FCC PART 90S TEST REPORT

Report Number	BWTR-2018-FCCPCE
FCC ID	SRQ-ZTEA51
Applicant	ZTE CORPORATION
Product Name	LTE/WCDMA/GSM(GPRS) Multi-Mode Digital Mobile Phone
Marketing Name	N/A
Brand Name	ZTE
Model Name	ZTE Blade A51
Serial Number	No.1: 867934050002890 No.2: 867934050002866
Test Standard	FCC 47 CFR Part 90 Subpart S
Tested Date	Oct. 13, 2020 - Oct. 21, 2020

CONTENTS

Revision History

Revision	Description	Issued Date
A	Initial issue of report	2020/10/28

1 Summary of Test Result

Report Section	FCC Section	Description	Result
3.1	90.635 (b)	RF Output Power	Pass
3.2	KDB 971168 D01 v03 - 5.7	Peak to Average Power Ratio (PAPR)	Pass
3.3	90.635 (b)	Effective Radiated Power	Pass
3.4	90.209 (a)	Occupied Bandwidth	Pass
3.5	90.691	Spurious Emission at Antenna Terminal	Pass
3.6	90.691	Field Strength of Spurious Radiation	Pass
3.7	90.691	Band Edge	Pass
3.8	90.213	Frequency Stability	Pass

We, Beijing Boomwave Test Service Co. Ltd., would like to declare that the tested sample has been evaluated and in compliance with the requirements of applicable standards.

Prepared by: 2020.10.28 12:15:28 +08'00'

Reviewed by: 2020.10.28 12:37:22 +08'00'

Approved by: 2020.10.28 13:11:39 +08'00'

Rationale:
The test results in this report apply exclusively to the tested model / sample.
The electrical copy of test report is invalid without the signatures. The hard copy is invalid without seal.
The test report shall not be modified, republished or copied without the written authorization of the laboratory.

2 General Information

2.1 Applicant

ZTE CORPORATION

Electronic Testing Building, No. 43 Shahe Road, Xili street, Nanshan District, Shenzhen, Guangdong, China

2.2 Manufacturer

ZTE CORPORATION

Electronic Testing Building, No. 43 Shahe Road, Xili street, Nanshan District, Shenzhen, Guangdong, China

2.3 Product Feature of Equipment Under Test

Product Name	LTE/WCDMA/GSM(GPRS) Multi-Mode Digital Mobile Phone
Marketing Name	N/A
Model Name	ZTE Blade A51
Sample Status	Production
Operating Frequency Range	814MHz~824MHz
Type of Wireless Technology	FDD LTE - Band 26
Modulation Type	QPSK, 16QAM, 64QAM
Channel Bandwidth	1.4MHz, 3MHz, 5MHz, 10MHz
Antenna Type	Internal Antenna
Antenna Gain	-2.1dBi
Extreme Operating Temperature	Minimum: -10℃
	Maximum: +55℃
Power Supply	Normal Voltage: 3.40V
	Lowest Voltage: 3.85V
	Highest Voltage: 4.40V
Hardware Version	zc7A
Software Version	TEL_MX_ZTE_Blade_A51V1.0
Sample Received Date	2020.10.10

2.4 Ancillary Equipment

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following ancillary equipment were used to form a representative test configuration during the tests.

Support Unit	Li-Lon Polymer Rechargeable Battery
Manufacturer	Zhongshan Tianmao Battery Co. Ltd.
Model Name	Li3931T44P8h806139
Capacity	3100mAh
Nominal Voltage	3.85V
Serial Number	---

Note: This battery model was selected for test as the worst case.

Support Unit	Li-Lon Polymer Rechargeable Battery
Manufacturer	Ningbo Veken Battery Co., Ltd.
Model Name	Li3931T44P8h806139
Capacity	3100mAh
Nominal Voltage	3.85V
Serial Number	---

2.5 Description of Test Modes

The EUT was linked by base station simulator to work in continious trasmitting and receiving mode. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, bandwidth, resource block (RB) and RB offset.

Following channels were selected for test:

Channel Bandwidth	Low Channel		Mid Channel		High Channel	
	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.
1.4MHz	814.7	26697	819.0	26740	823.3	26783
3MHz	815.5	26705	819.0	26740	822.5	26775
5MHz	816.5	26715	819.0	26740	821.5	26765
10MHz	---		819.0	26740	---	

Following modes were selected as the worst case configuration for each test:

Test Items	Channel	BW (MHz)	RB Size	RB Offset	Modulation	Antenna Orientation
RF Output Power	L\M\H	1.4	1\3\6	0\5\2	QPSK,16QAM, 64QAM	N/A
		3	1\8\15	0\14\4		
		5	1\12\25	0\24\6		
		10	1\24\50	0\49\12		
Peak to Average Power Ratio	L\M\H	1.4	1\6	0\5	QPSK,16QAM, 64QAM	N/A
		3	1\15	0\14		
		5	1\25	0\24		
		10	1\50	0\49		
Effective Radiated Power	L\M\H	1.4\3\5\10	1	0	QPSK,16QAM, 64QAM	X axis
Occupied Bandwidth	L\M\H	1.4	6	0	QPSK,16QAM, 64QAM	N/A
		3	15			
		5	25			
		10	50			
Spurious Emission at Antenna Terminal	M	10	1	49	QPSK	N/A
Field Strength of Spurious Radiation	M	10	1	0	QPSK	X axis
Band Edge	L\H	1.4	1\6	0\5	QPSK	N/A
		3	1\15	0\14		
		5	1\25	0\24		
		10	1\50	0\49		
Frequency Stability	L\H	1.4\3\5\10	1	0	QPSK	N/A

2.6 Applicable Standards

Standard	Version	Title
FCC 47 CFR Part 90 Subpart S	2019	Regulations Governing Licensing and Use of Frequencies in the 806-824, 851-869, 896-901, and 935-940 MHz Bands
ANSI C63.26	2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

2.7 Test Facilities

Company Name: Beijing Boomwave Test Service Co. Ltd

Address: EMC Building, No.1 Wang Jing East Road, Chao Yang District Beijing, P.R. China 100102

FCC Test Firm Registration Number: 613197

ISED Canada Registration No.: 24289 (CAB Identifier: CN0010)

VCCI Registration No.: R-20062, G-20063, C-20050, T-20049

Test Site	Description	Dimension	Ground Plane Size
☐ SAC10	10m semi-anechoic chamber	19.5m×12.9m×8.6m	4m×4m
☒ SAC3	3m semi-anechoic chamber	9.6m×6.4m×6.0m	9.6m×6.4m
☐ SR#1	Shielding Room for EMS test	8.1m×4.05m×2.755m	8.1m×4.05m
☒ SR#2	Shielding Room for RF test	8.1m×4.05m×2.755m	---

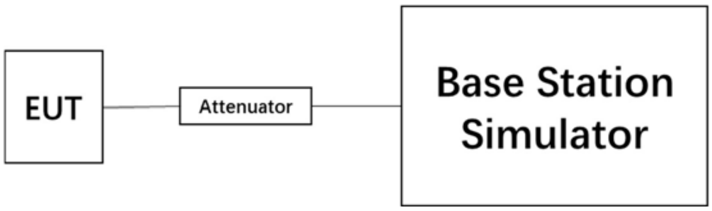
3 Test Result

3.1 RF Output Power

3.1.1. Limit

FCC 47 CFR Part 90 Subpart S - §90.635(b)
The maximum output power of the transmitter for mobile station is 100 watts (20dBw).

3.1.2. Test Setup



3.1.3. Test Procedures

1) The measurement procedure follows ANSI C63.26-2015, clause 5.2.
2) The RF output of EUT and BS simulator are connected via a sufficient attenuation.
3) EUT is configured to transmit the maximum output power while the measurement is performed.

3.1.4. Test Result

Test Engineer	Xu Dongxu	**Test Date**	2020.10.13
Temperature	21.9°C	**Relative Humidity**	48.7%
Pressure	102.1kPa	**Test Sample Selected**	No.1

Modulation Type	Frequency (MHz)	BW (MHz)	RB Size	RB Offset	Output Power (dBm)
QPSK	814.7	1.4	1	0	24.65
			1	5	24.60
			3	2	23.68
			6	0	23.73
	819.0		1	0	24.66
			1	5	24.69
			3	2	23.60
			6	0	23.60
	823.3		1	0	24.55
			1	5	24.48
			3	2	23.62
			6	0	23.49
16QAM	814.7	1.4	1	0	22.83
			1	5	22.82
			3	2	22.73
			6	0	22.53
	819.0		1	0	22.84
			1	5	22.67
			3	2	22.56
			6	0	22.47
	823.3		1	0	22.74
			1	5	22.77
			3	2	22.58
			6	0	22.75

Modulation Type	Frequency (MHz)	BW (MHz)	RB Size	RB Offset	Output Power (dBm)
64QAM	814.7	1.4	1	0	22.74
			1	5	22.80
			3	2	22.71
			6	0	22.61
	819.0		1	0	22.74
			1	5	22.68
			3	2	22.40
			6	0	22.47
	823.3		1	0	22.70
			1	5	22.80
			3	2	22.52
			6	0	22.76

Modulation Type	Frequency (MHz)	BW (MHz)	RB Size	RB Offset	Output Power (dBm)
QPSK	815.5	3	1	0	24.70
			1	14	24.61
			8	4	23.71
			15	0	23.71
	819.0		1	0	24.55
			1	14	24.60
			8	4	23.57
			15	0	23.72
	822.5		1	0	24.51
			1	14	24.52
			8	4	23.71
			15	0	23.47
16QAM	815.5	3	1	0	22.83
			1	14	22.90
			8	4	22.68
			15	0	22.58
	819.0		1	0	22.79
			1	14	22.76
			8	4	22.54
			15	0	22.42
	822.5		1	0	22.81
			1	14	22.79
			8	4	22.61
			15	0	22.73
64QAM	815.5	3	1	0	22.82
			1	14	22.77
			8	4	22.66
			15	0	22.58
	819.0		1	0	22.79
			1	14	22.67
			8	4	22.45
			15	0	22.39
	822.5		1	0	22.73
			1	14	22.81
			8	4	22.52
			15	0	22.73

Modulation Type	Frequency (MHz)	BW (MHz)	RB Size	RB Offset	Output Power (dBm)
QPSK	816.5	5	1	0	24.77
			1	24	24.73
			12	6	23.73
			25	0	23.74
	819.0		1	0	24.67
			1	24	24.69
			12	6	23.69
			25	0	23.73
	821.5		1	0	24.65
			1	24	24.59
			12	6	23.71
			25	0	23.59
16QAM	816.5	5	1	0	22.93
			1	24	22.91
			12	6	22.74
			25	0	22.68
	819.0		1	0	22.86
			1	24	22.79
			12	6	22.58
			25	0	22.49
	821.5		1	0	22.84
			1	24	22.86
			12	6	22.67
			25	0	22.81
64QAM	816.5	5	1	0	22.87
			1	24	22.91
			12	6	22.72
			25	0	22.69
	819.0		1	0	22.84
			1	24	22.73
			12	6	22.54
			25	0	22.47
	821.5		1	0	22.82
			1	24	22.85
			12	6	22.62
			25	0	22.81

Modulation Type	Frequency (MHz)	BW (MHz)	RB Size	RB Offset	Output Power (dBm)
QPSK	819.0	10	1	0	24.67
			1	49	24.69
			24	12	23.69
			50	0	23.73
16QAM	819.0	10	1	0	22.86
			1	49	22.79
			24	12	22.58
			50	0	22.49
64QAM	819.0	10	1	0	22.84
			1	49	22.73
			24	12	22.54
			50	0	22.47

3.1.5. Uncertainty

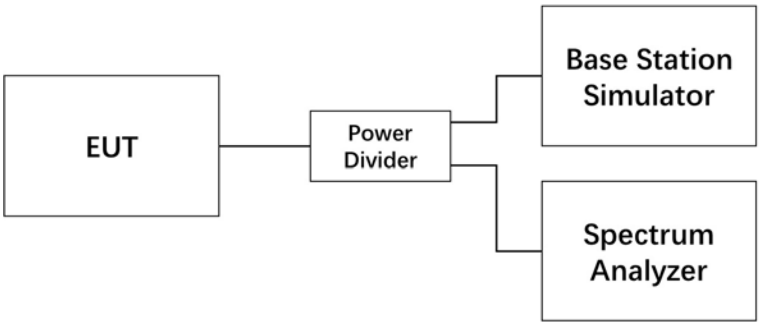
U_{lab}=1.48dB (k=2)

3.2 Peak to Average Power Ratio (PAPR)

3.2.1. Limit

In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

3.2.2. Test Setup



3.2.3. Test Procedures

1) The measurement procedure follows ANSI C63.26-2015, clause 5.2.6.
2) The RF output of the EUT, BS simulator and spectrum analyzer are connected via a power divider.
3) Measure the total peak power and record as P_{Pk}.
4) Measure the total average power and record as P_{Avg}.
5) Calculate the PAPR from: PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).

3.2.4. Test Result

Test Engineer	Xu Dongxu	**Test Date**	2020.10.13
Temperature	21.9°C	**Relative Humidity**	48.7%
Pressure	102.1kPa	**Test Sample Selected**	No.1

Frequency (MHz)	Channel No.	BW (MHz)	RB Size	RB Offset	QPSK	16-QAM	64-QAM
814.7	26697	1.4	1	5	Fig.1	Fig.2	Fig.3
814.7	26697	1.4	6	0	Fig.4	Fig.5	Fig.6
819	26740	1.4	1	5	Fig.7	Fig.8	Fig.9
819	26740	1.4	6	0	Fig.10	Fig.11	Fig.12
823.3	26783	1.4	1	5	Fig.13	Fig.14	Fig.15
823.3	26783	1.4	6	0	Fig.16	Fig.17	Fig.18
815.5	26705	3	1	14	Fig.19	Fig.20	Fig.21
815.5	26705	3	15	0	Fig.22	Fig.23	Fig.24
819	26740	3	1	14	Fig.25	Fig.26	Fig.27
819	26740	3	15	0	Fig.28	Fig.29	Fig.30
822.5	26775	3	1	14	Fig.31	Fig.32	Fig.33
822.5	26775	3	15	0	Fig.34	Fig.35	Fig.36
816.5	26715	5	1	24	Fig.37	Fig.38	Fig.39
816.5	26715	5	25	0	Fig.40	Fig.41	Fig.42
819	26740	5	1	24	Fig.43	Fig.44	Fig.45
819	26740	5	25	0	Fig.46	Fig.47	Fig.48
821.5	26765	5	1	24	Fig.49	Fig.50	Fig.51
821.5	26765	5	25	0	Fig.52	Fig.53	Fig.54
819	26740	10	1	49	Fig.55	Fig.56	Fig.57
819	26740	10	50	0	Fig.58	Fig.59	Fig.60

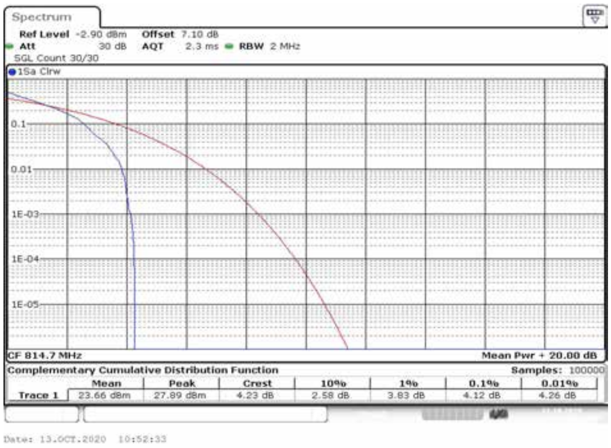


Fig.1

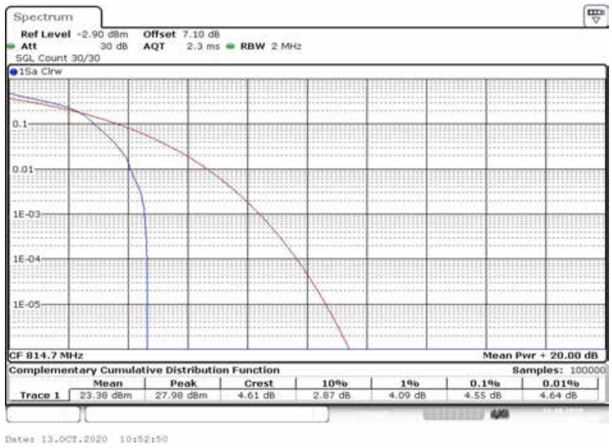


Fig.2

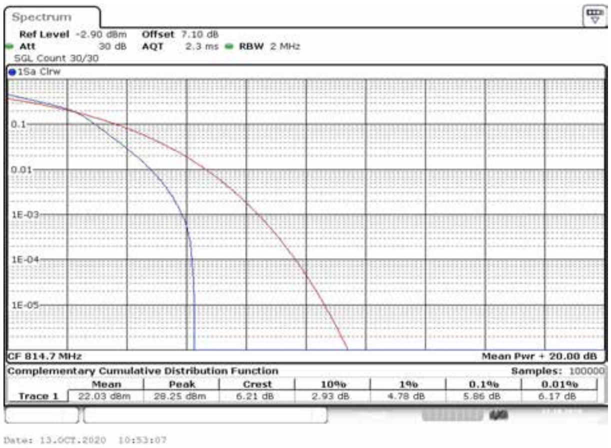


Fig.3

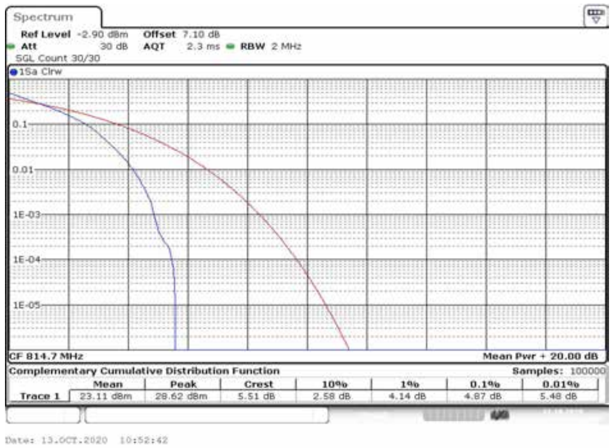


Fig.4

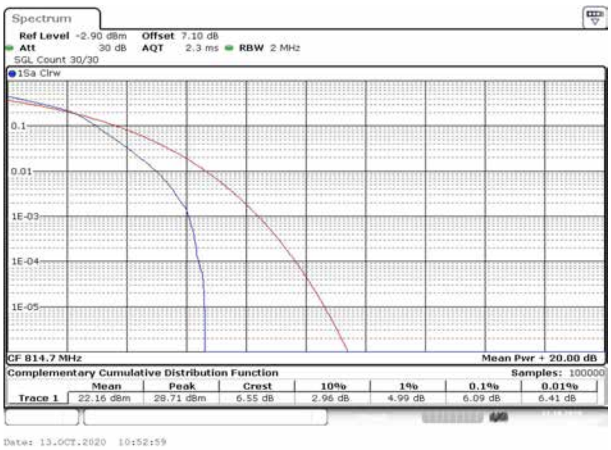


Fig.5

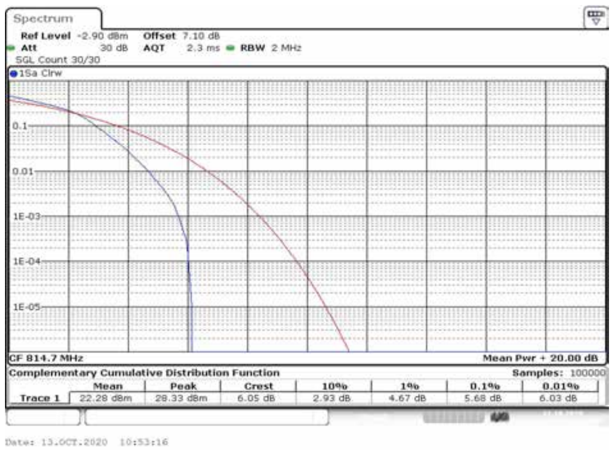


Fig.6

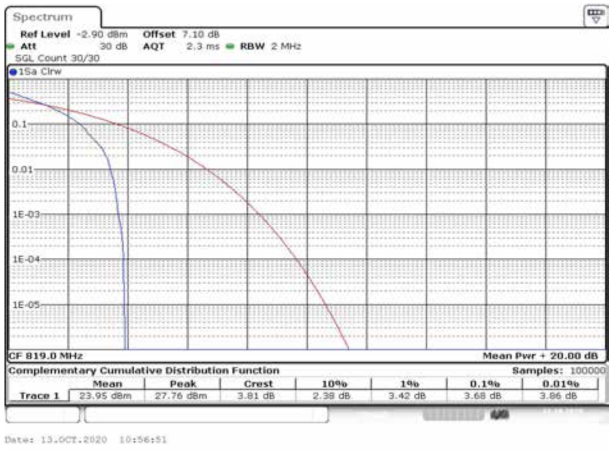


Fig.7

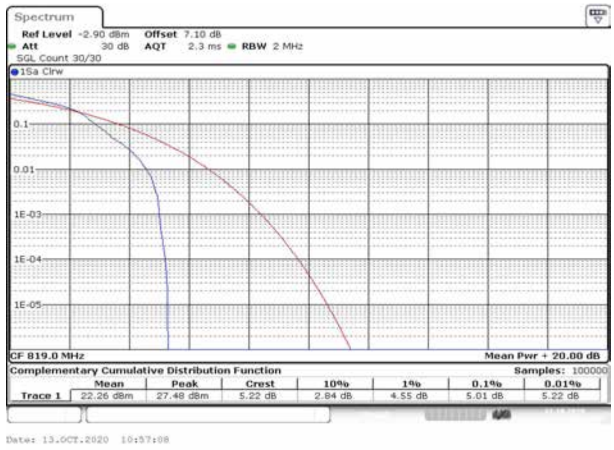


Fig.8

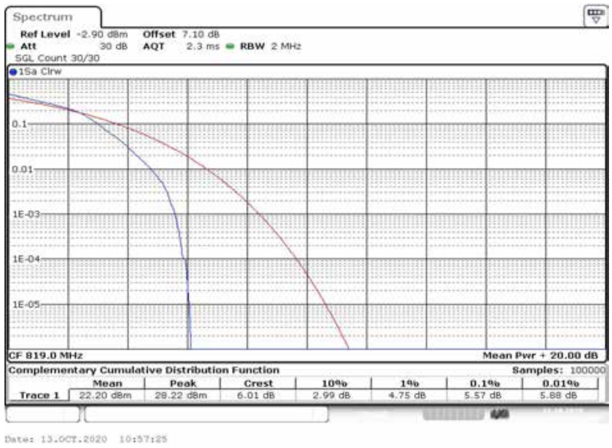


Fig.9

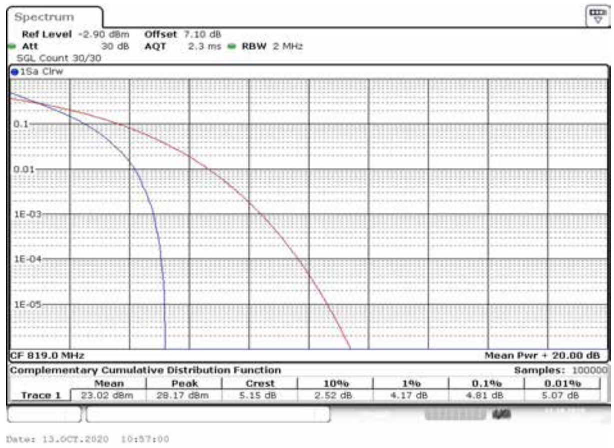


Fig.10

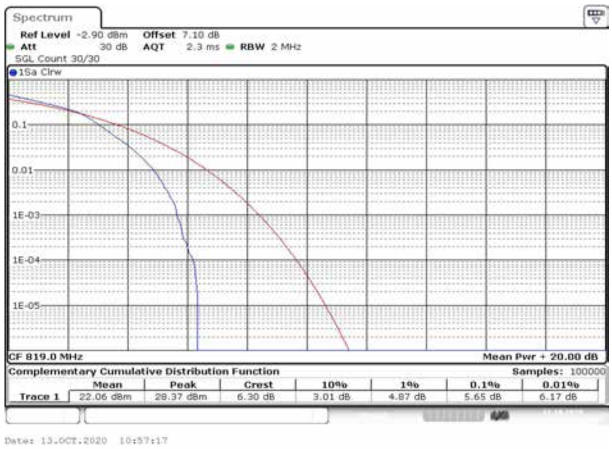


Fig.11

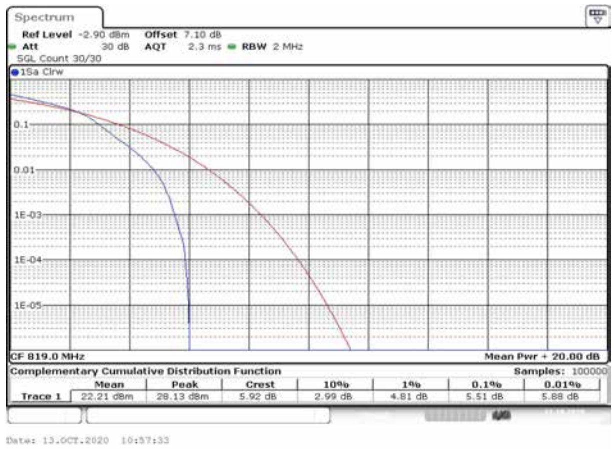


Fig.12

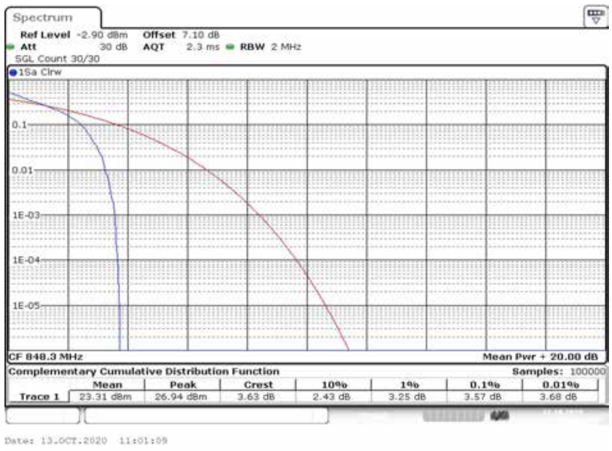


Fig.13

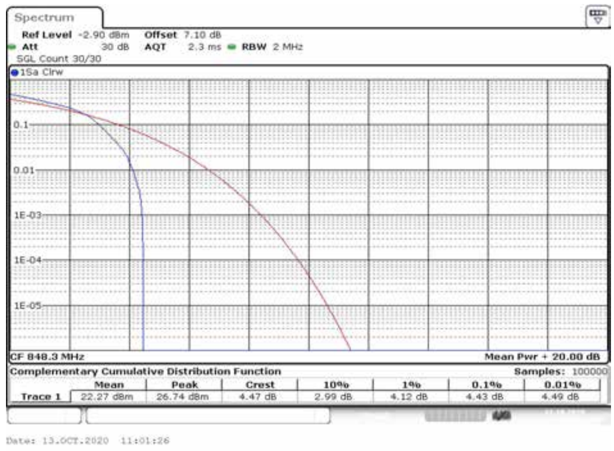


Fig.14

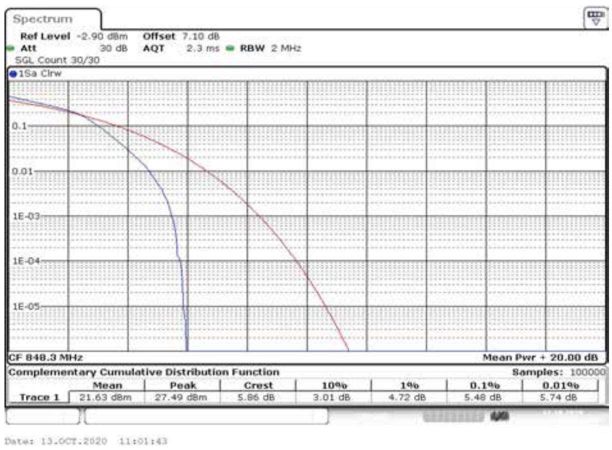


Fig.15

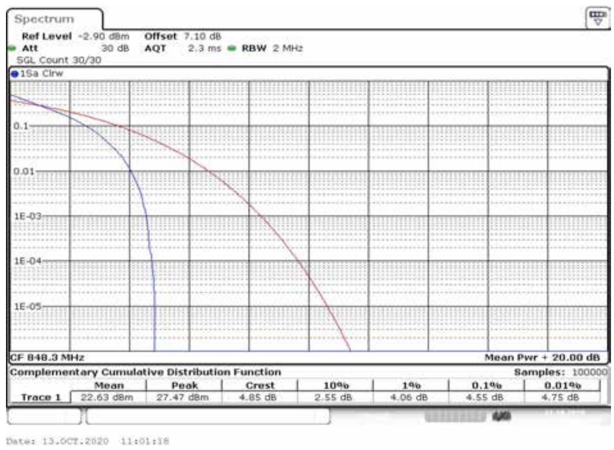


Fig.16

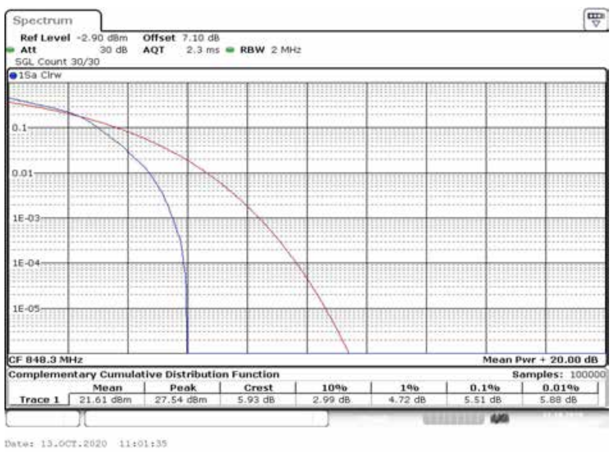


Fig.17

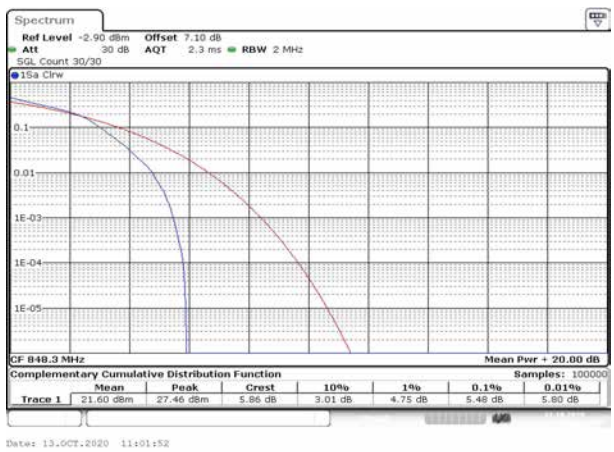
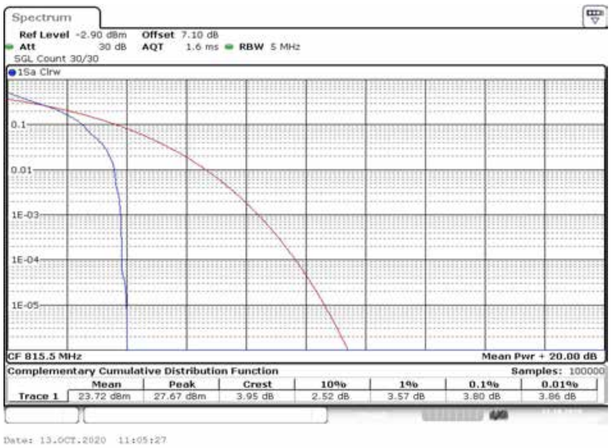


Fig.18



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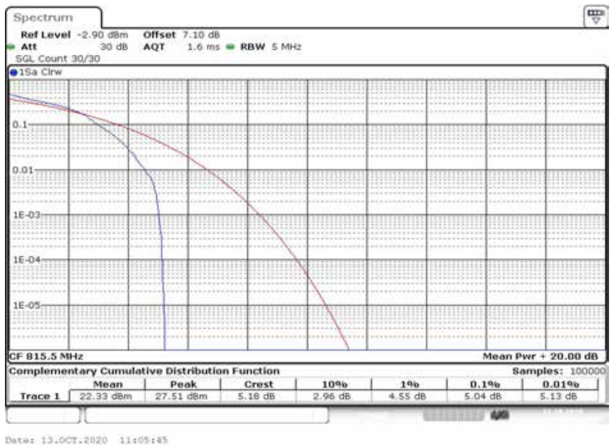

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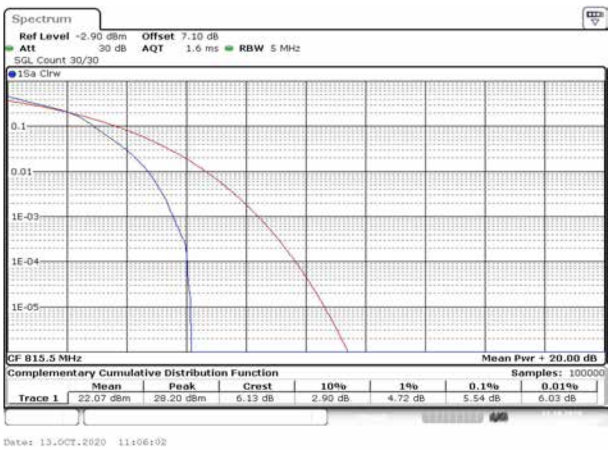
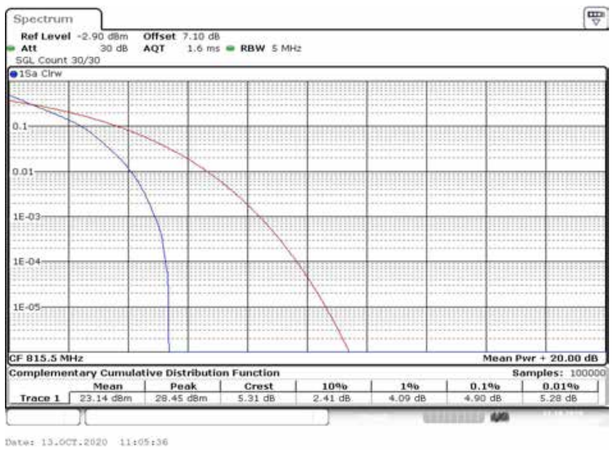


Fig.21



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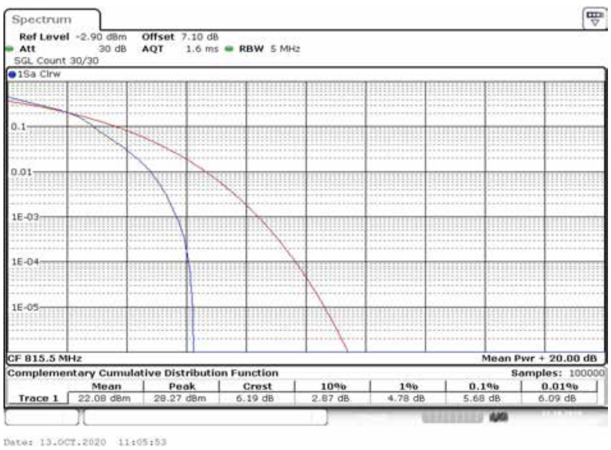

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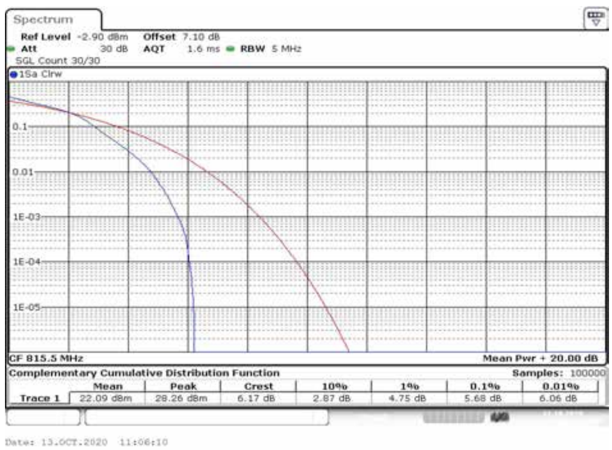


Fig.24

Tel: +86-010-64711866
Fax: +86-010-64711866-810

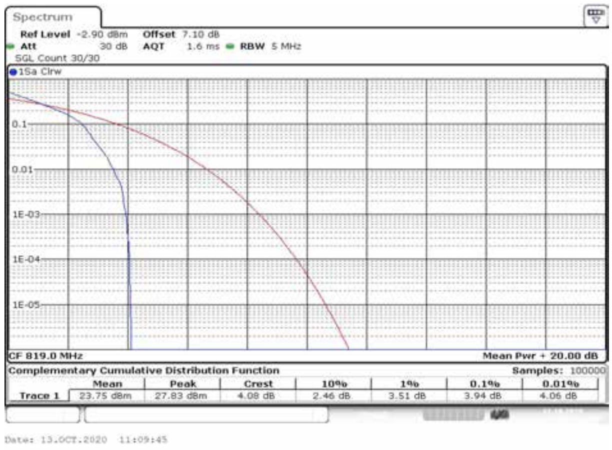


Fig.25

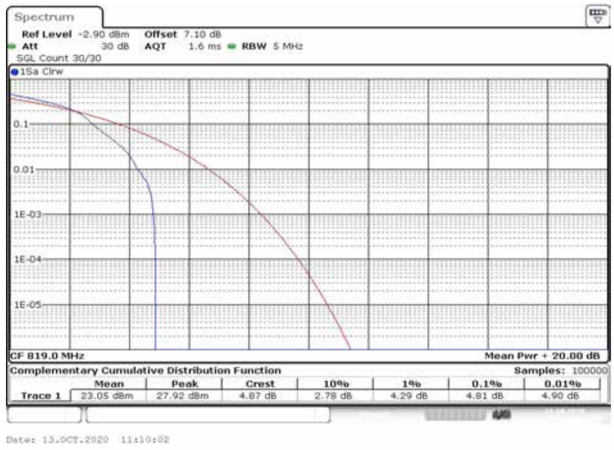


Fig.26

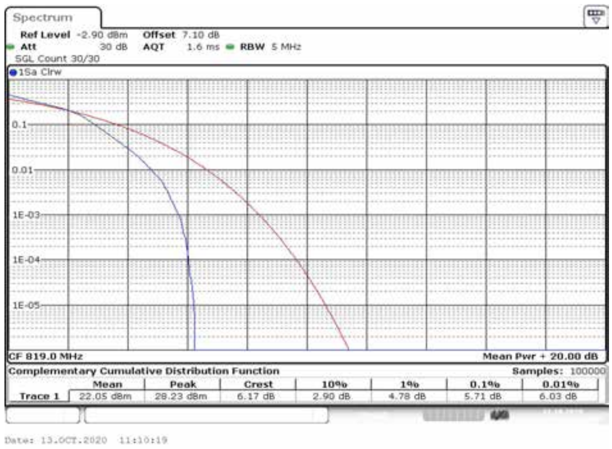


Fig.27

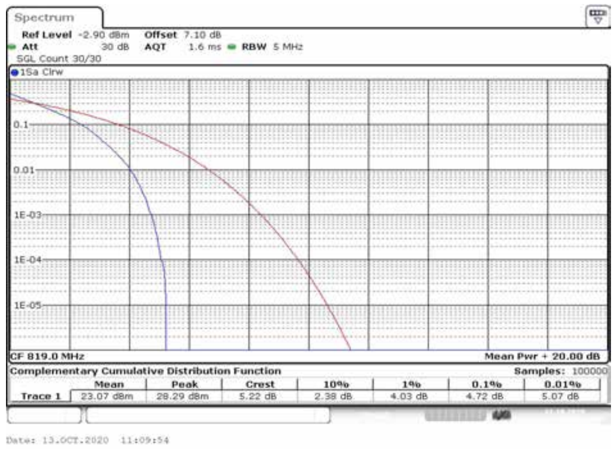
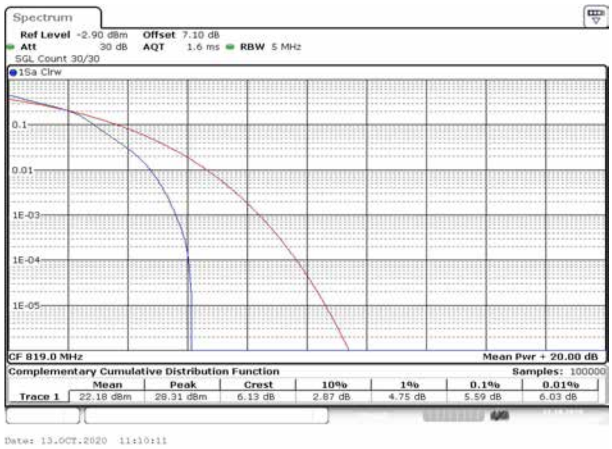


Fig.28



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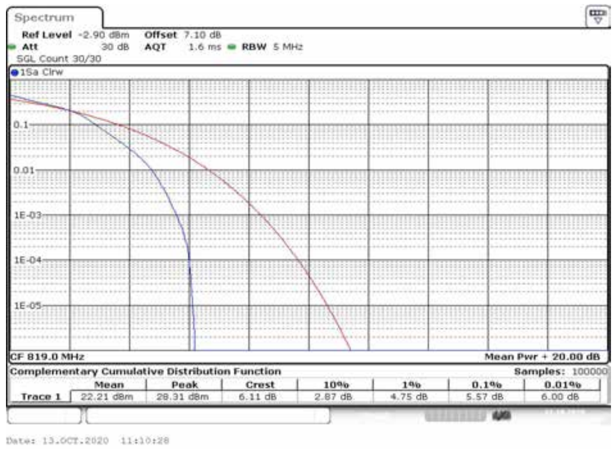

Fig.30

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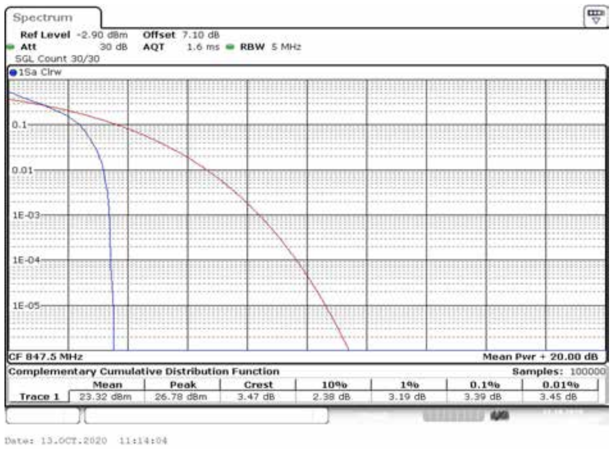	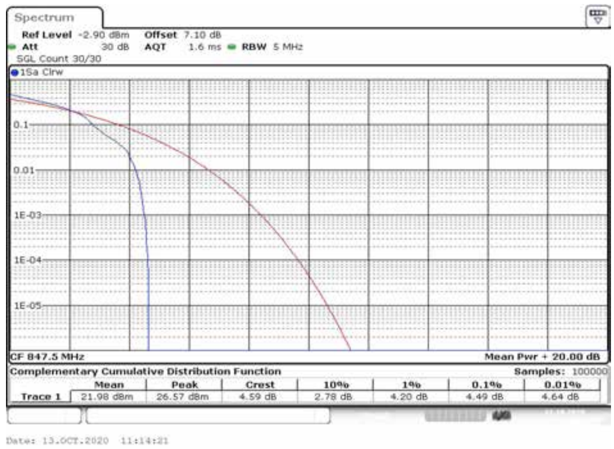
Fig.31	Fig.32
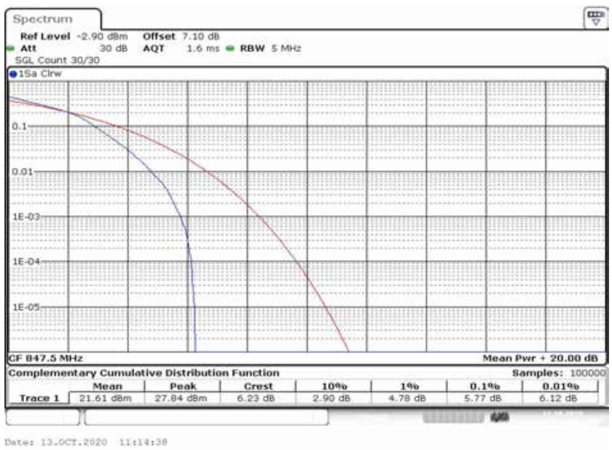	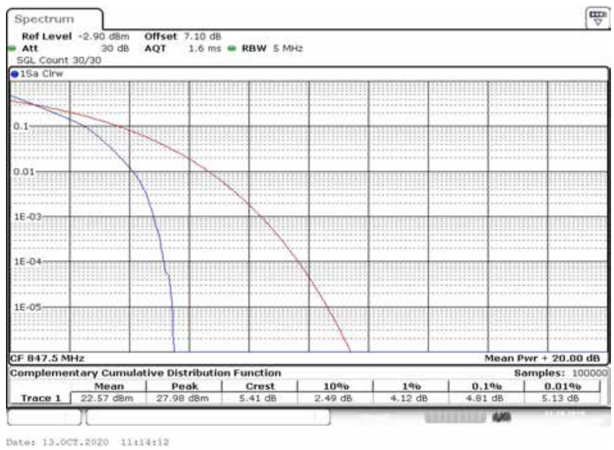
Fig.33	Fig.34
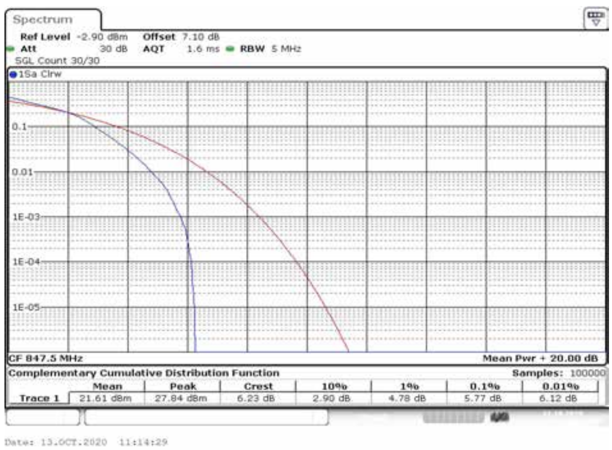	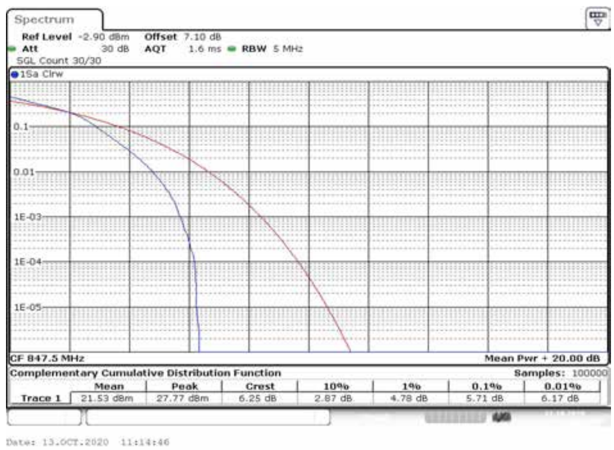
Fig.35	Fig.36

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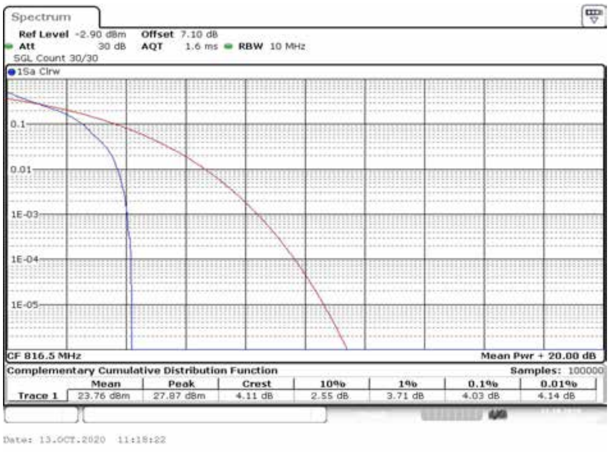
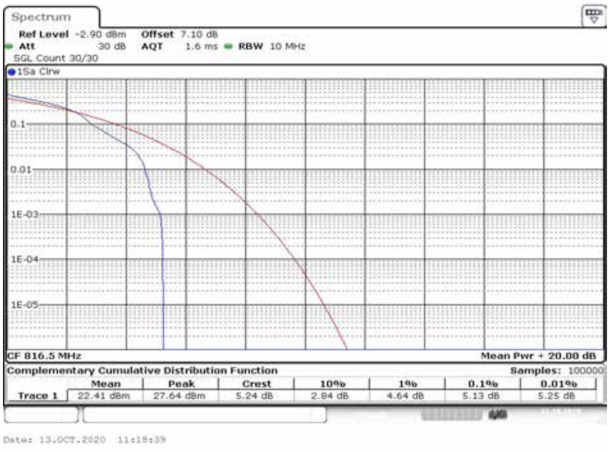


Fig.37



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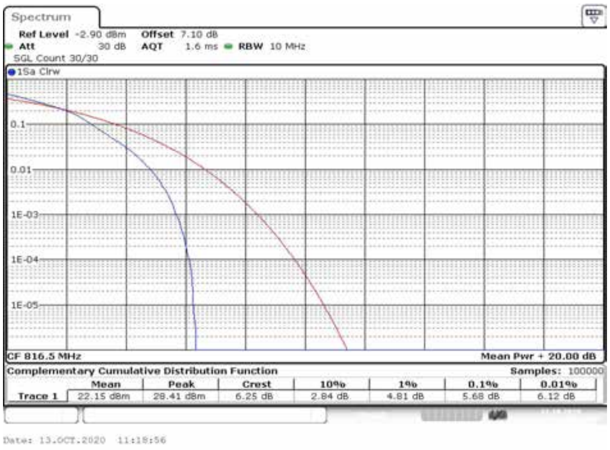

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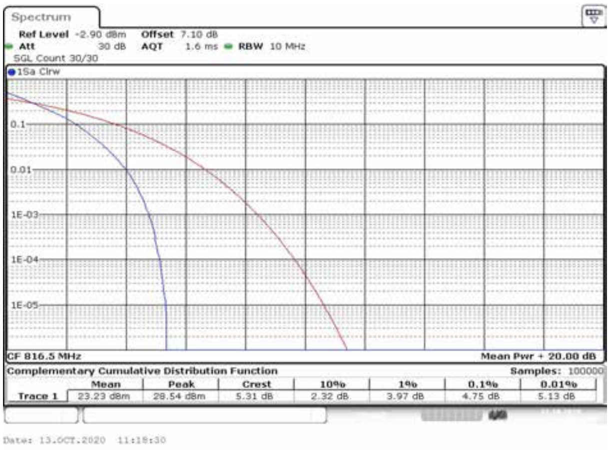


Fig.40

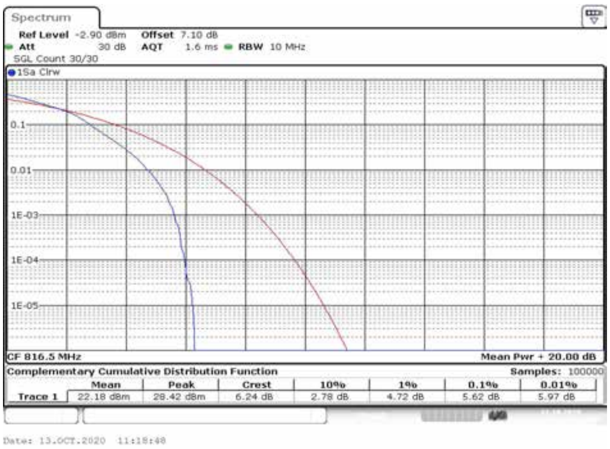
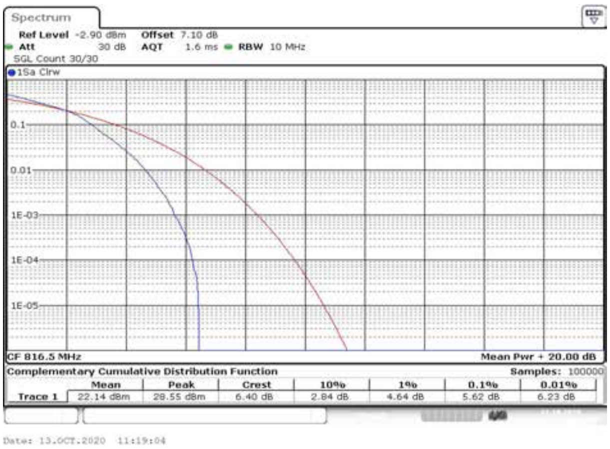


Fig.41



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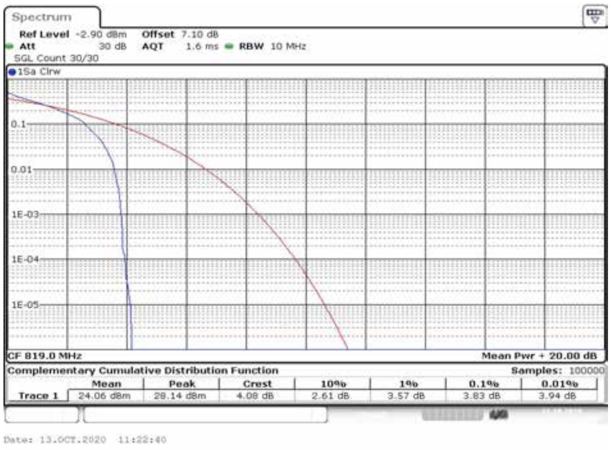

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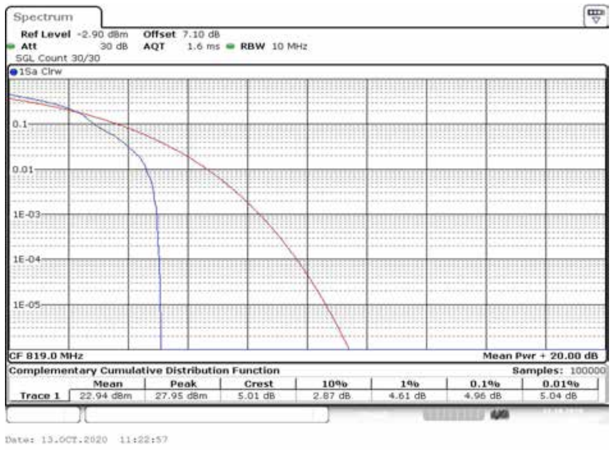
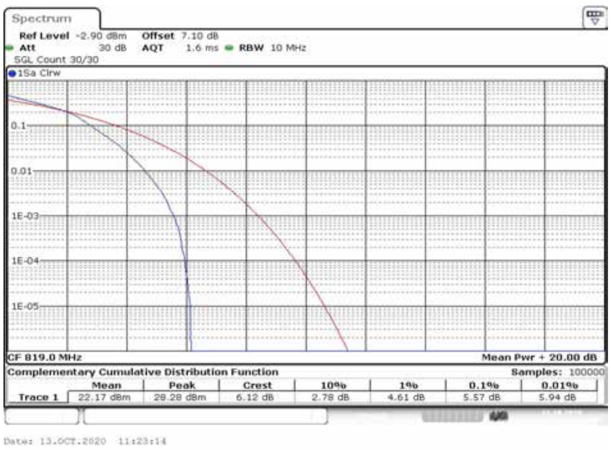


Fig.44



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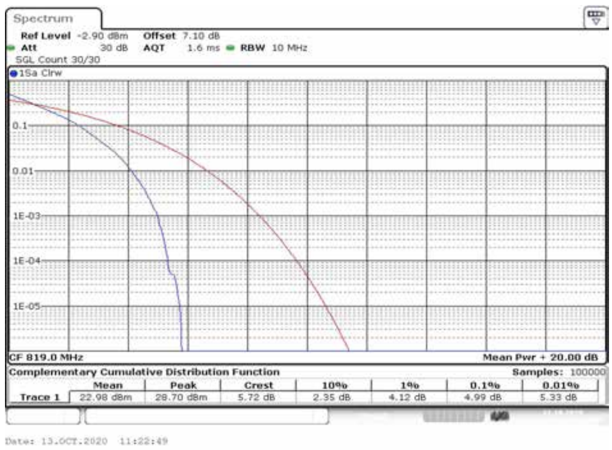


Fig.46

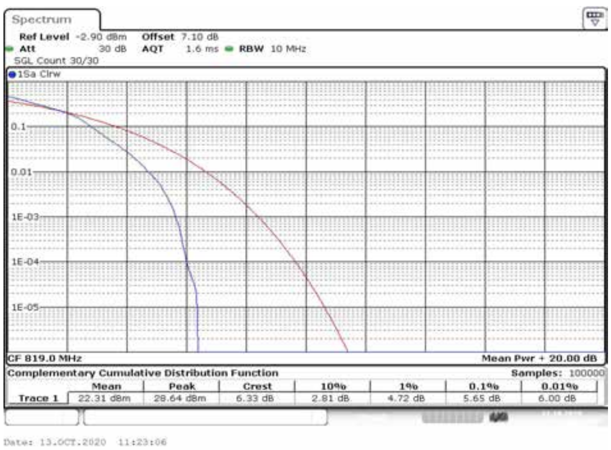


Fig.47

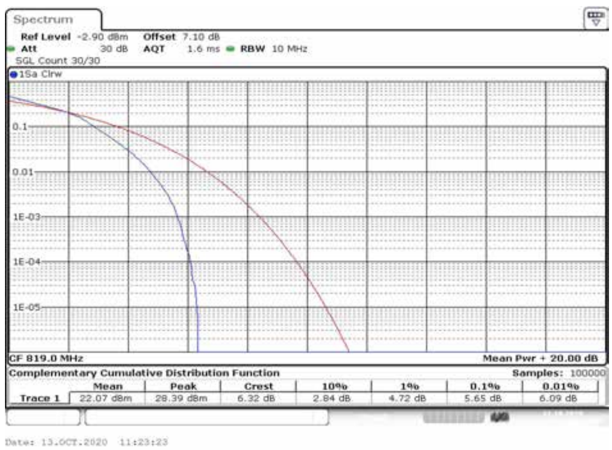


Fig.48

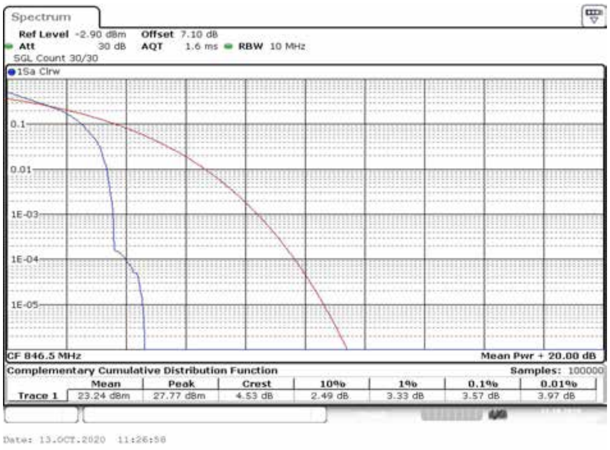


Fig.49

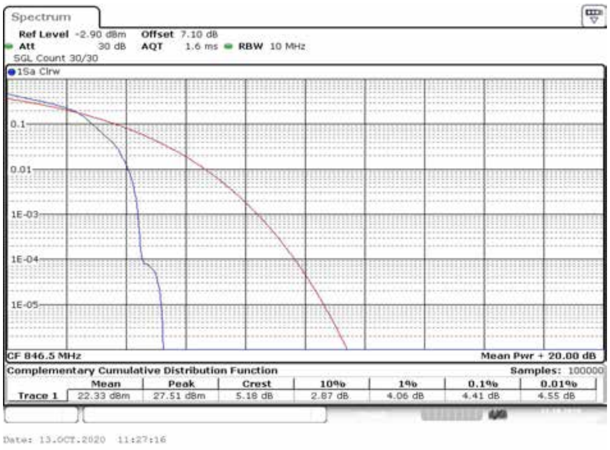


Fig.50

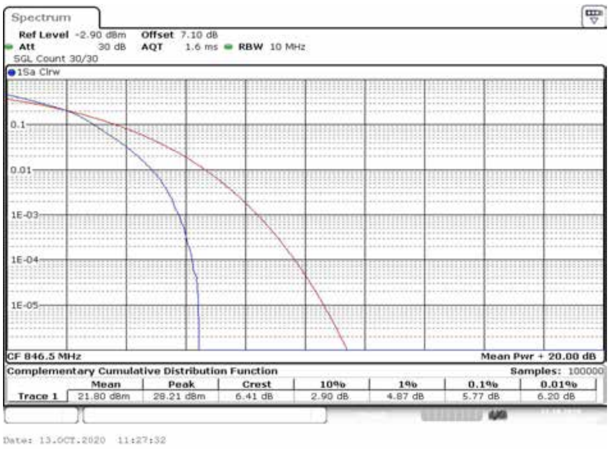


Fig.51

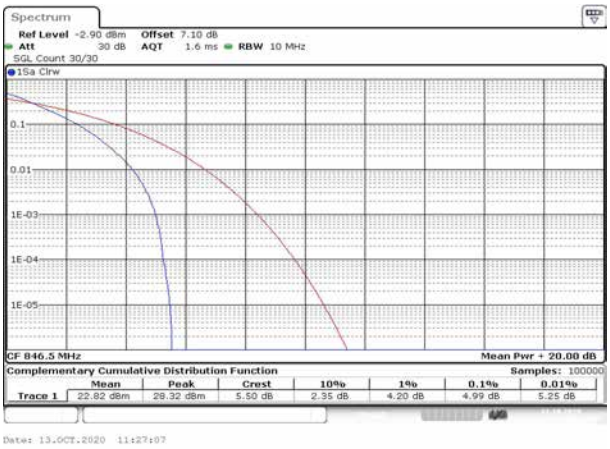


Fig.52

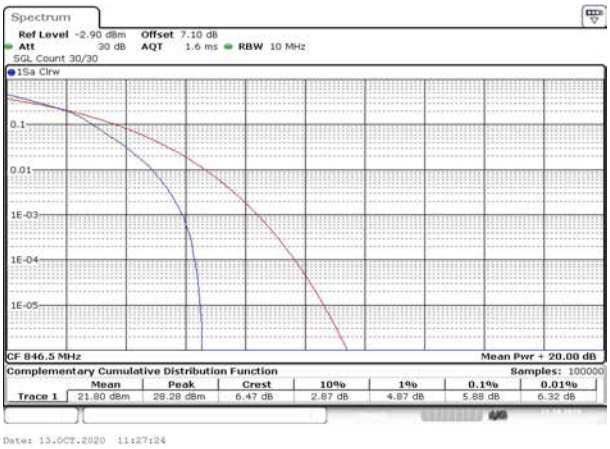


Fig.53

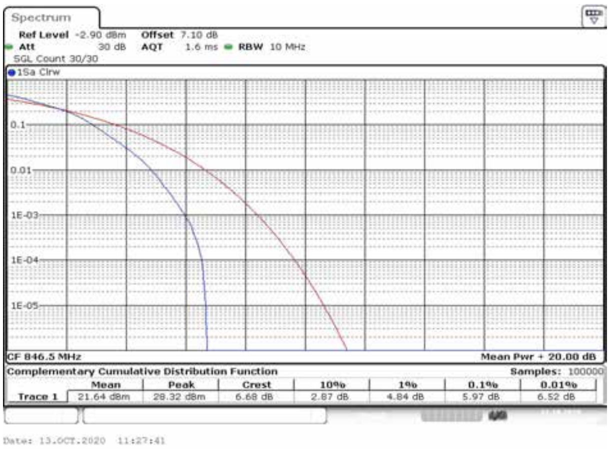


Fig.54

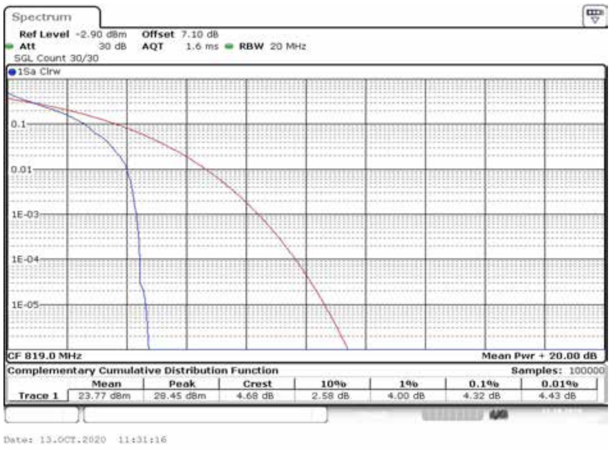


Fig.55

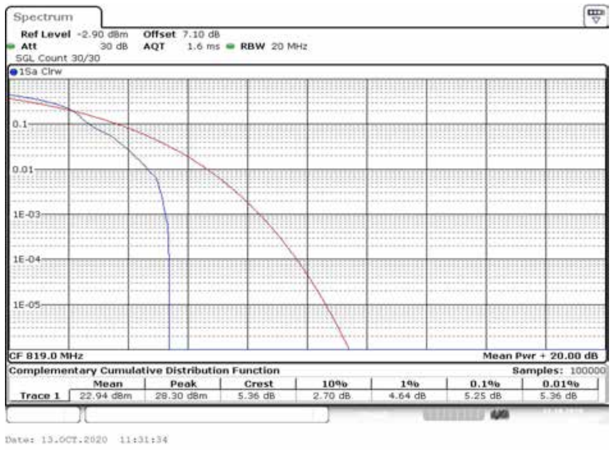


Fig.56

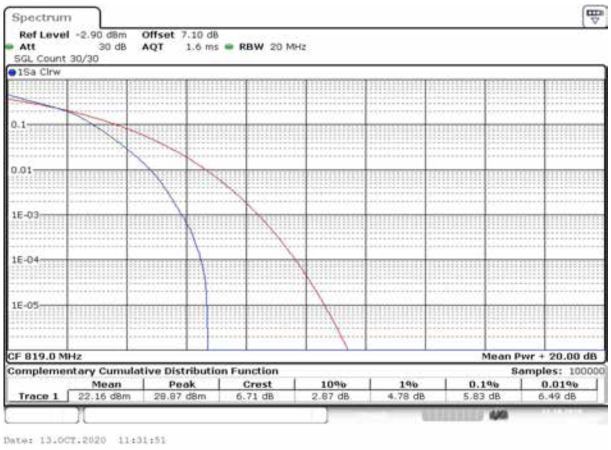


Fig.57

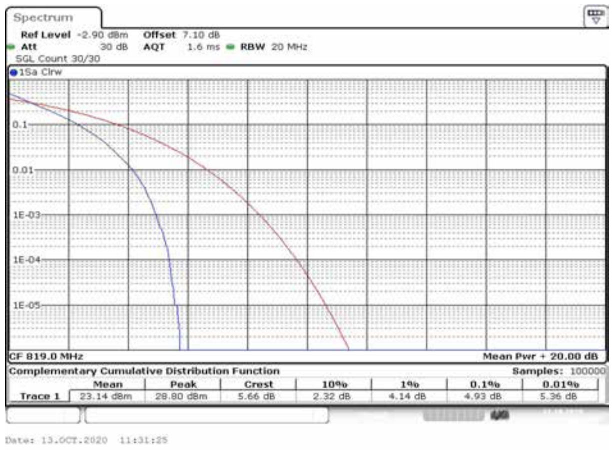


Fig.58

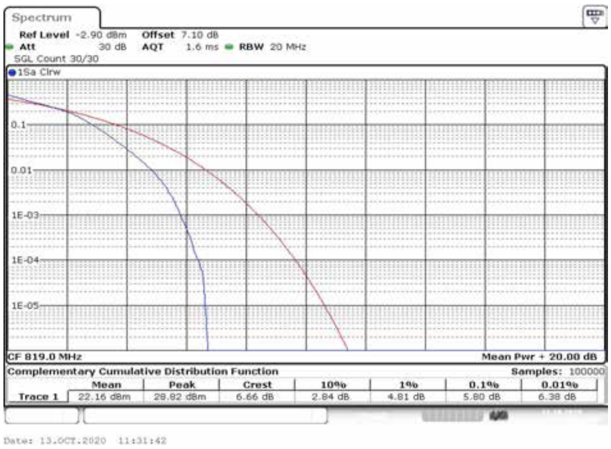


Fig.59

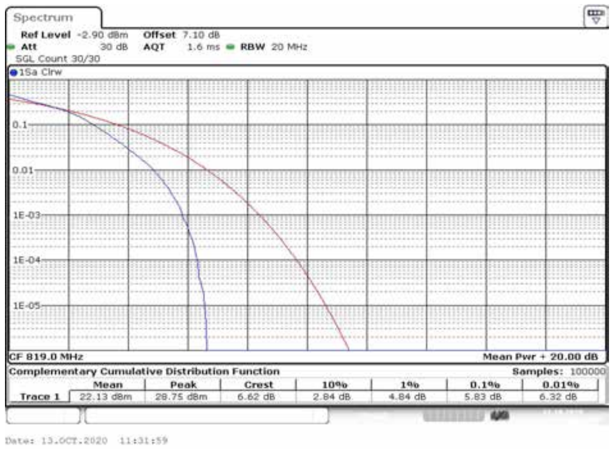


Fig.60

3.2.5. Uncertainty

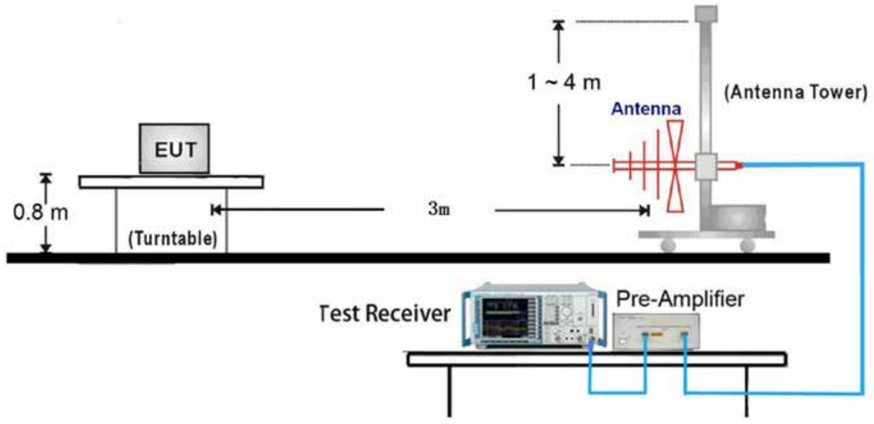
U_{lab}=2.46dB (k=2)

3.3 Effective Radiated Power

3.3.1. Limit

FCC 47 CFR Part 90 Subpart S - §90.635 (b)
The maximum output power of the transmitter for mobile station is 100 watts (20dBw).

3.3.2. Test Setup



3.3.3. Test Procedures

1) The measurement procedure follows ANSI C63.26-2015, clause 5.2.7.
2) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.
3) Key the transmitter, then rotate the EUT 360°azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).
4) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.
5) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading. LOSS = Generator Output Power (dBm) – Analyzer reading (dBm).
6) Determine the effective radiated output power at each angular position from the readings in steps 2) and 4) using the following equation: ERP (dBm) = LVL (dBm) + LOSS (dB)
7) The maximum ERP is the maximum value determined in the preceding step.
8) When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g. transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:

   EIRP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBi)

   where: dB refers to gain relative to an ideal dipole.

   EIRP (dBm) = ERP (dBm) + 2.15 (dB.)

   The RB allocation refers the configuration of maximum output power.

3.3.4. Test Result

Test Engineer	Gao Yanan	**Test Date**	2020.10.21
Temperature	20.4°C	**Relative Humidity**	49.8%
Pressure	105.0kPa	**Test Sample Selected**	No.2

Modulation	BW (MHz)	Frequency (MHz)	RB/RB offset	EIRP/ERP (dBm)	EIRP/ERP (W)
QPSK	1.4	814.7	1#0	21.61	0.15
QPSK	1.4	819.0	1#0	21.96	0.16
QPSK	1.4	823.3	1#0	21.46	0.14
16QAM	1.4	814.7	1#0	20.12	0.10
16QAM	1.4	819.0	1#0	20.26	0.11
16QAM	1.4	823.3	1#0	19.87	0.10
64QAM	1.4	814.7	1#0	19.85	0.10
64QAM	1.4	819.0	1#0	20.04	0.10
64QAM	1.4	823.3	1#0	20.12	0.10
QPSK	3	815.5	1#0	21.67	0.15
QPSK	3	819.0	1#0	21.89	0.16
QPSK	3	822.5	1#0	21.47	0.14
16QAM	3	815.5	1#0	20.73	0.12
16QAM	3	819.0	1#0	20.17	0.10
16QAM	3	822.5	1#0	20.08	0.10
64QAM	3	815.5	1#0	20.27	0.11
64QAM	3	819.0	1#0	20.54	0.11
64QAM	3	822.5	1#0	19.77	0.10
QPSK	5	816.5	1#0	22.30	0.17
QPSK	5	819.0	1#0	22.07	0.16
QPSK	5	821.5	1#0	21.93	0.16
16QAM	5	816.5	1#0	20.53	0.11
16QAM	5	819.0	1#0	20.32	0.11
16QAM	5	821.5	1#0	20.68	0.12
64QAM	5	816.5	1#0	20.28	0.11
64QAM	5	819.0	1#0	19.74	0.09
64QAM	5	821.5	1#0	20.28	0.11
QPSK	10	819.0	1#0	21.98	0.16
16QAM	10	819.0	1#0	20.61	0.12
64QAM	10	819.0	1#0	20.39	0.11

3.3.5. Uncertainty

U_{lab}=3.24dB (k=2)

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