



FCC PART 15.247 TEST REPORT

For

Fujian Wazan Technology Co., Ltd.

601, Building 1, Huajian mansion, No. 12 Science and Technology East Road, High-tech Zone, Fuzhou, Fujian, China

FCC ID: 2BGEKU0301

Report Type: Original Report	Product Name: Unattended Payment Terminal Su3
Report Number:	2407S72267E-RF-01
Report Date:	2024-07-15
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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	2407S72267E-RF-01	R1V1	2024-07-15	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product Name:	Unattended Payment Terminal Su3
Tested Model:	Su3
Power Supply:	DC 12V
Maximum Output Power:	5.29dBm
RF Function:	Classic BT
Operating Band/Frequency:	2402-2480 MHz
Channel Number:	79
Channel Separation:	1 MHz
Modulation Type:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Antenna Type:	FPC Antenna
★Maximum Antenna Gain:	-3.35 dBi
EUT Received Status:	Good
<p>Note:</p> <ol style="list-style-type: none"> The Maximum Antenna Gain was declared by manufacturer. All measurement and test data in this report was gathered from production sample serial number: 2MA2-1. (Assigned by the BACL(Xiamen). The EUT supplied by the applicant was received on 2024-04-24) 	

Objective

This test report is prepared for *Fujian Wazan Technology Co., Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine Compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and 558074 D01 15.247 Meas Guidance v05r02.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Xiamen) to collect test data is located on the Unit 102, No. 902 Meifeng South Road, Binhai West Avenue, Science and Technology Innovation Park, Torch High tech Zone Xiamen.

Bay Area Compliance Laboratories Corp. (Xiamen) Lab is accredited to ISO/IEC 17025 by A2LA (Certificate Number: 7134.01) and the lab has been recognized as the FCC accredited lab under the KDB 974614 D01, the FCC Designation No. : CN1384.

Measurement Uncertainty

Item		U_{lab}
AC Power Lines Conducted Emissions	150kHz-30MHz	2.33 dB
Radiated emission	9kHz-30MHz	2.59 dB
	30MHz~1GHz	4.79 dB
	1GHz~6GHz	4.6 dB
	6GHz~18GHz	5.42 dB
	18GHz~26.5GHz	5.37 dB
Occupied Bandwidth		± 0.10 MHz
Transmitter Conducted Power		± 0.624 dB
Temperature		± 1 °C
Humidity		$\pm 5\%$

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

SYSTEM TEST CONFIGURATION

Test Mode and Voltage

The system was configured for testing in a typical mode (as normally used by a typical user).	
Test mode:	Test mode 1: Transmitting
Test voltage:	Test mode 1: DC 12V from adapter (AC 120V/60Hz)
Remark:	During all emission tests, the EUT was configured to measure its highest possible emission level and the worst case's test data was presented in this test report.

Description of Test Configuration

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	40	2442
1	2403
...
...	...	78	2480
39	2441	/	/

EUT was tested with Channel 0, 39 and 78.

EUT Exercise Software

BT test in the engineer mode.

RF Test Tool: cmd.exe

Test Modes	Power Level Setting		
	Lowest Channel	Middle Channel	Highest Channel
GFSK	0x1f	0x1f	0x1f
$\pi/4$ -DQPSK	0x20	0x20	0x20
8DPSK	0x20	0x20	0x20

Note: The power level was declared by the applicant.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

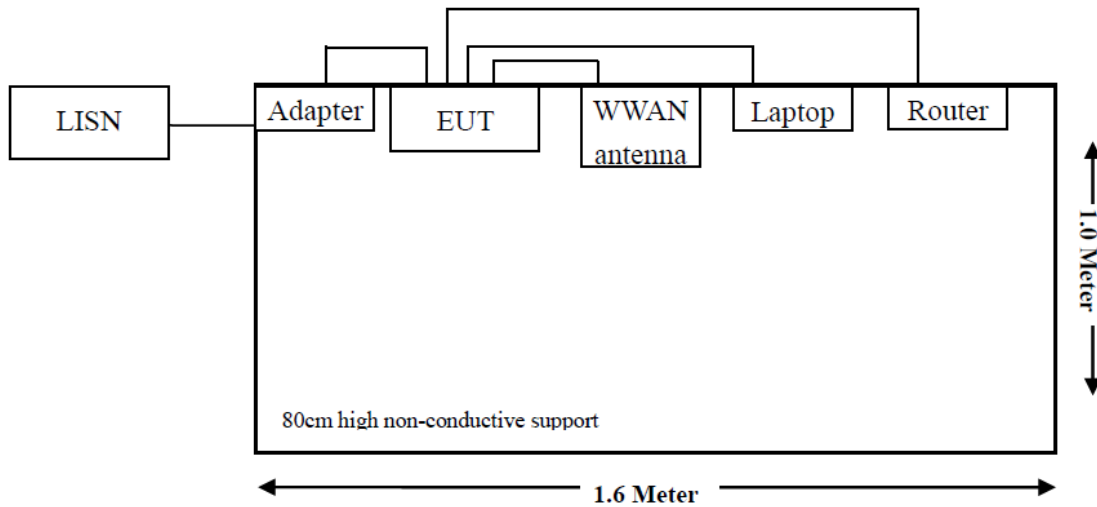
Manufacturer	Description	Model	Serial Number
Lenovo	Laptop	T480	PF1P5K4F
Honor	Router	WS831	W6E7S15B09001200
Shanghai Jesoncom Communication Engineering Co., Ltd	WWAN antenna	9Z067M	N/A
MNC	Adapter	MACS-1201501801	MACS-120150190004

External I/O Cable

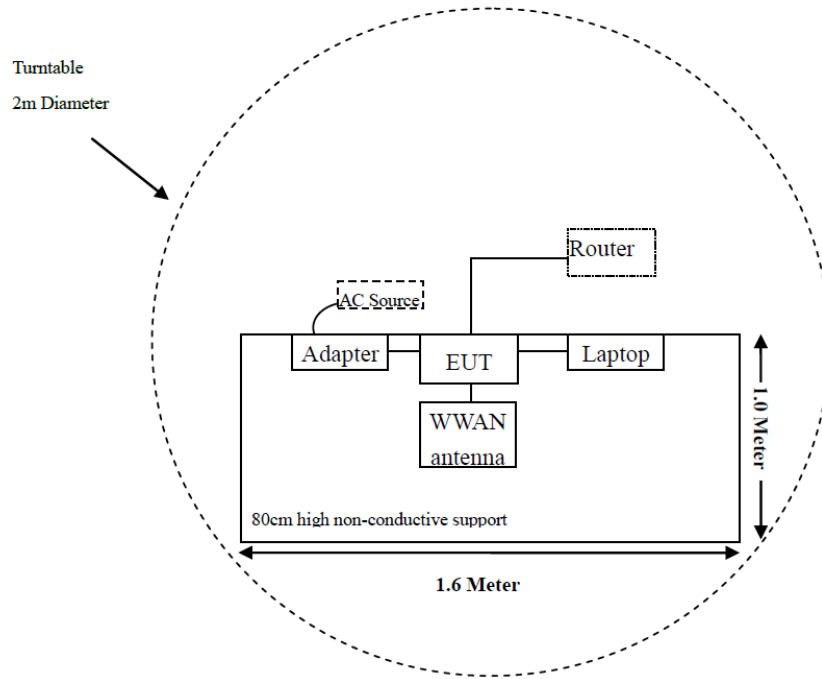
Cable Description	Length (m)	From Port	To
Power Line	1.8	EUT	Adapter
USB Line	1	EUT	Laptop
Network cable	10	EUT	Router

Block Diagram of Test Setup

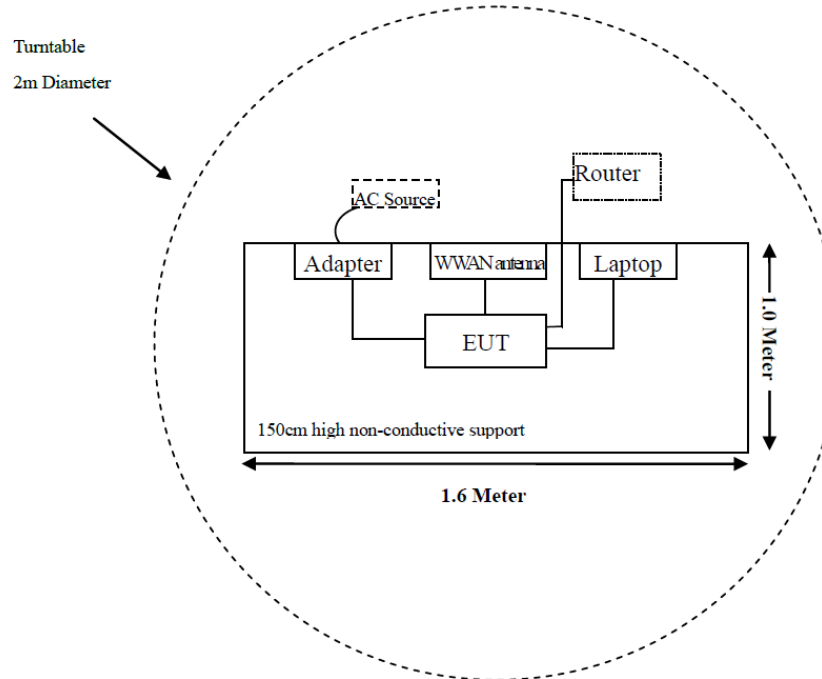
Conducted Emission:



Radiated Emission:
Below 1GHz



Above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209 & §15.247(d)	Radiated Emissions & Restricted Bands Emissions & Conducted Spurious Emissions at Antenna Port	Compliant
§15.247(a)(1)	20 dB Emission Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges	Compliant

TEST EQUIPMENT LIST

Test Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission Test					
EMI Test Receiver	Rohde & Schwarz	ESR	103105	2023/09/12	2024/09/11
LISN	Rohde & Schwarz	ENV216	100129	2023/09/12	2024/09/11
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54	2023/09/12	2024/09/11
Coaxial Cable	XINHANGWEIBO	XH400T-N-4M	CC001	2023/08/29	2024/08/28
Test Software	Audix	E3	18621a	N/A	N/A
Radiated Emissions Below 1GHz					
EMI Test Receiver	Rohde & Schwarz	ESR	103103	2023/09/12	2024/09/11
Loop Antenna	Rohde & Schwarz	HFH2-Z2	830749/001	2023/07/27	2026/07/26
Antenna	Sunol Sciences	JB6	A122022-5	2023/07/27	2026/07/26
Amplifier	Sonoma	310B	120903	2023/09/12	2024/09/11
Coaxial Cable	XINHANGWEIBO	XH400T-N-4M	CC002	2023/08/29	2024/08/28
Coaxial Cable	XINHANGWEIBO	XH460B-N-2M	CC006	2023/08/29	2024/08/28
Coaxial Cable	XINHANGWEIBO	XH460B-N-12M	CC007	2023/08/29	2024/08/28
Coaxial Cable	XINHANGWEIBO	HFH2-CC	335.3609	2023/09/20	2024/09/19
Test Software	Audix	E3	18621a	N/A	N/A
Radiated Emission Above 1 GHz					
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102051	2023/09/12	2024/09/11
Double Ridge Guide Horn Antenna	A.H.Systems	SAS-571	1980	2023/07/28	2026/07/27
Horn Antenna	EMCO	3116	9407-2232	2023/07/31	2026/07/30
Preamplifier	A.H.Systems	PAM-0118P	489	2023/09/12	2024/09/11
Preamplifier	A.H.Systems	PAM-1840	200	2023/09/12	2024/09/11
Coaxial Cable	XINHANGWEIBO	XH800A-N-6M	CC004	2023/08/29	2024/08/28
Coaxial Cable	XINHANGWEIBO	XH800A-N-1M	CC005	2023/08/29	2024/08/28
Multiplex Switch Test Control Set	Decentest	DT7220SCU	DS79901	2024/02/23	2025/02/22
Filter Switch Unit	Decentest	DT7220FSU	DS79904	2024/02/23	2025/02/22
Test Software	Audix	E3	18621a	N/A	N/A
RF Conducted Test					
Spectrum Analyzer	Rohde & Schwarz	FSU	100405	2023/09/12	2024/09/11
Coaxial Cable	N/A	N/A	N/A	Each time	N/A

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Xiamen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has one FPC antenna for Bluetooth, which was permanently attached and the antenna gain is -3.35 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

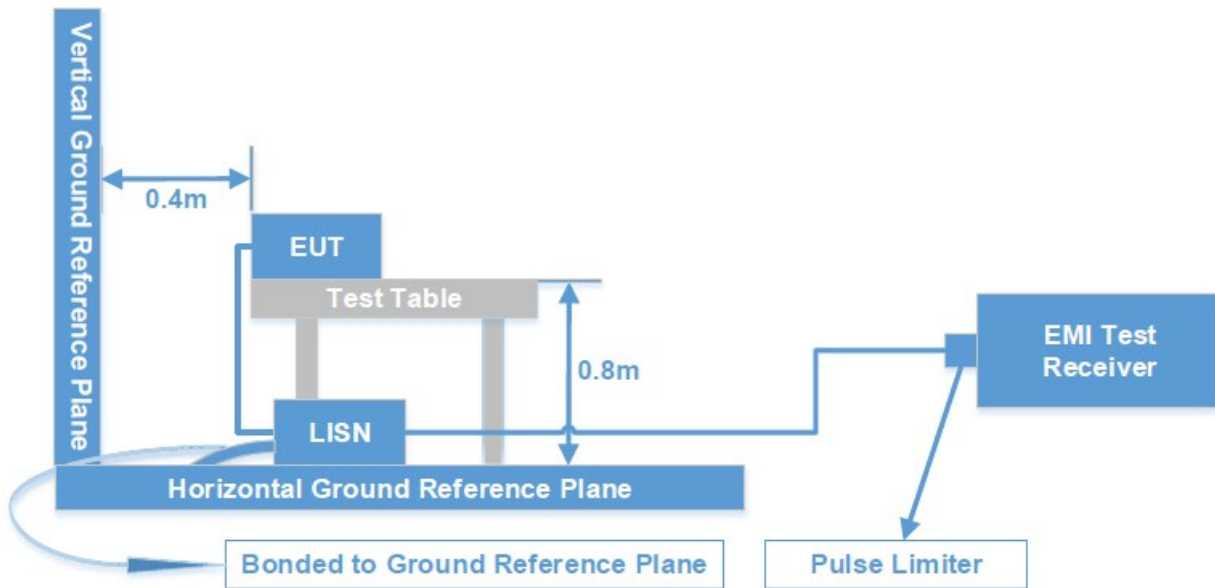
Result: Compliance

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

Test System Setup



The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	VBW	Detector
150 kHz – 30 MHz	9 kHz	30 kHz	QP/AV

Test Procedure

ANSI C63.10-2013 clause 6.2

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

If the maximum peak value of the emissions is below the average limit, the QP value and average value measurement will not need to be performed and only record the maximum peak measured value to meet the requirements.

Level & Margin Calculation

The Level is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation from the Meter Reading. The basic equation is as follows:

$$\text{Factor (dB)} = \text{LISN VDF (dB)} + \text{Cable Loss (dB)} + \text{Transient Limiter Attenuation (dB)}$$
$$\text{Level (dB}\mu\text{V)} = \text{Reading (dB}\mu\text{V)} + \text{Factor (dB)}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V)} - \text{Level (dB}\mu\text{V)}$$

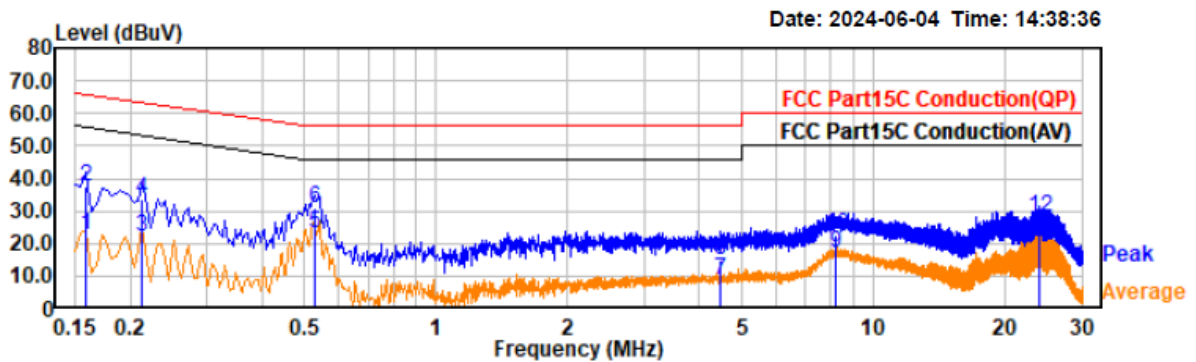
Test Data

Temperature:	21.4°C
Relative Humidity:	54%
ATM Pressure:	101kPa
Test Date:	2024-06-04
Test Engineer:	Toby Chen

EUT operation mode: Transmitting in the high channel of EDR (8DPSK) mode (worst case)

Project No.: 2407S72267E-RF
 Test Mode: BT EDR 3DH1 2480
 EUT Model: Su3

Temp/Humi: 21.4°C/54%
 Tested by: Toby Chen
 Power Source: AC 120V/60Hz

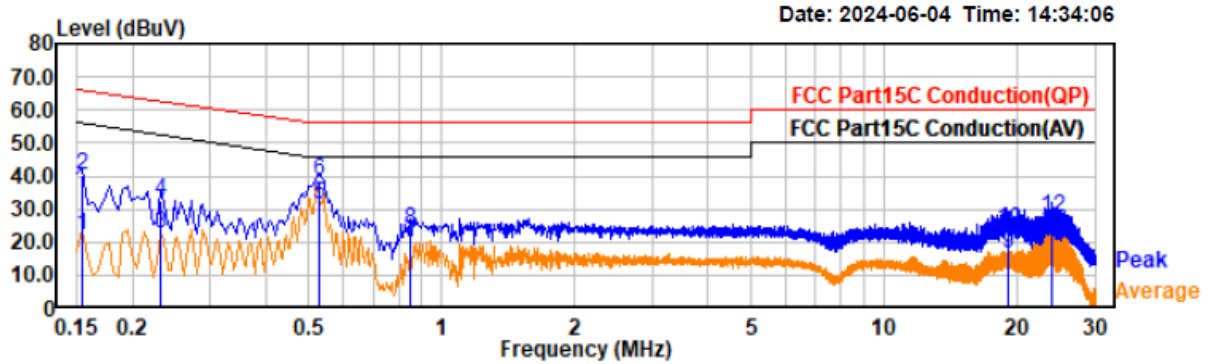


Trace: 1

Freq MHz	Reading dBuV	Factor dB	Result dBuV	Limit dBuV	Margin dB	Phase	Remark
0.16	3.13	19.51	22.64	55.57	32.93	Line	Average
0.16	18.22	19.51	37.73	65.57	27.84	Line	QP
0.21	2.42	19.52	21.94	53.13	31.19	Line	Average
0.21	14.08	19.52	33.60	63.13	29.53	Line	QP
0.53	3.59	19.60	23.19	46.00	22.81	Line	Average
0.53	11.23	19.60	30.83	56.00	25.17	Line	QP
4.47	-10.75	19.63	8.88	46.00	37.12	Line	Average
4.47	-4.46	19.63	15.17	56.00	40.83	Line	QP
8.17	-2.70	19.86	17.16	50.00	32.84	Line	Average
8.17	2.97	19.86	22.83	60.00	37.17	Line	QP
24.00	3.46	20.18	23.64	50.00	26.36	Line	Average
24.00	7.85	20.18	28.03	60.00	31.97	Line	QP

Project No.: 2407S72267E-RF
 Test Mode: BT EDR 3DH1 2480
 EUT Model: Su3

Temp/Humi: 21.4°C /54%
 Tested by: Toby Chen
 Power Source: AC 120V/60Hz



Trace: 1

Freq MHz	Reading dBuV	Factor dB	Result dBuV	Limit dBuV	Margin dB	Phase	Remark
0.15	2.70	19.47	22.17	55.78	33.61	Neutral	Average
0.15	20.95	19.47	40.42	65.78	25.36	Neutral	QP
0.23	2.96	19.51	22.47	52.39	29.92	Neutral	Average
0.23	13.26	19.51	32.77	62.39	29.62	Neutral	QP
0.53	11.87	19.61	31.48	46.00	14.52	Neutral	Average
0.53	19.27	19.61	38.88	56.00	17.12	Neutral	QP
0.85	0.06	19.61	19.67	46.00	26.33	Neutral	Average
0.85	4.19	19.61	23.80	56.00	32.20	Neutral	QP
19.00	-3.09	19.88	16.79	50.00	33.21	Neutral	Average
19.00	3.68	19.88	23.56	60.00	36.44	Neutral	QP
23.95	2.93	20.21	23.14	50.00	26.86	Neutral	Average
23.95	7.14	20.21	27.35	60.00	32.65	Neutral	QP

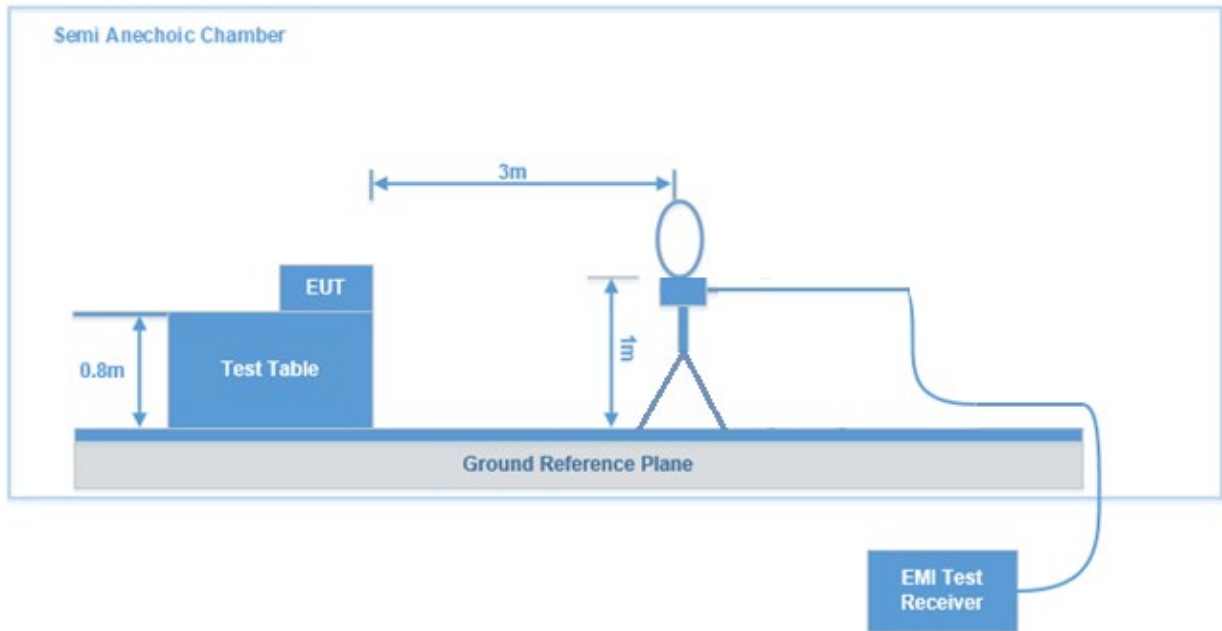
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

Applicable Standard

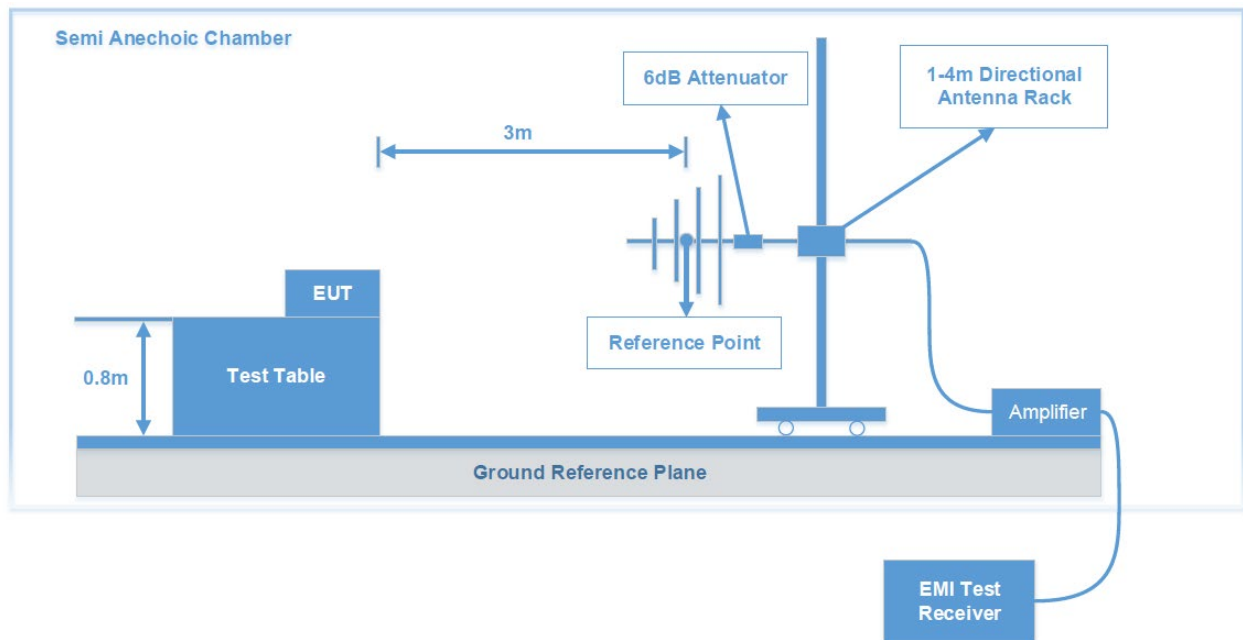
FCC §15.205; §15.209; §15.247(d)

Test System Setup

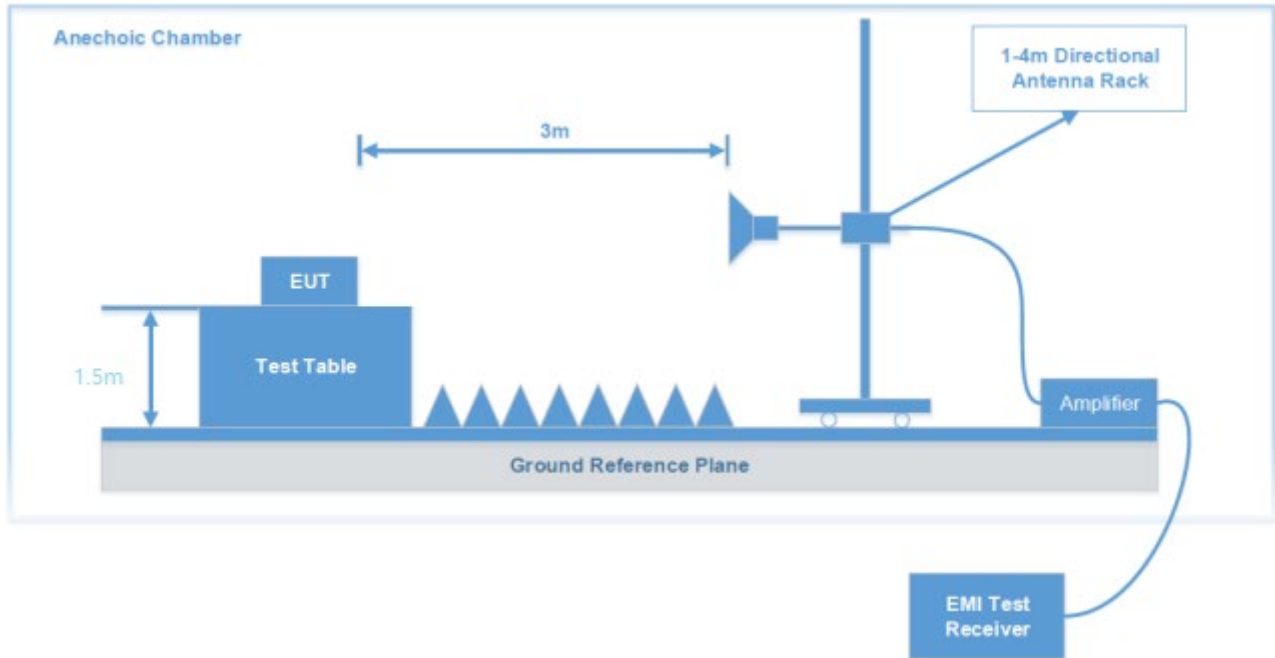
9 kHz-30MHz



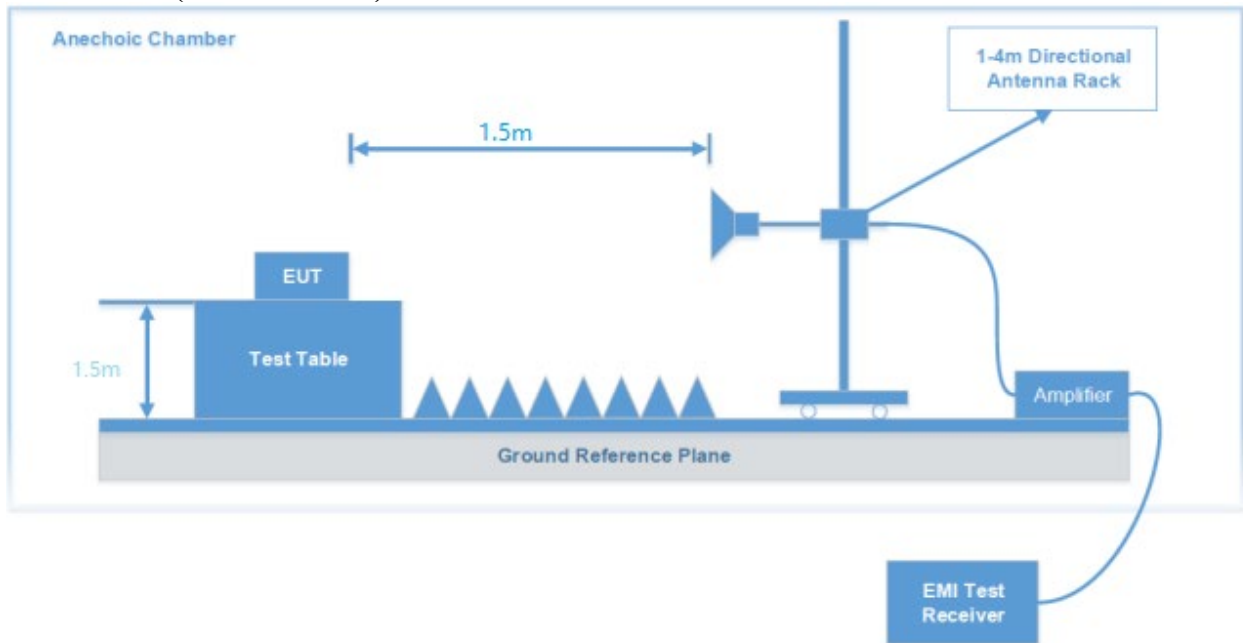
Below 1 GHz:



Above 1GHz (1GHz~18GHz)



Above 1GHz (18GHz~40GHz)



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.247 limits.

EMI Test Receiver Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	VBW	IF B/W	Measurement
9 kHz – 150 kHz	200Hz	1 kHz	/	PK
	/	/	200Hz	QP/AV
150 kHz – 30 MHz	10 kHz	30 kHz	/	PK
	/	/	9kHz	QP/AV
30 MHz – 1000 MHz	100 kHz	300 kHz	/	PK
	/	/	120kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	/	10Hz	AV

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

For each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable. The report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground parallel) unless the margin is greater than 20 dB, then the following statement shall be made: “all emissions were greater than 20 dB below the limit.”

If the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 10 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

For Radiated Bandedge test, which was performed at 1.5 m distance, according to C63.10, the test result shall be extrapolated to the specified distance using an extrapolation Factor of 20dB/decade from 3m to 1.5m

Distance extrapolation Factor = 20 log (specific distance [3m]/test distance [1.5m]) dB = 6.0 dB

All emissions under the average limit and under the noise floor have not recorded in the report.

Level & Margin Calculation

The Level is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Factor (dB/m)} = \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Amplifier Gain (dB)}$$

$$\text{Level (dB}\mu\text{V/m)} = \text{Reading (dB}\mu\text{V)} + \text{Factor (dB/m)}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin (dB)} = \text{Limit (dB}\mu\text{V/m)} - \text{Level (dB}\mu\text{V/m)}$$

Test Data

Please refer to the below table and plots.

After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

Frequency Range:	Below 1 GHz	Above 1 GHz
Temperature:	22.3°C	22.5°C~23.5°C
Relative Humidity:	55 %	54%~58%
ATM Pressure:	101kPa	100.8 kPa~101.0kPa
Test Date:	2024-06-04	2024-07-01~2024-07-15
Test Engineer:	Stein Peng	Stein Peng, Ash Lin

1) 9 kHz ~30MHz

EUT operation mode: Transmitting in EDR high channel (8DPSK) (worst case)

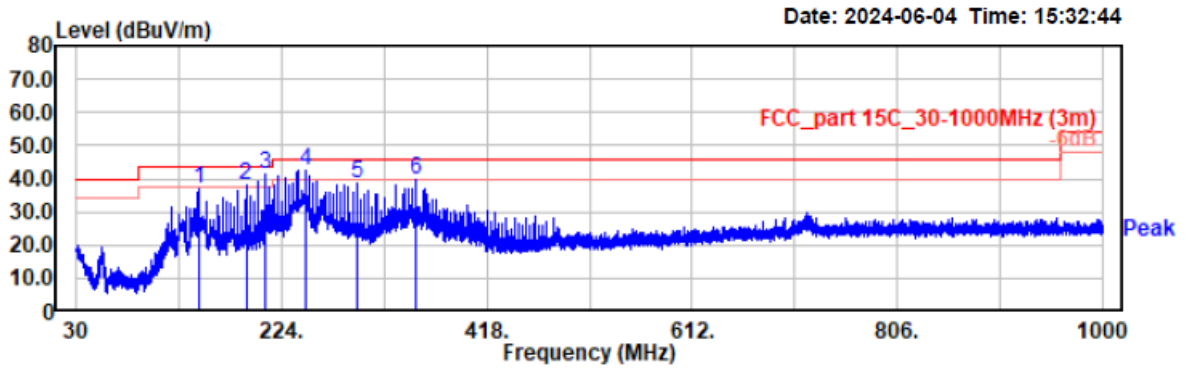
Pre-scan in parallel, ground-parallel and perpendicular of orientation of loop antenna, the amplitude of spurious emissions attenuated is more than 20 dB below the permissible value, which is not required to be report.

2) 30MHz-1GHz

EUT operation mode: Transmitting in EDR high channel in Z-axis of orientation (worst case)

Project No.: 2407S72267E-RF
 Test Mode: 8DPSK 2480
 EUT Model: Su3
 Test distance: 3m

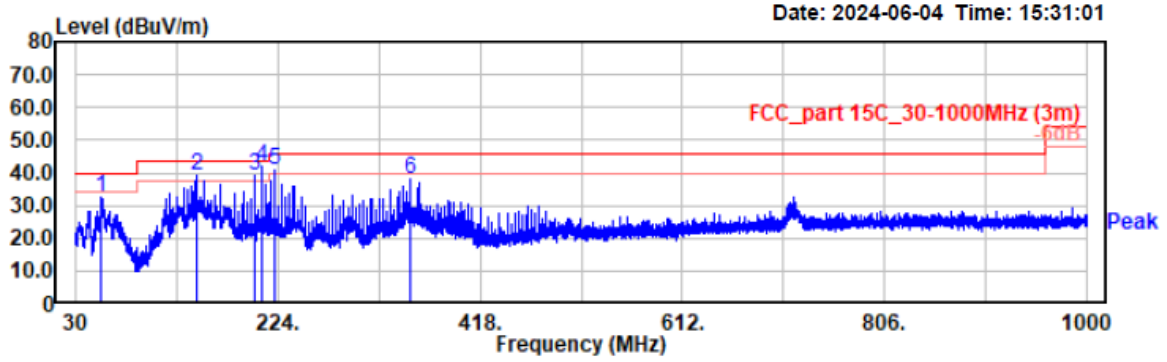
Temp/Humi: 22.3°C/55%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBUV	Factor dB/m	Result dBUV/m	Limit dBUV/m	Margin dB	Polarity	Remark
145.53	47.94	-10.97	36.97	43.50	6.53	Horizontal	QP
190.34	50.56	-12.25	38.31	43.50	5.19	Horizontal	QP
209.06	53.90	-12.52	41.38	43.50	2.12	Horizontal	QP
246.41	54.18	-11.44	42.74	46.00	3.26	Horizontal	QP
294.91	47.76	-9.31	38.45	46.00	7.55	Horizontal	QP
350.88	47.57	-8.00	39.57	46.00	6.43	Horizontal	QP

Project No.: 2407S72267E-RF
 Test Mode: 8DPSK 2480
 EUT Model: Su3
 Test distance: 3m

Temp/Humi: 22.3°C/55%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



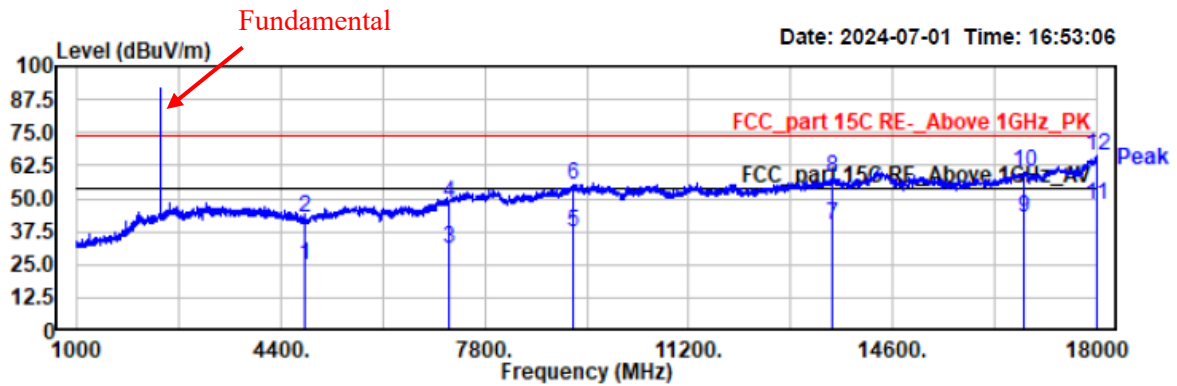
Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
54.15	50.27	-17.81	32.46	40.00	7.54	Vertical	QP
145.53	50.29	-10.97	39.32	43.50	4.18	Vertical	QP
201.59	50.79	-11.83	38.96	43.50	4.54	Vertical	QP
209.06	54.47	-12.52	41.95	43.50	1.55	Vertical	QP
220.22	53.30	-12.64	40.66	46.00	5.34	Vertical	QP
350.88	46.22	-8.00	38.22	46.00	7.78	Vertical	QP

3) 1 GHz-18 GHz (worst case)

EUT operation mode: Transmitting in EDR (8DPSK) Low Channel in Z-axis of orientation

Project No.: 2407S72267E-RF
 Test Mode: BT 8DPSK 2402
 EUT Model: Su3
 Test distance: 3m

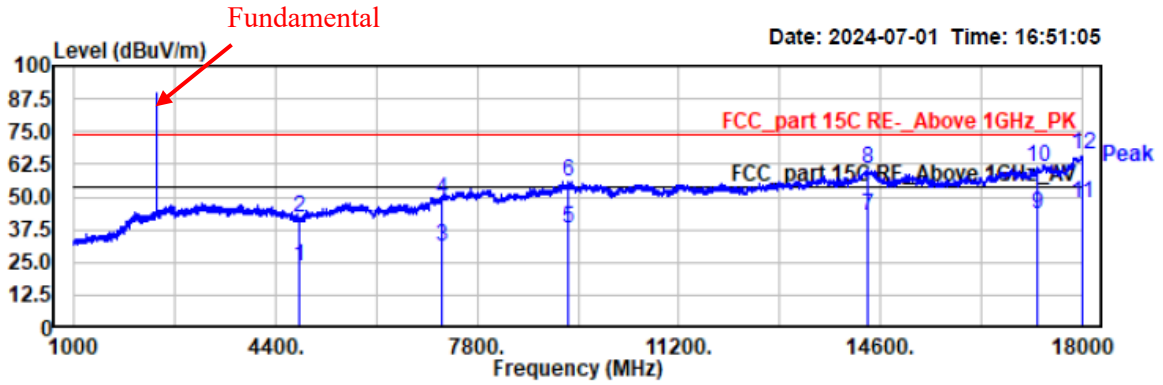
Temp/Humi: 23.5°C/54%
 Tested by: Ash Lin
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4804.60	26.15	-1.51	24.64	54.00	29.36	horizontal	Average
4804.60	44.61	-1.51	43.10	74.00	30.90	horizontal	Peak
7206.00	26.65	4.53	31.18	54.00	22.82	horizontal	Average
7206.00	43.87	4.53	48.40	74.00	25.60	horizontal	Peak
9275.60	29.52	7.98	37.50	54.00	16.50	horizontal	Average
9275.60	47.26	7.98	55.24	74.00	18.76	horizontal	Peak
13607.20	28.49	11.55	40.04	54.00	13.96	horizontal	Average
13607.20	46.06	11.55	57.61	74.00	16.39	horizontal	Peak
16793.00	28.95	13.57	42.52	54.00	11.48	horizontal	Average
16793.00	46.61	13.57	60.18	74.00	13.82	horizontal	Peak
17996.60	28.83	19.00	47.83	54.00	6.17	horizontal	Average
17996.60	47.44	19.00	66.44	74.00	7.56	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: BT 8DPSK 2402
 EUT Model: Su3
 Test distance: 3m

Temp/Humi: 23.5°C/54%
 Tested by: Ash Lin
 Power Source: AC 120V/60Hz

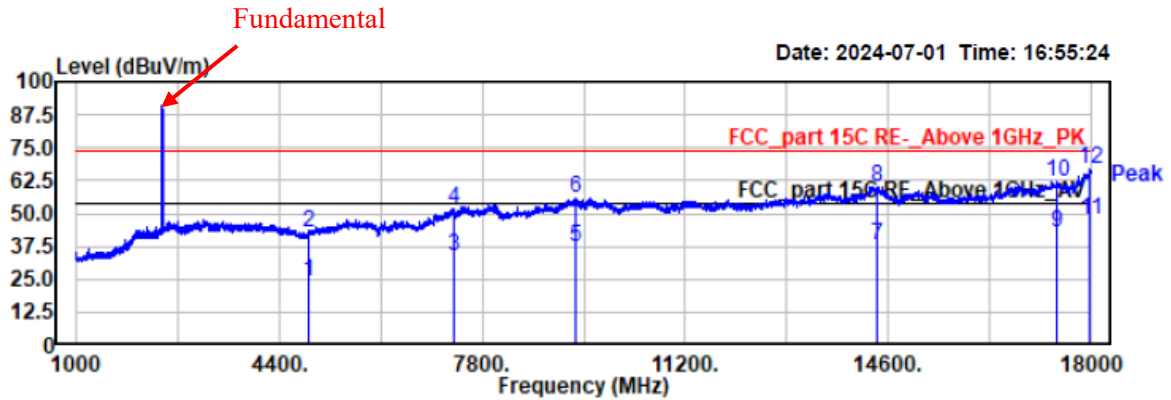


Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4804.60	25.07	-1.51	23.56	54.00	30.44	vertical	Average
4804.60	43.50	-1.51	41.99	74.00	32.01	vertical	Peak
7206.00	26.66	4.53	31.19	54.00	22.81	vertical	Average
7206.00	44.27	4.53	48.80	74.00	25.20	vertical	Peak
9323.20	29.67	8.34	38.01	54.00	15.99	vertical	Average
9323.20	47.77	8.34	56.11	74.00	17.89	vertical	Peak
14382.40	29.34	13.23	42.57	54.00	11.43	vertical	Average
14382.40	47.53	13.23	60.76	74.00	13.24	vertical	Peak
17258.80	29.34	14.04	43.38	54.00	10.62	vertical	Average
17258.80	47.23	14.04	61.27	74.00	12.73	vertical	Peak
18000.00	28.67	19.02	47.69	54.00	6.31	vertical	Average
18000.00	47.37	19.02	66.39	74.00	7.61	vertical	Peak

EUT operation mode: Transmitting in EDR (8DPSK) Middle Channel in Z-axis of orientation

Project No.: 2407S72267E-RF
 Test Mode: BT 8DPSK 2441
 EUT Model: Su3
 Test distance: 3m

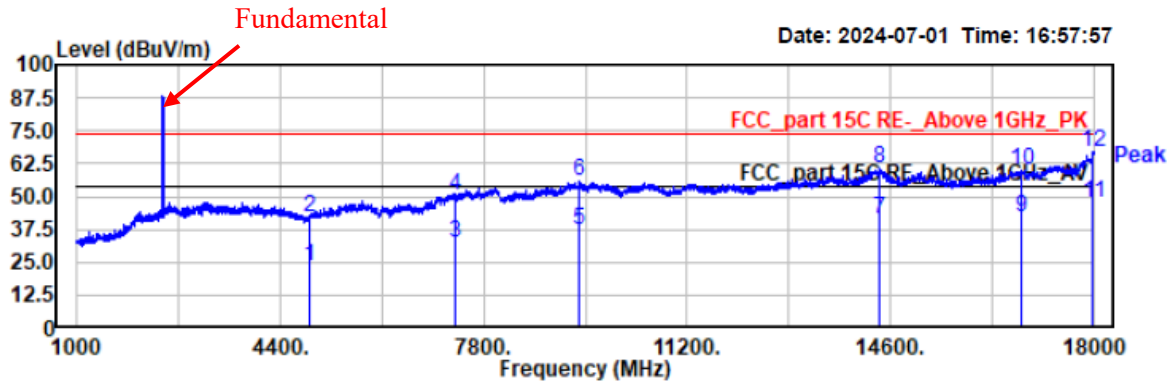
Temp/Humi: 23.5°C/54%
 Tested by: Ash Lin
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4882.80	25.12	-0.64	24.48	54.00	29.52	horizontal	Average
4882.80	43.50	-0.64	42.86	74.00	31.14	horizontal	Peak
7323.00	28.92	5.01	33.93	54.00	20.07	horizontal	Average
7323.00	46.39	5.01	51.40	74.00	22.60	horizontal	Peak
9374.20	28.78	8.77	37.55	54.00	16.45	horizontal	Average
9374.20	46.99	8.77	55.76	74.00	18.24	horizontal	Peak
14409.60	27.26	10.59	37.85	54.00	16.15	horizontal	Average
14409.60	46.95	13.15	60.10	74.00	13.90	horizontal	Peak
17425.40	28.12	14.32	42.44	54.00	11.56	horizontal	Average
17425.40	47.61	14.32	61.93	74.00	12.07	horizontal	Peak
17979.60	29.05	18.86	47.91	54.00	6.09	horizontal	Average
17979.60	48.24	18.86	67.10	74.00	6.90	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: BT 8DPSK 2441
 EUT Model: Su3
 Test distance: 3m

Temp/Humi: 23.5°C/54%
 Tested by: Ash Lin
 Power Source: AC 120V/60Hz

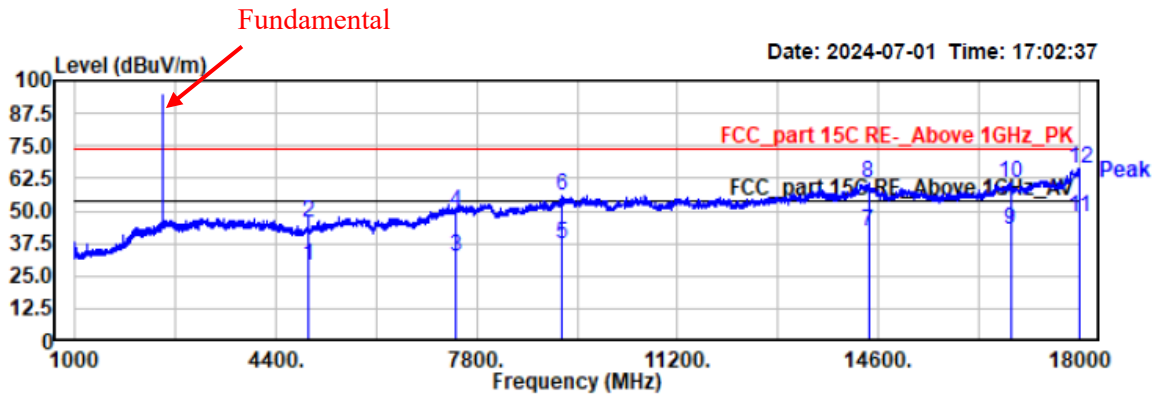


Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4882.80	24.18	-0.64	23.54	54.00	30.46	vertical	Average
4882.80	42.81	-0.64	42.17	74.00	31.83	vertical	Peak
7323.00	27.07	5.01	32.08	54.00	21.92	vertical	Average
7323.00	45.10	5.01	50.11	74.00	23.89	vertical	Peak
9384.40	28.18	8.88	37.06	54.00	16.94	vertical	Average
9384.40	46.72	8.88	55.60	74.00	18.40	vertical	Peak
14413.00	28.18	13.16	41.34	54.00	12.66	vertical	Average
14413.00	47.52	13.16	60.68	74.00	13.32	vertical	Peak
16793.00	28.32	13.57	41.89	54.00	12.11	vertical	Average
16793.00	46.54	13.57	60.11	74.00	13.89	vertical	Peak
17986.40	28.74	18.91	47.65	54.00	6.35	vertical	Average
17986.40	48.24	18.91	67.15	74.00	6.85	vertical	Peak

EUT operation mode: Transmitting in EDR (8DPSK) high Channel in Z-axis of orientation

Project No.: 2407S72267E-RF
 Test Mode: BT 8DPSK 2480
 EUT Model: Su3
 Test distance: 3m

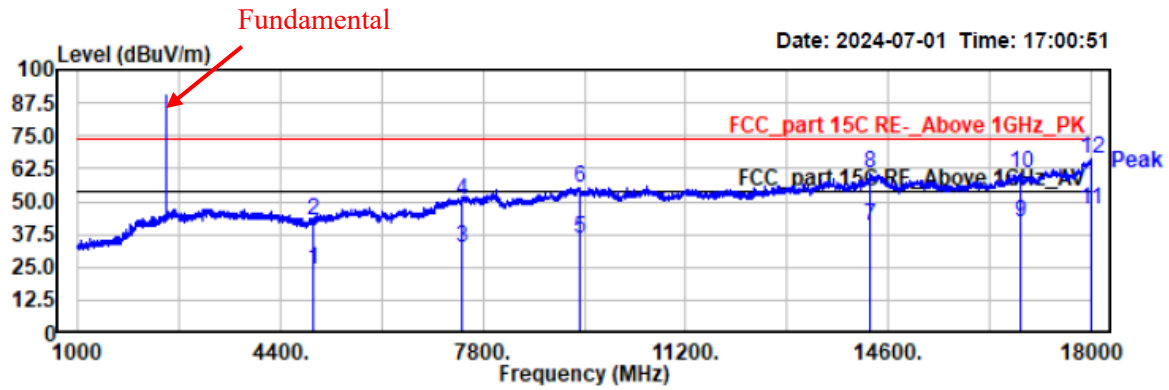
Temp/Humi: 23.5°C /54%
 Tested by: Ash Lin
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4961.00	28.95	-0.03	28.92	54.00	25.08	horizontal	Average
4961.00	45.40	-0.03	45.37	74.00	28.63	horizontal	Peak
7440.00	26.53	5.90	32.43	54.00	21.57	horizontal	Average
7440.00	44.06	5.90	49.96	74.00	24.04	horizontal	Peak
9245.00	29.39	7.74	37.13	54.00	16.87	horizontal	Average
9245.00	48.14	7.74	55.88	74.00	18.12	horizontal	Peak
14430.00	28.84	13.16	42.00	54.00	12.00	horizontal	Average
14430.00	47.39	13.16	60.55	74.00	13.45	horizontal	Peak
16833.80	29.50	13.38	42.88	54.00	11.12	horizontal	Average
16833.80	47.35	13.38	60.73	74.00	13.27	horizontal	Peak
18000.00	28.25	19.02	47.27	54.00	6.73	horizontal	Average
18000.00	47.12	19.02	66.14	74.00	7.86	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: BT 8DPSK 2480
 EUT Model: Su3
 Test distance: 3m

Temp/Humi: 23.5°C/54%
 Tested by: Ash Lin
 Power Source: AC 120V/60Hz



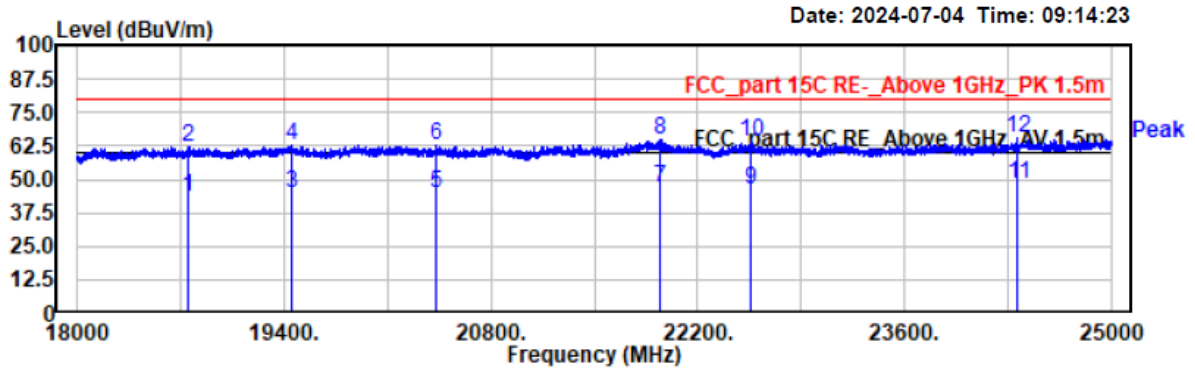
Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
4961.00	24.16	-0.03	24.13	54.00	29.87	vertical	Average
4961.00	42.72	-0.03	42.69	74.00	31.31	vertical	Peak
7440.00	26.56	5.90	32.46	54.00	21.54	vertical	Average
7440.00	44.46	5.90	50.36	74.00	23.64	vertical	Peak
9421.80	27.39	8.74	36.13	54.00	17.87	vertical	Average
9421.80	46.54	8.74	55.28	74.00	18.72	vertical	Peak
14304.20	27.25	13.58	40.83	54.00	13.17	vertical	Average
14304.20	46.82	13.58	60.40	74.00	13.60	vertical	Peak
16816.80	28.65	13.53	42.18	54.00	11.82	vertical	Average
16816.80	47.36	13.53	60.89	74.00	13.11	vertical	Peak
17993.20	28.16	18.96	47.12	54.00	6.88	vertical	Average
17993.20	47.52	18.96	66.48	74.00	7.52	vertical	Peak

4) 18 GHz - 25 GHz (worst case)

EUT operation mode: Transmitting in EDR (8DPSK) high channel in Z-axis of orientation

Project No.: 2407S72267E-RF
 Test Mode: BT 8DPSK 2480
 EUT Model: Su3
 Test distance: 1.5m

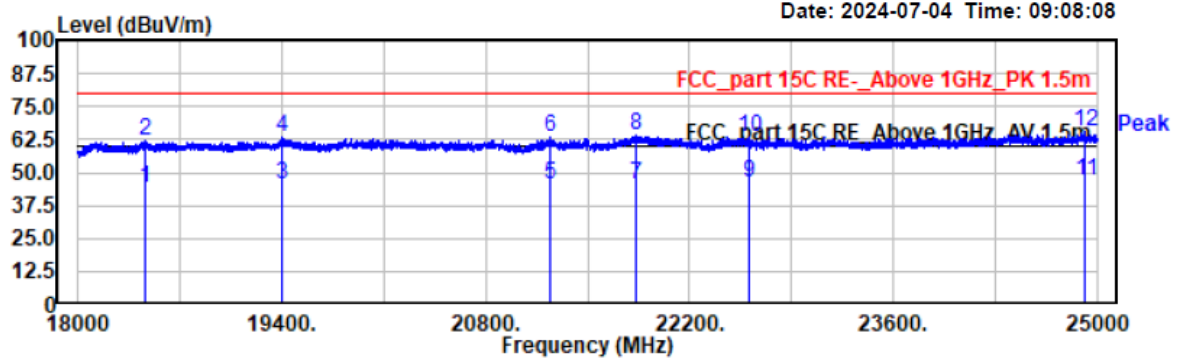
Temp/Humi: 22.5°C/58%
 Tested by: Ash Lin
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
18751.30	19.07	24.45	43.52	60.00	16.48	horizontal	Average
18751.30	37.41	24.45	61.86	80.00	18.14	horizontal	Peak
19453.10	19.90	24.59	44.49	60.00	15.51	horizontal	Average
19453.10	38.50	24.59	63.09	80.00	16.91	horizontal	Peak
20431.00	19.40	25.43	44.83	60.00	15.17	horizontal	Average
20431.00	37.10	25.43	62.53	80.00	17.47	horizontal	Peak
21940.20	20.82	26.08	46.90	60.00	13.10	horizontal	Average
21940.20	38.98	26.08	65.06	80.00	14.94	horizontal	Peak
22563.90	19.82	26.23	46.05	60.00	13.95	horizontal	Average
22563.90	37.59	26.23	63.82	80.00	16.18	horizontal	Peak
24366.80	19.64	28.31	47.95	60.00	12.05	horizontal	Average
24366.80	37.07	28.31	65.38	80.00	14.62	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: BT 8DPSK 2480
 EUT Model: Su3
 Test distance: 1.5m

Temp/Humi: 22.5°C/58%
 Tested by: Ash Lin
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
18458.70	19.96	24.34	44.30	60.00	15.70	vertical	Average
18458.70	37.40	24.34	61.74	80.00	18.26	vertical	Peak
19401.40	20.98	24.59	45.57	60.00	14.43	vertical	Average
19401.40	38.70	24.59	63.29	80.00	16.71	vertical	Peak
21243.90	20.00	25.63	45.63	60.00	14.37	vertical	Average
21243.90	37.50	25.63	63.13	80.00	16.87	vertical	Peak
21830.20	19.65	25.91	45.56	60.00	14.44	vertical	Average
21830.20	37.96	25.91	63.87	80.00	16.13	vertical	Peak
22609.00	19.67	26.23	45.90	60.00	14.10	vertical	Average
22609.00	37.27	26.23	63.50	80.00	16.50	vertical	Peak
24919.00	18.18	28.41	46.59	60.00	13.41	vertical	Average
24919.00	36.81	28.41	65.22	80.00	14.78	vertical	Peak

Restricted Bands Emissions:

*Pre-Scan with GFSK, π/4-DQPSK, 8DPSK modes of operation in the X,Y and Z axes of orientation, the worst case in **Z-axis of orientation** is recorded*

Note:

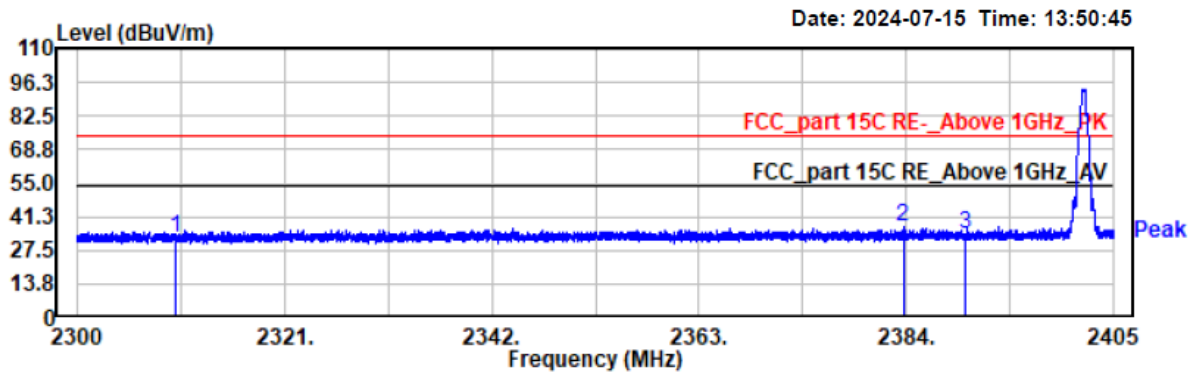
Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

Level (dBμV/m) = Reading (dBμV) + Factor (dB/m)

Margin (dB) = Limit (dBμV/m) - Level (dBμV/m)

Project No.: 2407S72267E-RF
 Test Mode: BDR DH1 2402
 EUT Model: Su3
 Test distance: 3m

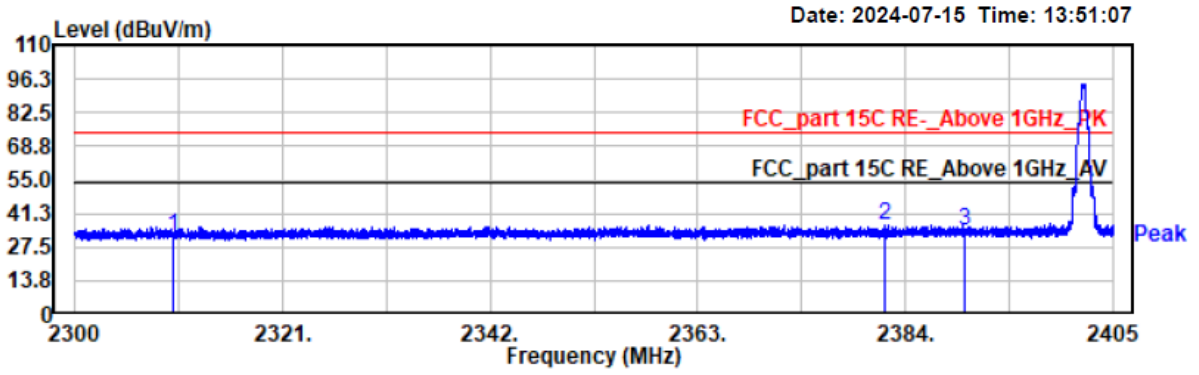
Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2310.00	34.84	-2.51	32.33	74.00	41.67	horizontal	Peak
2383.71	38.48	-1.60	36.88	74.00	37.12	horizontal	Peak
2390.00	35.84	-1.51	34.33	74.00	39.67	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: BDR DH1 2402
 EUT Model: Su3
 Test distance: 3m

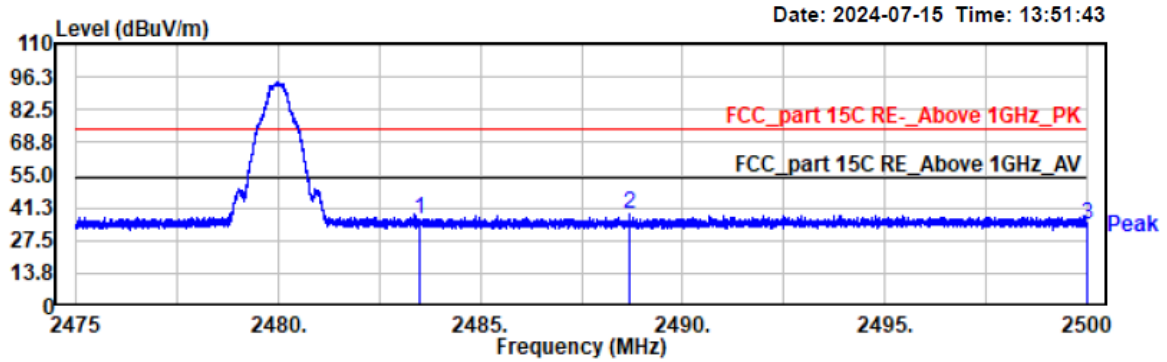
Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2310.00	34.58	-2.51	32.07	74.00	41.93	vertical	Peak
2381.84	38.04	-1.62	36.42	74.00	37.58	vertical	Peak
2390.00	35.31	-1.51	33.80	74.00	40.20	vertical	Peak

Project No.: 2407S72267E-RF
 Test Mode: BDR DH1 2480
 EUT Model: Su3
 Test distance: 3m

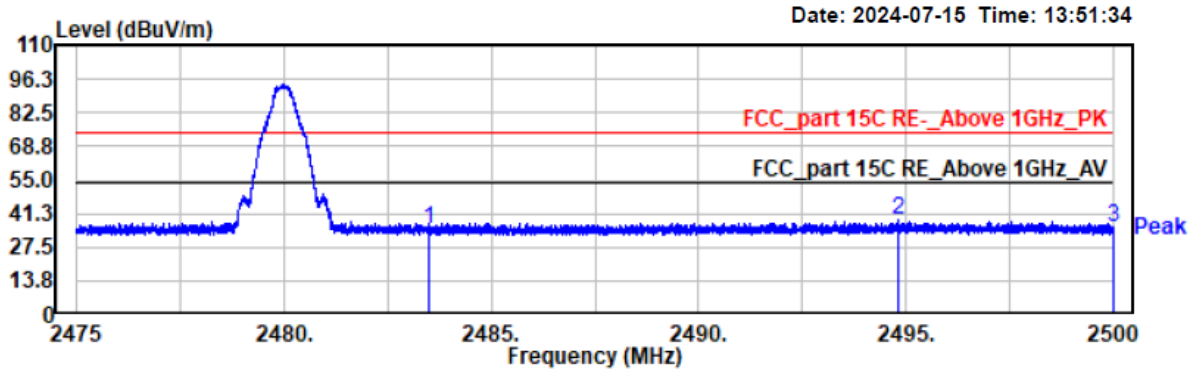
Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	36.73	-0.56	36.17	74.00	37.83	horizontal	Peak
2488.67	39.33	-0.46	38.87	74.00	35.13	horizontal	Peak
2500.00	34.60	-0.22	34.38	74.00	39.62	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: BDR DH1 2480
 EUT Model: Su3
 Test distance: 3m

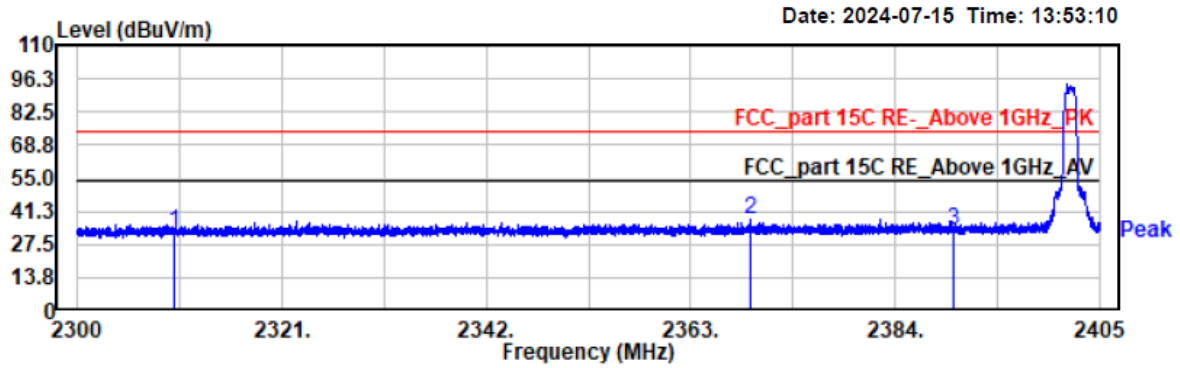
Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	35.53	-0.56	34.97	74.00	39.03	vertical	Peak
2494.82	38.82	-0.32	38.50	74.00	35.50	vertical	Peak
2500.00	35.94	-0.22	35.72	74.00	38.28	vertical	Peak

Project No.: 2407S72267E-RF
 Test Mode: EDR 2DH1 2402
 EUT Model: Su3
 Test distance: 3m

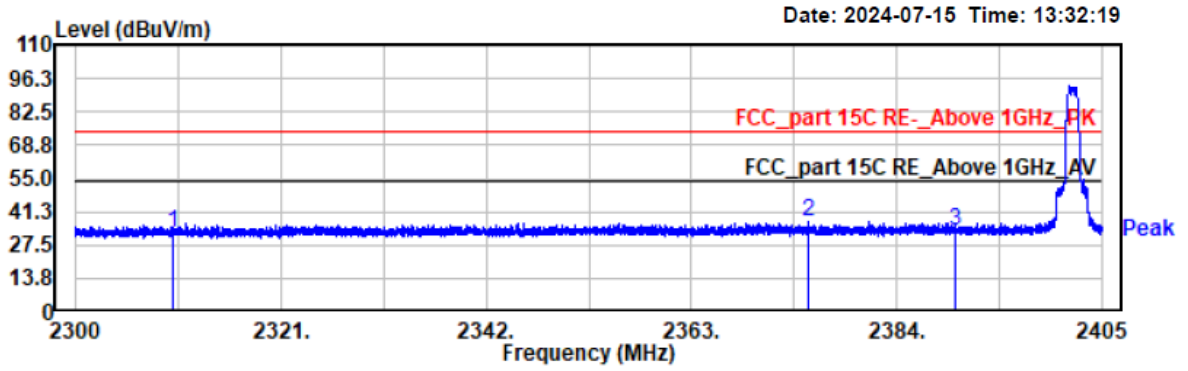
Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2310.00	35.34	-2.51	32.83	74.00	41.17	horizontal	Peak
2369.21	39.53	-1.81	37.72	74.00	36.28	horizontal	Peak
2390.00	34.69	-1.51	33.18	74.00	40.82	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: EDR 2DH1 2402
 EUT Model: Su3
 Test distance: 3m

Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz

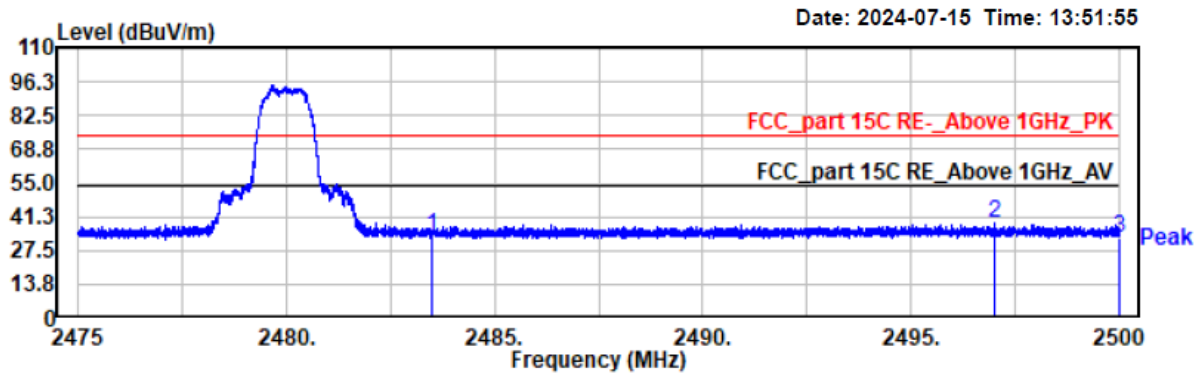


Date: 2024-07-15 Time: 13:32:19

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2310.00	35.21	-2.51	32.70	74.00	41.30	vertical	Peak
2374.96	39.10	-1.73	37.37	74.00	36.63	vertical	Peak
2390.00	34.94	-1.51	33.43	74.00	40.57	vertical	Peak

Project No.: 2407S72267E-RF
 Test Mode: EDR 2DH1 2480
 EUT Model: Su3
 Test distance: 3m

Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz

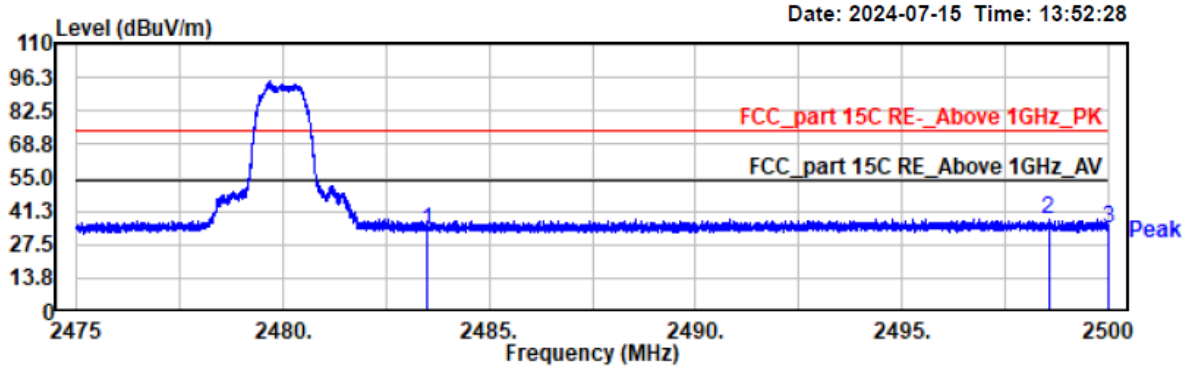


Date: 2024-07-15 Time: 13:51:55

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	34.01	-0.56	33.45	74.00	40.55	horizontal	Peak
2497.00	38.70	-0.28	38.42	74.00	35.58	horizontal	Peak
2500.00	33.00	-0.22	32.78	74.00	41.22	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: EDR 2DH1 2480
 EUT Model: Su3
 Test distance: 3m

Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz

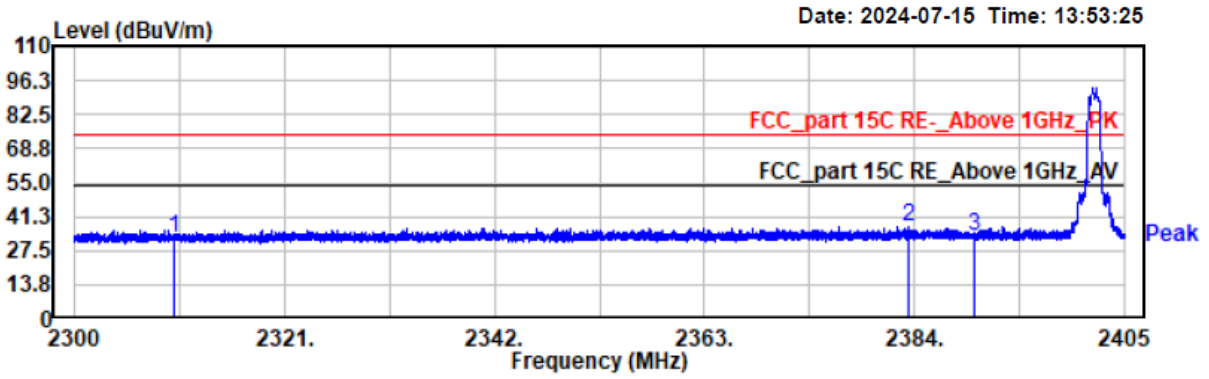


Date: 2024-07-15 Time: 13:52:28

Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	34.14	-0.56	33.58	74.00	40.42	vertical	Peak
2498.56	38.24	-0.25	37.99	74.00	36.01	vertical	Peak
2500.00	34.06	-0.22	33.84	74.00	40.16	vertical	Peak

Project No.: 2407S72267E-RF
 Test Mode: EDR 3DH1 2402
 EUT Model: Su3
 Test distance: 3m

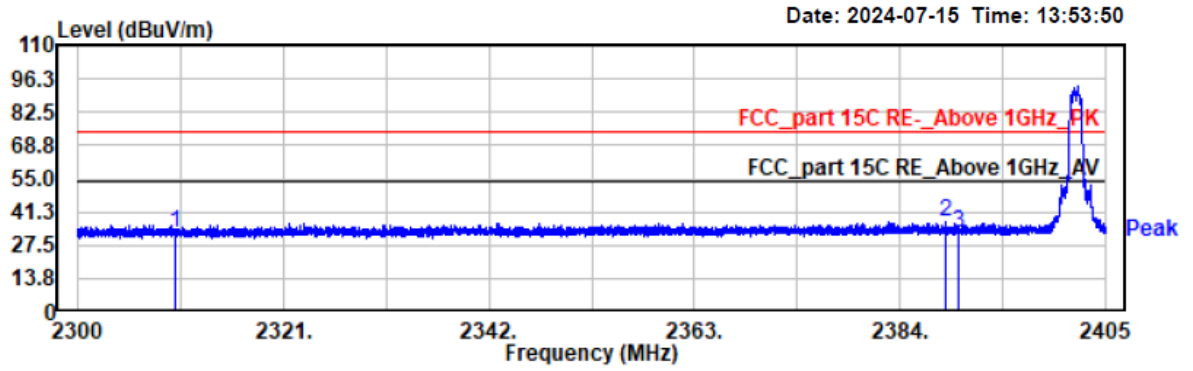
Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2310.00	35.18	-2.51	32.67	74.00	41.33	horizontal	Peak
2383.51	39.09	-1.60	37.49	74.00	36.51	horizontal	Peak
2390.00	34.75	-1.51	33.24	74.00	40.76	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: EDR 3DH1 2402
 EUT Model: Su3
 Test distance: 3m

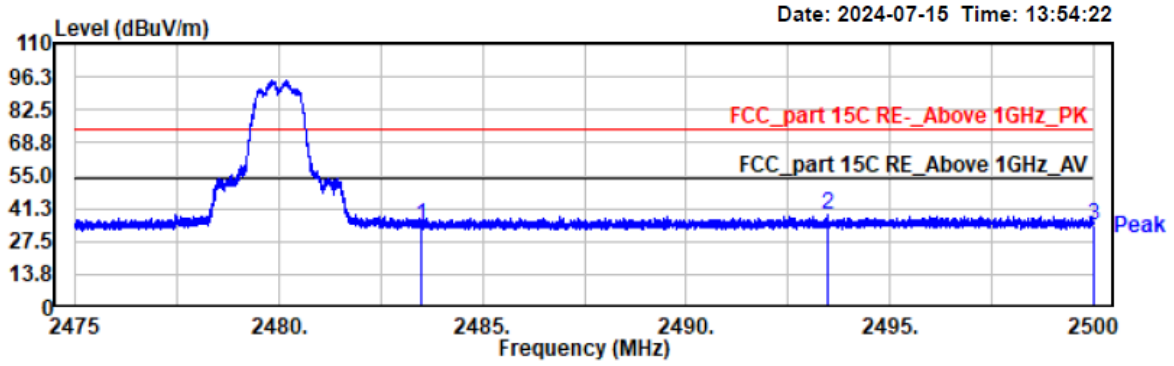
Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2310.00	35.16	-2.51	32.65	74.00	41.35	vertical	Peak
2388.70	38.41	-1.53	36.88	74.00	37.12	vertical	Peak
2390.00	34.07	-1.51	32.56	74.00	41.44	vertical	Peak

Project No.: 2407S72267E-RF
 Test Mode: EDR 3DH1 2480
 EUT Model: Su3
 Test distance: 3m

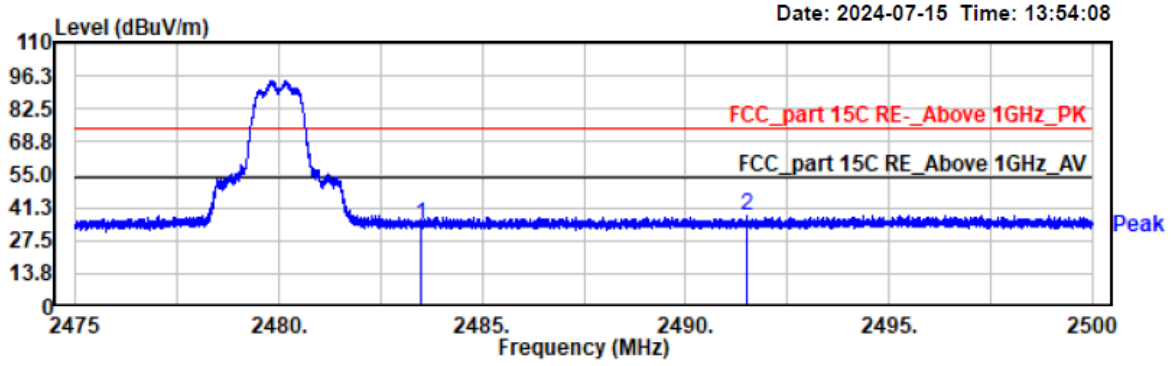
Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	34.72	-0.56	34.16	74.00	39.84	horizontal	Peak
2493.46	38.80	-0.35	38.45	74.00	35.55	horizontal	Peak
2500.00	34.70	-0.22	34.48	74.00	39.52	horizontal	Peak

Project No.: 2407S72267E-RF
 Test Mode: EDR 3DH1 2480
 EUT Model: Su3
 Test distance: 3m

Temp/Humi: 23.5°C/54%
 Tested by: Stein Peng
 Power Source: AC 120V/60Hz



Date: 2024-07-15 Time: 13:54:08

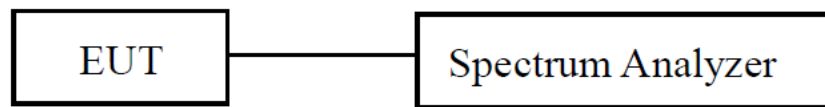
Freq MHz	Reading dBuV	Factor dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Polarity	Remark
2483.50	35.03	-0.56	34.47	74.00	39.53	vertical	Peak
2491.53	38.49	-0.39	38.10	74.00	35.90	vertical	Peak

FCC §15.247(a) (1) –CHANNEL SEPARATION TEST

Applicable Standard

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

EUT Setup



Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a. Span: Wide enough to capture the peaks of two adjacent channels.
- b. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- c. Video (or average) bandwidth (VBW) \geq RBW.
- d. Sweep: Auto.
- e. Detector function: Peak.
- f. Trace: Max hold.
- g. Allow the trace to stabilize.

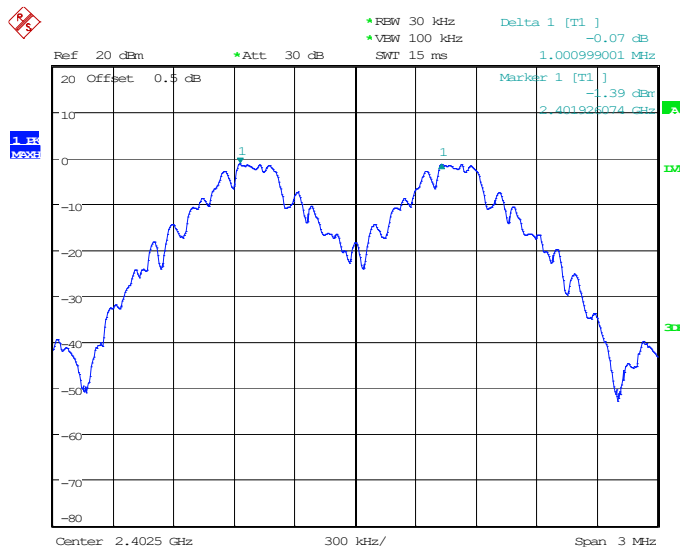
Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

Test Data

Test Mode:		Transmitting		Test Engineer:		Stein Peng	
Test Date:		2024-05-28		Environment:		Temp.: 23.8°C Humi.: 59% Atm:100.4kPa	
Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result		
BDR (GFSK)	Low	2402	1.001	0.695	Pass		
	Middle	2441	1.001	0.693	Pass		
	High	2480	0.998	0.693	Pass		
EDR ($\pi/4$ -DQPSK)	Low	2402	1.004	0.905	Pass		
	Middle	2441	1.004	0.903	Pass		
	High	2480	1.001	0.903	Pass		
EDR (8DPSK)	Low	2402	1.004	0.863	Pass		
	Middle	2441	1.004	0.863	Pass		
	High	2480	1.004	0.863	Pass		

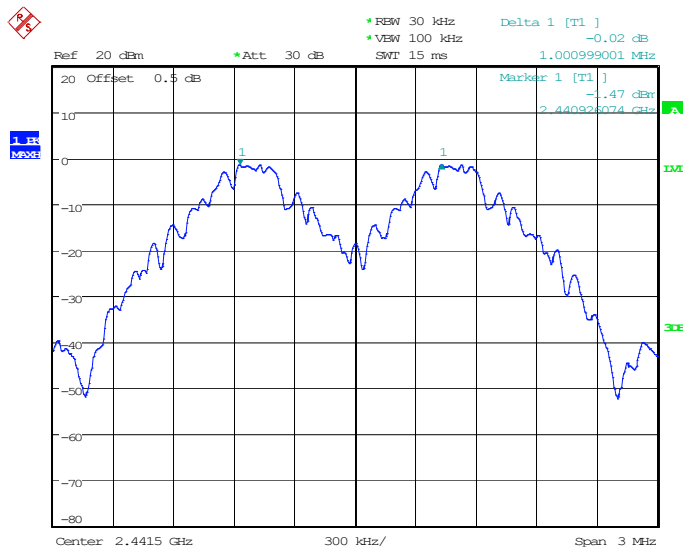
Note: Limit = 20 dB bandwidth*2/3

BDR (GFSK): Low Channel



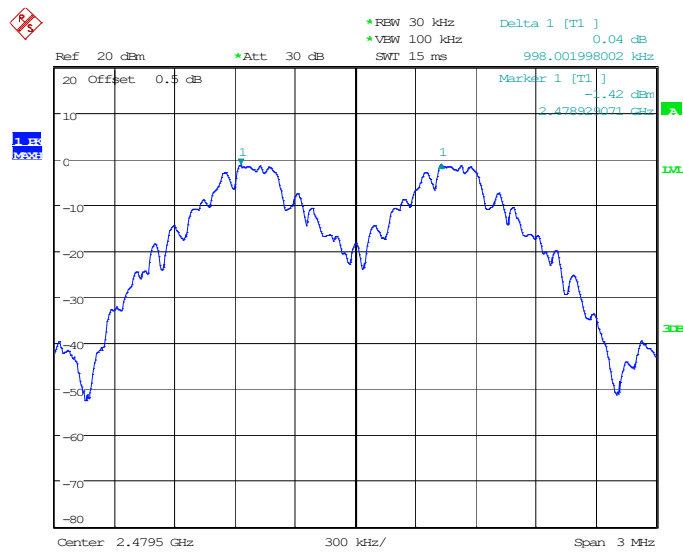
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:49:34

BDR (GFSK): Middle Channel



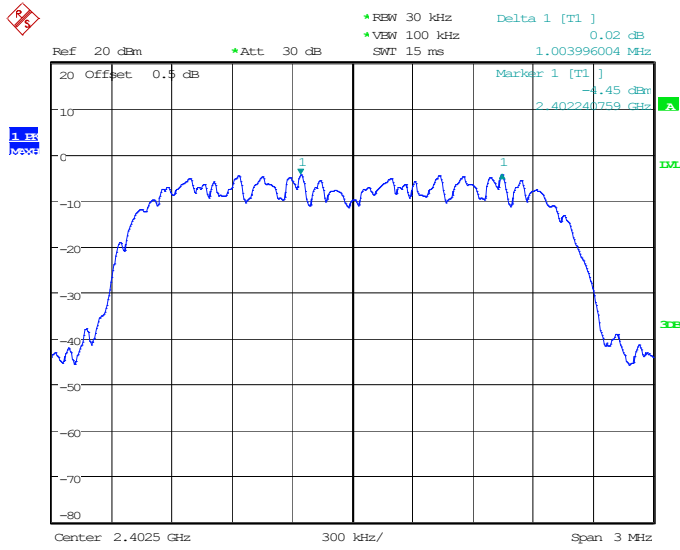
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:50:39

BDR (GFSK): High Channel



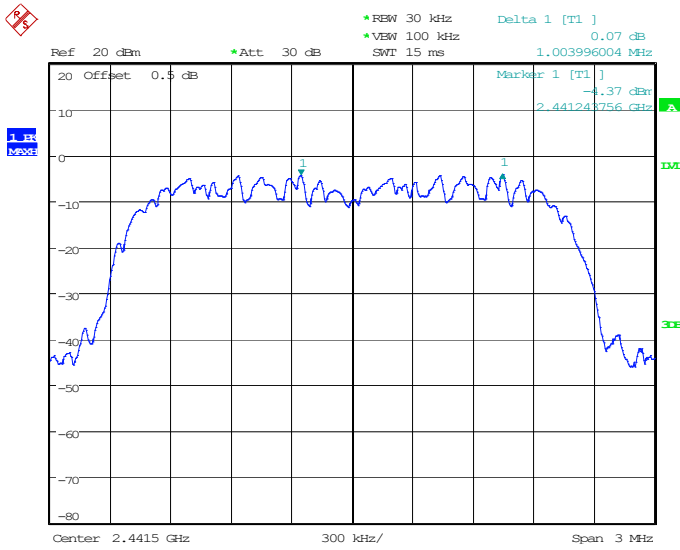
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:52:18

EDR ($\pi/4$ -DQPSK): Low Channel



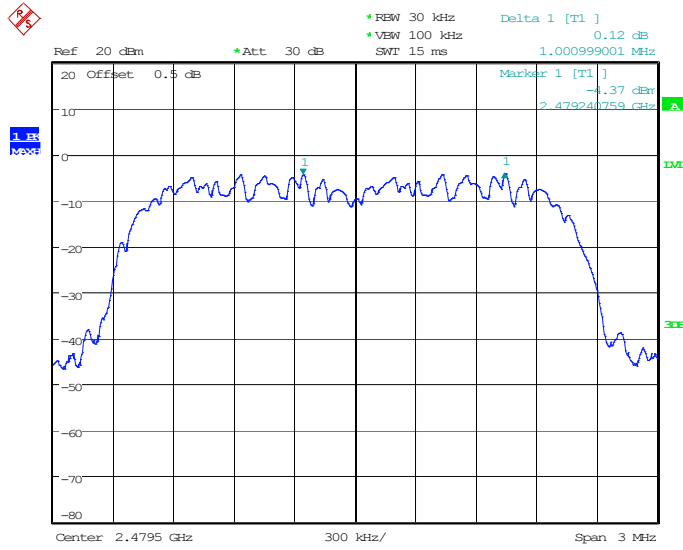
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:54:35

EDR ($\pi/4$ -DQPSK): Middle Channel



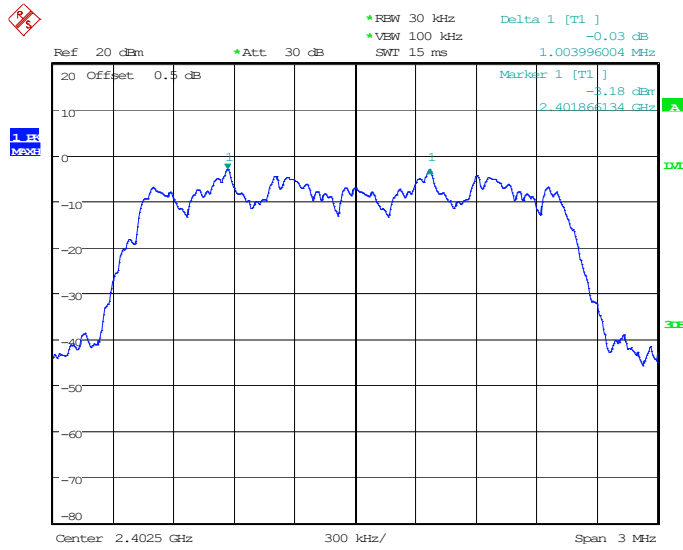
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:57:37

EDR ($\pi/4$ -DQPSK): High Channel



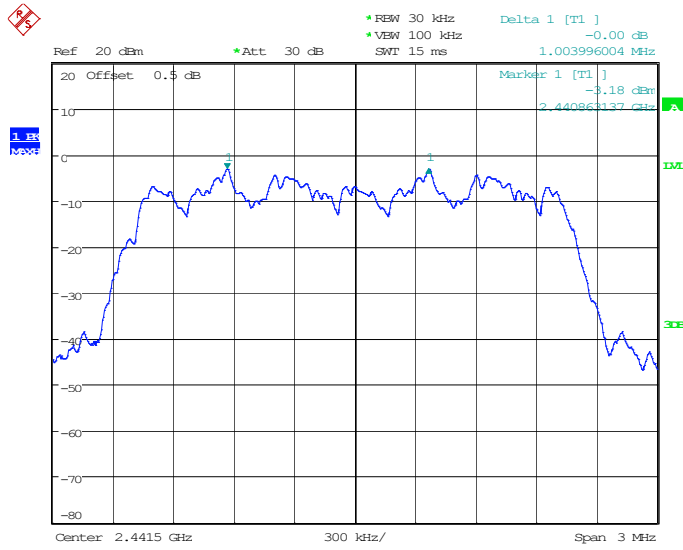
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:59:39

EDR (8DPSK): Low Channel



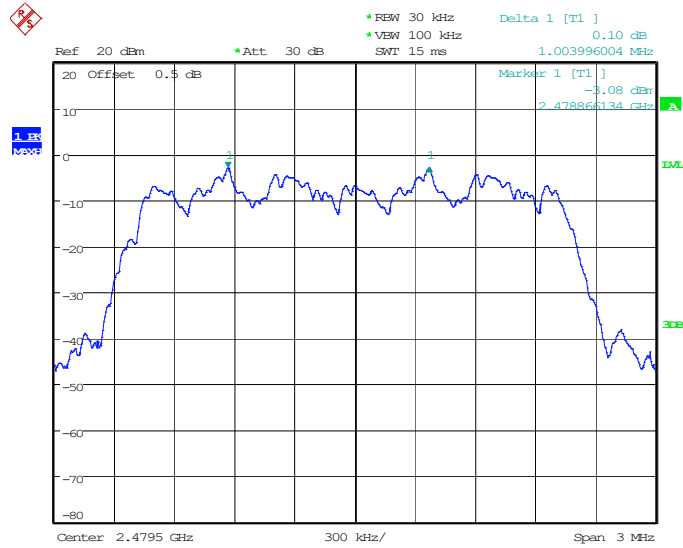
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 16:01:05

EDR (8DPSK): Middle Channel



ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 16:02:40

EDR (8DPSK): High Channel



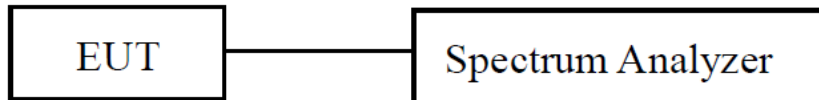
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 16:04:05

FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

EUT Setup



Test Procedure

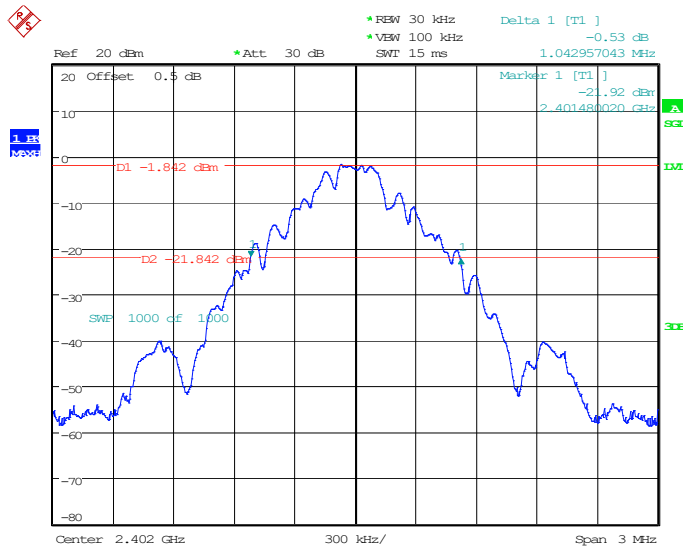
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Data

Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-28	Environment:	Temp.: 23.8°C Humi.: 59% Atm :100.4kPa
Mode	Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
BDR (GFSK)	Low	2402	1.043
	Middle	2441	1.04
	High	2480	1.04
EDR ($\pi/4$-DQPSK)	Low	2402	1.358
	Middle	2441	1.355
	High	2480	1.355
EDR (8DPSK)	Low	2402	1.295
	Middle	2441	1.295
	High	2480	1.295

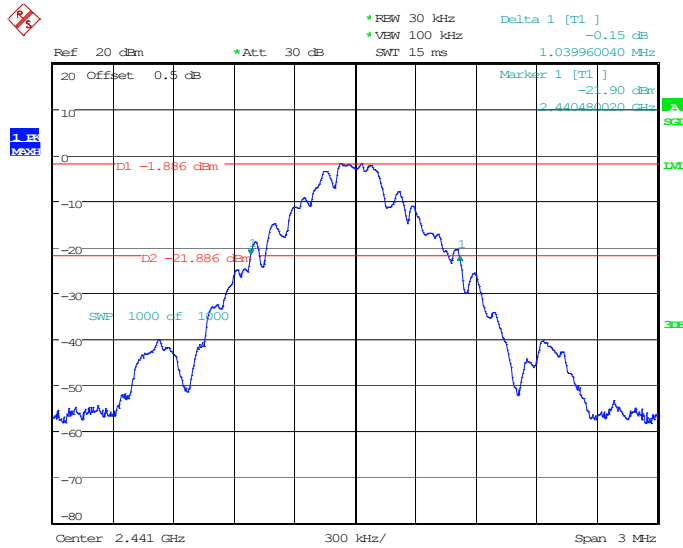
Please refer to below plots:

BDR (GFSK): Low Channel



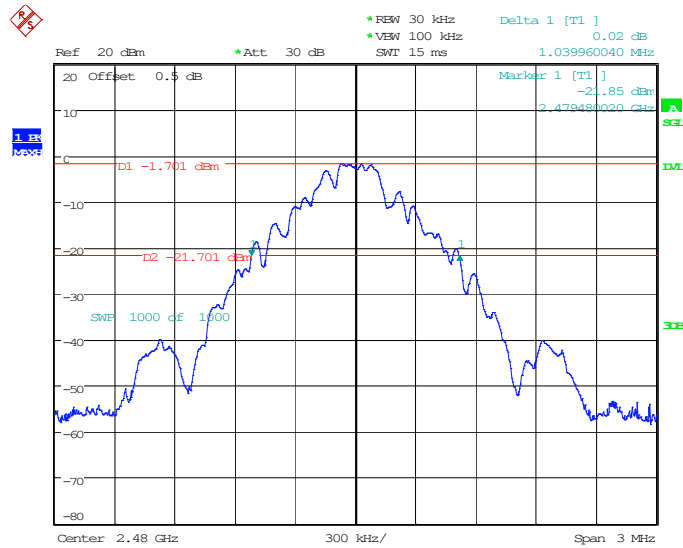
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 09:22:45

BDR (GFSK): Middle Channel



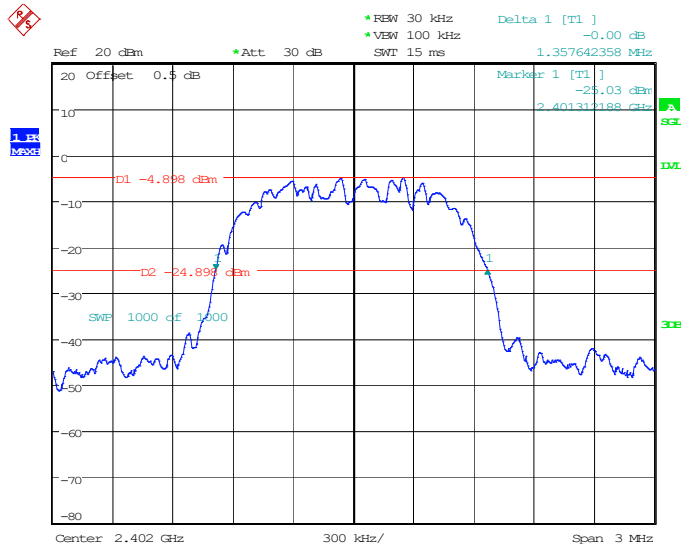
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 09:26:01

BDR (GFSK): High Channel



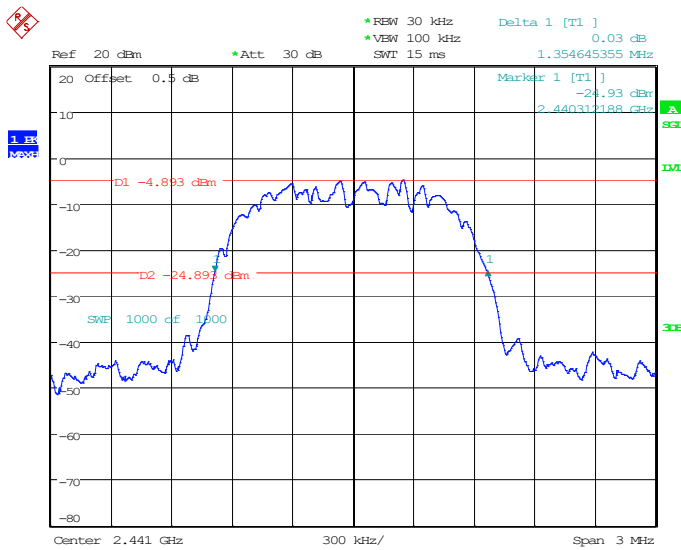
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 09:27:15

EDR ($\pi/4$ -DQPSK): Low Channel



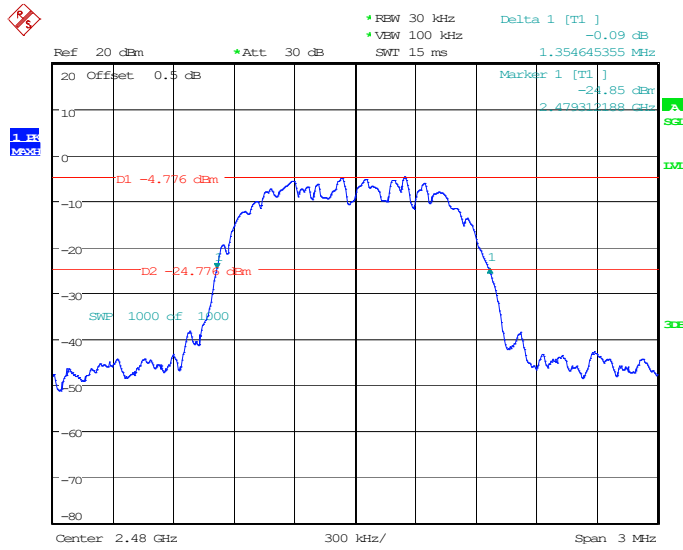
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 09:28:50

EDR($\pi/4$ -DQPSK): Middle Channel



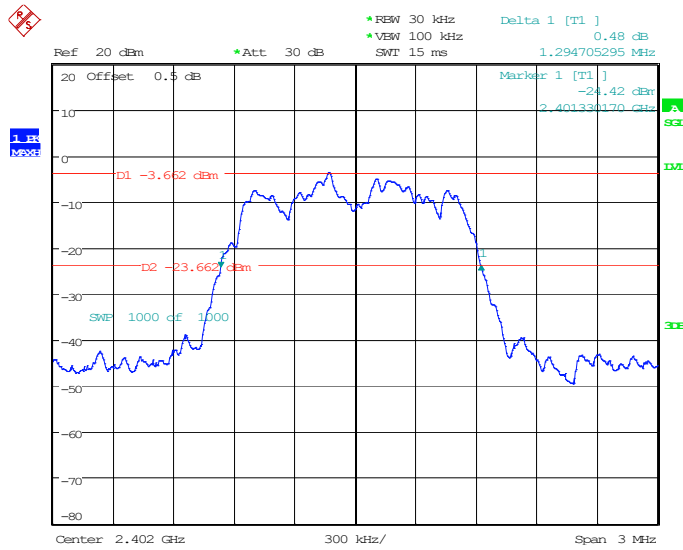
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 09:30:00

EDR ($\pi/4$ -DQPSK): High Channel



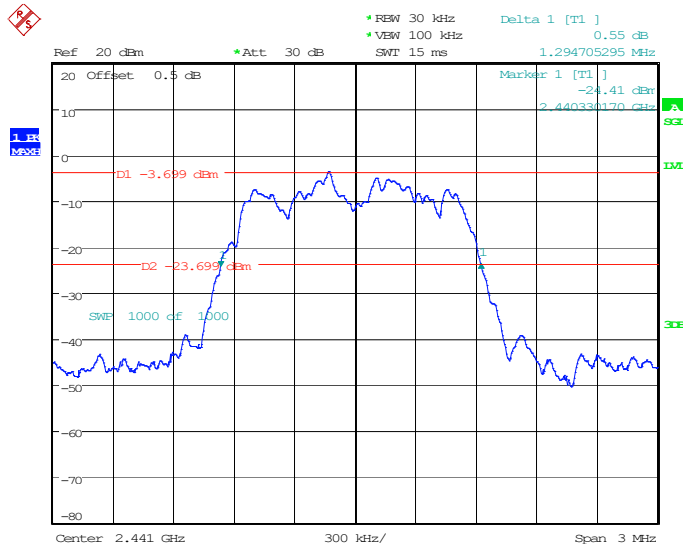
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 09:31:22

EDR (8DPSK): Low Channel



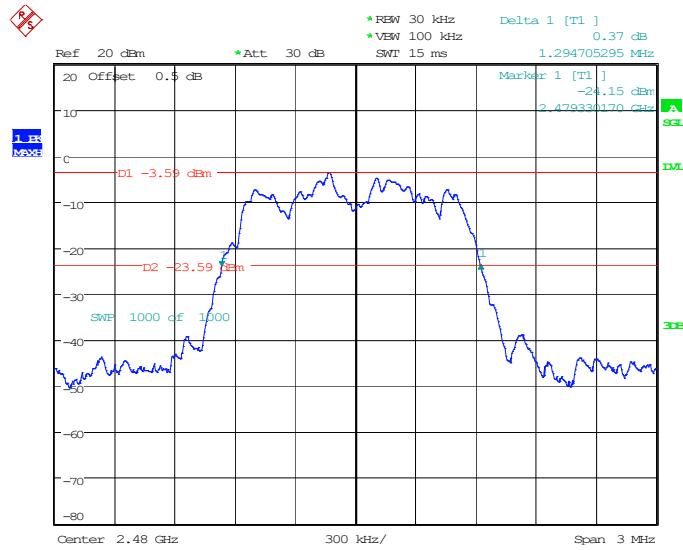
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 09:32:58

EDR (8DPSK): Middle Channel



ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 09:34:14

EDR (8DPSK): High Channel

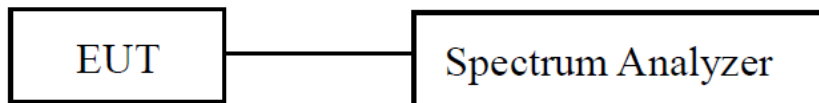


ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 09:35:31

FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

EUT Setup**Test Procedure**

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

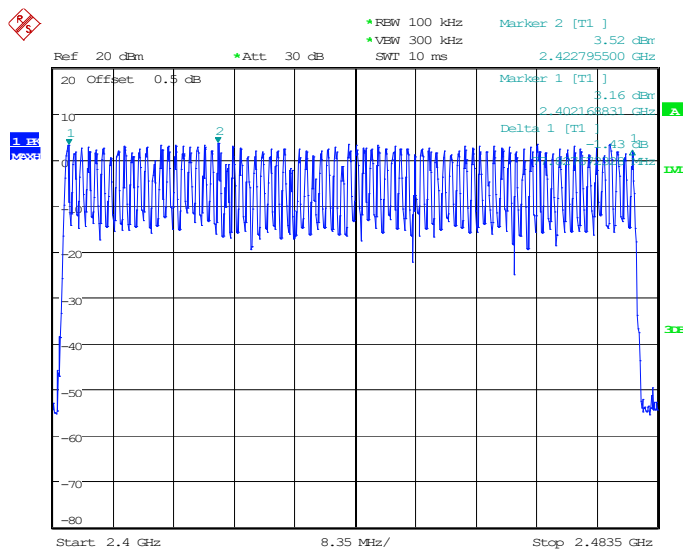
- a. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- b. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- c. VBW \geq RBW.
- d. Sweep: Auto.
- e. Detector function: Peak.
- f. Trace: Max hold.
- g. Allow the trace to stabilize.

It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies.

Test Data

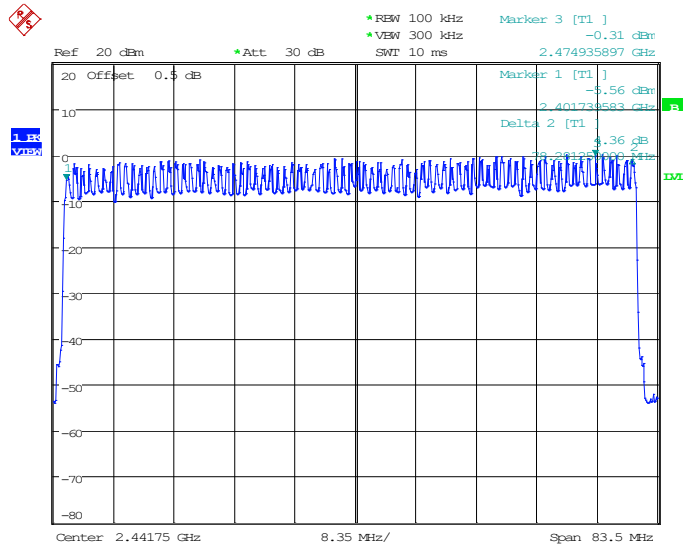
Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-28	Environment:	Temp.: 23.8°C Humi.: 59% Atm :100.4kPa
Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2400-2483.5	79	≥15
EDR (π/4-DQPSK)	2400-2483.5	79	≥15
EDR (8DPSK)	2400-2483.5	79	≥15

BDR (GFSK): Number of Hopping Channels



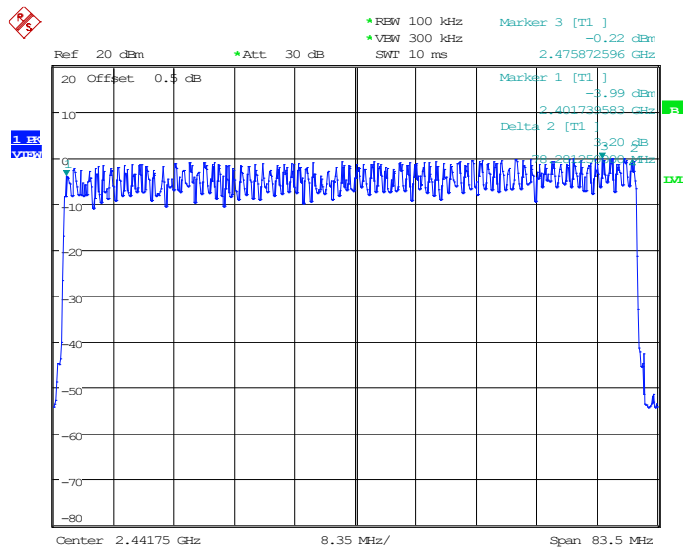
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 16:09:29

EDR ($\pi/4$ -DQPSK): Number of Hopping Channels



Project No.: 2407S72267E-RF Tester: Stein Peng
Date: 28.MAY.2024 16:26:42

EDR (8DPSK): Number of Hopping Channels

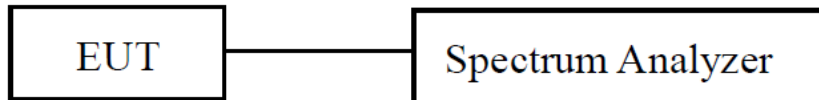


Project No.: 2407S72267E-RF Tester: Stein Peng
Date: 28.MAY.2024 16:30:41

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

EUT Setup**Test Procedure**

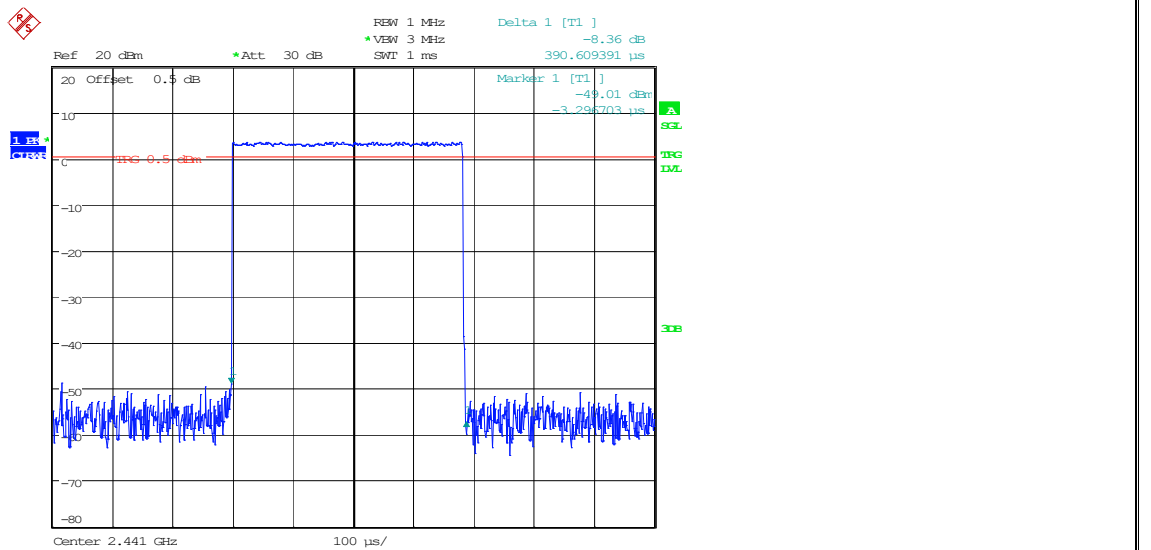
The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a Span: Zero span, centered on a hopping channel.
- b RBW shall be \leq channel spacing and where possible RBW should be set $\geq 1 / T$, where T is the expected dwell time per channel.
- c Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
- d Detector function: Peak.
- e Trace: Max hold.

Test Data

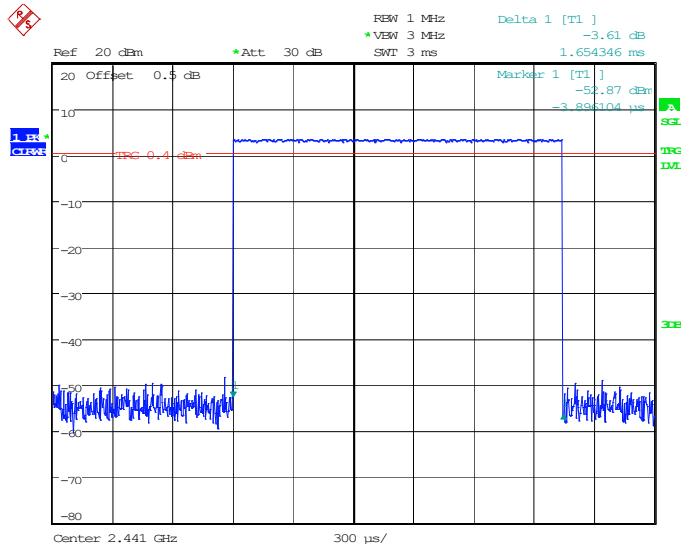
Test Mode:	Transmitting		Test Engineer:	Stein Peng		
Test Date:	2024-05-28		Environment:	Temp.: 23.8°C Humi.: 59% Atm :100.4kPa		
Mode		Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
BDR (GFSK)	DH1	Middle	0.391	0.125	0.400	Pass
	DH3	Middle	1.654	0.265	0.400	Pass
	DH5	Middle	2.927	0.312	0.400	Pass
EDR ($\pi/4$ -DQPSK)	2DH1	Middle	0.401	0.128	0.400	Pass
	2DH3	Middle	1.660	0.266	0.400	Pass
	2DH5	Middle	2.932	0.313	0.400	Pass
EDR (8DPSK)	3DH1	Middle	0.401	0.128	0.400	Pass
	3DH3	Middle	1.660	0.266	0.400	Pass
	3DH5	Middle	2.932	0.313	0.400	Pass
<p>Note:</p> <p>DH1, 2DH1, 3DH1:Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s</p> <p>DH3, 2DH3, 3DH3:Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s</p> <p>DH5, 2DH5, 3DH5:Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s</p>						

BDR (GFSK): Pulse time, Middle Channel, DH1



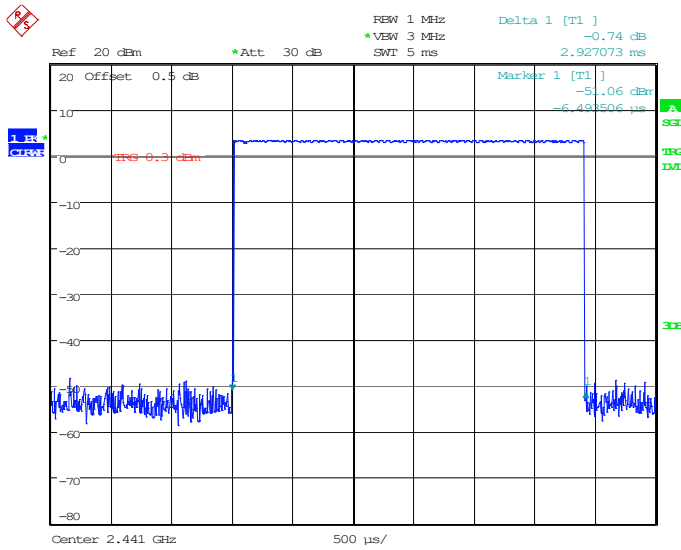
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:35:06

BDR (GFSK): Pulse time, Middle Channel, DH3



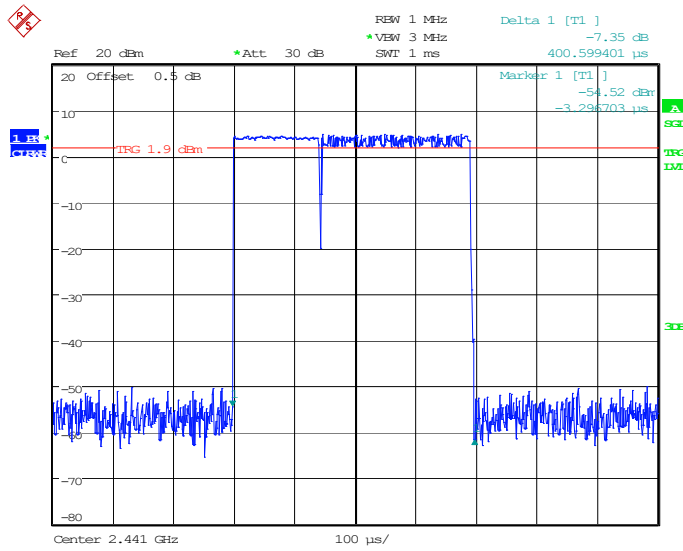
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:35:57

BDR (GFSK): Pulse time, Middle Channel, DH5



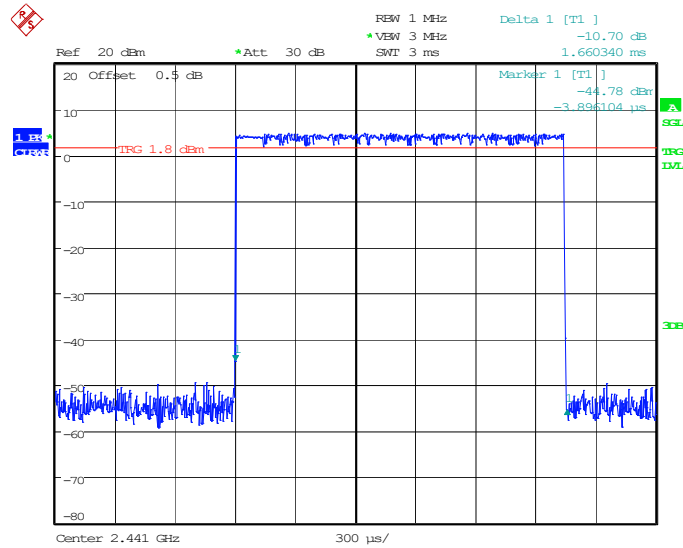
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:36:54

EDR ($\pi/4$ -DQPSK): Pulse time, Middle Channel, 2DH1



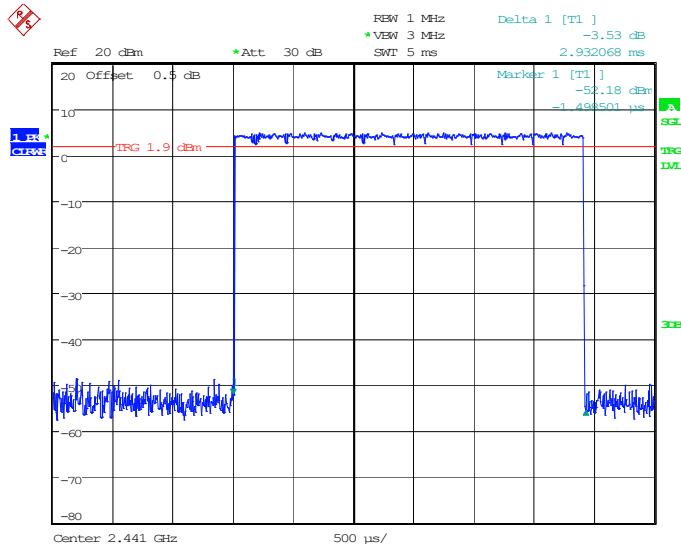
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:41:03

EDR ($\pi/4$ -DQPSK):Pulse time, Middle Channel, 2DH3



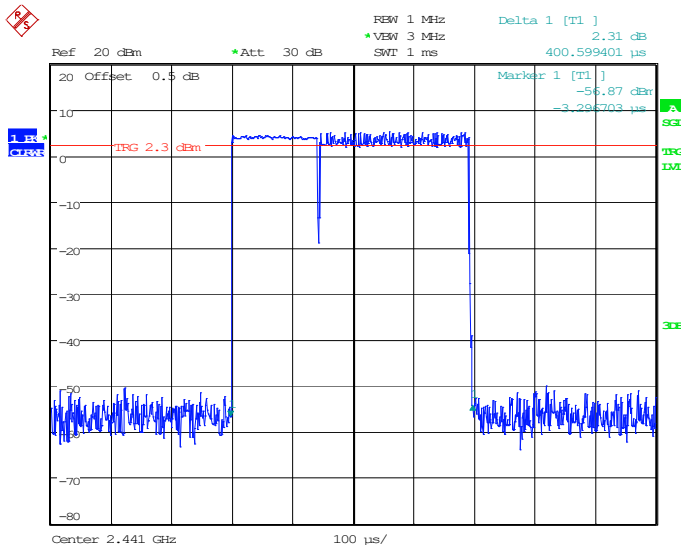
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:42:58

EDR ($\pi/4$ -DQPSK): Pulse time, Middle Channel, 2DH5



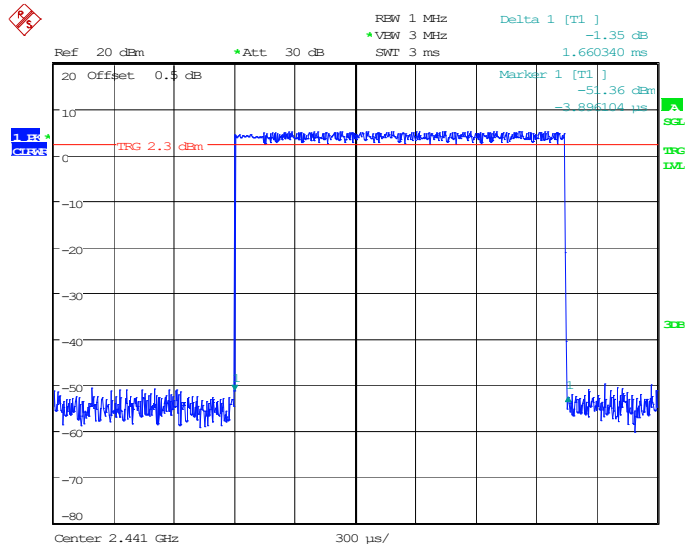
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:44:02

EDR (8DPSK): Pulse time, Middle Channel, 3DH1



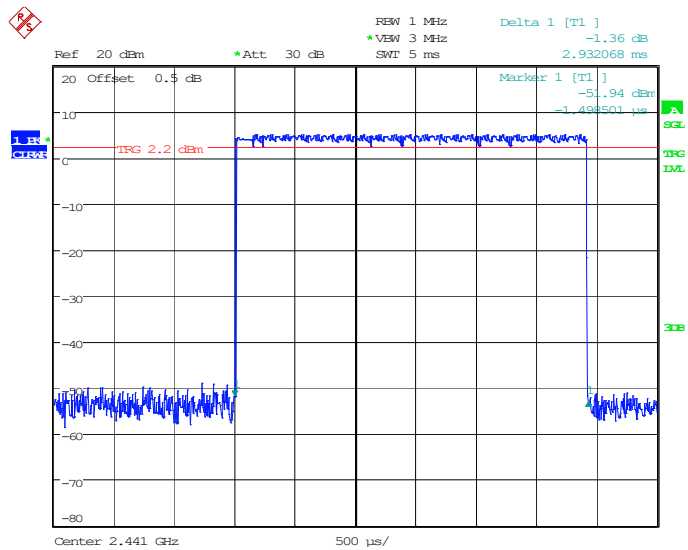
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:45:00

EDR (8DPSK): Pulse time, Middle Channel, 3DH3



ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:45:57

EDR (8DPSK): Pulse time, Middle Channel, 3DH5



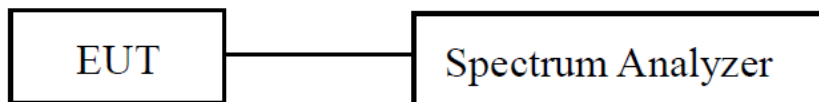
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 15:47:08

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

EUT Setup



Test Procedure

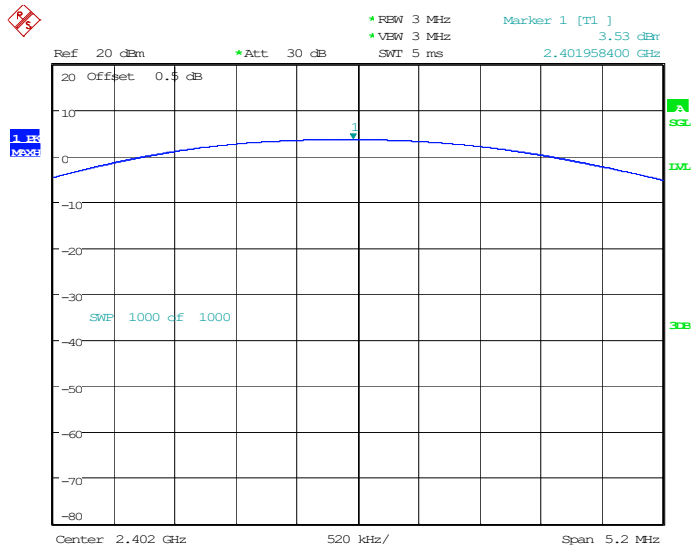
- a. Use the following spectrum analyzer settings:
 - 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
 - 2) RBW > 20 dB bandwidth of the emission being measured.
 - 3) VBW \geq RBW.
 - 4) Sweep: Auto.
 - 5) Detector function: Peak.
 - 6) Trace: Max hold.
- b. Allow trace to stabilize.
- c. Use the marker-to-peak function to set the marker to the peak of the emission.
- d. The indicated level is the peak output power, after any corrections for external attenuators and cables.
- e. A plot of the test results and setup description shall be included in the test report.

Test Data

Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-28	Environment:	Temp.: 23.8°C Humi.: 59% Atm :100.4kPa
Mode	Frequency (MHz)	Peak Conducted Output Power (dBm)	Limit (dBm)
BDR (GFSK)	2402	3.53	21
	2441	2.81	21
	2480	3.75	21
EDR ($\pi/4$-DQPSK)	2402	4.76	21
	2441	4.83	21
	2480	4.98	21
EDR (8DPSK)	2402	5.09	21
	2441	5.1	21
	2480	5.29	21

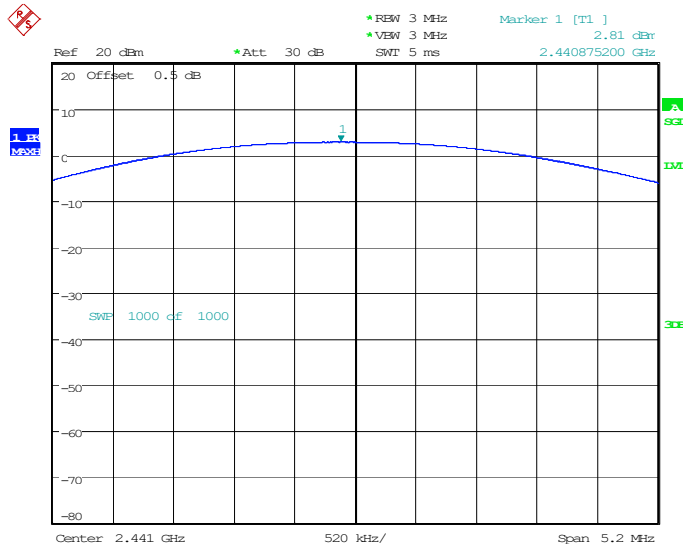
Please refer to below plots:

BDR (GFSK): 2402MHz



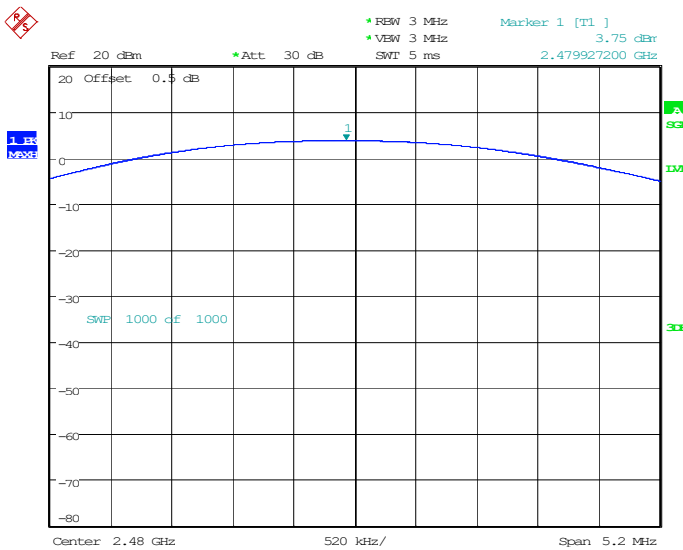
ProjectNo.:2407S72267E-RF Tester:Stein Peng
 Date: 28.MAY.2024 09:55:45

BDR (GFSK): 2441MHz



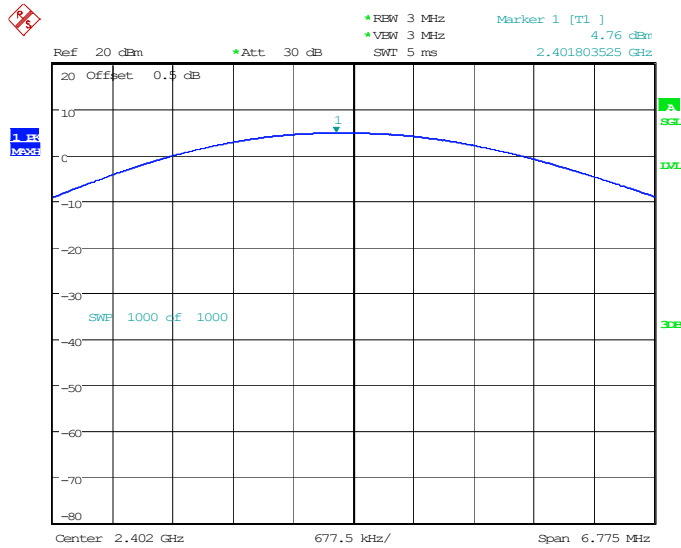
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:11:43

BDR (GFSK): 2480MHz



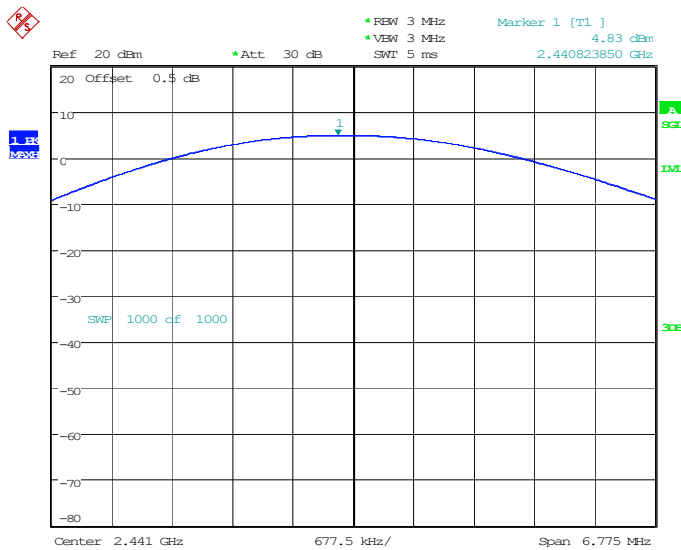
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:13:42

EDR($\pi/4$ -DQPSK): 2402MHz



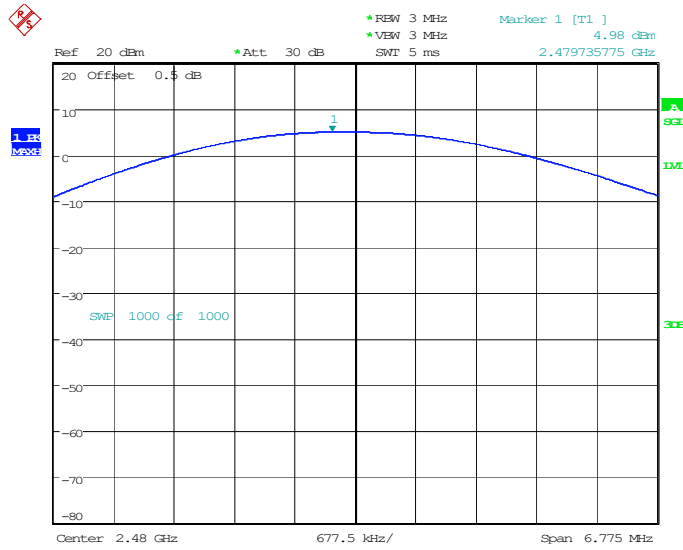
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:15:15

EDR($\pi/4$ -DQPSK): 2441MHz



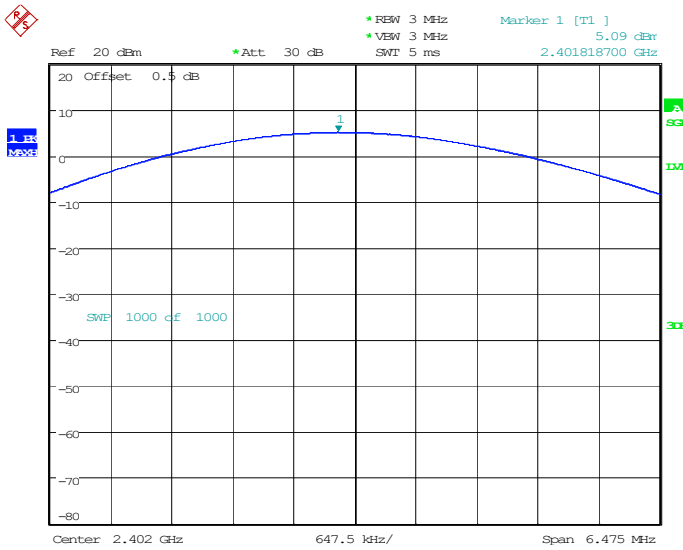
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:16:20

EDR($\pi/4$ -DQPSK): 2480MHz



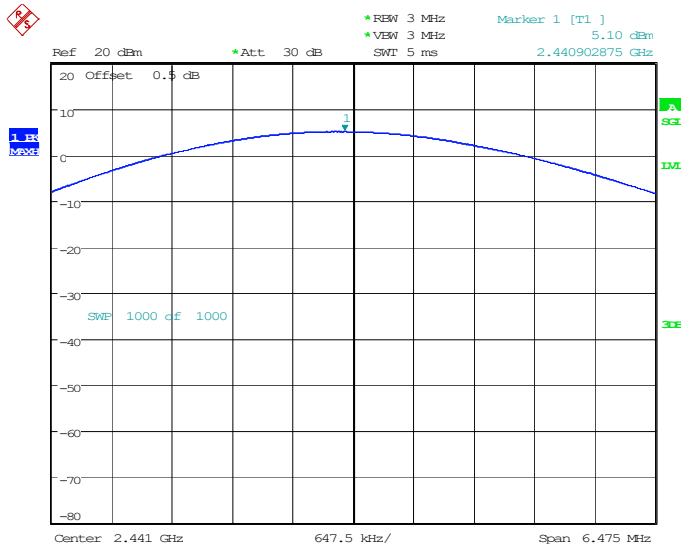
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:17:30

EDR(8DPSK): 2402MHz



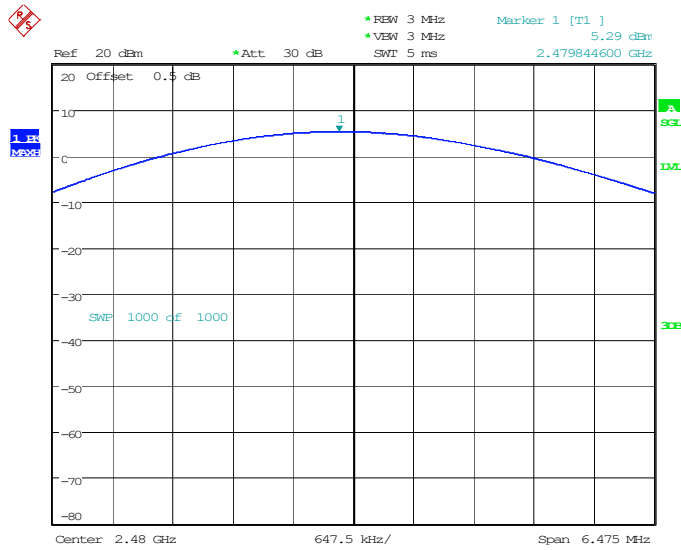
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:19:03

EDR(8DPSK): 2441MHz



ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:20:15

EDR(8DPSK): 2480MHz



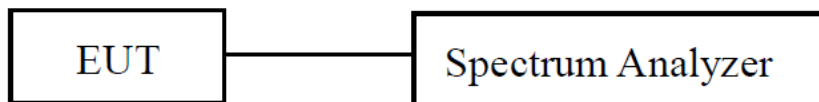
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:21:21

FCC §15.247(d) - BAND EDGES TESTING

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates Compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EUT Setup



Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

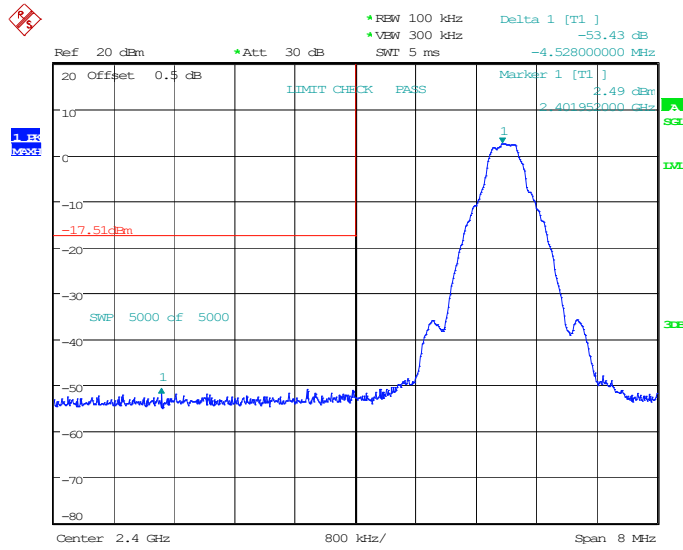
Test Data

Test Mode:	Transmitting	Test Engineer:	Stein Peng
Test Date:	2024-05-28	Environment:	Temp.: 23.8°C Humi.: 59% Atm :100.4kPa

Please refer to the below plots:

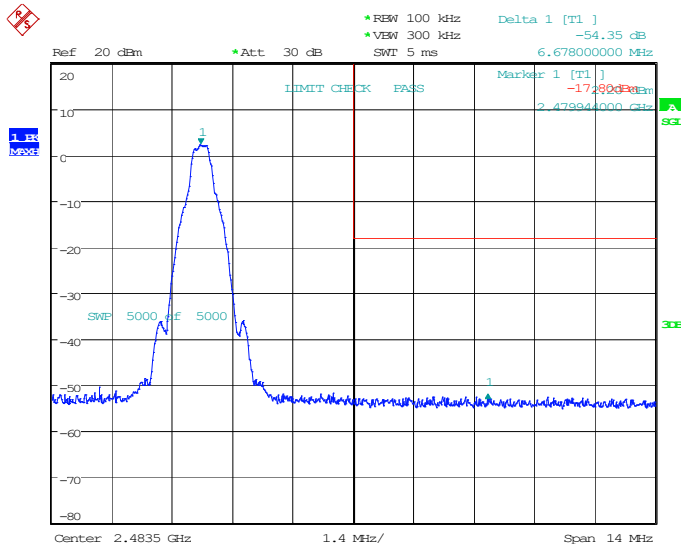
Band Edge

BDR (GFSK): Left Side



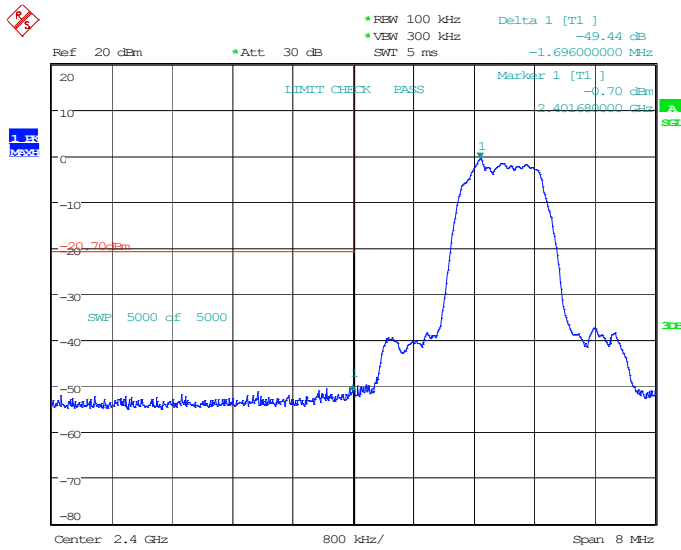
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:25:55

BDR (GFSK): Right Side



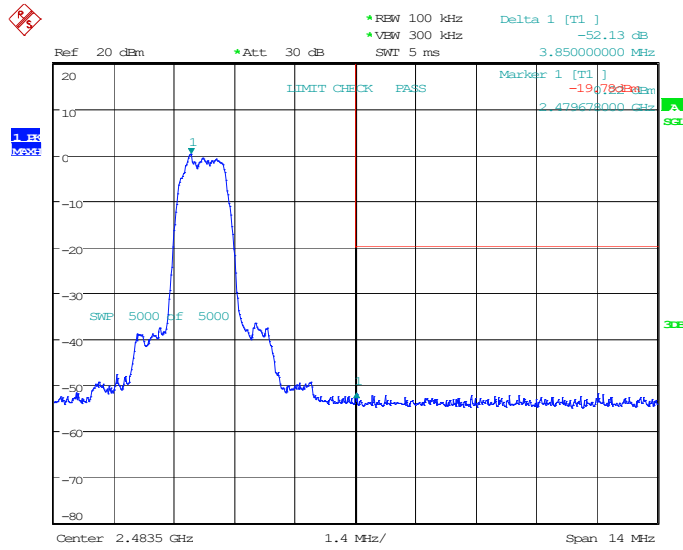
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 13:09:17

EDR ($\pi/4$ -DQPSK): Left Side



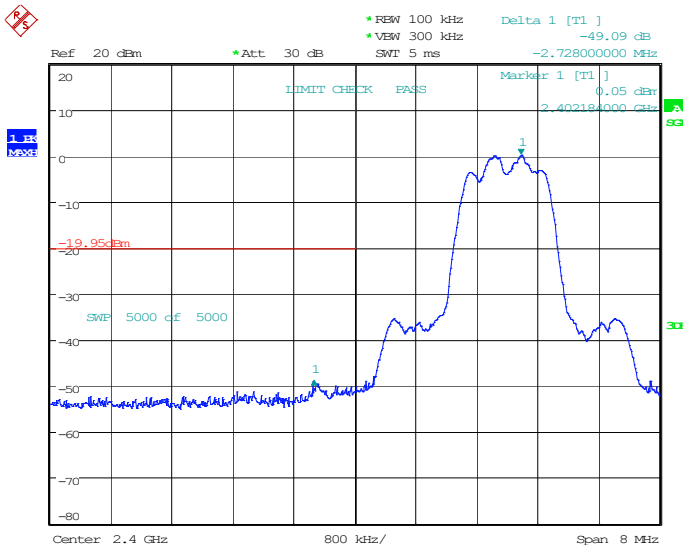
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 13:13:22

EDR ($\pi/4$ -DQPSK): Right Side



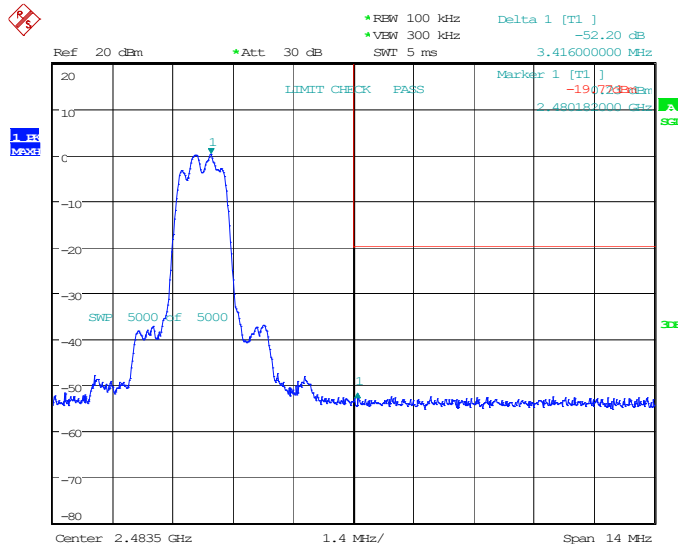
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 13:27:59

EDR (8DPSK): Left Side



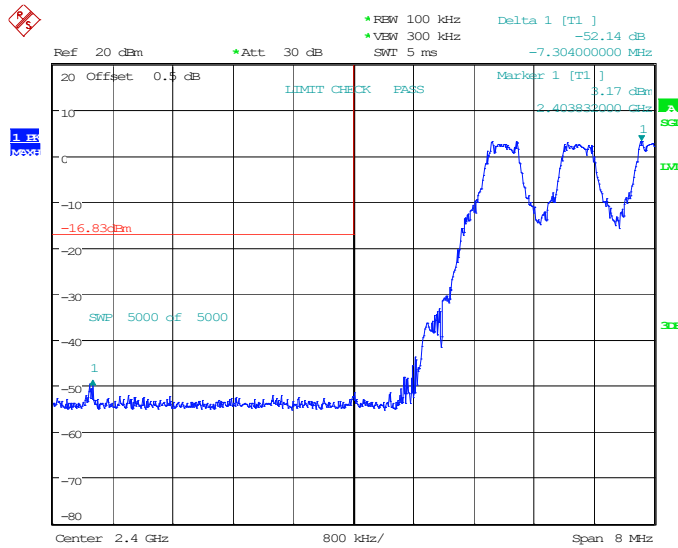
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 13:31:54

EDR (8DPSK): Right Side



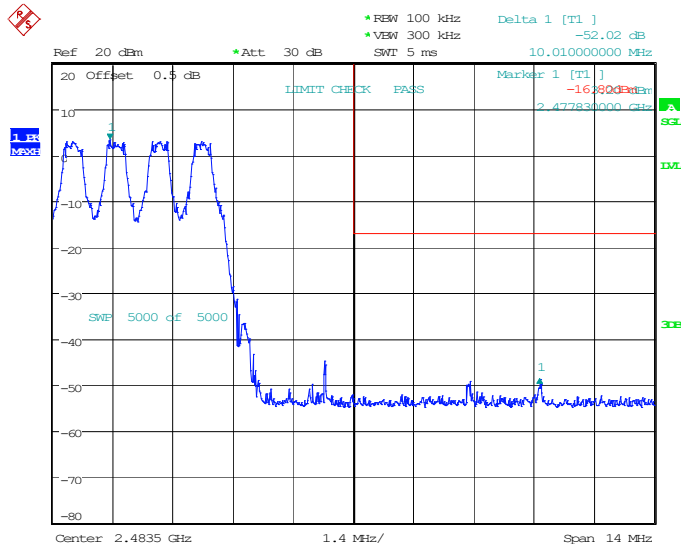
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 13:46:40

BDR (GFSK): Left Side - Hopping



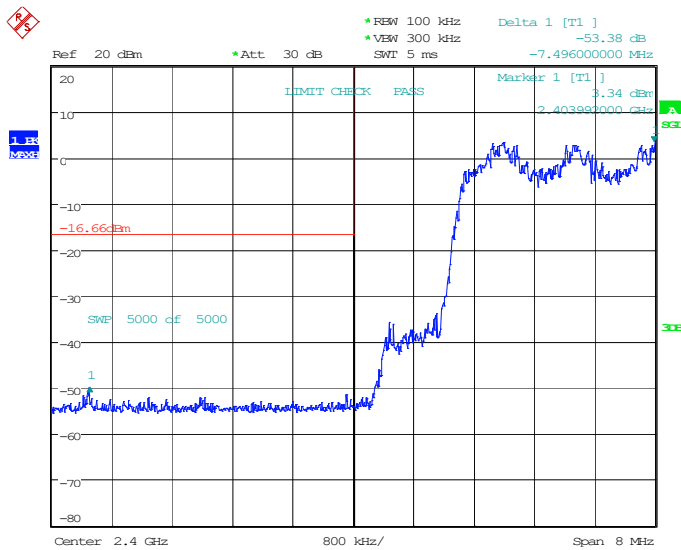
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 10:30:32

BDR (GFSK): Right Side - Hopping



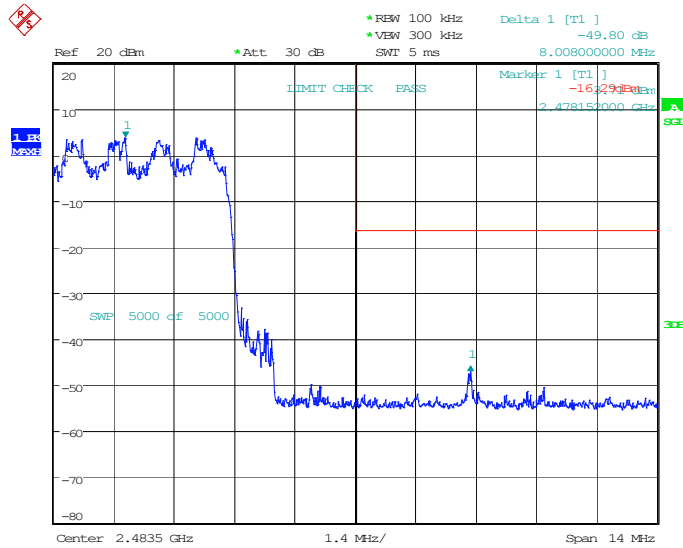
ProjectNo.:2407S72267E-RF Tester:Stein Peng
 Date: 28.MAY.2024 10:35:54

EDR ($\pi/4$ -DQPSK): Left Side - Hopping



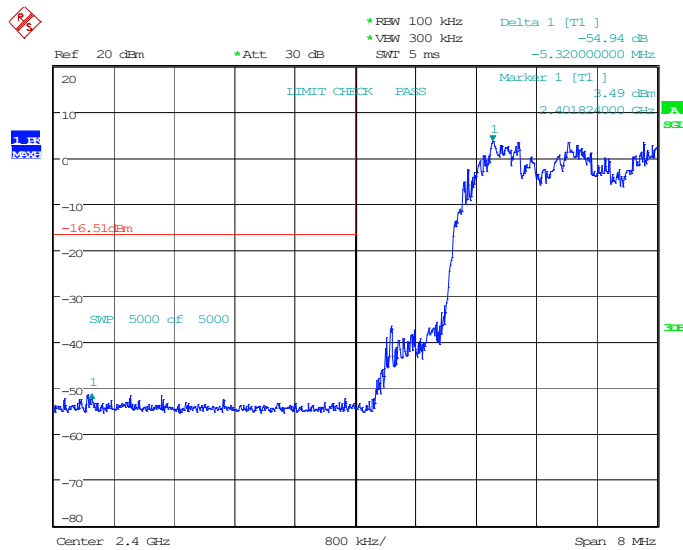
ProjectNo.:2407S72267E-RF Tester:Stein Peng
 Date: 28.MAY.2024 13:17:49

EDR ($\pi/4$ -DQPSK): Right Side - Hopping



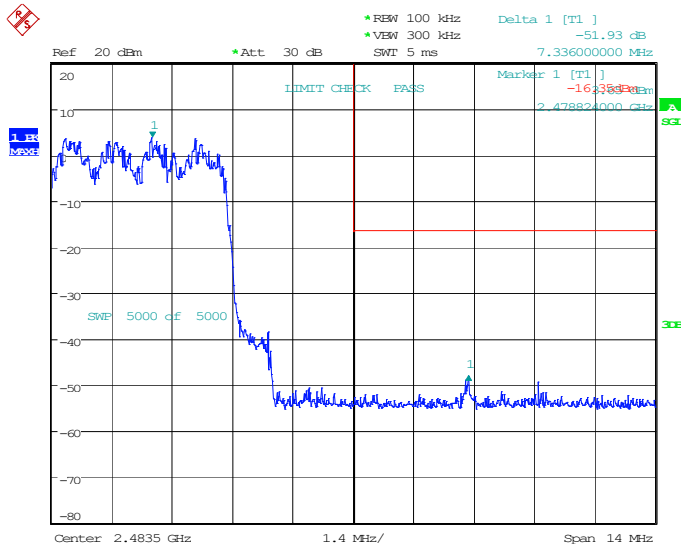
ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 13:22:14

EDR (8DPSK): Left Side - Hopping



ProjectNo.:2407S72267E-RF Tester:Stein Peng
Date: 28.MAY.2024 13:35:46

EDR (8DPSK): Right Side - Hopping



ProjectNo.:2407S72267E-RF Tester:Stein Peng
 Date: 28.MAY.2024 13:40:52

EUT PHOTOGRAPHS

Please refer to the attachment 2407S72267E-RF-EXP EUT EXTERNAL PHOTOGRAPHS and 2407S72267E-RF-INP EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2407S72267E-RF-01-TSP_TEST SETUP PHOTOGRAPHS.

Declarations

1. Bay Area Compliance Laboratories Corp. (Xiamen) is not responsible for authenticity of any information provided by the applicant. Information from the applicant that may affect test results are marked with an asterisk “★”.
2. Unless otherwise stated, the results shown in this test report refer only to the sample(s) tested.
3. Unless required by the rule provided by the applicant or product regulations, then decision rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor $k=2$ with the 95.45% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of Bay Area Compliance Laboratories Corp. (Xiamen).
6. This report is valid only with a valid digital signature. The digital signature may be available only under the adobe software above version 7.0.

******* END OF REPORT *******