5. CONDUCTED SPURIOUS EMISSIONS

5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	N9030A	MY51380221	Oct.31, 13	1Year
2.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr. 28,14	1 Year
3.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	Apr. 28,14	1 Year

5.2. Limit

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

5.3. Test Procedure

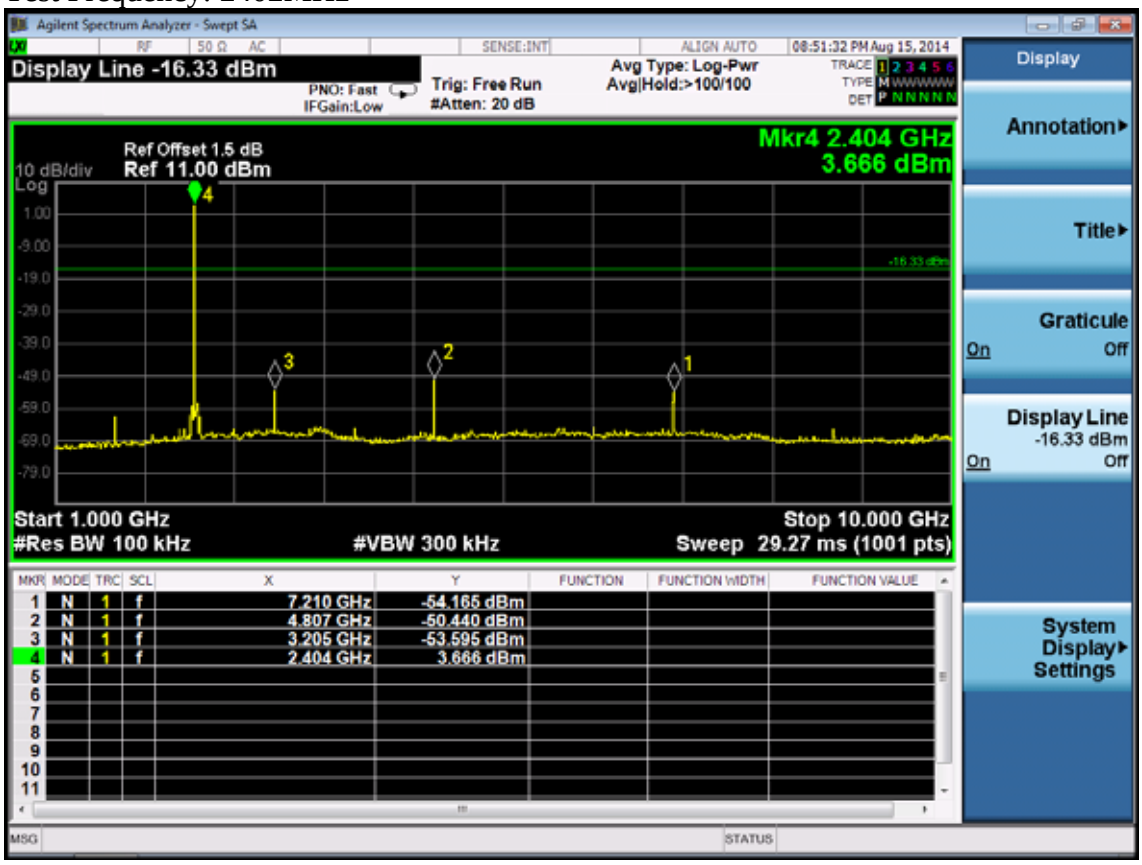
The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz and measure all the emissions detected.

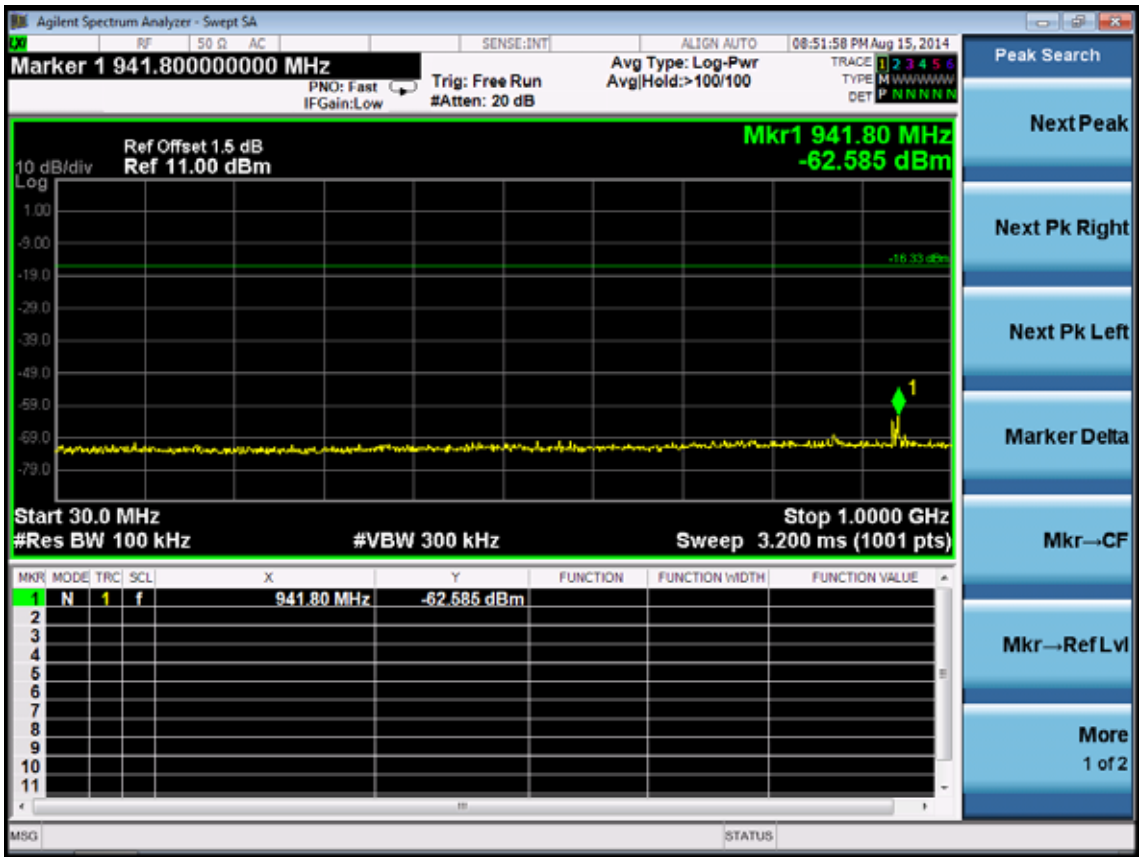
5.4. Test result

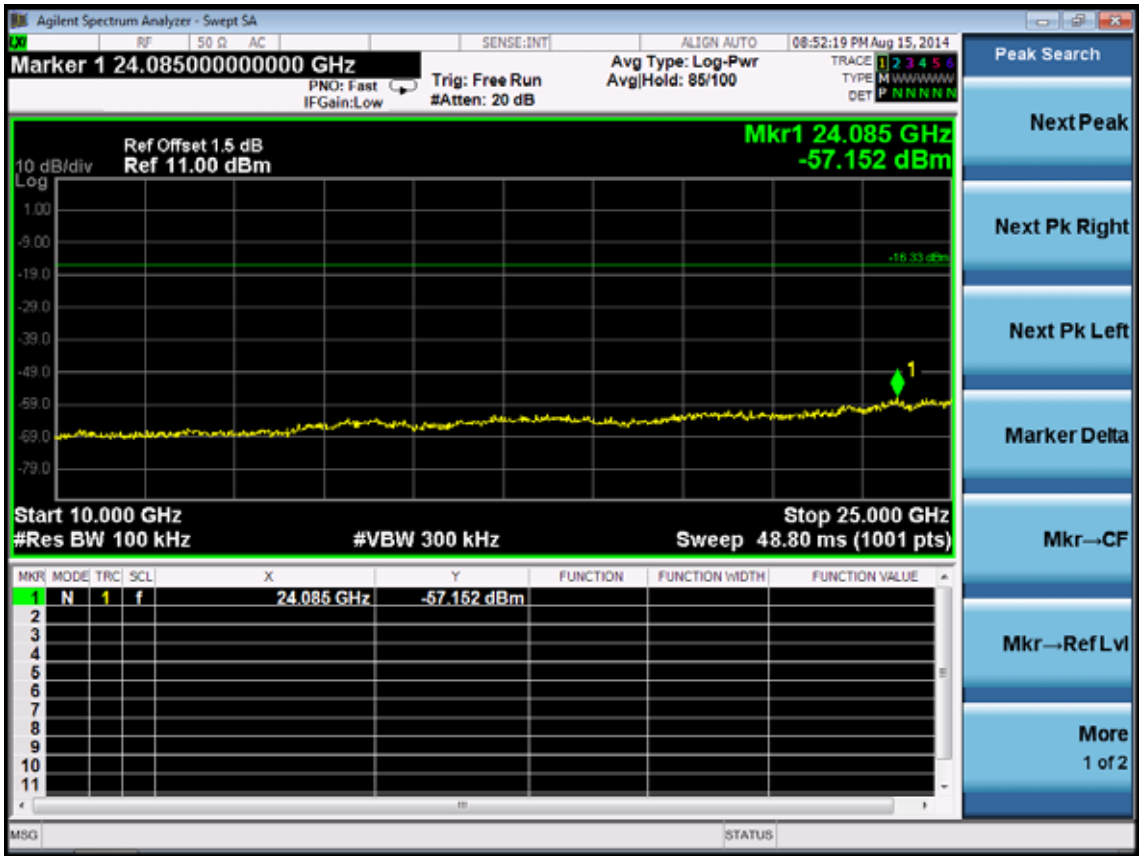
PASS (The testing data was attached in the next pages.)

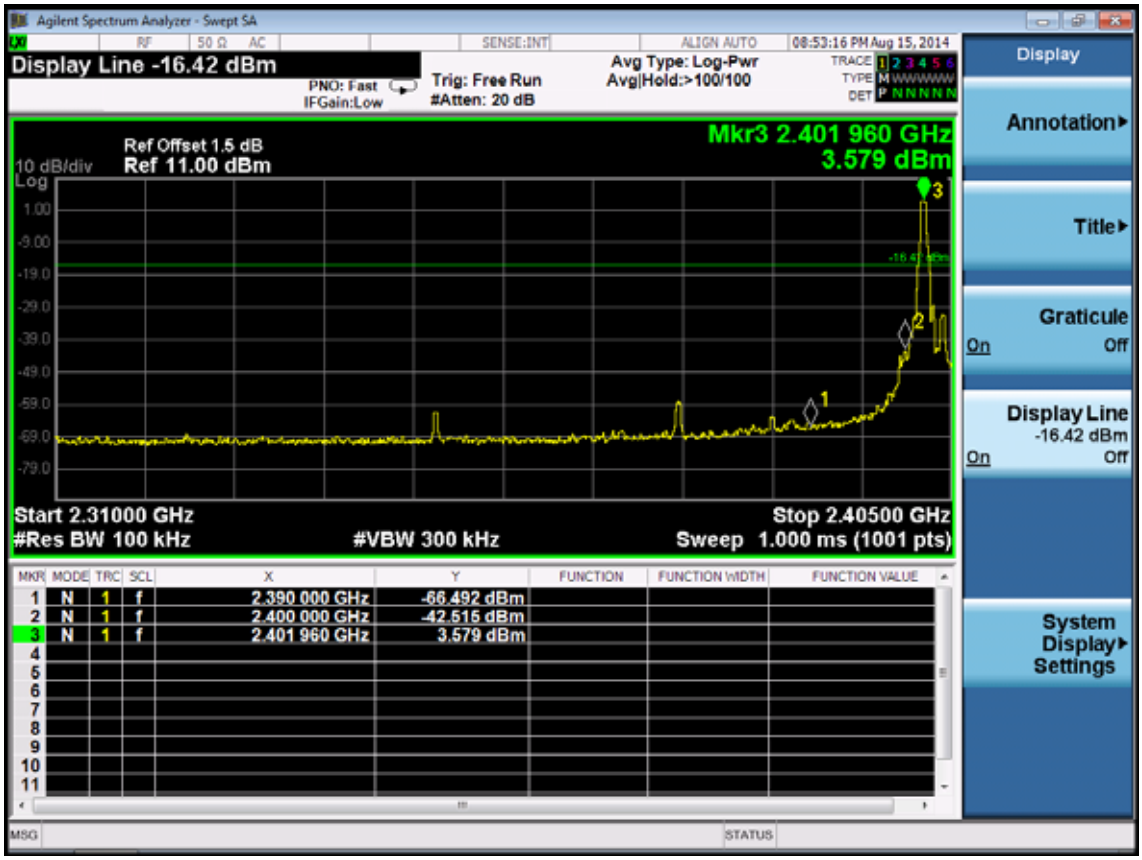
GFSK

Test Frequency: 2402MHz

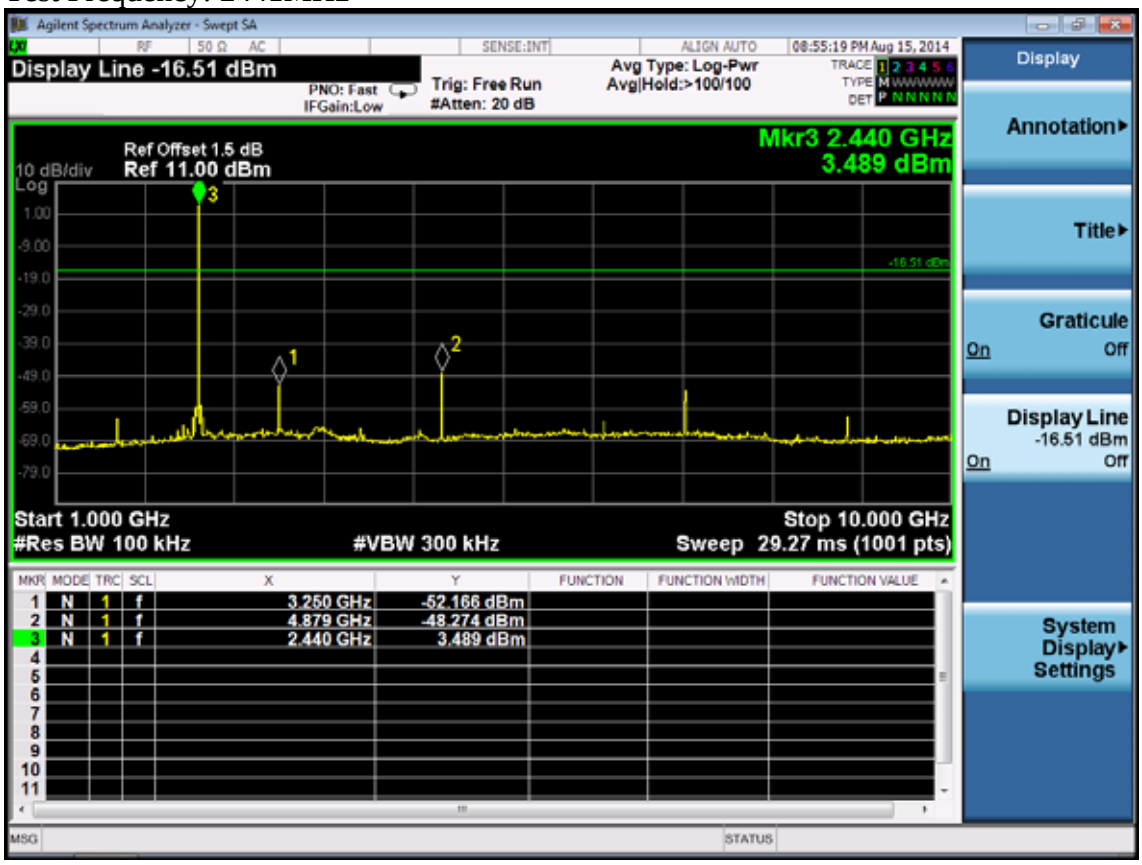


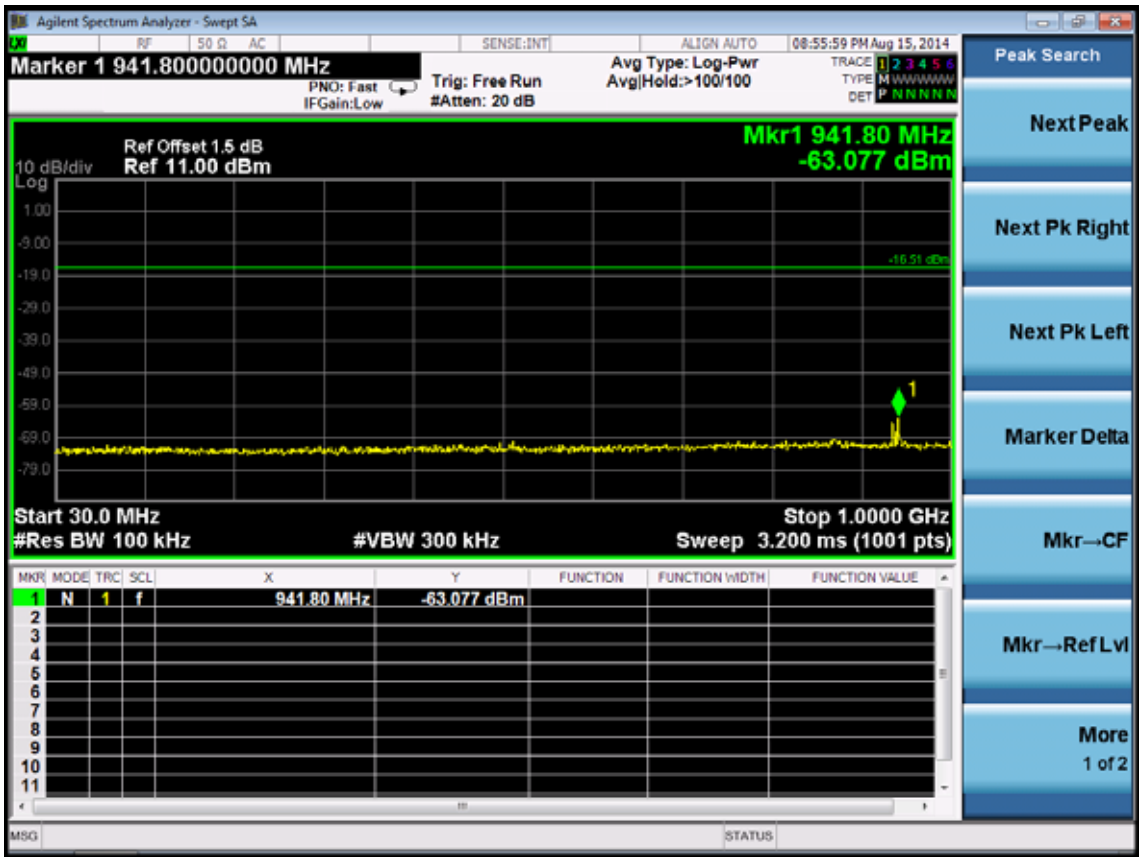


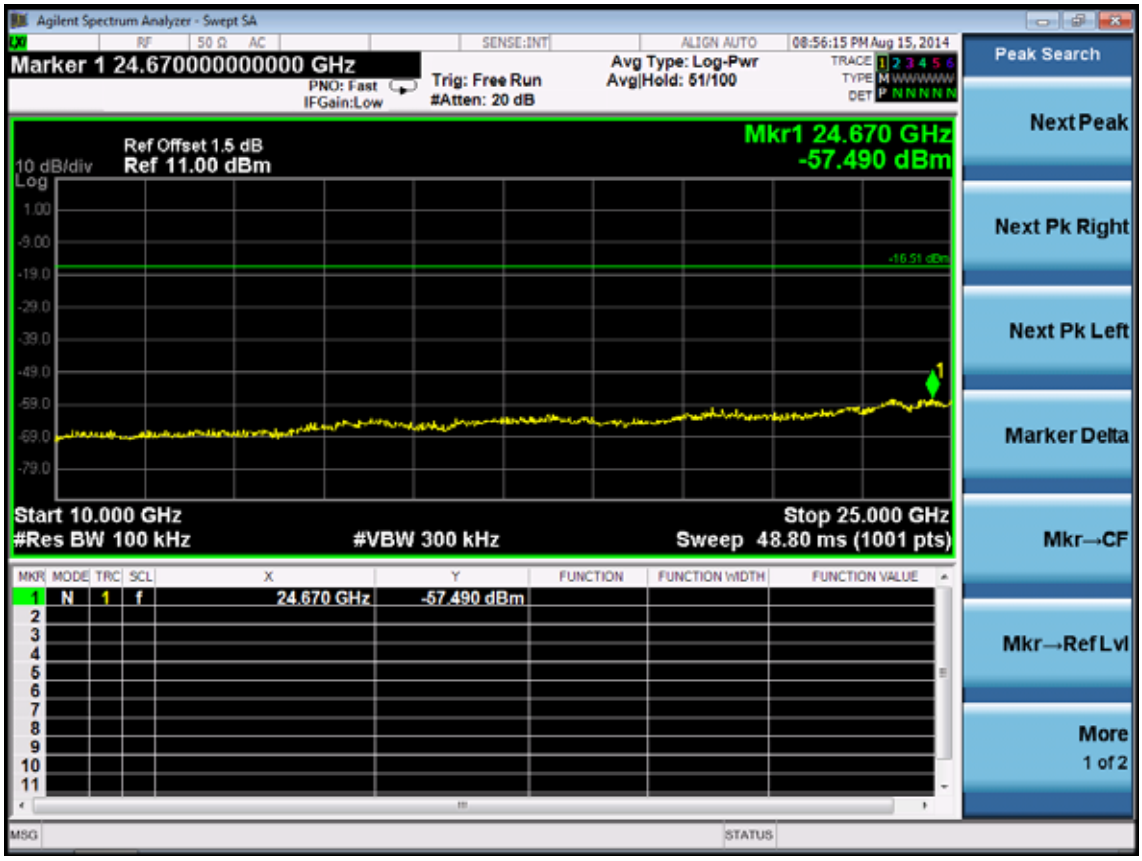

Agilent Spectrum Analyzer - Swept SA
Marker 1 24.085000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 85/100
08:52:19 PM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Log
Mkr1 24.085 GHz
-57.152 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 48.80 ms (1001 pts)
1 N 1 f 24.085 GHz -57.152 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Display Line -16.42 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:53:16 PM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Log
Mkr3 2.401 960 GHz
3.579 dBm
Start 2.31000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.40500 GHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.390 000 GHz -66.492 dBm
2 N 1 f 2.400 000 GHz -42.515 dBm
3 N 1 f 2.401 960 GHz 3.579 dBm
Display
Annotation
Title
Graticule
On Off
Display Line
-16.42 dBm
On Off
System
Display
Settings

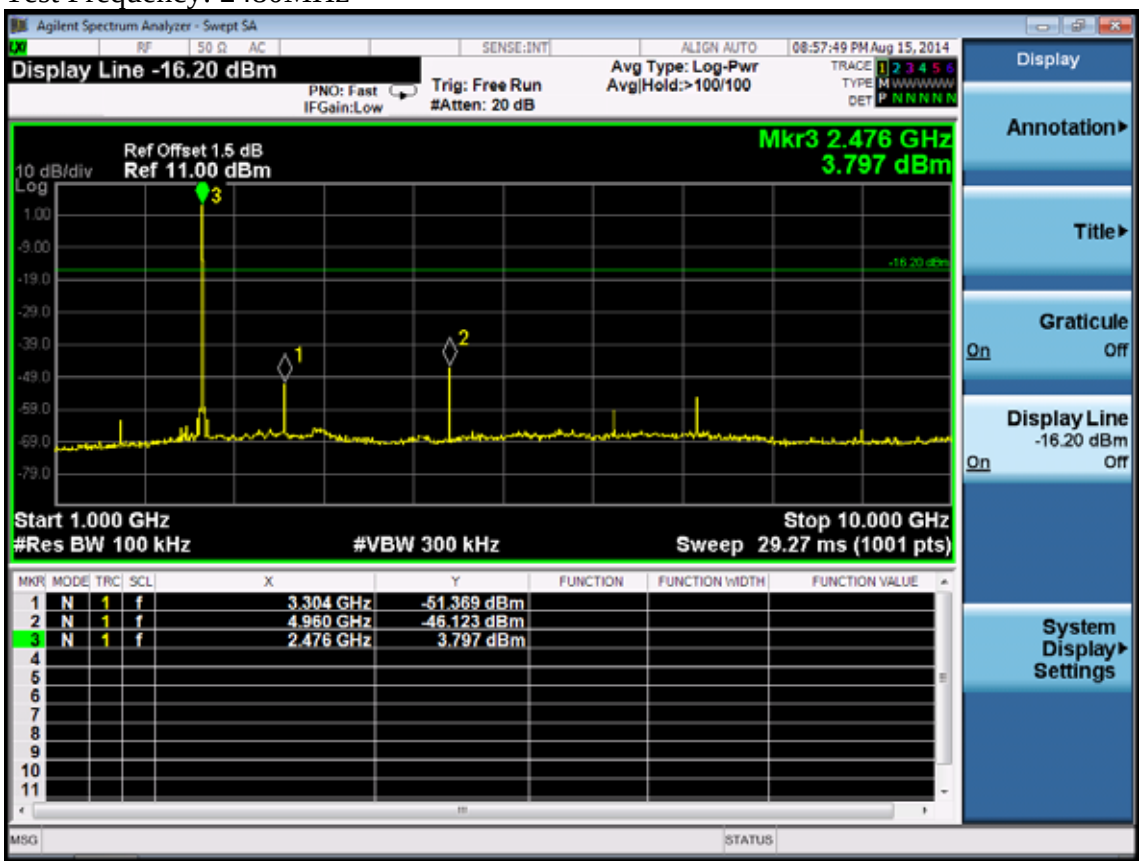
Test Frequency: 2441MHz

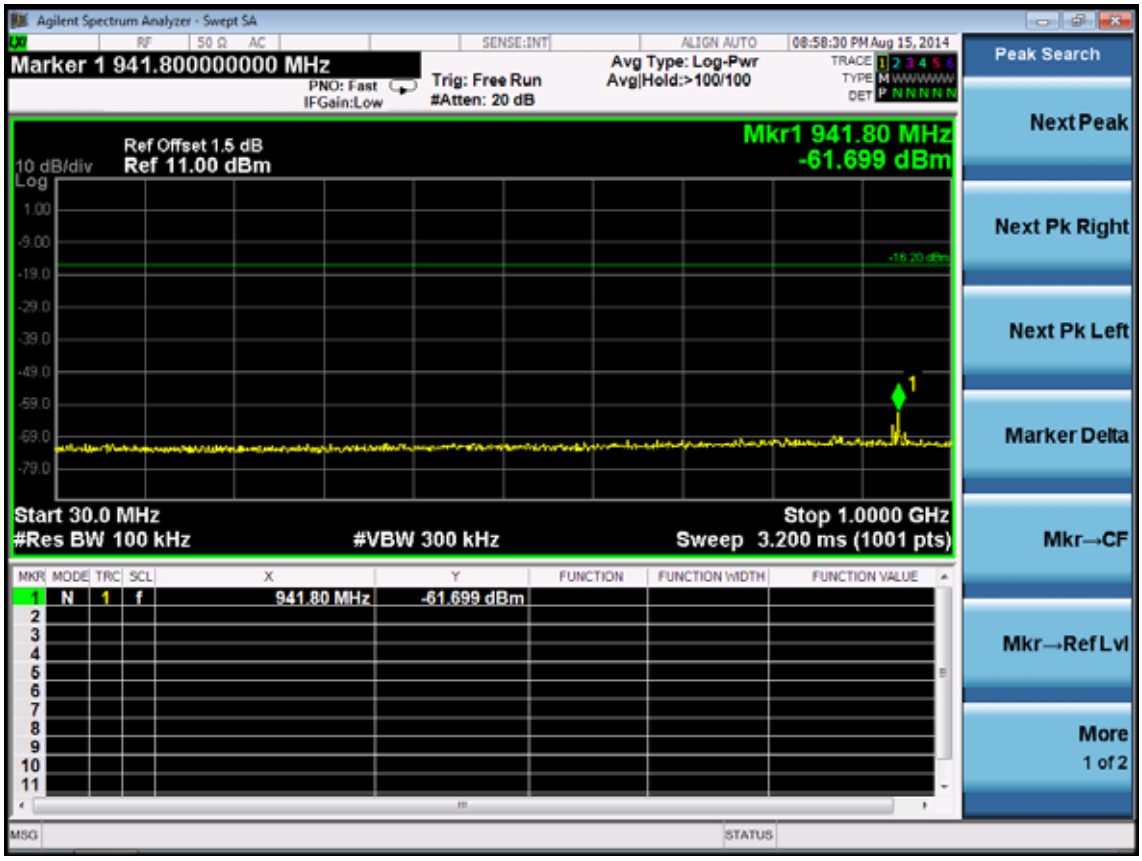


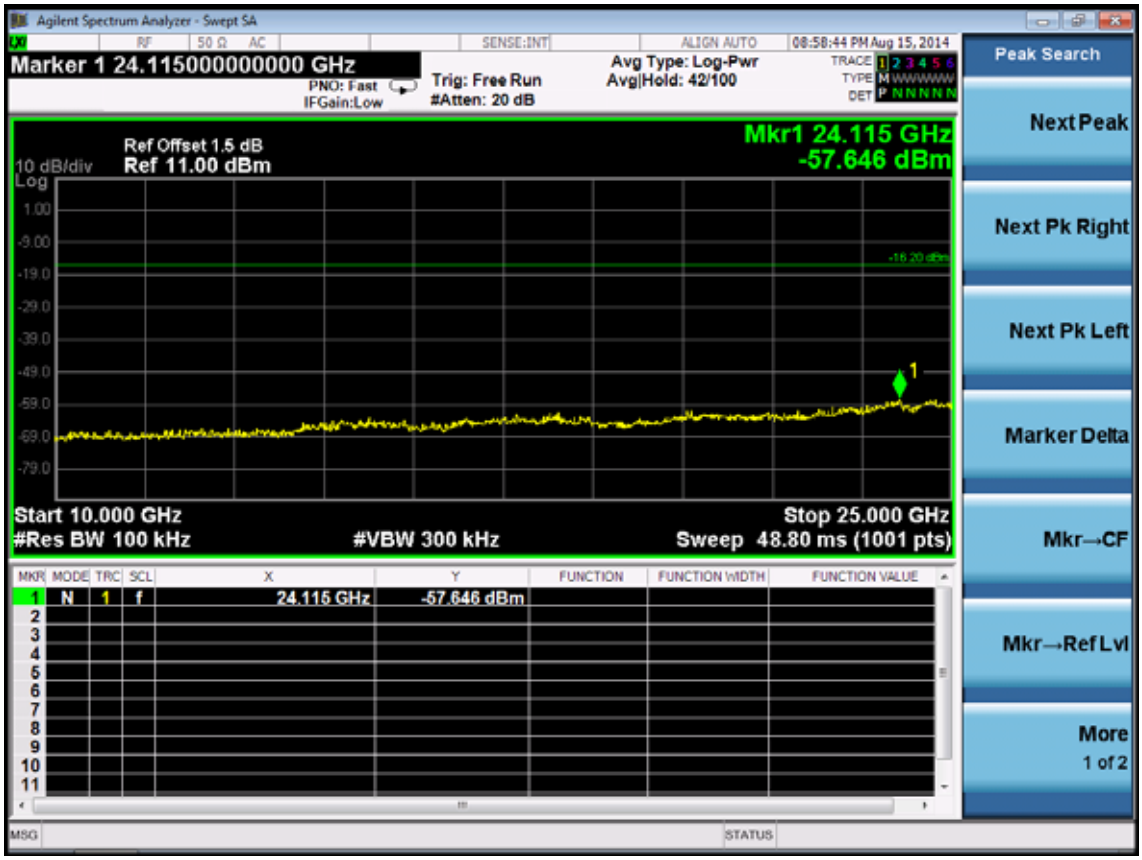


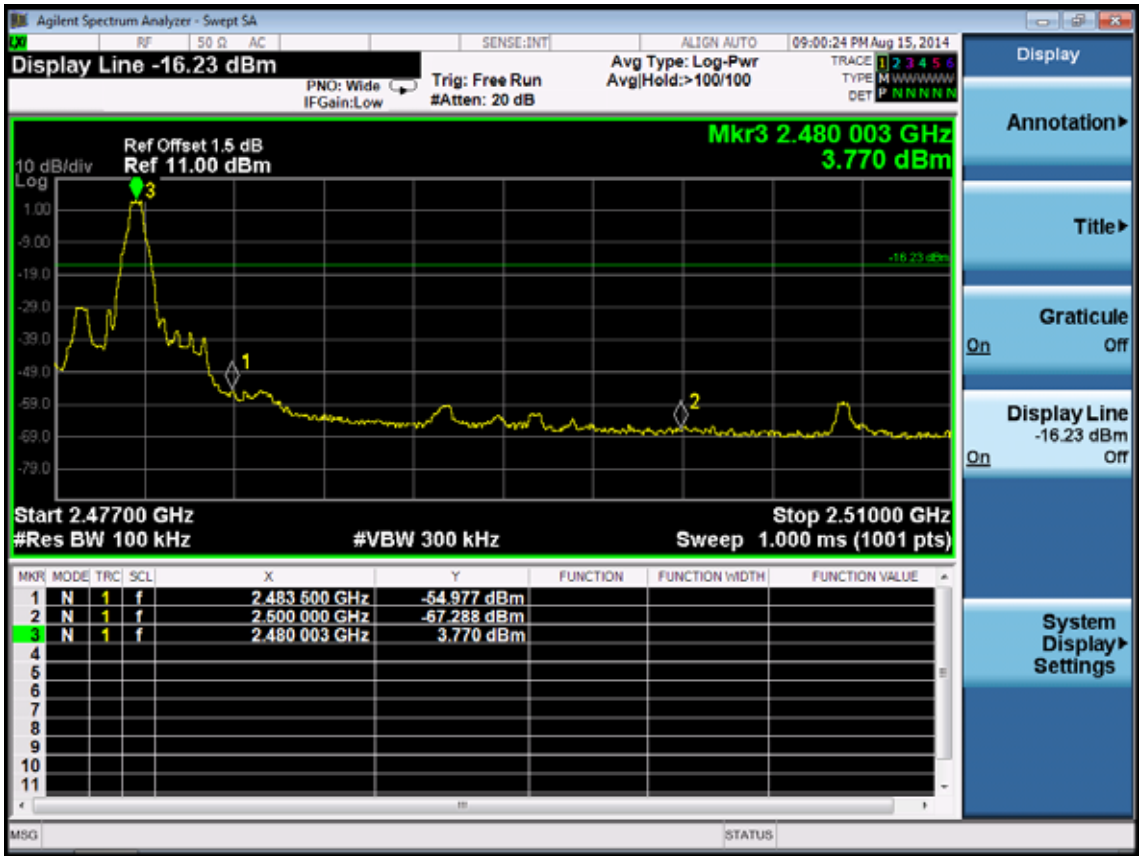


Test Frequency: 2480MHz



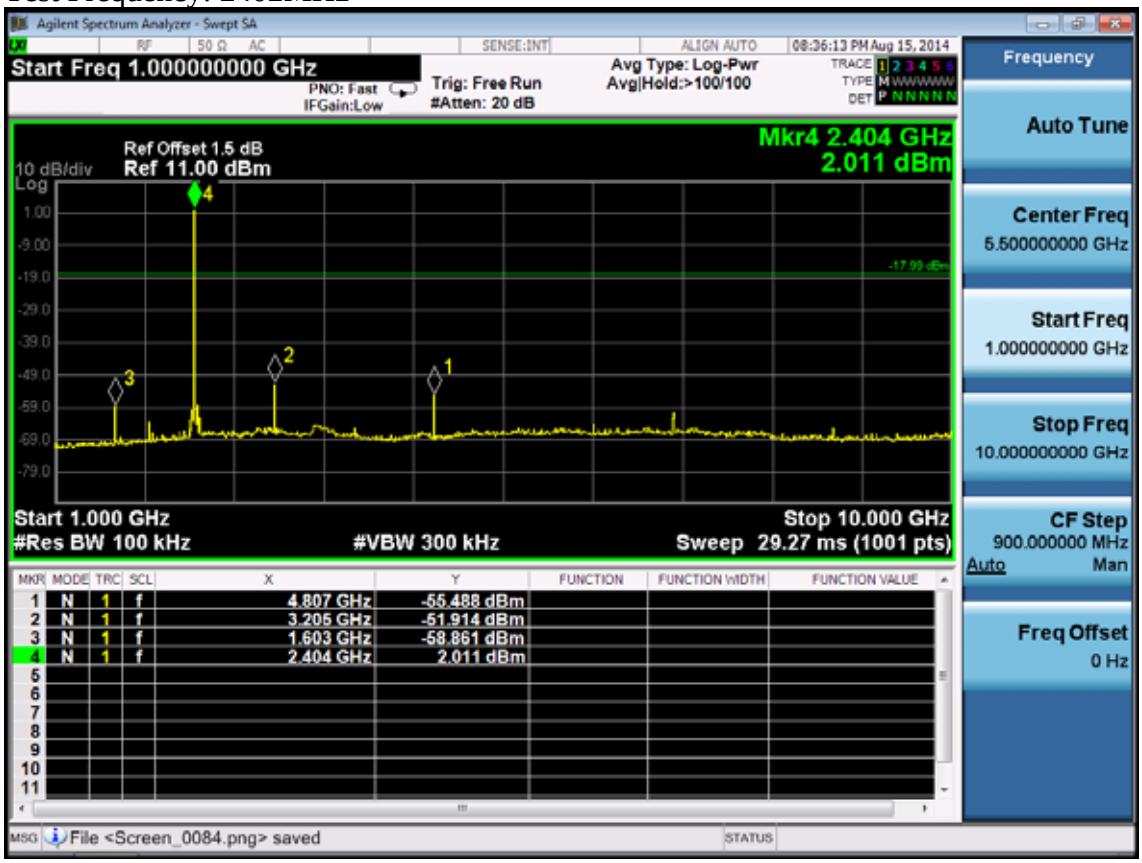

Agilent Spectrum Analyzer - Swept SA
Marker 1 941.800000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:58:30 PM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Log
Mkr1 941.80 MHz
-61.699 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 3.200 ms (1001 pts)
1 N 1 f 941.80 MHz -61.699 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

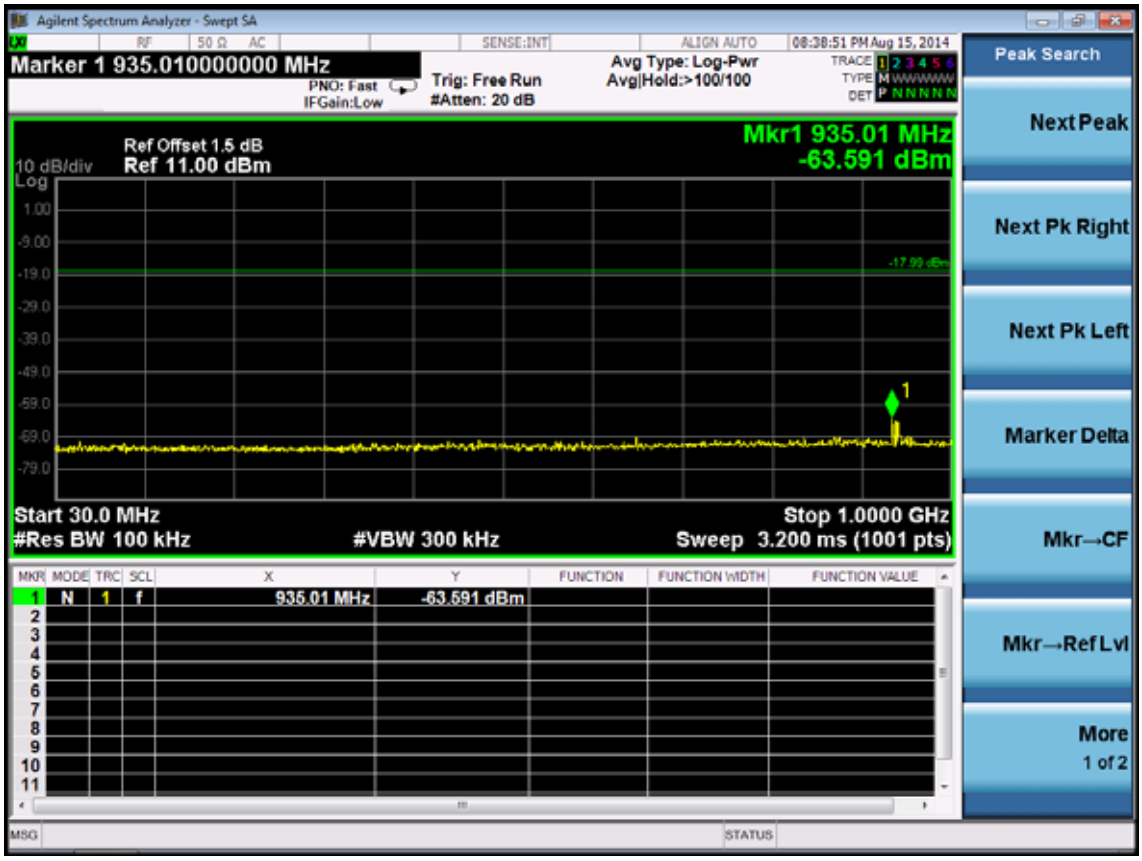

Agilent Spectrum Analyzer - Swept SA
Marker 1 24.115000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 42/100
08:58:44 PM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Log
Mkr1 24.115 GHz
-57.646 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 48.80 ms (1001 pts)
1 N 1 f 24.115 GHz -57.646 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

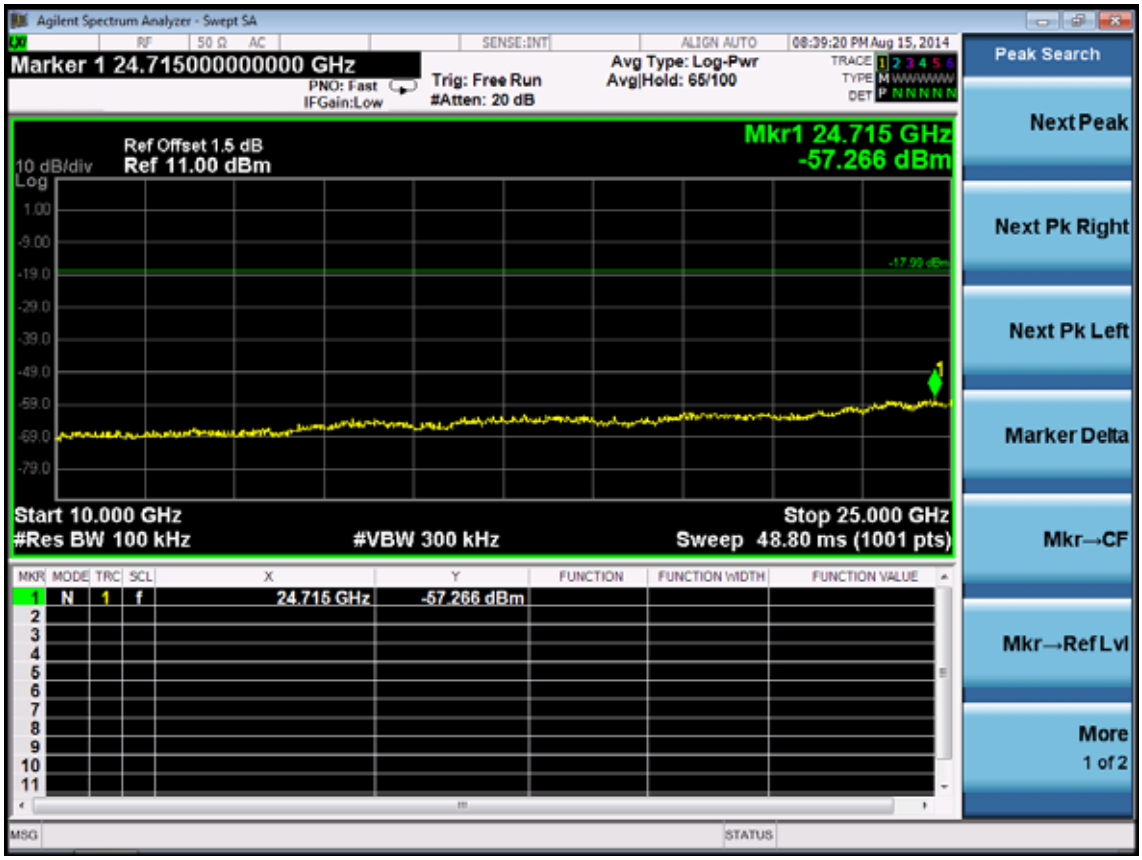


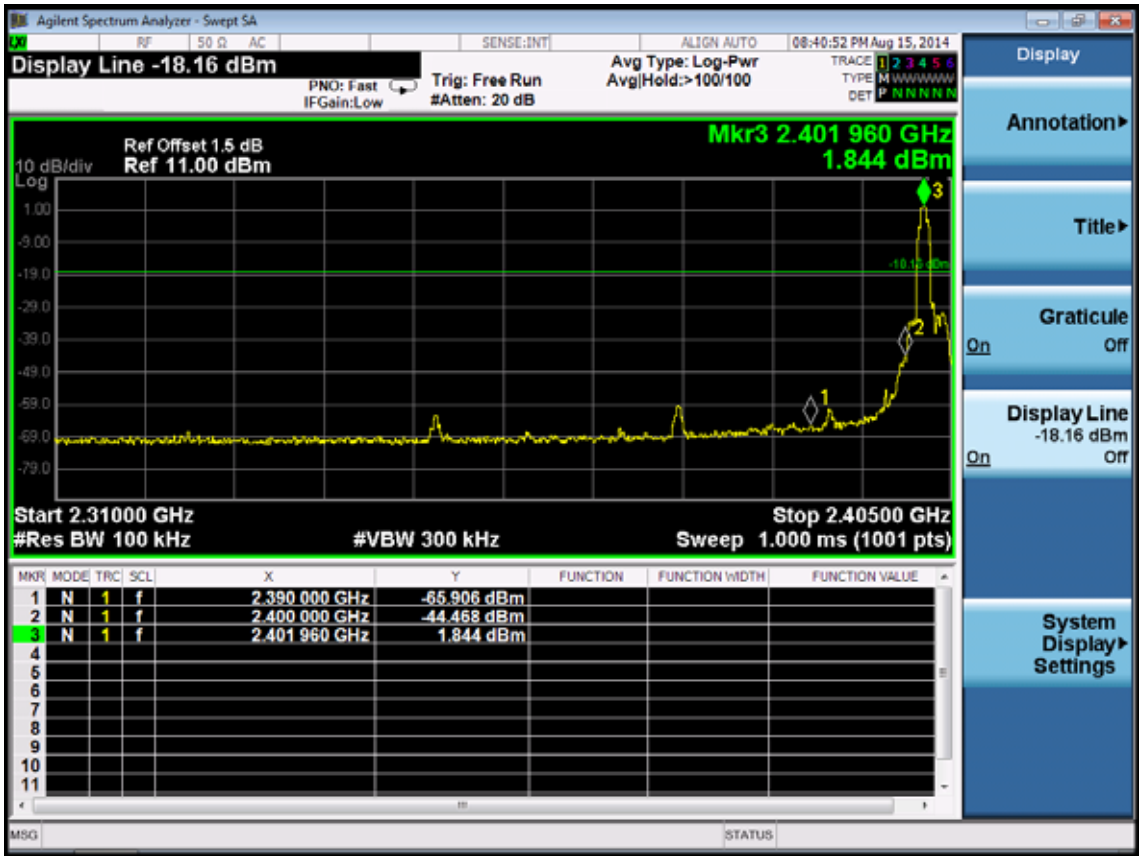
8-DPSK

Test Frequency: 2402MHz

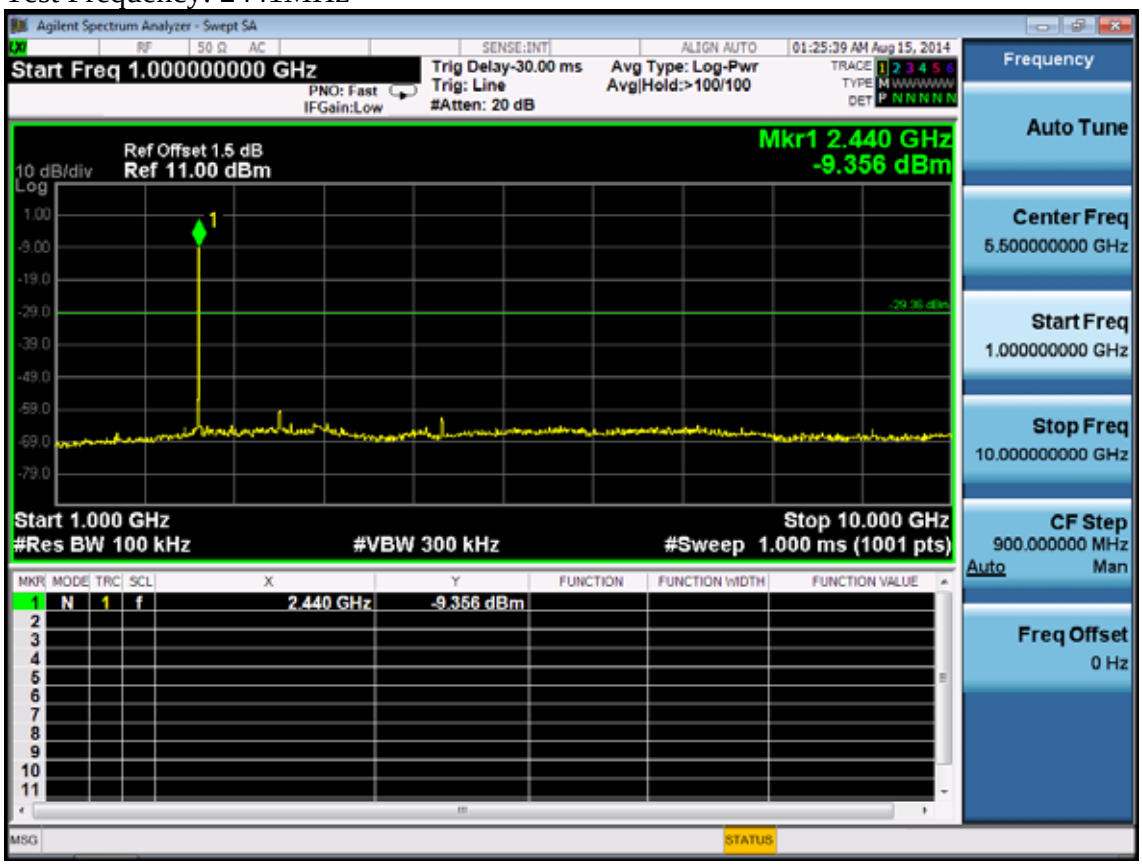


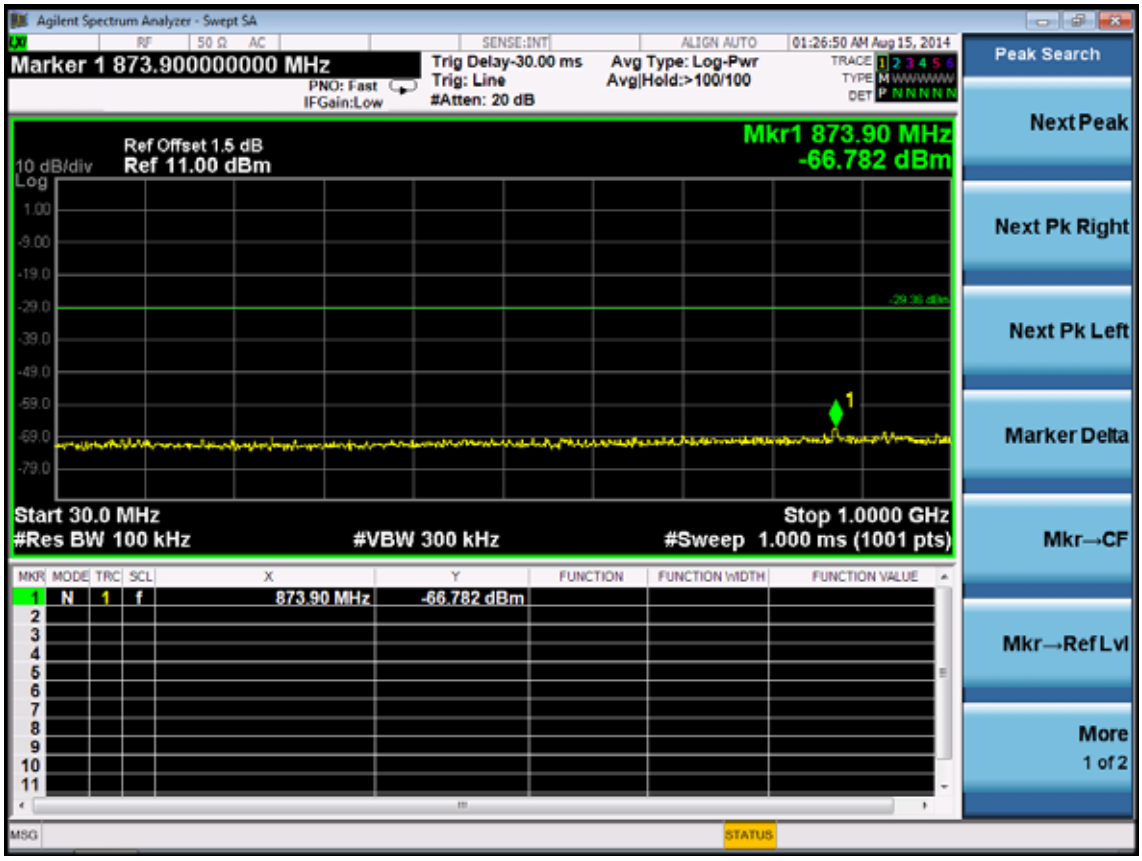

Agilent Spectrum Analyzer - Swept SA
Marker 1 935.010000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:38:51 PM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
Mkr1 935.01 MHz
-63.591 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 3.200 ms (1001 pts)
1 N 1 f 935.01 MHz -63.591 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

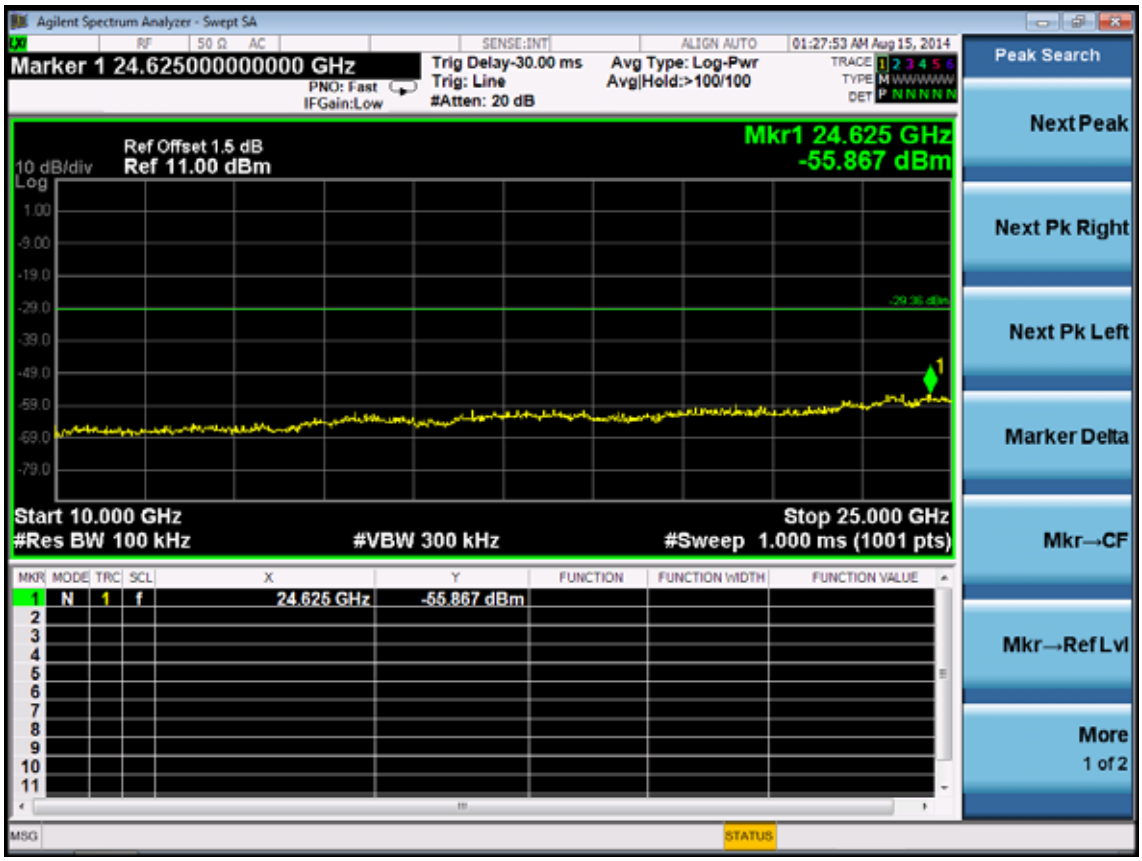

Agilent Spectrum Analyzer - Swept SA
Marker 1 24.715000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 65/100
08:39:20 PM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
Mkr1 24.715 GHz
-57.266 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 48.80 ms (1001 pts)
1 N 1 f 24.715 GHz -57.266 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2



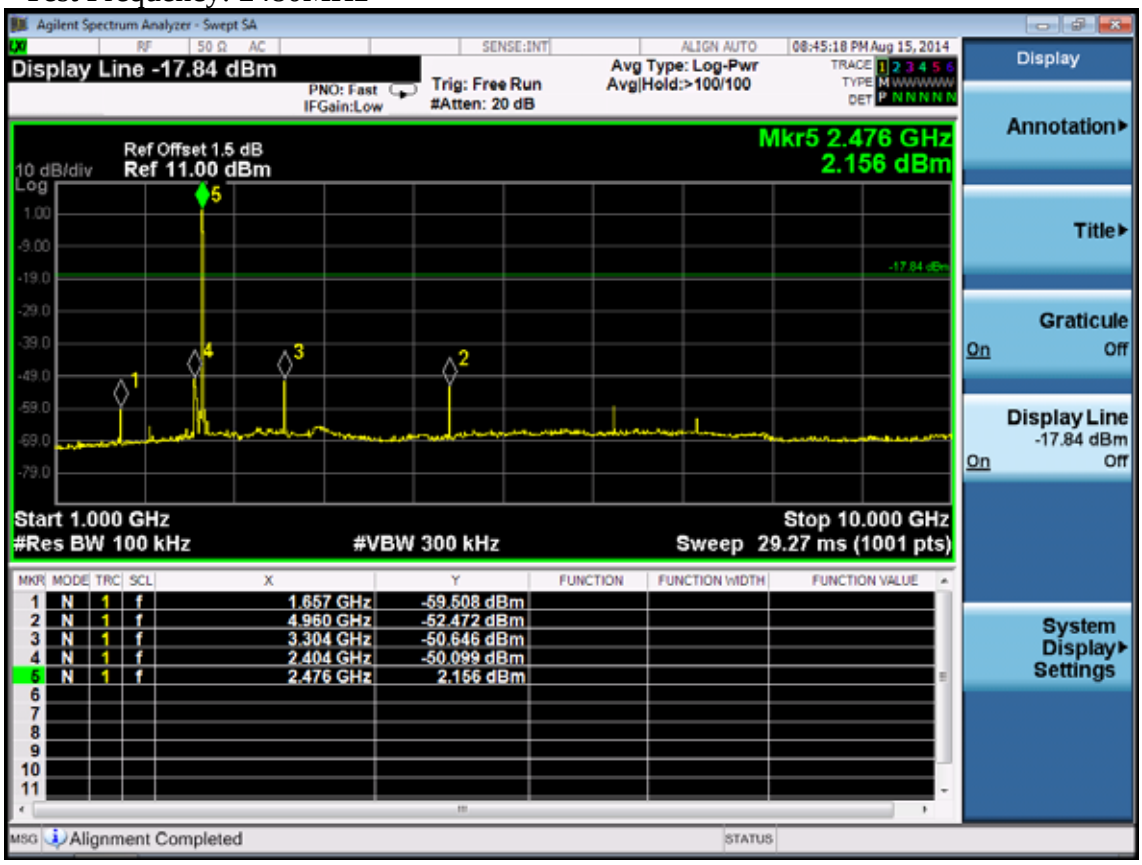
Test Frequency: 2441MHz

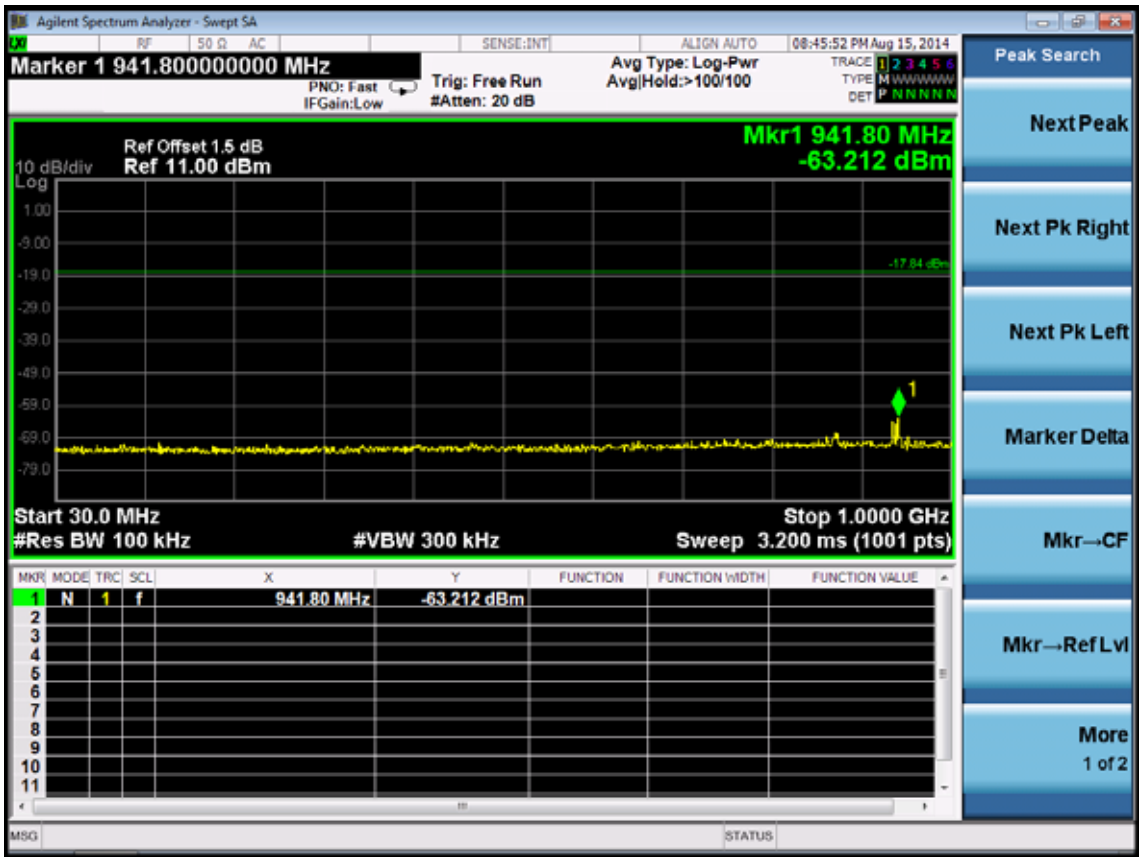


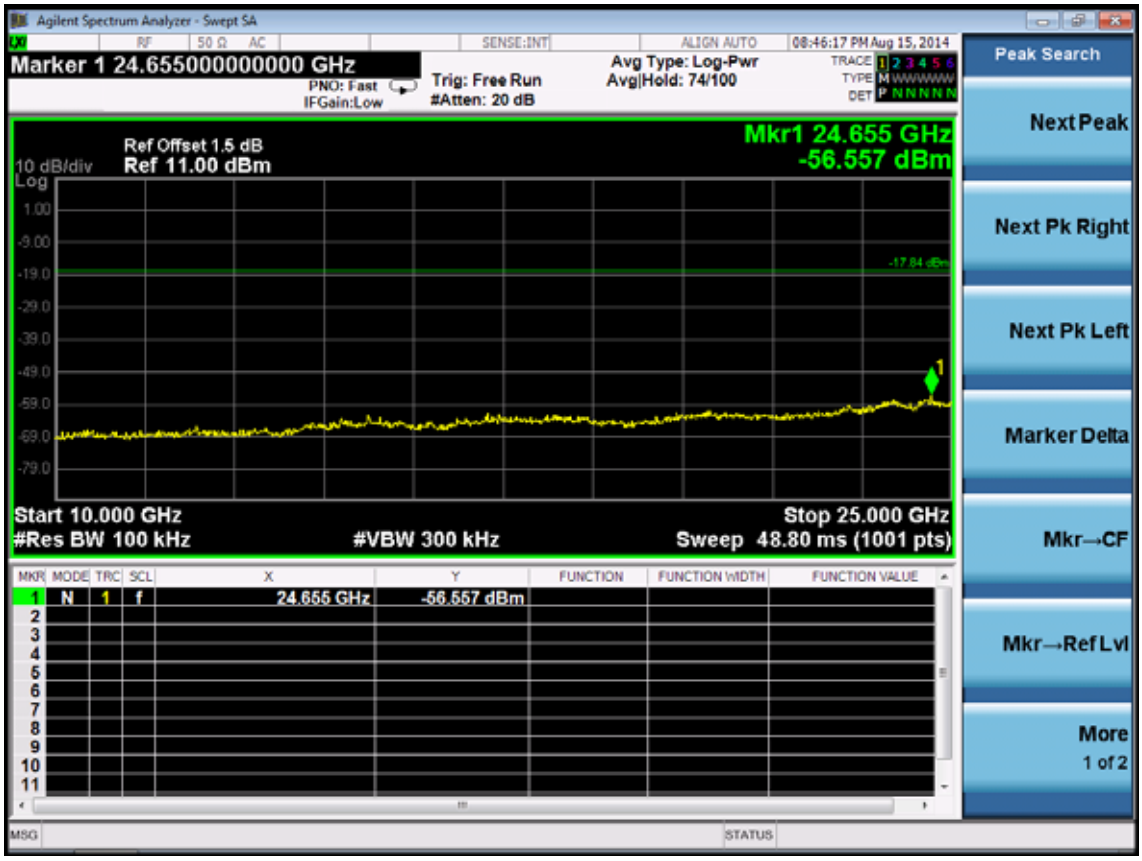

Agilent Spectrum Analyzer - Swept SA
Marker 1 873.900000000 MHz
PNO: Fast
IFGain:Low
Trig Delay-30.00 ms
Trig: Line
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
01:26:50 AM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
Mkr1 873.90 MHz
-66.782 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
#Sweep 1.000 ms (1001 pts)
1 N 1 f 873.90 MHz -66.782 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

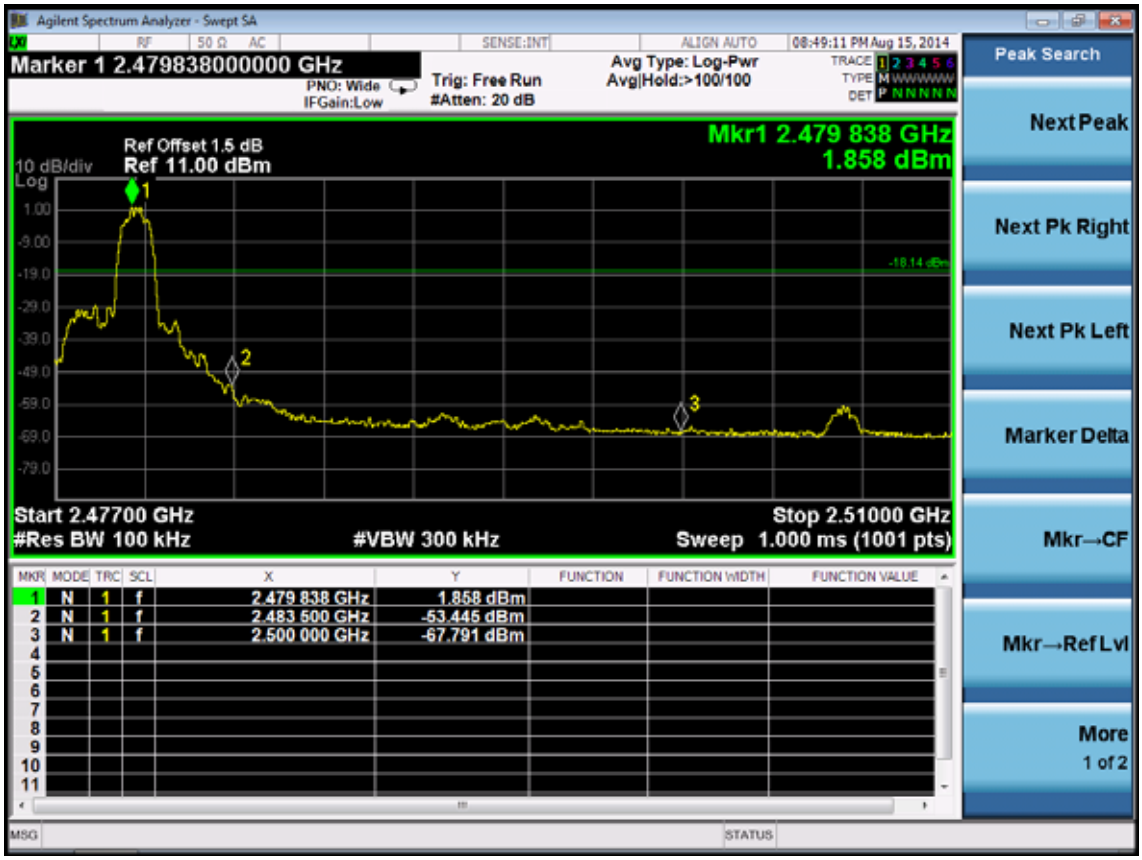

Agilent Spectrum Analyzer - Swept SA
Marker 1 24.625000000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-30.00 ms
Trig: Line
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
01:27:53 AM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
Mkr1 24.625 GHz
-55.867 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
#Sweep 1.000 ms (1001 pts)
1 N 1 f 24.625 GHz -55.867 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

Test Frequency: 2480MHz

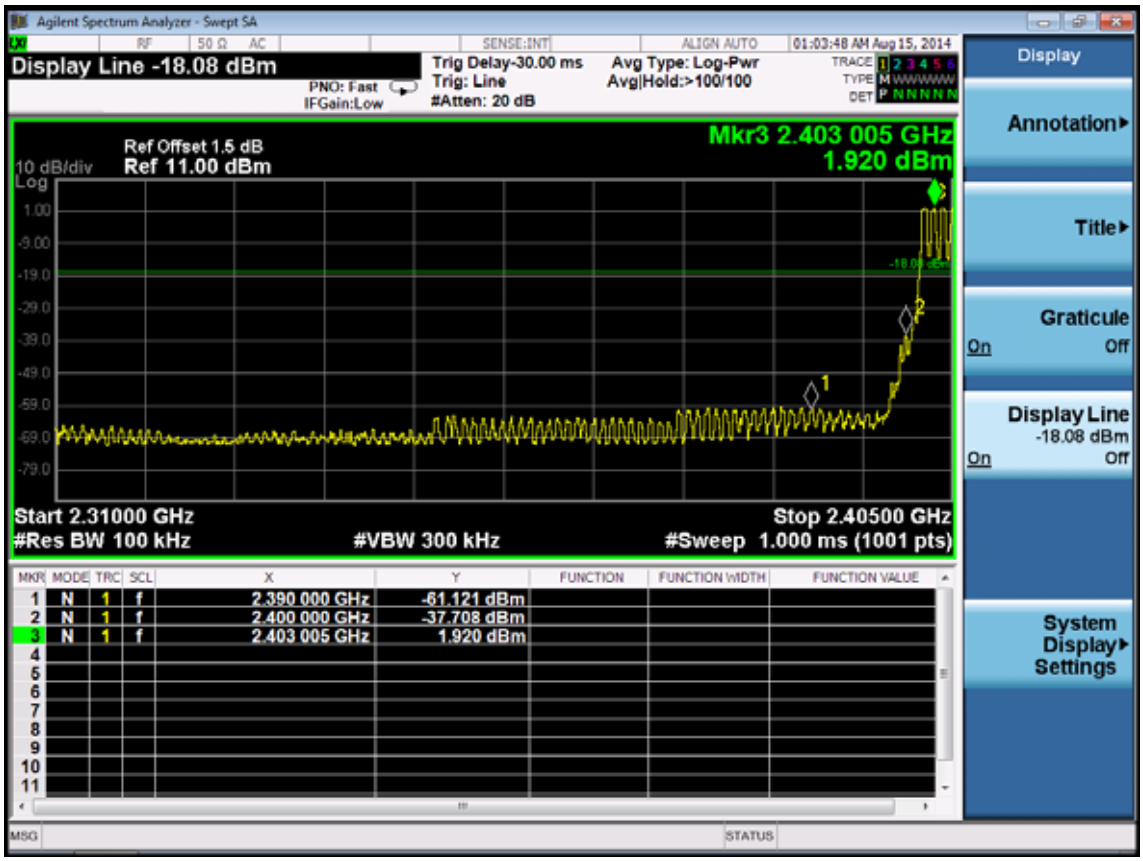


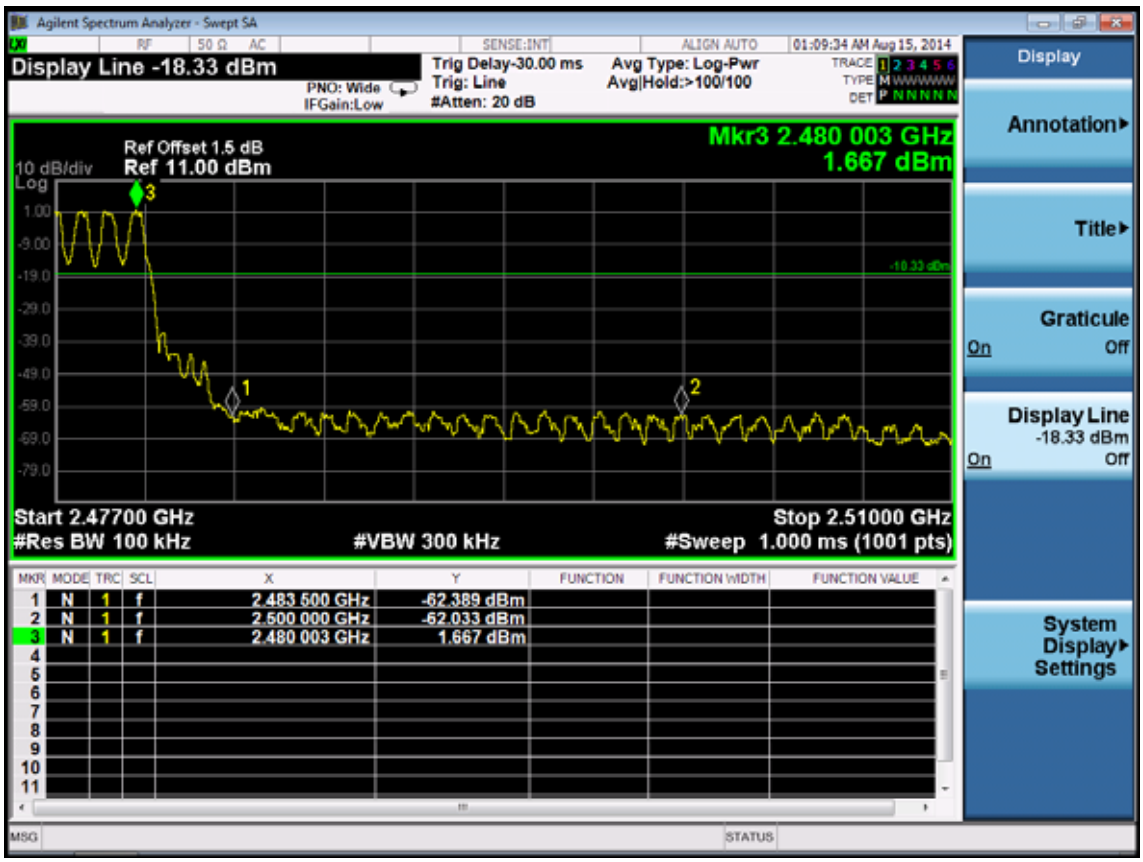



Agilent Spectrum Analyzer - Swept SA
Marker 1 24.655000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 74/100
08:46:17 PM Aug 15, 2014
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Log
Mkr1 24.655 GHz
-56.557 dBm
Start 10.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 48.80 ms (1001 pts)
1 N 1 f 24.655 GHz -56.557 dBm

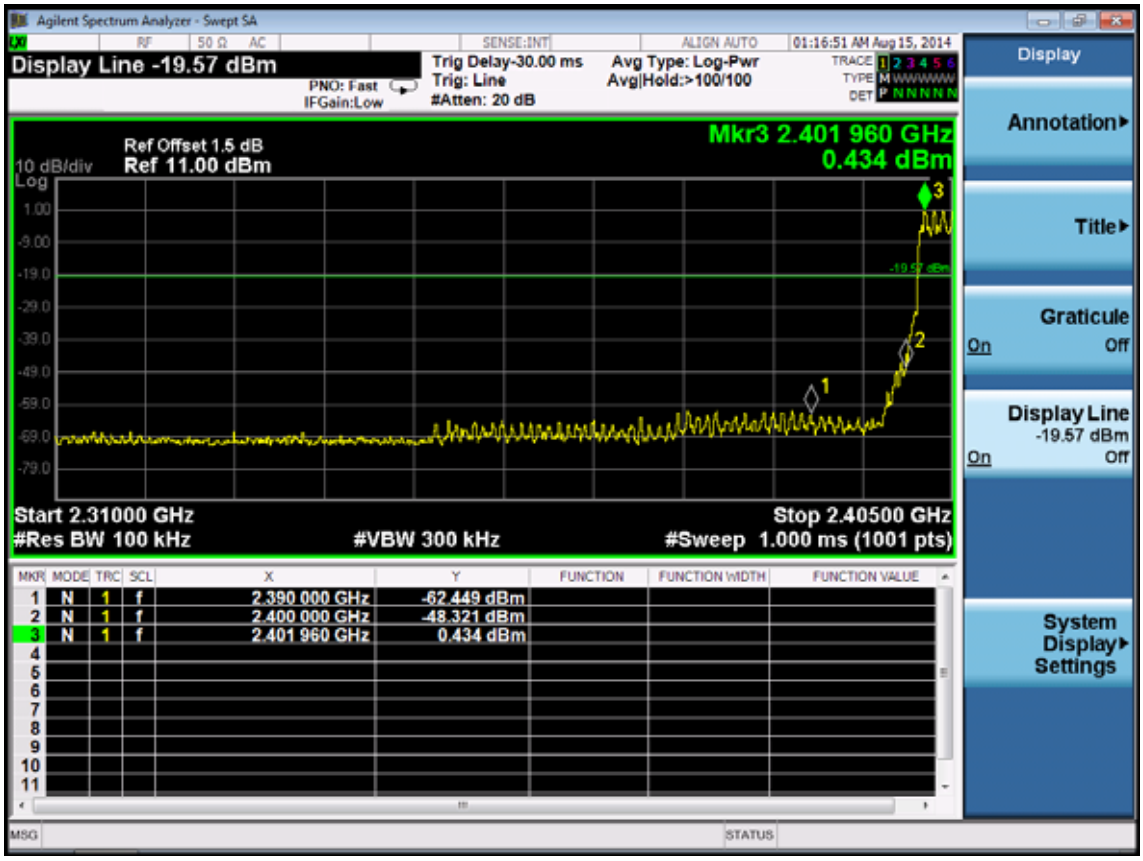

Agilent Spectrum Analyzer - Swept SA
Marker 1 2.479838000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
08:49:11 PM Aug 15, 2014
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Log
Mkr1 2.479 838 GHz
1.858 dBm
Start 2.47700 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.51000 GHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.479 838 GHz 1.858 dBm
2 N 1 f 2.483 500 GHz -53.445 dBm
3 N 1 f 2.500 000 GHz -67.791 dBm

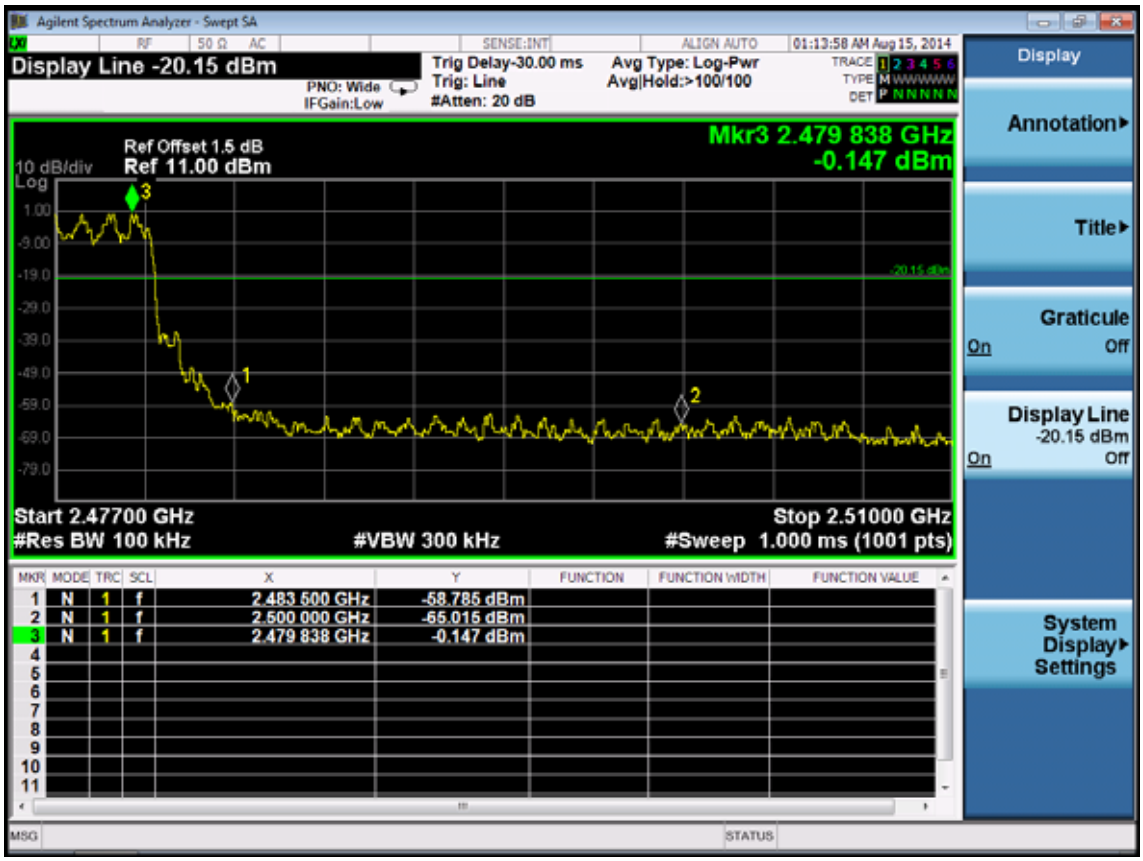
Hopping on
GFSK





8 DPSK


Agilent Spectrum Analyzer - Swept SA
Display Line -19.57 dBm
PNO: Fast
IFGain:Low
Trig Delay-30.00 ms
Trig: Line
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
01:16:51 AM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Mkr3 2.401 960 GHz
0.434 dBm
Start 2.31000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.40500 GHz
#Sweep 1.000 ms (1001 pts)
1 N 1 f 2.390 000 GHz -62.449 dBm
2 N 1 f 2.400 000 GHz -48.321 dBm
3 N 1 f 2.401 960 GHz 0.434 dBm
Display
Annotation
Title
Graticule
Display Line
-19.57 dBm
System
Display
Settings


Agilent Spectrum Analyzer - Swept SA
Display Line -20.15 dBm
PNO: Wide
IFGain:Low
Trig Delay-30.00 ms
Trig: Line
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
01:13:58 AM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Mkr3 2.479 838 GHz
-0.147 dBm
Start 2.47700 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.51000 GHz
#Sweep 1.000 ms (1001 pts)
1 N 1 f 2.483 500 GHz -58.785 dBm
2 N 1 f 2.500 000 GHz -65.015 dBm
3 N 1 f 2.479 838 GHz -0.147 dBm
Display
Annotation
Title
Graticule
Display Line
-20.15 dBm
System
Display
Settings

6. CARRIER FREQUENCY SEPARATION TEST

6.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	N9030A	MY51380221	Oct.31, 13	1Year

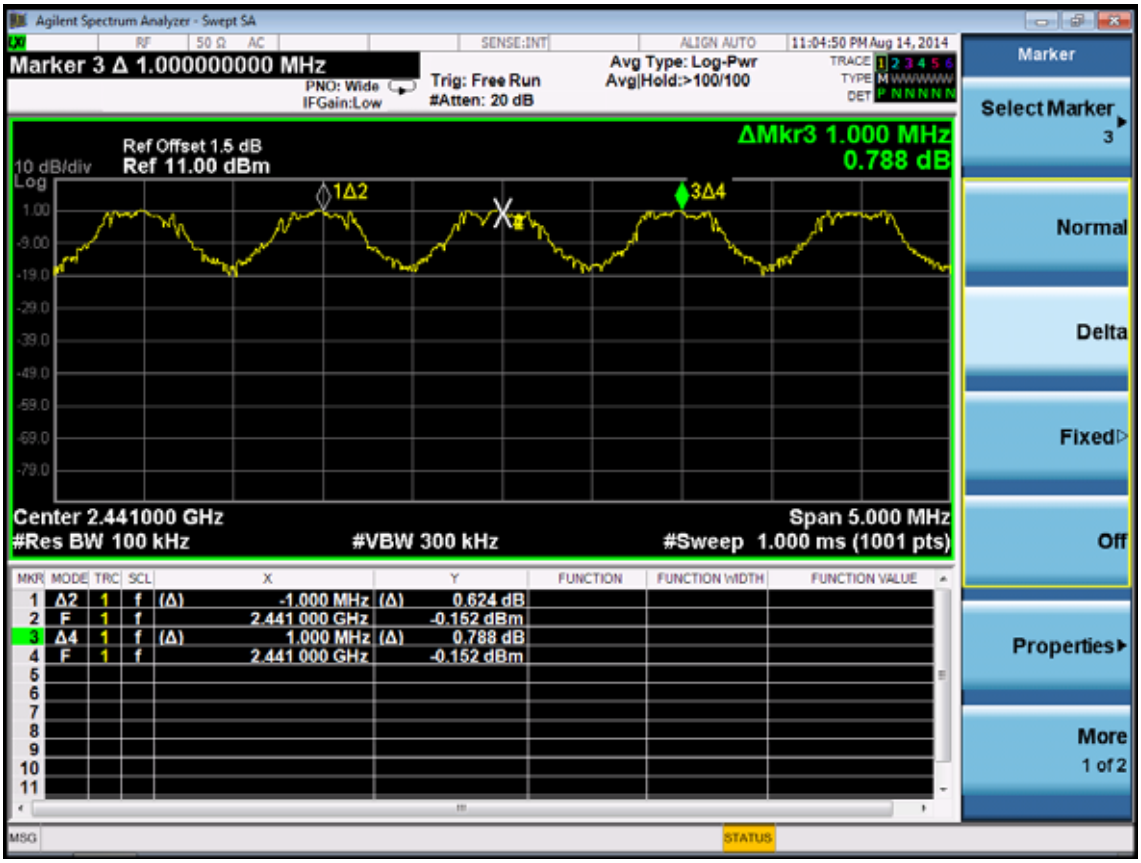
6.2.Limit

Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

6.3.Test Results.

EUT: Bluetooth Module		
M/N:TBM-CBC5		
Test date: 2014-08-14	Pressure: 101.4±1.0 kpa	Humidity: 52.7±3.0%
Tested by: Kevin_Hu	Test site: RF site	Temperature:21.7±0.6 ℃

Test Mode	Channel separation	Conclusion
8-DPSK	1.0MHz	PASS
GFSK	1.0MHz	PASS


Agilent Spectrum Analyzer - Swept SA
Marker 3 Δ 1.000000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
11:04:50 PM Aug 14, 2014
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
ΔMkr3 1.000 MHz
0.788 dB
1Δ2
3Δ4
Center 2.441000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 5.000 MHz
#Sweep 1.000 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 1 f (Δ) -1.000 MHz (Δ) 0.624 dB
2 F 1 f 2.441 000 GHz -0.152 dBm
3 Δ4 1 f (Δ) 1.000 MHz (Δ) 0.788 dB
4 F 1 f 2.441 000 GHz -0.152 dBm
Marker
Select Marker 3
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

7. 20 DB BANDWIDTH TEST

7.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	N9030A	MY51380221	Oct.31, 13	1Year
2.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr. 28,14	1 Year
3.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	Apr. 28,14	1 Year

7.2.Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

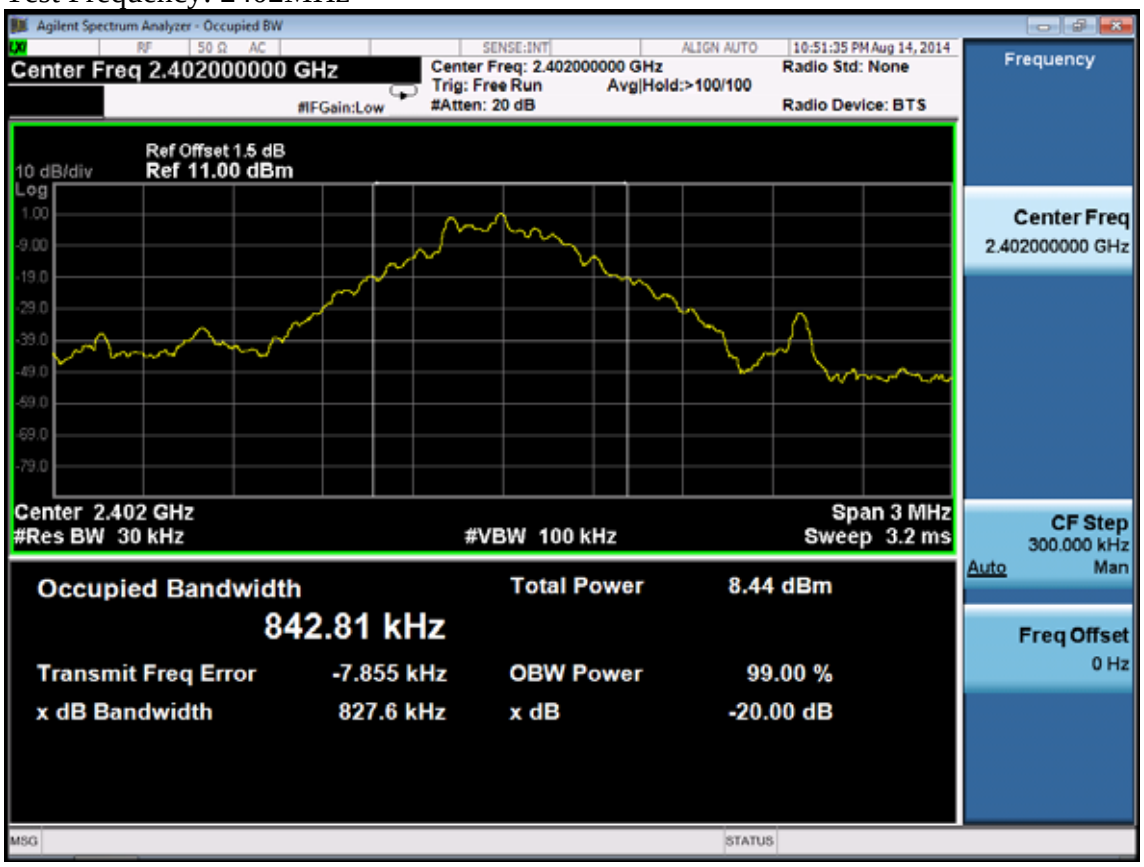
7.3.Test Results

EUT: Bluetooth Module		
M/N: TBM-CBC5		
Test date: 2014-08-14	Pressure: 101.1±1.0 kpa	Humidity: 50.3±3.0%
Tested by: Kobe_Huang	Test site: RF Site	Temperature：22 .5±0.6℃

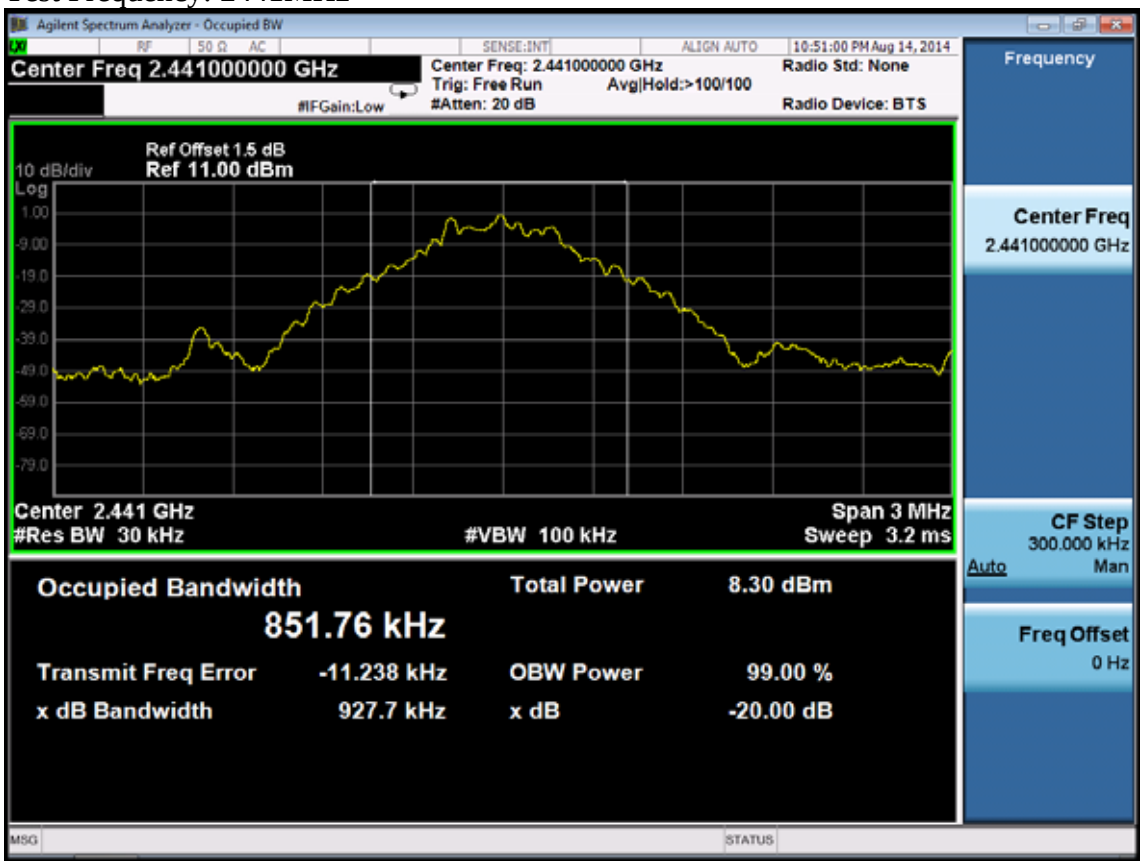
Cable loss: 1.5 dB		Attenuator loss: 0 dB	
Test Mode	CH (MHz)	20dB bandwidth (KHz)	Limit (KHz)
GFSK	2402	827.6	N/A
	2441	927.7	N/A
	2480	925.2	N/A
8-DPSK	2402	1205	N/A
	2441	1259	N/A
	2480	1257	N/A
Conclusion：PASS			

GFSK

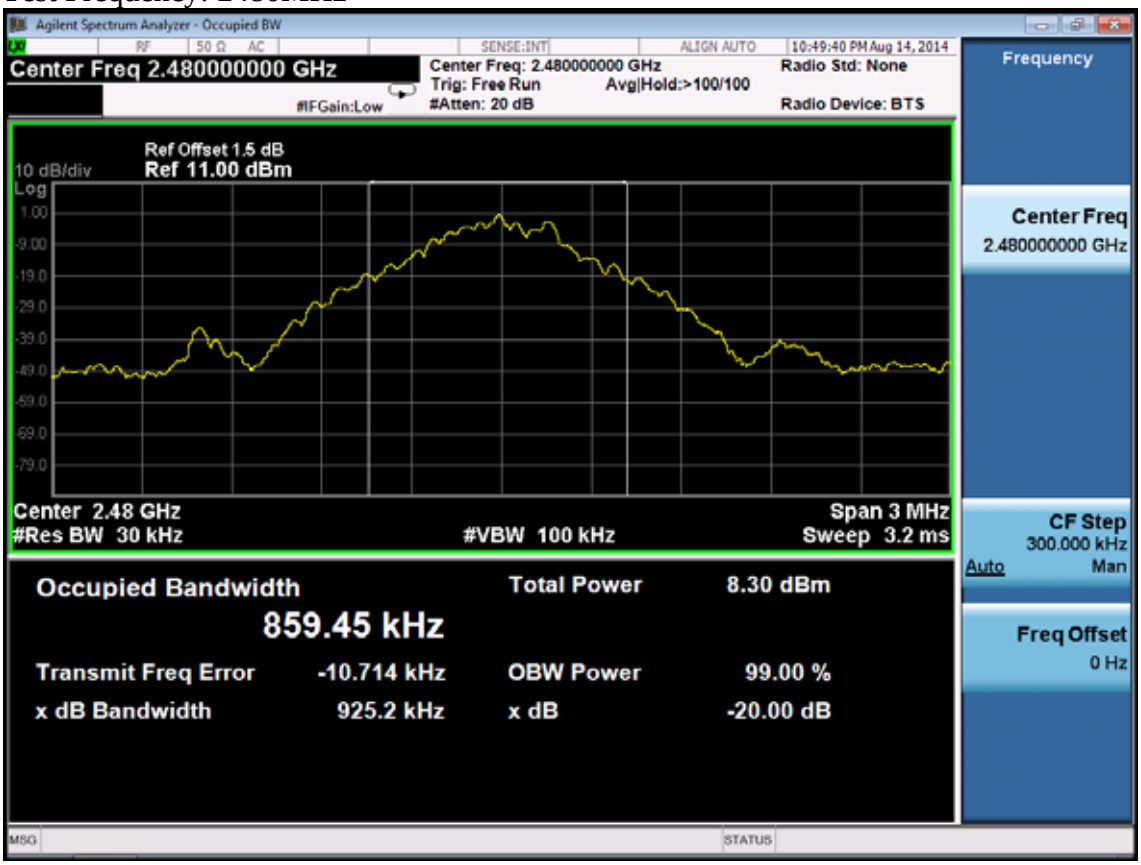
Test Frequency: 2402MHz



Test Frequency: 2441MHz

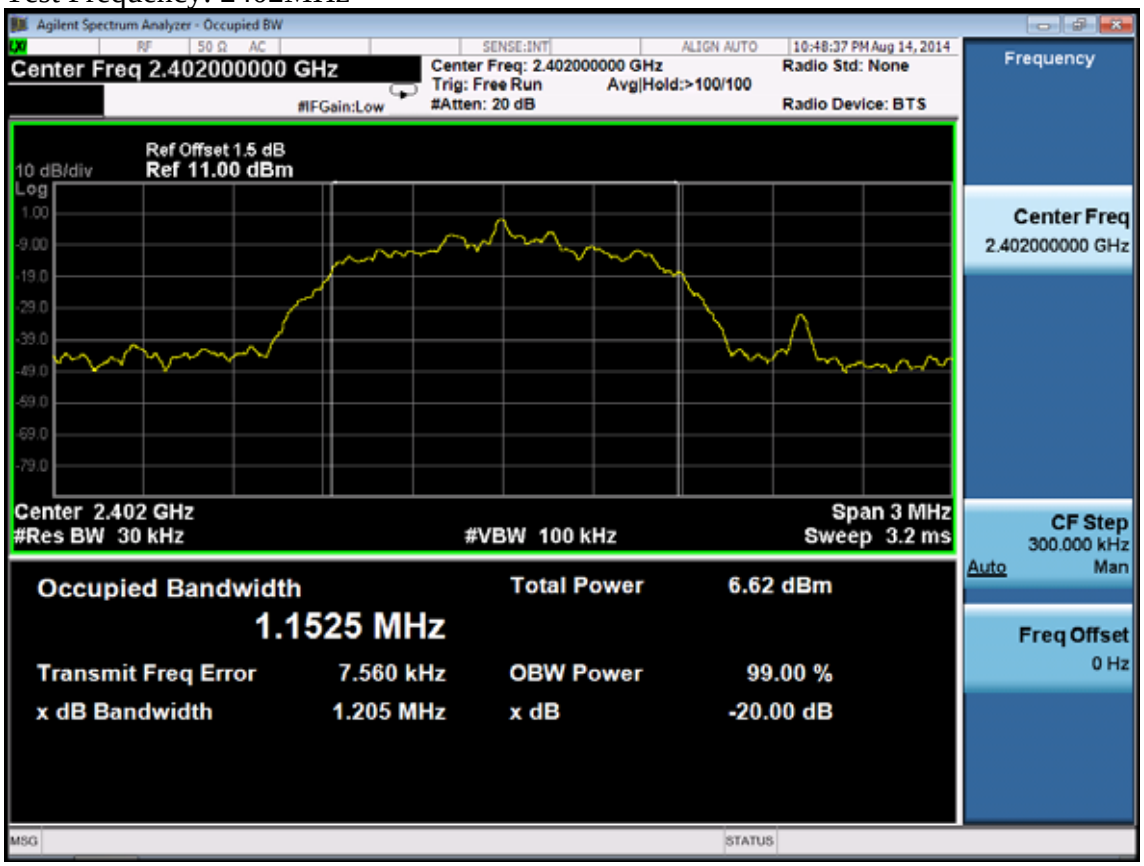


Test Frequency: 2480MHz

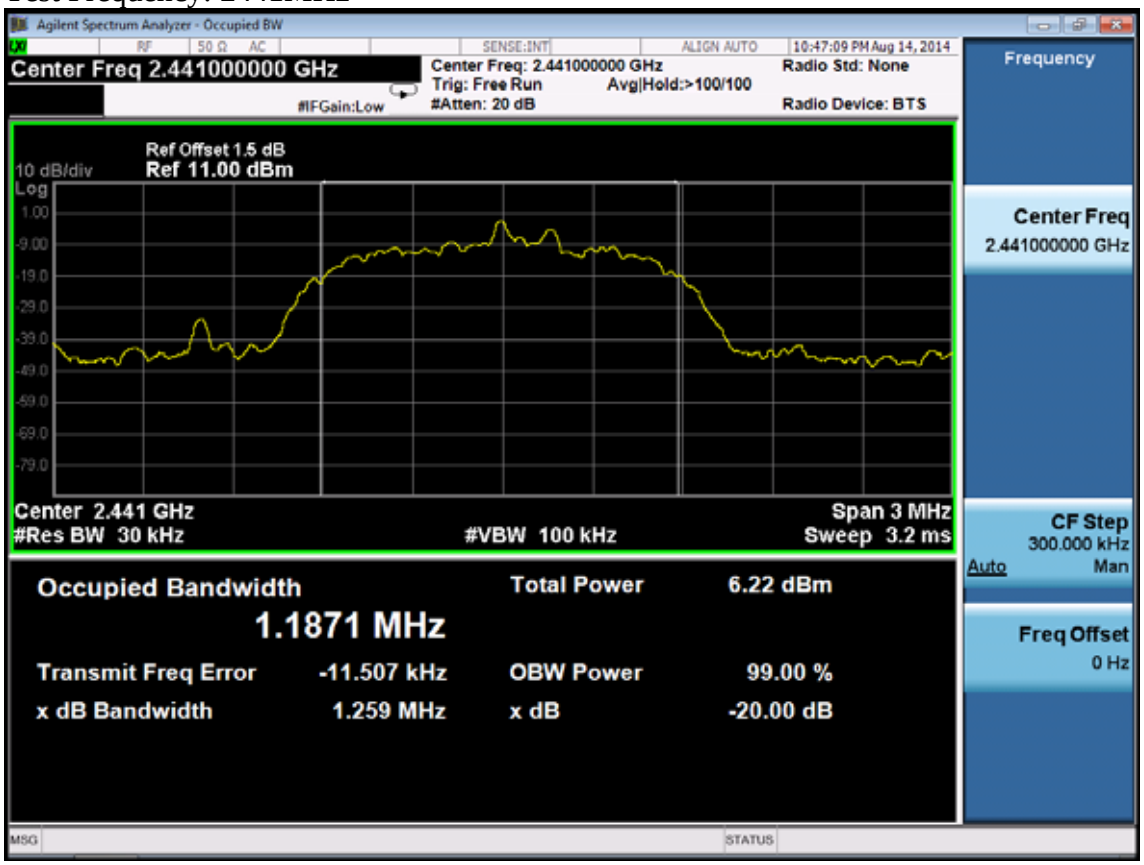


8-DPSK

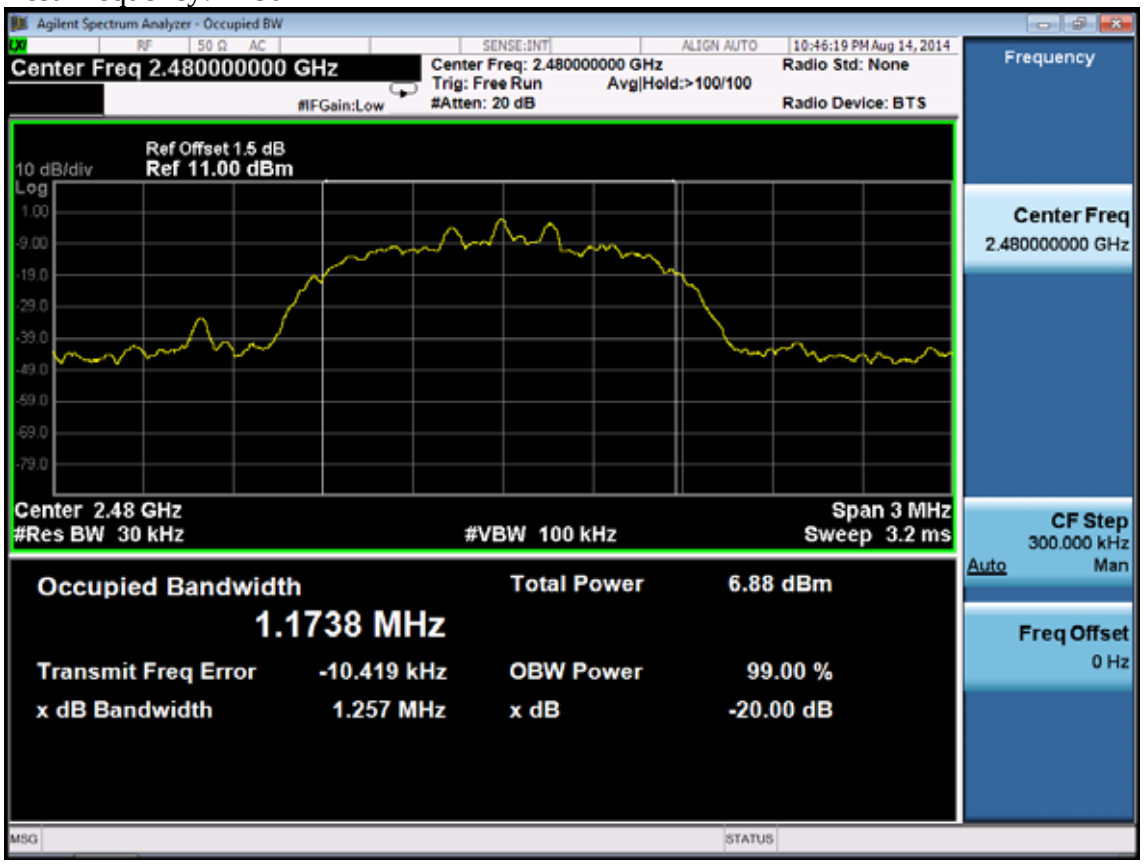
Test Frequency: 2402MHz



Test Frequency: 2441MHz



Test Frequency: 2480MHz



8. NUMBER OF HOPPING FREQUENCY TEST

8.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	N9030A	MY51380221	Oct.31, 13	1Year

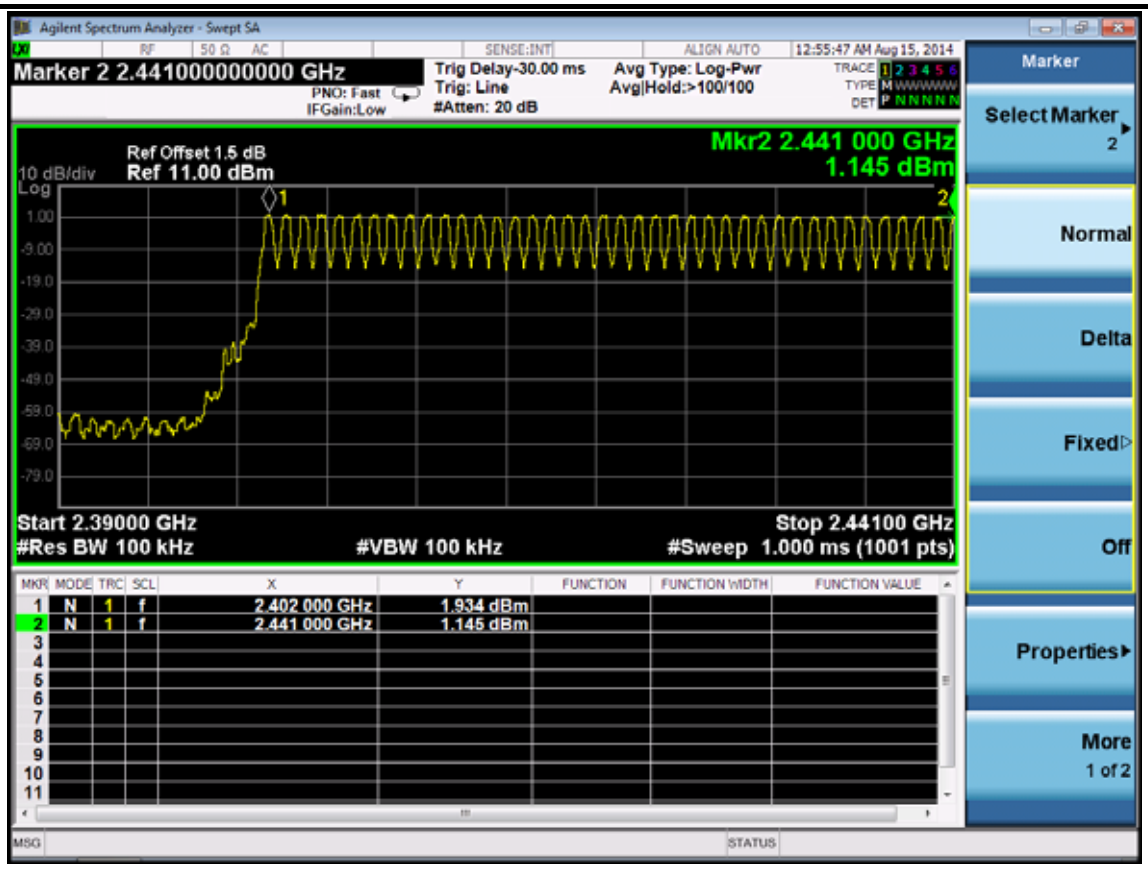
8.2.Limit

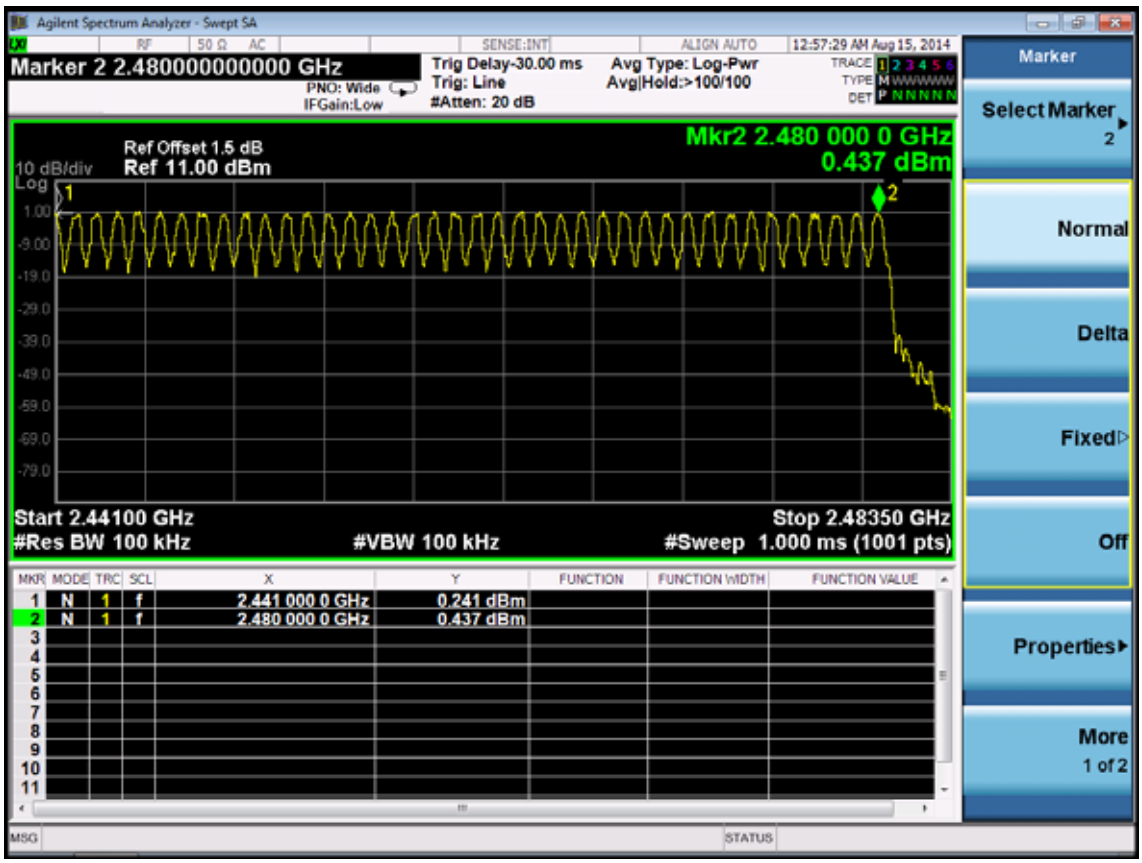
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

8.3.Test Results

EUT: Bluetooth Module		
M/N:TBM-CBC5		
Test date: 2014-08-15	Pressure: 101.4±1.0 kpa	Humidity: 52.7±3.0%
Tested by: Kevin_Hu	Test site: RF site	Temperature:21.7±0.6 ℃

Test Mode	Number of channel	Limit	Conclusion
8-DPSK	79	>=15	PASS
GFSK	79	>=15	PASS


Agilent Spectrum Analyzer - Swept SA
Marker 2 2.441000000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-30.00 ms
Trig: Line
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
12:55:47 AM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Log
Mkr2 2.441 000 GHz
1.145 dBm
Start 2.39000 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 2.44100 GHz
#Sweep 1.000 ms (1001 pts)
1 N 1 f 2.402 000 GHz 1.934 dBm
2 N 1 f 2.441 000 GHz 1.145 dBm
Marker
Select Marker 2
Normal
Delta
Fixed
Off
Properties
More 1 of 2


Agilent Spectrum Analyzer - Swept SA
Marker 2 2.480000000000 GHz
PNO: Wide
IFGain:Low
Trig Delay-30.00 ms
Trig: Line
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
12:57:29 AM Aug 15, 2014
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Log
Mkr2 2.480 000 0 GHz
0.437 dBm
Start 2.44100 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 2.48350 GHz
#Sweep 1.000 ms (1001 pts)
1 N 1 f 2.441 000 0 GHz 0.241 dBm
2 N 1 f 2.480 000 0 GHz 0.437 dBm
Marker
Select Marker 2
Normal
Delta
Fixed
Off
Properties
More 1 of 2

9. DWELL TIME

9.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	N9030A	MY51380221	Oct.31, 13	1Year

9.2.Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

9.3.Test Results

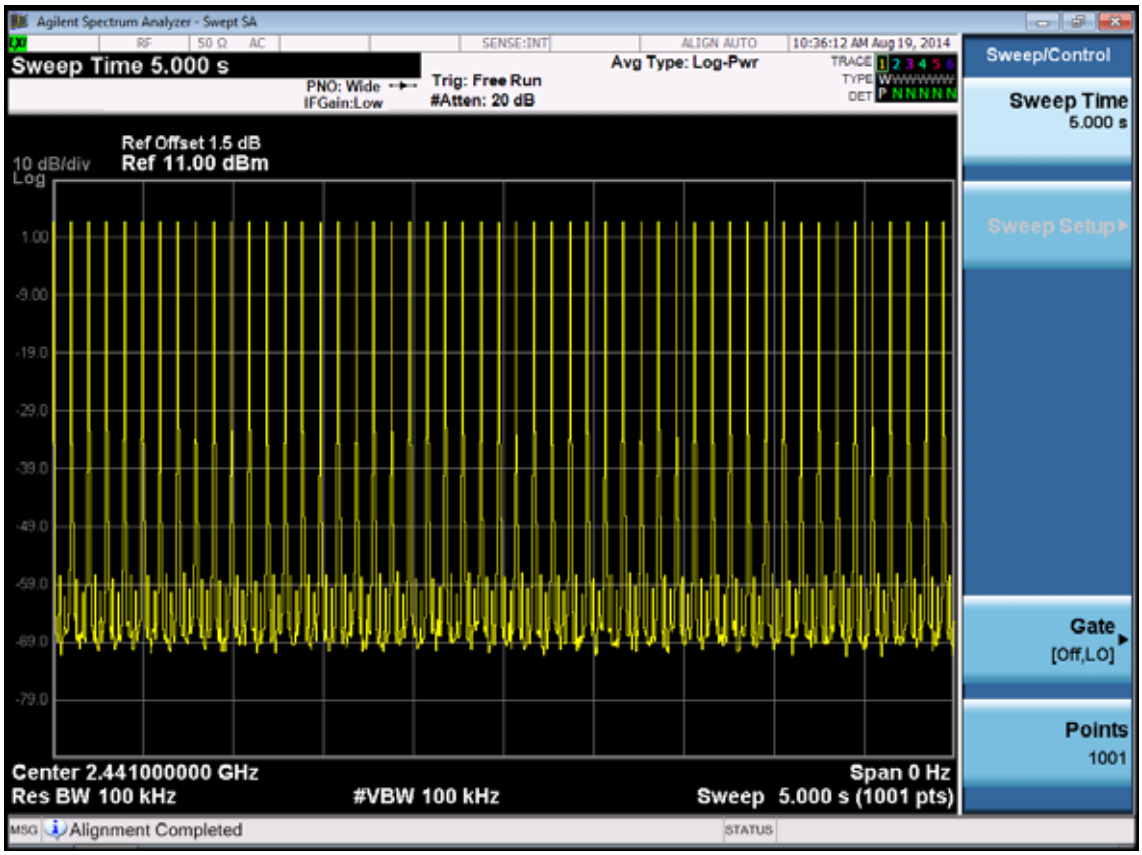
EUT: Bluetooth Module		
M/N:TBM-CBC5		
Test date: 2014-08-19	Pressure: 101.4±1.0 kpa	Humidity: 52.7±3.0%
Tested by: Kevin_Hu	Test site: RF site	Temperature:21.7±0.6 ℃

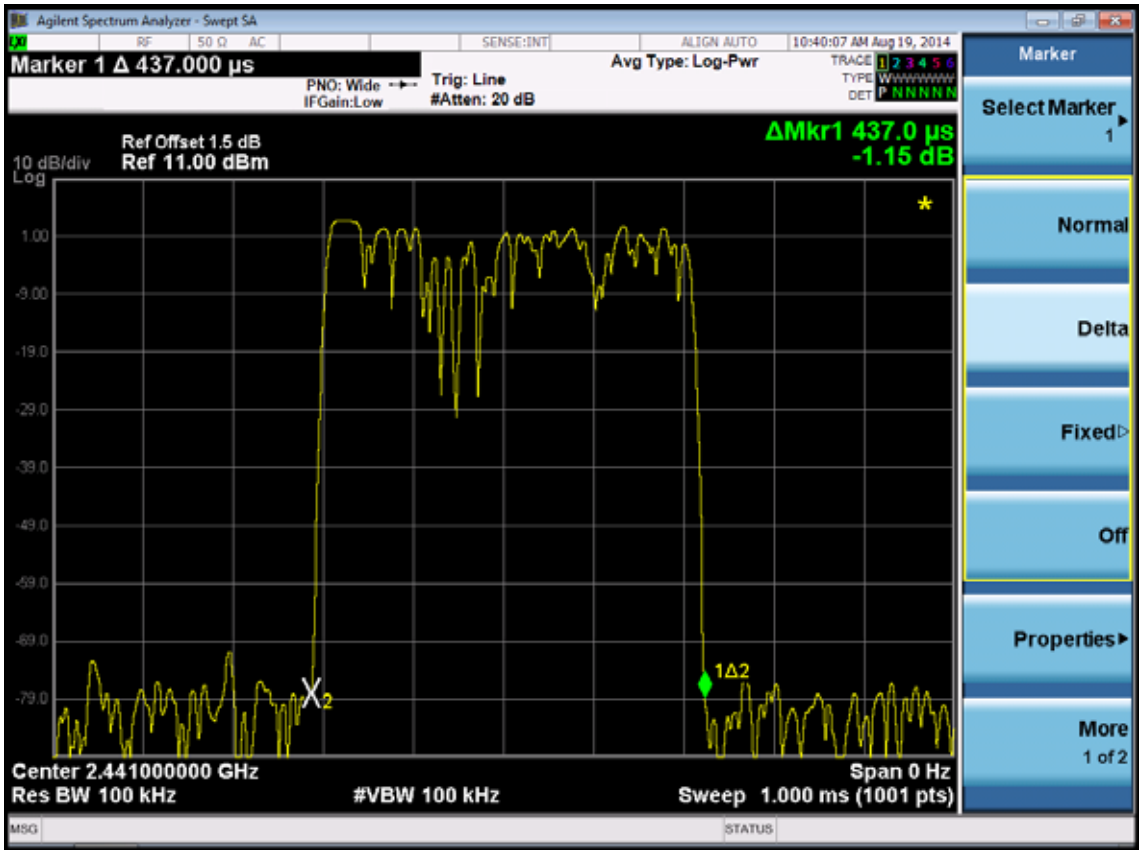
Mode		dwell time	Limit	Conclusion
GFSK	DH1	53hops/5s*0.4*79chanels*0.437ms =146.38ms	<400ms	PASS
	DH3	26hops/5s*0.4*79chanels*1.698ms =279.02ms	<400ms	PASS
	DH5	17hops/5s*0.4*79chanels*2.950ms=316.95ms	<400ms	PASS
8-DPSK	DH1	50hops/5s*0.4*79chanels*0.456ms =144.09ms	<400ms	PASS
	DH3	25hops/5s*0.4*79chanels*1.731ms =273.49ms	<400ms	PASS
	DH5	17hops/5s*0.4*79chanels*2.965ms =318.56ms	<400ms	PASS

Note: All the lower levels were signal from receiver's, and should not considered in here.

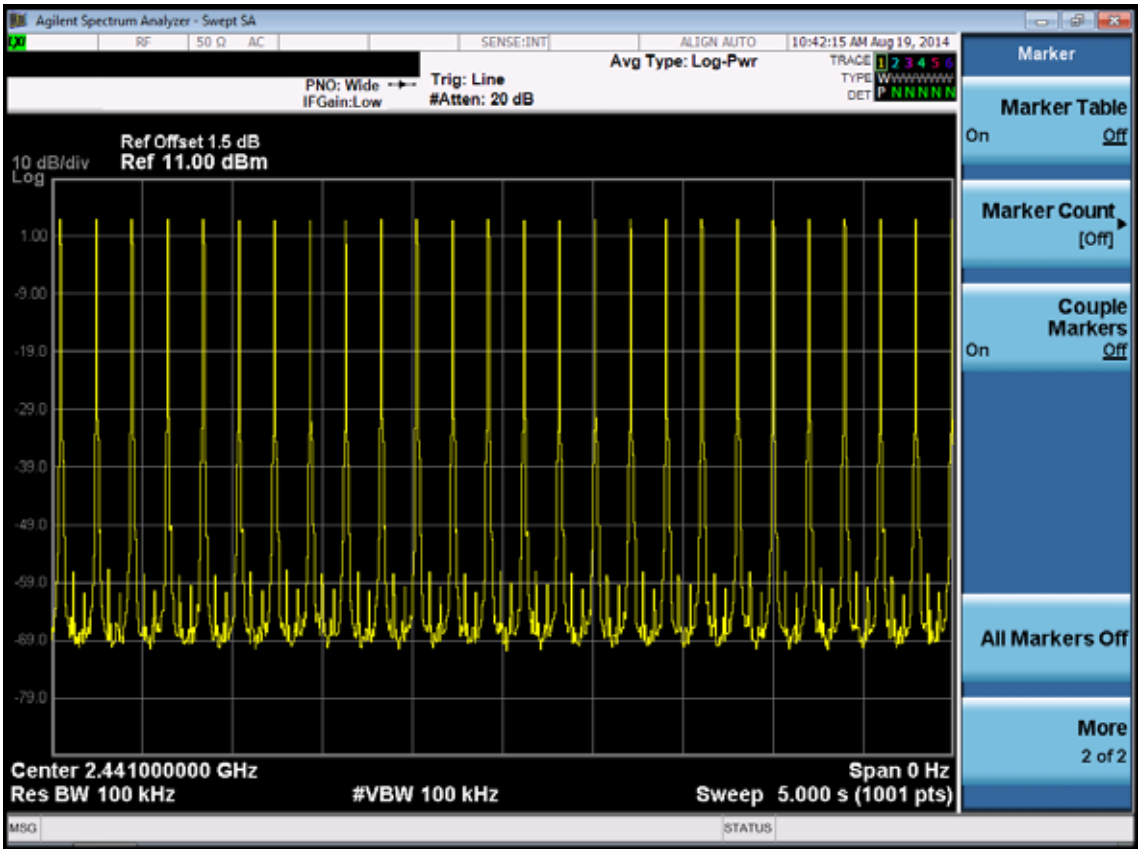
Test Mode: GFSK

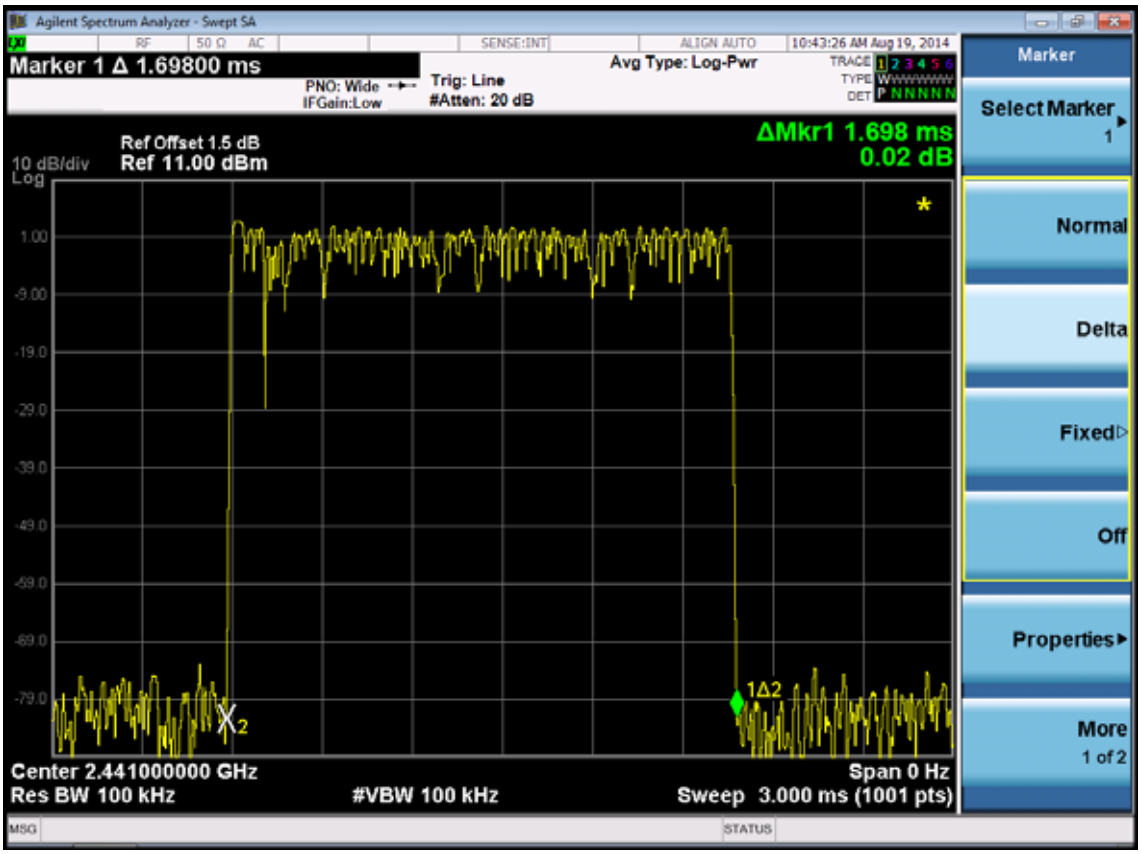
DH 1



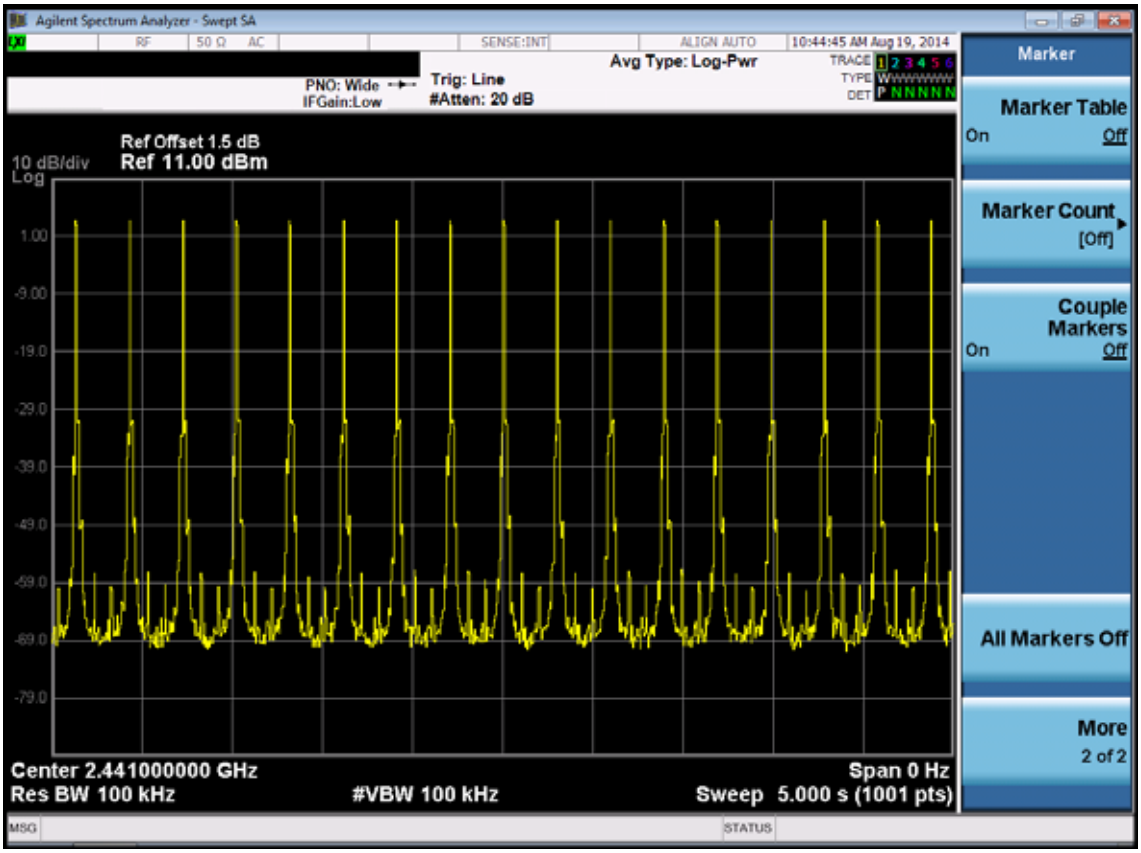


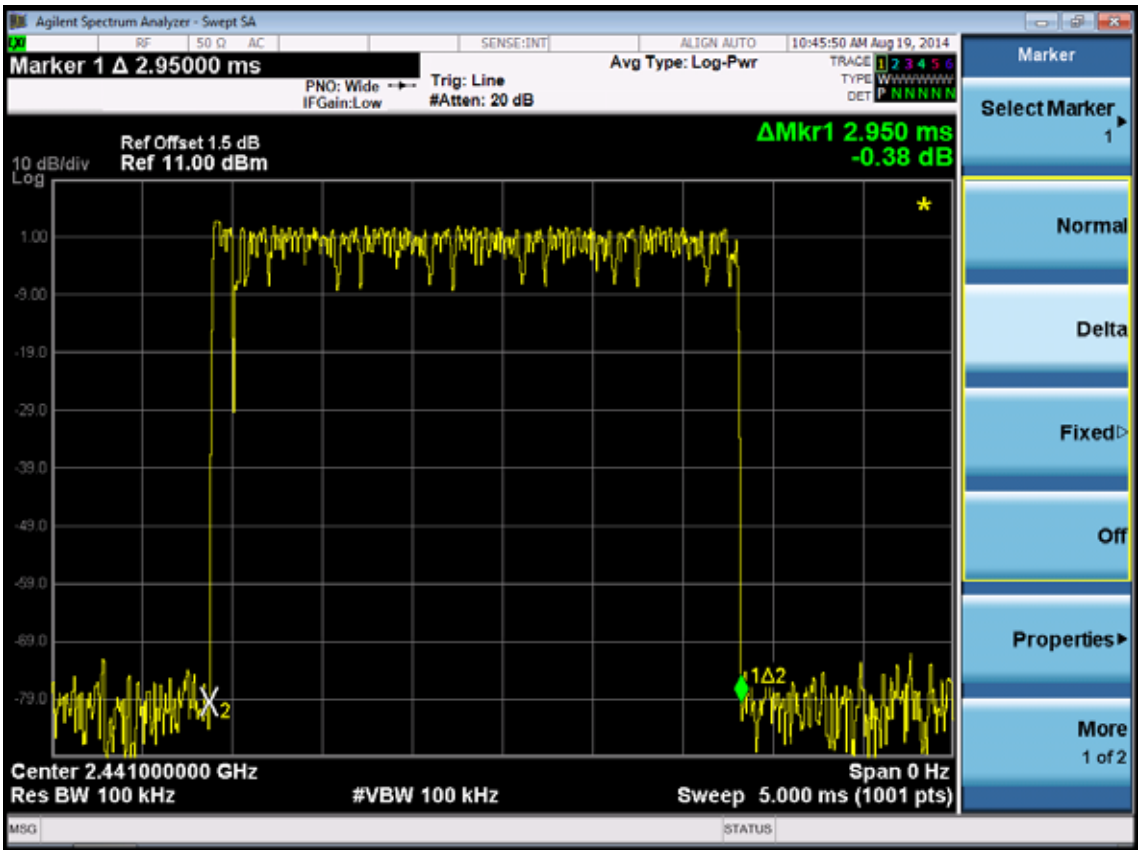
DH 3


Agilent Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
10:42:15 AM Aug 19, 2014
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET P N N N N N
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 20 dB
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
1.00
-9.00
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
-79.0
Center 2.441000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 5.000 s (1001 pts)
MSG
STATUS
Marker
Marker Table
On Off
Marker Count
[Off]
Couple Markers
On Off
All Markers Off
More
2 of 2

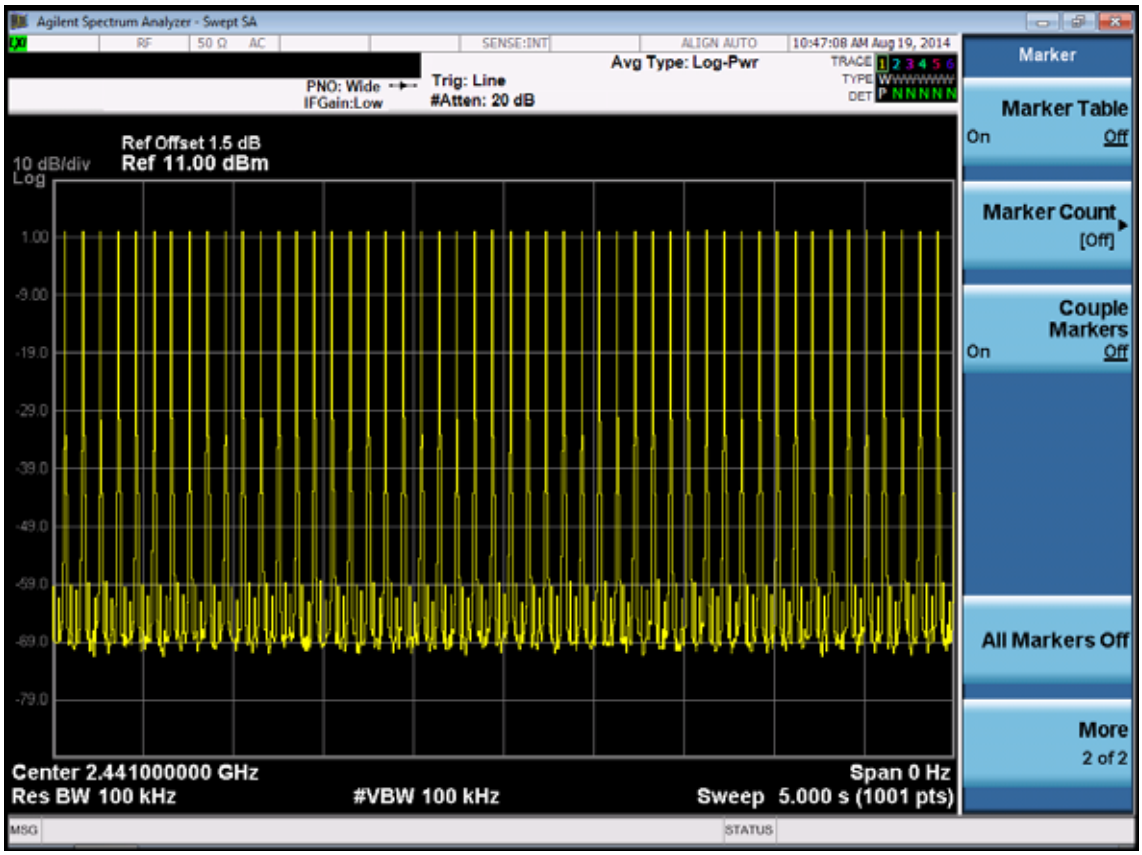

Agilent Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
10:43:26 AM Aug 19, 2014
Marker 1 Δ 1.69800 ms
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET P N N N N N
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 20 dB
ΔMkr1 1.698 ms
0.02 dB
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
1.00
-9.00
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
-79.0
1Δ2
Center 2.441000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 3.000 ms (1001 pts)
MSG
STATUS
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

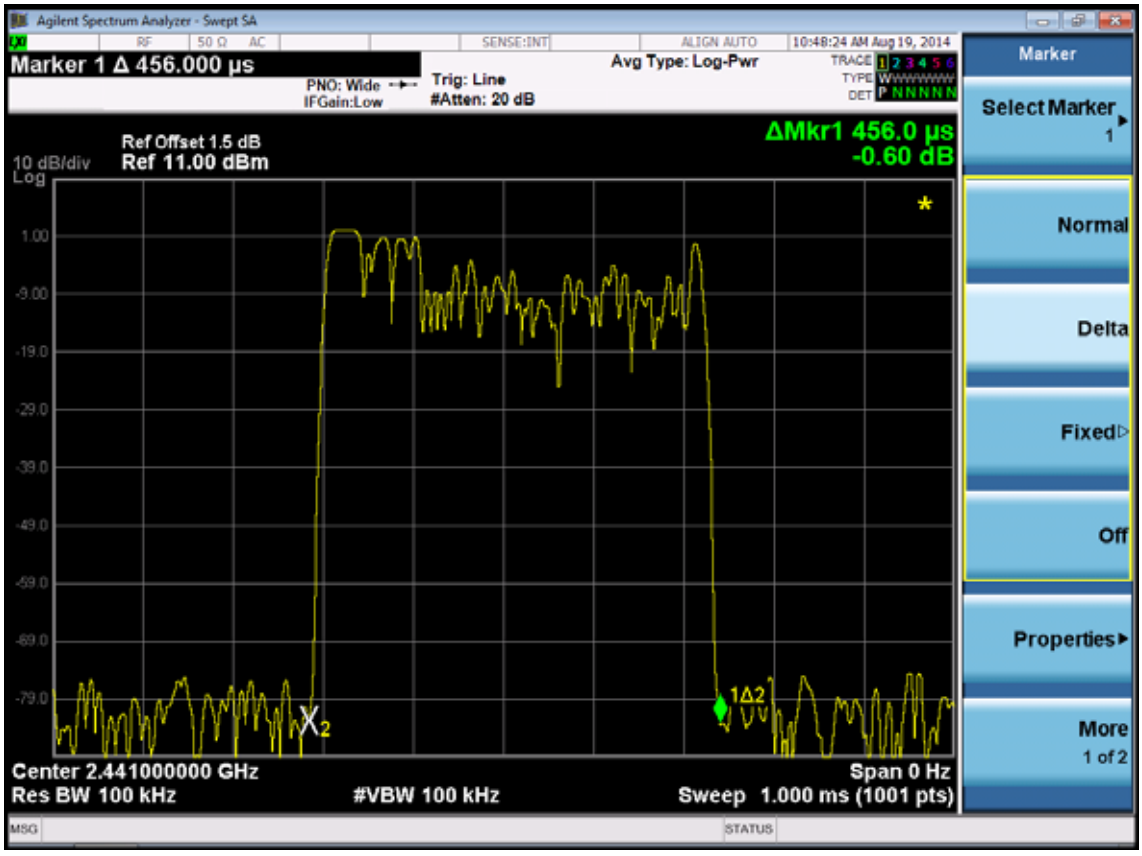
DH 5


Agilent Spectrum Analyzer - Swept SA
10:44:45 AM Aug 19, 2014
Avg Type: Log-Pwr
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 20 dB
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
Log
1.00
-9.00
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
-79.0
Center 2.441000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 5.000 s (1001 pts)
Marker
Marker Table
On Off
Marker Count
[Off]
Couple Markers
On Off
All Markers Off
More
2 of 2
MSG
STATUS

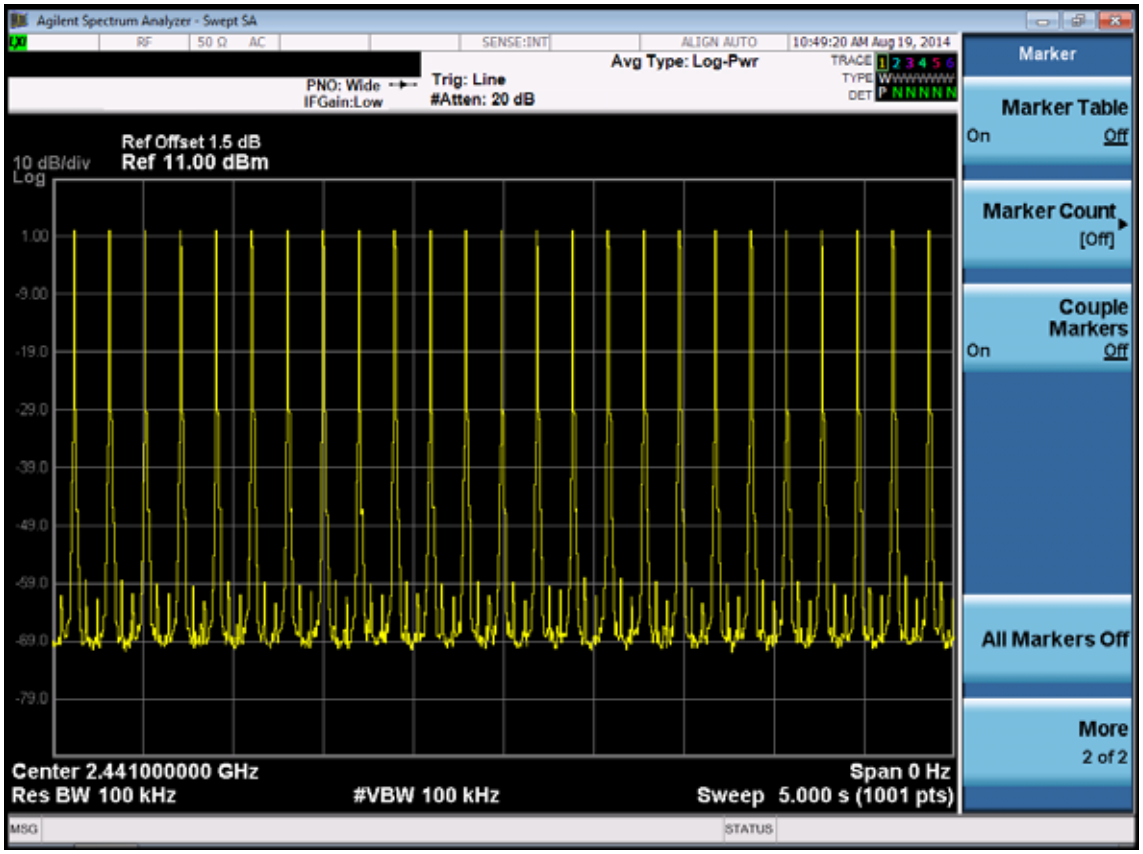

Agilent Spectrum Analyzer - Swept SA
10:45:50 AM Aug 19, 2014
Marker 1 Δ 2.95000 ms
Avg Type: Log-Pwr
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 20 dB
Ref Offset 1.5 dB
10 dB/div
Ref 11.00 dBm
ΔMkr1 2.950 ms
-0.38 dB
Log
1.00
-9.00
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
-79.0
1Δ2
Center 2.441000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 5.000 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS

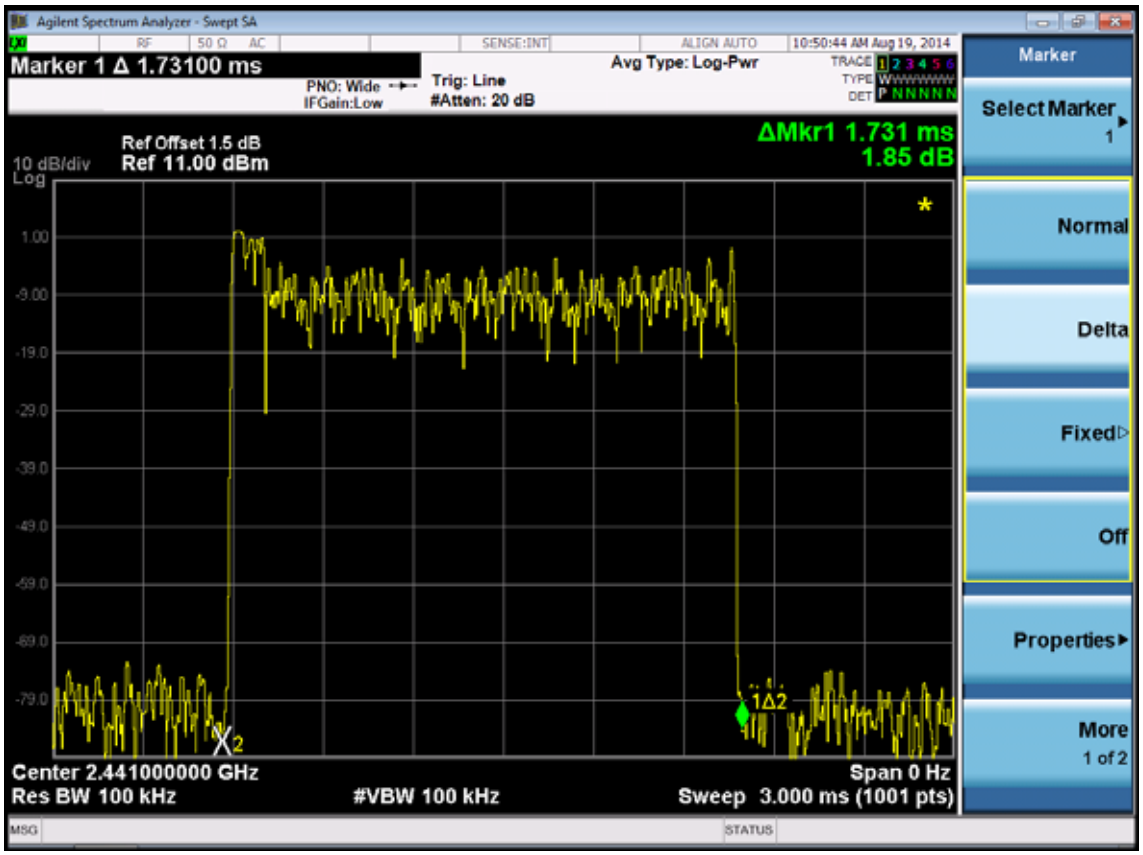
Test Mode: 8-DPSK
DH 1



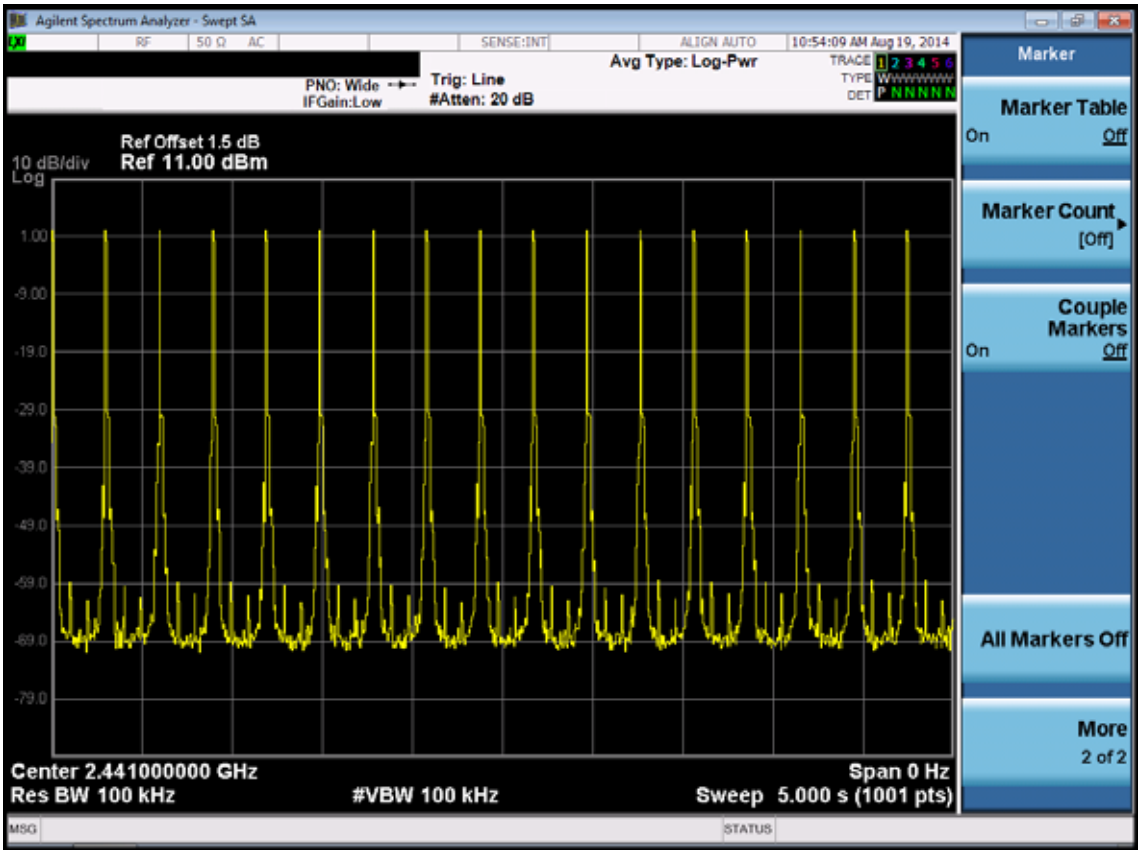


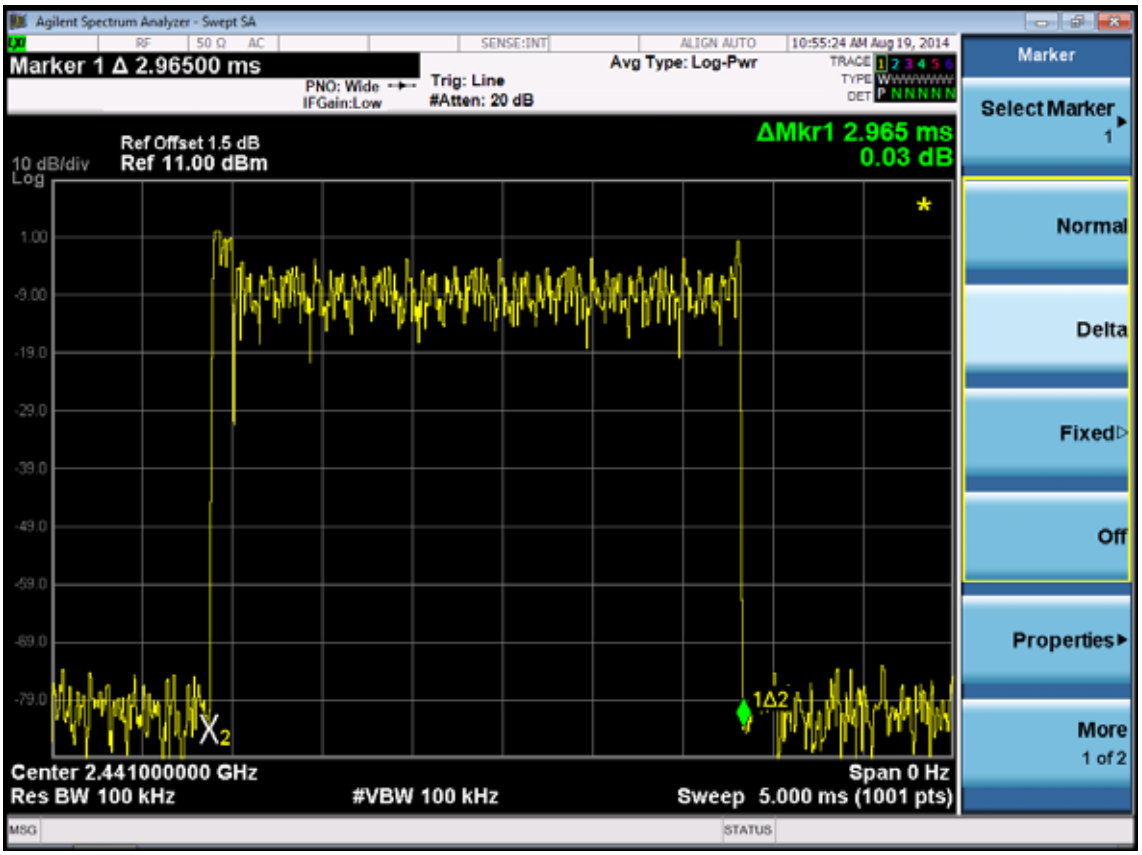
DH 3


Agilent Spectrum Analyzer - Swept SA
Avg Type: Log-Pwr
10:49:20 AM Aug 19, 2014
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 20 dB
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
Center 2.441000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 5.000 s (1001 pts)
Marker
Marker Table
On Off
Marker Count
[Off]
Couple Markers
On Off
All Markers Off
More
2 of 2


Agilent Spectrum Analyzer - Swept SA
Marker 1 Δ 1.73100 ms
Avg Type: Log-Pwr
10:50:44 AM Aug 19, 2014
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 20 dB
ΔMkr1 1.731 ms
1.85 dB
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
Center 2.441000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 3.000 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

DH 5


Agilent Spectrum Analyzer - Swept SA
10:54:09 AM Aug 19, 2014
Avg Type: Log-Pwr
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 20 dB
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
Center 2.441000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 5.000 s (1001 pts)
Marker
Marker Table
On Off
Marker Count
[Off]
Couple Markers
On Off
All Markers Off
More
2 of 2


Agilent Spectrum Analyzer - Swept SA
10:55:24 AM Aug 19, 2014
Marker 1 Δ 2.96500 ms
Avg Type: Log-Pwr
PNO: Wide
IFGain:Low
Trig: Line
#Atten: 20 dB
ΔMkr1 2.965 ms
0.03 dB
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.00 dBm
Center 2.441000000 GHz
Res BW 100 kHz
#VBW 100 kHz
Span 0 Hz
Sweep 5.000 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

10. MAXIMUM PEAK OUTPUT POWER TEST

10.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	N9030A	MY51380221	Oct.31, 13	1Year
2.	Power meter	Anritsu	ML2487A	6K00002472	Apr. 28,14	1Year
3.	Power sensor	Anritsu	MA2491A	0033005	Apr. 28,14	1Year
4.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr. 28,14	1Year
5.	RF Cable	Hubersuhner	SUCOFLEX102	28610/2	Apr. 28,14	1Year

10.2. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

10.3. Test Procedure

Connected the EUT's antenna port to Power Sensor, and use power meter to test peak output power Directly.

10.4. Test Results

EUT: Bluetooth Module			
M/N: TBM-CBC5			
Test date: 2014-08-11	Pressure: 101.1±1.0 kpa	Humidity: 51.2±1.0%	
Tested by: Kobe_Huang	Test site: RF site	Temperature:22.5±1.0 ℃	
Cable loss: 1.5dB		Attenuator loss: 20 dB	
Test Mode	CH (MHz)	Peak output Power (dBm)	Limit (dBm)
GFSK	2402	3.891	30
	2441	3.086	30
	2480	3.843	30
8-DPSK	2402	2.961	30
	2441	2.261	30
	2480	2.913	30
Conclusion: PASS			

11. BAND EDGE COMPLIANCE TEST

11.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Amp	HP	8449B	3008A02495	Apr. 28,14	1 Year
2.	Horn Antenna	ETS	3115	9510-4580	Jun. 06, 14	1 Year
3.	HF Cable	Hubersuhner	Sucoflex104	274094/4	Apr. 28,14	1 Year
4.	RF Cable	Hubersuhner	Sucoflex102	28610/2	Apr. 28,14	1 Year

11.2. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

11.3. Test Produce

For upper band emissions that are up to two bandwidths(2MHz) away (2483.5MHz to 2485.5MHz） from the band-edge use below produce:

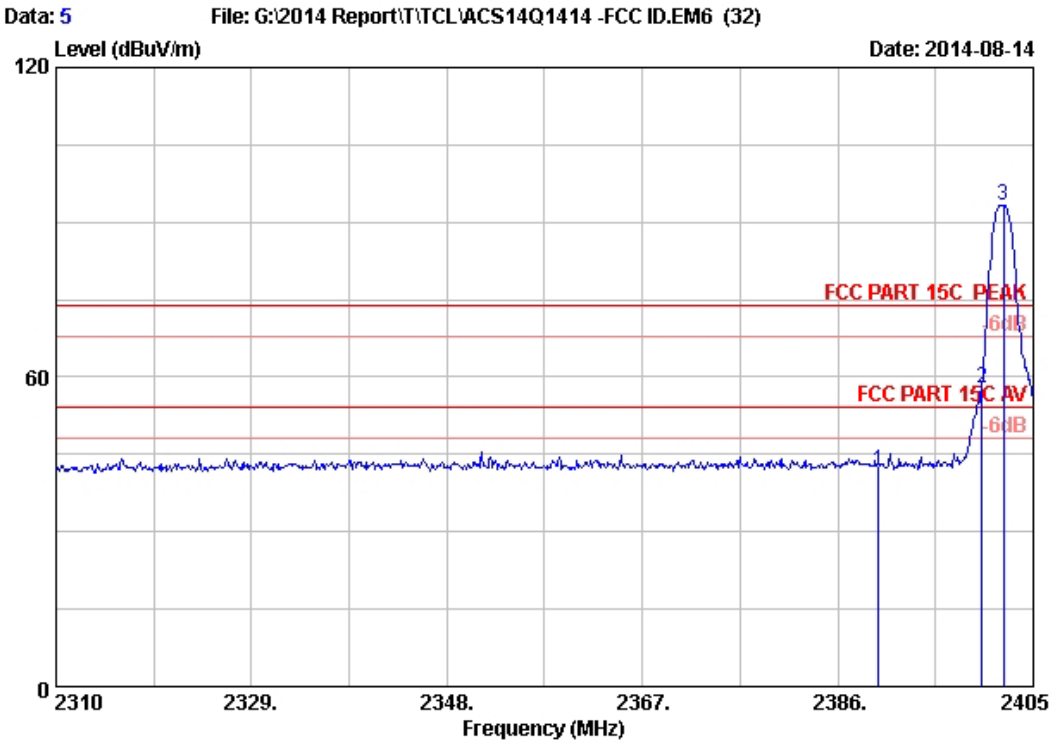
1. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 100KHz and with a video bandwidth 300KHz. Record the peak levels of the fundamental emission and the relevant band-edge emission, Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.
2. Subtract the delta measured in step (1) from the maximum field strengths measured in clause 4 .The resultant field strengths are then used to determine band-edge compliance as required by Section 15.205

For emissions above two bandwidths away from the band-edge use below produce:

1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
   (a) PEAK: RBW=1MHz ;VBW=3MHz, PK detector, Sweep=AUTO
   (b) This is pulse Modulation device a duty cycle factor was used to calculate average level based measured peak level.

11.4. Test Results

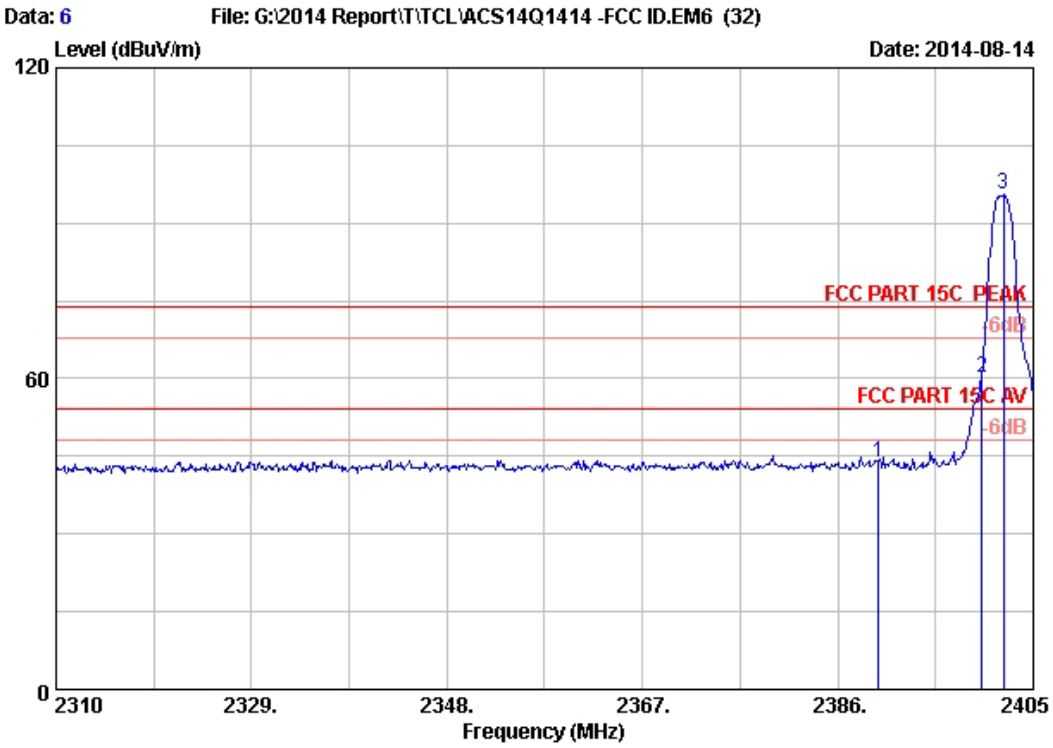
Pass (The testing data was attached in the next pages.)
Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.



Site no. : 3m Chamber Data no. : 5
Dis. / Ant. : 3m 2013 3115 (4580) Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 24*C/56% Engineer : Kevin_Hu
EUT : Bluetooth Module
Power Rating : DC 3.3V
Test Mode : GFSK 2402MHz
M/N : TBM-CBC5

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	28.16	5.78	35.70	43.67	41.91	74.00	32.09	Peak
2	2400.000	28.18	5.80	35.70	59.64	57.92	74.00	16.08	Peak
3	2402.150	28.18	5.80	35.70	95.12	93.40	74.00	-19.40	Peak

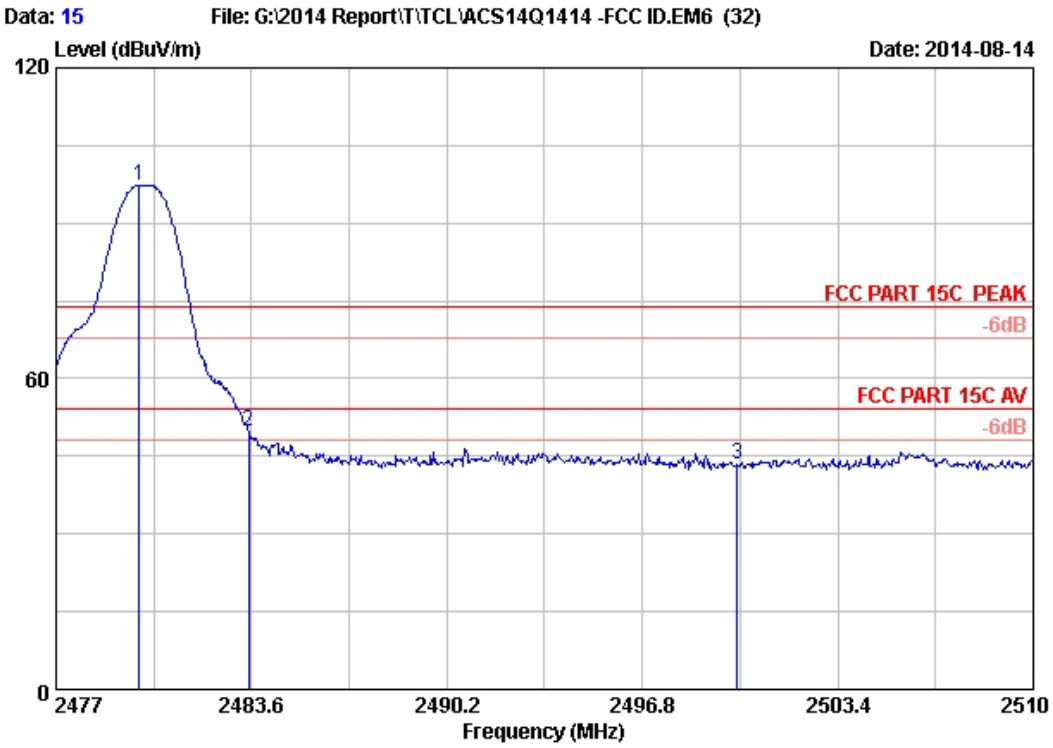
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 6
Dis. / Ant. : 3m 2013 3115 (4580) Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 24*C/56% Engineer : Kevin_Hu
EUT : Bluetooth Module
Power Rating : DC 3.3V
Test Mode : GFSK 2402MHz
M/N : TBM-CBC5

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	28.16	5.78	35.70	45.44	43.68	74.00	30.32	Peak
2	2400.000	28.18	5.80	35.70	61.93	60.21	74.00	13.79	Peak
3	2402.150	28.18	5.80	35.70	97.17	95.45	74.00	-21.45	Peak

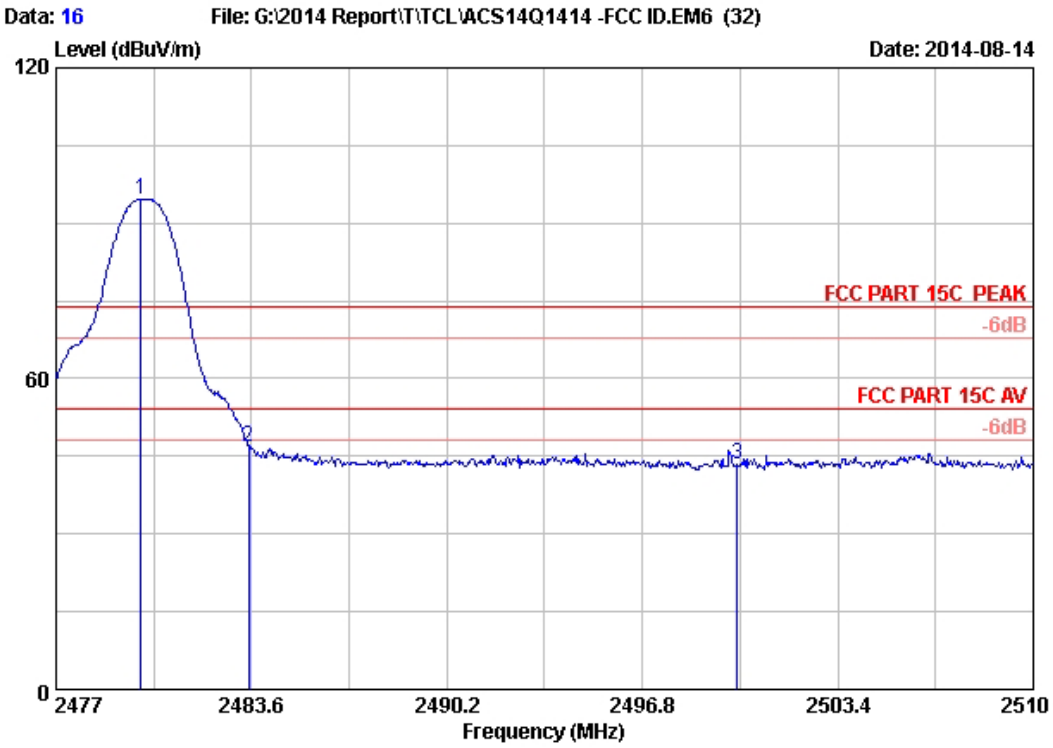
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 15
Dis. / Ant. : 3m 2013 3115 (4580) Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 24*C/56% Engineer : Kevin_Hu
EUT : Bluetooth Module
Power Rating : DC 3.3V
Test Mode : GFSK 2480MHz
M/N : TBM-CBC5

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.805	28.36	5.91	35.70	98.82	97.39	74.00	-23.39	Peak
2	2483.500	28.36	5.92	35.70	51.19	49.77	74.00	24.23	Peak
3	2500.000	28.40	5.94	35.70	44.69	43.33	74.00	30.67	Peak

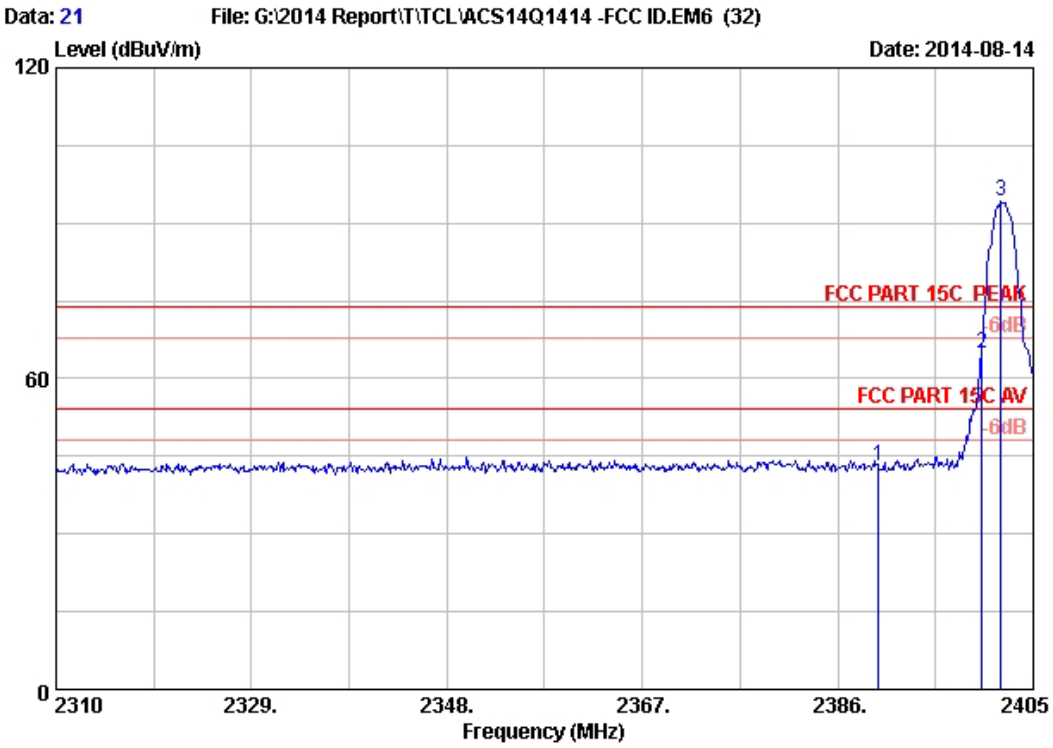
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 16
Dis. / Ant. : 3m 2013 3115 (4580) Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 24*C/56% Engineer : Kevin_Hu
EUT : Bluetooth Module
Power Rating : DC 3.3V
Test Mode : GFSK 2480MHz
M/N : TBM-CBC5

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.871	28.36	5.91	35.70	96.02	94.59	74.00	-20.59	Peak
2	2483.500	28.36	5.92	35.70	48.29	46.87	74.00	27.13	Peak
3	2500.000	28.40	5.94	35.70	44.94	43.58	74.00	30.42	Peak

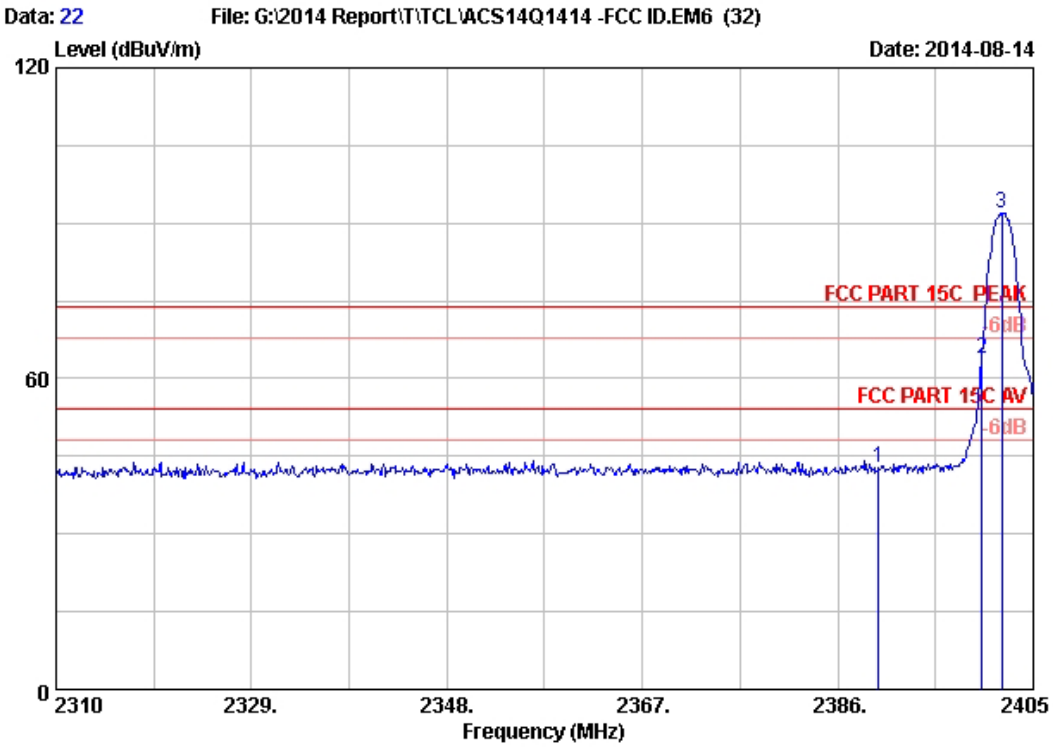
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 21
Dis. / Ant. : 3m 2013 3115 (4580) Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 24*C/56% Engineer : Kevin_Hu
EUT : Bluetooth Module
Power Rating : DC 3.3V
Test Mode : 8-DPSK 2402MHz
M/N : TBM-CBC5

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	28.16	5.78	35.70	44.96	43.20	74.00	30.80	Peak
2	2400.000	28.18	5.80	35.70	66.59	64.87	74.00	9.13	Peak
3	2401.865	28.18	5.80	35.70	95.88	94.16	74.00	-20.16	Peak

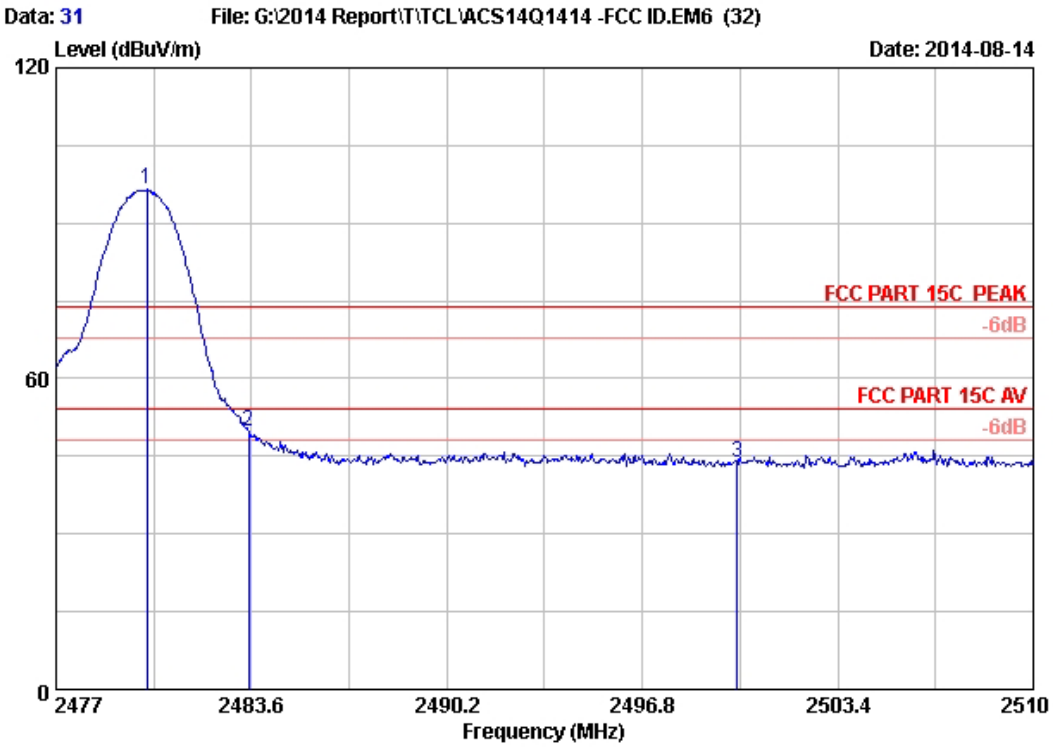
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 22
Dis. / Ant. : 3m 2013 3115 (4580) Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 24*C/56% Engineer : Kevin_Hu
EUT : Bluetooth Module
Power Rating : DC 3.3V
Test Mode : 8-DPSK 2402MHz
M/N : TBM-CBC5

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	28.16	5.78	35.70	44.44	42.68	74.00	31.32	Peak
2	2400.000	28.18	5.80	35.70	65.56	63.84	74.00	10.16	Peak
3	2401.960	28.18	5.80	35.70	93.66	91.94	74.00	-17.94	Peak

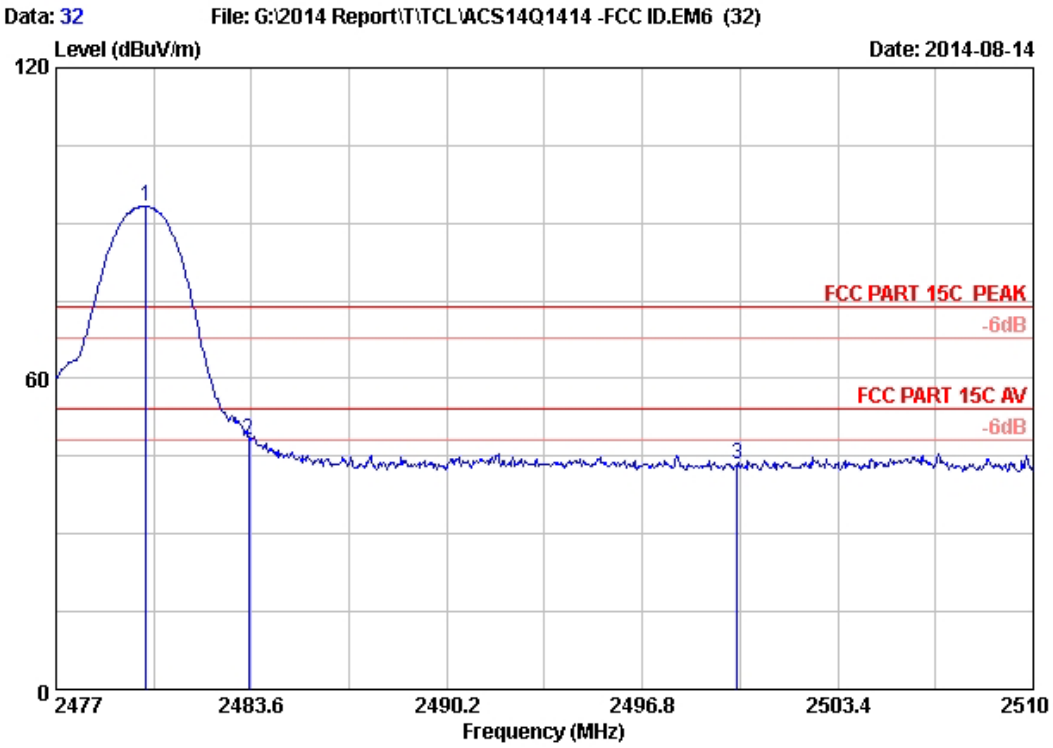
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 31
Dis. / Ant. : 3m 2013 3115 (4580) Ant. pol. : VERTICAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 24*C/56% Engineer : Kevin_Hu
EUT : Bluetooth Module
Power Rating : DC 3.3V
Test Mode : 8-DPSK 2480MHz
M/N : TBM-CBC5

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.069	28.36	5.91	35.70	97.87	96.44	74.00	-22.44	Peak
2	2483.500	28.36	5.92	35.70	51.30	49.88	74.00	24.12	Peak
3	2500.000	28.40	5.94	35.70	45.20	43.84	74.00	30.16	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 32
Dis. / Ant. : 3m 2013 3115 (4580) Ant. pol. : HORIZONTAL
Limit : FCC PART 15C PEAK
Env. / Ins. : 24*C/56% Engineer : Kevin_Hu
EUT : Bluetooth Module
Power Rating : DC 3.3V
Test Mode : 8-DPSK 2480MHz
M/N : TBM-CBC5

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.036	28.36	5.91	35.70	94.78	93.35	74.00	-19.35	Peak
2	2483.500	28.36	5.92	35.70	49.71	48.29	74.00	25.71	Peak
3	2500.000	28.40	5.94	35.70	44.90	43.54	74.00	30.46	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp Factor
2. The emission levels that are 20dB below the official limit are not reported.

12. DEVIATION TO TEST SPECIFICATIONS

[NONE]