

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

#### Lowest Channel

Frequency (MHz)	ANT Pol	The worst case 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)
2389.21	V	Z	PK	44.45	0.70	N/A	N/A	45.15	74.00	28.85
2389.21	V	Z	AV	44.45	0.70	-24.79	N/A	20.36	54.00	33.64
4803.92	V	Z	PK	46.94	4.77	N/A	N/A	51.71	74.00	22.29
4803.92	V	Z	AV	46.94	4.77	-24.79	N/A	26.92	54.00	27.08

#### Middle Channel

Frequency (MHz)	ANT Pol	The worst case 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)
4882.02	V	Z	PK	46.73	5.11	N/A	N/A	51.84	74.00	22.16
4882.02	V	Z	AV	46.73	5.11	-24.79	N/A	27.05	54.00	26.95

#### Highest Channel

Frequency (MHz)	ANT Pol	The worst case 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	V	Z	PK	48.92	0.94	N/A	N/A	49.86	74.00	24.14
2483.71	V	Z	AV	48.92	0.94	-24.79	N/A	25.07	54.00	28.93
4959.46	V	Z	PK	45.88	5.34	N/A	N/A	51.22	74.00	22.78
4959.46	V	Z	AV	45.88	5.34	-24.79	N/A	26.43	54.00	27.57

#### Note.

1. The radiated emissions were investigated up to 25GHz. 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.

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 : 8DPSK)

#### Lowest Channel

Frequency (MHz)	ANT Pol	The worst case 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)
2389.10	V	Z	PK	44.04	0.70	N/A	N/A	44.74	74.00	29.26
2389.10	V	Z	AV	44.04	0.70	-24.79	N/A	19.95	54.00	34.05
4803.67	V	Z	PK	45.66	4.77	N/A	N/A	50.43	74.00	23.57
4803.67	V	Z	AV	45.66	4.77	-24.79	N/A	25.64	54.00	28.36

#### Middle Channel

Frequency (MHz)	ANT Pol	The worst case 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)
4881.66	V	Z	PK	46.45	5.11	N/A	N/A	51.56	74.00	22.44
4881.66	V	Z	AV	46.45	5.11	-24.79	N/A	26.77	54.00	27.23

#### Highest Channel

Frequency (MHz)	ANT Pol	The worst case 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)
2483.59	V	Z	PK	46.53	0.94	N/A	N/A	47.47	74.00	26.53
2483.59	V	Z	AV	46.53	0.94	-24.79	N/A	22.68	54.00	31.32
4960.07	V	Z	PK	46.75	5.34	N/A	N/A	52.09	74.00	21.91
4960.07	V	Z	AV	46.75	5.34	-24.79	N/A	27.30	54.00	26.70

#### Note.

1. The radiated emissions were investigated up to 25GHz. 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

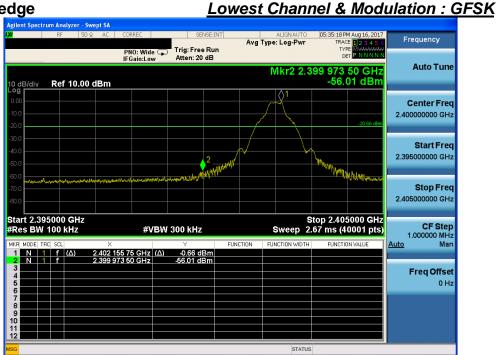
4. Sample Calculation.

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



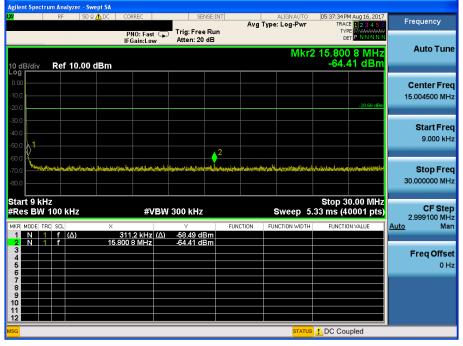
#### Low Band-edge

#### Hopping mode & Modulation : GFSK





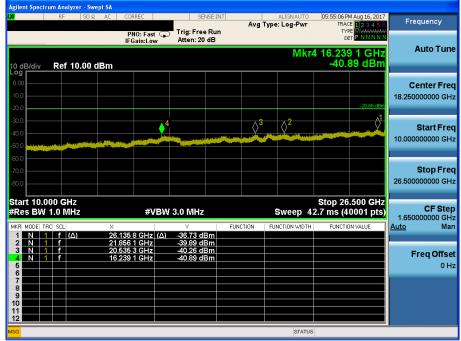
#### Lowest Channel & Modulation : GFSK



		RF	50 Ω	AC	CORREC		SEI	VSE:INT	<b>A</b>	ALIGN AUTO		M Aug 16, 2017	Frequency
					PNO: Fa	st 🖵	Trig: Free Atten: 20		Avg	Type: Log-Pwr	TY	E 123456 M	
	_				IFGain:Lo	ow	Atten: 20	aB		Mice		26 GHz	Auto Tu
0 dB/div	v	Ref 10	).00 di	Вm						IVINI		20 GH2 40 dBm	
				1									
													Center Fr 5.015000000 G
20.0												-20.66 dBm	5.015000000 G
80.0							Y			3			
10 n l l l l l l l l l l l l l l l l l l				A	5					Y	6	4	Start Fr
50.0				<u>л</u> У				- Internet	and the later of the second second	والمحرب والملاقلة فاستعصانك			30.000000 M
io.o				alossalesta da					يحتقع كت				
70.0													Stop Fr
30.0													10.00000000 G
tart 30 Res Bl			,		#	VBM	3.0 MHz			Sweep 1		.000 GHz	CF St
KR MODE			2			<b>V</b> D V V	Y Y		UNCTION		```		997.000000 M Auto M
KH MUDE	1 I HL	f (Δ)		× 2.402	2 11 GH	z (Δ)	-0.30 dl		UNCTION	FUNCTION WIDTH	FUNCTI	JN VALUE	<u>Auto</u> M
1 N		6		4 00	1.00.011		-24.61 dE						
1 N 2 N	1	T			4 38 GH			1					
1 N 2 N 3 N 4 N	1	f f		7.206	6 16 GH;	z	-37.25 dE	Bm Bm					Freq Offs
1 N 2 N 3 N 4 N 5 N	1 1 1	f f f		7.200 9.608 2.658	6 <u>16 GH;</u> 8 43 GH; 8 34 GH;	z z z	-37.25 dE -45.71 dE -47.38 dE	3m 3m					Freq Offs 0
6 N	1 1 1 1	f f f f		7.200 9.608 2.658	6 16 GH: 8 43 GH:	z z z	-37.25 dE -45.71 dE	3m 3m					
6 N 7 8	1 1 1 1	f f f f		7.200 9.608 2.658	6 <u>16 GH;</u> 8 43 GH; 8 34 GH;	z z z	-37.25 dE -45.71 dE -47.38 dE	3m 3m					
6 N 7 8 9	1 1 1 1			7.200 9.608 2.658	6 <u>16 GH;</u> 8 43 GH; 8 34 GH;	z z z	-37.25 dE -45.71 dE -47.38 dE	3m 3m					
6 N 7 8				7.200 9.608 2.658	6 <u>16 GH;</u> 8 43 GH; 8 34 GH;	z z z	-37.25 dE -45.71 dE -47.38 dE	3m 3m					



#### Lowest Channel & Modulation : GFSK



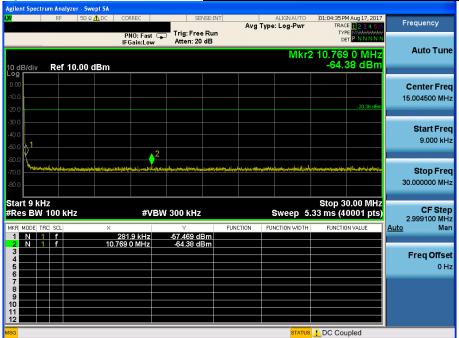


#### **Reference for limit**

#### Middle Channel & Modulation : GFSK



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





#### Middle Channel & Modulation : GFSK

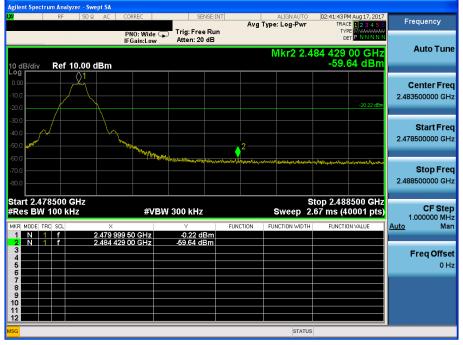




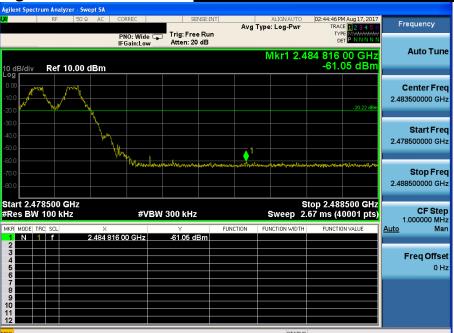


#### **High Band-edge**

#### Highest Channel & Modulation : GFSK

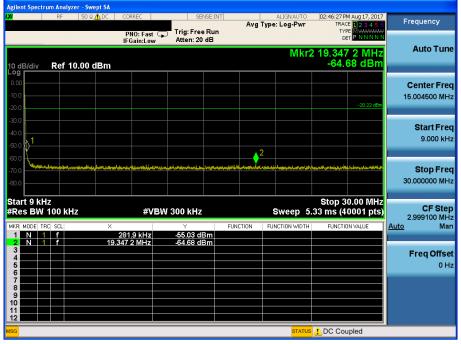


### High Band-edge Hopping mode & Modulation : GFSK





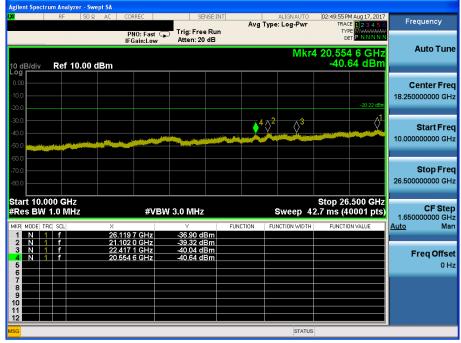
#### Highest Channel & Modulation : GFSK







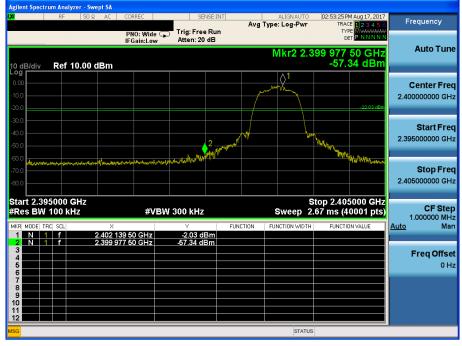
#### Highest Channel & Modulation : GFSK





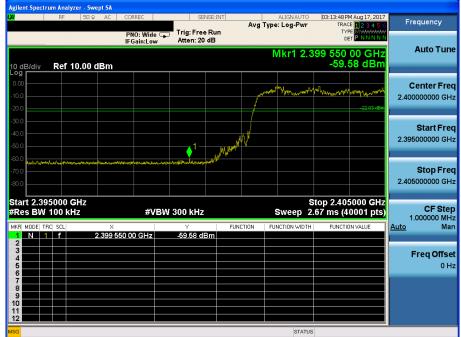
#### Low Band-edge

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



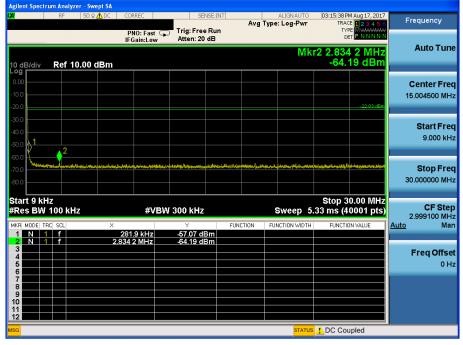
#### Low Band-edge

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





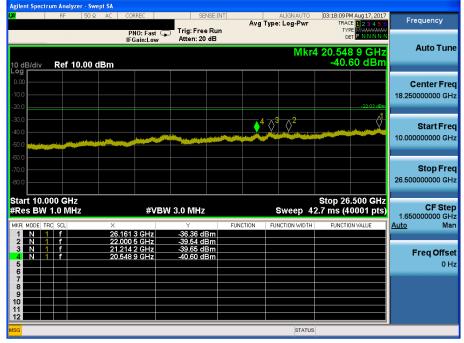
#### Lowest Channel & Modulation : π/4DQPSK



RF	50 Ω AC	CORREC	SENSE:IN		ALIGN AUTO	03:17:06 PM Aug 17, 2017	Frequency
		PNO: Fast G	🕞 Trig: Free Run	Avg T	ype: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	requercy
		IFGain:Low	Atten: 20 dB				Auto Tune
0 dB/div Ref 1	0.00 dBm				MKr	5 9.307 09 GHz -47.42 dBm	Auto Full
.og		1					
10.0							Center Free 5.015000000 GH
20.0						-22.03 dBm	5.015000000 GH
30.0			Y I		3		
40.0					Y	6 <u>}</u> 4	Start Free
50.0	and the second secon			. out the Year	- Design of the later of the later		30.000000 MH:
60.0			كأأن فتشمر با			فنتنقص فتتقعطتنا	
70.0							Stop Free
80.0							10.00000000 GH
start 30 MHz						Stop 10.000 GHz	
Res BW 1.0 MH	z	#VB\	N 3.0 MHz		Sweep 1	8.7 ms (40001 pts)	CF Step 997.000000 MH
KR MODE TRC SCL	×		Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Mar
1 N 1 f 2 N 1 f	4	.402 36 GHz .804 13 GHz	-0.11 dBm -23.62 dBm				
3 N 1 f		.206 41 GHz .608 18 GHz	-38.01 dBm -45.08 dBm				Freq Offse
5 N 1 f	6	.243 80 GHz .307 09 GHz	-47.12 dBm -47.42 dBm				0 H:
7	3	.307 09 GHZ	-47.42 UBIII				
8							
10							
12						ļ	
SG					STATUS		



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





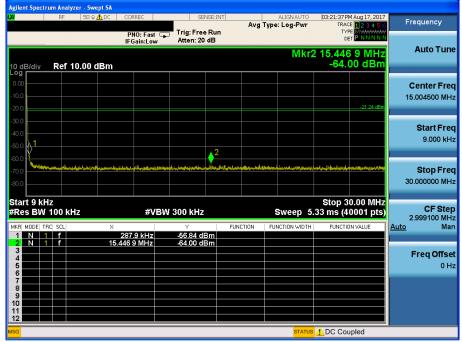
#### **Reference for limit**

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



#### **Conducted Spurious Emissions**

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





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







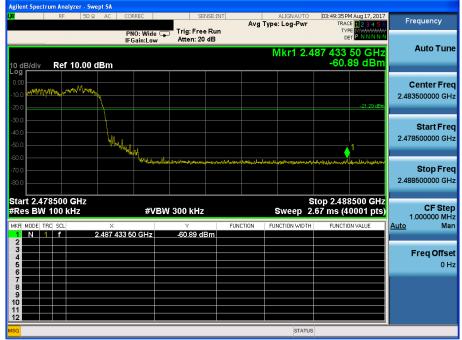
#### **High Band-edge**

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



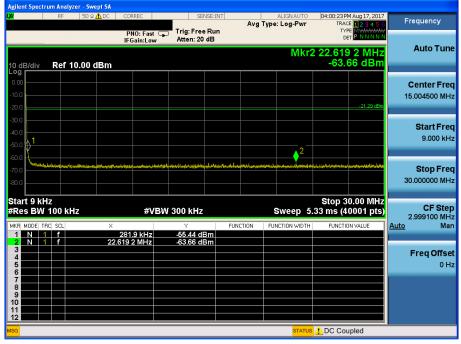
#### High Band-edge

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





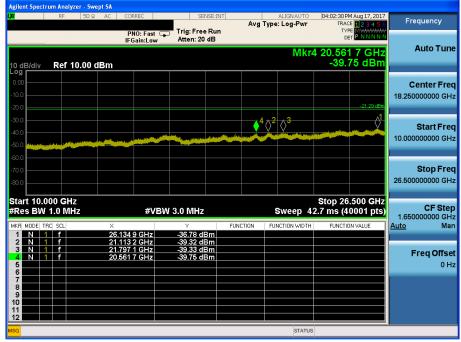
#### Highest Channel & Modulation : π/4DQPSK







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





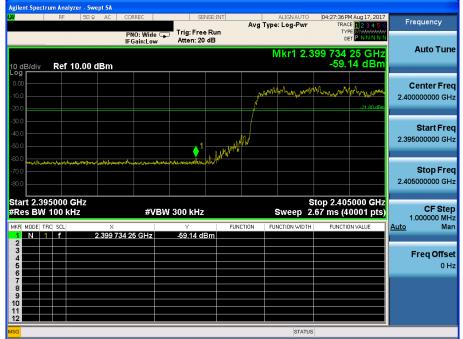
#### Low Band-edge

#### Lowest Channel & Modulation : 8DPSK



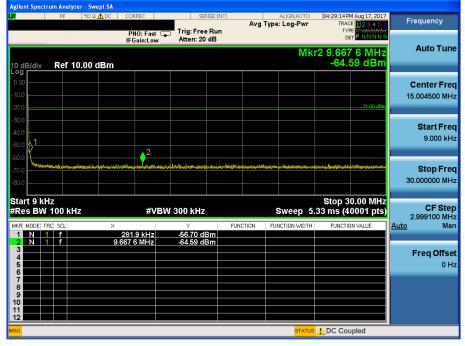
#### Low Band-edge

#### Hopping mode & Modulation : 8DPSK





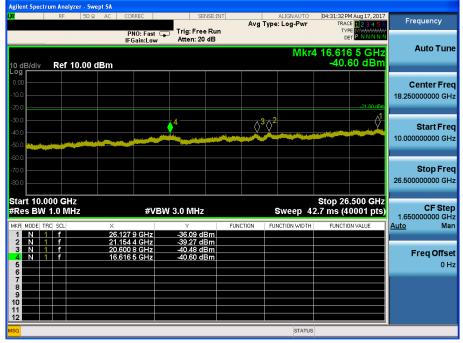
#### Lowest Channel & Modulation : 8DPSK



	1	RF 50	DΩ AC	COR	REC	9	ENSE:INT		ALIGN AUTO		4 Aug 17, 2017	Frequency
						Trig: Fre		Avg Ty	pe: Log-Pwr	TRAC	E 123456	Frequency
					0: Fast ∶C ain:Low	Atten: 2				DE	E MWWWWW T P N N N N N	
									Mkr	6 6.006	77 GH7	Auto Tun
0 dB/di		ef 10.0	0 dDm						IVINI.	-47 9	96 dBm	
og 🗖	V R			1								
D.00				<u>/'</u>								Center Fre
												5.015000000 GH
20.0							2				-21 80 dBm	0.0100000000
						Y			۸3			
10.0					_				$\neg \Diamond$		. 1	Start Fre
10.0					)							30.000000 MH
0.0			and the second secon	, in second	BALL	THE OWNER WHEN THE PARTY		Name Blackstone				00.000000 111
50.0 <b></b>		and the second states in	تتثلثنا أغنه									
70.0												Stop Fre
30.0												10.00000000 GH
0.0												
tart 3	0 MHz									Stop 10	.000 GHz	
tart 3 Res B					#VB	W 3.0 MH	z		Sweep 1		.000 GHz 0001 pts)	
Res B	W 1.0	MHz		×	#VB	W 3.0 MH		FUNCTION		8.7 ms (4	0001 pts)	997.000000 MH
Res B	W 1.0	MHz		× 2.402 11	GHz	۲ -0.25	dBm	FUNCTION	Sweep 1		0001 pts)	997.000000 MH
Res B KR MODE 1 N 2 N	W 1.0	MHz	2	2.402 11 4.804 38	GHz GHz	ې -0.25 ( -24,46 (	dBm dBm	FUNCTION		8.7 ms (4	0001 pts)	
Res B Kr Mode 1 N	W 1.0	MHz		2.402 11 4.804 38 7.206 16	GHz GHz GHz	-0.25 -24.46 -37.70 (	dBm dBm dBm	FUNCTION		8.7 ms (4	0001 pts)	997.000000 MH <u>Auto</u> Ma
Res B 1 N 2 N 3 N 4 N 5 N	W 1.0	MHz		2.402 11 4.804 38 7.206 16 9.607 93 2.916 32	GHz GHz GHz GHz GHz GHz	-0.25 -24.46 -37.70 -46.17 -47.69	dBm dBm dBm dBm dBm	FUNCTION		8.7 ms (4	0001 pts)	997.000000 MH
Res B 1 N 2 N 3 N 4 N 5 N 6 N	W 1.0	MHz		2.402 11 4.804 38 7.206 16 9.607 93	GHz GHz GHz GHz GHz GHz	-0.25 -24.46 -37.70 -46.17	dBm dBm dBm dBm dBm	FUNCTION		8.7 ms (4	0001 pts)	997.000000 MH <u>Auto</u> Ma Freq Offso
Res B 1 N 2 N 3 N 4 N 5 N 6 N 7	W 1.0	MHz		2.402 11 4.804 38 7.206 16 9.607 93 2.916 32	GHz GHz GHz GHz GHz GHz	-0.25 -24.46 -37.70 -46.17 -47.69	dBm dBm dBm dBm dBm	FUNCTION		8.7 ms (4	0001 pts)	997.000000 MH <u>Auto</u> Ma Freq Offs
Res B 1 N 2 N 3 N 4 N 5 N 6 N 7 8	W 1.0	MHz		2.402 11 4.804 38 7.206 16 9.607 93 2.916 32	GHz GHz GHz GHz GHz GHz	-0.25 -24.46 -37.70 -46.17 -47.69	dBm dBm dBm dBm dBm	FUNCTION		8.7 ms (4	0001 pts)	997.000000 MH <u>Auto</u> Ma Freq Offso
Res B KR MODE 1 N 2 N 3 N 4 N 5 N 6 N 7 8 9 0	W 1.0	MHz		2.402 11 4.804 38 7.206 16 9.607 93 2.916 32	GHz GHz GHz GHz GHz GHz	-0.25 -24.46 -37.70 -46.17 -47.69	dBm dBm dBm dBm dBm	FUNCTION		8.7 ms (4	0001 pts)	997.000000 MH <u>Auto</u> Ma Freq Offs
Res B 1 N 2 N 3 N 4 N 5 N 6 N 7 8	W 1.0	MHz		2.402 11 4.804 38 7.206 16 9.607 93 2.916 32	GHz GHz GHz GHz GHz GHz	-0.25 -24.46 -37.70 -46.17 -47.69	dBm dBm dBm dBm dBm	FUNCTION		8.7 ms (4	0001 pts)	997.000000 MH <u>Auto</u> Ma Freq Offs



#### Lowest Channel & Modulation : 8DPSK





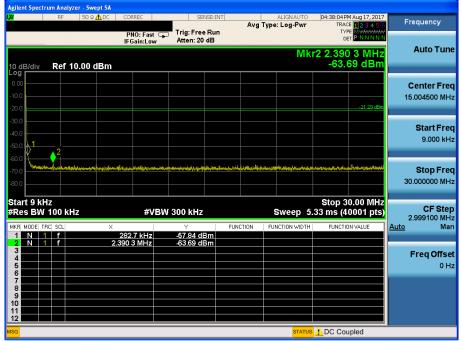
#### Reference for limit

#### Middle Channel & Modulation : 8DPSK



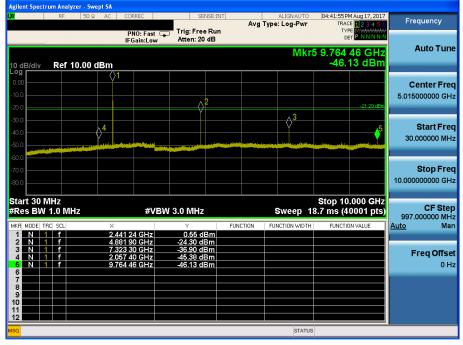
#### **Conducted Spurious Emissions**

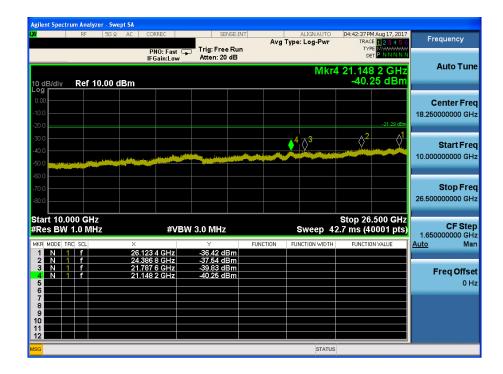






#### Middle Channel & Modulation : 8DPSK

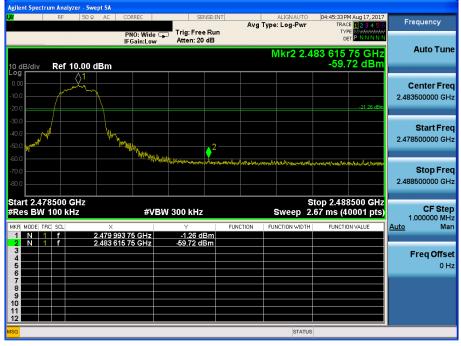






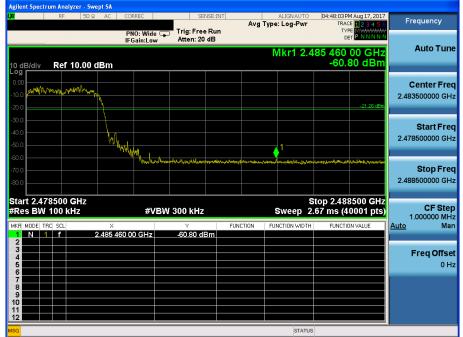
#### **High Band-edge**

#### Highest Channel & Modulation : 8DPSK



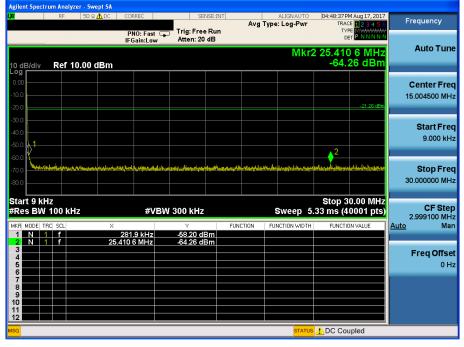
#### High Band-edge

#### Hopping mode & Modulation : 8DPSK





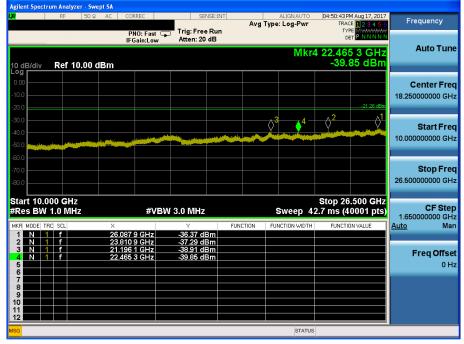
#### Highest Channel & Modulation : 8DPSK



	RF	50 Ω	AC COF	REC	SENS	SE:INT		ALIGN AUTO		M Aug 17, 2017	-
						_	Avg Type	e: Log-Pwr	TRAC	E 123456	Frequency
			PN IEG	10: Fast ( Gain:Low	Trig: Free l				Di		
				dimeow				Mkr	2 0 207	58 GHz	Auto Tun
I0 dB/di	Dof 4	0.00 dE						IVIKI		06 dBm	
-og <b>r</b>	V RELI	0.00 dE	<u></u>								
0.00			Y'								Center Fre
10.0											5.015000000 GH
20.0						2				-21.26 dBm	0.0100000000
30.0					Ň			.3			
			. 4			. 5					Start Fre
40.0						$ \bigcirc $				<b>→°</b> —	30.000000 MH
50.0	and and in the second				VI APPROVING						
50.0				· ·							
70.0											Stop Fre
30.0											10.00000000 GH
											10.00000000 GF
											10.00000000 GF
Start 30										.000 GHz	
Start 30	0 MHz W 1.0 MH	łz		#VB	W 3.0 MHz			Sweep 1		.000 GHz 0001 pts)	CF Ste
Start 30 Res B	W 1.0 MH	lz	×		Y			Sweep 1	8.7 ms (4	0001 pts)	CF Ste 997.000000 M⊦
tart 30 Res B	W 1.0 MH	lz	2.480 3	B GHz	ү 0.31 dB	m			8.7 ms (4	0001 pts)	CF Ste
tart 30 Res B	W 1.0 MH	lz	2.480 3 4.959 6 7.440 2	B GHz 7 GHz 0 GHz	0.31 dB -24.14 dB -37.89 dB	m m m			8.7 ms (4	0001 pts)	CF Ste 997.00000 MH <u>Auto</u> Ma
itart 30 Res B KR MODE 1 N 2 N	W 1.0 MH	lz	2.480 3 4.959 6 7.440 2 2.705 2	B GHz 7 GHz 0 GHz 0 GHz	Y 0.31 dB -24.14 dB -37.89 dB -47.21 dB	m m m m			8.7 ms (4	0001 pts)	CF Ste 997.000000 Mł <u>Auto</u> Ma Freq Offs
tart 30 Res B 1 N 2 N 3 N 4 N 5 N 6 N	W 1.0 MH	lz	2.480 3 4.959 6 7.440 2	3 GHz 7 GHz 0 GHz 0 GHz 5 GHz	0.31 dB -24.14 dB -37.89 dB	m m m m m			8.7 ms (4	0001 pts)	CF Ste 997.000000 Mł <u>Auto</u> Ma Freq Offs
Start 30 FRes B MKR MODE 1 N 2 N 3 N 4 N 5 N 6 N 7	W 1.0 MH		2.480 3 4.959 6 7.440 2 2.705 2 5.778 4	3 GHz 7 GHz 0 GHz 0 GHz 5 GHz	Y 0.31 dB -24.14 dB -37.89 dB -47.21 dB -47.22 dB	m m m m m			8.7 ms (4	0001 pts)	CF Ste 997.000000 MH Auto Ma Freq Offs
Start 30 FRes B MKR MODE 1 N 2 N 3 N 4 N 5 N 6 N	W 1.0 MH	lz	2.480 3 4.959 6 7.440 2 2.705 2 5.778 4	3 GHz 7 GHz 0 GHz 0 GHz 5 GHz	Y 0.31 dB -24.14 dB -37.89 dB -47.21 dB -47.22 dB	m m m m m			8.7 ms (4	0001 pts)	CF Ste 997.000000 MH Auto Ma Freq Offs
Start 30 Res B 4KR Mode 1 N 2 N 3 N 4 N 5 N 6 N 7 8 9 9	W 1.0 MH	iz	2.480 3 4.959 6 7.440 2 2.705 2 5.778 4	3 GHz 7 GHz 0 GHz 0 GHz 5 GHz	Y 0.31 dB -24.14 dB -37.89 dB -47.21 dB -47.22 dB	m m m m m			8.7 ms (4	0001 pts)	CF Ste 997.000000 MH Auto Ma Freq Offs
AKR MODE 1 N 2 N 3 N 4 N 5 N 6 N 7 8 9	W 1.0 MH	IZ	2.480 3 4.959 6 7.440 2 2.705 2 5.778 4	3 GHz 7 GHz 0 GHz 0 GHz 5 GHz	Y 0.31 dB -24.14 dB -37.89 dB -47.21 dB -47.22 dB	m m m m m			8.7 ms (4	0001 pts)	CF Ste 997.000000 M⊦



#### 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.

Frequency Pango (MHz)	Conducted I	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

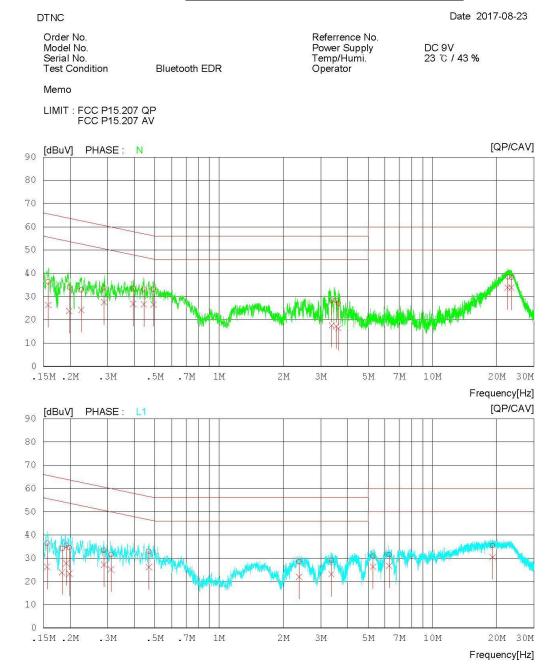
Conducted emissions from the EUT were measured according to the ANSI C63.10.

- 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**



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

### **Results of Conducted Emission**

Date 2017-08-23

DC 9V 23 °C / 43 %

Order No. Model No. Serial No. Test Condition

Bluetooth EDR

Referrence No. Power Supply Temp/Humi. Operator

Memo

DTNC

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

NC	) FREQ	READING QP CAV [dBuV] [dBuV]	C.FACTOR ] [dB]	RESULT QP CAV [dBuV] [dBuV]	QP	MIT CAV ][dBuV]	QP CAV	PHASE
1	0.15801	26.4516.46	9.89	36.34 26.35	65.57	55.57	29.23 29.22	Ν
2	0.19815	24.20 13.88	9.90	34.10 23.78	63.69	53.69	29.5929.91	Ν
3	0.22593	22.9514.39	9.90	32.85 24.29	62.60	52.60	29.75 28.31	Ν
4	0.28885	23.8617.62	9.90	33.76 27.52	60.56	50.56	26.80 23.04	N
5	0.39618	23.60 16.94	9.90	33.50 26.84	57.93	47.93	24.4321.09	Ν
6	0.44399	23.28 16.72	9.90	33.18 26.62	56.99	46.99	23.81 20.37	Ν
7		23.24 16.79	9.90	33.14 26.69	56.12	46.12	22.9819.43	Ν
8		18.45 7.74	9.99	28.44 17.73	56.00	46.00	27.5628.27	Ν
9		18.32 7.22	10.00	28.32 17.22	56.00	46.00	27.6828.78	Ν
10		17.19 6.37	10.01	27.20 16.38	56.00	46.00	28.80 29.62	Ν
11		28.05 23.55	10.31	38.3633.86	60.00	50.00	21.64 16.14	N
12		27.9823.49	10.31	38.29 33.80	60.00	50.00	21.7116.20	N
13		26.5316.36	9.89	36.42 26.25	65.67	55.67	29.25 29.42	L1
14		24.25 14.01	9.90	34.15 23.91	64.32	54.32	30.17 30.41	L1
15		25.62 17.82	9.90	35.52 27.72	63.94	53.94	28.4226.22	L1
16		24.5713.45	9.90	34.47 23.35	63.67	53.67	29.20 30.32	L1
17		23.47 17.24	9.90	33.37 27.14		50.57	27.20 23.43	L1
18		21.62 15.25	9.90	31.52 25.15	59.93	49.93	28.4124.78	L1
19		23.0016.26	9.90	32.90 26.16	56.53	46.53	23.63 20.37	L1
20		18.52 11.95	9.95	28.47 21.90	56.00	46.00	27.5324.10	L1
21		19.0613.12	9.99	29.05 23.11	56.00	46.00	26.95 22.89	L1
22		20.7516.32	10.06	30.81 26.38	60.00	50.00	29.1923.62	L1
23		21.3516.72	10.05	31.40 26.77	60.00	50.00	28.60 23.23	L1
24	19.17480	25.17 20.14	10.27	35.44 30.41	60.00	50.00	24.5619.59	L1



### 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.

### 10.1 Test Setup

Refer to the APPENDIX I.

### 10.2 Limit

Limit : Not Applicable

### 10.3 Test Procedure

The 99 % power bandwidth was measured with a calibrated spectrum analyzer.

The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately  $3 \times RBW$ .

Spectrum analyzer plots are included on the following pages.

### 10.4 Test Results

Modulation	Tested Channel Test Results (MHz)				
	Lowest	0.880			
<u>GFSK</u>	Middle	0.880			
	Highest	0.878			
<u>π/4DQPSK</u>	Lowest	1.171			
	Middle	1.171			
	Highest	1.170			
<u>8DPSK</u>	Lowest	1.176			
	Middle	1.176			
	Highest	1.178			

Note : The test plot is same with the 20 dB BW test plots. Please refer to the 20 dB BW plots.

### Lowest Channel & GFSK



### Occupied Bandwidth (99 %)

### Middle Channel & GFSK



#### Highest Channel & GFSK





#### Lowest Channel & π/4 DQPSK



### Occupied Bandwidth (99 %)

#### Middle Channel & π/4 DQPSK



#### Highest Channel & π/4 DQPSK



# ENSE:INT ALIGNAUTO D3:51:20FM ALIG 16. 2017



### Occupied Bandwidth (99 %)

### Middle Channel & 8DPSK



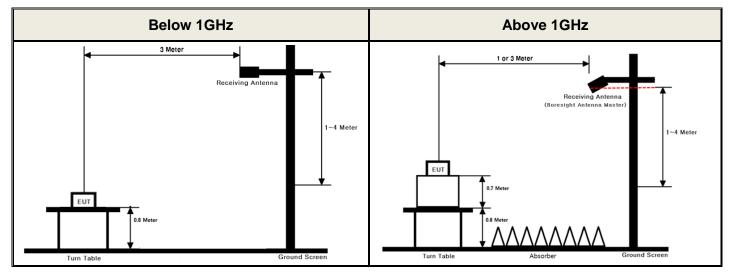
### Highest Channel & 8DPSK



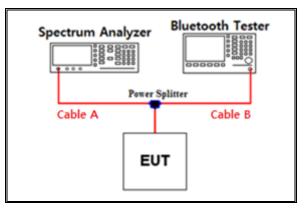
### **APPENDIX I**

#### Test set up diagrams

#### Radiated Measurement



#### Conducted Measurement



#### Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	6.07	15	9.88
1	6.75	20	10.85
2.402 & 2.440 & 2.480	7.50	25	11.25
5	8.30	-	-
10	9.03	-	-

Note 1 : The path loss from EUT to Spectrum analyzer were measured and used for test.

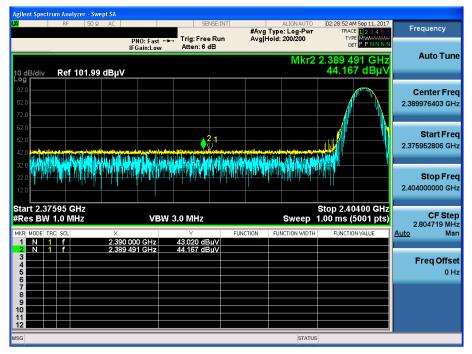
Path loss (S/A's Correction factor) = Cable A + Power splitter



### **APPENDIX II**

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

#### GFSK & Lowest & Z & Ver



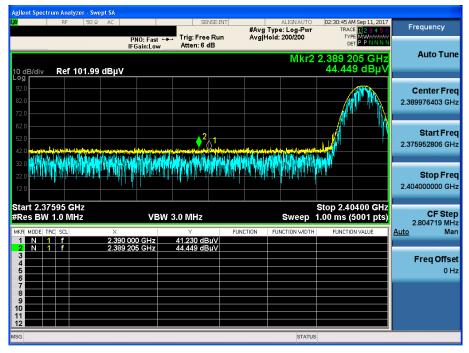
#### GFSK & Highest & Z & Ver

#### rum Analyzer - Swept Si Frequency #Avg Type: Log-Pwi Avg|Hold: 200/200 Trig: Free Run Atten: 6 dB TYPE DET PNO: Fast 🔸 Auto Tune Mkr2 2.483 640 8 GH 47.335 dBµ Ref 101.99 dBµV **Center Freq** 2.489000000 GHz Start Freq 2 2.478000000 GHz er folget i skaller en er bikker det skiller er bikker beste beste bikker bisker bisker bisker bisker bisker b d, to fit talkard, be hat de bereiten de die الأبها إيلا Stop Freq 2.50000000 GHz Start 2.47800 GHz #Res BW 1.0 MHz Stop 2.50000 GHz 1.00 ms (5001 pts) CF Step 2.200000 MHz Man VBW 3.0 MHz Sweep FUNCTION Auto 2.483 500 0 GHz 2.483 640 8 GHz 45.692 dBµV 47.335 dBµV Freq Offset 0 Hz STATUS

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



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



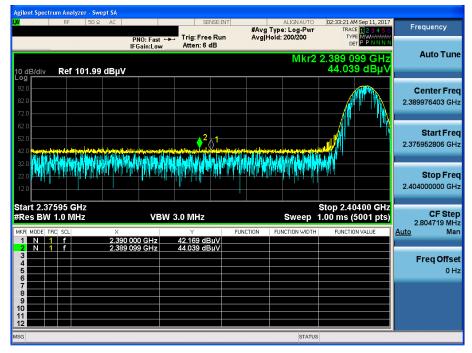
#### **Detector Mode : PK**

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

Agilent Spectrum Analyzer - Swep	AC AC	SENSE:INT		ALIGNAUTO	00.17.51.04	Sep 11, 2017		
κ- 30 Ω			#Avg Type	: Log-Pwr	TRACE	123456 MW	Frequenc	y
	PNO: Fast 🔸 IFGain:Low	Trig: Free Run Atten: 6 dB	Avg Hold:	200/200	DE	PPNNNN		
				Mkr2 2.	483 706		Auto	Tune
10 dB/div Ref 101.99 c	lBμV				48.91	2 dBµV		
92.0							Center	Free
82.0							2.489000000	
72.0								
62.0							Otort	<b>F m m m</b>
52.0	tw. 2						Start 2.47800000	
42.0	IN A MARLET AND A MARLET ALLA	dalls with and blick b	the and the state of the state	and the second second	erlangen Anterna A. Julia old ar dia	alkiako ka l	2.478000000	, Gri
32.0		an management		N#TH N	lo di di la			
22.0		terker i seitek		the state of the second se	di ti mi di ti	II PHO P	Stop 2.50000000	
12.0							2.500000000	J GH2
Start 2.47800 GHz					Stop 2.50	000 GHz		
#Res BW 1.0 MHz	VBW	3.0 MHz		Sweep 7	1.00 ms (5	i001 pts)	2.200000	Step MHz
MKR MODE TRC SCL	× 2.483 500 0 GHz	Y	FUNCTION FUN	ICTION WIDTH	FUNCTIO	N VALUE	<u>Auto</u>	Mar
2 N 1 f 2	2.483 500 0 GHZ	45.778 dBµV 48.912 dBµV						
3 4							Freq O	ffse
5								0 H:
7								
8 9 <b></b>								
10								
12								
MSG				STATUS				



#### 8DPSK & Lowest & Z & Ver



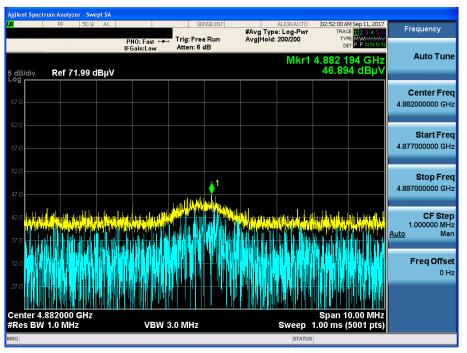
#### **Detector Mode : PK**

#### 8DPSK & Highest & Z & Ver

gilent Spectrum Analyz RF	50 Ω AC		SENSE:	INIT	ALIGN AUTO	02:10:47 AM Sep 11.20:	17
10	00 A 10			Avg	Type: Log-Pwr Hold: 200/200	TRACE 12345 TYPE MWWWW	Frequency
		PNO: Fast ↔ IFGain:Low	Atten: 6 dB	n Avgji	Hold: 200/200	DET P P N N N	Ň
					Mkr2 2.	483 588 0 GH	Z Auto Tui
0 dB/div Ref 1	01.99 dBµ∖	1				46.528 dBµ`	<b>V</b>
.og 92.0							Center Fre
82.0							2.489000000 G
72.0	<b>"</b> []						2.4000000000
62.0	<u>''</u>						
52.0		2					Start Fre
42.0		and a state of the second second	وارز واروا مراد ووارت والمناه وراد	والمحمور المحمد ومحرر وأسوه	ning the second seco	يعصيبه ابتجعظ وتصانيتهم	2.478000000 GI
32.0	TW HA	inete tru	1. <b>WWW. WW</b> 4.				N
22.0	1111	n a du bhair llai		ndin Acti		ALIGA TELEVINA ALI D	Stop Fre
12.0					• • • •	1 · · · · · ·	2.50000000 GI
Start 2.47800 GH Res BW 1.0 MH		VBM	3.0 MHz		Swoon	Stop 2.50000 GH 1.00 ms (5001 pts	Z CF Ste
		V (-) V (					2.200000 MI
4KR MODE TRC SCL	× 2.483	500 0 GHz	۲ 44.902 dBuV	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Ma
2 N 1 f	2.483	588 0 GHz	46.528 dBµV				
4							Freq Offs
5							0
7							
8							
10							-
12							
SG					STATUS		

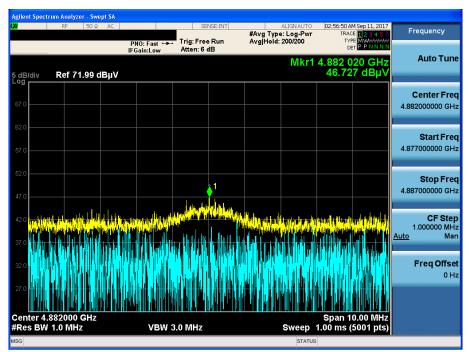


#### GFSK & Middle & Z & Ver



#### Detector Mode : PK

#### π/4DQPSK & Middle & Z & Ver





#### 8DPSK & Highest & Z & Ver

