

#### 9 kHz ~ 25 GHz Data (Hopping mode)

#### Modulation : GFSK

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)
2388.22	V	х	PK	46.22	0.78	N/A	N/A	47.00	74.00	27.00
2387.96	V	Х	AV	36.83	0.78	-24.79	N/A	12.82	54.00	41.18
2483.56	V	х	PK	47.18	1.16	N/A	N/A	48.34	74.00	25.66
2483.51	V	Х	AV	37.66	1.16	-24.79	N/A	14.03	54.00	39.97

#### Modulation : π/4DQPSK

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)
2388.50	V	Х	PK	46.82	0.78	N/A	N/A	47.60	74.00	26.40
2388.95	V	х	AV	37.67	0.78	-24.79	N/A	13.66	54.00	40.34
2483.83	V	Х	PK	47.96	1.16	N/A	N/A	49.12	74.00	24.88
2483.54	V	х	AV	37.17	1.16	-24.79	N/A	13.54	54.00	40.46

#### Modulation : 8DPSK

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)
2386.41	V	Х	PK	46.93	0.78	N/A	N/A	47.71	74.00	26.29
2386.03	V	х	AV	37.81	0.78	-24.79	N/A	13.80	54.00	40.20
2483.59	V	х	PK	46.19	1.16	N/A	N/A	47.35	74.00	26.65
2483.52	V	Х	AV	36.95	1.16	-24.79	N/A	13.32	54.00	40.68

#### Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.

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) = 1.736 = 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

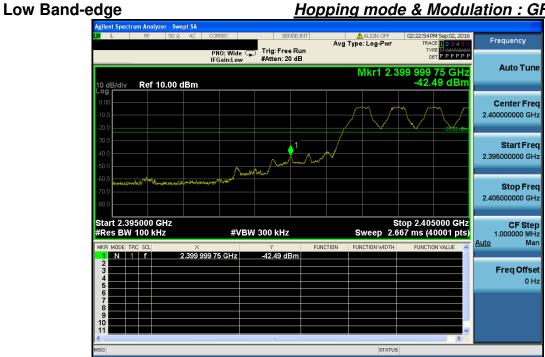
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain.



#### Low Band-edge



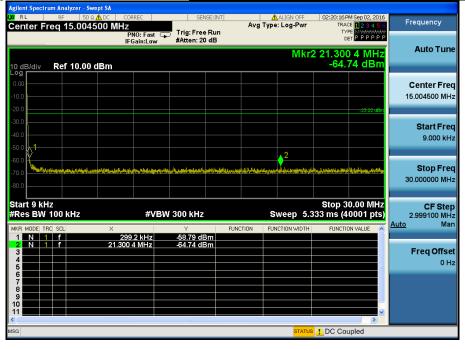
#### Lowest Channel & Modulation : GFSK



### Hopping mode & Modulation : GFSK



# Lowest Channel & Modulation : GFSK



Agilent Spectrum Analyzer - Sw						
Center Freg 5.01500	AC CORREC	SENSE:INT		ALIGN OFF Type: Log-Pwr	02:20:25 PM Sep 02, 2016 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast G IFGain:Low	Trig: Free Run #Atten: 20 dB		Mkr	түре Милини Det P P P P P P 5 2.797 92 GHz -48.79 dBm	Auto Tune
10 dB/div Ref 10.00						Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0	and a standard service and a service of the service	TA VITE BUT PERMIT	¢³	ta data da garan da garan da garan da garan da da garan d	an in 1995 and a start of the s	Start Freq 30.000000 MHz
-60.0						<b>Stop Freq</b> 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBV	V 3.0 MHz		Sweep 18	Stop 10.000 GHz 67 ms (40001 pts)	CF Step 997.000000 MHz
MKR MODE TRC SCL	× 2.402 11 GHz	ү -3.19 dBm	FUNCTION	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	5.792 91 GHz 5.785 43 GHz 3.028 98 GHz 2.797 92 GHz	-48.10 dBm -48.31 dBm -48.64 dBm -48.79 dBm			=	<b>Freq Offset</b> 0 Hz
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# Lowest Channel & Modulation : GFSK

Center Freq 17.500000000 GHz         Trig: Free Run Akten: 20 dB         Avg Type: Log-Pwr         Trig: Gree Run Trig: Free Run Akten: 20 dB         Frequency           10 dB/div         Ref 10.00 dBm         -38.36 dBm         -38.36 dBm         -38.36 dBm           000         -38.36 dBm         -38.36 dBm         -38.36 dBm         -38.36 dBm           10 dB/div         Ref 10.00 dBm         -3224b         -38.36 dBm         -3224b           000         -38.36 dBm         -3224b         -38.36 dBm         -3224b         -3224b           10 dB/div         -38.36 dBm         -3224b         -3224b <t< th=""><th>Agilent Spectrum Analyzer - Swep</th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	Agilent Spectrum Analyzer - Swep						
PHO: Fast IFGain:Low       Trg: Free Run #Atten: 20 dB       Mkr3 23.732 125 GHz -38.36 dBm         10 dB/div       Ref 10.00 dBm       -38.36 dBm         20 dB       Ref 10.00 dBm       -38.36 dBm         10 dB/div       Ref 10.00 dBm       -38.36 dBm         20 dB       Ref 10.000 GHz       Start Freq 10.00000000 GHz         20 dB       Ref 10.000 GHz       Stop 25.000 GHz         30 dB       Ref 10.000 GHz       Stop 25.000 GHz         30 dB       Stop 25.000 GHz       Stop 25.000 GHz         30 dB       Stop 25.000 GHz         31 N 1 f       24.334 250 GHz       -37.59 dBm         2 N 1 f       23.732 125 GHz       -37.36 dBm         31 N 1 f       23.732 125 GHz       -37.33 dBm         31 N 1 f       23.732 125 GHz       -37.73 dBm         31 N 1 f       23.732 125 GHz       -37.73 dBm         31 N 1 f       23.732 125 GHz       -37.73 dBm         31 N 1 f       23.732 125 GHz       -37.73 dBm         31			SENSE:INT		g-Pwr TRAC	E 1 2 3 4 5 6	Frequency
Mkr3 23.732 125 GHz         Auto Tune           10 dB/div         Ref 10.00 dBm         -38.36 dBm         Center Freq           10 dB/div         Ref 10.00 dBm         -38.36 dBm         Center Freq           10 dB/div         Ref 10.00 dBm         -38.36 dBm         Center Freq           10 dB/div         Ref 10.00 dBm         -38.36 dBm         Center Freq           10 dB/div         Ref 10.00 dBm         -37.59 dBm         -37.59 dBm         -37.73 dBm           11 d         1 f         24.933 250 GHz         -37.73 dBm         Stop 25.000 GHz         -25.000 GHz           11 d         1 f         24.933 250 GHz         -37.73 dBm         -37.73 dBm         -40.00 ms (40001 pts)           11 d         1 f         24.933 250 GHz         -37.73 dBm         -40.00 ms (40001 pts)         -50.000000 GHz           11 d         1 f         24.933 250 GHz         -37.73 dBm         -40.00 ms (40001 pts)         -50.000000 GHz           11 d         1 f         24.933 250 GHz         -37.73 dBm         -40.00 ms (40001 pts)         -50.0000000 GHz           11 d         1 f         24.933 250 GHz         -37.93 dBm         -40.00 ms         -60.00 ms         -60.00 ms           11 d         1 f         24.933 250 GHz         -37.93 dBm </td <td></td> <td>PNO: Fast</td> <td></td> <td></td> <td></td> <td></td> <td></td>		PNO: Fast					
10 dB/div       Ref 10.00 dBm       -38.36 dBm         000		IFGain:LOW	WALLEN LO UD	84	kr2 02 720 4		Auto Tune
Cog       Image: Cog	10 dB(diu Bof 10 00 di	Bm		IVI			
Mode         The         Center Freq           100							
200         33         21           400         33         21           400         33         21           400         33         21           400         34         34           400         34         34           400         34         34           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44         44           400         44	0.00						Center Freq
Start 10.000 GHz         Start freq 10.00000000 GHz           Start 10.000 GHz         Stop 25.000 GHz           WER MODE TRC SCL         Y         FUNCTION         FUNCTION WIDTH         FUNCTION VALUE           N         1         f         24.33250 GHz         37.739 dBm         FTRE QT7.33 dBm         FTRE QT7.32 125 GHz         Stop 25.000 GHz         Ftreq Offset 0 Hz           N         1         f         24.353 250 GHz         37.73 dBm         FTRE QT7.32 125 GHz         Stop 25.000 GHz         Ftreq Offset 0 Hz           N         1         f         24.353 250 GHz         37.73 dBm         FTRE QT7.35 dBm         Ftreq Offset 0 Hz           N         1         f         24.353 250 GHz         37.73 dBm         Ftreq Offset 0 Hz         0 Hz           N         1         f         24.353 250 GHz         37.73 dBm         Ftreq Offset 0 Hz         0 Hz           N         1         f         24.353 250 GHz         37.73 dBm         GBm         GBm         GBm         GBm           N         1         f         24.353 250 GHz         37.73 dBm         GBm	-10.0						17.50000000 GHz
40.0       40.0       51000       5100	-20.0					-23.22 dBm	
400       400       400       10.00000000 GHz         500       500       500       500       500         700       10.0000000 GHz       10.00000000 GHz         800       10.0000000 GHz       10.00000000 GHz         Start 10.000 GHz       #VBW 3.0 MHz       Stop 25.000 GHz         90       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1         1       1       1       1       1         1       1       1       1       1       1         1       1       1       1       1       1       1         1       1       1       1       1       1       1       1         1       1       1       1       1       1       1       1       1       1	-30.0					<mark>321</mark> ∧	Start Fred
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With WODE         The 24.933 250 GHz         Y         Function         Function width         Function value	-60.0						
Start 10.000 GHz #Res BW 1.0 MHz         #VBW 3.0 MHz         Stop 25.000 GHz Sweep 40.00 ms (40001 pts)         CF Step 1.50000000 GHz Auto           1         N         1         f         24.353 250 GHz 23.732 125 GHz         -37.73 dBm         FUNCTION WIDTH         FUNCTION VALUE         Auto         Man           1         N         1         f         23.732 125 GHz         -37.73 dBm         FUNCTION WIDTH         FUNCTION VALUE         Auto         Man           3         N         1         f         23.732 125 GHz         -38.36 dBm         General         Genera         General         General	-70.0						
#Res BW 1.0 MHz         #VBW 3.0 MHz         Sweep         40.00 ms (40001 pts)         1.50000000 GHz           MKR MODE         TC         State         Y         FUNCTION         FUNCTION VALUE         Auto         Man           1         N         1         f         24.3520 GHz         -37.73 dBm         Sweep         FUNCTION VALUE         Auto         Man           3         N         1         f         23.732 125 GHz         -38.36 dBm         Sweep         O Hz         O Hz         0 Hz         0 Hz         Freq Offset         0 Hz	-80.0						25.00000000 GHz
#Res BW 1.0 MHz         #VBW 3.0 MHz         Sweep         40.00 ms (40001 pts)         1.50000000 GHz           MKR MODE         TC         State         Y         FUNCTION         FUNCTION VALUE         Auto         Man           1         N         1         f         24.3520 GHz         -37.73 dBm         Sweep         FUNCTION VALUE         Auto         Man           3         N         1         f         23.732 125 GHz         -38.36 dBm         Sweep         O Hz         O Hz         0 Hz         0 Hz         Freq Offset         0 Hz							
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1       N       1       f       24,354,250 GHz       .37,59 dBm         2       N       1       f       24,354,250 GHz       .37,73 dBm         3       N       1       f       24,354,250 GHz       .37,73 dBm         4       1       f       23,732 125 GHz       .38,36 dBm							
2       N       1       f       24.354 250 GHz       -37.73 dBm         3       N       1       f       23.732 125 GHz       -38.36 dBm				FUNCTION FUNCTION	VWIDTH FUNCTIO	N VALUE	
4         6         6         6         6         7         6         7	2 N 1 f	24.354 250 GHz	-37.73 dBm				Erea Offect
		23.732 125 GHZ	-26.36 dBm				•
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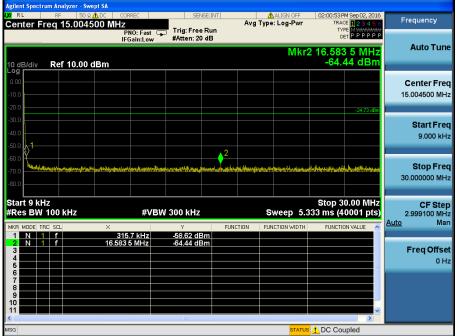


#### **Reference for limit**

## Middle Channel & Modulation : GFSK

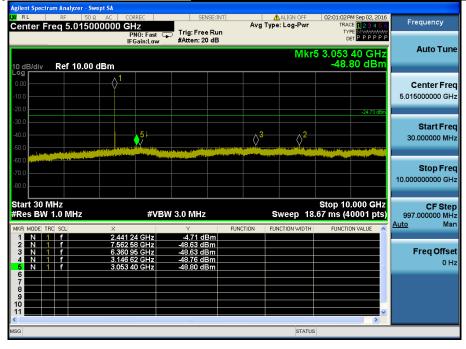


## Conducted Spurious Emissions <u>Middle Channel & Modulation : GFSK</u>





# Middle Channel & Modulation : GFSK



Agilent Spectrum Analyzer - Swept SA		ALIGN OFF	02:01:09 PM Sep 02, 2016 TRACE 1 2 3 4 5 6	Frequency
PN	0: Fast Trig: Free Run ain:Low #Atten: 20 dB	Mkr3 2	23.951 500 GHz -38.09 dBm	Auto Tune
-10.0				Center Freq 17.50000000 GHz
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-60.0				<b>Stop Freq</b> 25.00000000 GHz
Start 10.000 GHz #Res BW 1.0 MHz		Sweep 40	Stop 25.000 GHz .00 ms (40001 pts)	<b>CF Step</b> 1.500000000 GHz <u>Auto</u> Man
1 N 1 f 24,999,250 2 N 1 f 24,617,500 3 N 1 f 23,951,500 4 23,951,500 5 5	GHz -37.20 dBm			<b>Freq Offset</b> 0 Hz
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MSG		STATUS		



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

### Highest Channel & Modulation : GFSK

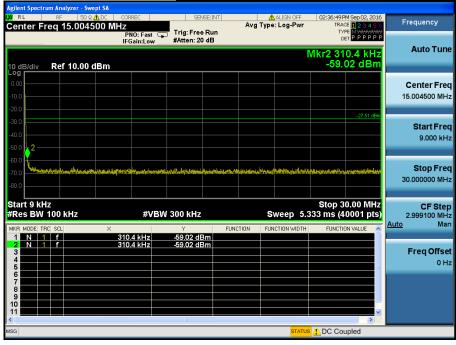


# High Band-edge <u>Hopping mode & Modulation : GFSK</u>





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







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





#### Low Band-edge

# Lowest Channel & Modulation : π/4DQPSK



# Low Band-edge

# Hopping mode & Modulation : π/4DQPSK





# Conducted Spurious Emissions Lowest Char

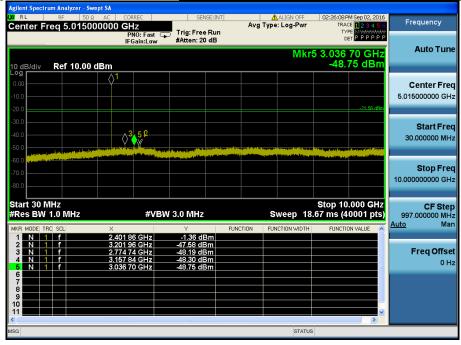
# Lowest Channel & Modulation : π/4DQPSK

Agilent Spectrum Analyzer - Swep						
X RL RF 50 Ω <u>4</u> Center Freg 15.00450		SENSE:IN		ALIGN OFF e: Log-Pwr	02:25:59 PM Sep 02, 2016 TRACE 1 2 3 4 5 6	
Center Fred 15.00450	PNO: Fast	👝 🛛 Trig: Free Rur		e. Log-i wi	TYPE M WAWAAAA DET P P P P P	
	IFGain:Low	#Atten: 20 dB			DET PPPPP	
					Mkr2 281.9 kHz	Auto Tune
10 dB/div Ref 10.00 d	Bm				-58.02 dBm	
Log						
0.00						Center Fred
-10.0						15.004500 MH:
-20.0					-21.56 dBm	
30.0						
-40.0						Start Fred
						9.000 kHz
-50.0						
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-70.0	hedro can be and the second state	n ji kati kati kang jini kati kati kati kati kati kati kati kat	usherraited an and a low star	n hiteranister	lag lastas in also and have dependent of	Stop Fred
-80.0						30.000000 MHz
Start 9 kHz					Stop 30.00 MHz	CF Step
Res BW 100 kHz	#VE	3W 300 kHz	5	Sweep 5.3	33 ms (40001 pts)	2.999100 MHz
MKR MODE TRC SCL	X	Y	FUNCTION FU	NCTION WIDTH	FUNCTION VALUE	Auto Mar
1 N 1 f	281.9 kHz 281.9 kHz	-58.02 dBm -58.02 dBm				
2 N 1 f	281.9 KHZ	-58.02 dBm				Freq Offset
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ISG				CTATUS	DC Coupled	
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# Conducted Spurious Emissions <u>Lowest Channel & Modulation : π/4DQPSK</u>



Agilent Spect	um Analyzer -	Swept SA								
LXI RL		50Ω AC COR		SENSE	INT		ALIGN OFF		M Sep 02, 2016	
Center F	req 17.50	0000000 G	HZ 10: Fast G	Trig: Free F	lun	Avg Type	: Log-Pwr	TYP	CE 123456 PE MWWWWWW	
			io: Fast 🔾 iain:Low	#Atten: 20 d				De	ТРРРРР	
							Mkr3.2	4 135 2	50 GHz	Auto Tune
10 dB/div	Ref 10.0	0 dBm					MINIO 2		96 dBm	
Log	Rel IU.U									
0.00										Center Freq
-10.0										17.500000000 GHz
-20.0									-21.56 dBm	
-30.0										Start Freq
-40.0				الم المسلما المسلم	فللناميع والملافة	فبالد ويبر بالانتقا	And in the second second	a constant and the party of	Contract of the second	10.000000000 GHz
-50.0 <b></b>	the second s	and the second production of	A Direction of the second s				A DESCRIPTION OF THE OWNER OF THE	and the second secon		
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Start 10.0								Oton 25	.000 GHz	
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			<i>"</i> 0 E 1					,		Auto Man
MKR MODE T		× 24.202.000		۲ -37.81 dBn	FUNCT	TON FUN	ICTION WIDTH	FUNCTIO	N VALUE	
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3 N 1	f	24.135 250		-37.96 dBn						Freq Offset
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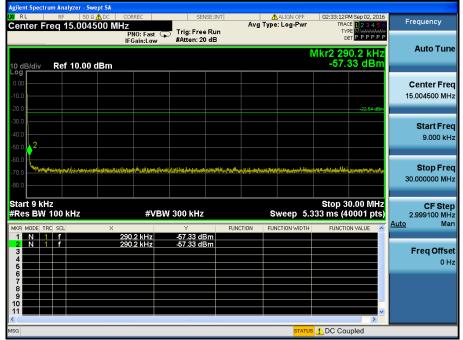
#### **Reference for limit**

# Middle Channel & Modulation : π/4DQPSK



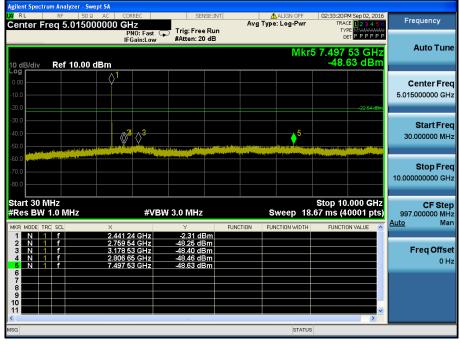
# Conducted Spurious Emissions

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





## Middle Channel & Modulation : π/4DQPSK



Agilent Spectri	um Analyzer - S	wept SA										
LXIRL	RF 50		SENSE:I		ALIGN OFF	02:33:28 PM Sep 02, 2016	Frequency					
Center Fr	eq 17.500	0000000 GHz PNO: Fast IFGain:Lov		in Ö	Type: Log-Pwr	TRACE 12345 C TYPE MUNICIPAL PPPPF DET PPPPF						
10 dB/div												
-10.0						-22.54 dBm	Center Fred 17.500000000 GHz					
-30.0 -40.0 -50.0						<b>→</b> <sup>3</sup> - <del>)</del> <sup>2</sup>	Start Fred 10.000000000 GHz					
-60.0 -70.0 -80.0							<b>Stop Fred</b> 25.000000000 GHz					
Start 10.0 #Res BW		#V	'BW 3.0 MHz		Sweep 40	Stop 25.000 GHz .00 ms (40001 pts)	CF Step 1.50000000 GHz					
MKR MODE TR	f	× 24.938 500 GHz	۲ -37.58 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Mar					
2 N 1 3 N 1 4 5	f	24.601 375 GHz 23.872 375 GHz	-37.72 dBm -37.77 dBm				Freq Offset 0 Hz					
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## **High Band-edge**

# Highest Channel & Modulation : π/4DQPSK



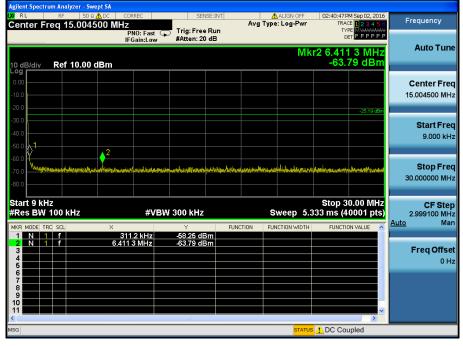
## High Band-edge

# <u>Hopping mode & Modulation : π/4DQPSK</u>





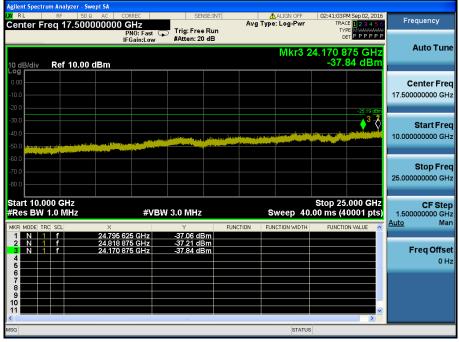
## Highest Channel & Modulation : π/4DQPSK



	um Analyzer - Swe							
Center F	RF 50 Ω reg 5.01500			NSE:INT		ALIGN OFF	02:40:56 PM Sep 02, 2010 TRACE 1 2 3 4 5	Frequency
		PNO: F IFGain:	ast 😱 Trig: Fre Low #Atten: 2			Mkr	түре ререре	Auto Tune
10 dB/div 0.00	Ref 10.00 c						-48.97 dBm	Center Freq 5.015000000 GHz
-20.0 -30.0 -40.0 -50.0		$a^2$	5	3	- an t	an the Local and a second s	-25.19 dBm	Start Freq 30.000000 MHz
-60.0 -70.0 -80.0							ander de la contra d Internet de la contra	<b>Stop Freq</b> 10.000000000 GHz
Start 30 N #Res BW			#VBW 3.0 MH2			weep 18.	Stop 10.000 GHz 67 ms (40001 pts	
MKR         MODE         TH           1         N         1           2         N         1           3         N         1           4         N         1           5         N         1           6         7         8	Image: SCL         Image: Scheme	× 2.480 38 GF 2.388 65 GF 5.792 66 GF 3.160 83 GF 3.297 92 GF	Hz -48.63 d Hz -48.75 d Hz -48.88 d	Bm Bm Bm	TION FUN	ICTION WIDTH	FUNCTION VALUE	Freq Offset 0 Hz
9 10 11 <						STATUS	×	



## Highest Channel & Modulation : π/4DQPSK





#### Low Band-edge

## Lowest Channel & Modulation : 8DPSK

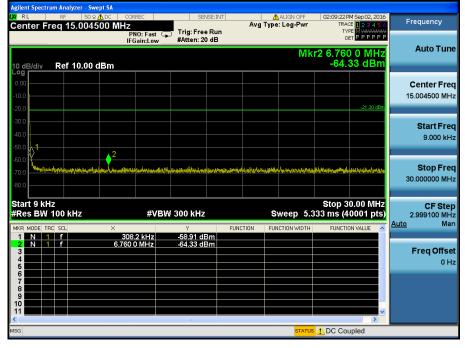


# Low Band-edge <u>Hopping mode & Modulation : 8DPSK</u>





## Lowest Channel & Modulation : 8DPSK



		Analyzer -											
K/RL			50Ω A		RREC		SENSE:	INT	Δυσ Τυ	ALIGN OFF		M Sep 02, 2016	Frequency
Center	Fred	5.013	50000	P	12 NO: Fast Gain:Lov		g: Free Ru ten: 20 dB			pe. Log-i wi	TY		
10 dB/di	v R	ef 10.0	)0 dBr	n						Mkr		26 GHz 68 dBm	Auto Tune
Log 0.00 -10.0 -20.0				<b>\</b> 1								-21.30 dBm	Center Fre 5.015000000 GH
-30.0	و المراجع المراجع	An and selected as a loss		5	↓ 			∕ <mark>3</mark>	prost	¢ <sup>2</sup>	and the second secon	in a filling of parts of the fille	Start Fre 30.000000 MH
-60.0	لمدهر <sub>( ا</sub> دام <sub>ین</sub> )										in the second state of the		<b>Stop Fre</b> 10.000000000 GH
Start 30 #Res B					#∖	/BW 3.0	MHz			Sweep 18	Stop 10 .67 ms (4	.000 GHz 0001 pts)	CF Ste 997.000000 MH
MKR MODE	E TRC S	CL f		× 2.402 1	1 GHz	-	√ .23 dBm	FUNC	TION F	UNCTION WIDTH	FUNCTION	ON VALUE	<u>Auto</u> Ma
2 N 3 N 4 N 5 N	1 1 1	f f f f		6.978 5 5.321 0 3.188 2 2.767 2	8 GHz 5 GHz	-48 -48	23 dBm 58 dBm 60 dBm						Freq Offse 0 H
6 7 8 9													
10												~	
¢												>	



## Lowest Channel & Modulation : 8DPSK



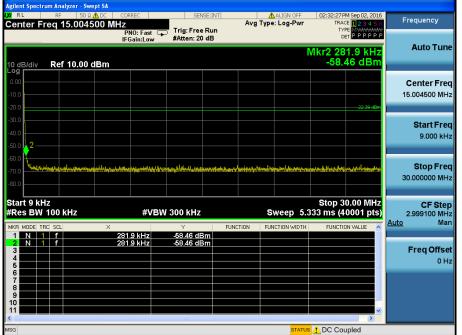


#### **Reference for limit**

## Middle Channel & Modulation : 8DPSK

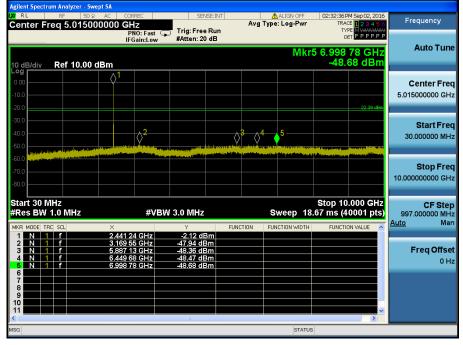


# Conducted Spurious Emissions <u>Middle Channel & Modulation : 8DPSK</u>





## Middle Channel & Modulation : 8DPSK



gilent Specti	um Analyzer - RF 5	Swept SA 0 Q AC CORREC	OT NO	E:INT	ALIGN OFF	00,00,4404,00,00,0046					
		0000000 GHz	ast 😱 Trig: Free	Av Run	g Type: Log-Pwr	02:32:44 PM Sep 02, 2016 TRACE 1 2 3 4 5 6 TYPE M WWWWWW DET P P P P P	Frequency				
0 dB/div	Mkr3 23.731 000 GHz           B/div         Ref 10.00 dBm         -37.84 dBm										
0.00 10.0						22.39.450	Center Fre 17.500000000 GH				
30.0 40.0 50.0			م روی به از از آستان از این روی این و روی این و روی بر از روی به منطقه این از می و می این و می و می و می و روی و	new start and a start of the st		32 A	Start Fre 10.000000000 G⊦				
60.0 70.0 80.0							Stop Fre 25.000000000 G⊦				
tart 10.0 Res BW	00 GHz 1.0 MHz		#VBW 3.0 MHz		Sweep 40	Stop 25.000 GHz .00 ms (40001 pts)	CF Ste 1.50000000 GH				
IN 1	RC SCL	× 24.747 625 GI	۲ Hz36.98 dBi		FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma				
2 N 1 3 N 1 4 5	f	23.964 250 GI 23.731 000 GI					Freq Offso 0 ⊦				
6 7 8 9 10											
11 <b></b>						×					
SG					STATUS						



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

### Highest Channel & Modulation : 8DPSK

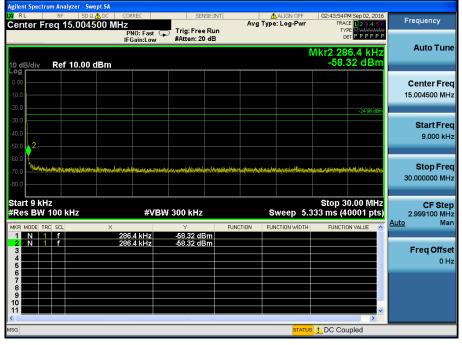


# High Band-edge Hopping mode & Modulation : 8DPSK





## Highest Channel & Modulation : 8DPSK



RL RF	50 Q AC CORREC	SENSE:INT	ALIGN OFF	02:44:03 PM Sep 02, 2016	
	15000000 GHz PNO: Fa	st 😱 Trig: Free Run	Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWWW DET PPPPP	Frequency
0 dB/div Ref 10	0.00 dBm		Mkr	5 6.814 09 GHz -48.95 dBm	Auto Tun
og 0.00 10.0 20.0	\01			-24,96 dBm	Center Fre 5.015000000 GH
50.0 50.0 50.0	Careford and the second s	Of Density of the providence of the second	\$ <sup>3</sup> ∳ <sup>5</sup> \$ <sup>4</sup> \$ <sup>2</sup>	ant was to appreciate the state of the state	Start Fre 30.000000 M⊦
60.0 70.0 					Stop Fre 10.000000000 G⊦
tart 30 MHz Res BW 1.0 MH	z #	VBW 3.0 MHz	Sweep 18	Stop 10.000 GHz .67 ms (40001 pts)	CF Ste 997.000000 MH
IKR MODE TRC SCL	× 2.480 13 GH:		FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Ma
2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	7.557 85 GH 5.867 93 GH 7.118 42 GH 6.814 09 GH	z -48.76 dBm z -48.94 dBm			Freq Offs 0 ⊦
7 8 9 0					
				×	



# Highest Channel & Modulation : 8DPSK





# 8. Transmitter AC Power Line Conducted Emission

### 8.1 Test Setup

#### Not Applicable

#### 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 Range (MHz)	Conducted Limit (dBuV)				
Frequency nange (Minz)	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.



# 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 on PCB. (Refer to Internal photo file.)

#### - 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. Occupied Bandwidth (99 %)

# 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**

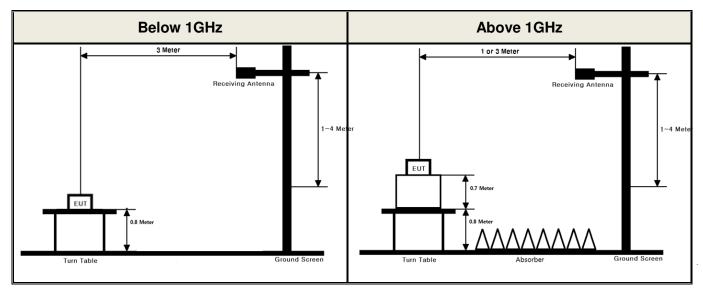
Not Applicable



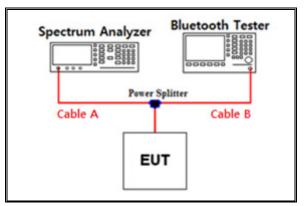
# **APPENDIX I**

#### Test set up diagrams

Radiated Measurement



#### Conducted Measurement



#### Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	5.95	15	8.54
1	6.21	20	9.14
2402 & 2440 & 2480	6.71	25	9.72
5	6.91	-	-
10	8.08	-	-

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

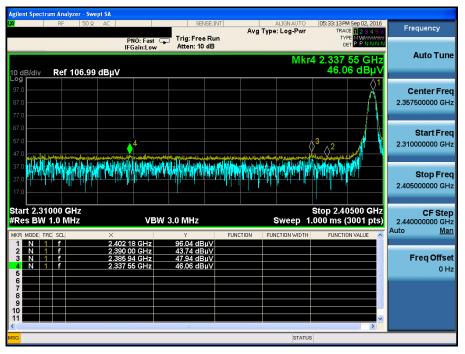
Path loss (S/A's Correction factor) = Cable A + Power splitter



# **APPENDIX II**

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

#### GFSK & Lowest & X & Ver



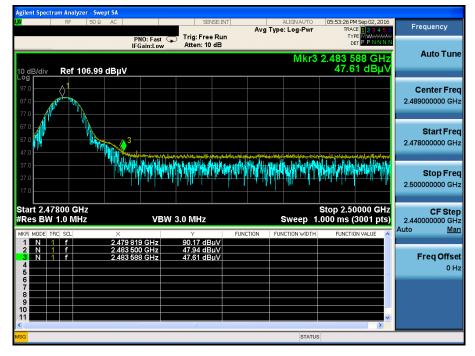
#### Detector Mode : AV

GFSK & Lowest & X & Ver





# GFSK & Highest & X & Ver



#### **Detector Mode : AV**

### GFSK & Highest & X & Ver





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

Agilent Spectrum Analyzer - Swept SA					
<b>μχμ</b> RF 50Ω AC	PNO: Fast 😱 Tr	ig: Free Run	ALIGN AUTO Avg Type: Log-Pwr	05:39:53 PM Sep 02, 2016 TRACE 1 2 3 4 5 6 TYPE M WWWWW	Frequency
10 dB/div Ref 106.99 dBµV	IFGain:Low A	tten: 10 dB	Mkr	ост Р РИЛИИ 3 2.385 72 GHz 47.17 dBµV	Auto Tune
97.0 87.0 77.0					Center Freq 2.357500000 GHz
67.0 57.0 47.0		1 gilley i Jacob and and and a star a star	dentition and the adjustic province for	3	Start Freq 2.310000000 GHz
37.0 <b>444 44 44 44 44 44 44 44 44 44 44 44 4</b>	And Anna Anna Anna Anna Anna Anna Anna A	ANTH COMPANY AND A			<b>Stop Freq</b> 2.405000000 GHz
Start 2.31000 GHz #Res BW 1.0 MHz	VBW 3.0		Sweep 1	Stop 2.40500 GHz .000 ms (3001 pts)	<b>CF Step</b> 2.440000000 GHz Auto <u>Man</u>
2 N 1 f 2.38 3 N 1 f 2.38 4 6 6 6 7 8	0 00 GHz 44	Y FUNCTIO 3.62 dBµV 3.34 dBµV .17 dBµV	N FUNCTION WIDTH	FUNCTION VALUE	Freq Offset 0 Hz
9 10 11 K MSG			STATUS	3	

#### π/4DQPSK & Lowest & X & Ver

#### ım Analyzer - Swept S*I* ent Sp Frequency Avg Type: Log-Pwr Avg|Hold: 200/200 TYPE M WAR DET P P N Trig: Free Run Atten: 10 dB PNO: Fast ↔→ IFGain:Low Auto Tune Mkr3 2.385 78 GHz 37.257 dBµ\ Ref 106.99 dBµV B/div **Center Freq** 2.357500000 GHz Start Freq 2.31000000 GHz $\wedge^2$ **Stop Freq** 2.40500000 GHz Stop 2.40500 GHz Sweep 74.20 ms (3001 pts) Start 2.31000 GHz #Res BW 1.0 MHz **CF Step** 2.440000000 GHz Auto <u>Man</u> #VBW 1.0 kHz FUNCTION FUNCTI Freq Offset 0 Hz STATUS



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

Agilent Spectrum Analyzer - Swept SA				
<b>LXI</b> RF 50Ω AC	SENSE:I		05:59:51 PM Sep 02, 2016	Frequency
	Tain Face Du	Avg Type: Log-Pwr	TRACE 123456	requeitcy
	: Fast 🖵 Trig: Free Ru in:Low Atten: 10 dB	n	TYPE MWARAAAA DET P P N N N N	
IFGa	In:Low Attent to do			Auto Tune
		Mkr3	2.483 573 GHz	Auto Tune
10 dB/div Ref 106.99 dBµV			48.16 dBµV	
Log			· · · · ·	
97.0				Center Freq
87.0				2.489000000 GHz
				2.46900000 GH2
77.0				
				Start Freq
57.0				2.478000000 GHz
47.0				
Methods at a second	en al lata di shika ka di s	a that deal installa, bit Manair, a tit actual as	the state of the s	
37.0	u in the second second	NAMIN'NY TANÀNA MANAZA MPINA	WATER ALTERNIE	Stop Freq
27.0	and a find the first first star	an in the base of the standard states to		
17.0		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		2.50000000 GHz
17.0				
Start 2.47800 GHz			Stop 2.50000 GHz	
		8		CF Step
#Res BW 1.0 MHz	VBW 3.0 MHz	Sweep 1	.000 ms (3001 pts)	2.440000000 GHz
MKR MODE TRC SCL X	Y	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto <u>Man</u>
1 N 1 f 2.479 929 (				
2 N 1 f 2.483 500 (	GHz 47.19 dBµV			
3 N 1 f 2.483 573 (	GHz 48.16 dBµV			Freq Offset
4			-	0 Hz
6				
7				
8				
9				
10			~	
<	111		×	
MSG		STATU		
		STATO	3	

#### **Detector Mode : AV**

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





# 8DPSK & Lowest & X & Ver

Agilent Spectrum Analyzer - Swept SA					
<b>LXI</b> RF 50 Ω AC		SENSE:INT Avg 1	ALIGNAUTO	05:38:02 PM Sep 02, 2016 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 106.99 dBµV	IFGain:Low Atten:	ree Run 10 dB		2.385 81 GHz 47.44 dBuV	Auto Tune
97.0 87.0 77.0					Center Freq 2.357500000 GHz
67.0 57.0 47.0	wayshire and a straight of the state	ระการประการสารสารสารสารสารสารสารสารสารสารสารสารสา	wywaliaty, bijanii jaba	3	<b>Start Freq</b> 2.310000000 GHz
37.0 <b>11.0 11.</b>	rand a far an	ann an ann an ann ann ann ann ann ann a	ulan kana	nite for the second	<b>Stop Freq</b> 2.405000000 GHz
Start 2.31000 GHz #Res BW 1.0 MHz	VBW 3.0 MH	Z	Sweep 1.	Stop 2.40500 GHz 000 ms (3001 pts)	<b>CF Step</b> 2.44000000 GHz Auto <u>Man</u>
2 N 1 f 2.39	01 96 GHz 98.74 90 00 GHz 44.79 85 81 GHz 47.44	dBµV			Freq Offset 0 Hz
<pre>11 MSG</pre>			STATUS	>	

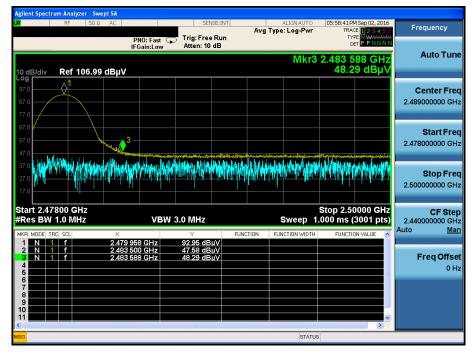
#### **Detector Mode : AV**

## 8DPSK & Lowest & X & Ver

gilent Spectrum Analyzer - S						
0 RF 50	I Q AC PNO: F IFGain:	ast ⊶⊷ Trig:Free	Run Avg	ALIGN AUTO Type: Log-Pwr Hold: 200/200	05:37:31 PM Sep 02, 2016 TRACE 2 3 4 5 6 TYPE MW470000 DET P P N N N N	Frequency
10 dB/div Ref 106.9				Mkr	3 2.385 94 GHz 37.292 dBμV	Auto Tun
97.0 87.0 77.0						Center Fre 2.357500000 G⊦
67.0 57.0 47.0					3 .2	Start Fre 2.310000000 G⊦
37.0 27.0 17.0						<b>Stop Fre</b> 2.405000000 GH
tart 2.31000 GHz Res BW 1.0 MHz		#VBW 1.0 kHz		Sweep 7	Stop 2.40500 GHz 4.20 ms (3001 pts)	CF Ste 2.44000000 GI Auto Mi
MKR         MODE         TRC         SCL           1         N         1         f           2         N         1         f           3         N         1         f           4         -         -         -           5         -         -         -	× 2.402 02 GF 2.390 00 GF 2.385 94 GF	Iz 34.756 dB	ıV	FUNCTION WIDTH	FUNCTION VALUE	Freq Offs 0 F
6 7 8 9 10 11					·	
s <mark>g</mark>		III		STATUS		



#### 8DPSK & Highest & X & Ver



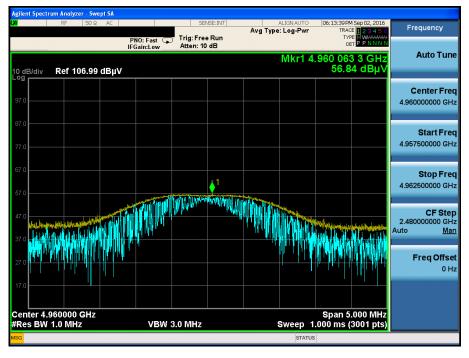
#### **Detector Mode : AV**

### 8DPSK & Highest & X & Ver

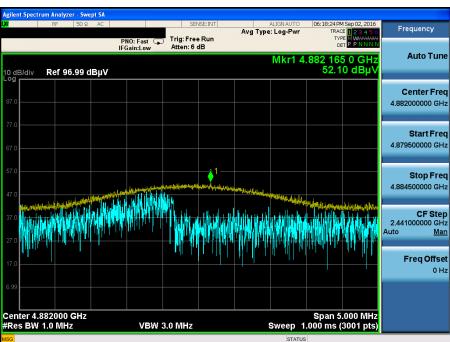




## GFSK & Highest & X & Ver



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



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

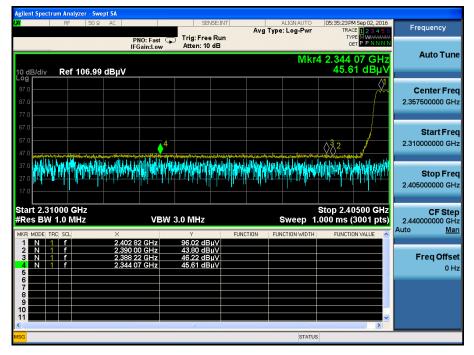


# 8DPSK & Middle & X & Ver



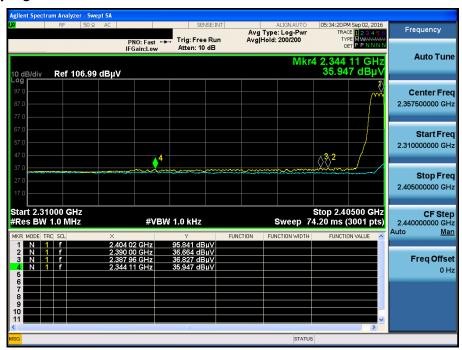


#### GFSK & Hopping mode & X & Ver



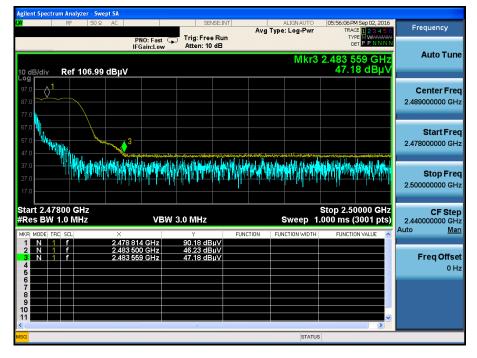
#### Detector Mode : AV

#### GFSK & Hopping mode & X & Ver





## GFSK & Hopping mode & X & Ver

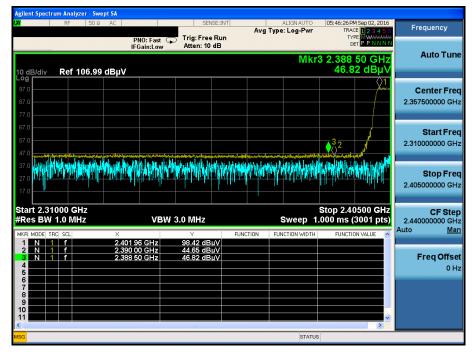


#### GFSK & Hopping mode & X & Ver





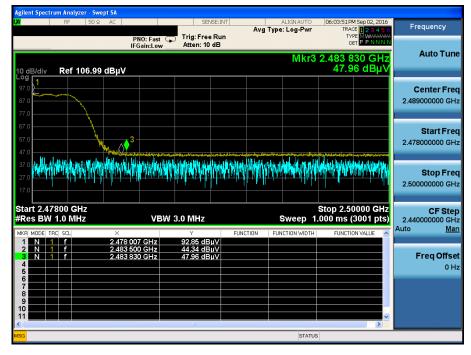
#### $\pi/4DQPSK$ & Hopping mode & X & Ver



#### $\pi/4DQPSK$ & Hopping mode & X & Ver

#### eilent Spectrum Analyzer - Swept S/ Frequency Avg Type: Log-Pwr Avg|Hold: 200/200 TRACE TYPE DE Trig: Free Run Atten: 10 dB PNO: Fast ++++ IFGain:Low Auto Tune Mkr3 2.388 95 GHz 37.673 dBµV Ref 106.99 dBµV B/div **Center Freq** 2.357500000 GHz Start Freq 2.310000000 GHz **3**2 Stop Freq 2.405000000 GHz Stop 2.40500 GHz 74.20 ms (3001 pts) Start 2.31000 GHz #Res BW 1.0 MHz CF Step 2.44000000 GHz #VBW 1.0 kHz Sweep Man Auto 95.788 dBµV 37.431 dBµV 37.673 dBµV Freq Offset 0 Hz STATUS

# $\pi/4DQPSK$ & Hopping mode & X & Ver

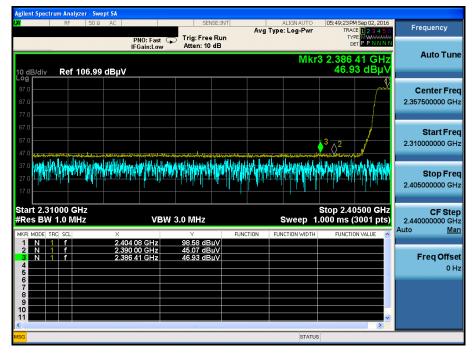


#### $\pi/4DQPSK$ & Hopping mode & X & Ver





## 8DPSK & Hopping mode & X & Ver

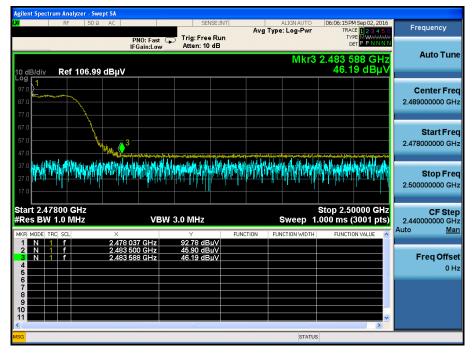


#### 8DPSK & Hopping mode & X & Ver

#### ilent Spectrum Analyzer - Swept SA Frequency Avg Type: Log-Pwr Avg|Hold: 200/200 TRACE TYPE DE Trig: Free Run Atten: 10 dB PNO: Fast +++ IFGain:Low Auto Tune Mkr3 2.386 03 GHz 37.814 dBµV Ref 106.99 dBµV B/div **Center Freq** 2.357500000 GHz Start Freq 2.310000000 GHz <sup>3</sup> <sup>2</sup> Stop Freq 2.405000000 GHz Stop 2.40500 GHz 74.20 ms (3001 pts) Start 2.31000 GHz #Res BW 1.0 MHz CF Step 2.440000000 GHz uto <u>Man</u> #VBW 1.0 kHz Sweep Auto 95.696 dBµ 37.327 dBµ 37.814 dBµ Freq Offset 0 Hz STATUS



# 8DPSK & Hopping mode & X & Ver



#### 8DPSK & Hopping mode & X & Ver

#### nt Spectrum Analy Swept SJ TRAC TYP Frequency Avg Type: Log-Pwr Avg|Hold: 200/200 Trig: Free Run Atten: 10 dB MWW P P N PNO: Fast ↔→ IFGain:Low Auto Tune Mkr3 2.483 515 GHz 36.954 dBµV Ref 106.99 dBµV /div **Center Freq** 2.489000000 GHz Start Freq 2.478000000 GHz **→**<sup>3</sup> Stop Freq 2.50000000 GHz Stop 2.50000 GHz Sweep 17.20 ms (3001 pts) Start 2.47800 GHz #Res BW 1.0 MHz CF Step 2.44000000 GHz #VBW 1.0 kHz Man Auto 2.483 500 2.483 515 36.985 dBµ\ 36.954 dBµ\ Freq Offset 0 Hz STATUS