



(1 GHz ~ 26.5 GHz)

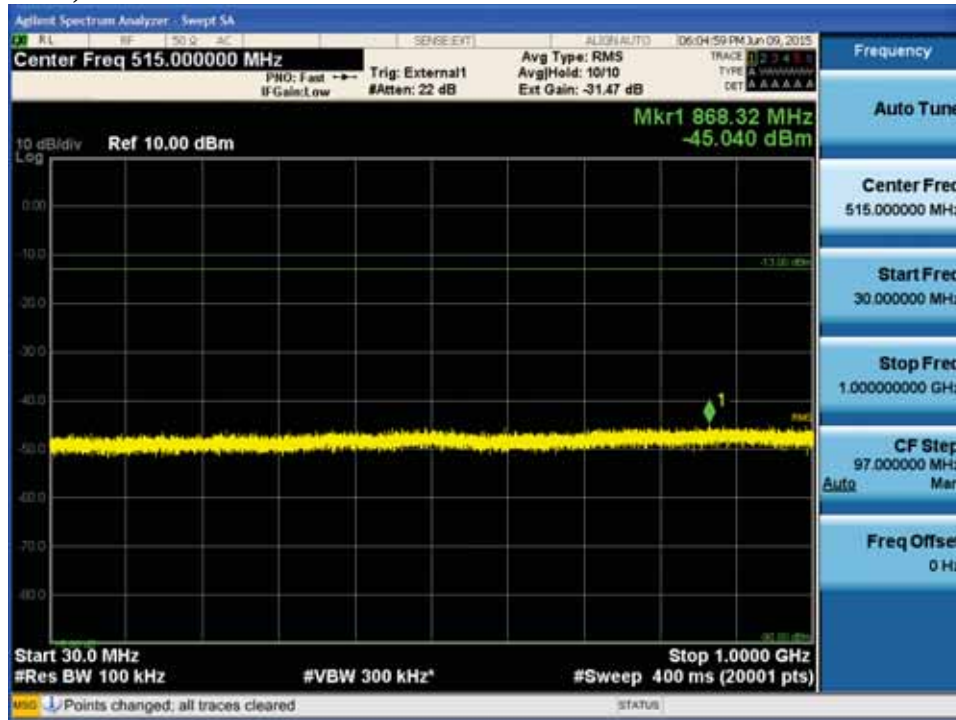


(3 GHz ~ 26.5 GHz)

(Band Edge High)



7.4.38. Test Data at Output Port 5
(QPSK Low Channel)



(30 MHz ~ 1 GHz)

(QPSK Low Channel)

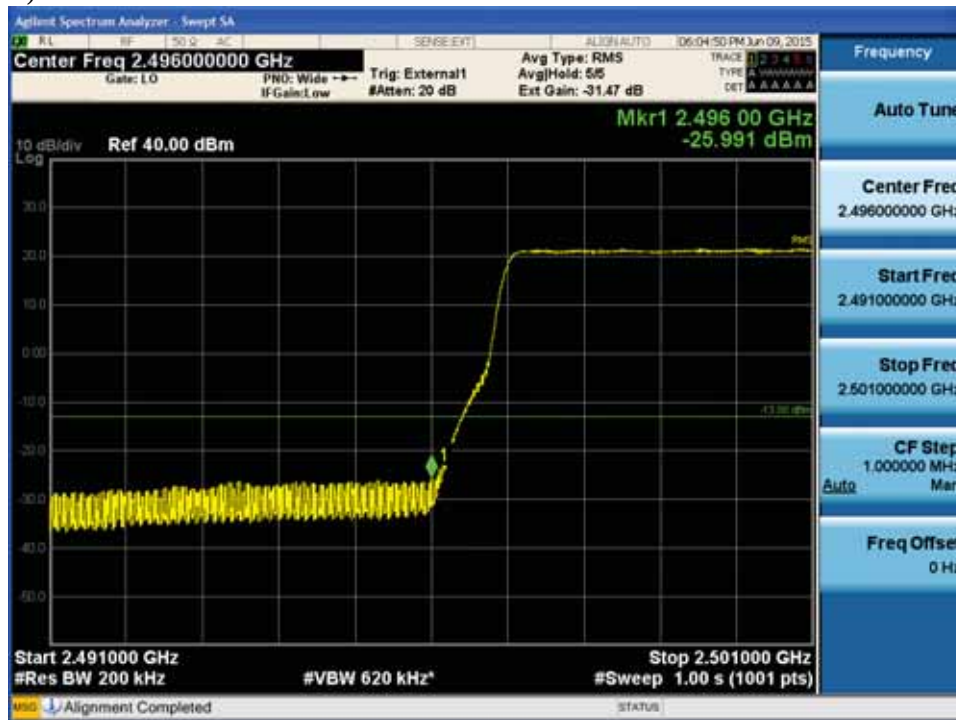


(1 GHz ~ 26.5 GHz)

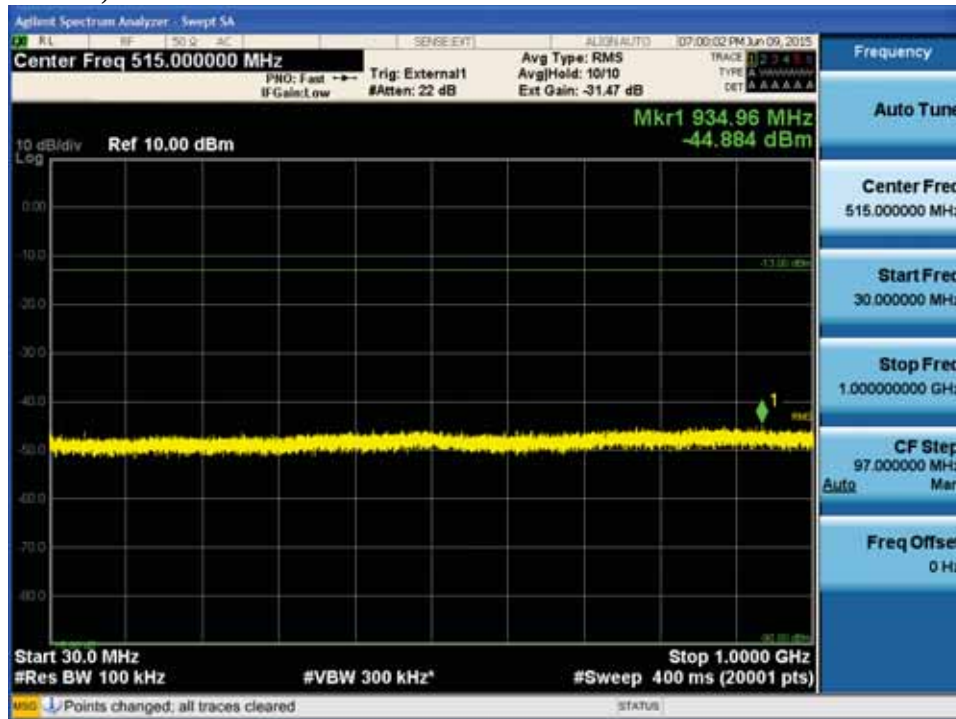


(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(QPSK Middle Channel)



(30 MHz ~ 1 GHz)

(QPSK Middle Channel)

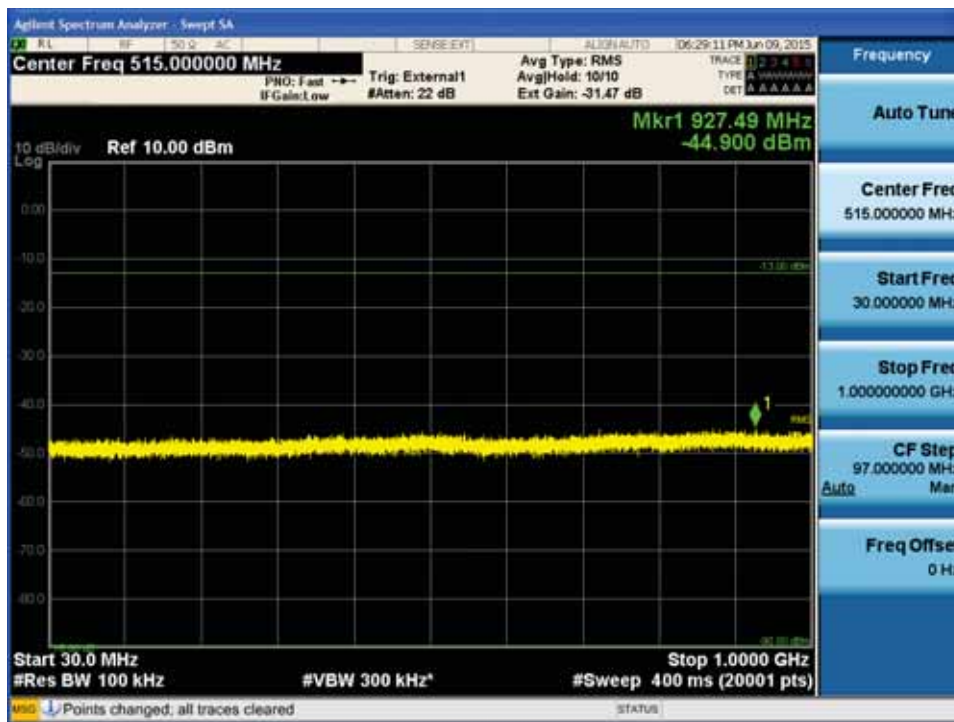


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(QPSK High Channel)



(30 MHz ~ 1 GHz)

(QPSK High Channel)



(1 GHz ~ 26.5 GHz)



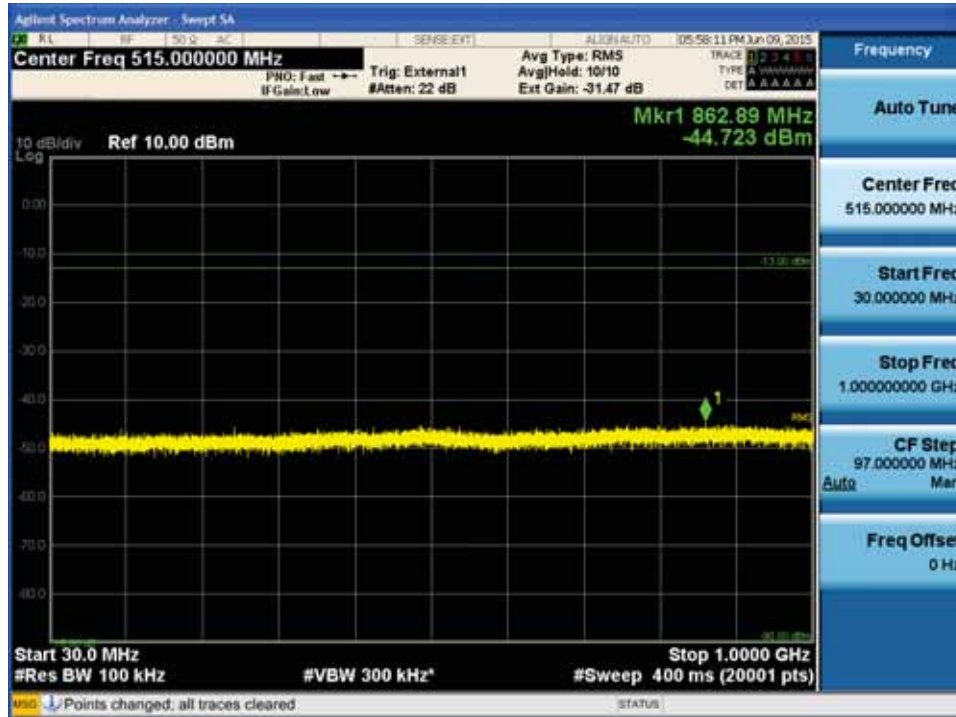
(3 GHz ~ 26.5 GHz)

(Band Edge High)



(16QAM Low Channel)





(30 MHz ~ 1 GHz)

(16QAM Low Channel)

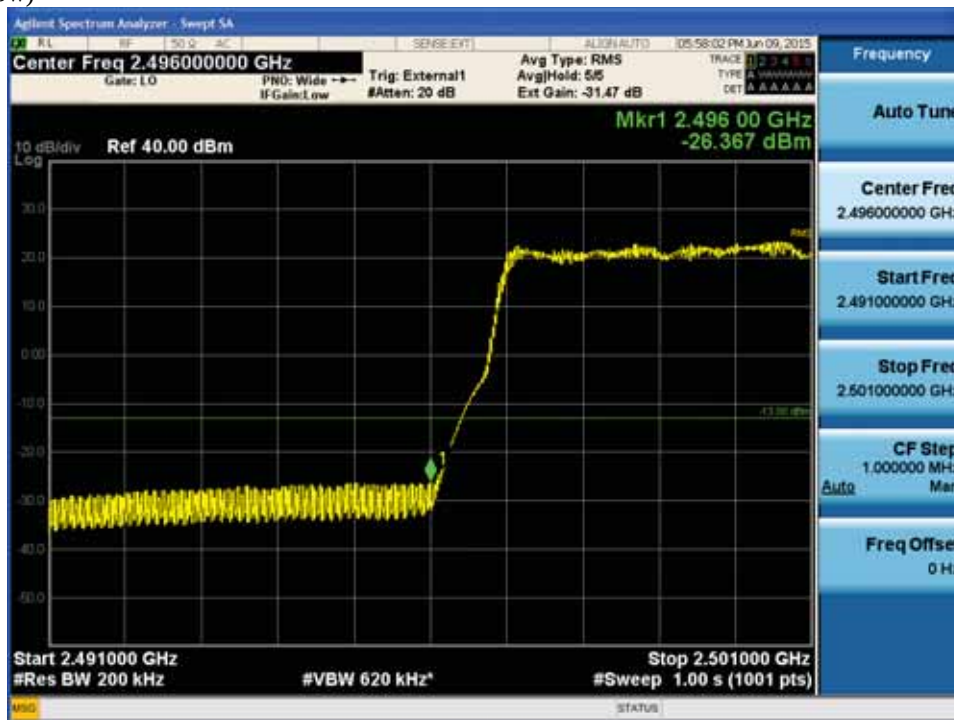


(1 GHz ~ 26.5 GHz)

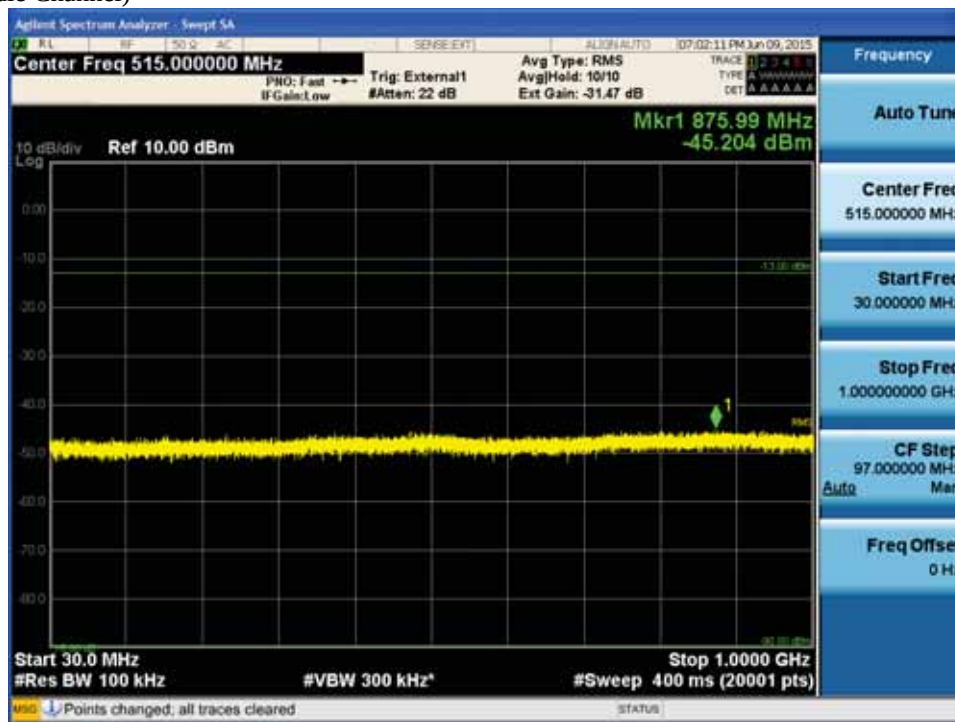


(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(16QAM Middle Channel)



(30 MHz ~ 1 GHz)

(16QAM Middle Channel)

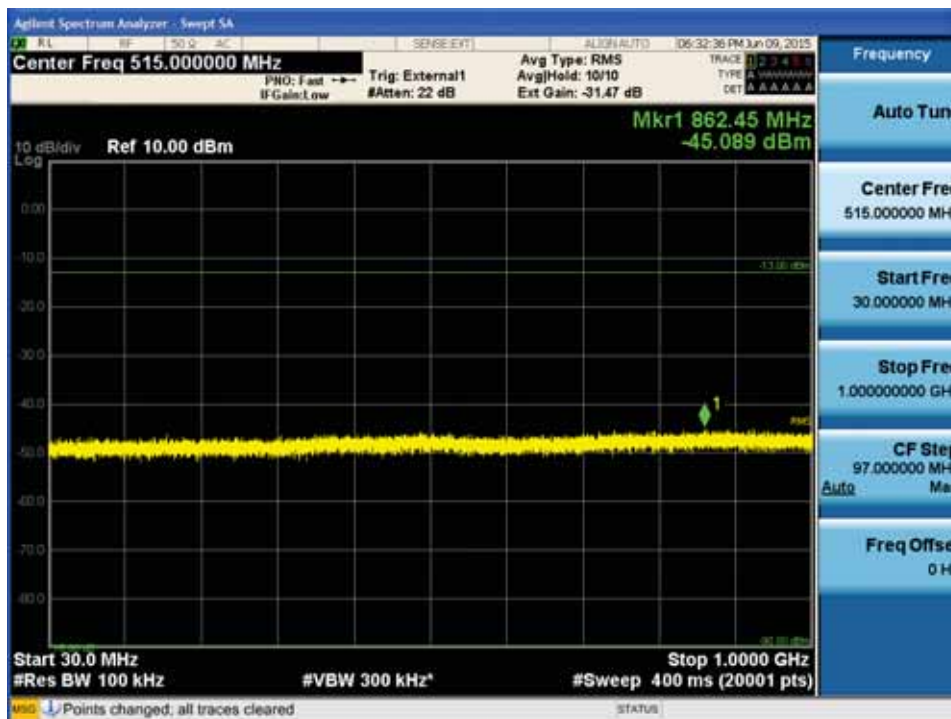


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(16QAM High Channel)



(30 MHz ~ 1 GHz)

(16QAM High Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge High)



(64QAM Low Channel)



(30 MHz ~ 1 GHz)

(64QAM Low Channel)

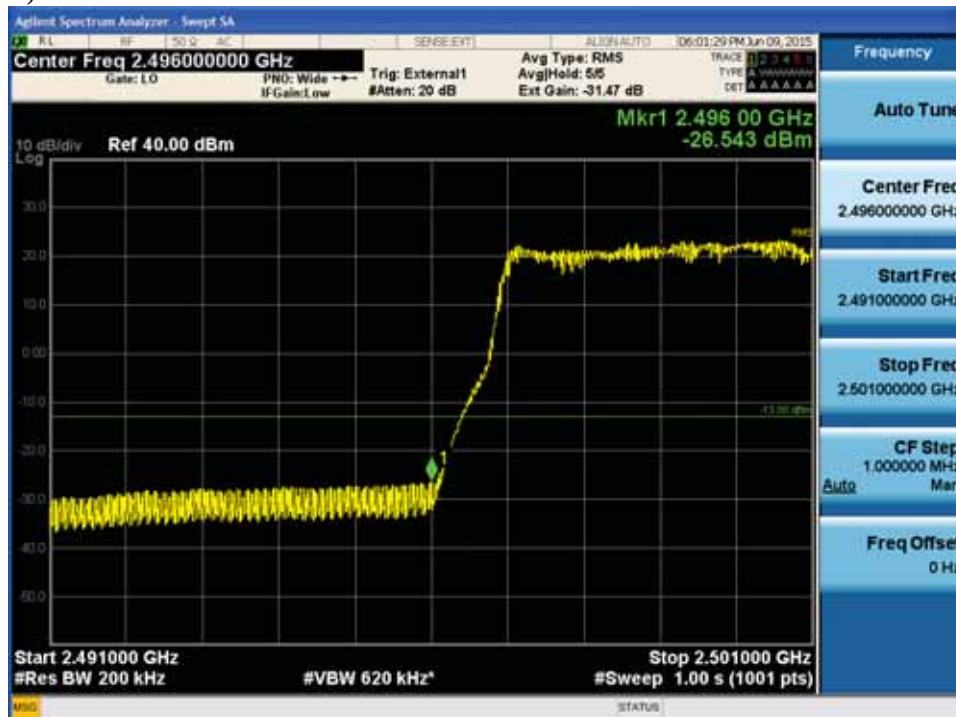


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge Low)

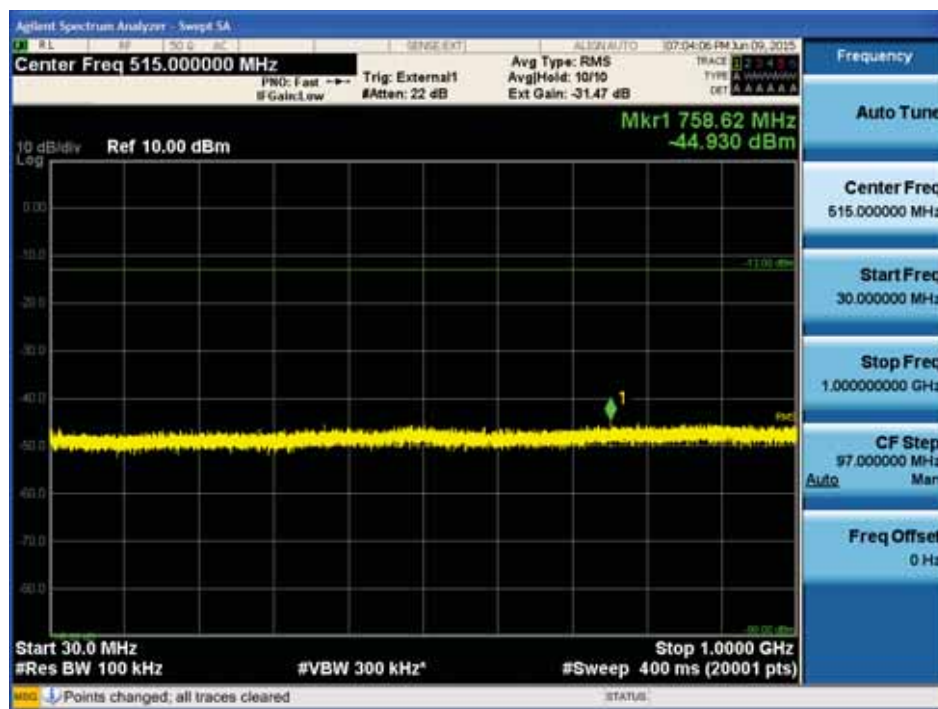


(64QAM Middle Channel)



(30 MHz ~ 1 GHz)

(64QAM Middle Channel)



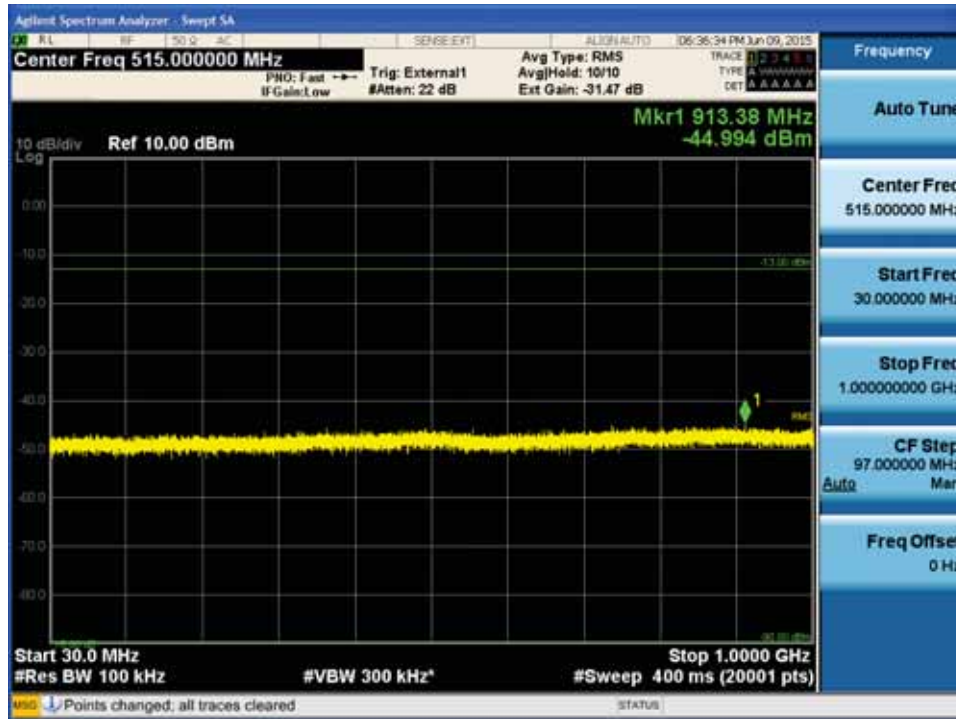


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(64QAM High Channel)



(30 MHz ~ 1 GHz)

(64QAM High Channel)



(1 GHz ~ 26.5 GHz)

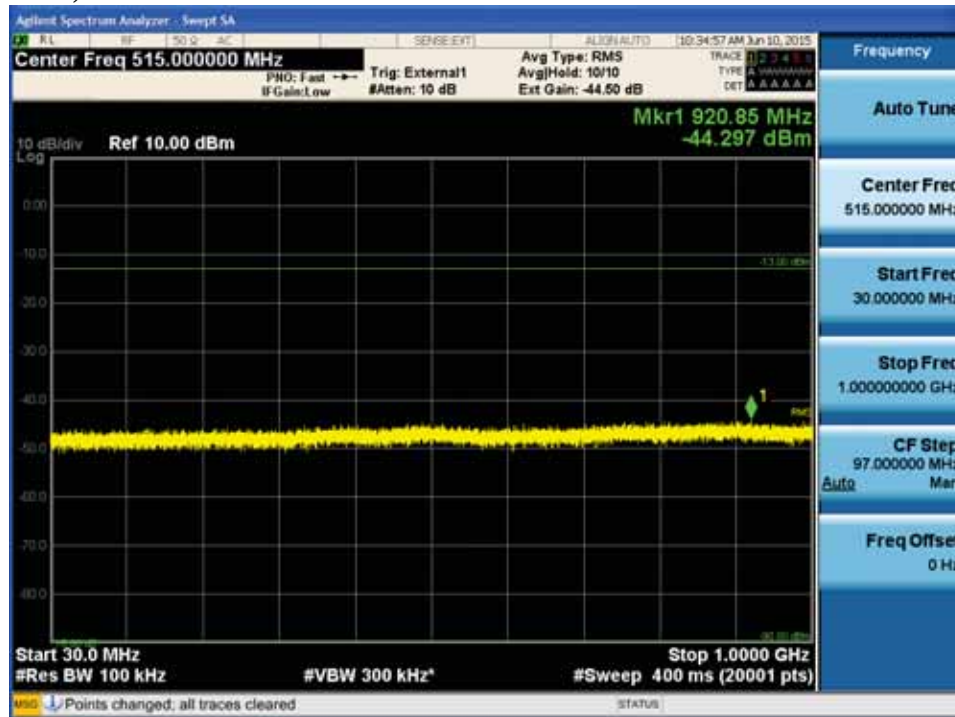


(3 GHz ~ 26.5 GHz)

(Band Edge High)



7.4.39. Test Data at Output Port 6
(QPSK Low Channel)



(30 MHz ~ 1 GHz)

(QPSK Low Channel)

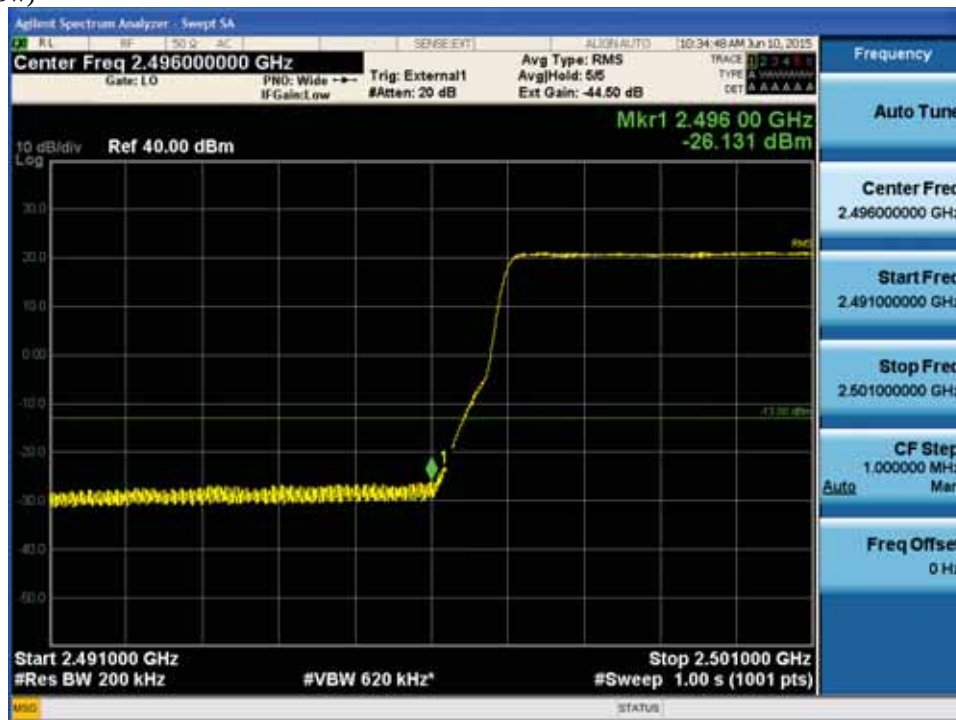


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(QPSK Middle Channel)



(30 MHz ~ 1 GHz)

(QPSK Middle Channel)

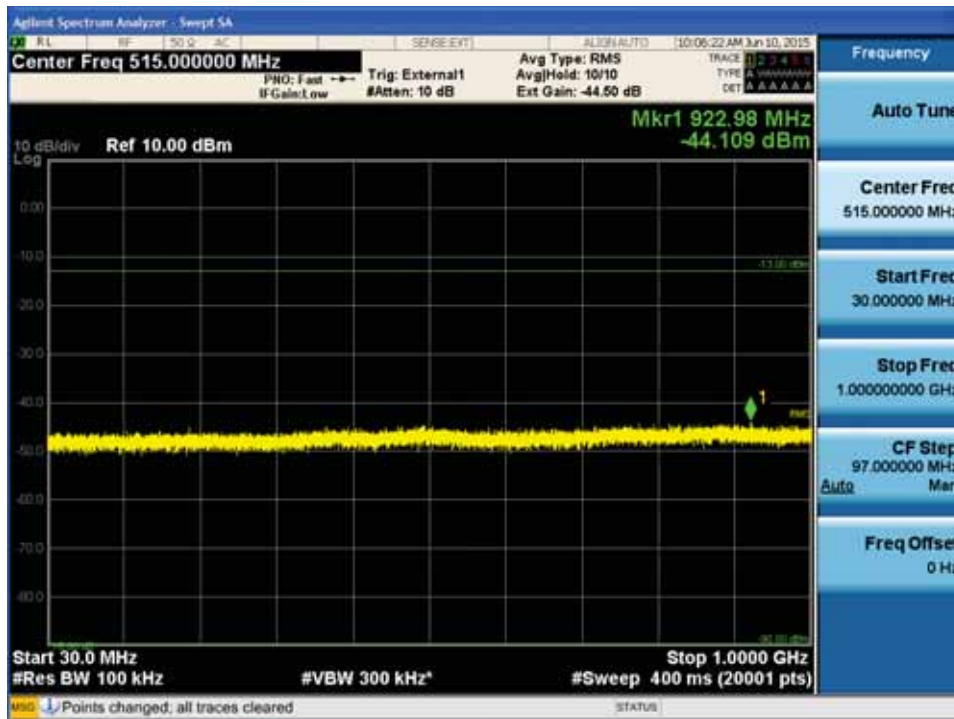


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(QPSK High Channel)



(30 MHz ~ 1 GHz)

(QPSK High Channel)



(1 GHz ~ 26.5 GHz)

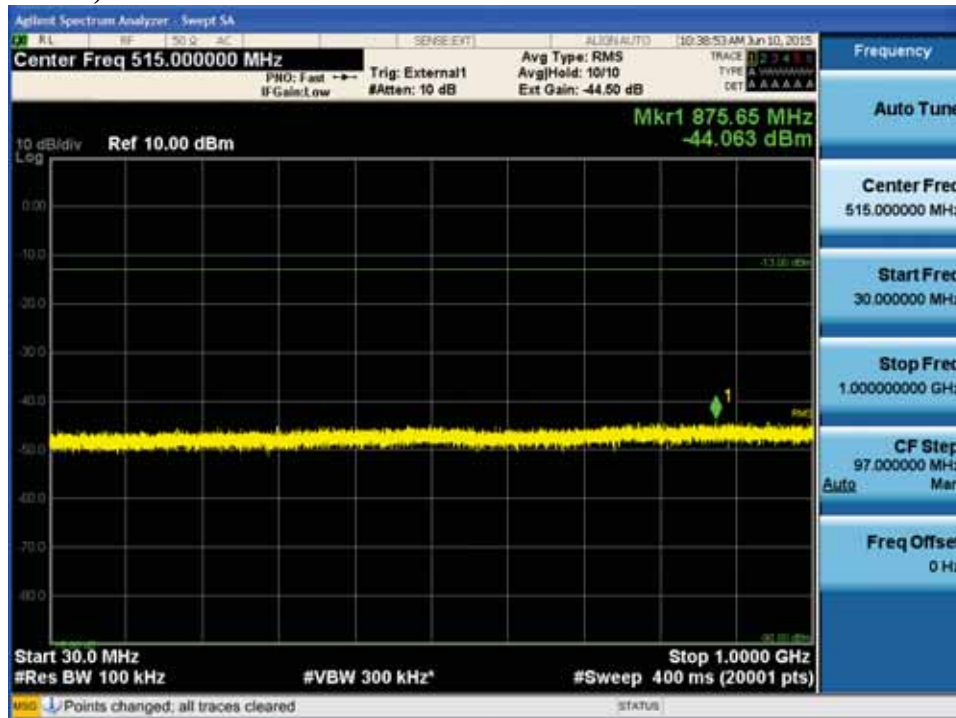


(3 GHz ~ 26.5 GHz)

(Band Edge High)



(16QAM Low Channel)



(30 MHz ~ 1 GHz)

(16QAM Low Channel)

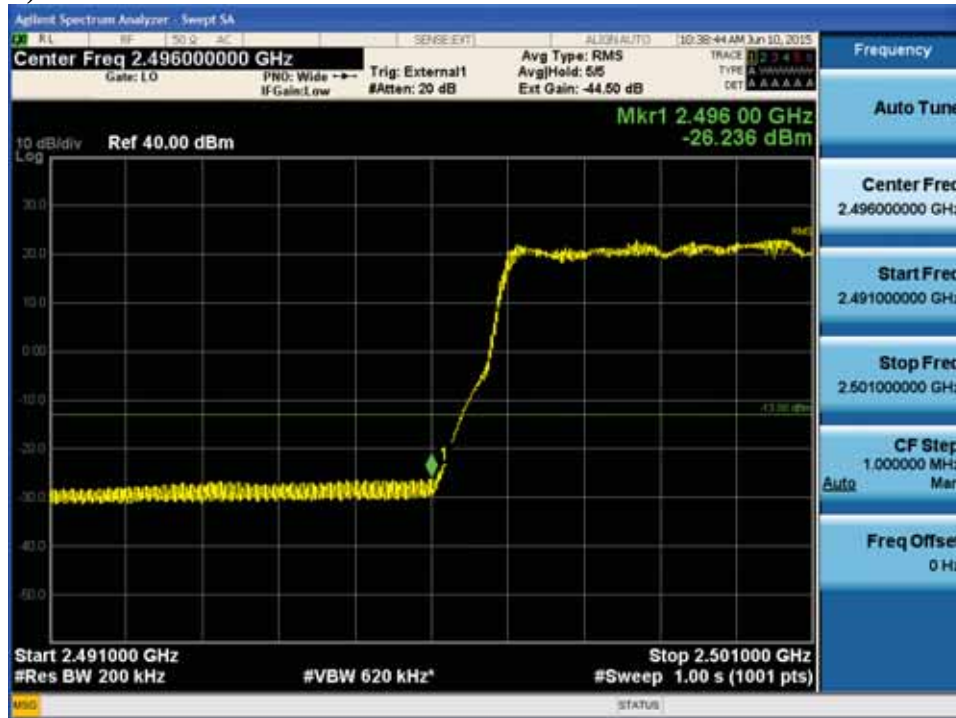


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(16QAM Middle Channel)





(30 MHz ~ 1 GHz)

(16QAM Middle Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(16QAM High Channel)



(30 MHz ~ 1 GHz)

(16QAM High Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge High)



(64QAM Low Channel)



(30 MHz ~ 1 GHz)

(64QAM Low Channel)

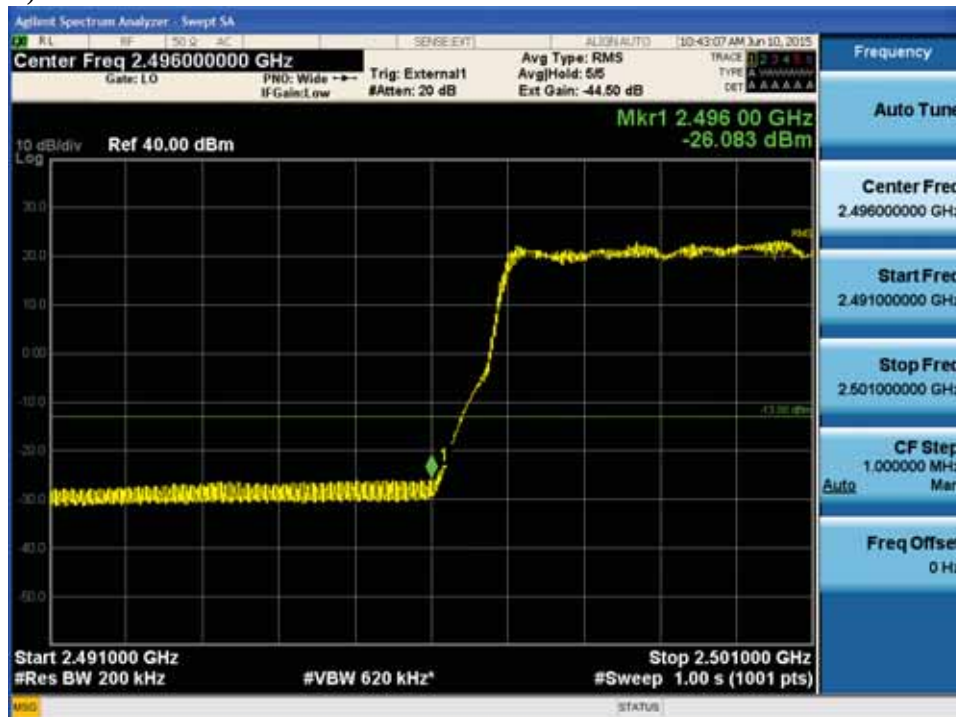


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(64QAM Middle Channel)



(30 MHz ~ 1 GHz)

(64QAM Middle Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(64QAM High Channel)



(30 MHz ~ 1 GHz)

(64QAM High Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge High)



7.4.40. Test Data at Output Port 7
(QPSK Low Channel)



(30 MHz ~ 1 GHz)

(QPSK Low Channel)

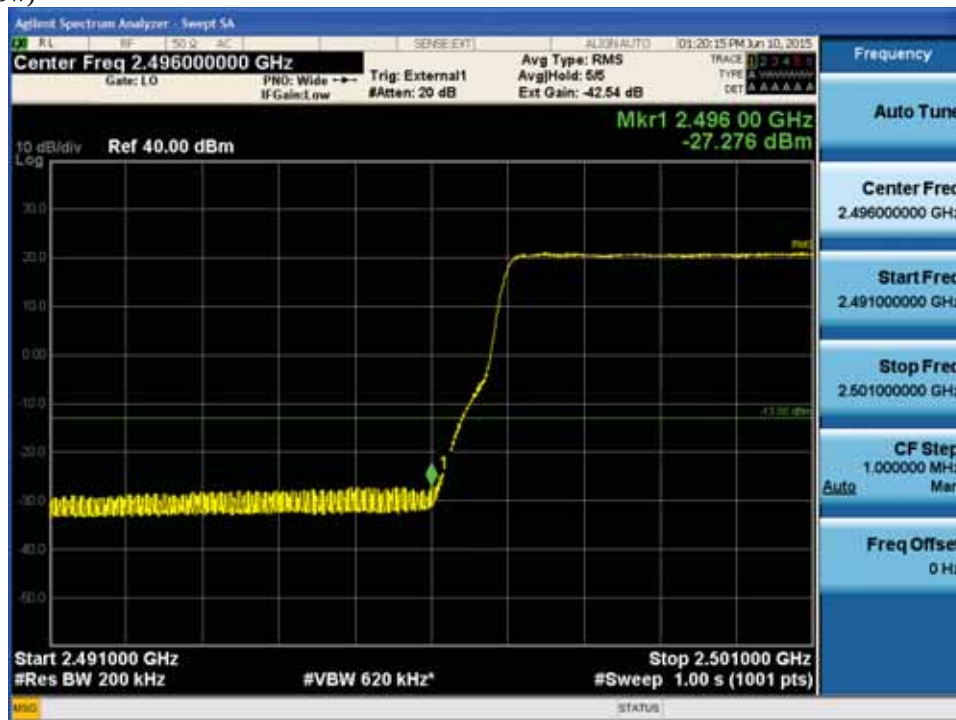


(1 GHz ~ 26.5 GHz)

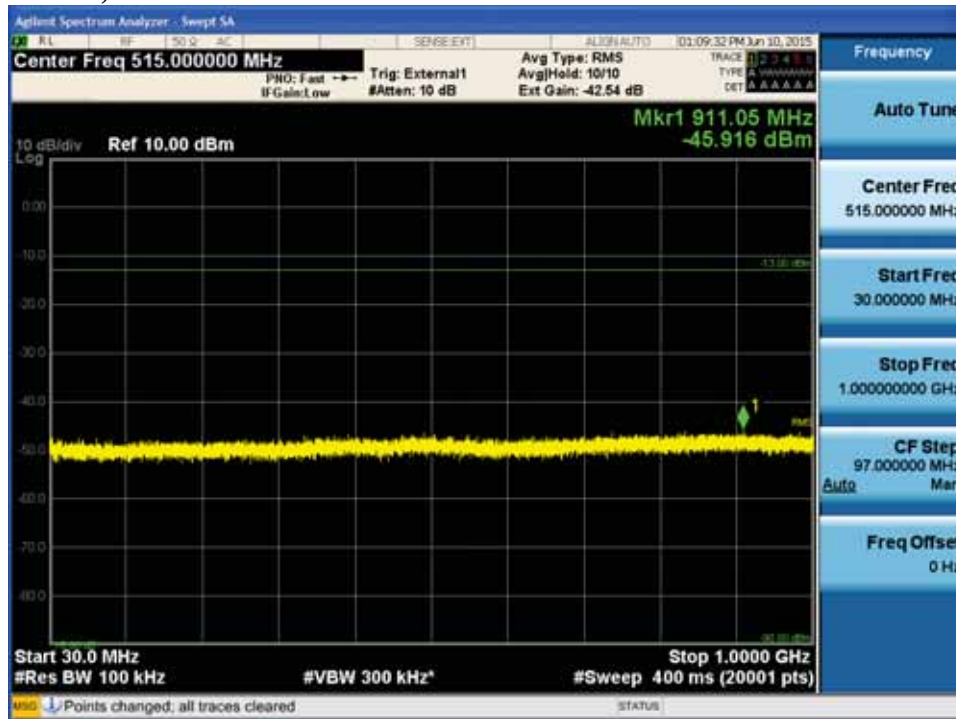


(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(QPSK Middle Channel)



(30 MHz ~ 1 GHz)

(QPSK Middle Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(QPSK High Channel)



(30 MHz ~ 1 GHz)

(QPSK High Channel)



(1 GHz ~ 26.5 GHz)

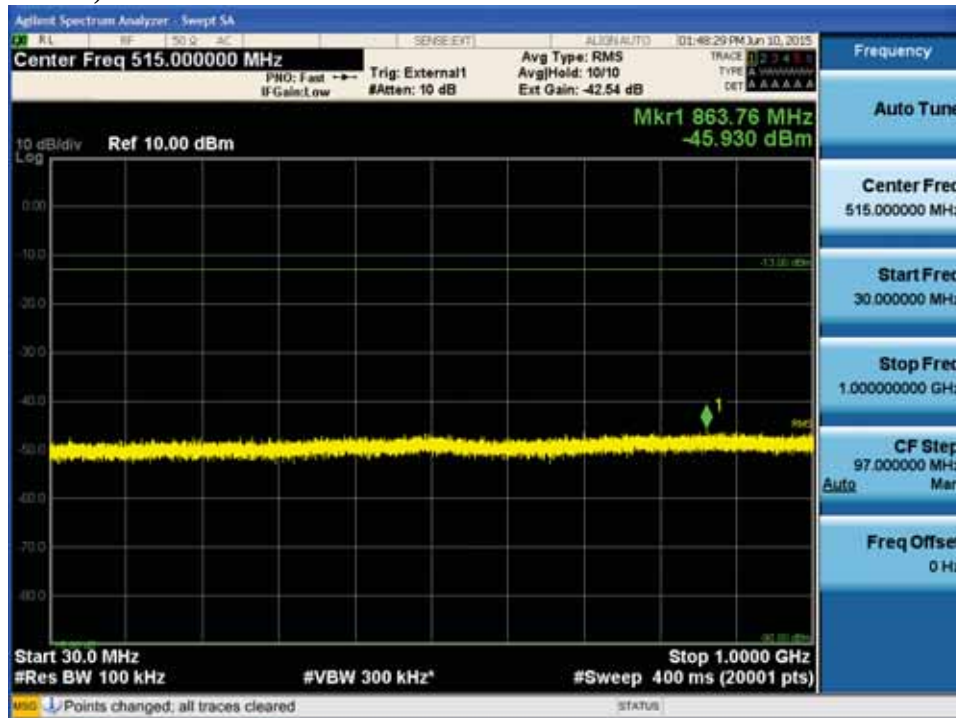


(3 GHz ~ 26.5 GHz)

(Band Edge High)



(16QAM Low Channel)



(30 MHz ~ 1 GHz)

(16QAM Low Channel)



(1 GHz ~ 26.5 GHz)

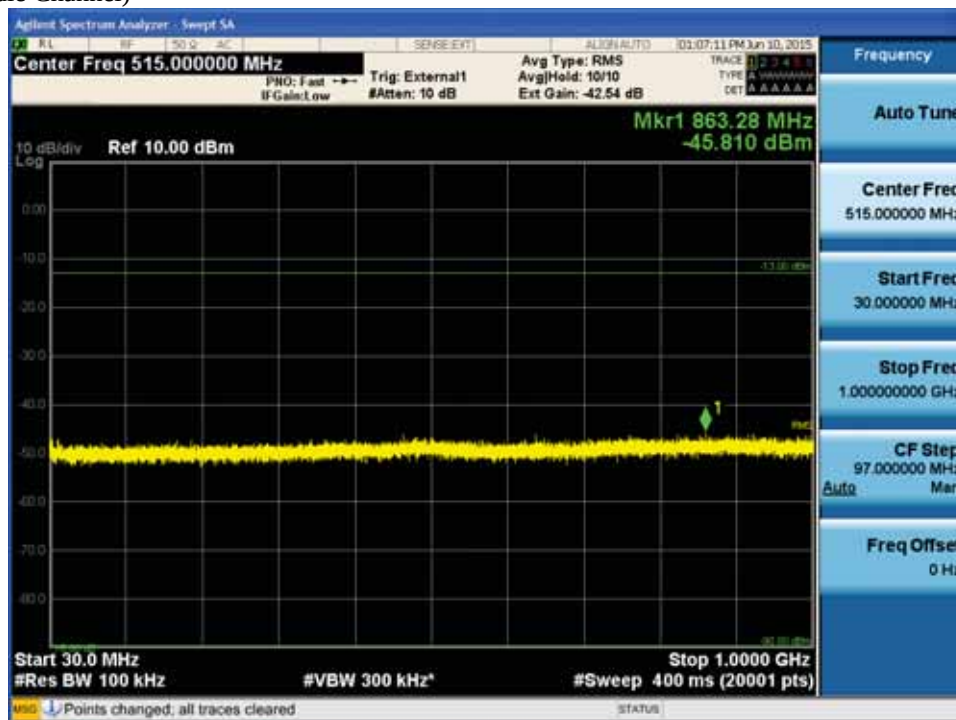


(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(16QAM Middle Channel)



(30 MHz ~ 1 GHz)

(16QAM Middle Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(16QAM High Channel)



(30 MHz ~ 1 GHz)

(16QAM High Channel)



(1 GHz ~ 26.5 GHz)

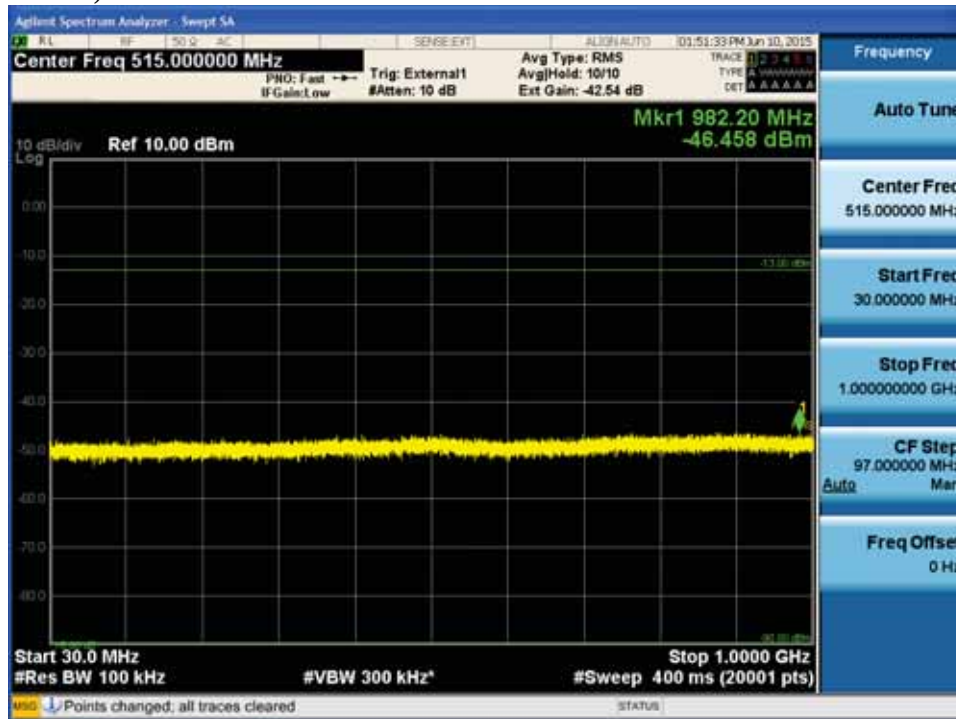


(3 GHz ~ 26.5 GHz)

(Band Edge High)



(64QAM Low Channel)



(30 MHz ~ 1 GHz)

(64QAM Low Channel)

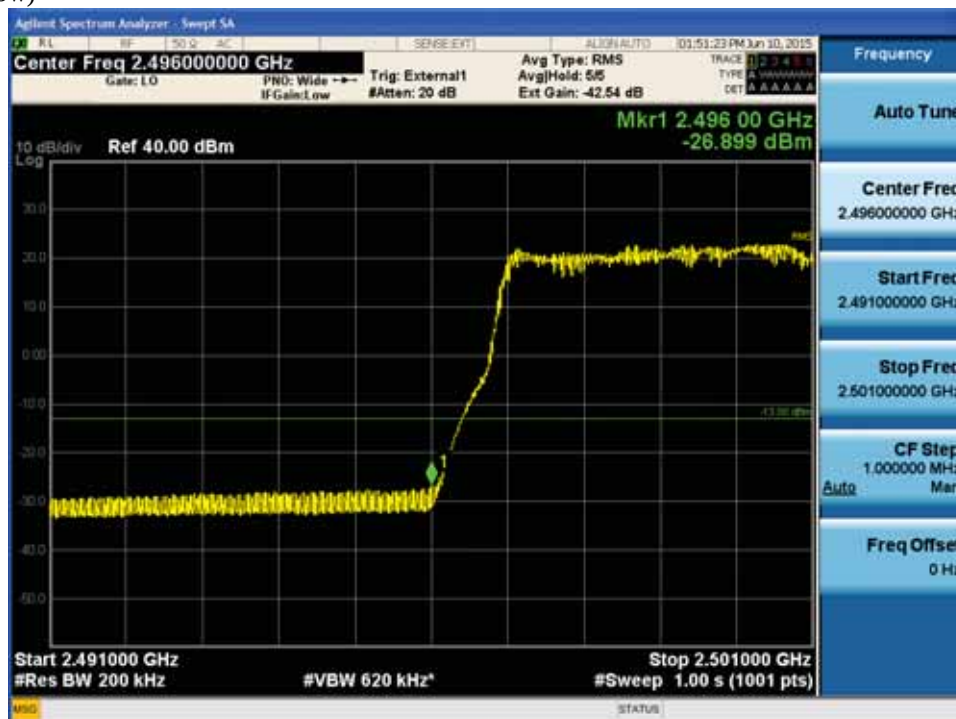


(1 GHz ~ 26.5 GHz)

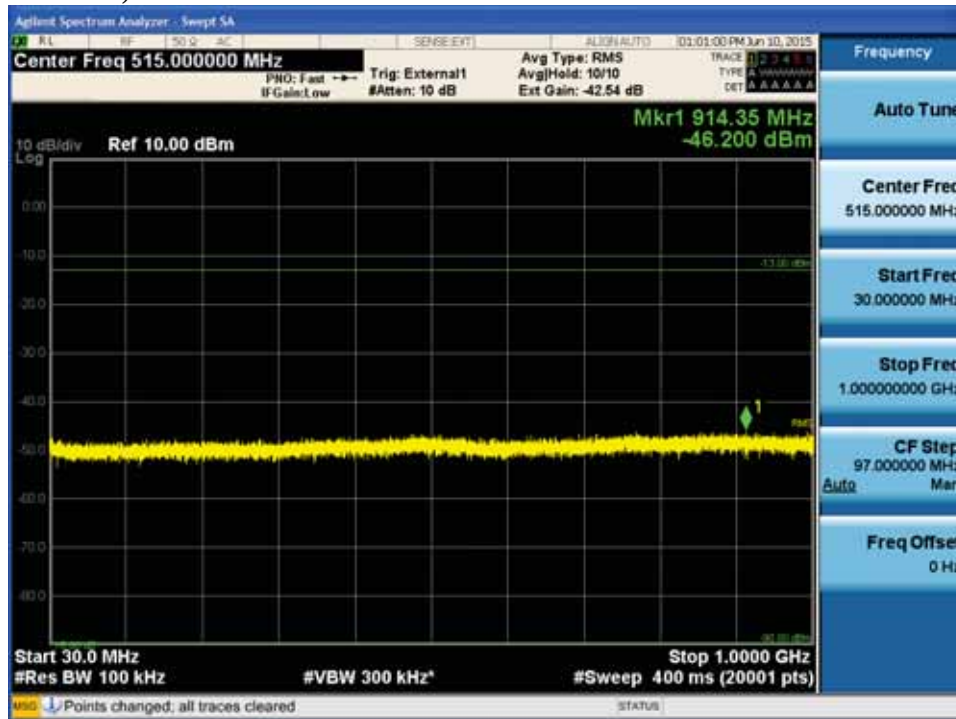


(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(64QAM Middle Channel)



(30 MHz ~ 1 GHz)

(64QAM Middle Channel)

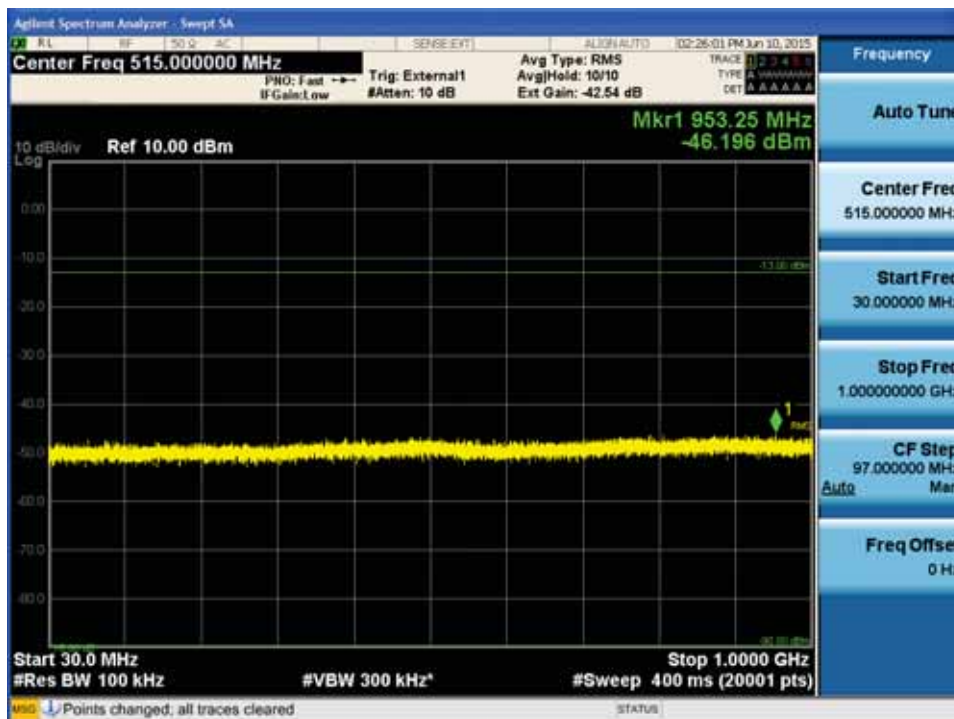


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(64QAM High Channel)



(30 MHz ~ 1 GHz)

(64QAM High Channel)



(1 GHz ~ 26.5 GHz)

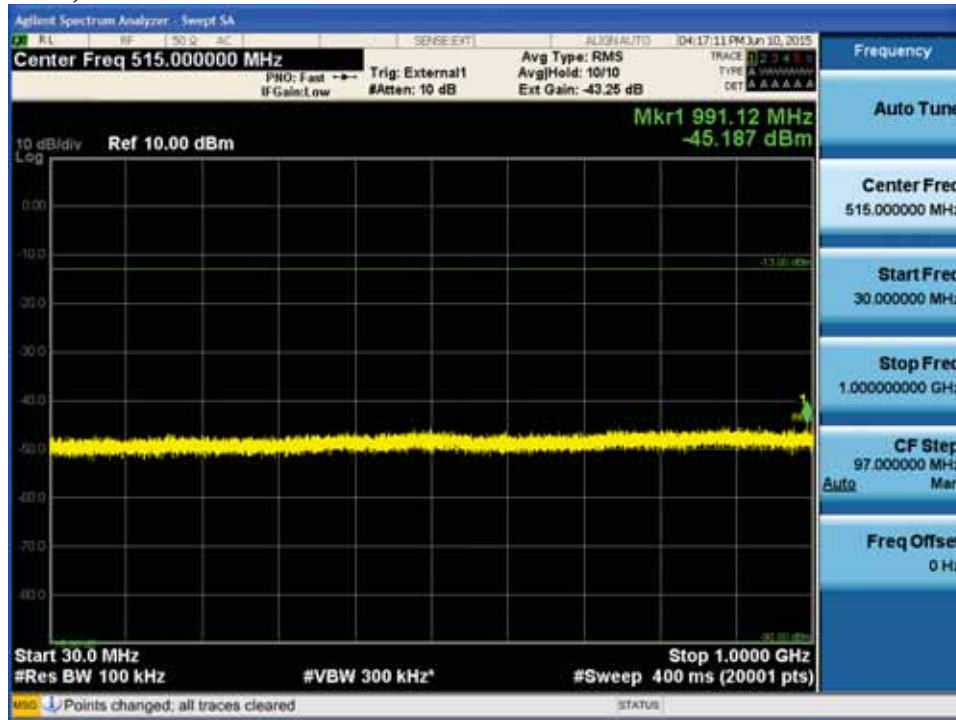


(3 GHz ~ 26.5 GHz)

(Band Edge High)



7.4.41. Test Data at Output Port 8
(QPSK Low Channel)



(30 MHz ~ 1 GHz)

(QPSK Low Channel)

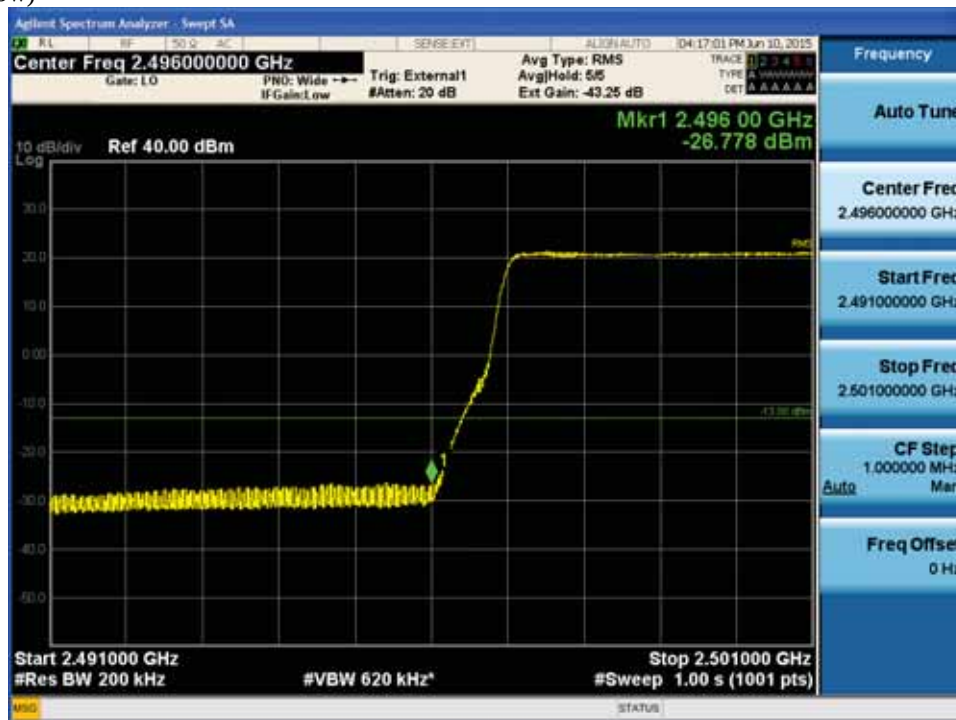


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(QPSK Middle Channel)



(30 MHz ~ 1 GHz)

(QPSK Middle Channel)

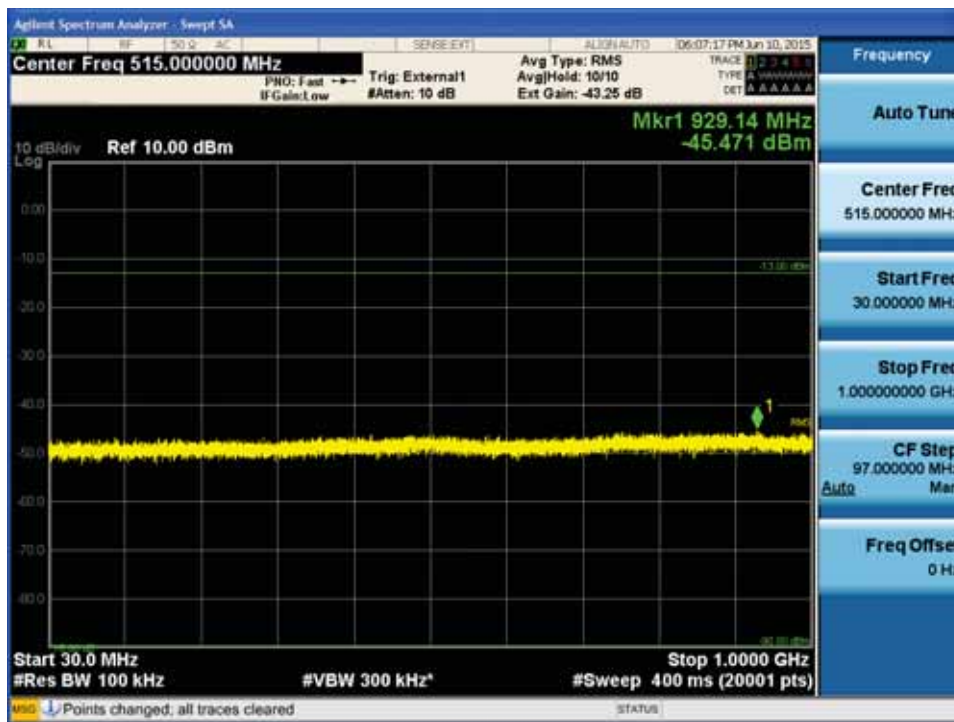


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(QPSK High Channel)



(30 MHz ~ 1 GHz)

(QPSK High Channel)



(1 GHz ~ 26.5 GHz)



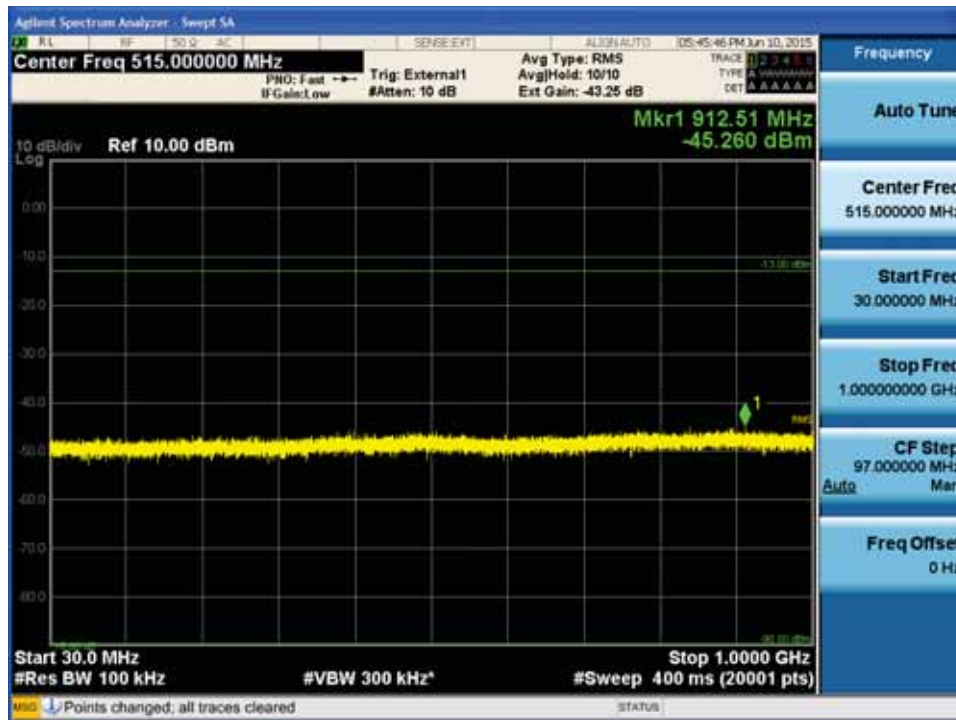
(3 GHz ~ 26.5 GHz)

(Band Edge High)



(16QAM Low Channel)





(30 MHz ~ 1 GHz)

(16QAM Low Channel)

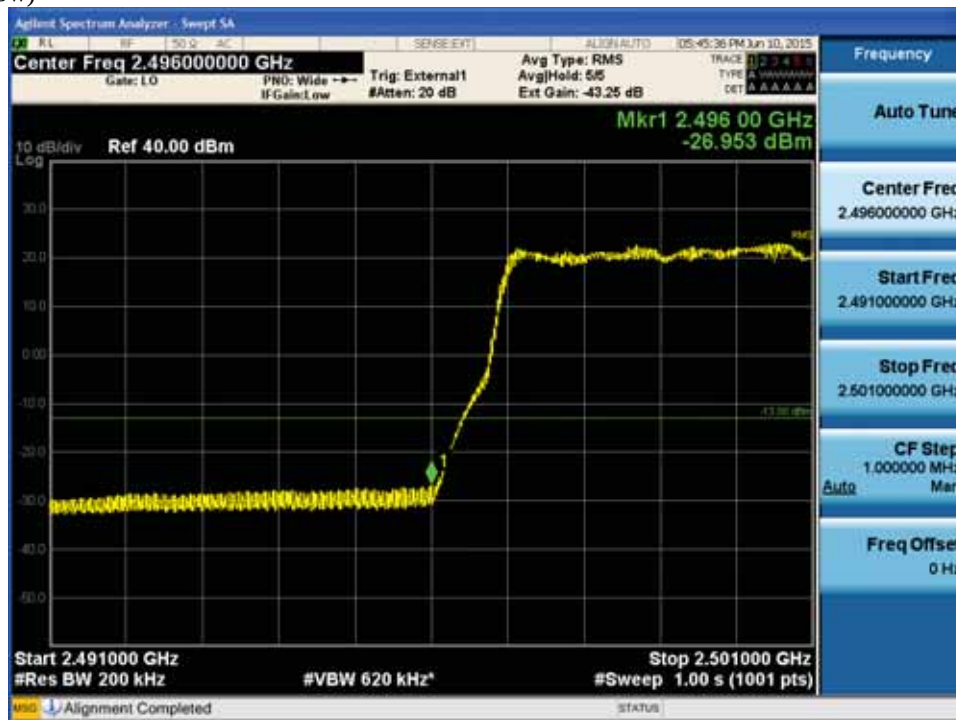


(1 GHz ~ 26.5 GHz)

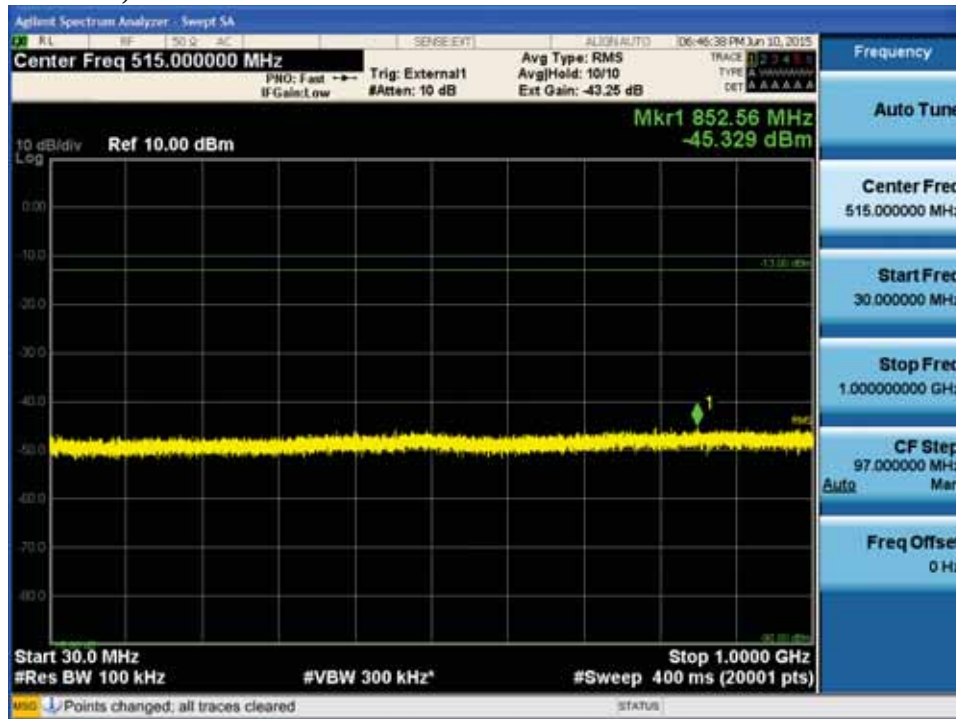


(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(16QAM Middle Channel)



(30 MHz ~ 1 GHz)

(16QAM Middle Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(16QAM High Channel)



(30 MHz ~ 1 GHz)

(16QAM High Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge High)



(64QAM Low Channel)



(30 MHz ~ 1 GHz)

(64QAM Low Channel)

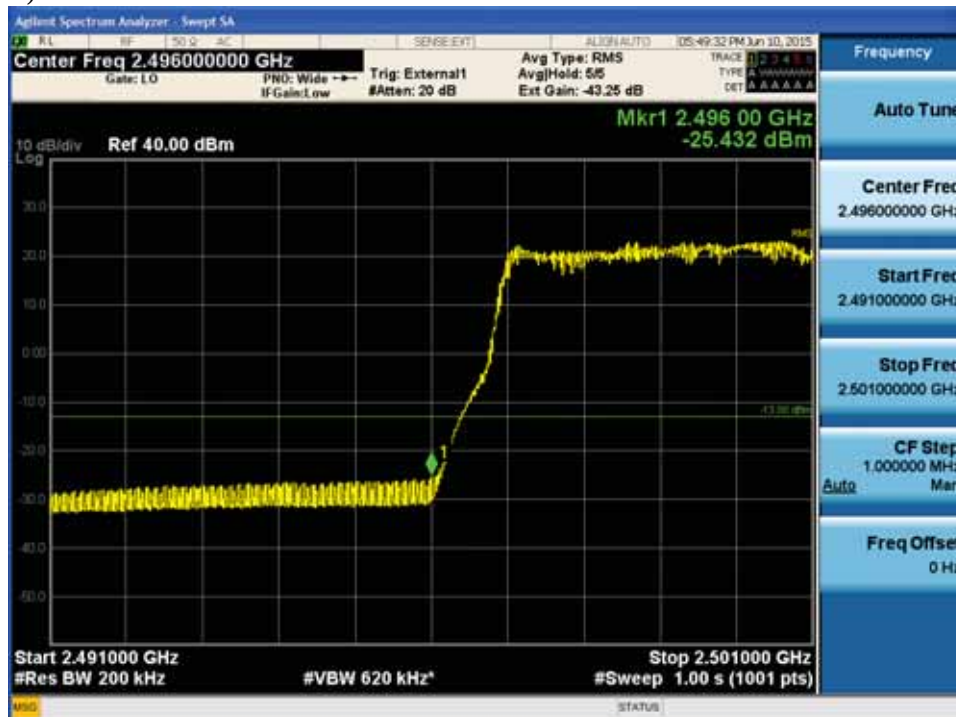


(1 GHz ~ 26.5 GHz)

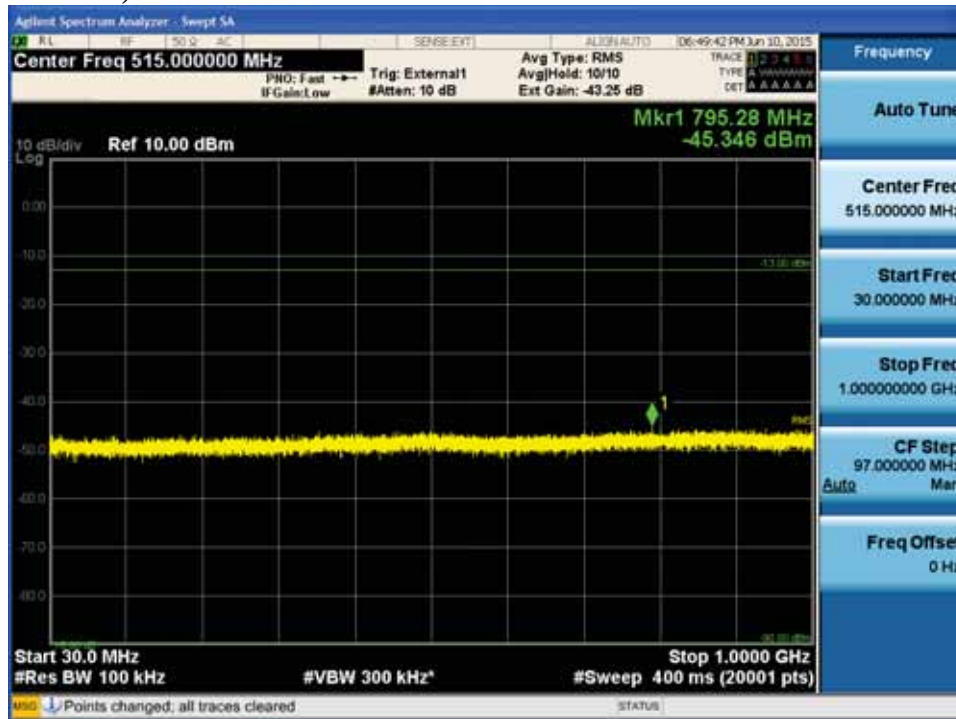


(3 GHz ~ 26.5 GHz)

(Band Edge Low)



(64QAM Middle Channel)



(30 MHz ~ 1 GHz)

(
64QAM Middle Channel)

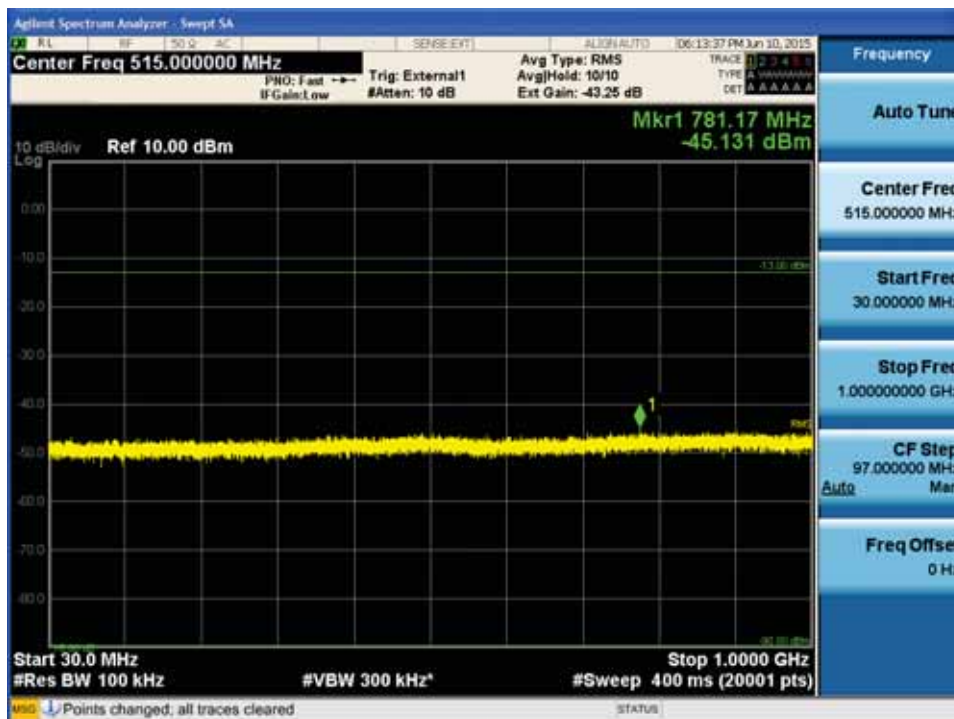


(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(64QAM High Channel)



(30 MHz ~ 1 GHz)

(64QAM High Channel)



(1 GHz ~ 26.5 GHz)



(3 GHz ~ 26.5 GHz)

(Band Edge High)



8. RADIATED SPURIOUS EMISSION

8.1 Applicable Standard

(1) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts. (2) For fixed and temporary fixed digital stations, the attenuation shall be not less than $43 + 10 \log (P)$ dB, unless a documented interference complaint is received from an adjacent channel licensee. Provided that the complaint cannot be mutually resolved between the parties, both licensees of existing and new systems shall reduce their out-of-band emissions by at least $67 + 10 \log (P)$ dB measured at 3 MHz from their channel's edges for distances between stations exceeding 1.5 km.

8.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Interval	Calibration Due
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	1151	Biennial	07/05/2013
Schwarzbeck	VULB 9160 / TRILOG Antenna	3368	Biennial	10/10/2014
HD	MA240 / Antenna Position Tower	556	N/A	N/A
EMCO	1050 / Turn Table	114	N/A	N/A
HD GmbH	HD 100 / Controller	13	N/A	N/A
HD GmbH	KMS 560 / SlideBar	12	N/A	N/A
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	10094	Annual	09/04/2014
Rohde & Schwarz	FSP / Spectrum Analyzer	836650/016	Annual	10/24/2014
Rohde & Schwarz	FSP / Spectrum Analyzer	836650/016	Annual	10/24/2014
WEINSCHL	67-30-33 / Attenuator	CC7264	Annual	08/25/2014
WEINSCHL	67-30-33 / Attenuator	CC7265	Annual	08/26/2014

8.3 Test Procedure

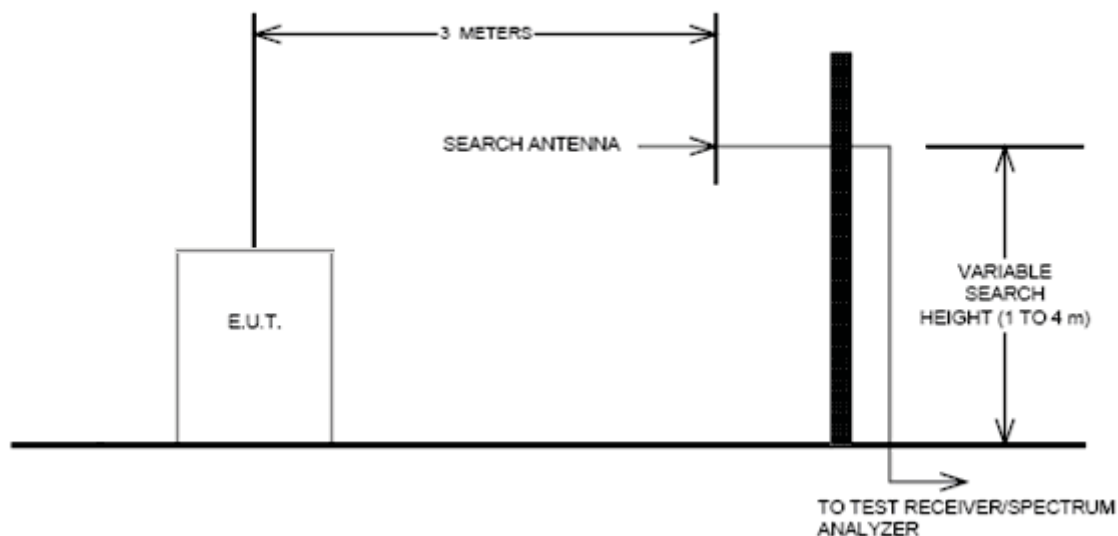
Radiated emission measurements were performed at an semi-anechoic chamber.

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° 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

Tset Freq.(MHz)	Freq.(MHz)	<u>Measured</u> <u>Level</u> [dBm]	Ant Gain	C.L <u>Level</u> [dBm]	<u>Substitute</u> <u>Level</u> [dBm]	Pol. (dBm)	EIRP (dBm)	Margin (dB)
2593	3429.0	-53.77	12.21	4.70	-49.48	V	-41.97	28.97
	3916.5	-50.87	12.75	5.15	-46.67	V	-39.07	26.07
	5632.5	-51.70	12.81	5.90	-46.81	V	-39.90	26.90

- It was tested when 3 carriers simultaneously transmitted.

9. FREQUENCY STABILITY

9.1 Applicable Standard

Requirements: FCC § 2.1055 (a), Part 27.54 following: The frequency stability shall be sufficient to ensure that the fundamental emissions stay

9.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Interval	Calibration Due
Agilent	N9020A /Signal Analyzer	MY51110068	Annual	07/21/2014
Agilent	6674A / DC Power Supply	3501A00901	Annual	07/24/2014
WEINSCHEL	67-30-33 / Attenuator	CC7264	Annual	08/25/2014
WEINSCHEL	67-30-33 / Attenuator	CC7265	Annual	08/26/2014
WEINSCHEL	AF9003-69-31 / Attenuator	11787	Annual	10/24/2014
DYENT	DFSS60 / DC Power Supply	1003030-1	Annual	04/01/2014
Nang-Yeoul	NY-THR18750 / Temperature Chamber	NY-2009012201A	Annual	11/03/2014

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

9.4.1. Frequency Stability over Temperature and Voltage variation

Modulation: QPSK

Reference: - 48 Vdc at 20°C **Freq.** = 2506,000,000 MHz

Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	2506 000 005	4.6	0	0.0000
	-30	2506 000 002	2.0	-2.6	-0.0010
	-20	2506 000 001	1.3	-3.3	-0.0013
	-10	2505 999 998	-1.8	-6.4	-0.0026
	0	2506 000 002	2.0	-2.6	-0.0010
	+10	2505 999 997	-2.7	-7.3	-0.0029
	+30	2505 999 998	-2.5	-7.1	-0.0028
	+40	2506 000 003	3.2	-1.4	-0.0006
	+50	2506 000 004	3.6	-1	-0.0004
115%	+20	2506 000 004	3.9	-0.7	-0.0003
85%	+20	2506 000 005	4.7	0.1	0.0000

Modulation: 16QAM

Reference: - 48 Vdc at 20°C **Freq.** = 2593,000,000 MHz

Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	2592 999 999	-0.8	0	0.0000
	-30	2592 999 996	-3.7	-2.9	-0.0012
	-20	2593 000 000	-0.1	0.7	0.0003
	-10	2592 999 995	-4.9	-4.1	-0.0016
	0	2593 000 000	0.1	0.9	0.0004
	+10	2592 999 996	-4.1	-3.3	-0.0013
	+30	2592 999 994	-5.6	-4.8	-0.0019
	+40	2592 999 998	-2.4	-1.6	-0.0006
	+50	2592 999 997	-2.6	-1.8	-0.0007
115%	+20	2592 999 996	-4.5	-3.7	-0.0015
85%	+20	2592 999 998	-1.9	-1.1	-0.0004

Modulation: 64QAM

Reference: - 48 Vdc at 20°C **Freq.** = 2680,000,000 MHz

Voltage (%)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	2680 000 000	-0.3	0	0.0000
	-30	2679 999 999	-1.2	-0.9	-0.0004
	-20	2680 000 000	-0.2	0.1	0.0000
	-10	2680 000 000	0.2	0.5	0.0002
	0	2680 000 000	0.4	0.7	0.0003
	+10	2680 000 001	0.9	1.2	0.0005
	+30	2680 000 001	1.1	1.4	0.0006
	+40	2680 000 001	1.1	1.4	0.0006
	+50	2680 000 001	0.9	1.2	0.0005
115%	+20	2680 000 001	0.5	0.8	0.0003
85%	+20	2680 000 002	1.8	2.1	0.0008

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

Port 1~8

Maximum output, including the tolerance	44.00	dBm
Maximum output, including the tolerance	25118.86432	mW
Prediction distance	1600.00	cm
Prediction frequency	2593.0	MHz
Antenna Peak Gain	22.00	dBi
Antenna Gain(numeric)	158.48932	—
Power density at prediction frequency (S)	0.1238	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm ²

Notes: TX output power is 43dBm and output power tolerance is +1dB / -1.5dB

The power density level at 1600 cm is 0.1238 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at Port 1~8

Simultaneous MPE at 1500 cm is $(0.1238/1.0) * 8 < 1$
 $= (0.9900/1.0) < 1$