

FCC Test Report

Client Name : MELTEC COMUNICACIONES SA

Client Address : Calle 130A # 58A-29, Bogota DC, 11111,
COLOMBIA

Product Name : Smart watch

Report Date : Feb. 04, 2023

Shenzhen Anbotek Compliance Laboratory Limited



Shenzhen Anbotek Compliance Laboratory Limited

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community,
Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel: (86) 0755-26066440 Fax: (86) 0755-26014772 Email: service@anbotek.com

Code: AB-RF-05-b



Hotline

400-003-0500

www.anbotek.com.cn



Contents

1. General Information	6
1.1. Client Information	6
1.2. Description of Device (EUT)	6
1.3. Auxiliary Equipment Used During Test	7
1.4. Operation State	7
1.5. Environmental Conditions	8
1.6. Test Equipment List	9
1.7. Measurement Uncertainty	10
1.8. Description of Test Facility	10
2. Summary of Test	11
2.1. Summary of test result	11
3. Conducted Output Power Test	13
3.1. Test Standard and Limit	13
3.2. Test Setup	13
3.3. Test Procedure	13
3.4. Test Data	13
4. Peak-Average Ratio	14
4.1. Test Standard and Limit	14
4.2. Test Setup	14
4.3. Test Procedure	14
4.4. Test Data	14
5. Modulation Characteristic	15
6. 99% Occupied Bandwidth & 26 dB Bandwidth	16
6.1. Test Standard and Limit	16
6.2. Test Setup	16
6.3. Test Procedure	16
6.4. Test Data	16
7. Conducted Spurious Emission	17
7.1. Test Standard and Limit	17
7.2. Test Setup	17
7.3. Test Procedure	17
7.4. Test Data	17
8. Band Edge	18
8.1. Test Standard and Limit	18
8.2. Test Setup	18
8.3. Test Procedure	18



8.4. Test Data	18
9. Radiated Spurious Emission	19
9.1. Test Standard and Limit	19
9.2. Test Setup	19
9.3. Test Procedure	19
9.4. Test Data	21
10. ERP and EIRP	29
10.1. Test Standard and Limit	29
10.2. Test Setup	29
10.3. Test Procedure	29
10.4. Test Data	31
11. Frequency stability VS Voltage measurement	34
11.1. Test Standard and Limit	34
11.2. Test Setup	34
11.3. Test Procedure	34
11.4. Test Data	34
12. Frequency stability VS Temperature measurement	35
12.1. Test Standard and Limit	35
12.2. Test Setup	35
12.3. Test Procedure	35
12.4. Test Data	35
APPENDIX I -- TEST SETUP PHOTOGRAPH	36
APPENDIX II -- EXTERNAL PHOTOGRAPH	36
APPENDIX III -- INTERNAL PHOTOGRAPH	36



TEST REPORT

Applicant : MELTEC COMUNICACIONES SA
Manufacturer : Shenzhen Baba Intelligent Technology Co., Ltd
Product Name : Smart watch
Model No. : S001
Trade Mark : BBJT
Rating(s) : Input: 3.7V $\pm$ 2A(with DC 3.8V, 750mAh battery inside)
Test Standard(s) : FCC PART 2, FCC Part 22(H), FCC Part 24(E), FCC Part 27(C)
Test Method(s) : ANSI C63.26-2015
KDB 971168 D01 Power Meas License Digital Systems v03r01

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 22, FCC Part 24, FCC Part 27 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Dec. 15, 2022

Date of Test :

Dec. 15, 2022 ~ Jan. 12, 2023

Prepared by :

Nian Xiu Chen

(Nianxiu Chen)

Approved & Authorized Signer :

Kingkong Jin

(Kingkong Jin)



Revision History

Report Version	Description	Issued Date
R00	Original Issue.	Feb. 04, 2023



1. General Information

1.1. Client Information

Applicant	:	MELTEC COMUNICACIONES SA
Address	:	Calle 130A # 58A-29, Bogota DC, 111111, COLOMBIA
Manufacturer	:	Shenzhen Baba Intelligent Technology Co., Ltd
Address	:	Bositai 301, Building 22, Tangxi yongli Industrial Zone, Guxing Community, Xixiang Subdistrict, Baoan, Shenzhen, China
Factory	:	Shenzhen Baba Intelligent Technology Co., Ltd
Address	:	Bositai 301, Building 22, Tangxi yongli Industrial Zone, Guxing Community, Xixiang Subdistrict, Baoan, Shenzhen, China

1.2. Description of Device (EUT)

Product Name	:	Smart watch
Model No.	:	S001
Trade Mark	:	BBJT
Test Power Supply	:	DC 3.8V battery inside
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Adapter	:	N/A
RF Specification		
Support Band	:	☒ FDD Band 2 ☐ FDD Band 4 ☒ FDD Band 5 ☐ FDD Band 7 ☐ FDD Band 12 ☐ FDD Band 13 ☐ FDD Band 14 ☐ FDD Band 17 ☐ FDD Band 25 ☐ FDD Band 26 ☐ TDD Band 38 ☒ TDD Band 41 ☐ FDD Band 66 ☐ FDD Band 71
Transmit Frequency	:	FDD Band 2: 1850.7 MHz~1909.3 MHz FDD Band 5: 824.7 MHz~848.3 MHz TDD Band 41: 2537.5 MHz~2652.5 MHz
Receive Frequency	:	FDD Band 2: 1930.7 MHz~1989.3 MHz FDD Band 5: 869.7 MHz~893.3 MHz TDD Band 41: 2537.5 MHz~2652.5 MHz
Modulation Type	:	QPSK, 16QAM
Power Class	:	Class 3
Antenna Type	:	FPC Antenna
Antenna	:	FDD Band 2: 3.83 dBi (Provided by customer)



Gain(Peak)	FDD Band 5: 3.83 dBi (Provided by customer) TDD Band 41: 1.52 dBi (Provided by customer)
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.	

1.3. Auxiliary Equipment Used During Test

Description	Rating(s)
--	--

1.4. Operation State

Test frequency list:

Band	Frequency (MHz)					
FDD Band 2	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NbL	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
	Mid Range	20 [1]	18700	1860	700	1940
		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
FDD Band 5	Test Frequency ID	Bandwidth [MHz]	NUL	Frequency of Uplink [MHz]	NbL	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



TDD Band 41	Test Frequency ID	Bandwidth [MHz]	EARFCN	Frequency (UL and DL) [MHz]
	Low Range	5	40065	2537.5
		10	40090	2540
		15	41165	2647.5
		20	40140	2545
	Mid Range	5	40590	2590
		10	40590	2590
		15	40590	2542.5
		20	40590	2590
	High Range	5	41215	2652.5
		10	41190	2650
		15	40590	2590
		20	41140	2645

1.5. Environmental Conditions

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa



1.6. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Preamplifier	SKET Electronic	LNPA-0118G-45	SKET-PA-002	Oct. 13, 2022	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 23, 2022	1 Year
3.	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	02555	Oct. 16, 2022	3 Year
4.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 23, 2022	2 Year
5.	Pre-amplifier	SONOMA	310N	186860	Oct. 23, 2022	1 Year
6.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
7.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 13, 2022	1 Year
8.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 13, 2022	1 Year
9.	DC Power Supply	LW	TPR-6420D	374470	Oct. 22, 2022	1 Year
10.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Oct. 19, 2022	1 Year
11.	Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	167336	Oct. 13, 2022	1 Year
12.	High-Pass Filter	CDKMV	ZHPF-BM1100 -4000-0730	B2015094550	Oct. 22, 2022	1 Year
13.	High-Pass Filter	CDKMV	ZHPF-M3.5 -18G-3834	1307006523	Oct. 22, 2022	1 Year



1.7. Measurement Uncertainty

Maximum measurement uncertainty

Parameter	Uncertainty
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±1 °C
Humidity	±5 %
DC and low frequency voltages	±3 %
Time	±5 %
Confidence interval: 95%. Confidence factor:k=2	

1.8. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, 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 in our files. Registration No. 184111.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102



2. Summary of Test

2.1. Summary of test result

Description of Test	FCC Rules	Requirements	Result
Conducted Output Power	Part 2.1046 Part 22.913(a) Part 24.232(b) Part 27.50(h)	N/A	Compliance
Peak-Average Ratio	Part 22.913 Part 24.232 Part 27.50	≤13dB	Compliance
Modulation Characteristics	§ 2.1047	Digital modulation	N/A
99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049	OBW: No limit EBW: No limit	Compliance
Conducted Spurious Emission	Part 2.1051 Part 22.917 Part 24.238 Part 27.53(m)	≤ -13dBm(LTE Band 5) ≤ -13dBm(LTE Band 2) ≤ -25dBm(LTE Band 41)	Compliance
Band Edge	Part 2.1051 Part 22.917 Part 24.238 Part 27.53(m)	≤ -13dBm (LTE Band 5) ≤ -13dBm (LTE Band 2) Refer to clause 8.1 for LTE Band 41)	Compliance
Frequency stability VS. temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54	≤ ±2.5ppm	Compliance
Frequency stability VS. voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54	≤ ±2.5ppm	Compliance
ERP and EIRP	Part 2.1046 Part 22.913(a) Part 24.232(c) Part 27.50(h)	ERP≤ 7W(LTE Band 5) EIRP≤ 2W(LTE Band 2) EIRP≤ 2W(LTE Band 41)	Compliance



Radiated Spurious Emission	Part 2.1053		Compliance
	Part 22.917	$\leq -13\text{dBm}(\text{LTE Band 5})$	
	Part 24.238	$\leq -13\text{dBm}(\text{LTE Band 2})$	
	Part 27.53(m)	$\leq -25\text{dBm}(\text{LTE Band 41})$	

Note:

1. "N/A" is an abbreviation for Not Applicable.
2. Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

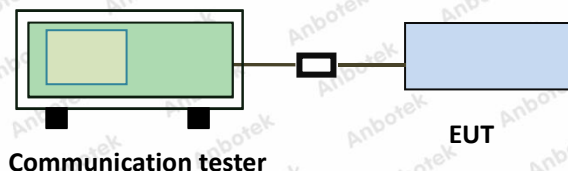


3. Conducted Output Power Test

3.1. Test Standard and Limit

Applicable Standard:	Part 2.1046 Part 22.913(a) Part 24.232(b) Part 27.50(h)
Limit:	N/A

3.2. Test Setup



3.3. Test Procedure

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

3.4. Test Data

Pass

Please refer to Appendix A of the Appendix Test Data.

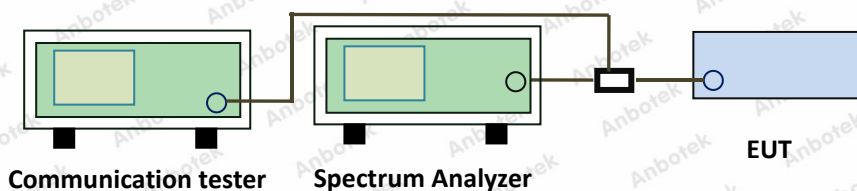


4. Peak-Average Ratio

4.1. Test Standard and Limit

Applicable Standard:	Part 22.913 Part 24.232 Part 27.50
Limit:	≤13dB

4.2. Test Setup



4.3. Test Procedure

According with KDB 971168 D01 Section 5.7:

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Center Frequency = Carrier frequency, RBW > Emission bandwidth of signal.
4. The signal analyzer was set to collect one million samples to generate the CCDF curve.
5. The measurement interval was set depending on the type of signal analyzed.
 - i. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.
 - ii. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power
6. Record the maximum PAPR level associated with a probability of 0.1%.

4.4. Test Data

Pass

Please refer to Appendix B of the Appendix Test Data.



5. Modulation Characteristic

According to FCC § 2.1047, Part 22H, Part 24E, Part 27C there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

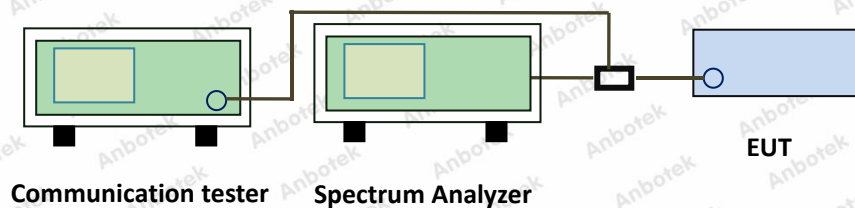


6. 99% Occupied Bandwidth & 26 dB Bandwidth

6.1. Test Standard and Limit

Applicable Standard:	Part 2.1049
Limit:	N/A

6.2. Test Setup



6.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:
Center Frequency= Carrier frequency, RBW=1% to 5% of anticipated OBW, VBW= 3 * RBW,
Detector=Peak,
Trace maximum hold.
4. Record the value of 99% Occupied bandwidth and -26dB bandwidth.

6.4. Test Data

Pass

Please refer to Appendix C of the Appendix Test Data.

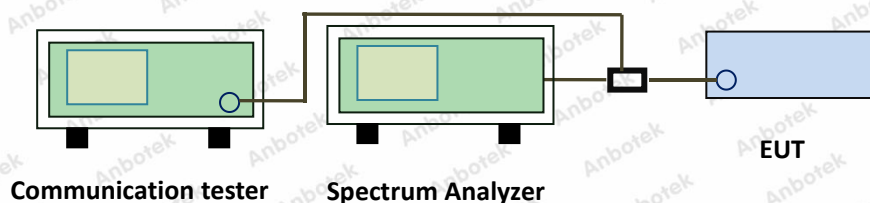


7. Conducted Spurious Emission

7.1. Test Standard and Limit

Applicable Standard:	Part 2.1051 Part 22.917 Part 24.238 Part 27.53(m)
Limit:	$\leq -13\text{dBm}$ (LTE Band 5) $\leq -13\text{dBm}$ (LTE Band 2) $\leq -25\text{dBm}$ (LTE Band 41)

7.2. Test Setup



7.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. Spectrum analyzer setting as follow:
Below 1GHz, RBW=100KHz, VBW = 300KHz, Detector=Peak, Sweep time= Auto
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peak, Sweep time= Auto
Scan frequency range up to 10th harmonic.
4. Record the test plot.

7.4. Test Data

Pass

Please refer to Appendix E of the Appendix Test Data.

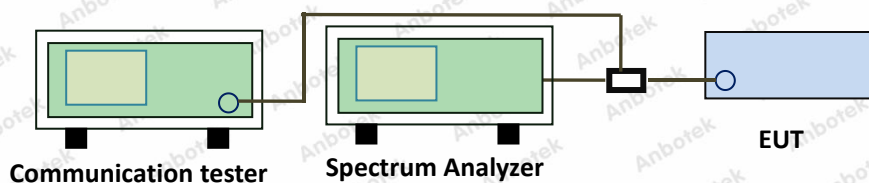


8. Band Edge

8.1. Test Standard and Limit

Applicable Standard:	Part 2.1051 Part 22.917 Part 24.238 Part 27.53(m)
Limit:	$\leq -13\text{dBm}$ (LTE Band 5) $\leq -13\text{dBm}$ (LTE Band 2) For LTE Band 41: 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 than $43 + 10 \log (P)$ 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.

8.2. Test Setup



8.3. Test Procedure

1. The EUT was connected to the spectrum analyzer and communication tester via a power splitter.
2. Set EUT in maximum power output.
3. The band edges of low and high channels were measured.
4. Spectrum analyzer setting as follow:
RBW=3KHz, VBW = 10KHz, Sweep time= Auto
5. Record the test plot.

8.4. Test Data

Pass

Please refer to Appendix D of the Appendix Test Data.

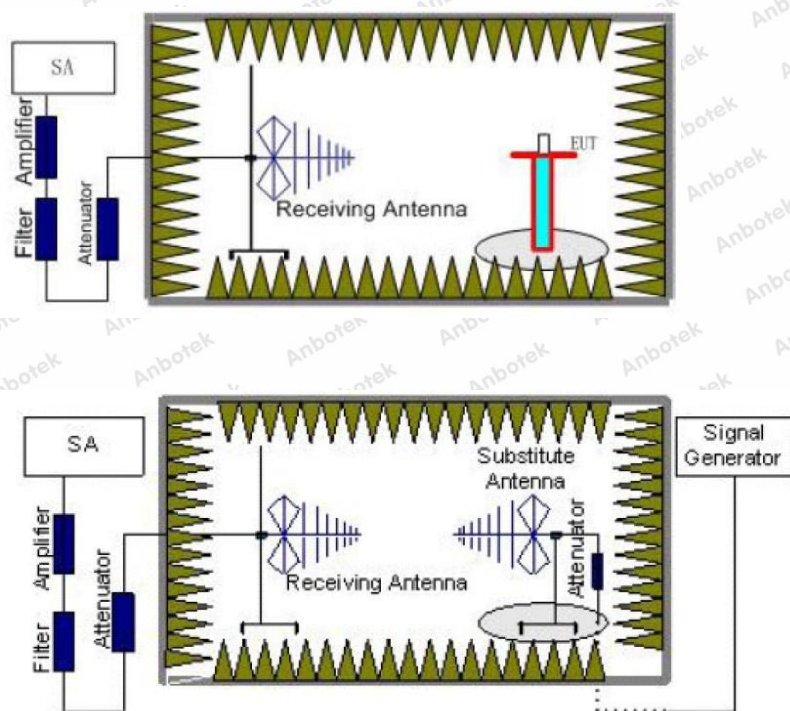


9. Radiated Spurious Emission

9.1. Test Standard and Limit

Applicable Standard:	Part 2.1053 Part 22.917 Part 24.238 Part 27.53(m)
Limit:	$\leq -13\text{dBm}$ (LTE Band 5) $\leq -13\text{dBm}$ (LTE Band 2) $\leq -25\text{dBm}$ (LTE Band 41)

9.2. Test Setup



9.3. Test Procedure

- Place the EUT in the center of the turntable.
 - For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
 - For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
- Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.



3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:
Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto
Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
 - a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
 - b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
 - c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
 - d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
 - e) Record the measured emission amplitude level and frequency
6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
 - a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
 - b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
 - c) Record the output power level of the signal generator when equivalence is achieved in step b).
11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.
12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:
$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where

P_e = equivalent emission power in dBm

P_s = source (signal generator) power in dBm

NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.
13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:



gain (dBd) = gain (dBi) – 2.15 dB.

If necessary, the antenna gain can be calculated from calibrated antenna factor information

14. Provide the complete measurement results as a part of the test report.

9.4. Test Data

Pass

Please to see the following pages

LTE Band 2								
Bandwidth	Channel	Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
			Polarization	reading (dBm)	factor (dB)	Level (dBm)		
1.4MHz	Low	3701.40	Vertical	-49.30	13.21	-36.09	-13.00	PASS
		5552.10	V	-56.46	16.61	-39.85		
		7402.80	V	-58.80	18.03	-40.77		
		3701.40	Horizontal	-50.18	13.21	-36.97	-13.00	PASS
		5552.10	H	-57.29	16.61	-40.68		
		7402.80	H	-59.51	18.03	-41.48		
	Mid	3760.00	Vertical	-47.79	12.36	-35.43	-13.00	PASS
		5640.00	V	-56.26	17.03	-39.23		
		7520.00	V	-58.03	17.85	-40.18		
		3760.00	Horizontal	-48.52	12.36	-36.16	-13.00	PASS
		5640.00	H	-57.05	17.03	-40.02		
		7520.00	H	-58.71	17.85	-40.86		
	High	3818.60	Vertical	-47.08	12.78	-34.30	-13.00	PASS
		5727.90	V	-56.06	17.86	-38.20		
		7637.20	V	-57.76	18.56	-39.20		
		3818.60	Horizontal	-48.54	12.78	-35.76	-13.00	PASS
		5727.90	H	-57.51	17.86	-39.65		
		7637.20	H	-59.10	18.56	-40.54		
3MHz	Low	3703.00	Vertical	-46.35	12.78	-33.57	-13.00	PASS
		5554.50	V	-52.82	16.69	-36.13		
		7406.00	V	-55.87	18.18	-37.69		
		3703.00	Horizontal	-46.75	12.78	-33.97	-13.00	PASS
		5554.50	H	-54.21	16.69	-37.52		
		7406.00	H	-57.61	18.18	-39.43		
	Mid	3760.00	Vertical	-44.33	12.79	-31.54	-13.00	PASS
		5640.00	V	-50.94	16.72	-34.22		



		7520.00	V	-53.82	18.22	-35.60		PASS
		3760.00	Horizontal	-45.07	12.79	-32.28		
		5640.00	H	-53.06	16.72	-36.34		
		7520.00	H	-56.29	18.22	-38.07		PASS
		3817.00	Vertical	-42.61	12.93	-29.68		
		5725.50	V	-49.88	17.01	-32.87		
		7634.00	V	-53.13	18.41	-34.72		PASS
		3817.00	Horizontal	-43.43	12.93	-30.50		
		5725.50	H	-52.00	17.01	-34.99		
		7634.00	H	-54.09	18.41	-35.68		
5MHz	Low	3705.00	Vertical	-40.94	13.25	-27.69		PASS
		5557.50	V	-46.43	16.59	-29.84		
		7410.00	V	-50.57	18.12	-32.45		
		3705.00	Horizontal	-45.27	13.25	-32.02		PASS
		5557.50	H	-54.28	16.59	-37.69		
		7410.00	H	-55.13	18.12	-37.01		
	Mid	3760.00	Vertical	-40.97	12.31	-28.66		PASS
		5640.00	V	-48.79	17.14	-31.65		
		7520.00	V	-51.97	17.96	-34.01		
		3760.00	Horizontal	-46.58	12.31	-34.27		PASS
		5640.00	H	-56.36	17.14	-39.22		
		7520.00	H	-56.14	17.96	-38.18		
	High	3815.00	Vertical	-43.89	12.77	-31.12		PASS
		5722.50	V	-51.22	17.82	-33.40		
		7630.00	V	-54.11	18.59	-35.52		
		3815.00	Horizontal	-48.80	12.77	-36.03		PASS
		5722.50	H	-58.68	17.82	-40.86		
		7630.00	H	-58.01	18.59	-39.42		
10MHz	Low	3710.00	Vertical	-42.07	12.59	-29.48		PASS
		5565.00	V	-49.13	16.61	-32.52		
		7420.00	V	-52.81	18.35	-34.46		
		3710.00	Horizontal	-51.12	12.59	-38.53		PASS
		5565.00	H	-59.18	16.61	-42.57		
		7420.00	H	-59.74	18.35	-41.39		
	Mid	3760.00	Vertical	-44.13	12.71	-31.42		PASS
		5640.00	V	-50.79	16.65	-34.14		



		7520.00	V	-54.68	18.27	-36.41	-13.00	PASS
		3760.00	Horizontal	-52.52	12.71	-39.81		
		5640.00	H	-61.12	16.65	-44.47		
		7520.00	H	-61.17	18.27	-42.90		
	High	3810.00	Vertical	-45.05	12.91	-32.14	-13.00	PASS
		5715.00	V	-52.99	17.23	-35.76		
		7620.00	V	-56.88	18.59	-38.29		
		3810.00	Horizontal	-51.18	12.91	-38.27	-13.00	PASS
		5715.00	H	-60.80	17.23	-43.57		
		7620.00	H	-60.29	18.59	-41.70		
15MHz	Low	3715.00	Vertical	-44.03	13.21	-30.82	-13.00	PASS
		5572.50	V	-51.22	16.65	-34.57		
		7430.00	V	-55.31	18.29	-37.02		
		3715.00	Horizontal	-52.73	13.21	-39.52	-13.00	PASS
		5572.50	H	-61.39	16.65	-44.74		
		7430.00	H	-60.99	18.29	-42.70		
	Mid	3760.00	Vertical	-44.15	12.39	-31.76	-13.00	PASS
		5640.00	V	-52.63	17.18	-35.45		
		7520.00	V	-55.84	17.99	-37.85		
		3760.00	Horizontal	-50.73	12.39	-38.34	-13.00	PASS
		5640.00	H	-60.69	17.18	-43.51		
		7520.00	H	-60.00	17.99	-42.01		
	High	3805.00	Vertical	-43.64	12.86	-30.78	-13.00	PASS
		5707.50	V	-51.52	17.89	-33.63		
		7610.00	V	-54.73	18.69	-36.04		
		3805.00	Horizontal	-52.75	12.86	-39.89	-13.00	PASS
		5707.50	H	-63.91	17.89	-46.02		
		7610.00	H	-63.28	18.69	-44.59		
20MHz	Low	3720.00	Vertical	-44.89	12.57	-32.32	-13.00	PASS
		5580.00	V	-51.97	16.59	-35.38		
		7440.00	V	-56.03	18.67	-37.36		
		3720.00	Horizontal	-52.90	12.57	-40.33	-13.00	PASS
		5580.00	H	-63.03	16.59	-46.44		
		7440.00	H	-63.61	18.67	-44.94		
	Mid	3760.00	Vertical	-45.41	12.76	-32.65	-13.00	PASS



		5640.00	V	-52.38	16.69	-35.69		PASS
		7520.00	V	-56.03	18.38	-37.65		
		3760.00	Horizontal	-53.38	12.76	-40.62		
		5640.00	H	-63.37	16.69	-46.68		
		7520.00	H	-63.54	18.38	-45.16		
	High	3800.00	Vertical	-44.50	12.97	-31.53	-13.00	PASS
		5700.00	V	-51.38	17.19	-34.19		
		7600.00	V	-54.85	18.28	-36.57		
		3800.00	Horizontal	-53.90	12.97	-40.93		
		5700.00	H	-64.16	17.19	-46.97		
		7600.00	H	-63.69	18.28	-45.41		

LTE Band 5								
Bandwidth	Channel	Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
			Polarization	reading (dBm)	factor (dB)	Level (dBm)		
1.4MHz	Low	1649.40	Vertical	-43.27	7.29	-35.98	-13.00	PASS
		2474.10	V	-52.82	9.41	-43.41		
		3298.80	V	-56.83	12.69	-44.14		
		1649.40	Horizontal	-44.88	7.29	-37.59		
		2474.10	H	-54.72	9.41	-45.31		
		3298.80	H	-58.56	12.69	-45.87		
	Mid	1673.00	Vertical	-42.82	7.32	-35.50	-13.00	PASS
		2509.50	V	-52.35	9.39	-42.96		
		3346.00	V	-56.40	12.78	-43.62		
		1673.00	Horizontal	-44.42	7.32	-37.10		
		2509.50	H	-54.24	9.39	-44.85		
		3346.00	H	-58.22	12.78	-45.44		
	High	1696.60	Vertical	-42.28	7.33	-34.95	-13.00	PASS
		2544.90	V	-51.98	9.46	-42.52		
		3393.20	V	-55.91	12.71	-43.20		
		1696.60	Horizontal	-42.53	7.33	-35.20		
		2544.90	H	-51.75	9.46	-42.29		
		3393.20	H	-56.31	12.71	-43.60		
3MHz	Low	1651.00	Vertical	-41.32	7.36	-33.96	-13.00	PASS



5MHz		2476.50	V	-51.10	9.51	-41.59	-13.00	PASS
		3302.00	V	-55.13	12.72	-42.41		
		1651.00	Horizontal	-41.91	7.36	-34.55		
		2476.50	H	-51.19	9.51	-41.68		
		3302.00	H	-55.80	12.72	-43.08		
		1673.00	Vertical	-40.88	7.41	-33.47		
	Mid	2509.50	V	-50.65	9.52	-41.13	-13.00	PASS
		3346.00	V	-54.71	12.73	-41.98		
		1673.00	Horizontal	-41.09	7.41	-33.68		
		2509.50	H	-50.49	9.52	-40.97		
		3346.00	H	-55.14	12.73	-42.41		
		1695.00	Vertical	-39.92	7.52	-32.40		
	High	2542.50	V	-49.61	9.46	-40.15	-13.00	PASS
		3390.00	V	-53.86	12.81	-41.05		
		1695.00	Horizontal	-40.40	7.52	-32.88		
		2542.50	H	-49.68	9.46	-40.22		
		3390.00	H	-54.58	12.81	-41.77		
		1653.00	Vertical	-38.02	7.61	-30.41		
	Low	2479.50	V	-48.40	9.49	-38.91	-13.00	PASS
		3306.00	V	-52.28	12.86	-39.42		
		1653.00	Horizontal	-40.97	7.61	-33.36		
		2479.50	H	-50.16	9.49	-40.67		
		3306.00	H	-55.01	12.86	-42.15		
		1673.00	Vertical	-38.49	7.72	-30.77		
	Mid	2509.50	V	-48.78	9.53	-39.25	-13.00	PASS
		3346.00	V	-52.58	12.84	-39.74		
		1673.00	Horizontal	-41.23	7.72	-33.51		
		2509.50	H	-50.32	9.53	-40.79		
		3346.00	H	-55.11	12.84	-42.27		
		1693.00	Vertical	-39.00	7.79	-31.21		
	High	2539.50	V	-49.18	9.53	-39.65	-13.00	PASS
		3386.00	V	-53.01	12.89	-40.12		
		1693.00	Horizontal	-40.47	7.79	-32.68		
		2539.50	H	-49.54	9.53	-40.01		
		3386.00	H	-54.50	12.89	-41.61		



10MHz	Low	1658.00	Vertical	-38.46	7.81	-30.65	-13.00	PASS
		2487.00	V	-48.73	9.56	-39.17		
		3316.00	V	-52.62	12.91	-39.71		
		1658.00	Horizontal	-41.13	7.81	-33.32	-13.00	PASS
		2487.00	H	-50.17	9.56	-40.61		
		3316.00	H	-55.03	12.91	-42.12		
	Mid	1673.00	Vertical	-38.96	7.83	-31.13	-13.00	PASS
		2509.50	V	-49.21	9.59	-39.62		
		3346.00	V	-53.08	12.94	-40.14		
		1673.00	Horizontal	-41.34	7.83	-33.51	-13.00	PASS
		2509.50	H	-50.35	9.59	-40.76		
		3346.00	H	-55.21	12.94	-42.27		
	High	1688.00	Vertical	-39.25	7.89	-31.36	-13.00	PASS
		2532.00	V	-49.45	9.62	-39.83		
		3376.00	V	-53.30	12.96	-40.34		
		1688.00	Horizontal	-41.58	7.89	-33.69	-13.00	PASS
		2532.00	H	-50.55	9.62	-40.93		
		3376.00	H	-55.37	12.96	-42.41		

LTE Band 41								
Bandwidth	Channel	Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
			Polarization	reading (dBm)	factor (dB)	Level (dBm)		
5MHz	Low	4997.00	Vertical	-55.72	15.64	-40.08	-25.00	PASS
		7495.50	V	-58.66	17.82	-40.84		
		9994.00	V	-61.58	23.83	-37.75		
		4997.00	Horizontal	-56.62	15.64	-40.98	-25.00	PASS
		7495.50	H	-59.51	17.82	-41.69		
		9994.00	H	-62.3	23.83	-38.47		
	Mid	5186.00	Vertical	-55.09	15.69	-39.40	-25.00	PASS
		7779.00	V	-58.16	17.96	-40.20		
		10372.00	V	-61.35	24.20	-37.15		
		5186.00	Horizontal	-55.84	15.69	-40.15	-25.00	PASS
		7779.00	H	-58.98	17.96	-41.02		
		10372.00	H	-62.03	24.20	-37.83		
	High	5375.00	Vertical	-54.2	15.96	-38.24	-25.00	PASS



		8062.50	V	-57.79	18.64	-39.15	-25.00	PASS
		10750.00	V	-60.44	24.29	-36.15		
		5375.00	Horizontal	-55.71	15.96	-39.75		
		8062.50	H	-59.28	18.64	-40.64		
		10750.00	H	-61.8	24.29	-37.51		
10MHz	Low	5002.00	Vertical	-53.14	15.65	-37.49	-25.00	PASS
		7503.00	V	-54.87	17.83	-37.04		
		10004.00	V	-58.46	23.85	-34.61		
		5002.00	Horizontal	-53.57	15.65	-37.92		
		7503.00	H	-56.3	17.83	-38.47		
		10004.00	H	-60.23	23.85	-36.38		
	Mid	5186.00	Vertical	-51.11	15.69	-35.42	-25.00	PASS
		7779.00	V	-53.05	17.96	-35.09		
		10372.00	V	-56.68	24.20	-32.48		
		5186.00	Horizontal	-51.89	15.69	-36.20		
		7779.00	H	-55.22	17.96	-37.26		
		10372.00	H	-59.19	24.20	-34.99		
	High	5370.00	Vertical	-49.33	15.80	-33.53	-25.00	PASS
		8055.00	V	-53.72	18.64	-35.08		
		10740.00	V	-56.72	24.29	-32.43		
		5370.00	Horizontal	-50.59	15.80	-34.79		
		8055.00	H	-54.82	18.64	-36.18		
		10740.00	H	-57.39	24.29	-33.10		
15MHz	Low	5007.00	Vertical	-51.13	15.67	-35.46	-25.00	PASS
		7510.50	V	-51.80	17.84	-33.96		
		10014.00	V	-56.15	23.85	-32.30		
		5007.00	Horizontal	-55.14	15.67	-39.47		
		7510.50	H	-59.06	17.84	-41.22		
		10014.00	H	-61.58	23.85	-37.73		
	Mid	5186.00	Vertical	-52.10	15.69	-36.41	-25.00	PASS
		7779.00	V	-54.89	17.96	-36.93		
		10372.00	V	-56.77	24.20	-32.57		
		5186.00	Horizontal	-54.19	15.69	-38.50		
		7779.00	H	-56.78	17.96	-38.82		
		10372.00	H	-60.38	24.20	-36.18		



20MHz	High	5365.00	Vertical	-49.18	15.51	-33.67	-25.00	PASS
		8047.50	V	-53.84	18.66	-35.18		
		10730.00	V	-56.81	24.30	-32.51		
		5365.00	Horizontal	-52.10	15.51	-36.59	-25.00	PASS
		8047.50	H	-56.51	18.66	-37.85		
		10730.00	H	-58.67	24.30	-34.37		
	Low	5012.00	Vertical	-49.46	15.67	-33.79	-25.00	PASS
		7518.00	V	-50.90	17.84	-33.06		
		10024.00	V	-55.91	23.86	-32.05		
		5012.00	Horizontal	-57.69	15.67	-42.02	-25.00	PASS
		7518.00	H	-60.80	17.84	-42.96		
		10024.00	H	-63.59	23.86	-39.73		
	Mid	5186.00	Vertical	-54.08	15.69	-38.39	-25.00	PASS
		7779.00	V	-56.54	17.96	-38.58		
		10372.00	V	-58.76	24.20	-34.56		
		5186.00	Horizontal	-55.49	15.69	-39.80	-25.00	PASS
		7779.00	H	-58.72	17.96	-40.76		
		10372.00	H	-61.91	24.20	-37.71		
	High	5360.00	Vertical	-50.39	15.98	-34.41	-25.00	PASS
		8040.00	V	-55.48	18.65	-36.83		
		10720.00	V	-58.76	24.34	-34.42		
		5360.00	Horizontal	-51.00	15.98	-35.02	-25.00	PASS
		8040.00	H	-55.58	18.65	-36.93		
		10720.00	H	-57.49	24.34	-33.15		

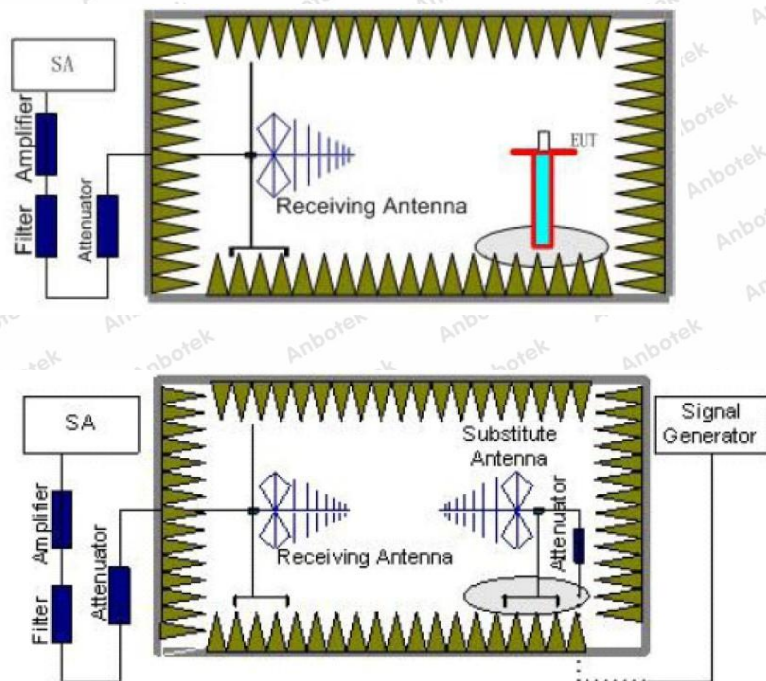


10. ERP and EIRP

10.1. Test Standard and Limit

Applicable Standard:	Part 2.1046 Part 22.913(a) Part 24.232(c) Part 27.50(h)
Limit:	ERP ≤ 7W(38.45dBm) (LTE Band 5) EIRP ≤ 2W(33.00dBm) (LTE Band 2) EIRP ≤ 2W(33.00dBm) (LTE Band 41)

10.2. Test Setup



10.3. Test Procedure

- Place the EUT in the center of the turntable.
 - For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
 - For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
- Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
- The EUT shall be tested while operating on the frequency per manufacturer specification. Set the



transmitter to operate in continuous transmit mode.

4. Receiver or Spectrum set as follow:

Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto

Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto

5. Each emission under consideration shall be evaluated:

- Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
- Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
- Return the turntable to the azimuth where the highest emission amplitude level was observed.
- Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
- Record the measured emission amplitude level and frequency

6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.

7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.

8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.

9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.

10. For each emission that was detected and measured in the initial test

- Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
- Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
- Record the output power level of the signal generator when equivalence is achieved in step b).

11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.

12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:

$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where

P_e = equivalent emission power in dBm

P_s = source (signal generator) power in dBm

NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.

13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:



gain (dBd) = gain (dBi) – 2.15 dB.

If necessary, the antenna gain can be calculated from calibrated antenna factor information

14. Provide the complete measurement results as a part of the test report.

10.4. Test Data

Pass

Please to see the following pages

LTE Band 2						
Bandwidth	Modulation	Channel	EIRP (dBm)		Limit (dBm)	Result
			Vertical	Horizontal		
1.4MHz	QPSK	Low	20.47	18.04	33.00	PASS
		Mid	20.65	17.99		
		High	20.29	17.99		
	16QAM	Low	20.15	17.76		PASS
		Mid	20.34	17.74		
		High	19.97	17.76		
3MHz	QPSK	Low	20.43	17.97	33.00	PASS
		Mid	20.62	17.99		
		High	20.25	17.96		
	16QAM	Low	20.25	17.87		PASS
		Mid	20.40	17.79		
		High	19.98	17.78		
5MHz	QPSK	Low	20.60	18.13	33.00	PASS
		Mid	20.78	18.06		
		High	20.45	18.07		
	16QAM	Low	20.30	17.84		PASS
		Mid	20.47	17.82		
		High	20.09	17.83		
10MHz	QPSK	Low	20.60	18.14	33.00	PASS
		Mid	20.77	18.08		
		High	20.44	18.10		
	16QAM	Low	20.29	17.87		PASS
		Mid	20.46	17.85		
		High	20.08	17.85		
15MHz	QPSK	Low	20.54	18.06	33.00	PASS
		Mid	20.73	18.07		
		High	20.38	18.06		
	16QAM	Low	20.37	17.96		PASS



20MHz		Mid	20.50	17.89		
		High	20.08	17.86		
		Low	20.57	18.09		
	QPSK	Mid	20.77	18.10	33.00	PASS
		High	20.43	18.09		
		Low	20.42	18.02		
		Mid	20.54	17.91		
		High	20.11	17.87		
	16QAM					PASS

LTE Band 5						
Bandwidth	Modulation	Channel	ERP (dBm)		Limit (dBm)	Result
			Vertical	Horizontal		
1.4MHz	QPSK	Low	22.09	20.68	38.45	PASS
		Mid	22.26	21.00		
		High	22.24	20.92		
	16QAM	Low	20.78	19.38		PASS
		Mid	20.78	19.84		
		High	20.81	19.60		
3MHz	QPSK	Low	22.94	20.32	38.45	PASS
		Mid	22.64	20.61		
		High	22.31	20.40		
	16QAM	Low	20.70	19.82		PASS
		Mid	20.77	19.67		
		High	20.80	19.46		
5MHz	QPSK	Low	22.62	20.52	38.45	PASS
		Mid	22.42	20.81		
		High	22.11	20.53		
	16QAM	Low	21.15	19.84		PASS
		Mid	20.99	20.13		
		High	20.94	19.97		
10MHz	QPSK	Low	22.56	20.54	38.45	PASS
		Mid	22.37	20.83		
		High	22.07	20.54		
	16QAM	Low	21.16	19.58		PASS



	Mid	21.20	20.06		
	High	21.26	19.84		

LTE Band 41						
Bandwidth	Modulation	Channel	EIRP (dBm)		Limit (dBm)	Result
			Vertical	Horizontal		
5MHz	QPSK	Low	21.45	18.87	33.00	PASS
		Mid	21.73	18.79		
		High	21.55	18.90		
	16QAM	Low	18.97	16.68		PASS
		Mid	19.34	16.85		
		High	19.03	17.08		
10MHz	QPSK	Low	21.15	18.29	33.00	PASS
		Mid	21.54	18.77		
		High	21.22	18.66		
	16QAM	Low	19.78	17.51		PASS
		Mid	19.79	17.27		
		High	19.06	17.27		
15MHz	QPSK	Low	22.47	19.56	33.00	PASS
		Mid	22.73	19.36		
		High	22.77	19.53		
	16QAM	Low	20.12	17.34		PASS
		Mid	20.32	17.45		
		High	19.95	17.61		
20MHz	QPSK	Low	22.42	19.67	33.00	PASS
		Mid	22.68	19.48		
		High	22.71	19.77		
	16QAM	Low	20.06	17.51		PASS
		Mid	20.27	17.70		
		High	19.90	17.79		

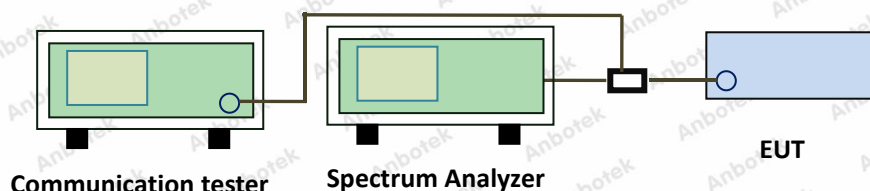


11. Frequency stability VS Voltage measurement

11.1. Test Standard and Limit

Applicable Standard:	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54
Limit:	$\leq \pm 2.5\text{ppm}$

11.2. Test Setup



11.3. Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber at 25°C.
4. The power supply voltage to the EUT was varied $\pm 15\%$ of the nominal value measured at the input to the EUT.
5. Record the maximum frequency change.

11.4. Test Data

Pass

Please refer to Appendix F of the Appendix Test Data.

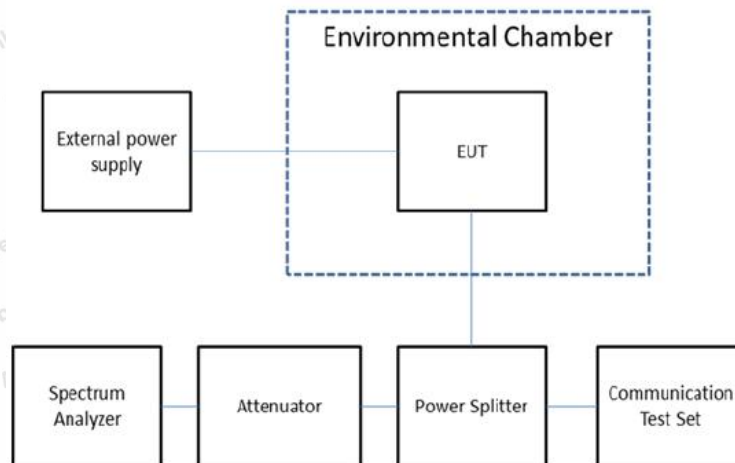


12. Frequency stability VS Temperature measurement

12.1. Test Standard and Limit

Applicable Standard:	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54
Limit:	$\leq \pm 2.5\text{ppm}$

12.2. Test Setup



12.3. Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. The EUT output port was connected to communication tester.
3. The EUT was placed inside the temperature chamber.
4. Turn EUT off and set the chamber temperature to -30°C . After the temperature stabilized for approximately 30 minutes recorded the frequency.
5. Repeat step 4 measure with 10°C increased per stage until the highest temperature of $+50^{\circ}\text{C}$ reached.

12.4. Test Data

Pass

Please refer to Appendix G of the Appendix Test Data.



APPENDIX I -- TEST SETUP PHOTOGRAPH

Please refer to separated files Appendix I -- Test Setup Photograph_Licensed

APPENDIX II -- EXTERNAL PHOTOGRAPH

Please refer to separated files Appendix II -- External Photograph

APPENDIX III -- INTERNAL PHOTOGRAPH

Please refer to separated files Appendix III -- Internal Photograph

----- End of Report -----

