



#### 7.3.2. Test Procedures for Conducted Spurious Emissions

- 1. The transmitter output was connected to the spectrum analyzer.
- 2. The **reference level** of the fundamental frequency was measured with the spectrum analyzer using RBW = 100 kHz, VBW = 300 kHz.
- 3. The conducted spurious emission was tested each ranges were set as below.

Frequency range : 9 kHz ~ 30 MHz RBW = 100 kHz, VBW = 300 kHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

Frequency range : 30 MHz ~ 10 GHz, 10 GHz ~ 25 GHz RBW = 1 MHz, VBW = 3 MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, SWEEP POINT : 40001

LIMIT LINE = 20 dB below of the reference level of above measurement procedure Step 2. (RBW = 100 kHz, VBW = 300 kHz)

If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 kHz, VBW = 300 kHz, SPAN = 100 MHz and BINS = 2001 to get accurate emission level within 100 kHz BW.

Also the path loss for conducted measurement setup was used as described on the Appendix I of this test report.



## 7.4. Test Results

#### 7.4.1. Radiated Emissions

#### 9 kHz ~ 1 GHz Data (Modulation : GFSK)

Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
352.04	Н	Х	PK	41.90	-4.00	N/A	N/A	37.90	46.00	8.10
512.09	V	Х	PK	34.60	-1.00	N/A	N/A	33.60	46.00	12.40
532.46	Н	Х	PK	30.80	-0.50	N/A	N/A	30.30	46.00	15.70
636.25	Н	Х	PK	31.10	1.70	N/A	N/A	32.80	46.00	13.20
768.16	V	Х	PK	33.30	4.30	N/A	N/A	37.60	46.00	8.40
778.83	Н	Х	PK	37.00	4.50	N/A	N/A	41.50	46.00	4.50
-	-	-	-	-	-	-	-	-	-	-

#### Note.

1. Exploratory testing has been performed to determine the emissions characteristic of this EUT.

And Middle channel of 1Mbps was selected for final testing and reported. 2. No other unwanted emissions were found above listed frequencies.

2. No other unwanted emissions w

3. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m. In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = 20 log( applied distance / required distance ) = 20 log( 1 m / 3 m ) = -9.54 dB

When distance factor is "N/A", the distance is 3 m and distance factor is not applied.

4. Sample Calculation.

 $Margin = Limit - Result \ / \ Result = Reading + T.F + D.C.F \ / \ T.F = AF + CL - AG$ 

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain.





#### 1 ~ 25 GHz Data (Modulation : GFSK)

#### Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2388.26	Н	Y	PK	52.04	2.76	N/A	N/A	54.80	74.00	19.20
2388.26	Н	Y	AV	52.04	2.76	-24.79	N/A	30.01	54.00	23.99
4803.65	Н	Z	PK	57.90	1.63	N/A	N/A	59.53	74.00	14.47
4803.65	Н	Z	AV	57.90	1.63	-24.79	N/A	34.74	54.00	19.26
7206.55	Н	Х	PK	49.08	7.67	N/A	N/A	56.75	74.00	17.25
7206.55	Н	Х	AV	49.08	7.67	-24.79	N/A	31.96	54.00	22.04

#### Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4882.24	Н	Z	PK	55.14	1.61	N/A	N/A	56.75	74.00	17.25
4882.24	Н	Z	AV	55.14	1.61	-24.79	N/A	31.96	54.00	22.04
7323.26	Н	Х	PK	50.54	7.92	N/A	N/A	58.46	74.00	15.54
7323.26	Н	Х	AV	50.54	7.92	-24.79	N/A	33.67	54.00	20.33

#### Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.53	Н	Y	PK	52.29	3.26	N/A	N/A	55.55	74.00	18.45
2483.53	Н	Y	AV	52.29	3.26	-24.79	N/A	30.76	54.00	23.24
4959.97	Н	Z	PK	54.24	1.75	N/A	N/A	55.99	74.00	18.01
4959.97	Н	Z	AV	54.24	1.75	-24.79	N/A	31.20	54.00	22.80
7439.40	Н	Х	PK	51.74	7.98	N/A	N/A	59.72	74.00	14.28
7439.40	Н	Х	AV	51.74	7.98	-24.79	N/A	34.93	54.00	19.07

#### Note.

1. The radiated emissions were investigated up to 25 GHz. And no other spurious and harmonic emissions were found above listed frequencies.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m. In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = 20 log( applied distance / required distance ) = 20 log( 1 m / 3 m ) = -9.54 dB

When distance factor is "N/A", the distance is 3 m and distance factor is not applied.

3. D.C.F Calculation. (D.C.F = Duty Cycle Correction Factor)

- Time to cycle through all channels =  $\Delta t$  = T [ms] X 20 minimum hopping channels , where T = pulse width = 2.88 ms

- 100 ms /  $\Delta t$  [ms] = H -> Round up to next highest integer, to account for worst case, H' = 100 / (2.88 X 20) = 1.74 = 2
- The Worst Case Dwell Time = T [ms] x H' = 2.88 ms X 2 = 5.76 ms

- D.C.F = 20 Log(The Worst Case Dwell Time / 100 ms) dB = 20 log( 5.76 / 100 ) = -24.79 dB

4. Sample Calculation.



#### 1 ~ 25 GHz Data (Modulation : $\pi$ /4DQPSK)

#### Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2388.01	Н	Y	PK	52.65	2.75	N/A	N/A	55.40	74.00	18.60
2388.01	Н	Y	AV	52.65	2.75	-24.79	N/A	30.61	54.00	23.39
4804.02	Н	Z	PK	54.75	1.63	N/A	N/A	56.38	74.00	17.62
4804.02	Н	Z	AV	54.75	1.63	-24.79	N/A	31.59	54.00	22.41
7205.74	Н	Х	PK	47.23	7.66	N/A	N/A	54.89	74.00	19.11
7205.74	Н	Х	AV	47.23	7.66	-24.79	N/A	30.10	54.00	23.90

#### Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4882.17	Н	Z	PK	54.48	1.61	N/A	N/A	56.09	74.00	17.91
4882.17	Н	Z	AV	54.48	1.61	-24.79	N/A	31.30	54.00	22.70
7322.69	H	Х	PK	49.01	7.92	N/A	N/A	56.93	74.00	17.07
7322.69	Н	Х	AV	49.01	7.92	-24.79	N/A	32.14	54.00	21.86

#### Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.12	Н	Y	PK	52.87	3.27	N/A	N/A	56.14	74.00	17.86
2484.12	Н	Y	AV	52.87	3.27	-24.79	N/A	31.35	54.00	22.65
4959.88	Н	Z	PK	53.07	1.75	N/A	N/A	54.82	74.00	19.18
4959.88	Н	Z	AV	53.07	1.75	-24.79	N/A	30.03	54.00	23.97
7440.42	Н	Х	PK	49.75	7.98	N/A	N/A	57.73	74.00	16.27
7440.42	Н	Х	AV	49.75	7.98	-24.79	N/A	32.94	54.00	21.06

#### Note.

1. The radiated emissions were investigated up to 25 GHz. And no other spurious and harmonic emissions were found above listed frequencies.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m. In this case, the distance factor(-9.54dB) is applied to the result.

- Calculation of distance factor = 20 log( applied distance / required distance ) = 20 log( 1 m / 3 m ) = -9.54 dB

When distance factor is "N/A", the distance is 3 m and distance factor is not applied. 3. D.C.F Calculation. (D.C.F = Duty Cycle Correction Factor)

- Time to cycle through all channels = Δt = T [ms] X 20 minimum hopping channels , where T = pulse width = 2.88 ms

- 100 ms /  $\Delta t$  [ms] = H -> Round up to next highest integer, to account for worst case, H' = 100 / (2.88 X 20) = 1.74 = 2

- The Worst Case Dwell Time = T [ms] x H' = 2.88 ms X 2 = 5.76 ms

- D.C.F = 20 Log(The Worst Case Dwell Time / 100 ms) dB = 20 log( 5.76 / 100 ) = -24.79 dB 4. Sample Calculation.

Margin = Limit - Result / Result = Reading + T.F + D.C.F / T.F = AF + CL - AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain.



#### 1 ~ 25 GHz Data (Modulation : <u>8DPSK</u>)

#### Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2387.18	Н	Y	PK	52.11	2.75	N/A	N/A	54.86	74.00	19.14
2387.18	Н	Y	AV	52.11	2.75	-24.79	N/A	30.07	54.00	23.93
4804.08	Н	Z	PK	55.28	1.63	N/A	N/A	56.91	74.00	17.09
4804.08	Н	Z	AV	55.28	1.63	-24.79	N/A	32.12	54.00	21.88
7206.48	Н	Х	PK	47.37	7.67	N/A	N/A	55.04	74.00	18.96
7206.48	Н	Х	AV	47.37	7.67	-24.79	N/A	30.25	54.00	23.75

#### Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4881.67	Н	Z	PK	54.87	1.61	N/A	N/A	56.48	74.00	17.52
4881.67	Н	Z	AV	54.87	1.61	-24.79	N/A	31.69	54.00	22.31
7323.17	Н	Х	PK	48.94	7.92	N/A	N/A	56.86	74.00	17.14
7323.17	Н	Х	AV	48.94	7.92	-24.79	N/A	32.07	54.00	21.93

#### Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	D.C.F (dB)	Distance Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.86	Н	Y	PK	52.85	3.27	N/A	N/A	56.12	74.00	17.88
2483.86	Н	Y	AV	52.85	3.27	-24.79	N/A	31.33	54.00	22.67
4959.74	Н	Z	PK	53.75	1.75	N/A	N/A	55.50	74.00	18.50
4959.74	Н	Z	AV	53.75	1.75	-24.79	N/A	30.71	54.00	23.29
7440.14	Н	Х	PK	49.54	7.98	N/A	N/A	57.52	74.00	16.48
7440.14	Н	Х	AV	49.54	7.98	-24.79	N/A	32.73	54.00	21.27

#### Note.

1. The radiated emissions were investigated up to 25 GHz. And no other spurious and harmonic emissions were found above listed frequencies.

2. Information of Distance Factor

For finding emissions, the test distance might be reduced from 3m to 1m. In this case, the distance factor(-9.54dB) is applied to

the result.
Calculation of distance factor = 20 log( applied distance / required distance ) = 20 log( 1 m / 3 m ) = -9.54 dB

When distance factor is "N/A", the distance is 3 m and distance factor is not applied.

3. D.C.F Calculation. (D.C.F = Duty Cycle Correction Factor)

- Time to cycle through all channels =  $\Delta t$  = T [ms] X 20 minimum hopping channels , where T = pulse width = 2.88 ms

- 100 ms /  $\Delta t$  [ms] = H -> Round up to next highest integer, to account for worst case, H' = 100 / ( 2.88 X 20 ) = 1.74 = 2

- The Worst Case Dwell Time = T [ms] x H' = **2.88 ms X 2** = **5.76 ms** 

- D.C.F = 20 Log(The Worst Case Dwell Time / 100 ms) dB = **20 log( 5.76 / 100 )** = <u>-24.79 dB</u> 4. Sample Calculation.

Margin = Limit - Result / Result = Reading + T.F + D.C.F / T.F = AF + CL - AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain.





#### Low Band-edge



#### Low Band-edge

# Hopping mode & Modulation : GFSK

Lowest Channel & Modulation : GFSK





# Lowest Channel & Modulation : GFSK

X/ RL		Swept SA I Q A DC COF 4500 MHz	REC		E:INT	Avg Ty	ALIGN OFF	TRAC	M May 16, 2019 E 1 2 3 4 5 6	Frequency
10 dB/div	Ref 20.00	IFO	IO: Fast ⊂ iain:Low	Trig: Free Atten: 30 o				DE Vikr1 28	4.2 kHz 12 dBm	Auto Tuno
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Start 9 kH Res BW	100 kHz	×		7 <b>300 kHz</b>	FUNC	TION F	Sweep 5			<b>CF Ste</b> 2.999100 MH <u>Auto</u> Ma
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		Atten: 30 dB	Mk	оет РРРРРР r3 7.205 91 GHz	Auto Tune
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50.0					Stop Fre 10.000000000 GH
Start 30 MHz Res BW 1.0 MHz MKR MODE TRC SCL × 1 N 1 f (A) 240	#VBW 3.		Sweep	Stop 10.000 GHz 18.7 ms (40001 pts) FUNCTION VALUE	<b>CF Ste</b> 997.000000 MH <u>Auto</u> Ma
2 N 1 f 4.80	4 38 GHz 🚽 🖓	22.57 dBm 32.65 dBm			Freq Offse 0 H
9 10 11 12					



# Lowest Channel & Modulation : GFSK

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Center F			000000	Hz			Avg	Type: Log-Pwr	TRAC	CE 123456 PE MWWWWWW	Frequency	
10 dB/div	Ref	20.00	IF	NO: Fast G Gain:Low	Atten: 30			Mkr3	DI 21.526 3	T PPPPP	Auto T	une
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-50.0 +60.0 -70.0											Stop F 25.000000000	
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8 9 10 11 12												
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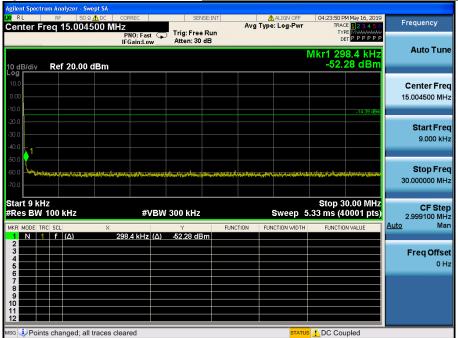


#### **Reference for limit**





## Conducted Spurious Emissions <u>Middle Channel & Modulation : GFSK</u>





# Middle Channel & Modulation : GFSK

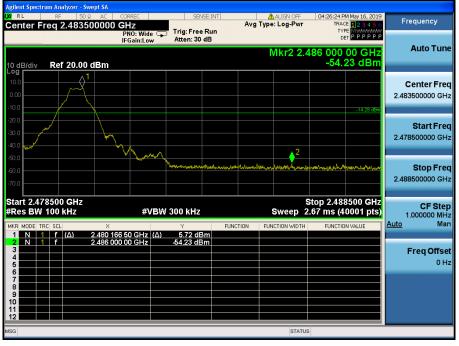
Agilent Spectrum Analyzer					
Center Freq 5.01	50 Ω AC CORREC 5000000 GHz	SENSE:INT	ALIGN OFF	04:24:14 PM May 16, 2019 TRACE 1 2 3 4 5 6	Frequency
Conton Prog old 1	PNO: Fast IFGain:Low	Trig: Free Run Atten: 30 dB		TYPE MWWWWW DET PPPPP	
	IFGain:Low	Atten: 50 dB	Mice	3 7.322 81 GHz	Auto Tune
to JEAN Dof 20	00 dBm		IVINI	-34.04 dBm	
10 dB/div Ref 20.	<u>, 1</u>				
10.0	<b>\'_</b>				Center Freq
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-60.0					Stop Freq
-70.0					10.00000000 GHz
-70.0					
Start 30 MHz				Stop 10.000 GHz	CF Step
#Res BW 1.0 MHz	#VE	3W 3.0 MHz	Sweep 1	8.7 ms (40001 pts)	997.000000 MHz
MKR MODE TRC SCL	Х		FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f (Δ) 2 N 1 f	2.441 00 GHz (/ 4.882 40 GHz	() 5.84 dBm -31.71 dBm			
3 N 1 f (Δ)	7.322 81 GHz (/	) -34.04 dBm			Freq Offset
5					0 Hz
6					
8					
9					
11					
			1		
MSG			STATUS	5	





#### High Band-edge

# Highest Channel & Modulation : GFSK



## **High Band-edge**

## Hopping mode & Modulation : GFSK





# Highest Channel & Modulation : GFSK

LXI RL		Ω <u>A</u> DC COF	RREC	SENS	E:INT	0	ALIGN OFF		4 May 16, 2019	Frequency
Center F	req 15.004	Р	NO: Fast 🖵 Gain:Low	Trig: Free F Atten: 30 d		Avgity		TYP DE	E 1 2 3 4 5 6 M M M M M M M T P P P P P P	
10 dB/div	Ref 20.00	dBm						04 Wkr1 -54.0	4.4 kHz )9 dBm	Auto Tun
Log 10.0										Center Fre
-10.0									-14.28 dBm	15.004500 MH
-20.0 -30.0										<b>Start Fre</b> 9.000 kH
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Start 9 kH	17							Stop 3	0.00 MHz	
#Res BW	100 kHz		#VBW	300 kHz			Sweep 5	.33 ms (4)	0001 pts)	CF Ste 2.999100 MH Auto Ma
MKR MODE TI	f (Δ)	× 304	.4 kHz (Δ)	Ƴ -54.09 dBr	FUNC	TION F	UNCTION WIDTH	FUNCTION	N VALUE	<u>Auto</u> ina
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6 7 8										
9 10 11										
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Agilent Spectrum Analyzer - Swept SA	CORREC	SENSE:INT	ALIGN OFF	04:27:10 PM May 16, 2019	
Center Freq 5.015000000	GHz		vg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW	Frequency
		en: 30 dB		DETPPPPP	
10 dB/div Ref 20.00 dBm			Mkr	3 7.439 95 GHz -36.48 dBm	Auto Tune
10.0	1			-14.28 dBm	Center Freq 5.015000000 GHz
-20.0 -30.0 -40.0			3	nelling transfer and the general fire and the fire	Start Freq 30.000000 MHz
-60.0 -60.0 -70.0					<b>Stop Freq</b> 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW 3.0	MHz	Sweep 1	Stop 10.000 GHz 8.7 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL X	80 13 GHz (Δ) 5	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 4.9	60 66 GHz -32.	05 dBm 48 dBm			<b>Freq Offset</b> 0 Hz
7 8 9 10 11					
MSG			STATUS		



# Highest Channel & Modulation : GFSK

Agilent Spectr <mark>X</mark> RL Center FI	RF	50 \$	2 AC CO			SE:INT	Avg	ALIGN OFF	TRAC	M May 16, 2019 E <b>1 2 3 4 5 6</b> E M WWWWWW	Frequency
10 dB/div	Rei	20.00	IF	NO: Fast G Gain:Low	Atten: 30			Mkr3 2	DE 20.936 1	T PPPPP	Auto Tun
- <b>og</b> 10.0 0.00										-14.28 dBm	Center Free 17.500000000 GH
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50.0	ا ادمانی ا										<b>Stop Fre</b> 25.000000000 GH
tart 10.0 Res BW	1.0 P			#VBV	/ 3.0 MHz			Sweep 4	0.0 ms (4		CF Ste 1.500000000 GH
AKR     MODE     TF       1     N     1       2     N     1       3     N     1       4     1     1       5     1     1	f f	(Δ) (Δ)	24.243 25	0 GHz (Δ) 0 GHz 5 GHz (Δ)	7 -24.51 dB -27.42 dB -30.55 dB	m	CTION	FUNCTION WIDTH	FUNCTIO	N VALUE	Auto Ma FreqOffse 0⊦
6 7 8 9 10											
12 <b>12</b>								STATUS			



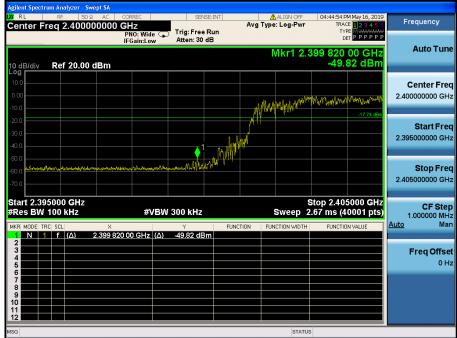
#### Low Band-edge

# Lowest Channel & Modulation : π/4DQPSK



#### Low Band-edge

## Hopping mode & Modulation : π/4DQPSK





# Lowest Channel & Modulation : π/4DQPSK

Agilent Spectr	um Analyz RF	er - Swept SA 50 Ω 🔥 DC	CORREC		SENSE	INT		ALIGN OFF	04/37/32 P	M May 16, 2019		
		004500 M	Hz		rig: Free R			e: Log-Pwr	TRAC		Frequer	псу
10 dB/div	Pof 2	0.00 dBm	PNO: Fas IFGain:Lo		Atten: 30 di				DI Mkr1 31	T PPPPP	Auto	Tune
		5.00 UBIII									<b>Cente</b> 15.0045	e <b>r Freq</b> 00 MHz
-20.0 -30.0 -40.0										-17.74 dBm		<b>t Freq</b> 100 kHz
-50.0 -60.0 -70.0		Versige <sup>te</sup> r state for stars with a	intelligi der ander an	ud an da	harad find find find find find find find fin	aar Udharar je	de incresedint	(bhits confitment of the	hilisia Marina da Palanda A		<b>Sto</b> 30.0000	p <b>Freq</b> 00 MHz
Start 9 kH #Res BW	100 kH		#\	/BW 3					.33 ms (4		2.9991	F Step
MKR MODE TR 1 N 1 2 3 4 5	RC SCL	X	317.9 kHz	(∆) ⊣	Ƴ 52.40 dBm	FUNC	TION FUN	ICTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u> Freq	Man Offset 0 Hz
6 7 8 9 10 11 12												
мsg 🔱 File •	<screen7< td=""><td>7.png&gt; saved</td><td>1</td><td></td><td></td><td></td><td></td><td>STATUS</td><td>S 🔔 DC Cou</td><td>upled</td><td></td><td></td></screen7<>	7.png> saved	1					STATUS	S 🔔 DC Cou	upled		

	Analyzer - Swept SA RF 50.0 AC	CORREC	SENSE: I	T A	ALIGN OFF	04:37:56 PM May 16, 20	10
	q 5.01500000	0 GHz		Avg Type	e: Log-Pwr	TRACE 1234	6 Frequency
		PNO: Fast 🔾 IFGain:Low	Trig: Free Ru Atten: 30 dB	า			P
10 dB/div R	tef 20.00 dBm				Mkr	3 7.205 16 GH -38.66 dBi	
Log 10.0 0.00	$\rightarrow$	1					Center Freq 5.015000000 GHz
-20.0			2 <sup>2</sup>	er fan skinste opgetieliker en sere	¢ <sup>3</sup>	-17.74 di	Start Freq 30.000000 MHz
-50.0 (700) (700) -60.0 (700) -70.0 (700)							<b>Stop Freq</b> 10.000000000 GHz
Start 30 MH: #Res BW 1.0	0 MHz		/ 3.0 MHz		Sweep 1	Stop 10.000 GH 8.7 ms (40001 pt	z CF Step S) 997.000000 MHz Auto Man
1 N 1 2 N 1	f (Δ) 2.4 f 4.8	401 86 GHz (Δ) 804 63 GHz 205 16 GHz (Δ)	3.08 dBm -35.70 dBm -38.66 dBm	FUNCTION FOR		FORCHON VALUE	Freq Offset
7 8 9 10 11							
12 MSG					STATUS	3	



# Lowest Channel & Modulation : π/4DQPSK

Agilent Spectr	RF	50		REC	SE	NSE:INT	Ava	ALIGN OFF		M May 16, 2019 ≅ 1 2 3 4 5 6	Frequency
10 dB/div		f 20.00	Pi IFC	NO: Fast C Gain:Low	Trig: Free Atten: 30				20.915 1	E MWWWWW P P P P P P	Auto Tun
Log 10.0 0.00											<b>Center Fre</b> 17.500000000 GH
-20.0 -30.0 -40.0			1 for the line of the second					3		-17.74 dBn	<b>Start Free</b> 10.000000000 GH
-50.0 -60.0 -70.0											<b>Stop Fre</b> 25.000000000 GH
Start 10.0 #Res BW	1.0	VIHz		#VB	N 3.0 MHz			Sweep 4	0.0 ms (4		CF Step 1.500000000 GH Auto Mai
	f		× 24.772 000 24.192 629 20.915 129	5 GHz	-27.24 di	3m 3m	NCTION	FUNCTION WIDTH	FUNCTIO	N VALUE	Freq Offse
6 7 8 9 9 10 11											
12 MISG								STATUS			



#### Reference for limit

# Middle Channel & Modulation : π/4DQPSK



# Conducted Spurious Emissions

#### Middle Channel & Modulation : π/4DQPSK

Agilent Spectrum	Analyzer - Swep RF 50 Ω 🖉		EC	SEN	SE:INT		ALIGN OFF	04:40:15 P	M May 16, 2019	
Center Fre		00 MHz	0: Fast			Avg Ty	pe: Log-Pwr	TRAC	E 123456	Frequency
10 dB/div	Ref 20.00 di	IFG	ain:Low	Atten: 30	dB			Mkr1 28	1.9 kHz 75 dBm	Auto Tune
10.0 0.00 -10.0										Center Fred 15.004500 MH:
-20.0 -30.0									-17.24 dBm	Start Free 9.000 kH:
-50.0	Alasi,aonson Nakata yak	aligi kepet, a Mitari ya jega	and all the state of	inatur af Suiterfright gant	Addiestripet societyteje	lain Munistration	etter ogen sterre forset af til an som det	lev fransellegenesser	na la brea la provi	Stop Free 30.000000 MH
Start 9 kHz Res BW 10	SCL	× 281 0	#VBW	7 300 kHz 7 -53.75 dB		CTION F	Sweep 5			CF Step 2.999100 MH <u>Auto</u> Mar
2 3 4 5 6 7 8										Freq Offse 0 Ha
9 10 11 12 MSG Deints of	changed; all tr	aces cleare	d				STATUS	DC Cou	upled	



# <u>Middle Channel & Modulation : π/4DQPSK</u>

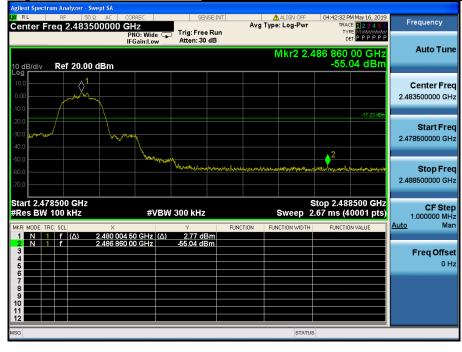
	Analyzer - Swept S										
Center Fre	RF 50Ω A				E:INT	Avg Ty	ALIGN OFF	TRAC	M May 16, 2019 E 123456	Frequency	/
		PNO: Fain:L		Trig: Free Atten: 30				TYI Di			
10 dB/div	Ref 20.00 dBr	n					Mkr		81 GHz 12 dBm	Auto T	une
Log 10.0 0.00 -10.0										Center F 5.015000000	
-20.0 -30.0 -40.0			Timere.	2		201 - 21 - 21 - 21 - 21 - 21 - 21 - 21 -	3	Constant of Consta	-17.24 dBm	Start F 30.000000	
-50.0 -60.0 -70.0										Stop F 10.000000000	
Start 30 MH #Res BW 1.		#	¢VBW	3.0 MHz			Sweep 1	Stop 10 8.7 ms (4	.000 GHz 0001 pts)	CF S 997.000000	
2 N 1 3 N 1 4 5	f (Δ) f	× 2.441 00 GH 4.882 15 GH 7.322 81 GH	z	Y 3.48 dB -35.12 dB -39.12 dB	m	TION F	UNCTION WIDTH	FUNCTIO	ON VALUE	Freq Of	Man ffset 0 Hz
6 7 8 9 10 11 11 12											
MSG							STATUS	6			

LXI RL	um Analyzer - Sv RF 50 S reg 17.500	2 AC CO	RREC	SENS	E:INT		ALIGN OFF		M May 16, 2019 E <b>1 2 3 4 5 6</b>	Frequency
Center P	req 17.500	р	NO: Fast G Gain:Low	Trig: Free Atten: 30 d				TYF DE	E MWWWWW P P P P P P	Auto Tune
10 dB/div Log r	Ref 20.00	dBm					Mkr3 2	1.392 1 -30.	25 GHz 77 dBm	Auto Tune
10.0 0.00										Center Freq 17.500000000 GHz
-20.0 -30.0 -40.0				A the providence of the second se		i ta ayar tayya ya kutota Masharan iya ayar a ƙasar	3		-17.24 dBn	Start Fred 10.000000000 GHz
-50.0 -60.0 -70.0										<b>Stop Fred</b> 25.000000000 GHz
Start 10.0 #Res BW	1.0 MHz	×	#VBV	V 3.0 MHz	FUNC		Sweep 4			<b>CF Step</b> 1.50000000 GH: Auto Mar
	f (Δ)	24.701 12 24.245 87	5 GHz (Δ) 5 GHz 5 GHz (Δ)	-26.04 dBr -27.10 dBr -30.77 dBr	n n			PONCHO	N VALUE	Freq Offset
6 7 8 9 10 11 12										
MSG							STATUS			



#### **High Band-edge**

## Highest Channel & Modulation : π/4DQPSK



#### **High Band-edge**

## Hopping mode & Modulation : π/4DQPSK





# <u>Highest Channel & Modulation : π/4DQPSK</u>

Agilent Spectr	RF	50 Ω	<b>≜</b> DC	CORREC		SEN	SE:INT	A	ALIGN OFF		M May 16, 2019	Frequ	Jency
Center Fi	req 1	5.004	500 MI	HZ PNO: Fa IFGain:Lo		Trig: Free Atten: 30		Avg I	ype: Log-Pwr	TY	<sup>2E</sup> <mark>1 2 3 4 5 6</mark> РЕ М <del>илиинии</del> ET Р Р Р Р Р Р Р	, roq	
10 dB/div	Ref	20.00	dBm							Mkr1 28 -54.	1.9 kHz 07 dBm	Αι	uto Tune
Log 10.0 0.00													<b>iter Freq</b> 4500 MHz
-20.0 -30.0 -40.0											-17.23 dBm		<b>tart Freq</b> 9.000 kHz
-50.0 -60.0	wateriterity		n filosofi se ta se t	( <sub>ter</sub> nia) <sup>(</sup> Maanhaadh		Arton Walderson (Brit	niteethioseepoinets	al geodesia	anteraptic from the	deren der	an ja ja kankan seka sekan		<b>top Freq</b> 0000 MHz
Start 9 kH #Res BW		Hz		#	VBW	300 kHz			Sweep 5	Stop 3 5.33 ms (4	0.00 MHz 0001 pts)	2.99	CF Step 9100 MHz
MKR MODE TF 1 N 1 2 3 3 4		(Δ)	×	281.9 kHz	z (Δ)	∀ -54.07 dB		CTION	FUNCTION WIDTH	FUNCTIO	ON VALUE	<u>Auto</u> Fre	Man e <b>q Offset</b> 0 Hz
5 6 7 8 9 10 11 12													0 Hz
мsg 🧼 File «	<scree< td=""><td>177.png</td><td>&gt; saved</td><td></td><td></td><td></td><td></td><td></td><td>STATUS</td><td>DC Co</td><td>upled</td><td></td><td></td></scree<>	177.png	> saved						STATUS	DC Co	upled		

Agilent Spectrum Analyzer - Sv					
Center Freq 5.0150		SENSE:INT	ALIGN OFF	04:43:19 PM May 16, 2019 TRACE 1 2 3 4 5 6	Frequency
Center Freq 5.0150	PNO: Fast 😱	Trig: Free Run Atten: 30 dB		TYPE MWWWWWWW DET PPPPP	
	IFGain:Low	Atten: 30 dB			Auto Tune
			MKr	3 6.480 34 GHz -39.73 dBm	nato rano
10 dB/div Ref 20.00	dBm			-39.73 dBm	
10.0	<u></u>				Center Freq
0.00					5.015000000 GHz
-10.0					0.01000000000112
				-17.23 dBm	
-20.0		A 2			Start Freq
-30.0		Q=	<mark>3</mark>		30.000000 MHz
-40.0	and the state of t	Contraction of the local division of the loc		and the second second second second second	
-50.0 male des technologies		And a state of the local data and the local data an	ومراجعتها والمتكاف ومتكاف الأفاط ويستشكره كمعيد		
-60.0					Stop Freq
-70.0					10.00000000 GHz
Start 30 MHz				Stop 10.000 GHz	CF Step
#Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep 1	8.7 ms (40001 pts)	997.000000 MHz
MKR MODE TRC SCL	X		TION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f (Δ) 2 N 1 f	2.479 88 GHz (Δ) 4.960 66 GHz	3.46 dBm -35.21 dBm			
<b>3</b> N <b>1</b> f (Δ)	6.480 34 GHz (Δ)	-39.73 dBm			Freq Offset
4					0 Hz
6					
8					
9					
10					
12					
MSG			STATUS		
			STATUS		



# <u>Highest Channel & Modulation : π/4DQPSK</u>

LXI RL		AC CORREC		ENSE:INT		ALIGN OFF		4 May 16, 2019 E <b>1 2 3 4 5</b> 6	Frequency
Center Fr	eq 17.500	000000 GHz PNO: Fa IFGain:L	ast 🖵 Trig: Fr ow Atten: 3		Avgiype	: Log-Pwr	TYP	E M WWWWWW F P P P P P	
10 dB/div	Ref 20.00	dBm				Mkr3 2	20.801 5 -29.7	00 GHz 77 dBm	Auto Tune
Log 10.0 0.00									Center Freq 17.50000000 GHz
-20.0 -30.0 -40.0						3		-17 23 dBm	<b>Start Freq</b> 10.00000000 GHz
-50.0 -60.0 -70.0									<b>Stop Freq</b> 25.00000000 GHz
Start 10.0 #Res BW		#	¥VBW 3.0 MH	z		Sweep 4	Stop 25 0.0 ms (4)	.000 GHz 0001 pts)	<b>CF Step</b> 1.50000000 GHz
2 N 1 3 N 1 4 5	C SCL f (Δ) f f (Δ)	× 24.817 375 GH 24.185 125 GH 20.801 500 GH	z -27.14 (	Bm	FION FUN	ICTION WIDTH	FUNCTIO	N VALUE	Auto Man Freq Offset 0 Hz
6 7 8 9 10 11 12									
MSG						STATUS	8		



#### Low Band-edge

# Lowest Channel & Modulation : 8DPSK



## Low Band-edge

## Hopping mode & Modulation : 8DPSK





# Lowest Channel & Modulation : 8DPSK

Agilent Spectr	RF		CORREC		SENSE:IN			ALIGN OFF	TRAC	M May 16, 2019 E 🚺 2 3 4 5 6	Fre	quency
10 dB/div		00 dBm	PNO: Fast IFGain:Low		Free Run n: 30 dB	1		-	DE Mkr1 28	1.9 kHz 40 dBm	,	Auto Tune
10.0 0.00 -10.0												e <b>nter Freq</b> 004500 MHz
-20.0 -30.0 -40.0										-17.72 dBm		<b>Start Freq</b> 9.000 kHz
-50.0	Malada Malada ang sa	withyrdnersenter	urtuté <sup>k</sup> tutegy je <sub>n</sub> ujé	yldjigt/frijerystafyyti	nia militari da se	)angan sa la	ettelse fannen	aniployologula	fraiseringe personal	prosiver menories		Stop Freq 100000 MHz
Start 9 kH #Res BW	100 kHz	X	#V	'BW 300 I	٢Hz	FUNCT		Sweep 5	Stop 3 .33 ms (4	0.00 MHz 0001 pts)	2.9 <u>Auto</u>	CF Step 999100 MHz Man
1 N 1 2 3 4 5 6	f (Δ)	2	81.9 kHz	(Δ) - <b>5</b> 3.4	0 dBm						F	r <b>eq Offset</b> 0 Hz
7 8 9 10 11 12												
	<screen77.< td=""><td>png&gt; saved</td><td></td><td></td><td></td><td></td><td></td><td>STATUS</td><td>DC Cou</td><td>Ipled</td><td></td><td></td></screen77.<>	png> saved						STATUS	DC Cou	Ipled		

Agilent Spectrum Analyzer - Swe LXI RL RF 50 Ω	pt SA AC CORREC	SENSE:INT	🛕 ALIGN OFF	04:54:28 PM May 16, 2019	<b>F</b>
Center Freq 5.01500	0000 GHz PNO: Fast	Trig: Free Run	Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW DET P P P P P P	Frequency
10 dB/div Ref 20.00 d	IFGain:Low	Atten: 30 dB	Mkr	3 7.206 16 GHz -37.32 dBm	Auto Tune
10.0 0.00 -10.0	1				Center Freq 5.015000000 GHz
-20.0 -30.0 -40.0				-17.72 dBm	Start Free 30.000000 MHz
-50.0					Stop Freq 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep 1	Stop 10.000 GHz 8.7 ms (40001 pts)	<b>CF Step</b> 997.000000 MHz <u>Auto</u> Mar
1 N 1 f (Δ) 2 N 1 f 3 N 1 f (Δ) 4 5 6	2.401 86 GHz (Δ) 4.803 39 GHz 7.206 16 GHz (Δ)	2.91 dBm -36.70 dBm -37.32 dBm			Freq Offset 0 Hz
7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9					
12 MSG			STATUS		



# Lowest Channel & Modulation : 8DPSK

LXI RL		Ω AC CORRE		SENSE		Avg T	ALIGN OFF	TRAC	M May 16, 2019 E <mark>1 2 3 4 5 6</mark> E M <del>V M M M M</del>	Frequency
10 dB/div	Ref 20.00	IFGai		Atten: 30 d			Mkr3 2	1.470 1	25 GHz 43 dBm	Auto Tune
Log 10.0 0.00										Center Freq 17.50000000 GHz
-20.0	New Plate - A second laterature - A re-						3		-17.72 dBm	Start Freq 10.000000000 GHz
-50.0 -60.0 -70.0										<b>Stop Freq</b> 25.000000000 GHz
Start 10.0 #Res BW	1.0 MHz	×	#VBW	3.0 MHz Y	FUNC	TION	Sweep 4	Stop 25 0.0 ms (4) FUNCTIO		<b>CF St</b> ep 1.500000000 GHz <u>Auto</u> Mar
2 N 1 3 N 1 4 5	f (Δ) f f (Δ)	24.815 125 0 24.137 500 0 21.470 125 0	Hz	-25.47 dBn -26.85 dBn -29.43 dBn	1					Freq Offset 0 Hz
6 7 8 9 10 11										
12 MSG							STATUS			

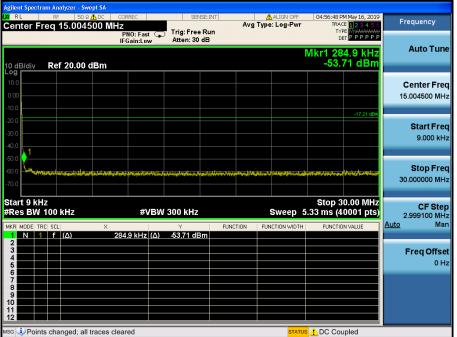


#### **Reference for limit**

## Middle Channel & Modulation : 8DPSK



## Conducted Spurious Emissions <u>Middle Channel & Modulation : 8DPSK</u>





# Middle Channel & Modulation : 8DPSK

Agilent Spectrum Analyzer - Swept SA					
X RL RF 50 Ω AC Center Freq 5.01500000		SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	04:57:12 PM May 16, 2019 TRACE 123456	Frequency
	PNO: Fast G IFGain:Low	Trig: Free Run Atten: 30 dB		TYPE MWWWWWW DET PPPPP	Auto Tune
10 dB/div Ref 20.00 dBm			Mkr	3 7.322 56 GHz -38.84 dBm	Auto Tune
10.0	) <mark>1</mark>				Center Freq
-10.0					5.015000000 GHz
-20.0		. 2		-17.21 dBm	Start Freq
-30.0	and				30.000000 MHz
-50.0 teased is a traditional advisor to a traditional					Stop Freq
-60.0					10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBV	V 3.0 MHz	Sweep 1	Stop 10.000 GHz 8.7 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL X			NCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 4.	441 00 GHz (Δ) 882 65 GHz	3.26 dBm -35.67 dBm			
3 Ν 1 f (Δ) 7. 4 5 6 7.	322 56 GHz (∆)	-38.84 dBm			Freq Offset 0 Hz
6 7 8					
9					
11 12					
ISG			STATUS	3	

Agilent Spectr	um Analyzer - Sv RE 503	vept SA R AC COR	PEC	SENS	E:INT		ALIGN OFF	04:57:25.0	Ч Мау 16, 2019	
	req 17.500	000000 G	Hz				e: Log-Pwr	TRAC	E 1 2 3 4 5 6	Frequency
			NO: Fast 🔾 Gain:Low	Atten: 30 d				DE	е М <del>иллала</del> ТРРРРРР	
10 dB/div	Ref 20.00	dBm					Mkr3 2	20.919 2 -30.3	50 GHz 33 dBm	Auto Tune
Log 10.0 0.00										Center Freq 17.500000000 GHz
-20.0 -30.0 -40.0 -40.0	مىتىرىدۇر دارىيى يىغى. مىتىرىدۇر دارىيى يىغى					ما در به اسر و را محدود در به مادر رد می محاط با محط	3		-17 24 dBp	Start Freq 10.000000000 GHz
-50.0 -60.0 -70.0										<b>Stop Freq</b> 25.000000000 GHz
Start 10.0 #Res BW	1.0 MHz		#VBW	/ 3.0 MHz			Sweep 4	0.0 ms (4		CF Step 1.50000000 GHz Auto Man
MKR MODE TH 1 N 1 2 N 1 3 N 1 4 5	f (Δ) f f (Δ)	× 24.876 25( 24.173 50( 20.919 25(	) GHz	Y -25.68 dBi -26.95 dBi -30.33 dBi	m	ION FU	NCTION WIDTH	FUNCTIO	N VALUE	Freq Offset 0 Hz
6 7 8 9 10 11 12										
MSG							STATUS			



#### **High Band-edge**

## Highest Channel & Modulation : 8DPSK



## High Band-edge

## Hopping mode & Modulation : 8DPSK





# Highest Channel & Modulation : 8DPSK

Agilent Spectr	rum Analyzer - Swept RF 50 Ω 🛕		SENSE:I	NT	A 11701 057	04/50/04/04/Minute 2010	
	req 15.00450			Avg T	ALIGN OFF	04:59:24 PM May 16, 2019 TRACE 123456 TYPE MWWWAAAAA	Frequency
10 dB/div	Ref 20.00 dB	PNO: Fas IFGain:Lov Sm		n	٢	Mkr1 281.9 kHz -52.81 dBm	Auto Tune
Log 10.0 0.00 -10.0							Center Freq 15.004500 MHz
-20.0 -30.0 -40.0						-17.22 dBm	Start Freq 9.000 kHz
-50.0 -60.0	مروية مريقة بالإلبان مستقور ومقرقت	and the design of the second	halland garren i Presidente (Prake	nglannerstan digenerika (sooik)	นุขรับที่ปู <i>้การเหล่าและเป็นสา</i> ประ	แน่หมูอกไดยจะอุณิคมอาจารในฟอนอ	Stop Freq 30.000000 MHz
Start 9 kH #Res BW	100 kHz		/BW 300 kHz			Stop 30.00 MHz .33 ms (40001 pts)	CF Step 2.999100 MHz Auto Man
MKR MODE TH 1 N 1 2 3 4 5	fc scL f (Δ)	× 281.9 kHz	γ (Δ) -52.81 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Freq Offset
6 7 8 9 10 11 12							
мsg 🔱 File ·	<screen77.png> s</screen77.png>	saved			STATUS	L DC Coupled	

	um Analyzer - Sw									
Center F	RF 50 Ω req 5.01500				E:INT AV	ALIG		TRAC	4 May 16, 2019 E 1 2 3 4 5 6	Frequency
Contor 1	104 0.0 100	PI	lO:Fast 🕞 Jain:Low	Trig: Free Atten: 30 d				TYP	EM <del>WWWWW</del> TPPPPP	
		ire		Thaten to t			Mkr	36/10	30 GHz	Auto Tune
10 dB/div	Ref 20.00	dBm					WIKIN		29 dBm	
Log 10.0		1								Contor From
0.00		Υ								Center Freq 5.015000000 GHz
-10.0										3.013000000 GHZ
-20.0									-17.22 dBm	
-30.0					2	3				Start Freq
-40.0				Y						30.000000 MHz
-50.0 4000404	and the West of the Party of th									
-60.0										Stop Freq
-70.0										10.00000000 GHz
Start 30 N						•	4	Stop 10	.000 GHz	CF Step
#Res BW			#VBW	/ 3.0 MHz				8.7 ms (4		997.000000 MHz
MKR MODE TH	RC SCL	× 2.480.39	GHz (Δ)	۲ 3.54 dBi	FUNCTION	FUNCTION	NWIDTH	FUNCTIO	N VALUE	<u>Auto</u> Man
2 N 1	f	4.960 17	7 GHz	-35.28 dBi	n					
3 N 1 4	f (Δ)	6.410 30	) GHz (∆)	-38.29 dBı	n					Freq Offset
5										0 Hz
7										
8										
10										
12										
MSG							STATUS			



# Highest Channel & Modulation : 8DPSK

Agilent Spectrum Analyzer XI R L RF	50 Ω AC CORREC	SENSE		ALIGN OFF	05:00:11 PM May 16, 2019	Frequency
Center Freq 17.5	PNO: Fas		un –	e: Log-Pwr	TRACE 123456 TYPE MWWWW DET PPPPP	
10 dB/div Ref 20.	IFGain:Lo	W Atten: 30 de	5	Mkr3 2	1.502 750 GHz -30.04 dBm	Auto Tune
						Center Freq 17.500000000 GHz
20.0 30.0 40.0				3	-17.22 dBn	<b>Start Freq</b> 10.000000000 GHz
50.0 60.0 70.0						<b>Stop Freq</b> 25.000000000 GHz
Start 10.000 GHz Res BW 1.0 MHz	: #\	/BW 3.0 MHz		Sweep 4	Stop 25.000 GHz 0.0 ms (40001 pts)	CF Step 1.50000000 GHz
MKR     MODE     TRC     SCL       1     N     1     f     (Δ)       2     N     1     f     (Δ)       3     N     1     f     (Δ)       4     -     -     -     -       5     -     -     -     -	× 24.895 375 GHz 24.229 000 GHz 21.502 750 GHz	-27.54 dBm		INCTION WIDTH	FUNCTION VALUE	Auto Man Freq Offset 0 Hz
6 7 8 9 10 11 12						
ISG				STATUS		

# 8. Transmitter AC Power Line Conducted Emission

## 8.1 Test Setup

See test photographs for the actual connections between EUT and support equipment.

## 8.2 Limit

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

	Conducted Limit (dBuV)					
Frequency Range (MHz)	Quasi-Peak	Average				
0.15 ~ 0.5	66 to 56 *	56 to 46 *				
0.5 ~ 5	56	46				
5 ~ 30	60	50				

\* Decreases with the logarithm of the frequency

## 8.3 Test Procedures

Conducted emissions from the EUT were measured according to the ANSI C63.10.

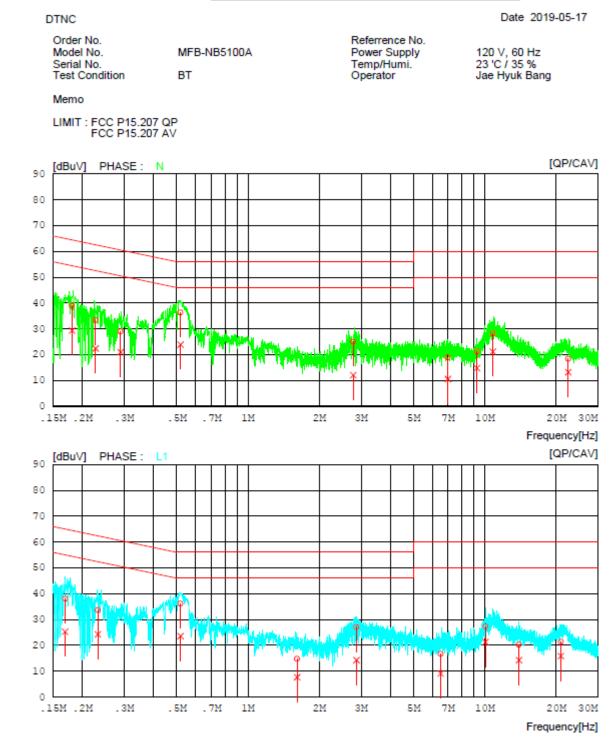
- The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
- 2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
- 3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
- 4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.



## 8.4 Test Results

#### AC Line Conducted Emissions (Graph) = Modulation : <u>GFSK</u>

# Results of Conducted Emission



#### AC Line Conducted Emissions (List) = Modulation : <u>GFSK</u>

# Results of Conducted Emission

		Date 2019-05-17
MFB-NB5100A BT	Referrence No. Power Supply Temp/Humi. Operator	120 V, 60 Hz 23 'C / 35 % Jae Hyuk Bang
READING C.FACTOR QP CAV [dBuV][dBuV] [dB]	••••••••••••••••••••••••••••••••••••••	MARGIN PHASE 2P CAV BuV][dBuV]
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	33.44   22.41   62.55   52.55   29.1     28.94   21.03   60.54   50.54   31.6     36.34   23.93   56.00   46.00   19.6     25.05   12.06   56.00   46.00   30.9     18.99   10.62   60.00   50.00   41.0     21.21   14.85   60.00   50.00   31.7     18.37   13.22   60.00   50.00   41.6     38.07   25.21   65.01   55.01   26.9     33.58   24.26   62.37   52.37   28.7     36.08   23.57   56.00   46.00   19.9     14.72   7.65   56.00   46.00   41.9     27.05   14.22   56.00   46.00   28.9     16.65   9.05   60.00   50.00   43.3     27.22   21.24   60.00   50.00   32.7	54 25.09 N 1 30.14 N 50 29.51 N 56 22.07 N 95 33.94 N 97 35.15 N 78 28.81 N 53 36.78 N 94 29.80 L1 79 28.11 L1 92 22.43 L1 19 38.35 L1 19 38.35 L1 19 38.35 L1 19 38.78 L1 18 38.35 L1 18 38.35 L1 18 38.78 L1 18 28.76 L1 17 35.76 L1
	BT 15.207 QP 15.207 AV READING C.FACTOR QP CAV [dBuV] [dBuV] [dB] 2 28.97 19.42 9.94 1 23.50 12.47 9.94 3 19.00 11.09 9.94 9 26.39 13.98 9.95 0 14.98 1.99 10.07 0 8.77 0.40 10.22 0 10.89 4.53 10.32 0 17.86 10.83 10.36 0 7.78 2.63 10.59 5 28.13 15.27 9.94 6 23.64 14.32 9.94 1 26.13 13.62 9.95 0 4.71 -2.36 10.01 0 16.99 4.16 10.06 0 6.45 -1.15 10.20	$ \begin{array}{c} \mbox{MFB-NB5100A} & \mbox{Power Supply} \\ \mbox{Temp/Humi.} \\ \mbox{BT} & \mbox{Operator} \\ \mbox{Supply} \\ \mbox{Temp/Humi.} \\ \mbox{Operator} \\ \mbox{Supply} \\ \mbox{Temp/Humi.} \\ \mbox{Operator} \\ \mbox{Operator} \\ \mbox{Operator} \\ \mbox{Supply} \\ \mbox{Temp/Humi.} \\ \mbox{Operator} \\ \$



# 9. Antenna Requirement

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

#### Conclusion: Comply

The antenna is permanently attached. (Refer to Internal Photo file.) Therefore this EUT complies with the requirement of §15.203.

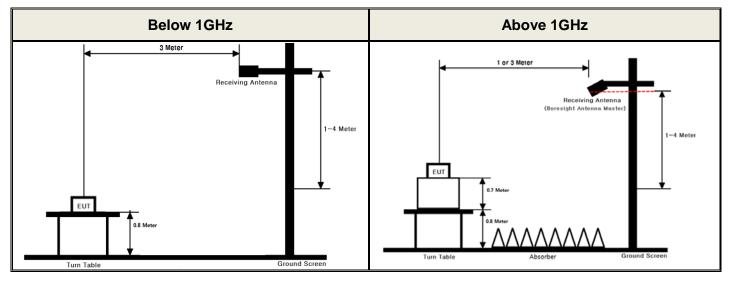
#### - Minimum Standard :

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.

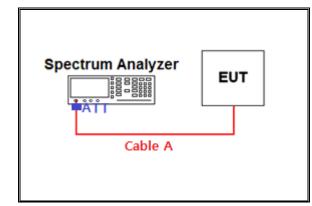
# **APPENDIX I**

#### Test set up diagrams

#### Radiated Measurement



#### Conducted Measurement



#### Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	3.10	15	7.74
1	3.29	20	9.80
2.402 & 2.441 & 2.480	4.74	25	10.16
5	5.55	-	-
10	6.67	-	-

Note 1 : The path loss from EUT to Spectrum analyzer were measured and used for test. Path loss ( S/A's Correction factor) = Cable A + Power splitter

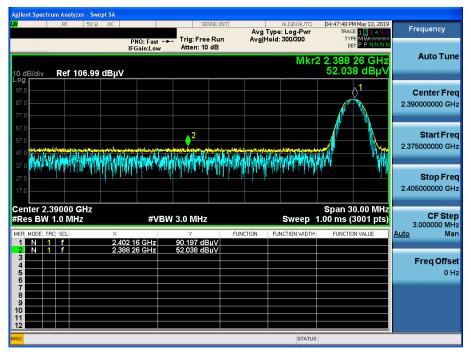


**Detector Mode : PK** 

# **APPENDIX II**

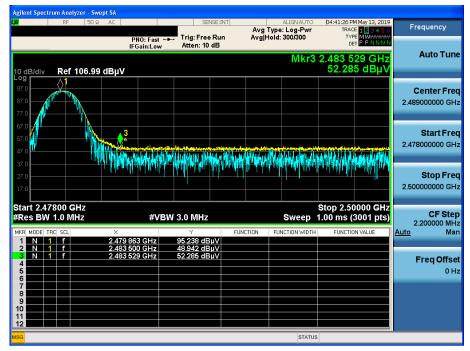
## **Unwanted Emissions (Radiated) Test Plot**

#### GFSK & Lowest & Y & Hor



#### **Detector Mode : PK**

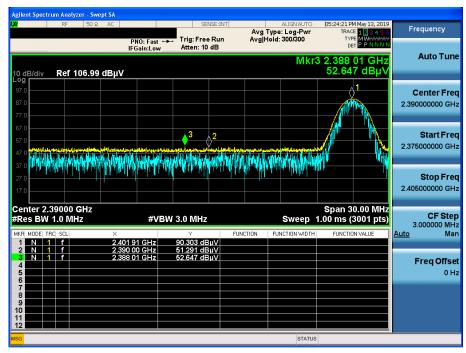
#### GFSK & Highest & Y & Hor





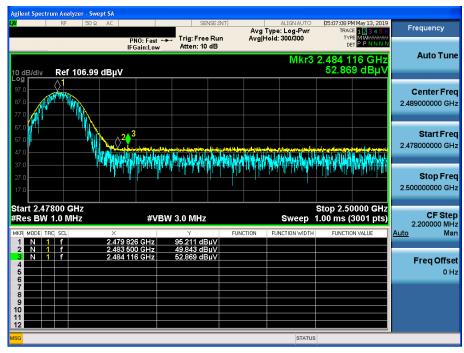
#### $\pi$ /4DQPSK & Lowest & Y & Hor

## **Detector Mode : PK**



#### **Detector Mode : PK**

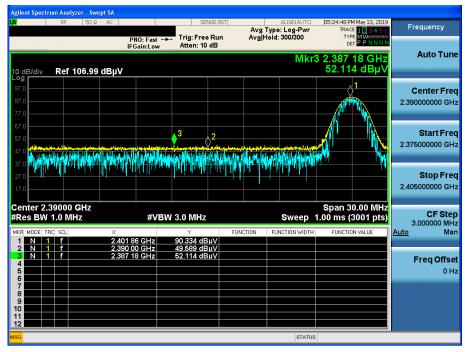
#### $\pi/4DQPSK$ & Highest & Y & Hor





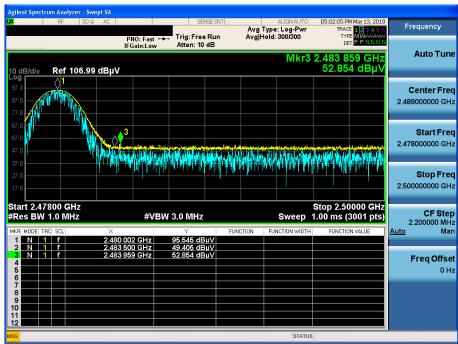
#### 8DPSK & Lowest & Y & Hor

# Detector Mode : PK



#### **Detector Mode : PK**

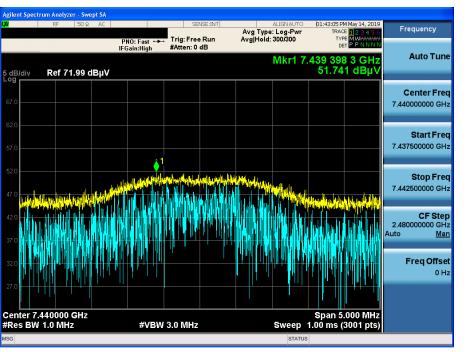
## 8DPSK & Highest & Y & Hor



**Detector Mode : PK** 

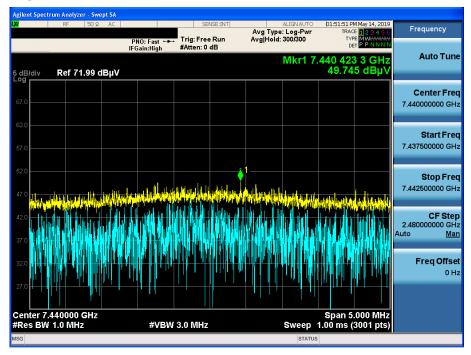


#### GFSK & Highest & X & Hor



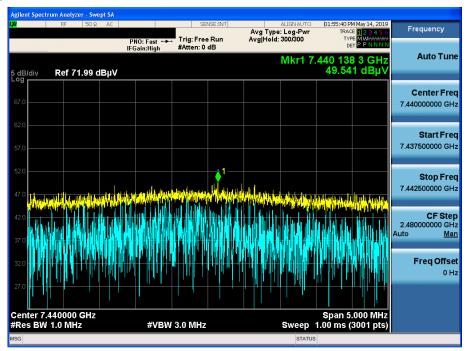
#### $\pi$ /4DQPSK & Highest & X & Hor

#### **Detector Mode : PK**





#### 8DPSK & Highest & X & Hor



#### **Detector Mode : PK**