	-13.00	-29.87	V
The Worst Test Results Channel 4233/846.6MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1693.42	-41.37	9.40	4.75	-36.72	-13.00	-23.72	H
2539.87	-39.58	10.60	8.39	-37.37	-13.00	-24.37	H
3386.14	-32.19	12.00	11.79	**-31.98**	-13.00	-18.98	H
1693.42	-43.29	9.40	4.75	-38.64	-13.00	-25.64	V
2539.87	-44.93	10.60	8.39	-42.72	-13.00	-29.72	V
3386.14	-43.76	12.00	11.79	-43.55	-13.00	-30.55	V

Note:

1.Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.

2.Result = Reading + Correct Factor.

3.Margin = Result – Limit

4.he device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test. Subsequently, only the worst case emissions are reported.

13. FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

13.1 PROVISIONS APPLICABLE

13.1.1 For Hand carried battery powered equipment

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

a.) Temperature: The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

13.1.2 For equipment powered by primary supply voltage

1 The carrier frequency of the transmitter is measured at room temperature (20°C to provide a

2 reference).

3 The equipment is turned on in a “standby” condition for fifteen minutes before applying power to

4 the transmitter. Measurement of the carrier frequency of the transmitter is made within oneminute after applying power to the transmitter.

5 Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at

6 least one half-hour is provided to allow stabilization of the equipment at each temperature level.

13.2 MEASUREMENT METHOD

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

7 Measure the carrier frequency at room temperature.

8 Subject the EUT to overnight soak at -30℃. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on channel 20175 for LTE band 4 measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

9 Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

10 Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from

minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.

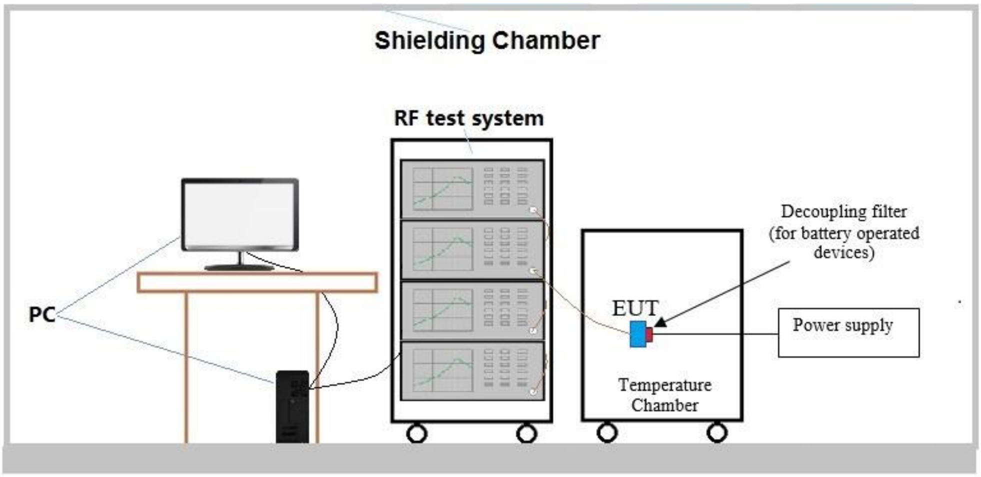
11 Subject the EUT to overnight soak at +50℃.

12 With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

13 Repeat the above measurements at 10℃ increments from +50℃ to -30℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

14 At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

13.3 MEASUREMENT SETUP



13.4 MEASUREMENT RESULT

Please refer to AiTSZ-240626006FW6_ Appendix GSM and Appendix WCDMA.

----END OF REPORT----