

# TEST REPORT

Report No.: BCTC2310372691-2E

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Applicant: Cube Tracker LLC

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Product Name: CUBE GPS PRO

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Model/Type  
reference: CUBE GPS PRO

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Tested Date: 2023-10-25 to 2023-11-15

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Issued Date: 2023-11-17

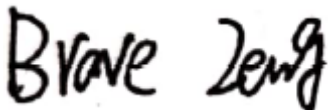
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**Shenzhen BCTC Testing Co., Ltd.**

# FCC ID: 2AP3S-GPSPRO

Product Name: CUBE GPS PRO  
Trademark: N/A  
Model/Type reference: CUBE GPS PRO  
Prepared For: Cube Tracker LLC  
Address: 46980, 86th Ave, Decatur, MI 49045 , US  
Manufacturer: Hong Kong Eureka Technology Co., Ltd  
Address: Unit F, 20/F, Kingley Industry Building Blk 01, Yip Kan St. 35, Wong Chuk Hang, HK  
Prepared By: Shenzhen BCTC Testing Co., Ltd  
Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Tangwei, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China  
Sample Received Date: 2023-10-25  
Sample tested Date: 2023-10-25 to 2023-11-15  
Report No.: BCTC2310372691-2E  
Test Standards: FCC CFR Title 47 Part 2  
FCC CFR Title 47 Part 24  
FCC CFR Title 47 Part 27  
Test Results: PASS  
Remark: This is radio test report for 4G in US full bands.

Tested by:



Brave Zeng/ Project Handler

Approved by:



Zero Zhou/Reviewer

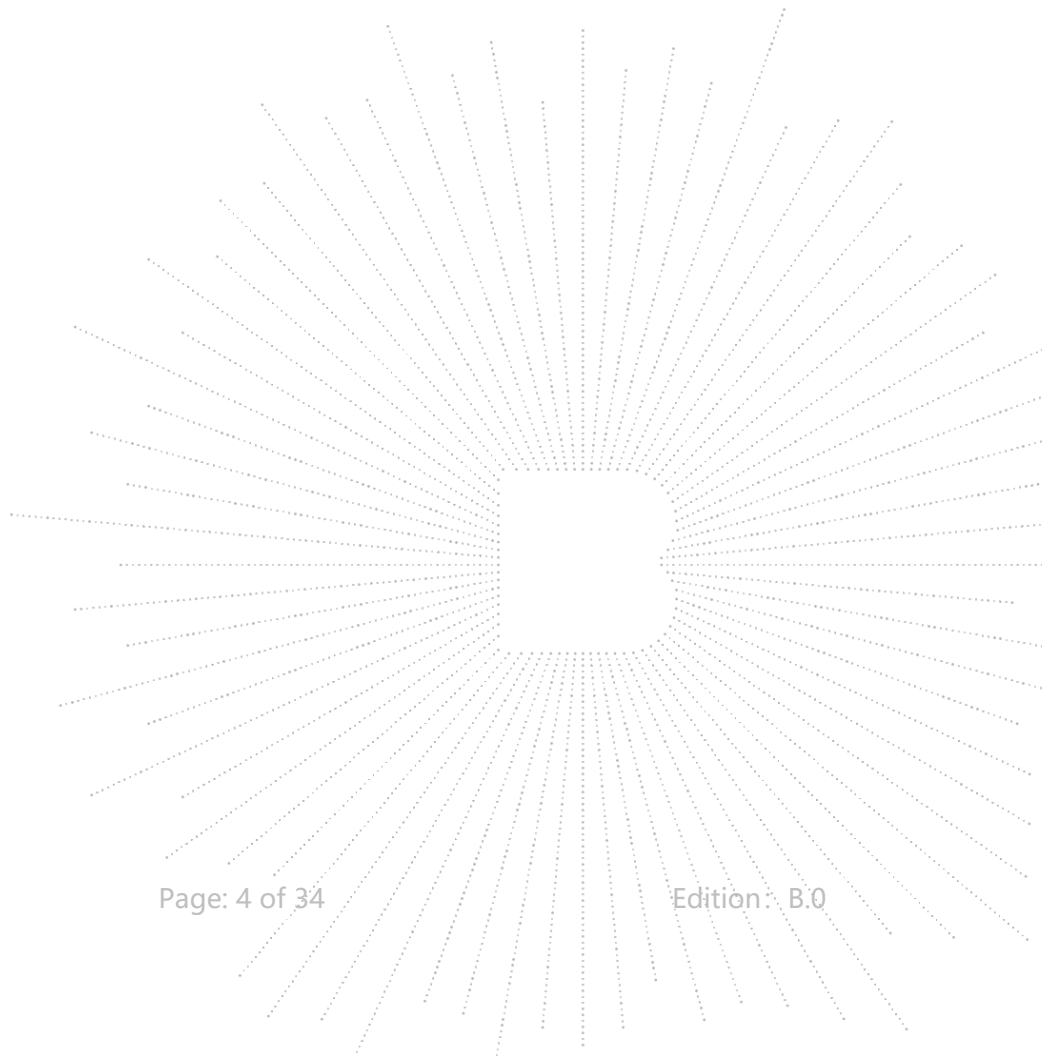
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## Table Of Content

	Page
Test Report Declaration	
1. Version .....	5
2. Test Summary .....	6
3. Measurement Uncertainty .....	7
4. Product Information And Test Setup .....	8
4.1 Product Information.....	8
4.2 Test Setup Configuration .....	9
4.2 Emission Designator .....	9
4.3 Description Operation Frequency .....	11
4.4 Test Mode .....	13
4.5 Support Equipment .....	16
4.6 Measurement Results Explanation Example.....	16
5. Test Facility And Test Instrument Used.....	17
5.1 Test Facility.....	17
5.2 Test Instrument Used.....	17
6. RF Output Power.....	18
6.1 Block Diagram Of Test Setup.....	18
6.2 Limit .....	20
6.3 Test procedure.....	20
6.4 Test Result.....	21
7. Peak-To-Average Ratio(PAR) Of Transmitter .....	24
7.1 Block Diagram Of Test Setup.....	24
7.2 Limit .....	24
7.3 Test procedure.....	24
7.4 Test Result.....	24
8. Emission Bandwidth .....	25
8.1 Block Diagram Of Test Setup.....	25
8.2 Standard Applicable .....	25
8.3 Test procedure.....	25
8.4 Test Result.....	25
9. Out of Band Emissions at Antenna Terminal.....	26
9.1 Block Diagram Of Test Setup.....	26
9.2 Limit .....	26
9.3 Test procedure.....	26
9.4 Test Result.....	26
10. Spurious Radiated Emissions.....	27
10.1 Block Diagram Of Test Setup.....	27
10.2 Limit .....	28
10.3 Test procedure.....	28
10.4 Test Result.....	29
11. Frequency Stability.....	32
11.1 Block Diagram Of Test Setup.....	32

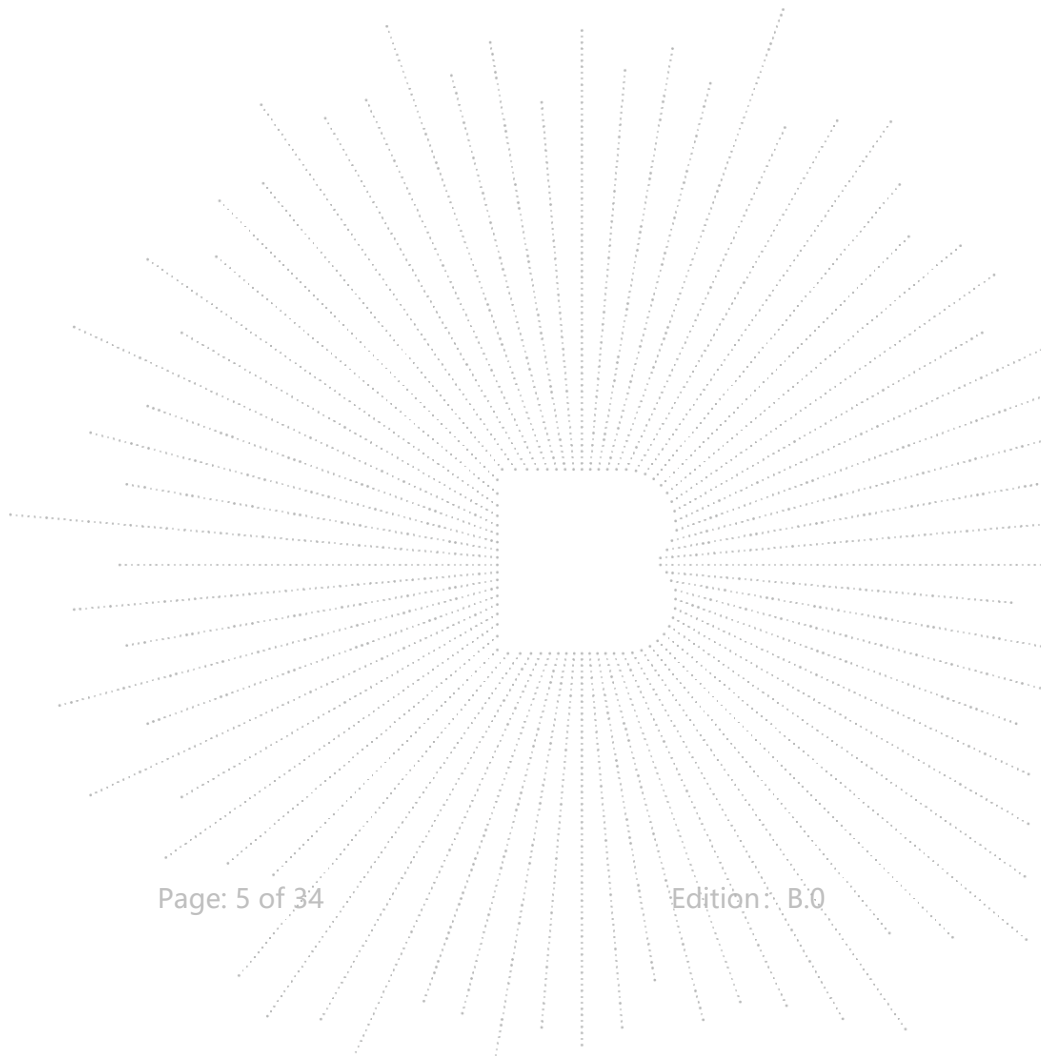
11.2	Limit .....	32
11.3	Test procedure.....	32
11.4	Test Result.....	32
12.	EUT Test Setup Photographs.....	33

(Note: N/A Means Not Applicable)



**1. Version**

<b>Report No.</b>	<b>Issue Date</b>	<b>Description</b>	<b>Approved</b>
BCTC2310372691-2E	2023-11-17	Original	Valid



## 2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
1	RF Exposure	§1.1307, §2.1093	PASS
2	RF Output Power	§2.1046; §22.913; §22.913 (a) §24.232(c); §27.50(d); §27.50(c); §27.50(b);	PASS
3	Peak-to-average Ratio(PAR) of Transmitter	§22.913 §2.1046; §24.232(d) §27.50(d); §27.50(c); §27.50(b);	PASS
4	Emission Bandwidth	§22.917 (b) §2.1049; §24.238(b); §27.53;	PASS
5	Spurious Emissions at Antenna Terminal	§22.917 (a), §24.238 (a), §27.53(g), §27.53(h)	PASS
6	Spurious Radiation Emissions	§22.917 (a) §2.1051; §22.917(a); §27.53(h); §27.53(g); §27.53(c); §24.238(a);	PASS
7	Out of Band Emissions	§22.917 (a) §2.1051; §22.917(a); §27.53(h); §27.53(c); §27.53(g); §24.238(a);	PASS
8	Frequency Stability	§2.1055; §22.355; §27.54; §24.235;	PASS

### 3. Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(9KHz-30MHz)	U=3.7dB
3	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
4	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
5	Conducted Emission (150kHz-30MHz)	U=3.20dB
6	Conducted Adjacent channel power	U=1.38dB
7	Conducted output power uncertainty Above 1G	U=1.576dB
8	Conducted output power uncertainty below 1G	U=1.28dB
9	humidity uncertainty	U=5.3%
10	Temperature uncertainty	U=0.59°C

## 4. Product Information And Test Setup

### 4.1 Product Information

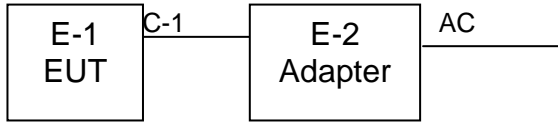
<b>Model/Type reference:</b>	CUBE GPS PRO
<b>Model differences:</b>	N/A
<b>Hardware Version:</b>	N/A
<b>Software Version:</b>	N/A
<b>Tx Frequency:</b>	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~787 MHz
<b>Rx Frequency:</b>	LTE Band 2: 1930 MHz ~ 1990 MHz LTE Band 4: 2110 MHz ~ 2155 MHz LTE Band 12: 729 MHz ~ 746 MHz LTE Band 13: 764 MHz ~756 MHz
<b>Bandwidth:</b>	LTE Band 2: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 4: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 12: 1.4MHz /3MHz /5MHz /10MHz LTE Band 13: 5MHz /10MHz
<b>Maximum Output Power to Antenna:</b>	LTE Band 2: 23.24dBm LTE Band 4: 23.01 dBm LTE Band 12: 23.70 dBm LTE Band 13: 23.61 dBm
<b>99% Occupied Bandwidth:</b>	LTE Band 2: 18M0W7D LTE Band 4: 18M0W7D LTE Band 12: 9M03G7D LTE Band 13: 8M95G7D
<b>Type of Modulation:</b>	QPSK/16QAM
<b>Antenna Type:</b>	Internal Antenna
<b>Ratings:</b>	DC 5V from the adapter DC 3.7V from the battery
<b>Battery:</b>	DC3.7V,6000mAh
<b>Antenna Gain:</b>	LTE Band 2: 1.52dBi LTE Band 4: 1.27dBi LTE Band 12: 1.33dBi LTE Band 13: 0.6 dBi



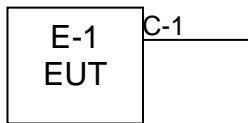
## 4.2 Test Setup Configuration

See test photographs attached in *EUT TEST SETUP PHOTOGRAPHS* for the actual connections between Product and support equipment.

Conducted Emission:



Radiated Spurious Emission



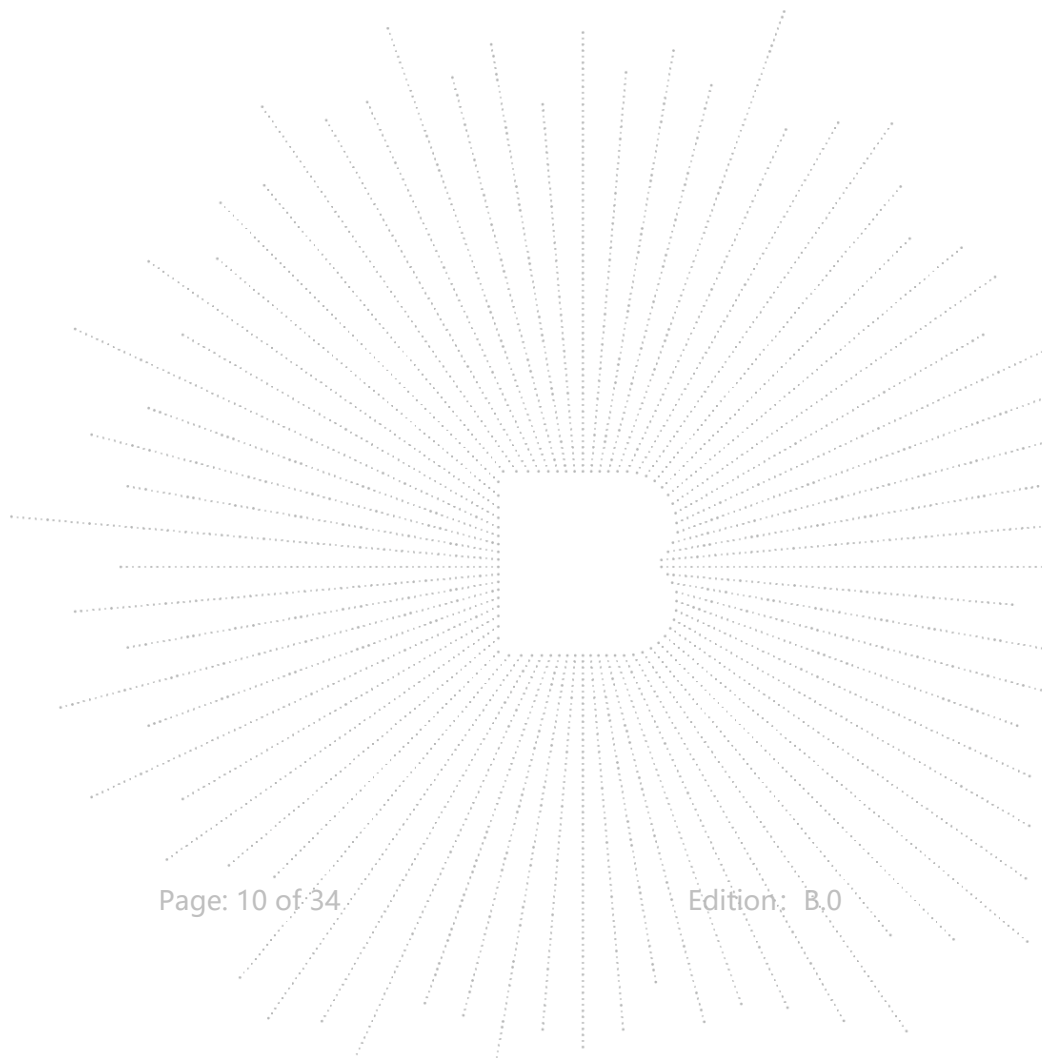
## 4.2 Emission Designator

LTE Band 2	QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
1.4	1M10G7D	0.199	1M10W7D	0.158
3	2M70G7D	0.211	2M70W7D	0.157
5	4M52G7D	0.202	4M51W7D	0.157
10	9M02G7D	0.199	9M01W7D	0.156
15	13M5G7D	0.195	13M5W7D	0.154
20	17M9G7D	0.194	18M0W7D	0.151

LTE Band 4	QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)
1.4	1M10G7D	0.200	1M10W7D	0.153
3	2M71G7D	0.195	2M71W7D	0.149
5	4M52G7D	0.190	4M53W7D	0.146
10	9M02G7D	0.190	9M02W7D	0.143
15	13M6G7D	0.194	13M5W7D	0.144
20	18M0G7D	0.192	18M0W7D	0.147

LTE Band 12	QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)
1.4	1M10G7D	0.223	1M10W7D	0.182
3	2M70G7D	0.234	2M71W7D	0.182
5	4M52G7D	0.227	4M52W7D	0.179
10	9M03G7D	0.222	9M03W7D	0.175

LTE Band 13	QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)
5	4M52G7D	0.230	4M53W7D	0.175
10	8M95G7D	0.226	8M95W7D	0.171



### 4.3 Description Operation Frequency

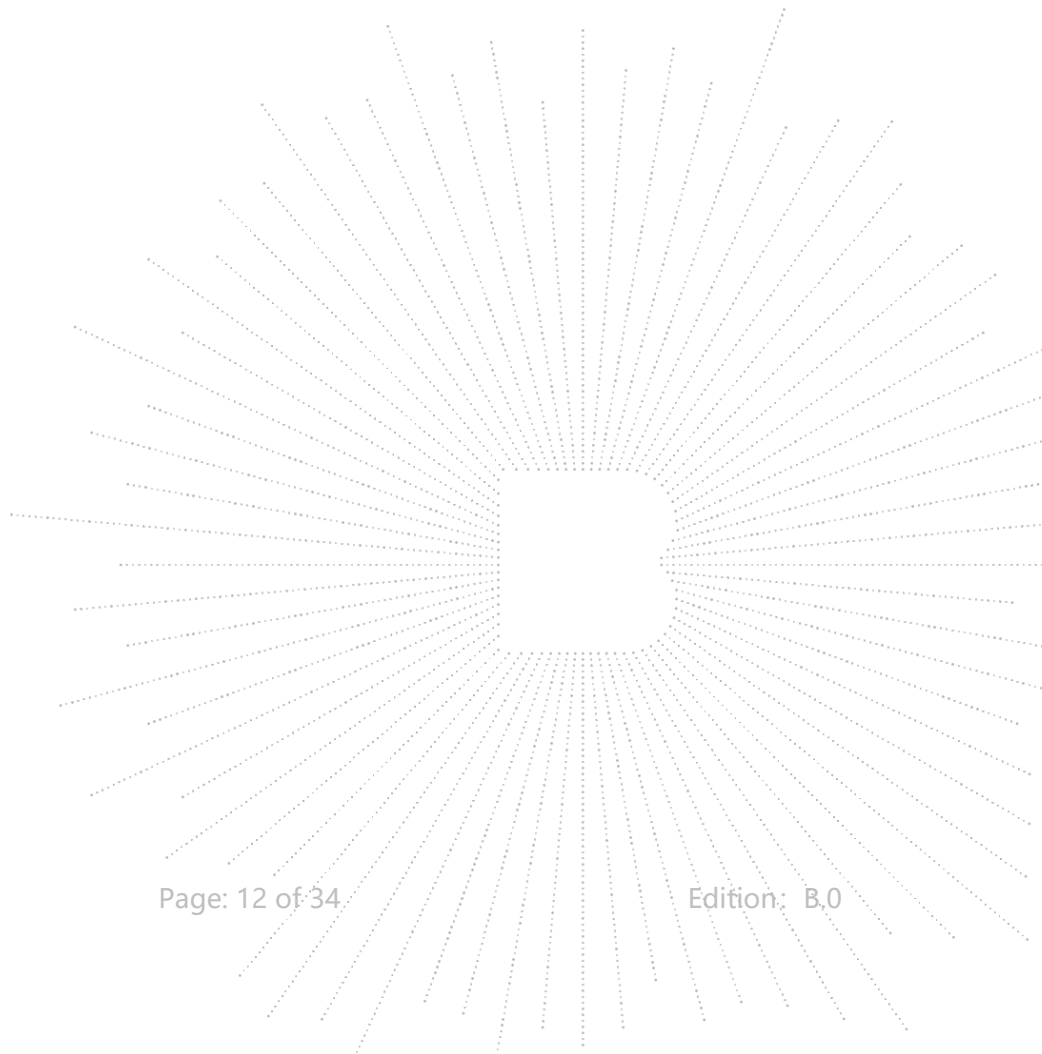
LTE Band 2(1.4MHz)		LTE Band 2(3MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
18607	1850.7	18615	1851.5
18900	1880	18900	1880
19193	1909.3	19185	1908.5
LTE Band 2(5MHz)		LTE Band 2(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
18625	1852.5	18650	1855
18900	1880	18900	1880
19175	1907.5	19150	1905
LTE Band 2(15MHz)		LTE Band 2(20MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
18675	1857.5	18700	1860
18900	1880	18900	1880
19125	1902.5	19100	1900

LTE Band 4(1.4MHz)		LTE Band 4(3MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
19957	1710.7	19965	1711.5
20175	1732.5	20175	1732.5
20393	1754.3	20385	1753.5
LTE Band 4(5MHz)		LTE Band 4(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
19975	1712.5	20000	1715
20175	1732.5	20175	1732.5
20375	1752.5	20350	1750
LTE Band 4(15MHz)		LTE Band 4(20MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20025	1717.5	20050	1720
20175	1732.5	20175	1732.5
20325	1747.5	20300	1745

LTE Band 12(1.4MHz)		LTE Band 12(3MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
23017	699.7	23025	700.5
23095	707.5	23095	707.5
23173	715.3	23165	714.5
LTE Band 12(5MHz)		LTE Band 12(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
23035	701.5	23060	704
23095	707.5	23095	707.5
23155	713.5	23130	711

LTE Band 13(5MHz)		LTE Band 13(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
23205	779.5	23230	782.0
23230	782	23230	782.0
23255	784.5	23230	782.0



#### 4.4 Test Mode

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

Test Mode		
Band	Radiated TCs	Conducted TCs
LTE Band 2	QPSK Link (1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz)	16QAM Link (1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz)
LTE Band 4	QPSK Link (1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz)	16QAM Link (1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz)
LTE Band 12	QPSK Link (1.4MHz / 3MHz / 5MHz / 10MHz)	16QAM Link (1.4MHz / 3MHz / 5MHz / 10MHz)
LTE Band 13	QPSK Link (5MHz / 10MHz)	16QAM Link (5MHz / 10MHz)

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas License Digital Systems v03 with maximum output power.

#### EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/
/	/	/	/

#### Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

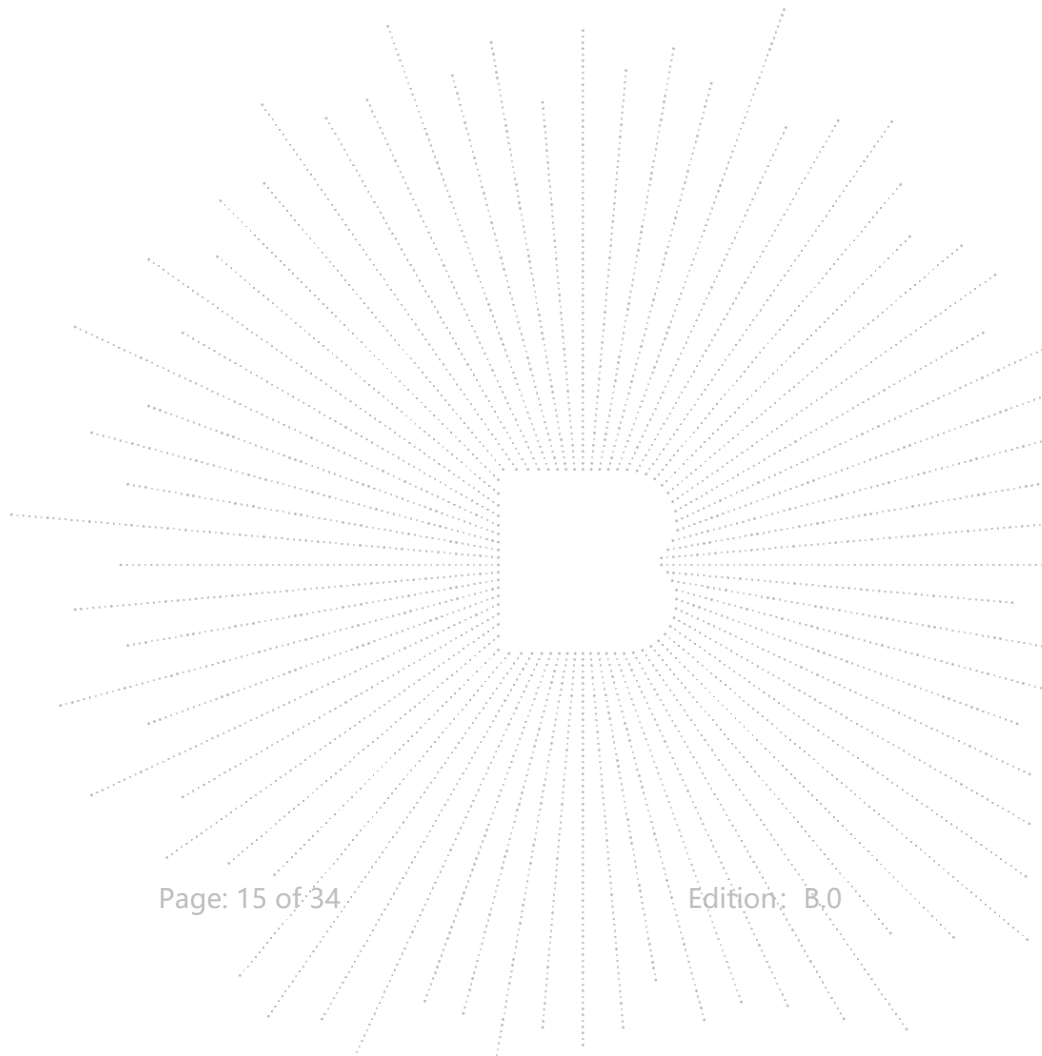
#### Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

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

Test Items	Band	Bandwidth (MHz)						Modulation		RB#			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max.Output Power	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	12	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	13	-	-	v	v	-	-	v	v				-	v	-
Peak-to-Average Ratio	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	12	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	13							v	v						
26dB and 99% Bandwidth	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	12	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	13	-	-	v	v	-	-	v	v						
Conducted Band Edge	2	v	v	v	v	v	v	v	v	v	v	v	v	-	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	-	v
	12	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	13							v	v						
Conducted Spurious Emission	2	v	v	v	v	v	v	v	v	v	-	-	v	v	v
	4	v	v	v	v	v	v	v	v	v	-	-	v	v	v
	12	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	13							v	v						
Frequency stability	2	v	-	-	-	-	-	v	v	v	-	-	v	v	v
	4	v	-	-	-	-	-	v	v	v	-	-	v	v	v
	12	v	-	-	-	-	-	v	v	v	-	-	v	v	v
	13							v	v						
E.R.P./ E.I.R.P.	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	12	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	13	-	-	v	v	-	-	v	v						
Radiated Spurious Emission	2	v	-	-	-	-	-	v	v	v	-	-	v	v	v
	4	v	-	-	-	-	-	v	v	v	-	-	v	v	v
	12	v	-	-	-	-	-	v	v	v	-	-	v	v	v

	13							v	v					
Note	1.The mark “v “ means that this configuration is chosen for testing 2.The mark “-“ means that this bandwidth is not supported.													



#### 4.5 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	Wireless Router	N/A	Z8102A	N/A	EUT
E-2	Adapter	N/A	N/A	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	1M	DC cable unshielded

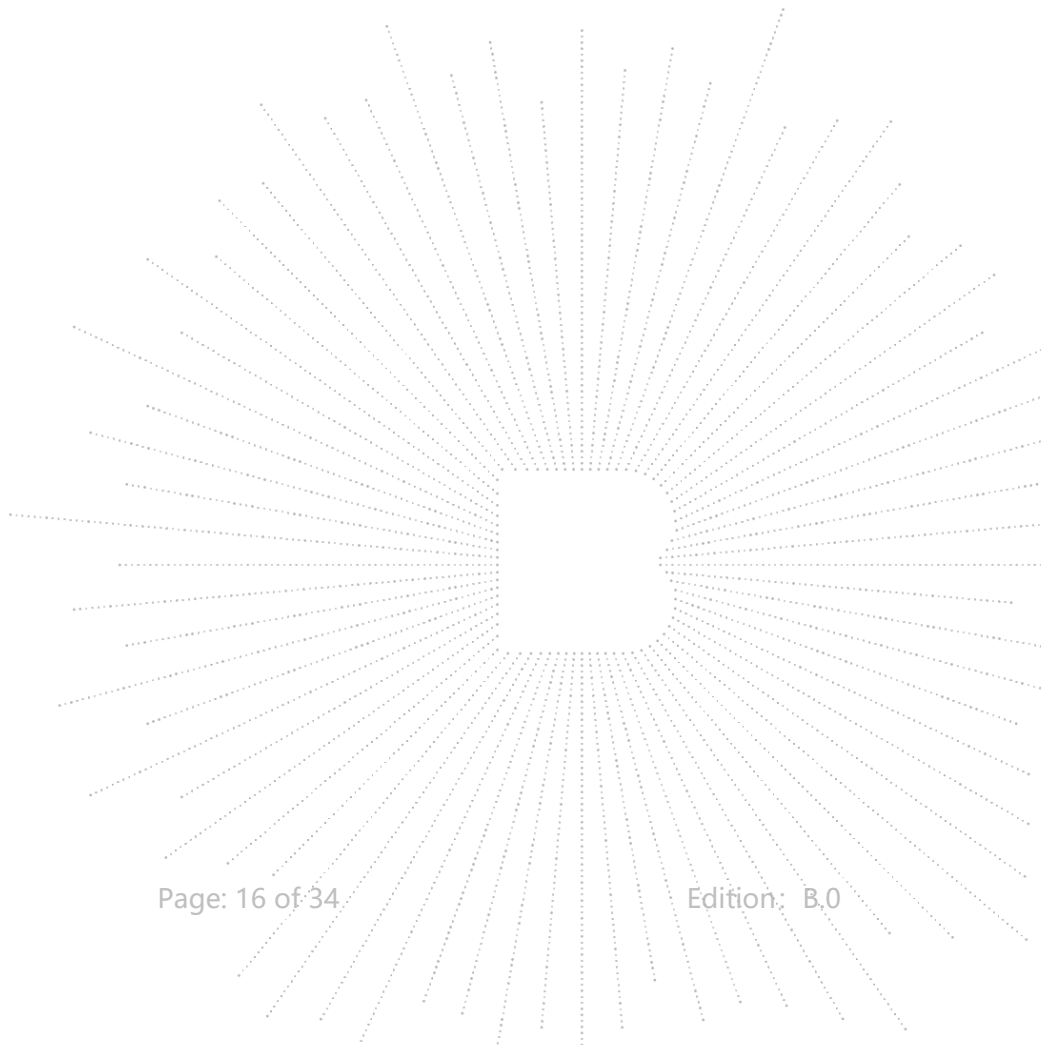
Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

#### 4.6 Measurement Results Explanation Example

For all conducted test items:

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





## 5. Test Facility And Test Instrument Used

### 5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

FCC Test Firm Registration Number: 712850

A2LA certificate registration number is: CN1212

ISED Registered No.: 23583

ISED CAB identifier: CN0017

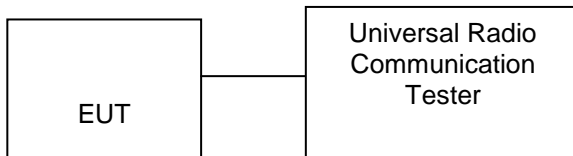
### 5.2 Test Instrument Used

Radiated Emissions Test (966 Chamber01)					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
966 chamber	ChengYu	966 Room	966	May 15, 2023	May 14, 2026
Receiver	R&S	ESR3	102075	May 15, 2023	May 14, 2024
Receiver	R&S	ESRP	101154	May 15, 2023	May 14, 2024
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 15, 2023	May 14, 2024
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 29, 2023	May 28, 2024
Loop Antenna(9KHz -30MHz)	Schwarzbeck	FMZB1519B	00014	May 31, 2023	May 30, 2024
Amplifier	SKET	LAPA_01G18 G-45dB	\	May 15, 2023	May 14, 2024
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 31, 2023	May 30, 2024
Amplifier(18G Hz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 15, 2023	May 14, 2024
Horn Antenn(18GHz -40GHz)	Schwarzbeck	BBHA9170	00822	May 31, 2023	May 30, 2024
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 15, 2023	May 14, 2024
Communication test set	R&S	CMW500	126173	Nov. 08, 2022	Nov. 07, 2024
Software	Frad	EZ-EMC	FA-03A2 RE	\	\

## 6. RF Output Power

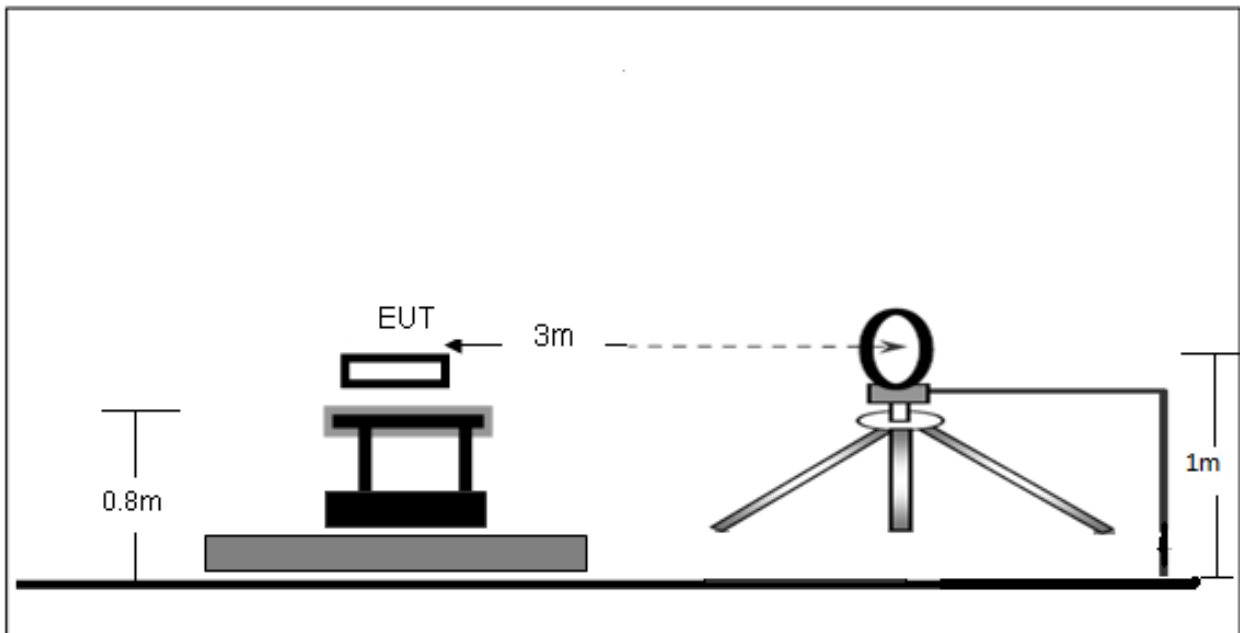
### 6.1 Block Diagram Of Test Setup

Conducted output power test method:

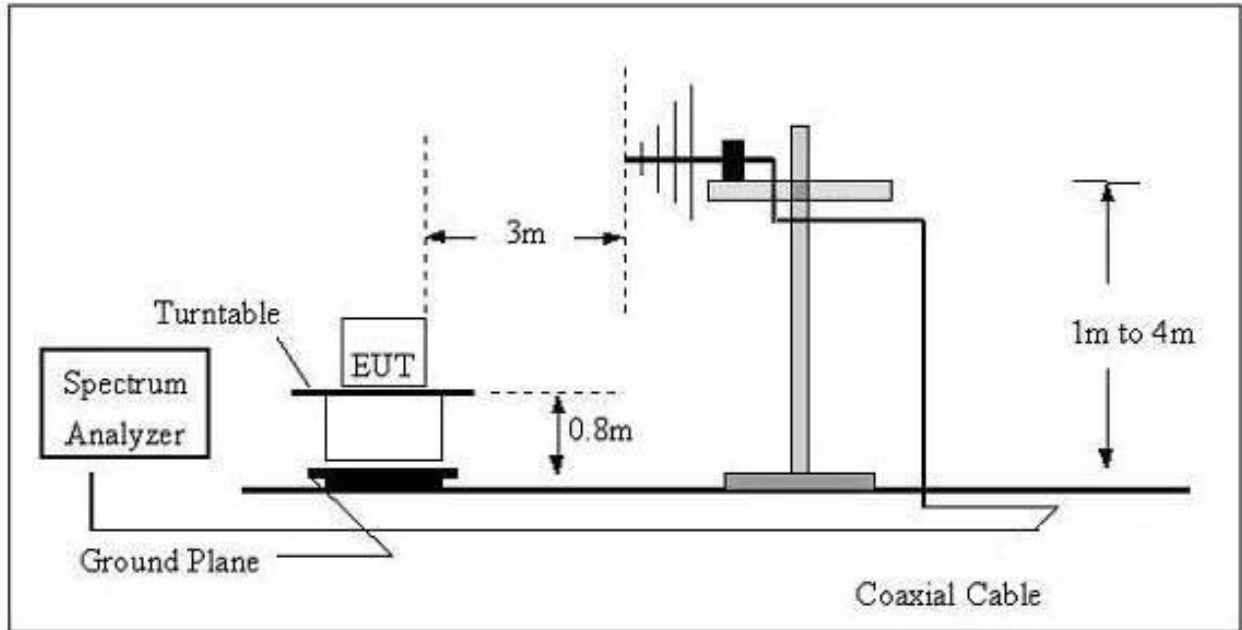


Radiated power test method:

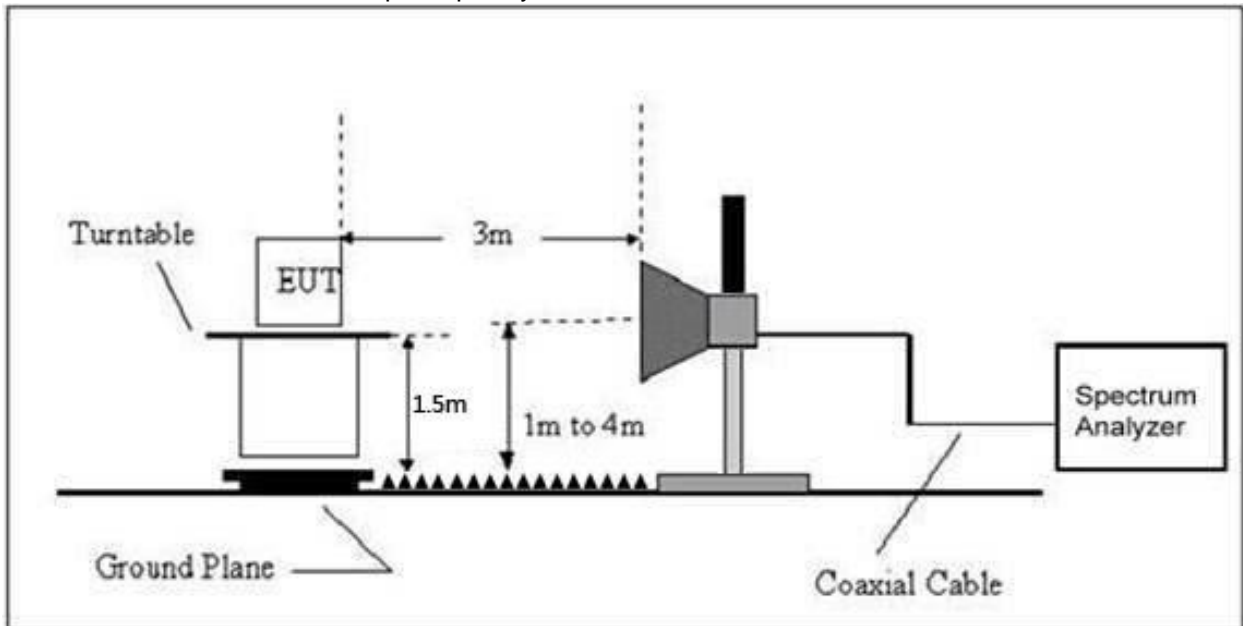
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



## 6.2 Limit

According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50(d)(4), Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

## 6.3 Test procedure

Radiated power test method:

1. The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

## 6.4 Test Result

**Max Radiated Power:**

FDD-LTE Band 2

<b>Channel Bandwidth: 1.4MHz</b>			
<b>Modulation</b>	<b>Channel</b>	<b>E.I.R.P.(dBm)</b>	<b>Verdict</b>
QPSK	LCH	22.83	PASS
	MCK	22.76	PASS
	HCH	22.98	PASS
16QAM	LCH	21.76	PASS
	MCK	21.81	PASS
	HCH	21.99	PASS
<b>Channel Bandwidth: 3MHz</b>			
<b>Modulation</b>	<b>Channel</b>	<b>E.I.R.P.(dBm)</b>	<b>Verdict</b>
QPSK	LCH	22.92	PASS
	MCK	23.09	PASS
	HCH	23.24	PASS
16QAM	LCH	21.90	PASS
	MCK	21.97	PASS
	HCH	21.95	PASS
<b>Channel Bandwidth: 5MHz</b>			
<b>Modulation</b>	<b>Channel</b>	<b>E.I.R.P.(dBm)</b>	<b>Verdict</b>
QPSK	LCH	22.92	PASS
	MCK	22.99	PASS
	HCH	23.05	PASS
16QAM	LCH	21.57	PASS
	MCK	21.97	PASS
	HCH	21.97	PASS
<b>Channel Bandwidth: 10MHz</b>			
<b>Modulation</b>	<b>Channel</b>	<b>E.I.R.P.(dBm)</b>	<b>Verdict</b>
QPSK	LCH	22.88	PASS
	MCK	22.99	PASS
	HCH	22.92	PASS
16QAM	LCH	21.66	PASS
	MCK	21.78	PASS
	HCH	21.94	PASS
<b>Channel Bandwidth: 15MHz</b>			
<b>Modulation</b>	<b>Channel</b>	<b>E.I.R.P.(dBm)</b>	<b>Verdict</b>
QPSK	LCH	22.91	PASS
	MCK	22.85	PASS
	HCH	22.76	PASS
16QAM	LCH	21.64	PASS
	MCK	21.88	PASS
	HCH	21.75	PASS
<b>Channel Bandwidth: 20MHz</b>			
<b>Modulation</b>	<b>Channel</b>	<b>E.I.R.P.(dBm)</b>	<b>Verdict</b>
QPSK	LCH	22.81	PASS
	MCK	22.80	PASS
	HCH	22.88	PASS
16QAM	LCH	21.65	PASS
	MCK	21.80	PASS
	HCH	21.63	PASS

FDD-LTE Band 4

Channel Bandwidth: 1.4MHz			
Modulation	Channel	E.I.R.P(dBm)	Verdict
QPSK	LCH	22.53	PASS
	MCK	23.01	PASS
	HCH	22.83	PASS
16QAM	LCH	21.63	PASS
	MCK	21.83	PASS
	HCH	21.84	PASS
Channel Bandwidth: 3MHz			
Modulation	Channel	E.I.R.P(dBm)	Verdict
QPSK	LCH	22.78	PASS
	MCK	22.89	PASS
	HCH	22.71	PASS
16QAM	LCH	21.49	PASS
	MCK	21.74	PASS
	HCH	21.57	PASS
Channel Bandwidth: 5MHz			
Modulation	Channel	E.I.R.P(dBm)	Verdict
QPSK	LCH	22.63	PASS
	MCK	22.79	PASS
	HCH	22.72	PASS
16QAM	LCH	21.44	PASS
	MCK	21.63	PASS
	HCH	21.55	PASS
Channel Bandwidth: 10MHz			
Modulation	Channel	E.I.R.P(dBm)	Verdict
QPSK	LCH	22.78	PASS
	MCK	22.52	PASS
	HCH	22.74	PASS
16QAM	LCH	21.51	PASS
	MCK	21.49	PASS
	HCH	21.55	PASS
Channel Bandwidth: 15MHz			
Modulation	Channel	E.I.R.P(dBm)	Verdict
QPSK	LCH	22.88	PASS
	MCK	22.57	PASS
	HCH	22.59	PASS
16QAM	LCH	21.56	PASS
	MCK	21.59	PASS
	HCH	21.50	PASS
Channel Bandwidth: 20MHz			
Modulation	Channel	E.I.R.P(dBm)	Verdict
QPSK	LCH	22.84	PASS
	MCK	22.66	PASS
	HCH	22.77	PASS
16QAM	LCH	21.66	PASS
	MCK	21.57	PASS
	HCH	21.27	PASS

## FDD-LTE Band 12

Channel Bandwidth: 1.4MHz			
Modulation	Channel	E.R.P(dBm)	Verdict
QPSK	LCH	23.40	PASS
	MCK	23.49	PASS
	HCH	23.38	PASS
16QAM	LCH	22.46	PASS
	MCK	22.60	PASS
	HCH	22.48	PASS
Channel Bandwidth: 3MHz			
Modulation	Channel	E.R.P(dBm)	Verdict
QPSK	LCH	23.70	PASS
	MCK	23.51	PASS
	HCH	23.48	PASS
16QAM	LCH	22.54	PASS
	MCK	22.59	PASS
	HCH	22.45	PASS
Channel Bandwidth: 5MHz			
Modulation	Channel	E.R.P(dBm)	Verdict
QPSK	LCH	23.56	PASS
	MCK	23.48	PASS
	HCH	23.30	PASS
16QAM	LCH	22.28	PASS
	MCK	22.53	PASS
	HCH	22.29	PASS
Channel Bandwidth: 10MHz			
Modulation	Channel	E.R.P(dBm)	Verdict
QPSK	LCH	23.47	PASS
	MCK	23.31	PASS
	HCH	23.41	PASS
16QAM	LCH	22.44	PASS
	MCK	22.38	PASS
	HCH	22.39	PASS

## FDD-LTE Band 13

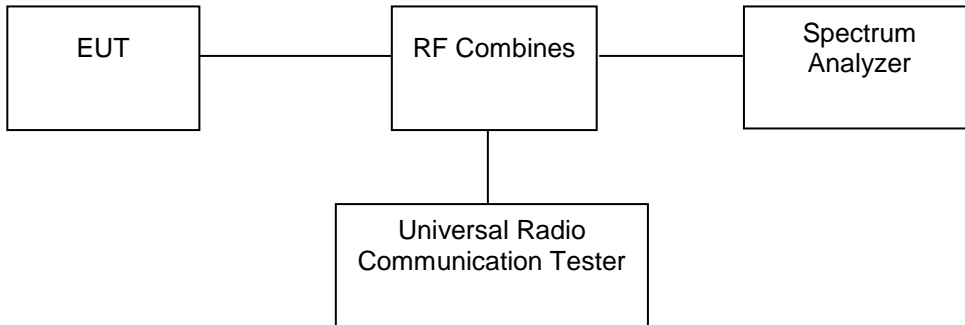
Channel Bandwidth: 5MHz			
Modulation	Channel	E.R.P(dBm)	Verdict
QPSK	LCH	23.49	PASS
	MCK	23.58	PASS
	HCH	23.61	PASS
16QAM	LCH	22.43	PASS
	MCK	22.19	PASS
	HCH	22.35	PASS
Channel Bandwidth: 10MHz			
Modulation	Channel	E.R.P(dBm)	Verdict
QPSK	/	/	PASS
	23230	23.55	PASS
	/	/	PASS
16QAM	/	/	PASS
	23230	22.34	PASS
	/	/	PASS

**Max Conducted output Power:**

Please refer to appendix A: Conducted Output Power  
 Test Result: Pass

## 7. Peak-To-Average Ratio(PAR) Of Transmitter

### 7.1 Block Diagram Of Test Setup



### 7.2 Limit

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. 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.

According to §27.50(B), the peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

### 7.3 Test procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded. Record the maximum PAPR level associated with a probability of 0.1%.

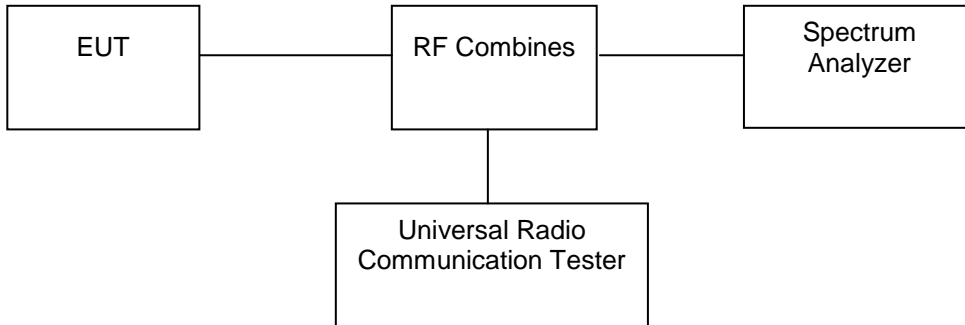
### 7.4 Test Result

Please refer to Appendix 3: Peak-to-Average Ratio  
Test Result: Pass



## 8. Emission Bandwidth

### 8.1 Block Diagram Of Test Setup



### 8.2 Standard Applicable

According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §27.53, The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### 8.3 Test procedure

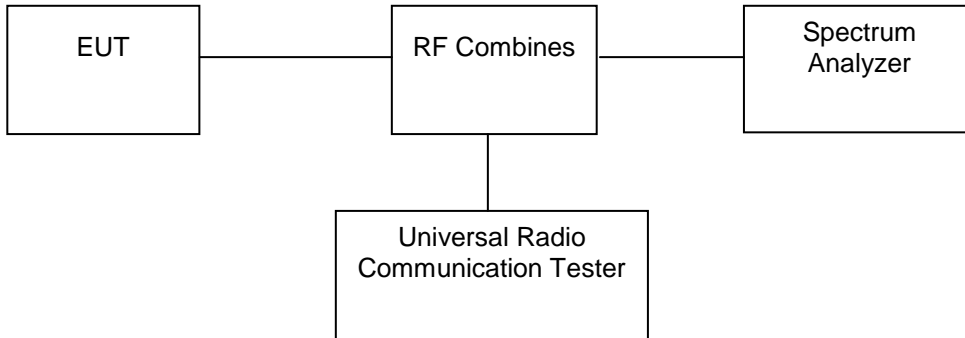
1. The testing follows FCC KDB 971168 D01v03 Section 4.2.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The 99% occupied bandwidth were measured, set RBW= 1% of OBW, VBW= 3\*RBW, sample detector, trace maximum hold.
5. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3\*RBW, peak detector, trace maximum hold.

### 8.4 Test Result

Please refer to Appendix 4: Occupied BandWidth  
Test Result: Pass

## 9. Out of Band Emissions at Antenna Terminal

### 9.1 Block Diagram Of Test Setup



### 9.2 Limit

According to §22.917(a), the power of any emissions 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.

According to §24.238(a), the power of any emissions 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.

According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.

### 9.3 Test procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10<sup>th</sup> harmonic.

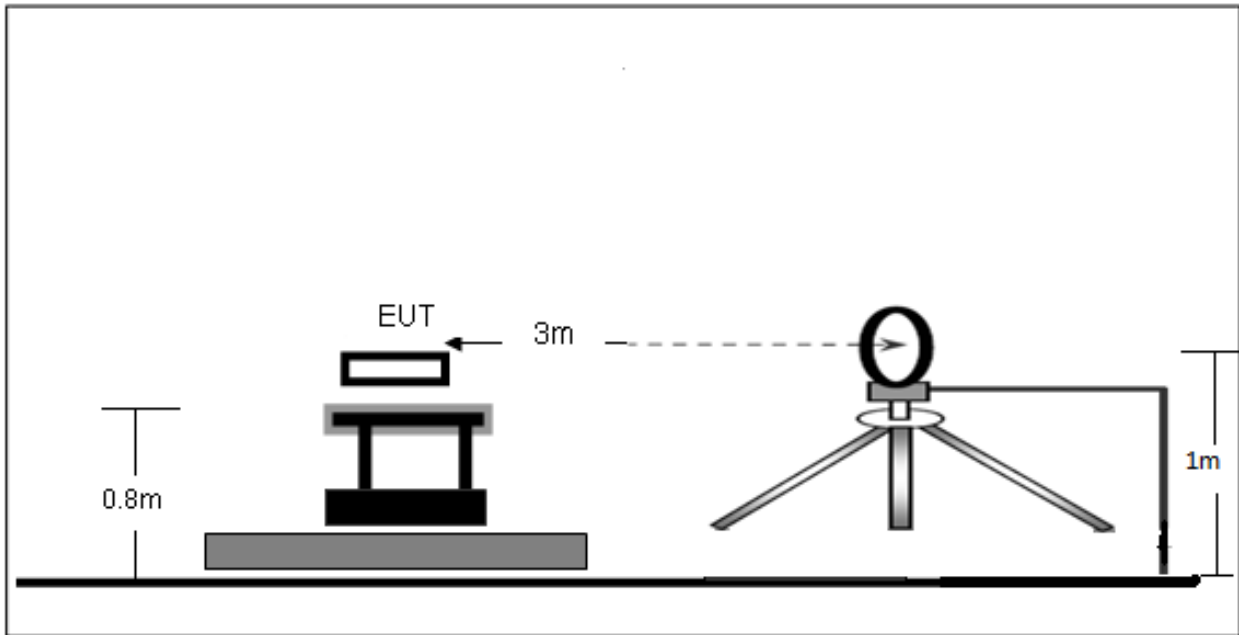
### 9.4 Test Result

Please refer to Appendix 5: Band Edge & Appendix 6: Out-of-band Emissions  
Test Result: Pass

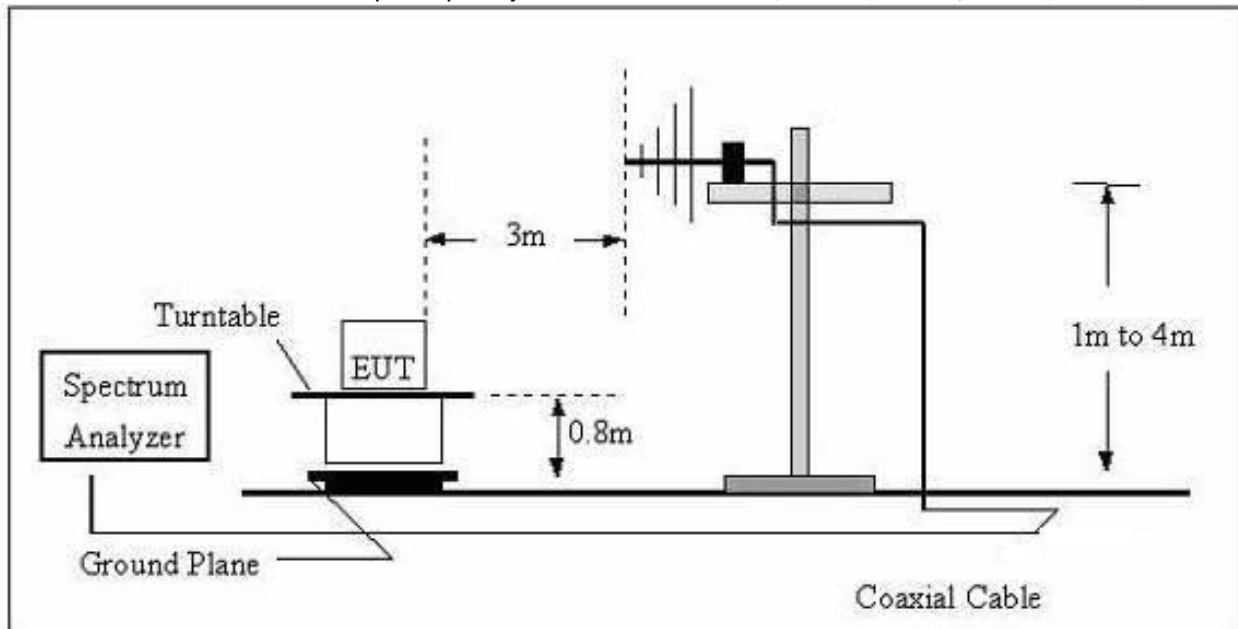
## 10. Spurious Radiated Emissions

### 10.1 Block Diagram Of Test Setup

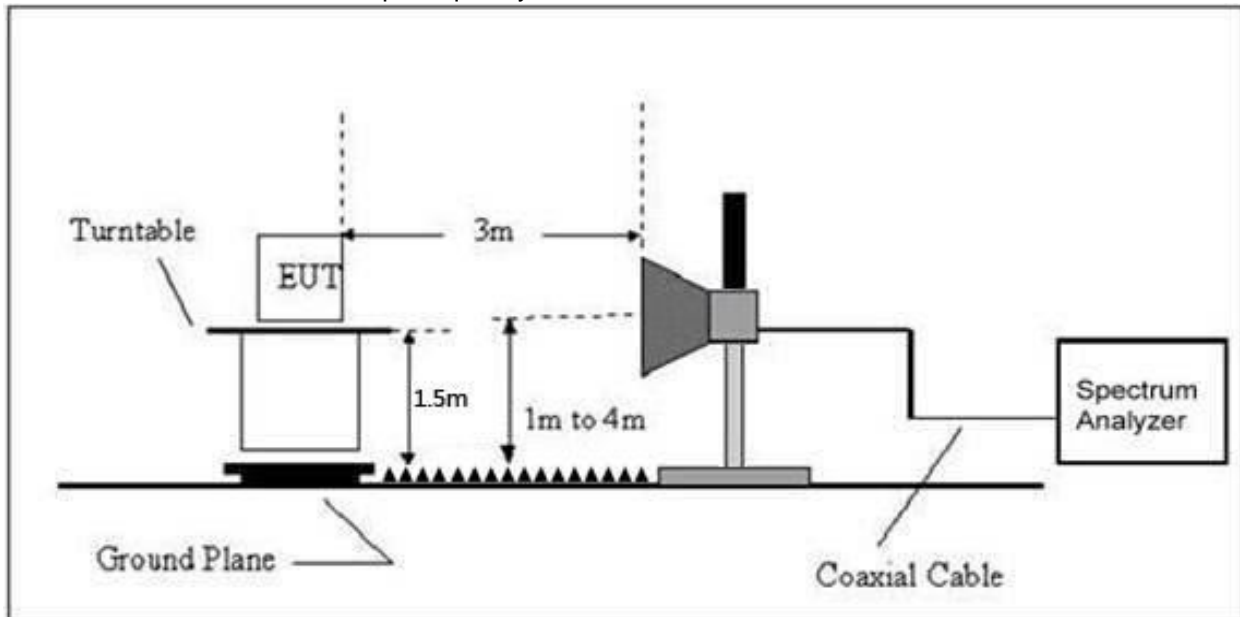
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



## (C) Radiated Emission Test-Up Frequency Above 1GHz



## 10.2 Limit

According to §22.917(a), the power of any emissions 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.

According to §24.238(a), the power of any emissions 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.

According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  dB.

## 10.3 Test procedure

1. The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB  
 $= 43 + 10 \log_{10}(\text{power out in Watts})$

## 10.4 Test Result

For FDD-LTE Band 2 Mode

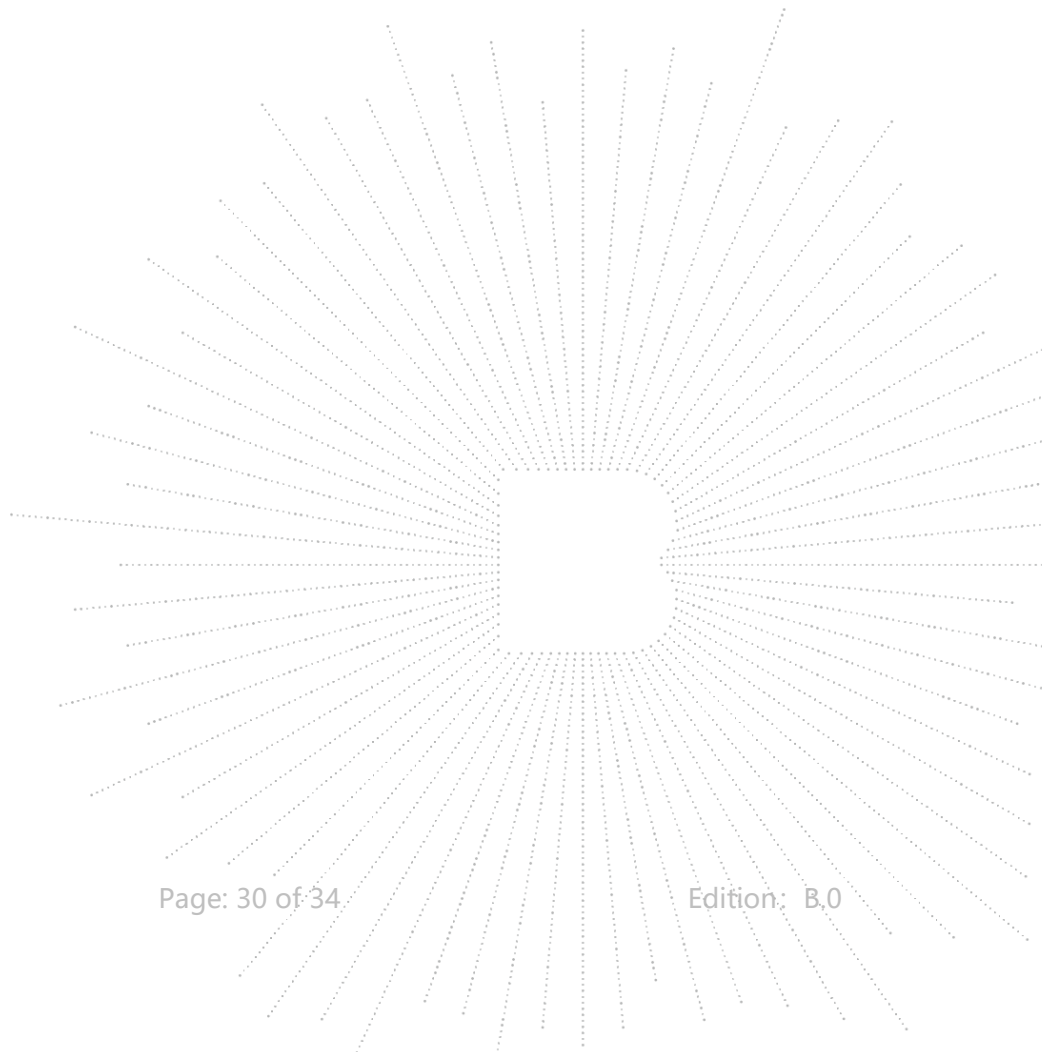
Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1852.5MHz)						
72.55	-42.91	-15.60	-58.51	-13.00	-45.51	H
3704.80	-24.33	-17.43	-41.76	-13.00	-28.76	H
5557.20	-31.09	-11.73	-42.82	-13.00	-29.82	H
72.55	-42.53	-15.60	-58.12	-13.00	-45.12	V
3704.80	-27.84	-17.43	-45.27	-13.00	-32.27	V
5557.20	-31.33	-11.73	-43.06	-13.00	-30.06	V
Middle Channel (1880MHz)						
72.55	-44.12	-15.60	-59.71	-13.00	-46.71	H
3760.00	-26.38	-16.98	-43.36	-13.00	-30.36	H
5640.00	-29.08	-11.33	-40.41	-13.00	-27.41	H
72.55	-43.01	-15.60	-58.60	-13.00	-45.60	V
3760.00	-26.30	-16.98	-43.28	-13.00	-30.28	V
5640.00	-29.80	-11.33	-41.13	-13.00	-28.13	V
High Channel (1907.5MHz)						
72.55	-44.28	-15.60	-59.87	-13.00	-46.87	H
3815.00	-27.42	-16.52	-43.94	-13.00	-30.94	H
5722.50	-32.07	-10.93	-43.00	-13.00	-30.00	H
72.55	-42.95	-15.60	-58.55	-13.00	-45.55	V
3815.00	-28.42	-16.52	-44.94	-13.00	-31.94	V
5722.50	-31.68	-10.93	-42.61	-13.00	-29.61	V

For FDD-LTE Band 4 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1710.7MHz)						
72.55	-41.76	-15.60	-57.36	-13.00	-44.36	H
3421.40	-25.31	-19.74	-45.05	-13.00	-32.05	H
5132.10	-30.64	-13.77	-44.41	-13.00	-31.41	H
72.55	-41.42	-15.60	-57.01	-13.00	-44.01	V
3421.40	-26.30	-19.74	-46.04	-13.00	-33.04	V
5132.10	-29.27	-13.77	-43.04	-13.00	-30.04	V
Middle Channel (1732.5MHz)						
72.55	-42.07	-15.60	-57.67	-13.00	-44.67	H
3465.00	-25.55	-19.41	-44.96	-13.00	-31.96	H
5197.50	-31.27	-13.48	-44.75	-13.00	-31.75	H
72.55	-44.53	-15.60	-60.12	-13.00	-47.12	V
3465.00	-27.53	-19.41	-46.94	-13.00	-33.94	V
5197.50	-30.18	-13.48	-43.66	-13.00	-30.66	V
High Channel (1754.3MHz)						
72.55	-42.21	-15.60	-57.81	-13.00	-44.81	H
3508.60	-27.16	-19.08	-46.24	-13.00	-33.24	H
5262.90	-31.22	-13.19	-44.41	-13.00	-31.41	H
72.55	-43.53	-15.60	-59.13	-13.00	-46.13	V
3508.60	-27.87	-19.08	-46.95	-13.00	-33.95	V
5262.90	-29.01	-13.19	-42.20	-13.00	-29.20	V

For FDD-LTE Band 12 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (699.7MHz)						
72.55	-44.34	-15.60	-59.93	-13.00	-46.93	H
1399.40	-21.81	-22.94	-44.75	-13.00	-31.75	H
2099.10	-23.04	-22.46	-45.50	-13.00	-32.50	H
72.55	-42.77	-15.60	-58.36	-13.00	-45.36	V
1399.40	-20.90	-22.94	-43.84	-13.00	-30.84	V
2099.10	-26.87	-22.46	-49.33	-13.00	-36.33	V
Middle Channel (707.5MHz)						
72.55	-44.69	-15.60	-60.29	-13.00	-47.29	H
1415.00	-21.17	-22.87	-44.04	-13.00	-31.04	H
2122.50	-25.22	-22.50	-47.72	-13.00	-34.72	H
72.55	-42.78	-15.60	-58.38	-13.00	-45.38	V
1415.00	-19.07	-22.87	-41.94	-13.00	-28.94	V
2122.50	-25.22	-22.50	-47.72	-13.00	-34.72	V
High Channel (715.3MHz)						
72.55	-43.43	-15.60	-59.03	-13.00	-46.03	H
1430.60	-21.78	-22.80	-44.58	-13.00	-31.58	H
2145.90	-23.36	-22.55	-45.91	-13.00	-32.91	H
72.55	-43.66	-15.60	-59.26	-13.00	-46.26	V
1430.60	-20.49	-22.80	-43.29	-13.00	-30.29	V
2145.90	-24.20	-22.55	-46.75	-13.00	-33.75	V

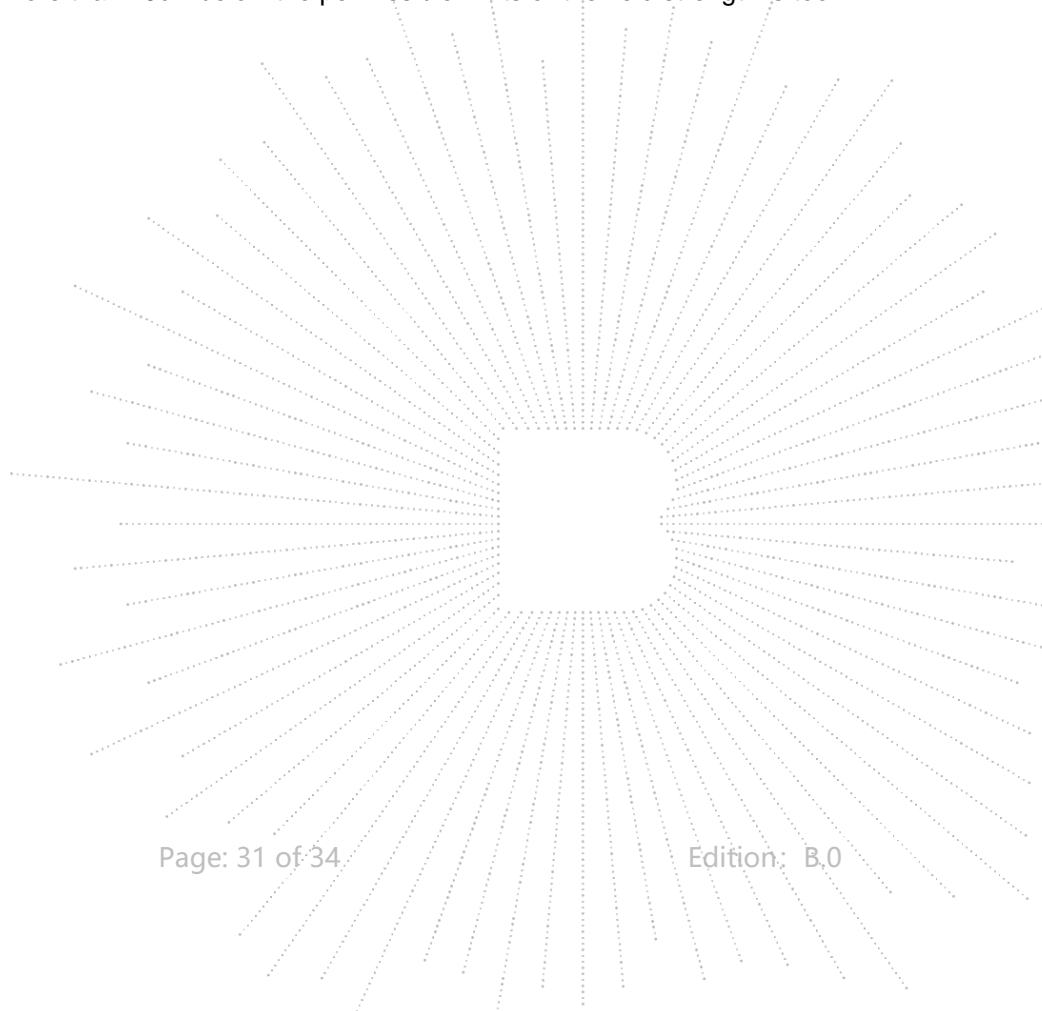


For FDD-LTE Band 13 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (779.5MHz)						
72.55	-41.07	-15.59	-56.66	-13.00	-43.66	H
1559.00	-19.77	-22.93	-42.70	-13.00	-29.70	H
2338.50	-26.07	-22.45	-48.52	-13.00	-35.52	H
72.55	-41.87	-15.59	-57.46	-13.00	-44.46	V
1559.00	-20.89	-22.93	-43.82	-13.00	-30.82	V
2338.50	-25.48	-22.45	-47.93	-13.00	-34.93	V
Middle Channel (782MHz)						
72.55	-42.85	-15.59	-58.44	-13.00	-45.44	H
1564.00	-21.72	-22.87	-44.59	-13.00	-31.59	H
2346.00	-25.27	-22.50	-47.77	-13.00	-34.77	H
72.55	-41.57	-15.59	-57.16	-13.00	-44.16	V
1564.00	-21.72	-22.87	-44.59	-13.00	-31.59	V
2346.00	-24.63	-22.50	-47.13	-13.00	-34.13	V
High Channel (784.5MHz)						
72.55	-43.88	-15.59	-59.46	-13.00	-46.46	H
1569.00	-19.63	-22.79	-42.42	-13.00	-29.42	H
2353.50	-23.98	-22.56	-46.54	-13.00	-33.54	H
72.55	-44.47	-15.59	-60.05	-13.00	-47.05	V
1569.00	-20.65	-22.79	-43.44	-13.00	-30.44	V
2353.50	-23.43	-22.56	-45.99	-13.00	-32.99	V

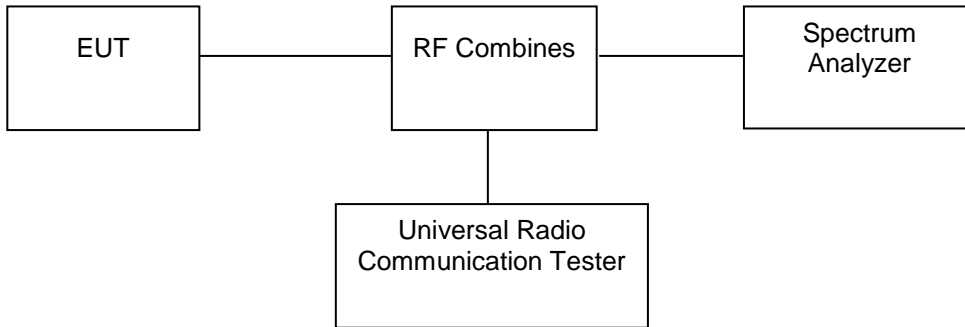
Note: Result=Reading+ Correct, Margin= Result- Limit

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



## 11. Frequency Stability

### 11.1 Block Diagram Of Test Setup



### 11.2 Limit

±2.5 ppm

### 11.3 Test procedure

Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 D01v03 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C steps up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 D01v03 Section 9.0.
2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.
5. The worst case(worst bandwidth) for frequency stability reported in the Test Data.

### 11.4 Test Result

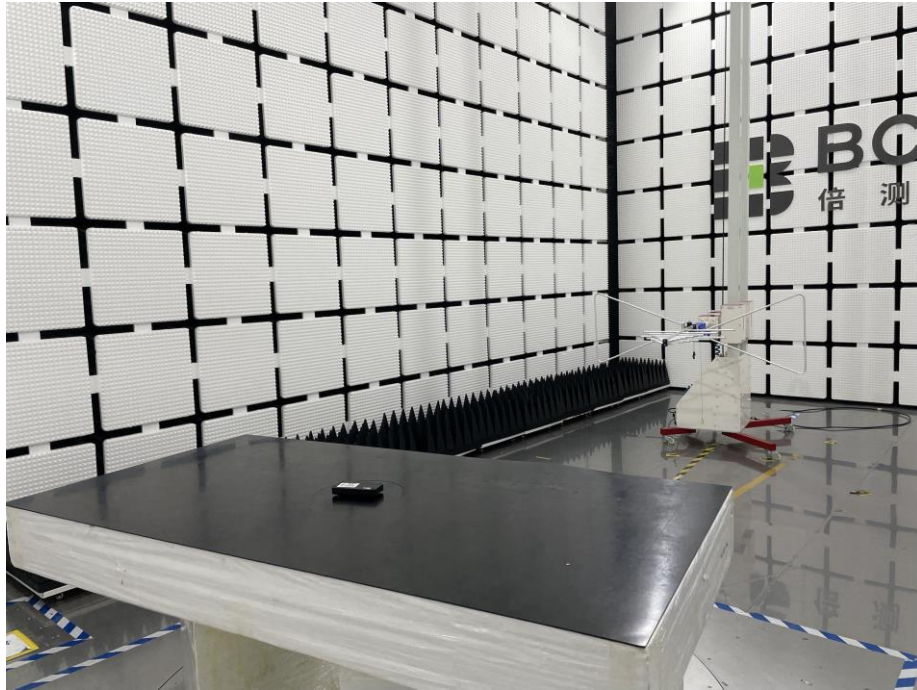
Please refer to Appendix 2: Frequency Stability

Test Result: Pass



## 12. EUT Test Setup Photographs

### Radiated Measurement Photos



**STATEMENT**

1. The equipment lists are traceable to the national reference standards.
2. The test report can not be partially copied unless prior written approval is issued from our lab.
3. The test report is invalid without the "special seal for inspection and testing".
4. The test report is invalid without the signature of the approver.
5. The test process and test result is only related to the Unit Under Test.
6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.
7. The quality system of our laboratory is in accordance with ISO/IEC17025.
8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

**Address:**

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P.C.: 518103

FAX: 0755-33229357

Website: <http://www.chnbctc.com>

E-Mail: [bctc@bctc-lab.com.cn](mailto:bctc@bctc-lab.com.cn)

**\*\*\*\*\* END \*\*\*\*\***