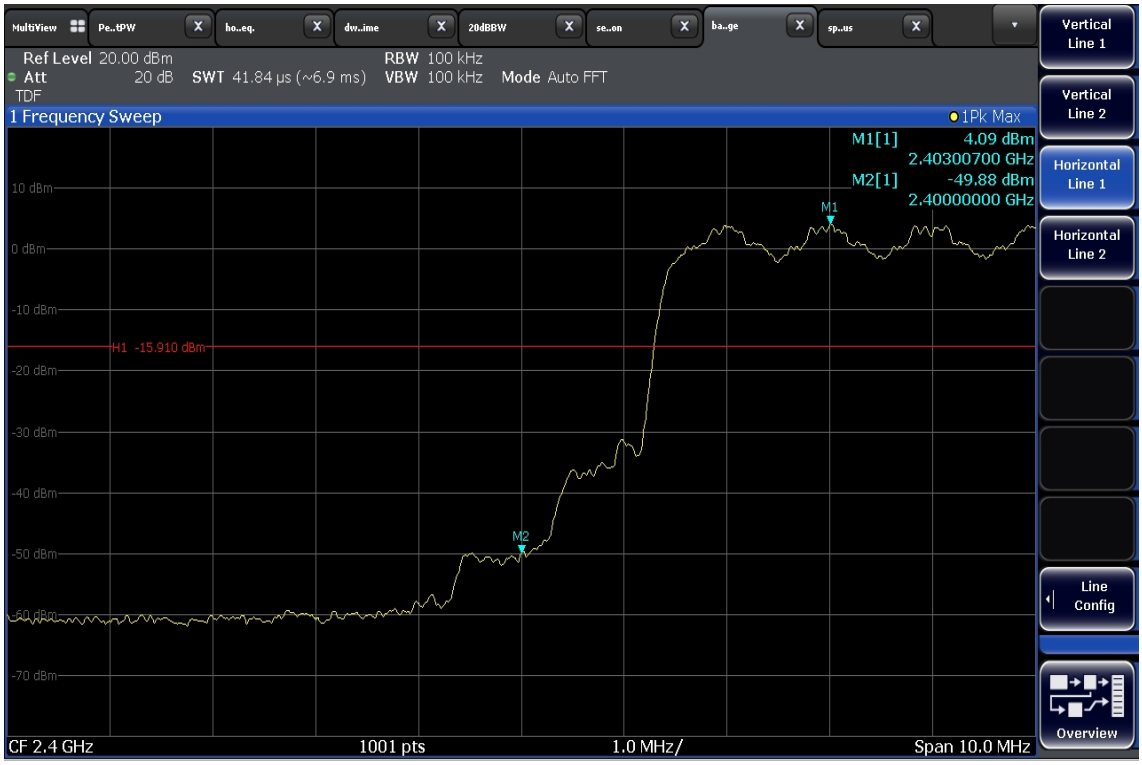
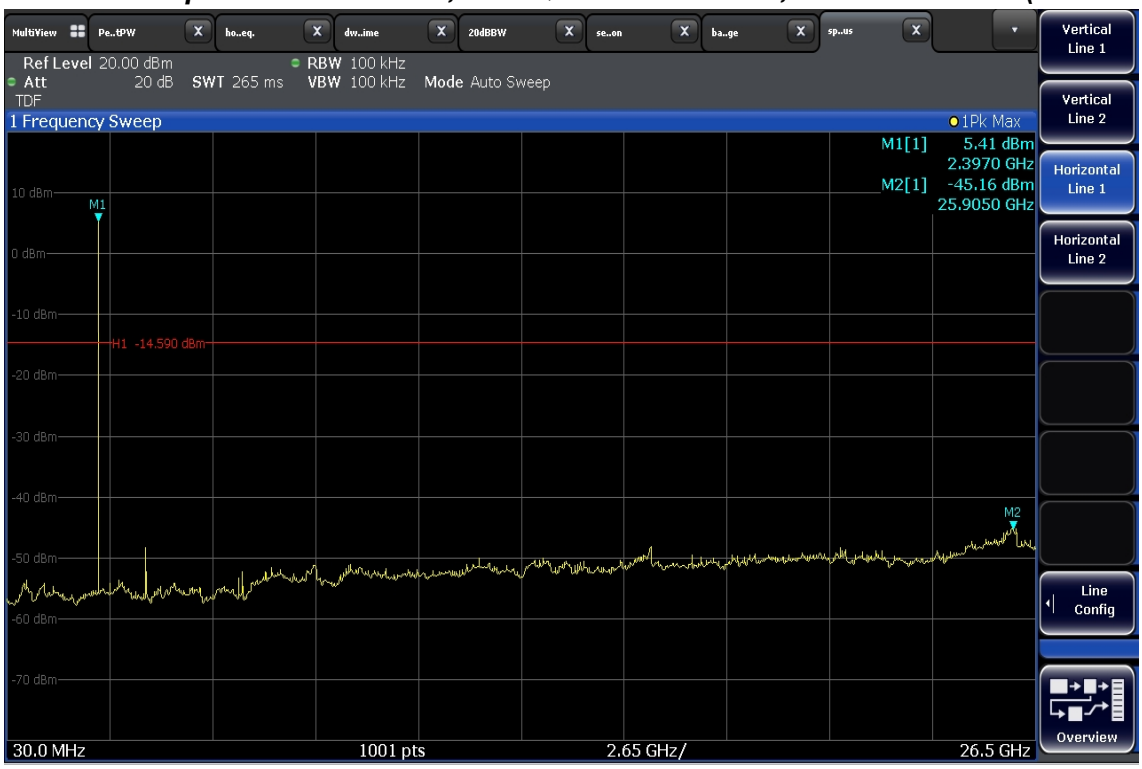
PLOTS OF EMISSIONS

Band Edge, Hopping mode, π/4DQPSK modulation, Lowest Channel (2402 MHz)

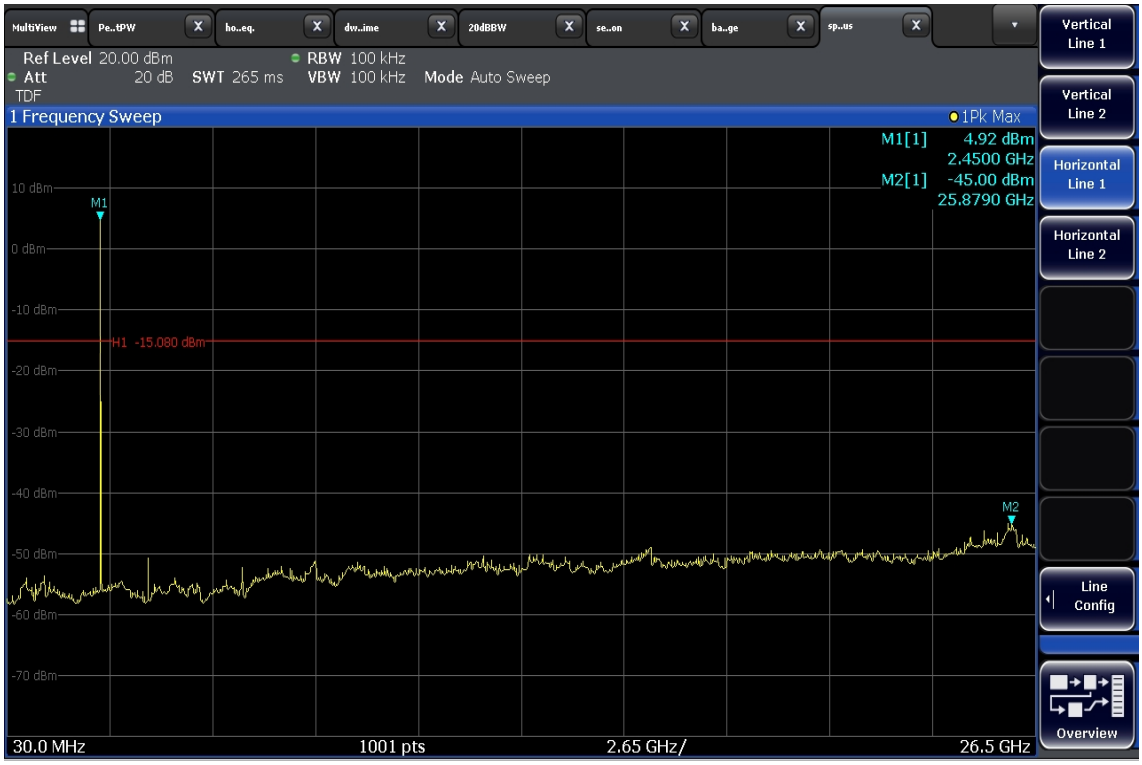


Conducted Spurious Emissions, π/4DQPSK modulation, Lowest channel (2402MHz)

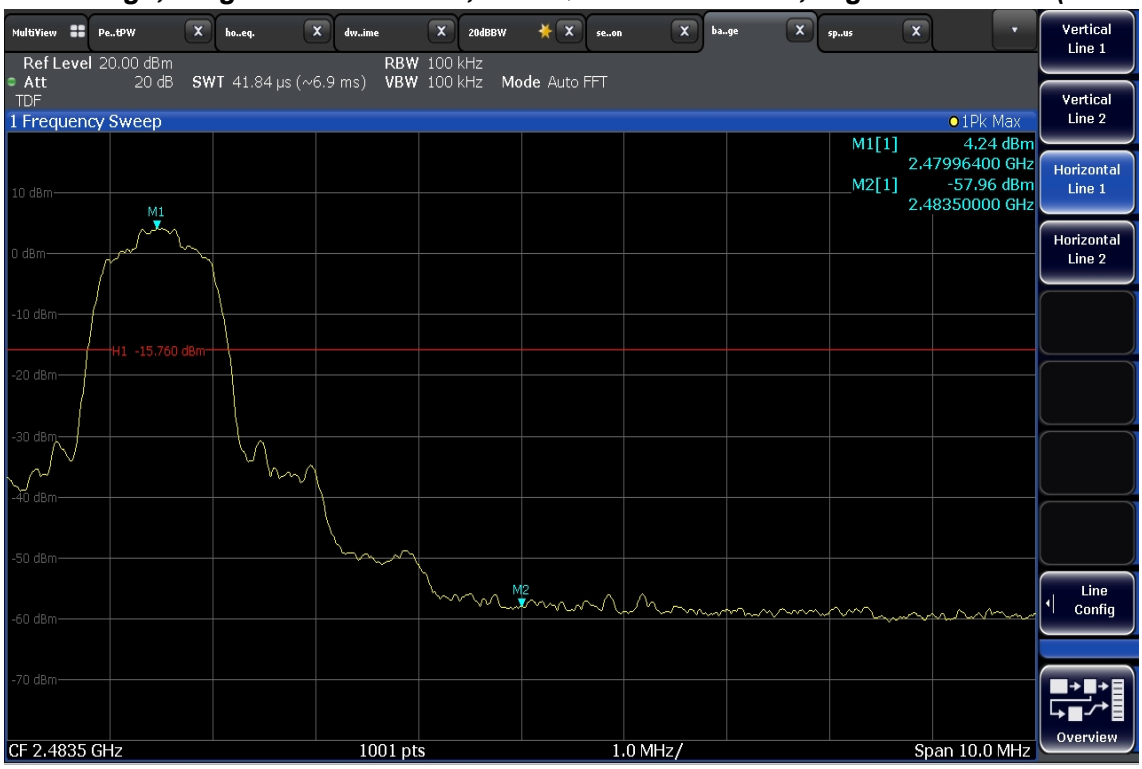


PLOTS OF EMISSIONS

Conducted Spurious Emissions, π/4DQPSK modulation, Middle channel (2441MHz)

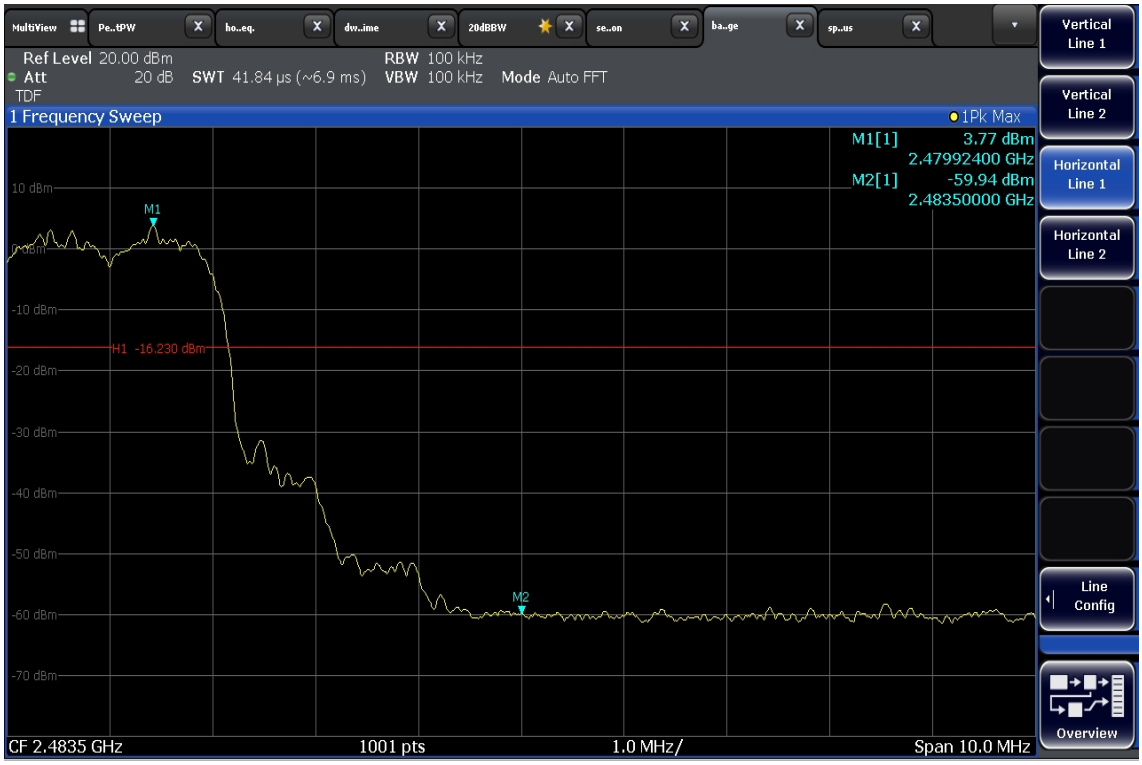


Band Edge, Single channel mode, π/4DQPSK modulation, Highest Channel (2480 MHz)

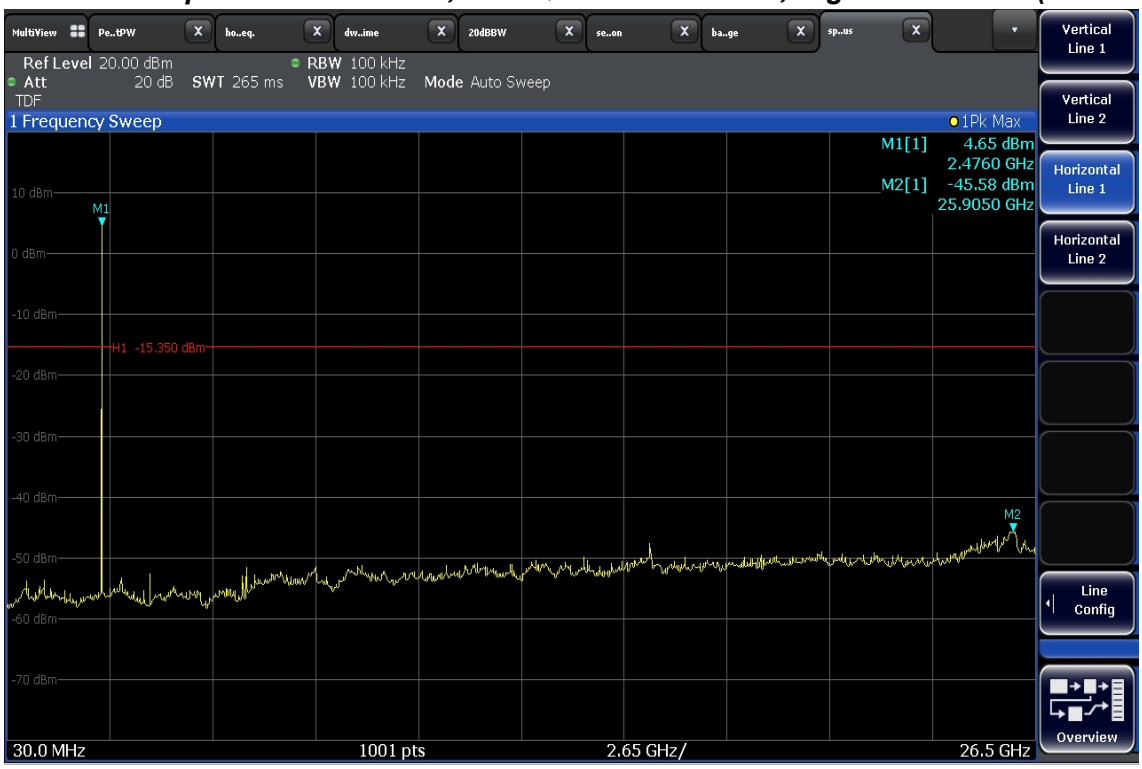


PLOTS OF EMISSIONS

Band Edge, Hopping mode, π/4DQPSK modulation, Highest Channel (2480 MHz)

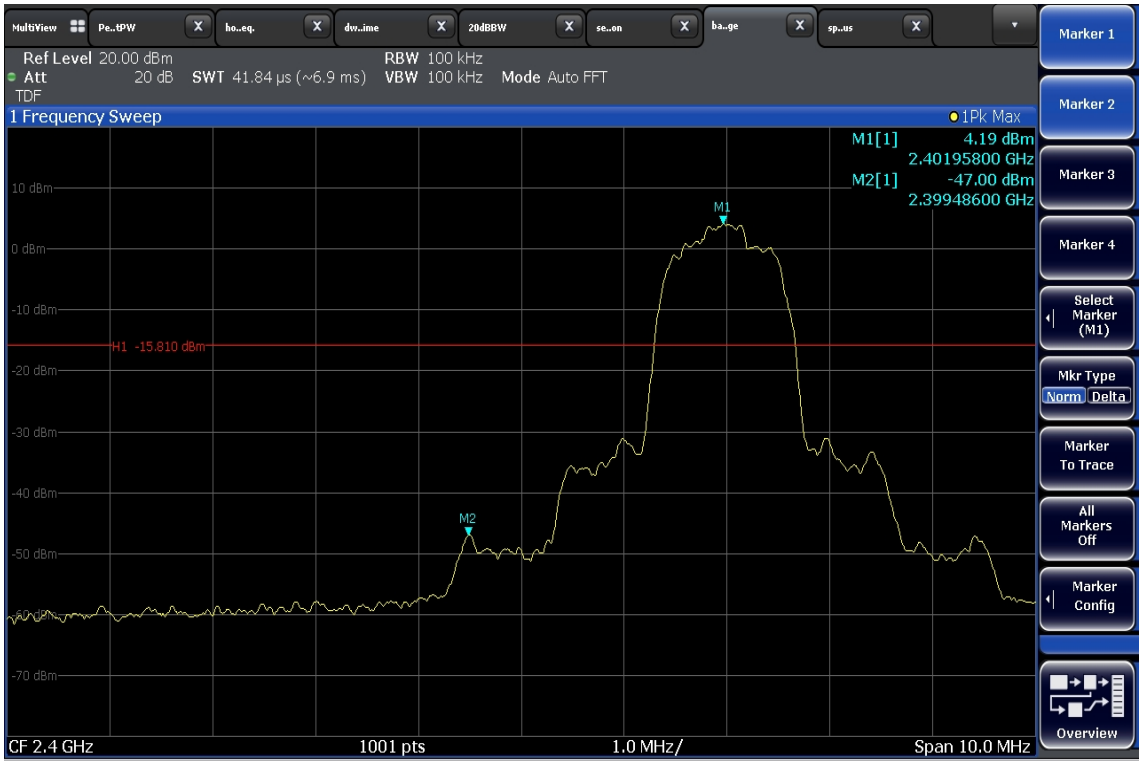


Conducted Spurious Emissions, π/4DQPSK modulation, Highest Channel (2480 MHz)

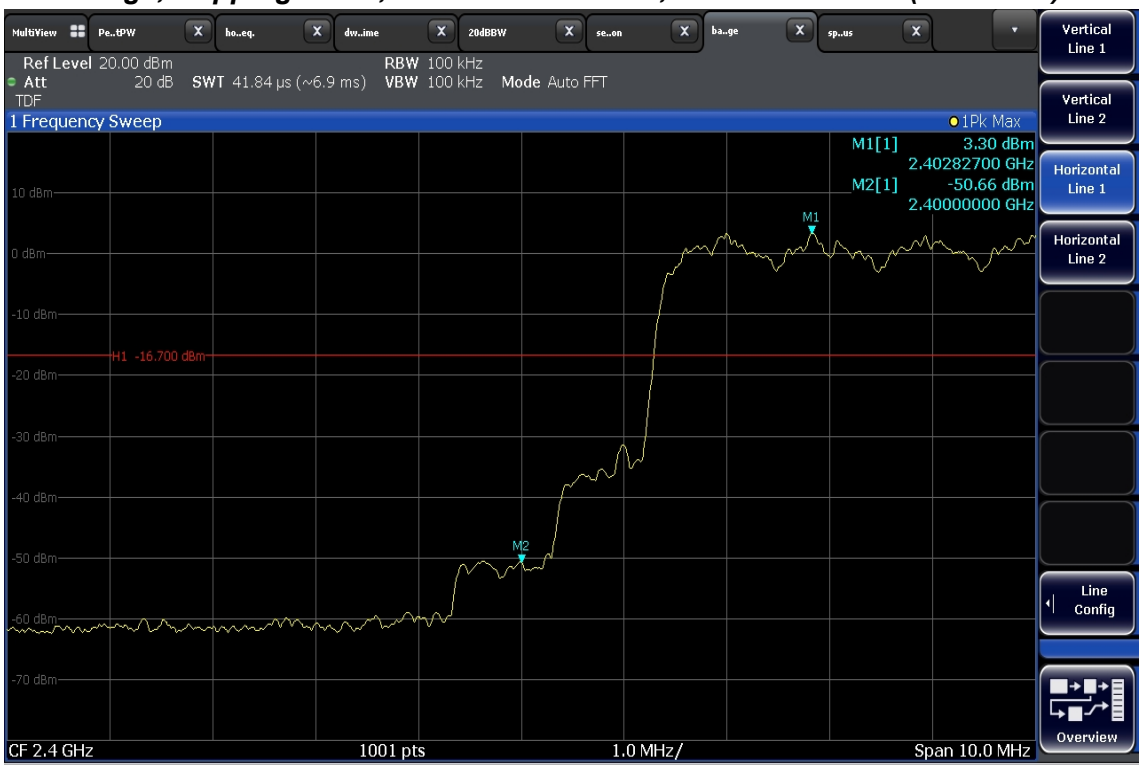


PLOTS OF EMISSIONS

Band Edge, Single channel mode, 8DPSK modulation, Lowest Channel (2402 MHz)

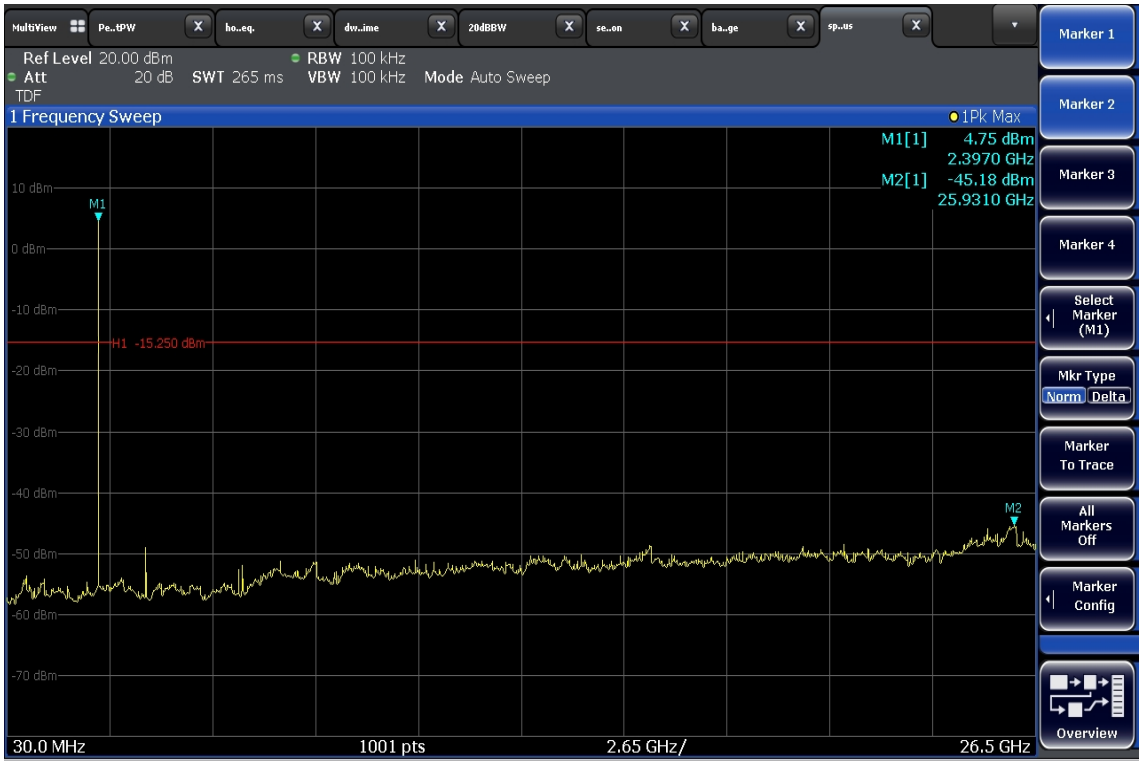


Band Edge, Hopping mode, 8DPSK modulation, Lowest Channel (2402 MHz)

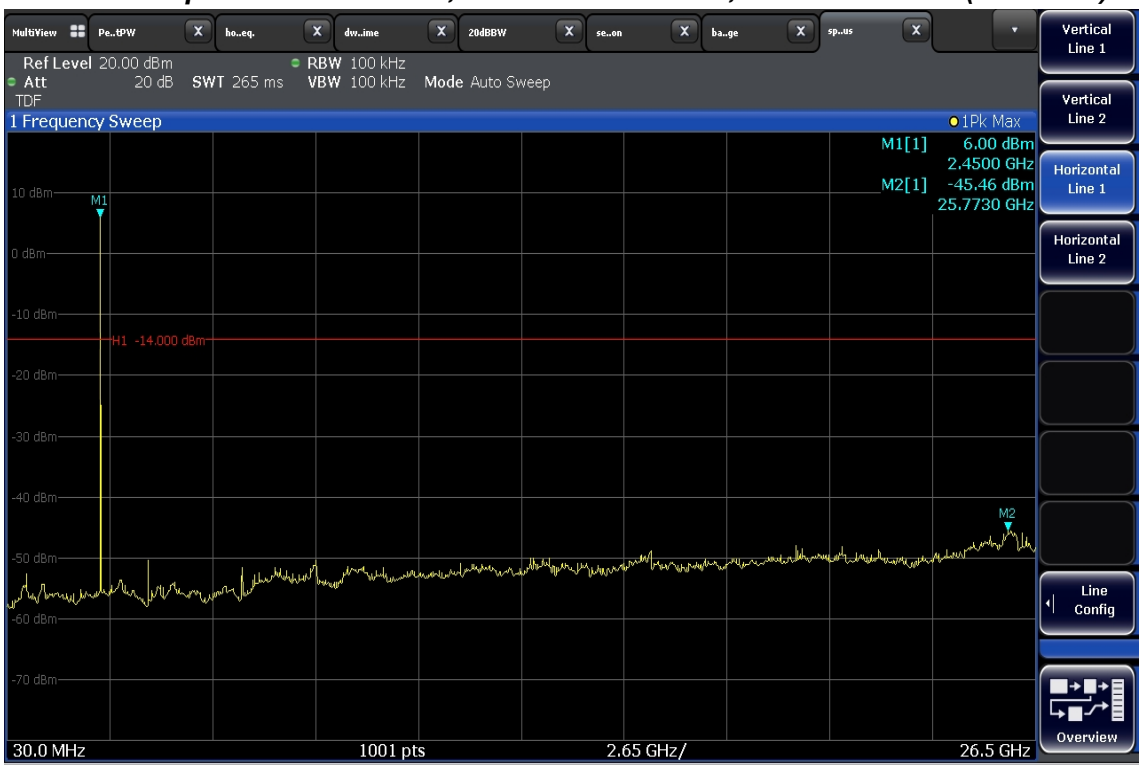


PLOTS OF EMISSIONS

Conducted Spurious Emissions, 8DPSK modulation, Lowest channel (2402MHz)

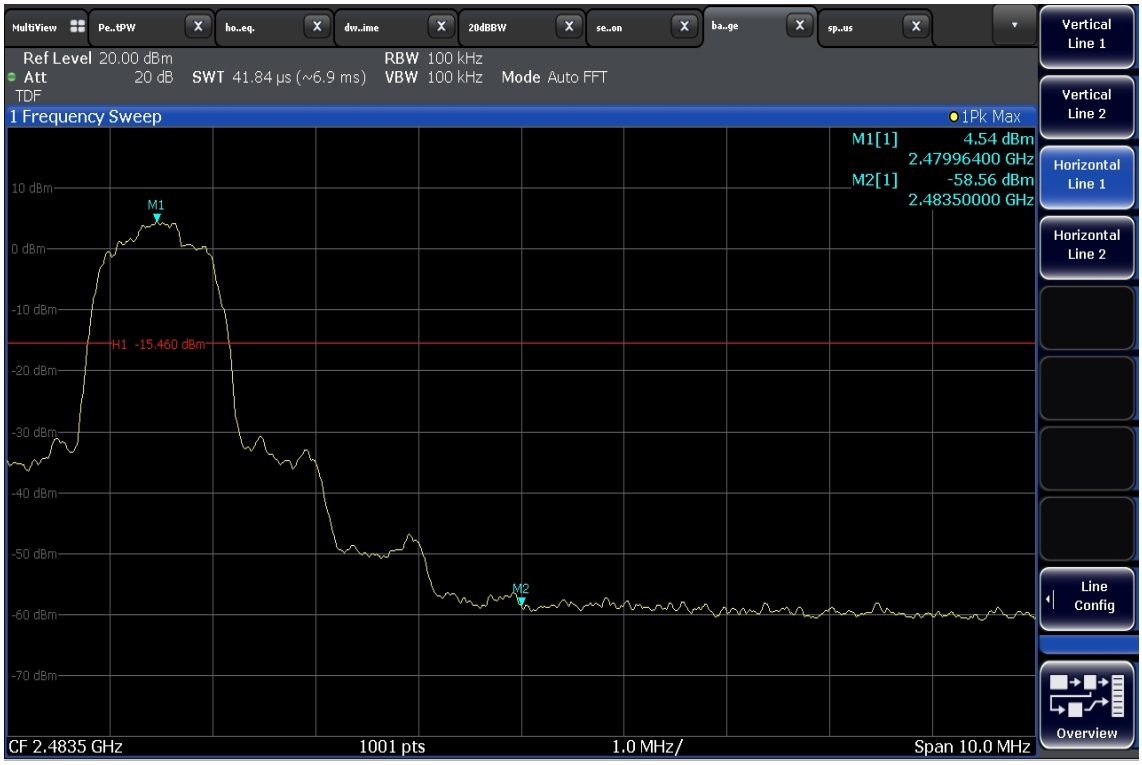


Conducted Spurious Emissions, 8DPSK modulation, Middle channel (2441MHz)

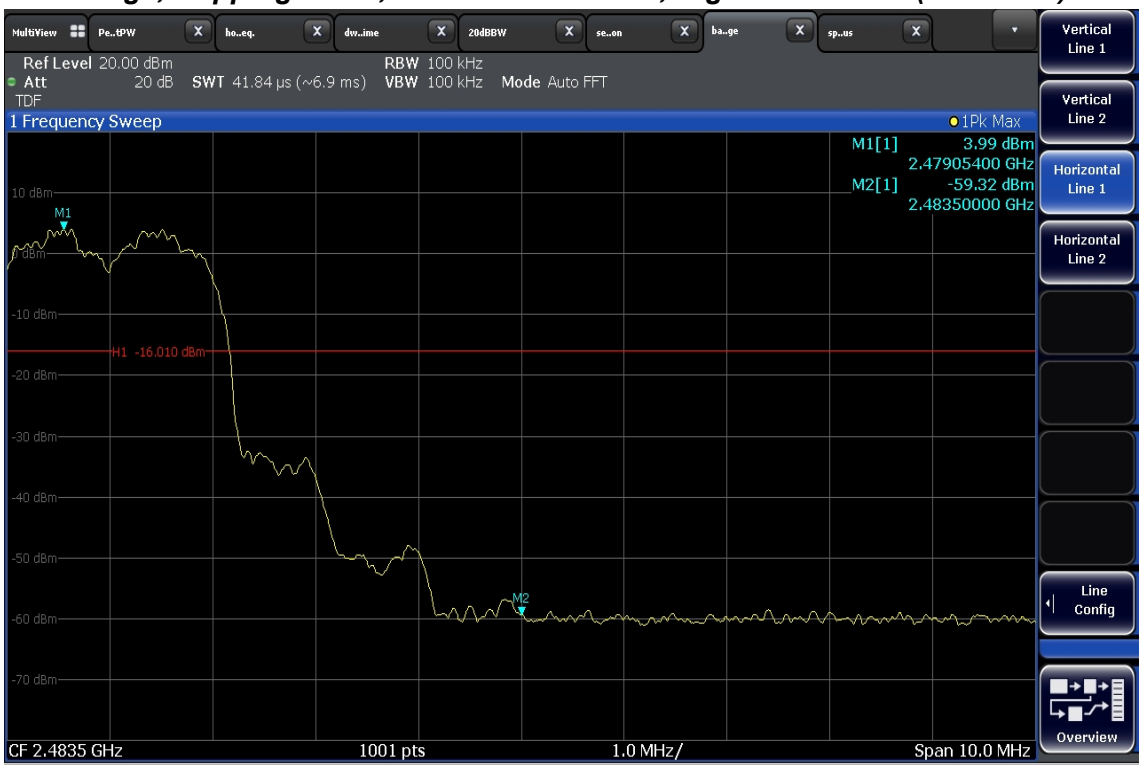


PLOTS OF EMISSIONS

Band Edge, Single channel mode, 8DPSK modulation, Highest Channel (2480 MHz)

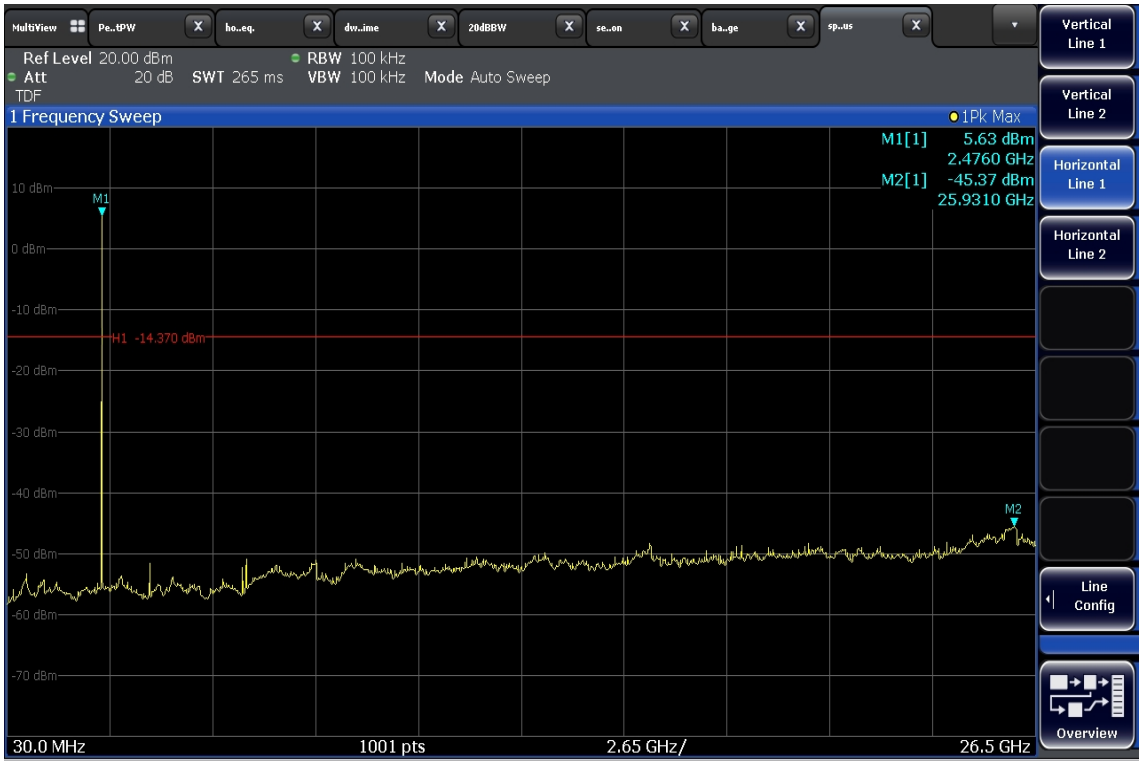


Band Edge, Hopping mode, 8DPSK modulation, Highest Channel (2480 MHz)



PLOTS OF EMISSIONS

Conducted Spurious Emissions, 8DPSK modulation, Highest channel (2480MHz)



TEST DATA

8.9 Radiated Spurious Emissions

FCC §15.247(d), IC RSS-247 Issue 2 5.5

Test Mode : Set to Lowest channel, Middle channel and Highest channel,

Result

GFSK modulation_Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3602.67	52.2	H	peak	-3.8	48.4	74.0	25.6

GFSK modulation_Middle Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3661.00	49.9	H	peak	-3.2	46.7	74.0	27.3

GFSK modulation_Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3964.67	50.1	V	peak	-2.0	48.1	74.0	25.9

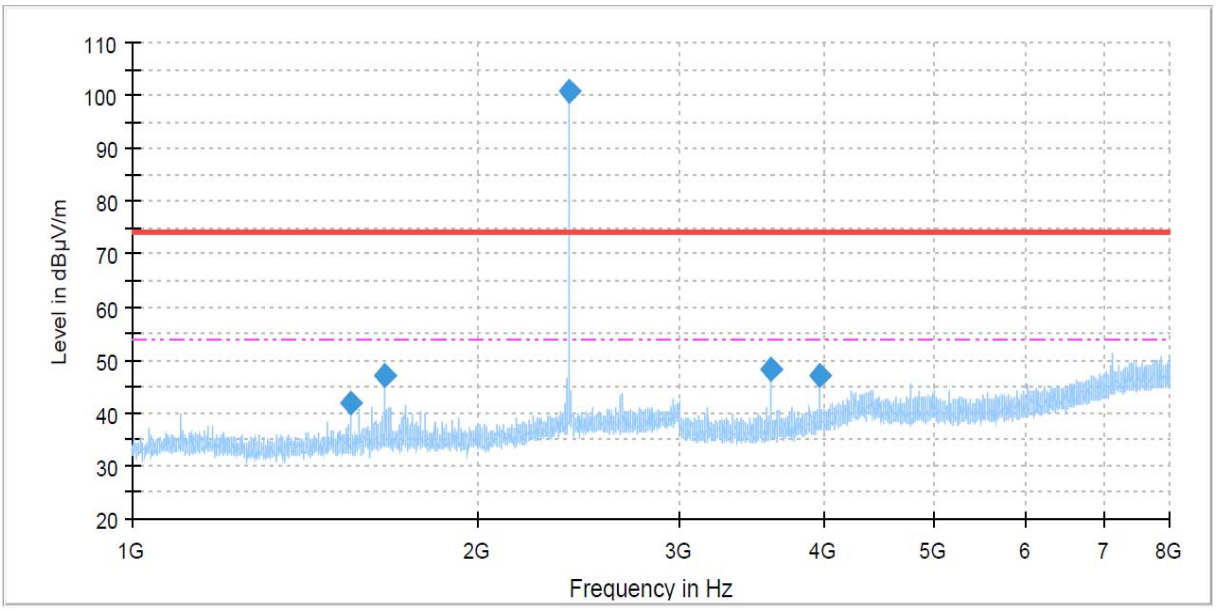
Note:

*1. *Pol. H = Horizontal V = Vertical*
*2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.*
3. Average measurement was not performed when peak-detected emission complies with the average limit.
4. Other spurious was under 20 dB below Fundamental.
5. Lowest channel (2402MHz) in GFSK modulation was the worst condition. For other modes, peak-detected emissions have enough margin more than 20dBc, therefore the results were not recorded in this report
6. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.
7. Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak.
9. Average emissions were measured using RBW = 1 MHz, VBW = 1 kHz, Detector = Peak.
8. The spectrum was measured from 9 kHz to 10th harmonic and the worst-case emissions were reported. No significant emissions were found beyond the 3rd harmonic for this device.

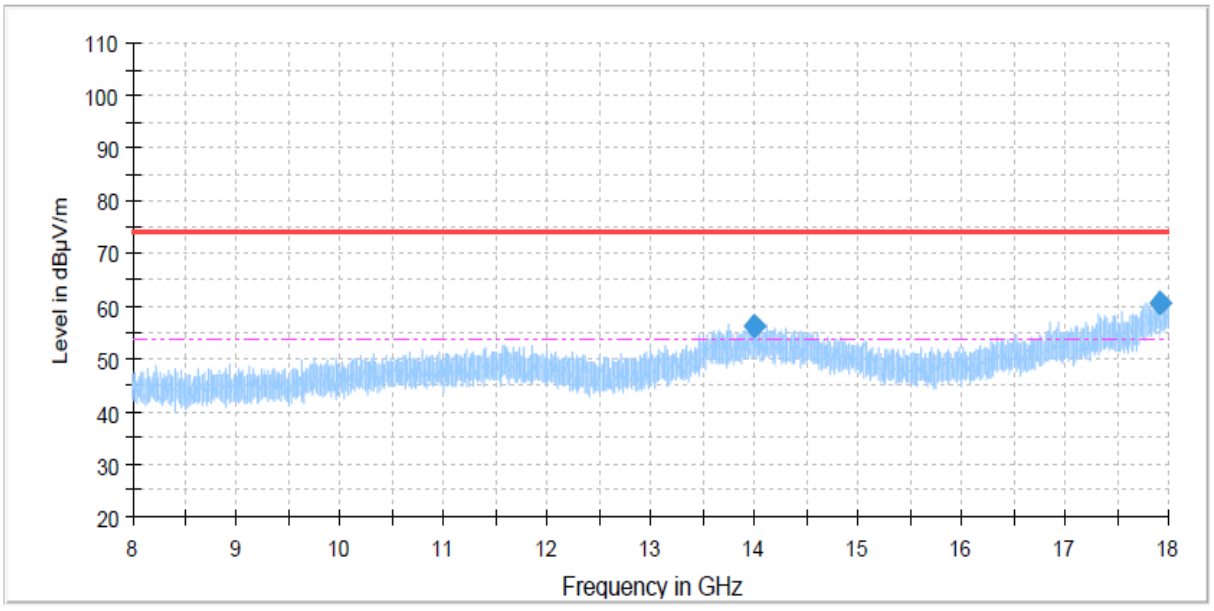
PLOTS OF EMISSIONS

Worst Case

Lowest channel : 1 GHz to 8 GHz_Peak

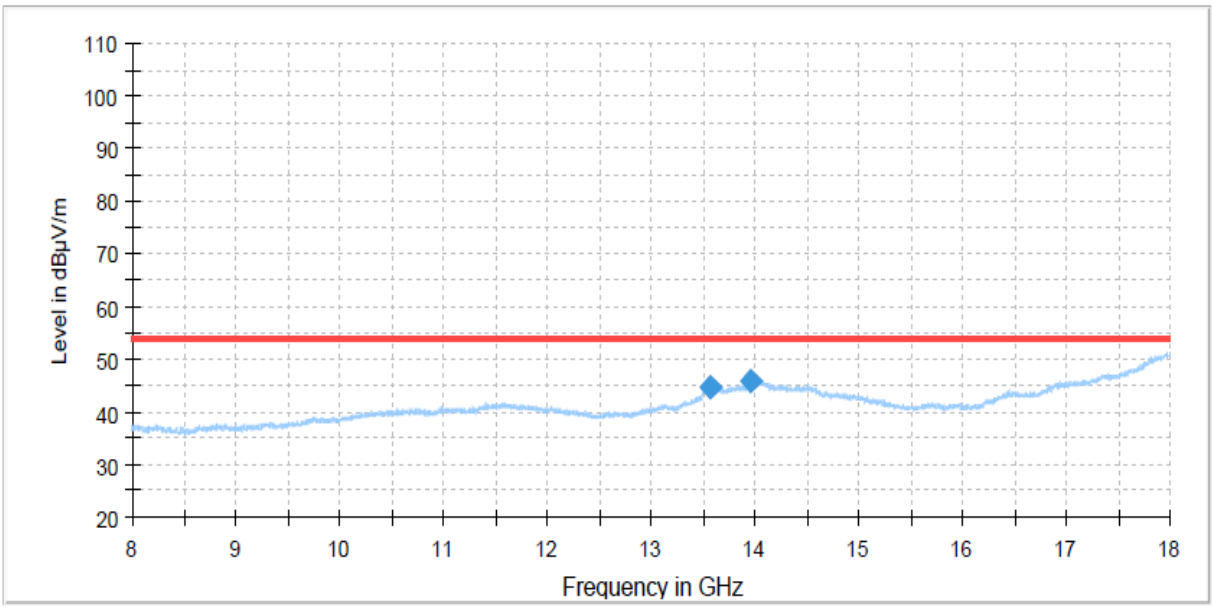


Lowest channel : 8 GHz to 18 GHz_Peak

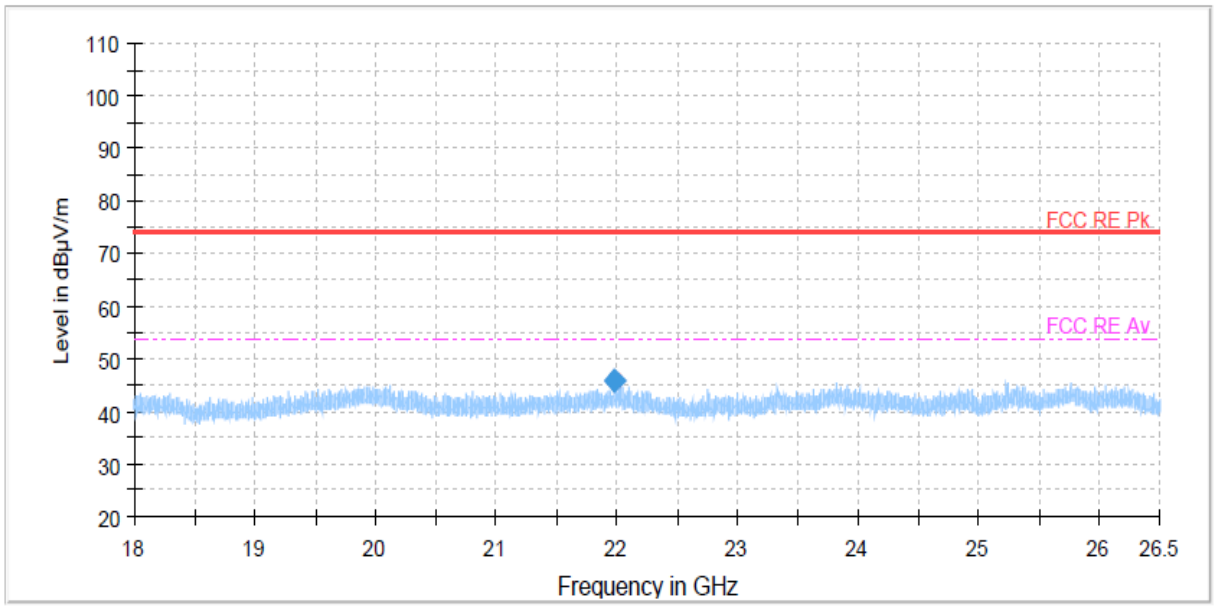


PLOTS OF EMISSIONS

Lowest channel : 8 GHz to 18 GHz_Average



Lowest channel : 18 GHz to 26.5 GHz_Peak



8.8 Radiated Band Edge

FCC §15.247(d), IC RSS-247 Issue 2 5.5

Test Mode : Set to Lowest channel and Highest channel

Result

8DPSK modulation_Lowest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2378.75	51.8	V	peak	-8.2	43.6	74.0	30.4
2389.88	50.3	H	peak	-8.3	42.0	74.0	32.0

8DPSK modulation_Highest Channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2483.50	56.3	V	peak	-8.0	48.3	74.0	25.8
2488.26	51.4	V	peak	-8.0	43.4	74.0	30.6

Note:

*1. *Pol. H = Horizontal V = Vertical*

*2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.*

3. Average measurement was not performed when peak-detected emission complies with the average limit.

4. Other spurious was under 20 dB below Fundamental.

5. Highest channel (2480MHz) mode in 8DPSK modulation was the worst condition. For other modes, peak-detected emissions have enough margin more than 20dBc, therefore the results were not recorded in this report

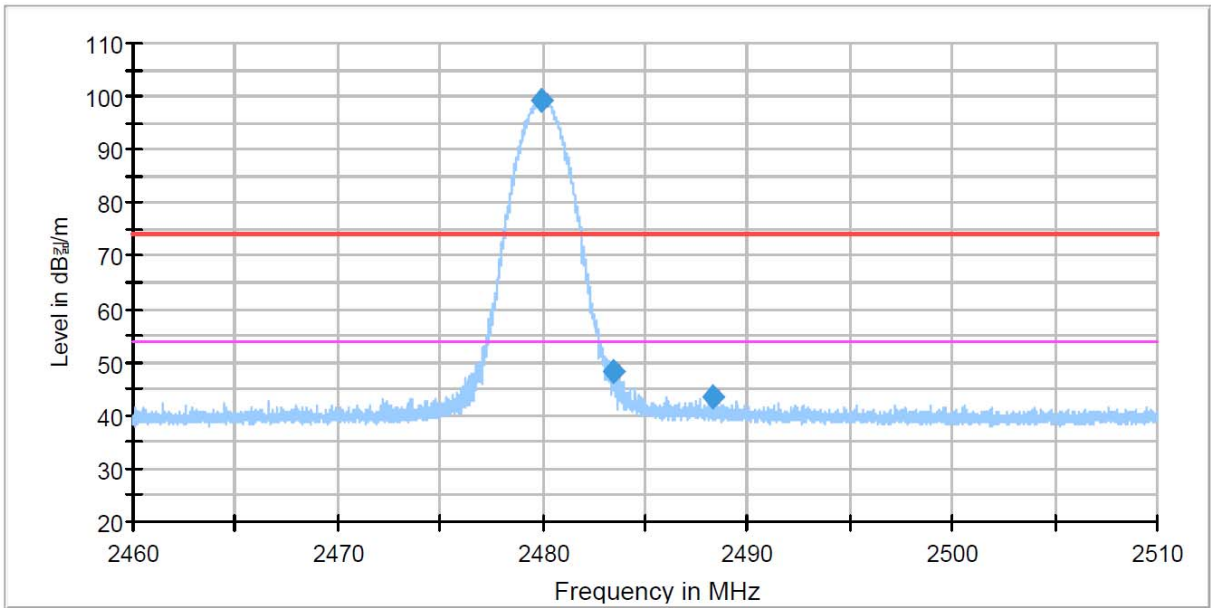
6. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.

7. Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak.

PLOT OF TEST DATA

Worst Case

Highest Channel_Peak



9. TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Calibration Date	Calibration Interval
1	*Test Receiver	R & S	ESU 40	100202	May. 24 2018	1 year
2	*Test Receiver	R & S	ESCS30	100302	Oct. 11 2018	1 year
3	*Attenuator	PASTERNACK	PE7395-10	1441-1	Jul. 07 2018	1 year
4	*Attenuator	FAIRVIEW	SA3N5W-06	N/A	Jul. 14 2018	1 year
5	*Attenuator	FAIRVIEW	SA3N5W-10	N/A	Apr. 04 2018	1 year
6	*Attenuator	WEINSCHEL	56-10	58765	Oct. 12 2018	1 year
7	*Amplifier	R & S	SCU 01	10029	Apr. 02 2018	1 year
8	*Amplifier	R & S	SCU18F	180025	Apr. 02 2018	1 year
9	*Amplifier	R & S	SCU26	10011	Jul. 16 2018	1 year
10	*Amplifier	R & S	SCU40	100380	Jul. 16 2018	1 year
11	Spectrum Analyzer	R & S	FSW43	100732	Apr. 02 2018	1 year
12	*Spectrum Analyzer	Agilent	E4440A	MY44022567	Oct. 11 2018	1 year
13	*Spectrum Analyzer	R & S	FSW43	104084	Apr. 02 2018	1 year
14	*Loop Antenna	R & S	HFH2-Z2	100279	Feb. 13 2019	2 year
15	*Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-474	Jun. 28 2017	2 year
16	*Horn Antenna	Q-par Angus	QSH20S20	8179	Aug. 01 2017	2 year
17	*Horn Antenna	Q-par Angus	QSH22K20	8180	Aug. 02 2017	2 year
18	*Trilog-Broadband Antenna	SCHWARZBECK	VULB 9163	946	May. 18 2017	2 year
19	*LISN	R & S	ESH3-Z5	833874/006	Oct. 12 2018	1 year
20	*ESH2-Z5 Artificial Mains Network	R & S	ESH2-Z5	100227	Apr. 03 2018	1 year
21	*Position Controller	INNCO	CO2000	12480406/L	N/A	N/A
22	*Controller	INNCO	CO3000	CO3000/937/38330516/L	N/A	N/A
23	*Turn Table	INNCO	DS1200S	N/A	N/A	N/A
24	*Turn Table	INNCO	DT2000-2t	N/A	N/A	N/A
25	*Antenna Mast	INNCO	MA4000	N/A	N/A	N/A
26	*TILT Antenna Mast	INNCO	MA4640-XP-EP	N/A	N/A	N/A
27	*Open Switch And Control Unit	R & S	OSP-120	100081	N/A	N/A
28	*Open Switch And Control Unit	R & S	OSP-120	101766	N/A	N/A
29	*Shielded Room	Seo-Young EMC	N/A	N/A	N/A	N/A
30	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
31	*WiFi Filter Bank	R & S	U083	N/A	N/A	N/A
32	*WiFi Filter Bank	R & S	U082	N/A	N/A	N/A

*) Test equipment used during the test

10. ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95%

1. Conducted Uncertainty Calculation

Source of Uncertainty	Xi	Uncertainty of Xi		Coverage factor k	u(Xi) (dB)	Ci	Ci u(Xi) (dB)
		Value (dB)	Probability Distribution				
Receiver reading	RI	± 0.1	normal 1	1.000	0.1	1	0.1
Attenuation AMN-Receiver	LC	± 0.08	normal 2	2.000	0.04	1	0.04
AMN Voltage division factor	LAMN	± 0.8	normal 2	2.000	0.4	1	0.4
Sine wave voltage	dVSW	± 2.00	normal 2	2.000	1.00	1	1.00
Pulse amplitude response	dVPA	± 1.50	rectangular	1.732	0.87	1	0.87
Pulse repetition rate response	dVPR	± 1.50	rectangular	1.732	0.87	1	0.87
Noise floor proximity	dVNF	± 0.00	-	-	0.00	1	0.00
AMN Impedance	dZ	± 1.80	triangular	2.449	0.73	1	0.73
ⓐ Mismatch	M	+ 0.70	U-Shaped	1.414	0.49	1	0.49
ⓑ Mismatch	M	- 0.80	U-Shaped	1.414	- 0.56	1	- 0.56
Measurement System Repeatability	RS	0.05	normal 1	1.000	0.05	1	0.05
Remark	ⓐ: AMN-Receiver Mismatch : + ⓑ: AMN-Receiver Mismatch : -						
Combined Standard Uncertainty	Normal			± 1.88			
Expended Uncertainty U	Normal (k = 2)			± 3.76			

2. Radiation Uncertainty Calculation

Source of Uncertainty	Xi	Uncertainty of Xi		Coverage factor k	u(Xi) (dB)	Ci	Ci u(Xi) (dB)
		Value (dB)	Probability Distribution				
Measurement System Repeatability	**RS**	0.34	normal 1	1.00	0.34	1	0.34
Receiver reading	**Ri**	± 0.02	normal 2	2.00	0.01	1	0.01
Sine wave voltage	**dVsw**	± 0.17	normal 2	2.00	0.09	1	0.09
Pulse amplitude response	**dVpa**	± 0.92	normal 2	2.00	0.46	1	0.46
Pulse repetition rate response	**dVpr**	± 0.35	normal 2	2.00	0.18	1	0.18
Noise floor proximity	**dVnf**	± 0.50	normal 2	2.00	0.25	1	0.25
Antenna Factor Calibration	**AF**	± 2.00	rectangular	$\sqrt{3}$	1.15	1	1.15
Cable Loss	**CL**	± 1.00	normal 2	2.00	0.50	1	0.50
Antenna Directivity	**AD**	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.00
Antenna Factor Height Dependence	**AH**	± 2.00	rectangular	$\sqrt{3}$	1.15	1	1.15
Antenna Phase Centre Variation	**AP**	± 0.20	rectangular	$\sqrt{3}$	0.12	1	0.12
Antenna Factor Frequency Interpolation	**Ai**	± 0.25	rectangular	$\sqrt{3}$	0.14	1	0.14
Site Imperfections	**Si**	± 4.00	triangular	$\sqrt{6}$	1.63	1	1.63
Measurement Distance Variation	**DV**	± 0.60	rectangular	$\sqrt{3}$	0.35	1	0.35
Antenna Balance	**Dbal**	± 0.90	rectangular	$\sqrt{3}$	0.52	1	0.52
Cross Polarisation	**DCross**	± 0.00	rectangular	$\sqrt{3}$	0.00	1	0.18
Mismatch	**M**	+ 0.98 - 1.11	U-Shaped	$\sqrt{2}$	0.74	1	0.74
EUT Volume Diameter	**Vd**	0.33	normal 1	1.00	0.33	1	0.11
Remark							
Combined Standard Uncertainty	Normal						
Expended Uncertainty U	Normal (k = 2)						