Product Name: Body Worn Camera	**Report No: FCC022022-0616RF12(a)**
Product Model: FirstVu PRO	**Security Classification: Open**
Version: V1.0	**Total Page: 28**

TIRT Testing Report

Prepared By:	Checked By:	Approved By:	
Stone Tang	Randy Lv	Daniel Chen	
Stone Tang	Randy LV	Daniel chen	

RF TEST REPORT

FCC ID: WPZ-FVPRO

According to

47 CFR FCC Part 02:2020

47 CFR FCC Part 22:2020

47 CFR FCC Part 24:2020

47 CFR FCC Part 27:2020

ANSI C63.26:2015

Equipment	:	Body Worn Camera
Model No.	:	FirstVu PRO
Trademark	:	Digital Ally
Product No.	:	20220218001974
Applicant	:	Digital Ally, Inc. 14001 Marshall Drive Lenexa, Kansas 66215 United States

- The test result referred exclusively to the presented test model /sample.
- Without written approval of TIRT Inc. the test report shall not reproduced except in full.
- Test Date: 2022.02.07-2022.03.16

Lab: Beijing TIRT Technology Service Co.,Ltd Shenzhen
Add: 101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street, Pingshan District, Shenzhen, China
TEL: +86-0755-27087573

Table of Contents

History of this test report

Original Report Issue Date: 2022.04.22

● No additional attachment

○ Additional attachments were issued following record

Attachment No.	Issue Date	Description

1. General Information

1.1 Applicant

Digital Ally, Inc.

14001 Marshall Drive Lenexa, Kansas 66215 United States

1.2 Manufacturer

Digital Ally, Inc.

14001 Marshall Drive Lenexa, Kansas 66215 United States

1.3 Factory

Digital Ally, Inc.

14001 Marshall Drive Lenexa, Kansas 66215 United States

1.4 Basic Description of Equipment Under Test

Items	Description	
Equipment Name	Body Worn Camera	
Model Number	FirstVu PRO	
Trademark	Digital Ally	
Power Supply	Adapter Model: AS1201A-0502000USU Input: 100-240V~50/60Hz 0.35A MAX Output: 5V 2000mA	
	Battery Model: A213A 3.8V 3450mAh 13.11Wh	
Operating Temperature	-30~50℃	
EUT Stage	○ Product Unit	●Final-Sample
Radio System Type	LTE	
Operating Band	Band 2, Band 4, Band 5, Band 12	

1.5 Technical Specification

Characteristics	Description	
Radio System Type	LTE	
Supported Frequency Range	LTE BAND2	Transmission (TX): 1850 to 1910 MHz
		Receiving (RX): 1930 to 1990 MHz
	LTE BAND4	Transmission (TX): 1710 to 1755 MHz
		Receiving (RX): 2110 to 2155 MHz
	LTE BAND5	Transmission (TX): 824 to 849 MHz
		Receiving (RX): 869 to 894 MHz
	LTE BAND12	Transmission (TX): 699 to 716 MHz
		Receiving (RX): 729 to 746 MHz
TX and RX Antenna Port Numbers	TX & RX port:	1
	RX-only port:	1
Target TX Output Power	LTE BAND2: 25dBm LTE BAND4: 25dBm LTE BAND5: 25dBm LTE BAND12: 25dBm	
Antenna Gain:	LTE BAND2: 2dBi LTE BAND4: 2dBi LTE BAND5: 2dBi LTE BAND12: 2dBi	
Supported Channel Bandwidth	LTE band 2	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
	LTE band 4	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz
	LTE band 5	1.4 MHz, 3 MHz, 5 MHz, 10 MHz
	LTE band 12	1.4 MHz, 3 MHz, 5 MHz, 10 MHz
Designation of Emissions (Note: the necessary bandwidth of which is the worst value from the measured occupied bandwidths for each type of channel bandwidth configuration.)	LTE BAND2:	1M10G7D (1.4 MHz QPSK modulation), 1M10W7D (1.4 MHz 16QAM modulation) 2M70G7D (3 MHz QPSK modulation), 2M70W7D (3 MHz 16QAM modulation) 4M50G7D (5 MHz QPSK modulation), 4M50W7D (5 MHz 16QAM modulation) 8M98G7D (10 MHz QPSK modulation), 8M97W7D (10 MHz 16QAM modulation) 13M45G7D (15 MHz QPSK modulation), 13M44W7D (15 MHz 16QAM modulation) 17M93G7D (20 MHz QPSK modulation), 17M94W7D (20 MHz 16QAM modulation)
	LTE BAND4:	1M09G7D (1.4 MHz QPSK modulation),

Characteristics	Description	
		1M09W7D (1.4 MHz 16QAM modulation) 2M70G7D (3 MHz QPSK modulation), 2M69W7D (3 MHz 16QAM modulation) 4M50G7D (5 MHz QPSK modulation), 4M50W7D (5 MHz 16QAM modulation) 8M97G7D (10 MHz QPSK modulation), 8M97W7D (10 MHz 16QAM modulation) 13M44G7D (15 MHz QPSK modulation), 13M43W7D (15 MHz 16QAM modulation) 17M93G7D (20 MHz QPSK modulation), 17M94W7D (20 MHz 16QAM modulation)
	LTE BAND5:	1M09G7D (1.4 MHz QPSK modulation), 1M09W7D (1.4 MHz 16QAM modulation) 2M70G7D (3 MHz QPSK modulation), 2M69W7D (3 MHz 16QAM modulation) 4M49G7D (5 MHz QPSK modulation), 4M50W7D (5 MHz 16QAM modulation) 8M98G7D (10 MHz QPSK modulation), 8M98W7D (10 MHz 16QAM modulation)
	LTE BAND12:	1M09G7D (1.4 MHz QPSK modulation), 1M09W7D (1.4 MHz 16QAM modulation) 2M70G7D (3 MHz QPSK modulation), 2M69W7D (3 MHz 16QAM modulation) 4M49G7D (5 MHz QPSK modulation), 4M50W7D (5 MHz 16QAM modulation) 8M98G7D (10 MHz QPSK modulation), 8M97W7D (10 MHz 16QAM modulation)

2. Summary of Test Results

2.1 Application of Standard

47 CFR FCC Part 02:2020

47 CFR FCC Part 22:2020

47 CFR FCC Part 24:2020

47 CFR FCC Part 27:2020

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI C63.26:2015

2.2 Cellular Band (824-849MHz paired with 869-894MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict (Note1)
Effective (Isotropic) Radiated Power Output Data	Part 2.1046, 22.913	FCC: ERP ≤ 7 W.	Appendix 1	Pass
Peak-Average Ratio	--	--	Appendix 2	Pass
Modulation Characteristics	Part 2.1047	Digital modulation	Appendix 3	Pass
Bandwidth	Part 2.1049	OBW: No limit. EBW: No limit.	Appendix 4	Pass
Band Edges Compliance	Part 2.1051, 22.917	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix 5	Pass
Spurious Emission at Antenna Terminals	Part 2.1051, 22.917	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Appendix 6	Pass
Field Strength of Spurious Radiation	Part 2.1053, 22.917	FCC: ≤ -13 dBm/100 kHz.	Appendix 7	Pass
Frequency Stability	Part 2.1055, 22.355	≤ ±2.5ppm.	Appendix 8	Pass
Note1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.				

2.3 PCS Band (1850-1910MHz paired with 1930-1990MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict (Note1)
Effective (Isotropic) Radiated Power Output Data	Part 2.1046, 24.232	EIRP ≤ 2 W	Appendix 1	Pass
Peak-Average Ratio	Part 2.1046, 24.232	Limit≤13 dB	Appendix 2	Pass
Modulation Characteristics	Part 2.1047	Digital modulation	Appendix 3	Pass
Bandwidth	Part 2.1049	OBW: No limit. EBW: No limit.	Appendix 4	Pass
Band Edges Compliance	Part 2.1051, 24.238	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix 5	Pass
Spurious Emission at Antenna Terminals	Part 2.1051, 24.238	≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Appendix 6	Pass
Field Strength of Spurious Radiation	Part 2.1053, 24.238	≤ -13 dBm/1 MHz.	Appendix 7	Pass
Frequency Stability	Part 2.1055, 24.235	≤ ±2.5 ppm.	Appendix 8	Pass
Note1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.				

2.4 AWS Band (1710-1755MHz paired with 2110-2155MHz)

Test Item	FCC Rule No.	Requirements	Test Result	Verdict (Note1)
Effective (Isotropic) Radiated Power Output Data	Part 2.1046, 27.50(d)	EIRP ≤ 1 W	Appendix 1	Pass
Peak-Average Ratio	Part 2.1046, 27.50(d)	Limit≤13 dB	Appendix 2	Pass
Modulation Characteristics	Part 2.1047	Digital modulation	Appendix 3	Pass
Bandwidth	Part 2.1049	OBW: No limit. EBW: No limit.	Appendix 4	Pass
Band Edges Compliance	Part 2.1051, 27.53(h)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix 5	Pass
Spurious Emission at Antenna Terminals	Part 2.1051, 27.53(h)	≤ -13 dBm/1 MHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Appendix 6	Pass
Field Strength of Spurious Radiation	Part 2.1053, 27.53(h)	≤ -13 dBm/1 MHz.	Appendix 7	Pass
Frequency Stability	Part 2.1055, 27.54	≤ ± 2.5 ppm.	Appendix 8	Pass
Note1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.				

2.5 Band12 (699-716MHz paired with 729-746 MHz)

Test Item	FCC Rule No	Requirements	Test Result	Verdict (Note1)
Effective (Isotropic) Radiated Power Output Data	Part 27.50(c)	FCC: ERP ≤ 3 W.	Appendix 1	Pass
Peak-Average Ratio	--	--	Appendix 2	Pass
Modulation Characteristics	Part 2.1047	Digital modulation	Appendix 3	Pass
Bandwidth	Part 2.1047	OBW: No limit. EBW: No limit.	Appendix 4	Pass
Band Edges Compliance	Part 2.1049,	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Appendix 5	Pass
Spurious Emission at Antenna Terminals	Part 2.1051, 27.53(g)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10th harmonics but outside authorized operating frequency ranges.	Appendix 6	Pass
Field Strength of Spurious Radiation	Part 2.1051, 27.53(g)	FCC: ≤ -13 dBm/100 kHz.	Appendix 7	Pass
Frequency Stability	Part 2.1053, 27.53(g)	≤ ±2.5ppm.	Appendix 8	Pass
Note1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” denotes “not tested”.				

3. General Test Frequency and Configuration

3.1 Test Modes

Test Mode	Test Modes Description
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation

3.2 Test Frequency

Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 2	TX(1.4M)	Channel 18607	Channel 18900	Channel 19193
		1850.7 MHz	1880 MHz	1909.3 MHz
	TX(3M)	Channel 18615	Channel 18900	Channel 19185
		1851.5 MHz	1880 MHz	1908.5 MHz
	TX(5M)	Channel 18625	Channel 18900	Channel 19175
		1852.5 MHz	1880 MHz	1907.5 MHz
	TX(10M)	Channel 18650	Channel 18900	Channel 19150
		1855 MHz	1880 MHz	1905 MHz
	TX(15M)	Channel 18675	Channel 18900	Channel 19125
		1857.5 MHz	1880 MHz	1902.5 MHz
	TX(20M)	Channel 18700	Channel 18900	Channel 19100
		1860 MHz	1880 MHz	1900 MHz
	RX(1.4M)	Channel 607	Channel 900	Channel 1193
		1930.7 MHz	1960 MHz	1989.3 MHz
	RX(3M)	Channel 615	Channel 900	Channel 1185
		1931.5 MHz	1960 MHz	1988.5 MHz
	RX(5M)	Channel 625	Channel 900	Channel 1175
		1932.5 MHz	1960 MHz	1987.5 MHz
	RX(10M)	Channel 650	Channel 900	Channel 1150
		1935 MHz	1960 MHz	1985 MHz
	RX(15M)	Channel 675	Channel 900	Channel 1125
		1937.5 MHz	1960 MHz	1982.5 MHz
	RX(20M)	Channel 700	Channel 900	Channel 1100
		1940 MHz	1960 MHz	1980 MHz
Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 4	TX(1.4M)	Channel 19957	Channel 20175	Channel 20393
		1710.7 MHz	1732.5 MHz	1754.3 MHz
	TX(3M)	Channel 19965	Channel 20175	Channel 20385

		1711.5 MHz	1732.5 MHz	1753.5 MHz
	TX(5M)	Channel 19975	Channel 20175	Channel 20375
		1712.5 MHz	1732.5 MHz	1752.5 MHz
	TX(10M)	Channel 20000	Channel 20175	Channel 20350
		1715 MHz	1732.5 MHz	1750 MHz
	TX(15M)	Channel 20025	Channel 20175	Channel 20325
		1717.5 MHz	1732.5 MHz	1747.5 MHz
	TX(20M)	Channel 20050	Channel 20175	Channel 20300
		1720 MHz	1732.5 MHz	1745 MHz
	RX(1.4M)	Channel 1975	Channel 2175	Channel 2375
		2112.5 MHz	2132.5MHz	2152.5 MHz
	RX(3M)	Channel 2000	Channel 2175	Channel 2350
		2115 MHz	2132.5MHz	2150 MHz
	RX(5M)	Channel 1975	Channel 2175	Channel 2375
		2112.5 MHz	2132.5MHz	2152.5 MHz
	RX(10M)	Channel 2000	Channel 2175	Channel 2350
		2115 MHz	2132.5MHz	2150 MHz
	RX(15M)	Channel 2025	Channel 2175	Channel 2325
		2117.5 MHz	2132.5MHz	2147.5 MHz
	RX(20M)	Channel 2050	Channel 2175	Channel 2300
		2120 MHz	2132.5MHz	2145 MHz
Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 5	TX(1.4M)	Channel 20407	Channel 20525	Channel 20643
		824.7 MHz	836.5 MHz	848.3 MHz
	TX(3M)	Channel 20415	Channel 20525	Channel 20635
		825.5 MHz	836.5 MHz	847.5 MHz
	TX(5M)	Channel 20425	Channel 20525	Channel 20625
		826.5 MHz	836.5 MHz	846.5 MHz
	TX(10M)	Channel 20450	Channel 20525	Channel 20600
		829 MHz	836.5 MHz	844 MHz
	RX(1.4M)	Channel 2407	Channel 2525	Channel 2643
		869.7 MHz	881.5 MHz	893.3 MHz
	RX (3M)	Channel 2415	Channel 2525	Channel 2635
		870.5 MHz	881.5 MHz	892.5 MHz
	RX(5M)	Channel 2425	Channel 2525	Channel 2625
		871.5 MHz	881.5 MHz	891.5 MHz
	RX (10M)	Channel 2450	Channel 2525	Channel 2600
		874 MHz	881.5 MHz	889 MHz
Test Mode	TX / RX	RF Channel		
		Low (B)	Middle (M)	High (T)
LTE Band 12	TX(1.4M)	Channel 23017	Channel 23095	Channel 23173

		699.7 MHz	707.5 MHz	715.3 MHz
	TX(3M)	Channel 23025	Channel 23095	Channel 23165
		700.5 MHz	707.5 MHz	714.5 MHz
	TX(5M)	Channel 23035	Channel 23095	Channel 23155
		701.5 MHz	707.5 MHz	713.5 MHz
	TX(10M)	Channel 23060	Channel 23095	Channel 23130
		704 MHz	707.5 MHz	711 MHz
	RX(1.4M)	Channel 5017	Channel 5095	Channel 5173
		729.7 MHz	737.5 MHz	745.3 MHz
	RX (3M)	Channel 5025	Channel 5095	Channel 5165
		730.5 MHz	737.5 MHz	744.5 MHz
	RX(5M)	Channel 5035	Channel 5095	Channel 5155
		731.5 MHz	737.5 MHz	743.5 MHz
	RX (10M)	Channel 5060	Channel 5095	Channel 5130
		734 MHz	737.5 MHz	741 MHz

3.3 Test Environment

Applicable to	Environmental conditions	Input Power	Tested by
Transmitter Conducted Power Output	24.3°C, 56 % RH	120Vac, 60Hz	Stone Tang
Peak-Average Ratio	24.2°C, 55 % RH	120Vac, 60Hz	Stone Tang
Modulation Characteristics	24.4°C, 56 % RH	120Vac, 60Hz	Stone Tang
Bandwidth	24.5°C, 56 % RH	120Vac, 60Hz	Stone Tang
Emission Mask	24.8°C, 56 % RH	120Vac, 60Hz	Stone Tang
Spurious Emission at Antenna Terminals	24.7°C, 56 % RH	120Vac, 60Hz	Stone Tang
Field Strength of Spurious Radiation	24.0°C, 56 % RH	120Vac, 60Hz	Stone Tang
Frequency Stability	24.2°C, 55 % RH	120Vac, 60Hz	Stone Tang

The applicant declare the operating environment of EUT as below:

Normal conditions: 3.8V DC ,15°C ~35°C

Extreme conditions:3.6V DC~4.35V DC, -30°C ~50°C

VL= lower extreme test voltage, VN= nominal voltage, VH= upper extreme test voltage

TL= lower extreme test temperature, TN= normal temperature, TH= upper extreme test temperature

3.4 Test Instruments

Main Test Equipment				
Equip No.	Equipment Name	Manufacturer	Model	Calibrated until
JL 290	DC Power Supply	Keysight	E3642A	2022-09-12
JL 292	Wideband Radio Communication Tester	R & S	CMW 500	2022-09-12
JL 265	MXA Signal Analyzer	Keysight	N9020B	2022-09-16
JL 222	Programmable Temperature & Humidity Chamber	ETMOA	NTH1100-30A	2022-09-01
JL 253	Temperature&Humidity Recorder	Anymetre	JR900	2022-11-03
JL 199	Integral Antenna	SCHWARZBECK	VULB9163	2022-12-30
JL 200	Loop Antenna	SCHWARZBECK	FMZB1519B	2022-11-04
JL 198	Horn Antenna	SCHWARZBECK	BBHA 9170	2022-11-06
JL 102	Double Ridged Broadband Horn Antenna	SCHWARZBECK	BBHA 9120D	2022-11-20
JL 207	Spectrum Analyzer	R & S	FSV30	2022-11-09
JL 092	EMI Receiver	R & S	ESR	2022-11-09
JL 108	Broadband amplifier	SCHWARZBECK	BBV9718	2022-11-09
JL 196	Broadband amplifier	SCHWARZBECK	BBV9721	2022-11-09
JL 246	Anechoic Chamber	ZHONGSHUO	FSAC318	2024-07-16
JL 212	RF Cable	Top Precision	BLU18A-Sm-2m	2022-09-01
JL 213	RF Cable	Top Precision	BLU18A-Sm-2m	2022-09-01
JL 245	RF Cable	ZDECL	ZT40-2.92J-6M	2022-09-01
JL 294	Band Reject Filter Group	Tonscend	JS0806-F	NA

Software Information			
Test Item	Software Name	Manufacturer	Version
RSE	EZ-EMC	EZ-EMC	TW-03A2
Conducted RF	JS1120 RF Test System	Shenzhen JS tonscend co., Ltd	2.6.9.0826

3.5 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT.
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	±142.12 KHz
RF power conducted	±0.74dB
Band Edge Compliance	±1.24dB
Frequency stability	±0.12 ppm
Spurious emissions, radiated (30MHz～1GHz)	±4.6dB
Spurious emissions, radiated (1GHz ~ 18GHz)	±4.9dB
Humidity	±4.6%
Temperature	±0.7°C
Time	±1.25%

3.6 Test Location

Company:	Beijing TIRT Technology Service Co.,Ltd Shenzhen
Address:	101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street, Pingshan District, Shenzhen, China
CNAS Registration Number:	CNAS L14158
A2LA Registration Number	6049.01
Telephone:	+86-0755-27087573

3.7 Deviation from Standards

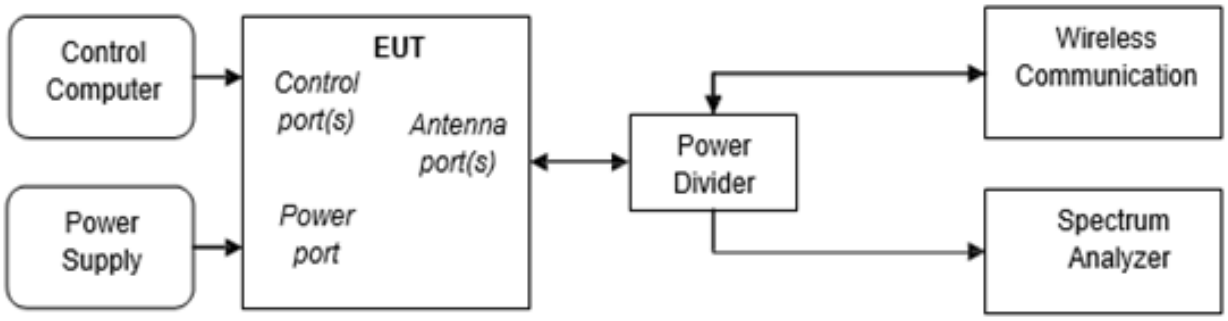
None

3.8 Abnormalities from Standard Conditions

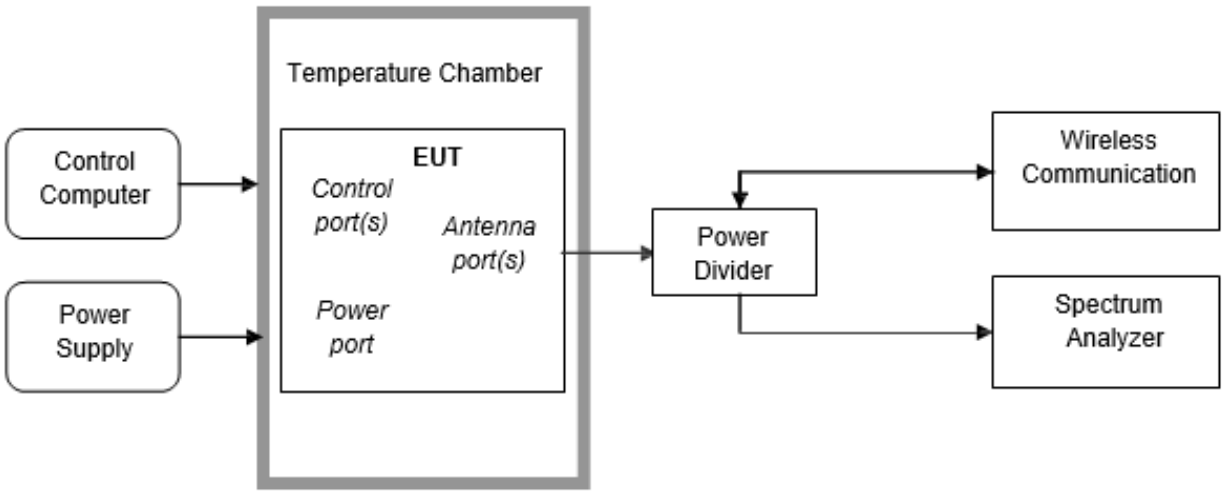
None

4. Test Setup and Conditions

4.1 Test Setup 1



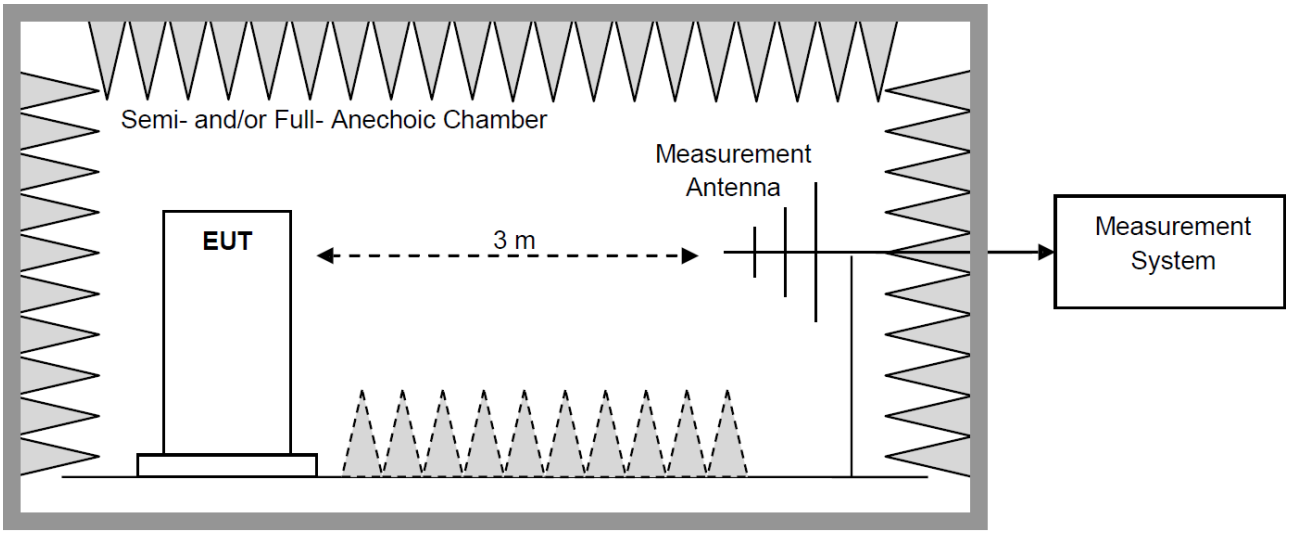
4.2 Test Setup 2



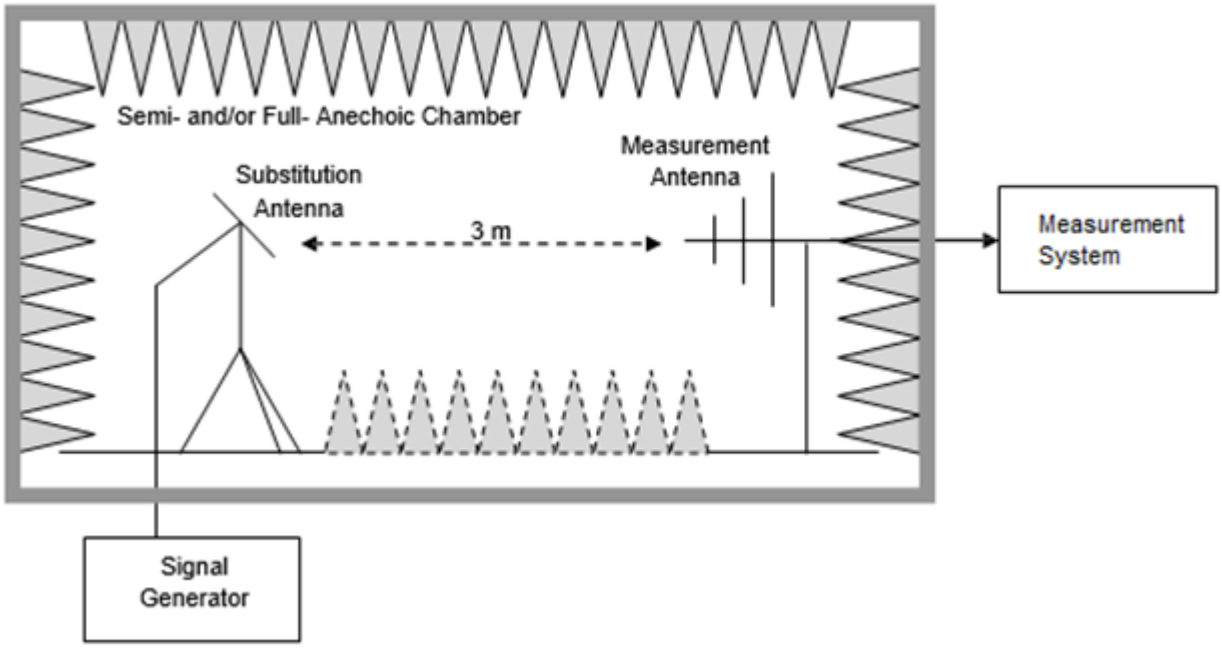
4.3 Test Setup 3

NOTE: Effective radiated power (ERP) and Equivalent Isotropic Radiated Power (EIRP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

Step 1: Pre-test



Step 2: Substitution method to verify the maximum ERP/EIRP



4.4 Test Conditions

Test Case		Test Conditions	
Transmit - Output Power Data -	Average Power, Total	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	LTE/TM1, LTE/TM2
	Average Power, Spectral Density (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	LTE/TM1,LTE/TM2
Peak-to-Average Ratio (if required)		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	LTE/TM1,LTE/TM2
Modulation Characteristics		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	M (L= low channel, M= middle channel, H= high channel)
		Test Mode	LTE/TM1,LTE/TM2
Bandwidth	Occupied Bandwidth	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	LTE/TM1,LTE/TM2
	Emission Bandwidth (if required)	Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	LTE/TM1,LTE/TM2
Band Edges Compliance		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	LTE/TM1,LTE/TM2
Spurious Emission at Antenna Terminals		Test Env.	Ambient Climate & Rated Voltage
		Test Setup	Test Setup 1
		RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
		Test Mode	LTE/TM1,LTE/TM2

Field Strength of Spurious Radiation	Test Env.	Ambient Climate & Rated Voltage
	Test Setup	Test Setup 3
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	LTE/TM1, LTE/TM2 NOTE: If applicable, the EUT conf. that has maximum power density (based on the equivalent power level) is selected.
Frequency Stability	Test Env.	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) VL, VN and VH of Rated Voltage at Ambient Climate.
	Test Setup	Test Setup 2
	RF Channels (TX)	L, M, H (L= low channel, M= middle channel, H= high channel)
	Test Mode	LTE/TM1, LTE/TM2

5. Description of Tests

5.1 Radiated Power and Radiated Spurious Emissions

Radiated spurious emissions are investigated indoors in a semi-anechoic chamber to determine the frequencies producing the worst case emissions. Final measurements for radiated power and radiated spurious emissions are performed on the 3 meter OATS per the guidelines of ANSI/TIA-603-C-2004. The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Emissions are also investigated with the receive antenna horizontally and vertically polarized.
A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other non-metallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that emissions from the EUT are maximized. Measure the EUT maximum RF power and record the result.
A half-wave dipole is then substituted in place of the EUT. For emissions above 3GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT.

The power of the emission is calculated using the following formula:

$$P_{d\ [dBm]} = P_{g\ [dBm]} - \text{cable loss}_{\ [dB]} + \text{antenna gain}_{\ [dBd/dBi]}$$

Where, Pd is the dipole equivalent power, Pg is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to Pg [dBm] – cable loss [dB].
The calculated Pd levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power}_{[\text{Watts}]})$.

Test Procedures Used

KDB 971168 D01 Power Meas License Digital Systems v03r01 5.8
KDB 971168 D01 Power Meas License Digital Systems v03r01 6

ANSI/TIA-603-C-2004-Section 2.2.17 / ANSI/TIA-603-C-2004-Section 2.2.12

Note: Reference test setup 3

5.2 Peak-Average Ratio

A peak to average ratio measurement is performed at the conducted port of the EUT. For WCDMA signals, the spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level. For GSM signals, an average and a peak trace are used on a spectrum analyzer to determine the largest deviation between the average and the peak power of the EUT in a bandwidth greater than the emission bandwidth. The traces are generated with the spectrum analyzer set to zero span mode.

Test Procedures Used
KDB 971168 D01 Power Meas License Digital Systems v03r01 5.7

Test Settings
1. The signal analyzer's CCDF measurement profile enabled
2. Frequency= carrier center frequency
3. Measurement BW > EBW of signal
4. for continuous transmissions, set to 1ms
5. Record the maximum PAPR level associated with a probability of 0.1%.

Note: Reference test setup 1

5.3 Occupied Bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual. The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

Test Procedures Used
KDB 971168 D01 Power Meas License Digital Systems v03r01 4

Test Settings
1. SET RBW=1-5% of OBW
2. SET VBW ≥ 3*RBW
3. Detector: Peak
4. Trace mode= max hold.
5. Sweep= auto couple
6. Steps 1-5 were repeated after it is stable

Note: Reference test setup 1.

5.4 Band Edge Compliance

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. The emission power must be attenuated below the transmitting power (P) by a factor of at least 43+10log10P dB.

Test Procedures Used
KDB 971168 D01 Power Meas License Digital Systems v03r01 6

Test Settings
1. SET RBW ≥ 1% of Emission BW.
2. SET VBW about three times of RBW
3. Detector: RMS
4. Trace mode= max hold.
5. Span= 2MHz

Note: Reference test setup 1.

5.5 Spurious and Harmonic Emissions at Antenna Terminal

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. 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. 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 emission are attenuated at least 26 dB below the transmitter power.

Test Procedures Used
KDB 971168 D01 Power Meas License Digital Systems v03r01 6

Test Settings
1. 9kHz~150kHz, RBW = 1KHz, VBW ≥ 3×RBW,
   150kHz~30MHz, RBW = 10KHz, VBW ≥ 3×RBW,
   30MHz~1GHz, RBW = 100 kHz, VBW = 300 kHz.
   Above 1GHz, RBW = 1 MHz, VBW = 3 MHz.
2. Detector: Peak
3. Trace mode= max hold.

Note: Reference test setup 1.

5.6 Frequency Stability / Temperature Variation

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-C-2004. The frequency stability of the transmitter is measured by:

a. **Temperature:** The temperature is varied from -30°C to + 65°C in 10°C increments using an environmental chamber.
b. **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.

Time Period and Procedure:

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

The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Procedures Used

ANSI/TIA-603-C-2004

KDB 971168 D01 Power Meas License Digital Systems v03r01 9

Note: Reference test setup 2.

6. Appendixes

Appendix No.	Description
FCC022022-0616RF12-Appendix A	Appendix for LTE B2
FCC022022-0616RF12-Appendix B	Appendix for LTE B4
FCC022022-0616RF12-Appendix C	Appendix for LTE B5
FCC022022-0616RF12-Appendix D	Appendix for LTE B12

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