TEST REPORT

Report No.: SHATBL2410006W03

Applicant	:	Shanghai Mini Deer Robot Co., LTD.
Product Name	:	GNSS RECEIVER
Brand Name	:	Mini Deer Robot
Model Name	:	R70 Smart
FCC ID	:	**2BKEC-R70SMART**
Test Standard	:	47 CFR Part 2 47 CFR Part 22 47 CFR Part 24 47 CFR Part 27
Date of Test	:	2024.10.19-2025.03.21

Report Prepared by : Emily

(Emily)

Report Approved by : Guozheng Li

(Guozheng Li)

Authorized Signatory : Terry Yang

(Terry Yang)

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REVISION HISTORY

Rev.	Issue Date	Revisions	Revised by
00	2025.03.24	Initial Release	Guozheng Li

DECLARATION OF REPORT

1. The device has been tested by ATBL, and the test results show that the equipment under test (EUT) is in compliance with the requirements of 47 CFR Part 2, 22, 24, 27. And it is applicable only to the tested sample identified in the report.

2. This report shall not be reproduced except in full, without the written approval of ATBL, this document only be altered or revised by ATBL, personal only, and shall be noted in the revision of the document.

3. The general information of EUT in this report is provided by the customer or manufacture, ATBL is only responsible for the test data but not for the information provided by the customer or manufacture.

4. The results in this report is only apply to the sample as tested under conditions. The customer or manufacturer is responsible for ensuring that the additional production units of this model have the same electrical and mechanical components.

SUMMARY OF TEST RESULT

Report Section	Standard Section	Test Item	Limit	Judgment	Remark
3.1	§2.1046	Conducted Output Power and ERP/EIRP	-	Report Only	--
	§24.232(c)	Equivalent Isotropic Radiated Power(Band 2)	EIRP < 2Watt	PASS	--
	§27.50(d)(4)	Equivalent Isotropic Radiated Power(Band 4)	EIRP < 1Watt		
	§22.913(a)(5)	Effective Radiated Power (Band 5)	ERP < 7Watt		
	§27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 7)(Band 38)(Band 41)	EIRP < 2Watt		
3.2	§2.1055 §22.355	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22	PASS	--
	§2.1055 §24.235 §27.54		Within Authorized Band		
3.3	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	--
3.4	§2.1049 §90.209	Occupied Bandwidth	-	Report Only	--
3.5	§2.1051 §22.917(a) §24.238(a) §27.53(h) §27.53(g)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 5)	< 43+10log10(P[Watts])	PASS	--
	§2.1051 §27.53(m)(4)	Conducted Band Edge Measurement (Band 7)(Band 38)(Band 41)	< 55+10log10(P[Watts])		
3.6	§2.1051 §22.917(a) §24.238(a) §27.53(h) §27.53(g)	Conducted Spurious Emission (Band 2) (Band 4) (Band 5)	< 43+10log10(P[Watts])	PASS	--
	§2.1051 §27.53(m)(4)	Conducted Spurious Emission (Band 7)(Band 38)(Band 41)	< 55+10log10(P[Watts])		
3.7	§2.1053 §22.917(a) §24.238(a) §27.53(h) §27.53(g)	Radiated Spurious Emission (Band 2) (Band 4) (Band 5)	< 43+10log10(P[Watts])	PASS	--
	§2.1053 §27.53(m)(4)	Radiated Spurious Emission (Band 7)(Band 38)(Band 41)	< 55+10log10(P[Watts])		

1. GENERAL DESCRIPTION

1.1. Applicant

Name : Shanghai Mini Deer Robot Co., LTD.

Address : Room 505, Building No.1,Lane 215,Gaoguang Road, Qingpu District,Shanghai,China

1.2. Manufacturer

Name : Shanghai Mini Deer Robot Co., LTD.

Address : Room 505, Building No.1,Lane 215,Gaoguang Road, Qingpu District,Shanghai,China

1.3. Factory

Name : Shanghai Mini Deer Robot Co., LTD.

Address : Room 505, Building No.1,Lane 215,Gaoguang Road, Qingpu District,Shanghai,China

1.4. General Information of EUT

General Information	
Equipment Name	GNSS RECEIVER
Brand Name	Mini Deer Robot
Model Name	R70 Smart
Series Model	/
Model Difference	/
Sample No.	202400812007004
UE Capabilities	UE Category 1
Power Input	DC 36V
Adapter	/
Battery	/
Hardware Version	1.020
Software Version	R70E_2.6.0_240418
Operating Temperature Range	-45℃ ~ +75℃
Connecting I/O Port(s)	Refer to the remark below.

Remark:

The above information of EUT was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.5. Environmental conditions

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

Temperature	Normal Temperature(TN):	20°C
	High Temperature(TH):	50°C
	Low Temperature(TL):	-30°C
Voltage	Normal Voltage(VN):	36V
	High Voltage(VH):	39.6V
	Low Voltage(VL):	32.4V
Other	Relative Humidity	52 %
	Air Pressure	101 kPa
NTNV	Normal temperature & Normal Voltage	
LTLV	Low temperature & Low Voltage	
LTHV	Low temperature & High Voltage	
HTLV	High temperature & Low Voltage	
HTHV	High temperature & High Voltage	

1.6. Equipment Specification

Standards-related Product Specification				
Band	**Tx Frequency Range(MHz)**	**Rx Frequency Range(MHz)**	**Antenna Gain(dBi)**	**Maximum Output Power(dBm)**
☑ Band 2	1850 ~ 1910	1930 ~ 1990	1	23.94
☑ Band 4	1710 ~ 1755	2110 ~ 2155	1	24.38
☑ Band 5	824 ~ 849	869 ~ 894	0	24.24
☑ Band 7	2500 ~ 2570	2620 ~ 2690	-5.5	22.99
☑ Band 38	2570 ~ 2620	2570 ~ 2620	-5.5	24.06
☑ Band 41	2496 ~ 2690	2496 ~ 2690	-5.5	24.03
Band	**Bandwidth**			
☑ Band 2	1.4MHz / 3MHz / 5MHz			
☑ Band 4	1.4MHz / 3MHz / 5MHz			
☑ Band 5	1.4MHz / 3MHz / 5MHz			
☑ Band 7	5MHz			
☑ Band 38	5MHz			
☑ Band 41	5MHz			
Type of Modulation				
☑ QPSK	☑ 16QAM	☐ 64QAM	☐ 256QAM	
Antenna Type	FPC			

1.7. Emission Designator

Band	Bandwidth (MHz)	Low Freq. (MHz)	High Freq. (MHz)	Type (Antenna or ERP or EIRP)	Max power (dBm)	Max Power (mW)	Emission Designator
LTE Band 2	5	1852.5	1907.5	EIRP	22.76	188.80	4M49W7D
	5	1852.5	1907.5	EIRP	23.84	242.10	4M53G7D
	3	1851.5	1908.5	EIRP	23.94	247.74	1M09G7D
LTE Band 4	5	1712.5	1752.5	EIRP	23.58	228.03	4M49W7D
	5	1712.5	1752.5	EIRP	24.23	264.85	4M50G7D
	1.4	1710.7	1754.3	EIRP	24.38	274.16	1M09G7D
LTE Band 5	5	826.5	846.5	ERP	23.31	214.29	4M49W7D
	5	826.5	846.5	ERP	23.94	247.74	4M50G7D
	1.4	824.7	848.3	ERP	24.24	265.46	1M10G7D
LTE Band 7	5	2502.5	2567.5	EIRP	22.14	163.68	4M50W7D
	5	2502.5	2567.5	EIRP	22.99	199.07	4M50G7D
LTE Band 38	5	2572.5	2617.5	EIRP	22.58	181.13	4M49W7D
	5	2572.5	2617.5	EIRP	24.06	254.68	4M49G7D
LTE Band 41	5	2498.5	2687.5	EIRP	22.51	178.24	4M47W7D
	5	2498.5	2687.5	EIRP	24.03	252.93	4M50G7D

Note:

1. The maximum ERP/EIRP is calculated from max output power and max antenna gain, only the maximum ERP/EIRP is shown in the report.
2. This device belongs to UE Category 1.

1.8. Modification of EUT

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

1.9. Laboratory Information

Company Name	:	Shanghai ATBL Technology Co., Ltd.
Address	:	Building 8,No.160 Basheng Road, Waigaoqiao Free Trade Zone, Pudong New Area, Shanghai
Telephone	:	+86(0)21-51298625
The FCC Registration Number (FRN)	:	485917
A2LA Number	:	6184.01
CNAS Number	:	CNAS L14531
CAB Identifier	:	CN0116

1.10. Applicable Standards

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

47 CFR Part 2, 22, 24, 27

ANSI C63.26-2015

FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

All test items were verified and recorded according to the standards and without any deviation during the test.

2. TEST CONFIGURATION OF EQUIPMENT UNDER TEST

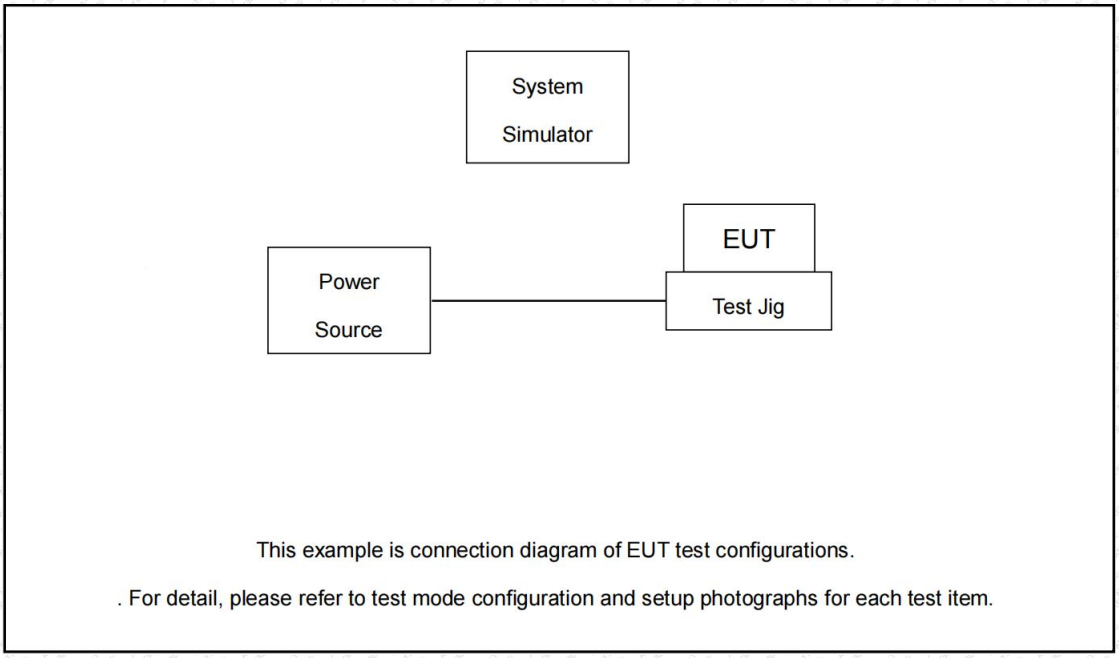
2.1. Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission. (X-Plane)

Test Items	Band	Bandwidth (MHz)						Modulation				RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full	L	M	H
Max. Output Power	2	√	√	√				√	√			√		√	√	√	√
	4	√	√	√				√	√			√		√	√	√	√
	5	√	√	√				√	√			√		√	√	√	√
	7			√				√	√			√		√	√	√	√
	38			√				√	√			√		√	√	√	√
	41			√				√	√			√		√	√	√	√
Peak-to-Average Ratio	2	√	√	√				√	√			√				√	
	4	√	√	√				√	√			√				√	
	5	√	√	√				√	√			√				√	
	7			√				√	√			√				√	
	38			√				√	√			√				√	
	41			√				√	√			√				√	
26dB and 99% Bandwidth	2	√	√	√				√	√					√		√	
	4	√	√	√				√	√					√		√	
	5	√	√	√				√	√					√		√	
	7			√				√	√					√		√	
	38			√				√	√					√		√	
	41			√				√	√					√		√	
Conducted Band Edge	2	√	√	√				√	√					√	√		√
	4	√	√	√				√	√					√	√		√
	5	√	√	√				√	√					√	√		√
	7			√				√	√					√	√		√
	38			√				√	√					√	√		√
	41			√				√	√					√	√		√
Conducted Spurious Emission	2	√	√	√				√	√					√	√		√
	4	√	√	√				√	√					√	√		√
	5	√	√	√				√	√					√	√		√
	7			√				√	√					√	√		√
	38			√				√	√					√	√		√
	41			√				√	√					√	√		√
Frequency Stability	2			√				√						√		√	
	4			√				√						√		√	
	5			√				√						√		√	
	7			√				√						√		√	
	38			√				√						√		√	
	41			√				√						√		√	
E.R.P / E.I.R.P	2	√	√	√				√	√			√		√	√	√	√
	4	√	√	√				√	√			√		√	√	√	√
	5	√	√	√				√	√			√		√	√	√	√
	7			√				√	√			√		√	√	√	√
	38			√				√	√			√		√	√	√	√
	41			√				√	√			√		√	√	√	√
Radiated Spurious Emission	2	Worst Case													√	√	√
	4	Worst Case													√	√	√
	5	Worst Case													√	√	√
	7	Worst Case													√	√	√
	38	Worst Case													√	√	√
	41	Worst Case													√	√	√
Note	1. The mark "√" means that this configuration is chosen for testing. 2. When a cell is empty, it means it is not supported or does not require testing. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. 4. The UE category is 1, so bandwidth greater than 5M does not support 16QAM.																

2.2. Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.3. Support Unit used in test configuration and system

NO.	Unit	Brand	Model	Description
1	DC Power Supply	GWINSTEK	GPD-2303S	GEV915433
2	SIM Card	N/A	N/A	N/A

2.4. Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3

LTE Band 4 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
5	Channel	19975	20175	20375
	Frequency	1712.5	1732.5	1752.5
3	Channel	19965	20175	20385
	Frequency	1711.5	1732.5	1753.5
1.4	Channel	19957	20175	20393
	Frequency	1710.7	1732.5	1754.3

LTE Band 5 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
5	Channel	20425	20525	20625
	Frequency	826.5	836.5	846.5
3	Channel	20415	20525	20635
	Frequency	825.5	836.5	847.5
1.4	Channel	20407	20525	20643
	Frequency	824.7	836.5	848.3

LTE Band 7 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
5	Channel	20775	21100	21425
	Frequency	2502.5	2535	2567.5

LTE Band 38 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
5	Channel	37775	38000	38225
	Frequency	2572.5	2595	2617.5

LTE Band 41 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
5	Channel	39675	40620	41565
	Frequency	2498.5	2593	2687.5

2.5. Equipment List

2.5.1. For Conducted Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	equipment number	Calibrated until	Calibrated due until	Cal. Interval
Environmental Test Chamber	BST	BST-HZ-410	T1131	SHATBL-W041	2024.03.28	2025.03.27	1 year
Vector signal generator	Agilent	N5182A	MY50143555	SHATBL-W037	2024.07.18	2025.07.17	1 year
Analog signal generator	Keysight	N5173B	MY60403026	SHATBL-W038	2024.07.18	2025.07.17	1 year
Wideband radio communication tester	R&S	CMW500	101331	SHATBL-W044	2024.07.18	2025.07.17	1 year
Spectrum analyzer	R&S	FSV40-N	101761	SHATBL-W036	2024.07.18	2025.07.17	1 year
Switch Box	MaiWei	MW200-RFCB	MW220720ATBL	SHATBL-W039	N/A	NA	N/A
Thermometer	DeLi	N/A	N/A	SHATBL-W012	2024.07.18	2025.07.17	1 year
Test Software	MaiWei	MW-Test	N/A	N/A	N/A	N/A	N/A
band rejection filter	MaiWei	MW200-SFCB	MW220719ATBL	SHATBL-W040	2024.07.18	2025.07.17	1 year

2.5.2. For Radiated Spurious Emission

Kind of Equipment	Manufacturer	Type No.	Serial No.	equipment number	Calibrated until	Calibrated due until	Cal. Interval
Signal analyzer	Agilent	N9020A	MY50200811	SHATBL-E017	2024.03.28	2025.03.27	1 year
Amplifier	JPT	JPA0118-55-303A	1910001800055000	SHATBL-E006	2024.03.28	2025.03.27	1 year
Amplifier	JPT	JPA-10M1G32	21010100035001	SHATBL-E005	2024.03.28	2025.03.27	1 year
Antenna/Turn table Controller	Brilliant	N/A	N/A	SHATBL-E007	N/A	N/A	N/A
Loop Antenna(9kHz-30MHz)	Daze	ZN30900C	20077	SHATBL-E042	2024.05.17	2025.05.16	1 year
Bilog Antenna	SCHWARZBECK	VULB 9168	01174	SHATBL-E008	2024.05.17	2025.05.16	1 year
Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120D	02334	SHATBL-E009	2024.05.17	2025.05.16	1 year
Horn Antenna	COM-POWER	AH-1840	10100008	SHATBL-E043	2024.07.28	2025.07.27	1 year
Thermometer	DeLi	N/A	N/A	SHATBL-E015	2024.07.18	2025.07.17	1 year
Test Software	FALA	EMC-RI(Ver.4A2)	N/A	N/A	N/A	N/A	N/A
Wideband radio communication tester	R&S	CMW500	101331	SHATBL-W044	2024.07.18	2025.07.17	1 year

2.6. Measurement Uncertainty

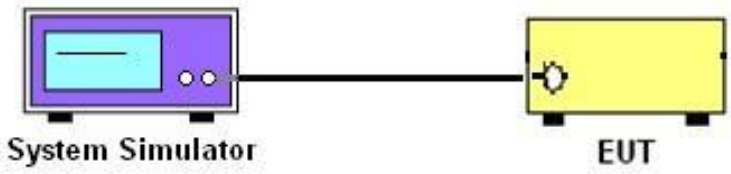
The reported uncertainty of measurement y±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Output Power	1.27dB
2	Power spectral density	1.28dB
3	Conducted spurious emissions	1.73dB
4	Conducted Frequency Stability	10.14Hz
5	RF Cable Loss	1.22dB
6	Radiated Spurious Emission 9KHz-30MHz	2.35dB
7	Radiated Spurious Emission 30MHz-1GHz	2.59dB
8	Radiated Spurious Emission 1GHz-18GHz	2.62dB
9	Radiated Spurious Emission 18GHz - 40GHz	2.80dB

3. TEST RESULT

3.1. Conducted Output Power and ERP/EIRP

3.1.1. Test Setup



3.1.2. Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

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

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 5.

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2, LTE Band Band 7, LTE Band Band 38 and LTE Band Band 41.

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4.

According to KDB 412172 D01 Power Approach, EIRP = P_T + G_T – L_C, ERP = EIRP -2.15, where P_T = transmitter output power in dBm, G_T = gain of the transmitting antenna in dBi, L_C= signal attenuation in the connecting cable between the transmitter and antenna in dB.

3.1.3. Test Procedures

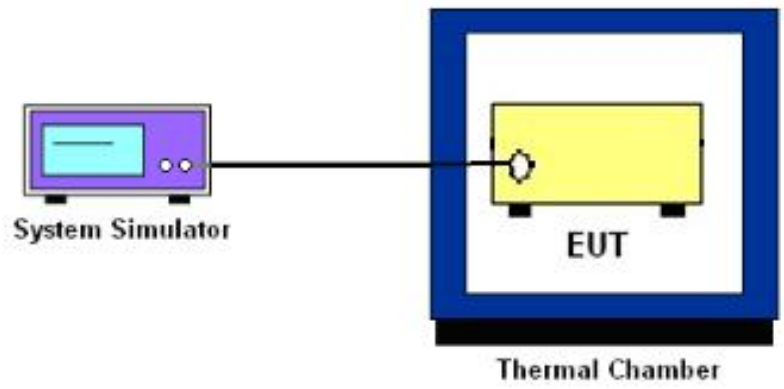
1. The testing follows ANSI C63.26 Section 5.2.
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

3.1.4. Test Result of Conducted Output Power and ERP/EIRP

Please refer to the Appendix A1.

3.2. Frequency Stability

3.2.1. Test Setup



3.2.2. Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.2.3. Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4.
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 step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.2.4. Test Procedures for Voltage Variation

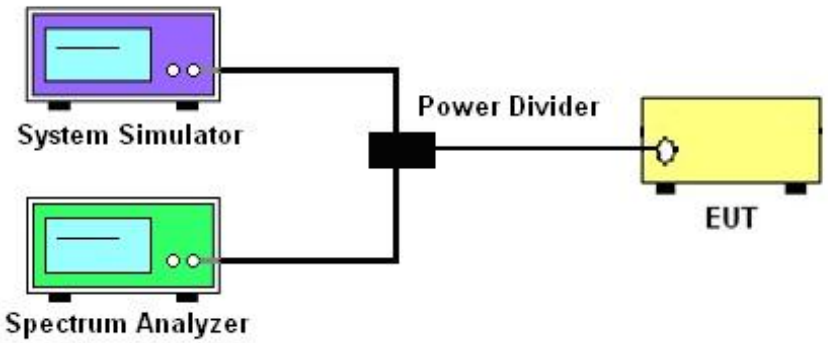
1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

3.2.5. Test Result of Frequency Stability

Please refer to Appendix A2.

3.3. Peak-to-Average Ratio

3.3.1. Test Setup



3.3.2. Description of the PAR Measurement

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

3.3.3. Test Procedures

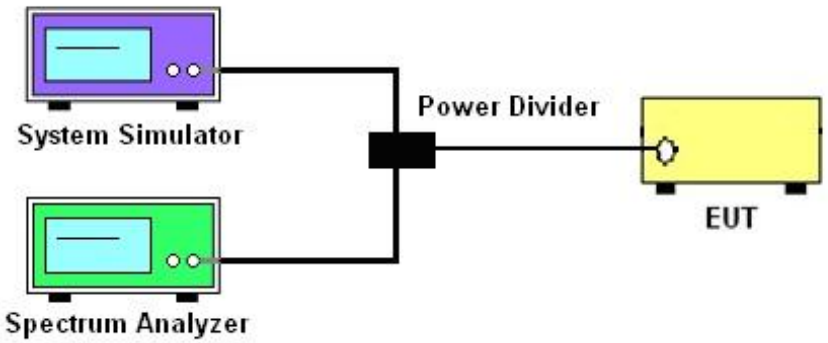
1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.3.4. Test Result of Peak-to-Average Ratio

Please refer to the Appendix A3.

3.4. Occupied Bandwidth

3.4.1. Test Setup



3.4.2. Description of Occupied Bandwidth Measurement

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

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

3.4.3. Test Procedures

1. The testing follows ANSI C63.26 Section 5.4.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace.(this is the reference value)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured

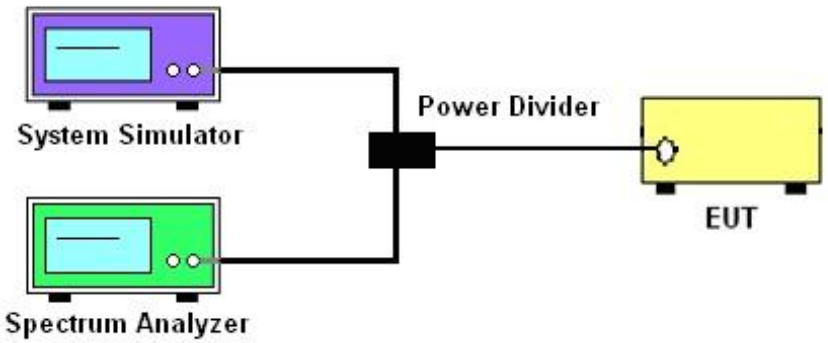
bandwidth.

3.4.4. Test Result of Occupied Bandwidth

Please refer to the Appendix A4.

3.5. Conducted Band Edge

3.5.1. Test Setup



3.5.2. Description of Conducted Band Edge Measurement

22.917(a):

For operations in the 814 – 849 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

24.238 (a):

For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53 (h):

For operations in the 1710 - 1755 MHz and 1710 - 1780 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53 (c):

For operations in the 776-788 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. 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. In addition, the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least 65 + 10 log10 p(watts), dB, for mobile and portable equipment.

27.53 (g):

For operations in the 600MHz band and 698-746 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. 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(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.

3.5.3. Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used or a narrower RBW was used and the measured power was integrated over the full required measurement bandwidth of 1 MHz.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.

   Example:

   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

   = P(W)- [43 + 10log(P)] (dB)

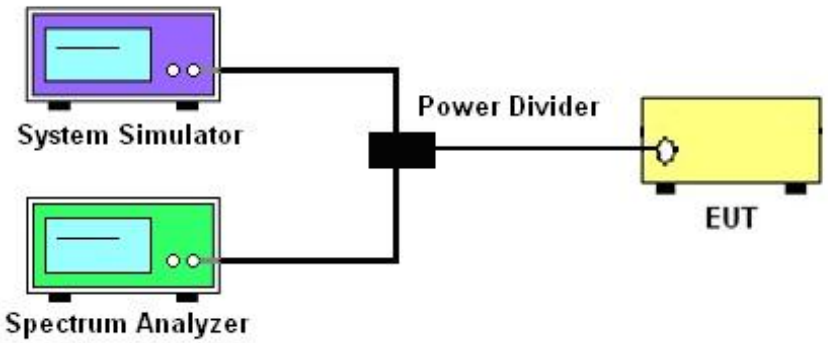
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm
9. When using the integration method, the starting frequency of the integration shall be centered at one-half of the RBW away from the band edge.

3.5.4. Test Result of Conducted Band Edge

Please refer to Appendix A5.

3.6. Conducted Spurious Emission

3.6.1. Test Setup



3.6.2. Description of Conducted Spurious Emission Measurement

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

For Band 7,38,41:

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 55 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

3.6.3. Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of 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 middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
7. Set spectrum analyzer with RMS detector.
8. Taking the record of maximum spurious emission.
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band
10. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts) = P(W)- [43 + 10log(P)] (dB) = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.
11. For Band 7, 38, 41:
    The limit line is derived from 55 + 10log(P)dB below the transmitter power P(Watts) = P(W)- [55+ 10log(P)] (dB) = [30+ 10log(P)] (dBm) - [55+ 10log(P)] (dB) = -25dBm.

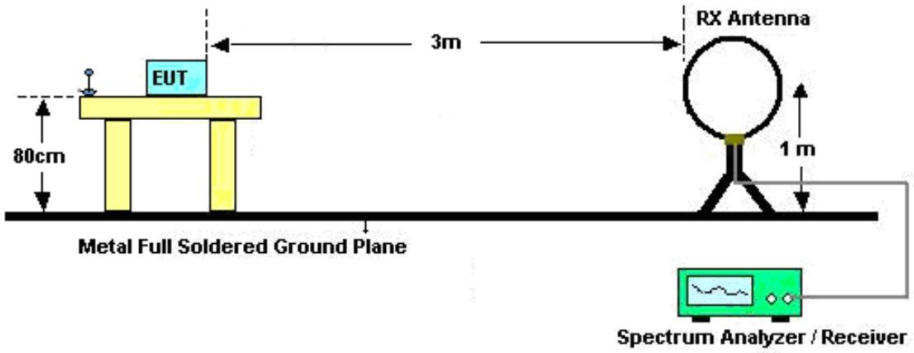
3.6.4. Test Result of Conducted Spurious Emission

Please refer to the Appendix A6.

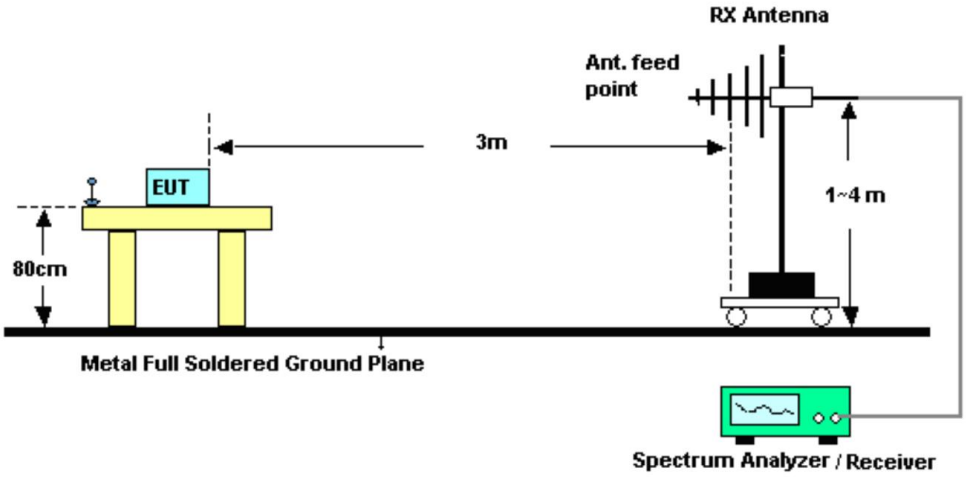
3.7. Radiated Spurious Emission

3.7.1. Test Setup

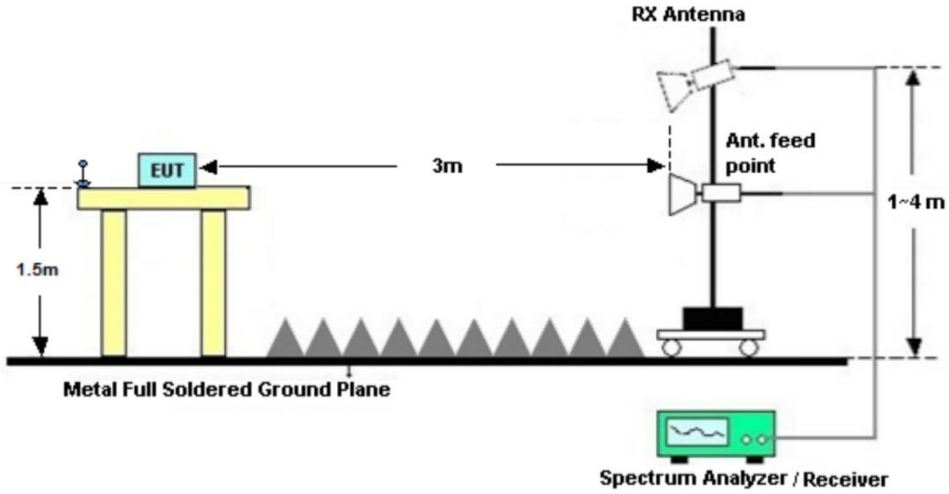
3.7.1.1. For radiated test below 30MHz



3.7.1.2. For radiated test from 30MHz to 1GHz



3.7.1.3. For radiated test above 1GHz



3.7.2. Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26.

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

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.7.3. Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.In the 50Ω test system at a distance of 3 meters, the compensation coefficient for free space path loss is approximately 95.2 dB, so the limit is:

(1)The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

= P(W)- [43 + 10log(P)] (dB) = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

= -13dBm + 95.2= 82.2 dBμV/m.

(2)The limit line is derived from 55 + 10log(P)dB below the transmitter power P(Watts)

= P(W)- [55+ 10log(P)] (dB) = [30+ 10log(P)] (dBm) - [55+ 10log(P)] (dB)

= -25dBm + 95.2= 70.2 dBμV/m.

3.7.4. Test Result of Radiated Spurious Emission

please refer to the Appendix B.

4. TEST SETUP PHOTOGRAPHS

Please refer to the Appendix C.

5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

External Photos Please refer to the Appendix D.

Internal Photos Please refer to the Appendix E.

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