TEST REPORT

Report No. ·····:	**CTC2026373901**
FCC ID·····:	**2BM2I-LC2520**
IC·····:	**34946-LC2520**
Applicant·····:	**Shenzhen Xiaopai Technology Co., Ltd.**
Address·····:	Unit A 8F 806, skyworth bldg, Gaoxin Ave. 1.S., Nanshan District, Shenzhen, Guangdong Province, China
Manufacturer·····:	Shenzhen Xiaopai Technology Co., Ltd.
Address·····:	Unit A 8F 806, skyworth bldg, Gaoxin Ave. 1.S., Nanshan District, Shenzhen, Guangdong Province, China
Product Name·····:	**Smart Camera**
Trade Mark·····:	XPAI
Model/Type reference·····:	LC2520
Listed Model(s) ·····:	/
Standard·····:	**CFR47 PART 22H, 24E, 27**
Test Report Form No……..:	CTC-TR-117_A5
Master TRF……..:	Dated 2026-06-01
Date of receipt of test sample.:	Jul. 20, 2026
Date of testing……...:	Jul. 22, 2026 ~ Aug. 18, 2026
Date of issue…….....:	Oct. 14, 2026
Result……..:	**PASS**

Compiled by: (Printed name+signature)	Alicia Liu	Alicia Liu
Supervised by: (Printed name+signature)	Eric Zhang	Eric Zhang
Approved by: (Printed name+signature)	Totti Zhao	Totti Zhao

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1. SUMMARY

1.1. Test Standards

FCC Rules Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
FCC Rules Part 22: PRIVATE LAND MOBILE RADIO SERVICES.
FCC Part 22 Subpart H: Cellular Radiotelephone Service.
FCC Rules Part 24: PUBLIC MOBILE SERVICES
FCC Rules Part 27: MISCELLANEOUS WIRDELESS COMMUNICATIONS SERVICES
ANSI C63.26: 2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 D01 Power Meas License Digital Systems v03: MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS
RSS-Gen Issue 5: General Requirements for Compliance of Radio Apparatus.
RSS-130 Issue 2: Mobile Broadband Services (MBS) Equipment Operating in the Frequency Bands 698-756 MHz and 777-787 MHz
RSS-132 Issue 4: Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz.
RSS-133 Issue 7: 2 GHz Personal Communications Services.
RSS-139 Issue 4: Advanced Wireless Services Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz
RSS-199 Issue 4: Broadband Radio Service (BRS) Equipment Operating in the Band 2500–2690 MHz

1.2. Report Version

Revised No.	Report No.	Date of issue	Description
01	CTC2026373901	Oct. 14, 2026	Original

1.3. Test Description

Test Item	Section in CFR 47	RSS Rule	Result	Note
Conducted Output Power	Part 2.1046 Part 22.913(a) Part 24.232(c) Part 27.50	RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.4)	Pass	/
Peak-to-Average Ratio	Part 24.232 Part 27.50	RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.4)	Pass	/
99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b) Part 27.53	RSS-GEN(6.6) RSS-130(3.1) RSS-133(6.5) RSS-139(6.5) RSS-199(4.2)	Pass	/
Band Edge	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.5)	Pass	/

Conducted Spurious Emissions	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.5)	Pass	/
Frequency stability VS Temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54	RSS-GEN(6.11) RSS-130(4.3) RSS-132(5.3) RSS-133(6.3) RSS-199(4.3)	Pass	/
Frequency stability VS Voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54	RSS-GEN(6.11) RSS-132(5.3) RSS-133(6.3) RSS-139(6.3) RSS-199(4.3)	Pass	/
ERP and EIRP	Part 22.913(a) Part 24.232(b) Part 27.50	RSS-130(4.4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.4) RSS-199(4.4)	Pass	/
Radiated Spurious Emissions	Part 2.1053 Part 22.917 Part 24.238 Part 27.53	RSS-130(4.6) RSS-132(5.5) RSS-133(6.5) RSS-139(6.5) RSS-199(4.5)	Pass	/
Receiver Spurious Emissions	/	RSS-GEN(7.1.3)	Pass	/

Note:

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

2. N/A: means this test item is not applicable for this device according to the technology characteristic of device.

1.4. Test Facility

Address of the report laboratory

CTC Laboratories, Inc.
Add: Room 107, 108, 207, 208 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

Laboratory accreditation
The test facility is recognized, certified, or accredited by the following organizations:

A2LA-Lab Cert. No.: 4340.01
CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in th e identified field of testing.

Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)
CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

FCC (Registration No.: 951311, Designation Number CN1208)
CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC)Federal Communications Commission. The acceptance letter from the FCC is maintained inour fi les. Registration 951311, Aug 26, 2017.

1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTC Laboratories, Inc. is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-12.75 GHz	1.60 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)
Emission Mask	---------	(1)
Modulation Characteristic	---------	(1)
Transmitter Frequency Behavior	---------	(1)

Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.6. Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	20°C-25°C
Relative Humidity:	50 %-55 %
Air Pressure:	101kPa

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Shenzhen Xiaopai Technology Co., Ltd.
Address:	Unit A 8F 806, skyworth bldg, Gaoxin Ave. 1.S., Nanshan District, Shenzhen, Guangdong Province, China
Manufacturer:	Shenzhen Xiaopai Technology Co., Ltd.
Address:	Unit A 8F 806, skyworth bldg, Gaoxin Ave. 1.S., Nanshan District, Shenzhen, Guangdong Province, China
Factory:	Shenzhen Skyworth Digital Technology Co.,LTD. Baoan Factory
Address:	2-5F, Integration Multi-Storied Building, Skyworth Science and Technology Industrial Park, Tangtou Industrial Zone, Shiyan Street, Baoan District, Shenzhen city, China.

2.2. General Description of EUT

Product Name:	Smart Camera
Trade Mark:	/
Model/Type reference:	LC2520
Listed Model(s):	/
Model Difference:	/
Sample ID:	CTC-GC260710-001-S002 CTC-GC260710-001-S003
Power supply:	Type-C Input: 5V⎓3A Battery: 3.7V, 10400mAh from Li-ion Battery
Hardware version:	/
Software version:	/
LTE	
Operation Band:	FDD Band 2: UL: 1850.7MHz~1909.3MHz, DL: 1930.7MHz~1989.3MHz FDD Band 4: UL: 1710.7MHz~1754.3MHz, DL: 2110.7MHz~2154.3MHz FDD Band 5: UL: 824.7MHz~848.3MHz, DL: 869.7MHz~893.3MHz FDD Band 12: UL: 699.7MHz~715.3MHz, DL: 729.7MHz~745.3MHz FDD Band 13: UL: 779.5MHz~784.5MHz, DL: 748.5MHz~751.0MHz FDD Band 66: UL: 1710.7MHz~1779.3MHz, DL: 2110.7MHz~2179.3MHz
Modulation Type:	QPSK, 16QAM
Antenna Type:	External Antenna
Antenna Gain:	Band 2: 2.89dBi Max Band 4: 2.89dBi Max Band 5: 2.73dBi Max Band 12: 2.73dBi Max Band 13: 2.73dBi Max Band 66: 2.89dBi Max

2.3. Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing.

Test Frequency:

FDD Band 2

Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Low Range	1.4	18607	1850.7	607	1930.7
	3	18615	1851.5	615	1931.5
	5	18625	1852.5	625	1932.5
	10	18650	1855	650	1935
	15 [1]	18675	1857.5	675	1937.5
	20 [1]	18700	1860	700	1940
Mid Range	1.4/3/5/10 15 [1]/20 [1]	18900	1880	900	1960
High Range	1.4	19193	1909.3	1193	1989.3
	3	19185	1908.5	1185	1988.5
	5	19175	1907.5	1175	1987.5
	10	19150	1905	1150	1985
	15 [1]	19125	1902.5	1125	1982.5
	20 [1]	19100	1900	1100	1980
NOTE 1: Bandwidth for which a relaxation of the specified UE receiver sensitivity requirement (TS 36.101 [27] Clause 7.3) is allowed.					

FDD Band 4

Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Low Range	1.4	19957	1710.7	1957	2110.7
	3	19965	1711.5	1965	2111.5
	5	19975	1712.5	1975	2112.5
	10	20000	1715	2000	2115
	15	20025	1717.5	2025	2117.5
	20	20050	1720	2050	2120
Mid Range	1.4/3/5/10/15/20	20175	1732.5	2175	2132.5
High Range	1.4	20393	1754.3	2393	2154.3
	3	20385	1753.5	2385	2153.5
	5	20375	1752.5	2375	2152.5
	10	20350	1750	2350	2150
	15	20325	1747.5	2325	2147.5
	20	20300	1745	2300	2145

FDD Band 5

Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Low Range	1.4	20407	824.7	2407	869.7
	3	20415	825.5	2415	870.5
	5	20425	826.5	2425	871.5
	10 [1]	20450	829	2450	874
Mid Range	1.4/3/5 10 [1]	20525	836.5	2525	881.5
High Range	1.4	20643	848.3	2643	893.3
	3	20635	847.5	2635	892.5
	5	20625	846.5	2625	891.5
	10 [1]	20600	844	2600	889
NOTE 1: Bandwidth for which a relaxation of the specified UE receiver sensitivity requirement (TS 36.101 [27] Clause 7.3) is allowed.					

FDD Band 12

Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Low Range	1.4	23017	699.7	5017	729.7
	3	23025	700.5	5025	730.5
	5 [1]	23035	701.5	5035	731.5
	10 [1]	23060	704	5060	734
Mid Range	1.4/3 5 [1]/10 [1]	23095	707.5	5095	737.5
High Range	1.4	23173	715.3	5173	745.3
	3	23165	714.5	5165	744.5
	5 [1]	23155	713.5	5155	743.5
	10 [1]	23130	711	5130	741
NOTE 1: Bandwidth for which a relaxation of the specified UE receiver sensitivity requirement (TS 36.101 [27] Clause 7.3) is allowed.					

FDD Band 13

Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Low Range	5 [1]	23205	779.5	5205	748.5
	10 [1]	23230	782	5230	751
Mid Range	5 [1]/10 [1]	23230	782	5230	751
High Range	5 [1]	23255	784.5	5255	753.5
	10 [1]	23230	782	5230	751
NOTE 1: Bandwidth for which a relaxation of the specified UE receiver sensitivity requirement (TS 36.101 [27] Clause 7.3) is allowed.					

FDD Band 66

Test Frequency ID	Bandwidth [MHz]	N_{UL}	Frequency of Uplink [MHz]	N_{DL}	Frequency of Downlink [MHz]
Low Range	1.4	131979	1710.7	66443	2110.7
	3	131987	1711.5	66451	2111.5
	5	131997	1712.5	66461	2112.5
	10	132022	1715	66486	2115
	15	132047	1717.5	66511	2117.5
	20	132072	1720	66536	2120
Mid Range Tx[1]	1.4/3/5/10/15/20	132322	1745	66786	2145
Mid Range	1.4/3/5/10/15/20	132422	1755	66886	2155
Paired High Range[2]	1.4	132665	1779.3	67129	2179.3
	3	132657	1778.5	67121	2178.5
	5	132647	1777.5	67111	2177.5
	10	132622	1775	67086	2175
	15	132597	1772.5	67061	2172.5
	20	132572	1770	67036	2170
High Range[3]	1.4	NA	NA	67329	2199.3
	3	NA	NA	67321	2198.5
	5	NA	NA	67311	2197.5
	10	NA	NA	67286	2195
	15	NA	NA	67261	2192.5
	20	NA	NA	67236	2190
Note 1: Applicable for transmitter testing. Note 2: Applicable if UL is configured on the CC. Note 3: Applicable if no UL is configured on the CC.					

2.4. Measurement Instruments List

RF Test System – 2/3/4G						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Until
1	Spectrum Analyzer	R&S	FSV40-N	101654	Aug. 07, 2025	Aug. 06, 2026
2	Spectrum Analyzer	R&S	FSV40-N	101654	Aug. 07, 2026	Aug. 06, 2027
3	MXA Signal Analyzer	Keysight	N9020A	MY46471737	Dec. 13, 2025	Dec. 12, 2026
4	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 13, 2025	Dec. 12, 2026
5	PSG Analog Signal Generator	Agilent	E8257D	MY46521908	Dec. 13, 2025	Dec. 12, 2026
6	EXG Analog Signal Generator	Keysight	N5173B	MY59100842	Dec. 13, 2025	Dec. 12, 2026
7	MXG Vector Signal Generator	Keysight	N5182B	MY59100212	Dec. 13, 2025	Dec. 12, 2026
8	Wideband Radio Communication Tester	R&S	CMW500	102257	May 25, 2026	May 24, 2027
9	High and low temperature test chamber	ESPEC	MT3035	/	Mar. 25, 2026	Mar. 24, 2027
10	RF Cable	HUBER+SUHNER	SUCOFLEX101PE	RF-11	Apr. 16, 2026	Apr. 15, 2027

Test Software		
Name	Manufacturer	Software Version
JS1120	Tonscend	V3.1.46

Radiated emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-1013	Dec. 18, 2024	Dec. 17, 2026
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Oct. 17, 2025	Oct. 16, 2027
3	Spectrum Analyzer	R&S	FSV40-N	101654	Dec. 13, 2025	Dec. 12, 2026
4	Wideband Radio Communication Tester	R&S	CMW500	102257	May 25, 2026	May 24, 2027
5	Pre-Amplifier	SONOMA	310	186194	Dec. 13, 2025	Dec. 12, 2026
6	Low Noise Pre-Amplifier	EMCI	EMC051835	980075	Dec. 13, 2025	Dec. 12, 2026
7	Test Receiver	R&S	ESCI7	100967	Dec. 13, 2025	Dec. 12, 2026
8	RE32L-001	HUBENR	/	009 (9kHz-1GHz)	Feb. 09, 2026	Feb. 08, 2027
9	RE32L-002	HUBENR	/	010 (9kHz-1GHz)	Feb. 09, 2026	Feb. 08, 2027
10	RE32L-003	HUBENR	/	011 (9kHz-1GHz)	Feb. 09, 2026	Feb. 08, 2027
11	RE32H-001	HUBENR	/	012 (1GHz-18GHz)	Feb. 09, 2026	Feb. 08, 2027
12	RE32H-002	HUBENR	/	013 (1GHz-18GHz)	Feb. 09, 2026	Feb. 08, 2027
13	3m chamber 2	Frankonia	EE025	/	Oct. 19, 2024	Oct. 18, 2027
Test Software						

Name	Manufacturer	Software Version
EZ-EMC	FARA	FA-03A2

Note: 1. The Cal. Interval was one year.
2. The Cal. Interval was three years of the antenna.
3. The cable loss has been calculated in test result which connection between each test instruments.

3. TEST ITEM AND RESULTS

3.1. Conducted Output Power (ERP /EIRP / Conducted Power)

LIMIT

Conducted Output Power: N/A

LTE FDD Band 2: 2W(33dBm) EIRP
LTE FDD Band 4: 1W(30dBm) EIRP
LTE FDD Band 5: 7W(38.45dBm) ERP
LTE FDD Band 12: 3W(34.77dBm) ERP
LTE FDD Band 13: 3W(34.77dBm) ERP
LTE FDD Band 66: 1W(30dBm) EIRP
FCC: §2.1046, §22.913, §24.232, §27.50, §90.635, §90.541, and §96.41

TEST CONFIGURATION

- For Conducted output Power

Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

KDB 971168 D01 V03ro1 Section 5.2.1, for Conducted Output Power
KDB 971168 D01 V03r01 Section 5.2, for Effective (Isotropic) Radiated Power

Conducted Output Power:
The transmitter output was connected to a calibrated attenuator, the other end of which was connected to the simulated base station. The simulated station was set to force the EUT to its maximum power setting, Transmitter output power was read off in dBm, read values have added cable loss and attenuation.

Radiated Power:
The formula for calculating ERP/EIRP based on conduction power is as follows:
EIRP (dBm) = Conducted Power (dBm) + antenna gain (dBi)
ERP=EIRP - 2.15dB

TEST RESULTS

Please see the appendix for every tested band.

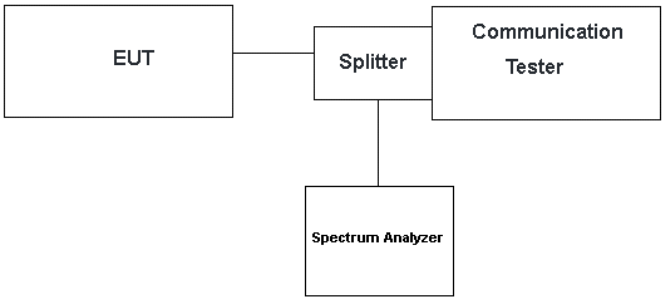
3.2. Peak-to-Average Ratio

LIMIT

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13dB.

TEST CONFIGURATION

- For Peak-to-Average Ratio



TEST PROCEDURE

- For Peak-to-Average Ratio

1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum and communication tester via a splitter
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 %.

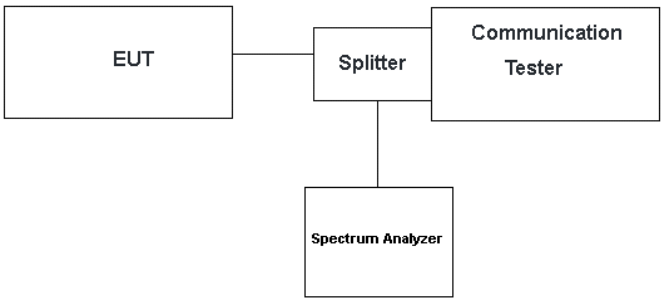
1. Record the deviation as Peak to Average Ratio.

TEST RESULTS

Please see the appendix for every tested band.

3.3. Occupy Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBW was set to about 1% of emission BW, VBW⩾3 times RBW.
3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

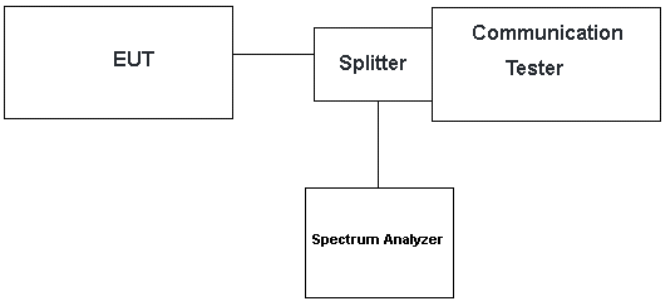
Please see the appendix for every tested band.

3.4. Out of band emission at antenna terminals

LIMIT

§ 22.917, §24.238, §27.53 (c), (g), (h), §90.691, §90.543 (Band 14)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.
§ 27.53 (a) (Band 30, 40)
The minimum permissible attenuation level of any spurious emissions is 70 + 10 log (P) dB where transmitting power (P) in Watts.
§ 27.53 (m) (Band 7, 41)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.
§ 96.41
(e) 3.5 GHz Emissions and Interference Limits—
(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

TEST CONFIGURATION



TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. For the out of band: Set the RBW = 1MHz VBW⩾3 times RBW, Start=30MHz, Stop= 10th harmonic.

TEST RESULTS

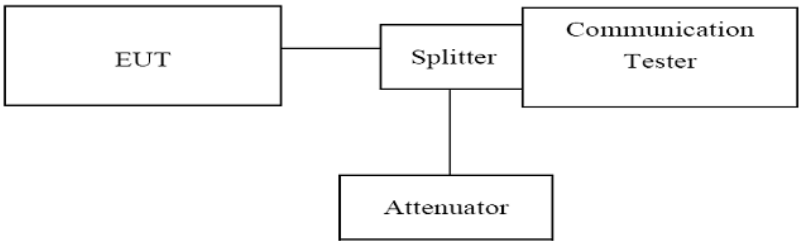
Please see the appendix for every tested band.

3.5. Receiver Spurious Emissions at Antenna Terminal

LIMIT

RSS-GEN7.1.3, Receiver-spurious emissions at any discrete frequency shall not exceed 2 nW in the band 30-1000 MHz, nor 5 nW above 1000 MHz.

TEST CONFIGURATION



TEST PROCEDURE

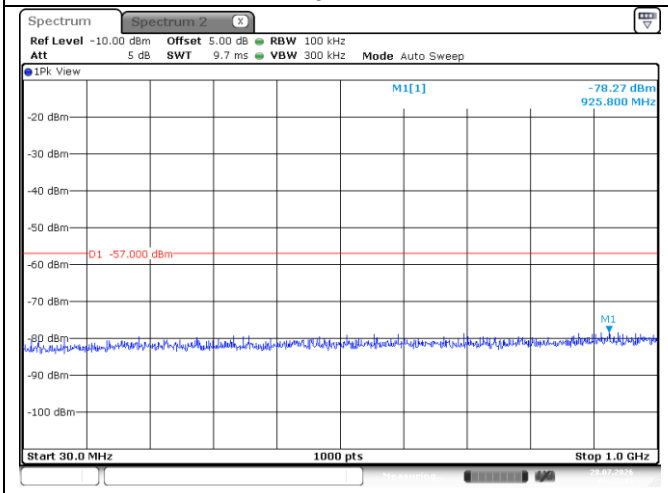
1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. Set the RBW= 100kHz, VBW =300kHz, below 1GHz
4. Set the RBW= 1MHz, VBW = 3MHz, above1GHz
5. Start=30MHz, Stop= 10th harmonic

TEST RESULTS

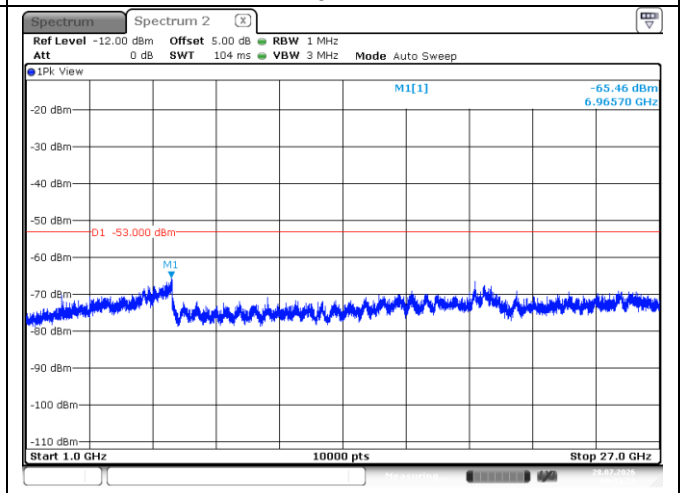
Remark: we test all modulation type and bandwidth, but only show worst case at report.

Band 2

20MHz

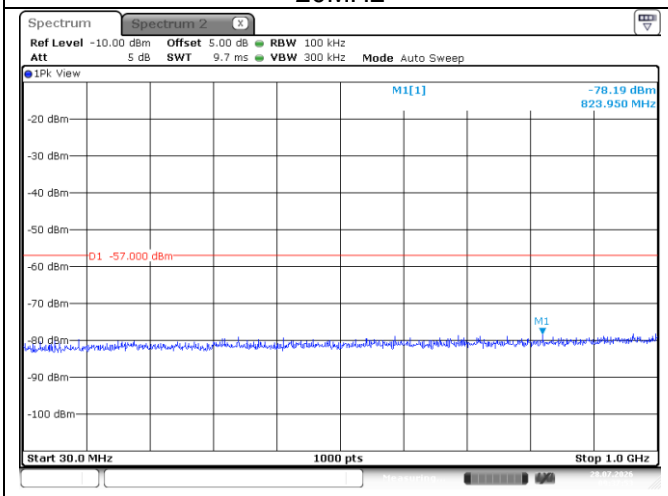


20MHz

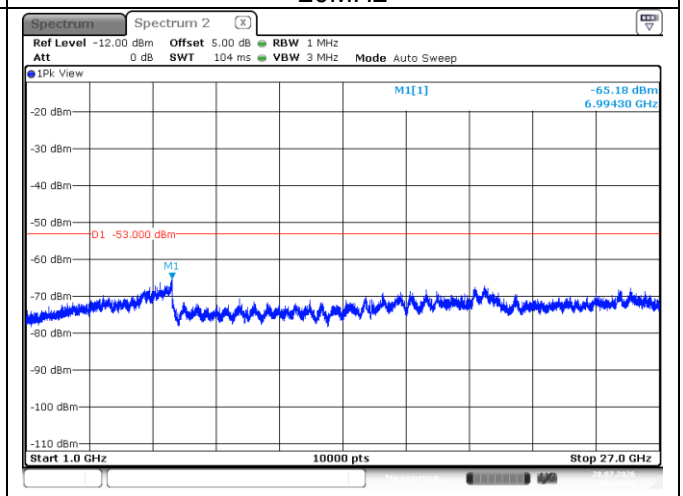


Band 4

20MHz

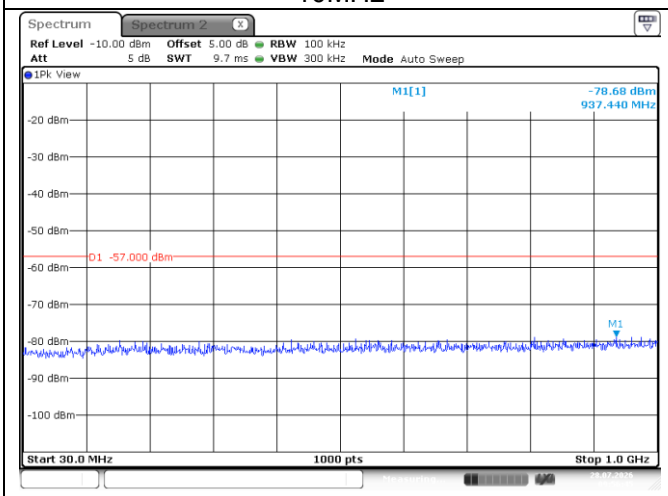


20MHz

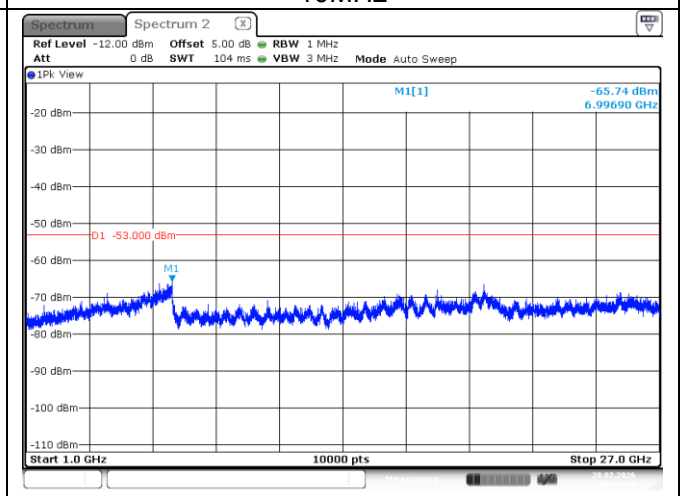


Band 5

10MHz

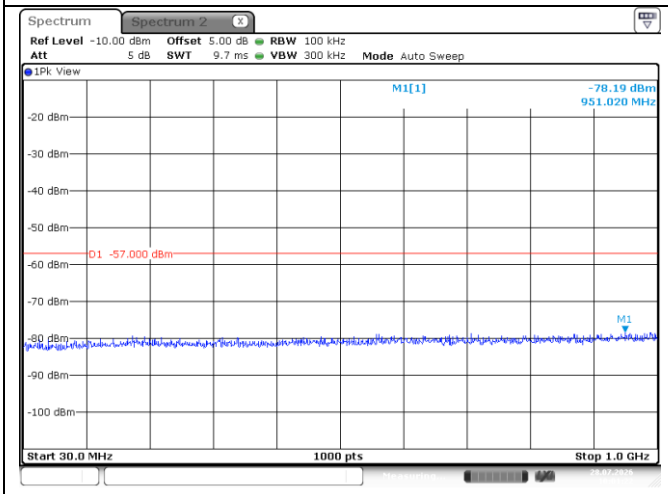


10MHz

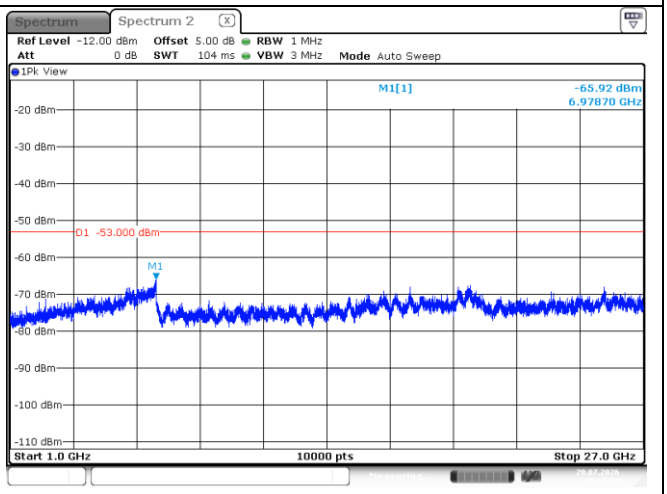


Band 12

10MHz

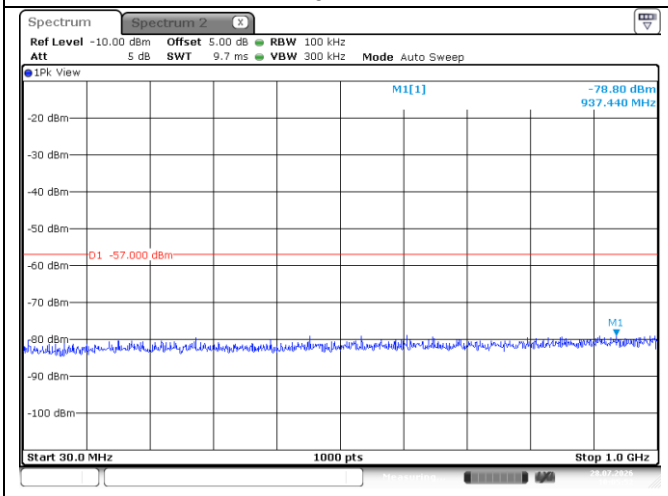


10MHz

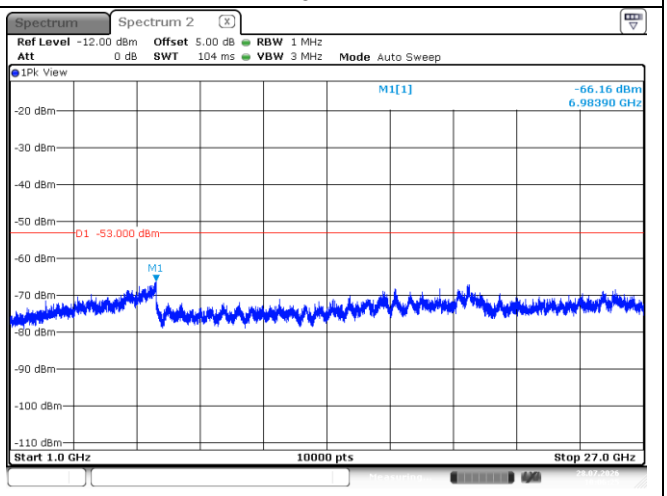


Band 13

10MHz

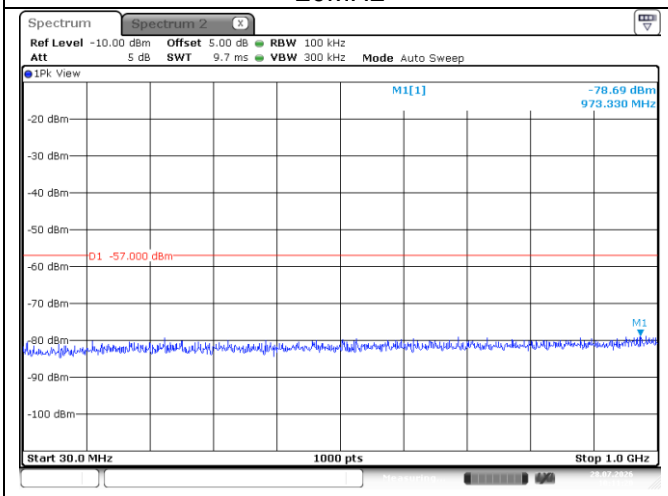


10MHz

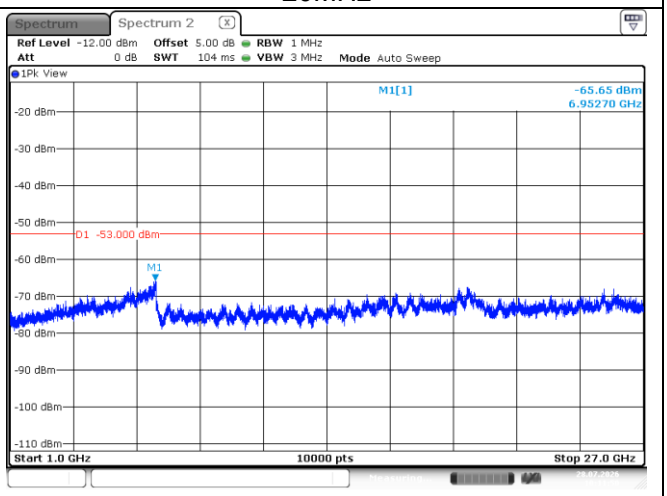


Band 66

20MHz



20MHz



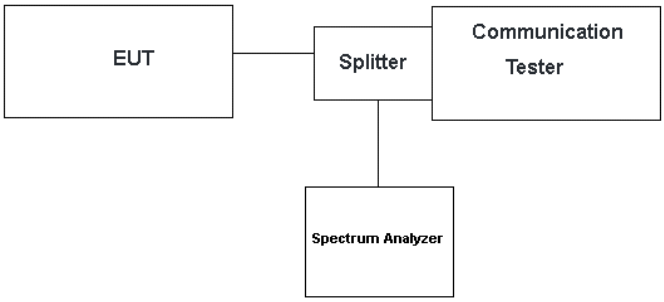
3.6. Band Edge compliance

LIMIT

§ 22.917, §24.238, §27.53(h)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the
transmitting power (P) by a factor of at least 43 + 10 log (P) dB.
§ 90.691 Emission mask requirements for EA-based systems.
(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum
adjacent to interior channels used by incumbent licensees. The emission limits are as follows:
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any
emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10
Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of
the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission
shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels,
whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in
kilohertz and where f is greater than 37.5 kHz.
§ 27.53 (Band 30)
(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed
only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:
(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:
(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz;
(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz,67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz;
(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.
§ 27.53 (Band 13)
(c)For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
(6) Compliance with the provisions of paragraphs (c)(4) of this section is based on the use of measurement

instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.
(f) Emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40dBm/MHz).
§ 27.53 (Band 12, 17, 71)
(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.
§ 27.53 (Band 7, 41)
(m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph
(m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.
FCC: §96.41
(e) 3.5 GHz Emissions and Interference Limits—(1) General protection levels. Except as otherwise specified in paragraph
(e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and
less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed −25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.
(2) Additional protection levels. Notwithstanding paragraph (d)(1) of this section, the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

TEST CONFIGURATION



TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. RBW was set to about 1% of emission BW, VBW≥3 times RBW.

TEST RESULTS

Please see the appendix for every tested band.

3.7. Radiated Spurious Emission

LIMIT

§ 22.917(a), §24.238(a), §27.53 (g), (h), §90.691

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

§ 27.53 (Band 13)

(c) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

(f) Emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40dBm/MHz).

FCC: § 90.669 Emission limits. (Band 26)

(a) On any frequency in an MTA licensee's spectrum block that is adjacent to a non-MTA frequency, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 plus 10 log10(P) decibels or 80 decibels, whichever is the lesser attenuation.

§ 27.53 (a) (Band 30)

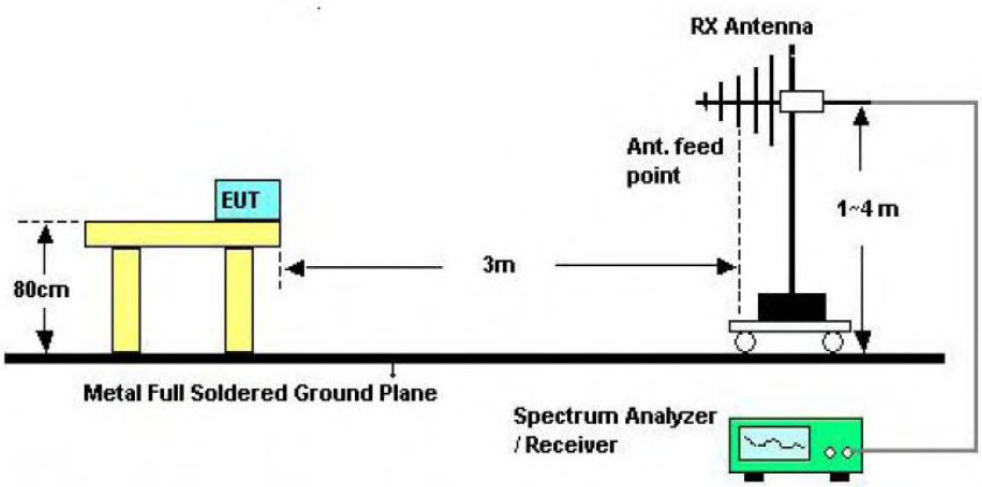
For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

§ 27.53 (m) (Band 7, 41)

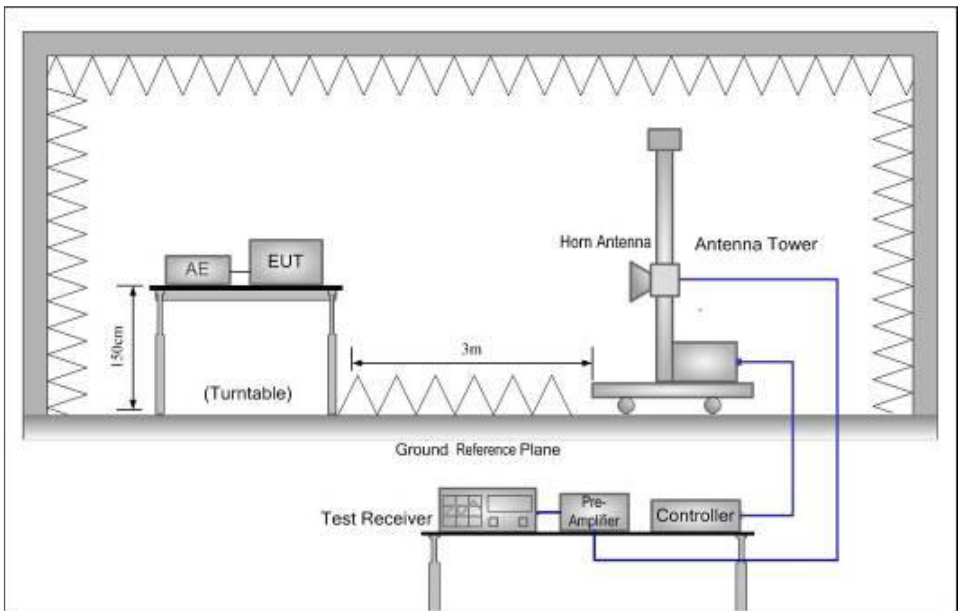
At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

TEST PROCEDURE

1. EUT was placed on a 1.50-meter-high non-conductive stand at a 3-meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:

7. Power (EIRP)=PMea- PAg - Pcl + Ga
   We used SMF100A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power (EIRP)=PMea- Pcl + Ga
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dBi) and known input power.
   ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.
9. Test frequency range should extend to 10th harmonic of highest fundamental frequency.

TEST RESULTS

Remark:
1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “X axis” position was the worst, and test data recorded in this report.
2. We test all modulation types, all bandwidths, and record the worst case at the maximum bandwidth of each modulation.

Measured data (worst case):

Band 2 Radiated Spurious Emissions							
Bandwidth	Modulation	Test Channel	Spurious Emission			Limit (dBm)	Result
			Frequency	Level (dBm)	Polarization		
20MHz	QPSK	L	3720.00	-39.18	Vertical	-13.00	Pass
			5580.00	-47.62	Vertical		
			3720.00	-44.30	Horizontal		
			5580.00	-53.05	Horizontal		
20MHz	QPSK	M	3760.00	-40.90	Vertical	-13.00	Pass
			5640.00	-47.19	Vertical		
			3760.00	-39.94	Horizontal		
			5640.00	-53.62	Horizontal		
20MHz	QPSK	H	3800.00	-40.15	Vertical	-13.00	Pass
			5700.00	-47.50	Vertical		
			3800.00	-39.24	Horizontal		
			5700.00	-53.53	Horizontal		
20MHz	16QAM	L	3720.00	-40.58	Vertical	-13.00	Pass
			5580.00	-46.42	Vertical		
			3720.00	-41.06	Horizontal		
			5580.00	-51.59	Horizontal		
20MHz	16QAM	M	3760.00	-41.07	Vertical	-13.00	Pass
			5640.00	-48.60	Vertical		
			3760.00	-41.58	Horizontal		
			5640.00	-53.16	Horizontal		
20MHz	16QAM	H	3800.00	-40.88	Vertical	-13.00	Pass
			5700.00	-46.29	Vertical		
			3800.00	-38.35	Horizontal		
			5700.00	-50.09	Horizontal		

Remark:

1. The emission behavior belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit above 20dB and not show in test report.

Band 4 Radiated Spurious Emissions							
Bandwidth	Modulation	Test Channel	Spurious Emission			Limit (dBm)	Result
			Frequency	Level (dBm)	Polarization		
20MHz	QPSK	L	3440.00	-38.39	Vertical	-13.00	Pass
			5160.00	-46.57	Vertical		
			3440.00	-44.28	Horizontal		
			5160.00	-51.64	Horizontal		
20MHz	QPSK	M	3465.00	-40.91	Vertical	-13.00	Pass
			5197.50	-48.27	Vertical		
			3465.00	-40.50	Horizontal		
			5197.50	-51.91	Horizontal		
20MHz	QPSK	H	3490.00	-40.28	Vertical	-13.00	Pass
			5235.00	-47.16	Vertical		
			3490.00	-41.42	Horizontal		
			5235.00	-53.44	Horizontal		
20MHz	16QAM	L	3440.00	-41.04	Vertical	-13.00	Pass
			5160.00	-46.45	Vertical		
			3440.00	-38.72	Horizontal		
			5160.00	-52.27	Horizontal		
20MHz	16QAM	M	3465.00	-41.31	Vertical	-13.00	Pass
			5197.50	-45.86	Vertical		
			3465.00	-40.93	Horizontal		
			5197.50	-53.11	Horizontal		
20MHz	16QAM	H	3490.00	-39.08	Vertical	-13.00	Pass
			5235.00	-47.07	Vertical		
			3490.00	-38.88	Horizontal		
			5235.00	-51.20	Horizontal		

Remark:

1. The emission behavior belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit above 20dB and not show in test report.

Band 5 Radiated Spurious Emissions							
Bandwidth	Modulation	Test Channel	Spurious Emission			Limit (dBm)	Result
			Frequency	Level (dBm)	Polarization		
10MHz	QPSK	L	3430.00	-39.65	Vertical	-13.00	Pass
			5145.00	-48.09	Vertical		
			3430.00	-44.92	Horizontal		
			5145.00	-52.88	Horizontal		
10MHz	QPSK	M	3465.00	-41.03	Vertical	-13.00	Pass
			5197.50	-48.06	Vertical		
			3465.00	-41.05	Horizontal		
			5197.50	-51.15	Horizontal		
10MHz	QPSK	H	3500.00	-41.82	Vertical	-13.00	Pass
			5250.00	-46.37	Vertical		
			3500.00	-39.79	Horizontal		
			5250.00	-52.62	Horizontal		
10MHz	16QAM	L	3430.00	-40.02	Vertical	-13.00	Pass
			5145.00	-46.71	Vertical		
			3430.00	-38.67	Horizontal		
			5145.00	-52.74	Horizontal		
10MHz	16QAM	M	3465.00	-39.35	Vertical	-13.00	Pass
			5197.50	-46.91	Vertical		
			3465.00	-40.85	Horizontal		
			5197.50	-53.33	Horizontal		
10MHz	16QAM	H	3500.00	-39.16	Vertical	-13.00	Pass
			5250.00	-45.99	Vertical		
			3500.00	-38.34	Horizontal		
			5250.00	-50.18	Horizontal		

Remark:

1. The emission behavior belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

Band 12 Radiated Spurious Emissions							
Bandwidth	Modulation	Test Channel	Spurious Emission			Limit (dBm)	Result
			Frequency	Level (dBm)	Polarization		
10MHz	QPSK	L	1408.00	-39.16	Vertical	-13.00	Pass
			2112.00	-46.44	Vertical		
			1408.00	-43.67	Horizontal		
			2112.00	-52.71	Horizontal		
10MHz	QPSK	M	1415.00	-39.44	Vertical	-13.00	Pass
			2122.50	-48.33	Vertical		
			1415.00	-40.39	Horizontal		
			2122.50	-53.58	Horizontal		
10MHz	QPSK	H	1422.00	-39.91	Vertical	-13.00	Pass
			2133.00	-47.29	Vertical		
			1422.00	-39.20	Horizontal		
			2133.00	-51.47	Horizontal		
10MHz	16QAM	L	1408.00	-39.18	Vertical	-13.00	Pass
			2112.00	-47.80	Vertical		
			1408.00	-40.10	Horizontal		
			2112.00	-50.47	Horizontal		
10MHz	16QAM	M	1415.00	-38.89	Vertical	-13.00	Pass
			2122.50	-48.49	Vertical		
			1415.00	-41.29	Horizontal		
			2122.50	-51.08	Horizontal		
10MHz	16QAM	H	1422.00	-39.33	Vertical	-13.00	Pass
			2133.00	-45.38	Vertical		
			1422.00	-39.10	Horizontal		
			2133.00	-49.68	Horizontal		

Remark:

1. The emission behavior belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit above 20dB and not show in test report.

Band 13 Radiated Spurious Emissions							
Bandwidth	Modulation	Test Channel	Spurious Emission			Limit (dBm)	Result
			Frequency	Level (dBm)	Polarization		
10MHz	QPSK	L	1564.00	-40.96	Vertical	-13	Pass
			2346.00	-46.94	Vertical		
			1564.00	-44.39	Horizontal		
			2346.00	-51.85	Horizontal		
10MHz	QPSK	M	1564.00	-41.34	Vertical	-13	Pass
			2346.00	-46.74	Vertical		
			1564.00	-39.81	Horizontal		
			2346.00	-53.69	Horizontal		
10MHz	QPSK	H	1564.00	-39.30	Vertical	-13	Pass
			2346.00	-47.84	Vertical		
			1564.00	-39.82	Horizontal		
			2346.00	-52.10	Horizontal		
10MHz	16QAM	L	1564.00	-38.70	Vertical	-13	Pass
			2346.00	-46.80	Vertical		
			1564.00	-38.64	Horizontal		
			2346.00	-51.72	Horizontal		
10MHz	16QAM	M	1564.00	-38.75	Vertical	-13	Pass
			2346.00	-46.72	Vertical		
			1564.00	-38.86	Horizontal		
			2346.00	-52.61	Horizontal		
10MHz	16QAM	H	1564.00	-40.89	Vertical	-13	Pass
			2346.00	-45.70	Vertical		
			1564.00	-38.48	Horizontal		
			2346.00	-50.50	Horizontal		

Remark:

1. The emission behavior belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit above 20dB and not show in test report.

Band 66 Radiated Spurious Emissions							
Bandwidth	Modulation	Test Channel	Spurious Emission			Limit (dBm)	Result
			Frequency	Level (dBm)	Polarization		
20MHz	QPSK	L	3440.00	-39.83	Vertical	-13.00	Pass
			5160.00	-47.32	Vertical		
			3440.00	-44.63	Horizontal		
			5160.00	-51.56	Horizontal		
20MHz	QPSK	M	3490.00	-40.84	Vertical	-13.00	Pass
			5235.00	-46.22	Vertical		
			3490.00	-41.01	Horizontal		
			5235.00	-52.23	Horizontal		
20MHz	QPSK	H	3540.00	-39.01	Vertical	-13.00	Pass
			5310.00	-47.86	Vertical		
			3540.00	-39.60	Horizontal		
			5310.00	-51.40	Horizontal		
20MHz	16QAM	L	3440.00	-39.69	Vertical	-13.00	Pass
			5160.00	-47.73	Vertical		
			3440.00	-39.67	Horizontal		
			5160.00	-52.29	Horizontal		
20MHz	16QAM	M	3490.00	-40.10	Vertical	-13.00	Pass
			5235.00	-47.58	Vertical		
			3490.00	-40.27	Horizontal		
			5235.00	-52.29	Horizontal		
20MHz	16QAM	H	3540.00	-39.31	Vertical	-13.00	Pass
			5310.00	-46.36	Vertical		
			3540.00	-38.88	Horizontal		
			5310.00	-49.63	Horizontal		

Remark:

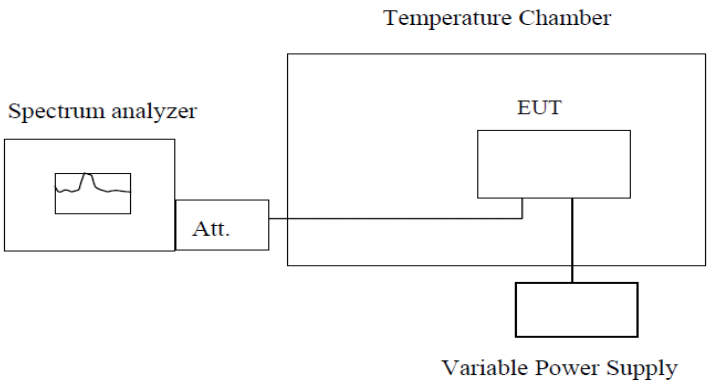
1. The emission behavior belongs to narrowband spurious emission.
2. The emission levels of below 1 GHz are very lower than the limit above 20dB and not show in test report.

3.8. Frequency Stability

LIMIT

Cellular Band: ±2.5ppm PCS Band: Within the authorized frequency block

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -5℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +30℃ reached.
7. Reduce the input voltage to specified extreme voltage variation (+/- 10%) and endpoint, record the maximum frequency change.

TEST RESULTS

Please see the appendix for every tested band.

**********THE END**********