Certificate #6613.01

FCC TEST REPORT

(PART 22)

Applicant:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland

Manufacturer or Supplier:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland
Product:	Mobile phone
Brand Name:	NOKIA
Model Name:	TA-1558
FCC ID:	2AJOTTA-1558
Date of tests:	Sep. 04, 2023 ~ Sep. 12, 2023

The tests have been carried out according to the requirements of the following standard:

☒ **FCC PART 22, Subpart H** ☒ **FCC Part 2**
☒ **ANSI/TIA/EIA-603-D** ☒ **ANSI C63.26-2015**
☒ **ANSI/TIA/EIA-603-E**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Chao Wu Engineer / Mobile Department	Approved by Peibo Sun Manager / Mobile Department
Chao Wu Date: Sep. 12, 2023	Sun Peibo Date: Sep. 12, 2023

This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/ and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P23010015RF01	Original release	Mar. 02, 2023
PSU-QSU2308280314RF01	Based on the original product adding 2G PA second supply. The FX5196 add 2nd supply FX5596Y, raw material of Wafer and the printing model have changes. The IC design has not changed and there is no impact on BT and WIFI, other has not changed. This report verify the GSM850,EDGE850 and replace the test result.	Sep. 12, 2023

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 22 & Part 2			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**Test lab***
§2.1046	Conducted Output Power	Compliance	A
§22.913 (a)(5)	Effective Radiated Power	Compliance	A
§2.1055 §22.355	Frequency Stability	Compliance	A
§2.1049	Occupied Bandwidth	Compliance	A
§22.913 (d)	Peak to average ratio*	Compliance	A
§22.917(a)	Band Edge Measurements	Compliance	A
§2.1051 §22.917(a)	Conducted Spurious Emissions	Compliance	A
§2.1053 §22.917(a)	Radiated Spurious Emissions	Compliance	A

* Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01.

Note:

1. Based on the original product adding 2G PA second supply. The FX5196 add 2nd supply FX5596Y, raw material of Wafer and the printing model have changes. The IC design has not changed and there is no impact on BT and WIFI, other has not changed. This report verify the GSM850,EDGE850 and replace the test result.

***Test Lab Information Reference**

Lab A:

Huarui 7Layers High Technology (Suzhou) Co., Ltd.

Lab Address:

Tower N, Innovation Center, 88 Zhuyi Road, High-tech District, Suzhou City, Anhui Province

Accredited Test Lab Cert 6613.01

The FCC Site Registration No. is 434559; The Designation No. is CN1325.

1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	UNCERTAINTY
Maximum Peak Output Power	±2.06dB
Frequency Stability	±76.97Hz
Radiated emissions (30MHz~1GMHz)	±4.98dB
Radiated emissions (1GMHz ~6GMHz)	±4.70dB
Radiated emissions (6GMHz ~18GMHz)	±4.60dB
Radiated emissions (18GMHz ~40GMHz)	±4.12dB
Conducted emissions	±4.01dB
Occupied Channel Bandwidth	±43.58KHz
Band Edge Measurements	±4.70dB
Peak to average ratio	±0.76dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Pre-Amplifier	R&S	SCU18F1	100815	Aug.30,22	Aug.29,24
Pre-Amplifier	R&S	SCU08F1	101028	Sep.16,22	Sep.15,24
Vector Signal Generator	R&S	SMBV100B	102176	Feb.16,22	Feb.15,24
Signal Generator	R&S	SMB100A	182185	Feb.16,22	Feb.15,24
3m Fully-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-01Chamber	Nov.25,22	Nov.24,25
3m Semi-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-02Chamber	Nov.25,22	Nov.24,25
EMI TEST Receiver	R&S	ESR26	101734	Feb.25,22	Feb.24,24
EMI TEST Receiver	R&S	ESW44	101973	Feb.25,22	Feb.24,24
Bilog Antenna	SCHWARZBECK	VULB 9163	1264	Feb.28,22	Feb.27,24
Horn Antenna	ETS-LINDGREN	3117	227836	Aug.22,22	Aug.21,24
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Feb.23,22	Feb.22,24
Horn Antenna	Steatite Q-par Antennas	QMS 00208	23485	Aug.22,22	Aug.21,24
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.23,22	Feb.22,24
WIDEBANDRADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.27,22	Jun.26,24
Test Software	EMC32	EMC32	N/A	N/A	N/A
Test Software	ELEKTRA	ELEKTRA4.32	N/A	N/A	N/A
Open Switch and Control Unit	R&S	OSP220	101964	Oct.01,22	Sep.30,24
DC Source	HYELEC	HY3010B	551016	Aug.31,22	Aug.30,24
Hygrothermograph	DELI	20210528	SZ014	Sep.06,22	Sep.05,24
PC	LENOVO	E14	HRSW0024	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-7.00M	N/A	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-4.00M	N/A	N/A	N/A
CABLE	R&S	W13.02	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W12.14	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	J12J103539-00-1	SEP-03-20-069	Apr.28,23	Oct.27,23
CABLE	R&S	J12J103539-00-1	SEP-03-20-070	Apr.28,23	Oct.27,23
Temperature Chamber	votsch	VT4002	58566078100050	May.31,22	May.30,24

NOTE:

1. The calibration interval of the above test instruments is 6 months or 24 months or 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT*	Mobile phone	
BRAND NAME*	NOKIA	
MODEL NAME*	TA-1558	
NOMINAL VOLTAGE*	5.0Vdc(adapter) 3.85Vdc (Li-ion, battery)	
MODULATION TYPE*	**GSM/EDGE**	GMSK,8PSK
	WCDMA	HSDPA/HSUPA/DC-HSDPA /HSPA+
	LTE	QPSK/16QAM/64QAM
FREQUENCY RANGE	**GSM/EDGE**	824.2MHz ~ 848.8MHz
	WCDMA	826.4MHz ~ 846.6MHz
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	824.7MHz ~ 848.3MHz
	LTE Band 5 (Channel Bandwidth: 3MHz)	825.5MHz ~ 847.5MHz
	LTE Band 5 (Channel Bandwidth: 5MHz)	826.5MHz ~ 846.5MHz
	LTE Band 5 (Channel Bandwidth: 10MHz)	829MHz ~ 844MHz
MAX. ERP POWER	**GSM**	514.04mW
	EDGE	127.94mW
	WCDMA	78.7mW
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	67.45mW
	LTE Band 5 (Channel Bandwidth: 3MHz)	66.68mW
	LTE Band 5 (Channel Bandwidth: 5MHz)	67.3mW
	LTE Band 5 (Channel Bandwidth: 10MHz)	67.45mW
EMISSION DESIGNATORGOGN	**GSM**	247KGXW
	EDGE	241KG7W
	WCDMA	4M15F9W
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	QPSK: 1M11G7D
		16QAM: 1M10W7D
		64QAM: 1M10W7D
	LTE Band 5 (Channel Bandwidth: 3MHz)	QPSK: 2M73G7D
		16QAM: 2M76W7D
		64QAM: 2M74W7D

	LTE Band 5 (Channel Bandwidth: 5MHz)	QPSK: 4M49G7D
		16QAM: 4M71W7D
		64QAM: 4M52W7D
	LTE Band 5 (Channel Bandwidth: 10MHz)	QPSK: 9M09G7D
		16QAM: 9M06W7D
		64QAM: 9M06W7D
ANTENNA TYPE*	Fixed Internal Antenna with -3.2dBi gain for GSM850/ WCDMA V/ LTE B5	
HW VERSION*	SPR_S63Q0	
SW VERSION*	00WW_0_122	
I/O PORTS*	Refer to user's manual	
CABLE SUPPLIED*	USB cable1: non-shielded cable, with w/o ferrite core, 1 meter USB cable2: non-shielded cable, with w/o ferrite core, 1 meter USB cable3: non-shielded cable, with w/o ferrite core, 1 meter Earphone: non-shielded cable, with w/o ferrite core, 1.2 meter	
EXTREME TEMPERATURE*	-20-60 ℃	
EXTREME VOLTAGE*	EUT 3.4V - EUT 4.4V	

NOTE:

1. *Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information , Test Lab is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.

2. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
3. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

MODULATION MODE	TX FUNCTION
GSM/EDGE	1TX/1RX
WCDMA	1TX/1RX
LTE	1TX/1RX

4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
5. The product of TA-1558(FCC ID: 2AJOTTA-1558), only the following manufacturer of key parts is different between the first and second supply, other parameters are the same. The details are as follows:

NO.	Change Description		specificatons	first supplier	specificatons	second supplier
1	PCBA	64GB EMMC	FEMDNN064G-A3A56 BWCTARV11X64G	Longsys	FEMDNN064G-A3A56 BWCTARV11X64G	Biwin
		128GB EMMC	FEMDNN128G-A3A56 BWCTAKJ21X128G	Longsys	FEMDNN128G-A3A56 BWCTAKJ21X128G	Biwin
		3GB LPDD	FLXC4003G-50 BWMEXX32H2A-24Gb-	Longsys	FLXC4003G-50 BWMEXX32H2A-24Gb-	Biwin

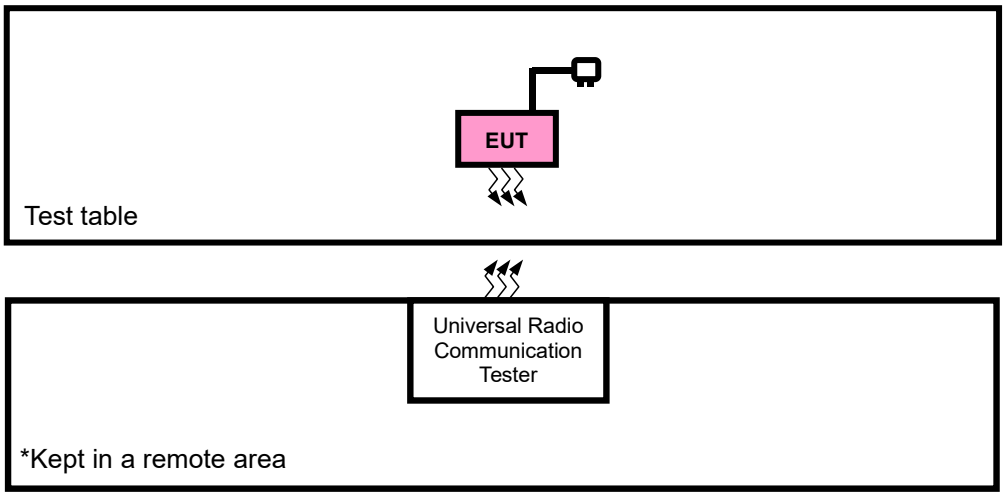
		R	X		X	
		4GB LPDDR	FLXC2004G-30 BWMZCX32H2A-32G-X	Longsys	FLXC2004G-30 BWMZCX32H2A-32G-X	Biwin
		PCB	/	KINGSHINE	/	wuzhu
2	LCM	LCD	6.517 HKC，360min,400typ, 2.5D	TCL	6.517 HKC，360min,400typ, 2.5D	Lia
3	Front camera	Camera	8M FF COM	Lianhe	8M FF COM	Shijia
4	Macro CAM	Camera	2M FF	Shijia	2M FF	Lianhe
5	Acoustic	Speaker	1712 1W	Dong Sheng	1712 1W	Xin Rongda
		Vibrator	1027 FPC	Chao Yin	1027 FPC	Kai Long
		Receiver	0809	Dong Sheng	0809	Xin Rongda
		Glass rear cover	Glass, monochrome printing or film	Kaimao	Glass, monochrome printing or film	Longqingxiangrui
		FPC	/	Lante	/	Kaihongxin
6	Battery		5000MAH	Gaoyuan	5000MAH	Fenghua
7	Data cable		2A typeC	Yuwei	2A typeC	Juwei

List of Accessory:

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
LCD Panel 1	HKC	MianYang HKC Optoelectronics Technology Co., Ltd.	QM065HS03-1	6.517
LCD Panel 2	BOE	BOE	BV065WBQ-L1B	6.517
Battery 1	Nokia	Guangdong Fenghua New Energy Co.,Ltd.	WT510	Capacity：3.85 Vdc, 4900mAh
Battery 2	Nokia	HUNAN GAOYUAN BATTERY Co., Ltd.	WT510	Capacity：3.85 Vdc, 4900mAh
AC Adapter	Nokia	SHENZHEN BAIJUNDA ELECTRONICS.,LTD	AD-010U	I/P: 100-240Vac, 0.35A, O/P: 5.0Vdc, 2.0A
Earphone	Juwei Electronics Co., LTD	Juwei Electronics Co., LTD	JWEP1252-H21H	Signal Line, 1.2meter
USB Cable 1	Juwei Electronics Co., LTD	Juwei Electronics Co., LTD	JWUB1536-H21H	Signal Line, 1.0meter
USB Cable 2	Yu Wei	Dongguan Yuwei Electronic Technology Co., Ltd.	CH2212TC	Signal Line, 1.0meter
USB Cable 3	Sai bao	Saibao (Jiangxi) Industrial Co., Ltd	SHM1-A003A	Signal Line, 1.0meter

2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION



2.3 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	N/A	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports The worst case in ERP and radiated emission was found when positioned on X-plane for GSM /WCDMA/ LTE. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	EUT + Adapter + GSM/WCDMA/LTE
B	EUT + DC source with GSM or WCDMA or LTE link

GSM MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
A	ERP	128 to 251	128, 190, 251	GSM, EDGE
B	FREQUENCY STABILITY	128 to 251	128, 190, 251	GSM, EDGE
A	OCCUPIED BANDWIDTH	128 to 251	128, 190, 251	GSM, EDGE
A	BAND EDGE	128 to 251	128, 251	GSM, EDGE
A	CONDCUDETED EMISSION	128 to 251	128, 190, 251	GSM, EDGE
A	RADIATED EMISSION	128 to 251	128, 190, 251	GSM, EDGE
A	PEAK TO AVERAGE RATIO	128 to 251	128, 190, 251	GSM, EDGE

WCDMA MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
A	ERP	4132 to 4233	4132, 4182, 4233	WCDMA
B	FREQUENCY STABILITY	4132 to 4233	4132, 4182, 4233	WCDMA
A	OCCUPIED BANDWIDTH	4132 to 4233	4132, 4182, 4233	WCDMA
A	BAND EDGE	4132 to 4233	4132, 4233	WCDMA
A	CONDCUDETED EMISSION	4132 to 4233	4132, 4182, 4233	WCDMA
A	RADIATED EMISSION	4132 to 4233	4132, 4182, 4233	WCDMA
A	PEAK TO AVERAGE RATIO	4132 to 4233	4132, 4182, 4233	WCDMA

LTE BAND 5 MODE

EUT CONFIGURE MODE	TEST ITEM	Available Channel	Tested Channel	Channel bandwidth	modulation	mode
A	ERP	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
		20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
		20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
		20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK,16QAM，64QAM	Full RB / 0 RB Offset
		20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM，64QAM	Full RB / 0 RB Offset
		20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM，64QAM	Full RB / 0 RB Offset
		20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM，64QAM	Full RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK,16QAM，64QAM	Full RB / 0 RB Offset
		20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM，64QAM	Full RB / 0 RB Offset
		20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM，64QAM	Full RB / 0 RB Offset
		20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM，64QAM	Full RB / 0 RB Offset
A	BAND EDGE	20407 to 20643	20407	1.4 MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
						Full RB / 0 RB Offset
		20407 to 20643	20643	1.4 MHz	QPSK,16QAM，64QAM	1 RB / 5 RB Offset
						Full RB / 0 RB Offset
		20415 to 20635	20415	3 MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
						Full RB / 0 RB Offset
		20415 to 20635	20635	3 MHz	QPSK,16QAM，64QAM	1 RB / 14 RB Offset
						Full RB / 0 RB Offset
		20425 to 20625	20425	5MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
						Full RB / 0 RB Offset
		20425 to 20625	20625	5MHz	QPSK,16QAM，64QAM	1 RB / 24 RB Offset
						Full RB / 0 RB Offset
		20450 to 20600	20450	10MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
						Full RB / 0 RB Offset
		20450 to 20600	20600	10MHz	QPSK,16QAM，64QAM	1 RB / 49 RB Offset
						Full RB / 0 RB Offset

A	CONDCUDETED EMISSION	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
		20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
		20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
		20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	20407 to 20643	20525	1.4MHz	QPSK	1 RB / 0 RB Offset
		20415 to 20635	20415,20525, 20635	3MHz	QPSK	1 RB / 0 RB Offset
		20425 to 20625	20525	5MHz	QPSK	1 RB / 0 RB Offset
		20450 to 20600	20525	10MHz	QPSK	1 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset Full RB / 0 RB Offset
		20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset Full RB / 0 RB Offset
		20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset Full RB / 0 RB Offset
		20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM，64QAM	1 RB / 0 RB Offset Full RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	23deg. C, 70%RH	DC 5V By Adapter	Chao Wu
FREQUENCY STABILITY	23deg. C, 70%RH	DC 3.85V By Battery	Chao Wu
OCCUPIED BANDWIDTH	23deg. C, 70%RH	DC5V By Adapter	Chao Wu
BAND EDGE	23deg. C, 70%RH	DC 5V By Adapter	Chao Wu
CONDCUDETED EMISSION	23deg. C, 70%RH	DC5V By Adapter	Chao Wu
RADIATED EMISSION	23deg. C, 70%RH	DC5V By Adapter	Chao Wu/Jace Hu
PEAK TO AVERAGE RATIO	23deg. C, 70%RH	DC5V By Adapter	Chao Wu

2.4 EUT OPERATING CONDITIONS

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 22

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-D

ANSI/TIA/EIA-603-E

ANSI C63.26-2015

NOTE: All test items have been performed and recorded as per the above standards.

3 TEST TYPES AND RESULTS

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile / Portable station are limited to 7 watts e.r.p.

3.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

Per KDB 971168 D01 Power Meas License Digital Systems v03r01 or subclause 5.2.5.5 of ANSI C63.26-2015, the relevant equation for determing the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

ERP or EIRP = $P_{Meas} + G_T - L_C$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

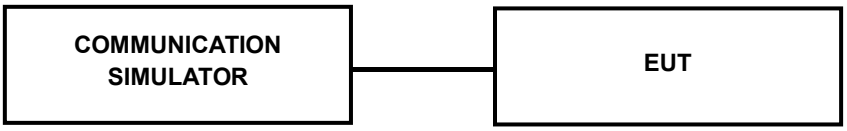
CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with GSM/WCDMA/LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.1.3 TEST SETUP

EIRP / ERP Measurement:

CONDUCTED POWER MEASUREMENT:



3.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

Band	GSM850			Max. Tune-up Power
Channel	128	190	251	
Frequency	824.2	836.6	848.8	
GSM	32.39	32.37	32.38	33.50
GPRS 1Tx Slot	**32.46**	32.41	32.37	33.50
GPRS 2Tx Slot	30.75	30.62	30.58	31.50
GPRS 3Tx Slot	29.05	28.91	28.84	30.00
GPRS 4Tx Slot	27.49	27.38	27.28	28.50
EDGE 1Tx Slot	26.42	26.36	26.20	27.50
EDGE 2Tx Slot	25.15	24.68	24.83	26.00
EDGE 3Tx Slot	22.40	21.98	22.18	23.00
EDGE 4Tx Slot	19.48	19.21	19.32	20.50

Band	WCDMA V			Max. Tune-up Power
Channel	4132	4182	4233	
Frequency	826.4	836.4	846.6	
RMC 12.2K	24.27	24.29	**24.31**	25.00
HSDPA Subtest-1	23.49	23.51	23.53	24.50
HSDPA Subtest-2	23.48	23.50	23.52	24.50
HSDPA Subtest-3	22.97	22.99	23.01	24.00
HSDPA Subtest-4	22.96	22.98	23.00	24.00
DC-HSDPA Subtest-1	23.41	23.45	23.45	24.50
DC-HSDPA Subtest-2	23.40	23.44	23.44	24.50
DC-HSDPA Subtest-3	22.98	22.93	22.95	24.00
DC-HSDPA Subtest-4	22.97	22.92	22.94	24.00
HSUPA Subtest-1	23.45	23.47	23.49	24.50
HSUPA Subtest-2	22.44	22.46	22.48	23.50
HSUPA Subtest-3	22.92	22.95	22.97	24.00
HSUPA Subtest-4	22.41	22.44	22.46	23.50
HSUPA Subtest-5	23.40	23.43	23.45	24.50
HSPA+ Subtest-1	22.16	22.20	22.22	23.00

LTE Band 5

Band/BW	Modulation	RB Size	RB Offset	Low CH 20407	Mid CH 20525	High CH 20643
				Frequency 824.7 MHz	Frequency 836.5 MHz	Frequency 848.3 MHz
5/ 1.4	QPSK	1	0	23.49	23.41	23.56
		1	2	23.48	23.57	23.56
		1	5	23.51	23.48	23.59
		3	0	23.42	23.50	23.49
		3	1	23.64	23.58	23.49
		3	3	23.60	23.47	23.61
		6	0	22.48	22.55	22.61
	16QAM	1	0	22.55	22.78	22.84
		1	2	22.73	22.75	22.82
		1	5	22.76	22.73	22.90
		3	0	22.77	22.73	22.81
		3	1	22.75	22.93	22.79
		3	3	22.72	22.87	22.89
		6	0	21.71	21.81	21.77
	64QAM	1	0	21.80	21.94	21.87
		1	2	21.85	21.80	21.88
		1	5	21.87	21.76	21.85
		3	0	22.00	21.64	21.68
		3	1	21.77	21.71	21.67
		3	3	21.76	21.61	22.03
		6	0	20.75	20.77	20.89

Band/BW	Modulation	RB Size	RB Offset	Low CH 20415	Mid CH 20525	High CH 20635
				Frequency 825.5 MHz	Frequency 836.5 MHz	Frequency 847.5 MHz
5/ 3	QPSK	1	0	23.51	23.43	23.55
		1	7	23.44	23.58	23.56
		1	14	23.47	23.48	23.59
		8	0	22.41	22.53	22.49
		8	3	22.57	22.58	22.51
		8	7	22.57	22.54	22.65
		15	0	22.45	22.56	22.55
	16QAM	1	0	22.52	22.84	22.87
		1	7	22.70	22.78	22.80
		1	14	22.79	22.73	22.90
		8	0	21.73	21.74	21.81
		8	3	21.80	21.88	21.82
		8	7	21.74	21.85	21.85
		15	0	21.71	21.75	21.80
	64QAM	1	0	21.86	21.97	21.81
		1	7	21.88	21.74	21.87
		1	14	21.88	21.78	21.85
		8	0	21.03	20.68	20.69
		8	3	20.81	20.65	20.72
		8	7	20.73	20.65	20.99
		15	0	20.77	20.74	20.93

Band/BW	Modulation	RB Size	RB Offset	Low CH 20425	Mid CH 20525	High CH 20625
				Frequency 826.5 MHz	Frequency 836.5 MHz	Frequency 846.5 MHz
5/ 5	QPSK	1	0	23.52	23.38	23.56
		1	12	23.49	23.55	23.56
		1	24	23.48	23.47	23.63
		12	0	22.44	22.53	22.46
		12	6	22.57	22.59	22.52
		12	13	22.61	22.50	22.66
		25	0	22.43	22.59	22.58
	16QAM	1	0	22.53	22.80	22.87
		1	12	22.67	22.81	22.79
		1	24	22.79	22.73	22.89
		12	0	21.73	21.72	21.78
		12	6	21.77	21.92	21.78
		12	13	21.69	21.87	21.88
		25	0	21.71	21.76	21.77
	64QAM	1	0	21.80	21.94	21.87
		1	12	21.85	21.80	21.87
		1	24	21.81	21.83	21.85
		12	0	21.04	20.65	20.68
		12	6	20.75	20.72	20.71
		12	13	20.77	20.64	20.96
		25	0	20.73	20.80	20.91

Band/BW	Modulation	RB Size	RB Offset	Low CH 20450	Mid CH 20525	High CH 20600
				Frequency 829 MHz	Frequency 836.5 MHz	Frequency 844 MHz
5/ 10	QPSK	1	0	23.57	23.45	23.61
		1	24	23.51	23.63	23.58
		1	49	23.53	23.55	**23.64**
		25	0	22.48	22.58	22.51
		25	12	22.65	22.60	22.57
		25	25	22.65	22.55	22.67
		50	0	22.49	22.61	22.63
	16QAM	1	0	22.60	22.85	22.89
		1	24	22.75	22.83	22.84
		1	49	22.81	22.81	22.91
		25	0	21.81	21.78	21.86
		25	12	21.83	21.94	21.84
		25	25	21.76	21.92	21.90
		50	0	21.77	21.83	21.82
	64QAM	1	0	21.87	21.99	21.89
		1	24	21.93	21.82	21.93
		1	49	21.89	21.84	21.87
		25	0	21.08	20.70	20.76
		25	12	20.83	20.73	20.73
		25	25	20.81	20.69	21.04
		50	0	20.79	20.82	20.94

ERP POWER (dBm)

GSM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
128	824.2	32.46	-3.2	27.11	514.04	7
190	836.6	32.41	-3.2	27.06	508.16	7
251	848.8	32.38	-3.2	27.03	504.66	7

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

EDGE

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
128	824.2	26.42	-3.2	21.07	127.94	7
190	836.6	26.36	-3.2	21.01	126.18	7
251	848.8	26.2	-3.2	20.85	121.62	7

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

WCDMA V

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
4132	826.4	24.27	-3.2	18.92	77.98	7
4182	836.4	24.29	-3.2	18.94	78.34	7
4233	846.6	24.31	-3.2	18.96	78.7	7

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

LTE BAND 5

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20407	824.7	23.64	-3.2	18.29	67.45	7
20525	836.5	23.58	-3.2	18.23	66.53	7
20643	848.3	23.61	-3.2	18.26	66.99	7

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20407	824.7	22.77	-3.2	17.42	55.21	7
20525	836.5	22.93	-3.2	17.58	57.28	7
20643	848.3	22.9	-3.2	17.55	56.89	7

CHANNEL BANDWIDTH: 1.4MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20407	824.7	22	-3.2	16.65	46.24	7
20525	836.5	21.94	-3.2	16.59	45.6	7
20643	848.3	22.03	-3.2	16.68	46.56	7

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20415	825.5	23.51	-3.2	18.16	65.46	7
20525	836.5	23.58	-3.2	18.23	66.53	7
20635	847.5	23.59	-3.2	18.24	66.68	7

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20415	825.5	22.79	-3.2	17.44	55.46	7
20525	836.5	22.84	-3.2	17.49	56.1	7
20635	847.5	22.9	-3.2	17.55	56.89	7

CHANNEL BANDWIDTH: 3MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20415	825.5	21.88	-3.2	16.53	44.98	7
20525	836.5	21.97	-3.2	16.62	45.92	7
20635	847.5	21.87	-3.2	16.52	44.87	7

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20425	826.5	23.52	-3.2	18.17	65.61	7
20525	836.5	23.55	-3.2	18.2	66.07	7
20625	846.5	23.63	-3.2	18.28	67.3	7

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20425	826.5	22.79	-3.2	17.44	55.46	7
20525	836.5	22.81	-3.2	17.46	55.72	7
20625	846.5	22.89	-3.2	17.54	56.75	7

CHANNEL BANDWIDTH: 5MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20425	826.5	21.85	-3.2	16.5	44.67	7
20525	836.5	21.94	-3.2	16.59	45.6	7
20625	846.5	21.87	-3.2	16.52	44.87	7

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20450	829	23.57	-3.2	18.22	66.37	7
20525	836.5	23.63	-3.2	18.28	67.3	7
20600	844	23.64	-3.2	18.29	67.45	7

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20450	829	22.81	-3.2	17.46	55.72	7
20525	836.5	22.85	-3.2	17.5	56.23	7
20600	844	22.91	-3.2	17.56	57.02	7

CHANNEL BANDWIDTH: 10MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20450	829	21.93	-3.2	16.58	45.5	7
20525	836.5	21.99	-3.2	16.64	46.13	7
20600	844	21.93	-3.2	16.58	45.5	7

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

3.2.2 TEST PROCEDURE

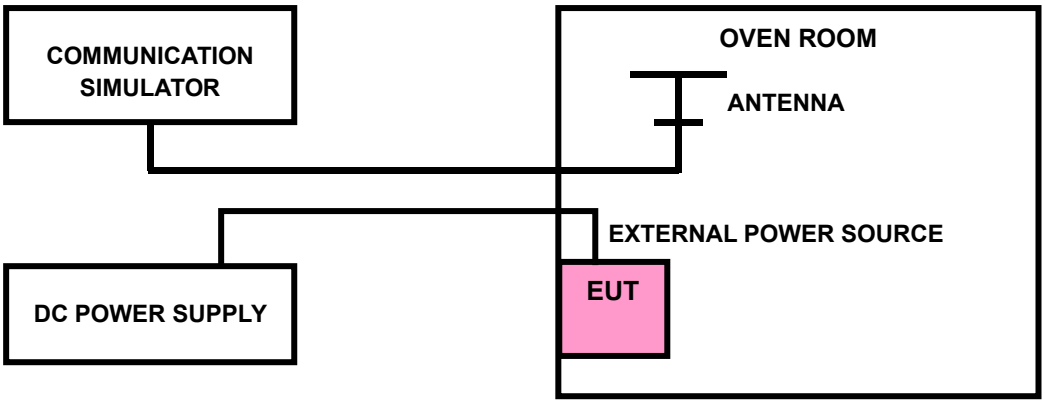
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

3.2.3 TEST SETUP



3.2.4 TEST RESULTS

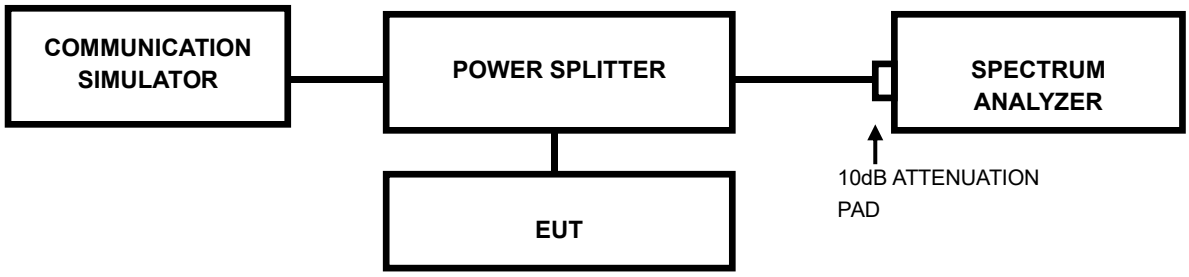
Please Refer to Appendix Of this test report.

3.3 OCCUPIED BANDWIDTH MEASUREMENT

3.3.1 TEST PROCEDURES

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

3.3.2 TEST SETUP



3.3.3 TEST RESULTS

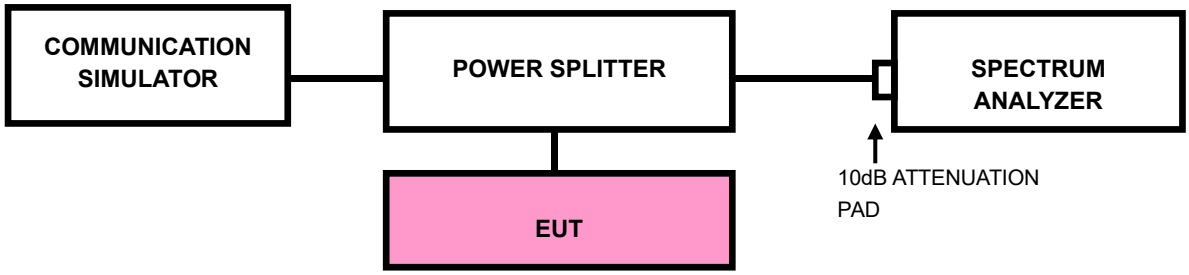
Please Refer to Appendix Of this test report.

3.4 BAND EDGE MEASUREMENT

3.4.1 LIMITS OF BAND EDGE MEASUREMENT

Power of any emission 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. 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.

3.4.2 TEST SETUP



3.4.3 TEST PROCEDURES

a) All measurements were done at low and high operational frequency range

b) Connect the transmitter to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.

c) Tune the analyzer to the nominal center frequency of the emission bandwidth (EBW)

d) Set the resolution bandwidth (RBW) ≧ 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.

e) Beyond the 1MHz band from the band edge, RBW=1MHz was used.

f) Set the video bandwidth (VBW) to ≧3 x RBW.

g) Select the average power (RMS) display detector.

h) Set the number of measurement points to ≧ 1001.

i) Use auto-coupled sweep time.

j) Perform the measurement over an interval of time when the transmission is continuous and at its maximum power level.

k) The RF fundamental frequency should be excluded against the limit line in the operating frequency band and use RBW is 10KHz or 100KHz.

l) Record the max trace plot into the test report.

3.4.4 TEST RESULTS

Please Refer to Appendix Of this test report.

3.5 CONDUCTED SPURIOUS EMISSIONS

3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

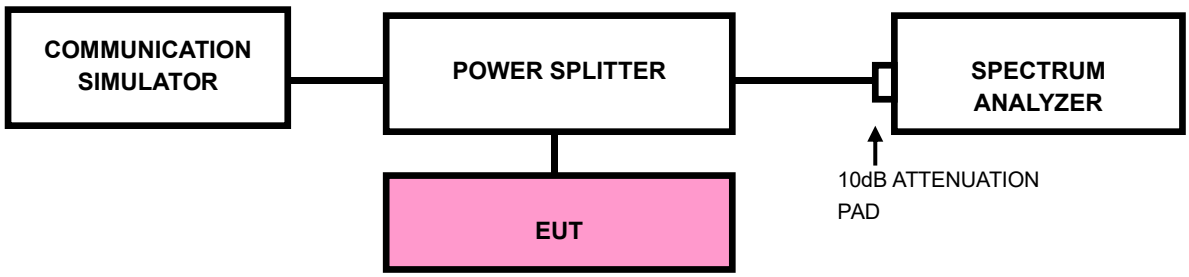
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

3.5.2 TEST PROCEDURE

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.

b. Measuring frequency range is from 9kHz up to a frequency including its 10th harmonic. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

3.5.1 TEST SETUP



3.5.2 TEST RESULTS

NOTE： The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

Please Refer to Appendix Of this test report.

3.6 RADIATED EMISSION MEASUREMENT

3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission 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. The emission limit equal to –13dBm.

3.6.2 TEST PROCEDURES

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.

b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step a. Record the power level of S.G

c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.

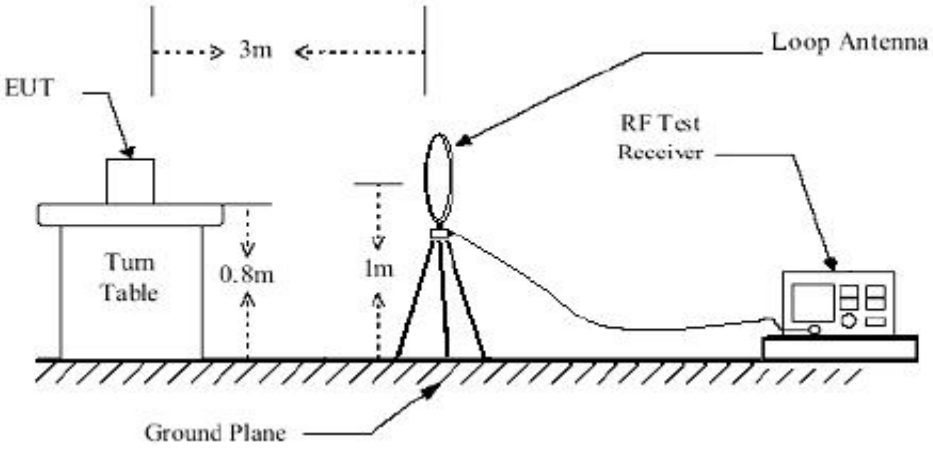
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.6.3 DEVIATION FROM TEST STANDARD

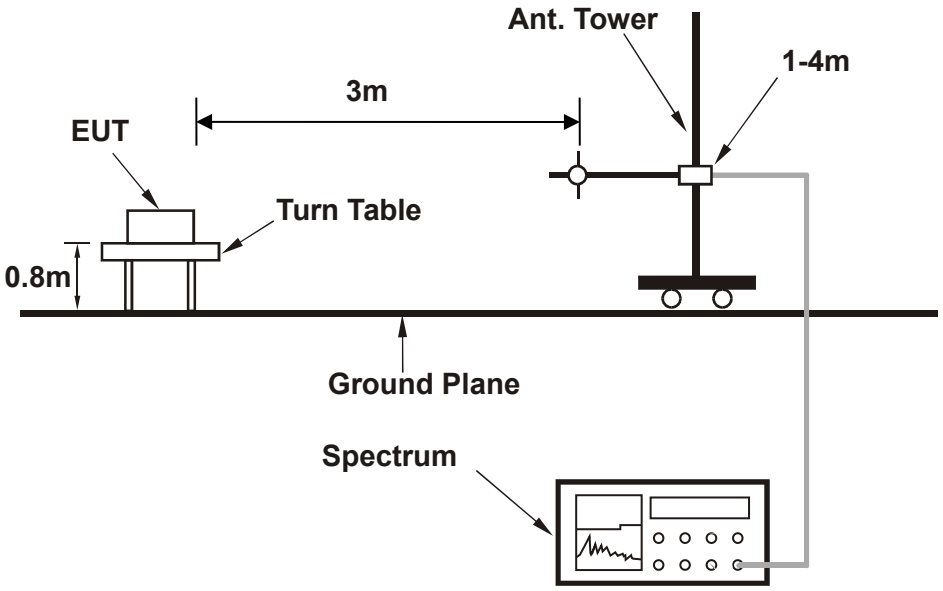
No deviation

3.6.4 TEST SETUP

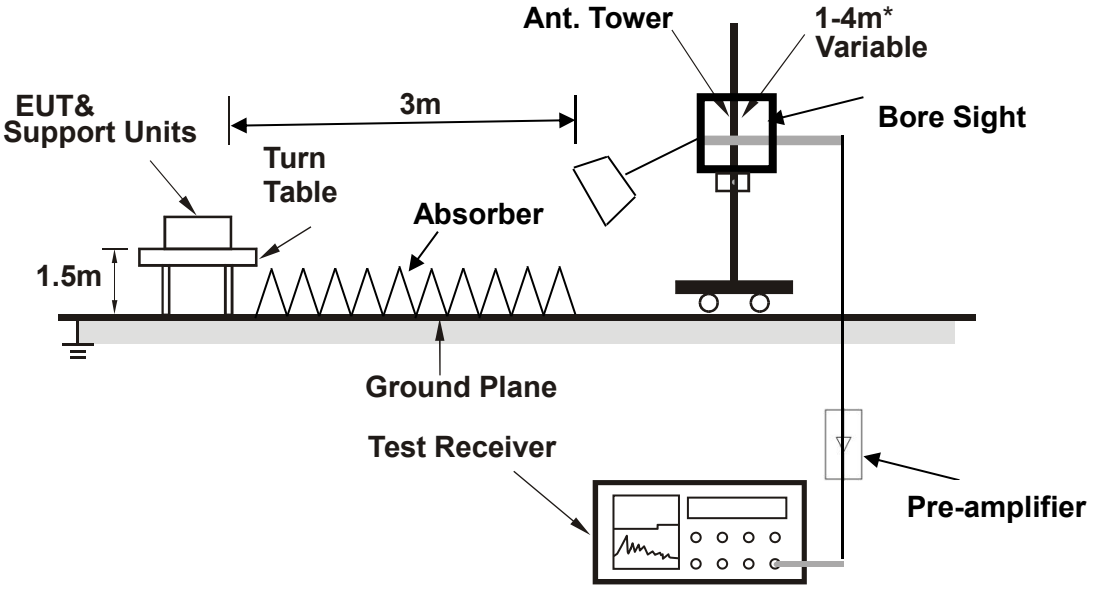
< Frequency Range below 30MHz >



< Frequency Range 30MHz~1GHz >



<Frequency Range above 1GHz>



Note: Above 1G is a directional antenna

Depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.6.5 TEST RESULTS

NOTE： The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

BELOW 1GHz WORST-CASE DATA

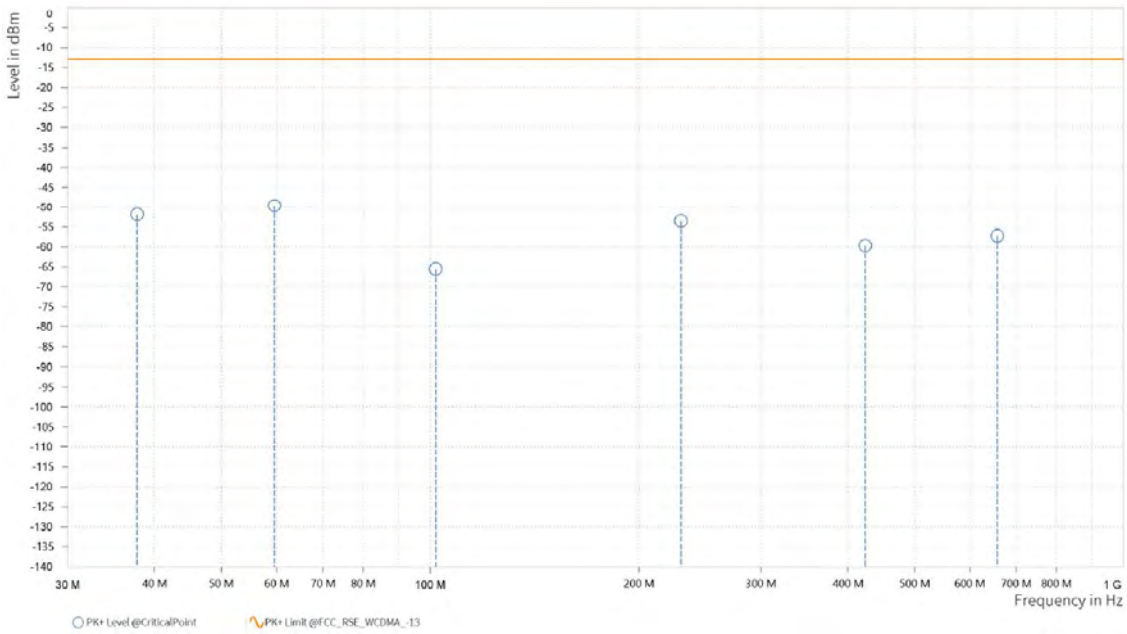
30 MHz – 1GHz data:

GSM 850

CHANNEL BANDWIDTH: 128 ~ 251

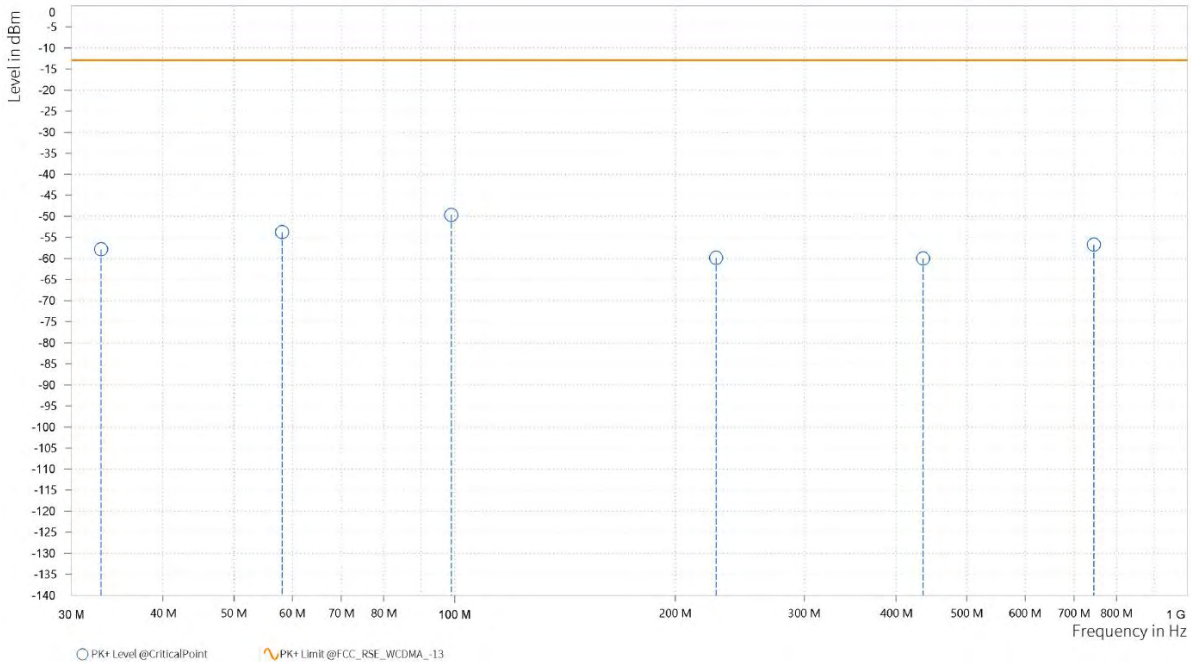
MODE	TX channel 251	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	37.760	-51.87	-13.00	38.87	4.82	H	170.2	1
1	59.585	-49.55	-13.00	36.55	0.42	H	53.1	1
1	101.780	-65.55	-13.00	52.55	-7.60	H	236	1
1	229.820	-53.51	-13.00	40.51	6.20	H	170.2	1
1	423.820	-59.67	-13.00	46.67	5.67	H	358.5	1
1	657.105	-57.27	-13.00	44.27	7.56	H	1	1



MODE	TX channel 251	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	32.910	-57.82	-13.00	44.82	-1.84	V	165.4	1
1	58.130	-53.77	-13.00	40.77	1.12	V	51.9	1
1	98.870	-49.64	-13.00	36.64	10.06	V	330.5	1
1	227.395	-59.80	-13.00	46.80	-1.16	V	220.5	1
1	435.460	-59.97	-13.00	46.97	5.75	V	359.1	1
1	744.890	-56.72	-13.00	43.72	7.94	V	275.4	1



ABOVE 1GHz DATA

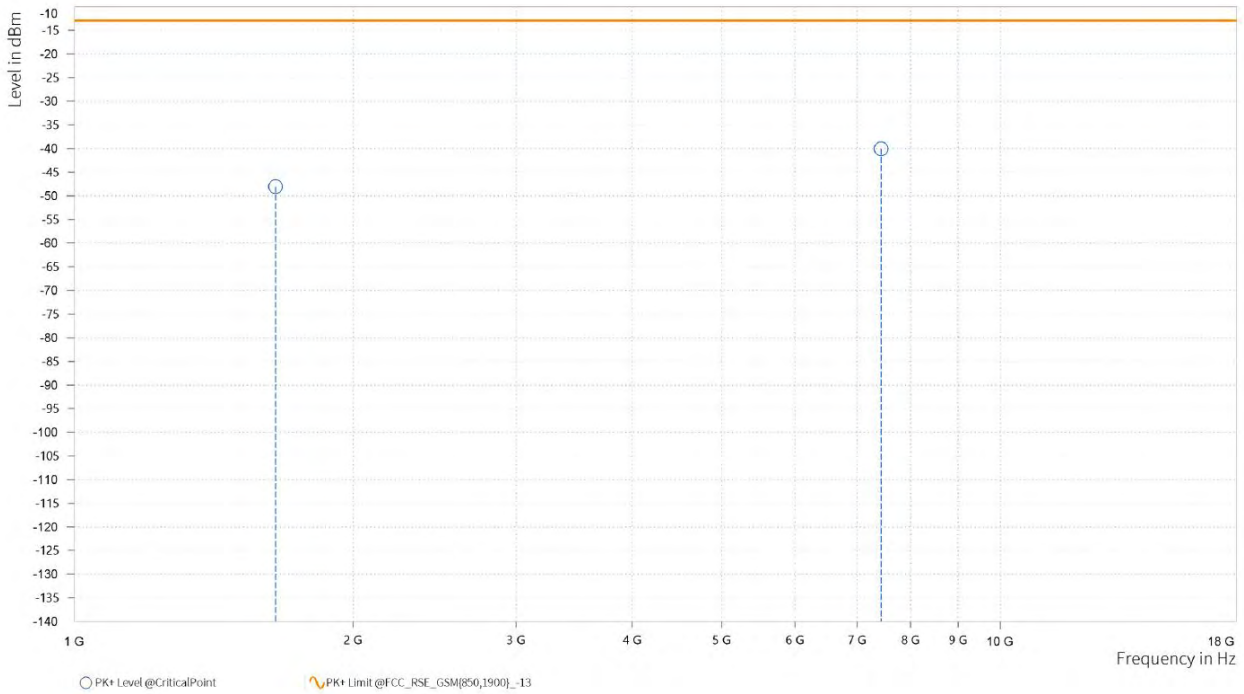
Note: For higher frequency, the emission is too low to be detected.

GSM 850

CH 128:

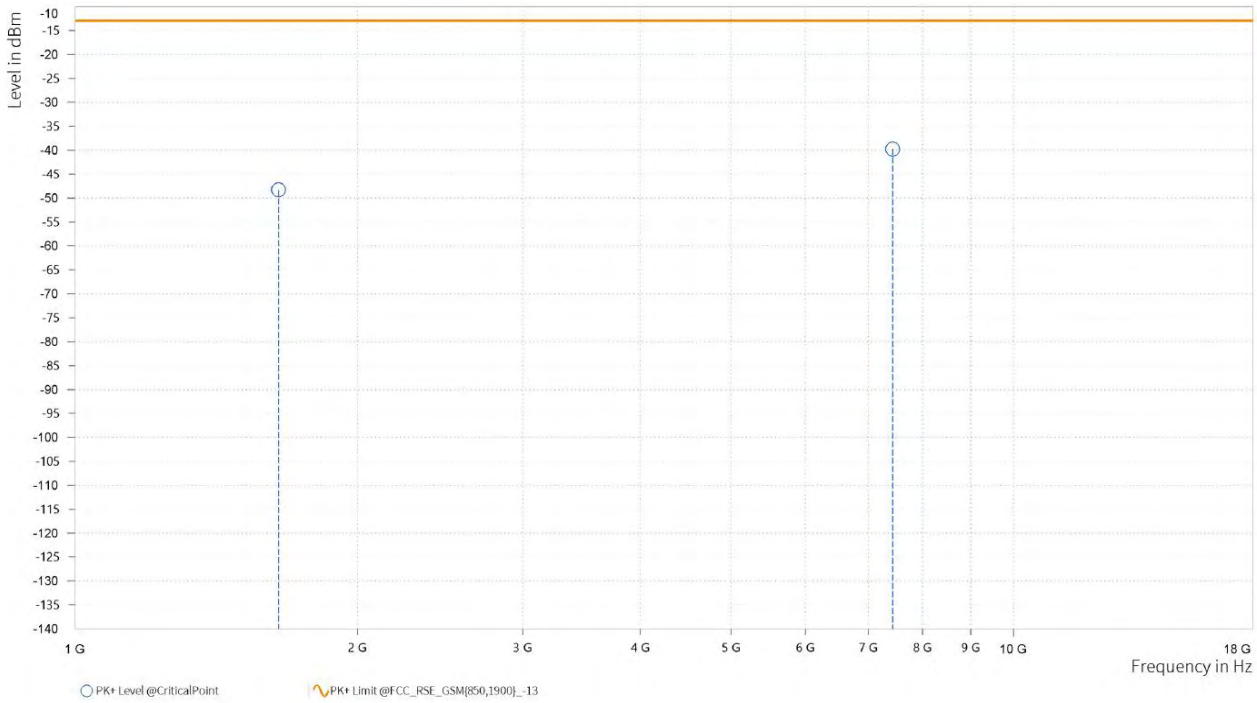
MODE	TX channel 128	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,648.500	-48.05	-13.00	35.05	17.46	H	0.9	2
4	7,433.500	-40.05	-13.00	27.05	29.11	H	250.4	1



MODE	TX channel 128	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

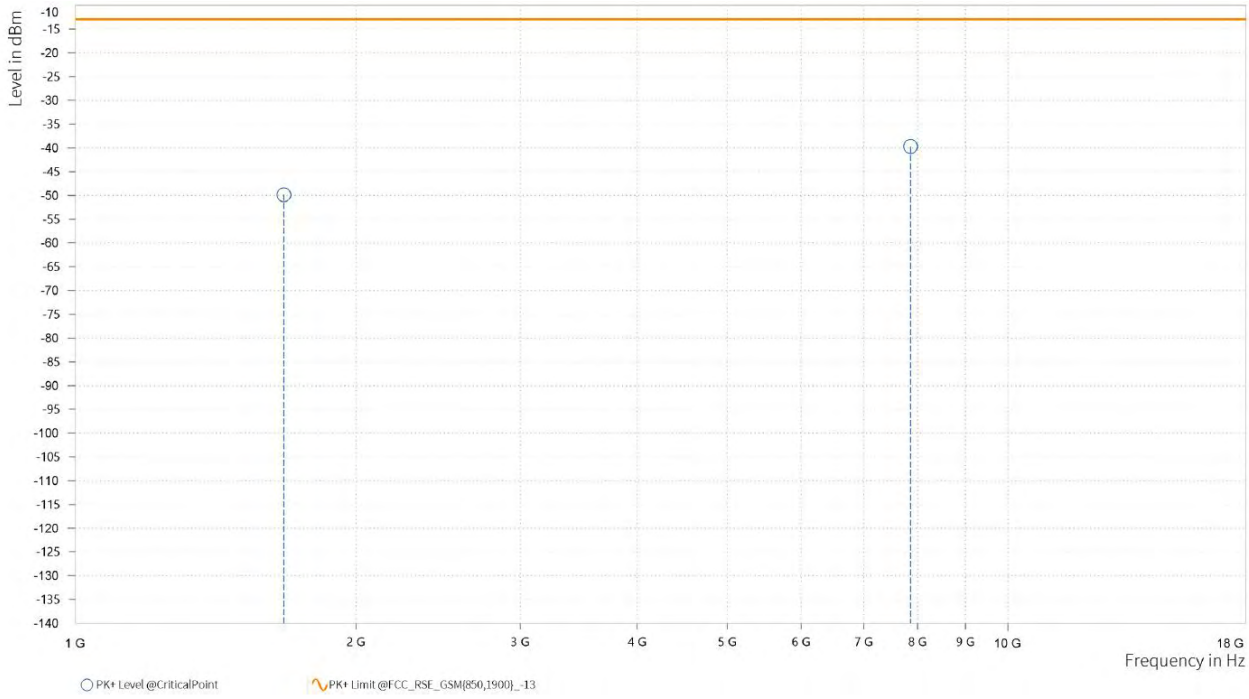
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,648.000	-48.28	-13.00	35.28	17.05	V	91.4	1
4	7,431.500	-39.75	-13.00	26.75	29.13	V	359.1	1



CH 190:

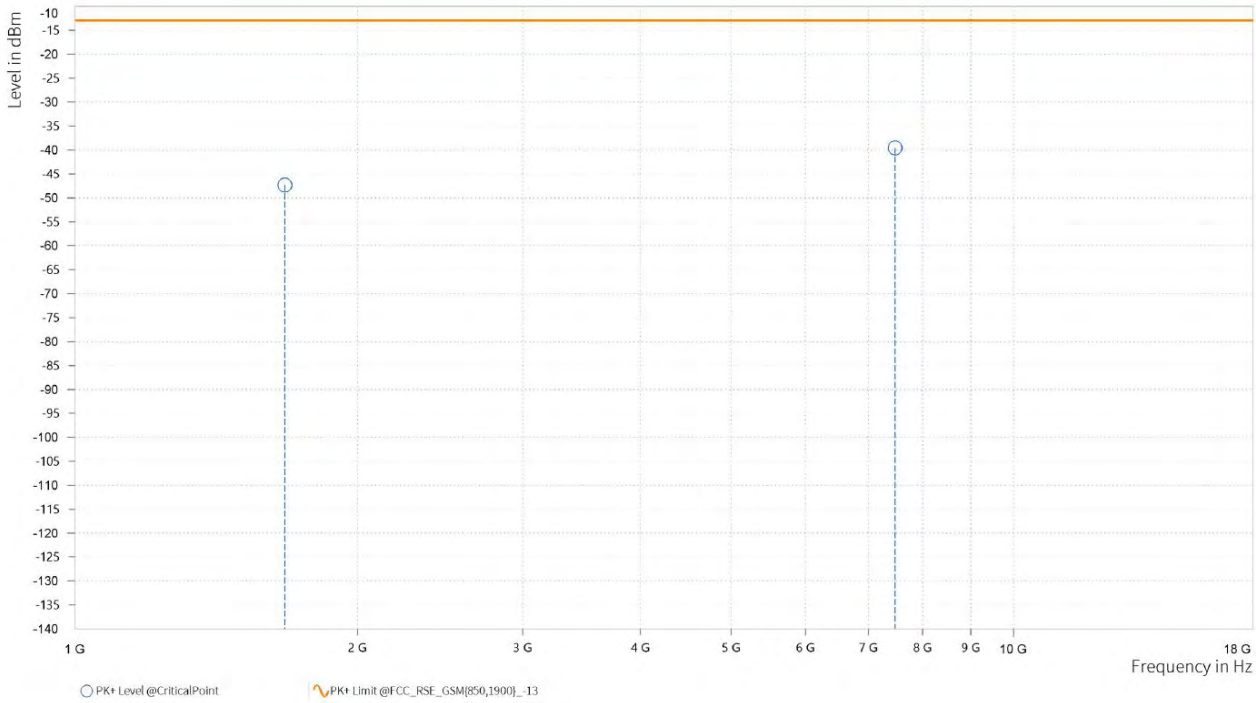
MODE	TX channel 190	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,672.500	-49.84	-13.00	36.84	18.24	H	359.1	1
4	7,865.500	-39.72	-13.00	26.72	29.36	H	0.9	2



MODE	TX channel 190	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

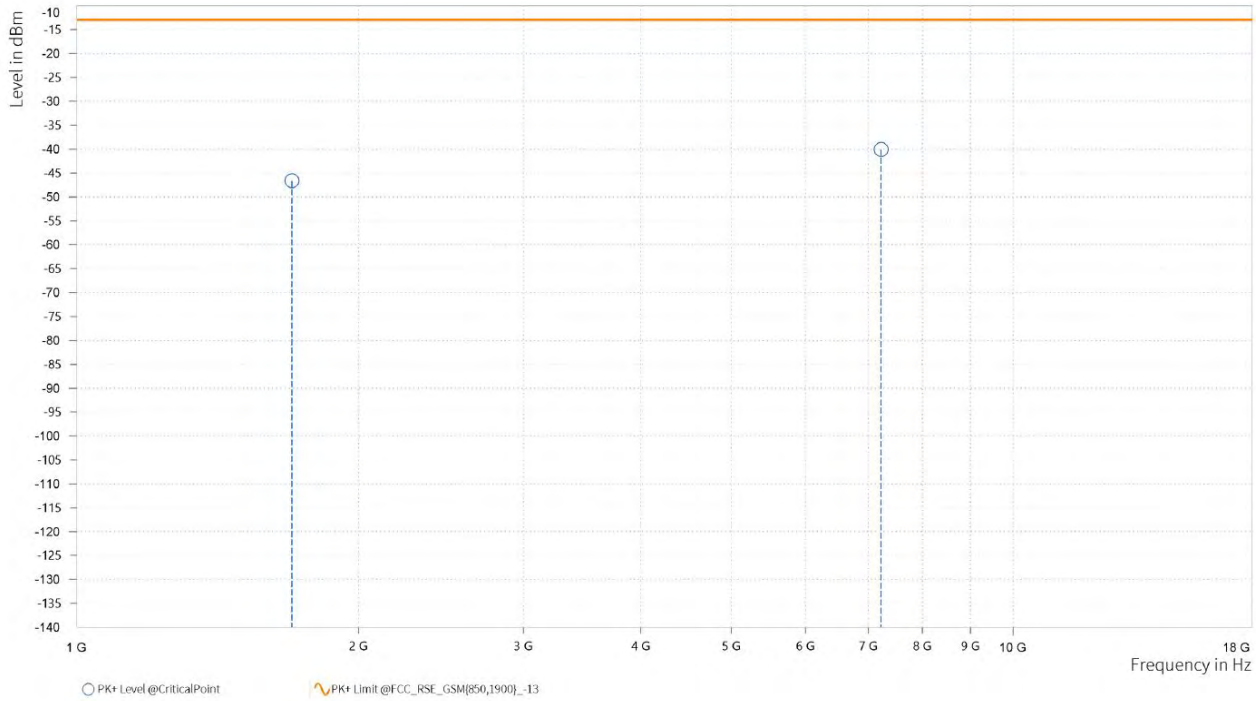
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,673.000	-47.30	-13.00	34.30	17.14	V	359	2
4	7,476.500	-39.56	-13.00	26.56	29.04	V	77.4	2



CH 251:

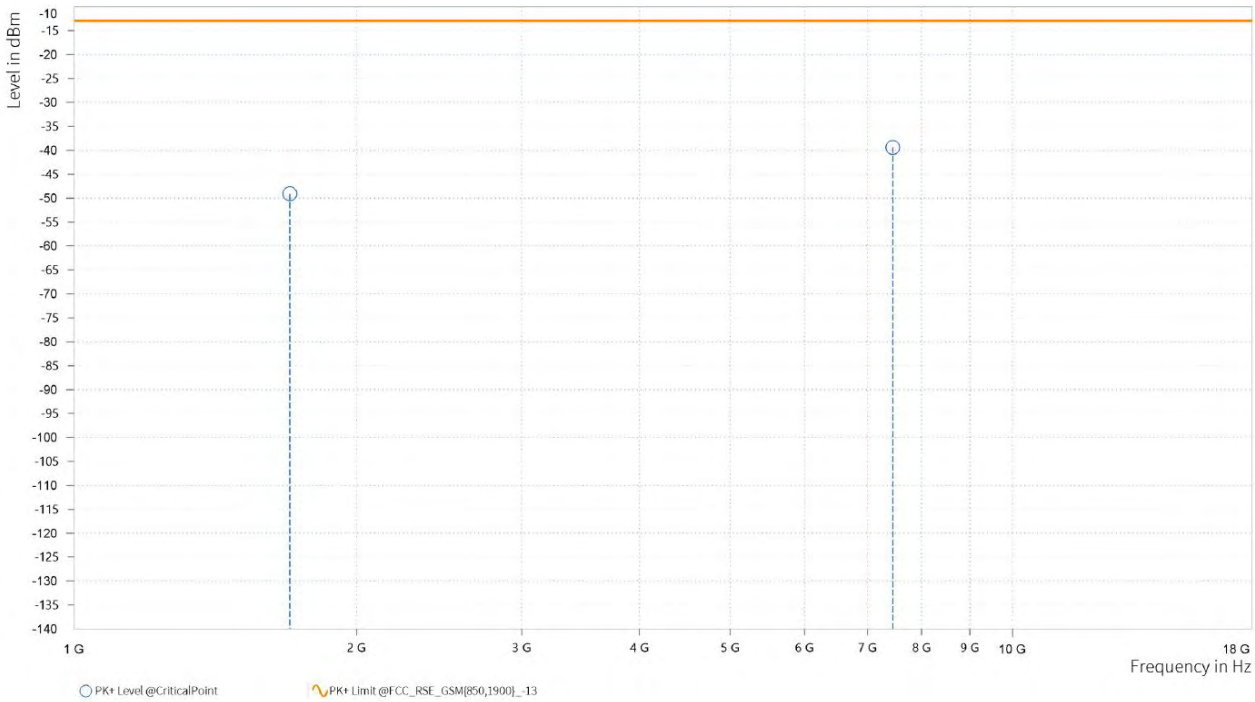
MODE	TX channel 251	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,697.500	-46.61	-13.00	33.61	18.62	H	0.9	2
4	7,227.000	-40.06	-13.00	27.06	29.62	H	0.9	2



MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,697.500	-49.09	-13.00	36.09	17.84	V	1	1
4	7,453.000	-39.40	-13.00	26.40	29.12	V	1	2

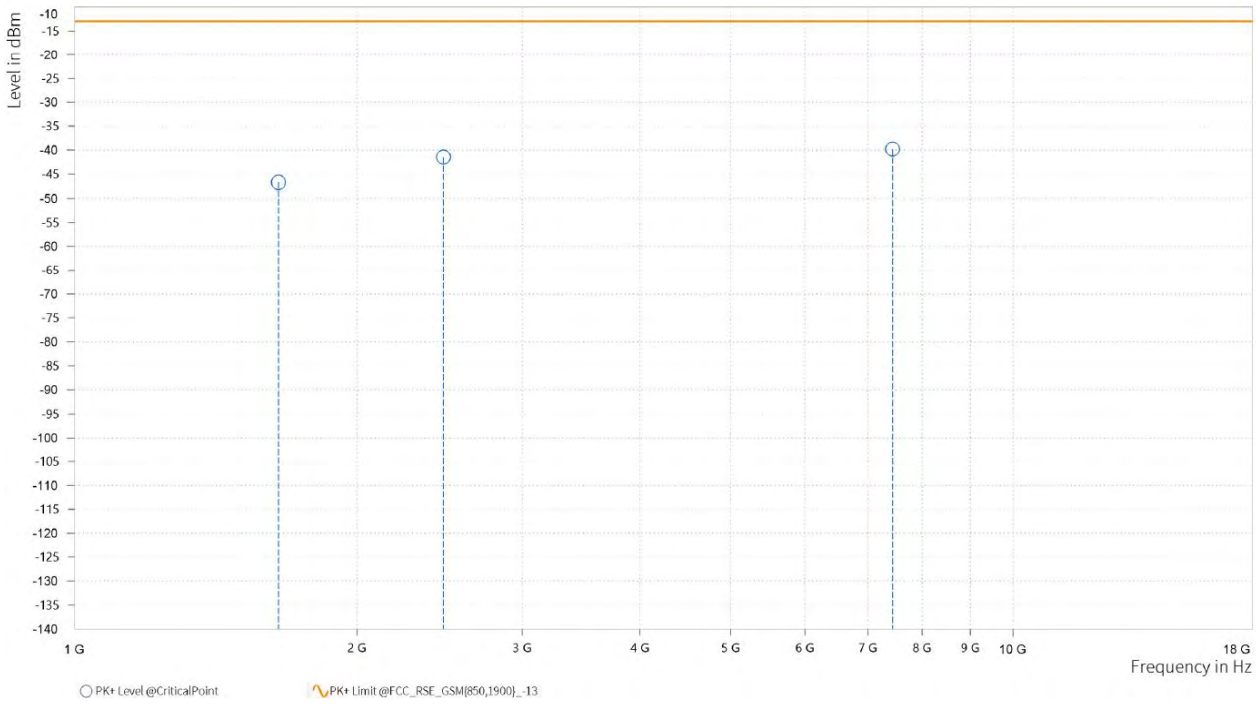


EDGE 850:

CH 128:

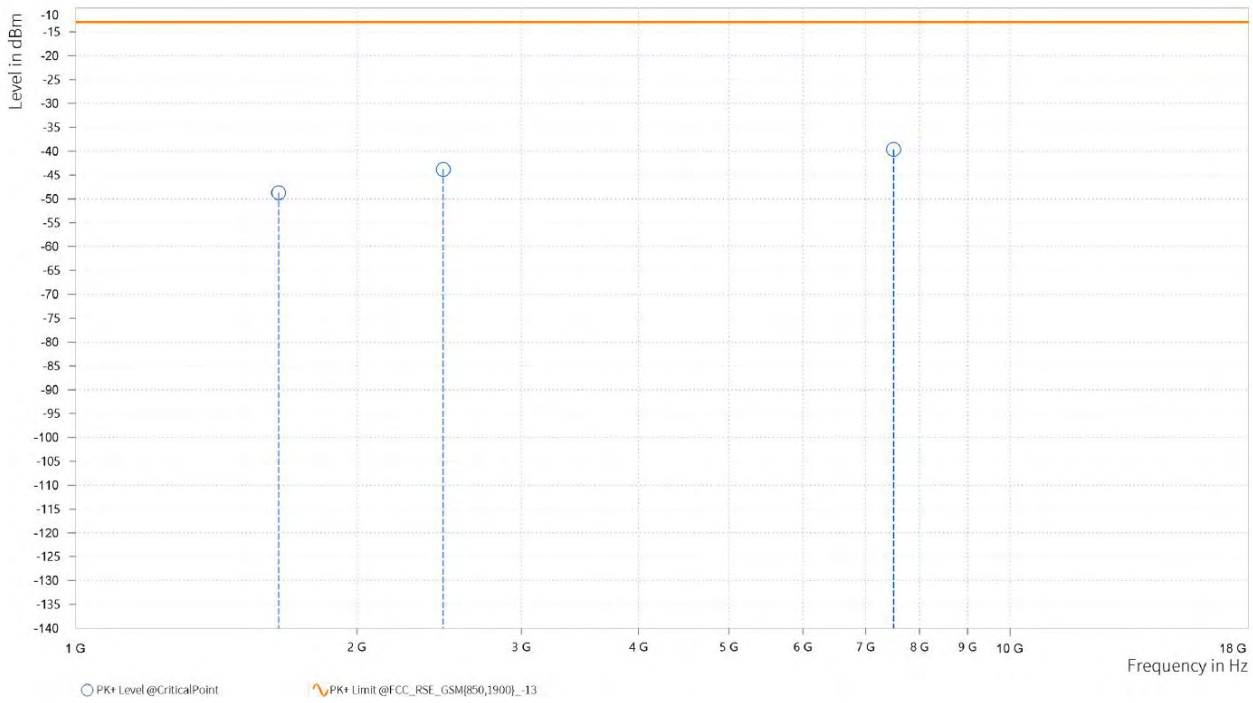
MODE	TX channel 128	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,649.000	-46.66	-13.00	33.66	17.48	H	359	2
3	2,472.500	-41.46	-13.00	28.46	22.42	H	359	2
4	7,437.000	-39.80	-13.00	26.80	29.09	H	250.5	1



MODE	TX channel 128	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

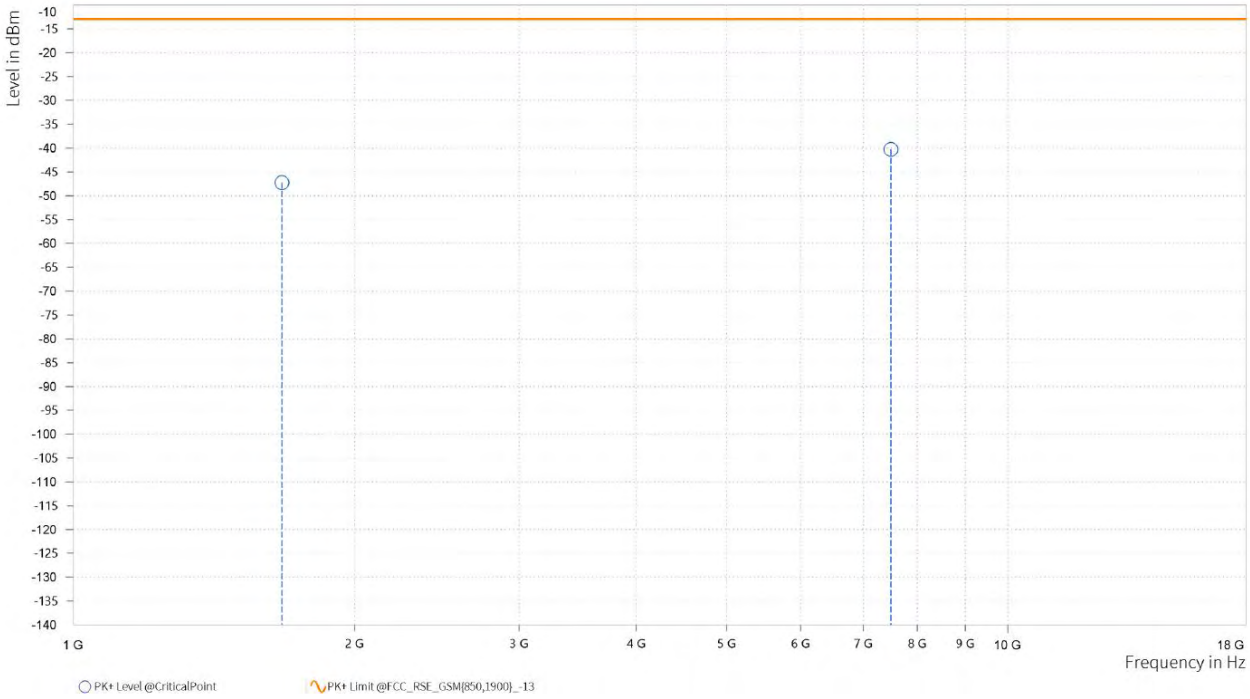
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,648.500	-48.71	-13.00	35.71	17.04	V	359	2
3	2,473.000	-43.82	-13.00	30.82	22.68	V	192.2	2
4	7,503.000	-39.65	-13.00	26.65	29.17	V	359	2



CH 190:

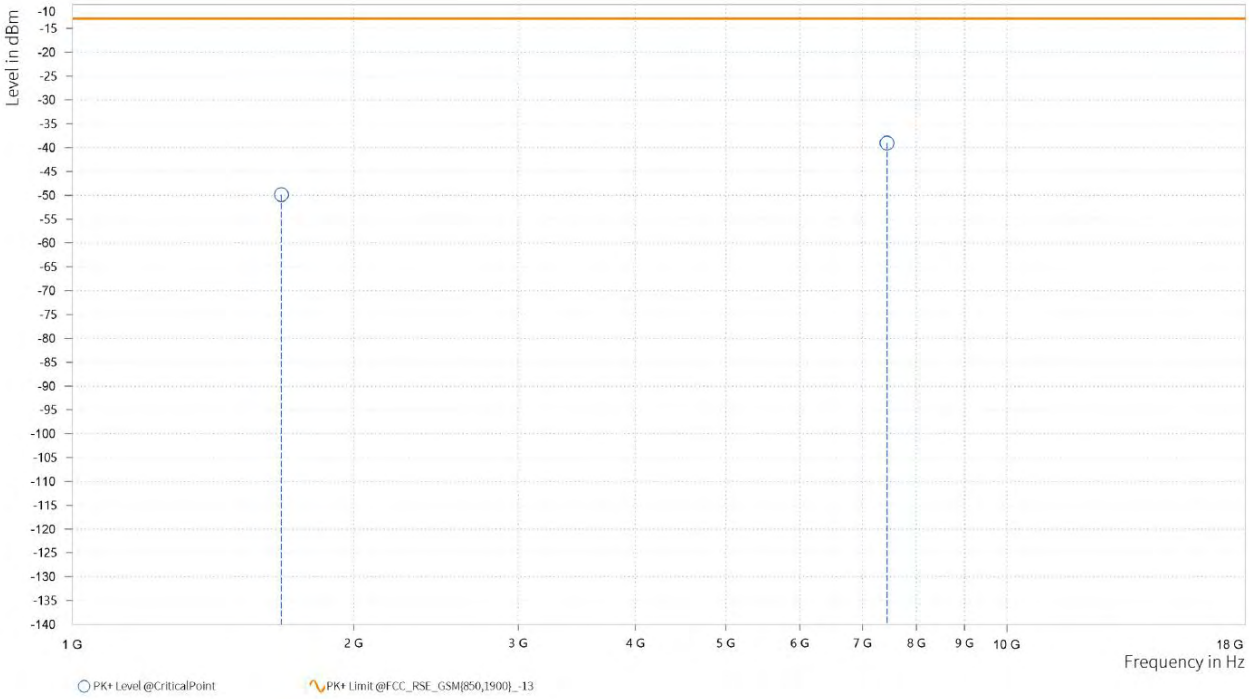
MODE	TX channel 190	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,672.000	-47.23	-13.00	34.23	18.24	H	93.8	1
4	7,497.500	-40.27	-13.00	27.27	29.13	H	359.1	1



MODE	TX channel 190	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

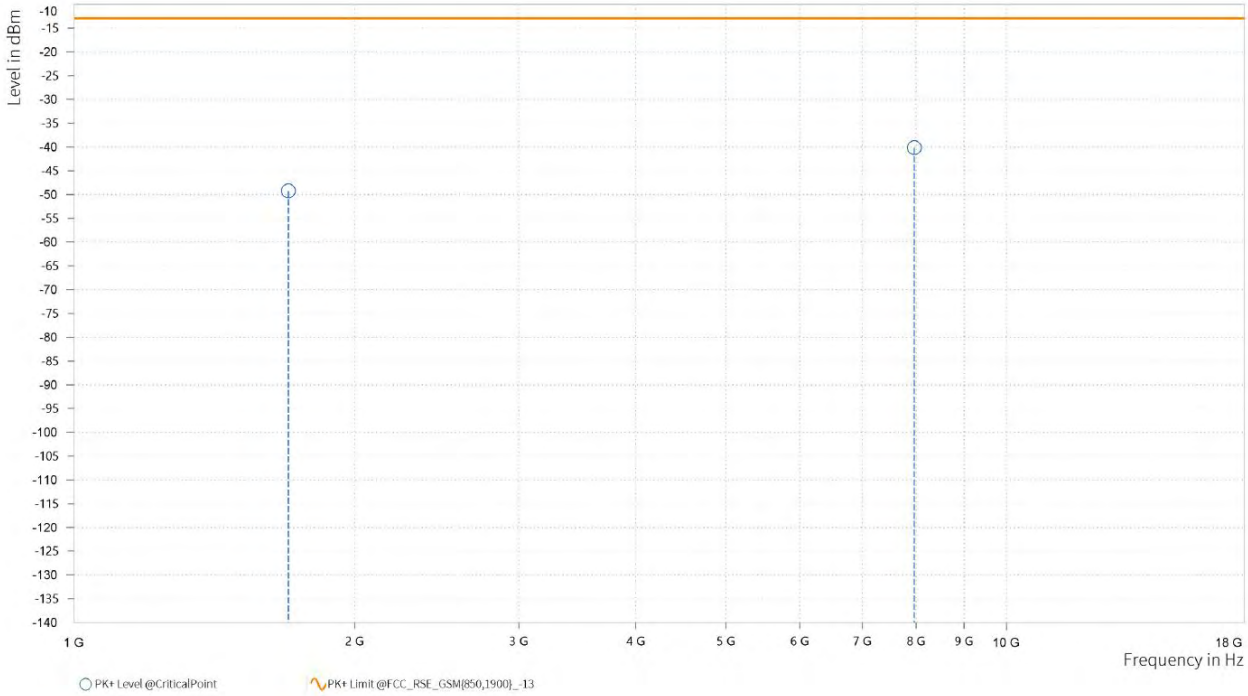
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,673.000	-49.90	-13.00	36.90	17.14	V	359	2
4	7,441.500	-39.01	-13.00	26.01	29.10	V	359.1	1



CH 251:

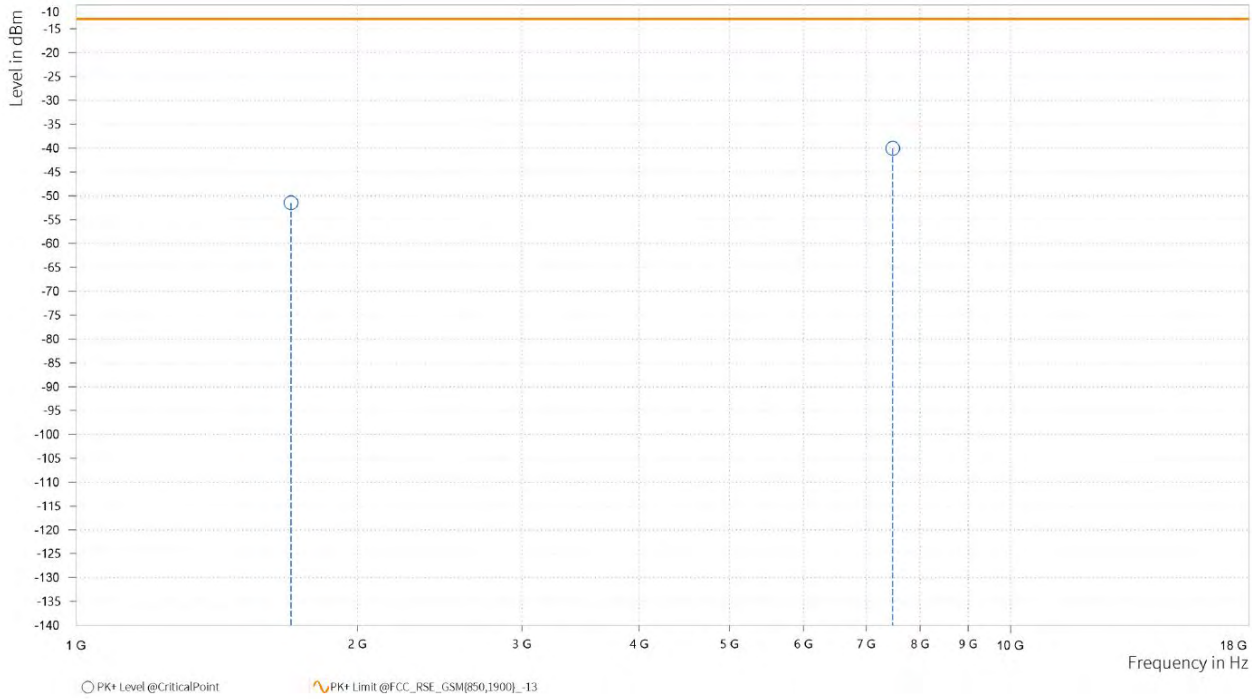
MODE	TX channel 251	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,697.500	-49.23	-13.00	36.23	18.62	H	359	1
4	7,961.000	-40.14	-13.00	27.14	29.90	H	1	2



MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,697.500	-51.49	-13.00	38.49	17.84	V	359.1	1
4	7,475.500	-40.05	-13.00	27.05	29.04	V	0.9	2

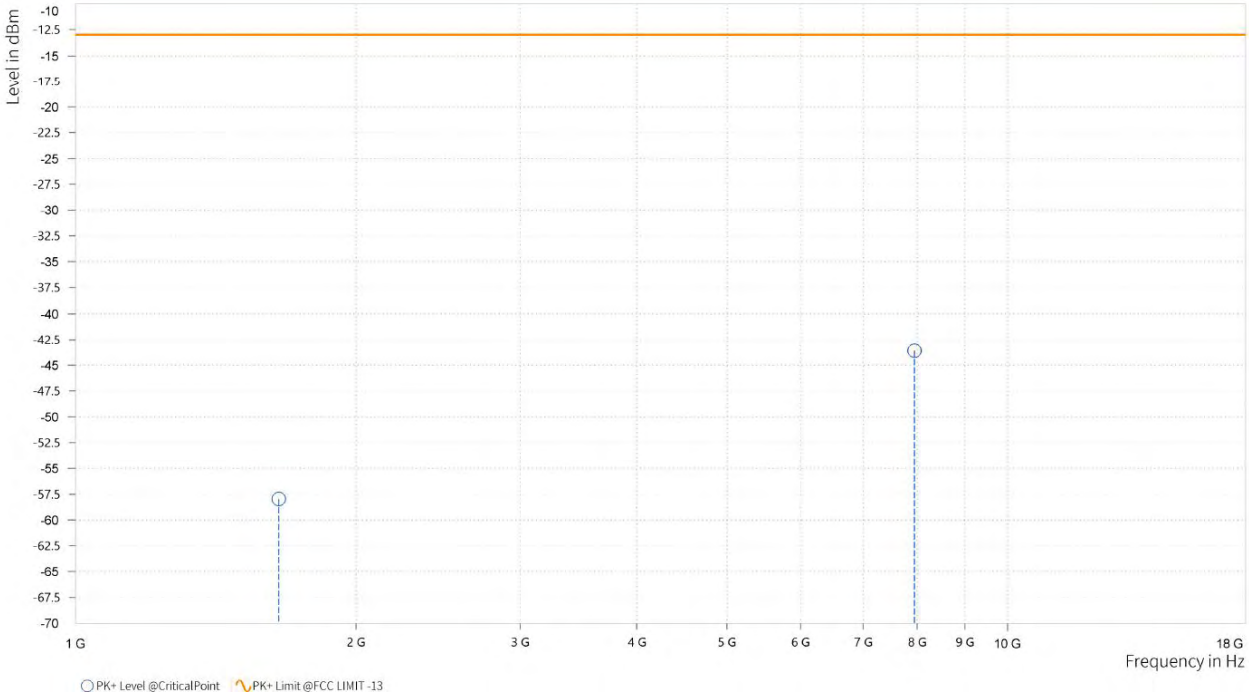


WCDMA Band V:

CH 4132:

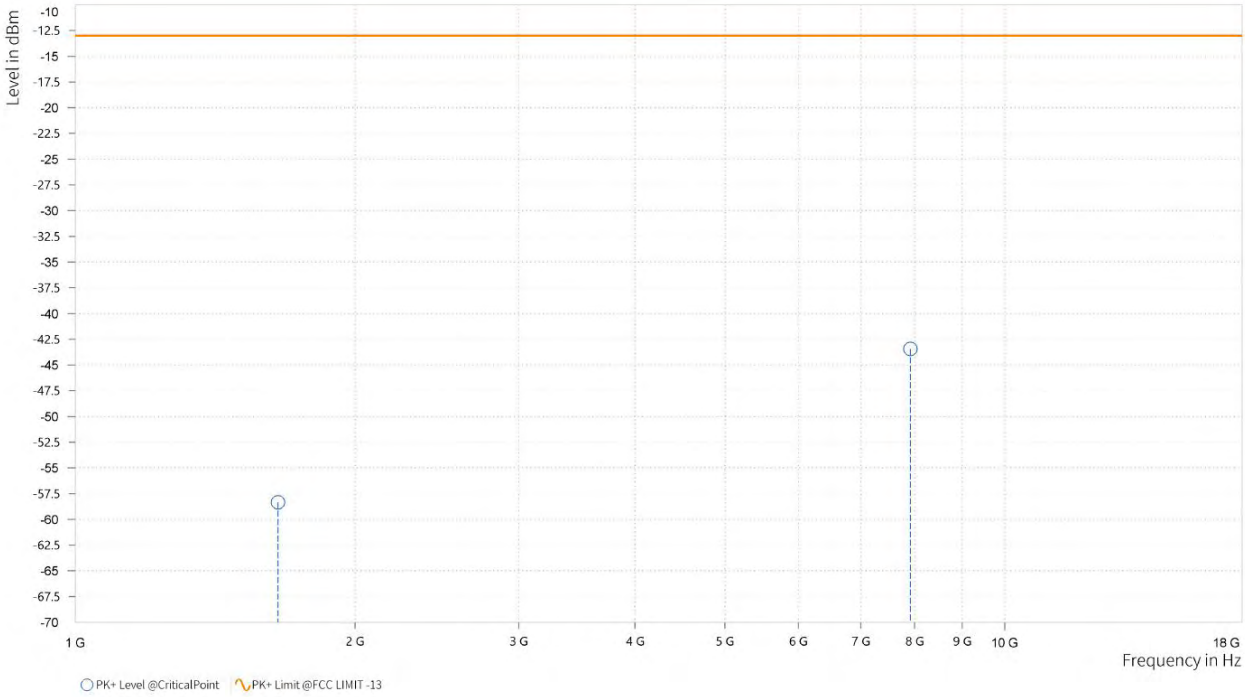
MODE	TX channel 4132	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,652.500	-57.96	-13.00	44.96	14.49	H	61.7	1
5	7,946.000	-43.58	-13.00	30.58	32.99	H	359	2



MODE	TX channel 4132	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

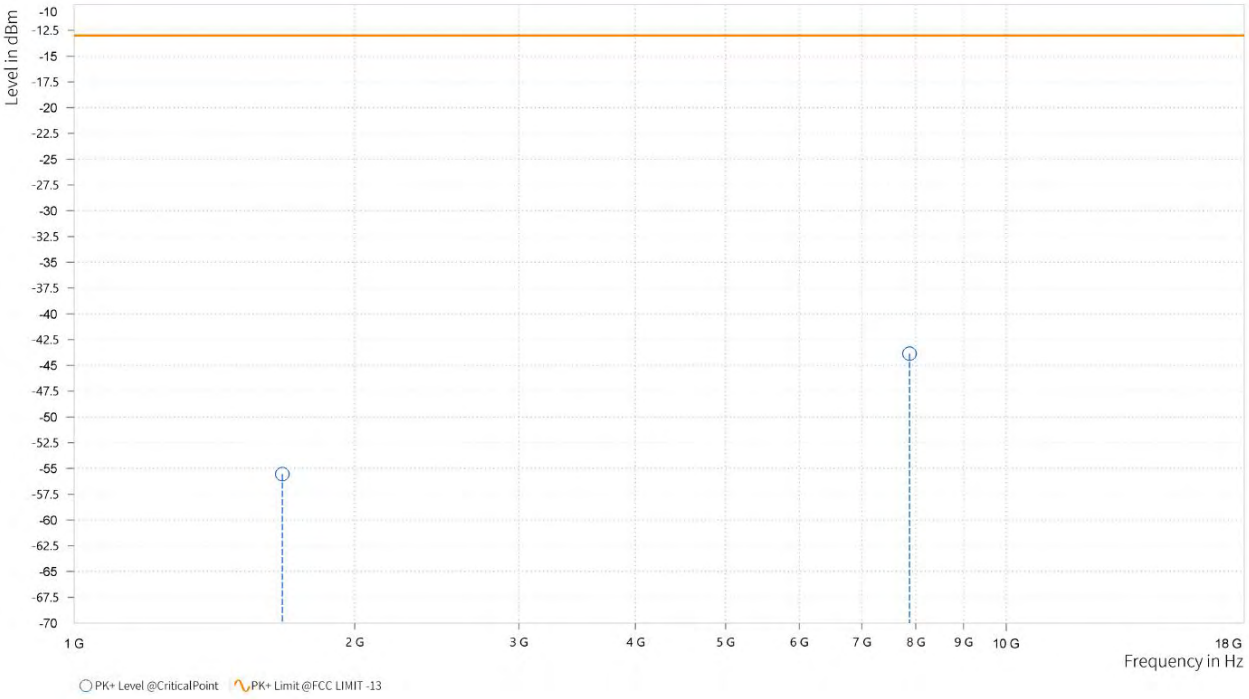
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,653.000	-58.33	-13.00	45.33	14.48	V	359	2
5	7,915.500	-43.45	-13.00	30.45	33.11	V	1	1



CH 4182:

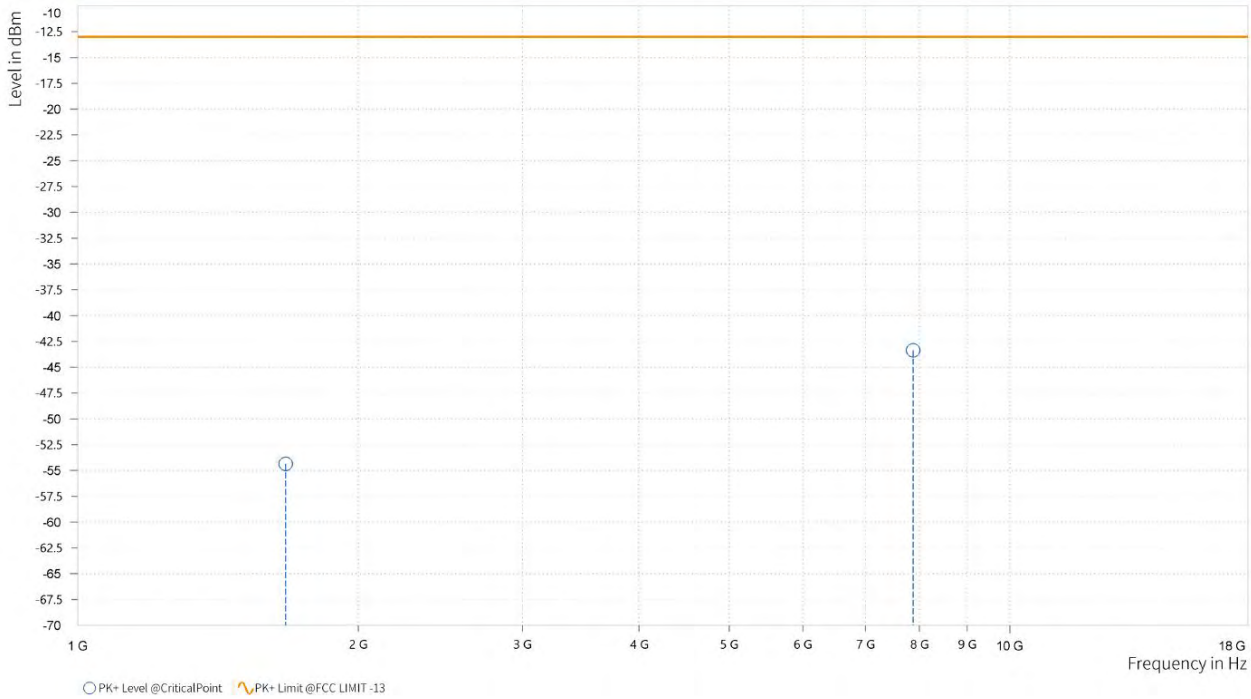
MODE	TX channel 4182	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,672.500	-55.55	-13.00	42.55	15.07	H	297	2
5	7,874.500	-43.86	-13.00	30.86	33.00	H	92.6	2



MODE	TX channel 4182	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

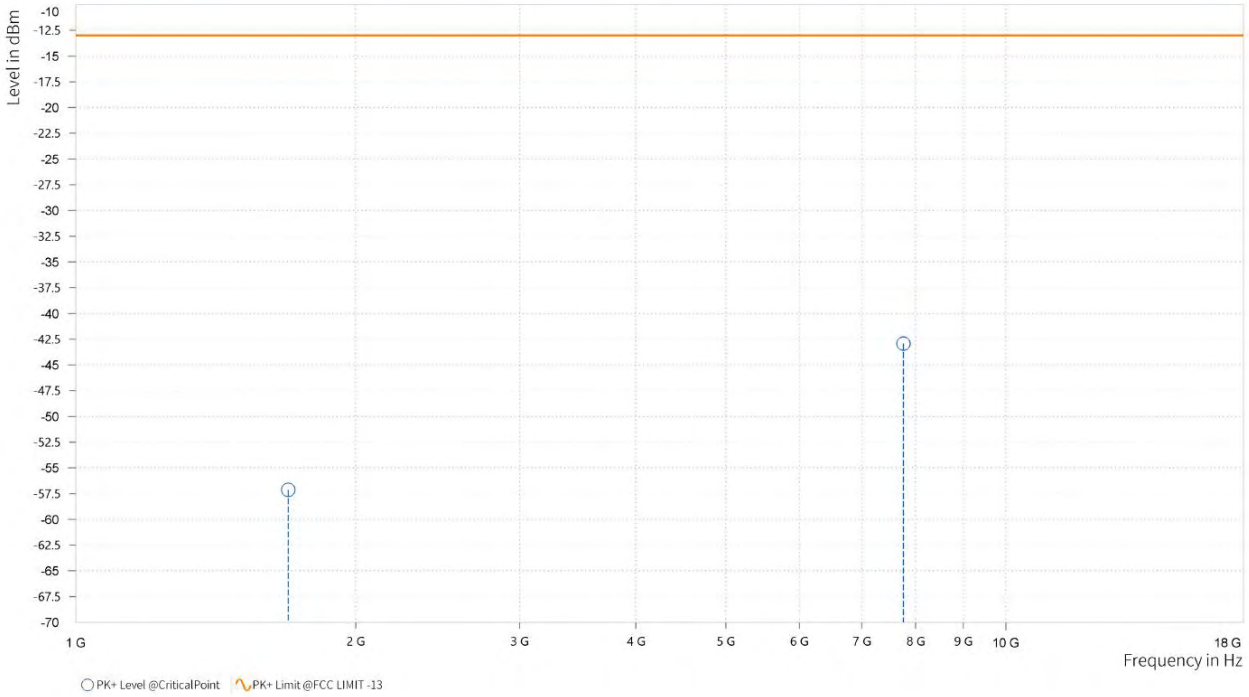
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,672.000	-54.36	-13.00	41.36	15.09	V	1	1
5	7,876.000	-43.35	-13.00	30.35	33.05	V	266.2	1



CH 4233:

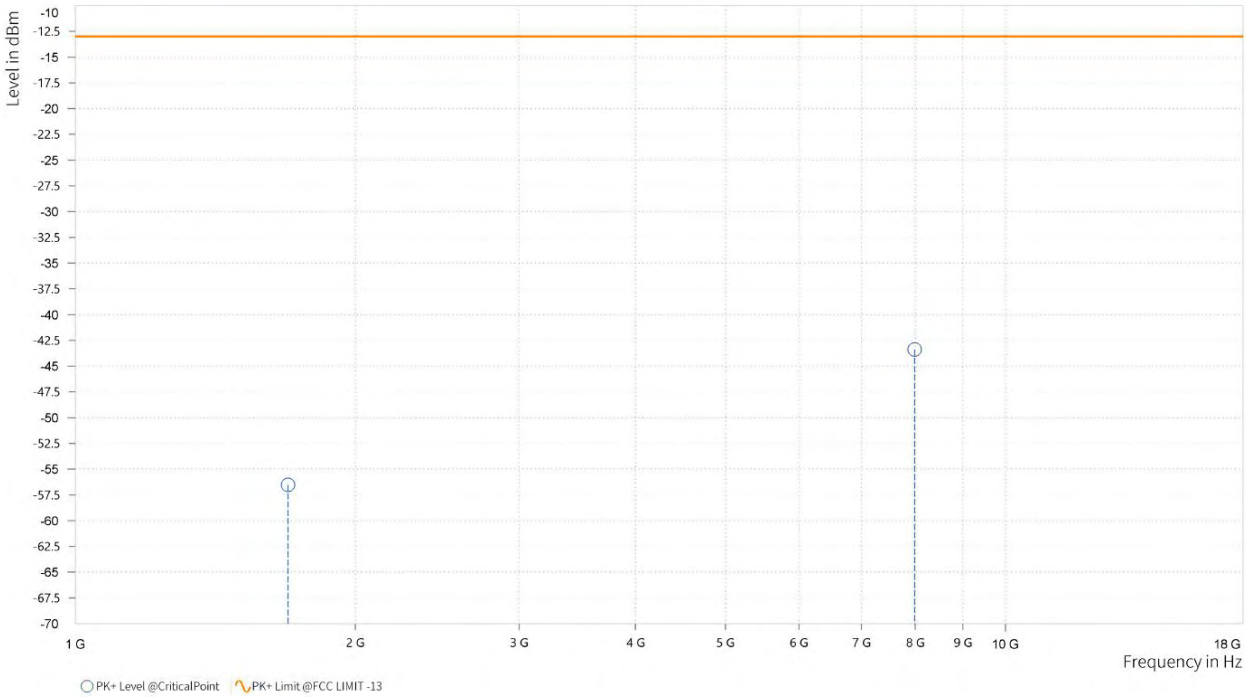
MODE	TX channel 4233	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,692.500	-57.14	-13.00	44.14	15.32	H	61.7	1
5	7,759.000	-42.93	-13.00	29.93	32.83	H	1	1



MODE	TX channel 4233	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,693.000	-56.53	-13.00	43.53	15.97	V	359	2
5	7,989.500	-43.38	-13.00	30.38	33.33	V	1	2



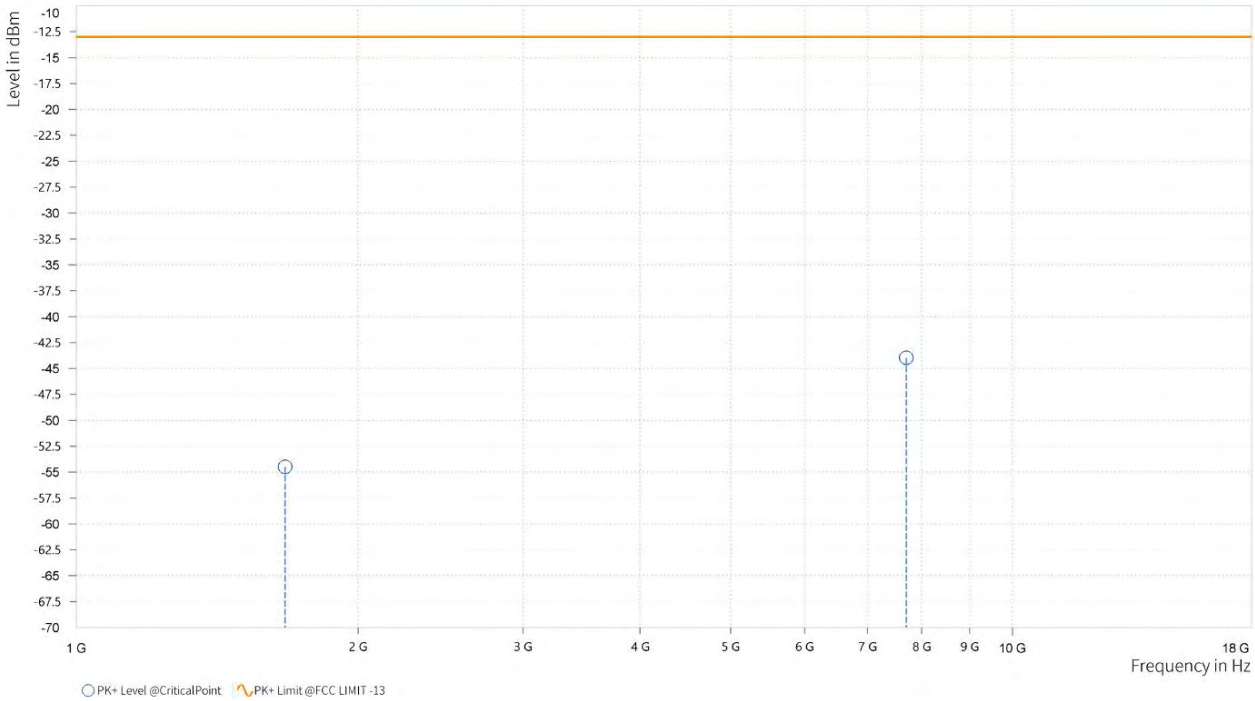
LTE Band 5

CHANNEL BANDWIDTH: 1.4MHz / QPSK

CH 20525:

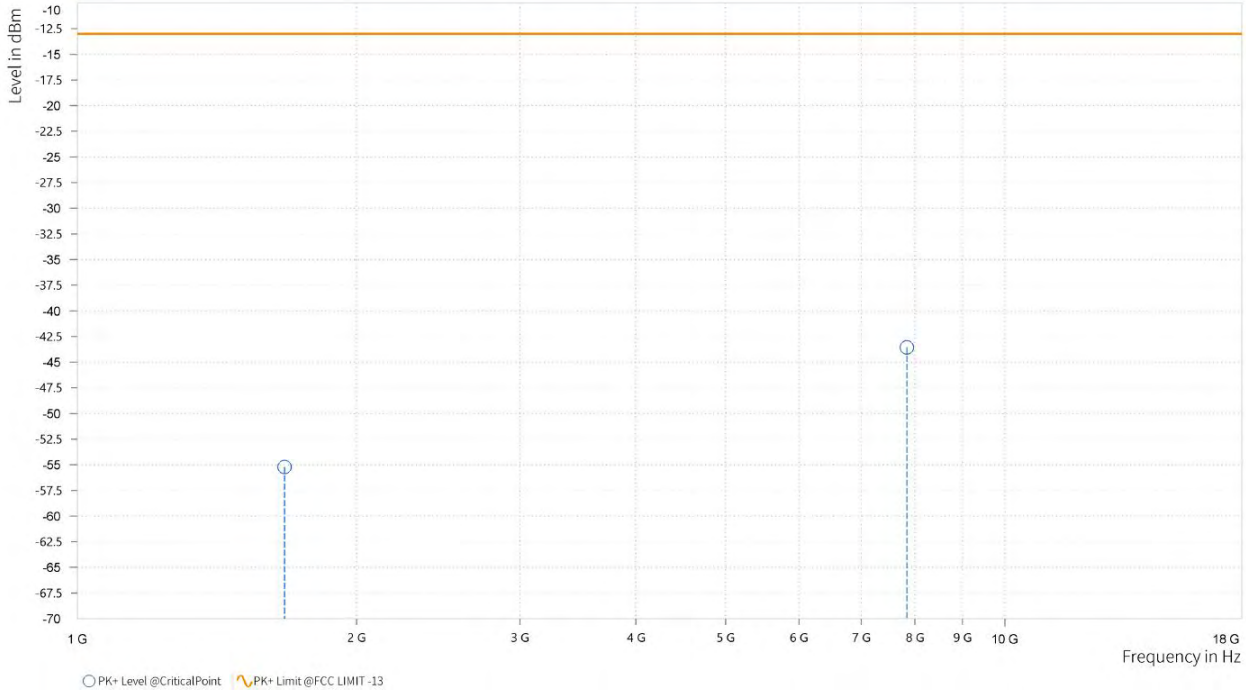
MODE	TX channel 20525	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,672.000	-54.49	-13.00	41.49	15.06	H	64.2	1
5	7,702.000	-43.97	-13.00	30.97	32.74	H	272.2	1



MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,672.500	-55.22	-13.00	42.22	15.10	V	1	2
5	7,842.000	-43.57	-13.00	30.57	33.06	V	269.7	1

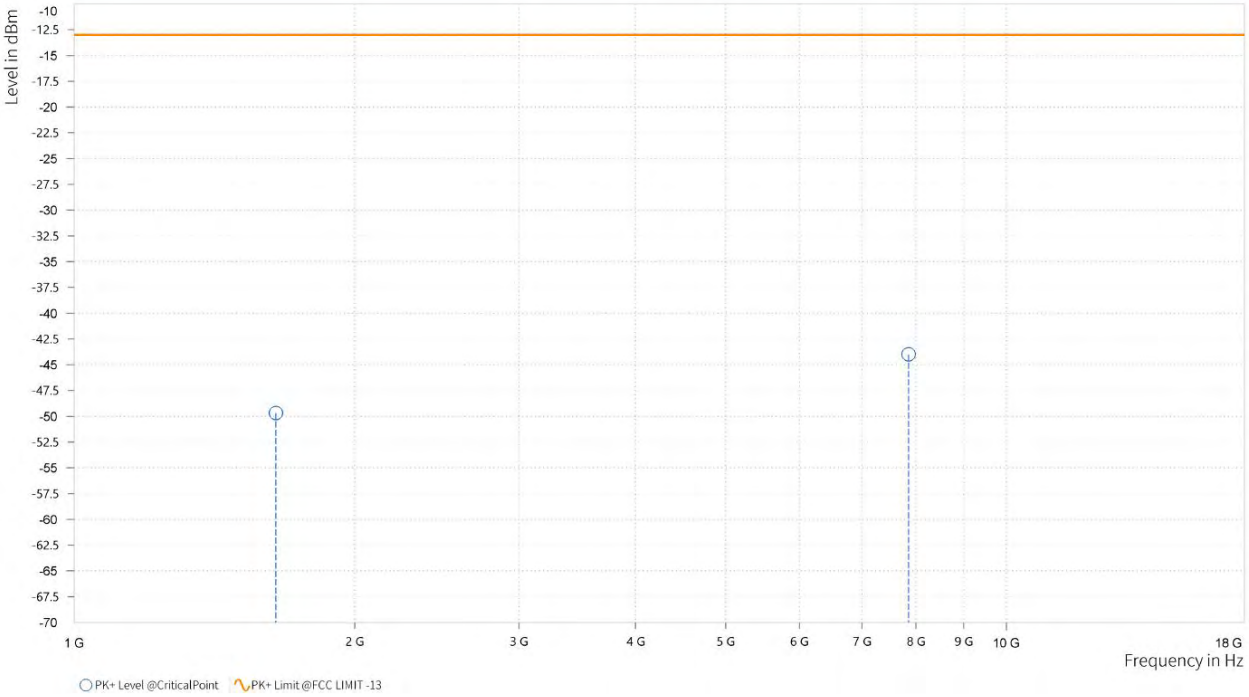


CHANNEL BANDWIDTH: 3MHz / QPSK

CH 20415:

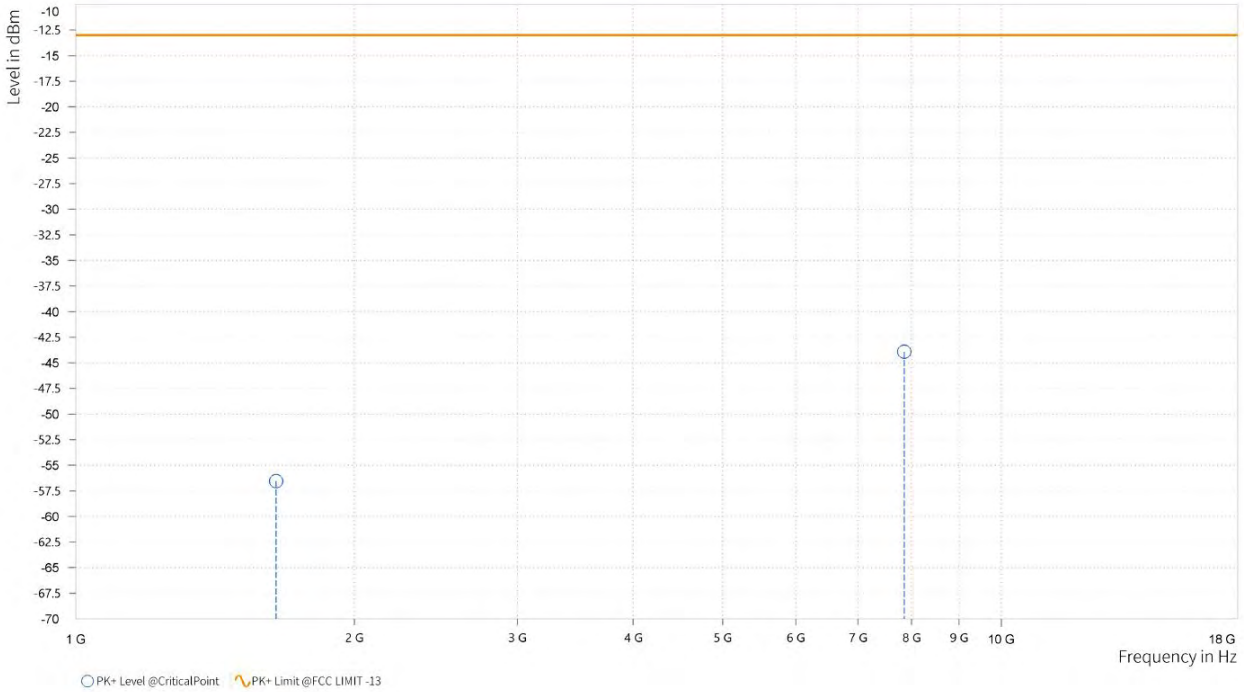
MODE	TX channel 20415	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,646.500	-49.69	-13.00	36.69	14.20	H	359.1	1
5	7,854.000	-43.98	-13.00	30.98	32.98	H	272.2	1



MODE	TX channel 20415	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

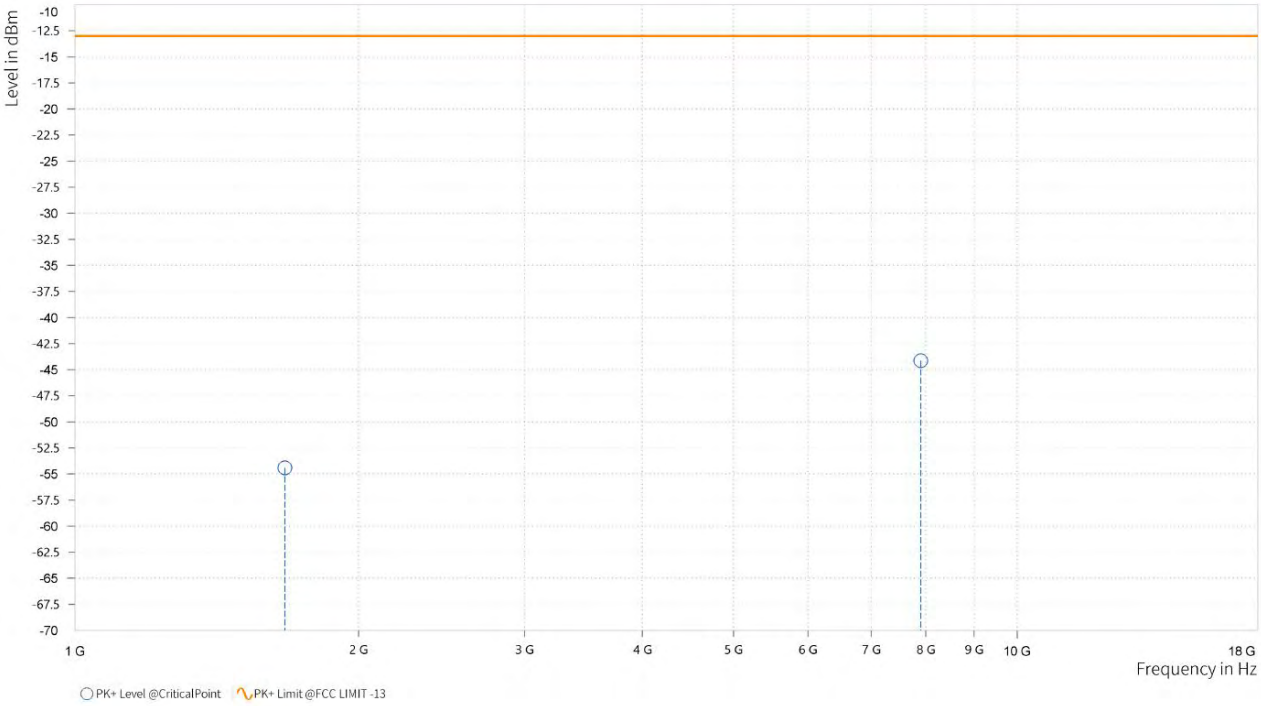
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,646.500	-56.55	-13.00	43.55	14.13	V	359.1	1
5	7,854.000	-43.90	-13.00	30.90	33.06	V	273.4	1



CH20525

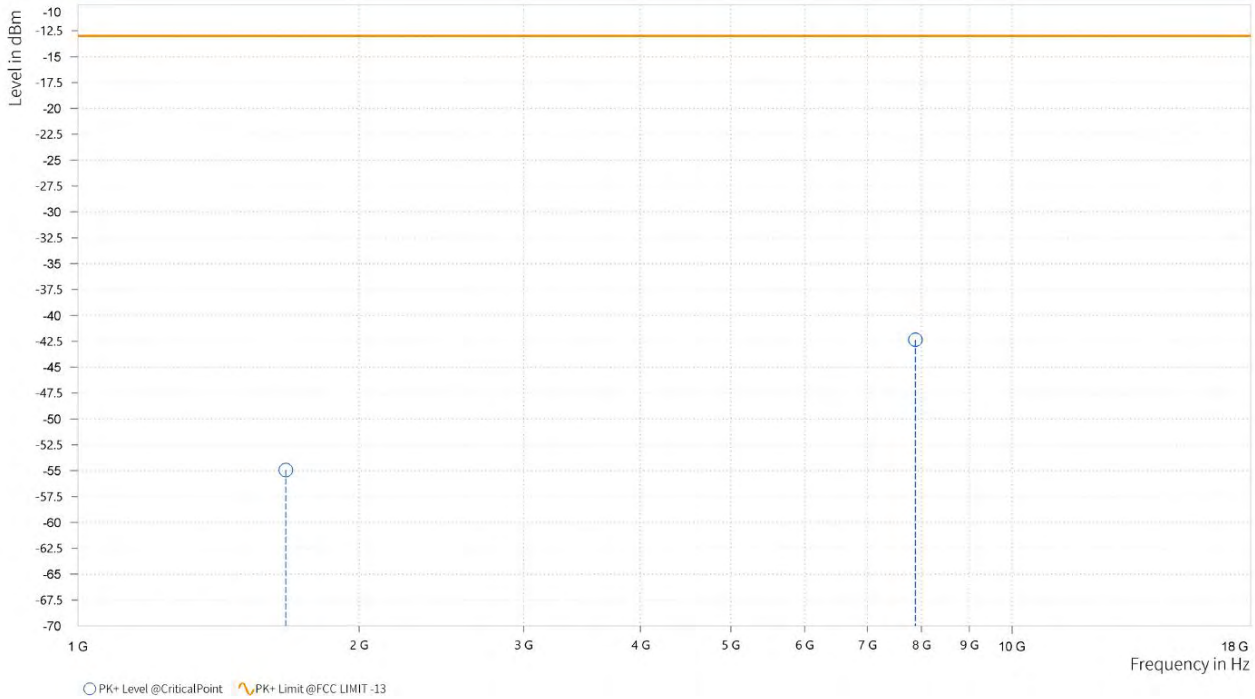
MODE	TX channel 20525	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,670.500	-54.42	-13.00	41.42	15.02	H	295.9	2
5	7,903.000	-44.13	-13.00	31.13	33.01	H	359.1	1



MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

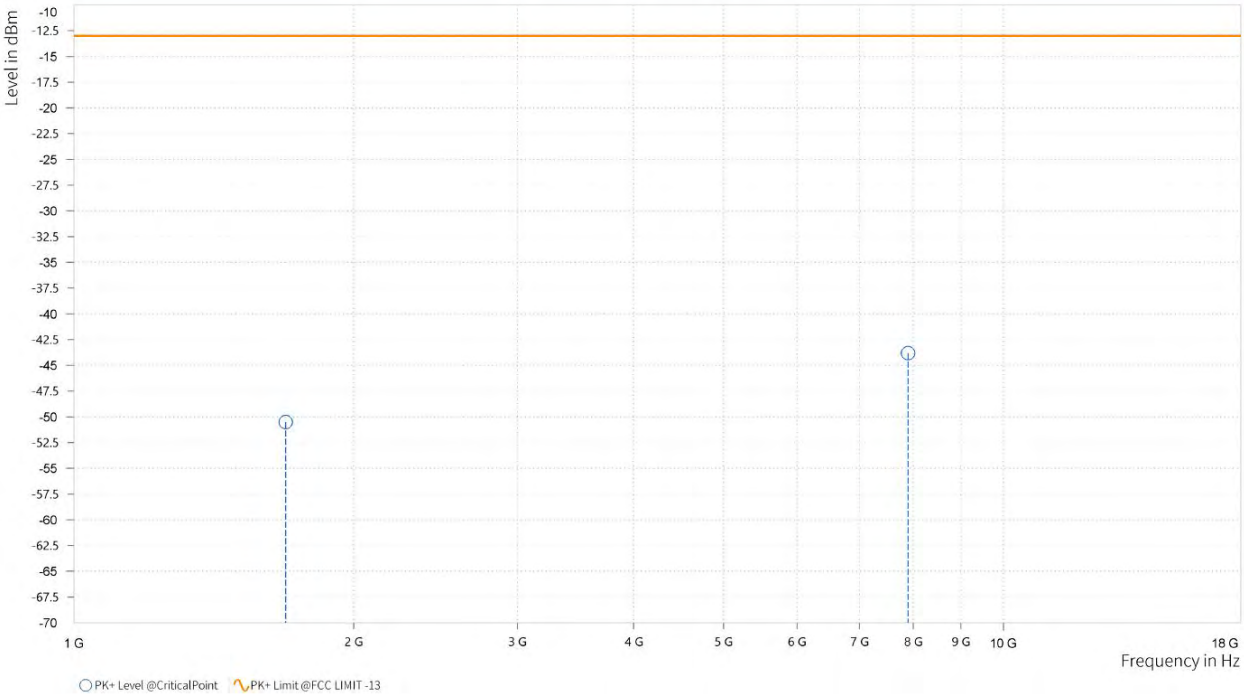
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,670.000	-54.94	-13.00	41.94	15.04	V	359.1	1
5	7,879.500	-42.37	-13.00	29.37	33.04	V	359.1	1



CH 20635:

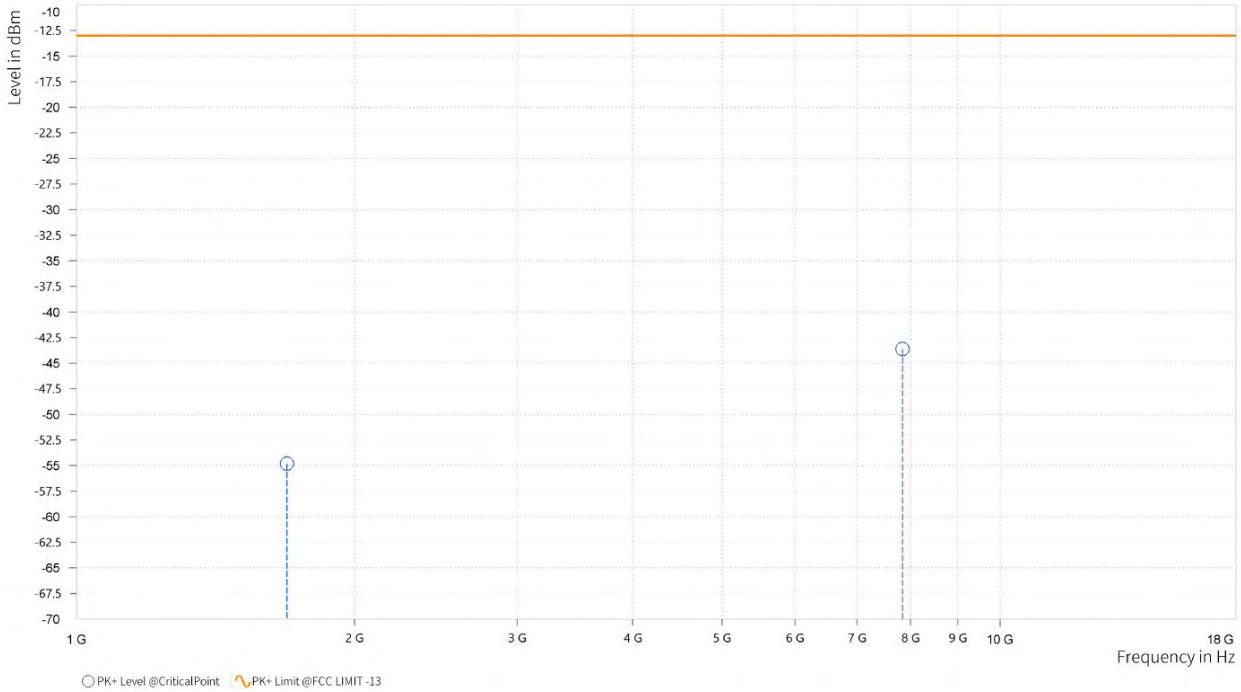
MODE	TX channel 20635	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,690.500	-50.52	-13.00	37.52	15.27	H	294.6	2
5	7,895.000	-43.81	-13.00	30.81	33.01	H	1	1



MODE	TX channel 20635	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,690.500	-54.81	-13.00	41.81	15.83	V	1	1
5	7,838.500	-43.62	-13.00	30.62	33.06	V	86.6	2

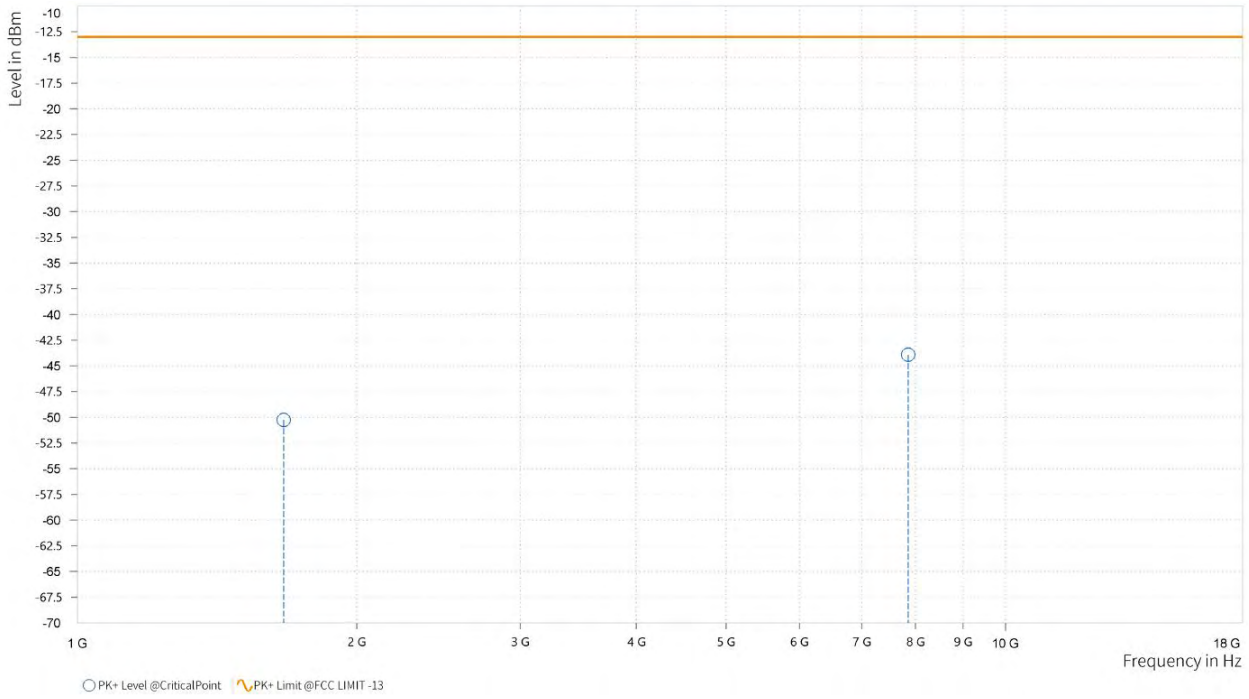


CHANNEL BANDWIDTH: 5MHz / QPSK

CH 20525

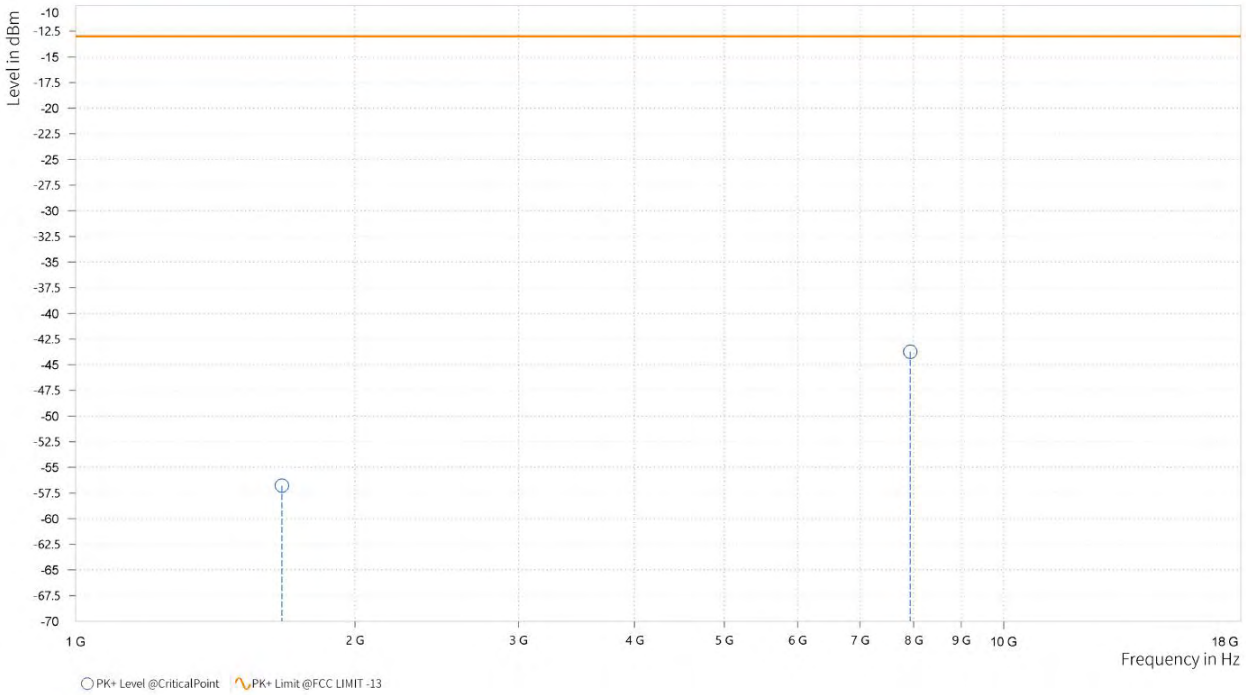
MODE	TX channel 20525	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,669.000	-50.26	-13.00	37.26	14.99	H	359	1
5	7,857.500	-43.91	-13.00	30.91	32.98	H	86.6	2



MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,668.500	-56.79	-13.00	43.79	15.00	V	359	2
5	7,930.500	-43.73	-13.00	30.73	33.16	V	359	1

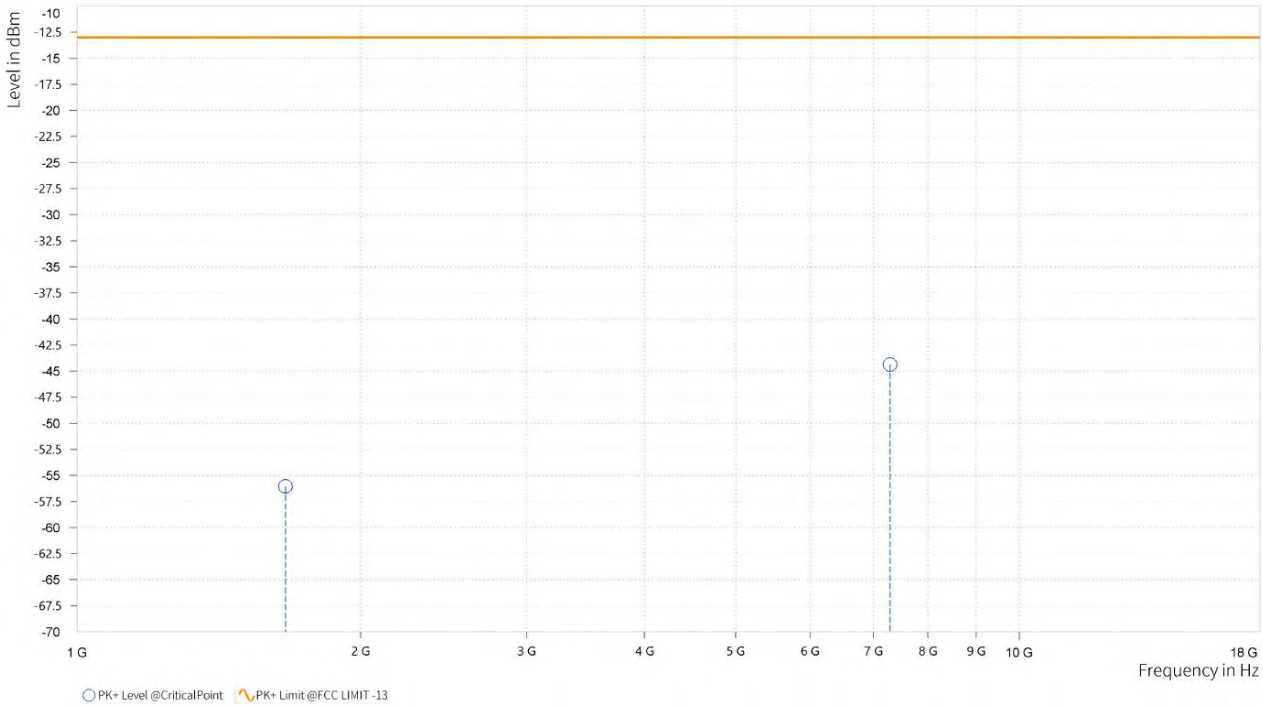


CHANNEL BANDWIDTH: 10MHz / QPSK

CH 20525

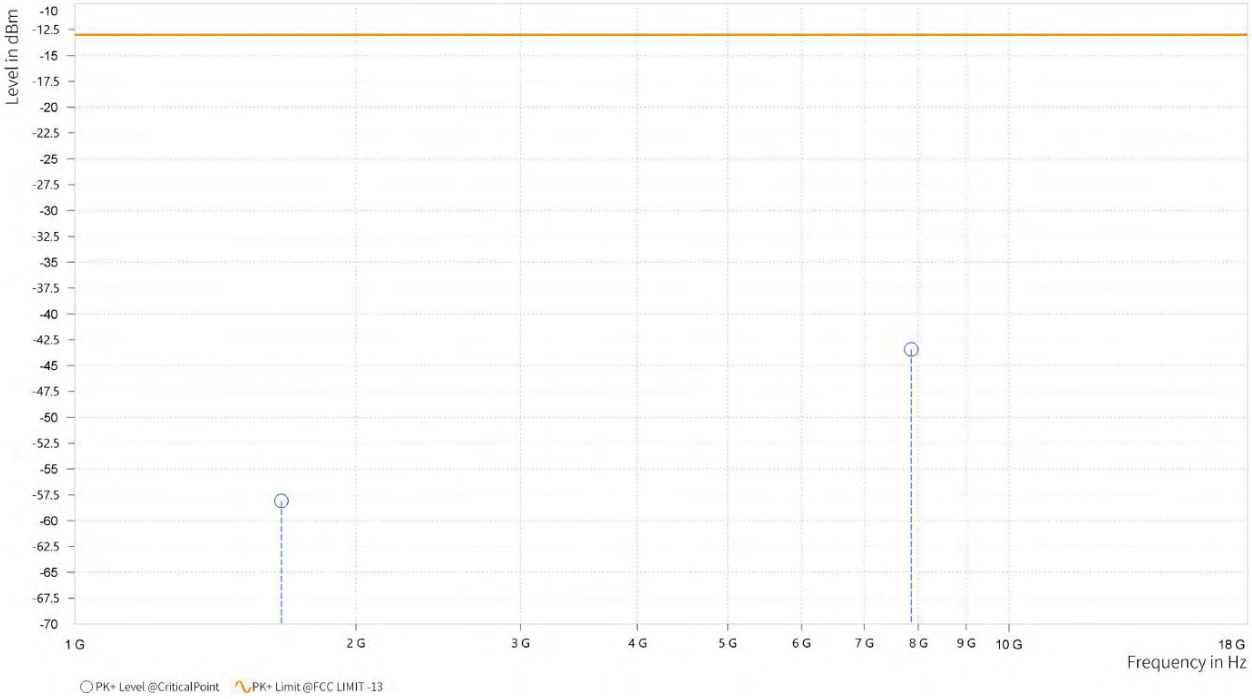
MODE	TX channel 20525	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,664.500	-56.04	-13.00	43.04	14.89	H	0.9	2
5	7,291.000	-44.36	-13.00	31.36	31.53	H	92.6	2



MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Chao Wu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,664.000	-58.10	-13.00	45.10	14.89	V	359	2
5	7,859.000	-43.43	-13.00	30.43	33.05	V	268.5	1

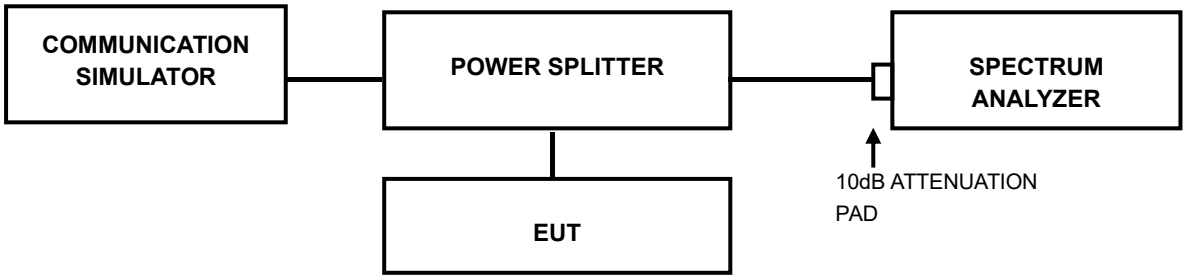


3.7 PEAK TO AVERAGE RATIO

3.7.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT

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

3.7.2 TEST SETUP



3.7.3 TEST PROCEDURES

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

3.7.4 TEST RESULTS

Please Refer to Appendix Of this test report.

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

5 INFORMATION ON THE TESTING LABORATORIES

We, Huarui 7layers High Technology (Suzhou) Co., Ltd. ,were founded in 2020 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Suzhou EMC/RF Lab:
Tel: +86 (0557) 368 1008

6 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

7 APPENDIX:

GSM850

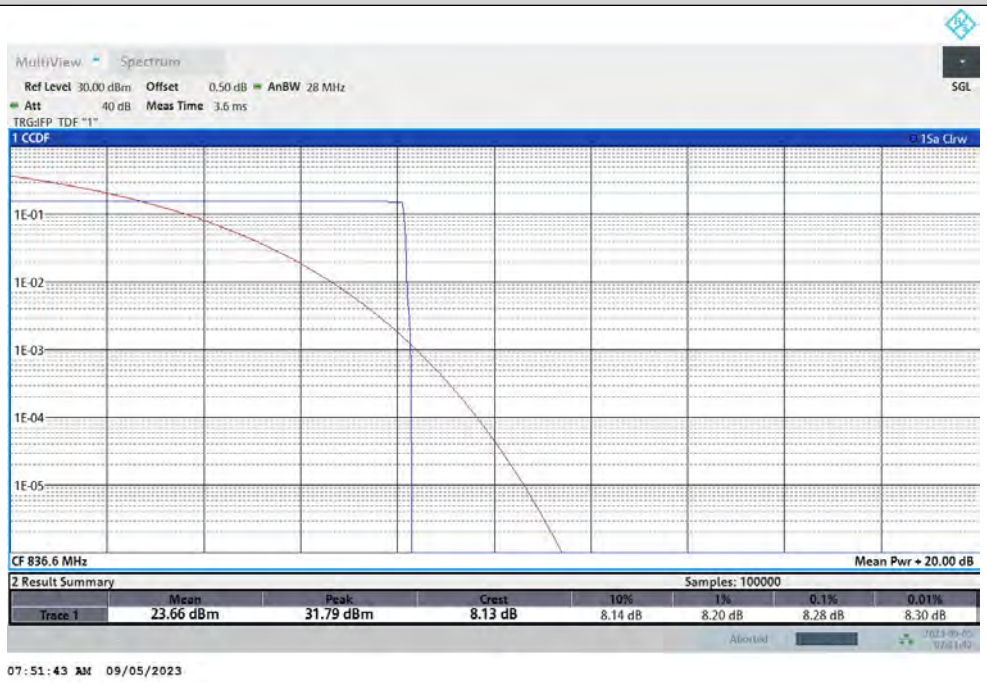
PEAK-TO-AVERAGE RATIO(CCDF)

Test Result

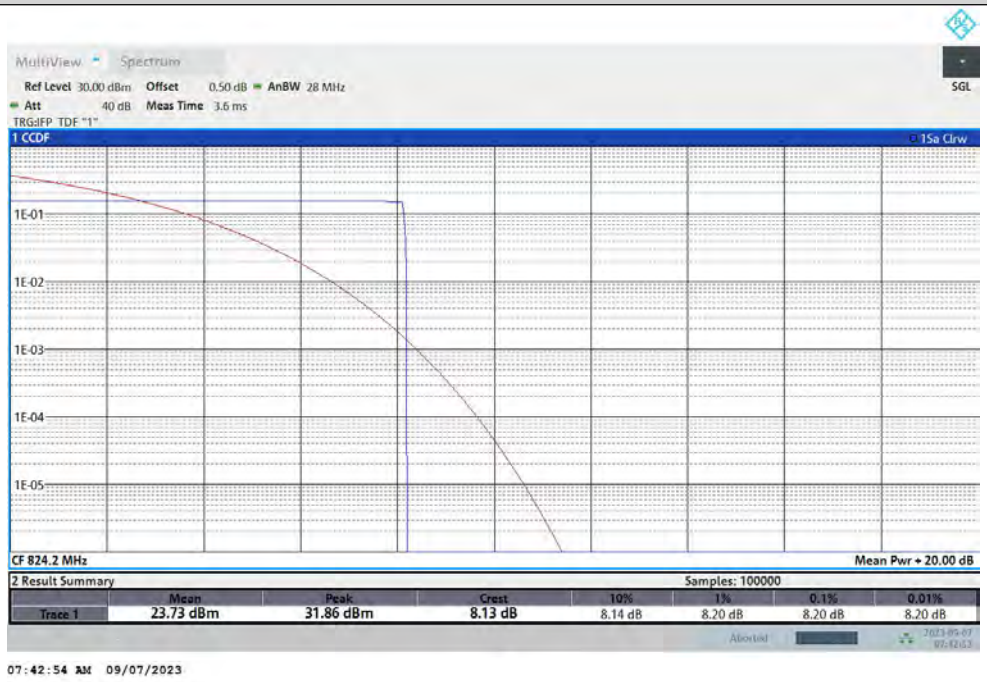
Band	Channel	Result(dB)	Limit(dB)	Verdict
GSM850	128	8.28	13	PASS
GSM850	189	8.28	13	PASS
GSM850	251	8.20	13	PASS
EGPRS850	128	11.24	13	PASS
EGPRS850	189	11.28	13	PASS
EGPRS850	251	11.38	13	PASS

Test Graphs

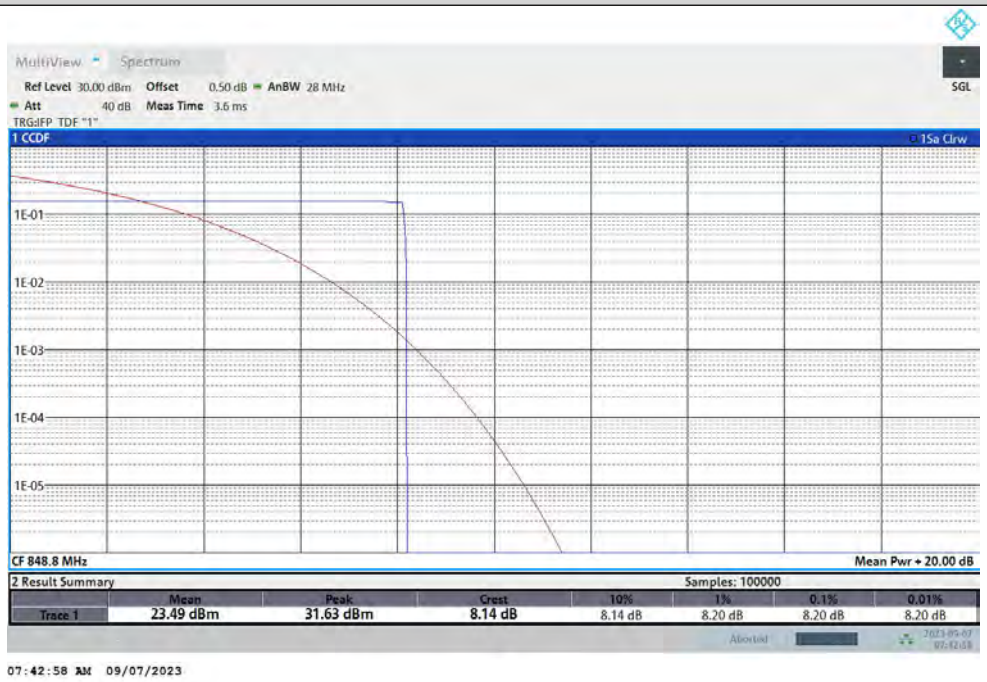
GSM850-128



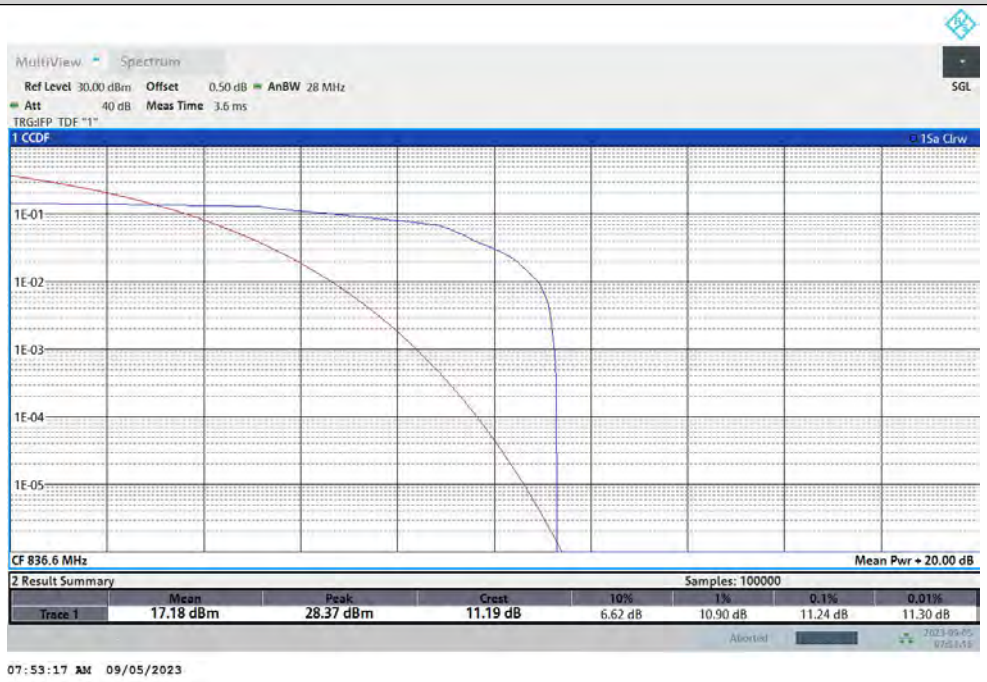
GSM850-189



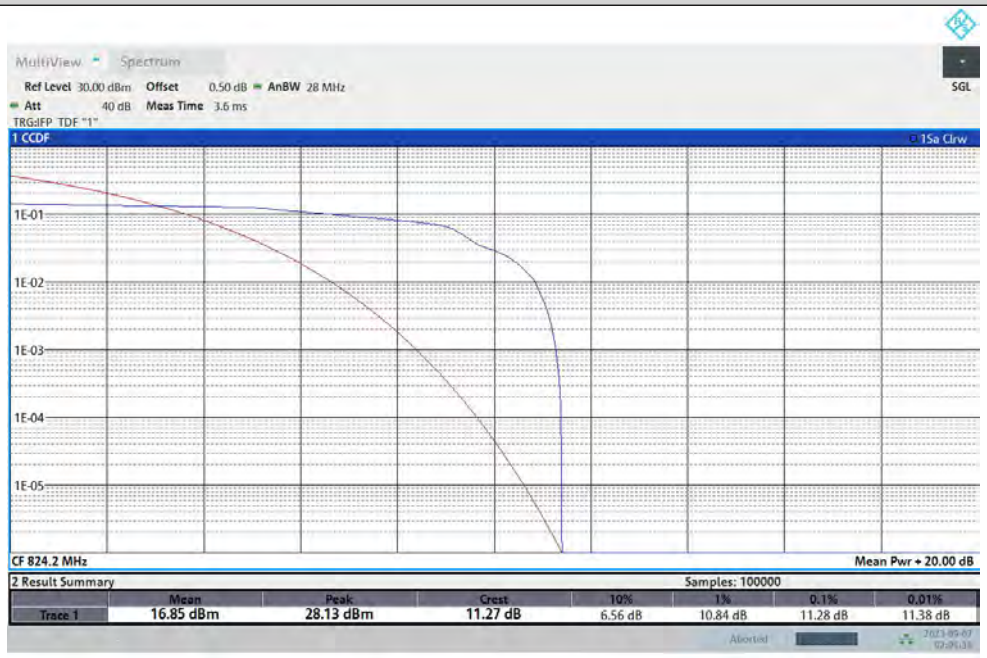
GSM850-251



EGPRS850-128



EGPRS850-189



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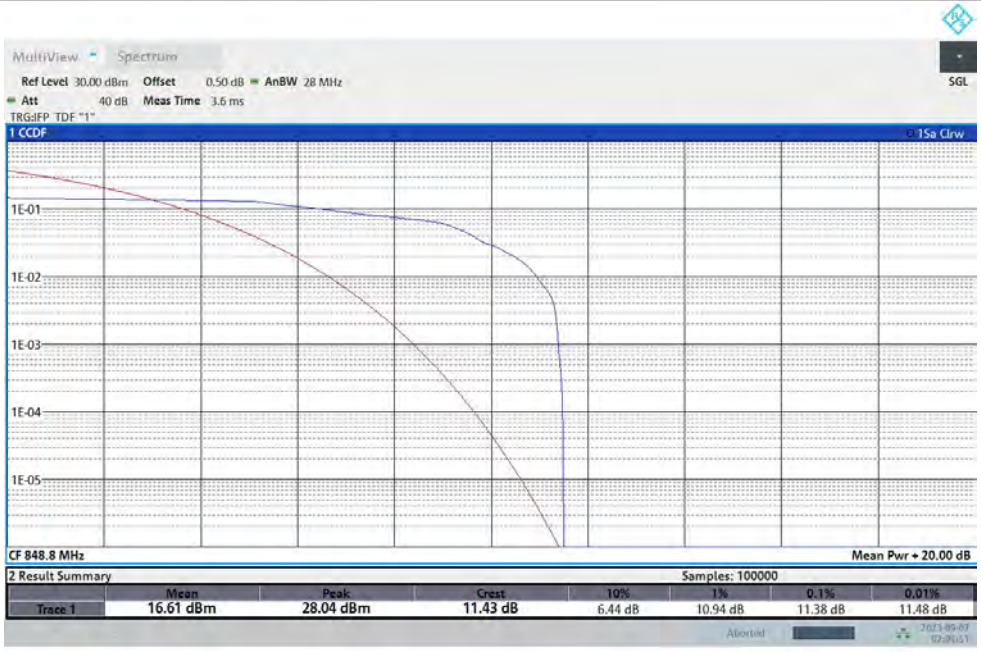
EGPRS850-251



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26DB BANDWIDTH AND OCCUPIED BANDWIDTH

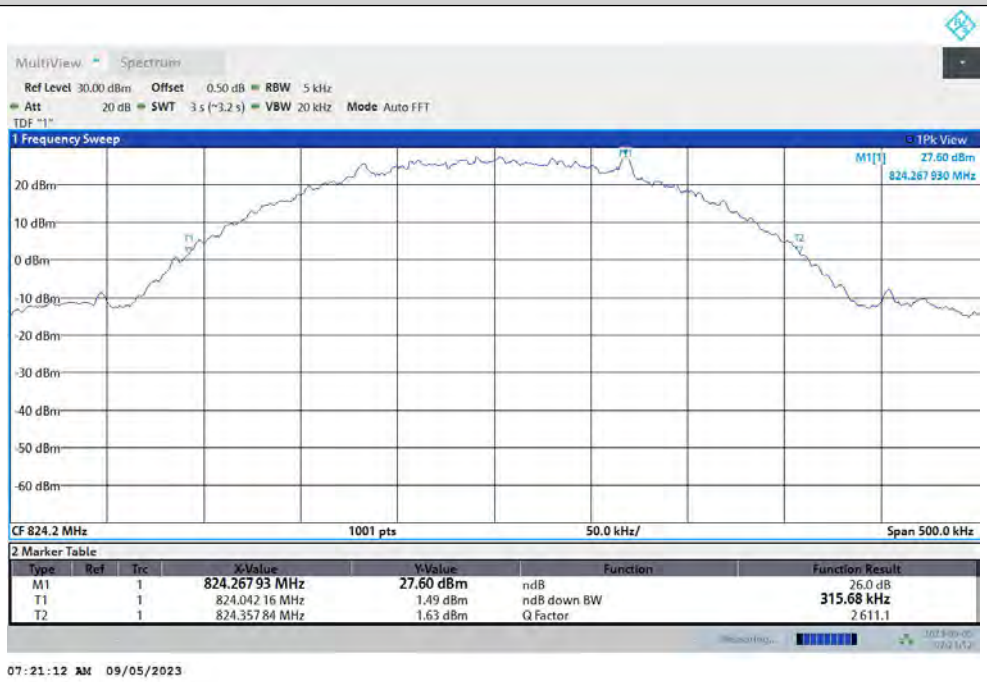
Test Result

Band	Channel	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Verdict
GSM850	128	244.484	315.680	---	PASS
GSM850	189	246.885	317.180	---	PASS
GSM850	251	245.273	315.180	---	PASS
EGPRS850	128	240.910	315.680	---	PASS
EGPRS850	189	241.016	312.690	---	PASS
EGPRS850	251	240.895	313.690	---	PASS

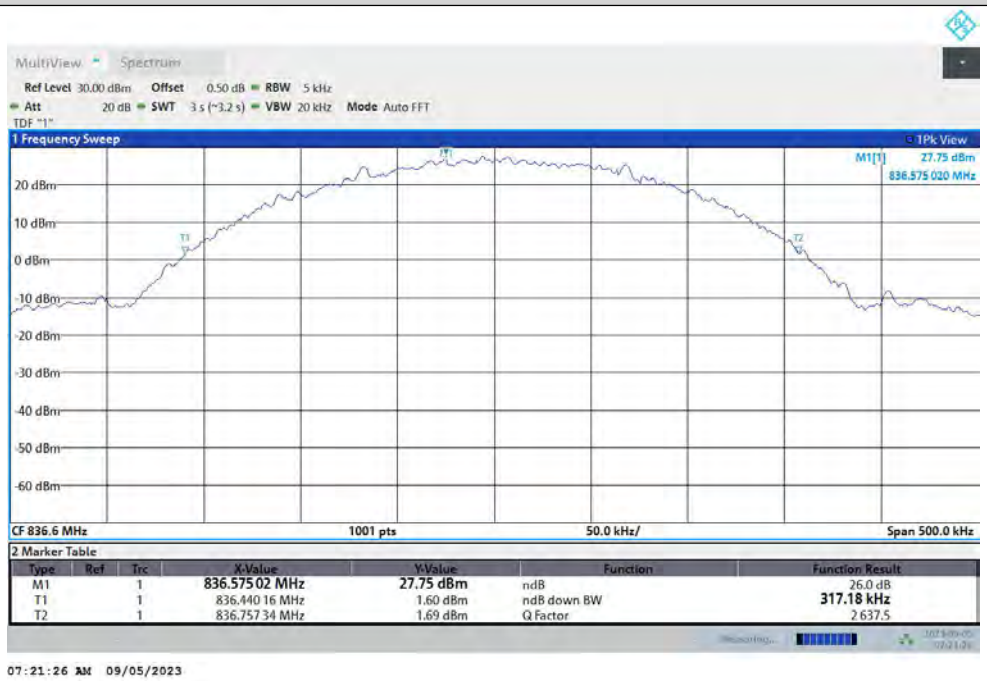
Test Graphs

26dB Bandwidth

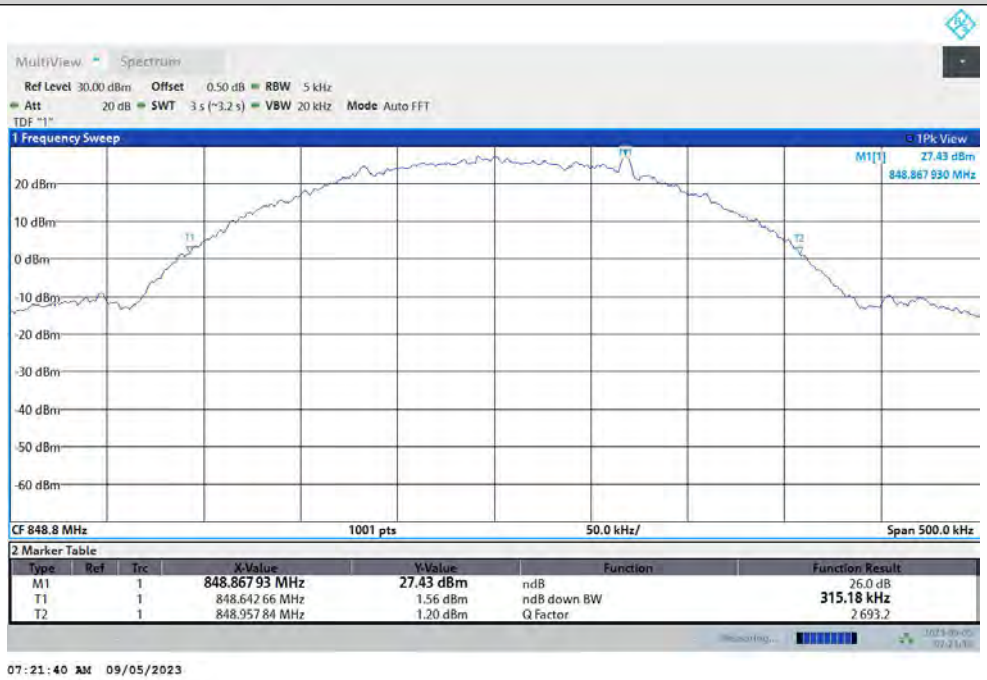
GSM850-128



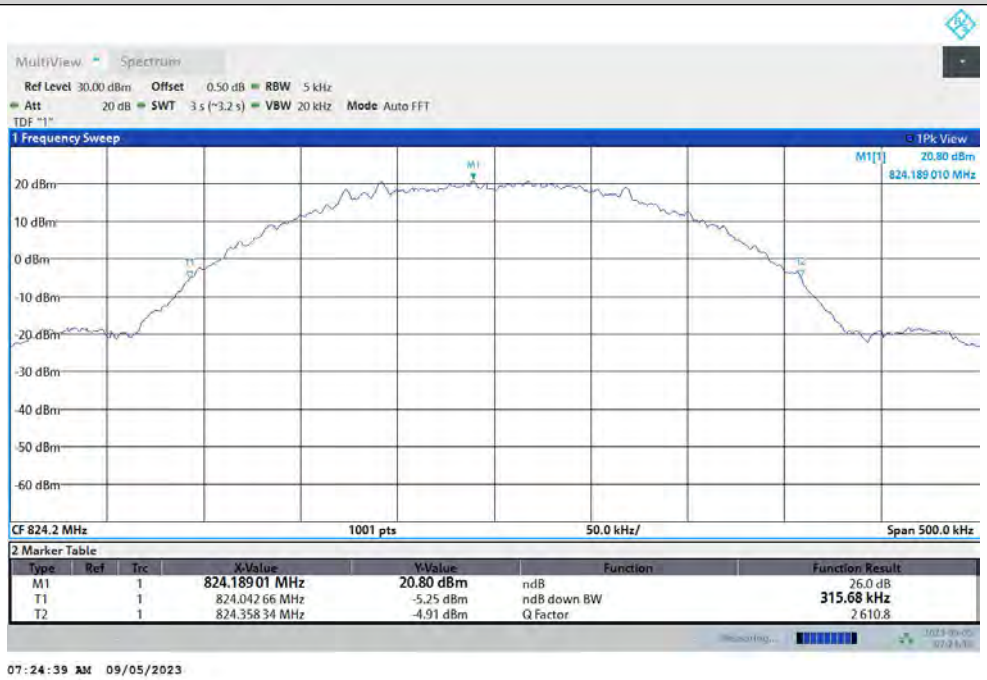
GSM850-189



GSM850-251



EGPRS850-128



EGPRS850-189

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EGPRS850-251

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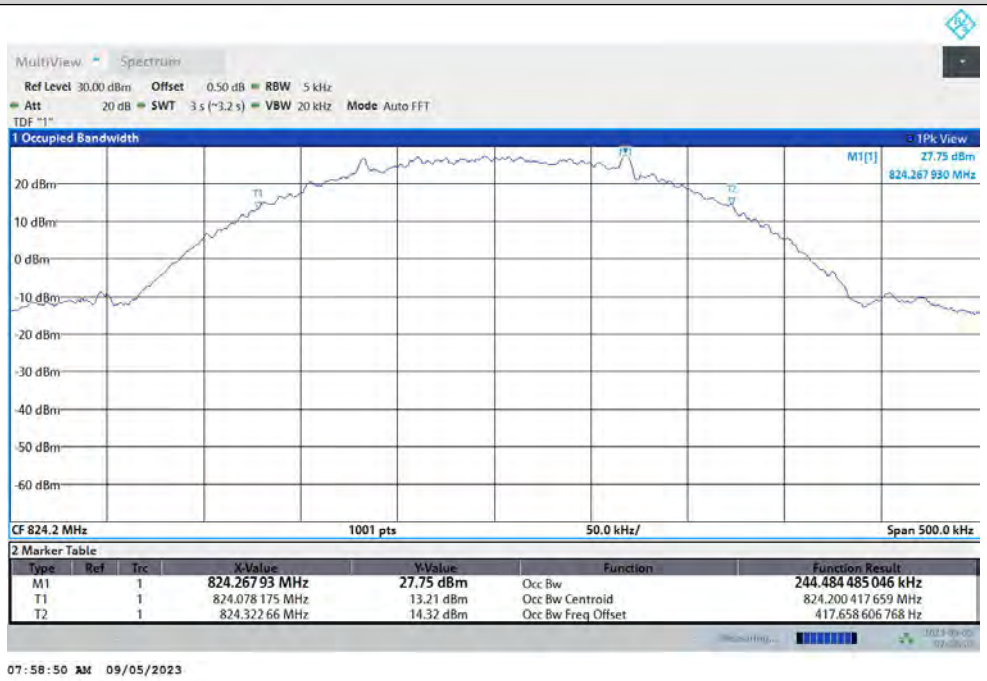
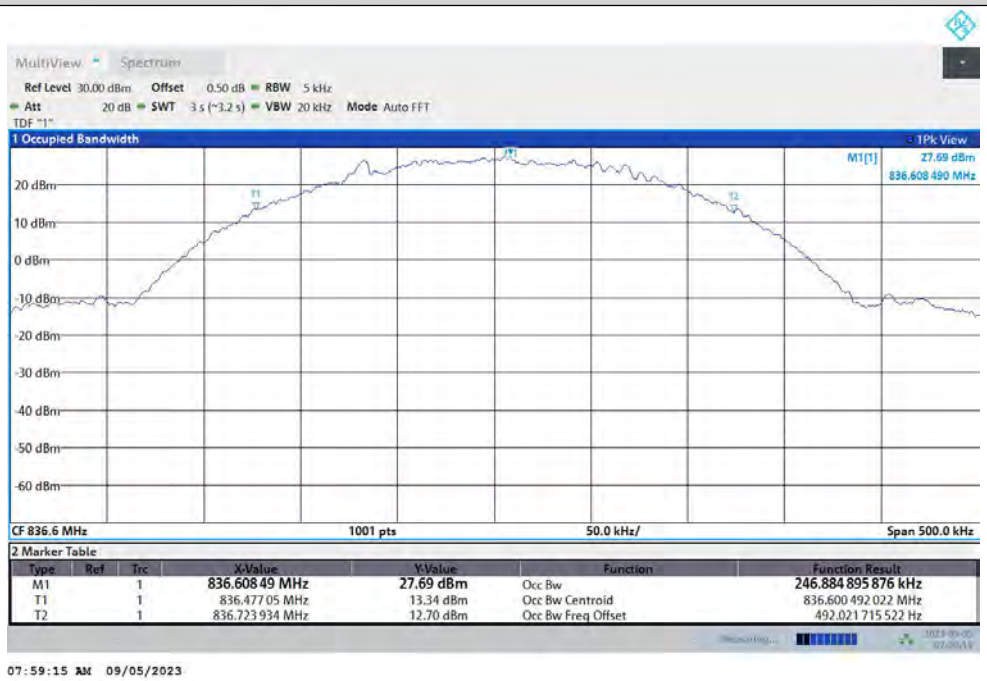
Occupied Bandwidth

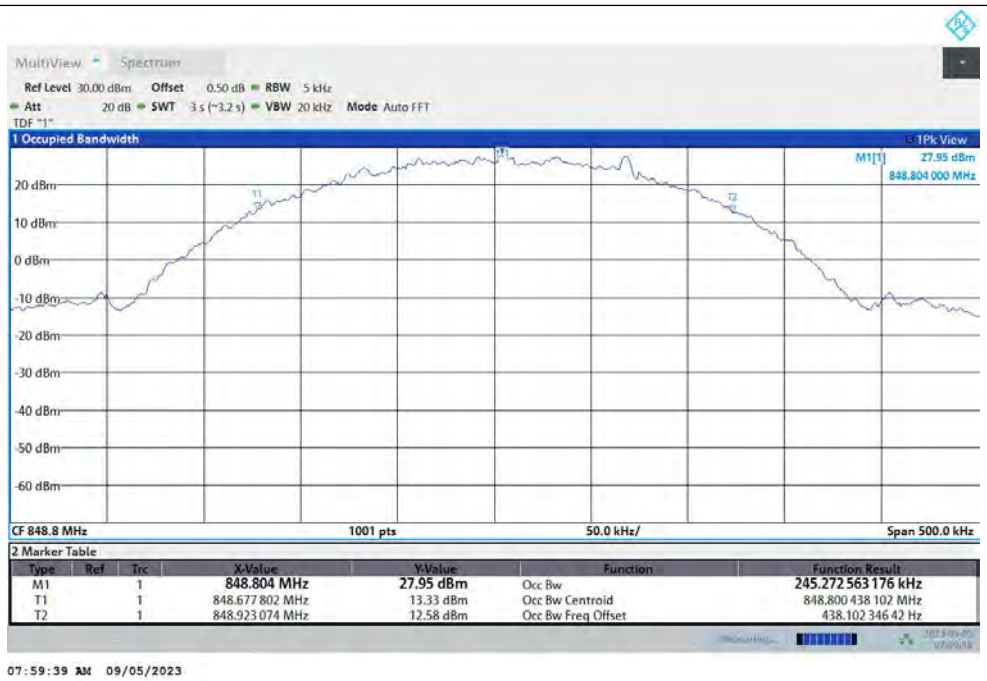
GSM850-128



GSM850-189



GSM850-251



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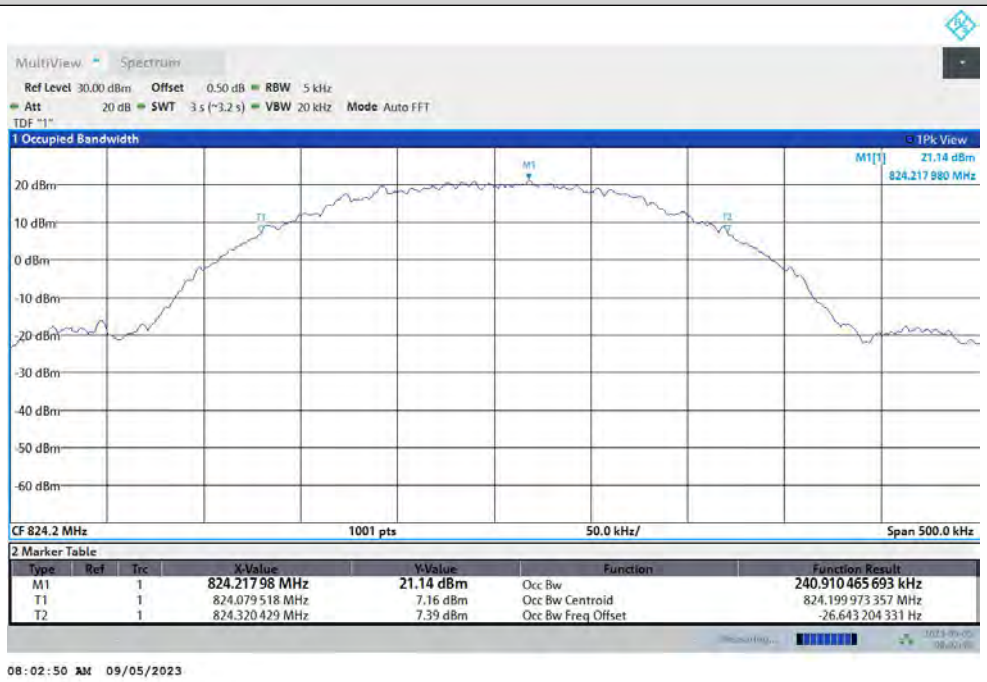

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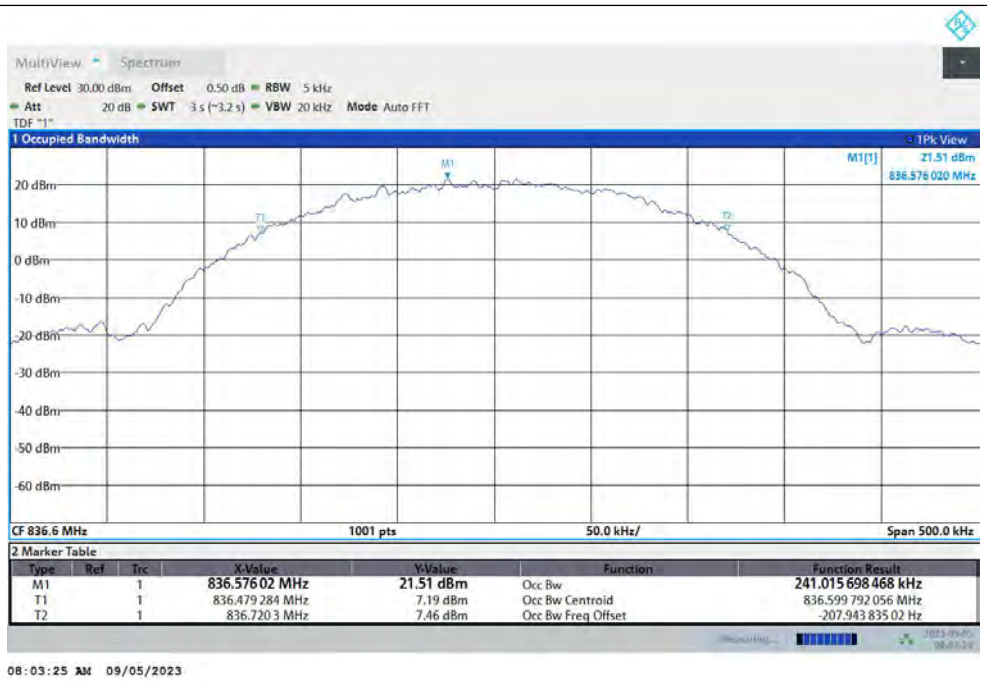
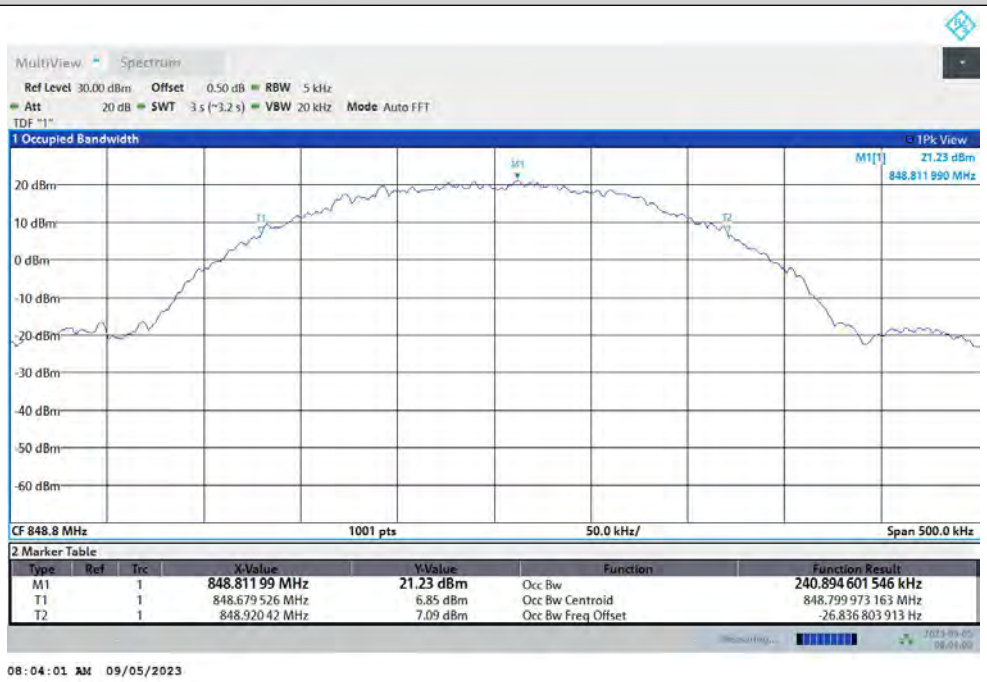


EGPRS850-251



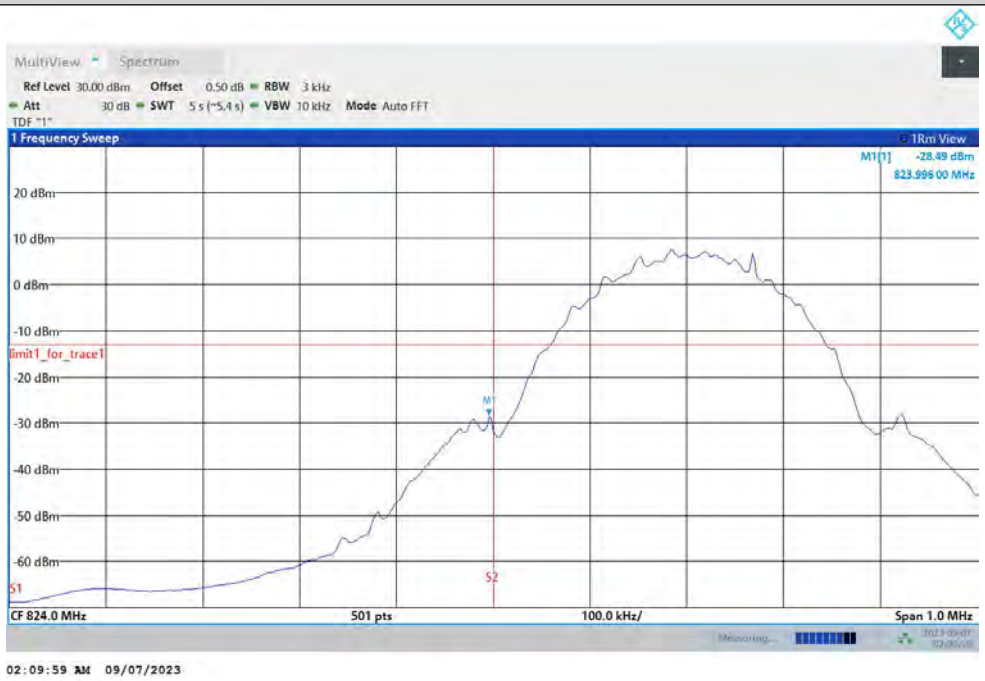
BAND EDGE

Test Result

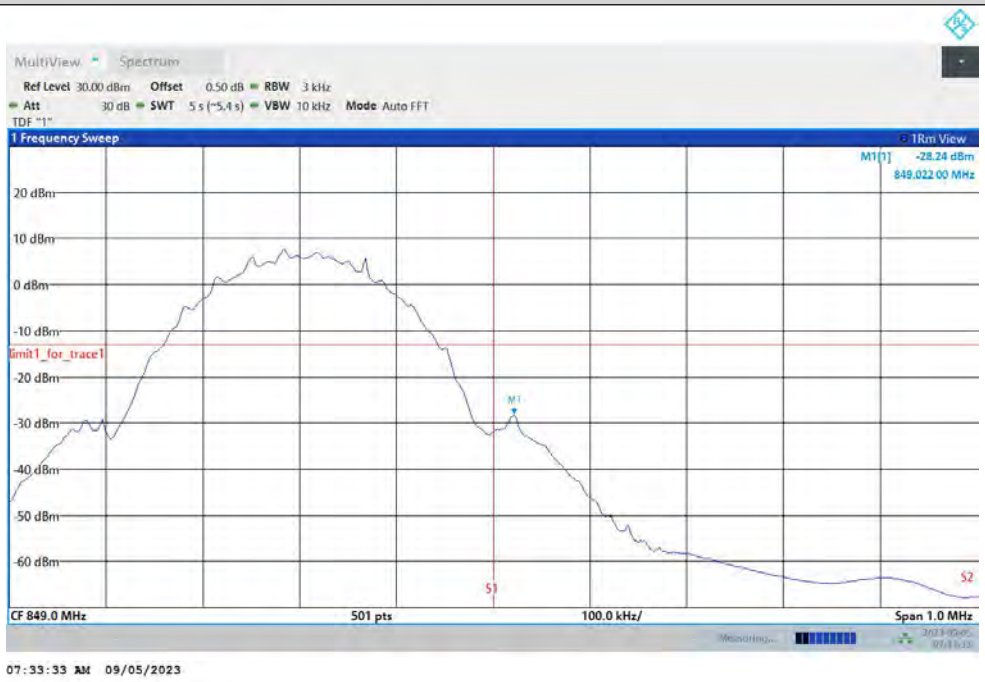
Band	Channel	Freq (MHz)	Result (dBm)	Limit(dBm)	Verdict
GSM850	128	See Graph	See Graph	-13	PASS
GSM850	251	See Graph	See Graph	-13	PASS
EGPRS850	128	See Graph	See Graph	-13	PASS
EGPRS850	251	See Graph	See Graph	-13	PASS

Test Graphs

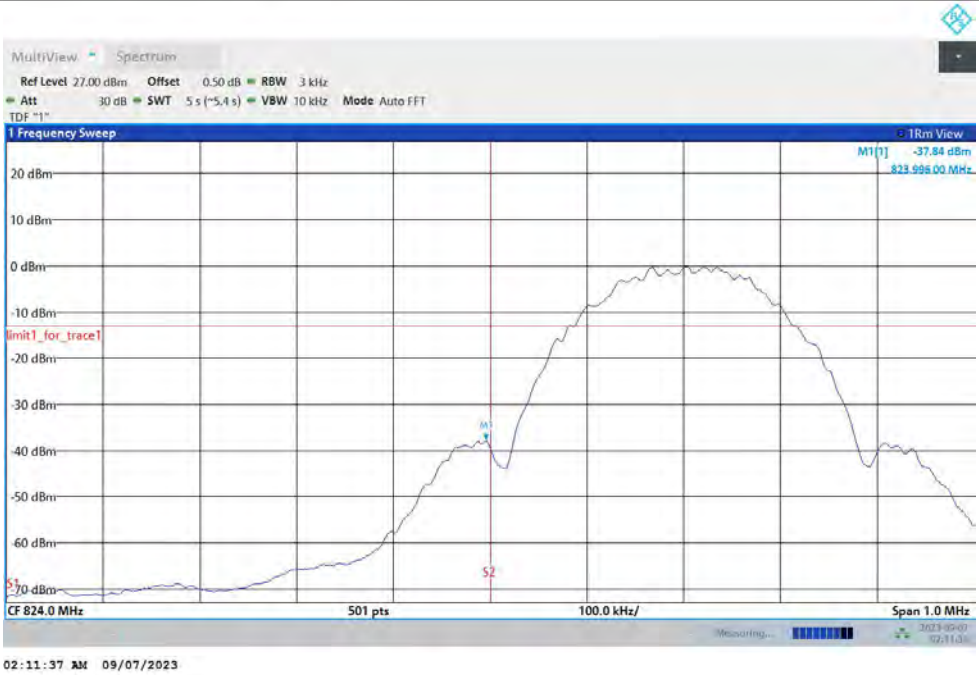
GSM850-128



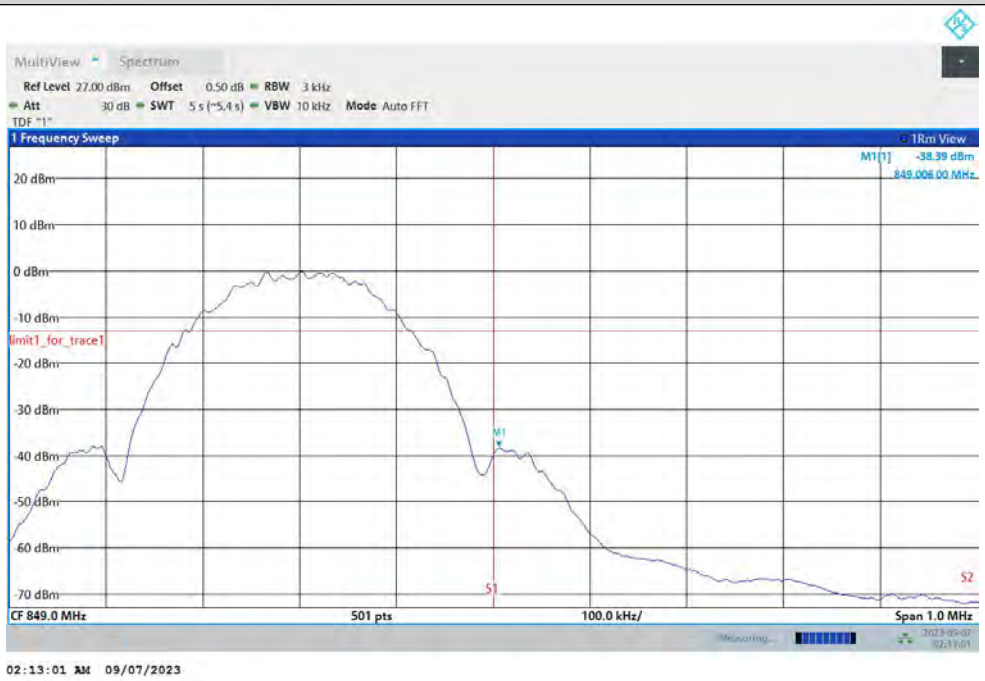
GSM850-251



EGPRS850-128



EGPRS850-251



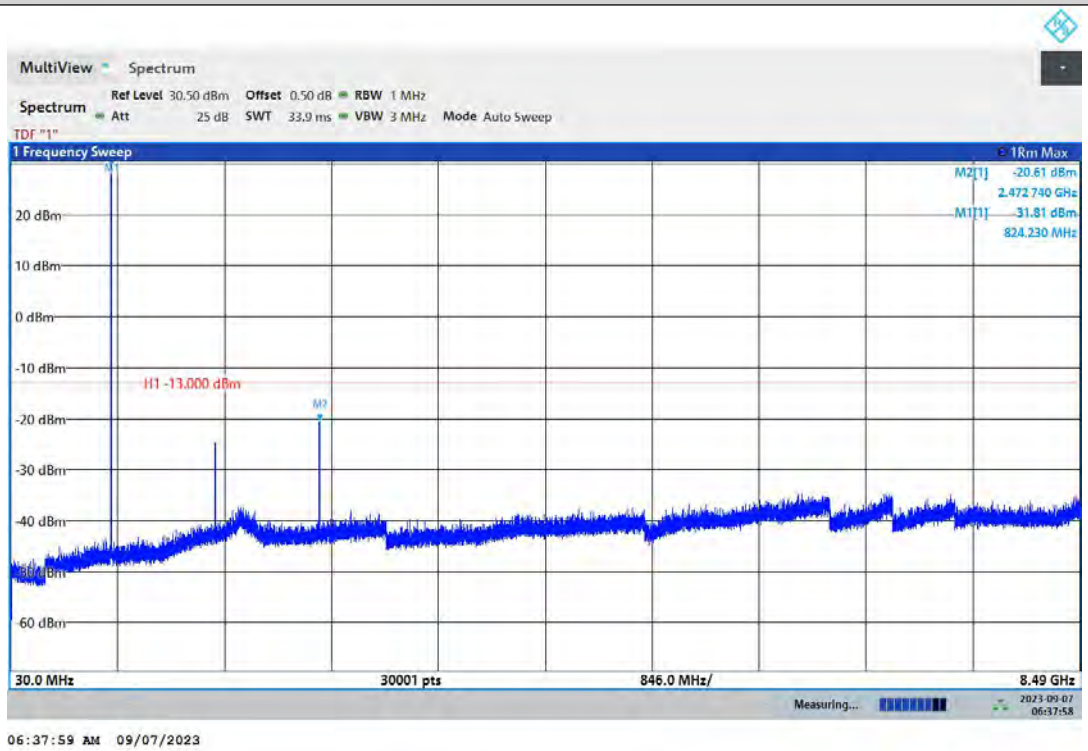
CONDUCTED SPURIOUS EMISSION

Test Result

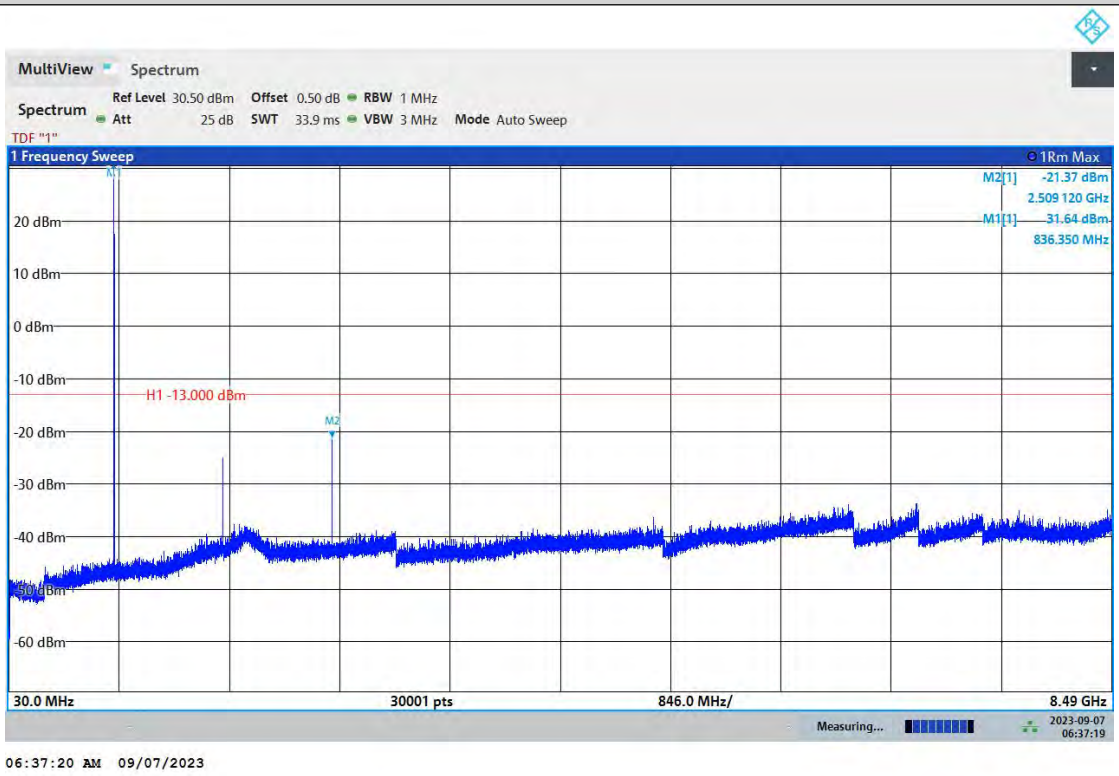
Band	Channel	Frequency Range(MHz)	Max.Freq. (MHz)	Result (dBm)	Limit (dBm)	Verdict
GSM850	128	30~8490MHZ	See Graph	See Graph	-13	PASS
GSM850	189	30~8490MHZ	See Graph	See Graph	-13	PASS
GSM850	251	30~8490MHZ	See Graph	See Graph	-13	PASS
EGPRS850	128	30~8490MHZ	See Graph	See Graph	-13	PASS
EGPRS850	189	30~8490MHZ	See Graph	See Graph	-13	PASS
EGPRS850	251	30~8490MHZ	See Graph	See Graph	-13	PASS

Test Graphs

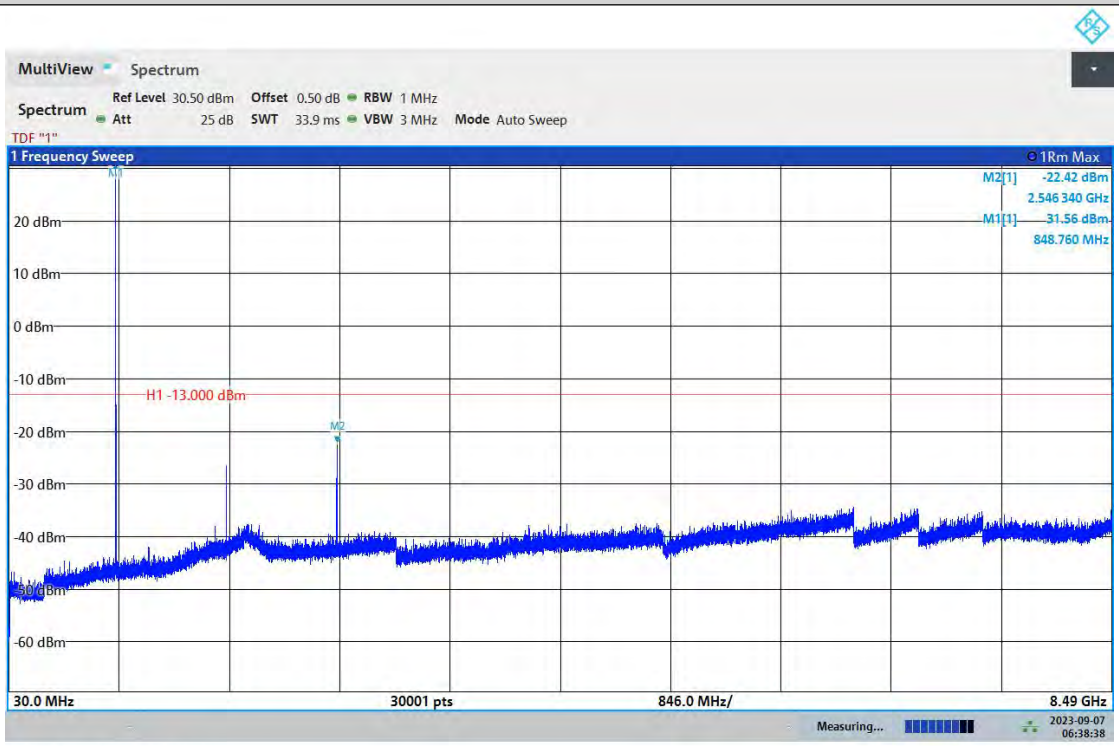
GSM850-128-30~8490MHz



GSM850-189-30~8490MHz

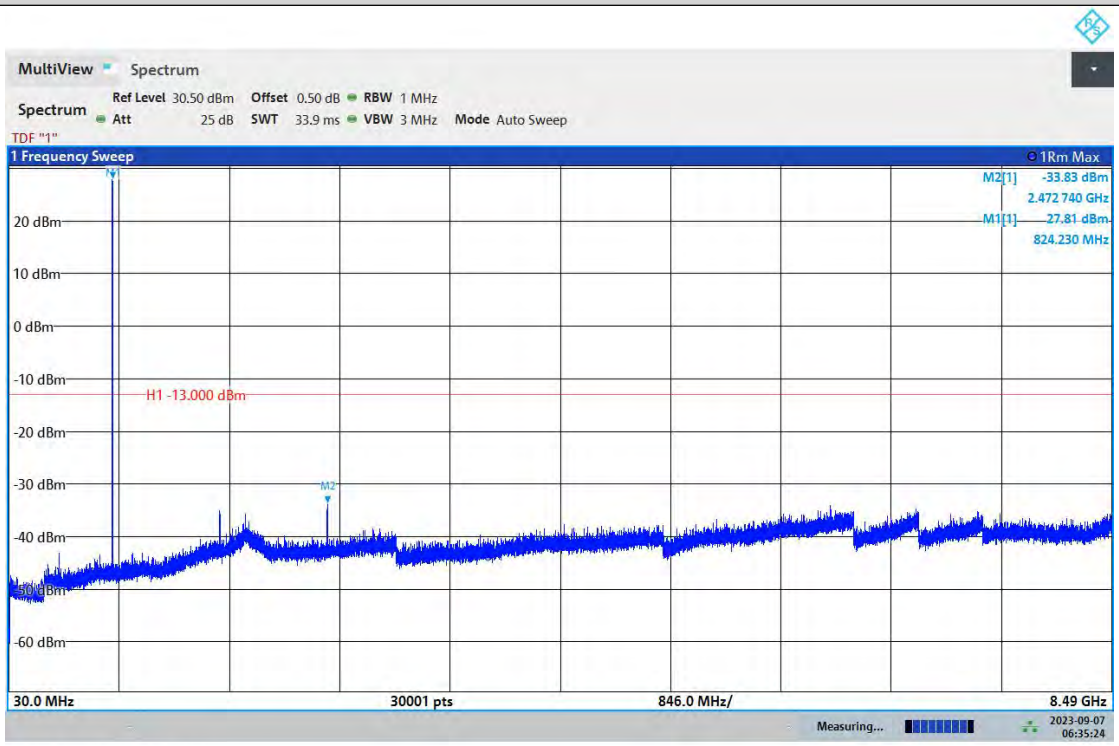


GSM850-251-30~8490MHz



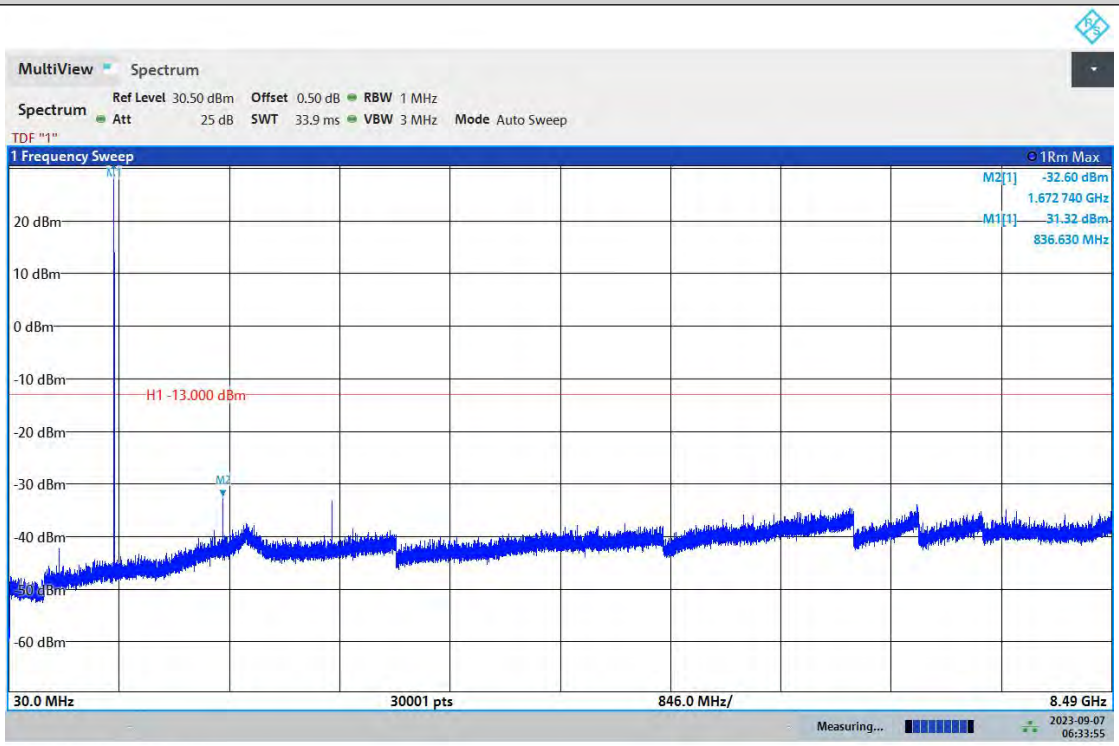
06:38:39 AM 09/07/2023

EGPRS850-128-30~8490MHz



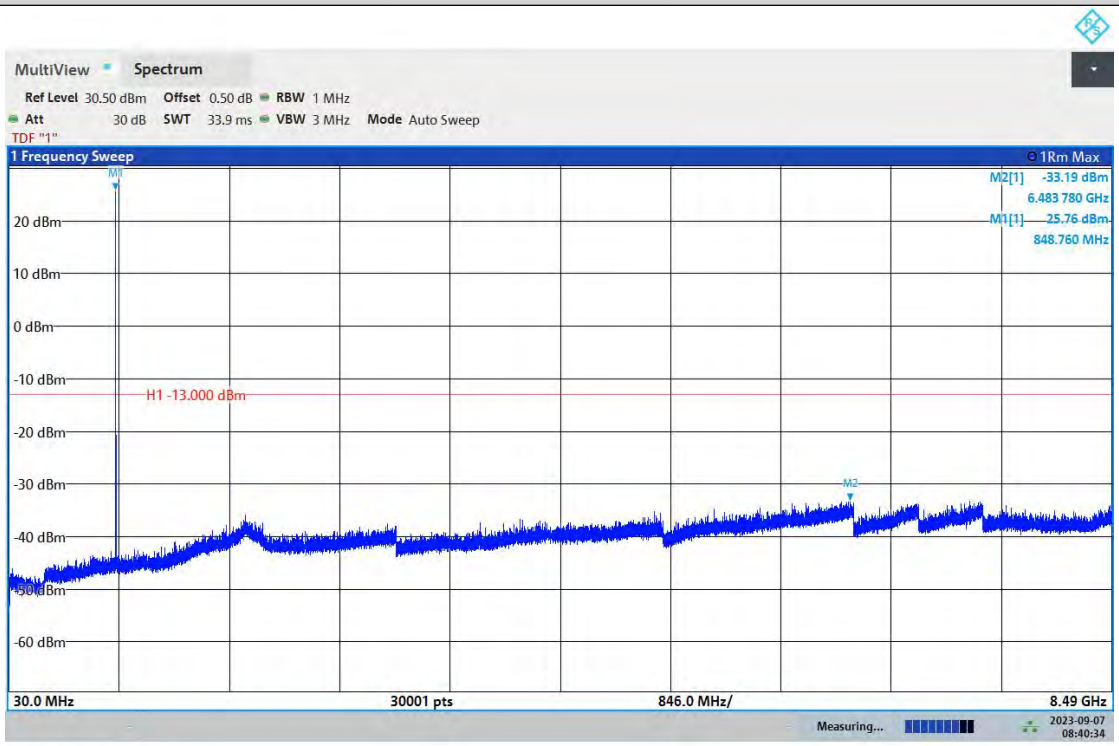
06:35:25 AM 09/07/2023

EGPRS850-189-30~8490MHz



06:33:56 AM 09/07/2023

EGPRS850-251-30~8490MHz



08:40:34 AM 09/07/2023

FREQUENCY STABILITY

Test Result

Voltage							
Band	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
GSM850	128	VL	NT	2.6	0.003155	±2.5	PASS
GSM850	128	VN	NT	-6.66	-0.008081	±2.5	PASS
GSM850	128	VH	NT	-7.31	-0.008869	±2.5	PASS
GSM850	189	VL	NT	4.14	0.004950	±2.5	PASS
GSM850	189	VN	NT	3.73	0.004460	±2.5	PASS
GSM850	189	VH	NT	-4.97	-0.005942	±2.5	PASS
GSM850	251	VL	NT	5.76	0.006786	±2.5	PASS
GSM850	251	VN	NT	6.94	0.008176	±2.5	PASS
GSM850	251	VH	NT	0.98	0.001155	±2.5	PASS
EGPRS850	128	VL	NT	2.98	0.003616	±2.5	PASS
EGPRS850	128	VN	NT	-0.28	-0.000340	±2.5	PASS
EGPRS850	128	VH	NT	6.38	0.007741	±2.5	PASS
EGPRS850	189	VL	NT	-3.49	-0.004173	±2.5	PASS
EGPRS850	189	VN	NT	-6.63	-0.007927	±2.5	PASS
EGPRS850	189	VH	NT	7	0.008369	±2.5	PASS
EGPRS850	251	VL	NT	0.01	0.000012	±2.5	PASS
EGPRS850	251	VN	NT	-8.87	-0.010450	±2.5	PASS
EGPRS850	251	VH	NT	4.92	0.005796	±2.5	PASS

Temperature							
Band	Channel	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
GSM850	128	NV	-30	7.6	0.009221	±2.5	PASS
GSM850	128	NV	-20	-2.97	-0.003603	±2.5	PASS
GSM850	128	NV	-10	-4.59	-0.005569	±2.5	PASS
GSM850	128	NV	0	6.56	0.007959	±2.5	PASS
GSM850	128	NV	10	7.99	0.009694	±2.5	PASS
GSM850	128	NV	20	0.96	0.001165	±2.5	PASS
GSM850	128	NV	30	-5.51	-0.006685	±2.5	PASS
GSM850	128	NV	40	-3.22	-0.003907	±2.5	PASS
GSM850	128	NV	50	9.99	0.012121	±2.5	PASS
GSM850	189	NV	-30	-3	-0.003587	±2.5	PASS
GSM850	189	NV	-20	-5.12	-0.006121	±2.5	PASS
GSM850	189	NV	-10	5.53	0.006612	±2.5	PASS
GSM850	189	NV	0	6.99	0.008357	±2.5	PASS
GSM850	189	NV	10	-3.85	-0.004603	±2.5	PASS
GSM850	189	NV	20	7.97	0.009529	±2.5	PASS
GSM850	189	NV	30	-6.86	-0.008202	±2.5	PASS
GSM850	189	NV	40	9.62	0.011502	±2.5	PASS
GSM850	189	NV	50	4.31	0.005153	±2.5	PASS
GSM850	251	NV	-30	-3.73	-0.004394	±2.5	PASS
GSM850	251	NV	-20	-9.97	-0.011746	±2.5	PASS

GSM850	251	NV	-10	7.16	0.008435	±2.5	PASS
GSM850	251	NV	0	9.99	0.011770	±2.5	PASS
GSM850	251	NV	10	-3.36	-0.003959	±2.5	PASS
GSM850	251	NV	20	-9.63	-0.011345	±2.5	PASS
GSM850	251	NV	30	5.59	0.006586	±2.5	PASS
GSM850	251	NV	40	3.34	0.003935	±2.5	PASS
GSM850	251	NV	50	5.51	0.006492	±2.5	PASS
EGPRS850	128	NV	-30	0.39	0.000211	±2.5	PASS
EGPRS850	128	NV	-20	8.2	0.004432	±2.5	PASS
EGPRS850	128	NV	-10	-1.84	-0.000994	±2.5	PASS
EGPRS850	128	NV	0	6.12	0.003308	±2.5	PASS
EGPRS850	128	NV	10	2.09	0.001130	±2.5	PASS
EGPRS850	128	NV	20	3.4	0.001838	±2.5	PASS
EGPRS850	128	NV	30	7.06	0.003816	±2.5	PASS
EGPRS850	189	NV	40	-0.4	-0.000216	±2.5	PASS
EGPRS850	189	NV	50	-0.55	-0.000297	±2.5	PASS
EGPRS850	189	NV	-30	1.98	0.001053	±2.5	PASS
EGPRS850	189	NV	-20	-9.17	-0.004878	±2.5	PASS
EGPRS850	189	NV	-10	9.52	0.005064	±2.5	PASS
EGPRS850	189	NV	0	-8.27	-0.004399	±2.5	PASS
EGPRS850	189	NV	10	-1.73	-0.000920	±2.5	PASS
EGPRS850	189	NV	20	3.44	0.001830	±2.5	PASS
EGPRS850	189	NV	30	-5.72	-0.003043	±2.5	PASS
EGPRS850	189	NV	40	2.86	0.001521	±2.5	PASS
EGPRS850	189	NV	50	-5.5	-0.002926	±2.5	PASS
EGPRS850	251	NV	-30	5.16	0.002702	±2.5	PASS
EGPRS850	251	NV	-20	-2.82	-0.001477	±2.5	PASS
EGPRS850	251	NV	-10	-8.95	-0.004686	±2.5	PASS
EGPRS850	251	NV	0	-2.95	-0.001545	±2.5	PASS
EGPRS850	251	NV	10	-6.54	-0.003424	±2.5	PASS
EGPRS850	251	NV	20	2.5	0.001309	±2.5	PASS
EGPRS850	251	NV	30	-7.97	-0.004173	±2.5	PASS
EGPRS850	251	NV	40	-3.55	-0.001859	±2.5	PASS
EGPRS850	251	NV	50	-4.7	-0.002461	±2.5	PASS

WCDMA V

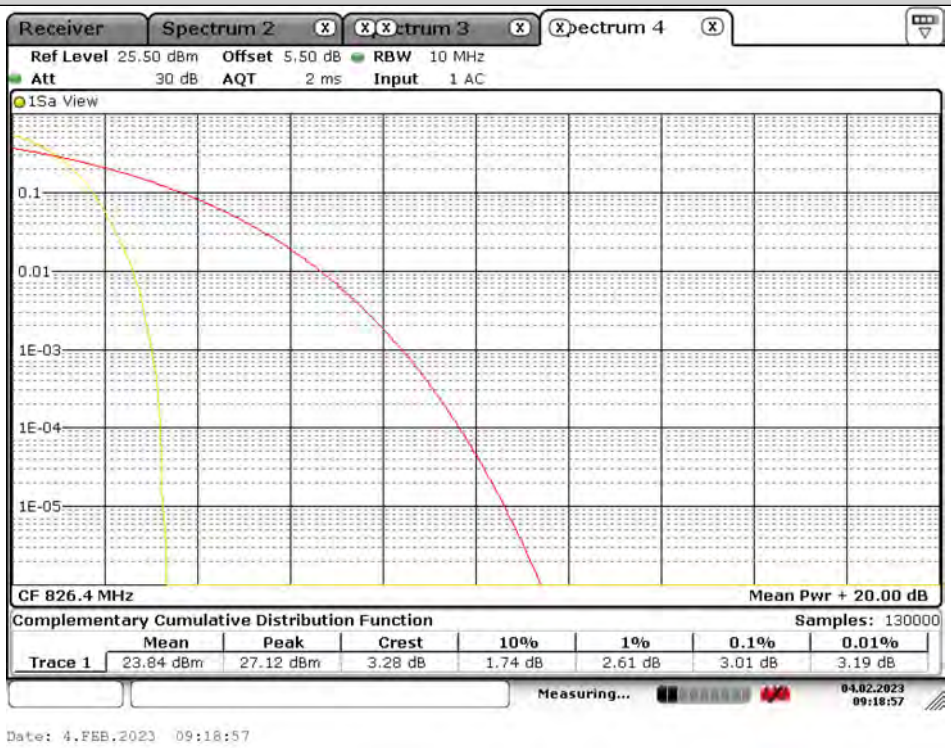
PEAK-TO-AVERAGE RATIO

Test Result

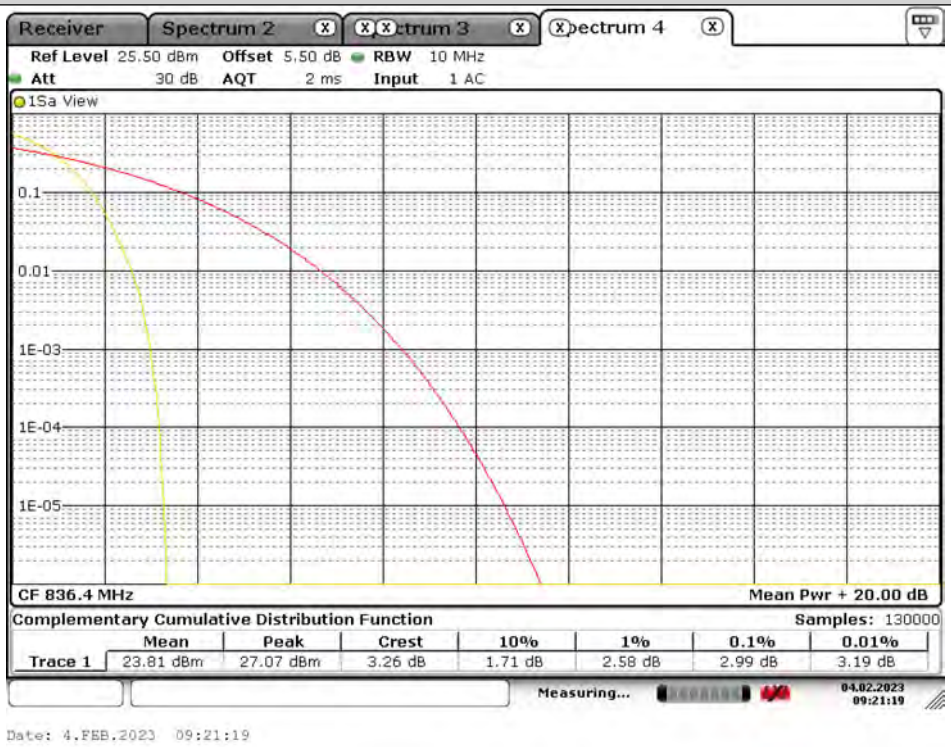
Band	Channel	Peak-to-Average Ratio(dB)	Limit(dBm)	Verdict
Band5	4132	3.01	13	PASS
Band5	4182	2.99	13	PASS
Band5	4233	2.87	13	PASS

Test Graphs

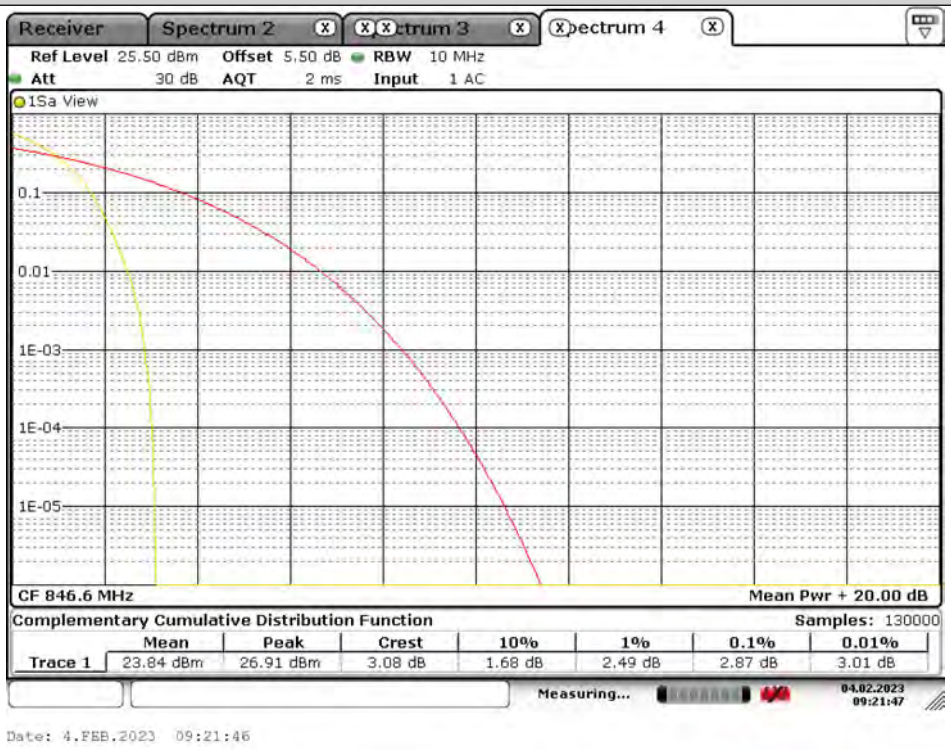
Band5-4132



Band5-4182



Band5-4233


Receiver
Spectrum 2
Spectrum 3
Spectrum 4
Ref Level 25.50 dBm Offset 5.50 dB RBW 10 MHz
Att 30 dB AQT 2 ms Input 1 AC
1Sa View
0.1
0.01
1E-03
1E-04
1E-05
CF 846.6 MHz
Mean Pwr + 20.00 dB
Complementary Cumulative Distribution Function
Samples: 130000
Mean Peak Crest 10% 1% 0.1% 0.01%
Trace 1 23.84 dBm 26.91 dBm 3.08 dB 1.68 dB 2.49 dB 2.87 dB 3.01 dB
Measuring...
04.02.2023
09:21:47
Date: 4.FEB.2023 09:21:46

26DB BANDWIDTH AND OCCUPIED BANDWIDTH

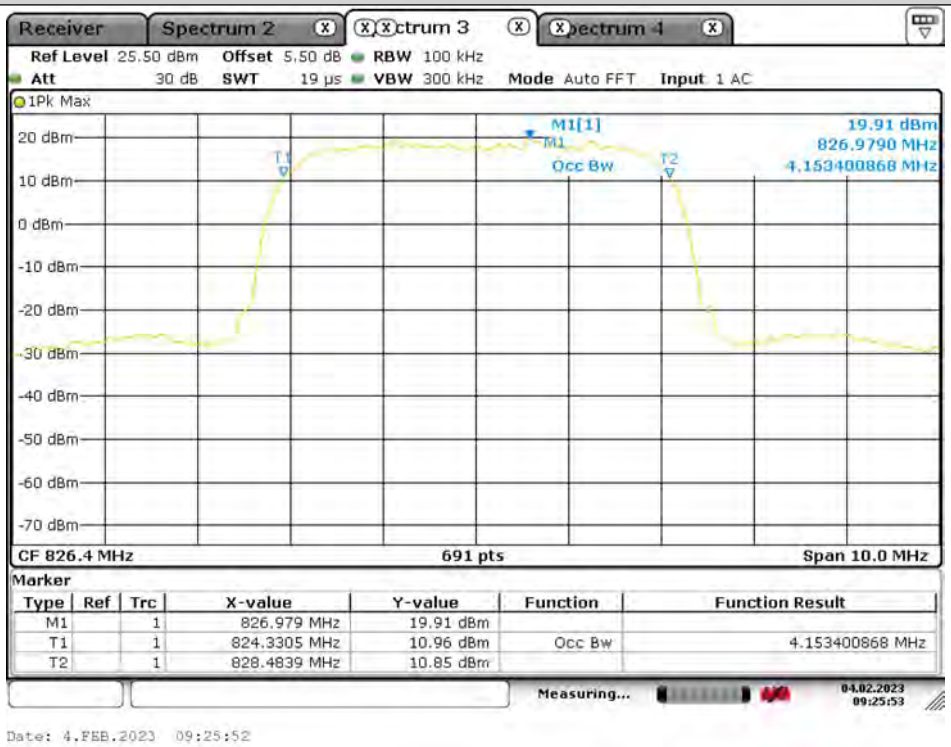
Test Result

Band	Channel	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Limit(kHz)	Verdict
Band5	4132	4.153	4.689	---	PASS
Band5	4182	4.139	4.689	---	PASS
Band5	4233	4.139	4.689	---	PASS

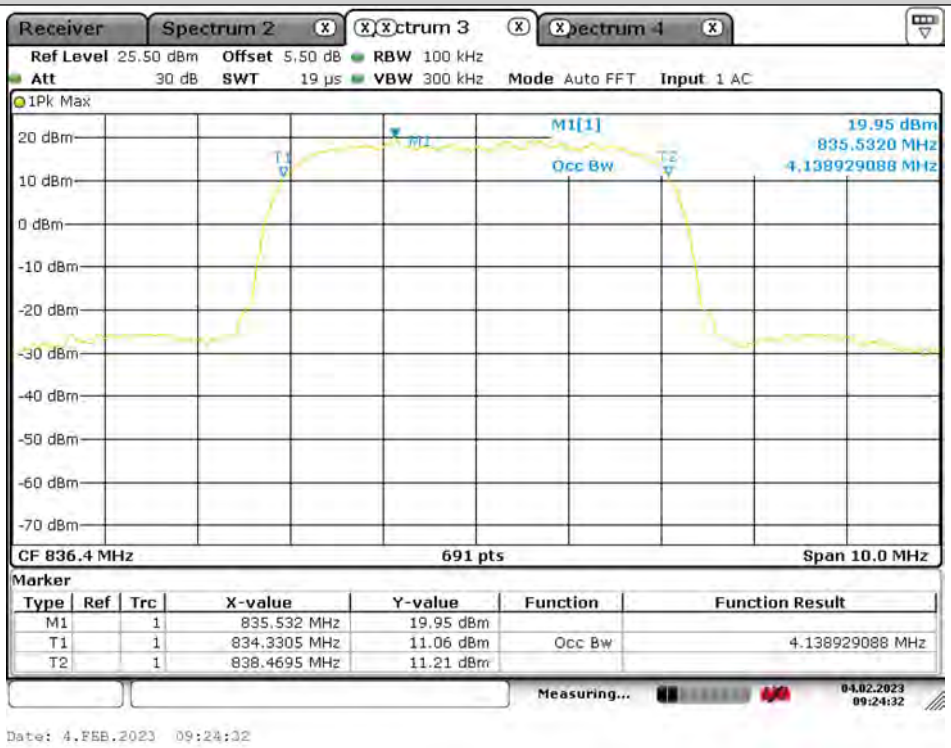
Test Graphs

Occupied Bandwidth

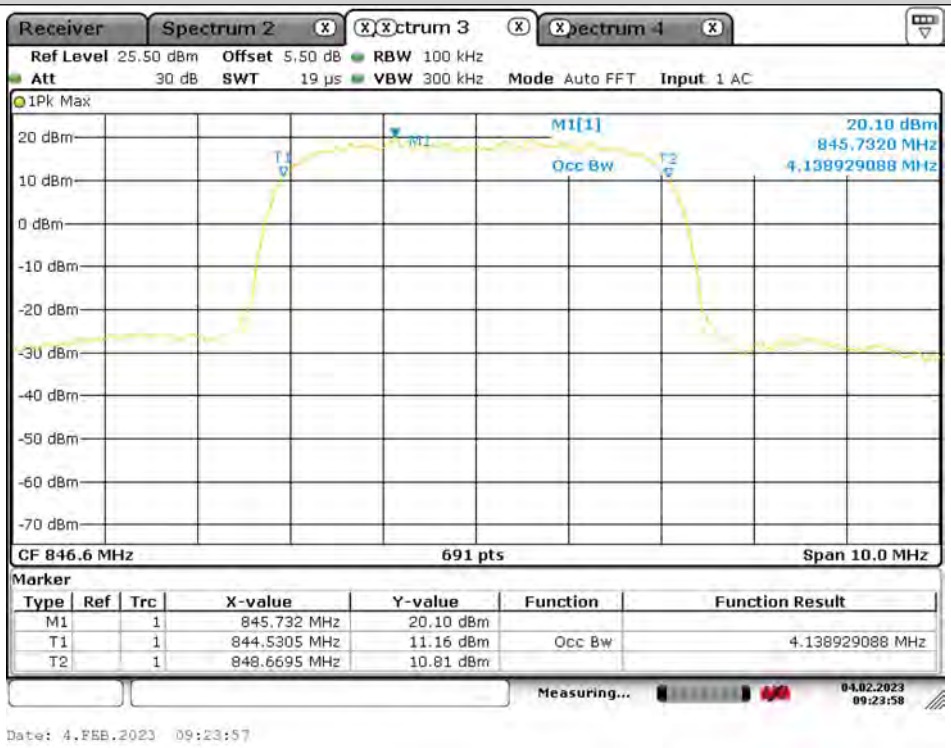
Band5-4132



Band5-4182

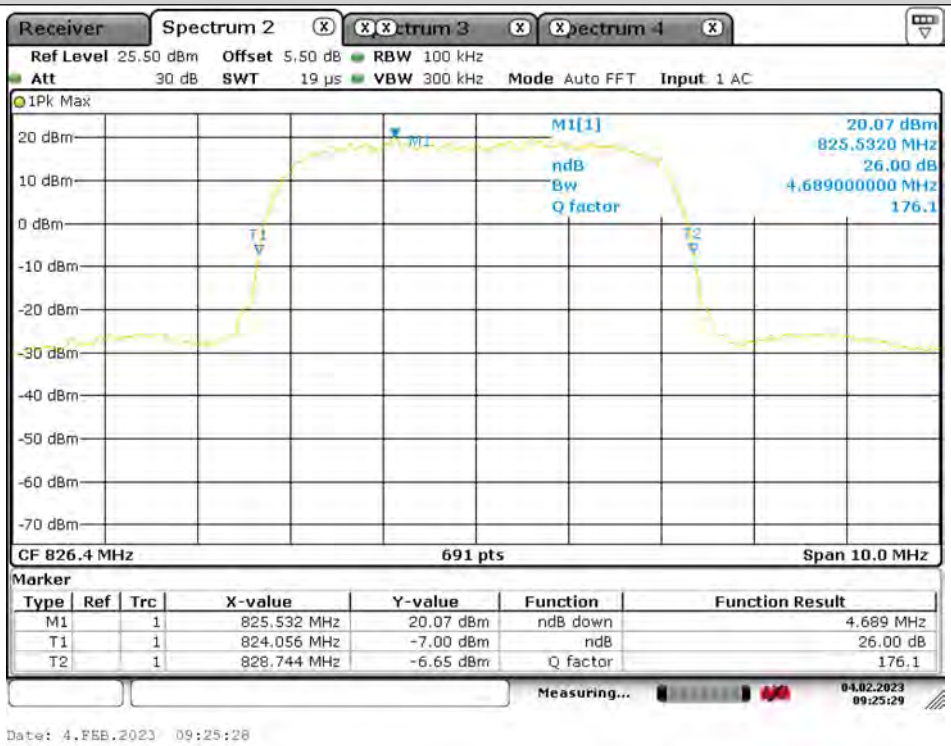


Band5-4233

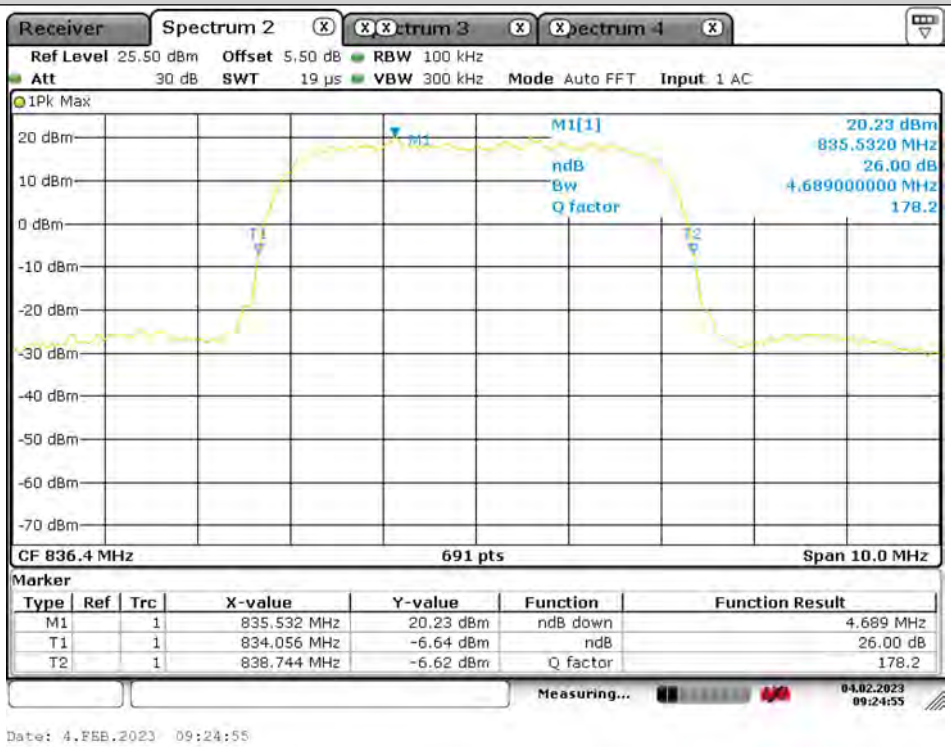

Receiver
Spectrum 2
Spectrum 3
Spectrum 4
Ref Level 25.50 dBm Offset 5.50 dB RBW 100 kHz
Att 30 dB SWT 19 µs VBW 300 kHz Mode Auto FFT Input 1 AC
1Pk Max
M1[1]
20.10 dBm
845.7320 MHz
4.138929088 MHz
Occ Bw
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 846.6 MHz
691 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 845.732 MHz 20.10 dBm
T1 1 844.5305 MHz 11.16 dBm Occ Bw 4.138929088 MHz
T2 1 848.6695 MHz 10.81 dBm
Measuring...
04.02.2023
09:23:58
Date: 4.FEB.2023 09:23:57

26dB Bandwidth

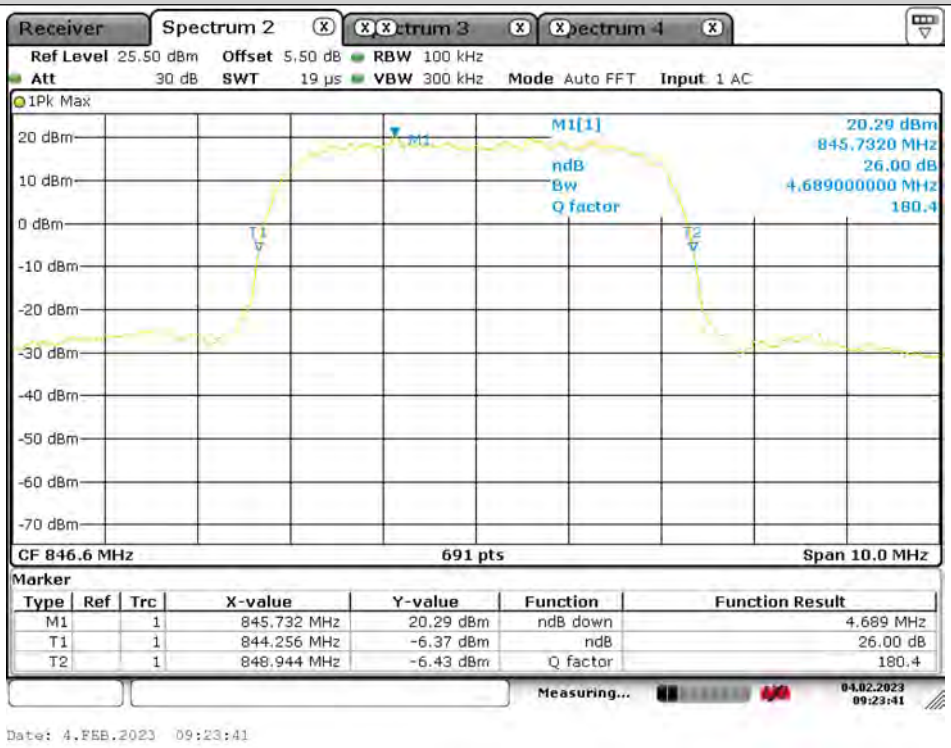
Band5-4132



Band5-4182



Band5-4233


Receiver
Spectrum 2
Ref Level 25.50 dBm Offset 5.50 dB RBW 100 kHz
Att 30 dB SWT 19 µs VBW 300 kHz Mode Auto FFT Input 1 AC
1Pk Max
M1[1] 20.29 dBm
845.7320 MHz
ndB 26.00 dB
Bw 4.689000000 MHz
Q factor 180.4
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 846.6 MHz
691 pts
Span 10.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 845.732 MHz 20.29 dBm ndB down 4.689 MHz
T1 1 844.256 MHz -6.37 dBm ndB 26.00 dB
T2 1 848.944 MHz -6.43 dBm Q factor 180.4
Measuring...
04.02.2023
09:23:41
Date: 4.FEB.2023 09:23:41

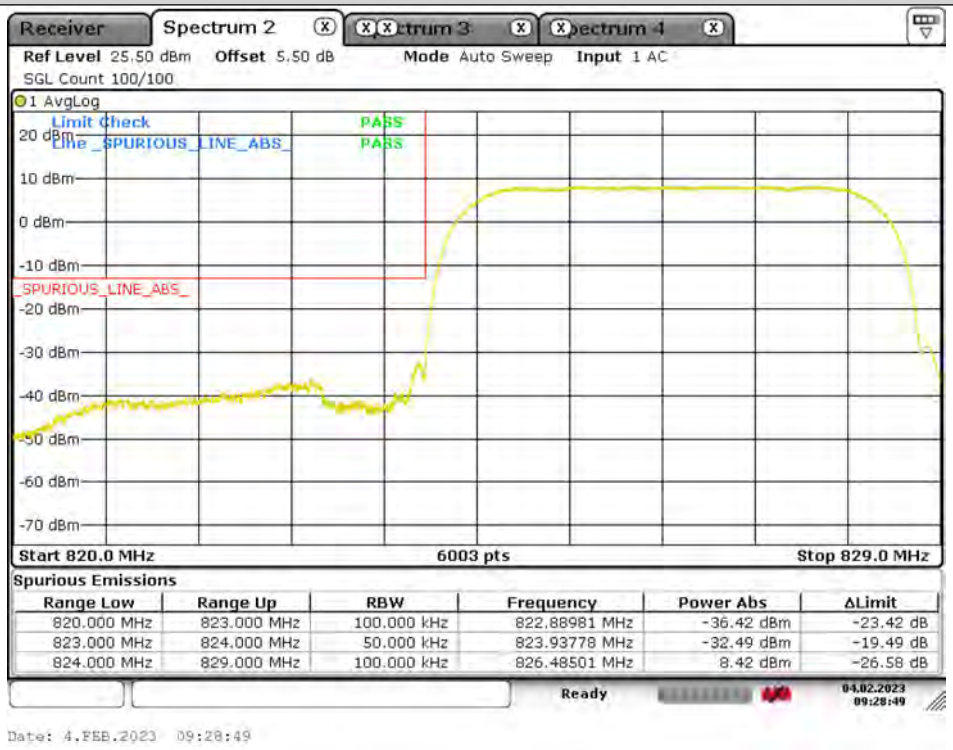
BAND EDGE

Test Result

Band	Channel	Frequency (MHz)	Result (dBm)	Limit(dBm)	Verdict
Band5	4132	823.93778	-32.49	-13	PASS
Band5	4233	849.04423	-34.43	-13	PASS

Test Graphs

Band5-4132



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
820.000 MHz	823.000 MHz	100.000 kHz	822.88981 MHz	-36.42 dBm	-23.42 dB
823.000 MHz	824.000 MHz	50.000 kHz	823.93778 MHz	-32.49 dBm	-19.49 dB
824.000 MHz	829.000 MHz	100.000 kHz	826.48501 MHz	8.42 dBm	-26.58 dB

Band5-4233

Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
844.000 MHz	849.000 MHz	100.000 kHz	847.53448 MHz	8.43 dBm	-26.57 dB
849.000 MHz	850.000 MHz	50.000 kHz	849.04423 MHz	-34.43 dBm	-21.43 dB
850.000 MHz	855.000 MHz	100.000 kHz	850.19115 MHz	-38.32 dBm	-25.32 dB

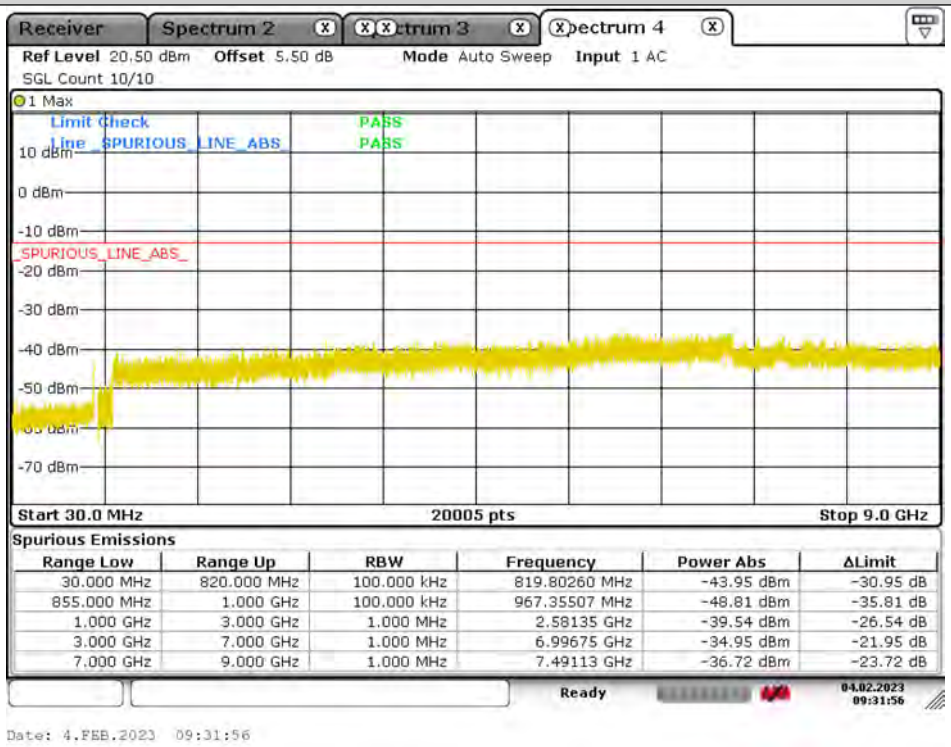
CONDUCTED SPURIOUS EMISSION

Test Result

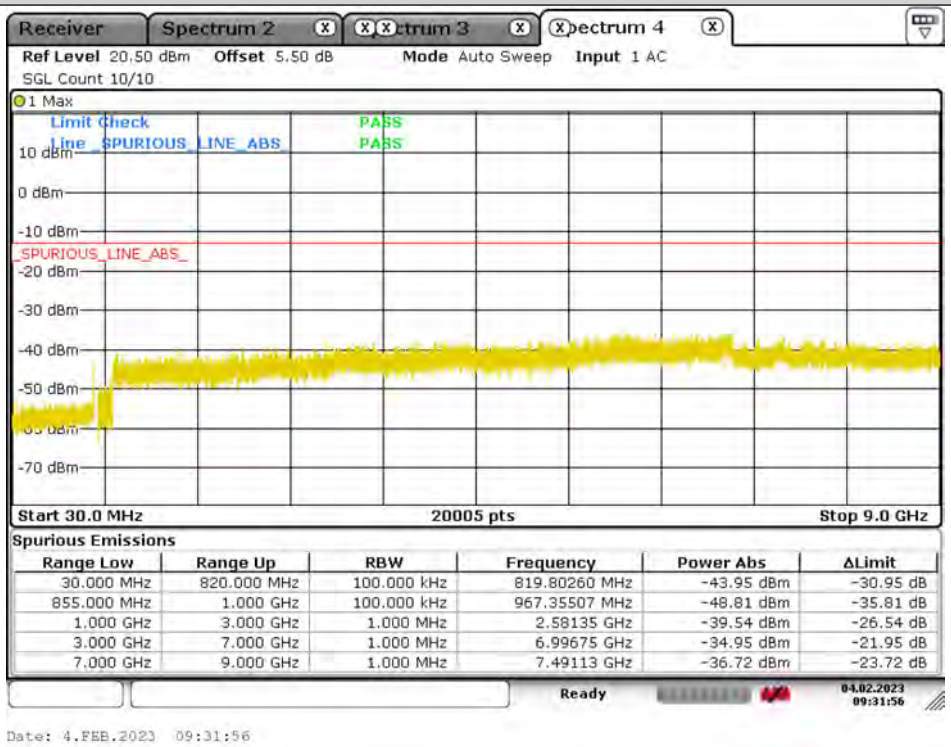
Band	Channel	Frequency Range (Mhz)	Frequency (dBm)	Result (dBm)	Limit (dBm)	Verdict
Band5	4132	30~1000MHz	819.8026	-43.95	-13	PASS
Band5	4132	1000~9000MHz	6996.75	-34.95	-13	PASS
Band5	4182	30~1000MHz	881.05072	-48.75	-13	PASS
Band5	4182	1000~9000MHz	5759.41	-34.76	-13	PASS
Band5	4233	30~1000MHz	855.1087	-42.68	-13	PASS
Band5	4233	1000~9000MHz	6078.37	-35.06	-13	PASS

Test Graphs

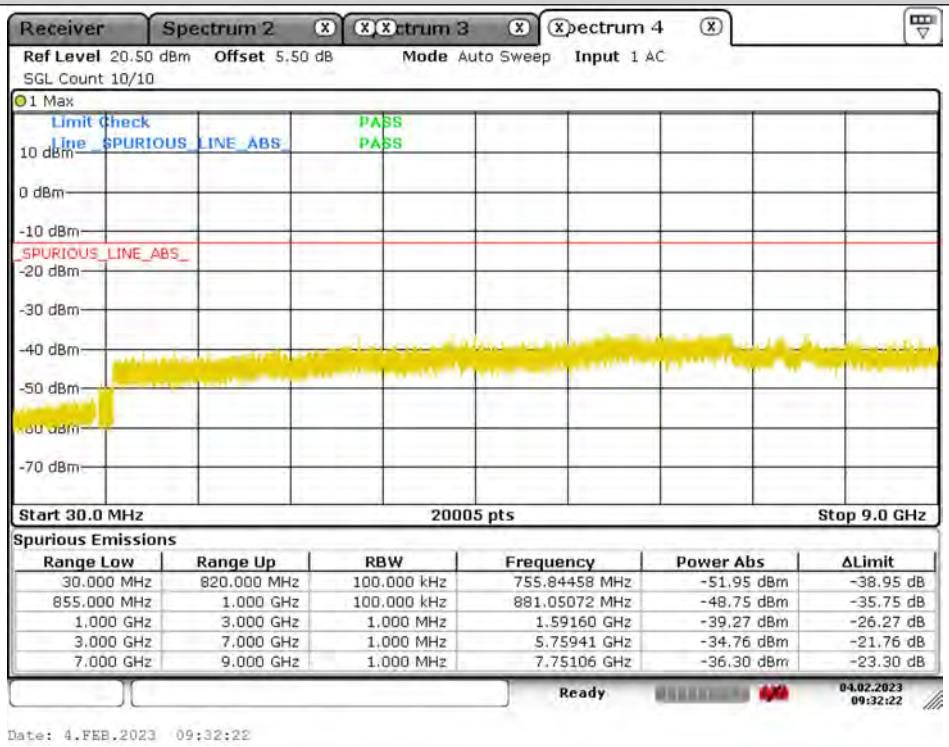
Band5-4132-30~1000MHz



Band5-4132-1000~9000MHz



Band5-4182-30~1000MHz

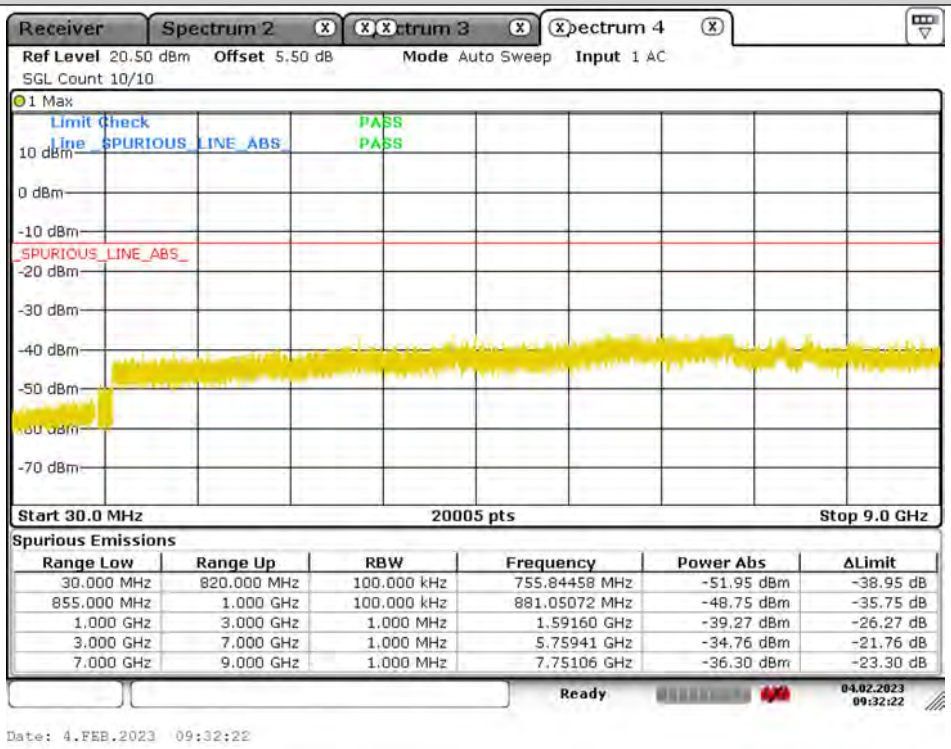


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	100.000 kHz	755.84458 MHz	-51.95 dBm	-38.95 dB
855.000 MHz	1.000 GHz	100.000 kHz	881.05072 MHz	-48.75 dBm	-35.75 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.59160 GHz	-39.27 dBm	-26.27 dB
3.000 GHz	7.000 GHz	1.000 MHz	5.75941 GHz	-34.76 dBm	-21.76 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.75106 GHz	-36.30 dBm	-23.30 dB

Date: 4.FEB.2023 09:32:22

Band5-4182-1000~9000MHz

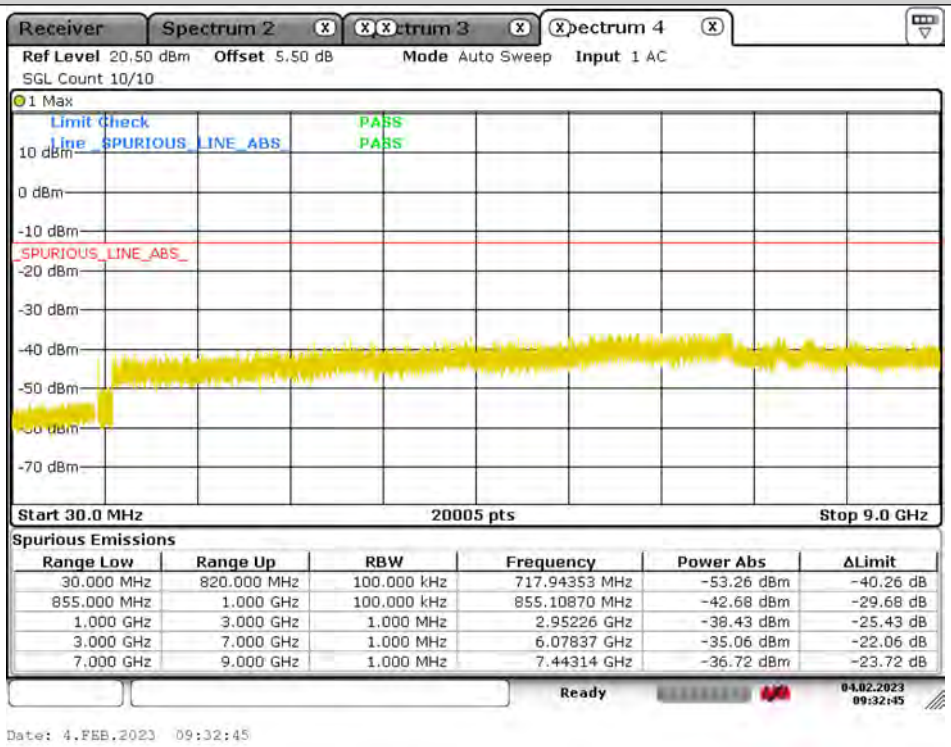


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	100.000 kHz	755.84458 MHz	-51.95 dBm	-38.95 dB
855.000 MHz	1.000 GHz	100.000 kHz	881.05072 MHz	-48.75 dBm	-35.75 dB
1.000 GHz	3.000 GHz	1.000 MHz	1.59160 GHz	-39.27 dBm	-26.27 dB
3.000 GHz	7.000 GHz	1.000 MHz	5.75941 GHz	-34.76 dBm	-21.76 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.75106 GHz	-36.30 dBm	-23.30 dB

Date: 4.FEB.2023 09:32:22

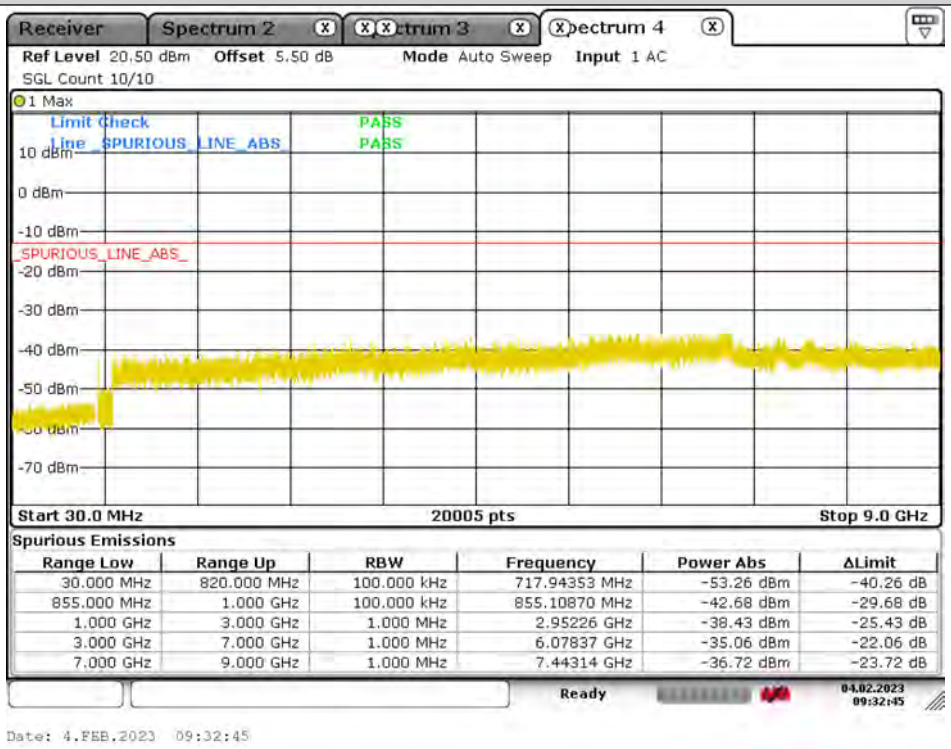
Band5-4233-30~1000MHz



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	100.000 kHz	717.94353 MHz	-53.26 dBm	-40.26 dB
855.000 MHz	1.000 GHz	100.000 kHz	855.10870 MHz	-42.68 dBm	-29.68 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.95226 GHz	-38.43 dBm	-25.43 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.07837 GHz	-35.06 dBm	-22.06 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.44314 GHz	-36.72 dBm	-23.72 dB

Band5-4233-1000~9000MHz



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
30.000 MHz	820.000 MHz	100.000 kHz	717.94353 MHz	-53.26 dBm	-40.26 dB
855.000 MHz	1.000 GHz	100.000 kHz	855.10870 MHz	-42.68 dBm	-29.68 dB
1.000 GHz	3.000 GHz	1.000 MHz	2.95226 GHz	-38.43 dBm	-25.43 dB
3.000 GHz	7.000 GHz	1.000 MHz	6.07837 GHz	-35.06 dBm	-22.06 dB
7.000 GHz	9.000 GHz	1.000 MHz	7.44314 GHz	-36.72 dBm	-23.72 dB

FREQUENCY STABILITY

Test Result

Voltage							
Band	Channel	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band5	4132	VL	NT	-6.64	-0.008035	±2.5	PASS
Band5	4132	VN	NT	9.51	0.011508	±2.5	PASS
Band5	4132	VH	NT	-7.52	-0.009100	±2.5	PASS
Band5	4182	VL	NT	9.77	0.011678	±2.5	PASS
Band5	4182	VN	NT	0.18	0.000215	±2.5	PASS
Band5	4182	VH	NT	-4.06	-0.004853	±2.5	PASS
Band5	4233	VL	NT	1.13	0.001335	±2.5	PASS
Band5	4233	VN	NT	-2.29	-0.002705	±2.5	PASS
Band5	4233	VH	NT	9.75	0.011517	±2.5	PASS

Temperature							
Band	Channel	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band5	4132	NV	-30	4.45	0.005385	±2.5	PASS
Band5	4132	NV	-20	-1.08	-0.001307	±2.5	PASS
Band5	4132	NV	0	1.8	0.002178	±2.5	PASS
Band5	4132	NV	10	2.51	0.003037	±2.5	PASS
Band5	4132	NV	20	-9.86	-0.011931	±2.5	PASS
Band5	4132	NV	30	4.34	0.005252	±2.5	PASS
Band5	4132	NV	40	1.1	0.001331	±2.5	PASS
Band5	4132	NV	50	7.51	0.009088	±2.5	PASS
Band5	4182	NV	-30	-7.12	-0.008511	±2.5	PASS
Band5	4182	NV	-20	-9.85	-0.011774	±2.5	PASS
Band5	4182	NV	0	9.48	0.011332	±2.5	PASS
Band5	4182	NV	10	7.78	0.009300	±2.5	PASS
Band5	4182	NV	20	0.92	0.001100	±2.5	PASS
Band5	4182	NV	30	-3.7	-0.004423	±2.5	PASS
Band5	4182	NV	40	-3.26	-0.003897	±2.5	PASS
Band5	4182	NV	50	-4.51	-0.005391	±2.5	PASS
Band5	4233	NV	-30	4.52	0.005339	±2.5	PASS
Band5	4233	NV	-20	4.89	0.005776	±2.5	PASS
Band5	4233	NV	0	-3.6	-0.004252	±2.5	PASS
Band5	4233	NV	10	-4.59	-0.005422	±2.5	PASS
Band5	4233	NV	20	2.32	0.002740	±2.5	PASS
Band5	4233	NV	30	8.11	0.009579	±2.5	PASS
Band5	4233	NV	40	-0.12	-0.000142	±2.5	PASS
Band5	4233	NV	50	-6.29	-0.007430	±2.5	PASS

LTE BAND5

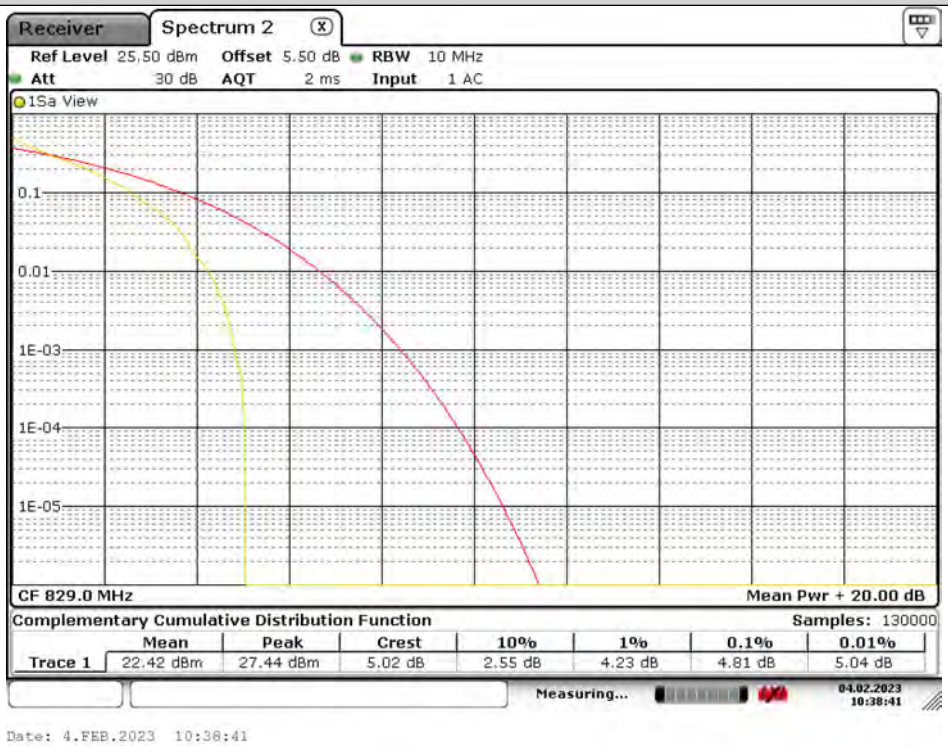
PEAK-TO-AVERAGE RATIO(CCDF)

Test Result

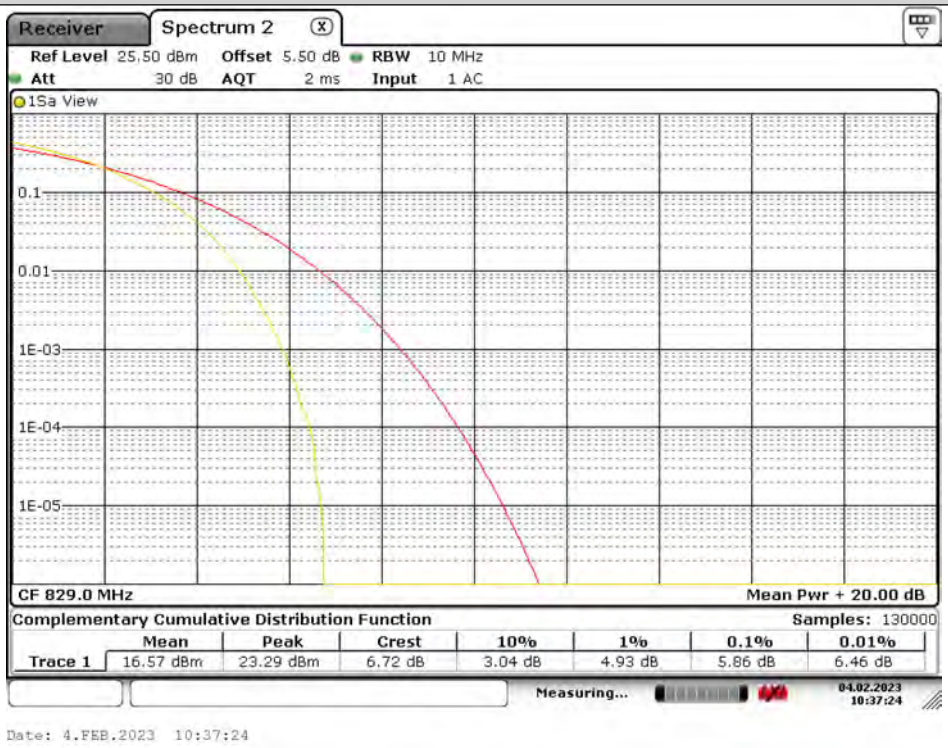
Band	Bandwidth	Modulation	Channel	RB Configuration	Result(dB)	Limit(dB)	Verdict
Band5	10MHz	QPSK	20450	1RB#0	4.81	13	PASS
Band5	10MHz	QPSK	20450	50RB#0	5.86	13	PASS
Band5	10MHz	QPSK	20525	1RB#0	5.01	13	PASS
Band5	10MHz	QPSK	20525	50RB#0	5.57	13	PASS
Band5	10MHz	QPSK	20600	1RB#0	5.1	13	PASS
Band5	10MHz	QPSK	20600	50RB#0	5.59	13	PASS
Band5	10MHz	16QAM	20450	1RB#0	5.88	13	PASS
Band5	10MHz	16QAM	20450	50RB#0	6.72	13	PASS
Band5	10MHz	16QAM	20525	1RB#0	6.29	13	PASS
Band5	10MHz	16QAM	20525	50RB#0	6.32	13	PASS
Band5	10MHz	16QAM	20600	1RB#0	6.32	13	PASS
Band5	10MHz	16QAM	20600	50RB#0	6.23	13	PASS
Band5	10MHz	64QAM	20450	1RB#0	6.58	13	PASS
Band5	10MHz	64QAM	20450	50RB#0	6.61	13	PASS
Band5	10MHz	64QAM	20525	1RB#0	6.32	13	PASS
Band5	10MHz	64QAM	20525	50RB#0	6.55	13	PASS
Band5	10MHz	64QAM	20600	1RB#0	6.55	13	PASS
Band5	10MHz	64QAM	20600	50RB#0	6.43	13	PASS

Test Graphs

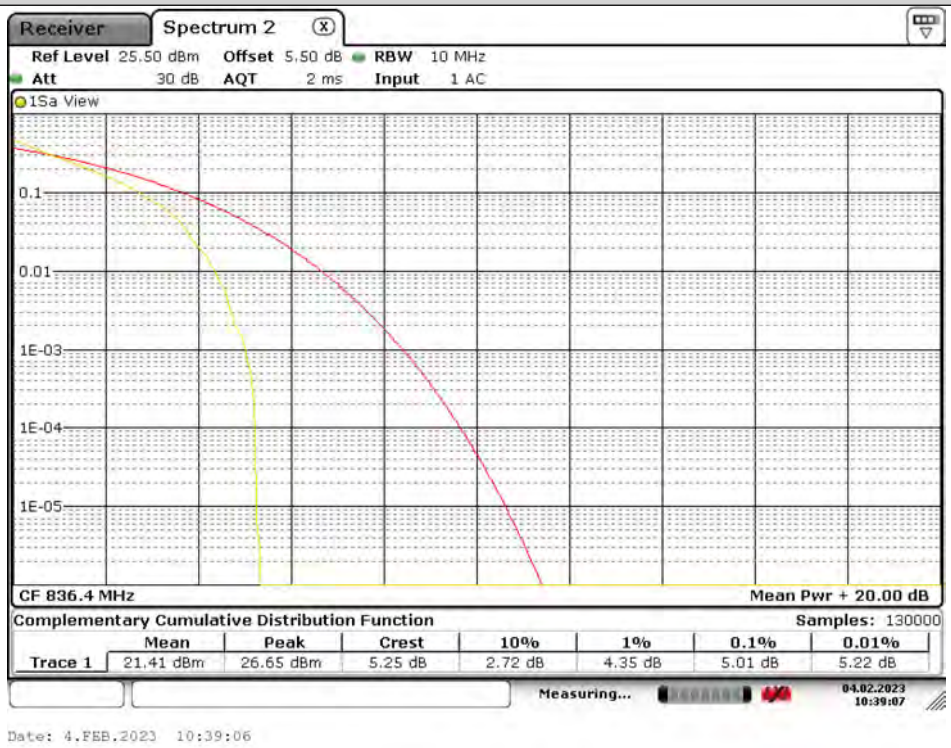
Band5-10MHz-QPSK-20450-1RB#0



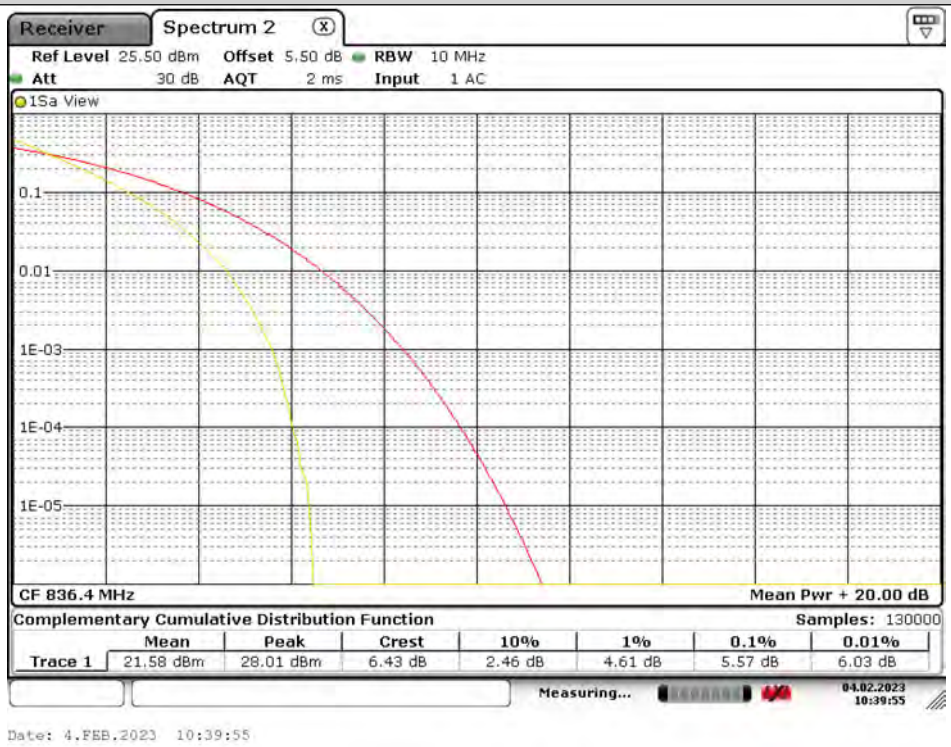
Band5-10MHz-QPSK-20450-50RB#0



Band5-10MHz-QPSK-20525-1RB#0



Band5-10MHz-QPSK-20525-50RB#0



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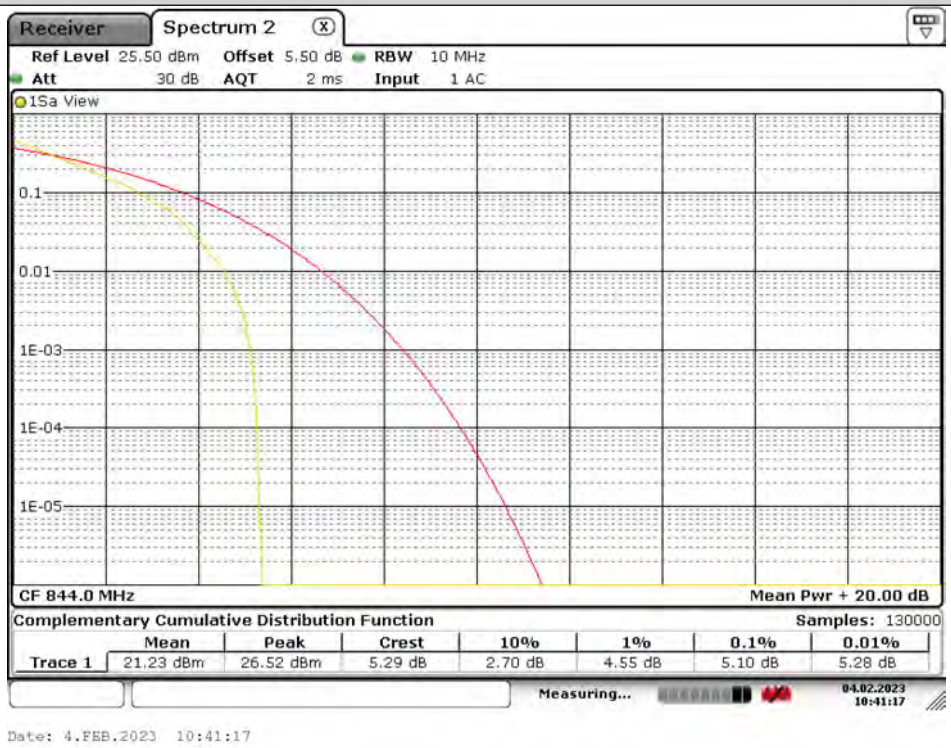
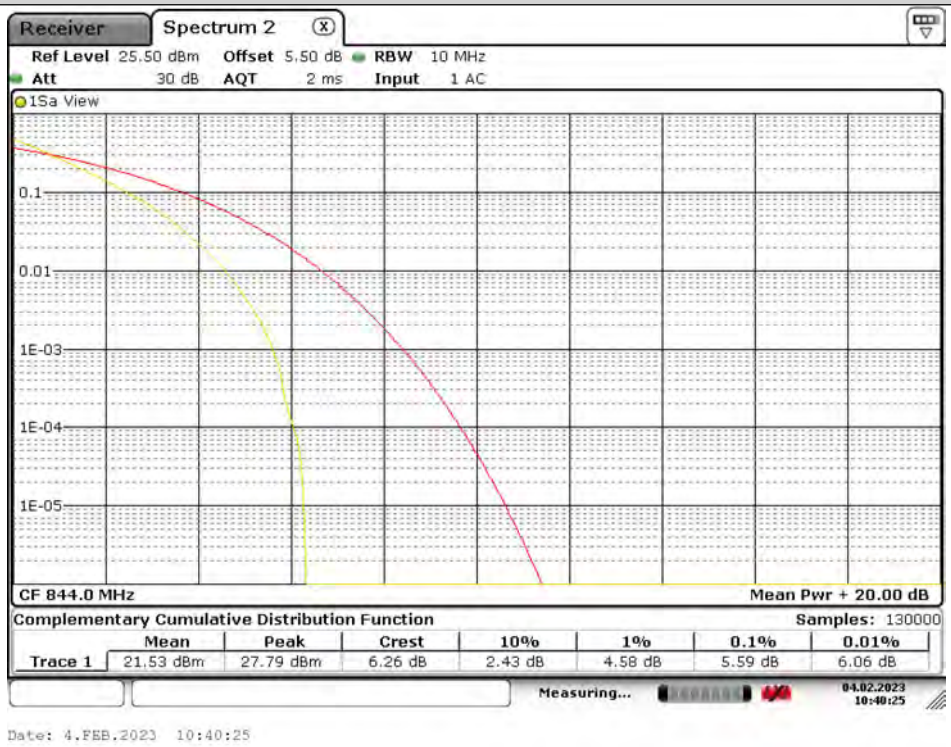
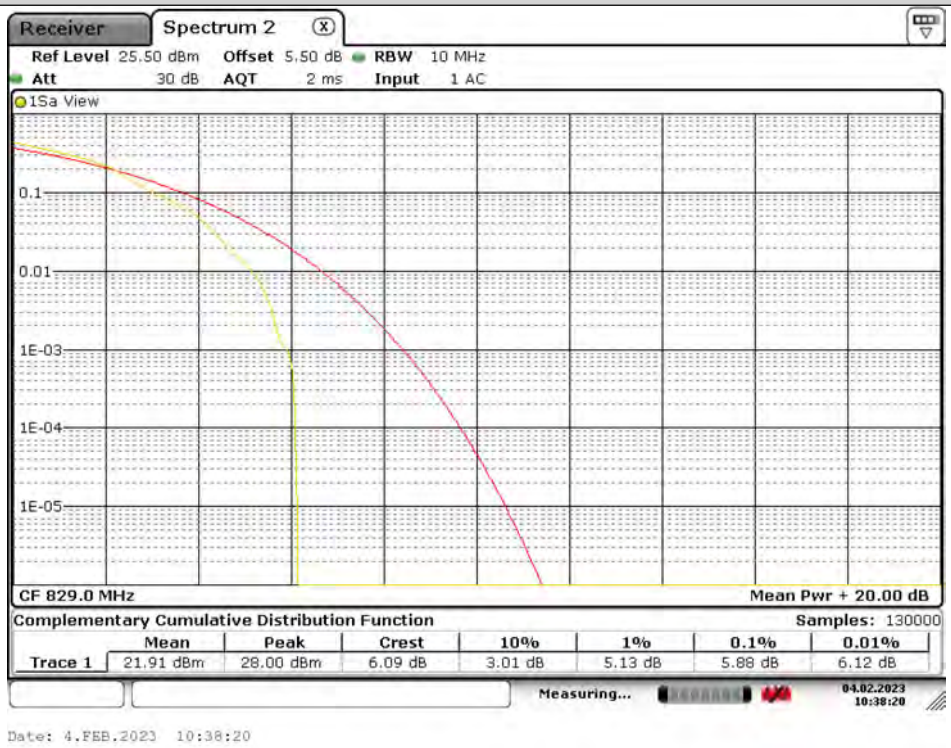


Band5-10MHz-QPSK-20600-50RB#0



Band5-10MHz-16QAM-20450-1RB#0



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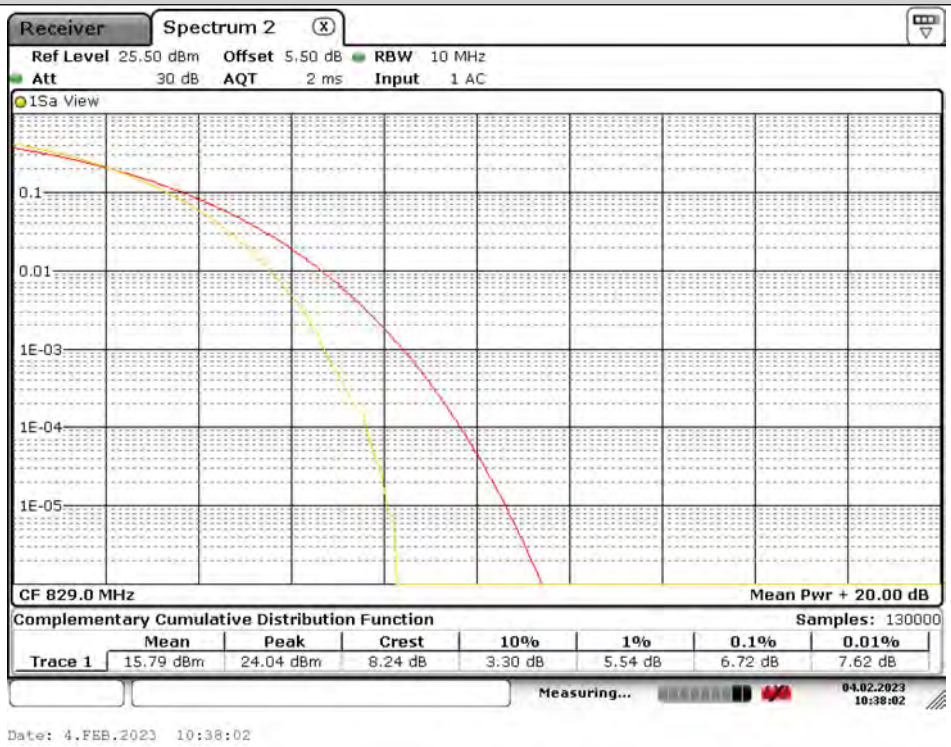

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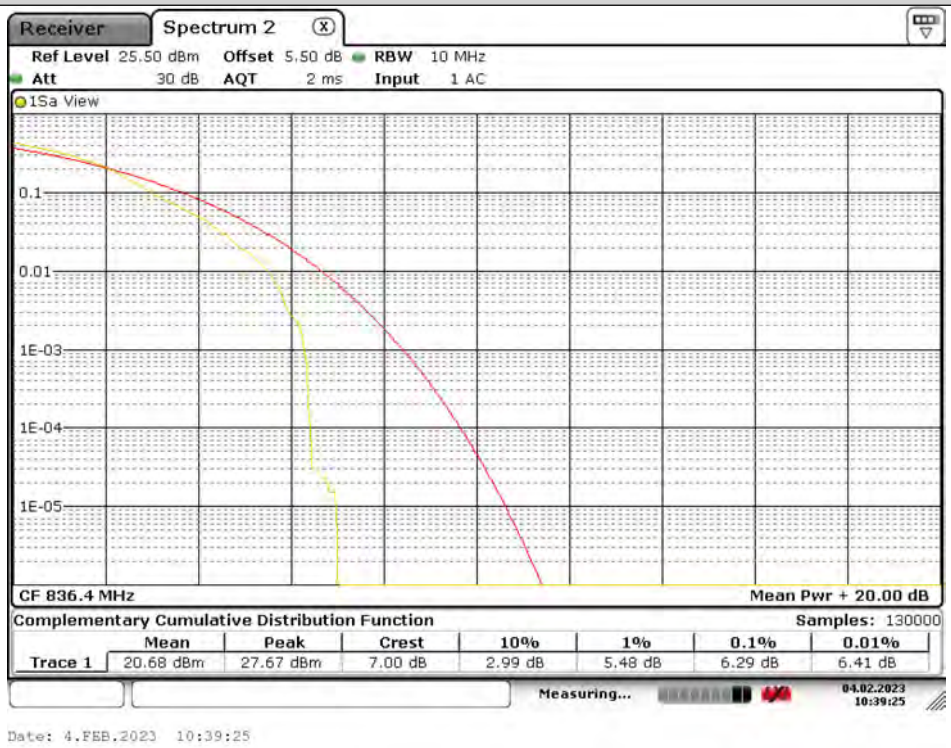
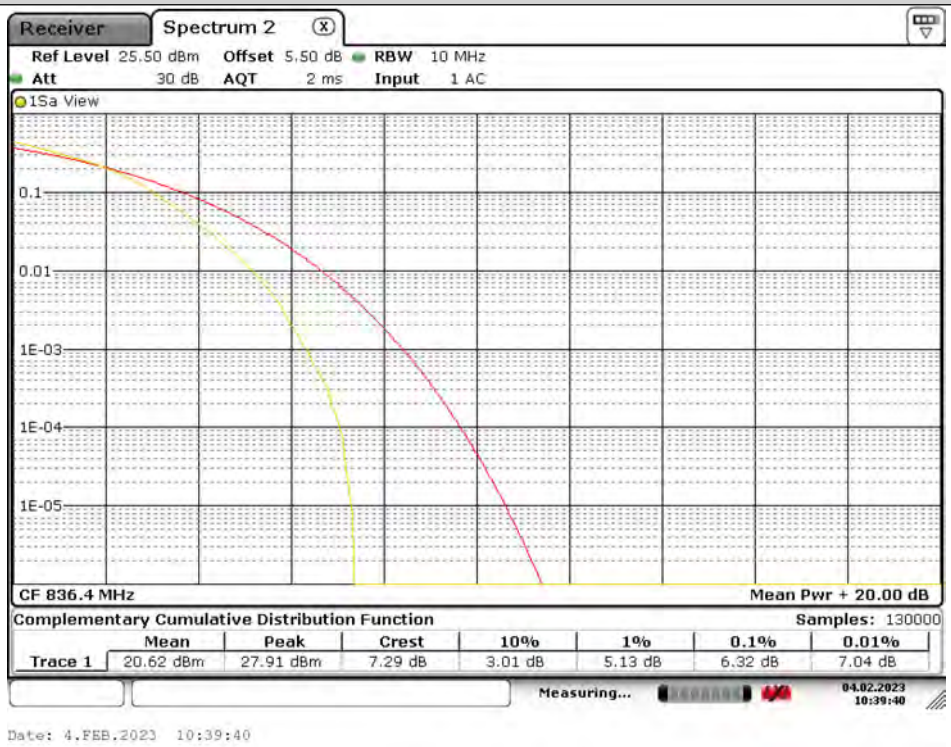


Band5-10MHz-16QAM-20525-50RB#0



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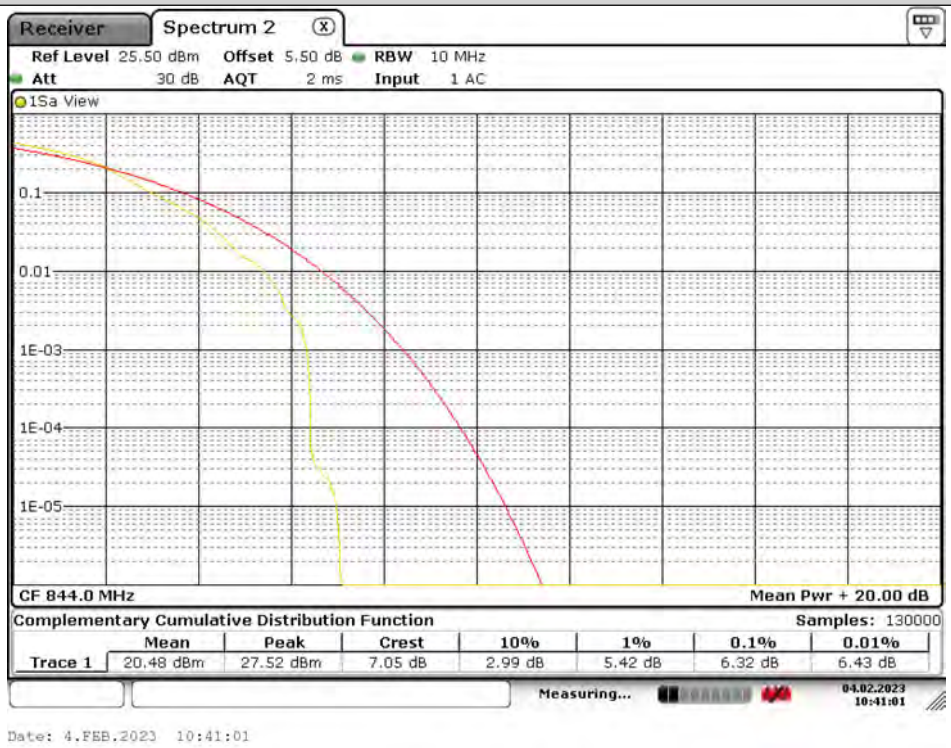
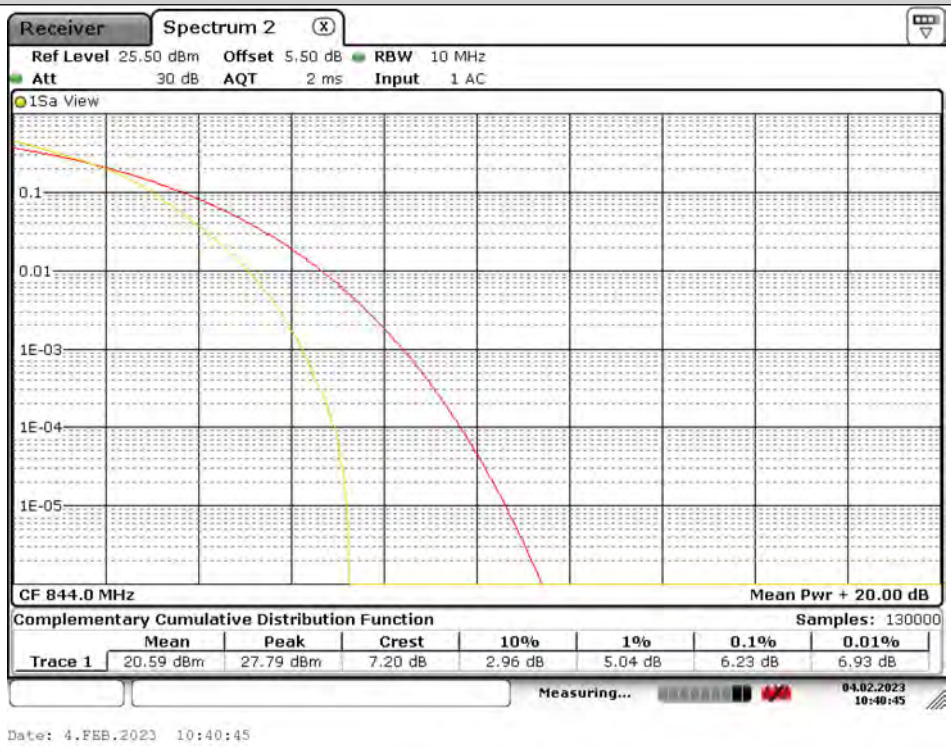
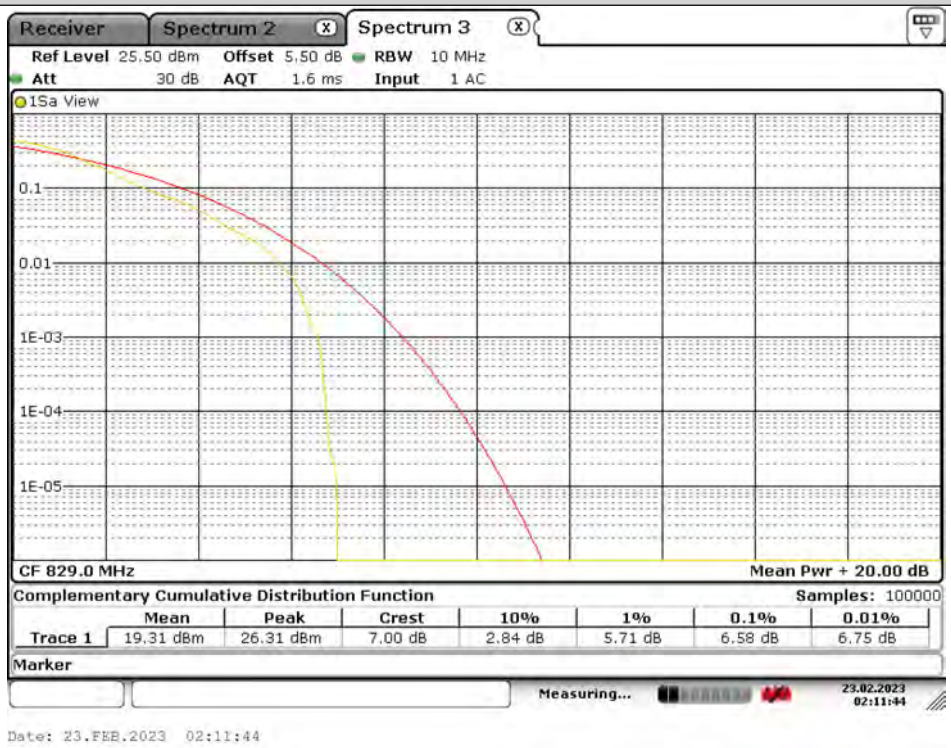


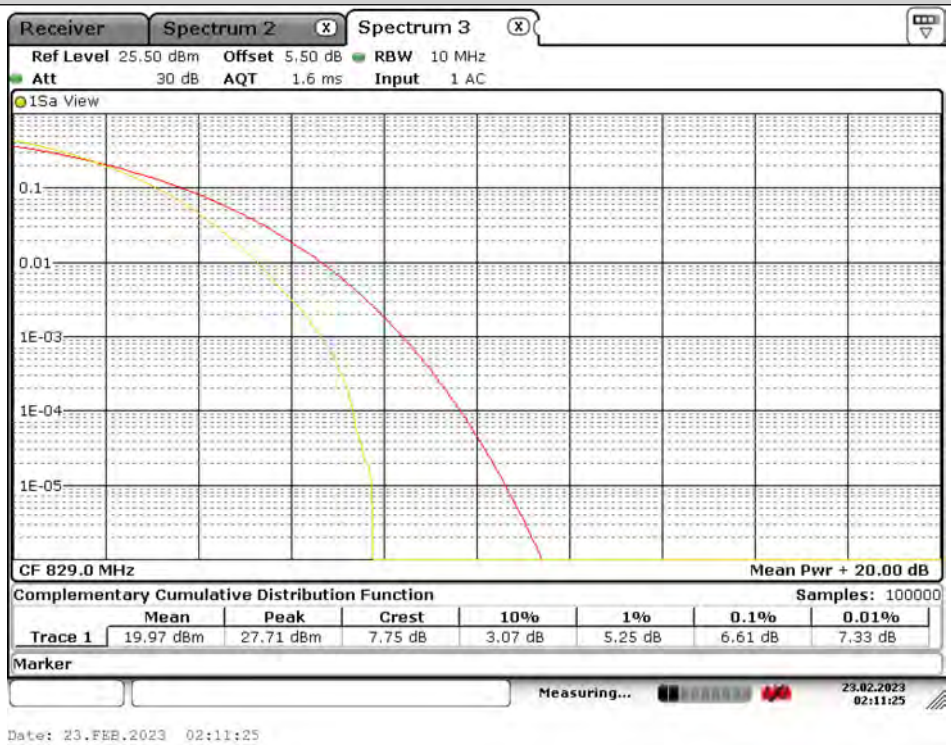
Band5-10MHz-16QAM-20600-50RB#0



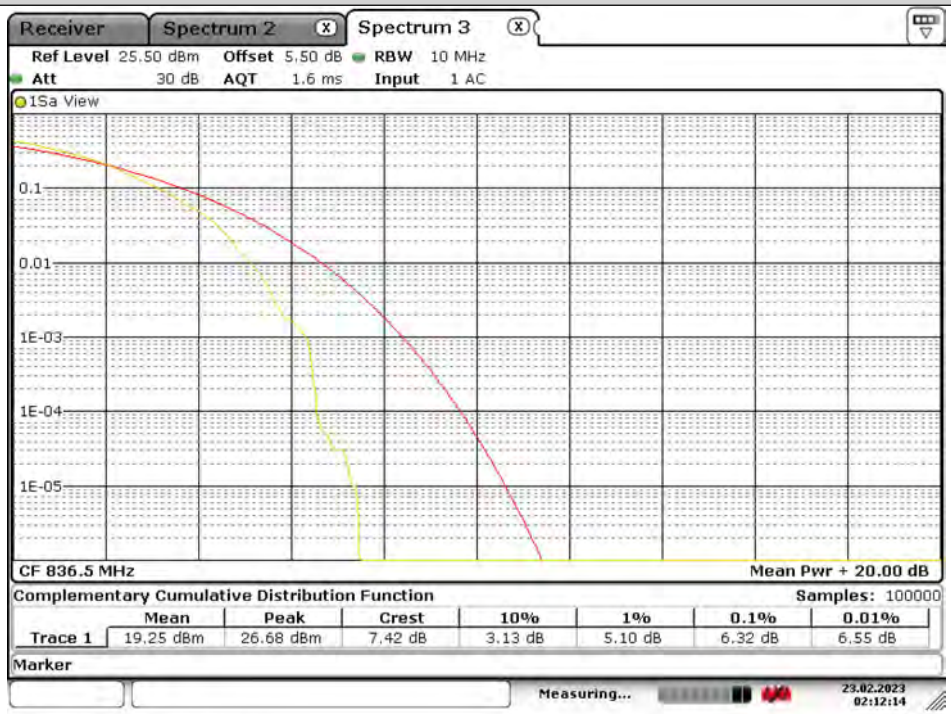
Band5-10MHz-64QAM-20450-1RB#0



Band5-10MHz-64QAM-20450-50RB#0

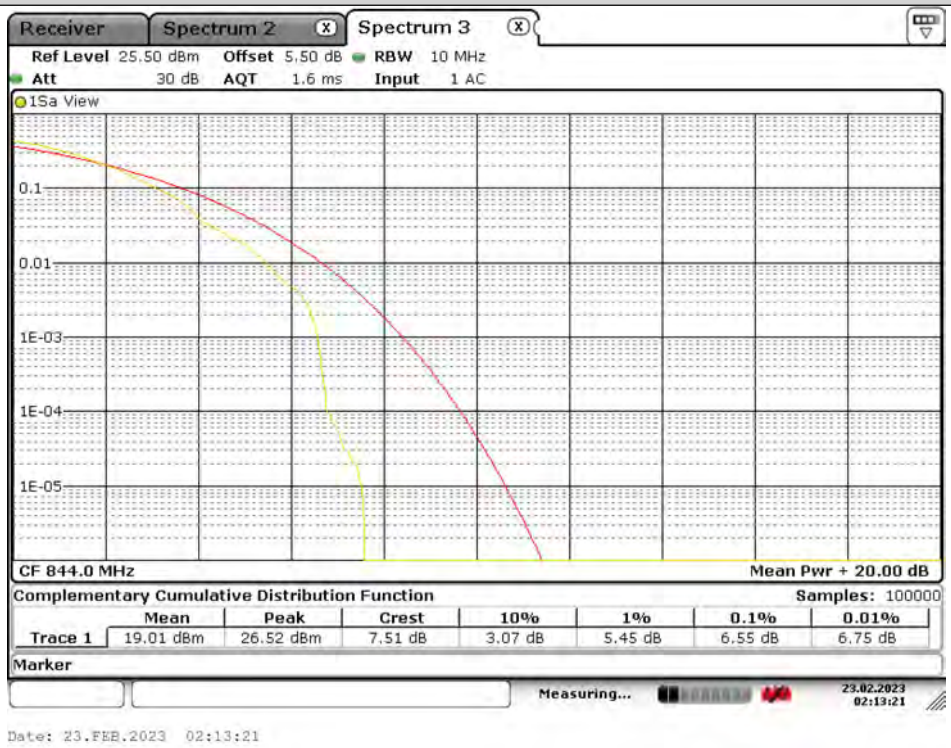


Band5-10MHz-64QAM-20525-1RB#0



Band5-10MHz-64QAM-20525-50RB#0

Band5-10MHz-64QAM-20600-1RB#0



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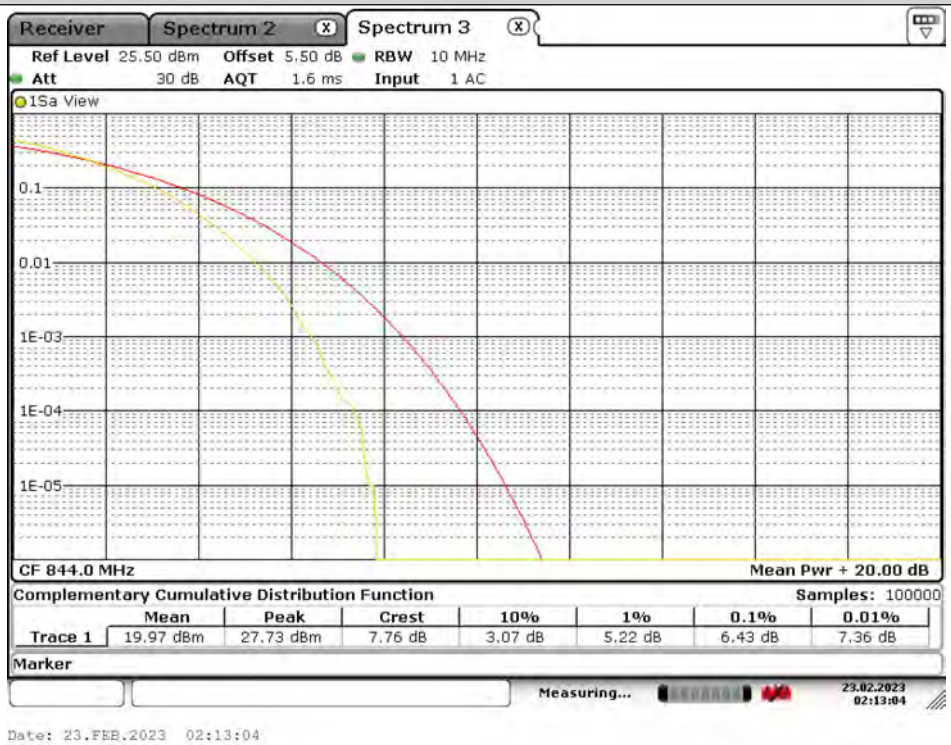


26DB BANDWIDTH AND OCCUPIED BANDWIDTH

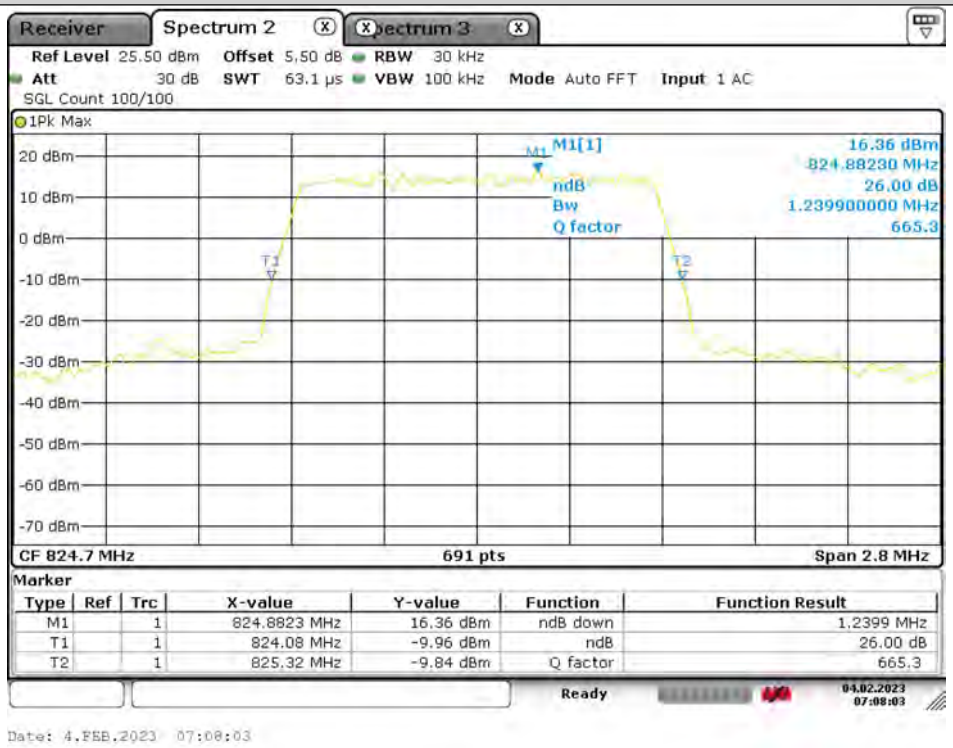
Test Result

Band	Bandwidth	Modulation	Channel	RB Configuration	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Verdict
Band5	1.4MHz	QPSK	20407	6RB#0	1.106	1.2399	PASS
Band5	1.4MHz	QPSK	20525	6RB#0	1.094	1.248	PASS
Band5	1.4MHz	QPSK	20643	6RB#0	1.094	1.2399	PASS
Band5	1.4MHz	16QAM	20407	6RB#0	1.086	1.244	PASS
Band5	1.4MHz	16QAM	20525	6RB#0	1.094	1.2359	PASS
Band5	1.4MHz	16QAM	20643	6RB#0	1.102	1.2318	PASS
Band5	3MHz	QPSK	20415	15RB#0	2.726	3.0304	PASS
Band5	3MHz	QPSK	20525	15RB#0	2.709	3.0825	PASS
Band5	3MHz	QPSK	20635	15RB#0	2.709	3.0738	PASS
Band5	3MHz	16QAM	20415	15RB#0	2.744	3.0651	PASS
Band5	3MHz	16QAM	20525	15RB#0	2.744	3.0825	PASS
Band5	3MHz	16QAM	20635	15RB#0	2.761	2.987	PASS
Band5	5MHz	QPSK	20425	25RB#0	4.486	4.891	PASS
Band5	5MHz	QPSK	20525	25RB#0	4.486	4.935	PASS
Band5	5MHz	QPSK	20625	25RB#0	4.486	4.834	PASS
Band5	5MHz	16QAM	20425	25RB#0	4.712	4.891	PASS
Band5	5MHz	16QAM	20525	25RB#0	4.515	4.92	PASS
Band5	5MHz	16QAM	20625	25RB#0	4.486	4.935	PASS
Band5	10MHz	QPSK	20450	50RB#0	9.001	9.725	PASS
Band5	10MHz	QPSK	20525	50RB#0	9.030	9.783	PASS
Band5	10MHz	QPSK	20600	50RB#0	9.088	9.87	PASS
Band5	10MHz	16QAM	20450	50RB#0	9.059	9.841	PASS
Band5	10MHz	16QAM	20525	50RB#0	9.030	9.754	PASS
Band5	10MHz	16QAM	20600	50RB#0	9.059	9.783	PASS
Band5	1.4MHz	64QAM	20407	6RB#0	1.098	1.2318	PASS
Band5	1.4MHz	64QAM	20525	6RB#0	1.098	1.244	PASS
Band5	1.4MHz	64QAM	20643	6RB#0	1.098	1.2359	PASS
Band5	3MHz	64QAM	20415	15RB#0	2.735	3.0391	PASS
Band5	3MHz	64QAM	20525	15RB#0	2.726	3.0304	PASS
Band5	3MHz	64QAM	20635	15RB#0	2.735	3.0478	PASS
Band5	5MHz	64QAM	20425	25RB#0	4.486	4.834	PASS
Band5	5MHz	64QAM	20525	25RB#0	4.515	4.920	PASS
Band5	5MHz	64QAM	20625	25RB#0	4.501	4.920	PASS
Band5	10MHz	64QAM	20450	50RB#0	9.059	9.812	PASS
Band5	10MHz	64QAM	20525	50RB#0	9.001	9.986	PASS
Band5	10MHz	64QAM	20600	50RB#0	9.059	9.928	PASS

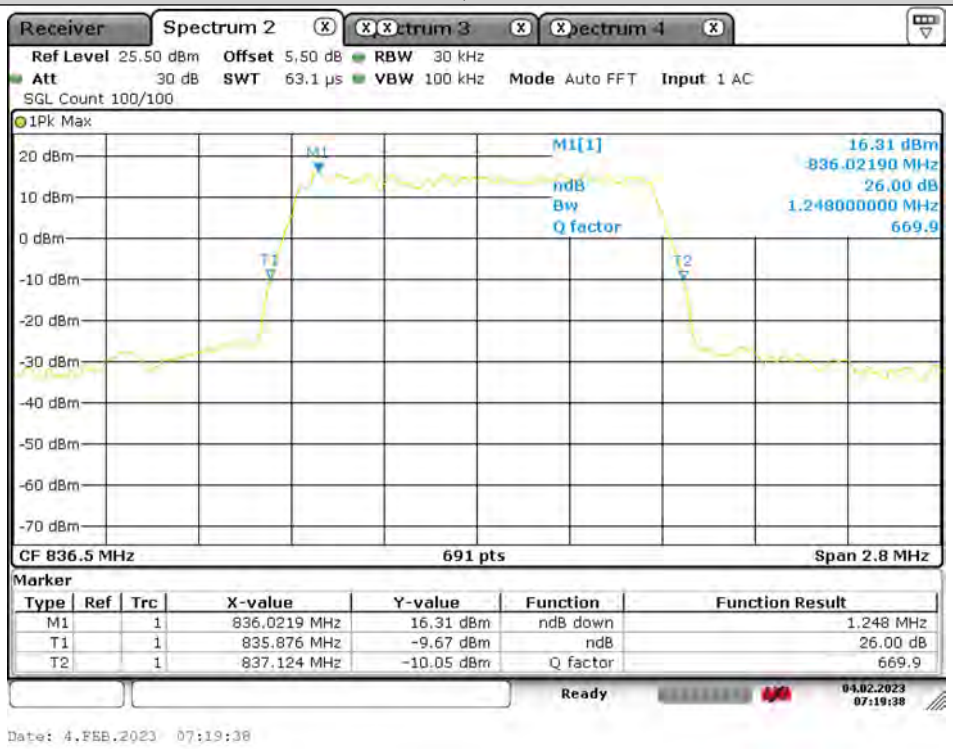
Test Graphs

26dB Bandwidth

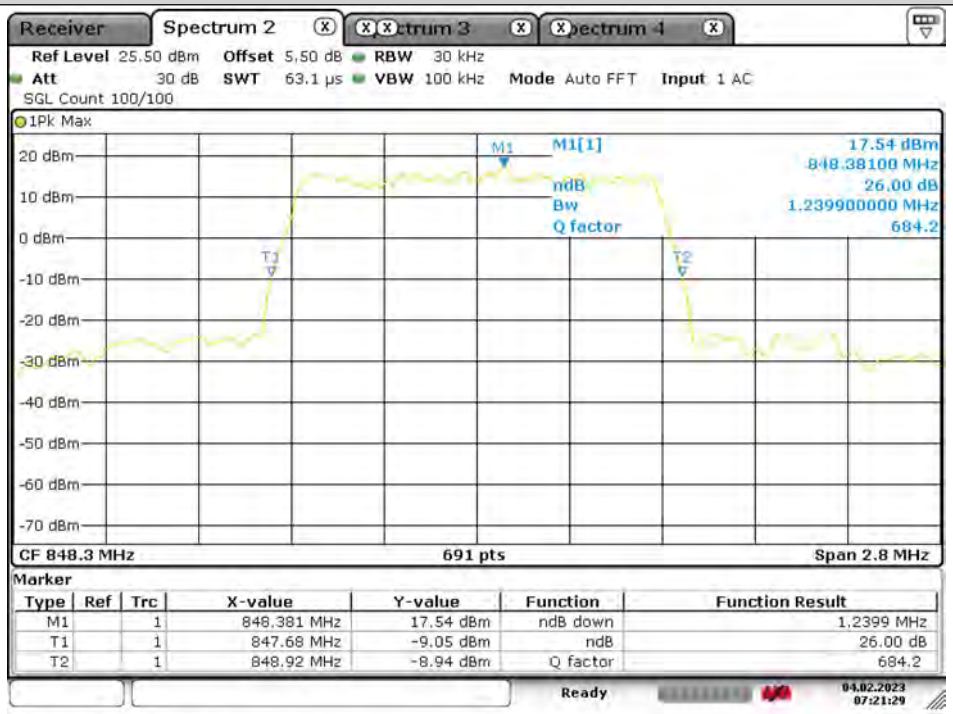
Band5-1.4MHz-QPSK-20407-6RB#0



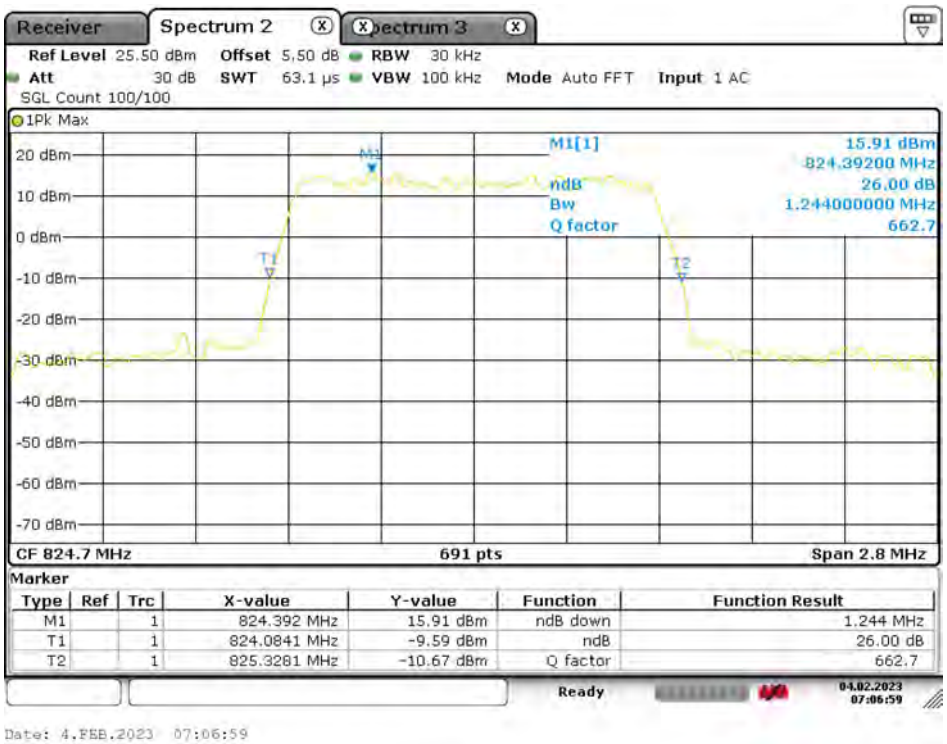
Band5-1.4MHz-QPSK-20525-6RB#0



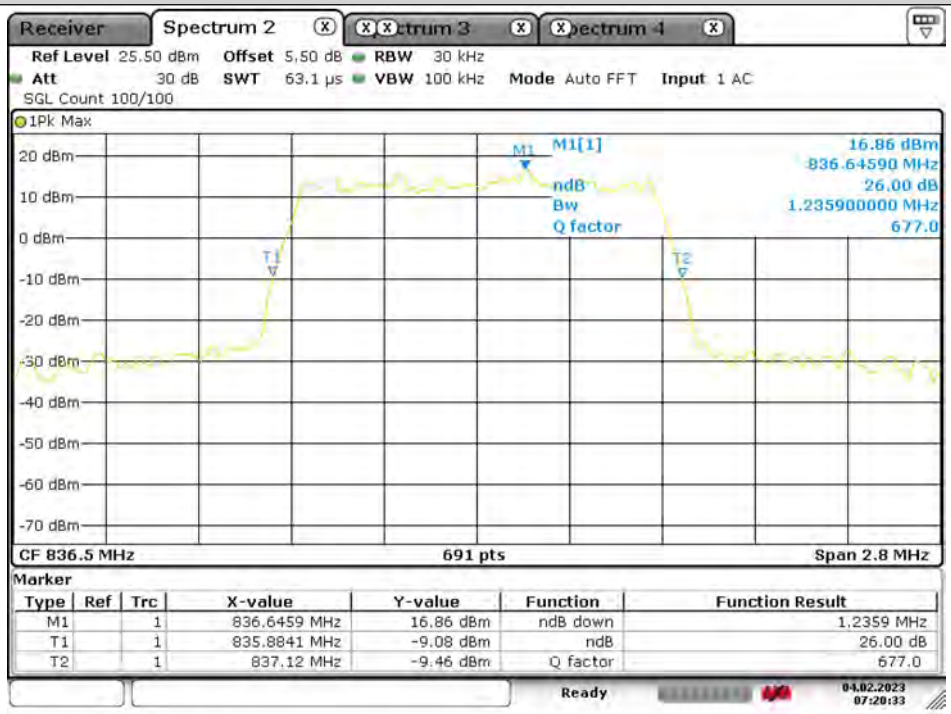
Band5-1.4MHz-QPSK-20643-6RB#0



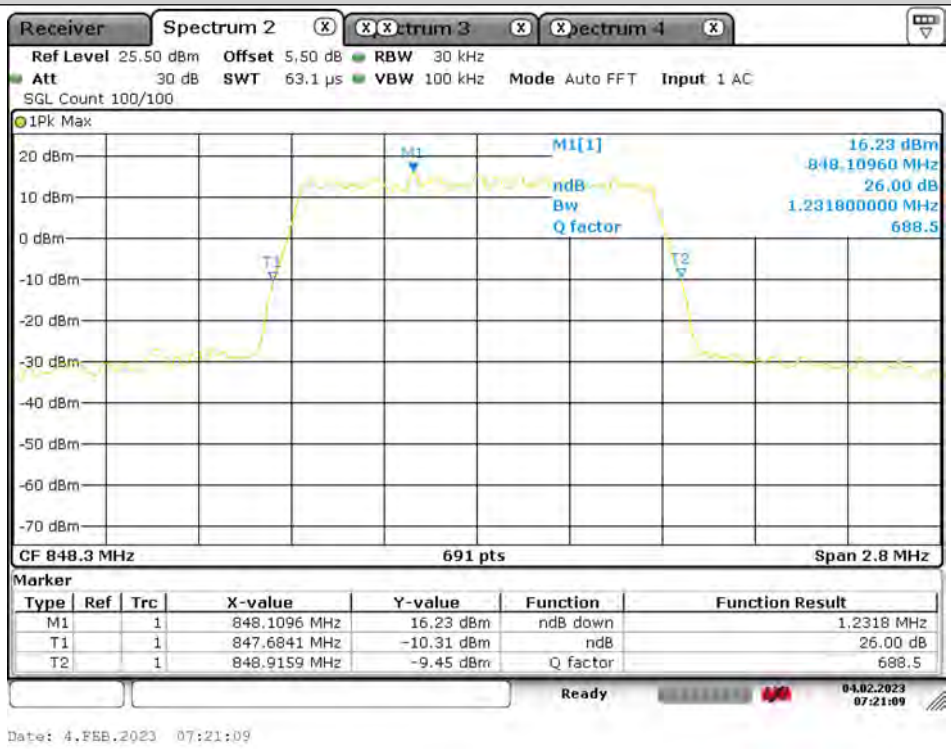
Band5-1.4MHz-16QAM-20407-6RB#0



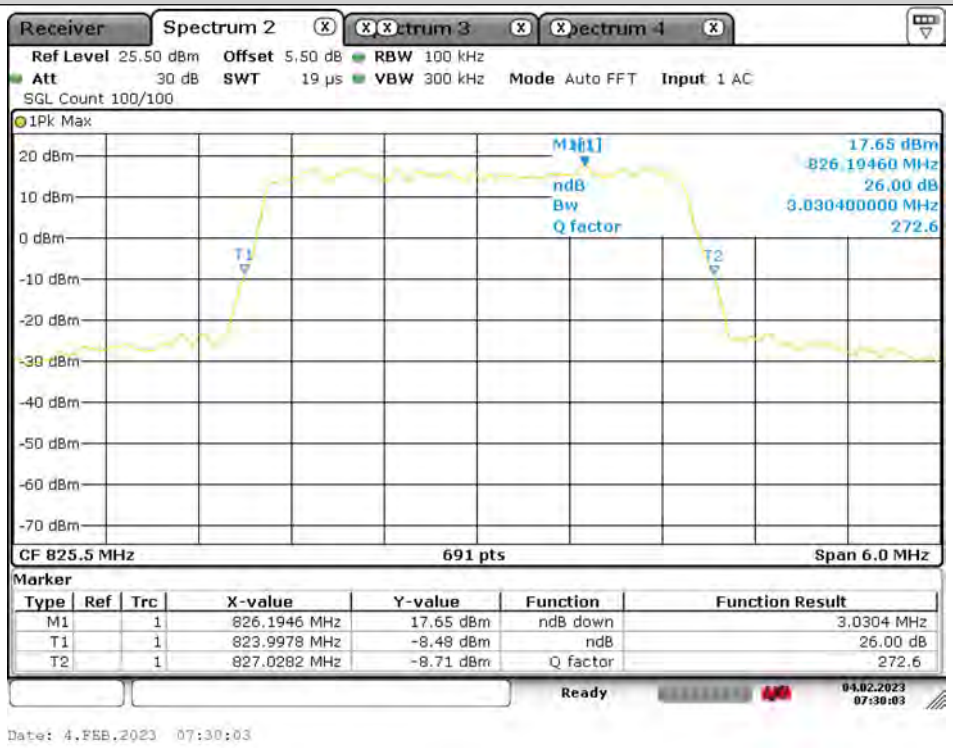
Band5-1.4MHz-16QAM-20525-6RB#0



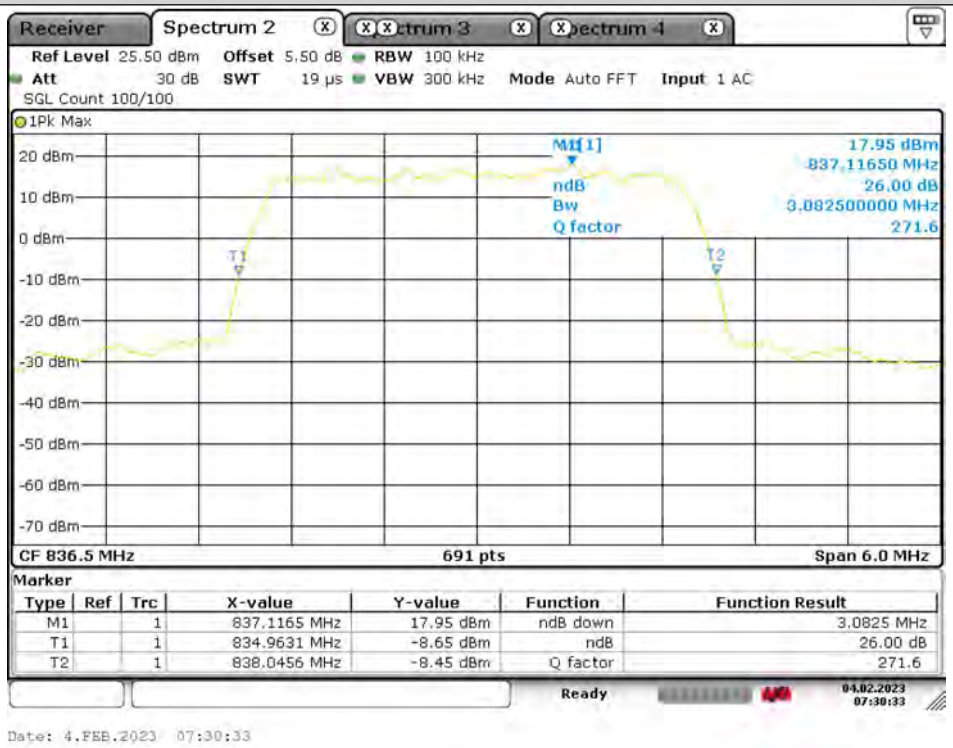
Band5-1.4MHz-16QAM-20643-6RB#0



Band5-3MHz-QPSK-20415-15RB#0



Band5-3MHz-QPSK-20525-15RB#0



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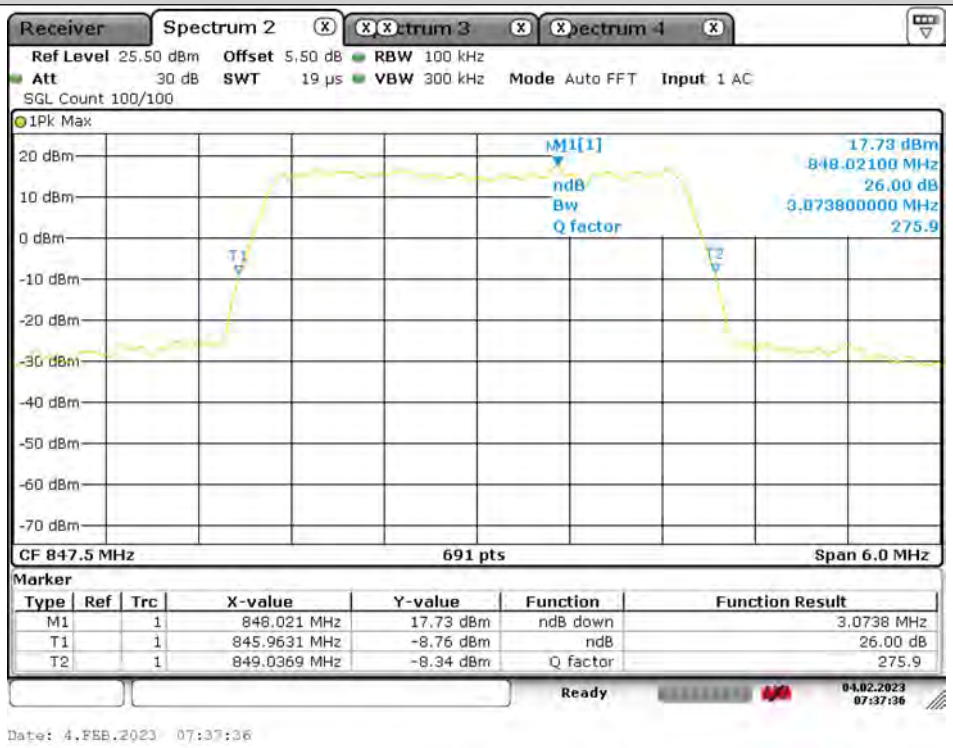
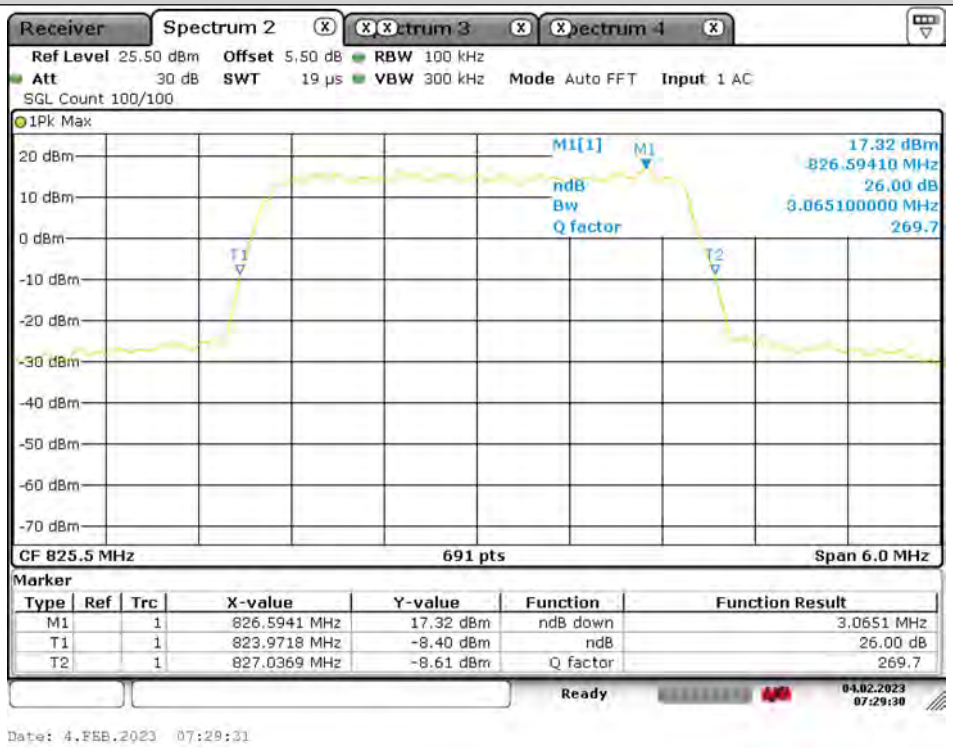
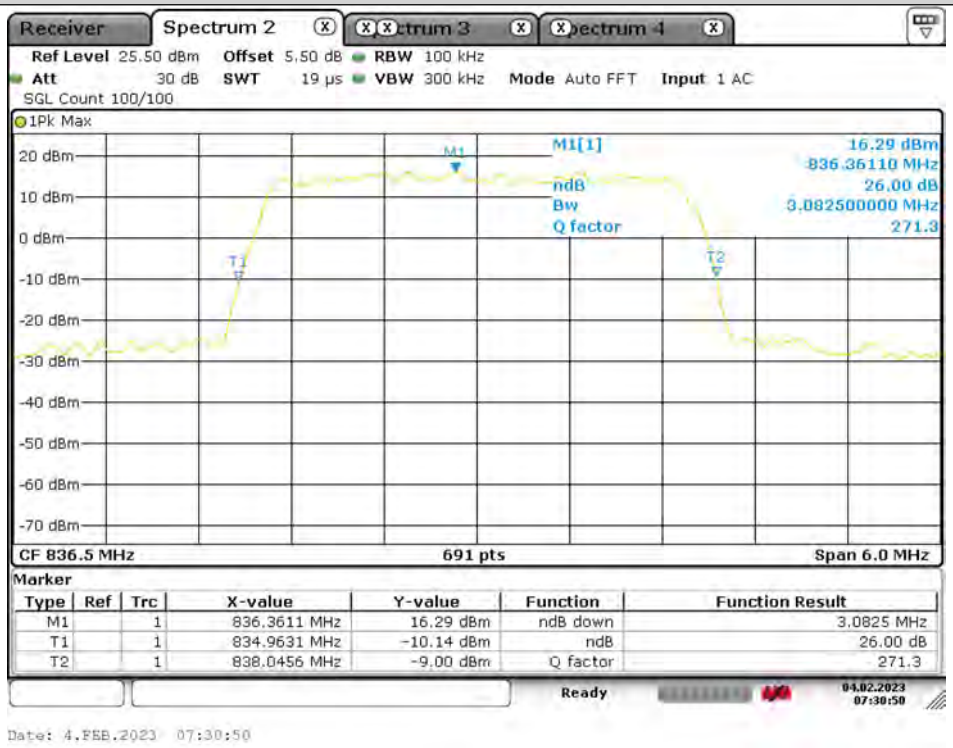


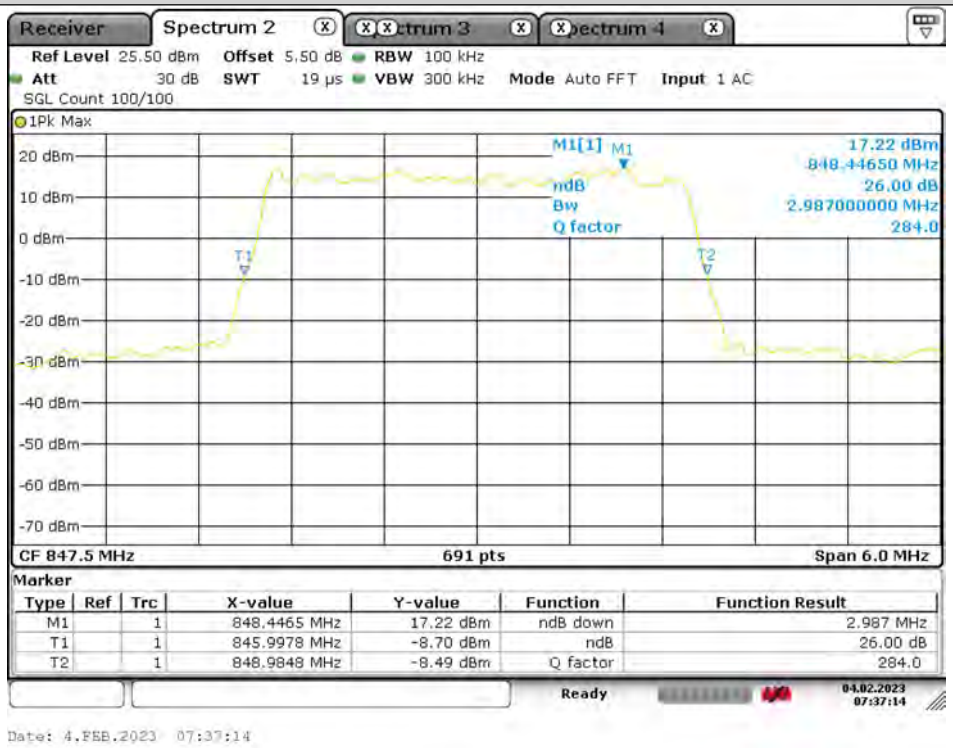
Band5-3MHz-16QAM-20415-15RB#0



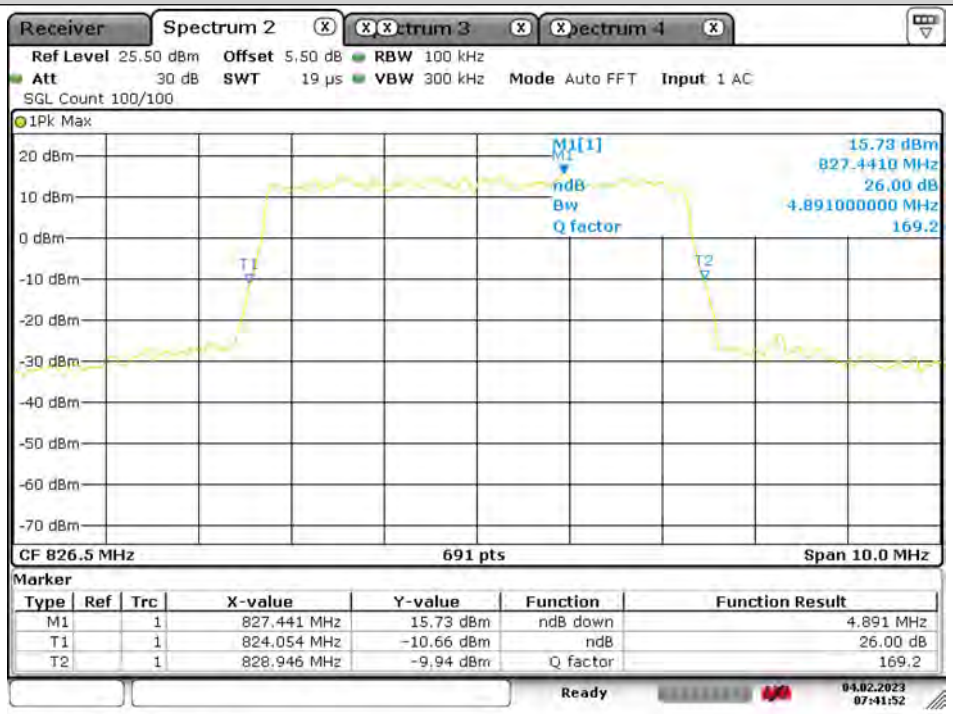
Band5-3MHz-16QAM-20525-15RB#0



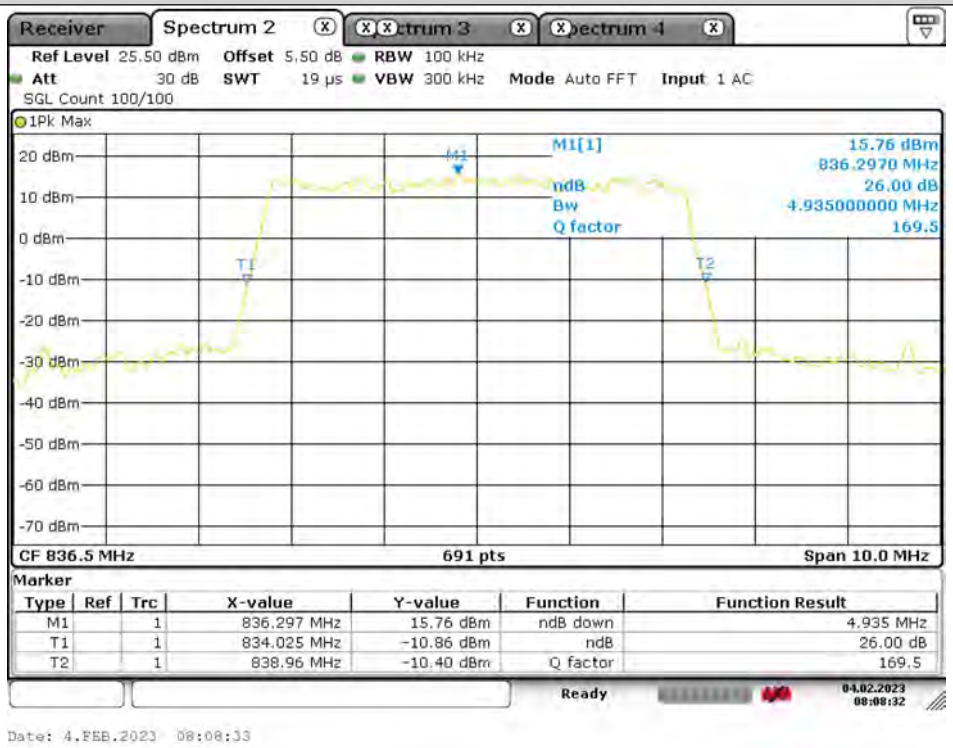
Band5-3MHz-16QAM-20635-15RB#0



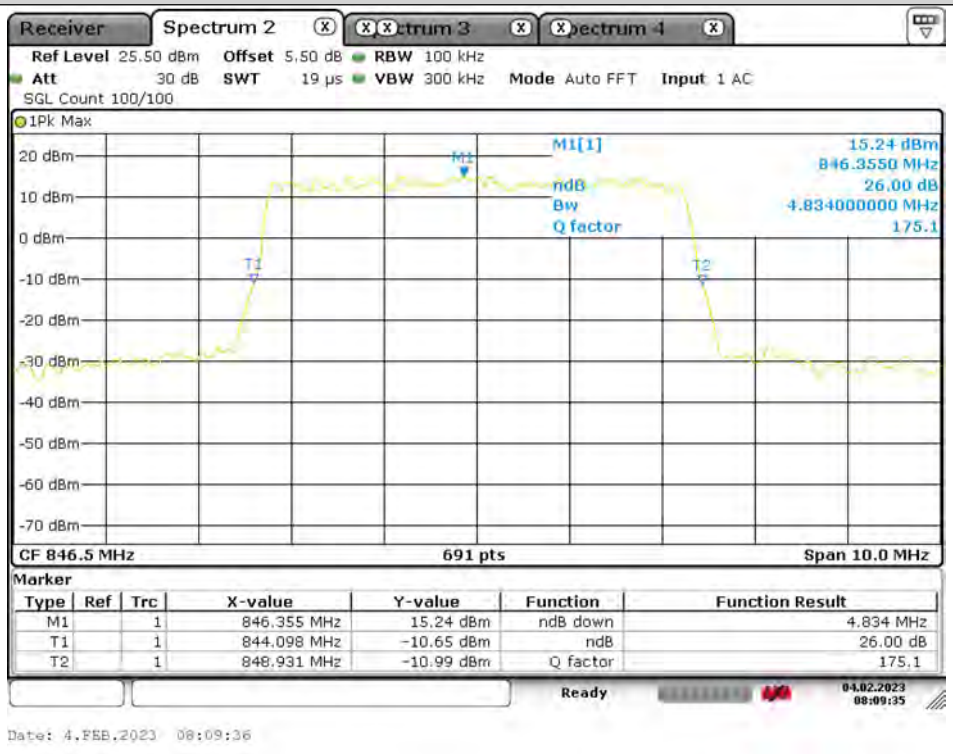
Band5-5MHz-QPSK-20425-25RB#0



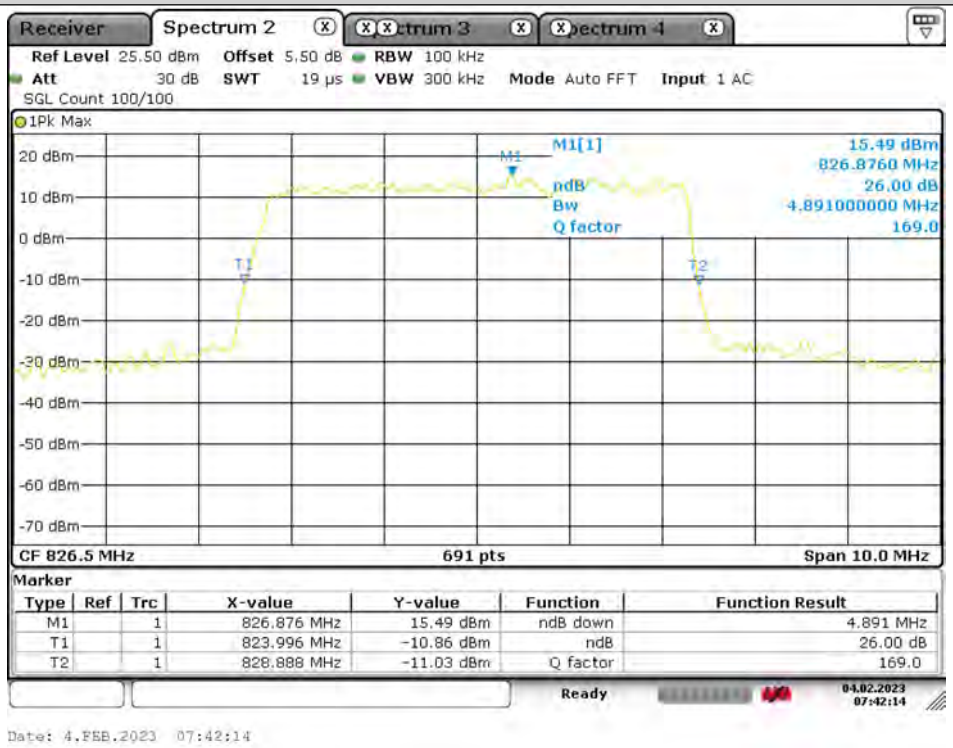
Band5-5MHz-QPSK-20525-25RB#0



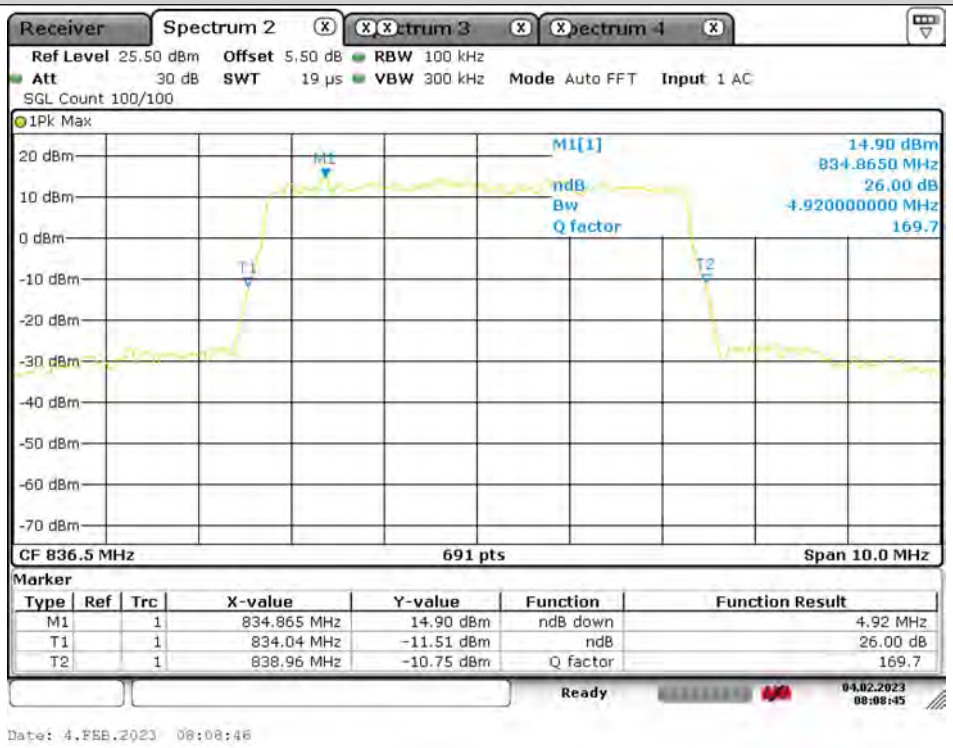
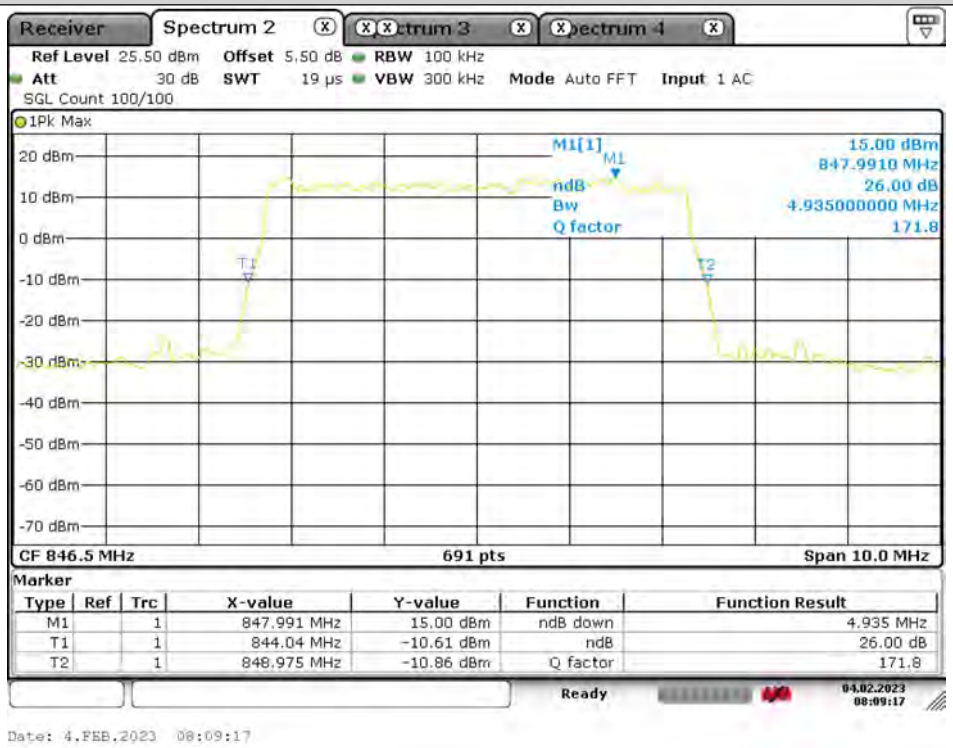
Band5-5MHz-QPSK-20625-25RB#0



Band5-5MHz-16QAM-20425-25RB#0



Band5-5MHz-16QAM-20525-25RB#0



Band5-5MHz-16QAM-20625-25RB#0