



Test Lab
Cert 2764.01

FCC LISTED, REGISTRATION
NUMBER: 2764.01

ISED LISTED REGISTRATION
NUMBER: 23595-1

Test report No:

2477ERM.005

Test report

**USA FCC Part 96
CITIZENS BROADBAND RADIO SERVICE DEVICES OPERATING WITHIN THE
BAND 3550-3700 MHz.**

Identification of item tested	Citizens Band Category A and B Devices
Trademark	Baicells
Model and /or type reference	mBS1105
Other identification of the product	FCC ID: 2AG32MBS110596
Features	----
Manufacturer	Baicells Technologies Co., Ltd. 3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist., Beijing, PR China, 100085.
Test method requested, standard	USA FCC Part 96 CITIZENS BROADBAND RADIO SERVICE DEVICES OPERATIONG WITHIN THE BAND 3550-3700 MHz. FCC KDB 940660 D01 Part 96 CBRS Eqpt v02: Certification and Test Procedures for Citizens Broadband Radio Service Devices Authorized Under Part 96 FCC KDB 662911 D01 Multiple Transmitter Output v02r01: Emissions Testing of Transmitters with Multiple Outputs in the Same Band ANSI TIA-603D: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager
Date of issue	08-23-2019
Report template No	FDT08_21

Index

Competences and guarantees3

General conditions3

Uncertainty3

Data provided by the client.....4

Usage of samples4

Test sample description5

Identification of the client.....6

Testing period and place6

Document history6

Remarks and comments8

Testing verdicts.....8

Summary8

List of equipment used during the test.....9

Appendix A: Test results10

Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01

DEKRA Certification Inc. is a testing laboratory competent to carry out the tests described in this report.

To assure the traceability to other national and international laboratories, DEKRA Certification Inc. has a calibration and maintenance program for its measurement equipment.

DEKRA Certification Inc. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification at the time of performance of the test.

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The results presented in this Test Report apply only to the item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Certification internal document PODT000.

Frequency (MHz)	U(k=2)	Units
30-180	3.82	dB
180-1000	2.61	dB
1000-18000	2.92	dB
18000-40000	2.15	dB

Data provided by the client

Baicells mBS1105 is high performance outdoor micro base station based on LTE TDD technology.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
2477.05	LTE-TDD Base Station	MBS1105	120200007218B8J0153	03/22/2019
2477.04	Power supply	EUV-300S048ST	1746MT153333	03/22/2019

1. Sample S/01 has undergone following test(s):

All conducted and radiated tests indicated in appendix A.

Test sample description

Product specification	Description	Yes/No
Device Name/Model #	mBS1105	
Base Station Class	Wide area Base Station (Macro Cell)	No
	Medium Range Base Stations (Micro Cell)	Yes
	Local area Base Station (Pico cell)	No
	Home Base Station (Femto cell)	No
Category of CBSD	Category A	No
	Category B	Yes
Type of Installation	Professional Installation	Yes
DC power supply voltage	48V AC/DC Adapter	
RF Test Tool Software of CBSD	DVT	
TX Frequency	10MHz: 3555 MHz — 3695 MHz	
	20MHz: 3560 MHz — 3690 MHz	
RX Frequency	10MHz: 3555 MHz — 3695 MHz	
	20MHz: 3560 MHz — 3690 MHz	
Maximum Output Power to Antenna	10 MHz BW: 27 dBm	
	20 MHz BW: 23 dBm	
Maximum 99% Occupied Bandwidth	20 MHz	
Type of Modulation	QPSK	Yes
	16QAM	Yes
	64QAM	Yes
	256QAM	No
Antenna Information	Model: Directional antenna	
	Gain (dBi): 17 dBi	
Duty Cycle	67.8 %	
MIMO Information	# of output port: 2 # of input port: 2 # of output ports transmitting simultaneously: 2 List all MIMO configurations supported: 2 ports transmitting on a single carrier	

Identification of the client

Baicells Technologies Co., Ltd.

3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist., Beijing, PR China, 100085

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	03-25-2019
Date (finish)	04-24-2019

Document history

Report number	Date	Description
2477ERM.005	08-23-2019	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the semi anechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Sravani Gollamudi, Koji Nishimoto and Poojita Bhattu.

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

FCC Part 96 Paragraph				
Section	Part 96. Spec Clause	Test Description	Verdict	Remark
A.1	§ 96.41 (b)	Maximum Effective Isotropic Radiated Power (EIRP)	P	N/A
A.2	§ 2.1046	Conducted Output Power	P	N/A
A.3	§ 2.1049	99% OBW and -26db Bandwidth	P	N/A
A.4	§ 96.41 (b)	Maximum Power Spectral Density (PSD)	P	N/A
A.5	§ 96.41 (g)	Peak to Average Power Ratio (PAPR)	P	N/A
A.6	§ 2.1051, 96.41 (e)	3.5 GHz Emission and Interference limits	P	N/A
A.7	§ 2.1051, 96.41 (e)	Spurious Emissions at Antenna Terminals	P	N/A
A.8	§ 2.1053	Radiated Spurious Emission	P	N/A
A.9	§ 2.1055	Frequency Stability	P	N/A

List of equipment used during the test

Conducted Measurements

CONTROL NUMBER	DESCRIPTION	LAST CALIBRATION	NEXT CALIBRATION
1039	Signal analyzer Rohde & Schwarz FSV40	2018/03	2020/03
1010	EMI Test Receiver Rohde & Schwarz ESR 7	2019/08	2021/08
101	Climatic chamber Espec	2019/01	2020/01

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	LAST CALIBRATION	NEXT CALIBRATION
1179	Semi anechoic Absorber Lined Chamber Frankonia SAC 3 plus "L"	N/A	N/A
1064	BiconicalLog antenna ETS LINDGREN 3142E	2017/03	2020/03
1058	Double-ridge Waveguide Horn antenna 750 MHz-18 GHz	2017/03	2020/03
1056	Double-ridge Waveguide Horn antenna 18-40 GHz	2016/12	2019/12
1014	Spectrum analyzer Rohde & Schwarz FSV40	2019/04	2021/04
1012	EMI Test Receiver Rohde & Schwarz ESR 26	2018/09	2020/09
1015,1017, 1019, 1020	Rohde & Schwarz EMC32 software	N/A	N/A

Appendix A: Test results

Appendix A Content

DESCRIPTION OF TEST CONDITIONS12

TEST A.1: MAXIMUM EFFECTIVE ISOTOPIC RADIATED POWER (EIRP)13

TEST A.2: CONDUCTED OUTPUT POWER.....13

TEST A.3: 99% OBW AND -26 DB BANDWIDTH26

TEST A.4: MAXIMUM POWER SPECTRAL DENSITY (PSD)53

TEST A.5: PEAK-TO-AVERAGE POWER RATIO (PAPR)62

TEST A.6: 3.5 GHZ EMISSION AND INTERFERENCE LIMITS70

TEST A.7: SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....78

TEST A.8: RADIATED SPURIOUS EMISSION.....98

TEST A.9: FREQUENCY STABILITY111

DESCRIPTION OF TEST CONDITIONS

TEST CONDITIONS	DESCRIPTION
TC#01 LTE Band 48	<u>Power supply (V):</u> $V_{\text{nominal}} = 48 \text{ Vdc}$ <u>Type of power supply:</u> DC voltage from AC/DC power supply. <u>Temperature (°C):</u> $T_{\text{nom}} = +15 \text{ to } +35$ $T_{\text{min}} = -40 (*)$ $T_{\text{max}} = +55 (*)$ The subscript nom indicates normal test conditions. The subscripts min and max indicate extreme test conditions (minimum and maximum respectively). N/A: Not Applicable. (*) Declared by applicant. All the tests were performed by using the full RB configuration according to the manufacturer's statement that mBS1105 can transmit only with full RBs in the CBRS band LTE B48. All supported modulations were evaluated and QPSK was identified as worst case. All three orientations (X, Y, and Z) of the DUT were evaluated to determine the worst DUT orientation with the strongest fundamental signal in the radiated emission pre-scan tests. All the radiated emission tests were performed by using the worst DUT orientation. <u>Test Frequencies for Conducted and Radiated tests:</u> -10 MHz Bandwidth (50 RB): Lowest Channel (3555 MHz) Middle Channel (3625 MHz) Highest Channel (3695 MHz) -20 MHz Bandwidth (100 RB): Lowest Channel (3560 MHz) Middle Channel (3625 MHz) Highest Channel (3690 MHz)

TEST A.1: MAXIMUM EFFECTIVE ISOTROPIC RADIATED POWER (EIRP) TEST A.2: CONDUCTED OUTPUT POWER

LIMITS:	Product standard:	Part 96.41 Subclause (b)
	Test standard:	ANSI C63.26-2015

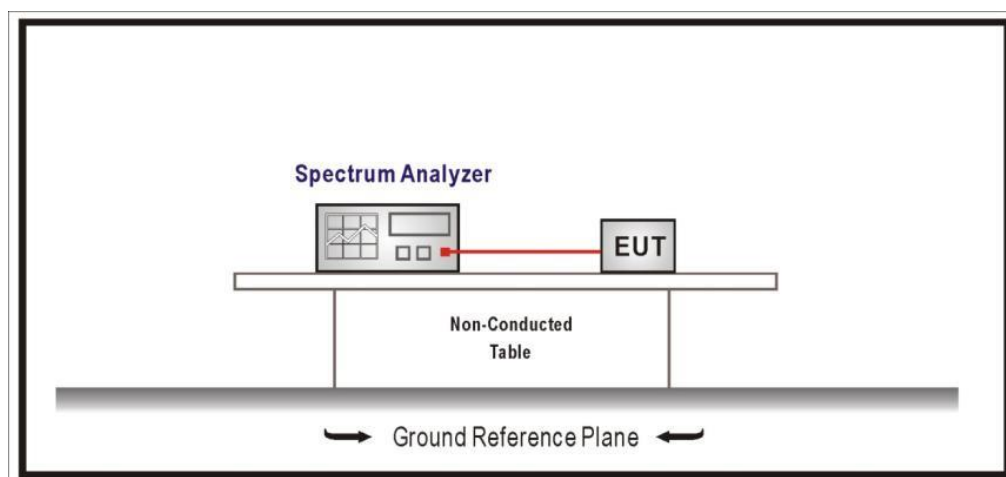
LIMITS

The maximum effective isotropic radiated power (EIRP) and maximum Power Spectral Density (PSD) of any CBSD and End User Device must comply with the limits shown in the following table.

Device	Maximum EIRP (dBm/ 10 MHz)	Maximum PSD (dBm/MHz)
End User Device	23	n/a
Category A CBSD	30	20
Category B CBSD	47	37

TEST SETUP:	
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The procedure in Section 5.2 of ANSI C63.26-2015 is acceptable for performing power measurements. Measurements can be made using either a peak or average (RMS) detector, if the appropriate procedure is followed. The RMS detector was used for the measurement at each frequency with following the procedure stated in the Section 5.2.4.4.2 of ANSI C63.26-2015.



EIRP was tested with a minimum, half, and maximum number of RBs for all the BWs and identified that the worst case is using full RBs. All the tests were performed by using the full RBs.

The maximum equivalent isotropically radiated power (e.i.r.p.) is calculated by adding the declared maximum antenna gain (dBi) and 10 log (1/duty cycle) was added in RF level offset to get the accurate measured power level in the average power measurement.

The duty cycle correction = $10 \log (1/0.68) = 1.67 \text{ (dB)}$

TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (Band 48)
TEST RESULTS:	PASS

2X2 MIMO

10MHz BW

Port 1 and 2

QPSK

	Lowest frequency 3555 MHz	Middle frequency 3625 MHz	Highest frequency 3695 MHz
Power at Port 1 (dBm/10 MHz)	26.17	26.42	26.74
Power at Port 2 (dBm/10 MHz)	26.16	26.85	26.10
Summed Power (dBm/10 MHz)	29.18	29.65	29.44
Maximum declared antenna gain (dBi)	17.00	17.00	17.00
Maximum EIRP (dBm/10 MHz)	46.18	46.65	46.44
Measurement uncertainty (dB)	< ± 0.95		

64QAM

	Lowest frequency 3555 MHz	Middle frequency 3625 MHz	Highest frequency 3695 MHz
Power at Port 1 (dBm/10 MHz)	25.44	25.89	25.15
Power at Port 2 (dBm/10 MHz)	25.56	25.27	25.48
Summed Power (dBm/10 MHz)	28.51	28.60	28.33
Maximum declared antenna gain (dBi)	17.00	17.00	17.00
Maximum EIRP (dBm/10 MHz)	45.51	45.60	45.33
Measurement uncertainty (dB)	< ± 0.95		

TEST RESULTS (Cont.):

20MHz BW

Port 1 and 2

QPSK

	Lowest frequency 3560 MHz	Middle frequency 3625 MHz	Highest frequency 3690 MHz
Power at Port 1 (dBm/10 MHz)	22.06	21.70	22.24
Power at Port 2 (dBm/10 MHz)	21.83	20.88	21.44
Summed Power (dBm/10 MHz)	24.96	24.32	24.87
Maximum declared antenna gain (dBi)	17.00	17.00	17.00
Maximum EIRP (dBm/10 MHz)	41.96	41.32	41.87
Measurement uncertainty (dB)	< ± 0.95		

64QAM

	Lowest frequency 3560 MHz	Middle frequency 3625 MHz	Highest frequency 3690 MHz
Power at Port 1 (dBm/10 MHz)	21.10	19.69	20.44
Power at Port 2 (dBm/10 MHz)	21.08	19.84	19.91
Summed Power (dBm/10 MHz)	24.10	22.78	23.19
Maximum declared antenna gain (dBi)	17.00	17.00	17.00
Maximum EIRP (dBm/10 MHz)	41.10	39.78	40.19
Measurement uncertainty (dB)	< ± 0.95		

TEST RESULTS (Cont.):

20MHz BW Reference only

Port 1 and 2

QPSK

	Lowest frequency 3560 MHz	Middle frequency 3625 MHz	Highest frequency 3690 MHz
Power at Port 1 (dBm/20 MHz)	23.27	23.34	23.23
Power at Port 2 (dBm/20 MHz)	23.22	22.97	23.32
Summed Power (dBm/20 MHz)	26.26	26.17	26.29
Maximum declared antenna gain (dBi)	17.00	17.00	17.00
Maximum EIRP (dBm/20 MHz)	43.26	43.17	43.29
Measurement uncertainty (dB)	< ± 0.95		

64QAM

	Lowest frequency 3560 MHz	Middle frequency 3625 MHz	Highest frequency 3690 MHz
Power at Port 1 (dBm/20 MHz)	22.57	22.24	22.88
Power at Port 2 (dBm/20 MHz)	22.92	22.40	22.46
Summed Power (dBm/20 MHz)	25.76	25.33	25.69
Maximum declared antenna gain (dBi)	17.00	17.00	17.00
Maximum EIRP (dBm/20 MHz)	42.76	42.33	42.69
Measurement uncertainty (dB)	< ± 0.95		

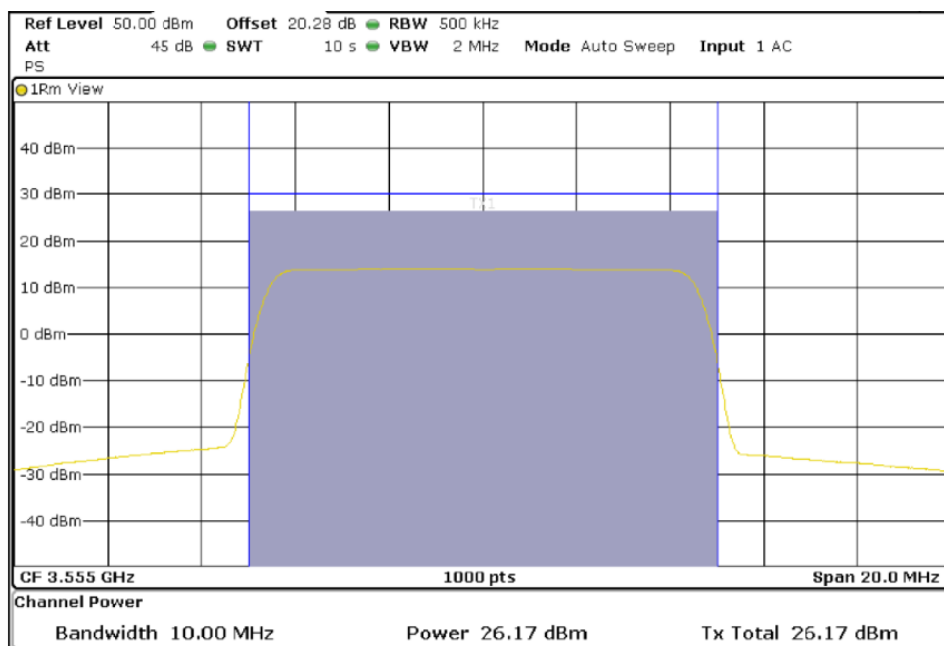
(See plots below showing QPSK Only)

TEST RESULTS (Cont.):

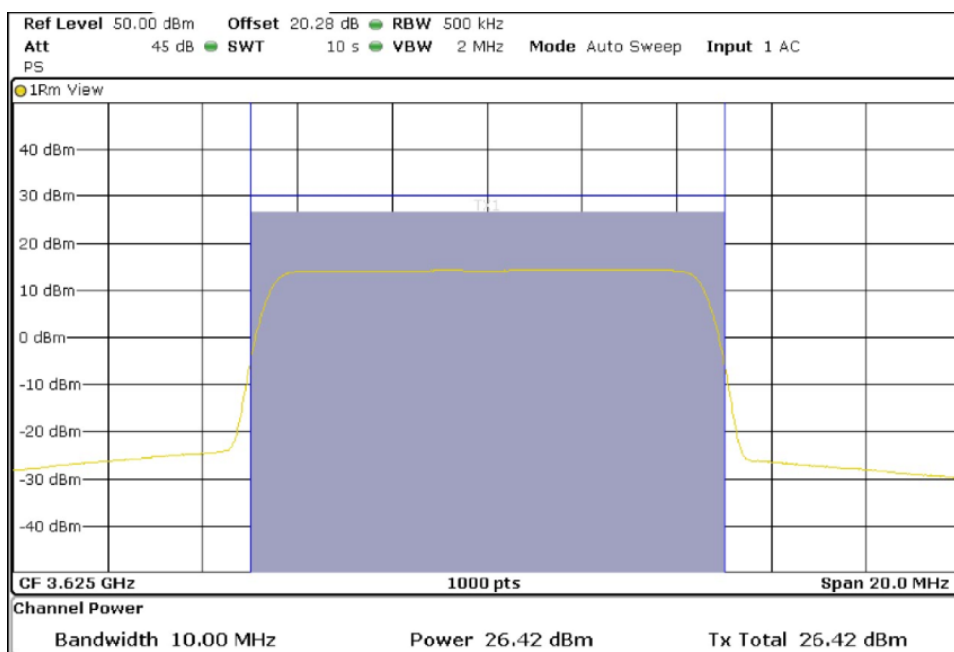
Port 1:

10 MHz BW

Lowest Channel (3555 MHz)

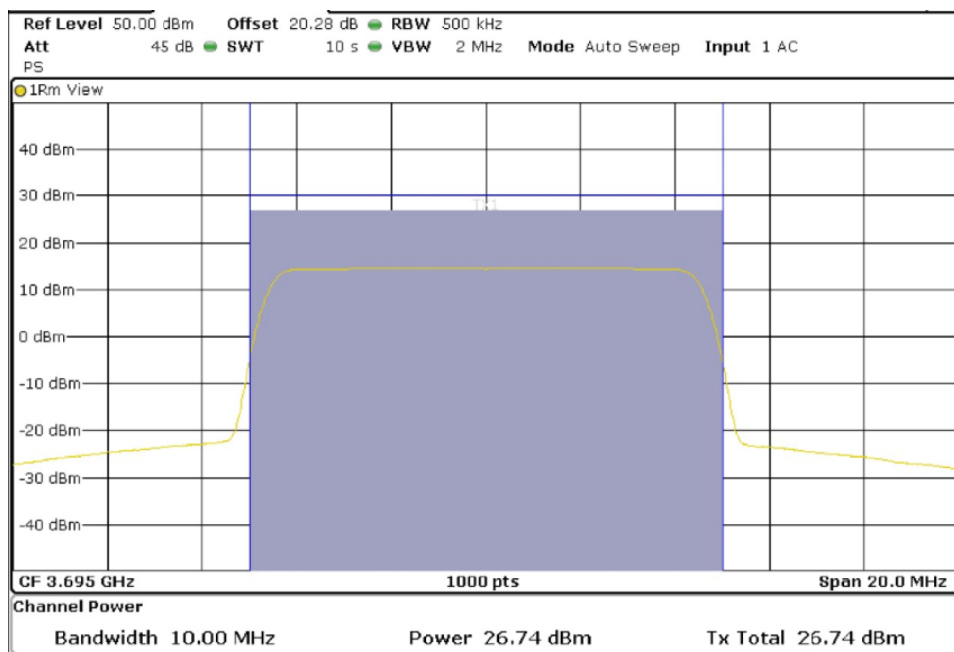


Middle Channel (3625 MHz)



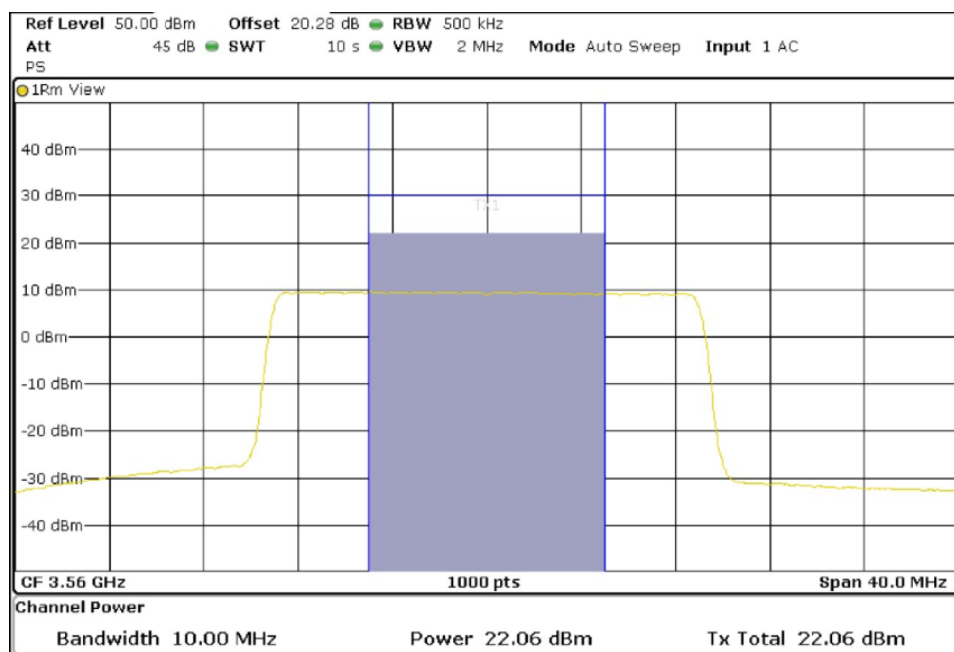
TEST RESULTS (Cont.):

Highest Channel (3695 MHz)



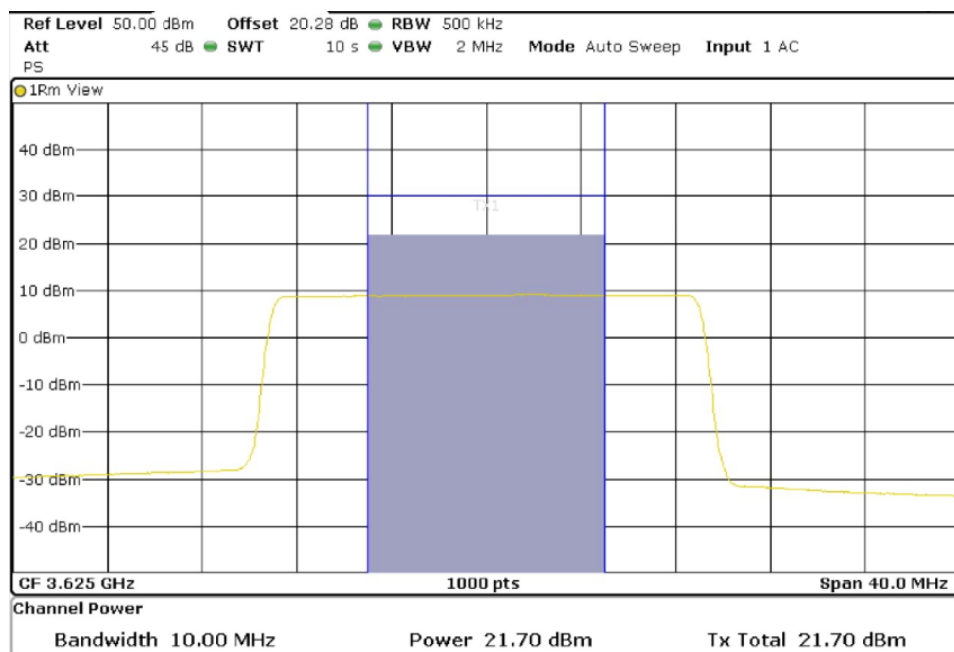
20 MHz BW

Lowest Channel (3560 MHz)

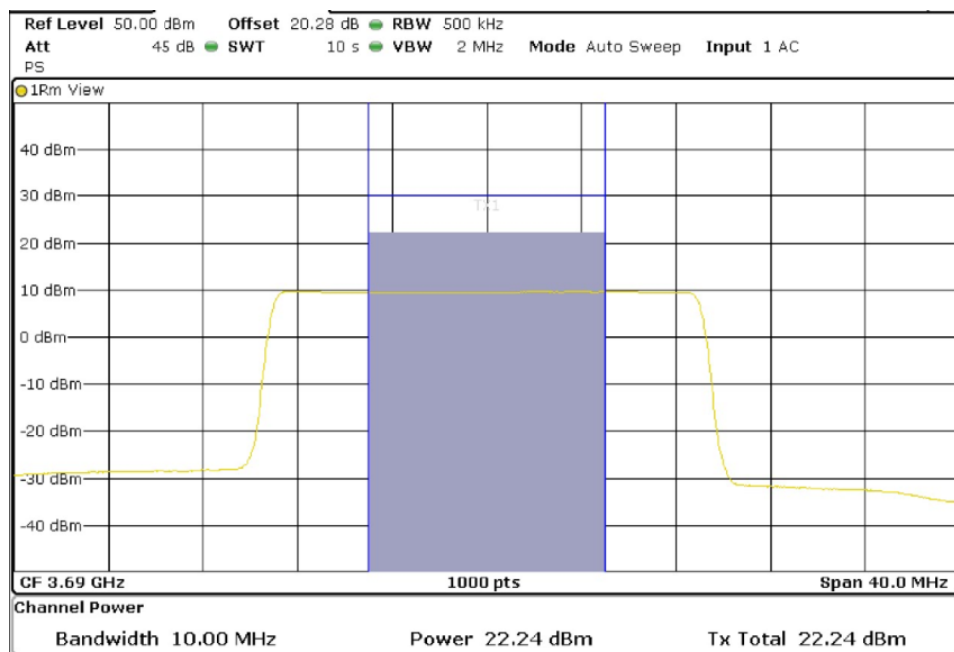


TEST RESULTS (Cont.):

Middle Channel (3625 MHz)



Highest Channel (3690 MHz)

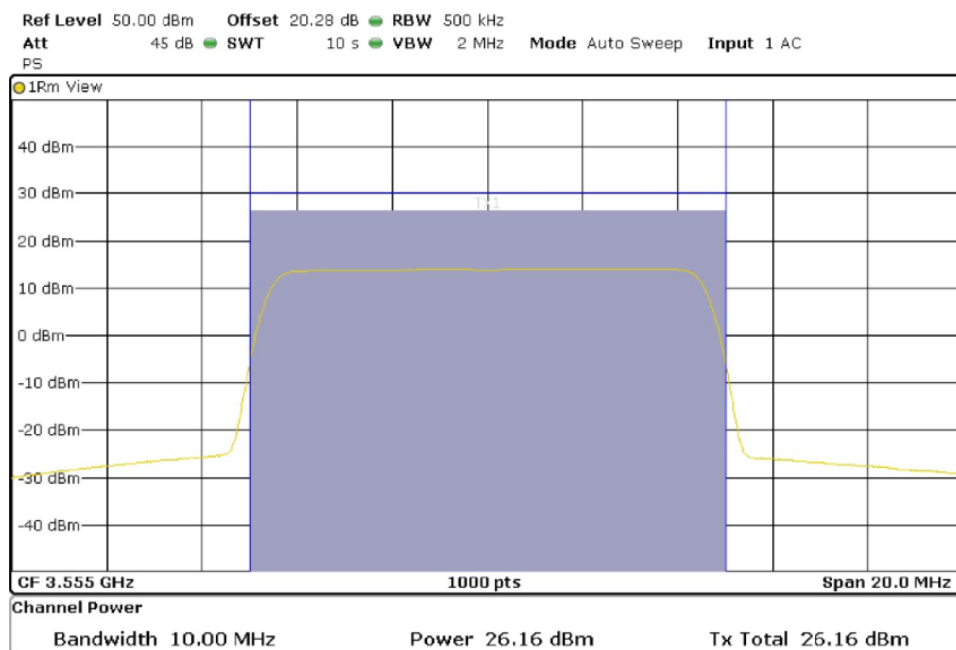


TEST RESULTS (Cont.):

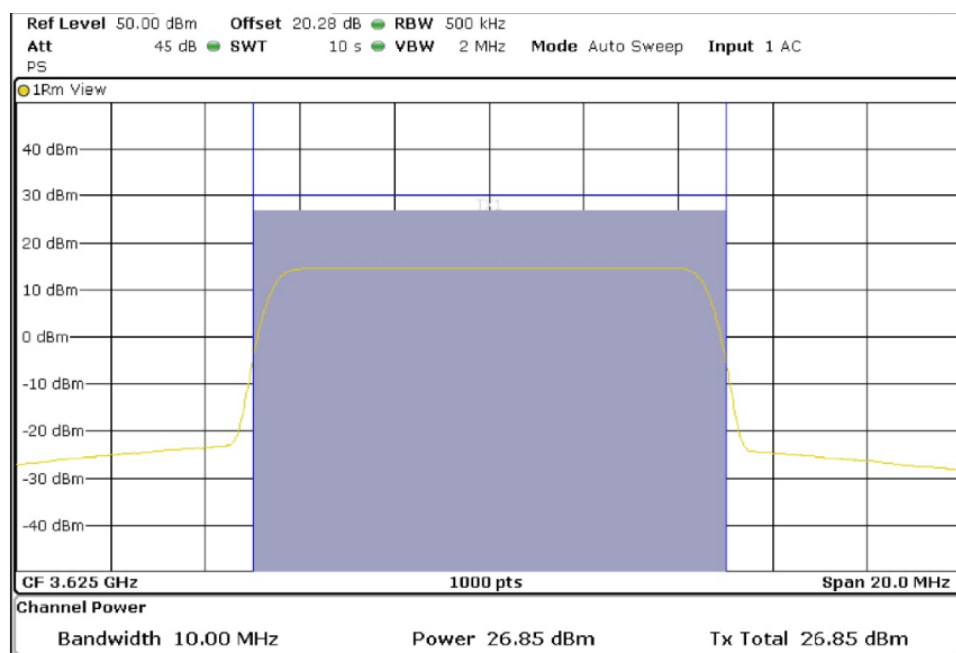
Port 2:

10 MHz BW

Lowest Channel (3555 MHz)

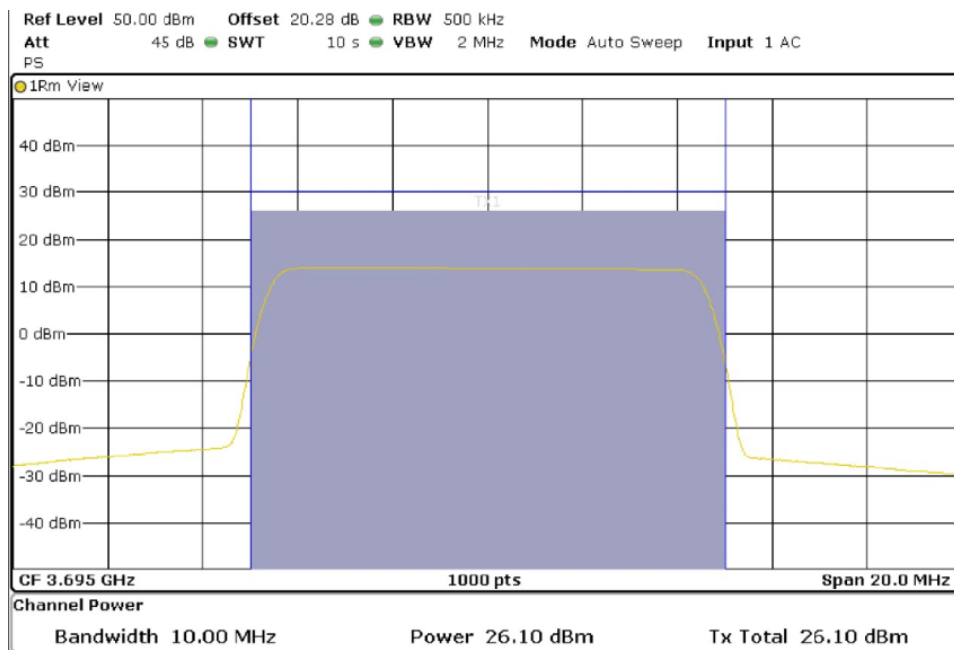


Middle Channel (3625 MHz)



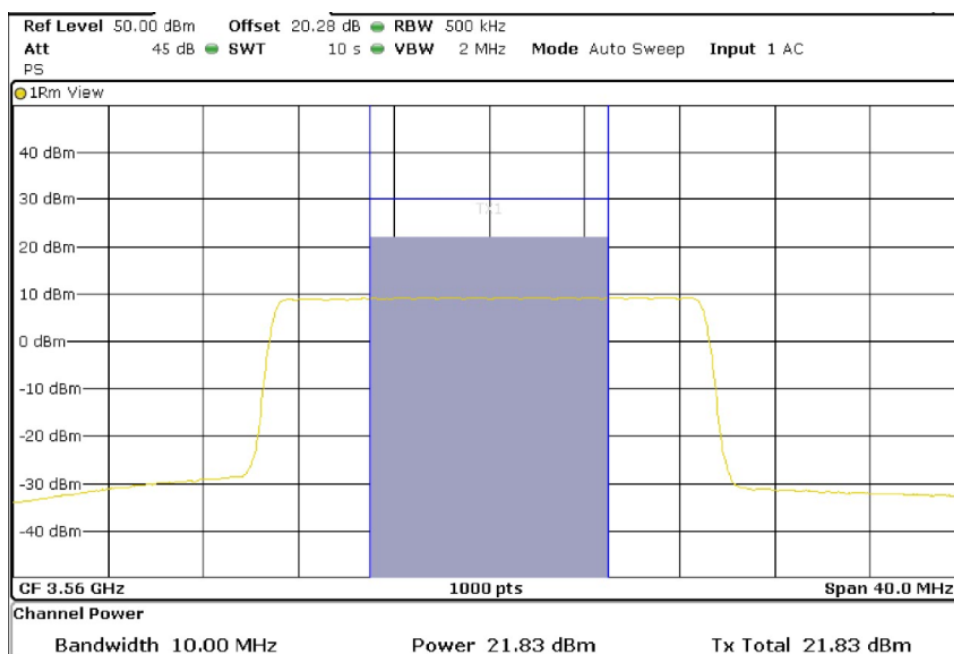
TEST RESULTS (Cont.):

Highest Channel (3695 MHz)



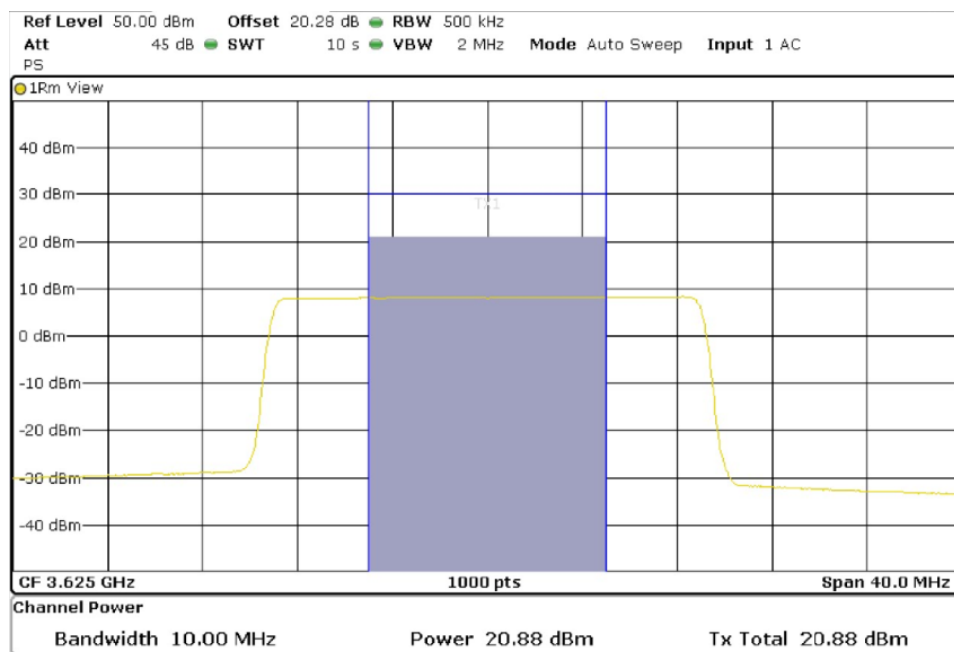
20 MHz BW

Lowest Channel (3560 MHz)

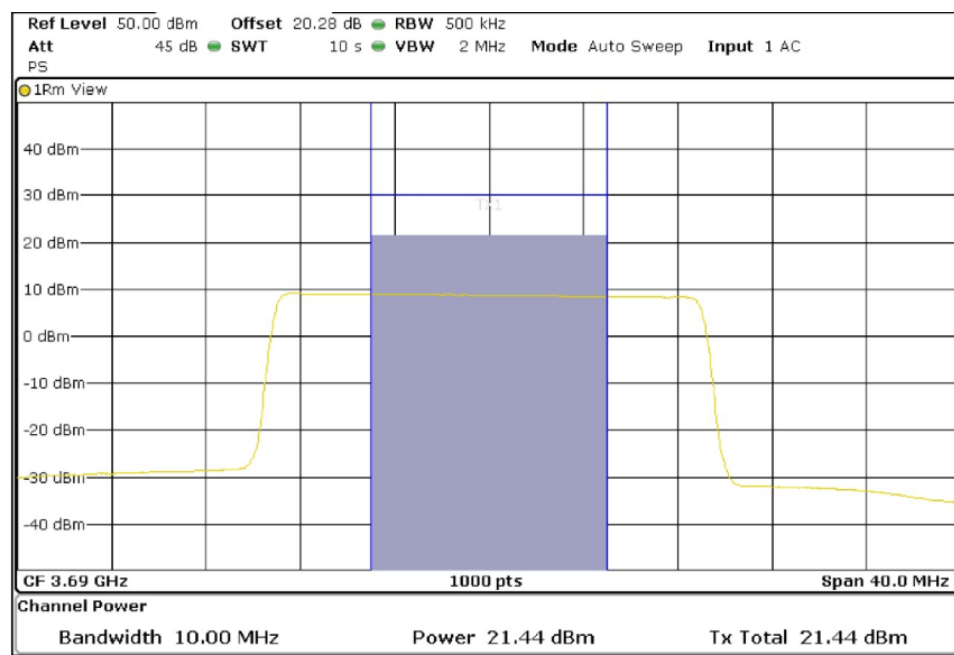


TEST RESULTS (Cont.):

Middle Channel (3625 MHz)



Highest Channel (3690 MHz)



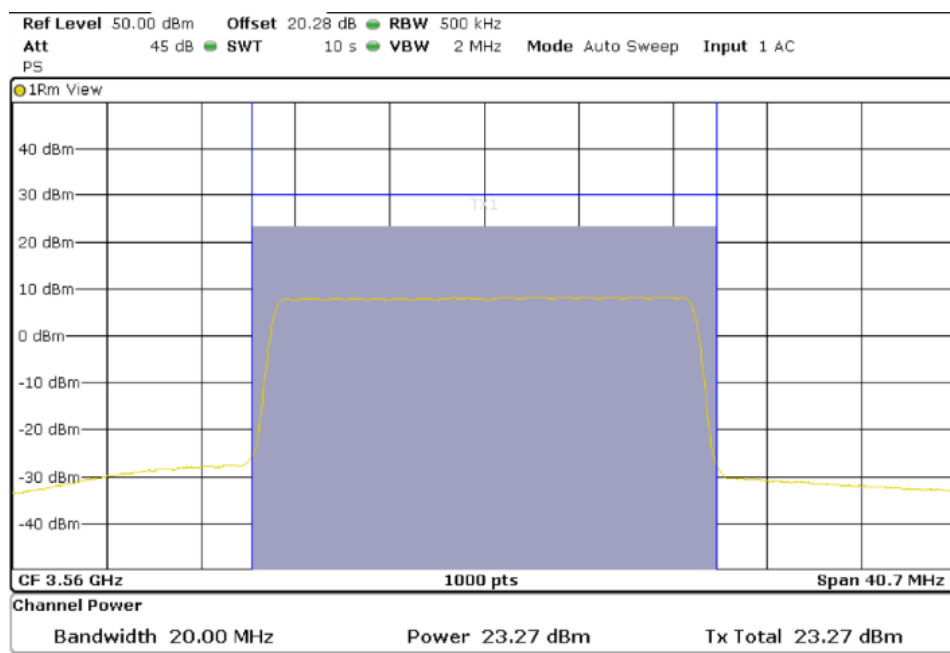
TEST RESULTS (Cont.):

20MHz BW Reference only

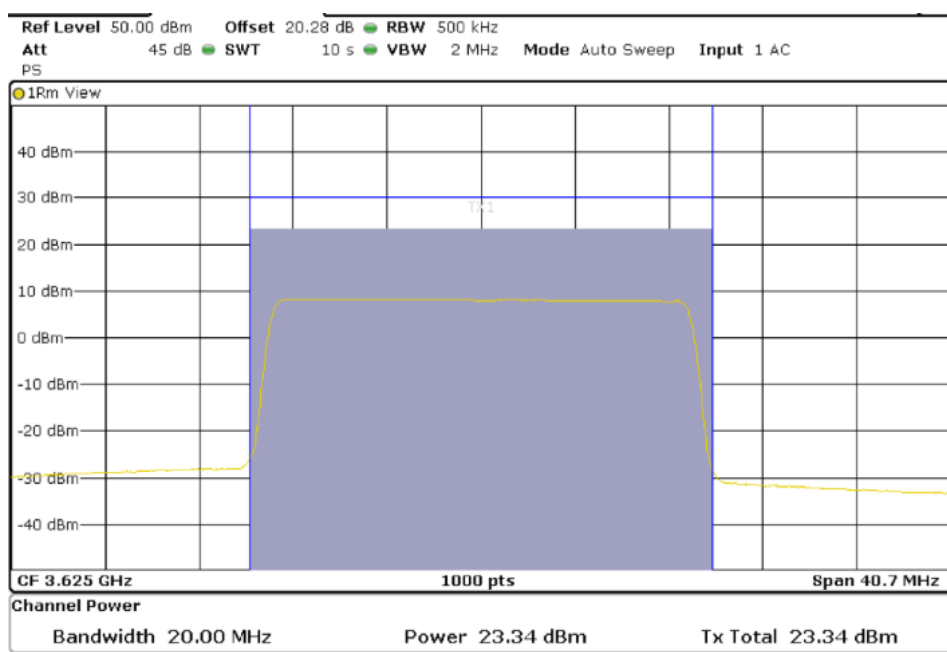
QPSK

Port 1

Lowest Channel (3560 MHz)

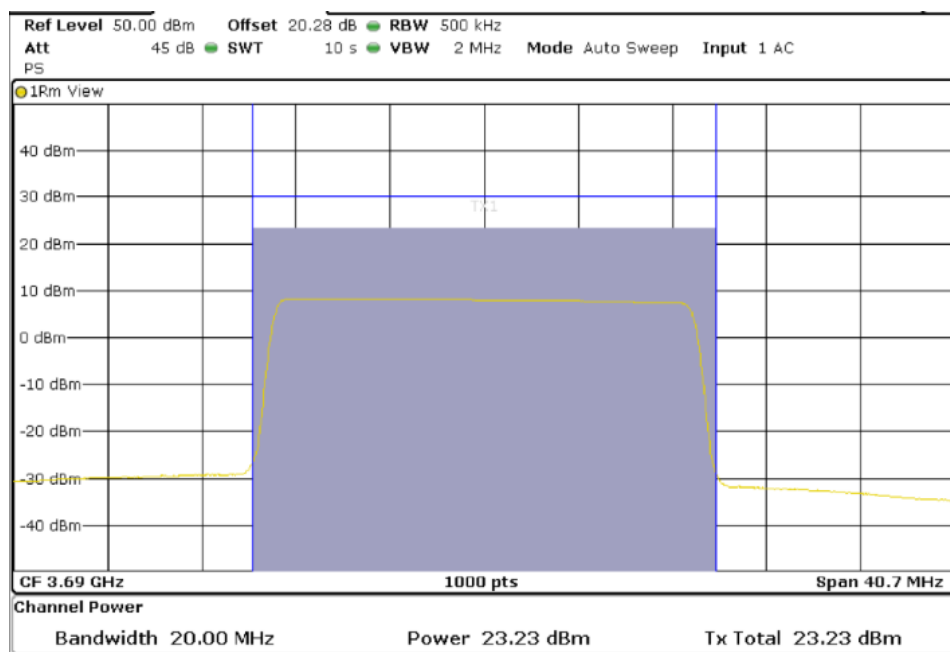


Middle Channel (3625 MHz)



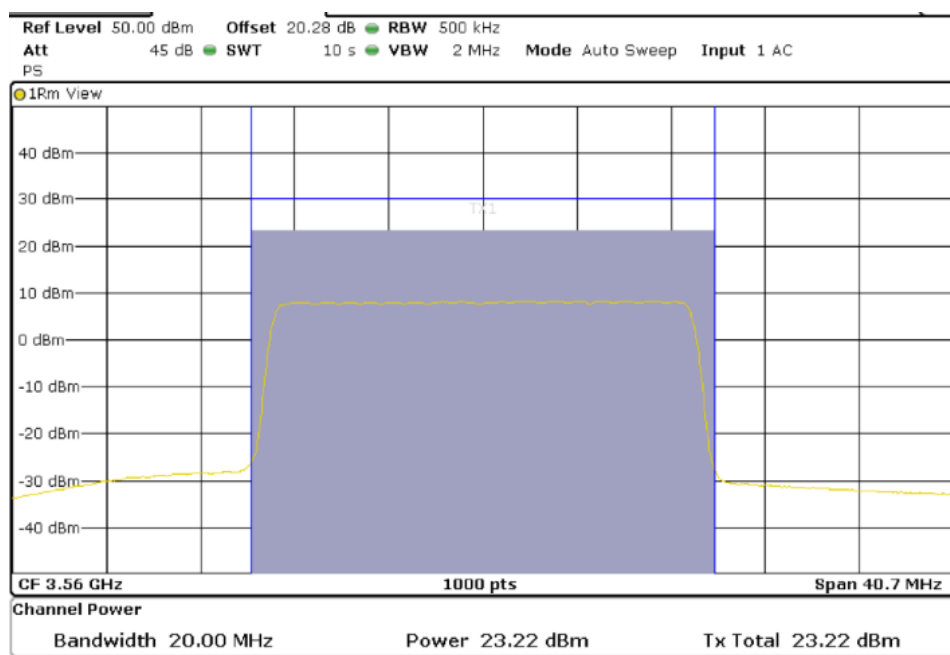
TEST RESULTS (Cont.):

Highest Channel (3690 MHz)



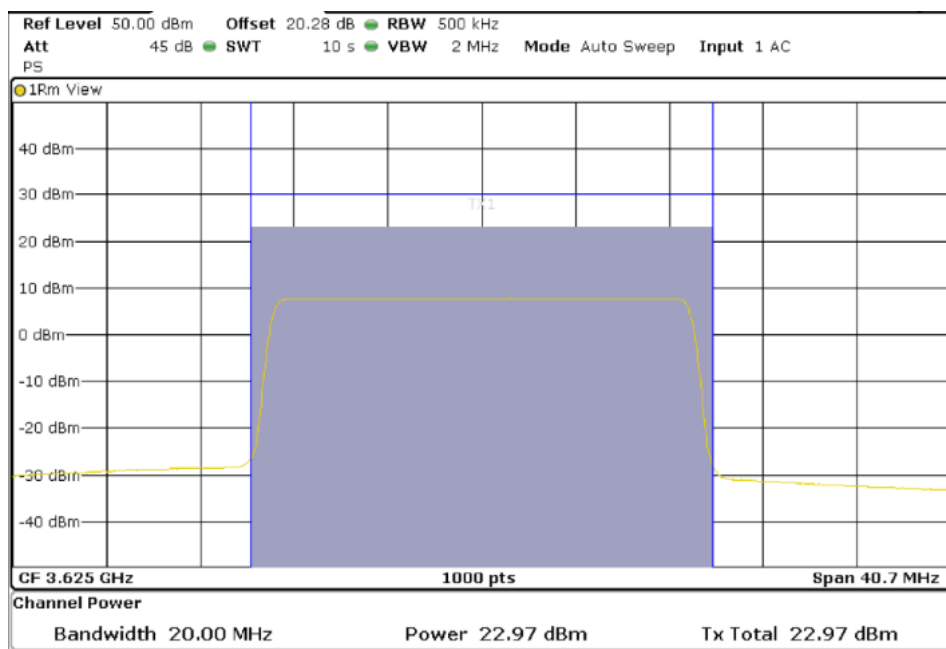
Port 2

Lowest Channel (3560 MHz)

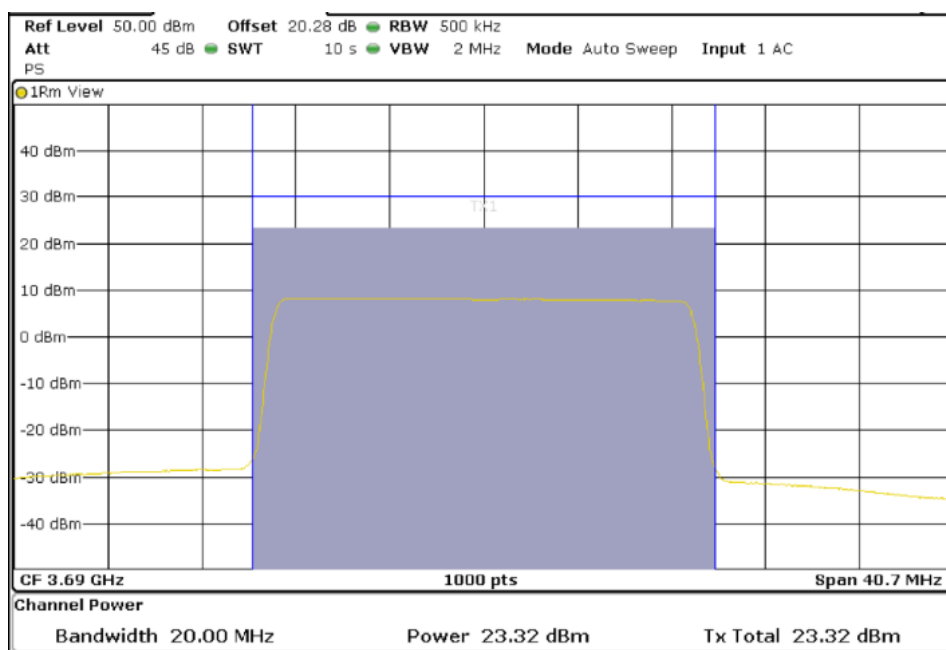


TEST RESULTS (Cont.):

Middle Channel (3625 MHz)



Highest Channel (3690 MHz)



TEST A.3: 99% OBW AND -26 DB BANDWIDTH

LIMITS:	Product standard:	Part 2.1049
	Test standard:	ANSI C63.26-2015

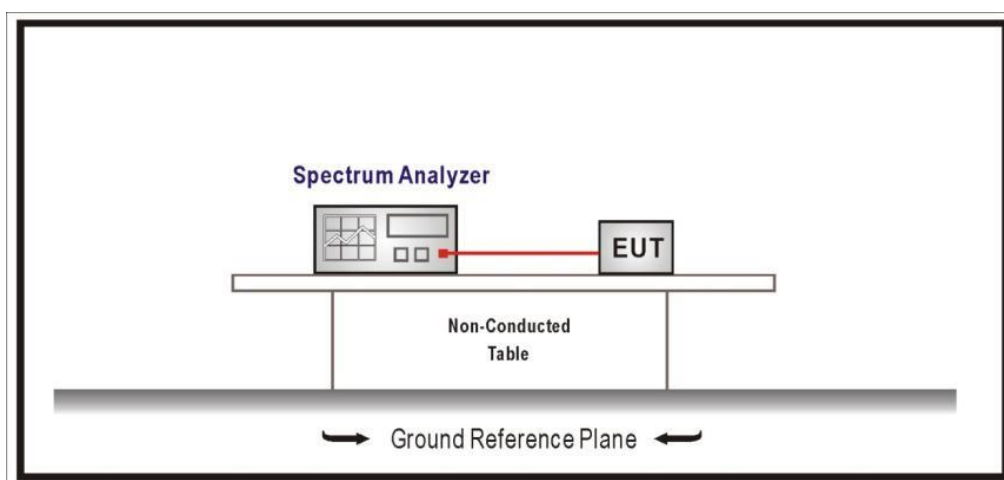
LIMITS

The 99% occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

The -26 dB Bandwidth is the bandwidth of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB from the peak of the carrier.

TEST SETUP:

The 99% occupied bandwidth and the -26dB bandwidth were measured directly using the built-in bandwidth measuring option of signal analyzer with following the procedure stated in the section 5.4.3 and 5.4.4 of ANSI C63.26-2015 and the section 4.2 and 4.3 of FCC KDB 971168 D01 v03 r01.



TESTED SAMPLES:	S/01
TESTED CONDITIONS MODES:	TC#01 (Band 48)
TEST RESULTS:	PASS

10 MHz BW

Port 1

QPSK

	Lowest frequency 3555 MHz	Middle frequency 3625 MHz	Highest frequency 3695 MHz
99% OBW (MHz)	9.02	9.02	9.02
-26 dB Bandwidth (MHz)	9.93	9.96	9.99
Measurement uncertainty (kHz)	<± 8.33		

64QAM

	Lowest frequency 3555 MHz	Middle frequency 3625 MHz	Highest frequency 3695 MHz
99% OBW (MHz)	9.00	9.02	9.00
-26 dB Bandwidth (MHz)	9.75	9.75	9.70
Measurement uncertainty (kHz)	<± 8.33		

Port 2

QPSK

	Lowest frequency 3555 MHz	Middle frequency 3625 MHz	Highest frequency 3695 MHz
99% OBW (MHz)	9.00	9.02	9.04
-26 dB Bandwidth (MHz)	9.90	9.96	9.99
Measurement uncertainty (kHz)	<± 8.33		

64QAM

	Lowest frequency 3555 MHz	Middle frequency 3625 MHz	Highest frequency 3695 MHz
99% OBW (MHz)	8.94	8.94	8.94
-26 dB Bandwidth (MHz)	9.64	9.64	9.64
Measurement uncertainty (kHz)	<± 8.33		

TEST RESULTS (Cont.):

20MHz BW

Port 1

QPSK

	Lowest frequency 3560 MHz	Middle frequency 3625 MHz	Highest frequency 3690 MHz
99% OBW (MHz)	17.96	17.92	17.96
-26 dB Bandwidth (MHz)	19.56	19.52	19.56
Measurement uncertainty (kHz)	<± 8.33		

64QAM

	Lowest frequency 3560 MHz	Middle frequency 3625 MHz	Highest frequency 3690 MHz
99% OBW (MHz)	17.92	17.88	17.88
-26 dB Bandwidth (MHz)	19.00	18.92	18.84
Measurement uncertainty (kHz)	<± 8.33		

Port 2

QPSK

	Lowest frequency 3560 MHz	Middle frequency 3625 MHz	Highest frequency 3690 MHz
99% OBW (MHz)	17.92	17.92	17.96
-26 dB Bandwidth (MHz)	19.40	19.60	19.56
Measurement uncertainty (kHz)	<± 8.33		

64QAM

	Lowest frequency 3560 MHz	Middle frequency 3625 MHz	Highest frequency 3690 MHz
99% OBW (MHz)	17.92	17.92	17.92
-26 dB Bandwidth (MHz)	19.00	19.04	19.04
Measurement uncertainty (kHz)	<± 8.33		

See plots below

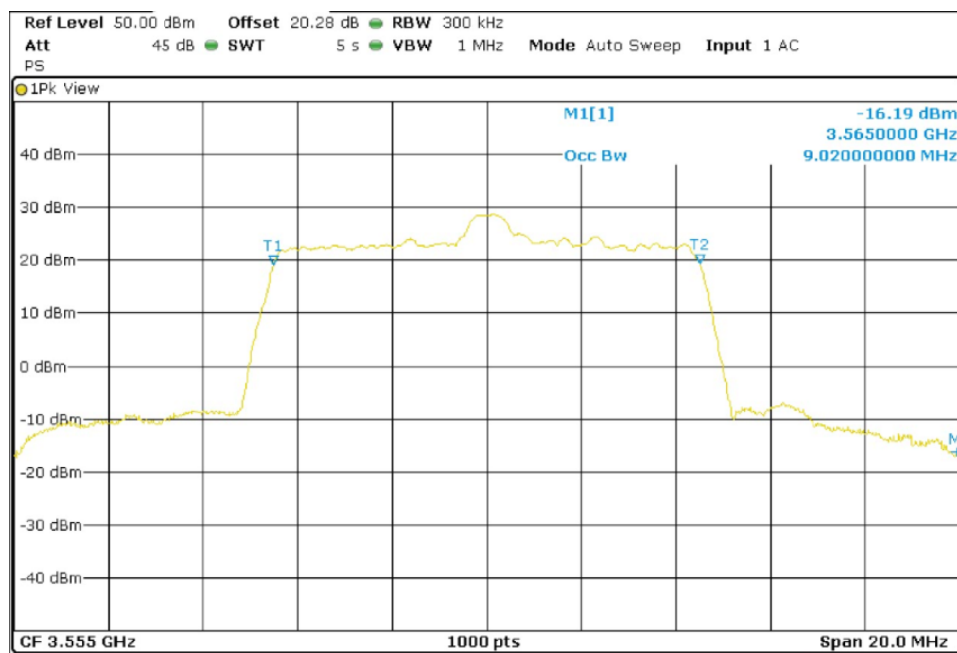
TEST RESULTS (Cont.):

Port 1

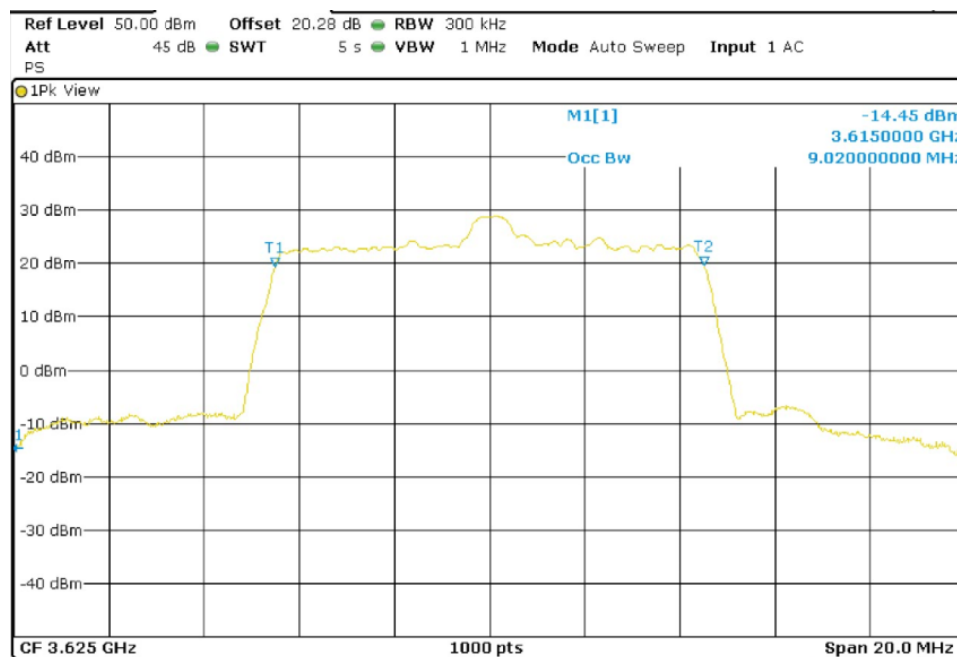
10 MHz BW

QPSK

Lowest Channel (3555 MHz)

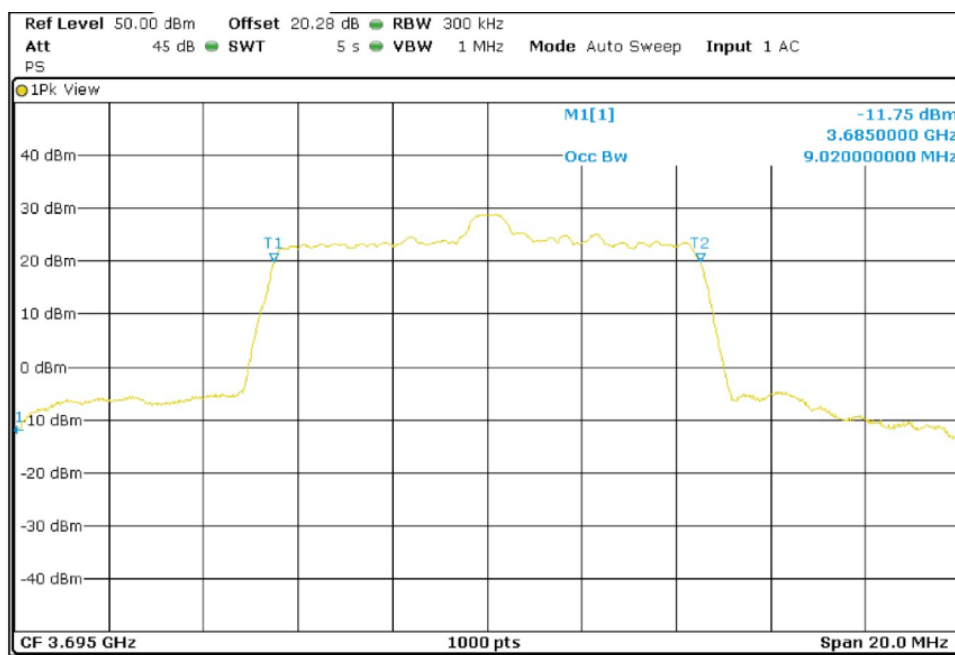


Middle Channel (3625 MHz)



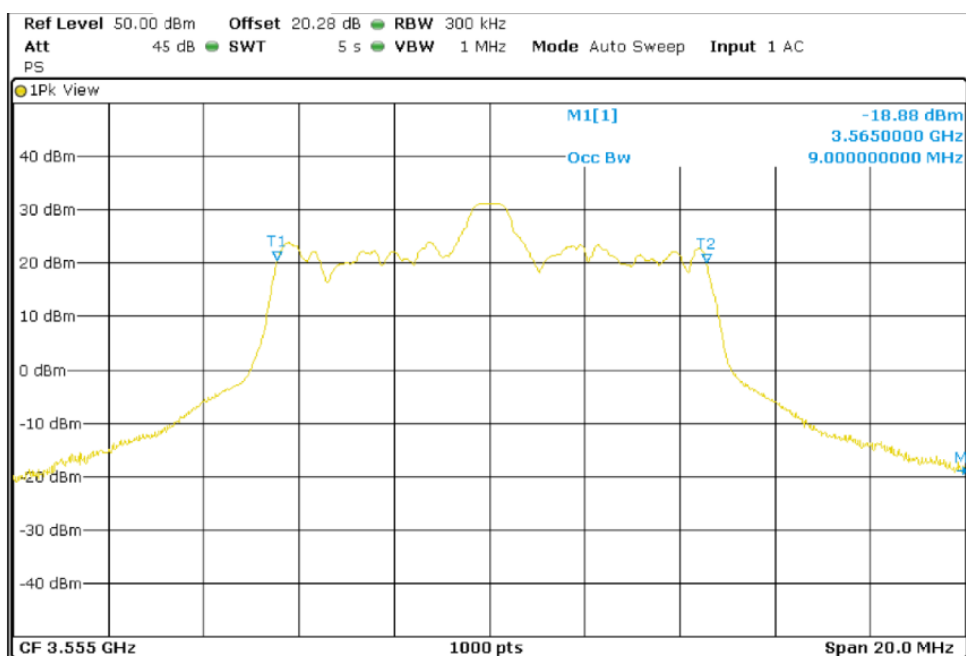
TEST RESULTS (Cont.):

High Channel (3695 MHz)



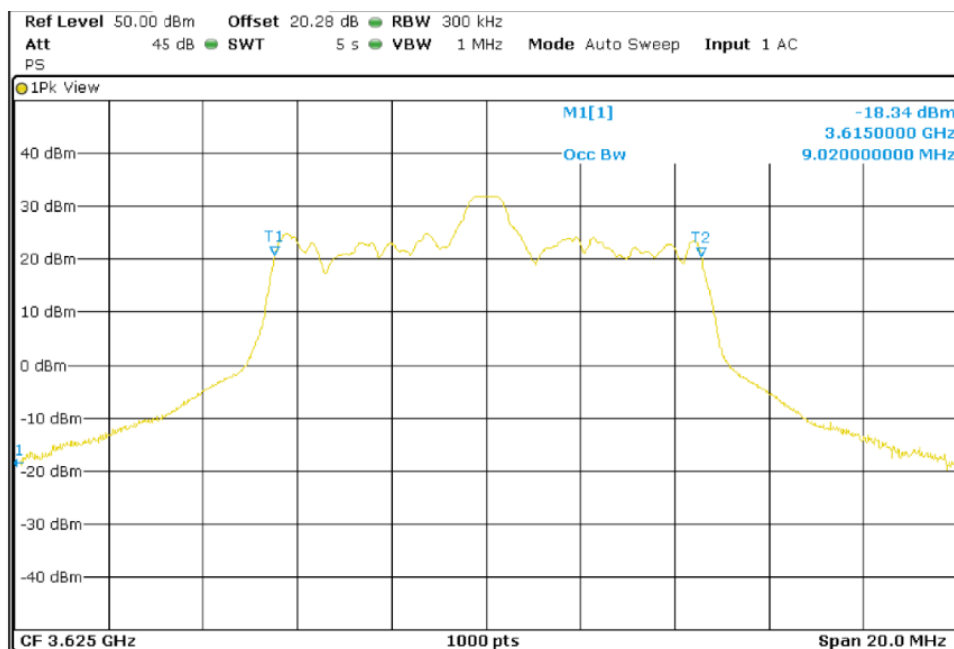
64QAM

Lowest Channel (3555 MHz)

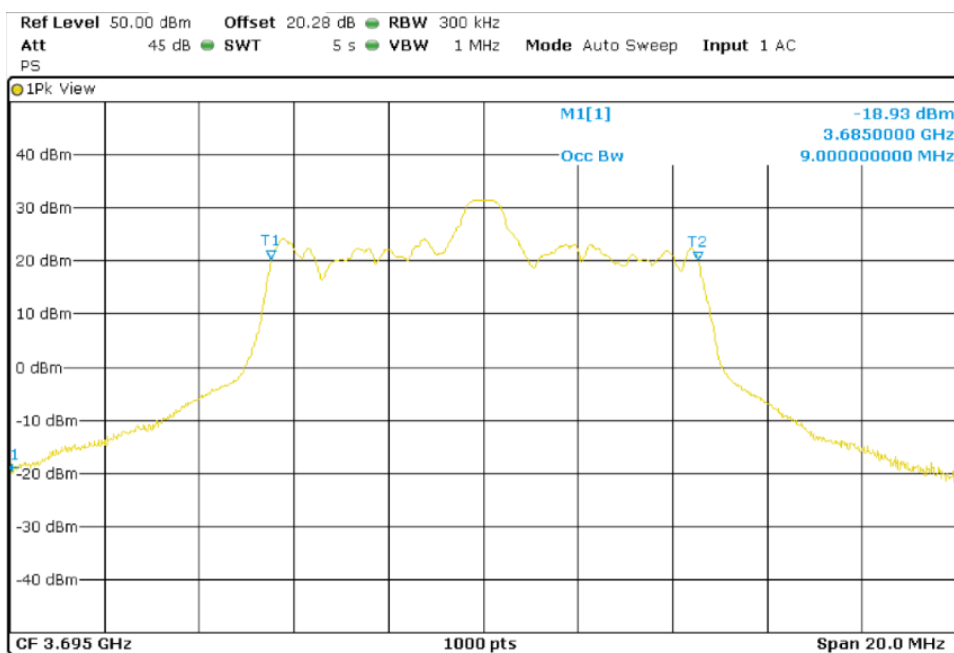


TEST RESULTS (Cont.):

Middle Channel (3625 MHz)



High Channel (3695 MHz)

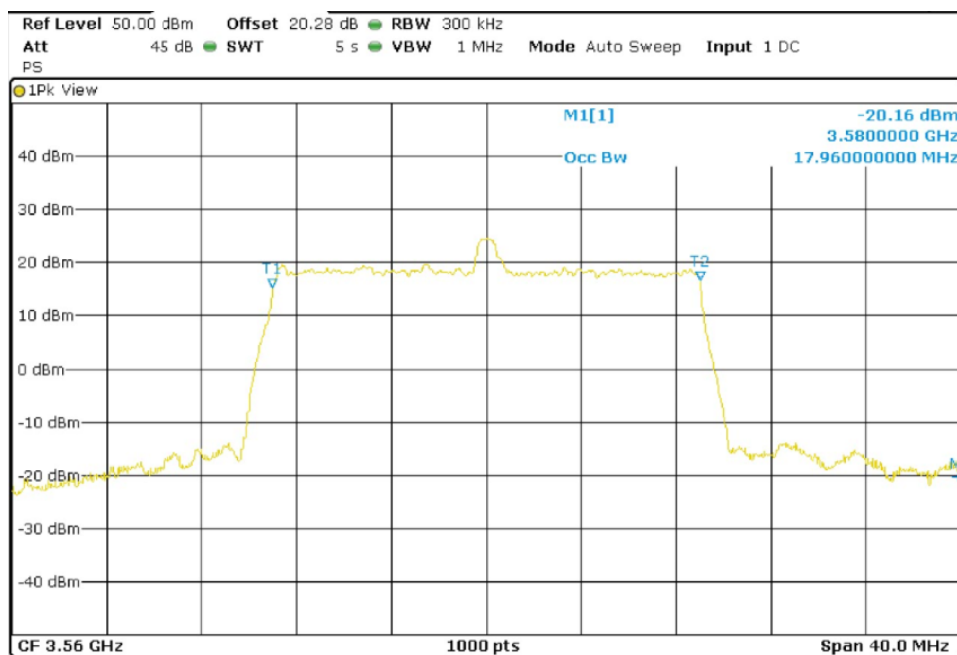


TEST RESULTS (Cont.):

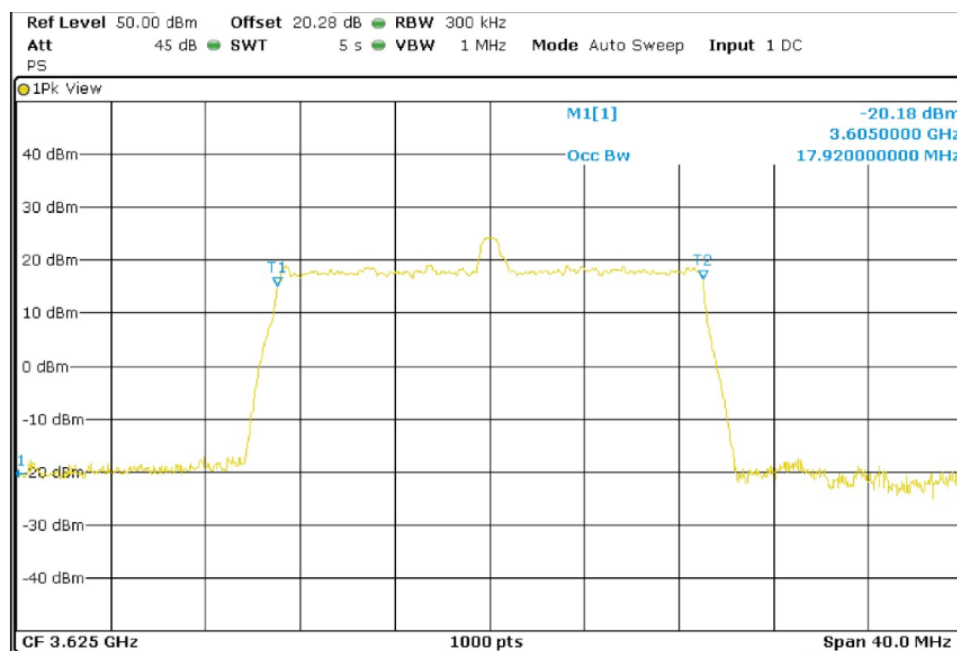
20 MHz BW

QPSK

Lowest Channel (3560 MHz)

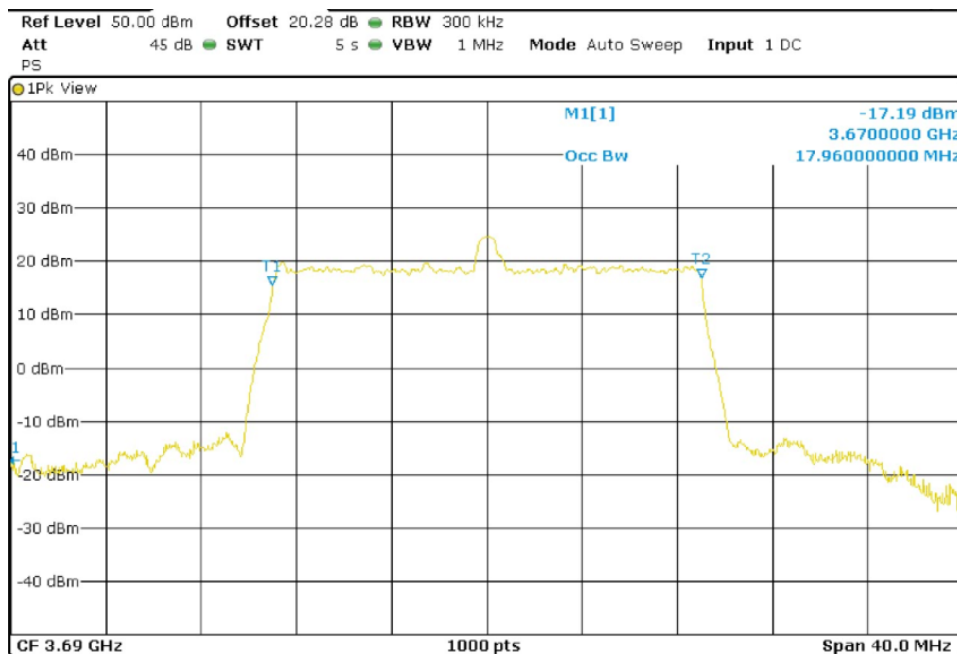


Middle Channel (3625 MHz)



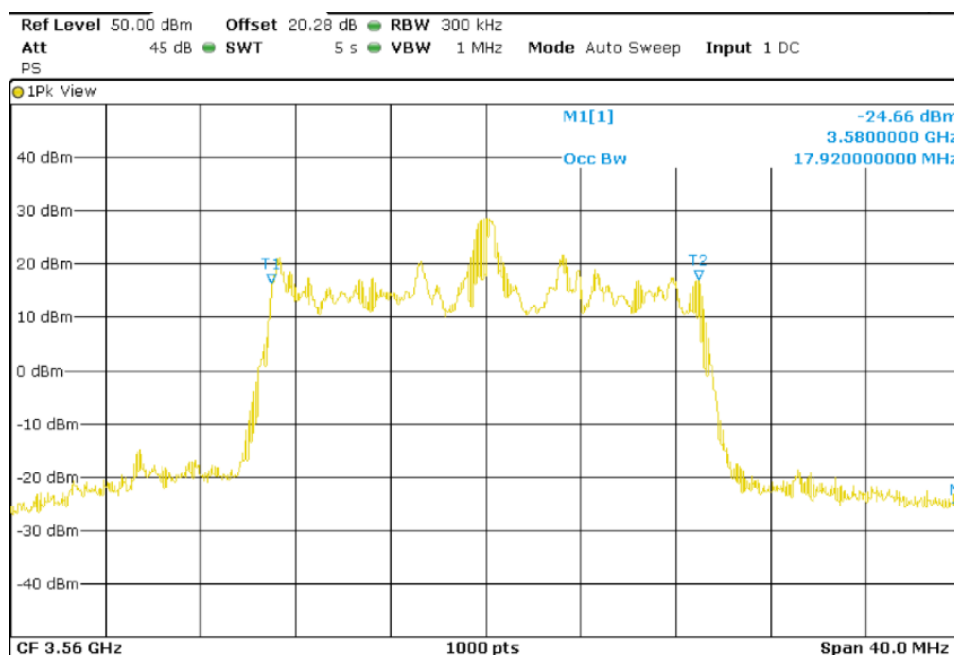
TEST RESULTS (Cont.):

High Channel (3690 MHz)



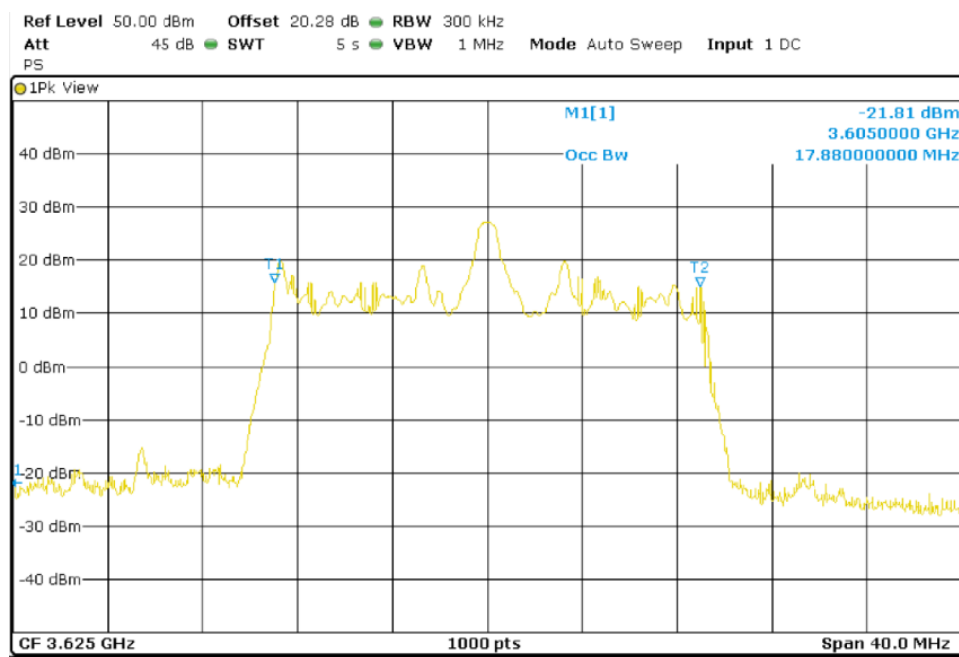
64QAM

Lowest Channel (3560 MHz)

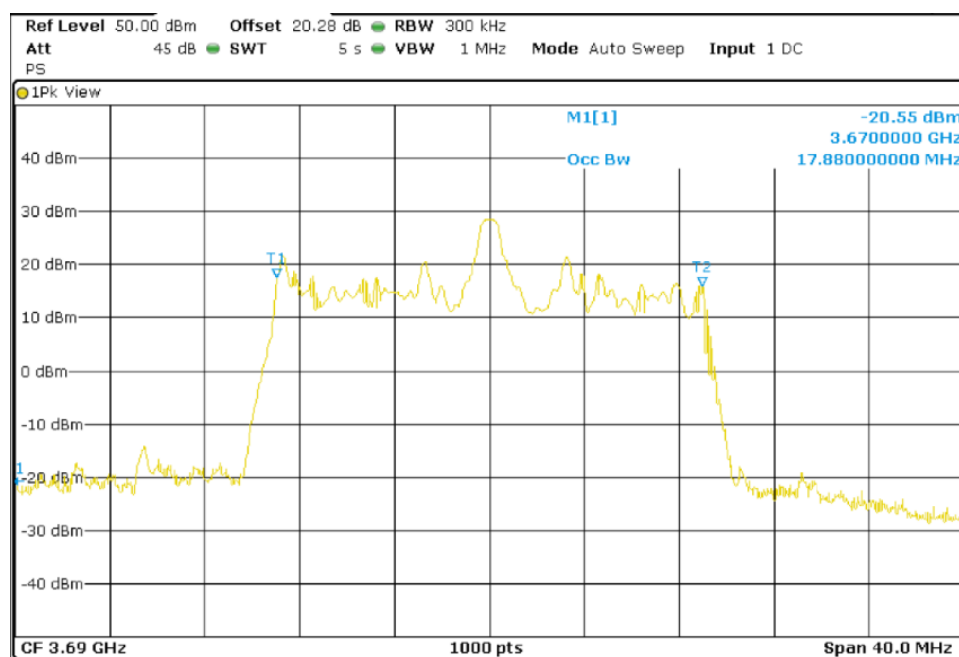


TEST RESULTS (Cont.):

Middle Channel (3625 MHz)



High Channel (3690 MHz)



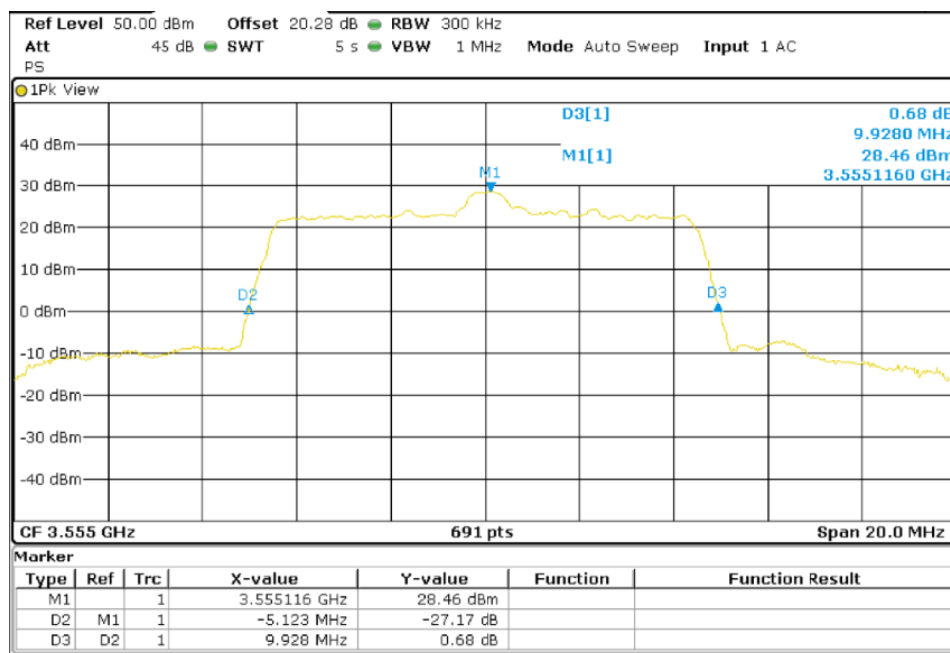
TEST RESULTS (Cont.):

-26dB Bandwidth

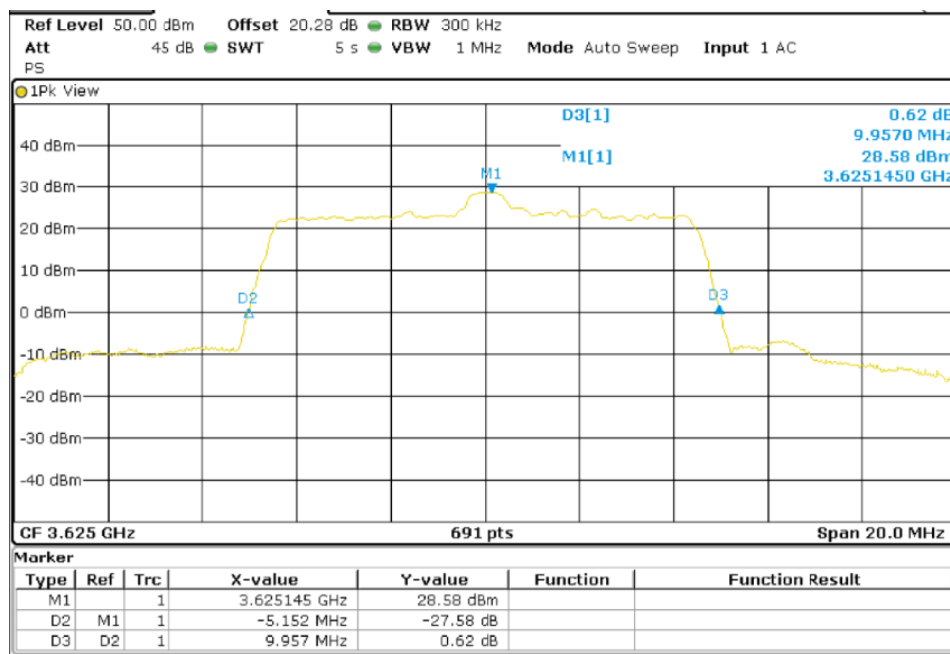
10 MHz BW

QPSK

Lowest Channel (3555 MHz)

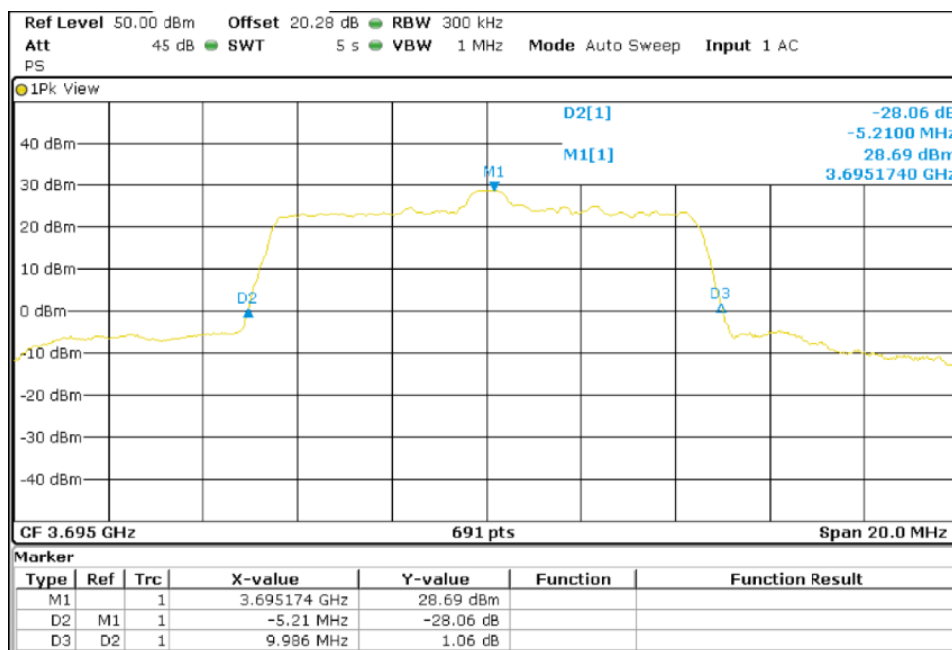


Middle Channel (3625 MHz)



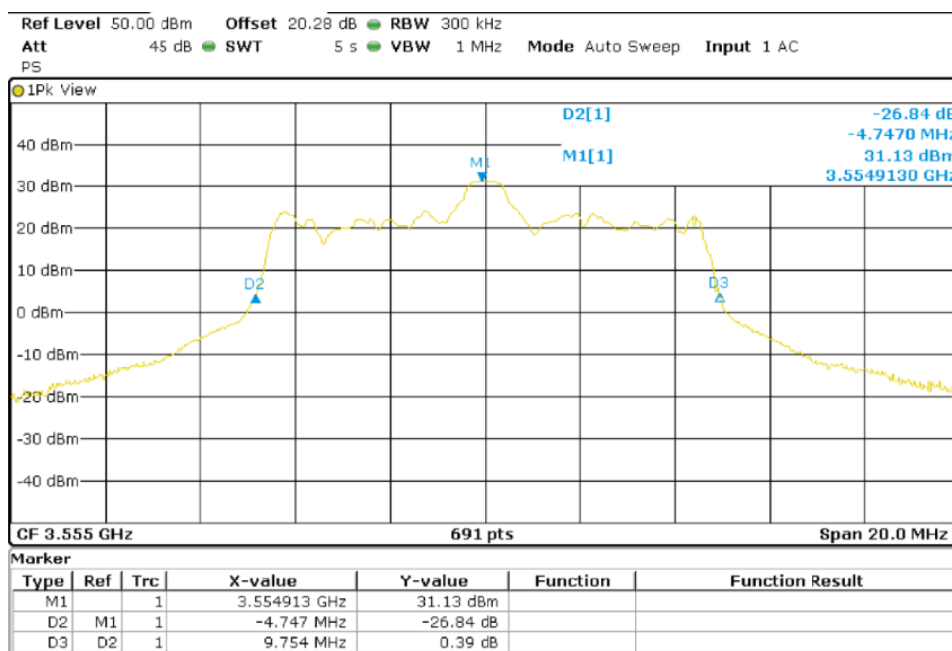
TEST RESULTS (Cont.):

High Channel (3695 MHz)



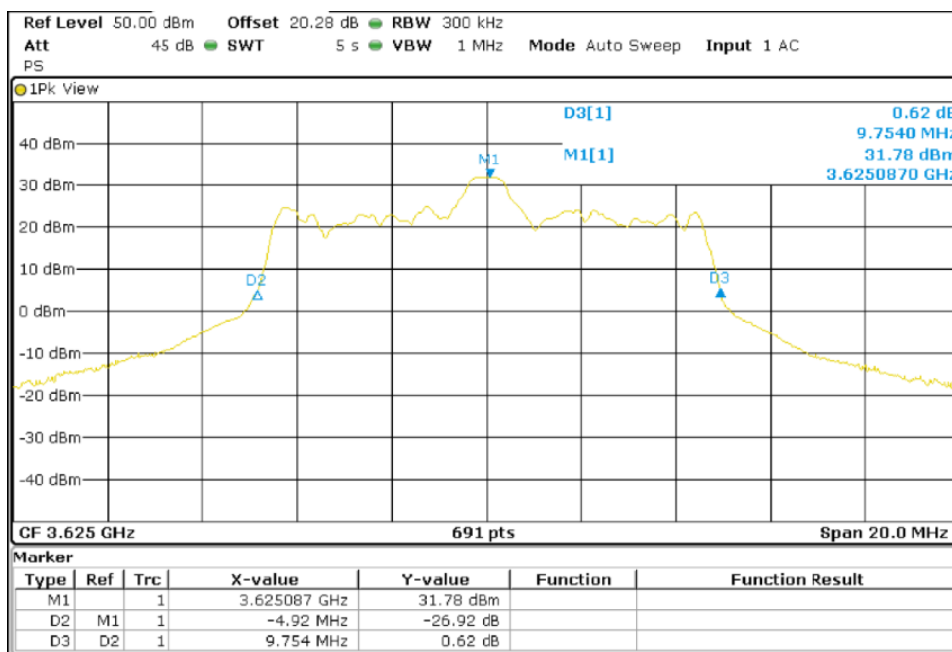
64QAM

Lowest Channel (3555 MHz)

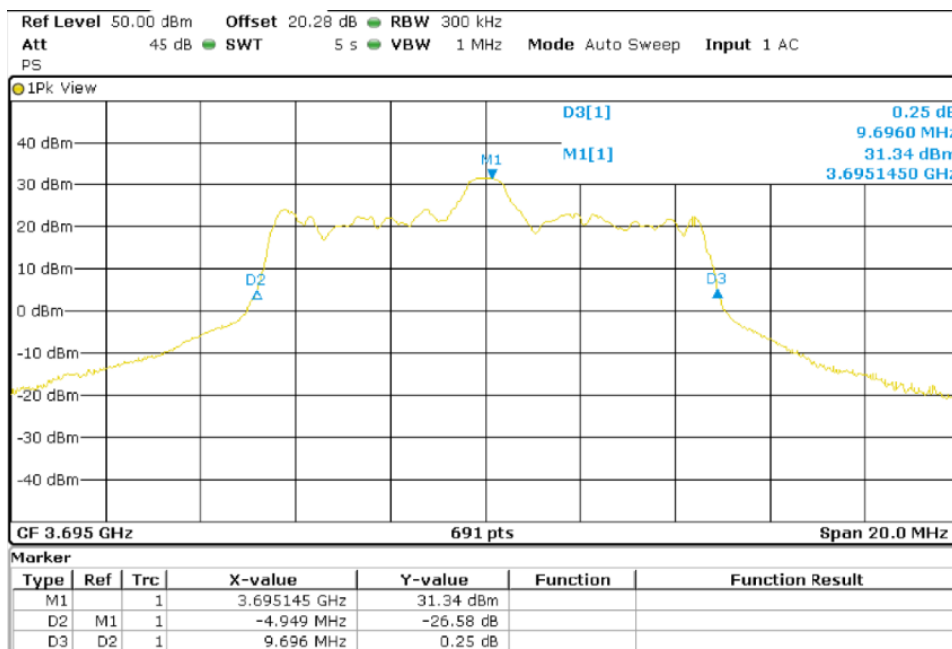


TEST RESULTS (Cont.):

Middle Channel (3625 MHz)



High Channel (3695 MHz)

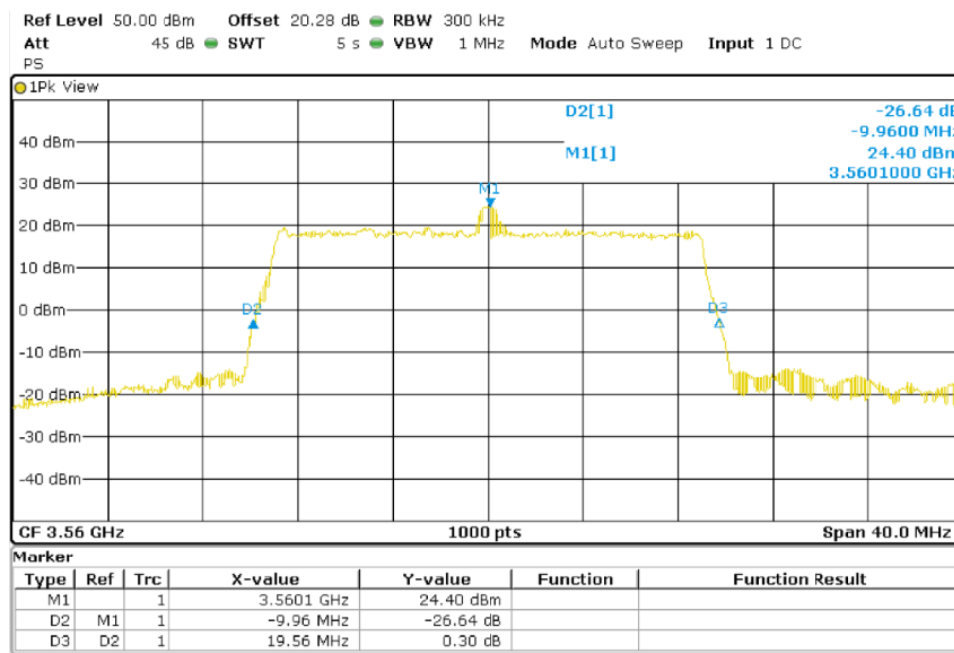


TEST RESULTS (Cont.):

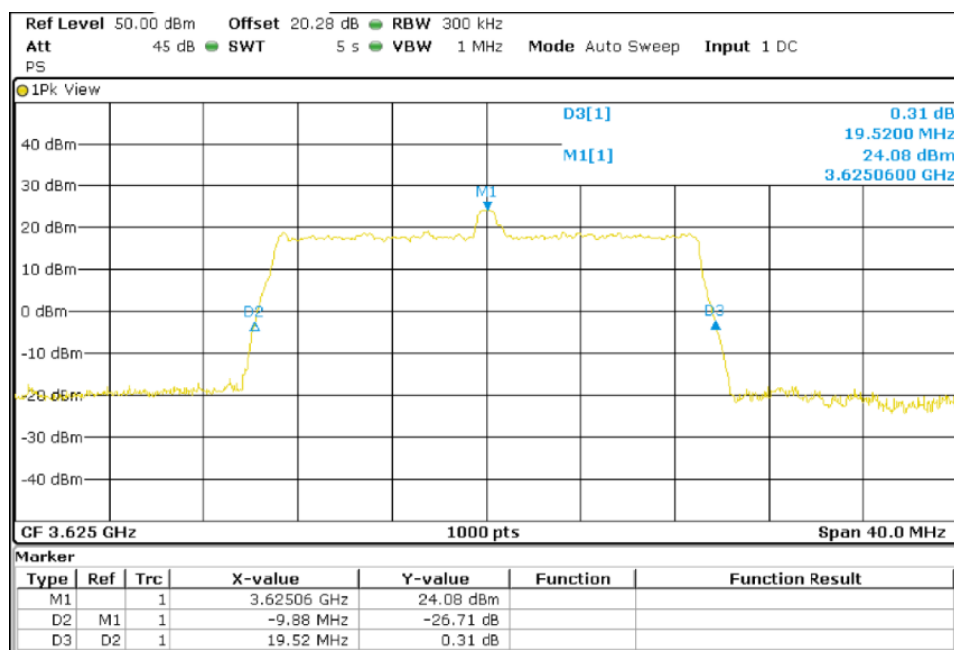
20 MHz BW

QPSK

Lowest Channel (3560 MHz)

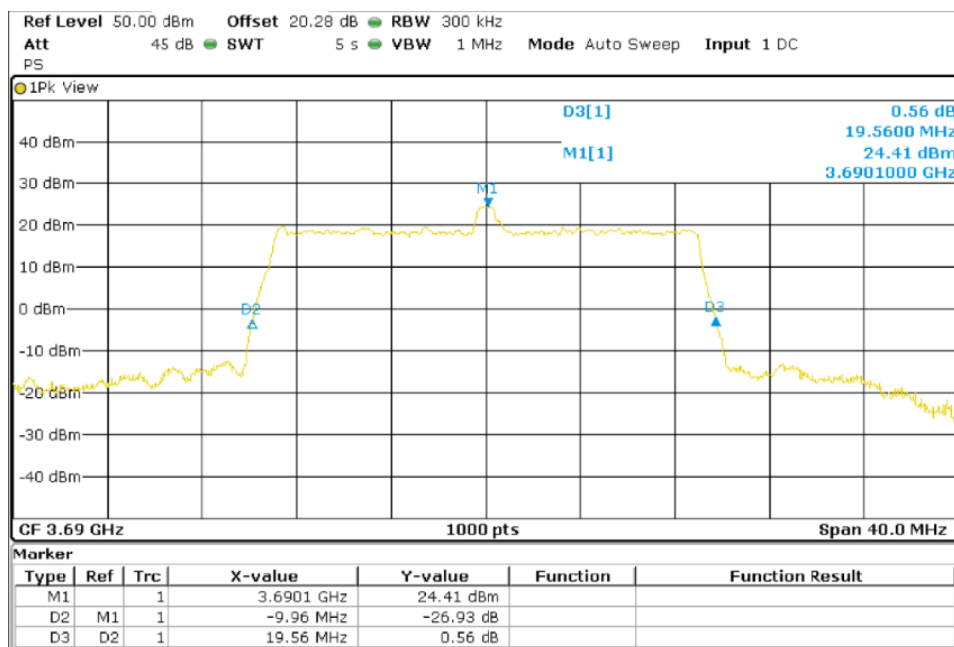


Middle Channel (3625 MHz)



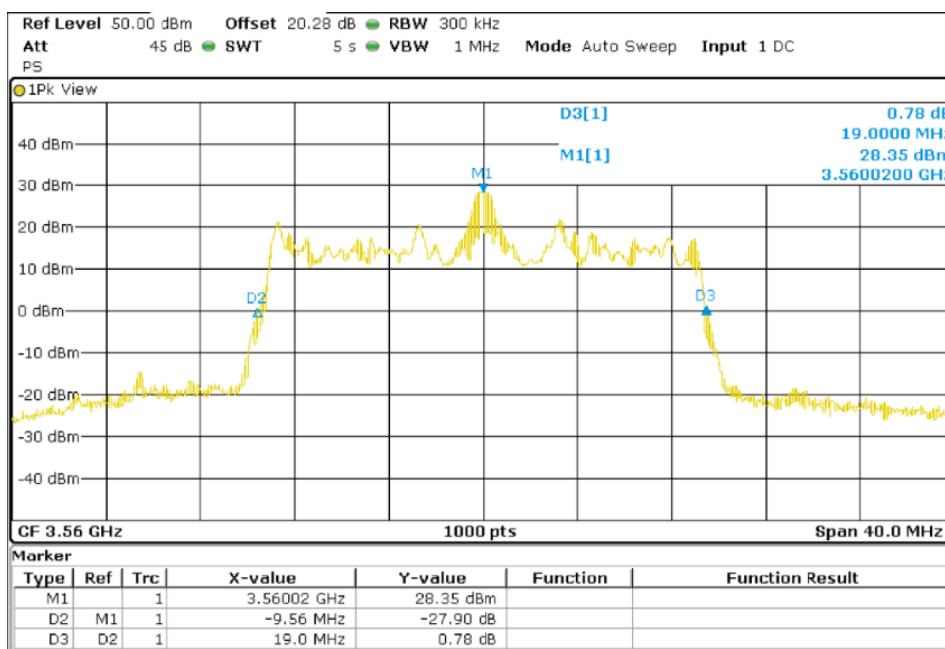
TEST RESULTS (Cont.):

High Channel (3690 MHz)



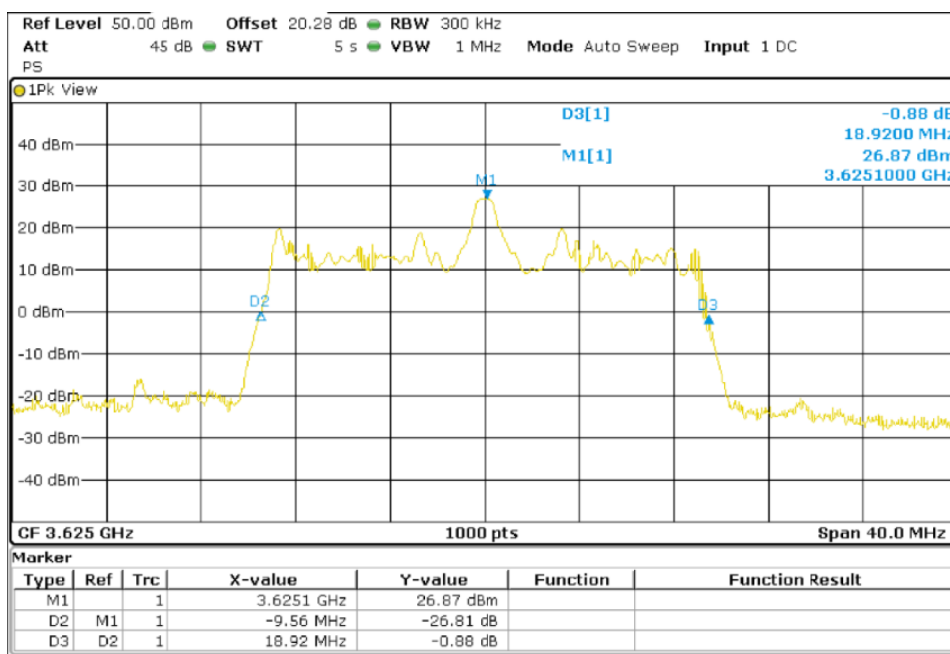
64QAM

Lowest Channel (3560 MHz)



TEST RESULTS (Cont.):

Middle Channel (3625 MHz)



High Channel (3690 MHz)

