

Global Telecom Corp

ADDENDUM TEST REPORT TO 93790-5A

WIMAX modem
Model: SWC – 9200

Tested To The Following Standards

FCC Part 90Z

Report No.: 93790-5B

Date of issue: July 26, 2013



TESTING
CERT #803.01, 803.02,
803.05, 803.06

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Customer Reference Number: 2351

DATE OF EQUIPMENT RECEIPT:

DATE(S) OF TESTING:

REPORT PREPARED BY:

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CKC Laboratories, Inc.
5046 Sierra Pines Drive
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Project Number: 93790

January 11, 2013

January 11-July 15, 2013

Revision History

Original: Testing of the WIMAX modem, SWC – 9200 to FCC Part 90Z.

Addendum A: The data for spurious radiated emissions was corrected to show compliance to attenuation of 43 + 10Log P.

Addendum B: New testing was performed to measure frequency shifting in all configurations. New data was added as Appendix A.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 N. Olinda Place
Brea, CA 92023
USA

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea D	US0060	SL2-IN-E-1146R	3082D-2	100638	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 90 Subpart Z

Description	Test Procedure/Method	Results
Transmitter Requirements		
Power and Antenna Limits.	FCC Part 90.1321 / 2.1046	Pass
Spurious Conducted Emissions	FCC Part 90.1323 / 2.1051	Pass
Spurious Radiated Emissions	FCC Part 90.1323 / 2.1051	Pass
-26dBc Occupied Bandwidth	FCC Part 90.209 / 2.1049	Pass
Band Edge Compliance	FCC Part 90.210 / 2.1047	Pass
Frequency Stability: Voltage and Temperature Variation	FCC Part 90.213 / 2.1055(d)	Pass

Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions

The EUT is placed on the test bench. Software is used to control EUT is MTK RFCAL-TOOL v1.6.6, build 649 LAN1 is connected to a support laptop. LAN2 is connected to Ethernet hub. RJ11 port is connected to telephone. Per the manufacturer, the product transmits from one antenna at a time. Conducted emissions performed one antenna port at a time while other antenna ports are terminated with 50ohm load.

TX frequency=3650-3700MHz

Low channel=3655MHz, Middle channel=3665MHz, High Channel=3695MHz

Channel Bandwidth=5,7,10MHz

Modulations: QPSK, 16QAM, 64QAM

Power settings in software:

Port 1

Hi channel:

5MHz: 24.4dbm for all 3 modulations

7MHz: 26dbm for all 3 modulations

10MHz: 26.7dbm for all 3 modulations

Mid channel:

5MHz: 25dbm for all 3 modulations

7MHz: 25.7dbm QPSK, 27dbm 16QAM, 25.8dbm 64QAM

10MHz: 26dbm for all 3 modulations

Low channel:

5MHz: 25.5dbm QPSK, 25.5dbm 16QAM, 25dbm 64QAM

7MHz: 25.8dbm QPSK, 25.5dbm 64QAM, 25.5dbm 16QAM

10MHz: 26.8dbm QPSK for all three modulations

Port 2

Low channel:

5MHz, 26dbm QPSK, 26dbm 16QAM, 25.5dbm 64QAM

7MHz, 25dbm QPSK, 27dbm 16QAM, 27dbm 64QAM

10MHz, 26.8dbm for all 3 modulations

Middle channel:

5MHz, 24dbm QPSK, 26dbm 16QAM, 25dbm 64QAM

7MHz, 27dbm QPSK, 27dbm 16QAM, 27dbm 64QAM

10MHz, 27dbm QPSK, 27dbm 16QAM, 27dbm 64QAM

Hi channel:

5MHz, 24dbm for all 3 modulations

7MHz, 24dbm QPSK, 24dbm 16QAM, 25dbm 64QAM

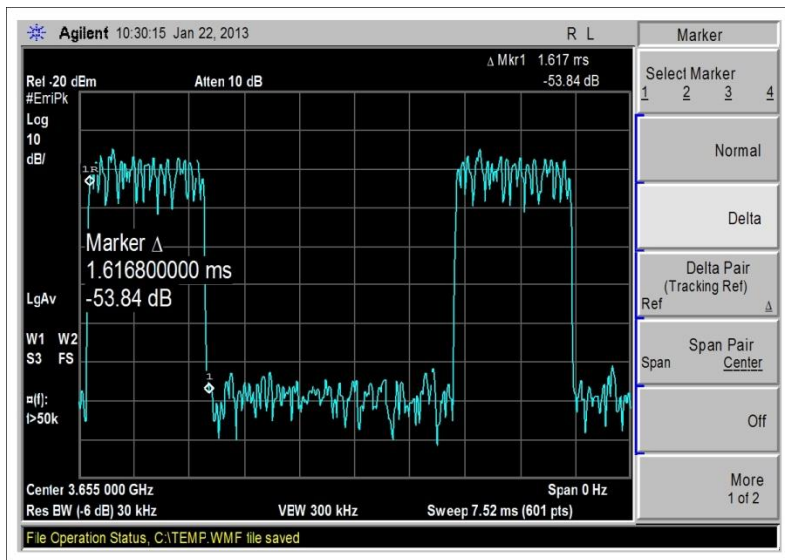
10MHz, 25.8dbm for 3 mods.

Per manufacturer, coaxial cable with 4dB insertion loss will be used between the EUT and the antenna during normal operation.

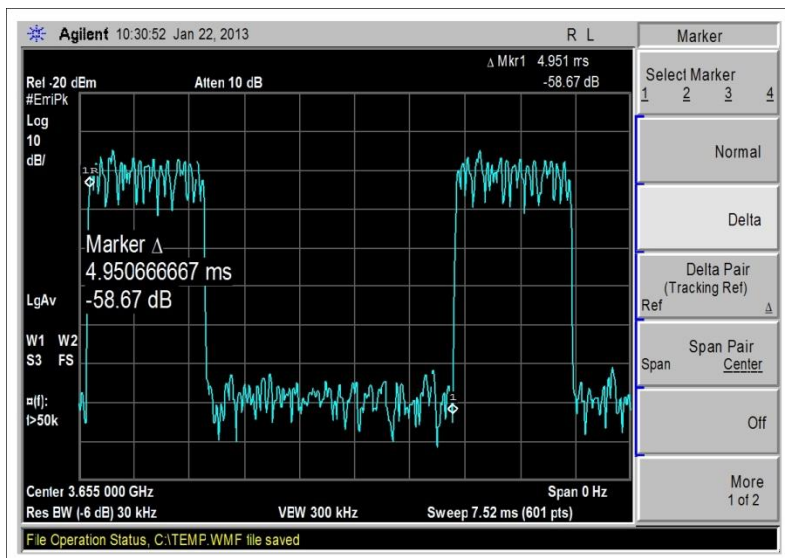
Antenna: Dual Polarized Panel, 10dBi gain. (14db-4db coaxial cable loss)

Duty cycle= $1.617/4.951=32.66\%$
 Correction factor for duty cycle= $10*\log(32.66\%)=4.86\text{db}$

Frequency range of measurement = 9 kHz- 40 GHz.
 9kHz -150 kHz; RBW=200 Hz, VBW=200 Hz;150 kHz-30 MHz; RBW=9 kHz, VBW=9 kHz;30 MHz-1000 MHz;
 RBW=120 kHz, VBW=120 kHz,1000 MHz-40,000 MHz; RBW=1 MHz, VBW=1 MHz.



Duty Cycle Correction



Duty Cycle= $1.617/4.951=32.66\%$
 Correction factor for duty cycle= $-10*\log(32.66\%)=4.86\text{db}$

EQUIPMENT UNDER TEST

EQUIPMENT UNDER TEST

WIMAX modem

Manuf: Global Telecom Corp
Model: SWC - 9200
Serial: USQ1029C9200-0000004

ACDC Adapter

Manuf: Ktec
Model: KSAS0241200200D5
Serial: NA

PERIPHERAL DEVICES

Laptop

Manuf: Toshiba
Model: Satellite A105-S4004
Serial: 36322146Q

Telephone

Manuf: Western Electric
Model: NA
Serial: NA

Ethernet Hub

Manuf: Netgear
Model: GS108T
Serial: NA

2 x 20db Attenuator

Manuf: Weinschel Corp.
Model: 33-20-34
Serial: NA

2x 50ohm Terminator

Manuf: MLC
Model: ANNE-50L
Serial: NA

FCC PART 90 SUBPART Z

This report contains EMC emissions test results of Transmitter Characteristics for Intentional radiators 47CFR under United States Federal Communications Commission (FCC) Part 90 Private Land Mobile Radio Services. Subpart Z--Wireless Broadband Services in the 3650-3700 MHz Band.

90.1321 / 2.1046 Power and Antenna Limits

Ambient Temperature: 20°C

Relative Humidity: 35%

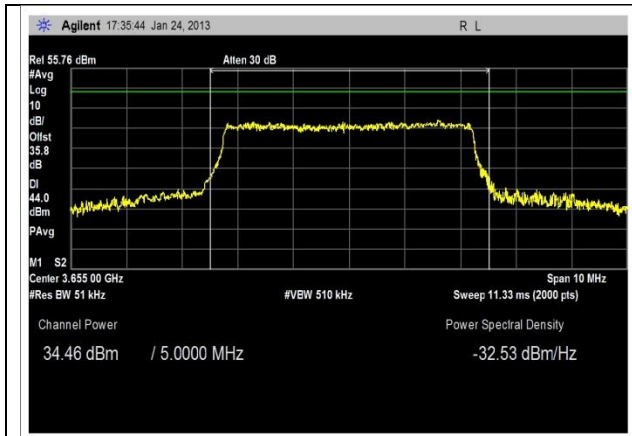
Test Engineer: Don Nguyen

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
AN02946	Cable	32022-2-2909K-36TC	Astrolab Inc.	8/8/2011	8/8/2013
AN02672	Spectrum Analyzer	E4446A	HP Agilent	9/4/2012	9/4/2014

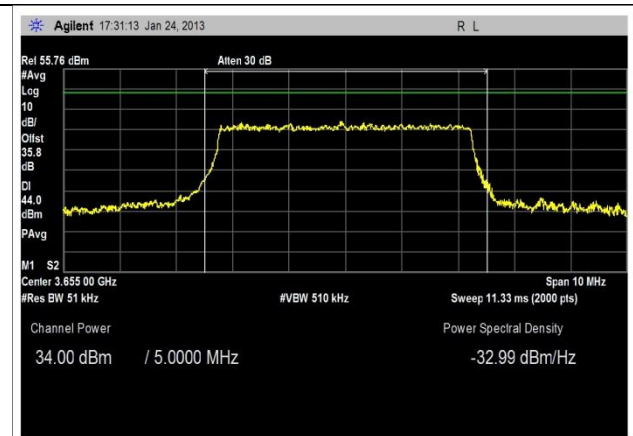
Band Power Port 1					
Frequency (MHz)	Channel Bandwidth (MHz)	Modulation	Power setting (dbm)	Measured power (dbm)	EIRP limit (dbm)
3655	5	16QAM	25.5	34.46	44
		64QAM	25.0	34.00	44
		QPSK	25.5	33.99	44
3655	7	16QAM	25.5	33.97	44
		64QAM	25.5	33.75	44
		QPSK	25.8	34.56	44
3655	10	16QAM	26.8	36.75	44
		64QAM	26.8	36.75	44
		QPSK	26.8	36.80	44
3665	5	16QAM	25.0	34.46	44
		64QAM	25.0	34.23	44
		QPSK	25.0	34.11	44
3665	7	16QAM	27.0	35.92	44
		64QAM	25.8	34.93	44
		QPSK	25.7	34.42	44
3665	10	16QAM	26.0	35.82	44
		64QAM	26.0	35.71	44
		QPSK	26.0	35.85	44
3695	5	16QAM	24.4	33.53	44
		64QAM	24.4	33.74	44
		QPSK	24.4	33.67	44
3695	7	16QAM	26.0	35.33	44
		64QAM	26.0	35.20	44
		QPSK	26.0	34.62	44
3695	10	16QAM	26.7	36.61	44
		64QAM	26.7	36.77	44
		QPSK	26.7	36.70	44

External 20db attenuator was used.

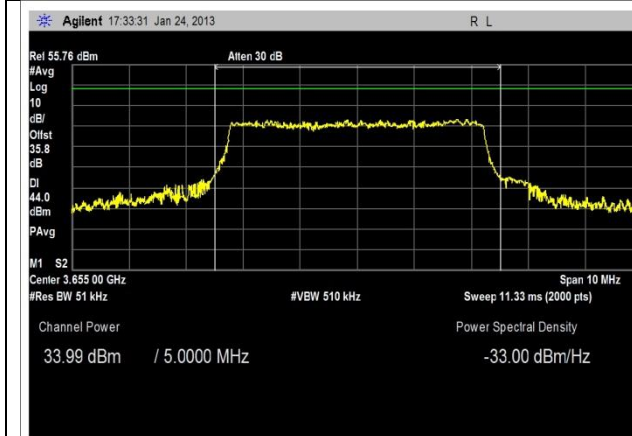
Offset in spectrum analyzer=20db attenuator + 0.9db cable loss (asset: AN02946)+4.86db duty cycle correction factor+10dbi antenna gain = 35.76db.



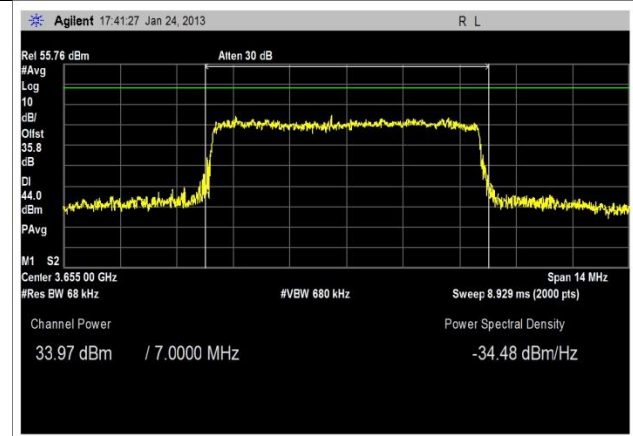
Band power_low ch_5MHz_16QAM_port 1



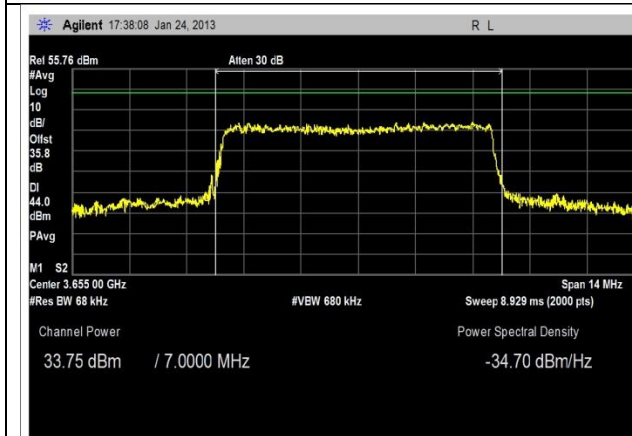
Band power_low ch_5MHz_64QAM_port 1



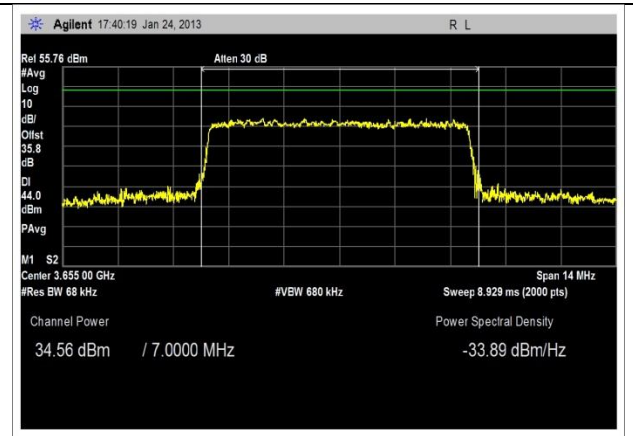
Band power_low ch_5MHz_QPSK_port 1



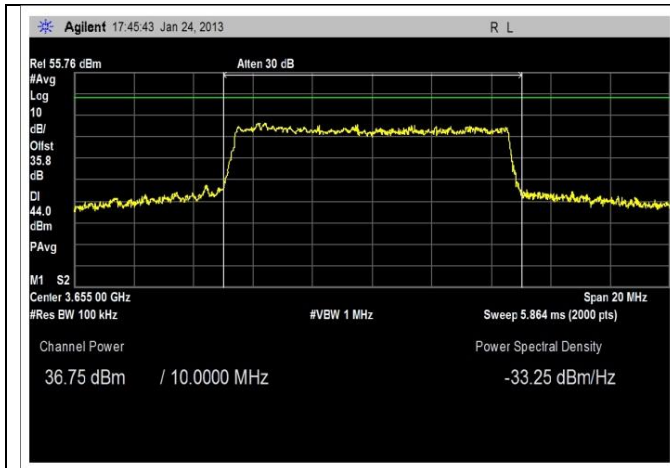
Band power_low ch_7MHz_16QAM_port 1



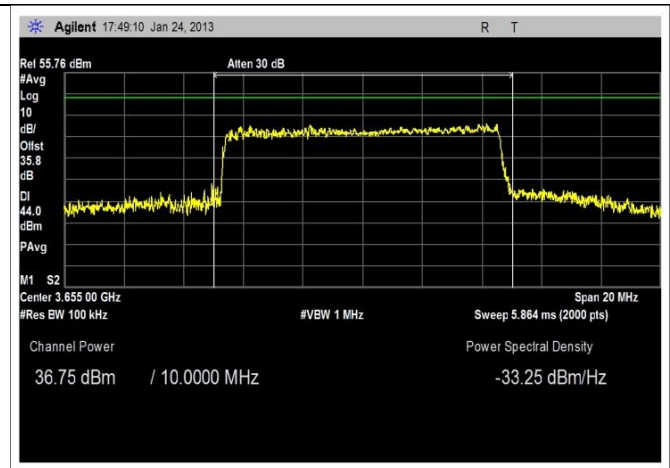
Band power_low ch_7MHz_64QAM_port 1



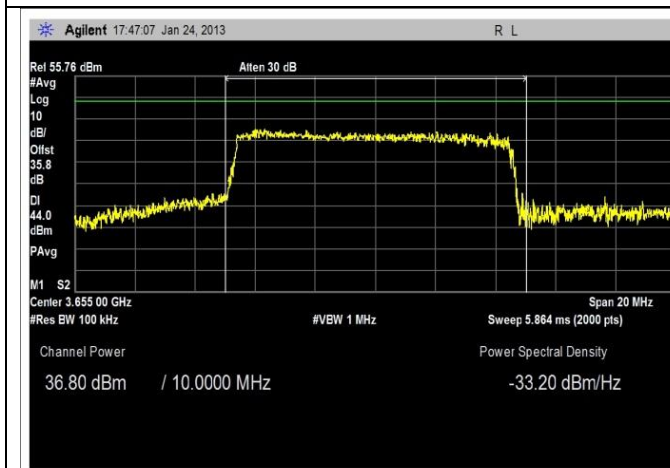
Band power_low ch_7MHz_QPSK_port 1



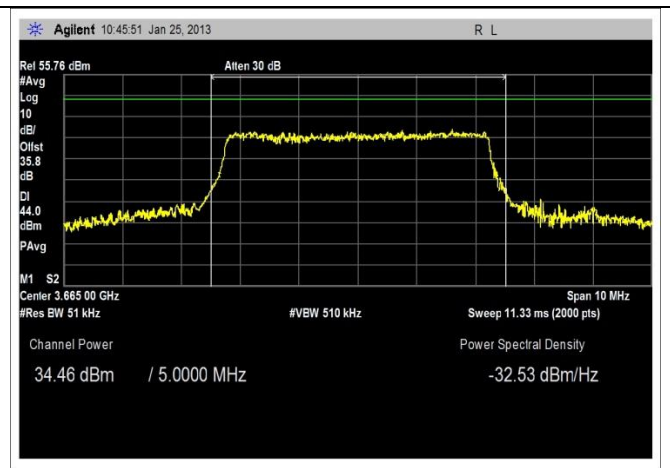
Band power_low ch_10MHz_16QAM_port 1



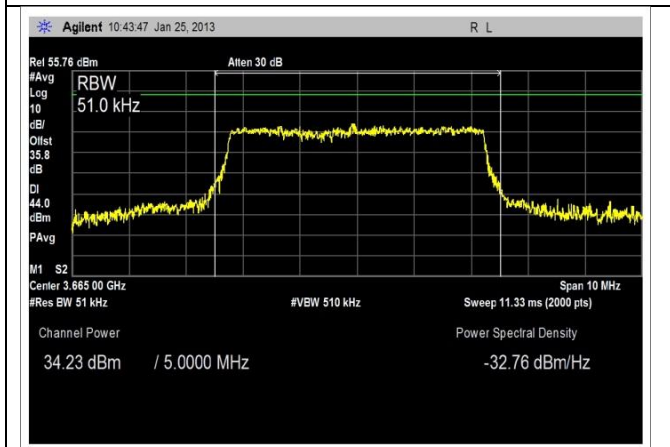
Band power_low ch_10MHz_64QAM_port 1



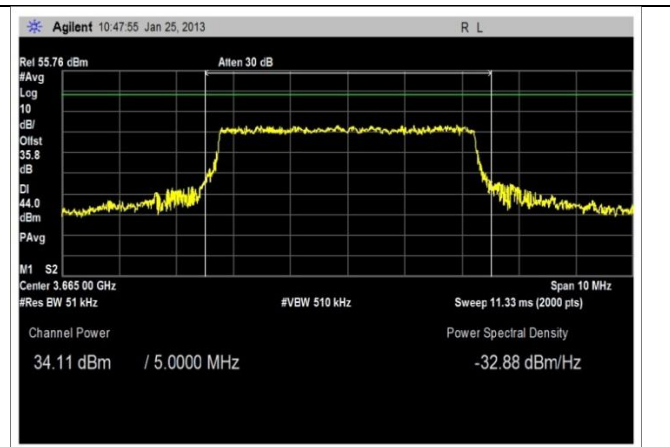
Band power_low ch_10MHz_QPSK_port 1



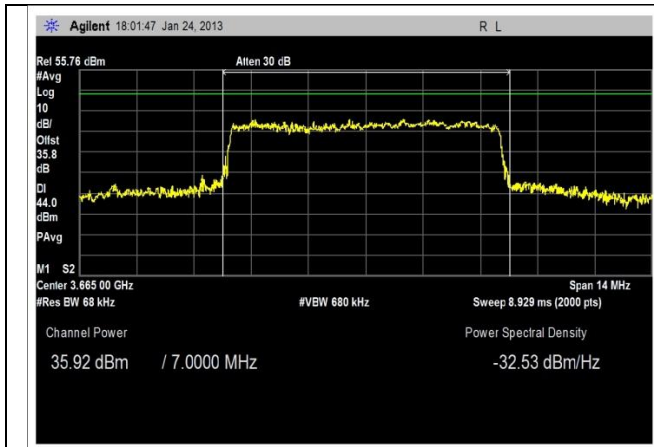
Band power_mid ch_5MHz_16QAM_port 1



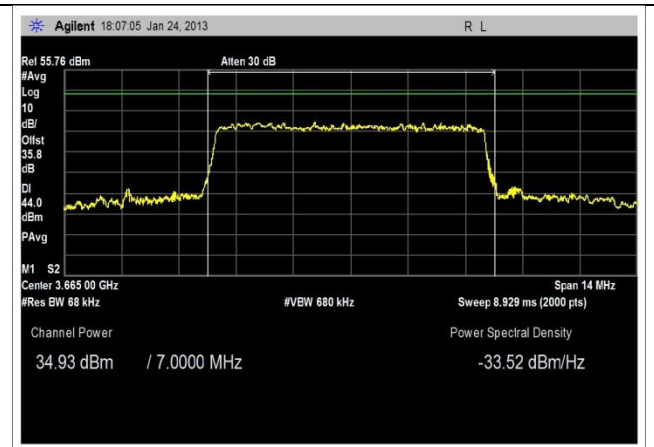
Band power_mid ch_5MHz_64QAM_port 1



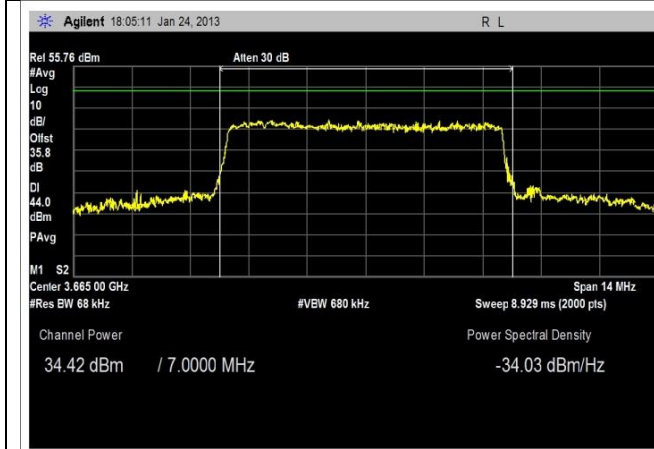
Band power_mid ch_5MHz_QPSK_port 1



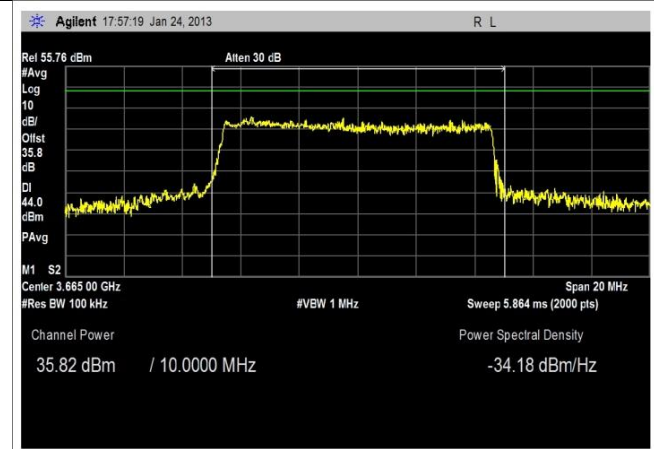
Band power_mid ch_7MHz_16QAM_port 1



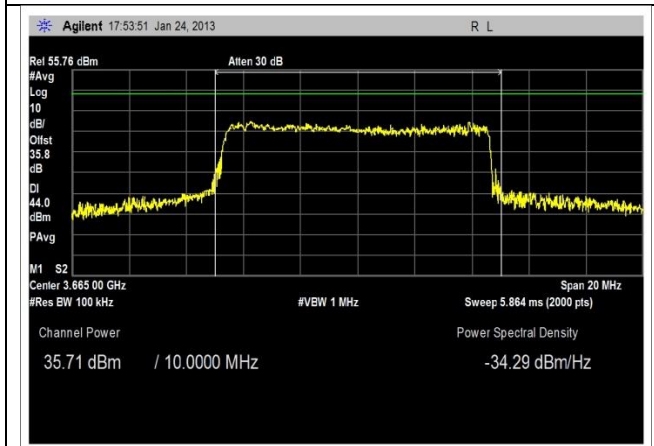
Band power_mid ch_7MHz_64QAM_port 1



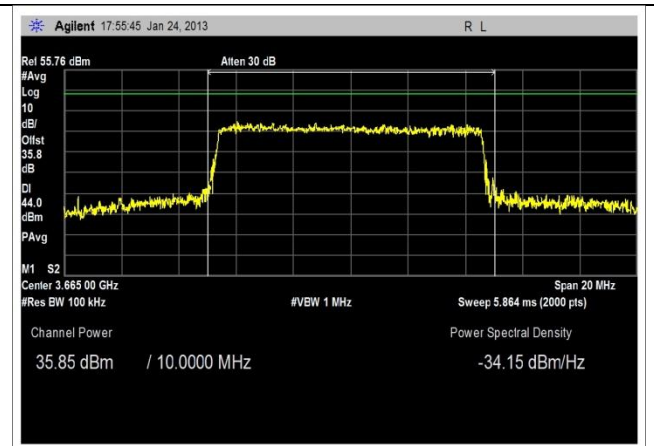
Band power_mid ch_7MHz_QPSK_port 1



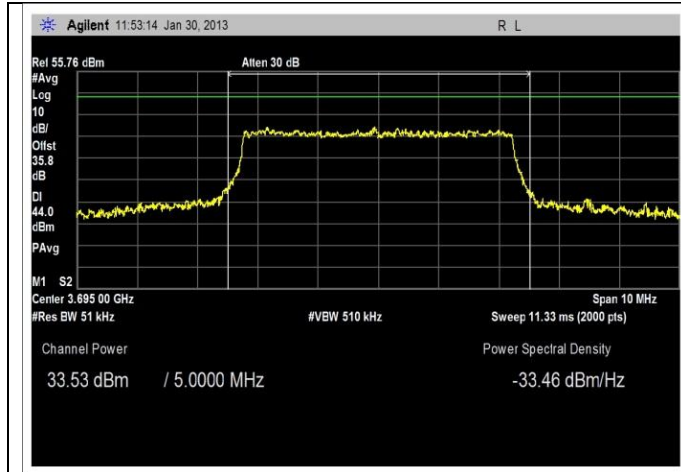
Band power_mid ch_10MHz_16QAM_port 1



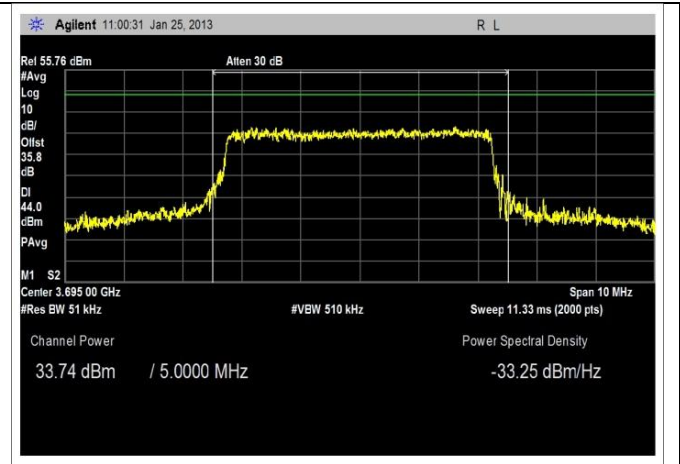
Band power_mid ch_10MHz_64QAM_port 1



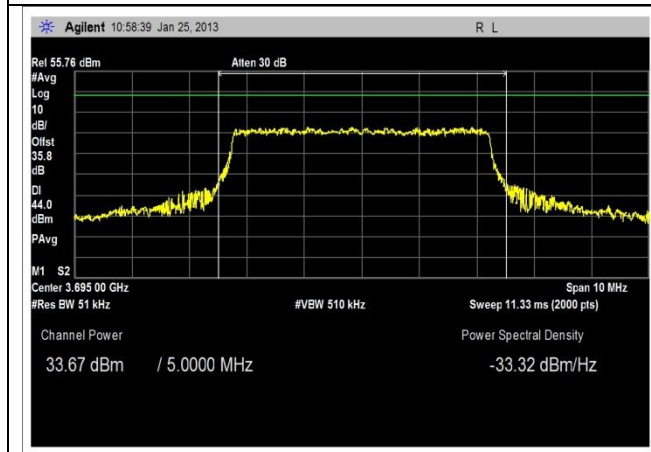
Band power_mid_ch_10MHz_QPSK_port 1



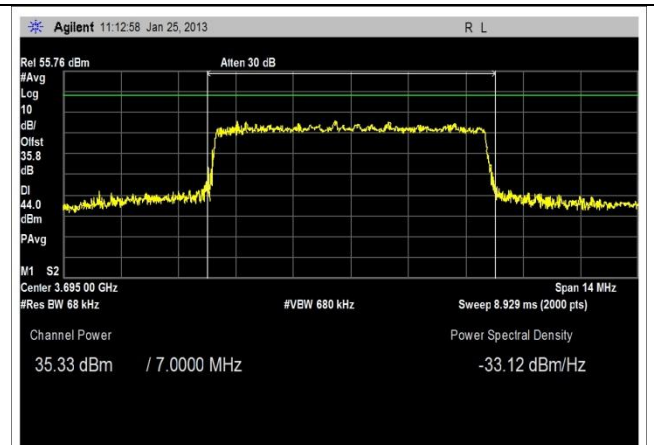
Band power_hi ch_5MHz_16QAM_port 1



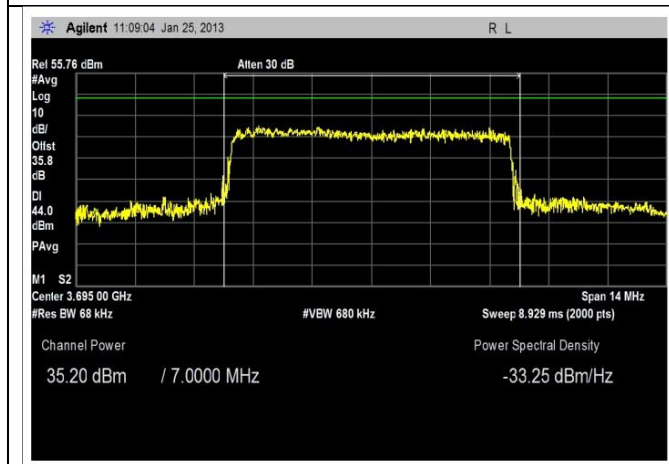
Band power_hi ch_5MHz_64QAM_port 1



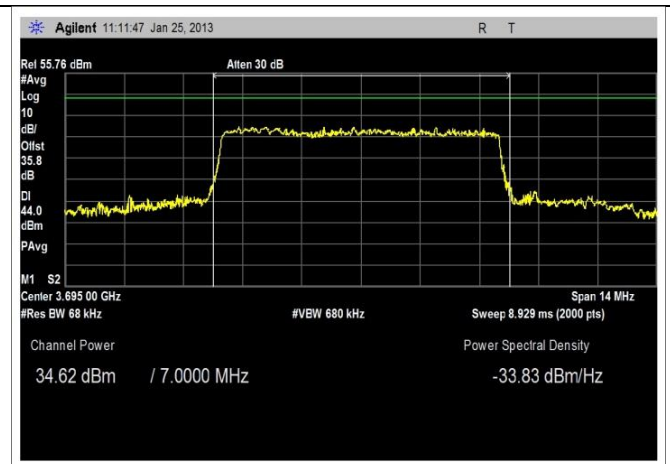
Band power_hi ch_5MHz_QPSK_port 1



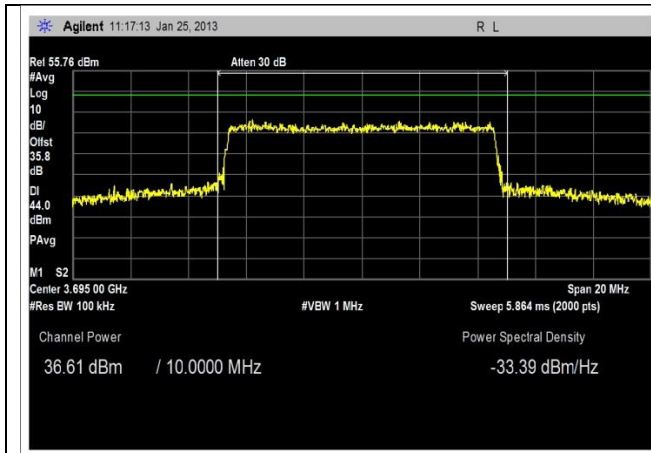
Band power_hi ch_7MHz_16QAM_port 1



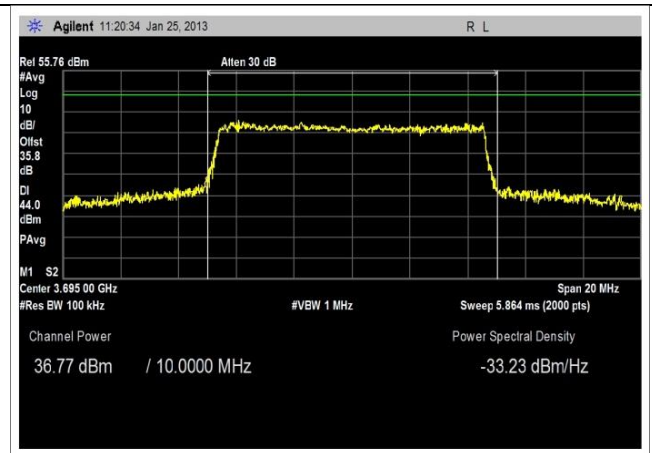
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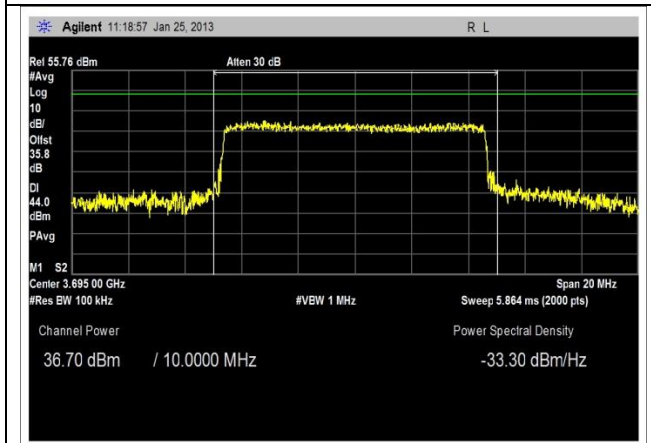
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Band power_hi ch_10MHz_16QAM_port 1



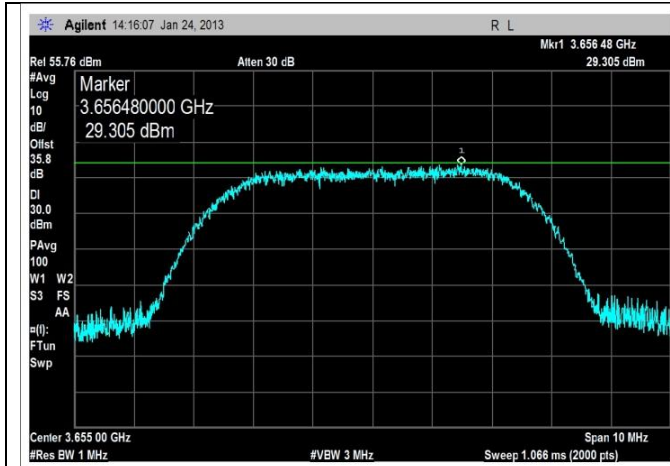
Band power_hi ch_10MHz_64QAM_port 1



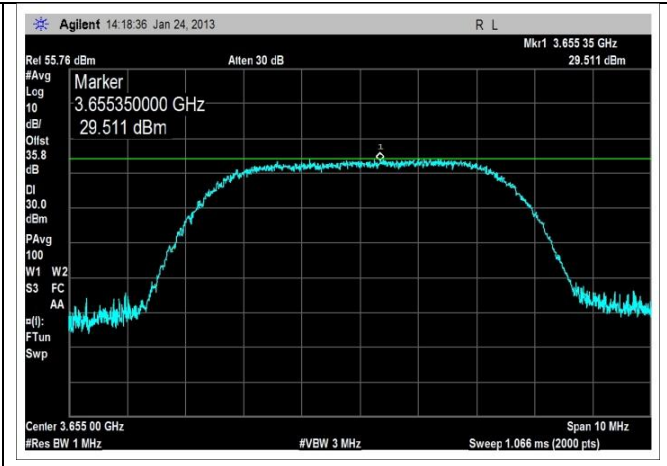
Band power_hi ch_10MHz_QPSK_port 1

Power Spectral Density Port 1					
Frequency (MHz)	Channel Bandwidth (MHz)	Modulation	Power setting (dbm)	Measured PSD (dbm)	EIRP PSD limit (dbm)
3655	5	16QAM	25.5	29.305	30
		64QAM	25.0	29.511	30
		QPSK	25.5	28.835	30
3655	7	16QAM	25.5	27.853	30
		64QAM	25.5	29.681	30
		QPSK	25.8	27.222	30
3655	10	16QAM	26.8	28.316	30
		64QAM	26.8	27.655	30
		QPSK	26.8	29.074	30
3665	5	16QAM	25.0	28.996	30
		64QAM	25.0	29.698	30
		QPSK	25.0	28.251	30
3665	7	16QAM	27.0	28.687	30
		64QAM	25.8	29.012	30
		QPSK	25.7	28.841	30
3665	10	16QAM	26.0	28.436	30
		64QAM	26.0	28.944	30
		QPSK	26.0	28.296	30
3695	5	16QAM	24.4	27.997	30
		64QAM	24.4	28.451	30
		QPSK	24.4	29.244	30
3695	7	16QAM	26.0	28.783	30
		64QAM	26.0	29.751	30
		QPSK	26.0	28.119	30
3695	10	16QAM	26.7	27.469	30
		64QAM	26.7	28.233	30
		QPSK	26.7	27.085	30

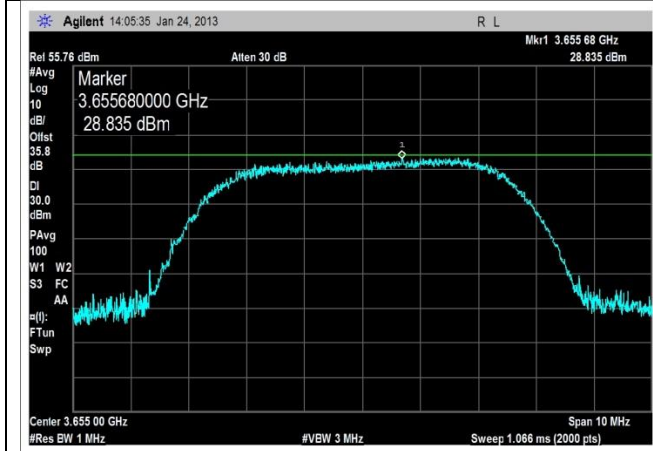
An external 20db attenuator was used. Offset in spectrum analyzer=20db attenuator + 0.9db cable loss (asset: AN02946) +4.86db duty cycle correction factor+10dbi antenna gain = 35.76db.



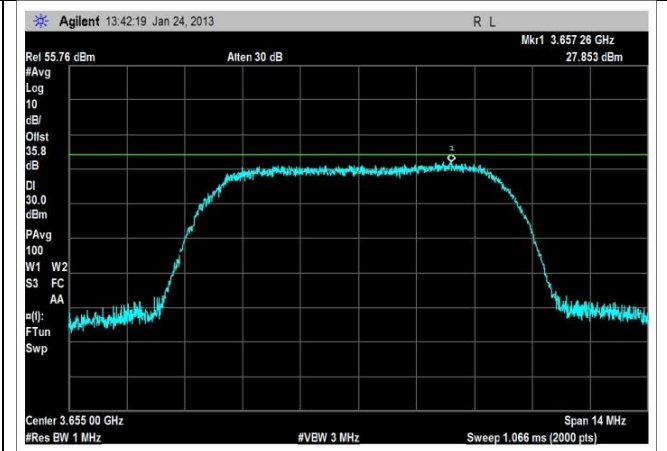
Power density_low ch_5MHz_16QAM_port 1



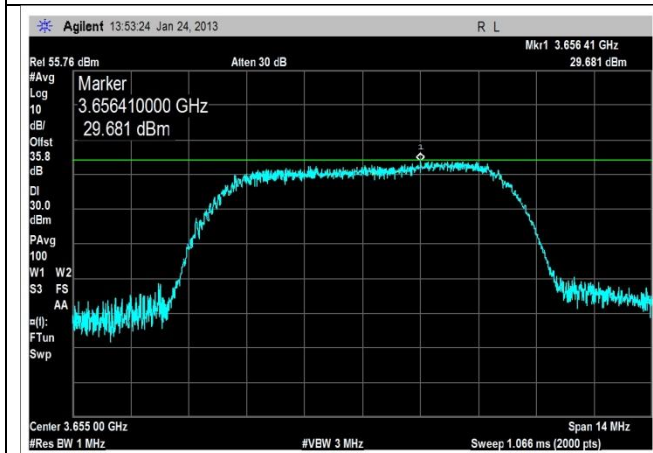
Power density_low ch_5MHz_64QAM_port 1



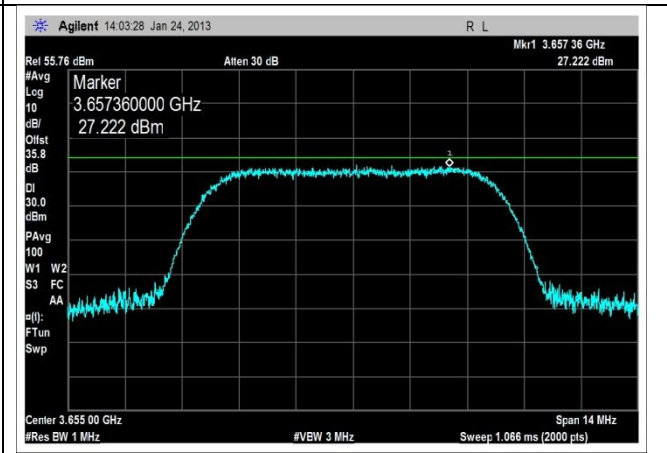
Power density_low ch_5MHz_QPSK_port 1



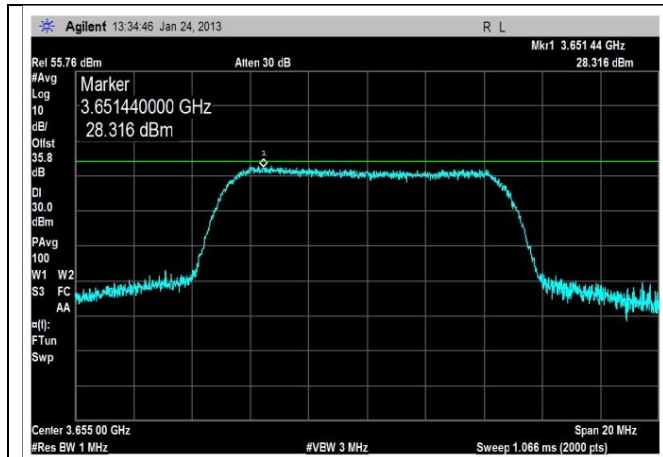
Power density_low ch_7MHz_16QAM_port 1



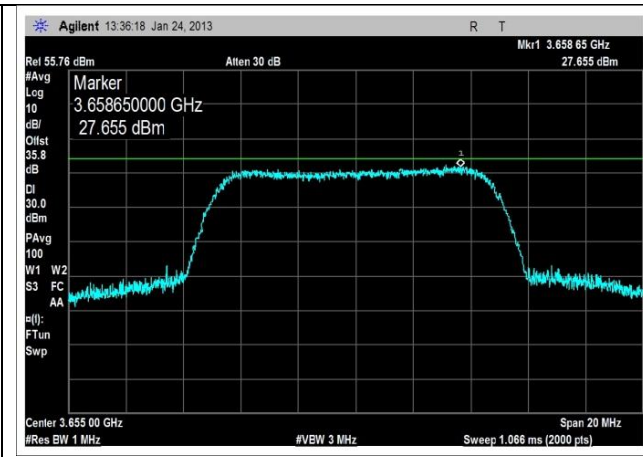
Power density_low ch_7MHz_64QAM_port 1



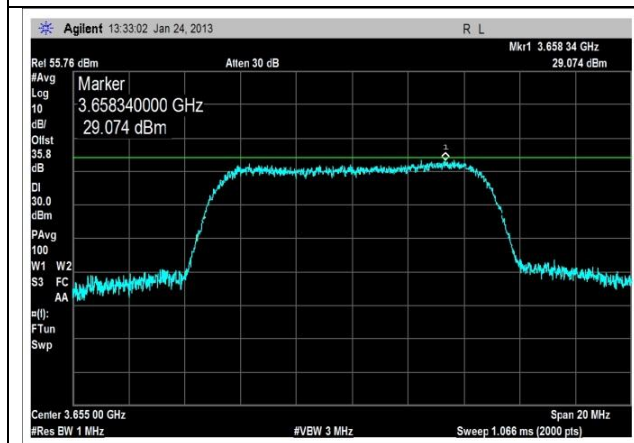
Power density_low ch_7MHz_QPSK_port 1



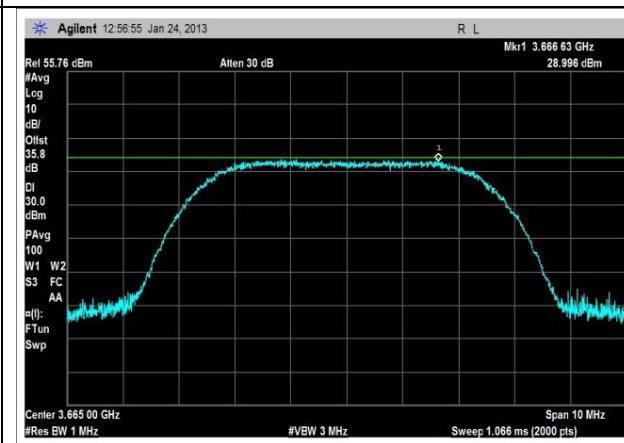
Power density_low ch_10MHz_16QAM_port 1



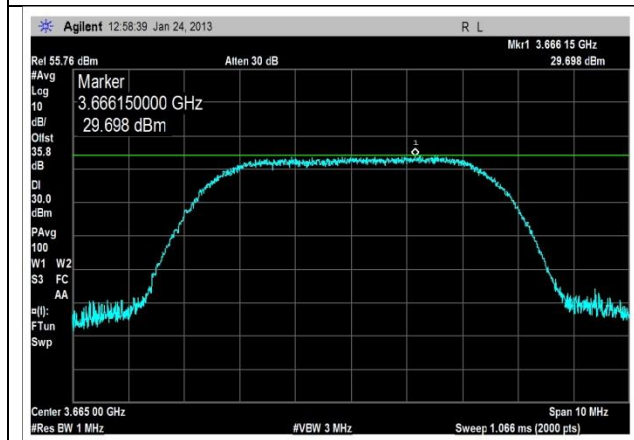
Power density_low ch_10MHz_64QAM_port 1



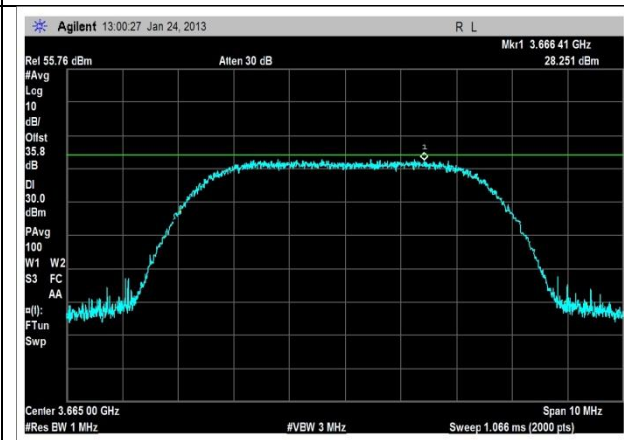
Power density_low ch_10MHz_QPSK_port 1



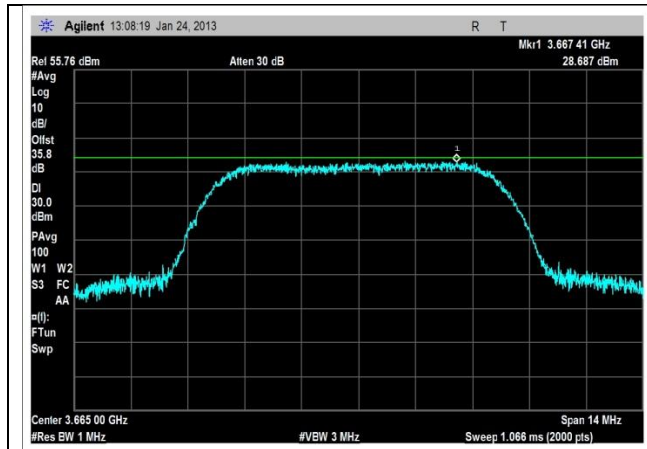
Power density_mid ch_5MHz_16QAM_port 1



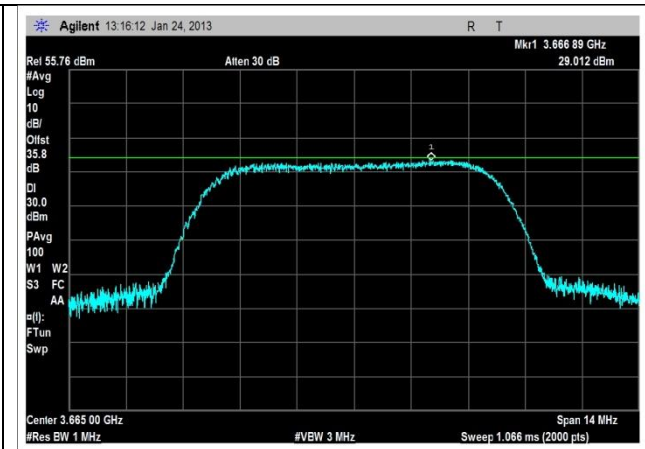
Power density_mid ch_5MHz_64QAM_port 1



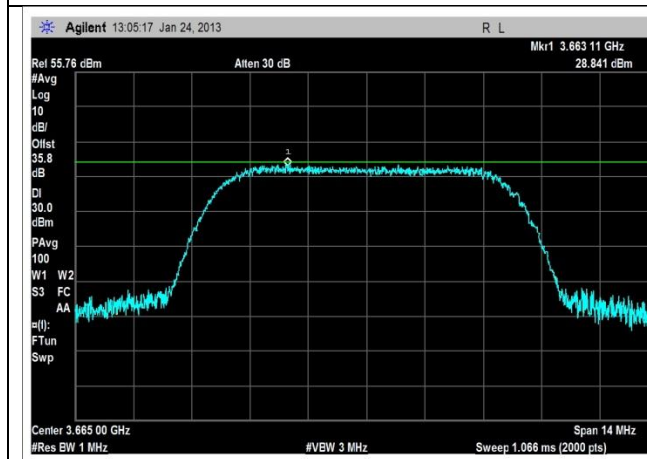
Power density_mid ch_5MHz_QPSK_port 1



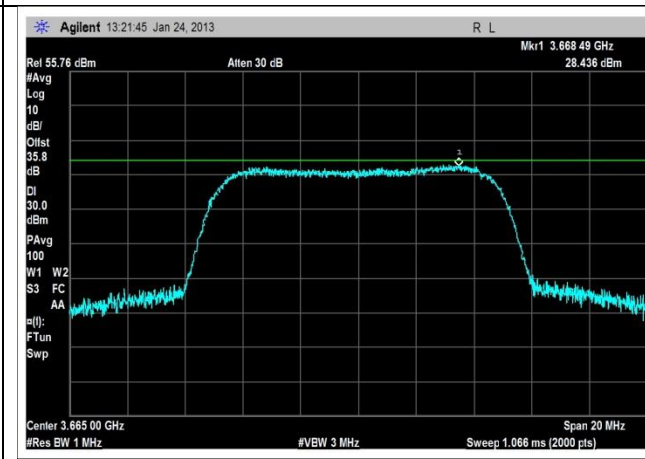
Power density_mid ch_7MHz_16QAM_port 1



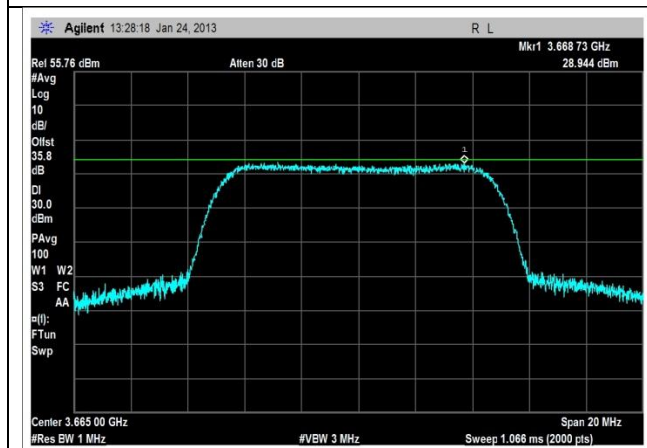
Power density_mid ch_7MHz_64QAM_port 1



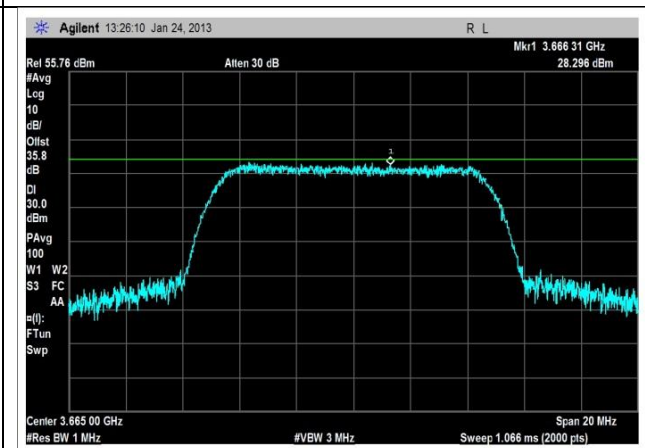
Power density_mid ch_7MHz_QPSK_port 1



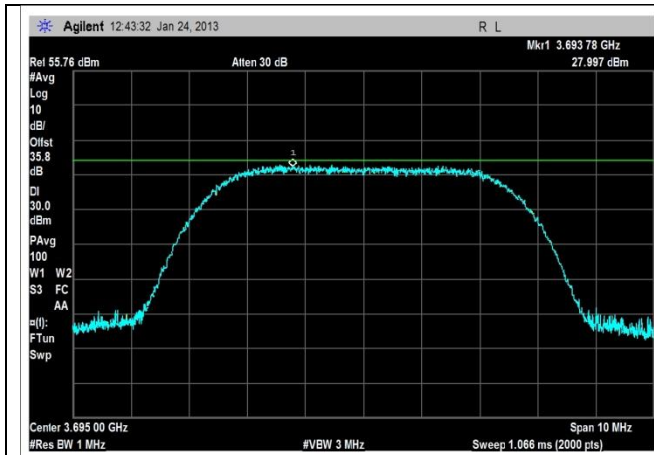
Power density_mid ch_10MHz_16QAM_port 1



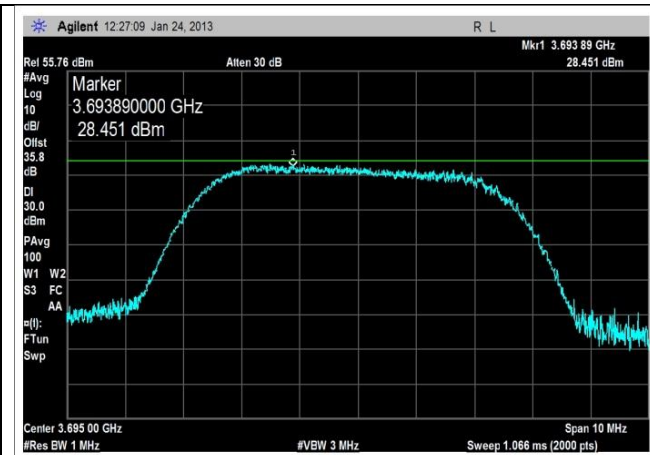
Power density_mid ch_10MHz_64QAM_port 1



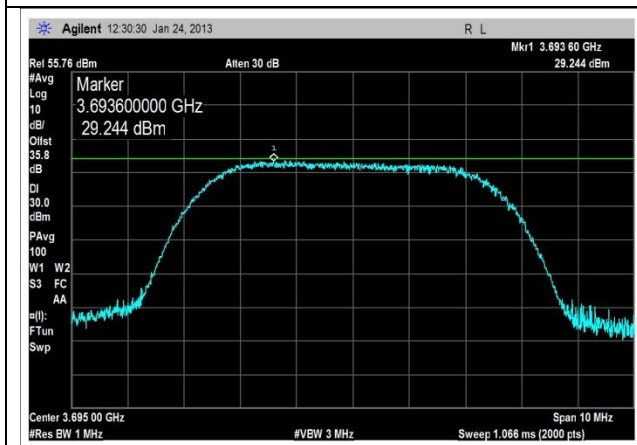
Power density_mid ch_10MHz_QPSK_port 1



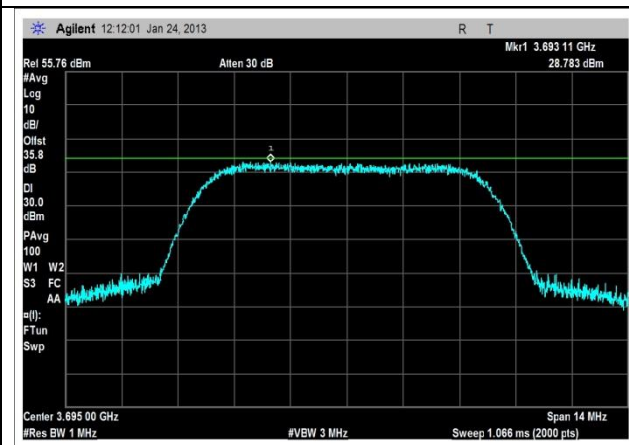
Power density_hi ch_5MHz_16QAM_port 1



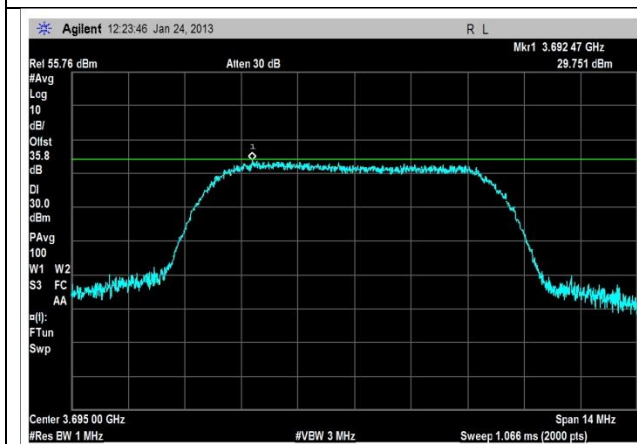
Power density_hi ch_5MHz_64QAM_port 1



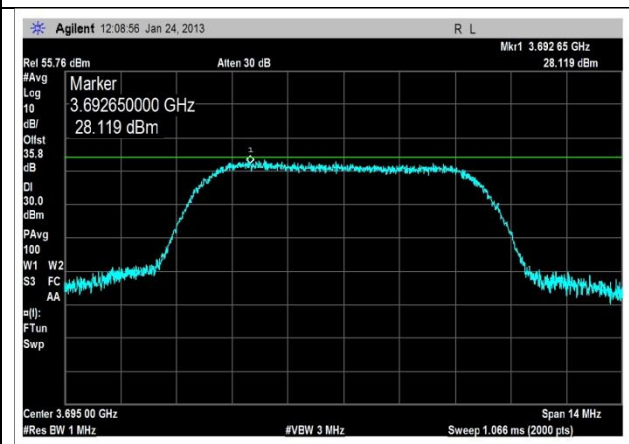
Power density_hi ch_5MHz_QPSK_port 1



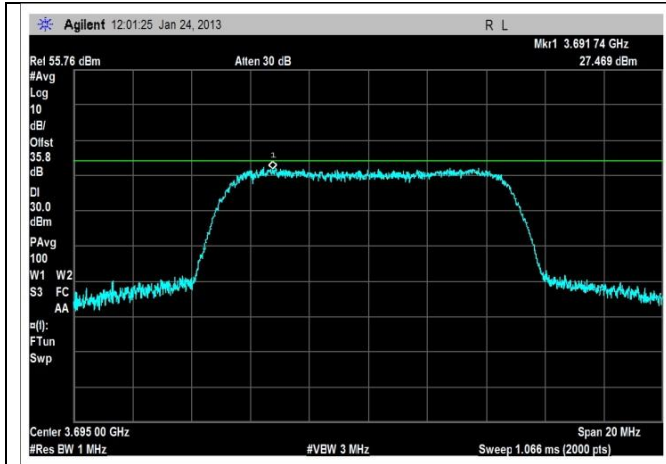
Power density_hi ch_7MHz_16QAM_port 1



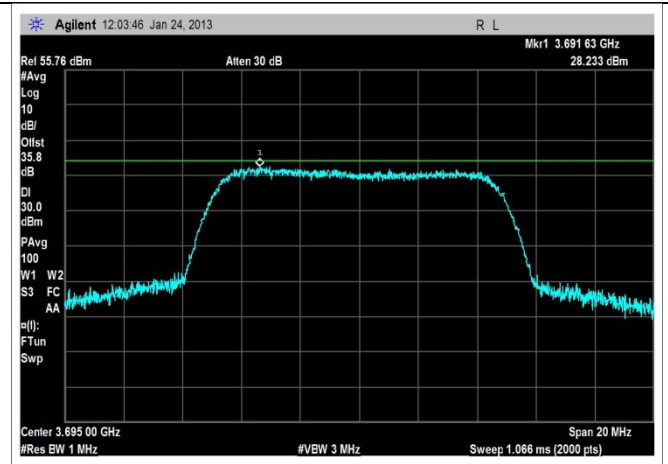
Power density_hi ch_7MHz_64QAM_port 1



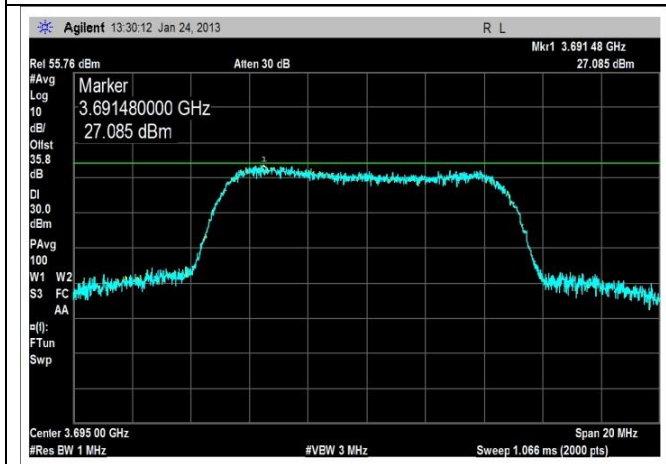
Power density_hi ch_7MHz_QPSK_port 1



Power density_hi ch_10MHz_16QAM_port 1



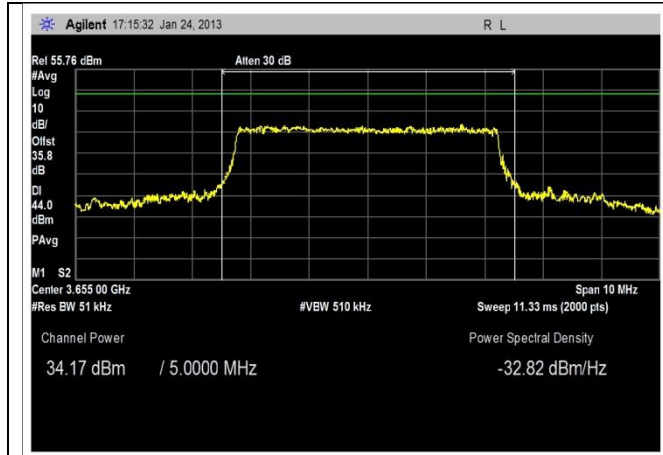
Power density_hi ch_10MHz_64QAM_port 1



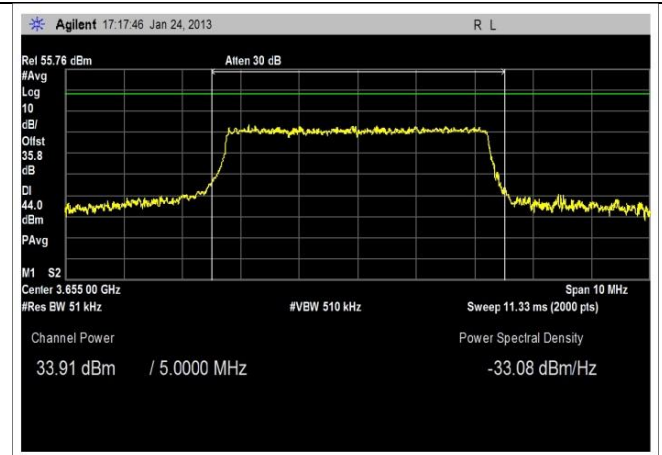
Power density_hi ch_10MHz_QPSK_port 1

Band Power Port 2					
Frequency (MHz)	Channel Bandwidth (MHz)	Modulation	Power setting (dbm)	Measured power (dbm)	EIRP limit (dbm)
3655	5	16QAM	26.0	34.17	44
		64QAM	25.5	33.91	44
		QPSK	26.0	34.40	44
3655	7	16QAM	27.0	34.82	44
		64QAM	27.0	34.92	44
		QPSK	25.0	33.14	44
3655	10	16QAM	26.8	36.47	44
		64QAM	26.8	36.67	44
		QPSK	26.8	36.73	44
3665	5	16QAM	26.0	34.43	44
		64QAM	25.0	32.91	44
		QPSK	24.0	32.06	44
3665	7	16QAM	27.0	34.94	44
		64QAM	27.0	34.64	44
		QPSK	27.0	34.53	44
3665	10	16QAM	27.0	35.97	44
		64QAM	27.0	36.13	44
		QPSK	27.0	36.42	44
3695	5	16QAM	24.0	33.94	44
		64QAM	24.0	33.91	44
		QPSK	24.0	33.33	44
3695	7	16QAM	24.0	32.43	44
		64QAM	25.0	34.13	44
		QPSK	24.0	33.11	44
3695	10	16QAM	25.8	36.15	44
		64QAM	25.8	36.51	44
		QPSK	25.8	36.70	44

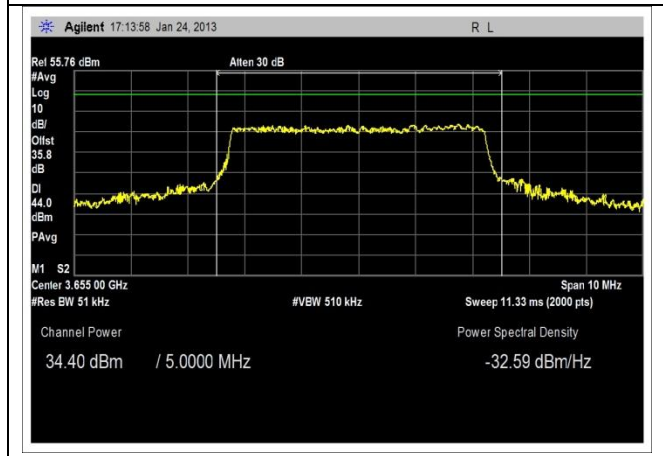
An external 20db attenuator was used. Offset in spectrum analyzer=20db attenuator + 0.9db cable loss (asset: AN02946) +4.86db duty cycle correction factor+10dbi antenna gain = 35.76db.



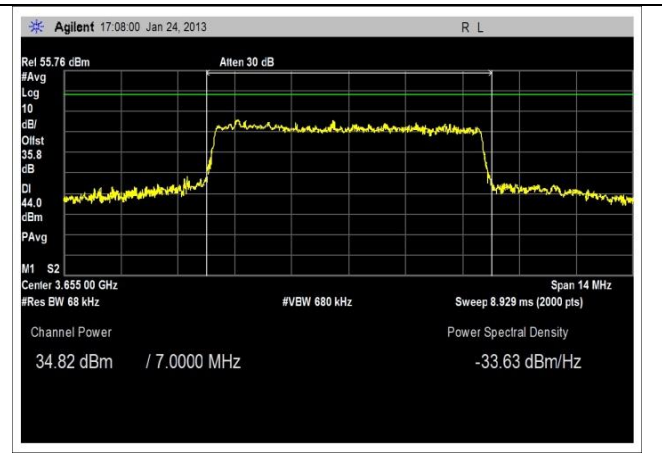
Band power_low ch_5MHz_16QAM_port 2



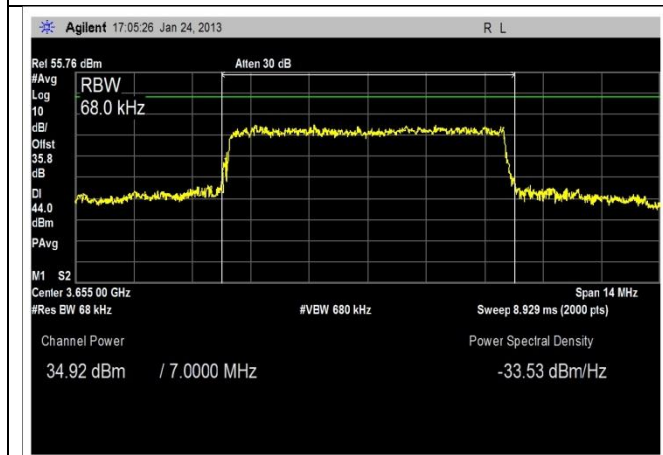
Band power_low ch_5MHz_64QAM_port 2



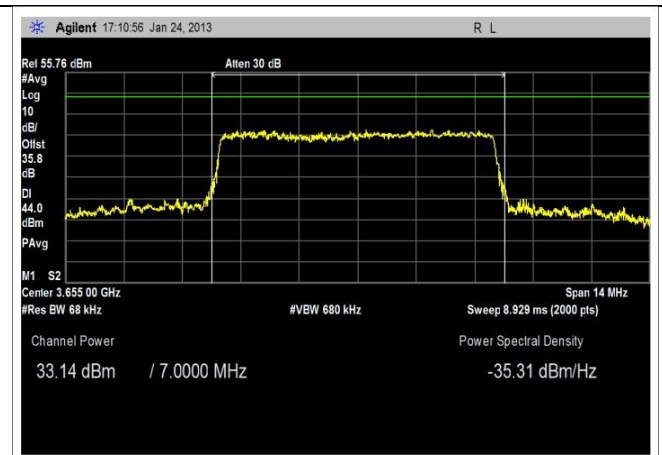
Band power_low ch_5MHz_QPSK_port 2



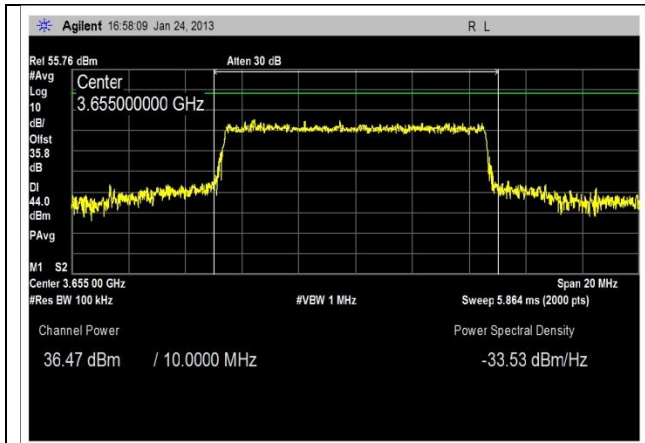
Band power_low ch_7MHz_16QAM_port 2



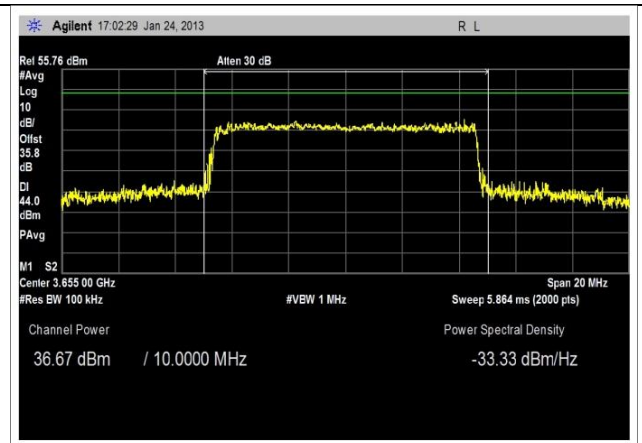
Band power_low ch_7MHz_64QAM_port 2



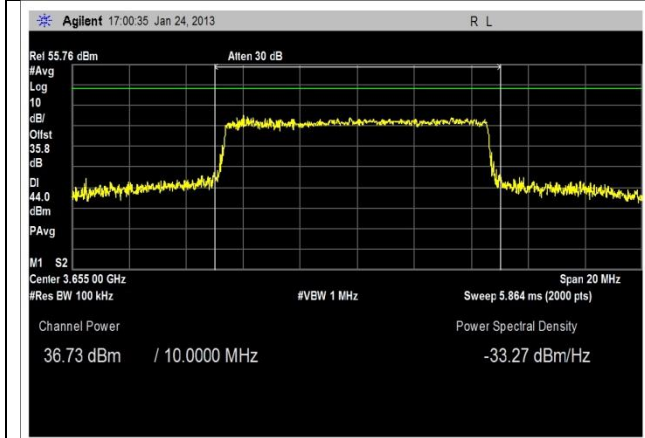
Band power_low ch_7MHz_QPSK_port 2



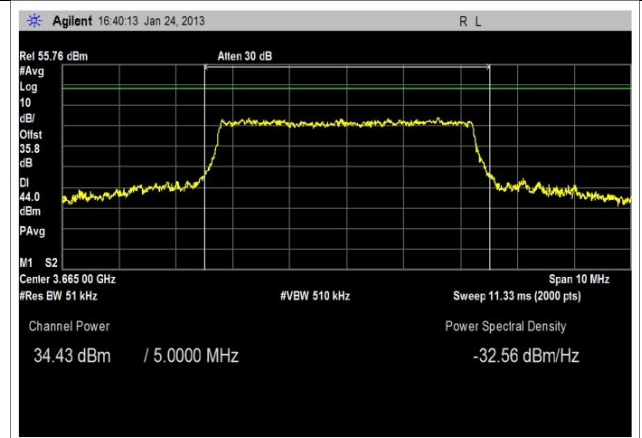
Band power_low ch_10MHz_16QAM_port 2



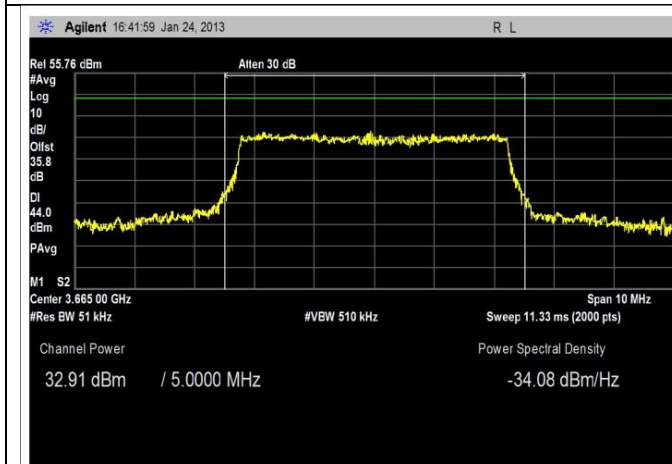
Band power_low ch_10MHz_64QAM_port 2



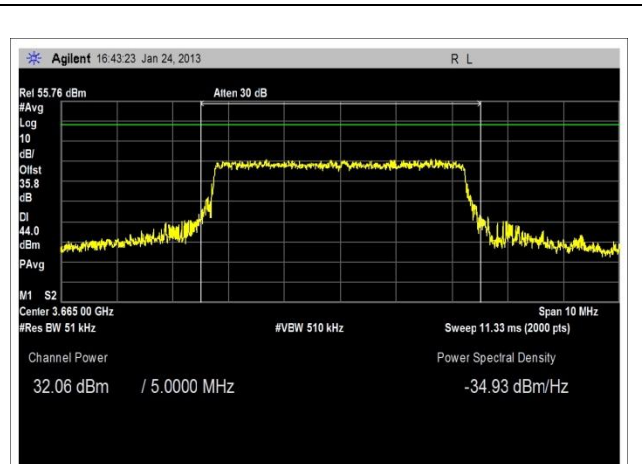
Band power_low ch_10MHz_QPSK_port 2



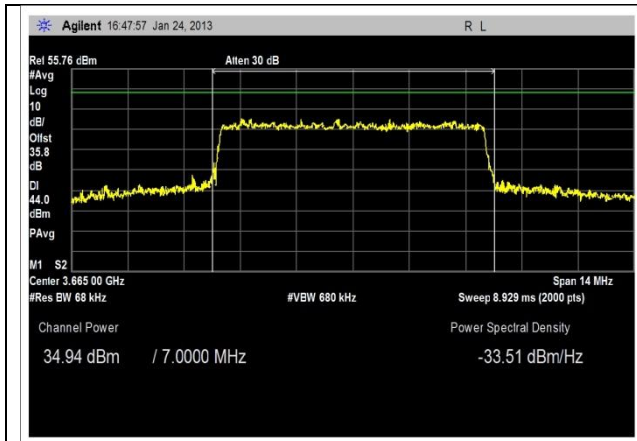
Band power_mid ch_5MHz_16QAM_port 2



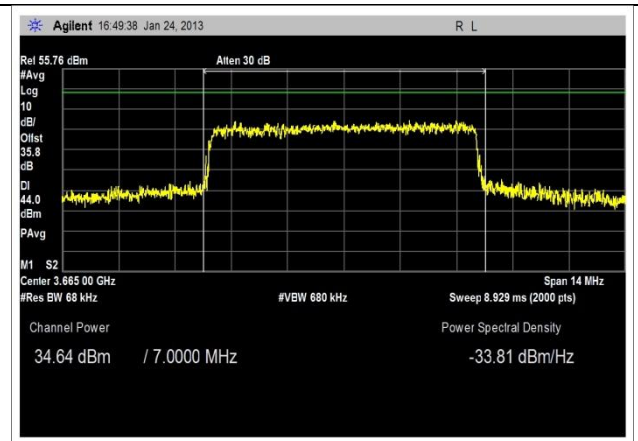
Band power_mid ch_5MHz_64QAM_port 2



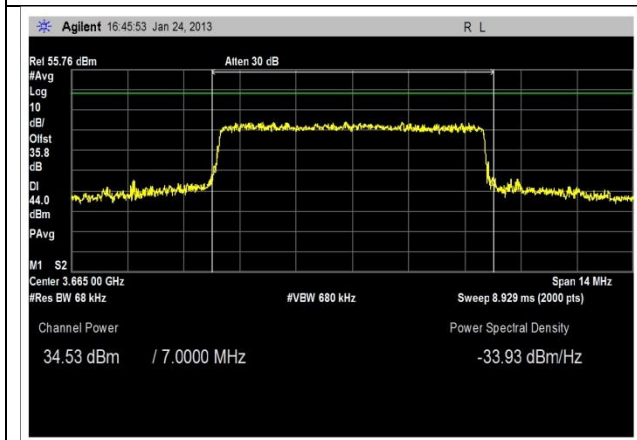
Band power_mid ch_5MHz_QPSK_port 2



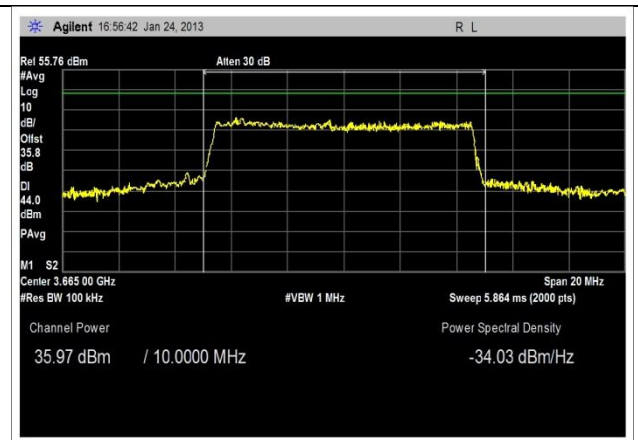
Band power_mid ch_7MHz_16QAM_port 2



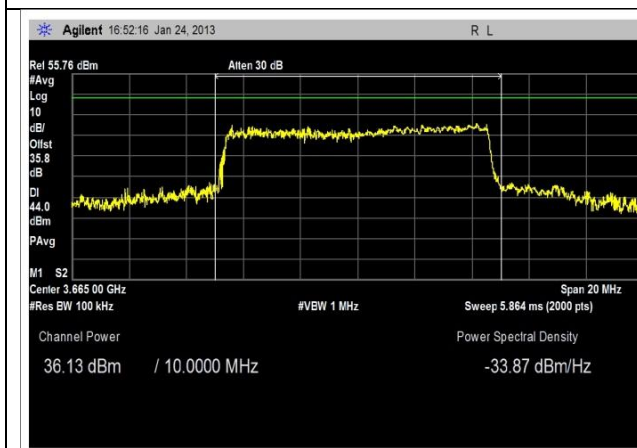
Band power_mid ch_7MHz_64QAM_port 2



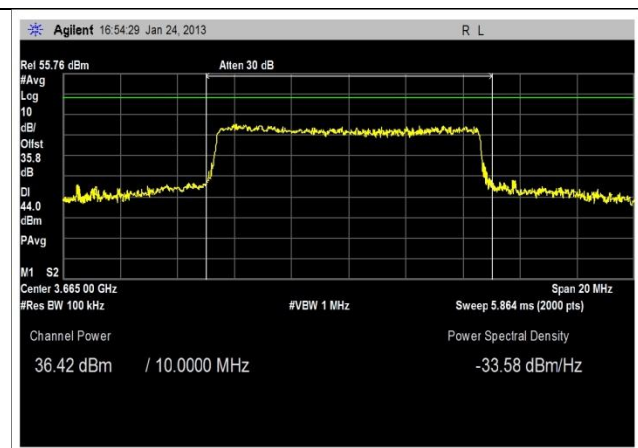
Band power_mid ch_7MHz_QPSK_port 2



Band power_mid ch_10MHz_16QAM_port 2



Band power_mid ch_10MHz_64QAM_port 2



Band power_mid_ch_10MHz_QPSK_port 2