7. SPURIOUS EMISSION AT ANTENNA TERMINAL

7.1. Applicable Standard

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in §2.1051

According to FCC § 24.238, (a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmit power (P) by a factor of at least 43+10* logP dB.

7.2. Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	MY51110020	04/16/2012
WEINSCHEL	67-30-33 / Attenuator	BU5347	12/29/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	12/29/2011
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/12/2011
WEINSCHEL	AF9003-69-31 / Attenuator	639	11/12/2011
Agilent	6674A / DC Power Supply	3501A00901	05/02/2012

7.3. Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.

The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

The conducted emission level is meaured at each antenna port and then summed mathmatically to determine the total emission level from the device.

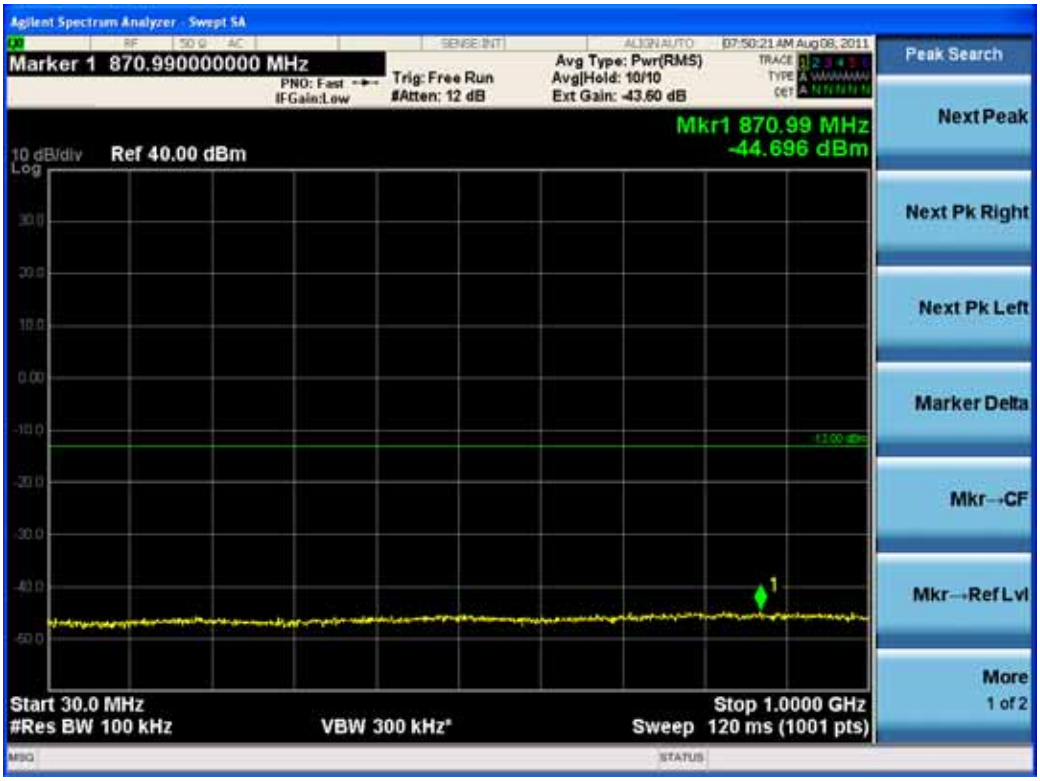
7.4. Test Result

: Pass (Power boost mode was tested on.)

7.4.1. Plot Data for 1 Carrier , Output Port 0

(QPSK Low Channel)

(30 MHz ~ 1 GHz)



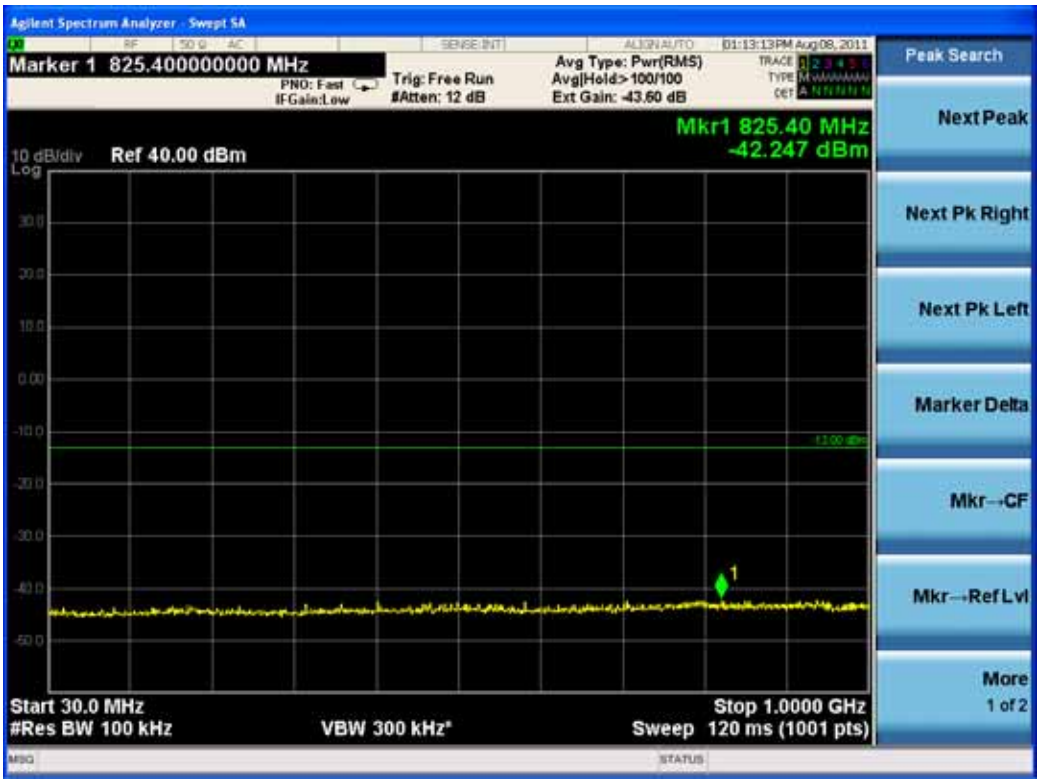
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
VBW:3 dB RBW 3.0
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
07:49:44 AM Aug 08, 2011
Mkr1 1.930 000 GHz
-18.497 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 12.35 MHz
Sweep 1.53 ms (1001 pts)
Alignment Completed
BW
Res BW
100 kHz
Auto
Man
Video BW
300 kHz
Auto
Man
VBW:3dB RBW
3.0
Auto
Man
Span:3dB RBW
106
Auto
Man
RBW Control
[Gaussian,-3 dB]

(QPSK Middle Channel)

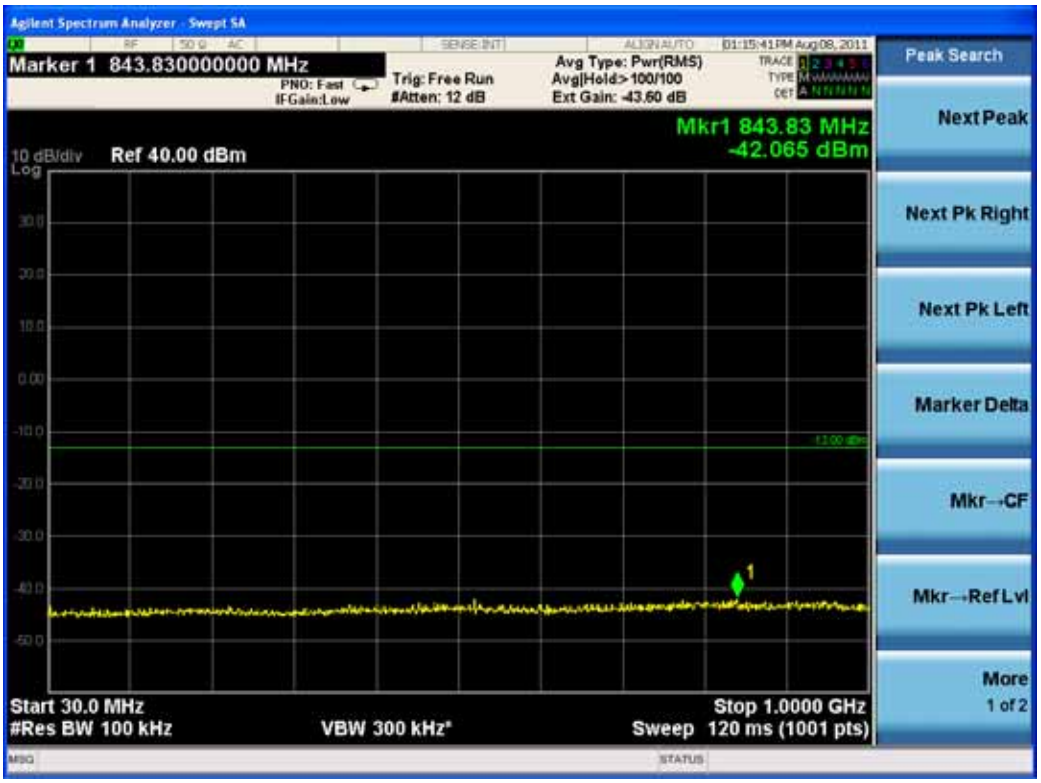
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(QPSK High Channel)

(30 MHz ~ 1 GHz)



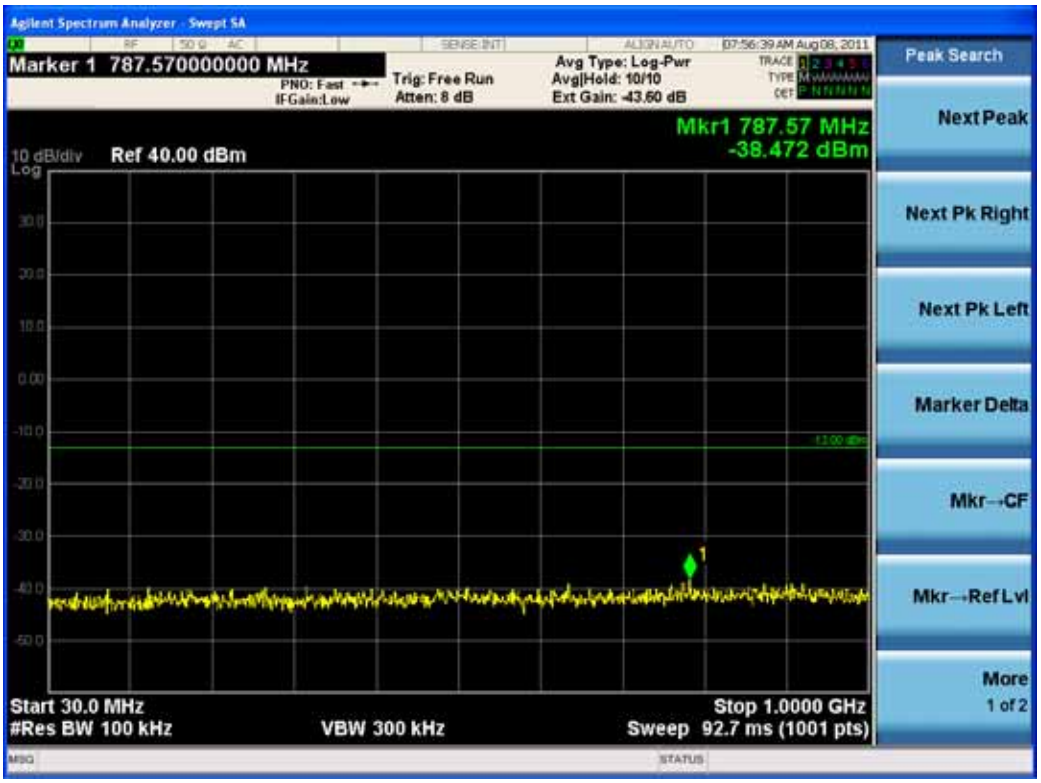
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.995000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
01:16:47 PM Aug 08, 2011
Mkr1 1.995 000 GHz
-20.669 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(16QAM Low Channel)

(30 MHz ~ 1 GHz)



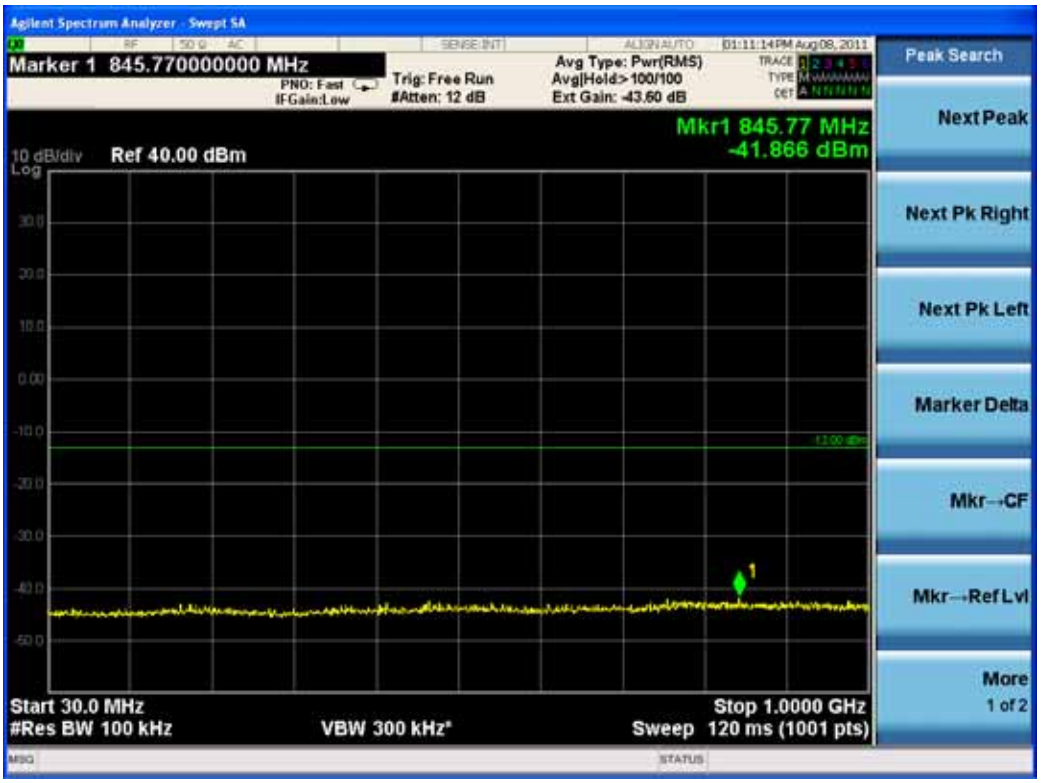
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Average/Hold Number 100
PNO: Far
IFGain:Low
Trig: Free Run
Atten: 8 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
07:58:06 AM Aug 08, 2011
Mkr1 1.930 00 GHz
-17.534 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 10.00 MHz
Sweep 1.27 ms (1001 pts)
Meas Setup
Average/Hold Number 100
Average Type Power
Auto Man
Limits
N dB Points -3.01 dB
On Off
PhNoise Opt Wide-offset
Auto Man
ADC Dither On
Auto Man
More 1 of 2

(16QAM Middle Channel)

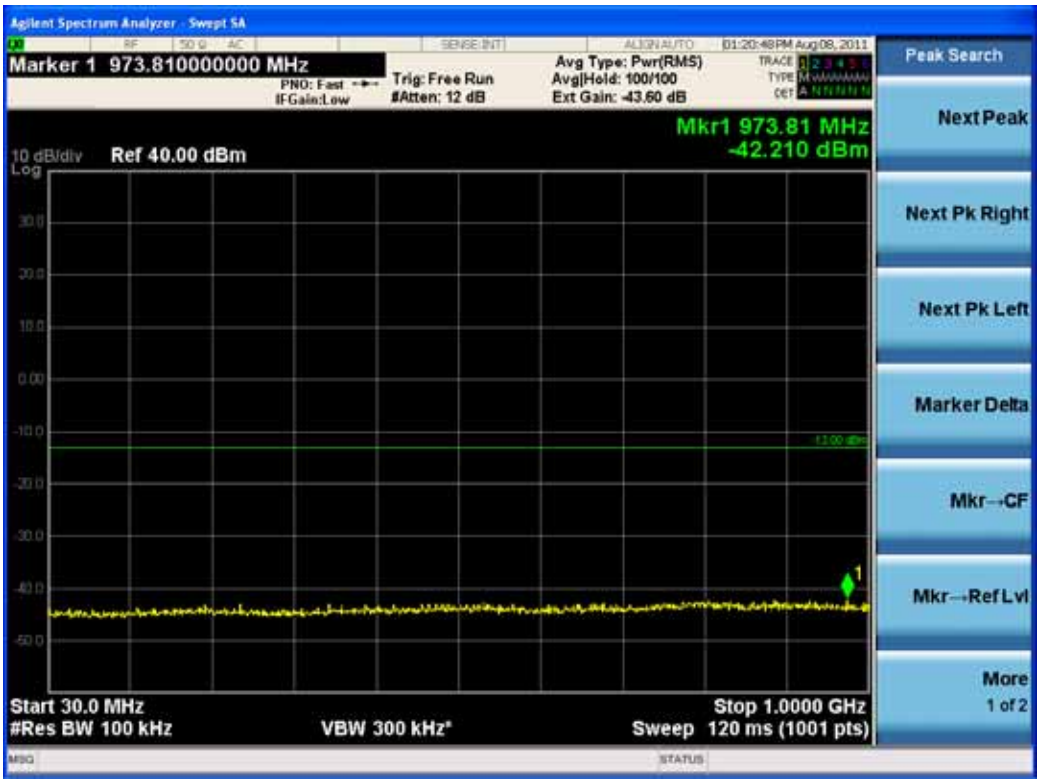
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(16QAM High Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

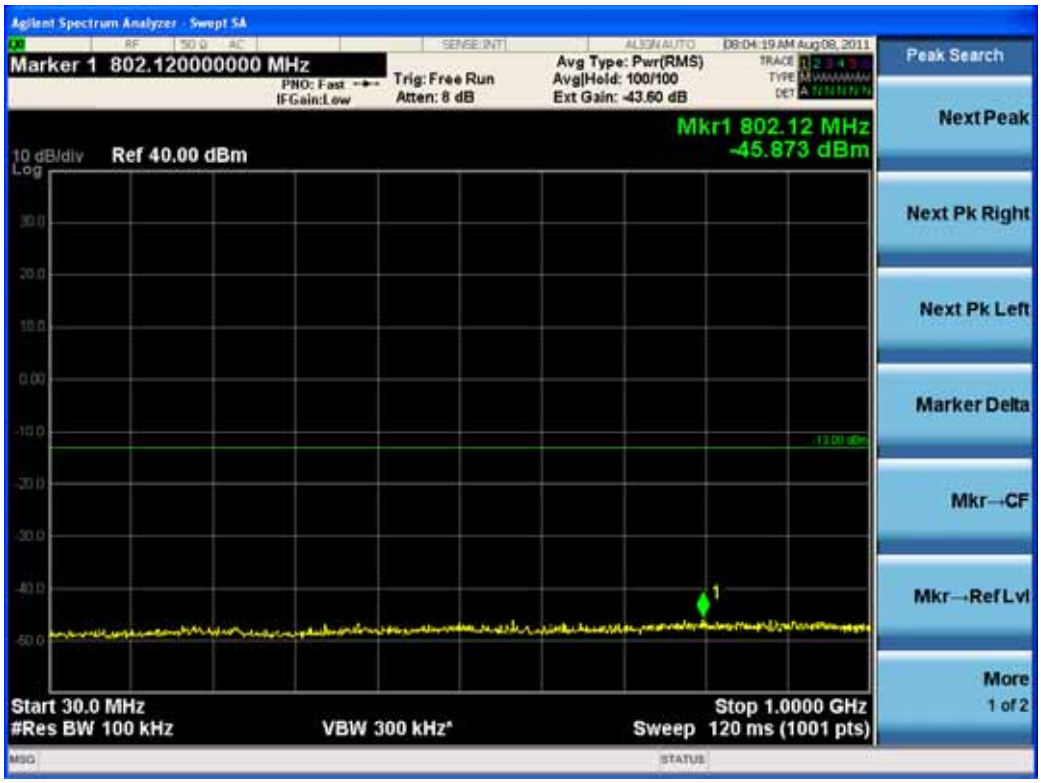
(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Preamp Gain -43.60 dB
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
01:18:47 PM Aug 08, 2011
Mkr1 1.995 000 GHz
-22.207 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
1.995000000 GHz
Start Freq
1.992500000 GHz
Stop Freq
1.997500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

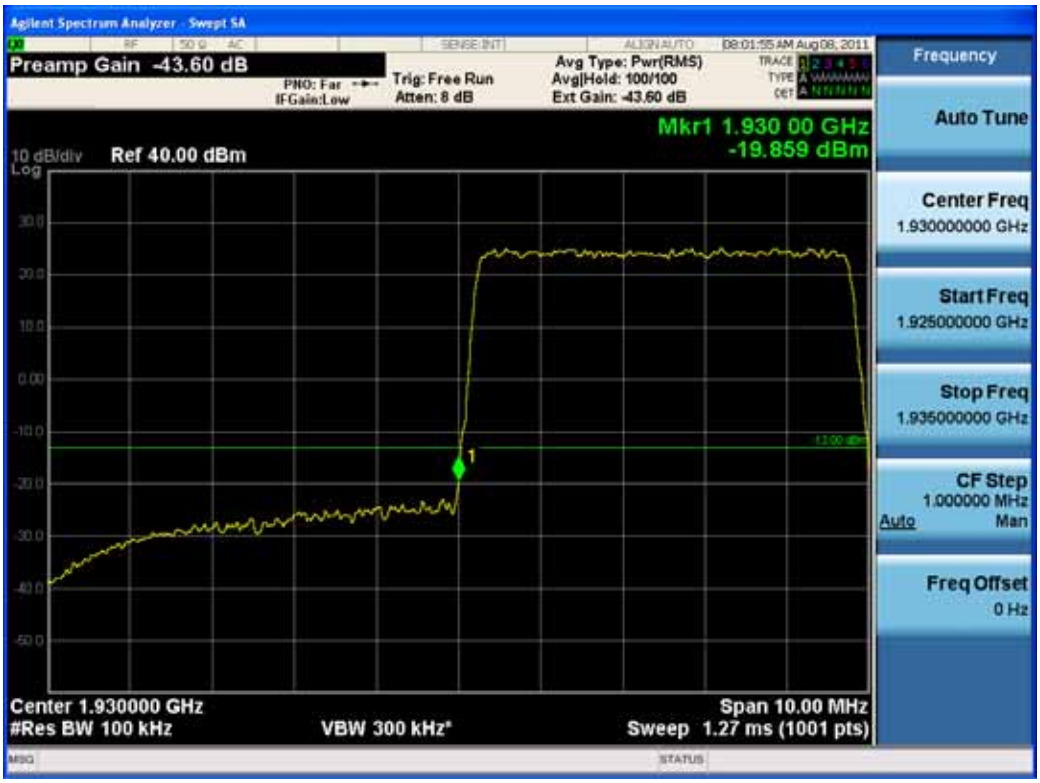
(64QAM Low Channel)

(30 MHz ~ 1 GHz)

(1 GHz ~ 26.5 GHz)

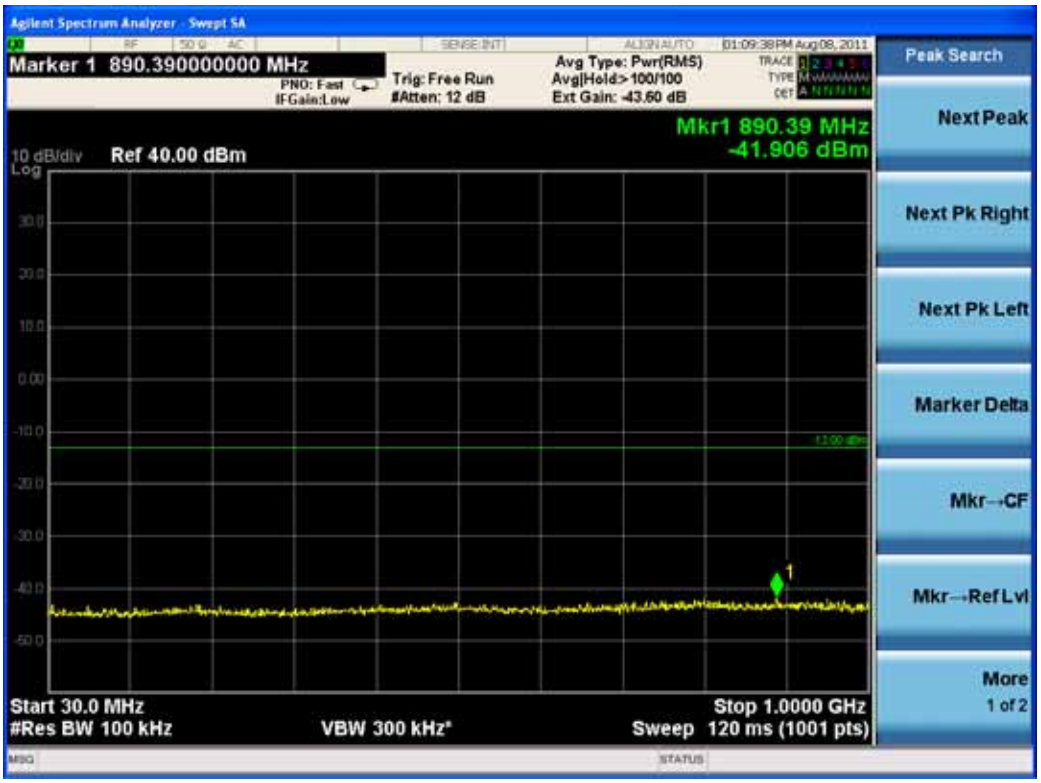


(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Preamp Gain -43.60 dB
PNO: Far
IFGain:Low
Trig: Free Run
Atten: 8 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
08:01:55 AM Aug 08, 2011
Mkr1 1.930 00 GHz
-19.859 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 10.00 MHz
Sweep 1.27 ms (1001 pts)
Frequency
Auto Tune
Center Freq
1.930000000 GHz
Start Freq
1.925000000 GHz
Stop Freq
1.935000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

(64QAM Middle Channel)

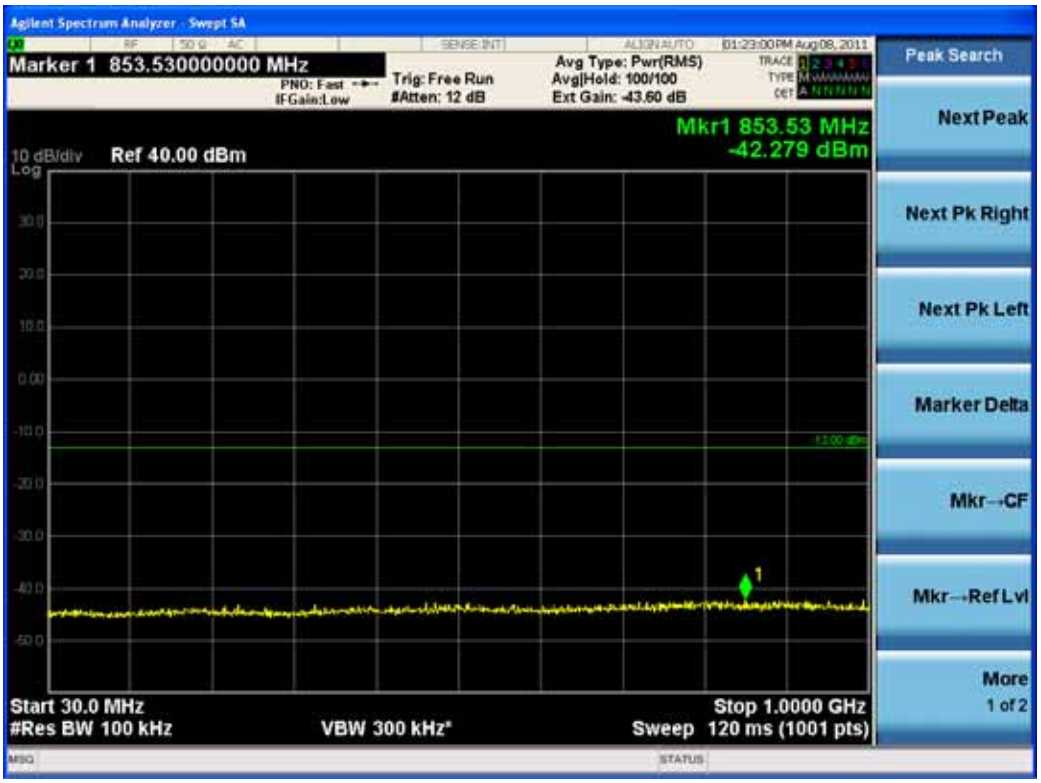
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(64QAM High Channel)

(30 MHz ~ 1 GHz)



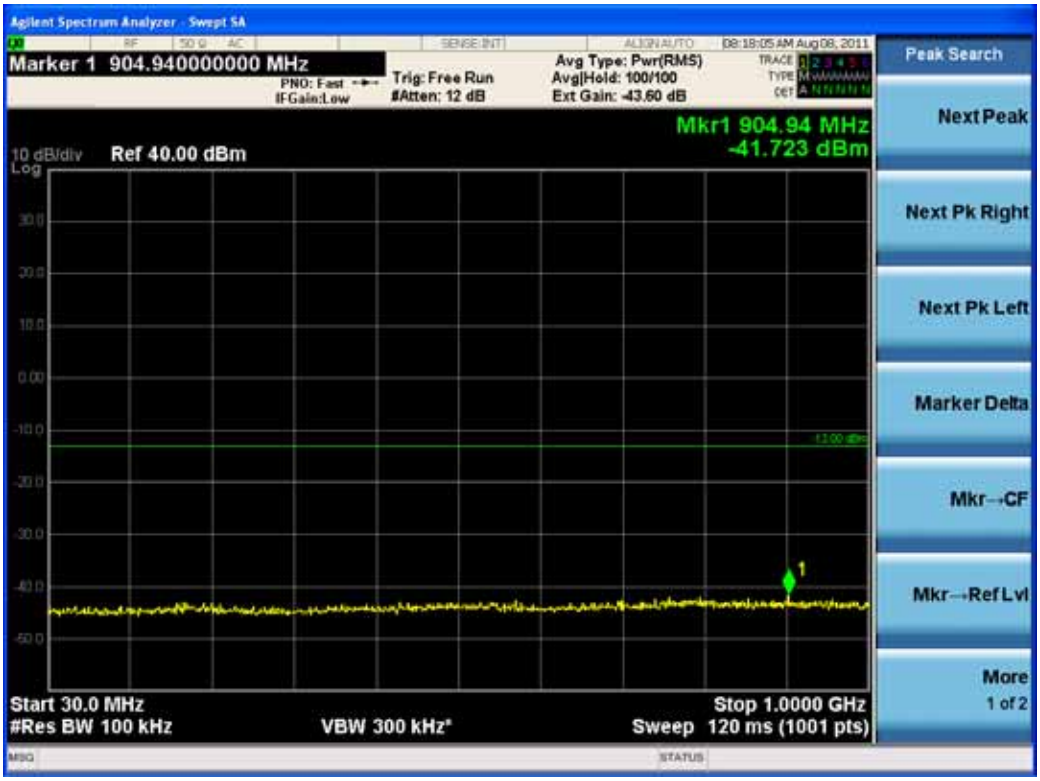
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.995000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
01:23:18 PM Aug 08, 2011
Mkr1 1.995 000 GHz
-21.273 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

7.4.2. Plot Data for 1 Carrier , Output Port 1
(QPSK Low Channel)

(30 MHz ~ 1 GHz)



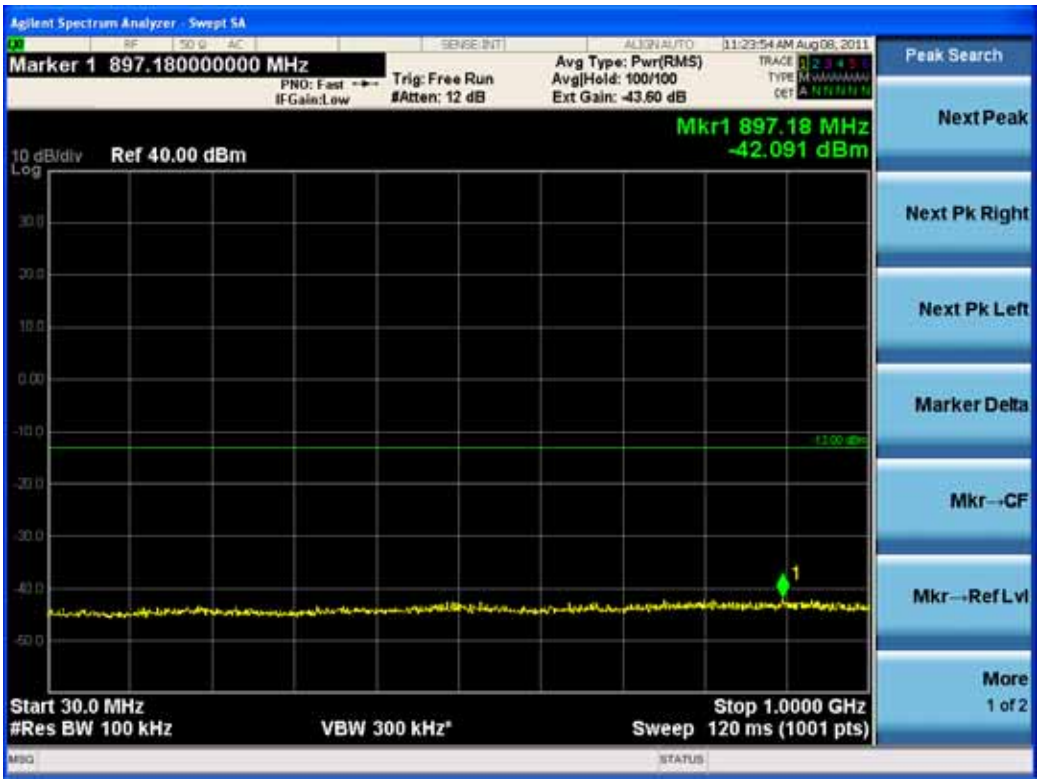
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.930000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
08:19:03 AM Aug 08, 2011
Mkr1 1.930 000 GHz
-20.510 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(QPSK Middle Channel)

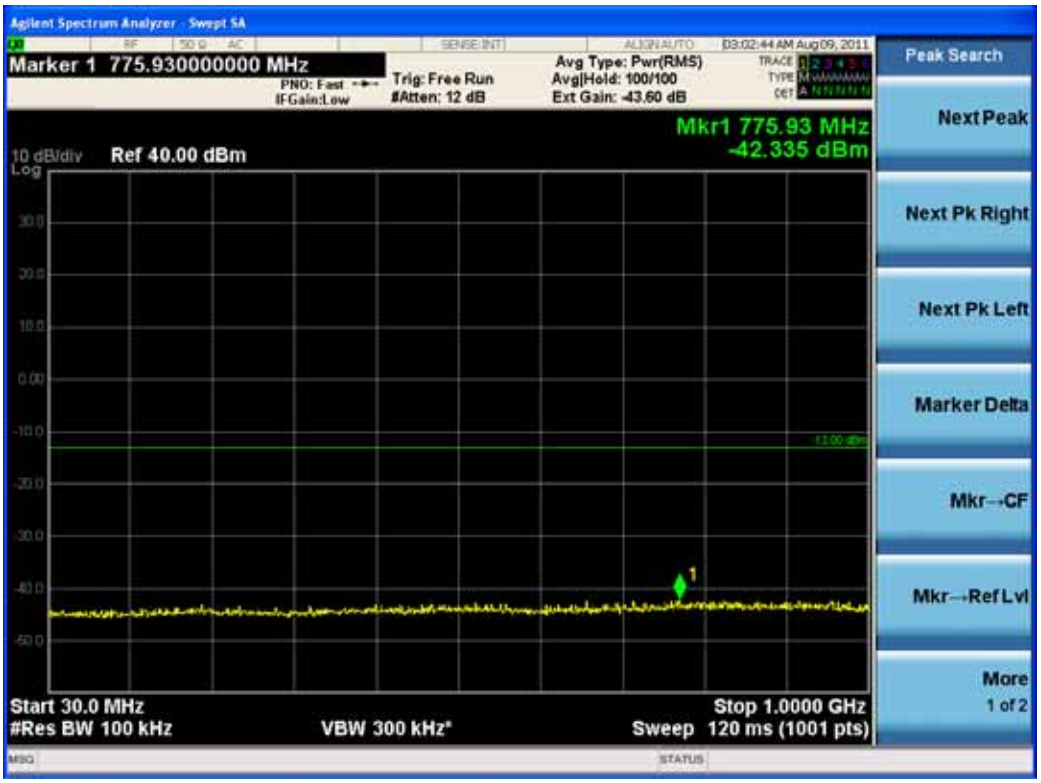
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(QPSK High Channel)

(30 MHz ~ 1 GHz)



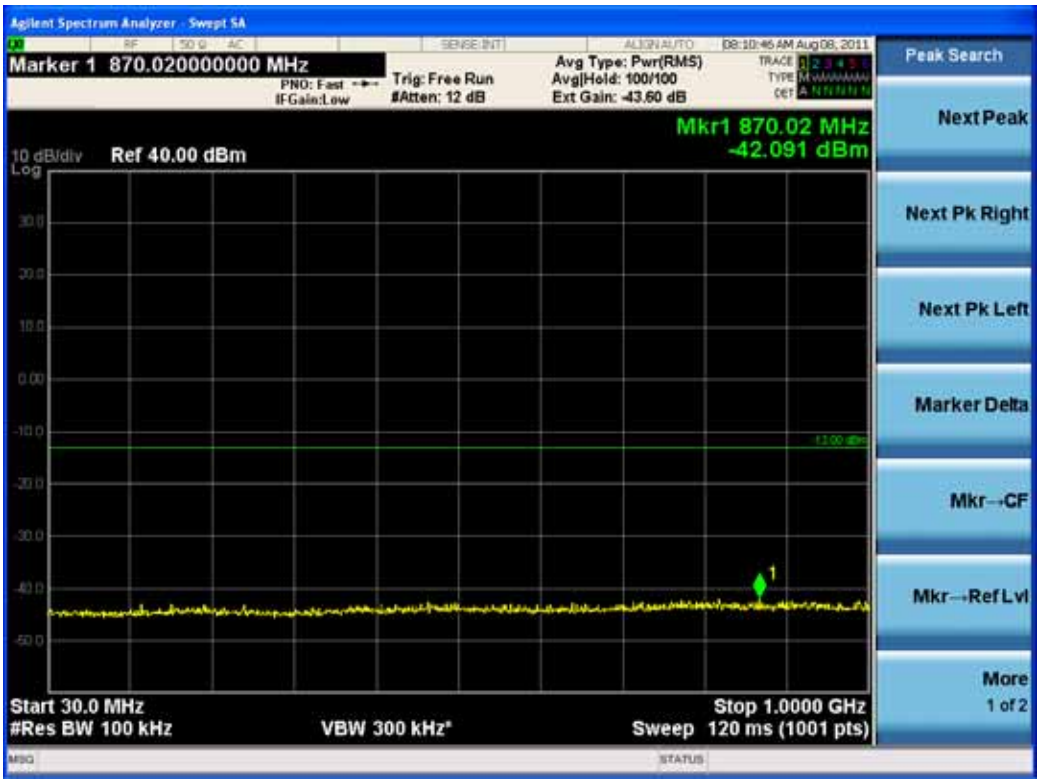
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Center Freq 1.995000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
03:01:10 AM Aug 09, 2011
Mkr1 1.995 000 GHz
-18.390 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
1.995000000 GHz
Start Freq
1.992500000 GHz
Stop Freq
1.997500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

(16QAM Low Channel)

(30 MHz ~ 1 GHz)



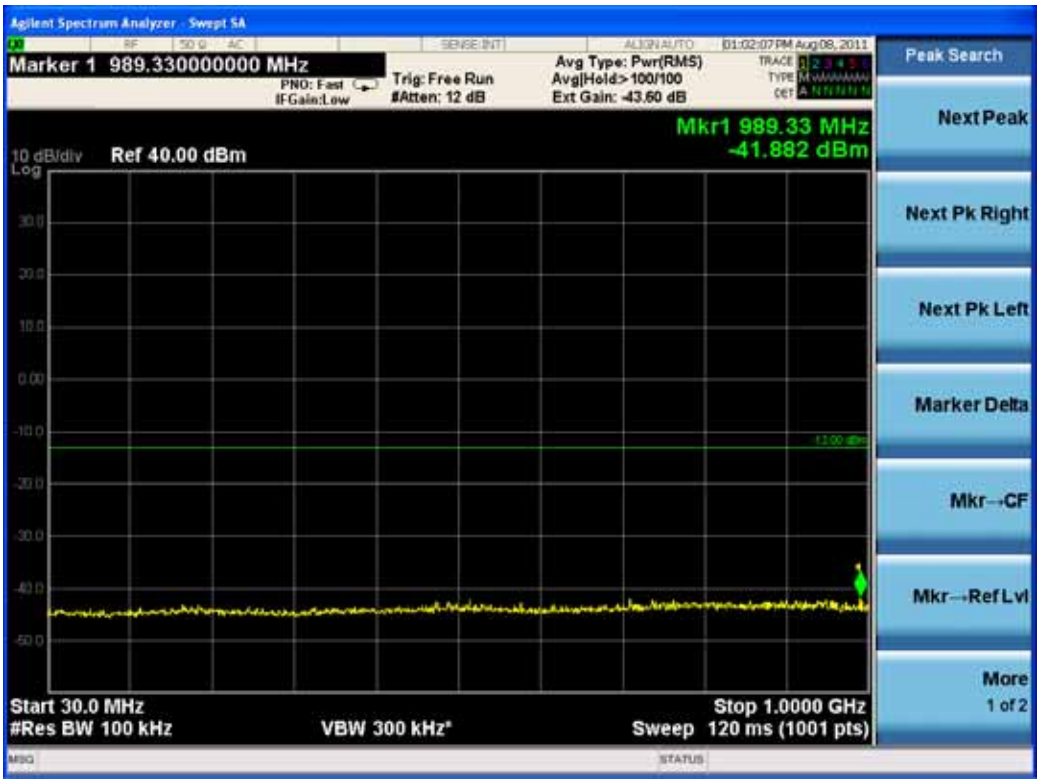
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.930000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
08:10:13 AM Aug 08, 2011
Mkr1 1.930 000 GHz
-18.878 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2
MSG
STATUS

(16QAM Middle Channel)

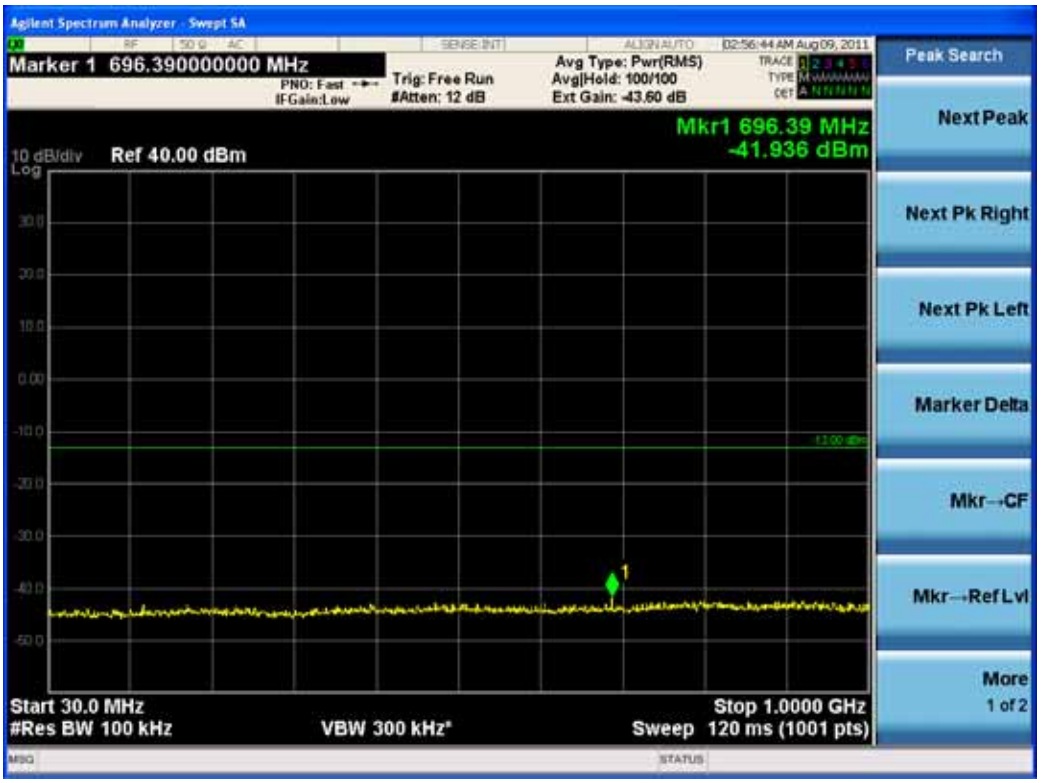
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(16QAM High Channel)

(30 MHz ~ 1 GHz)



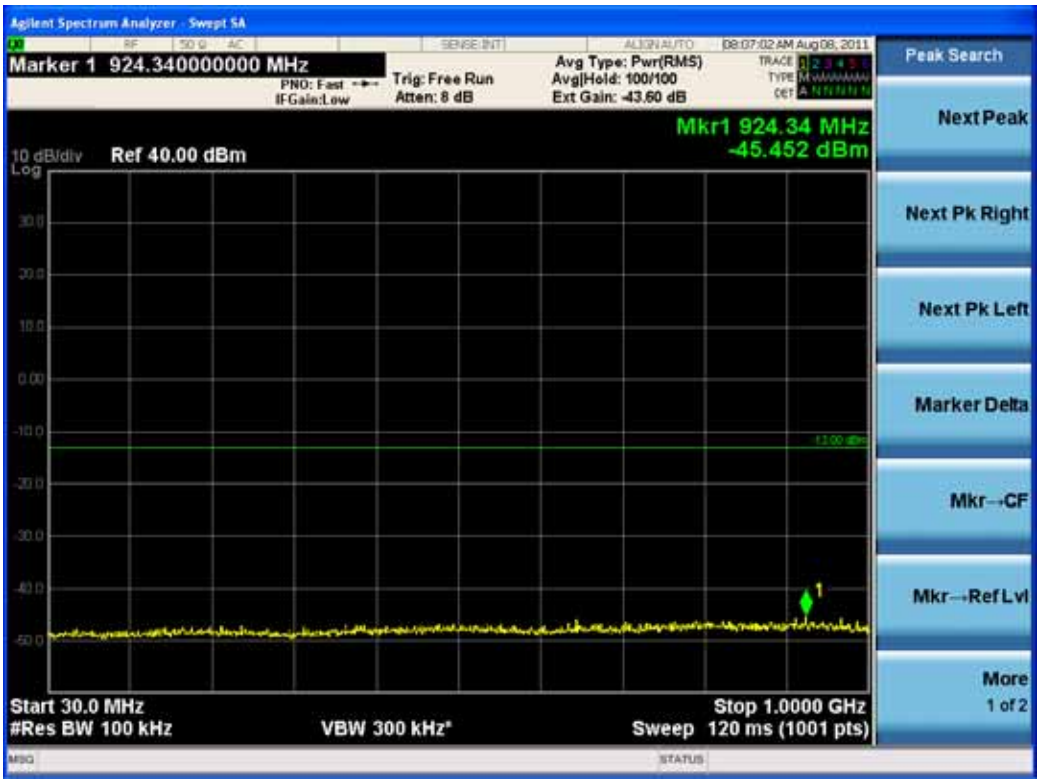
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.995000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
02:57:02 AM Aug 09, 2011
Mkr1 1.995 000 GHz
-19.092 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(64QAM Low Channel)

(30 MHz ~ 1 GHz)



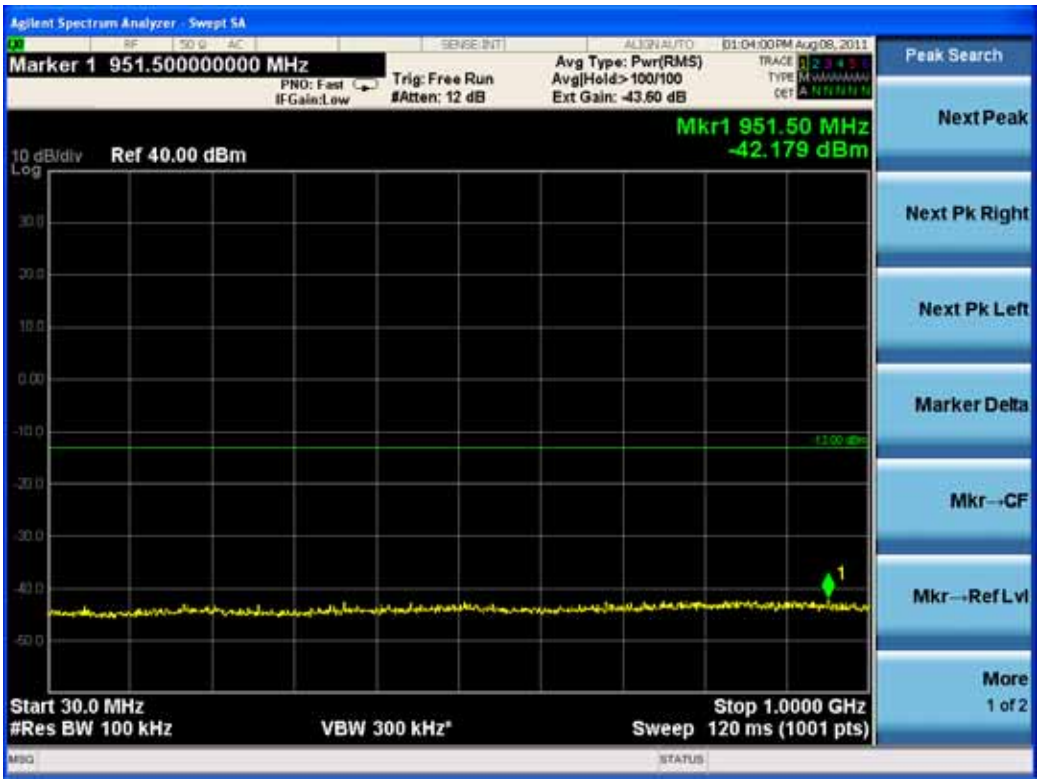
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.930000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
08:09:42 AM Aug 08, 2011
Mkr1 1.930 000 GHz
-17.992 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(64QAM Middle Channel)

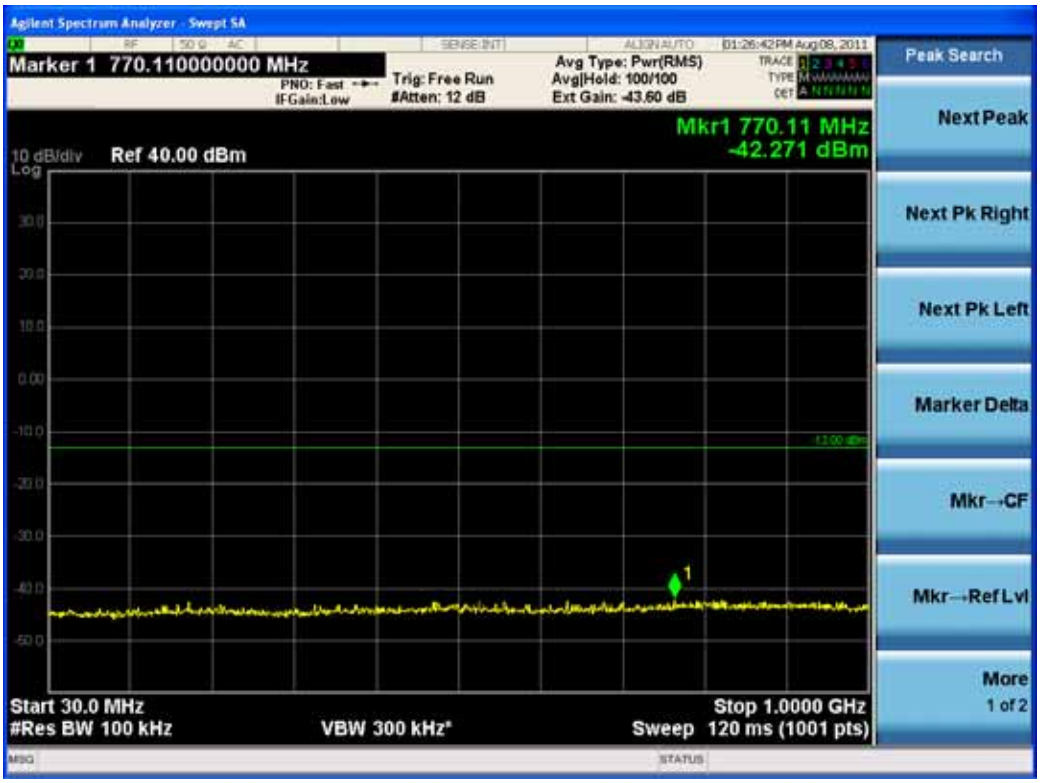
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(64QAM High Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

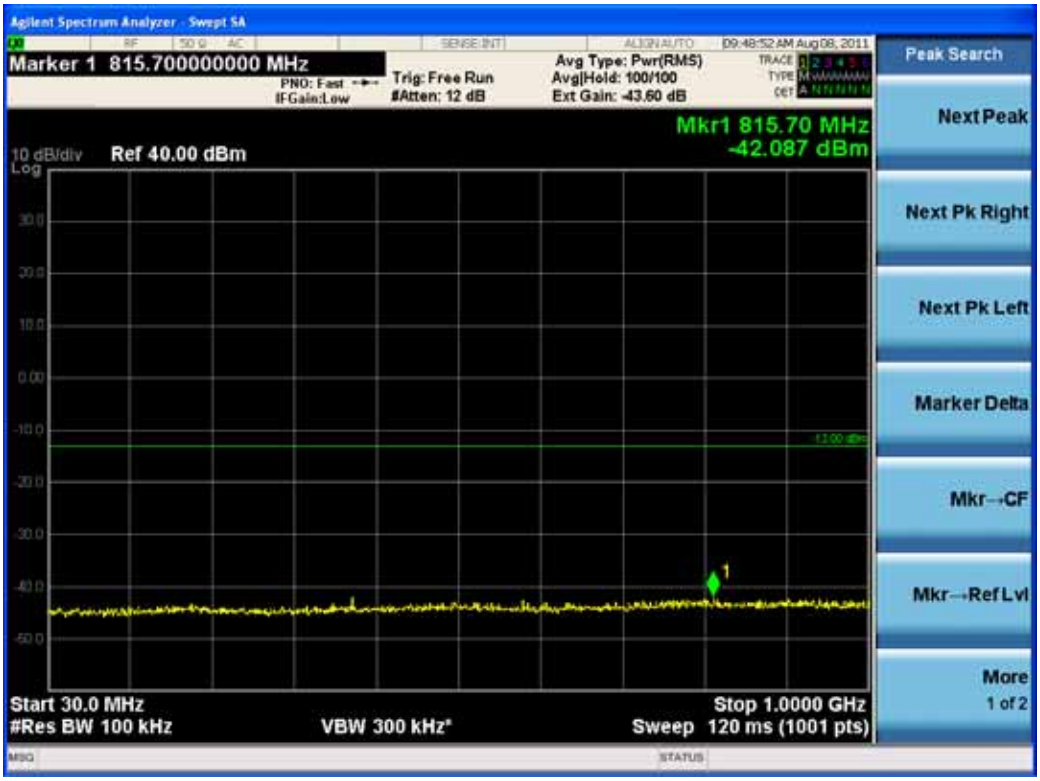
(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Preamp Gain -43.60 dB
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
01:26:04 PM Aug 08, 2011
Mkr1 1.995 000 GHz
-18.890 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
1.995000000 GHz
Start Freq
1.992500000 GHz
Stop Freq
1.997500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

7.4.3. Plot Data for 1 Carrier , Output Port 2

(QPSK Low Channel)

(30 MHz ~ 1 GHz)



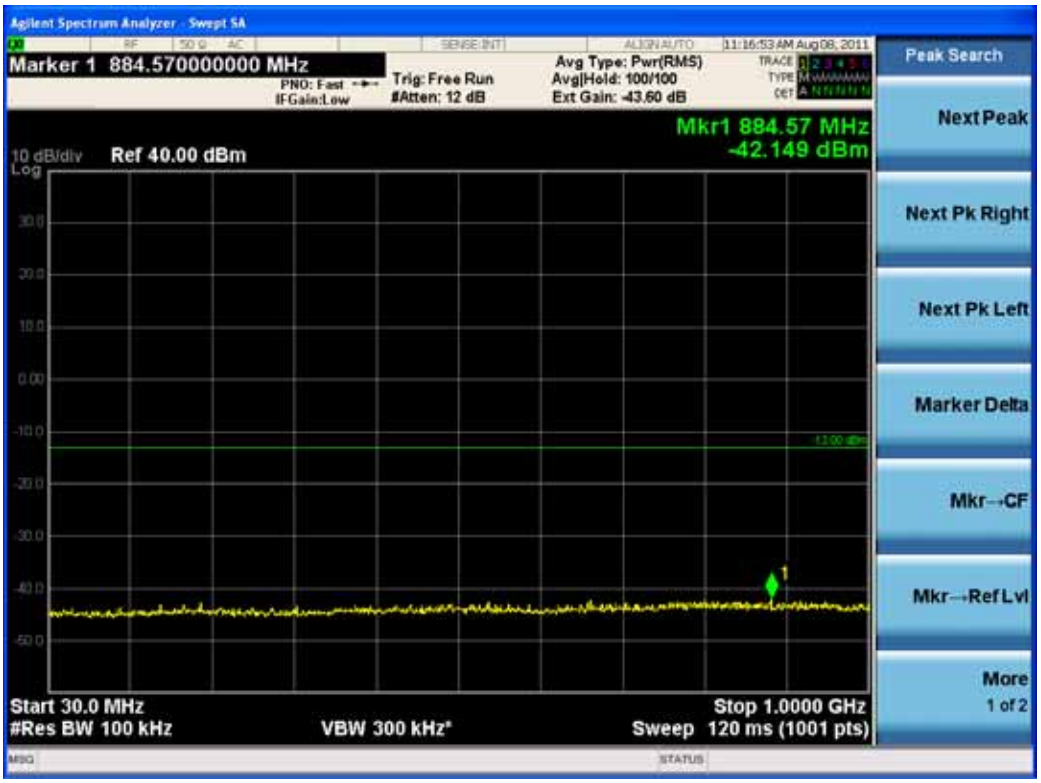
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
09:48:12 AM Aug 08, 2011
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
Mkr1 1.930 000 GHz
-20.222 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Trace/Det
Select Trace
Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View/Blank
Trace On
More
1 of 3

(QPSK Middle Channel)

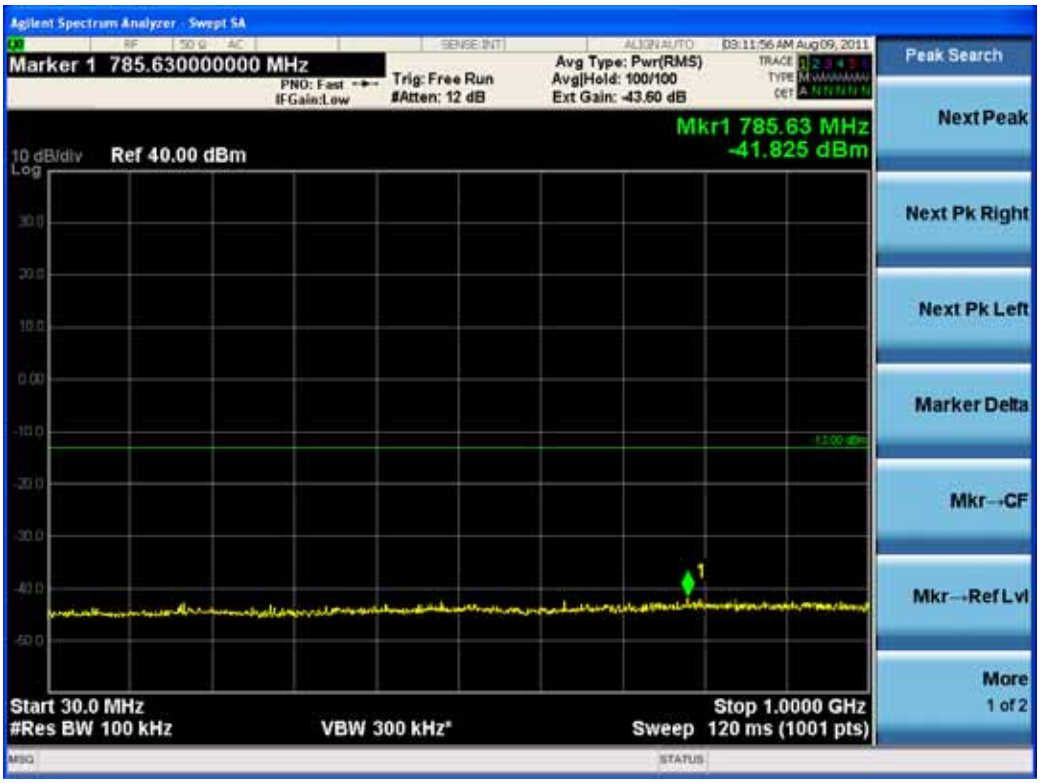
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(QPSK High Channel)

(30 MHz ~ 1 GHz)



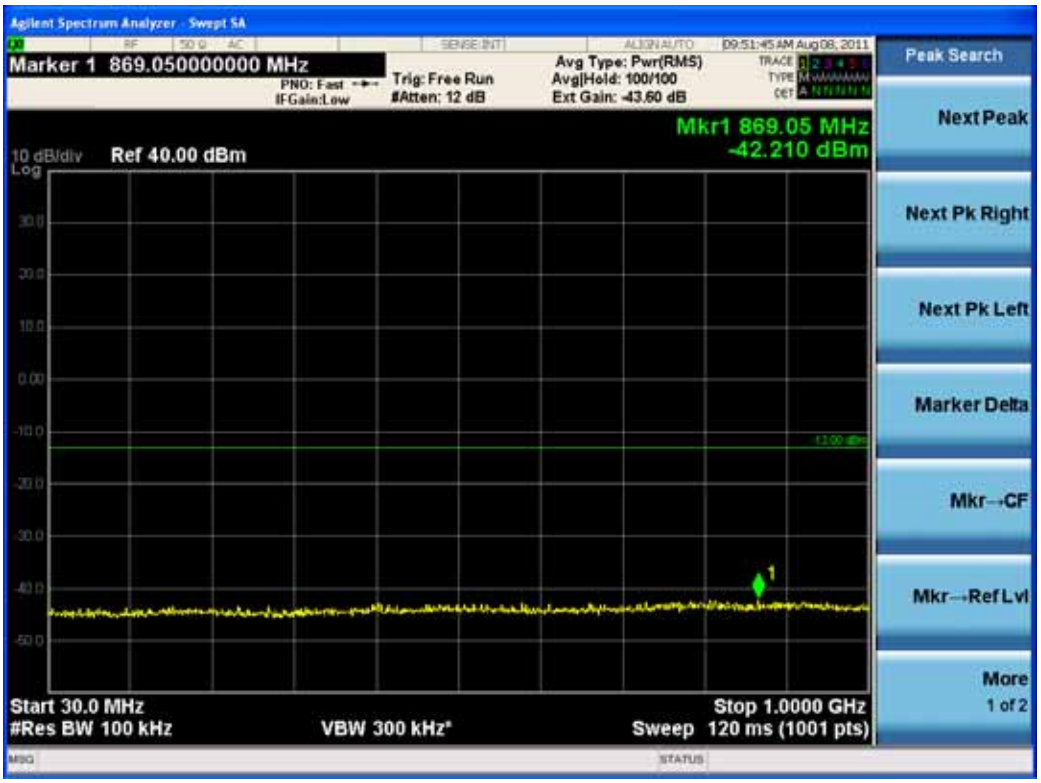
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.995000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
03:12:42 AM Aug 09, 2011
Mkr1 1.995 000 GHz
-19.397 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

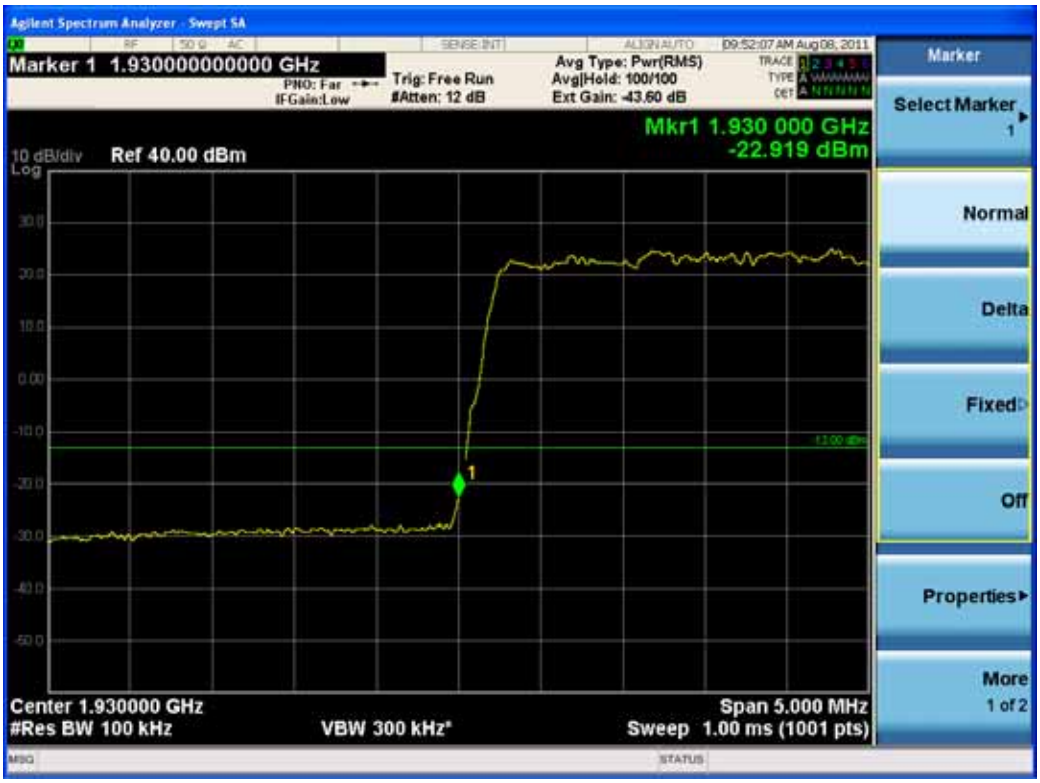
(16QAM Low Channel)

(30 MHz ~ 1 GHz)



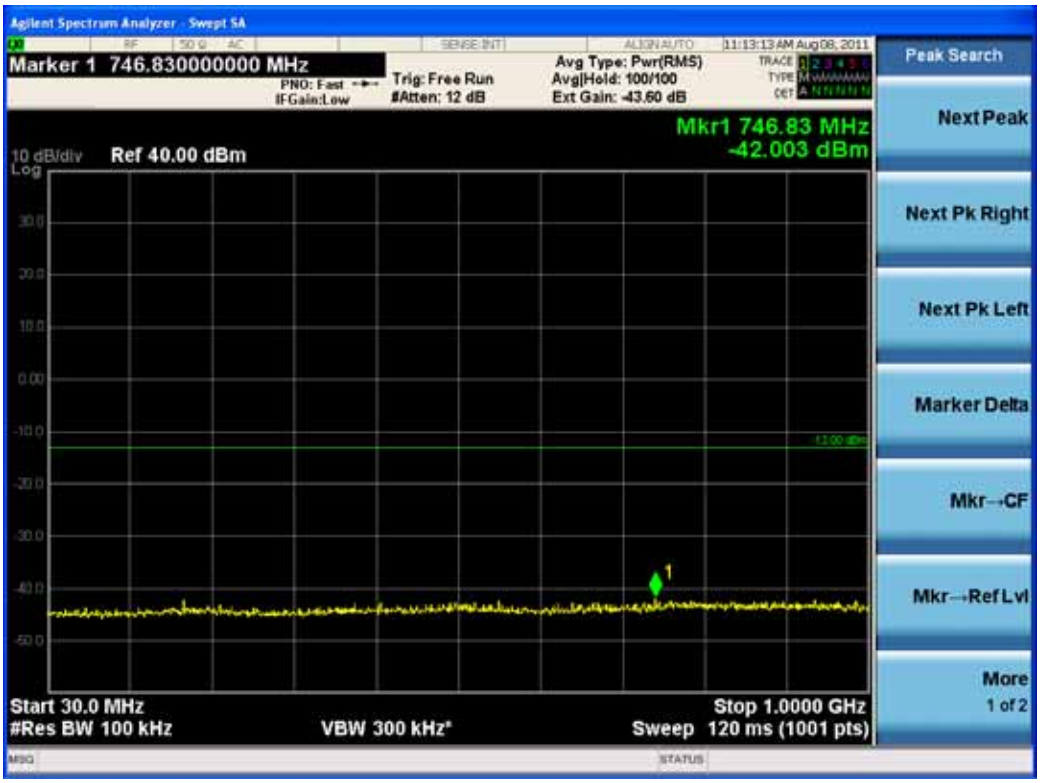
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.930000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
09:52:07 AM Aug 08, 2011
Mkr1 1.930 000 GHz
-22.919 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(16QAM Middle Channel)

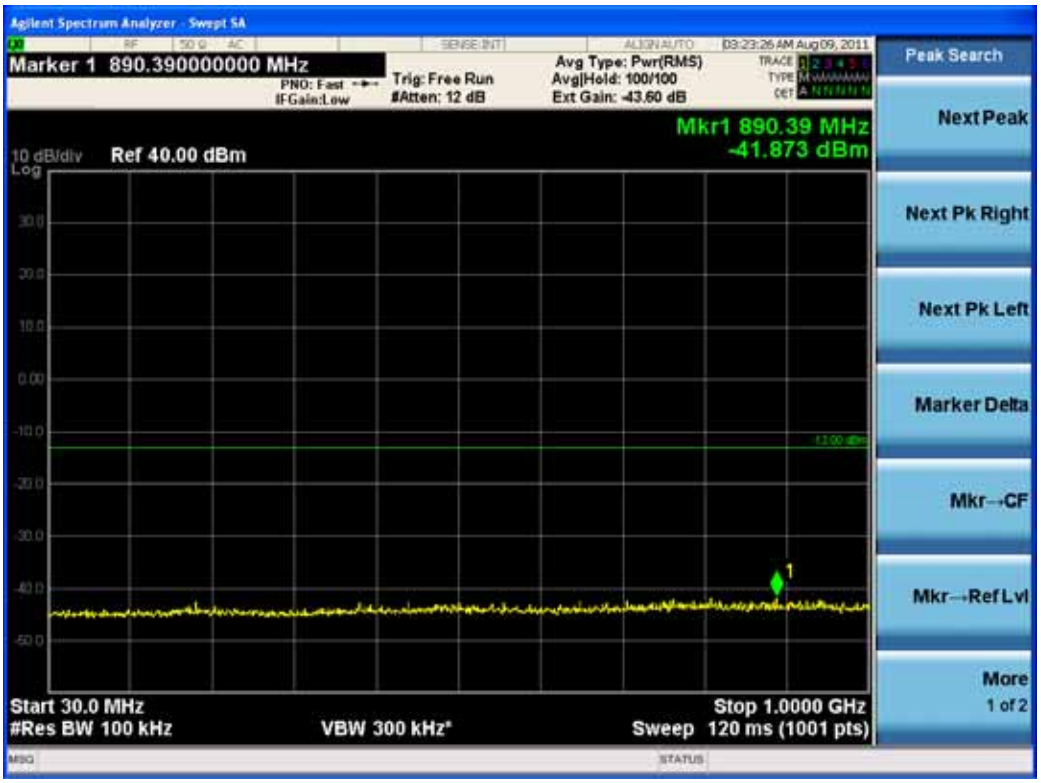
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(16QAM High Channel)

(30 MHz ~ 1 GHz)



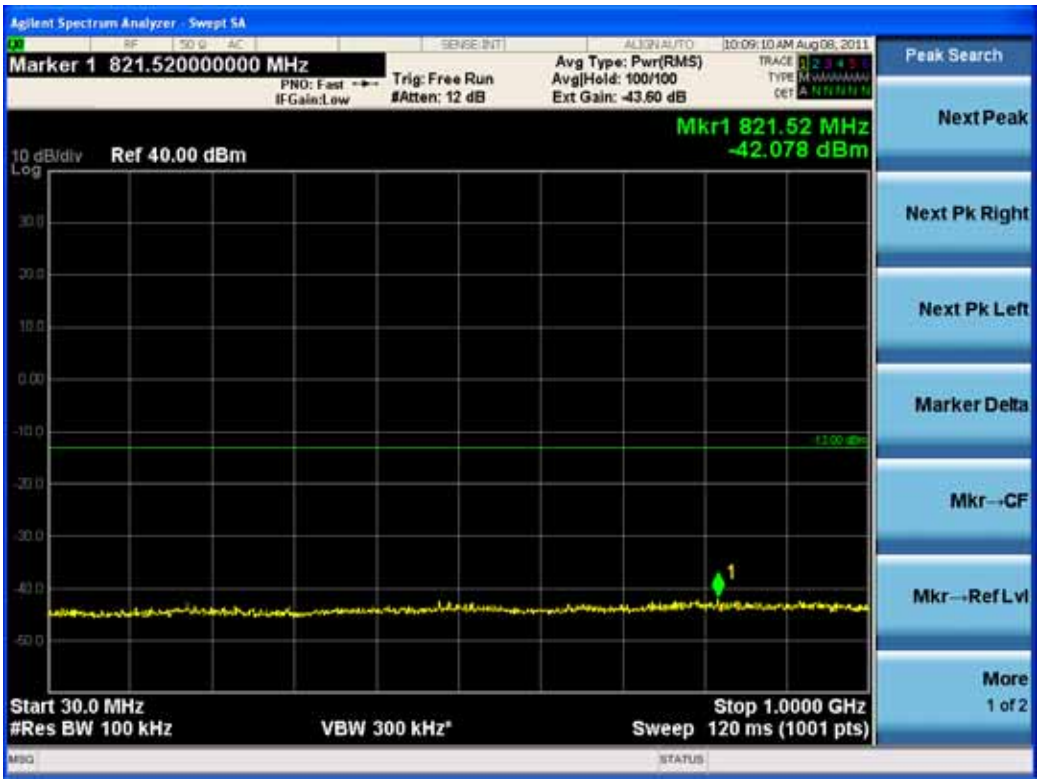
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Center Freq 1.995000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
03:22:14 AM Aug 09, 2011
Mkr1 1.995 000 GHz
-20.281 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
1.995000000 GHz
Start Freq
1.992500000 GHz
Stop Freq
1.997500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

(64QAM Low Channel)

(30 MHz ~ 1 GHz)



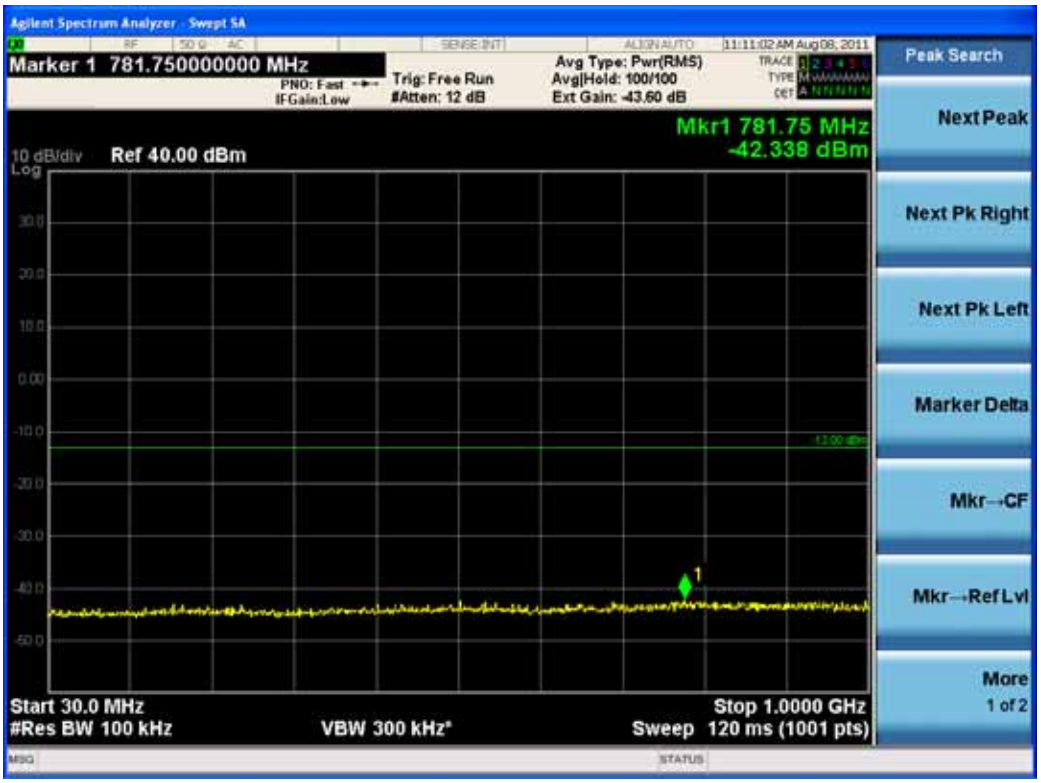
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Preamp Gain -43.60 dB
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
10:07:49 AM Aug 08, 2011
Mkr1 1.930 000 GHz
-20.120 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
1.930000000 GHz
Start Freq
1.927500000 GHz
Stop Freq
1.932500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

(64QAM Middle Channel)

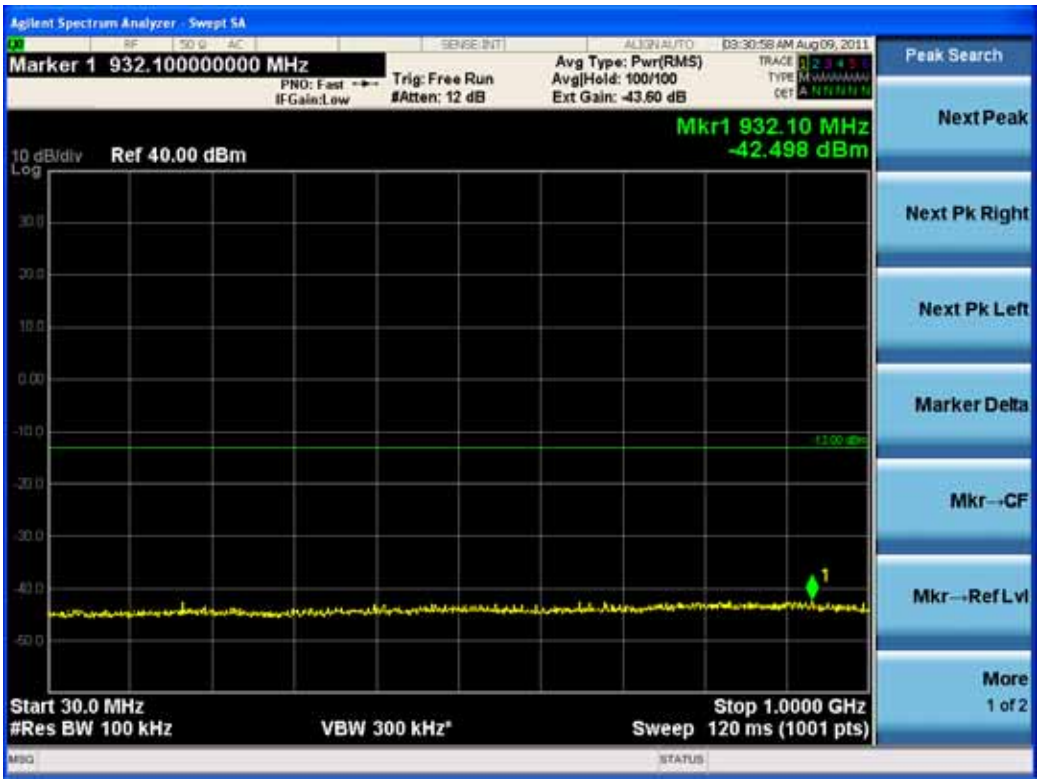
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(64QAM High Channel)

(30 MHz ~ 1 GHz)



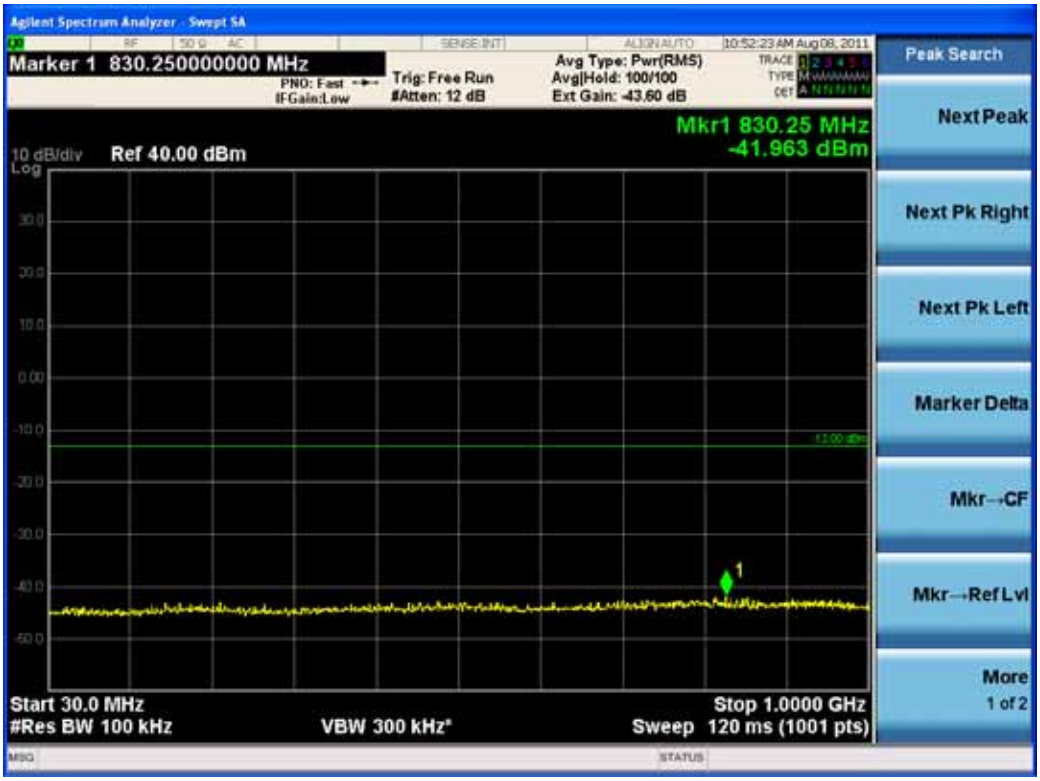
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.995000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
03:31:17 AM Aug 09, 2011
Mkr1 1.995 000 GHz
-19.018 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

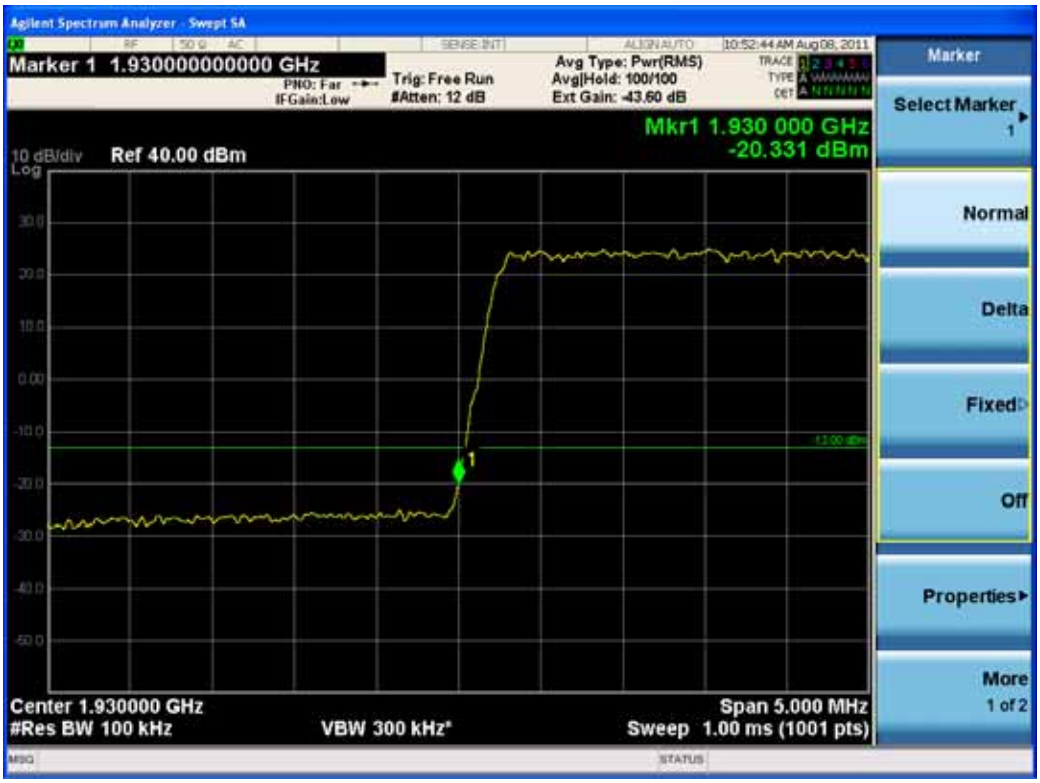
7.4.4. Plot Data for 1 Carrier , Output Port 3
(QPSK Low Channel)

(30 MHz ~ 1 GHz)



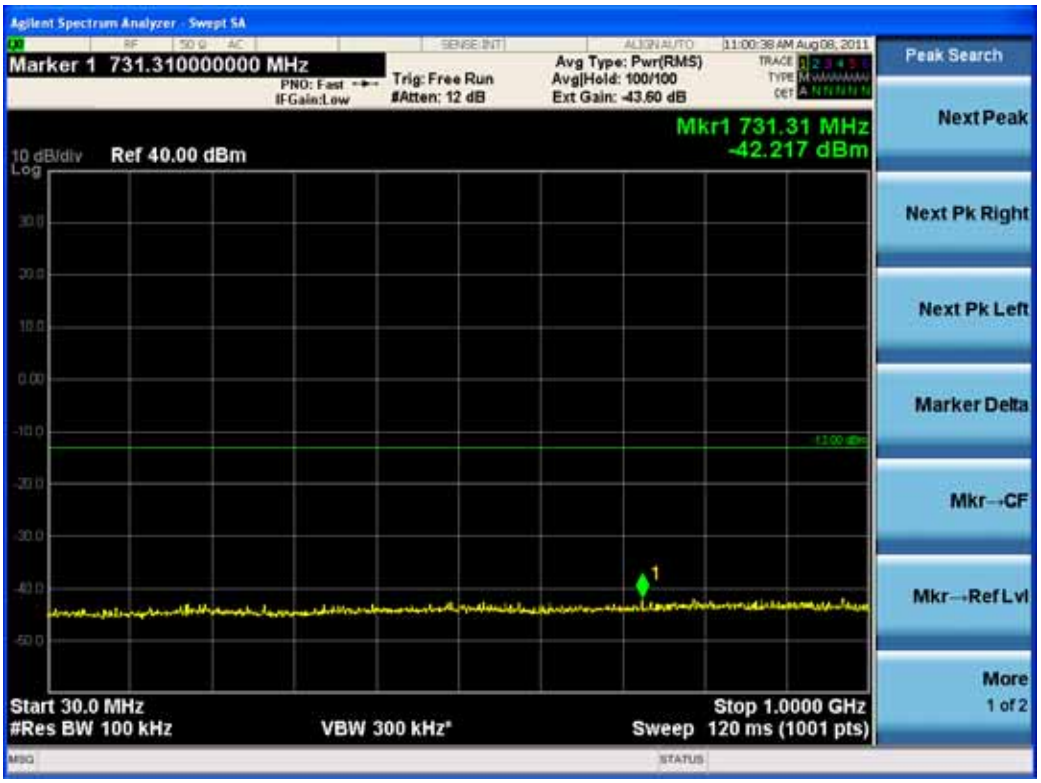
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.930000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
10:52:44 AM Aug 08, 2011
Mkr1 1.930 000 GHz
-20.331 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(QPSK Middle Channel)

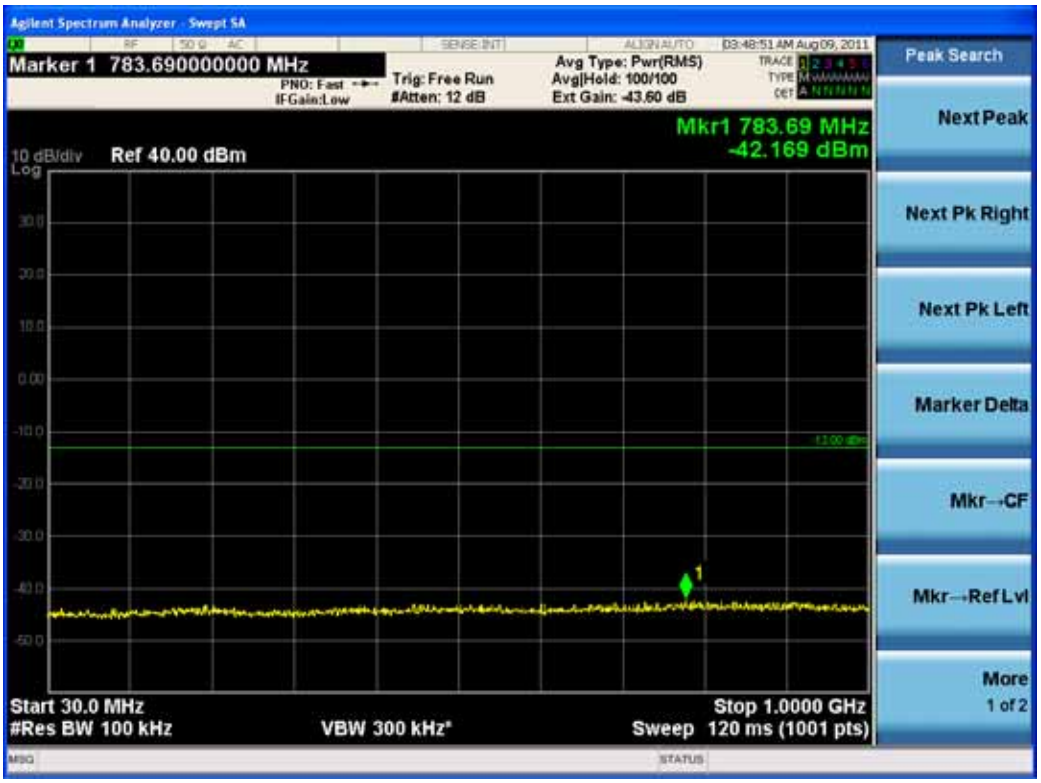
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(QPSK High Channel)

(30 MHz ~ 1 GHz)



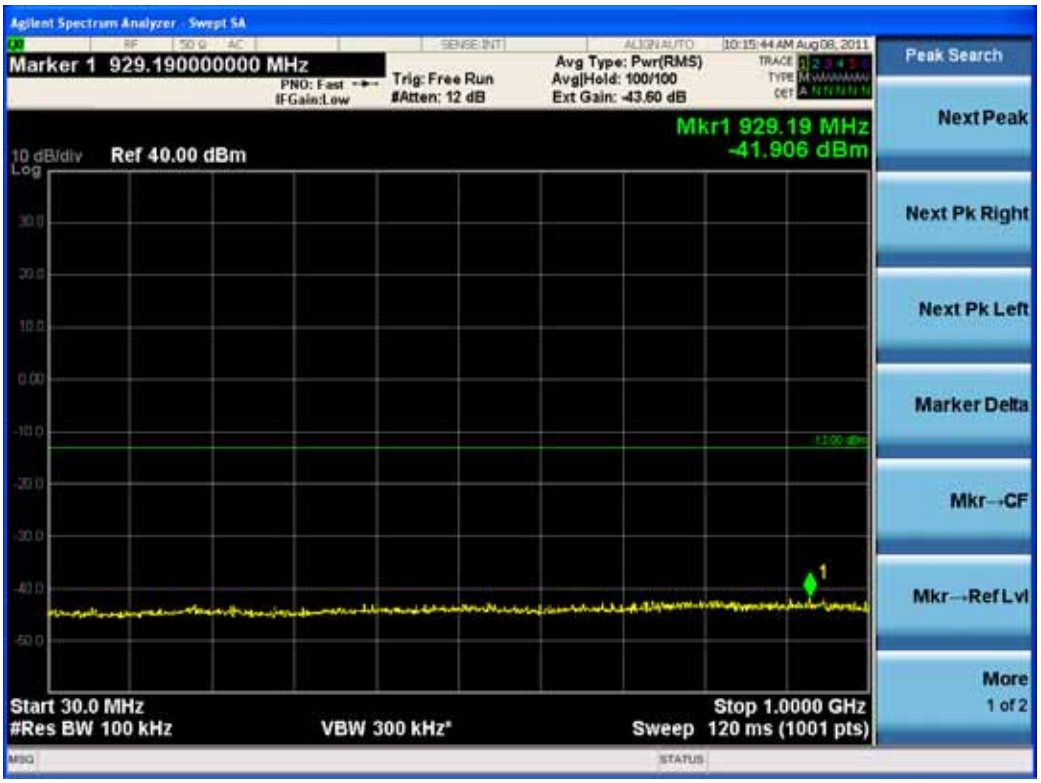
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Center Freq 1.995000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
03:47:58 AM Aug 09, 2011
Mkr1 1.995 000 GHz
-21.801 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
1.995000000 GHz
Start Freq
1.992500000 GHz
Stop Freq
1.997500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

(16QAM Low Channel)

(30 MHz ~ 1 GHz)



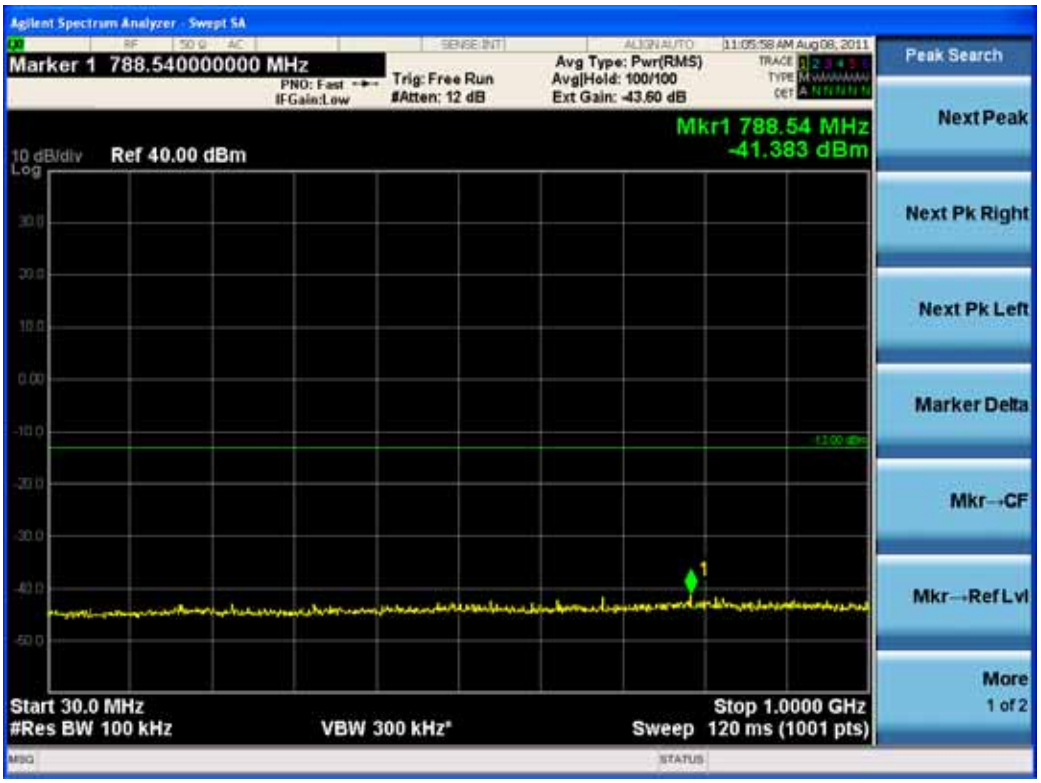
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Preamp Gain -43.60 dB
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
10:15:13 AM Aug 08, 2011
Mkr1 1.930 000 GHz
-21.575 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
1.930000000 GHz
Start Freq
1.927500000 GHz
Stop Freq
1.932500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

(16QAM Middle Channel)

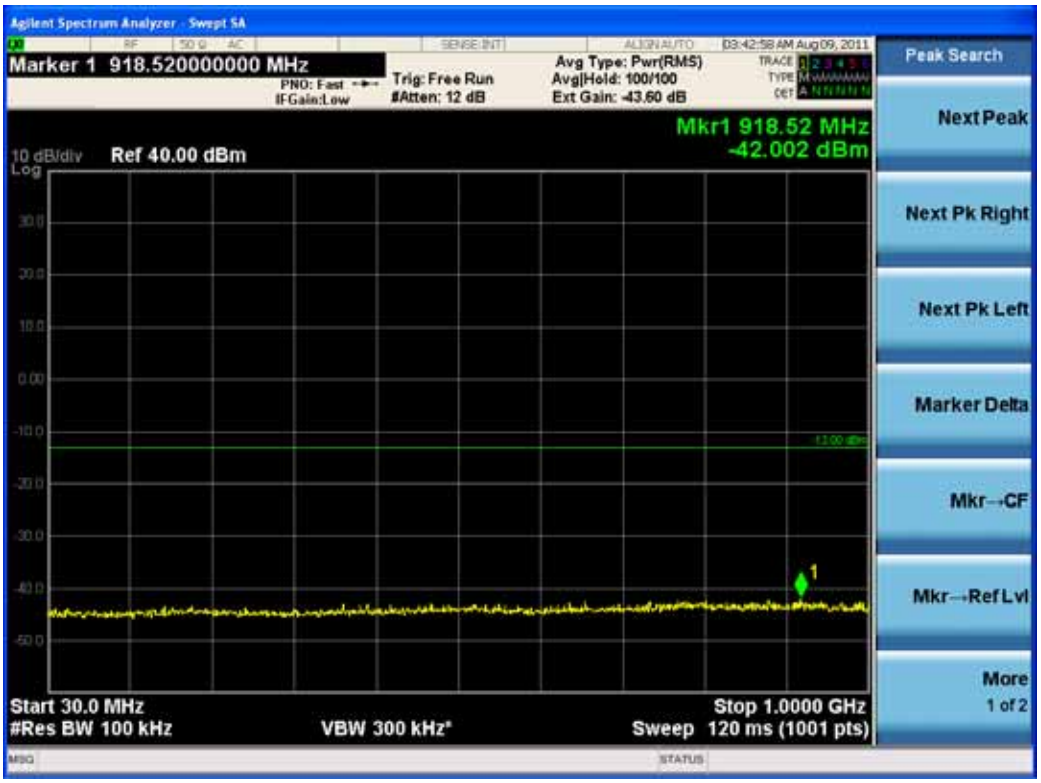
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(16QAM High Channel)

(30 MHz ~ 1 GHz)



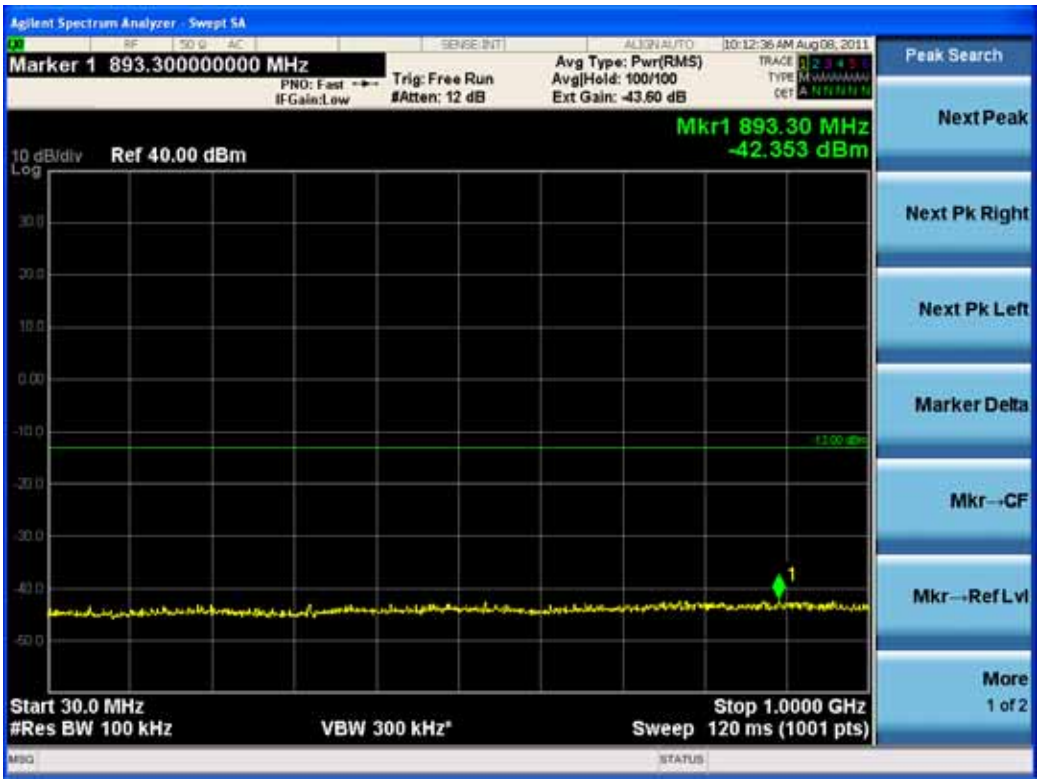
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.995000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
03:43:23 AM Aug 09, 2011
Mkr1 1.995 000 GHz
-20.204 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(64QAM Low Channel)

(30 MHz ~ 1 GHz)



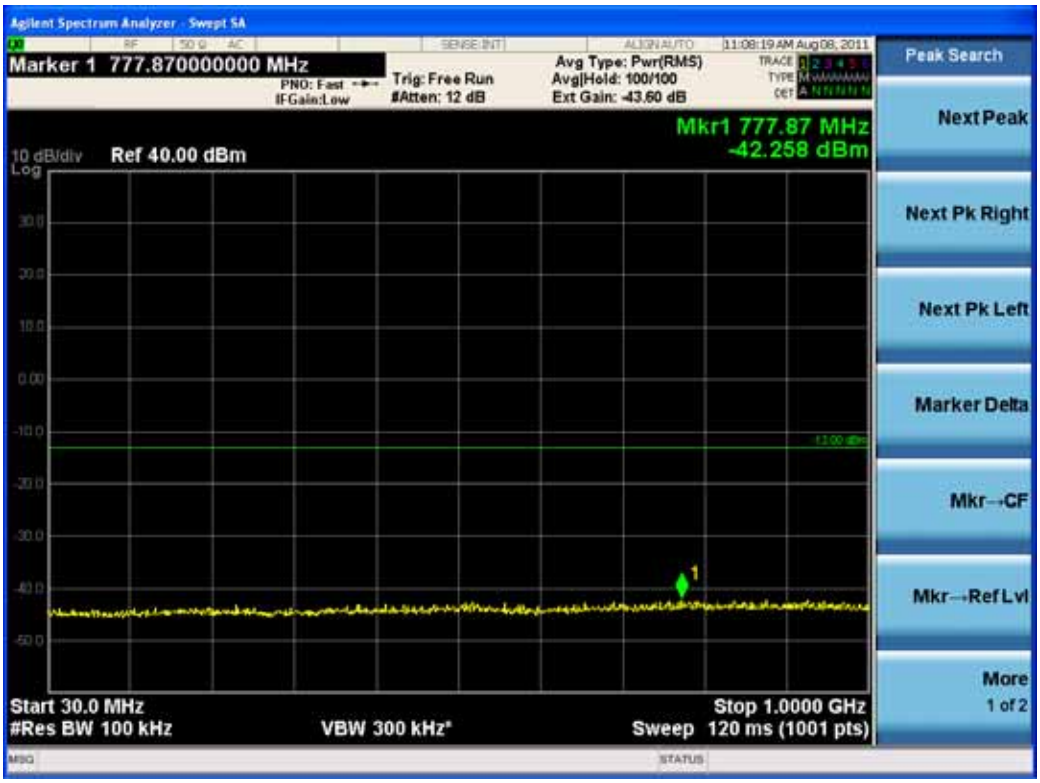
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Marker 1 1.930000000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
10:12:59 AM Aug 08, 2011
Mkr1 1.930 000 GHz
-18.560 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.930000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Marker
Select Marker
1
Normal
Delta
Fixed
Off
Properties
More
1 of 2

(64QAM Middle Channel)

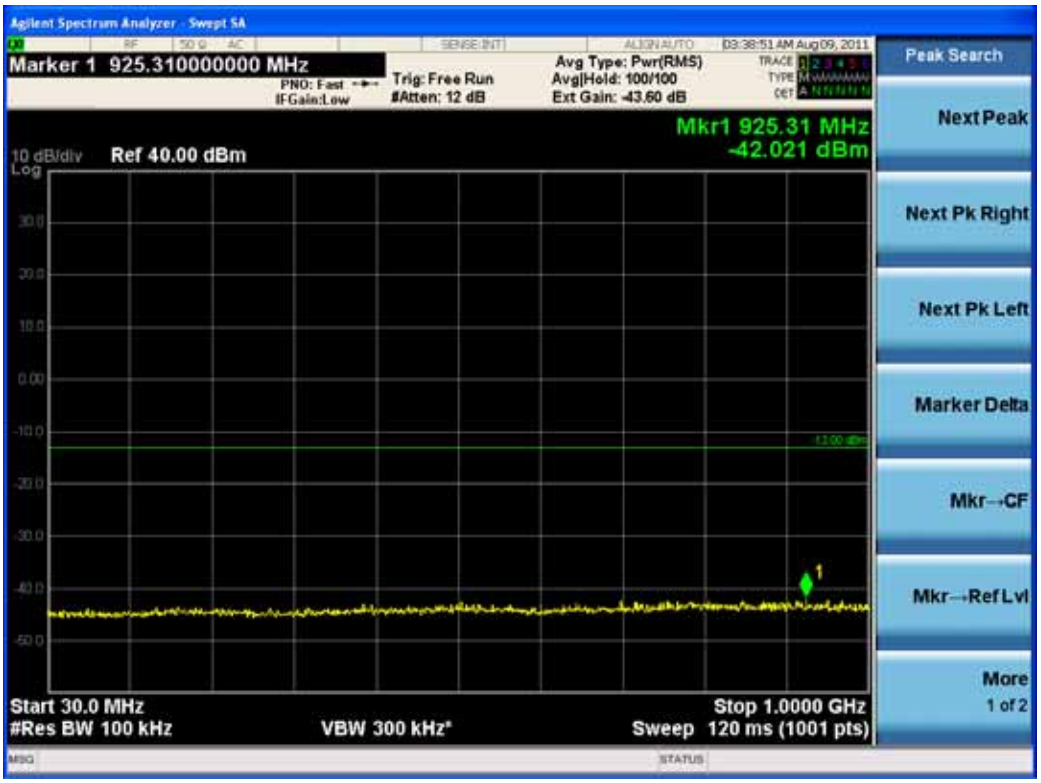
(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(64QAM High Channel)

(30 MHz ~ 1 GHz)



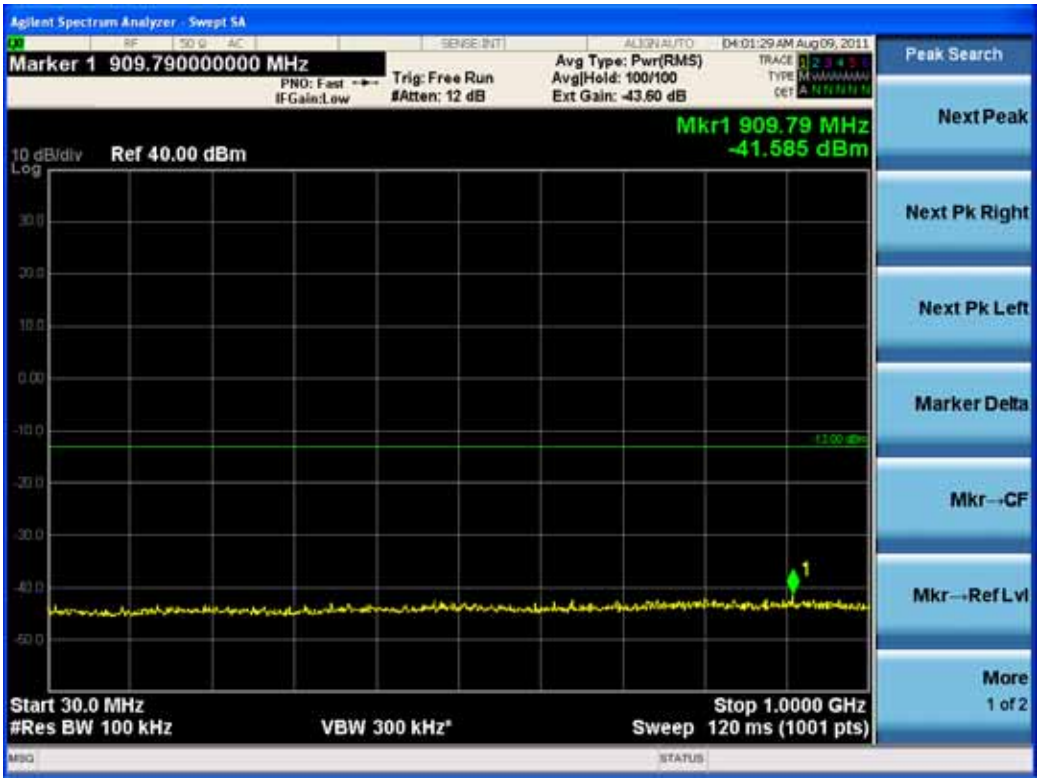
(1 GHz ~ 26.5 GHz)

(Band Edge)


Agilent Spectrum Analyzer - Swept SA
Center Freq 1.995000000 GHz
PNO: Far
IFGain:Low
Trig: Free Run
#Atten: 12 dB
Avg Type: Pwr(RMS)
Avg|Hold: 100/100
Ext Gain: -43.60 dB
03:37:47 AM Aug 09, 2011
Mkr1 1.995 000 GHz
-22.431 dBm
10 dB/div
Log
Ref 40.00 dBm
Center 1.995000 GHz
#Res BW 100 kHz
VBW 300 kHz*
Span 5.000 MHz
Sweep 1.00 ms (1001 pts)
Frequency
Auto Tune
Center Freq
1.995000000 GHz
Start Freq
1.992500000 GHz
Stop Freq
1.997500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

7.4.5. Plot Data for 4Carriers, Output Port 0
(QPSK Channel)

(30 MHz ~ 1 GHz)



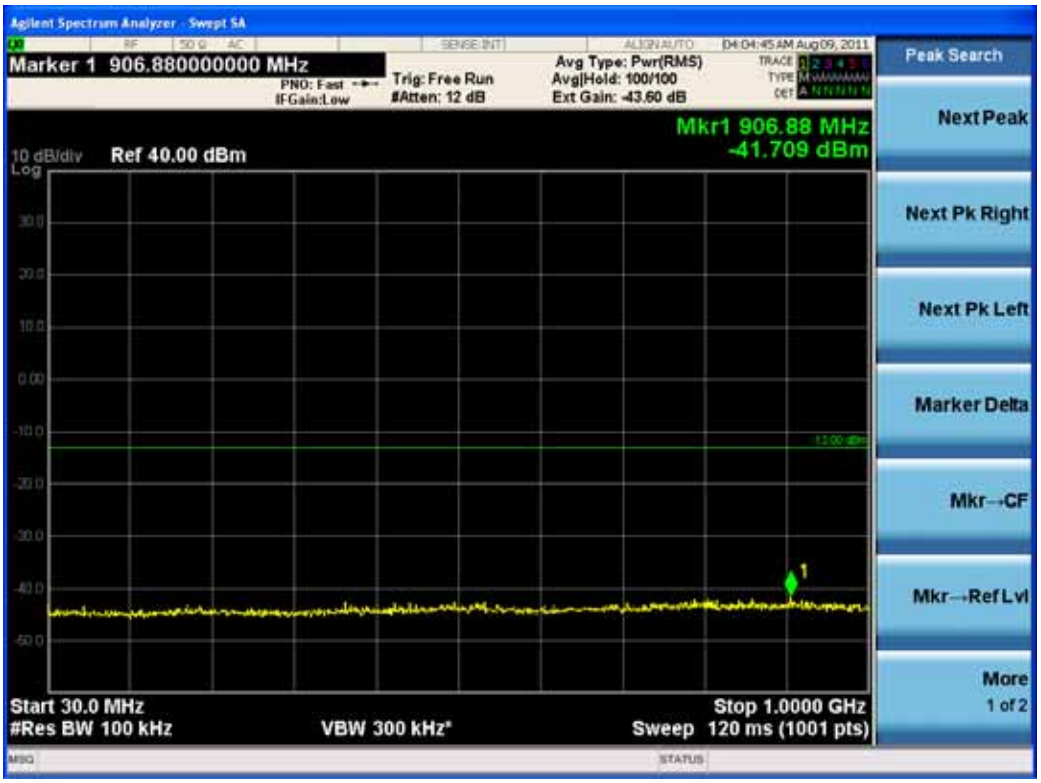
(1 GHz ~ 26.5 GHz)

(Lower Band Edge)

(Higher Band Edge)

(16QAM Channel)

(30 MHz ~ 1 GHz)



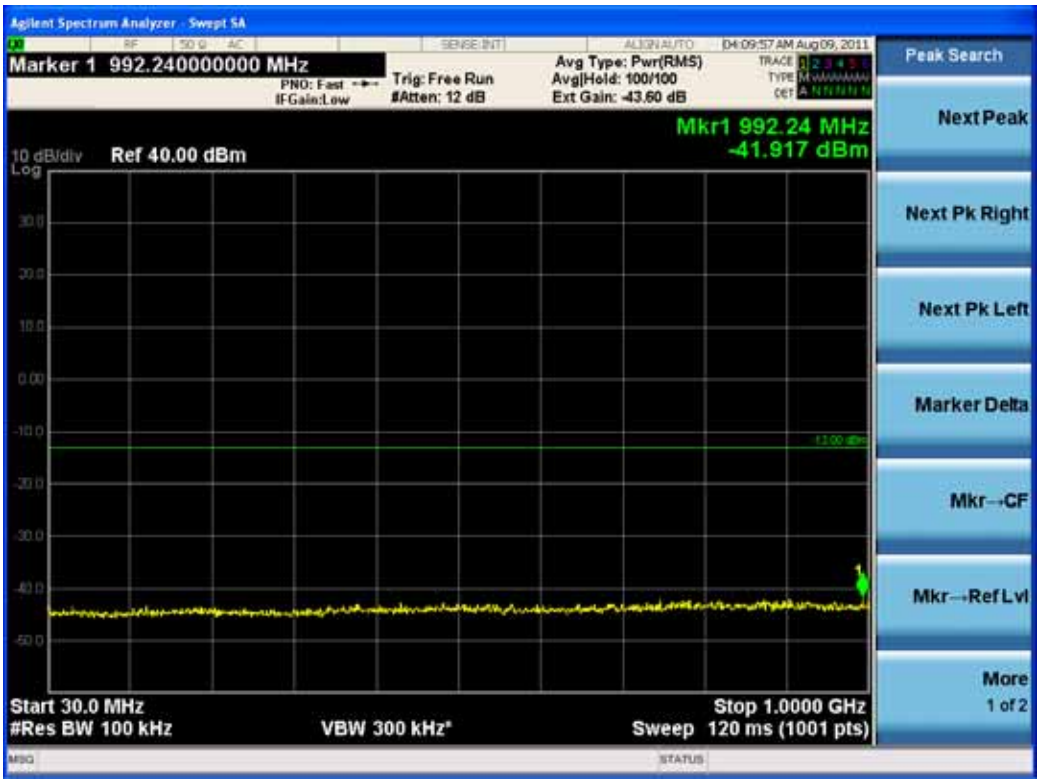
(1 GHz ~ 26.5 GHz)

(Lower Band Edge)

(Higher Band Edge)

(64QAM Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

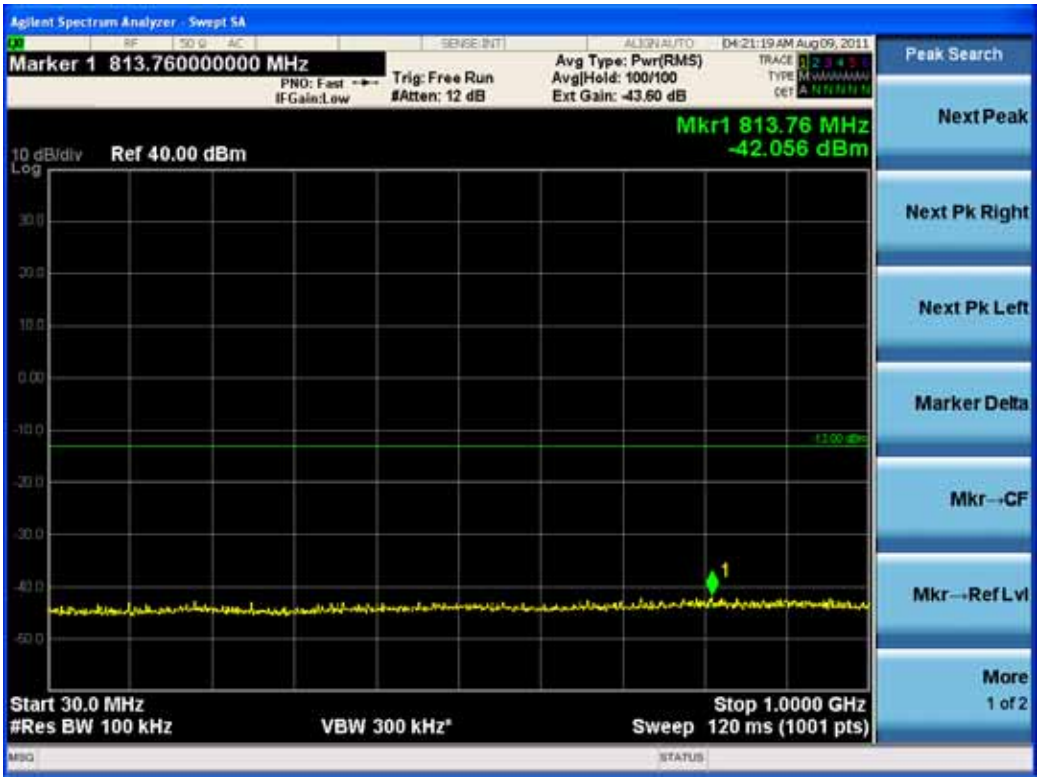
(Lower Band Edge)

(Higher Band Edge)

7.4.6. Plot Data for 4 Carriers , Output Port 1

(QPSK Channel)

(30 MHz ~ 1 GHz)



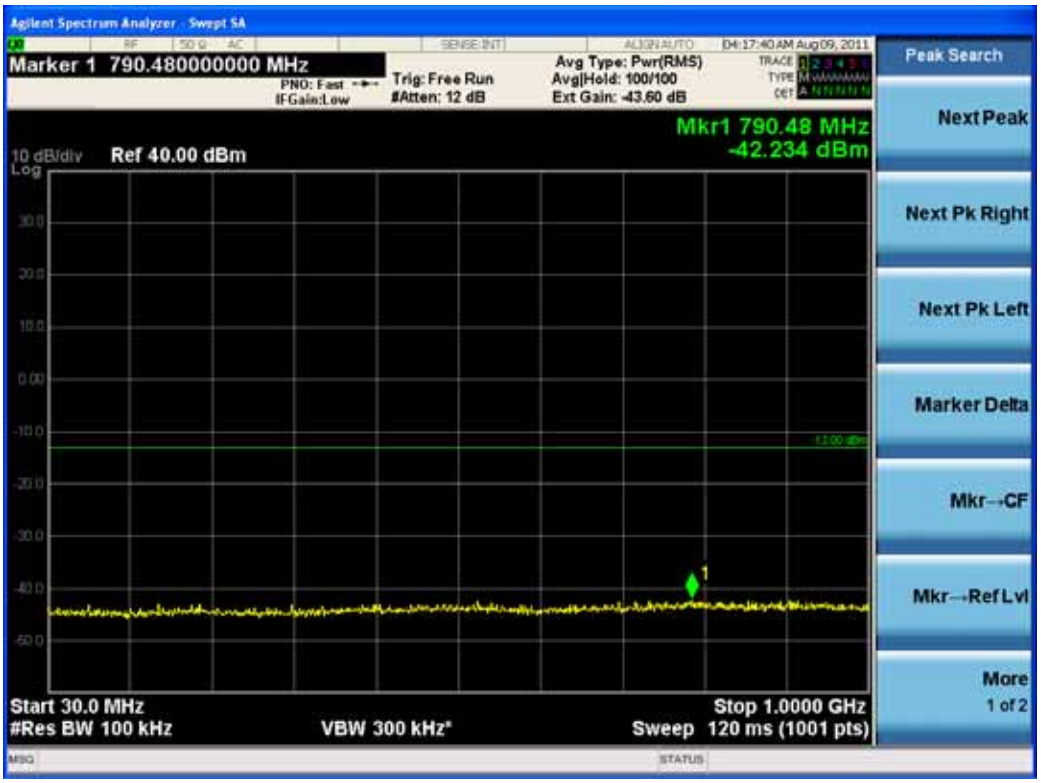
(1 GHz ~ 26.5 GHz)

(Lower Band Edge)

(Higher Band Edge)

(16QAM Channel)

(30 MHz ~ 1 GHz)



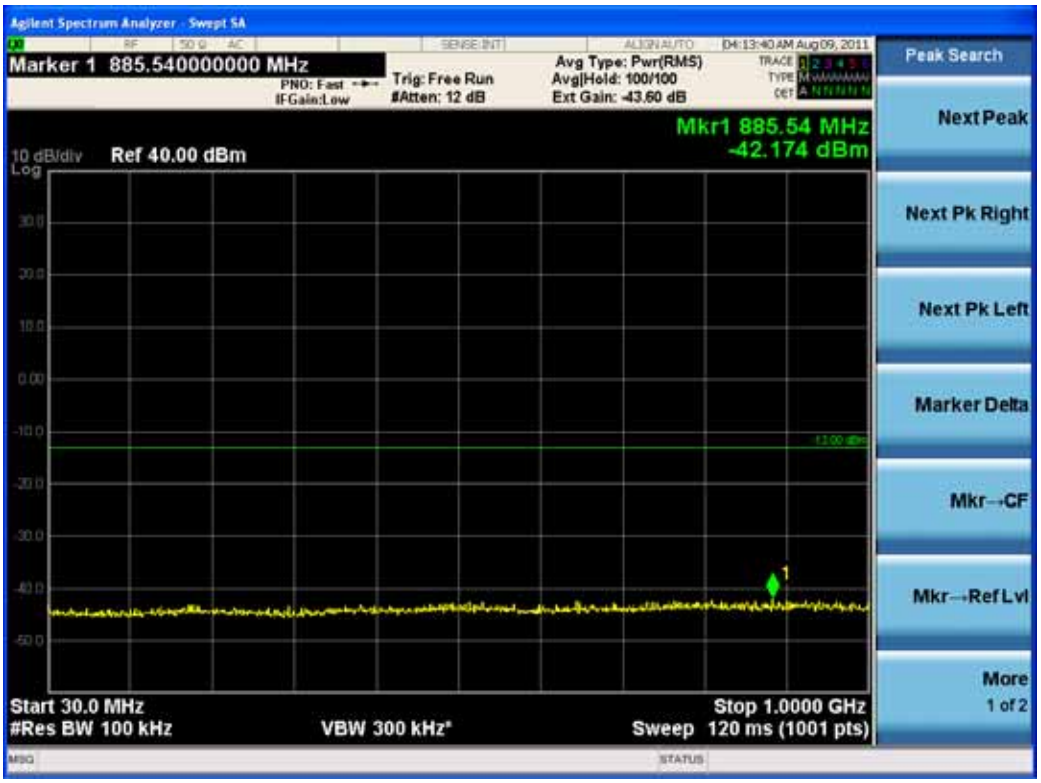
(1 GHz ~ 26.5 GHz)

(Lower Band Edge)

(Higher Band Edge)

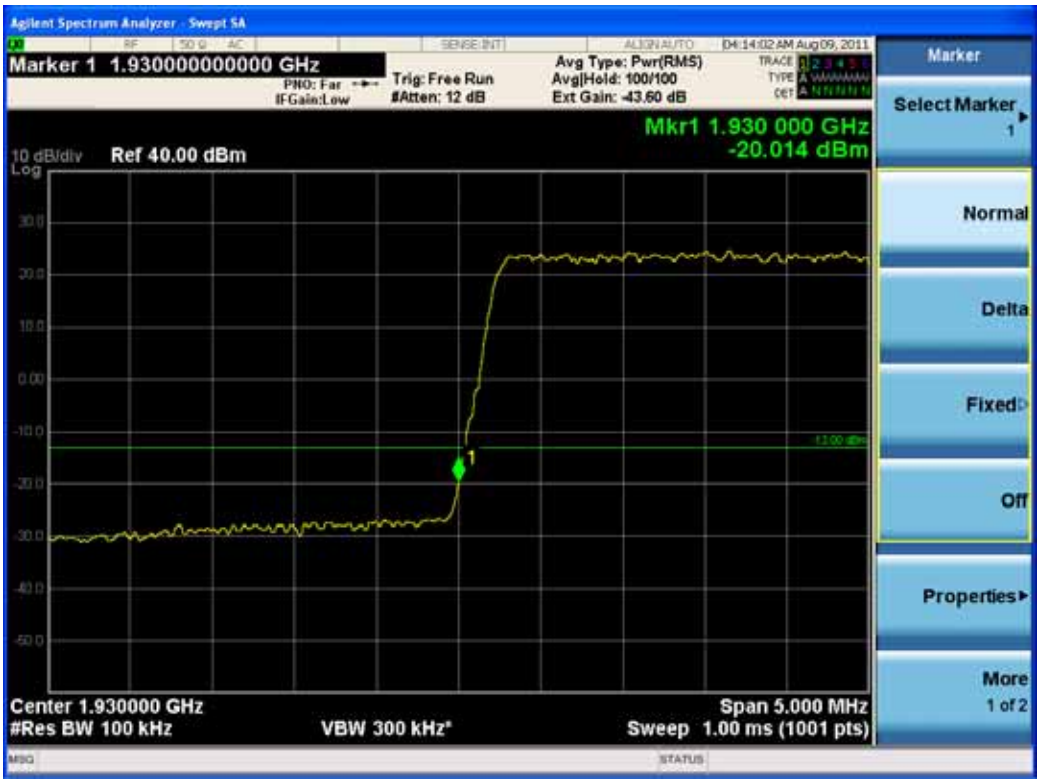
(64QAM Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

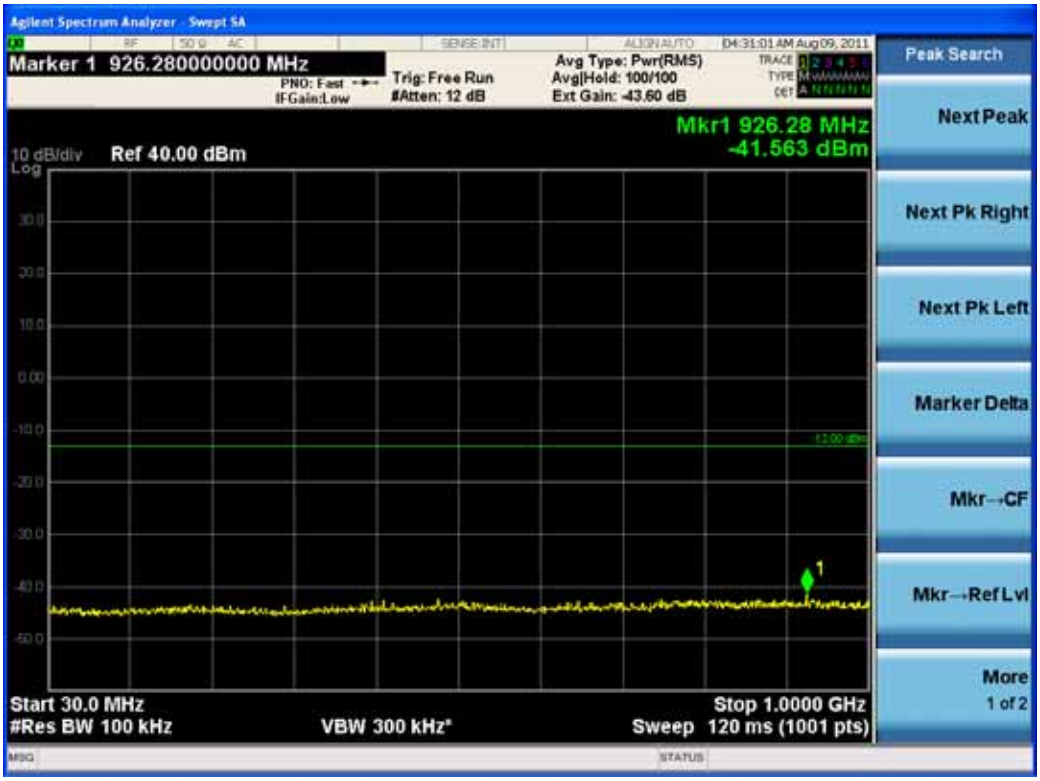
(Lower Band Edge)



(Higher Band Edge)

7.4.7. Plot Data for 4 Carriers , Output Port 2
(QPSK Channel)

(30 MHz ~ 1 GHz)



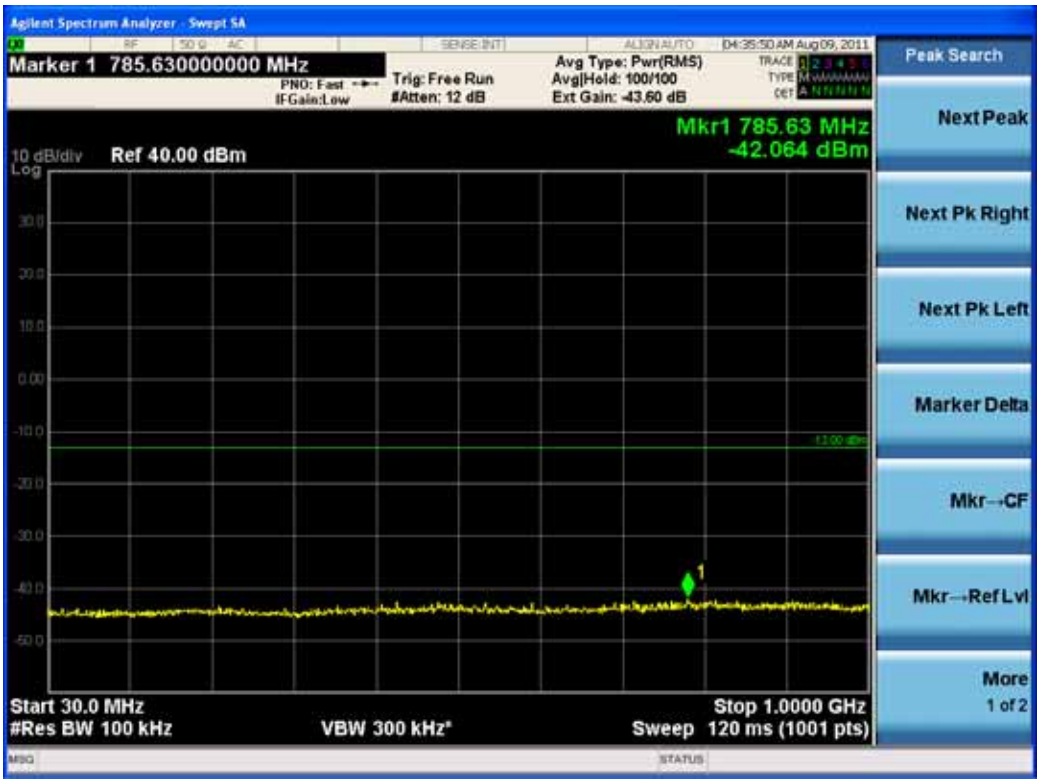
(1 GHz ~ 26.5 GHz)

(Lower Band Edge)

(Higher Band Edge)

(16QAM Channel)

(30 MHz ~ 1 GHz)



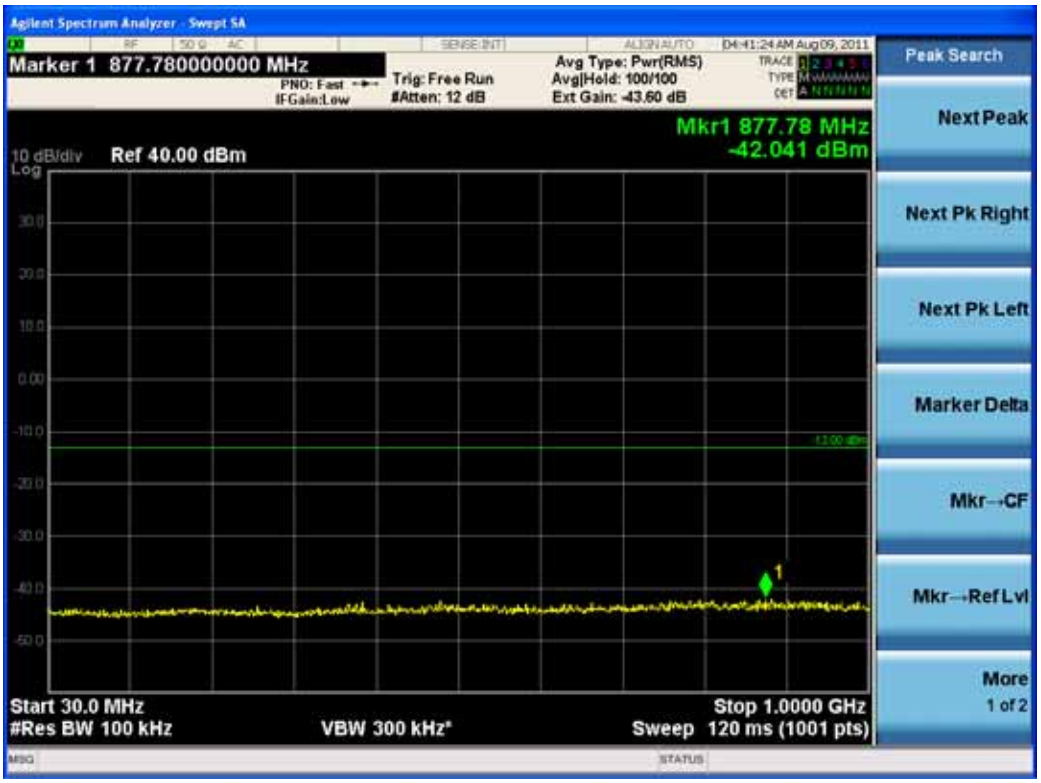
(1 GHz ~ 26.5 GHz)

(Lower Band Edge)

(Higher Band Edge)

(64QAM Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

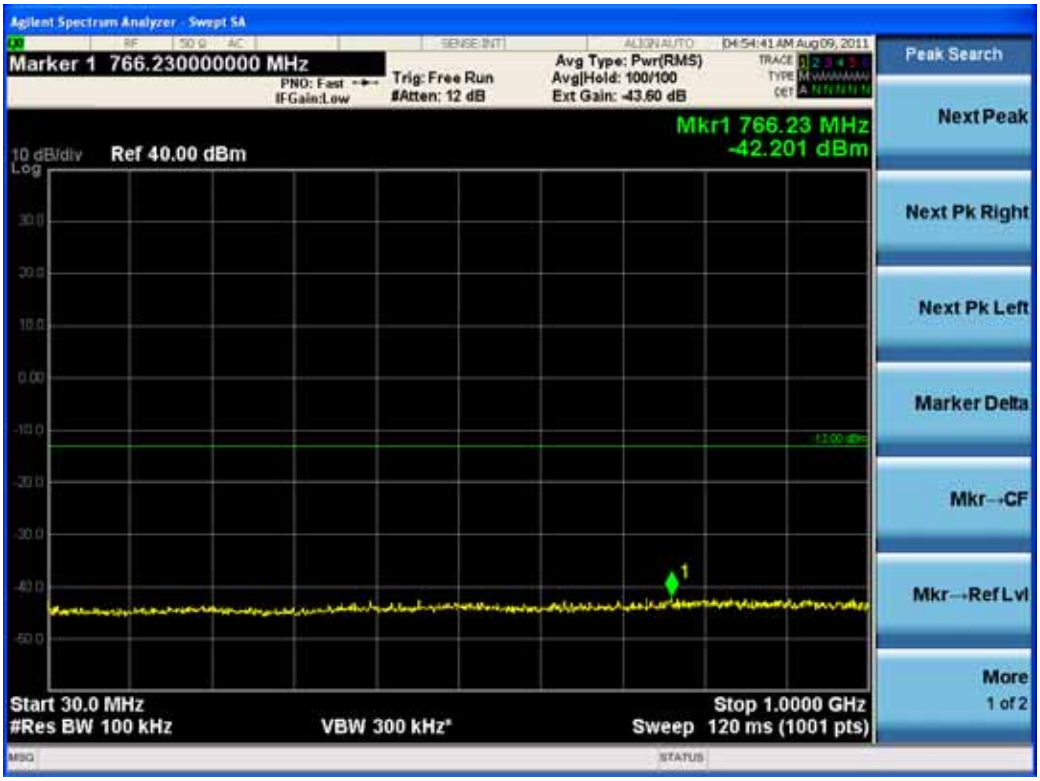
(Lower Band Edge)

(Higher Band Edge)

7.4.8. Plot Data for 4 Carriers , Output Port 3

(QPSK Channel)

(30 MHz ~ 1 GHz)



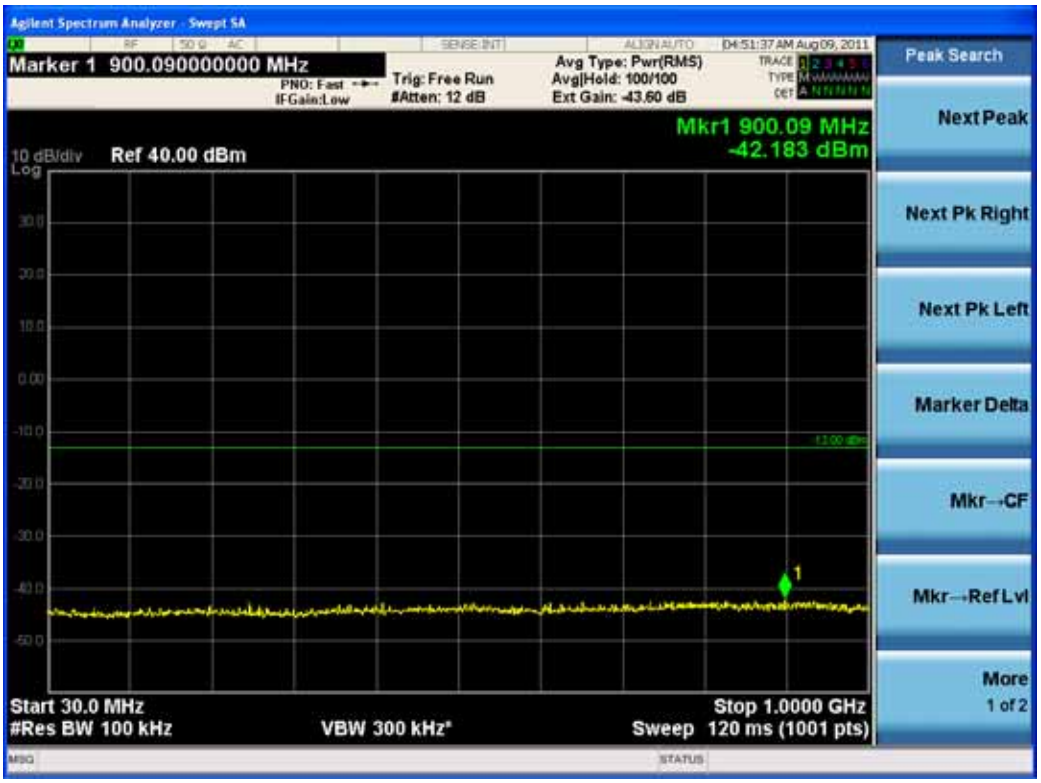
(1 GHz ~ 26.5 GHz)

(Lower Band Edge)

(Higher Band Edge)

(16QAM Channel)

(30 MHz ~ 1 GHz)



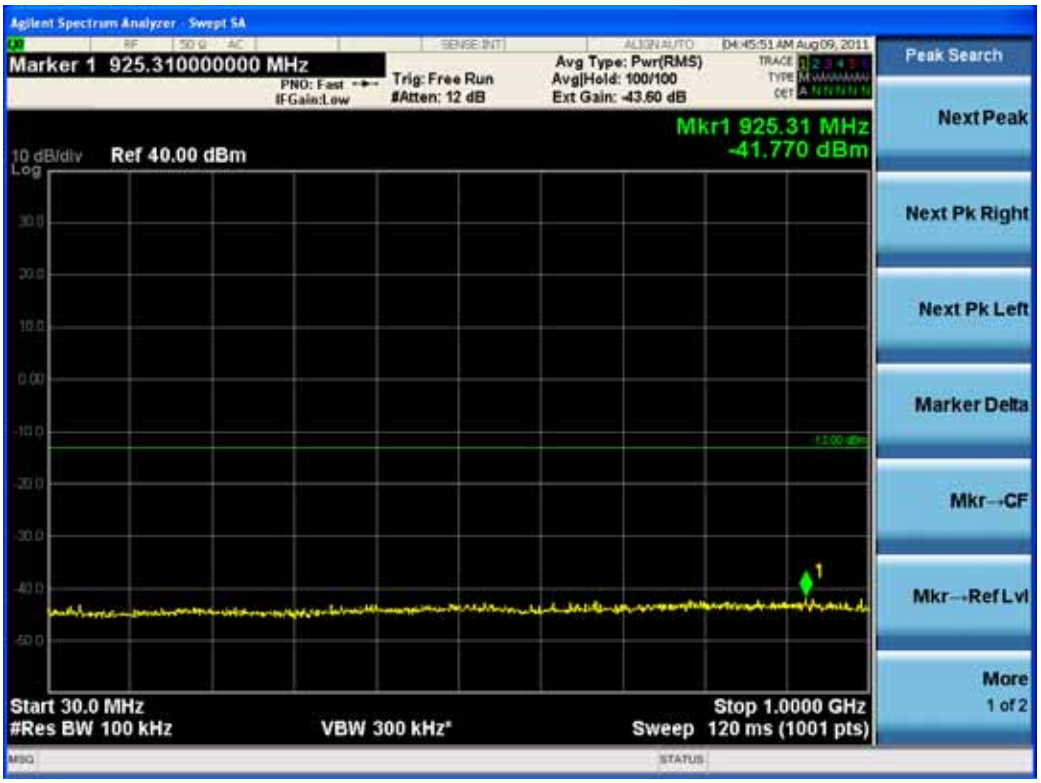
(1 GHz ~ 26.5 GHz)

(Lower Band Edge)

(Higher Band Edge)

(64QAM Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)

(Lower Band Edge)

(Higher Band Edge)

7.4.9. Measure and add 10log(N) data (N=4)

Modulation	Channel	Frequency	Measured data (dBm)		10*log(N)	Measure and sum (dBm)	
			30 MHz ~ 1 GHz	1 GHz ~ 26.5 GHz		30 MHz ~ 1 GHz	1 GHz ~ 26.5 GHz
QPSK	Middle	1962.5	-42.247	-23.466	6.02	-36.227	-17.446
16QAM			-41.866	-23.39		-35.846	-17.37
64QAM			-41.906	-23.545		-35.886	-17.525

8. RADIATED SPURIOUS EMISSION

8.1 Applicable Standard

According to FCC § 24.238

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

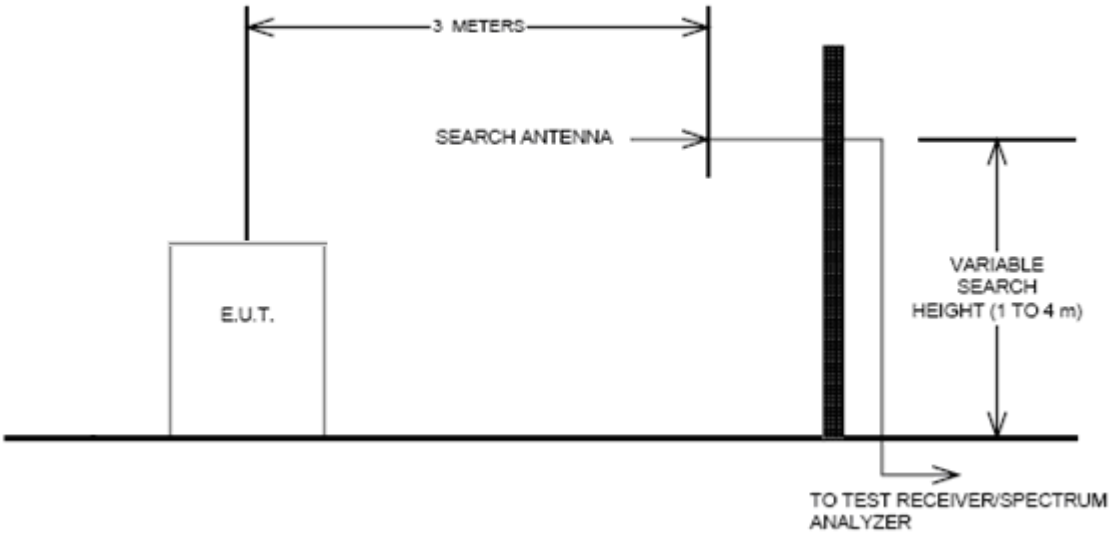
8.2 Txest Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	296	09/23/2011
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	147	04/13/2012
Schwarzbeck	VULB 9168 / TRILOG Antenna	9168-200	02/19/2013
HD	MA240 / Antenna Position Tower	556	N/A
EMCO	1050 / Turn Table	114	N/A
HD GmbH	HD 100 / Controller	13	N/A
HD GmbH	KMS 560 / SlideBar	12	N/A
MITEQ	AMF-6D-001180-35-20P/AMP	990893	05/02/2012
EMCO	6502/Loop Antenna	9009-2536	01/13/2012
Agilent	N9020A /Signal Analyzer	MY51110020	04/16/2012
Agilent	6674A / DC Power Supply	3501A00901	05/02/2012
WEINSCHEL	67-30-33 / Attenuator	BU5347	12/29/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	12/29/2011
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/12/2011
WEINSCHEL	AF9003-69-31 / Attenuator	639	11/12/2011

8.3 Test Procedure

Radiated emission measurements were performed at an semi-anechoic chamber.
The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360^0 and the receiving antenna scanned from 1-4m in order to capture the maximum emission.
A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated.
The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

8.3.1 Radiated Spurious Emissions Test Setup



8.4 Test Result

: PASS (There were no emissions detected above the noise floor which was at least 20 dB below the limit.)

(Power boost mode was tested on.)

Frequency	Freq.(MHz)	Substitute Level [dBm]	Ant. Gain (dBd)	C.L	Pol.	ERP (dBm)	Margin (dB)
1962.5	3925.00	-52.39	10.37	8.57	V	-50.50	-37.50
	5887.50	-51.54	10.74	10.41	V	-51.17	-38.17

※ Tested at 4 Carrier Tx mode

9. FREQUECNY STABILITY

9.1 Applicable Standard

Requirements: FCC § 2.1055 (a), §24.235 following: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

9.2 Txest Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	MY51110020	04/16/2012
WEINSCHEL	67-30-33 / Attenuator	BU5347	12/29/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	12/29/2011
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/12/2011
WEINSCHEL	AF9003-69-31 / Attenuator	639	11/12/2011
Agilent	6674A / DC Power Supply	3501A00901	05/02/2012
Agilent	11636B / Power Divider	11377	12/29/2011

9.3 Test Procedure

Frequency Stability over Temperature variation:
The equipment under test was connected to an external DC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. RF output cable exited the chamber through an opening made for the purpose.
After the temperature stabilized for approximately 30 minutes, the frequency output was recorded from the VSA8960 S/W via MXA Signal Analyzer.
Frequency stability over Voltage variation: An external variable DC power supply Source. The voltage was set to 85% and 115% of the nominal value. The output frequency was recorded for each voltage.

9.4. Test Result

: Pass (Power boost mode was tested on.)

9.4.1. Frequency Stability over Temperature and Voltage variation

Modulation: QPSK

Reference: - 48 Vdc at 20°c **Freq.** = 1962,500,000 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1962 499 957	-43	0	0.0000
	-30	1962 499 957	-43	0	0.0001
	-20	1962 499 957	-44	0	-0.0001
	-10	1962 499 958	-42	1	0.0006
	0	1962 499 956	-44	-1	-0.0004
	+10	1962 499 956	-44	-1	-0.0003
	+30	1962 499 956	-44	-1	-0.0004
	+40	1962 499 957	-43	0	0.0001
	+50	1962 499 957	-43	0	0.0001
115%	+20	1962 499 957	-43	0	0.0001
85%	+20	1962 499 957	-43	0	0.0001

(Output Port 1)

Modulation: QPSK

Reference: - 48 Vdc at 20°c **Freq.** = 1962,500,000 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1962 499 958	-42	0	0.0000
	-30	1962 499 957	-43	-1	-0.0005
	-20	1962 499 956	-44	-2	-0.0010
	-10	1962 499 956	-44	-2	-0.0010
	0	1962 499 958	-42	0	0.0000
	+10	1962 499 957	-43	-1	-0.0005
	+30	1962 499 957	-43	-1	-0.0005
	+40	1962 499 956	-44	-2	-0.0010
	+50	1962 499 957	-43	-1	-0.0005
115%	+20	1962 499 956	-44	-2	-0.0010
85%	+20	1962 499 956	-44	-2	-0.0010

(Output Port 2)

Modulation: 16QAM

Reference: - 48 Vdc at 20°c **Freq.** = 1962,500,000 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1962 499 957	-43	0	0.0000
	-30	1962 499 957	-43	0	0.0000
	-20	1962 499 957	-43	0	0.0000
	-10	1962 499 957	-43	0	0.0000
	0	1962 499 956	-44	-1	-0.0005
	+10	1962 499 956	-44	-1	-0.0005
	+30	1962 499 956	-44	-1	-0.0005
	+40	1962 499 957	-43	0	0.0000
	+50	1962 499 958	-42	1	0.0005
115%	+20	1962 499 957	-43	0	0.0000
85%	+20	1962 499 958	-42	1	0.0005

(Output Port 3)

10. RF EXPOSURE STATEMENT

1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
0.3 - 1.34	614	1.63	*(100)	30
1.34 - 30	824/f	2.19/f	*(180/ f^2)	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	.....	.....	f/1500	30
1500 - 100.000	.....	.....	1.0	30

F = frequency in MHz

* = Plane-wave equivalent power density

2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

3. RESULTS

Max Peak output Power at antenna input terminal	46.23000	dBm
Max Peak output Power at antenna input terminal	41.97590	W
Prediction distance	500.00000	cm
Prediction frequency	1962.50000	MHz
Antenna Gain(typical)	17.00000	dBi
Antenna Gain(numeric)	50.11872	-
Power density at prediction frequency (S)	0.66965	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm^2

The power density level at 500 cm is 0.66965 mW/cm^2, which is below the uncontrolled exposure limit of 1.0 mW/cm^2 at 1962.5 MHz.