

#### 9 kHz ~ 25 GHz Data (Modulation : <u>8DPSK</u>) With Wireless Charging

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)
2483.72	Н	Х	PK	49.40	5.79	N/A	N/A	55.19	74.00	18.81
2483.72	Н	Х	AV	49.40	5.79	-24.79	N/A	30.40	54.00	23.60
4960.33	Н	Х	PK	50.12	2.17	N/A	N/A	52.29	74.00	21.71
4960.33	Н	Х	AV	50.12	2.17	-24.79	N/A	27.50	54.00	26.50

#### Note.

1. The radiated emissions were investigated 9 kHz 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 dBWhen 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.

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.



#### 9 kHz ~ 25 GHz Data (Modulation : <u>8DPSK</u>) With Dual Display

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)
2483.76	Н	Y	PK	49.71	5.79	N/A	N/A	55.50	74.00	18.50
2483.76	Н	Y	AV	49.71	5.79	-24.79	N/A	30.71	54.00	23.29
4960.01	Н	Y	PK	49.36	2.17	N/A	N/A	51.53	74.00	22.47
4960.01	Н	Y	AV	49.36	2.17	-24.79	N/A	26.74	54.00	27.26
7440.22	Н	Ý	PK	46.57	9.58	N/A	N/A	56.15	74.00	17.85
7440.22	Η	Y	AV	46.57	9.58	-24.79	N/A	31.36	54.00	22.64

Note.

1. The radiated emissions were investigated 9 kHz to 25 GHz. And no other spurious and harmonic emissions were found above listed frequencies.

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the result.

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

- 100 ms / Δt [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.

#### 9 kHz ~ 25 GHz Data (Modulation : <u>8DPSK</u>) With Dual Display + Wireless Charging

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)
2483.71	Н	Х	PK	49.30	5.79	N/A	N/A	55.09	74.00	18.91
2483.71	Н	Х	AV	49.30	5.79	-24.79	N/A	30.30	54.00	23.70
4960.22	Н	Х	PK	49.45	2.17	N/A	N/A	51.62	74.00	22.38
4960.22	Н	Х	AV	49.45	2.17	-24.79	N/A	26.83	54.00	27.17
7439.88	Н	Х	PK	46.24	9.58	N/A	N/A	55.82	74.00	18.18
7439.88	Η	Х	AV	46.24	9.58	-24.79	N/A	31.03	54.00	22.97

#### <u>Note.</u>

1. The radiated emissions were investigated 9 kHz to 25 GHz. And no other spurious and harmonic emissions were found above listed frequencies.

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- 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

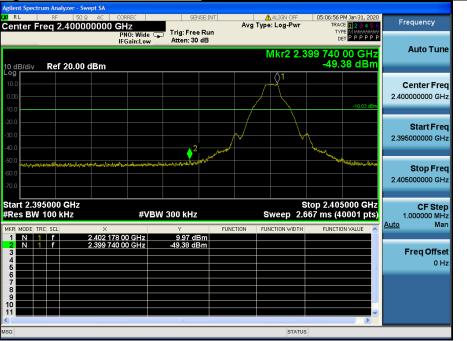
4. Sample Calculation.

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



#### Lowest Channel & Modulation : GFSK

#### Low Band-edge

### Hopping mode & Modulation : GFSK





## Lowest Channel & Modulation : GFSK

LXI RL	um Analyzer - Swe RF 50 Q 2 req 15.0045	∆dc cor 00 MHz			ISE:INT		ALIGN OFF	TRAC	PM Jan 31, 2020 E <b>1 2 3 4 5</b> 6 E M <del>WARANA</del>	Frequency
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Log 10.0 0.00									-10.03 dBm	Center Freq 15.004500 MHz
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Agilent Spectrum Analyzer - Swept			A		
M     RL     RF     50 Ω     A       Center Freq 5.0150000	000 GHz	SENSE:INT	ALIGN OFF	05:07:41 PM Jan 31, 2020 TRACE 1 2 3 4 5 6 TYPE M WARMAN	Frequency
	PNO: Fast G	Trig: Free Run Atten: 30 dB		DET	
10 dB/div Ref 20.00 dB	m		Mkr	5 6.280 19 GHz -38.38 dBm	Auto Tune
	<b>≬</b> 1			-10.03 dBm	Center Freq 5.015000000 GHz
-20.0	<b>0</b> 2 004		3 5-	They be interesting on the first terms of the second	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	#VBI	₩ 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz Auto Man
MKR MODE TRC SCL	× 2.402 11 GHz	Y FUI 10.29 dBm	NCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 F 3 N 1 F 4 N 1 F 5 N 1 F 6	2.650 86 GHz 5.764 00 GHz 3.180 27 GHz 6.280 19 GHz	-37.72 dBm -38.06 dBm -38.19 dBm -38.38 dBm		s	Freq Offset 0 Hz
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### Lowest Channel & Modulation : GFSK



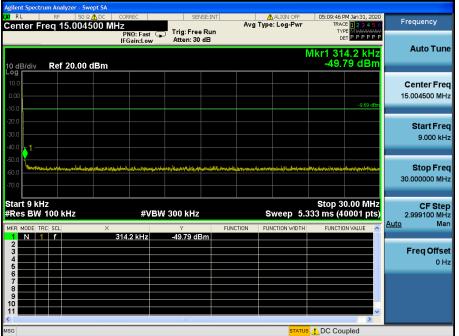


#### **Reference for limit**

### Middle Channel & Modulation : GFSK



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





### Middle Channel & Modulation : GFSK

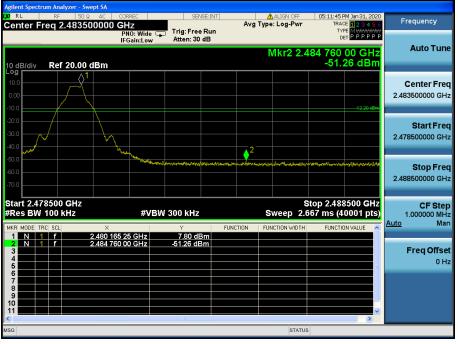


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IFGa	IFGain:Low     Atten: 30 dB     Def								
10.0 0.00 -10.0			-9.69 dBm	Center Freq 17.500000000 GHz					
-20.0 -30.0 -40.0			3	Start Freq 10.000000000 GHz					
-50.0 -60.0 -70.0				<b>Stop Freq</b> 25.000000000 GHz					
Start 10.000 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 40	Stop 25.000 GHz .00 ms (40001 pts)	CF Step 1.50000000 GHz					
MKR MODE TRC SCL X 1 N 1 f 24,736 000		CTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man					
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#### **High Band-edge**

### Highest Channel & Modulation : GFSK



### **High Band-edge**

### Hopping mode & Modulation : GFSK





## Highest Channel & Modulation : GFSK

Agilent Spectrum Analyzer - Swept SA						
RL RF 50 Ω ▲ DC Center Freq 15.004500 M	CORREC	SENSE:INT	Avg Type:	ALIGN OFF	05:12:08 PM Jan 31, TRACE 123	Frequency
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Agilent Spectrum Analyzer - Swept S			<b>m</b>	A		
RL RF 50 Ω A Center Freq 5.0150000	00 GHz	SENSE:IN	Avg T	ALIGN OFF	05:12:31 PM Jan 31, 2020 TRACE 1 2 3 4 5 6	
10 dB/div Ref 20.00 dBr	PNO: Fast C IFGain:Low	Trig: Free Run Atten: 30 dB		Mkr	түре Милини рет Р Р Р Р Р Р 5 6.073 81 GHz -39.25 dBm	Auto Tuno
10.00 -10.0	↓ ↓				12.20 dBm	Center Freq 5.015000000 GHz
-20.0	\$2 \$2			3	and the second state of th	Start Freq 30.000000 MHz
-50.0 -60.0 -70.0						<b>Stop Freq</b> 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VB	W 3.0 MHz		Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	× 2.480 13 GHz	۲ 8.17 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
2 N 1 f 3 N 1 f 4 N 1 f	2.655 60 GHz 7.581 28 GHz 5.817 34 GHz 6.073 81 GHz	-37.64 dBm -38.22 dBm -38.82 dBm -39.25 dBm				<b>Freq Offset</b> 0 Hz
7 8 9 10 11						
MSG				STATUS	>	



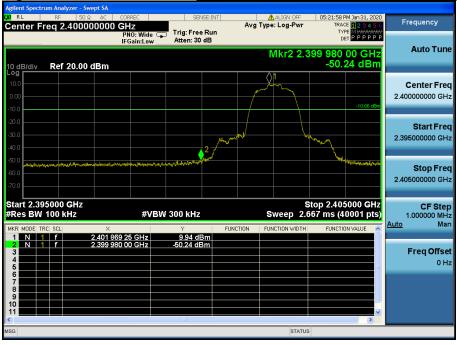
## Highest Channel & Modulation : GFSK





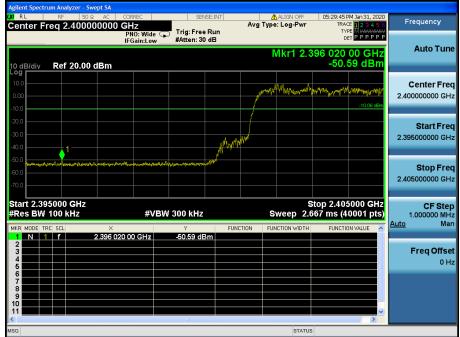
#### Low Band-edge

## Lowest Channel & Modulation : π/4DQPSK



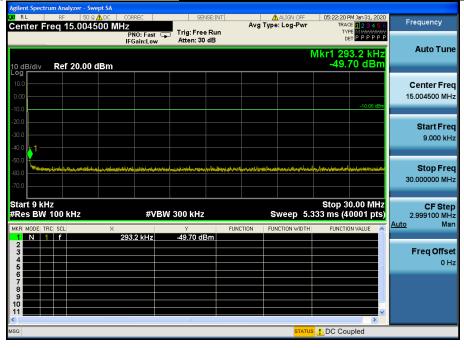
### Low Band-edge

### Hopping mode & Modulation : π/4DQPSK





## Lowest Channel & Modulation : π/4DQPSK



Agilent Spectrum Analyzer -					
Center Freq 5.015	000000 GHz	SENSE:INT	ALIGN OFF Avg Type: Log-Pwr	05:22:44 PM Jan 31, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast IFGain:Low	Trig: Free Run Atten: 30 dB	Mki	туре Мининин Det Р Р Р Р Р Р 75 6.497 54 GHz	Auto Tune
10 dB/div Ref 20.0	0 dBm			-38.29 dBm	
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-50.0					Oton Error
-60.0					Stop Fred 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VE	3W 3.0 MHz	Sweep 1	Stop 10.000 GHz 3.67 ms (40001 pts)	CF Step 997.000000 MH: Auto Mar
MKR MODE TRC SCL	× 2.402 36 GHz	Y 11.47 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Mai
2 N 1 f 3 N 1 f	2.566 62 GHz 3.176 28 GHz 7.593 99 GHz	-37.91 dBm -38.12 dBm -38.25 dBm			Freq Offset
4 N 1 F 5 N 1 f	6.497 54 GHz	-38.29 dBm -38.29 dBm		=	0 Hz
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## Lowest Channel & Modulation : π/4DQPSK



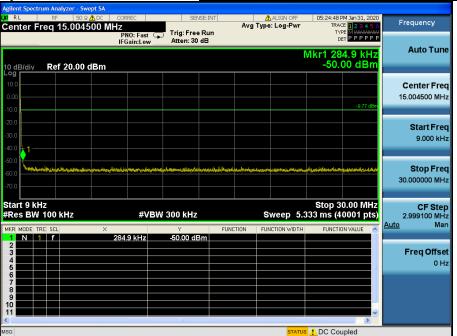


#### **Reference for limit**

## Middle Channel & Modulation : π/4DQPSK

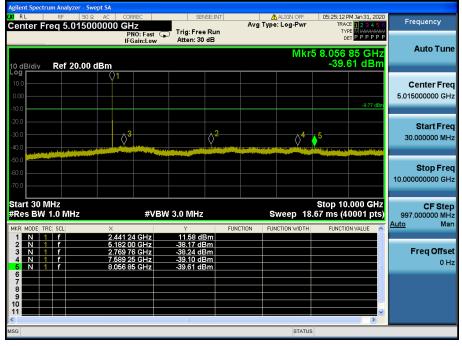


#### Conducted Spurious Emissions <u>Middle Channel & Modulation : π/4DQPSK</u>





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





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

## Highest Channel & Modulation : π/4DQPSK



### High Band-edge

## Hopping mode & Modulation : π/4DQPSK





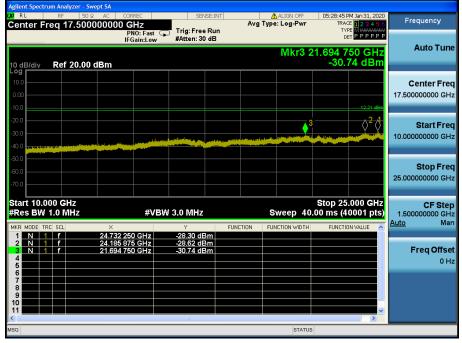
## <u>Highest Channel & Modulation : π/4DQPSK</u>

Agilent Spectrum A									
	⊧ ി ടാ ഒ <u>∧</u> ⊃⊂ 15.004500 N	CORREC		5E:INT		ALIGN OFF	TRAC	M Jan 31, 2020 E <mark>1 2 3 4 5</mark> 6	Frequency
10 dB/div R	ef 20.00 dBm	PNO: Fast IFGain:Low	Trig: Free #Atten: 30			ſ	/kr1 29	1.7 kHz 4 dBm	Auto Tune
Log 10.0 0.00 -10.0									Center Freq 15.004500 MHz
-20.0 -30.0 -40.0									Start Freq 9.000 kHz
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Start 9 kHz #Res BW 100		#VE	3W 300 kHz			weep 5.3	33 ms (4		<b>CF Step</b> 2.999100 MHz Auto Man
MKR MODE TRC SC 1 N 1 f 2 3 4 5		291.7 kHz	√ -50.14 dB	FUNCT	ION FON	ICTION WIDTH	FUNCTIL	IN VALUE	Freq Offset 0 Hz
6 7 8 9 10 11									
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Agilent Spectrum Analyzer - Swept SA					
RL RF 50 Ω AC Center Freq 5.015000000	) GHz	Avg Typ	ALIGN OFF	05:28:22 PM Jan 31, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast Trig: Fre IFGain:Low #Atten:			DET P P P P P	
	II Guill.20W		Mkr5	6.254 52 GHz	Auto Tune
10 dB/div Ref 20.00 dBm				-38.93 dBm	
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-50.0					
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-70.0					10.00000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW 3.0 MH	z s	sweep 18.67	Stop 10.000 GHz 7 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL X	Y		INCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
	479 88 GHz 9.32 c 395 60 GHz -38.11 c				
3 N 1 f 7.0	092 25 GHz -38.37 c 708 16 GHz -38.81 c	Bm			Freq Offset
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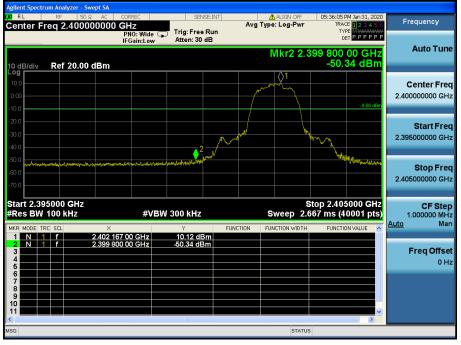
### Highest Channel & Modulation : π/4DQPSK





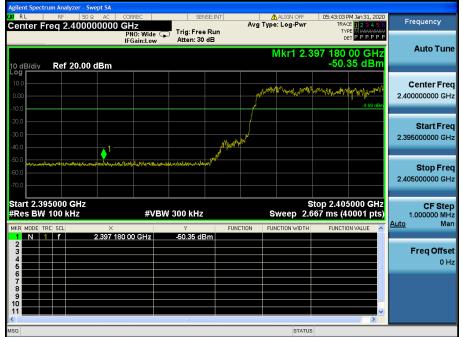
#### Low Band-edge

### Lowest Channel & Modulation : 8DPSK



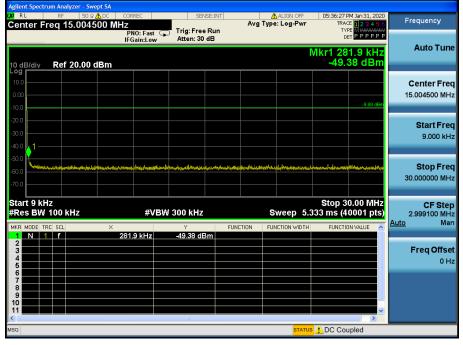
### Low Band-edge

#### Hopping mode & Modulation : 8DPSK





### Lowest Channel & Modulation : 8DPSK



Agilent Spectrum Analyzer - S									
Center Freq 5.015	0 Ω AC CORREC	SENSE:INT	ALIGN Avg Type: Log-	Pwr TRACE 123456	Frequency				
	PNO: Fast IFGain:Low	Trig: Free Run Atten: 30 dB		TYPE MWWWWWW DET PPPPP	Auto Tune				
10 dB/div Ref 20.00	Mkr5 5.863 20 GHz       dB/div     Ref 20.00 dBm     -38.18 dBm								
10.0 0.00 -10.0	\ 			-9.88 dBn	Center Freq 5.015000000 GHz				
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-50.0 -60.0 -70.0					<b>Stop Freq</b> 10.000000000 GHz				
Start 30 MHz #Res BW 1.0 MHz	#VE	W 3.0 MHz	Sweep	Stop 10.000 GHz 18.67 ms (40001 pts)	CF Step 997.000000 MHz Auto Man				
MKR MODE TRC SCL	× 2.402 11 GHz	۲ 12.14 dBm	FUNCTION FUNCTION V	VIDTH FUNCTION VALUE	Auto Mar				
2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	2.144 64 GHz 3.016 76 GHz 2.652 11 GHz 5.863 20 GHz	-38.06 dBm -38.08 dBm -38.14 dBm -38.18 dBm			Freq Offset 0 Hz				
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### Lowest Channel & Modulation : 8DPSK



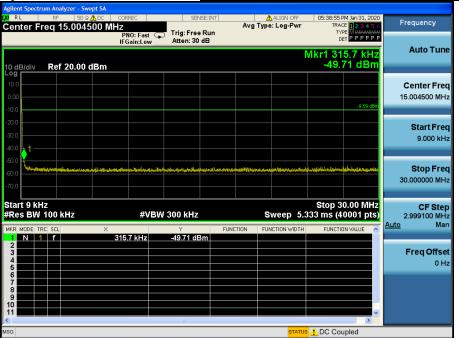


#### Reference for limit



### Middle Channel & Modulation : 8DPSK

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





### Middle Channel & Modulation : 8DPSK

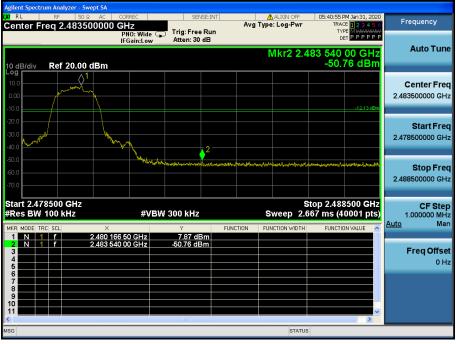


	um Analyzer - S						
(X) RL			SENSE		ALIGN OFF	05:39:41 PM Jan 31, 202 TRACE 1 2 3 4 5	
Center F	req 17.50	0000000 GHz PNO: Fa IFGain:L	st 🖵 Trig: Free R ow Atten: 30 dB	un	Trype. Log-t wi	TYPE MWWWWW DET PPPPP	
					Mkr3 2	1.691 750 GHz -30.73 dBm	Auto Tune
10 dB/div Log	Ref 20.00	0 dBm				-30.73 uBii	
10.0							Center Fred
0.00							17.500000000 GH:
-10.0						-9.59 dBm	
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-40.0	and the second second second	distant second second second					
-50.0							
-60.0							Stop Fred
-70.0							25.00000000 GH:
Start 10.0 #Res BW		#	VBW 3.0 MHz		Sweep 40	Stop 25.000 GHz 00 ms (40001 pts)	1.50000000 GHz
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MSG					STATUS		



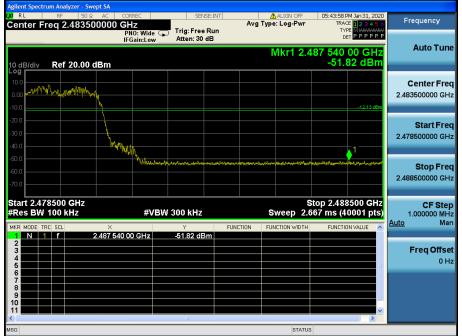
#### **High Band-edge**

### Highest Channel & Modulation : 8DPSK



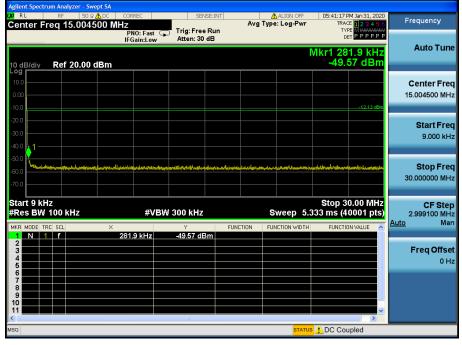
### High Band-edge

### Hopping mode & Modulation : 8DPSK





### Highest Channel & Modulation : 8DPSK



Agilent Spectrum Ana KI R L RF	50 Ω AC	CORREC	SENSE:		ALIGN OFF		Jan 31, 2020	Frequency
Center Freq t	5.01500000	PNO: Fast C	🖵 Trig: Free Ru	ın	g Type: Log-Pwr	TRACE TYPE	123456 MWWWWW PPPPPP	Frequency
10 dB/div Ref	f 20.00 dBm	IFGain:Low	Atten: 30 dB		Mk	r5 8.114 1		Auto Tune
10.0 0.00 -10.0		)1 					-12.13 dBm	Center Fred 5.015000000 GH;
-20.0 -30.0 -40.0				↓	3	5	terre i terreta lega da el	Start Free 30.000000 MH
-50.0								Stop Free 10.00000000 GH
Start 30 MHz #Res BW 1.0 M	٨Hz	#VB	W 3.0 MHz		Sweep 1	Stop 10.0 8.67 ms (40	001 pts)	CF Ste 997.000000 MH
MKR MODE TRC SCL		480 38 GHz 168 31 GHz	Y 9.52 dBm -38.30 dBm		FUNCTION WIDTI	I FUNCTION	VALUE	<u>Auto</u> Ma
3 N 1 f 4 N 1 f 5 N 1 f	7.	004 02 GHz 753 03 GHz 114 17 GHz	-38.66 dBm -39.13 dBm -39.55 dBm					Freq Offse 0 H
8 9 10 11							 >	
ISG					STAT	JS		



### Highest Channel & Modulation : 8DPSK





## 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.

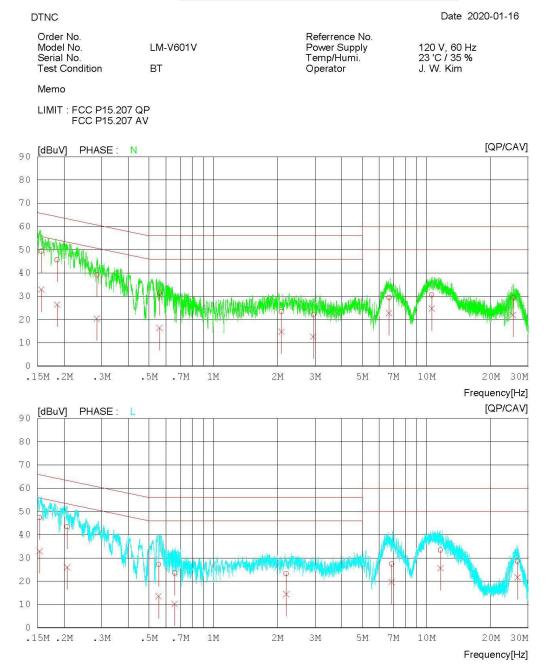
- The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
- 2. The EUT was connected 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>8DPSK</u>

# **Results of Conducted Emission**



DTNC

#### AC Line Conducted Emissions (List) = Modulation : <u>8DPSK</u>

# **Results of Conducted Emission**

Date 2020-01-16

Order No.		Referrence No.	
Model No.	LM-V601V	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	BT	Operator	J. W. Kim
Memo			
Werno			

LIMIT : FCC P15.207 QP FCC P15.207 AV

NC	) FREQ [MHz]	READING QP CAV [dBuV] [dBuV	C.FACTOR ] [dB]	RESULT QP CAV [dBuV][dBuV	QP	IMIT CAV /] [dBuV	MARGIN QP CAV ] [dBuV][dBuV	PHASE 7]
1	0.15650	39.4822.98	9.94	49.4232.92	65.65	55.65	16.23 22.73	N
2	0.18550	35.7816.44	9.94	45.7226.38	64.24	54.24	18.52 27.87	Ν
3	0.28503	29.27 10.50	9.94	39.2120.44	60.67	50.67	21.4630.23	Ν
4	0.55999	21.43 6.45	9.95	31.3816.40	56.00	46.00	24.6229.60	Ν
5	2.08852	13.41 4.78	10.03	23.44 14.81	56.00	46.00	32.5631.19	Ν
6	2.94693	12.02 2.54	10.07	22.09 12.61	56.00	46.00	33.91 33.39	Ν
7	6.67001	19.21 12.59	10.22	29.4322.81	60.00	50.00	30.57 27.19	N
8	10.58887	20.24 14.36	10.35	30.5924.71	60.00	50.00	29.41 25.29	Ν
9	25.47128	18.70 11.30	10.66	29.3621.96	60.00	50.00	30.64 28.04	Ν
10	0.15350	37.45 22.92	9.94	47.3932.86	65.81	55.81	18.4222.95	L
11	0.20677	33.44 16.14	9.94	43.3826.08	63.33	53.33	19.95 27.25	L
12	0.55450	17.30 3.55	9.95	27.25 13.50	56.00	46.00	28.75 32.50	L
13	0.66009	13.56 0.31	9.96	23.5210.27	56.00	46.00	32.4835.73	L
14	2.20092	13.19 4.36	10.03	23.2214.39	56.00	46.00	32.78 31.61	L
15	6.86343	17.09 9.43	10.22	27.3119.65	60.00	50.00	32.69 30.35	L
16	11.62650	23.0515.19	10.38	33.4325.57	60.00	50.00	26.5724.43	L
17	26.71467	17.8911.08	10.66	28.55 21.74	60.00	50.00	31.45 28.26	L



# 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 attached on the device by means of unique coupling method (Spring Tension). Therefore this E.U.T Complies with the requirement of §15.203

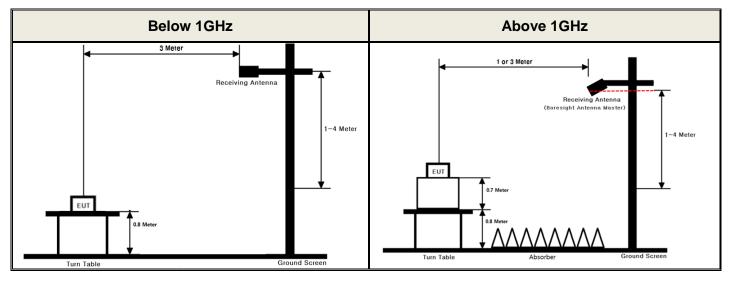
#### - Minimum Standard :

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.

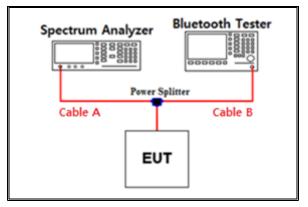
## **APPENDIX I**

#### Test set up diagrams

#### Radiated Measurement



#### Conducted Measurement



#### Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	6.59	15	9.84
1	6.87	20	10.81
2.402 & 2.441 & 2.480	7.55	25	11.9
5	8.08	-	-
10	8.14	-	-

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

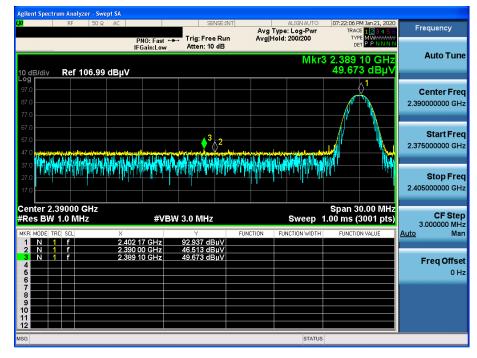


## **APPENDIX II**

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

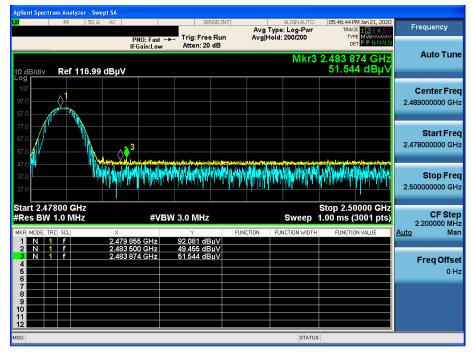
#### GFSK & Lowest & Y & Hor





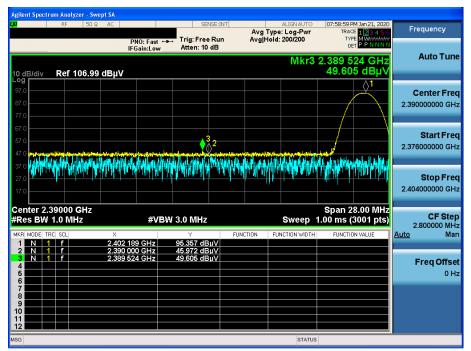
#### **Detector Mode : PK**

#### GFSK & Highest & Y & Hor



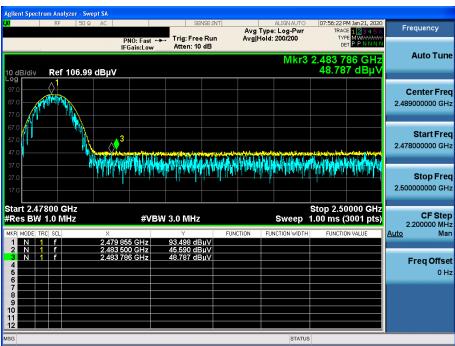


#### $\pi$ /4DQPSK & Lowest & X & Ver



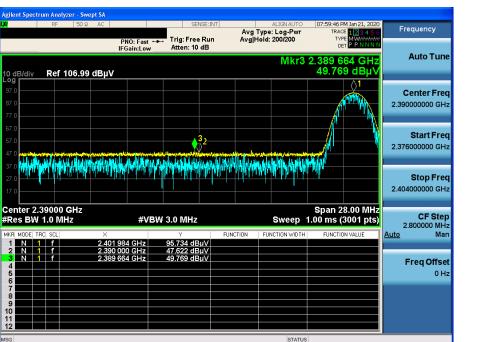
#### **Detector Mode : PK**

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

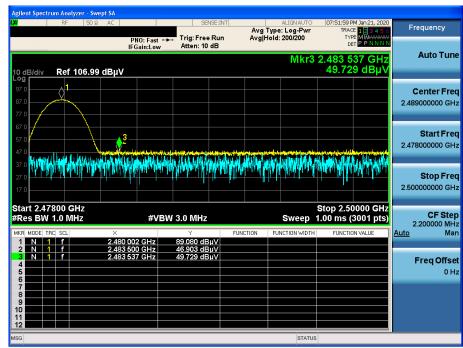




#### 8DPSK & Lowest & X & Ver

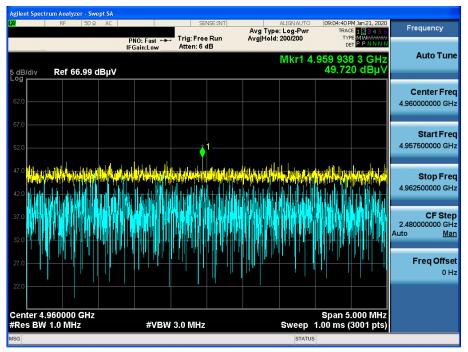


### 8DPSK & Highest & X & Ver

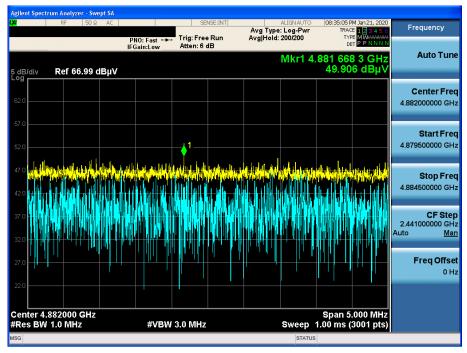




#### GFSK & Highest & Y & Hor

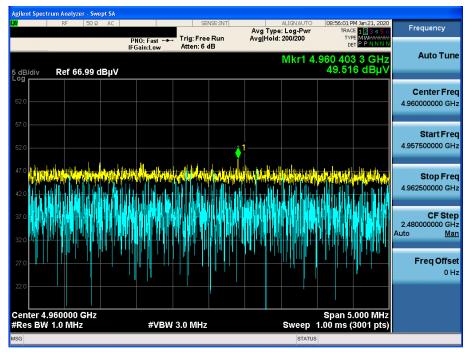


#### $\pi/4DQPSK$ & Middle & Y & Hor





### 8DPSK & Highest & Y & Hor



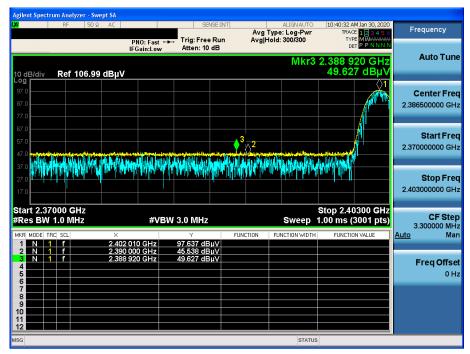
### Unwanted Emissions (Radiated) Test Plot \_ Wireless Charging

#### GFSK & Highest & X & Hor

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

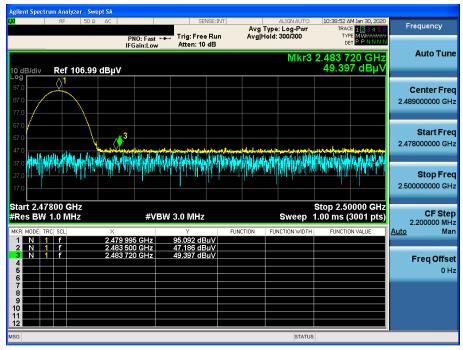


#### π/4DQPSK & Lowest & X & Hor



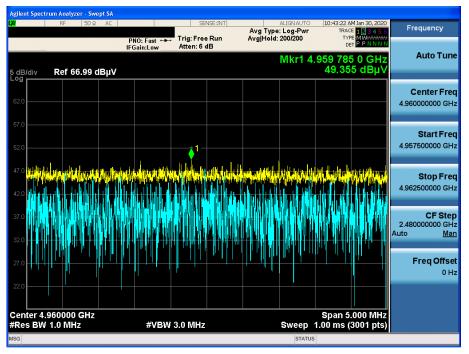


#### 8DPSK & Highest & X & Hor

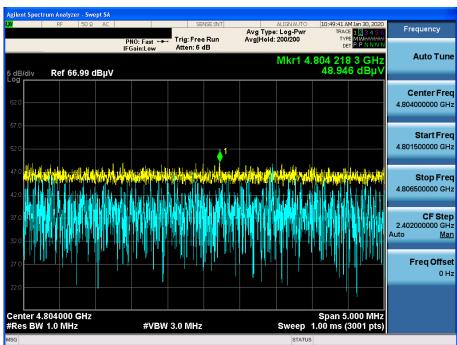




#### GFSK & Highest & X & Hor



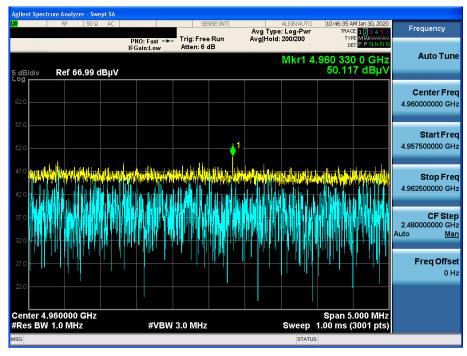
#### π/4DQPSK & Lowest & X & Hor



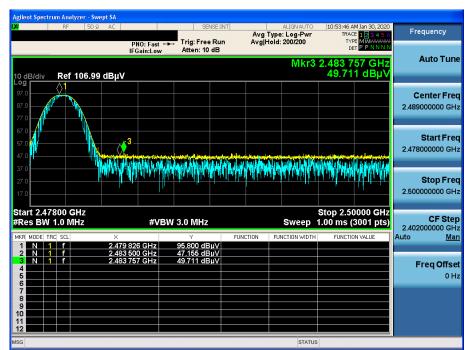


#### 8DPSK & Highest & X & Hor





### Unwanted Emissions (Radiated) Test Plot \_ With Dual Display



#### GFSK & Highest & Y & Hor

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

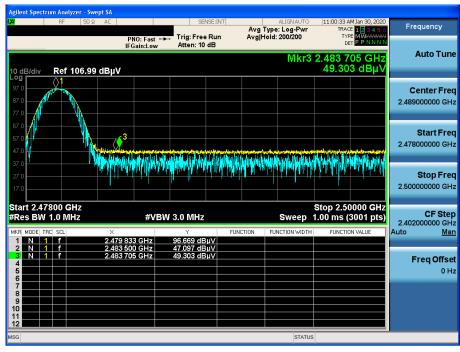
#### GFSK & Highest & Y& Hor

#### eilent Spectrum Analyzer - Swept SA Frequency Avg Type: Log-Pwr Avg|Hold: 200/200 Trig: Free Run Atten: 6 dB MW4 PP1 PNO: Fast IFGain:Low DE Auto Tune Mkr1 7.440 215 0 GHz 46.565 dBµV dB/div Ref 66.99 dBµV **Center Freq** 7.440000000 GHz Start Freq 7.437500000 GH: Stop Freq and is a feat for a section of the 7.442500000 GHz **CF Step** 2.480000000 GHz uto <u>Man</u> uto **Freq Offset** 0 Hz Center 7.440000 GHz #Res BW 1.0 MHz Span 5.000 MHz Sweep 1.00 ms (3001 pts) #VBW 3.0 MHz

### Unwanted Emissions (Radiated) Test Plot \_ With Dual Display+WPC

### GFSK & Highest & X & Hor

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



#### GFSK & Highest & X & Hor

