HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47 CFR part 15 section 15.255

FOR:

CERAGON Networks Inc.
All Outdoor unit
Model :FibeAir IP-20V
FCC ID:NZ4IP20V

Table of contents

1 Applicant information

Client name:	CERAGON Networks Ltd.
Address:	24 Raoul Wallenberg Street, Tel Aviv 69719, Israel
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E-mail:	sergeys@ceragon.com
Contact name:	Mr. Sergey Shkolnik

2 Equipment under test attributes

Product name:	All Outdoor unit
Product type:	Transceiver
Model(s):	FibeAir IP-20V
Part number:	31-0065-0
Serial number:	F118E11602
Hardware version:	A1K
Software release:	10.5
Receipt date	03-Apr-18

3 Manufacturer information

Manufacturer name:	Flex Ltd.

4 Test details

Project ID:	30645
Location:	Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started:	25-Apr-18
Test completed:	05-Sep-18
Test specification(s):	FCC 47 CFR part 15 section 15.255

5 Tests summary

Test	Status
Transmitter characteristics	
FCC section 15.255(b)(ii),(d), Transmitter power and power spectral density	Pass
FCC section 15.215(c), Occupied bandwidth	Pass
FCC section 15.255(c)(2), Radiated spurious emissions below 40 GHz	Pass
FCC section 15. 255(c)(3), Radiated emissions outside assigned band and above 40 GHz up to 200 GHz	Pass
FCC section 15.255(e), Frequency stability	Tested without limit
FCC section 15.255(f), RF exposure	Pass, exhibit included in Application for certification

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.
The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

This test report supersedes the previously issued test report identified by Doc ID:CERRAD_FCC.30645.

	Name and Title	Date	Signature
Tested by:	Mr. S. Samokha, test engineer	September 5, 2018	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	October 4, 2018	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	November 19, 2018	

6 EUT description

6.1 General information

The EUT, FibeAir IP-20V, is a high-capacity, all-outdoor Ethernet backhaul system designed to operate in the V-Band frequency range (57-66 GHz). IP-20V provides up to 2.5 Gbps capacity 50 – 500 MHz channels, with modulations from BSPK (2QAM) to up 256 QAM. The EUT is intended to be powered from DC power network through DC PoE adapter.

V-Band Frequency Bands – 57-66 GHz
Supported Modulation Range:
- 50 MHz: BPSK (2QAM) to 128 QAM
- 100 MHz: BPSK (2QAM) to 256 QAM
- 250 MHz: BPSK(2QAM) to 256 QAM
- 500 MHz: BPSK (2QAM) to 64 QAM.

6.2 Ports and lines

Port type	Port description	Conected from	Connected to	Qty.	Cable type	Cable length, m
Management &Power	PoE	EUT	PoE Injector	1	FTP	10
Telecom	Ethernet	EUT	Open circuit	1	SFP	3
GND	GND	EUT	GND	1	Unshielded	1

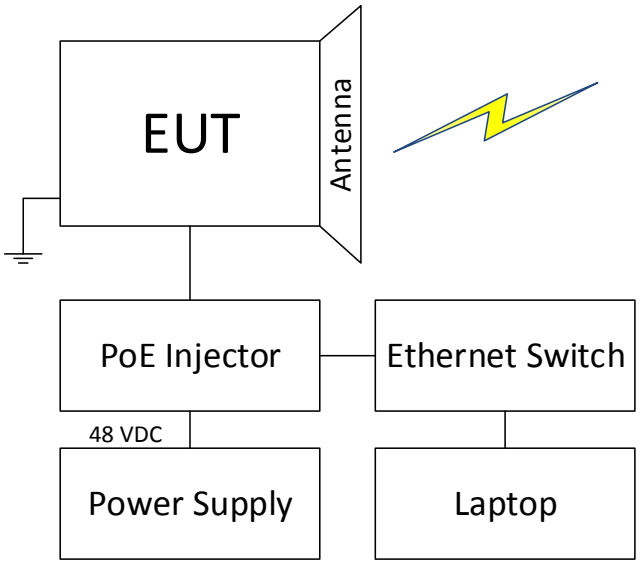
6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
Laptop	Dell	Latitude E6400	F553CA00
PoE Injector	Flex Ltd.	MK-7491-0	F553C1800
Power Supply 48VDC	Advice	ASB-4807T	AD8844
Ethernet Switch	D-Link	DES-108A	QSOV1C-1858

6.4 Changes made in the EUT

No changes were performed in the EUT during testing.

6.5 Test configuration



6.6 Transmitter characteristics

Type of equipment	
V	Stand-alone (Equipment with or without its own control provisions)
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)
	Plug-in card (Equipment intended for a variety of host systems)

Intended use		**Condition of use**
V	fixed	Always at a distance more than 2 m from all people
	mobile	Always at a distance more than 20 cm from all people
	portable	May operate at a distance closer than 20 cm to human body

Assigned frequency range	57000 -66000 MHz
Operating frequency range	57025 -65975 MHz
RF channel spacing	50/100/250/500 MHz

Maximum rated output power	At transmitter 50 Ω RF output connector	9.77 dBm (peak) and 5.88 dBm (average) at 61500 MHz at 250 MHz OBW
	EIRP with maximum declared antenna gain	48.77 dBm (peak) and 44.88 dBm (average) at 61500 MHz at 250 MHz OBW

Is transmitter output power variable?		No		
	V	Yes		continuous variable
			V	stepped variable with stepsize: 1.0 dB
				minimum RF power: -7 dBm
				maximum RF power: 5 dBm

Antenna connection			
unique coupling	standard connector	**V** Integral	with temporary RF connector
			without temporary RF connector

Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Integral	CERAGON Networks Inc.	AN-4206-1	38-39 dBi

Transmitter aggregate data rate/s, Mbps								
Transmitter 99% power bandwidth	Type of modulation							
	BPSK	4QAM	8QAM	16QAM	32QAM	64QAM	128QAM	256QAM
50 MHz	34.642	72.142	106.896	145.119	190.652	230.827	269.447	NA
100 MHz	69.283	144.284	213.792	290.238	381.305	467.777	546.775	615.520
250 MHz	179.679	374.154	554.382	752.598	989.108	1213.138	1460.154	1636.975
500MHz	359.358	748.309	1108.763	1505.196	1978.216	2426.277	NA	NA
Transmitter 99% power bandwidth	Power setting							
	BPSK	4QAM	8QAM	16QAM	32QAM	64QAM	128QAM	256QAM
50 MHz	5	5	5	5	5	4	3	NA
100 MHz	5	5	5	5	5	4	3	0
250 MHz	5	5	5	3	3	2	1	-2
500 MHz	5	5	5	2	2	1	NA	NA

Type of multiplexing	OFDMA / FDD
Modulating test signal (baseband)	PRBS
Maximum transmitter duty cycle in normal use	100 %

Transmitter power source			
V	DC	Nominal rated voltage	PoE (- DC 48 VDC)
V	AC	Nominal rated voltage	NA
Common power source for transmitter and receiver		V	yes

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

7 Transmitter tests

7.1 Transmitter power test

7.1.1 General

This test was performed to measure the peak output power. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Output power limits

Assigned frequency range, MHz	Emission bandwidth, MHz	Maximum output power			
		Peak conducted output power		EIRP, dBm*	
		mW	dBm	Peak	Average
57000 – 66000	>100	500	27.0	61	58
	50	250**	24.0**	58	55

*EIRP limit was calculated as follows:
Average power: 82 dBm – 2 dB x (51-39) = 58 dBm
Peak power: 85 dBm – 2 dB x (51-39) = 61 dBm.
** Transmitters with an emission bandwidth of 50 MHz must limit their peak transmitter conducted output power to the product of 500 mW times their emission bandwidth divided by 100 MHz.

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

7.1.2.2 The EUT was adjusted to produce maximum available for end user RF output power.

7.1.2.3 The average and peak voltage was measured at the low and high frequency channels with oscilloscope connected to RF detector and provided in the associated plots.

7.1.2.4 The step 7.1.2.3 was repeated for all modulations and emissions bandwidth.

7.1.2.5 The unmodulated signal was applied to Zero-Biased Detector via variable attenuator as shown in Figure 7.1.2.

7.1.2.6 The variable attenuator was adjusted such that the oscilloscope indicated a voltage equal to the peak voltage recorded in the step 7.1.2.3.

7.1.2.7 The variable attenuator was disconnected from the Zero-Biased Detector.

7.1.2.8 Without changing any settings, the variable attenuator was connected to a power meter as shown in Figure 7.1.3.

7.1.2.9 The power was measured and results were recorded in the associated tables.

7.1.2.10 The steps 7.1.2.5 through 7.1.2.9 were repeated for the average voltage recorded in the step 7.1.2.3 and 7.1.2.4.

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Figure 7.1.1 Peak output power test setup

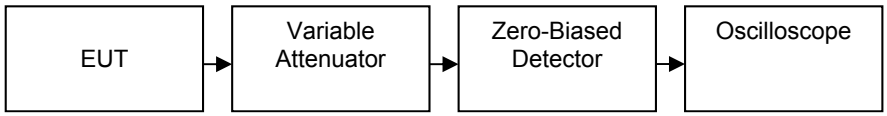


Figure 7.1.2 Peak output power test setup

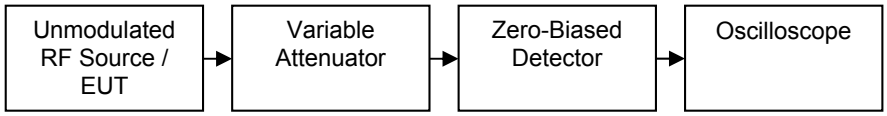
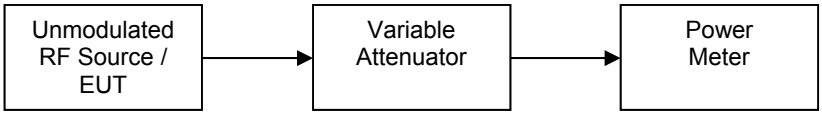


Figure 7.1.3 Peak output power test setup



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Table 7.1.2 Peak output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 50 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Antenna Gain, dBi	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
Modulation 2QAM								
57025	0.005261	56.0	8.64	39.0	47.64	58.0	-10.36	Pass
61500	0.004878	62.4	9.67	39.0	48.67	58.0	-9.33	Pass
65975	0.004547	67.2	8.60	39.0	47.60	58.0	-10.40	Pass
Modulation 4QAM								
57025	0.005261	57.6	8.76	39.0	47.76	58.0	-10.24	Pass
61500	0.004878	60.8	9.56	39.0	48.56	58.0	-9.44	Pass
65975	0.004547	68.0	8.65	39.0	47.65	58.0	-10.35	Pass
Modulation 8QAM								
57025	0.005261	52.0	8.32	39.0	47.32	58.0	-10.68	Pass
61500	0.004878	61.6	9.61	39.0	48.61	58.0	-9.39	Pass
65975	0.004547	67.2	8.60	39.0	47.60	58.0	-10.40	Pass
Modulation 16QAM								
57025	0.005261	43.9	7.58	39.0	46.58	58.0	-11.42	Pass
61500	0.004878	58.4	9.38	39.0	48.38	58.0	-9.62	Pass
65975	0.004547	63.2	8.34	39.0	47.34	58.0	-10.66	Pass
Modulation 32QAM								
57025	0.005261	43.1	7.50	39.0	46.50	58.0	-11.50	Pass
61500	0.004878	56.8	9.26	39.0	48.26	58.0	-9.74	Pass
65975	0.004547	61.6	8.22	39.0	47.22	58.0	-10.78	Pass
Modulation 64QAM								
57025	0.005261	47.1	7.89	39.0	46.89	58.0	-11.11	Pass
61500	0.004878	57.6	9.32	39.0	48.32	58.0	-9.68	Pass
65975	0.004547	61.6	8.22	39.0	47.22	58.0	-10.78	Pass
Modulation 128QAM								
57025	0.005261	41.5	7.34	39.0	46.34	58.0	-11.66	Pass
61500	0.004878	52.0	8.88	39.0	47.88	58.0	-10.12	Pass
65975	0.004547	55.2	7.75	39.0	46.75	58.0	-11.25	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - EIRP= Power Meter reading (dBm)+ Antenna Gain (dBi)
**** - Margin = EIRP – Limit

Test specification:	**Section 15.255(b)(ii),(d), Transmitter power and power spectral density**		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	**Relative Humidity:** 46 %	**Air Pressure:** 1009 hPa	**Power:** -48 VDC
Remarks:			

Table 7.1.3 Peak output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 100 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Antenna Gain, dBi	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
Modulation 2QAM								
57050	0.005259	53.6	8.46	39.0	47.46	61.0	-13.54	Pass
61500	0.004878	61.6	9.61	39.0	48.61	61.0	-12.39	Pass
65950	0.004549	68.0	8.66	39.0	47.66	61.0	-13.34	Pass
Modulation 4QAM								
57050	0.005259	55.2	8.58	39.0	47.58	61.0	-13.42	Pass
61500	0.004878	62.4	9.67	39.0	48.67	61.0	-12.33	Pass
65950	0.004549	68.0	8.66	39.0	47.66	61.0	-13.34	Pass
Modulation 8QAM								
57050	0.005259	51.2	8.26	39.0	47.26	61.0	-13.74	Pass
61500	0.004878	60.8	9.56	39.0	48.56	61.0	-12.44	Pass
65950	0.004549	68.0	8.66	39.0	47.66	61.0	-13.34	Pass
Modulation 16QAM								
57050	0.005259	46.3	7.82	39.0	46.82	61.0	-14.18	Pass
61500	0.004878	57.6	9.32	39.0	48.32	61.0	-12.68	Pass
65950	0.004549	64.0	8.40	39.0	47.40	61.0	-13.60	Pass
Modulation 32QAM								
57050	0.005259	43.1	7.51	39.0	46.51	61.0	-14.49	Pass
61500	0.004878	56.8	9.26	39.0	48.26	61.0	-12.74	Pass
65950	0.004549	64.0	8.40	39.0	47.40	61.0	-13.60	Pass
Modulation 64QAM								
57050	0.005259	47.1	7.90	39.0	46.90	61.0	-14.10	Pass
61500	0.004878	56.8	9.26	39.0	48.26	61.0	-12.74	Pass
65950	0.004549	64.8	8.45	39.0	47.45	61.0	-13.55	Pass
Modulation 128QAM								
57050	0.005259	43.9	7.59	39.0	46.59	61.0	-14.41	Pass
61500	0.004878	52.0	8.88	39.0	47.88	61.0	-13.12	Pass
65950	0.004549	56.8	7.88	39.0	46.88	61.0	-14.12	Pass
Modulation 256QAM								
57050	0.005259	29.5	5.86	39.0	44.86	61.0	-16.14	Pass
61500	0.004878	34.3	7.07	39.0	46.07	61.0	-14.93	Pass
65950	0.004549	40.7	6.43	39.0	45.43	61.0	-15.57	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - EIRP= Power Meter reading (dBm)+ Antenna Gain (dBi)
**** - Margin = EIRP – Limit

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Table 7.1.4 Peak output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 250 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Antenna Gain, dBi	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
Modulation 2QAM								
57125	0.005252	62.2	9.13	39.0	48.13	61.0	-12.87	Pass
61500	0.004878	63.8	9.77	39.0	48.77	61.0	-12.23	Pass
65875	0.004554	71.0	8.88	39.0	47.88	61.0	-13.12	Pass
Modulation 4QAM								
57125	0.005252	63.0	9.18	39.0	48.18	61.0	-12.82	Pass
61500	0.004878	63.8	9.77	39.0	48.77	61.0	-12.23	Pass
65875	0.004554	70.2	8.83	39.0	47.83	61.0	-13.17	Pass
Modulation 8QAM								
57125	0.005252	59.8	8.96	39.0	47.96	61.0	-13.04	Pass
61500	0.004878	63.0	9.71	39.0	48.71	61.0	-12.29	Pass
65875	0.004554	70.5	8.85	39.0	47.85	61.0	-13.15	Pass
Modulation 16QAM								
57125	0.005252	46.9	7.90	39.0	46.90	61.0	-14.10	Pass
61500	0.004878	50.1	8.72	39.0	47.72	61.0	-13.28	Pass
65875	0.004554	58.1	8.01	39.0	47.01	61.0	-13.99	Pass
Modulation 32QAM								
57125	0.005252	47.7	7.97	39.0	46.97	61.0	-14.03	Pass
61500	0.004878	50.1	8.72	39.0	47.72	61.0	-13.28	Pass
65875	0.004554	54.9	7.76	39.0	46.76	61.0	-14.24	Pass
Modulation 64QAM								
57125	0.005252	42.9	7.51	39.0	46.51	61.0	-14.49	Pass
61500	0.004878	50.9	8.78	39.0	47.78	61.0	-13.22	Pass
63875	0.004697	53.3	8.26	39.0	47.26	61.0	-13.74	Pass
65875	0.004554	54.1	7.70	39.0	46.70	61.0	-14.30	Pass
Modulation 128QAM								
57125	0.005252	38.9	7.09	39.0	46.09	61.0	-14.91	Pass
61500	0.004878	42.9	8.04	39.0	47.04	61.0	-13.96	Pass
65875	0.004554	47.7	7.15	39.0	46.15	61.0	-14.85	Pass
Modulation 256QAM								
57125	0.005252	24.4	5.06	39.0	44.06	61.0	-16.94	Pass
61500	0.004878	28.4	6.25	39.0	45.25	61.0	-15.75	Pass
65875	0.004554	34.0	5.68	39.0	44.68	61.0	-16.32	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - EIRP= Power Meter reading (dBm)+ Antenna Gain (dBi)
**** - Margin = EIRP – Limit

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Table 7.1.5 Peak output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 500 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Antenna Gain, dBi	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
Modulation 2QAM								
57250	0.005240	56.0	8.64	39.0	47.64	61	-13.36	Pass
61500	0.004878	62.4	9.67	39.0	48.67	61	-12.33	Pass
65750	0.004563	67.2	8.60	39.0	47.60	61	-13.40	Pass
Modulation 4QAM								
57250	0.005240	57.6	8.76	39.0	47.76	61	-13.24	Pass
61500	0.004878	60.8	9.56	39.0	48.56	61	-12.44	Pass
65750	0.004563	68.0	8.65	39.0	47.65	61	-13.35	Pass
Modulation 8QAM								
57250	0.005240	52.0	8.32	39.0	47.32	61	-13.68	Pass
61500	0.004878	61.6	9.61	39.0	48.61	61	-12.39	Pass
65750	0.004563	67.2	8.60	39.0	47.60	61	-13.40	Pass
Modulation 16QAM								
57250	0.005240	43.9	7.58	39.0	46.58	61	-14.42	Pass
61500	0.004878	58.4	9.38	39.0	48.38	61	-12.62	Pass
65750	0.004563	63.2	8.34	39.0	47.34	61	-13.66	Pass
Modulation 32QAM								
57250	0.005240	43.1	7.50	39.0	46.50	61	-14.50	Pass
61500	0.004878	56.8	9.26	39.0	48.26	61	-12.74	Pass
65750	0.004563	61.6	8.22	39.0	47.22	61	-13.78	Pass
Modulation 64QAM								
57250	0.005240	47.1	7.89	39.0	46.89	61	-14.11	Pass
61500	0.004878	57.6	9.32	39.0	48.32	61	-12.68	Pass
65750	0.004563	61.6	8.22	39.0	47.22	61	-13.78	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - EIRP= Power Meter reading (dBm)+ Antenna Gain (dBi)
**** - Margin = EIRP – Limit

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Table 7.1.6 Average output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Average
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 50 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Antenna Gain, dBi	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
Modulation 2QAM								
57025	0.005261	14.9	2.89	39.0	41.89	55.0	-13.11	Pass
61500	0.004878	22.6	5.26	39.0	44.26	55.0	-10.74	Pass
65975	0.004547	27.5	4.72	39.0	43.72	55.0	-11.28	Pass
Modulation 4QAM								
57025	0.005261	14.9	2.89	39.0	41.89	55.0	-13.11	Pass
61500	0.004878	22.8	5.30	39.0	44.30	55.0	-10.70	Pass
65975	0.004547	27.7	4.75	39.0	43.75	55.0	-11.25	Pass
Modulation 8QAM								
57025	0.005261	14.4	2.74	39.0	41.74	55.0	-13.26	Pass
61500	0.004878	22.3	5.20	39.0	44.20	55.0	-10.80	Pass
65975	0.004547	27.2	4.67	39.0	43.67	55.0	-11.33	Pass
Modulation 16QAM								
57025	0.005261	14.1	2.65	39.0	41.65	55.0	-13.35	Pass
61500	0.004878	22.4	5.22	39.0	44.22	55.0	-10.78	Pass
65975	0.004547	26.7	4.59	39.0	43.59	55.0	-11.41	Pass
Modulation 32QAM								
57025	0.005261	14.1	2.65	39.0	41.65	55.0	-13.35	Pass
61500	0.004878	22.4	5.22	39.0	44.22	55.0	-10.78	Pass
65975	0.004547	26.7	4.59	39.0	43.59	55.0	-11.41	Pass
Modulation 64QAM								
57025	0.005261	12.47	2.12	39.0	41.12	55.0	-13.88	Pass
61500	0.004878	18.5	4.39	39.0	43.39	55.0	-11.61	Pass
65975	0.004547	22.8	3.91	39.0	42.91	55.0	-12.09	Pass
Modulation 128QAM								
57025	0.005261	11.25	1.67	39.0	40.67	55.0	-14.33	Pass
61500	0.004878	15.8	3.70	39.0	42.70	55.0	-12.30	Pass
65975	0.004547	19.2	3.16	39.0	42.16	55.0	-12.84	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - EIRP= Power Meter reading (dBm)+ Antenna Gain (dBi)
**** - Margin = EIRP – Limit

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Table 7.1.7 Average output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Average
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 100 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Antenna Gain, dBi	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
Modulation 2QAM								
57050	0.005259	15.0	2.93	39.0	41.93	58.0	-16.07	Pass
61500	0.004878	22.7	5.28	39.0	44.28	58.0	-13.72	Pass
65950	0.004549	27.5	4.73	39.0	43.73	58.0	-14.27	Pass
Modulation 4QAM								
57050	0.005259	14.8	2.87	39.0	41.87	58.0	-16.13	Pass
61500	0.004878	22.6	5.26	39.0	44.26	58.0	-13.74	Pass
65950	0.004549	27.3	4.70	39.0	43.70	58.0	-14.30	Pass
Modulation 8QAM								
57050	0.005259	14.3	2.72	39.0	41.72	58.0	-16.28	Pass
61500	0.004878	22.2	5.18	39.0	44.18	58.0	-13.82	Pass
65950	0.004549	26.9	4.63	39.0	43.63	58.0	-14.37	Pass
Modulation 16QAM								
57050	0.005259	14.5	2.78	39.0	41.78	58.0	-16.22	Pass
61500	0.004878	22.4	5.22	39.0	44.22	58.0	-13.78	Pass
65950	0.004549	26.6	4.59	39.0	43.59	58.0	-14.41	Pass
Modulation 32QAM								
57050	0.005259	14.5	2.78	39.0	41.78	58.0	-16.22	Pass
61500	0.004878	22.3	5.20	39.0	44.20	58.0	-13.80	Pass
63950	0.004691	25.7	5.07	39.0	44.07	58.0	-13.93	Pass
65950	0.004549	26.6	4.59	39.0	43.59	58.0	-14.41	Pass
Modulation 64QAM								
57050	0.005259	12.51	2.14	39.0	41.14	58.0	-16.86	Pass
61500	0.004878	18.5	4.39	39.0	43.39	58.0	-14.61	Pass
65950	0.004549	22.5	3.86	39.0	42.86	58.0	-15.14	Pass
Modulation 128QAM								
57050	0.005259	11.46	1.76	39.0	40.76	58.0	-17.24	Pass
61500	0.004878	15.6	3.65	39.0	42.65	58.0	-15.35	Pass
65950	0.004549	19.1	3.15	39.0	42.15	58.0	-15.85	Pass
Modulation 256QAM								
57050	0.005259	7.02	-0.37	39.0	38.63	58.0	-19.37	Pass
61500	0.004878	9.39	1.44	39.0	40.44	58.0	-17.56	Pass
65950	0.004549	11.62	0.99	39.0	39.99	58.0	-18.01	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - EIRP= Power Meter reading (dBm)+ Antenna Gain (dBi)
**** - Margin = EIRP – Limit

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Table 7.1.8 Average output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Average
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 250 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Antenna Gain, dBi	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
Modulation 2QAM								
57125	0.005252	18.9	3.95	39.0	42.95	58.0	-15.05	Pass
61500	0.004878	26.0	5.87	39.0	44.87	58.0	-13.13	Pass
65875	0.004554	32.8	5.52	39.0	44.52	58.0	-13.48	Pass
Modulation 4QAM								
57125	0.005252	18.8	3.93	39.0	42.93	58.0	-15.07	Pass
61500	0.004878	26.1	5.88	39.0	44.88	58.0	-13.12	Pass
65875	0.004554	33.3	5.59	39.0	44.59	58.0	-13.41	Pass
Modulation 8QAM								
57125	0.005252	17.0	3.49	39.0	42.49	58.0	-15.51	Pass
61500	0.004878	25.2	5.73	39.0	44.73	58.0	-13.27	Pass
65875	0.004554	31.2	5.31	39.0	44.31	58.0	-13.69	Pass
Modulation 16QAM								
57125	0.005252	13.6	2.52	39.0	41.52	58.0	-16.48	Pass
61500	0.004878	16.6	3.92	39.0	42.92	58.0	-15.08	Pass
65875	0.004554	21.8	3.75	39.0	42.75	58.0	-15.25	Pass
Modulation 32QAM								
57125	0.005252	13.6	2.52	39.0	41.52	58.0	-16.48	Pass
61500	0.004878	17.1	4.05	39.0	43.05	58.0	-14.95	Pass
65875	0.004554	21.4	3.67	39.0	42.67	58.0	-15.33	Pass
Modulation 64QAM								
57125	0.005252	11.61	1.84	39.0	40.84	58.0	-17.16	Pass
61500	0.004878	14.6	3.36	39.0	42.36	58.0	-15.64	Pass
65875	0.004554	18.3	2.99	39.0	41.99	58.0	-16.01	Pass
Modulation 128QAM								
57125	0.005252	9.96	1.17	39.0	40.17	58.0	-17.83	Pass
61500	0.004878	12.43	2.66	39.0	41.66	58.0	-16.34	Pass
65875	0.004554	15.7	2.32	39.0	41.32	58.0	-16.68	Pass
Modulation 256QAM								
57125	0.005252	5.63	-1.31	39	37.69	58.0	-20.31	Pass
61500	0.004878	7.13	0.25	39	39.25	58.0	-18.75	Pass
65875	0.004554	9.2	0.00	39	39.00	58.0	-19.00	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - EIRP= Power Meter reading (dBm)+ Antenna Gain (dBi)
**** - Margin = EIRP – Limit

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Table 7.1.9 Average output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Average
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 500 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Antenna Gain, dBi	EIRP***, dBm	Limit, dBm	Margin****, dB	Verdict
Modulation 2QAM								
57250	0.005240	16.3	3.35	39.0	42.35	58.0	-15.65	Pass
61500	0.004878	16.2	3.81	39.0	42.81	58.0	-15.19	Pass
65750	0.004563	24.0	4.21	39.0	43.21	58.0	-14.79	Pass
Modulation 4QAM								
57250	0.005240	13.5	2.53	39.0	41.53	58.0	-16.47	Pass
61500	0.004878	18.1	4.29	39.0	43.29	58.0	-14.71	Pass
65750	0.004563	19.7	3.35	39.0	42.35	58.0	-15.65	Pass
Modulation 8QAM								
57250	0.005240	14.3	2.78	39.0	41.78	58.0	-16.22	Pass
61500	0.004878	15.2	3.54	39.0	42.54	58.0	-15.46	Pass
65750	0.004563	24.1	4.23	39.0	43.23	58.0	-14.77	Pass
Modulation 16QAM								
57250	0.005240	9.51	1.01	39.0	40.01	58.0	-17.99	Pass
61500	0.004878	8.64	1.08	39.0	40.08	58.0	-17.92	Pass
65750	0.004563	14.8	2.11	39.0	41.11	58.0	-16.89	Pass
Modulation 32QAM								
57250	0.005240	9.54	1.03	39.0	40.03	58.0	-17.97	Pass
61500	0.004878	8.76	1.14	39.0	40.14	58.0	-17.86	Pass
65750	0.004563	14.9	2.14	39.0	41.14	58.0	-16.86	Pass
Modulation 64QAM								
57250	0.005240	7.95	0.23	39.0	39.23	58.0	-18.77	Pass
61500	0.004878	7.25	0.32	39.0	39.32	58.0	-18.68	Pass
65750	0.004563	12.36	1.33	39.0	40.33	58.0	-17.67	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - EIRP= Power Meter reading (dBm)+ Antenna Gain (dBi)
**** - Margin = EIRP – Limit

Test specification:	**Section 15.255(b)(ii),(d), Transmitter power and power spectral density**		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	**Relative Humidity:** 46 %	**Air Pressure:** 1009 hPa	**Power:** -48 VDC
Remarks:			

Table 7.1.10 Output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Average
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 50 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Output power, dBm	Limit, dBm	Margin***, dB	Verdict
Modulation 2QAM							
57025	0.005261	14.9	2.89	2.89	24.0	-21.11	Pass
61500	0.004878	22.6	5.26	5.26	24.0	-18.74	Pass
65975	0.004547	27.5	4.72	4.72	24.0	-19.28	Pass
Modulation 4QAM							
57025	0.005261	14.9	2.89	2.89	24.0	-21.11	Pass
61500	0.004878	22.8	5.30	5.30	24.0	-18.70	Pass
65975	0.004547	27.7	4.75	4.75	24.0	-19.25	Pass
Modulation 8QAM							
57025	0.005261	14.4	2.74	2.74	24.0	-21.26	Pass
61500	0.004878	22.3	5.20	5.20	24.0	-18.80	Pass
65975	0.004547	27.2	4.67	4.67	24.0	-19.33	Pass
Modulation 16QAM							
57025	0.005261	14.1	2.65	2.65	24.0	-21.35	Pass
61500	0.004878	22.4	5.22	5.22	24.0	-18.78	Pass
65975	0.004547	26.7	4.59	4.59	24.0	-19.41	Pass
Modulation 32QAM							
57025	0.005261	14.1	2.65	2.65	24.0	-21.35	Pass
61500	0.004878	22.4	5.22	5.22	24.0	-18.78	Pass
65975	0.004547	26.7	4.59	4.59	24.0	-19.41	Pass
Modulation 64QAM							
57025	0.005261	12.47	2.12	2.12	24.0	-21.88	Pass
61500	0.004878	18.5	4.39	4.39	24.0	-19.61	Pass
65975	0.004547	22.8	3.91	3.91	24.0	-20.09	Pass
Modulation 128QAM							
57025	0.005261	11.25	1.67	1.67	24.0	-22.33	Pass
61500	0.004878	15.8	3.70	3.70	24.0	-20.30	Pass
65975	0.004547	19.2	3.16	3.16	24.0	-20.84	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - Margin = Output power– Limit

Test specification:	**Section 15.255(b)(ii),(d), Transmitter power and power spectral density**		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	**Relative Humidity:** 46 %	**Air Pressure:** 1009 hPa	**Power:** -48 VDC
Remarks:			

Table 7.1.11 Output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Average
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 100 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Output power, dBm	Limit, dBm	Margin***, dB	Verdict
Modulation 2QAM							
57050	0.005259	15.0	2.93	2.93	27.0	-24.07	Pass
61500	0.004878	22.7	5.28	5.28	27.0	-21.72	Pass
65950	0.004549	27.5	4.73	4.73	27.0	-22.27	Pass
Modulation 4QAM							
57050	0.005259	15.0	2.93	2.93	27.0	-24.07	Pass
61500	0.004878	22.7	5.28	5.28	27.0	-21.72	Pass
65950	0.004549	27.5	4.73	4.73	27.0	-22.27	Pass
Modulation 8QAM							
57050	0.005259	14.3	2.72	2.72	27.0	-24.28	Pass
61500	0.004878	22.2	5.18	5.18	27.0	-21.82	Pass
65950	0.004549	26.9	4.63	4.63	27.0	-22.37	Pass
Modulation 16QAM							
57050	0.005259	14.5	2.78	2.78	27.0	-24.22	Pass
61500	0.004878	22.4	5.22	5.22	27.0	-21.78	Pass
65950	0.004549	26.6	4.59	4.59	27.0	-22.41	Pass
Modulation 32QAM							
57050	0.005259	14.5	2.78	2.78	27.0	-24.22	Pass
61500	0.004878	22.3	5.20	5.20	27.0	-21.80	Pass
65950	0.004549	26.6	4.59	4.59	27.0	-22.41	Pass
Modulation 64QAM							
57050	0.005259	12.51	2.14	2.14	27.0	-24.86	Pass
61500	0.004878	18.5	4.39	4.39	27.0	-22.61	Pass
65950	0.004549	22.5	3.86	3.86	27.0	-23.14	Pass
Modulation 128QAM							
57050	0.005259	11.46	1.76	1.76	27.0	-25.24	Pass
61500	0.004878	15.6	3.65	3.65	27.0	-23.35	Pass
65950	0.004549	19.1	3.15	3.15	27.0	-23.85	Pass
Modulation 256QAM							
57050	0.005259	7.02	-0.37	-0.37	27.0	-27.37	Pass
61500	0.004878	9.39	1.44	1.44	27.0	-25.56	Pass
65950	0.004549	11.62	0.99	0.99	27.0	-26.01	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - Margin = Output power– Limit

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Table 7.1.12 Output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Average
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 250 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Output power, dBm	Limit, dBm	Margin***, dB	Verdict
Modulation 2QAM							
57125	0.005252	18.9	3.95	3.95	27.0	-23.05	Pass
61500	0.004878	26.0	5.87	5.87	27.0	-21.13	Pass
65875	0.004554	32.8	5.52	5.52	27.0	-21.48	Pass
Modulation 4QAM							
57125	0.005252	18.8	3.93	3.93	27.0	-23.07	Pass
61500	0.004878	26.1	5.88	5.88	27.0	-21.12	Pass
65875	0.004554	33.3	5.59	5.59	27.0	-21.41	Pass
Modulation 8QAM							
57125	0.005252	17.0	3.49	3.49	27.0	-23.51	Pass
61500	0.004878	25.2	5.73	5.73	27.0	-21.27	Pass
65875	0.004554	31.2	5.31	5.31	27.0	-21.69	Pass
Modulation 16QAM							
57125	0.005252	13.6	2.52	2.52	27.0	-24.48	Pass
61500	0.004878	16.6	3.92	3.92	27.0	-23.08	Pass
65875	0.004554	21.8	3.75	3.75	27.0	-23.25	Pass
Modulation 32QAM							
57125	0.005252	13.6	2.52	2.52	27.0	-24.48	Pass
61500	0.004878	17.1	4.05	4.05	27.0	-22.95	Pass
65875	0.004554	21.4	3.67	3.67	27.0	-23.33	Pass
Modulation 64QAM							
57125	0.005252	11.61	1.84	1.84	27.0	-25.16	Pass
61500	0.004878	14.6	3.36	3.36	27.0	-23.64	Pass
65875	0.004554	18.3	2.99	2.99	27.0	-24.01	Pass
Modulation 128QAM							
57125	0.005252	9.96	1.17	1.17	27.0	-25.83	Pass
61500	0.004878	12.43	2.66	2.66	27.0	-24.34	Pass
65875	0.004554	15.7	2.32	2.32	27.0	-24.68	Pass
Modulation 256QAM							
57125	0.005252	5.63	-1.31	-1.31	27.0	-28.31	Pass
61500	0.004878	7.13	0.25	0.25	27.0	-26.75	Pass
65875	0.004554	9.2	0.00	0.00	27.0	-27.00	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - Margin = Output power– Limit

Test specification:	**Section 15.255(b)(ii),(d), Transmitter power and power spectral density**		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	**Relative Humidity:** 46 %	**Air Pressure:** 1009 hPa	**Power:** -48 VDC
Remarks:			

Table 7.1.13 Output power test results

OPERATING FREQUENCY RANGE: 57.0 – 66.0 GHz
DETECTOR USED: Average
VIDEO BANDWIDTH: >10 MHz
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
CHANNEL SPECING: 500 MHz

Frequency, MHz	λ*, m	DSO**, mV	Power measured, dBm	Output power, dBm	Limit, dBm	Margin***, dB	Verdict
Modulation 2QAM							
57250	0.005240	16.3	3.35	3.35	27.0	-23.65	Pass
61500	0.004878	16.2	3.81	3.81	27.0	-23.19	Pass
65750	0.004563	24.0	4.21	4.21	27.0	-22.79	Pass
Modulation 4QAM							
57250	0.005240	13.5	2.53	2.53	27.0	-24.47	Pass
61500	0.004878	18.1	4.29	4.29	27.0	-22.71	Pass
65750	0.004563	19.7	3.35	3.35	27.0	-23.65	Pass
Modulation 8QAM							
57250	0.005240	14.3	2.78	2.78	27.0	-24.22	Pass
61500	0.004878	15.2	3.54	3.54	27.0	-23.46	Pass
65750	0.004563	24.1	4.23	4.23	27.0	-22.77	Pass
Modulation 16QAM							
57250	0.005240	9.51	1.01	1.01	27.0	-25.99	Pass
61500	0.004878	8.64	1.08	1.08	27.0	-25.92	Pass
65750	0.004563	14.8	2.11	2.11	27.0	-24.89	Pass
Modulation 32QAM							
57250	0.005240	9.54	1.03	1.03	27.0	-25.97	Pass
61500	0.004878	8.76	1.14	1.14	27.0	-25.86	Pass
65750	0.004563	14.9	2.14	2.14	27.0	-24.86	Pass
Modulation 64QAM							
57250	0.005240	7.95	0.23	0.23	27.0	-26.77	Pass
61500	0.004878	7.25	0.32	0.32	27.0	-26.68	Pass
65750	0.004563	12.36	1.33	1.33	27.0	-25.67	Pass

* - λ = 300/Frequency(MHz)
** - DSO – Digital Storage Oscilloscope
*** - Margin = Output power– Limit

Reference numbers of test equipment used

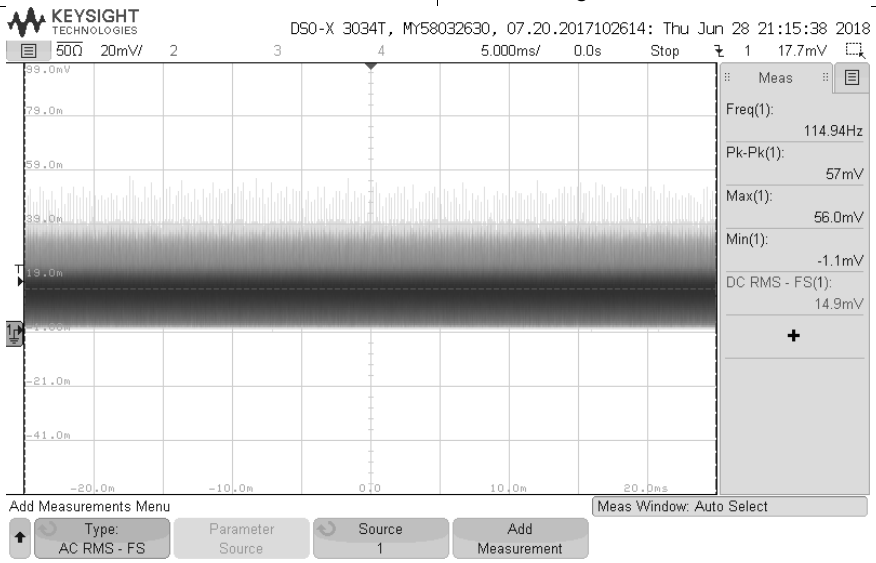
HL 3903	HL 5360	HL 5369			

Full description is given in Appendix A.

Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

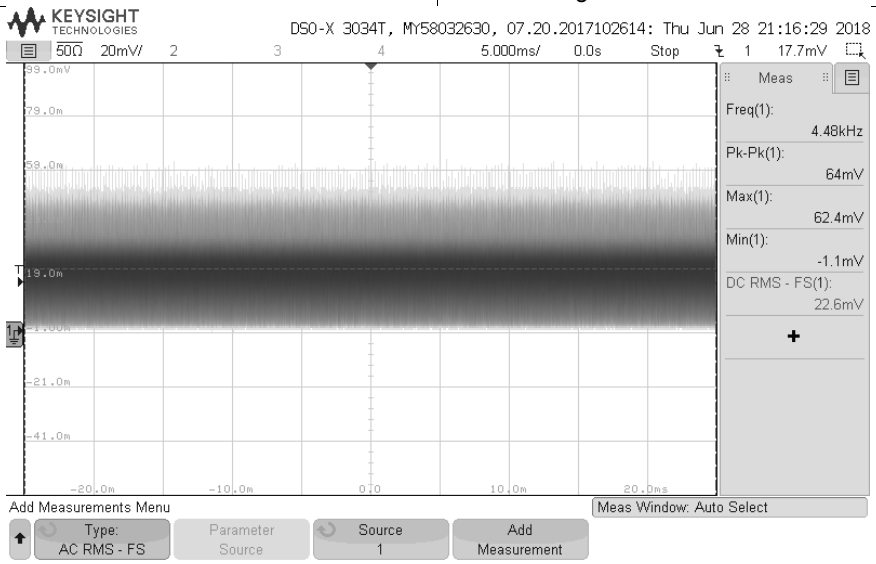
Plot 7.1.1 Output power test result at the low frequency

MODULATION"	2QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Plot 7.1.2 Output power test result at the mid frequency

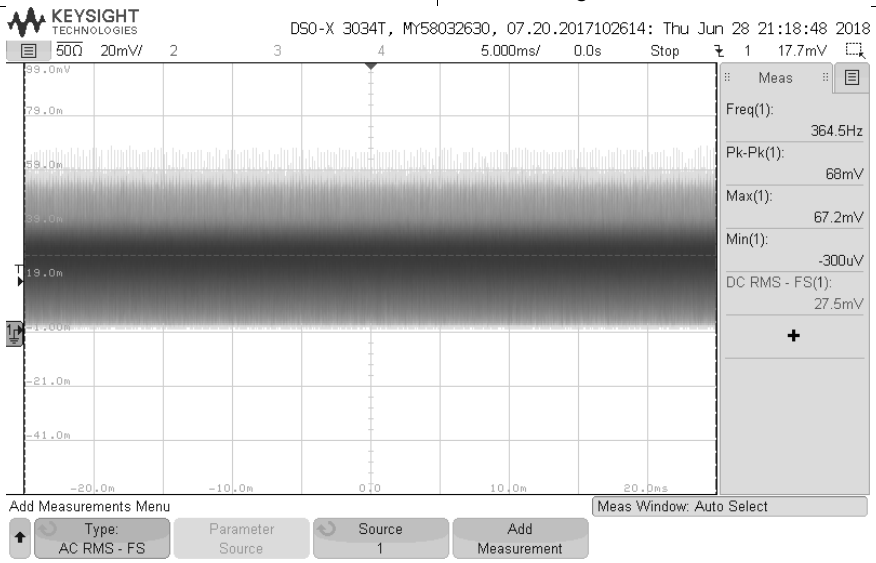
MODULATION"	2QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.3 Output power test result at the high frequency

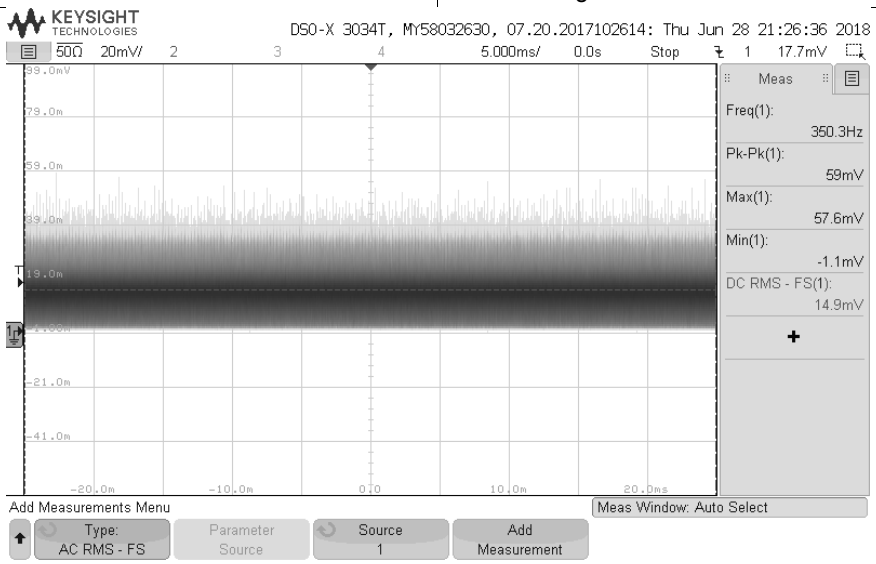
MODULATION"	2QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

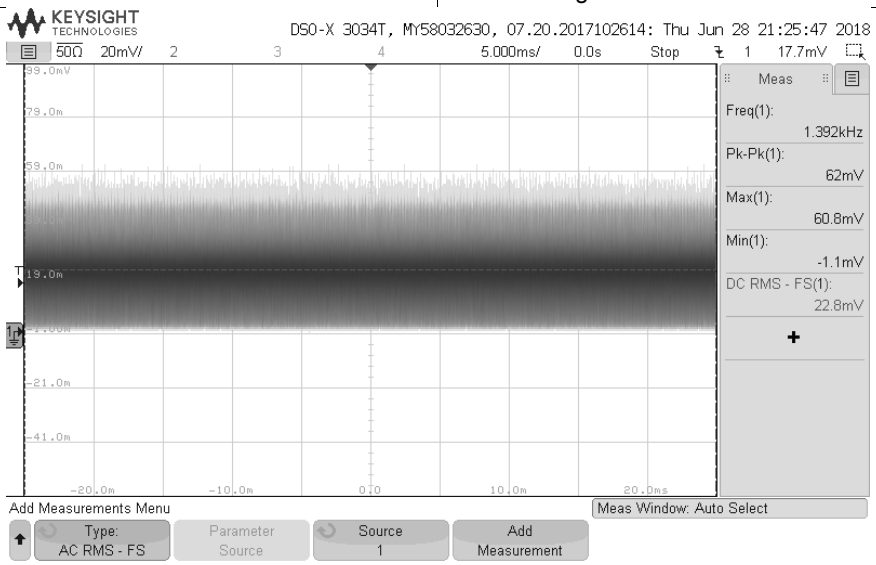
Plot 7.1.4 Output power test result at the low frequency

MODULATION"	4QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Plot 7.1.5 Output power test result at the mid frequency

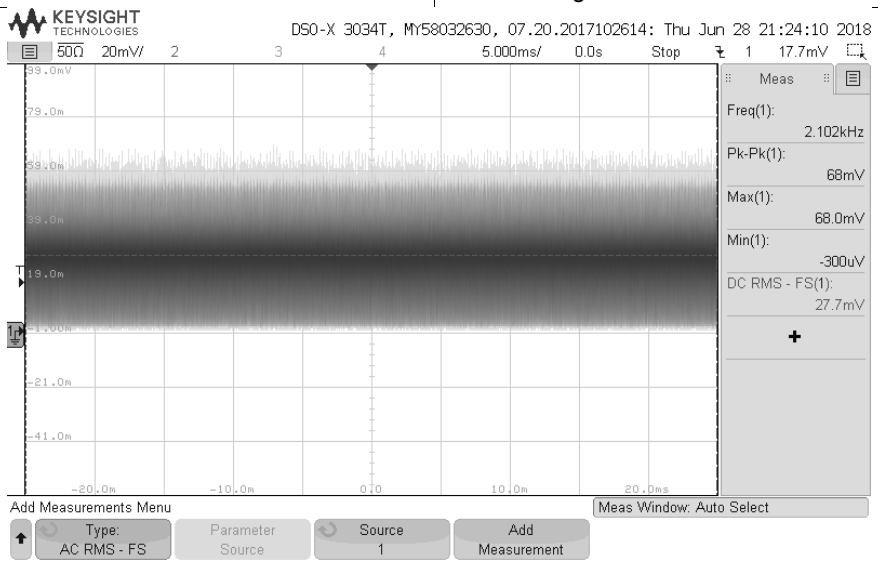
MODULATION"	4QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.6 Output power test result at the high frequency

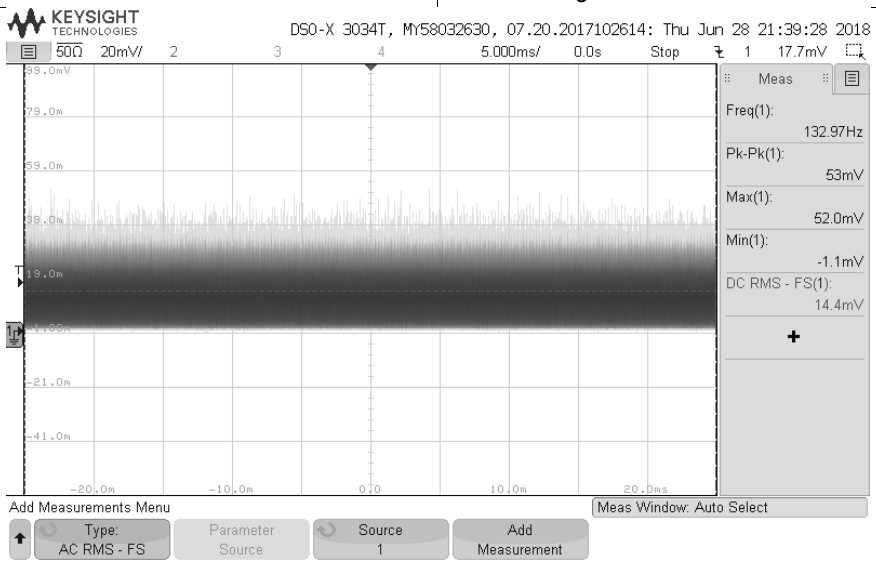
MODULATION"	4QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

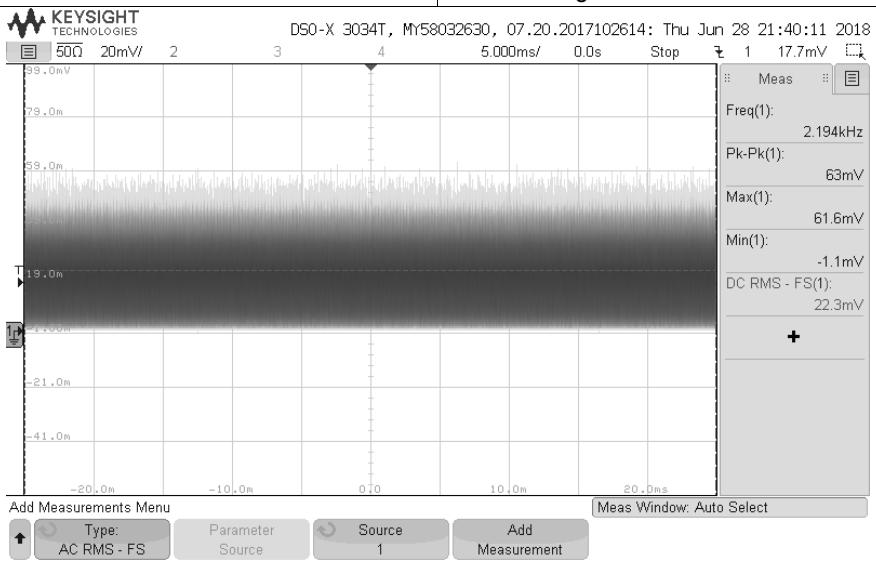
Plot 7.1.7 Output power test result at the low frequency

MODULATION"	8QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Plot 7.1.8 Output power test result at the mid frequency

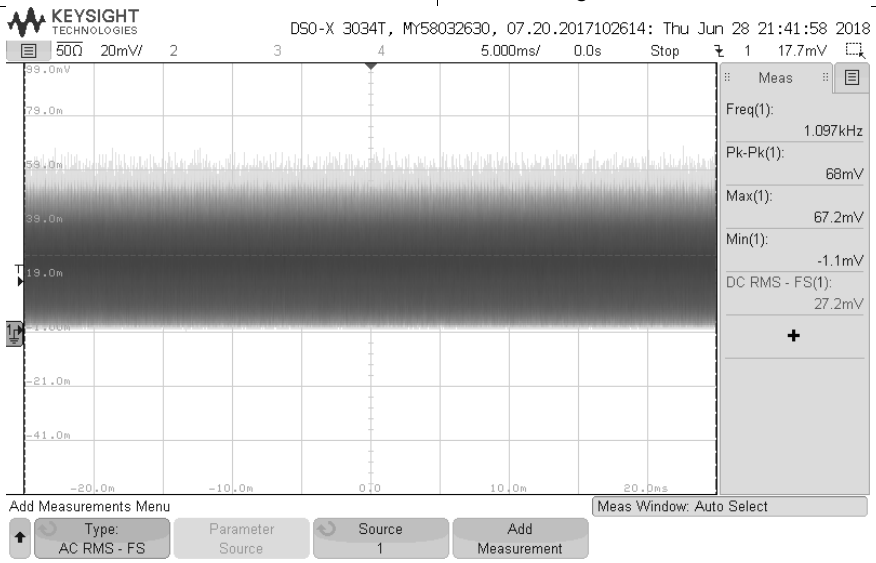
MODULATION"	8QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.9 Output power test result at the high frequency

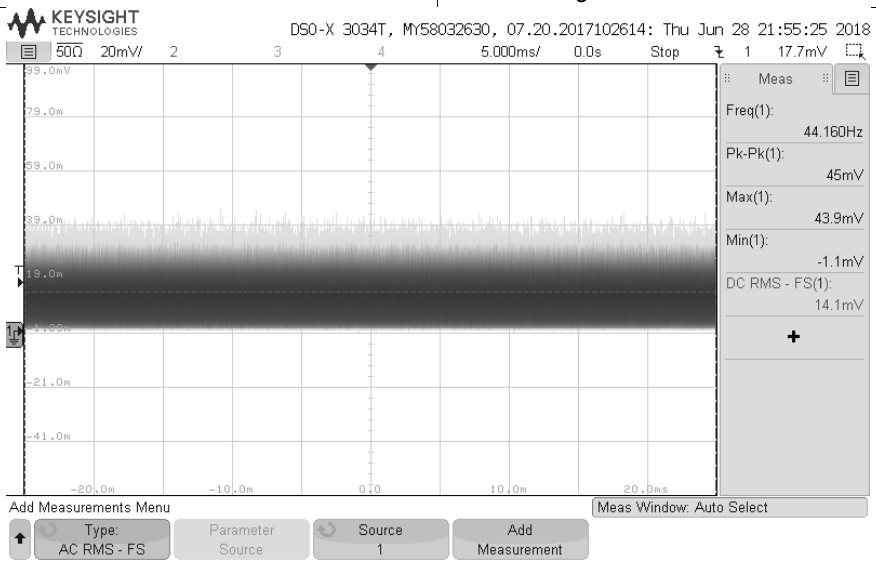
MODULATION"	8QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

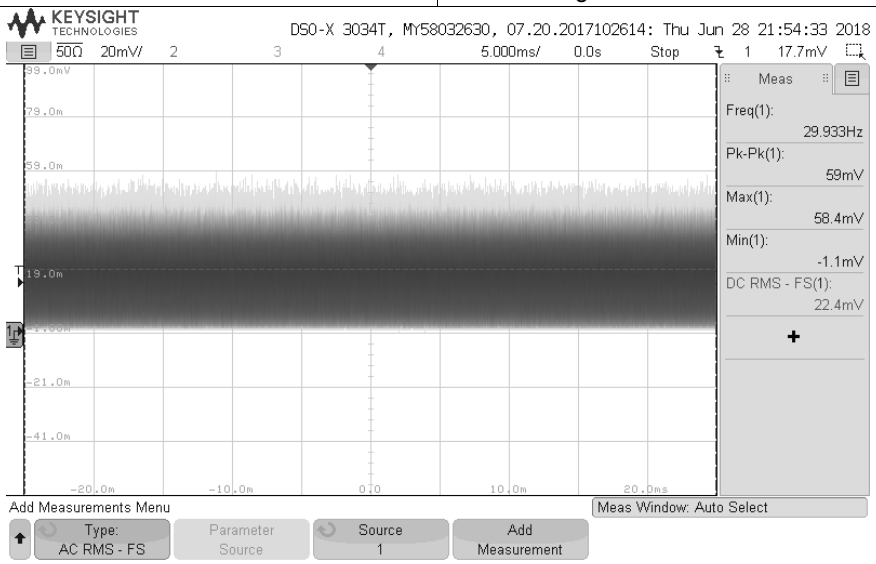
Plot 7.1.10 Output power test result at the low frequency

MODULATION"	16QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Plot 7.1.11 Output power test result at the mid frequency

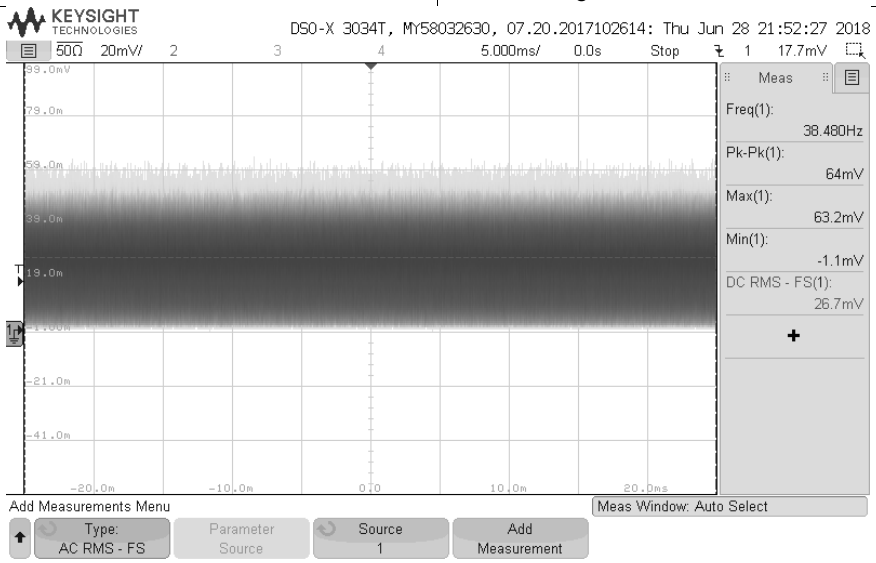
MODULATION"	16QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.12 Output power test result at the high frequency

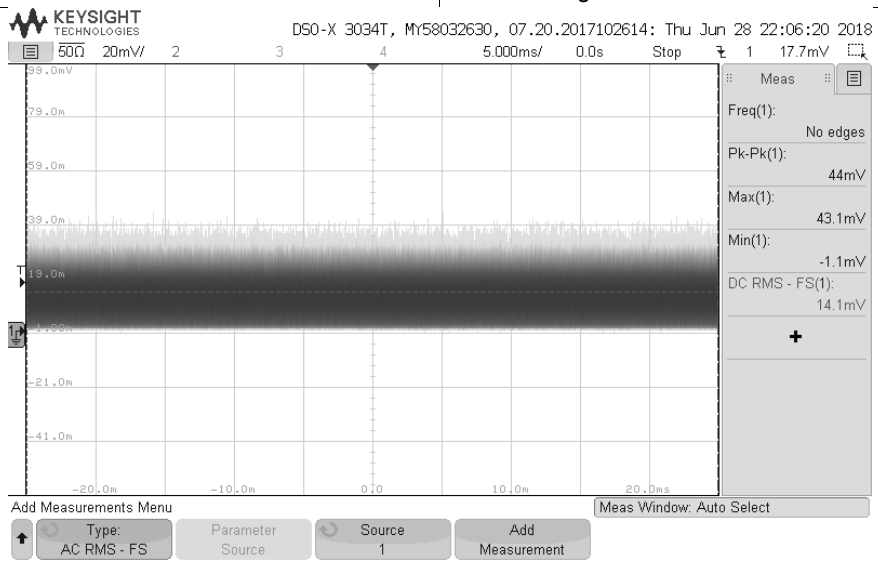
MODULATION"	16QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

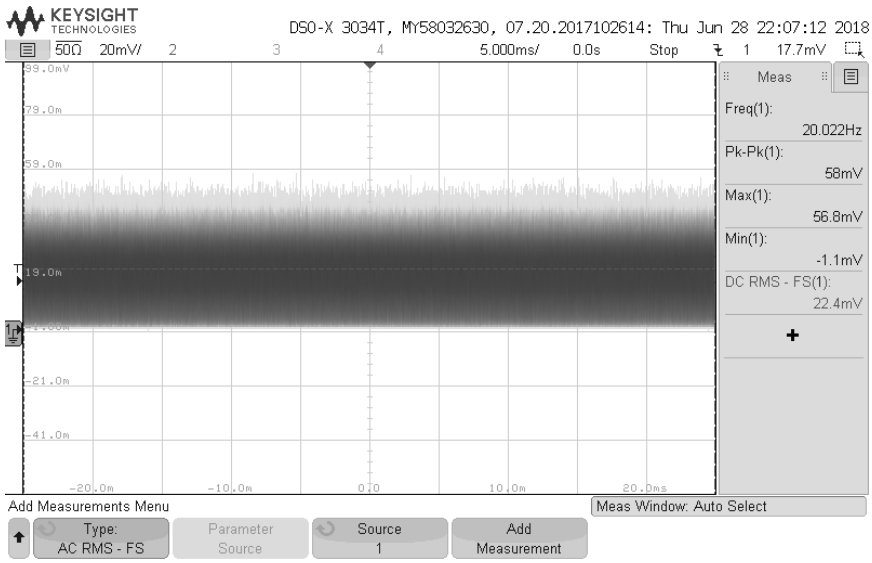
Plot 7.1.13 Output power test result at the low frequency

MODULATION"	32QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Plot 7.1.14 Output power test result at the mid frequency

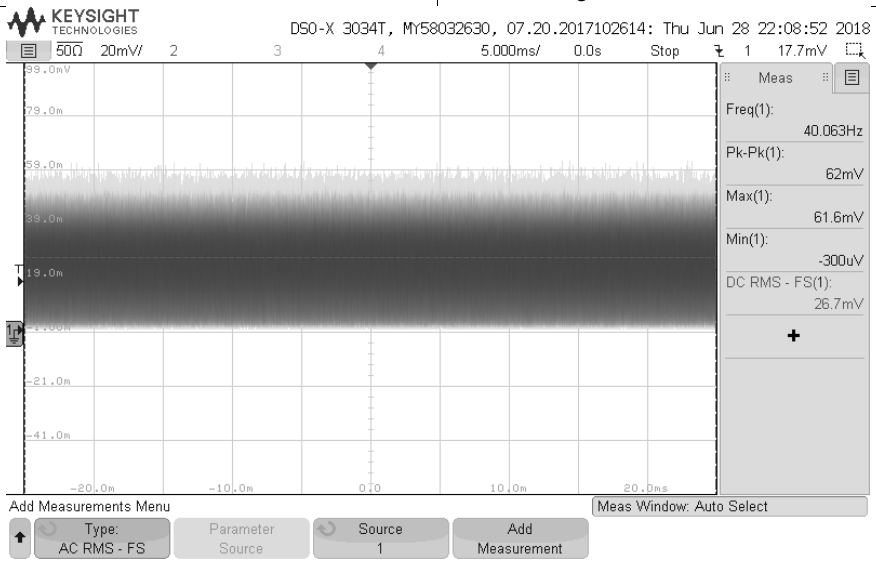
MODULATION"	32QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	**Section 15.255(b)(ii),(d), Transmitter power and power spectral density**		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	**Relative Humidity:** 46 %	**Air Pressure:** 1009 hPa	**Power:** -48 VDC
Remarks:			

Plot 7.1.15 Output power test result at the high frequency

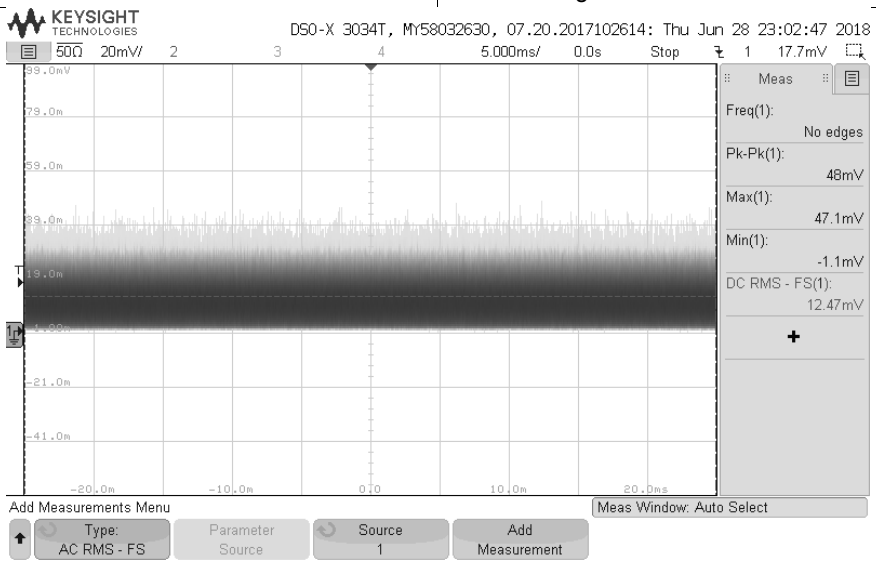
MODULATION"	32QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

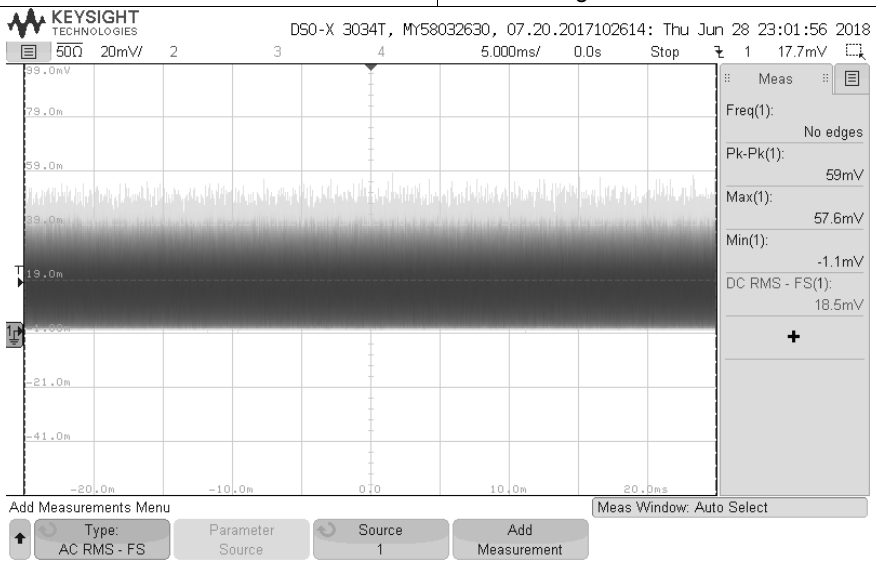
Plot 7.1.16 Output power test result at the low frequency

MODULATION"	64QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Plot 7.1.17 Output power test result at the mid frequency

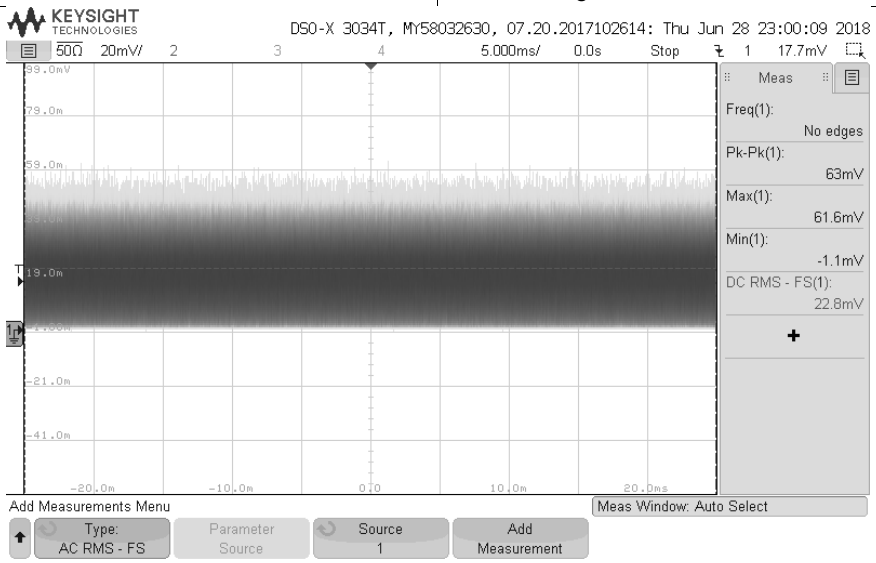
MODULATION"	64QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.18 Output power test result at the high frequency

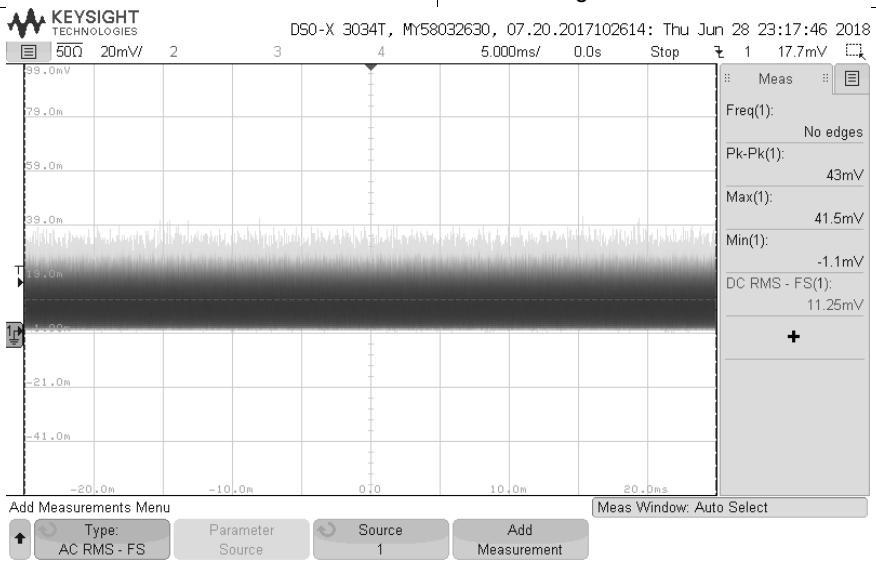
MODULATION"	64QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

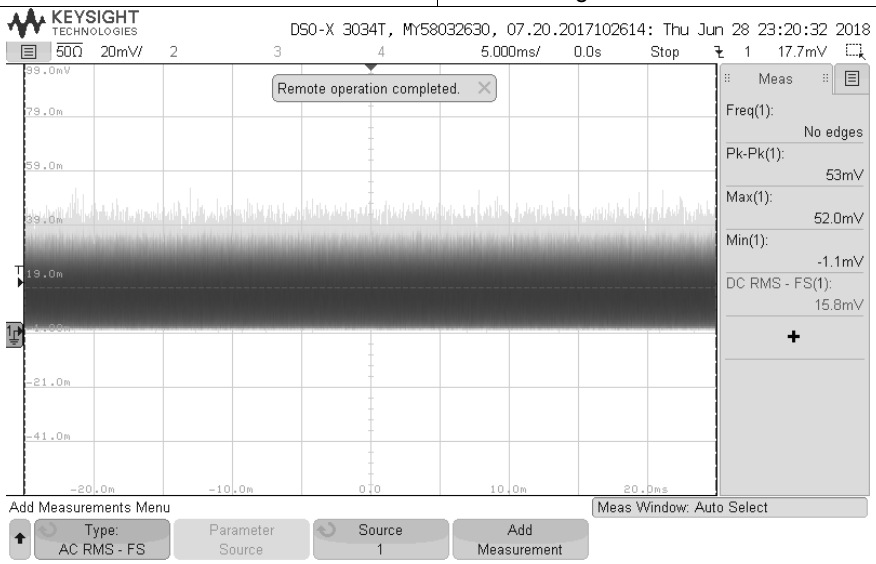
Plot 7.1.19 Output power test result at the low frequency

MODULATION"	128QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Plot 7.1.20 Output power test result at the mid frequency

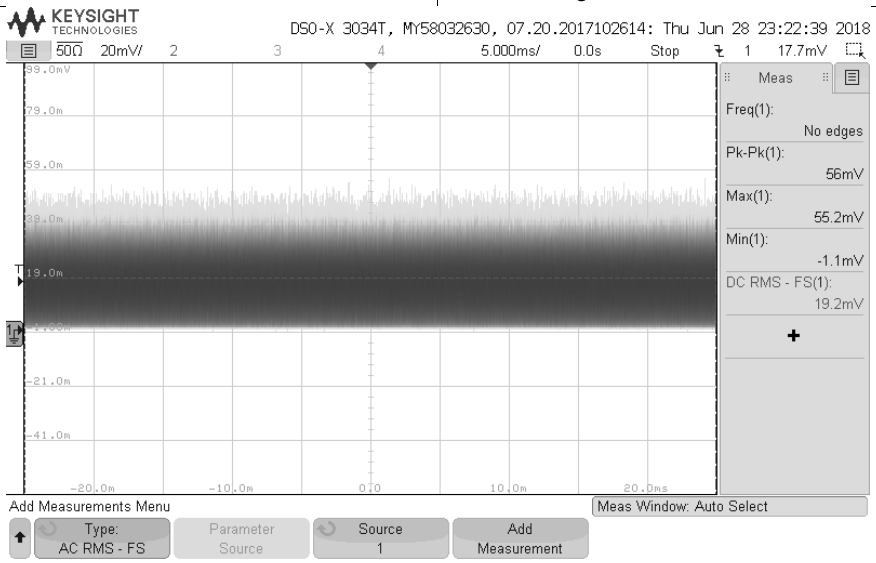
MODULATION"	128QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.21 Output power test result at the high frequency

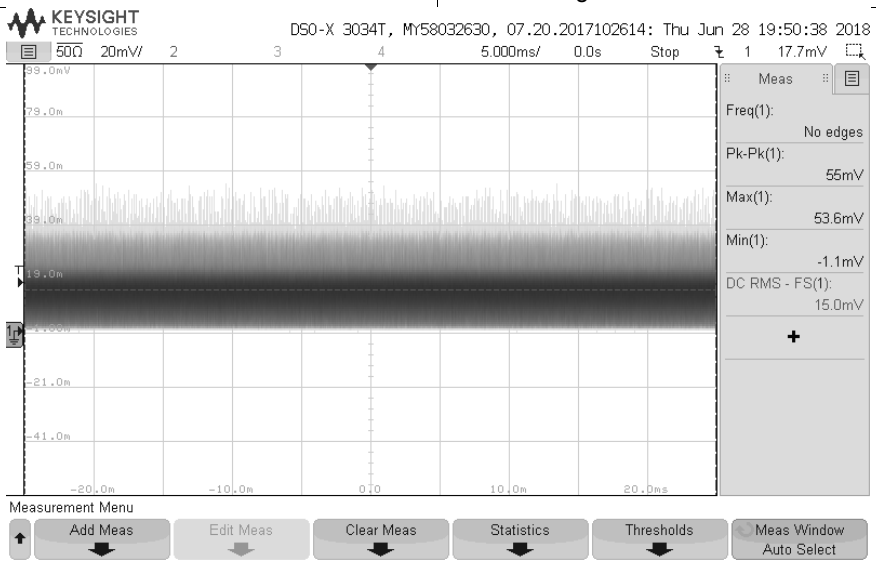
MODULATION"	128QAM
CHANNEL SPACING:	50 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

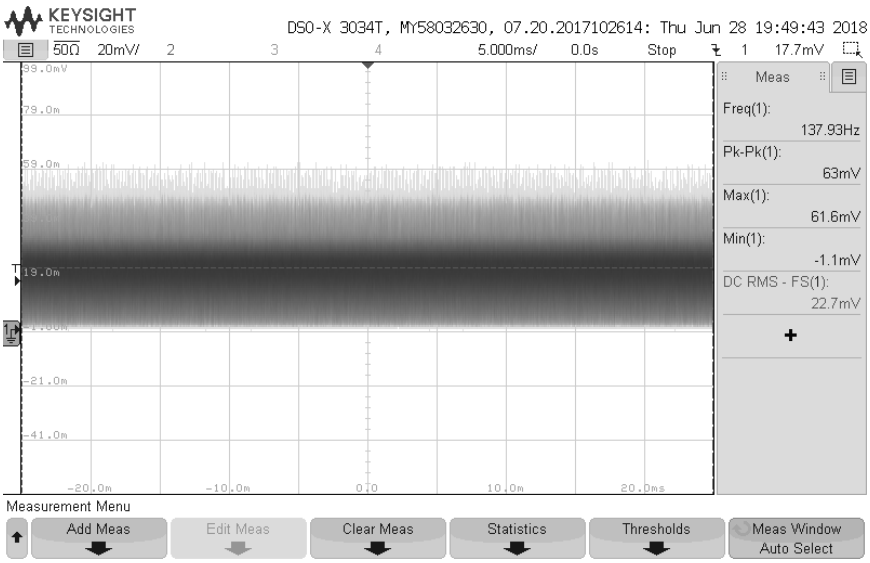
Plot 7.1.22 Output power test result at the low frequency

MODULATION"	2QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Plot 7.1.23 Output power test result at the mid frequency

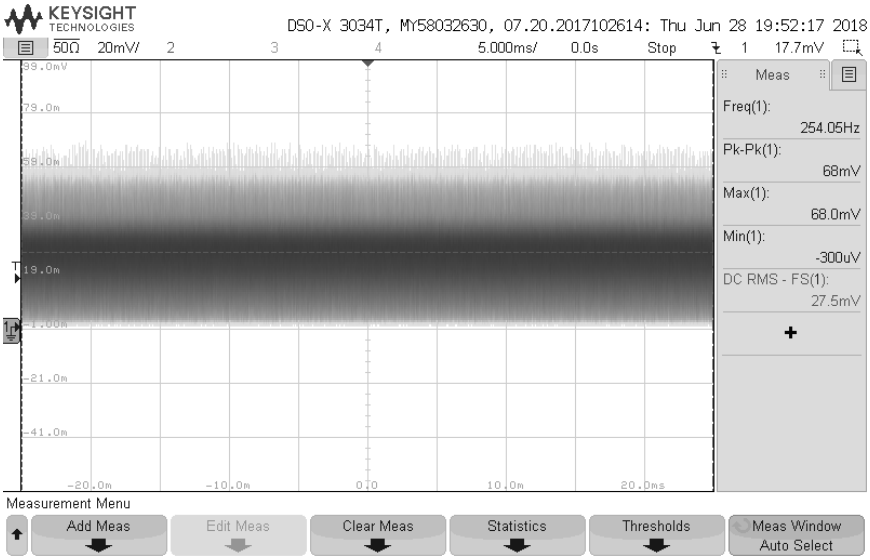
MODULATION"	2QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.24 Output power test result at the high frequency

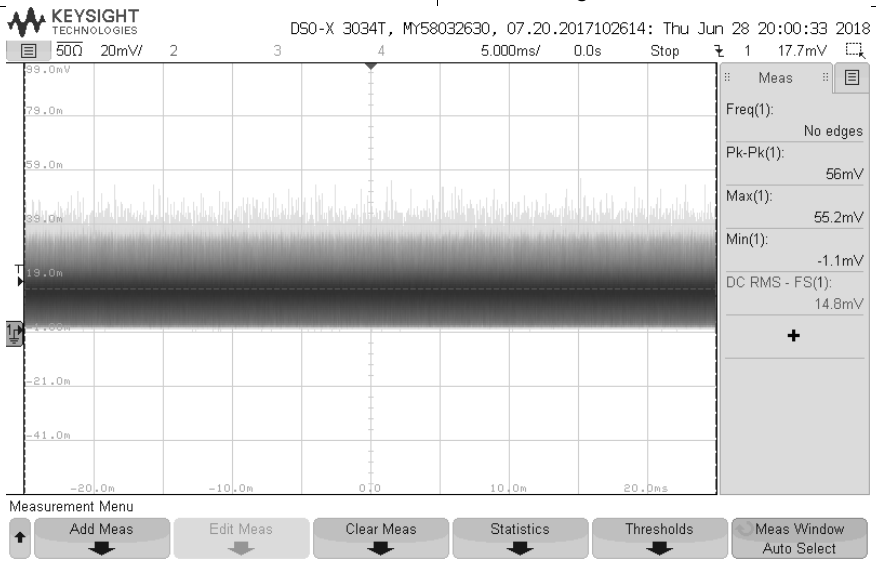
MODULATION”	2QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

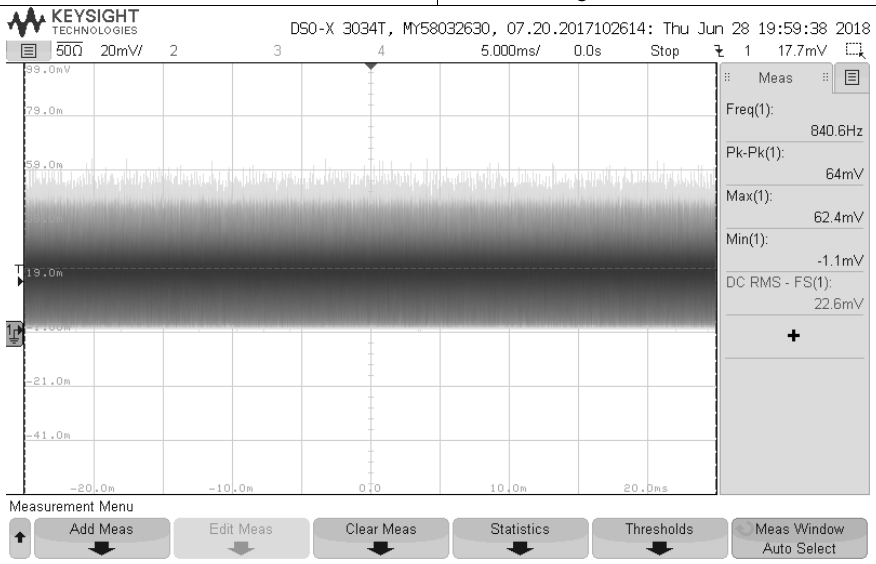
Plot 7.1.25 Output power test result at the low frequency

MODULATION"	4QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Plot 7.1.26 Output power test result at the mid frequency

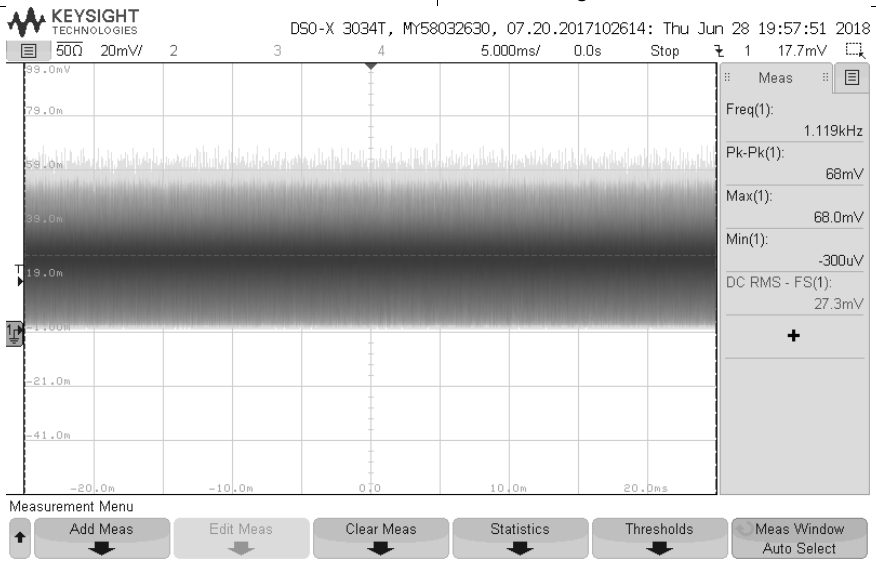
MODULATION"	4QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.27 Output power test result at the high frequency

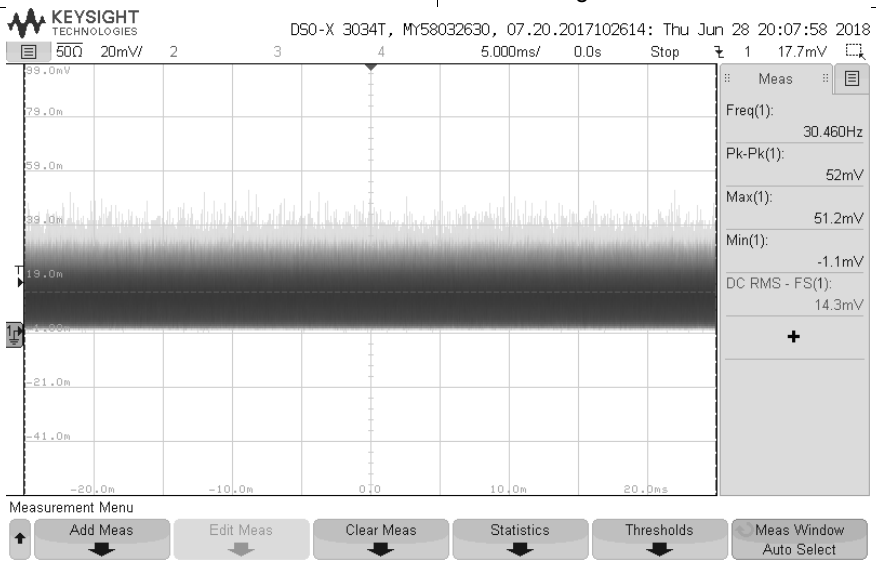
MODULATION"	4QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

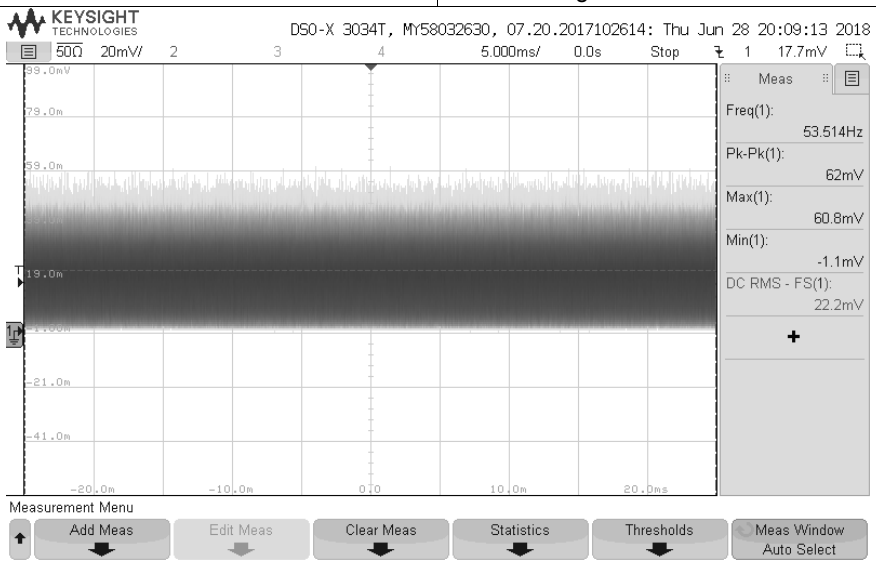
Plot 7.1.28 Output power test result at the low frequency

MODULATION"	8QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Plot 7.1.29 Output power test result at the mid frequency

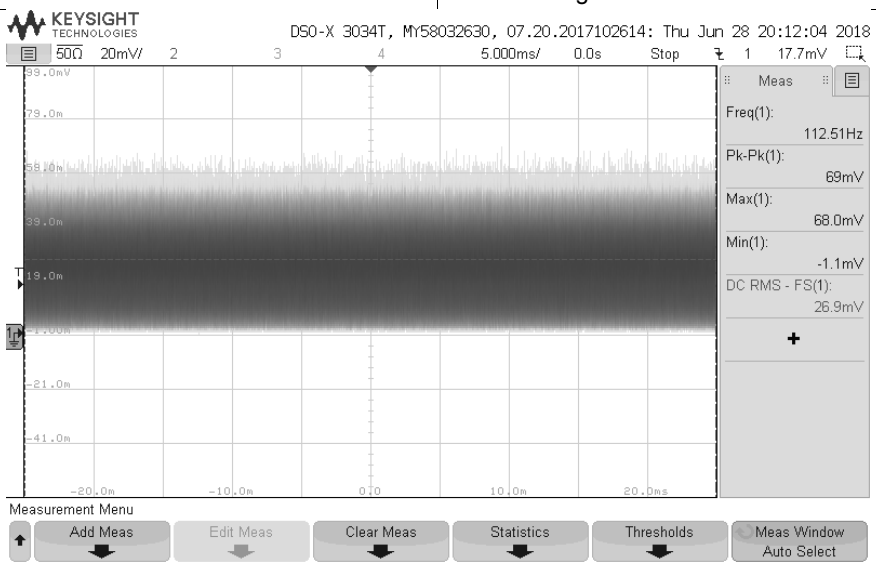
MODULATION"	8QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.30 Output power test result at the high frequency

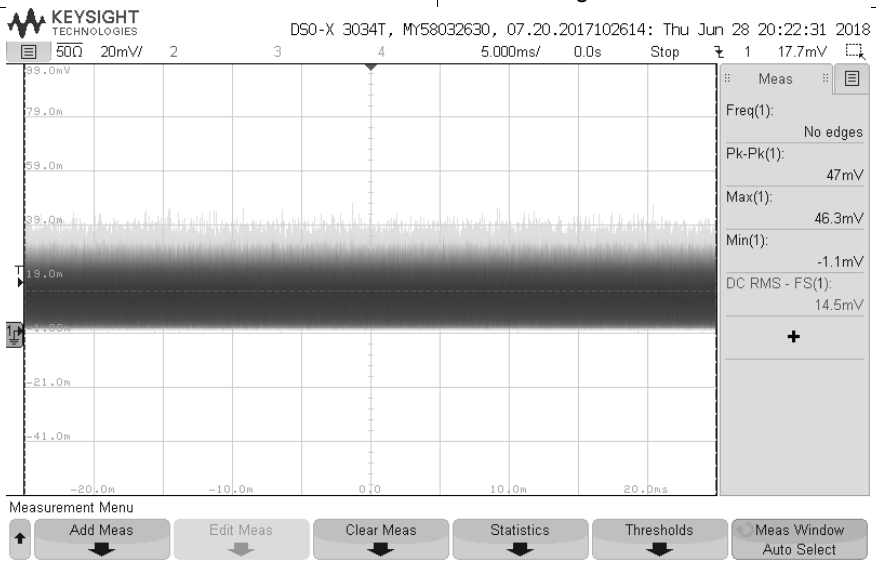
MODULATION"	8QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

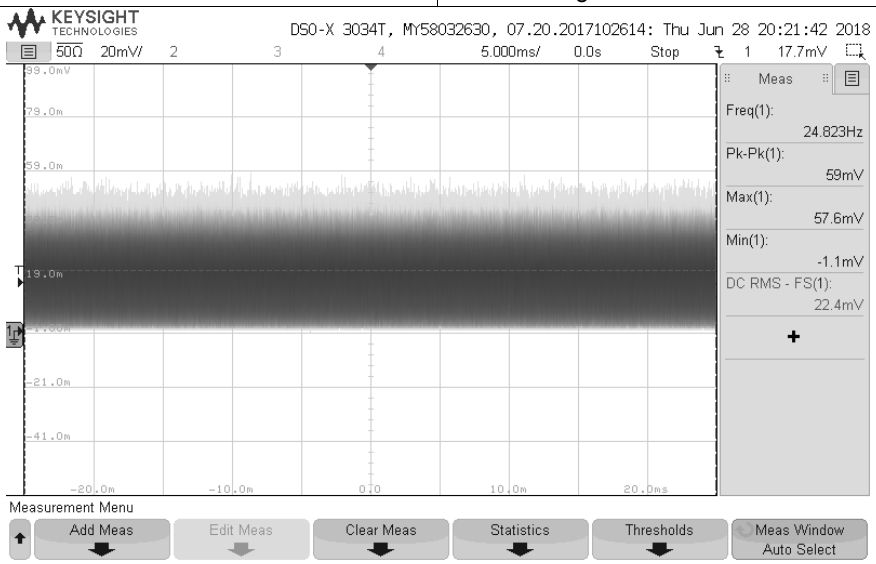
Plot 7.1.31 Output power test result at the low frequency

MODULATION"	16QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Plot 7.1.32 Output power test result at the mid frequency

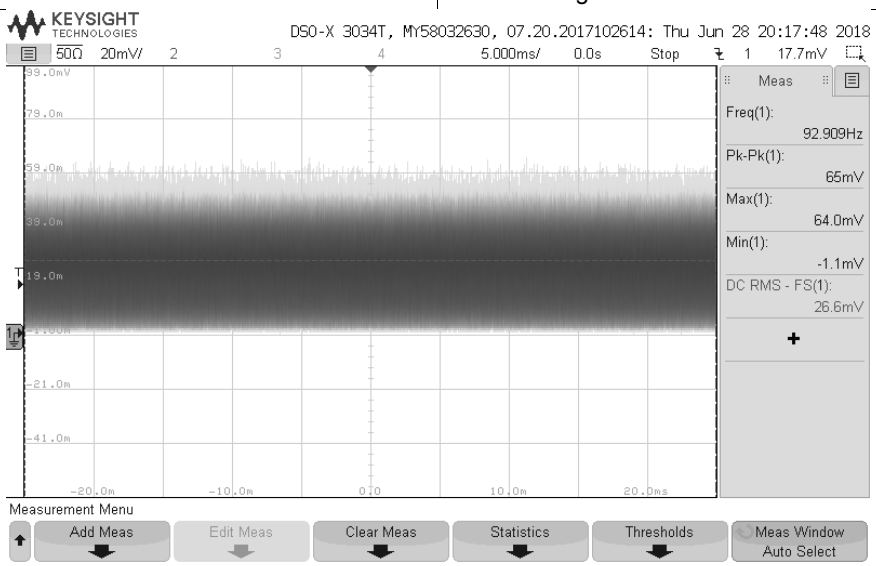
MODULATION"	16QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.33 Output power test result at the high frequency

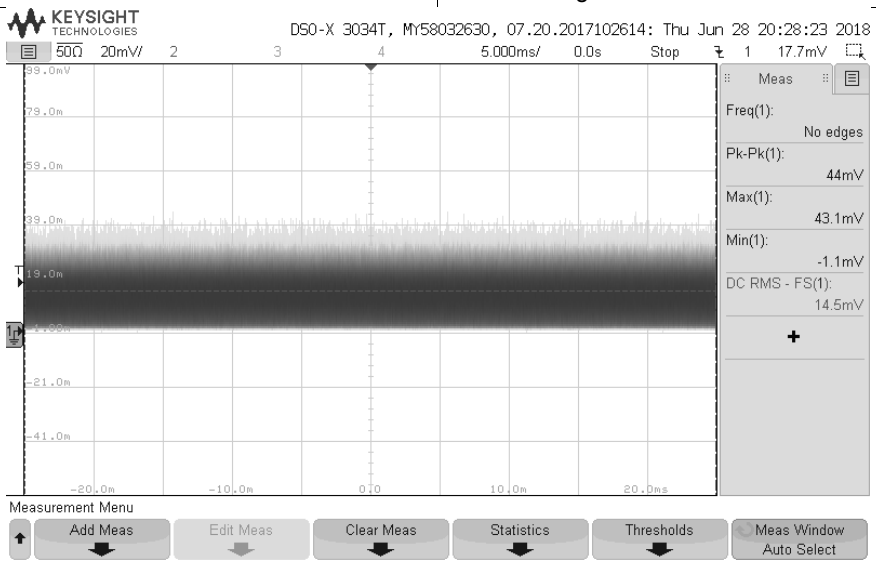
MODULATION"	16QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

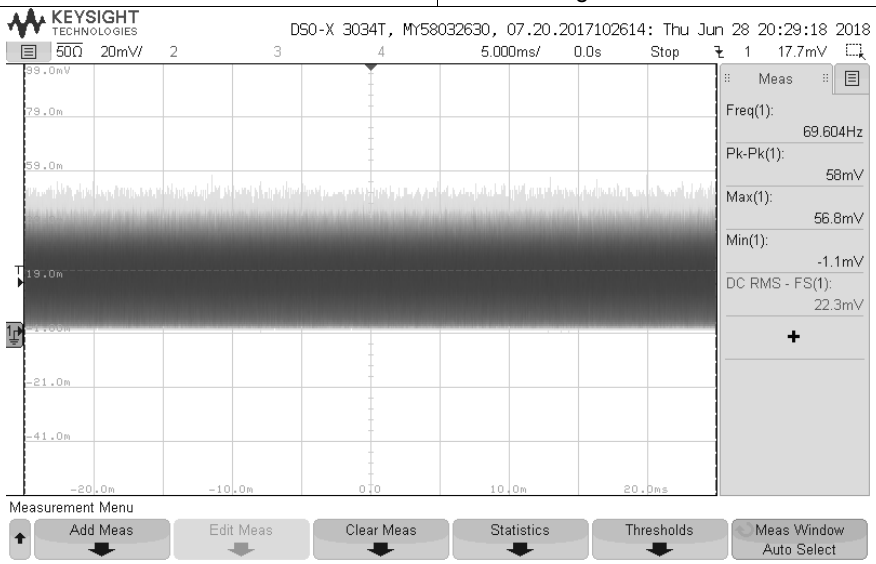
Plot 7.1.34 Output power test result at the low frequency

MODULATION"	32QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Plot 7.1.35 Output power test result at the mid frequency

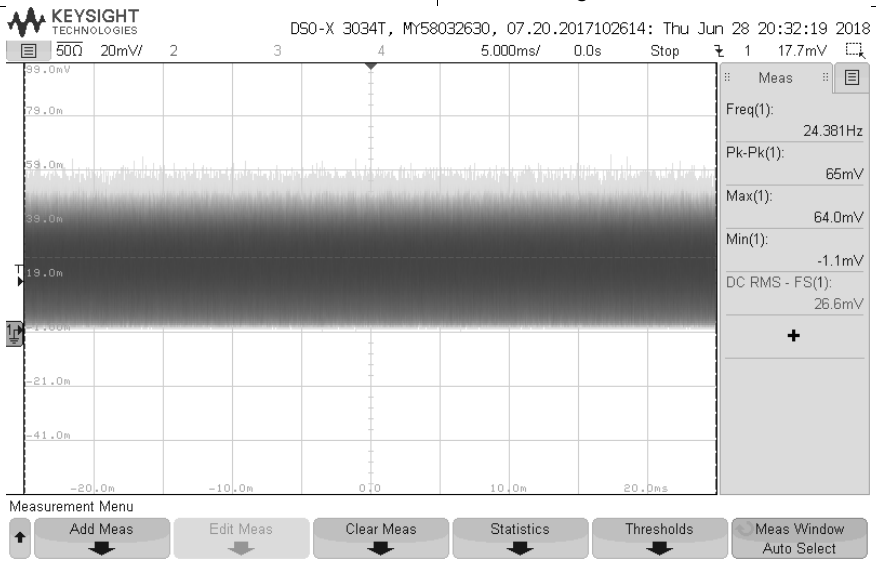
MODULATION"	32QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.36 Output power test result at the high frequency

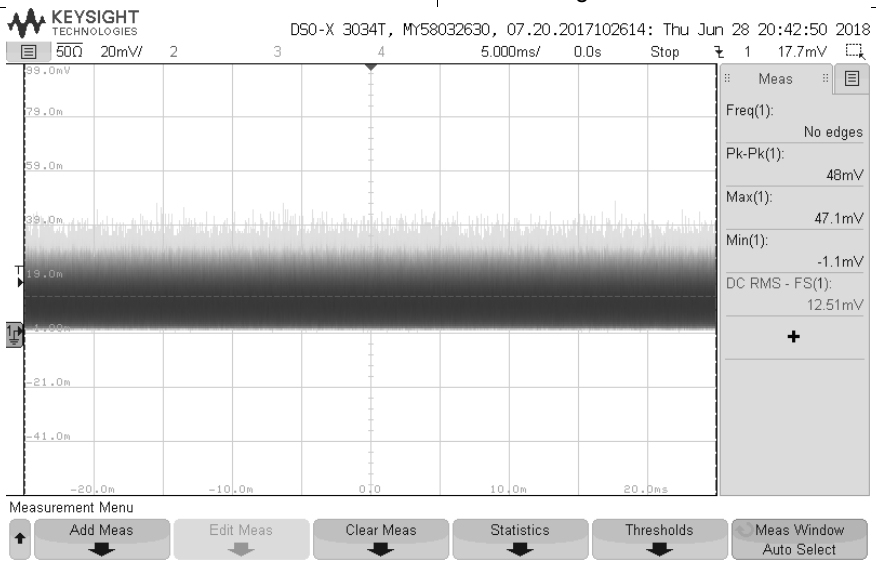
MODULATION"	32QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

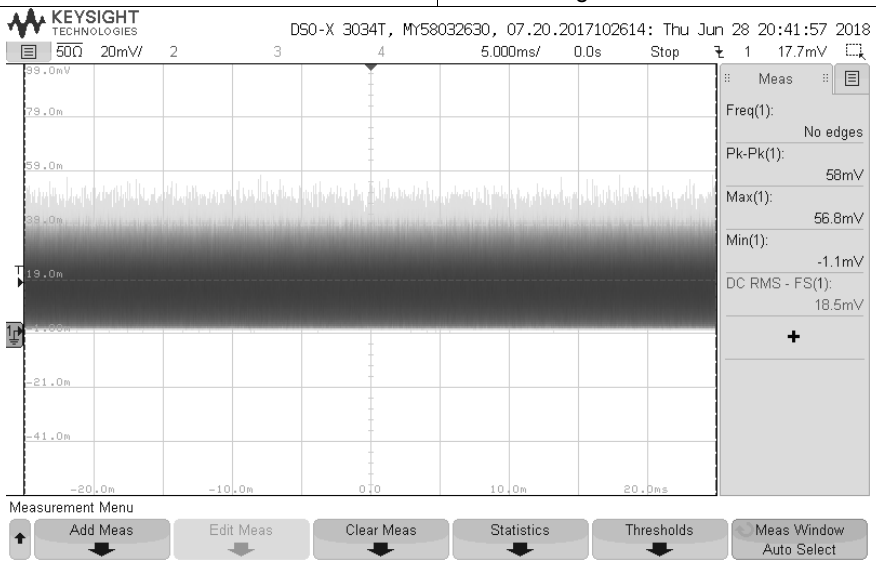
Plot 7.1.37 Output power test result at the low frequency

MODULATION"	64QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Plot 7.1.38 Output power test result at the mid frequency

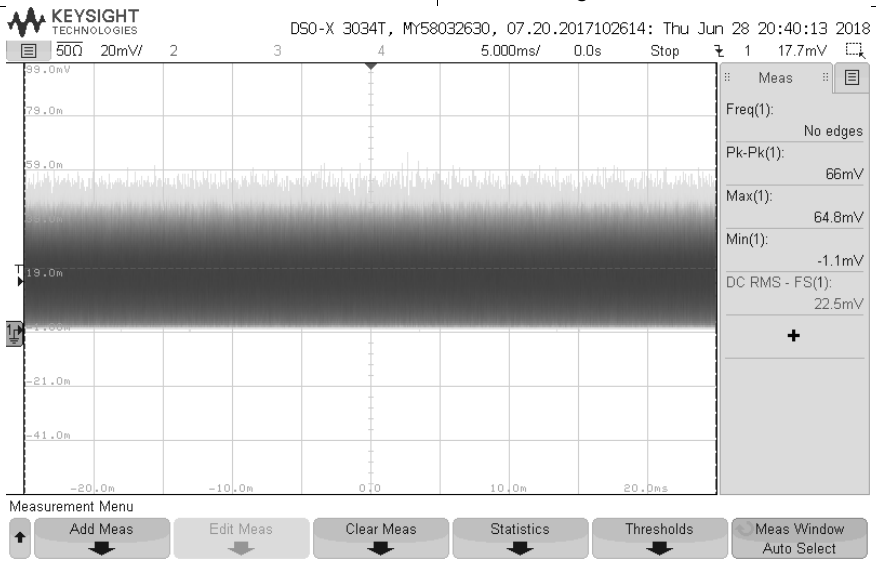
MODULATION"	64QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.39 Output power test result at the high frequency

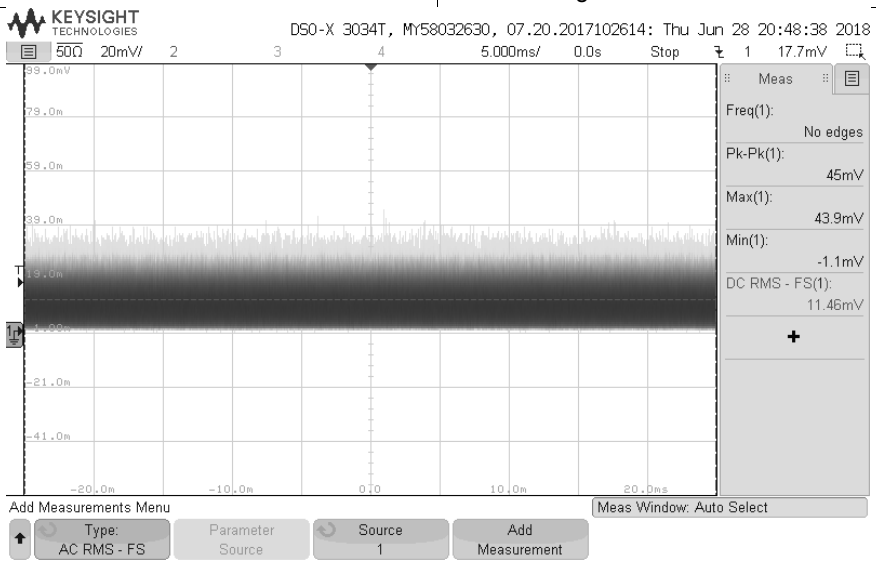
MODULATION"	64QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

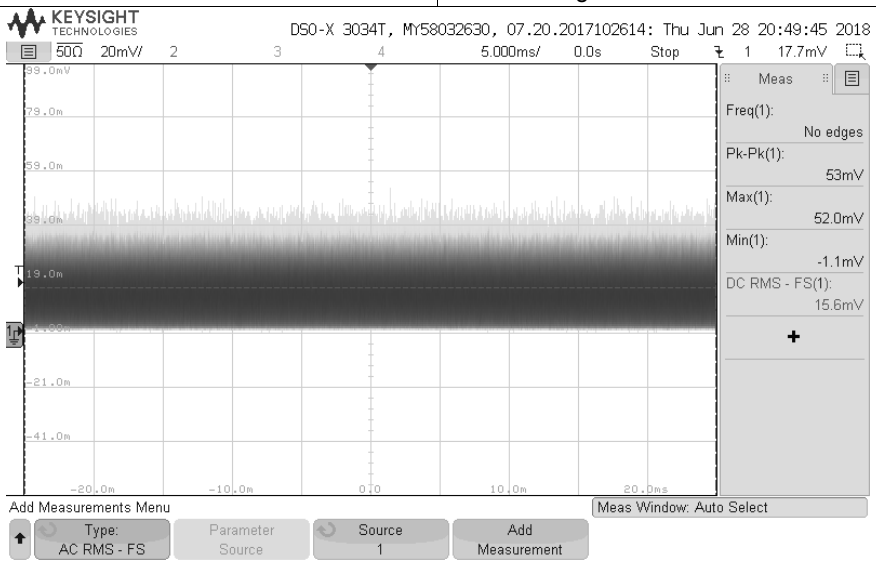
Plot 7.1.40 Output power test result at the low frequency

MODULATION"	128QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Plot 7.1.41 Output power test result at the mid frequency

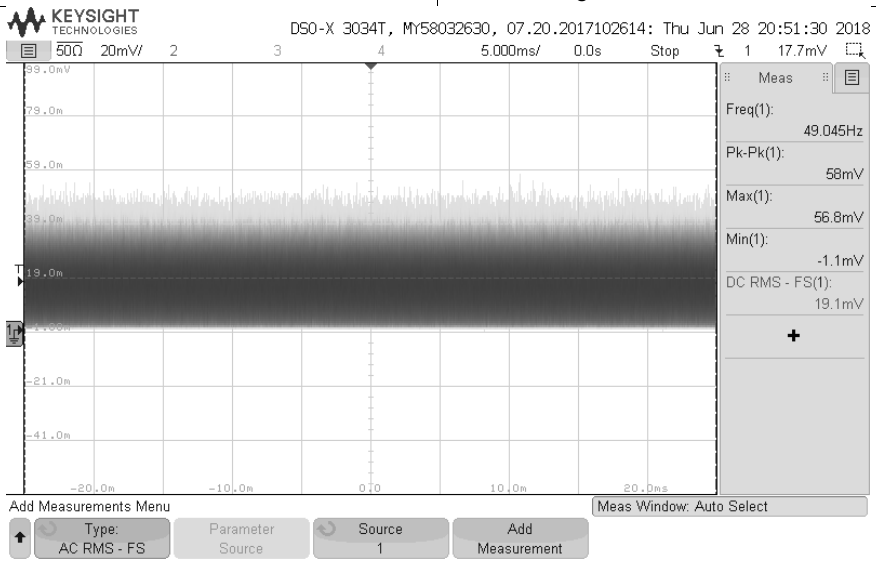
MODULATION"	128QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.42 Output power test result at the high frequency

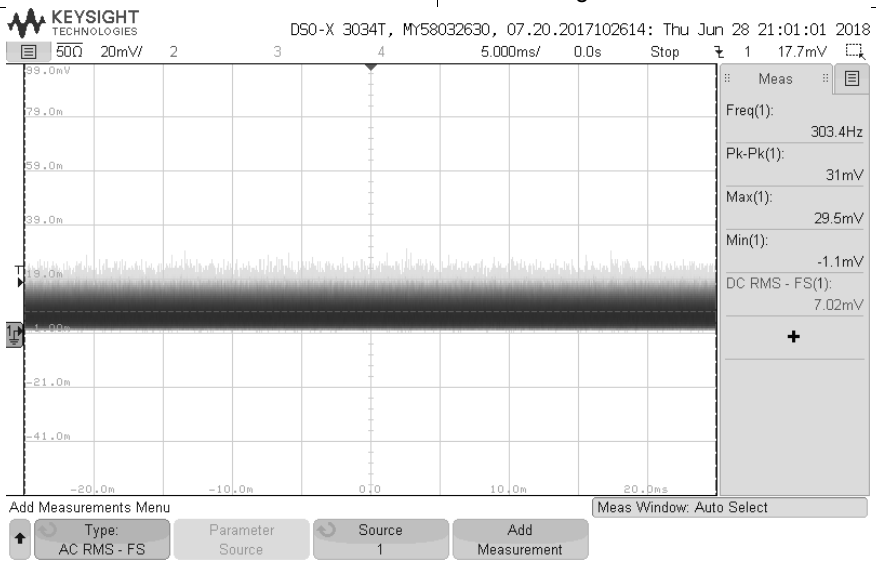
MODULATION"	128QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

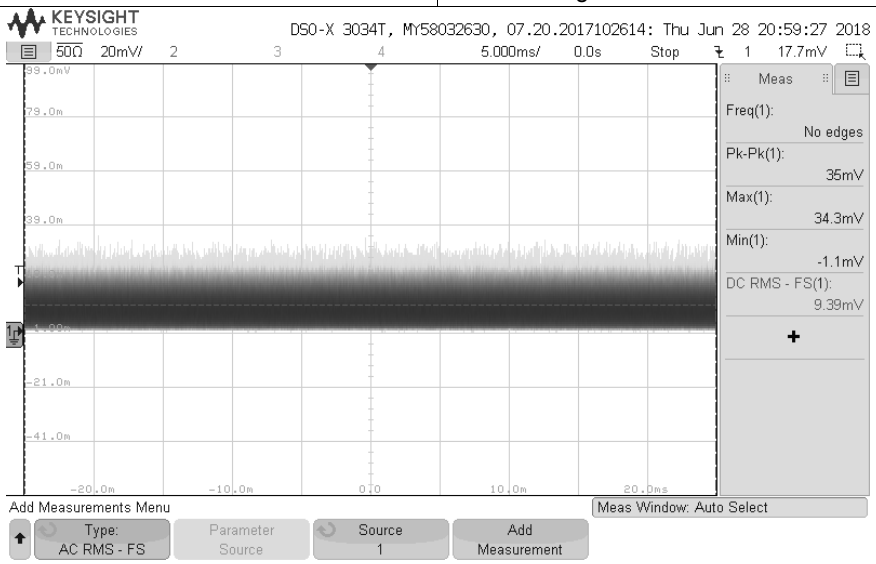
Plot 7.1.43 Output power test result at the low frequency

MODULATION"	256QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Plot 7.1.44 Output power test result at the mid frequency

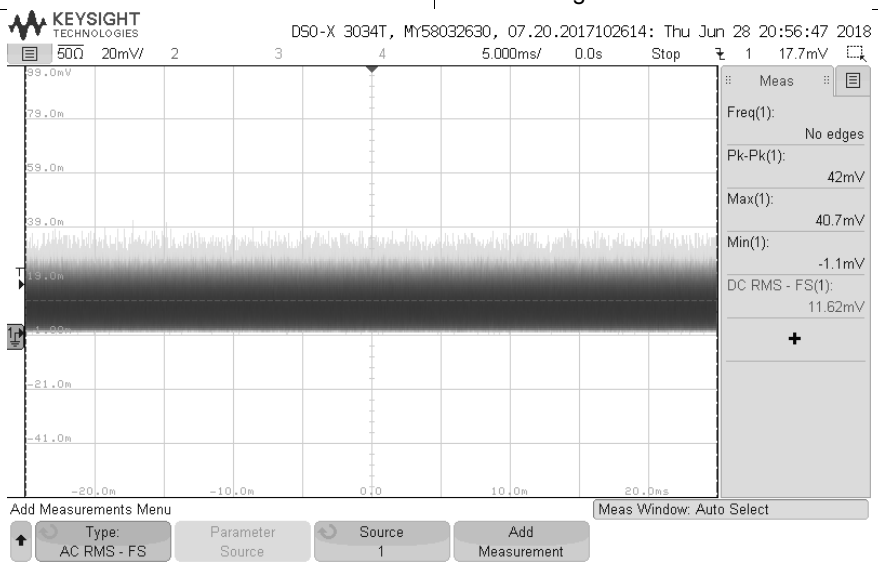
MODULATION"	256QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.45 Output power test result at the high frequency

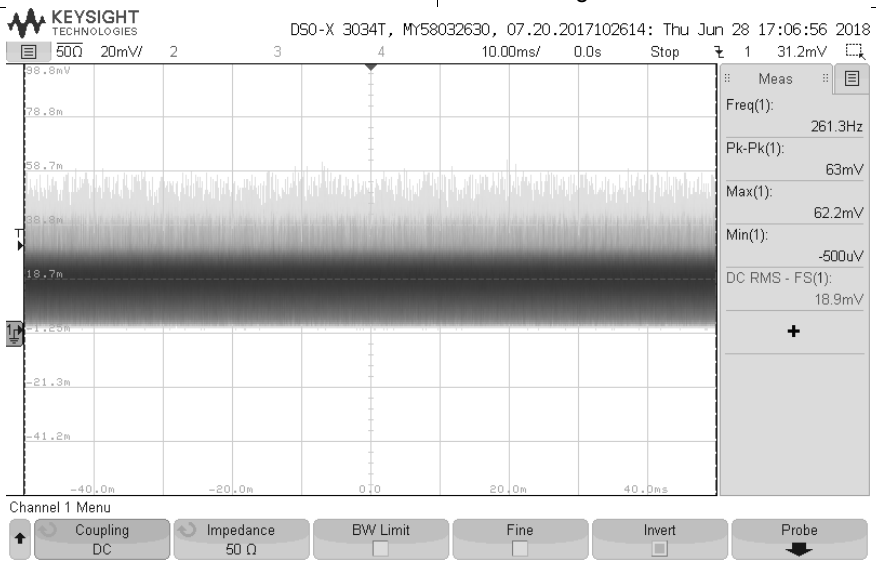
MODULATION"	256QAM
CHANNEL SPACING:	100 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

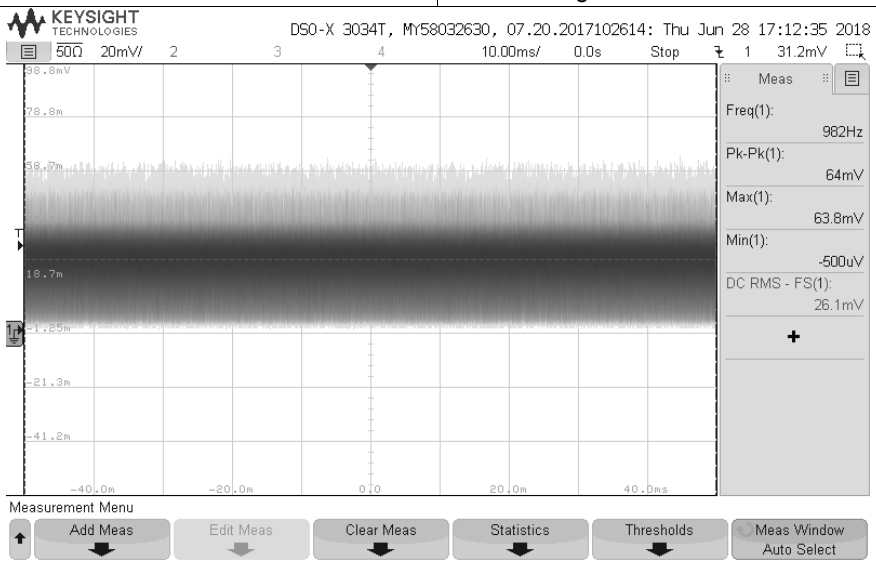
Plot 7.1.46 Output power test result at the low frequency

MODULATION"	2QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Plot 7.1.47 Output power test result at the mid frequency

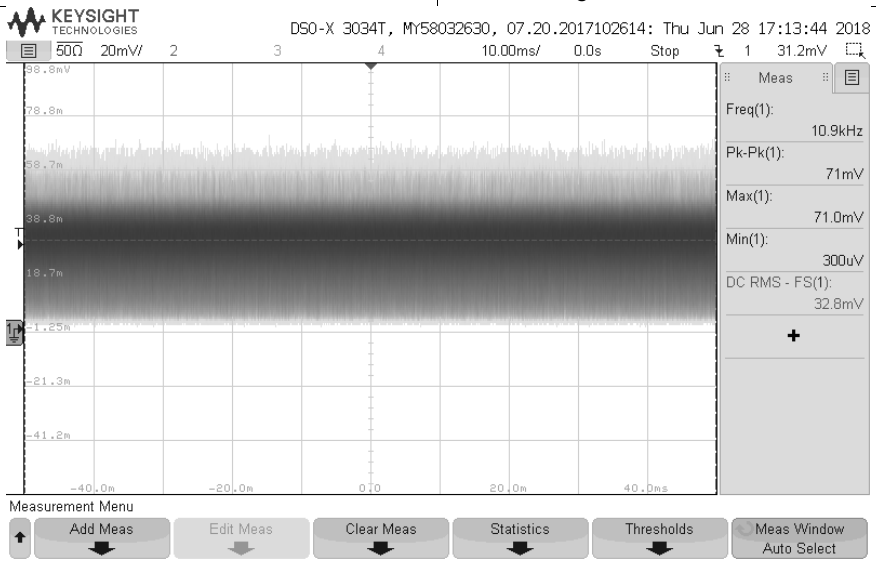
MODULATION"	2QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.48 Output power test result at the high frequency

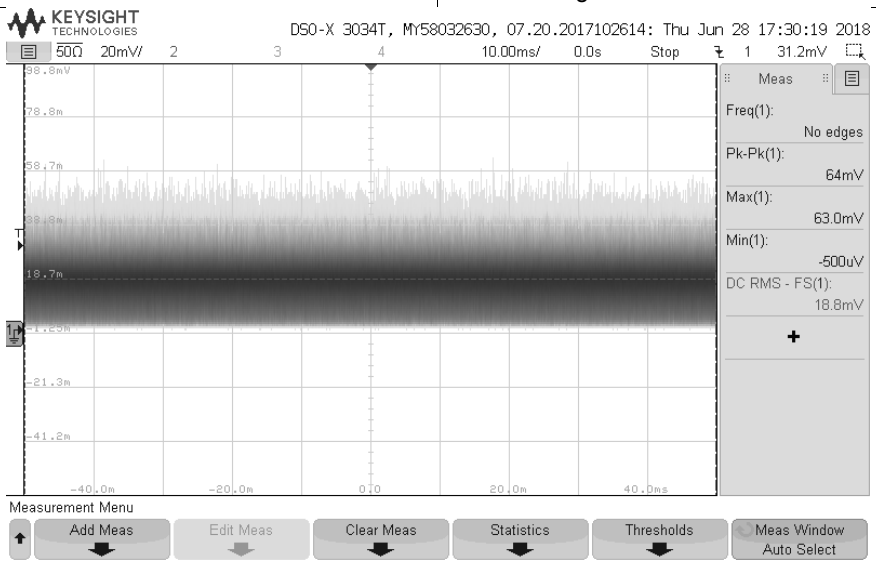
MODULATION"	2QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

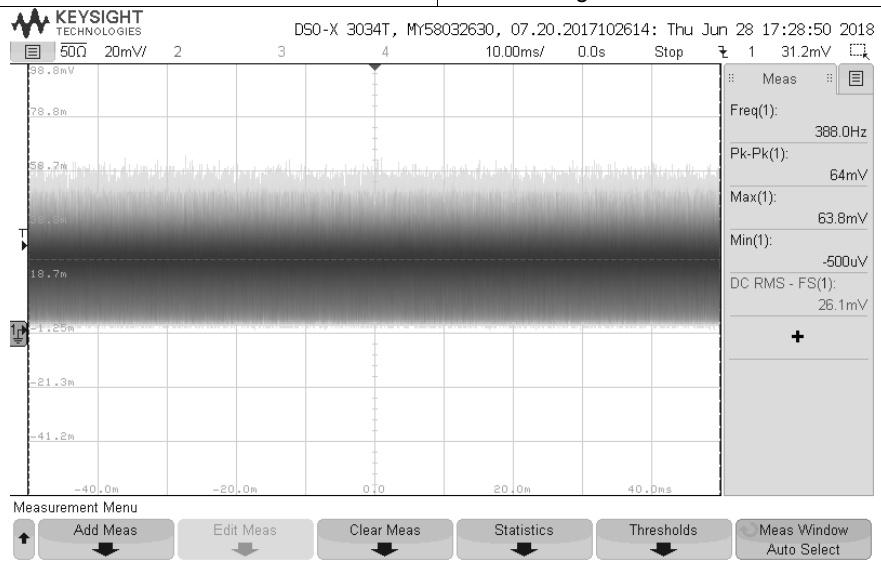
Plot 7.1.49 Output power test result at the low frequency

MODULATION"	4QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Plot 7.1.50 Output power test result at the mid frequency

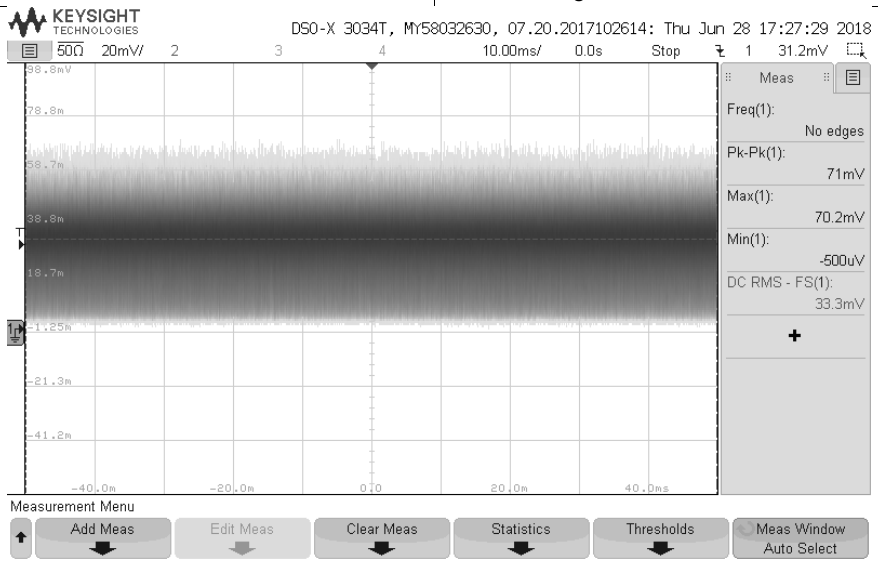
MODULATION"	4QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.51 Output power test result at the high frequency

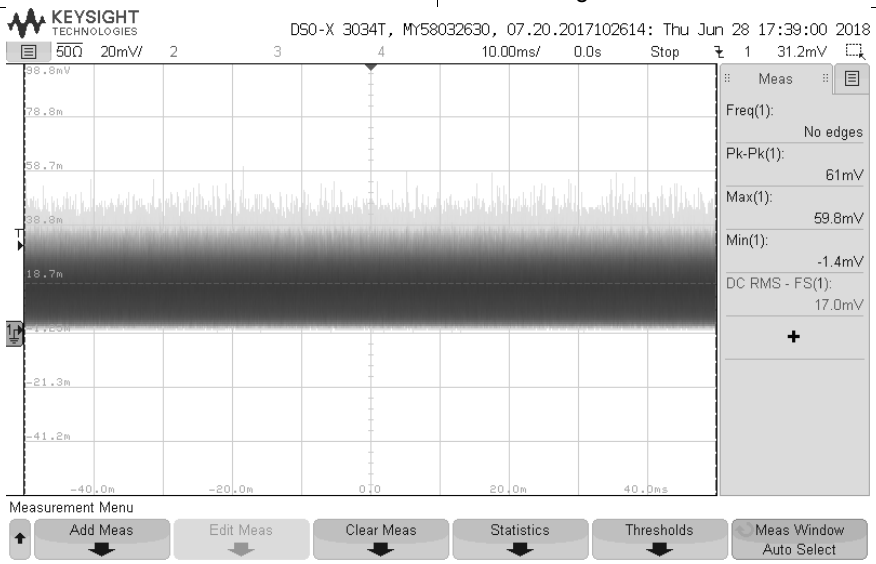
MODULATION"	4QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

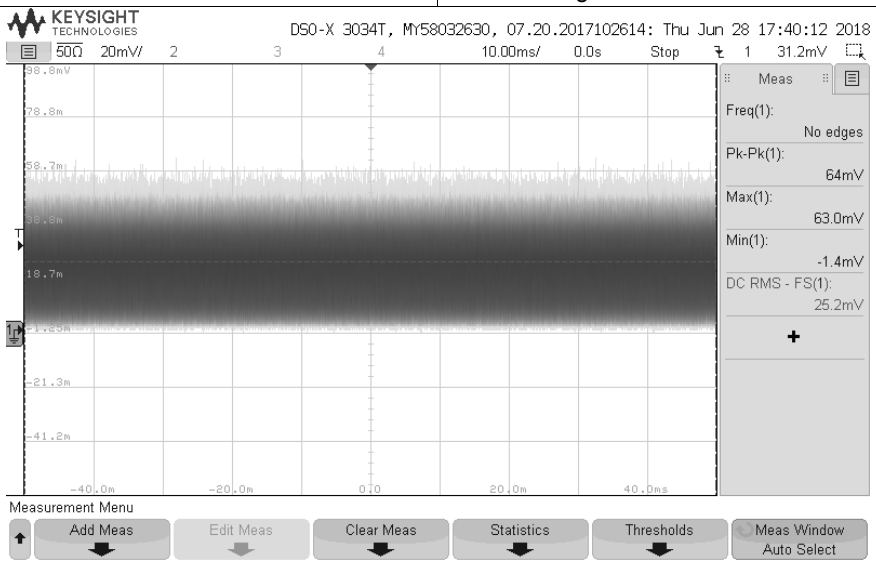
Plot 7.1.52 Output power test result at the low frequency

MODULATION"	8QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Plot 7.1.53 Output power test result at the mid frequency

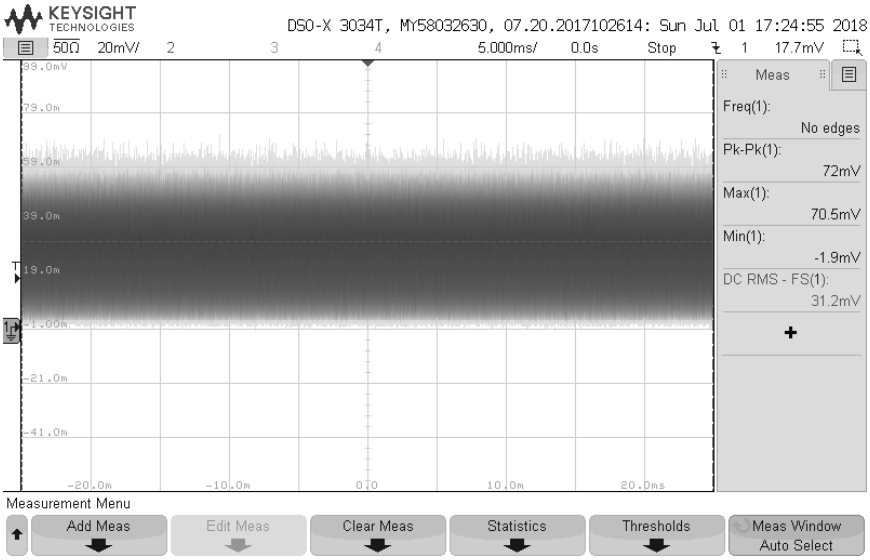
MODULATION"	8QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.54 Output power test result at the high frequency

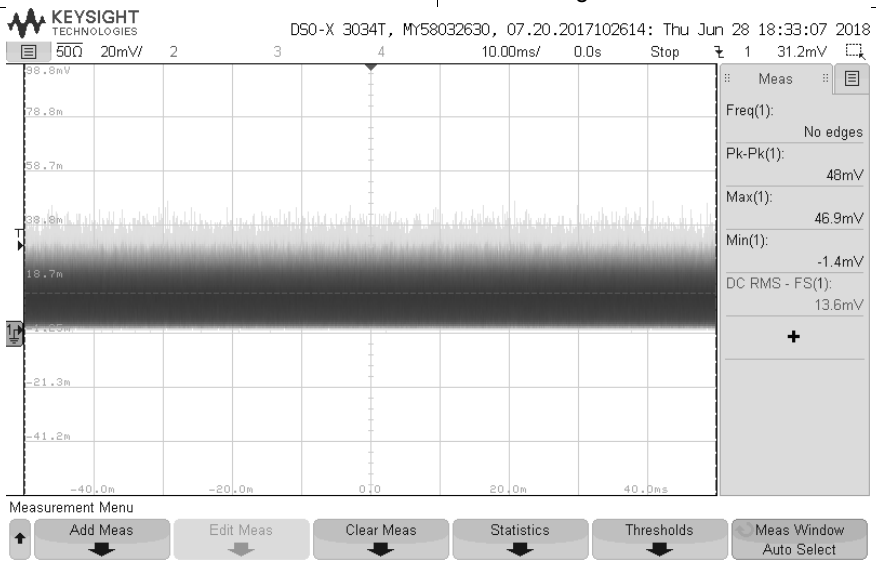
MODULATION”	8QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

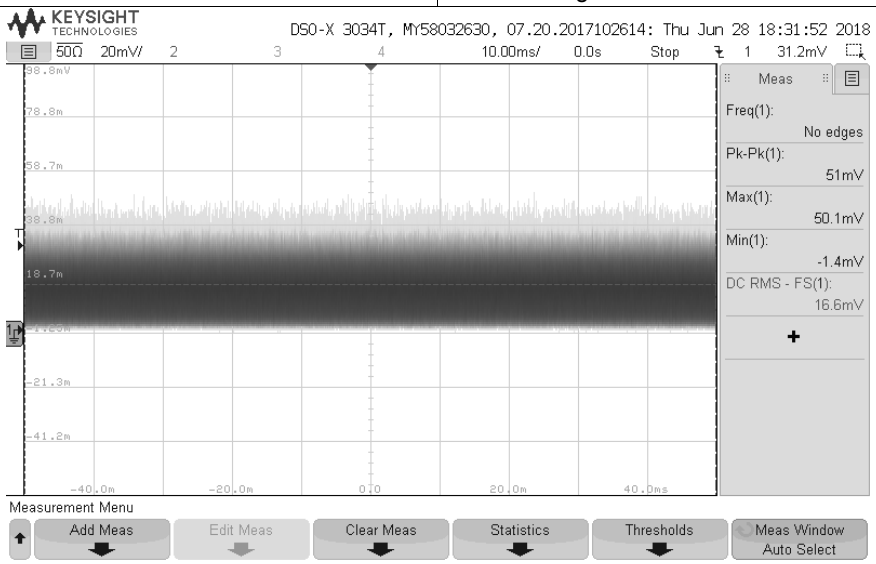
Plot 7.1.55 Output power test result at the low frequency

MODULATION"	16QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Plot 7.1.56 Output power test result at the mid frequency

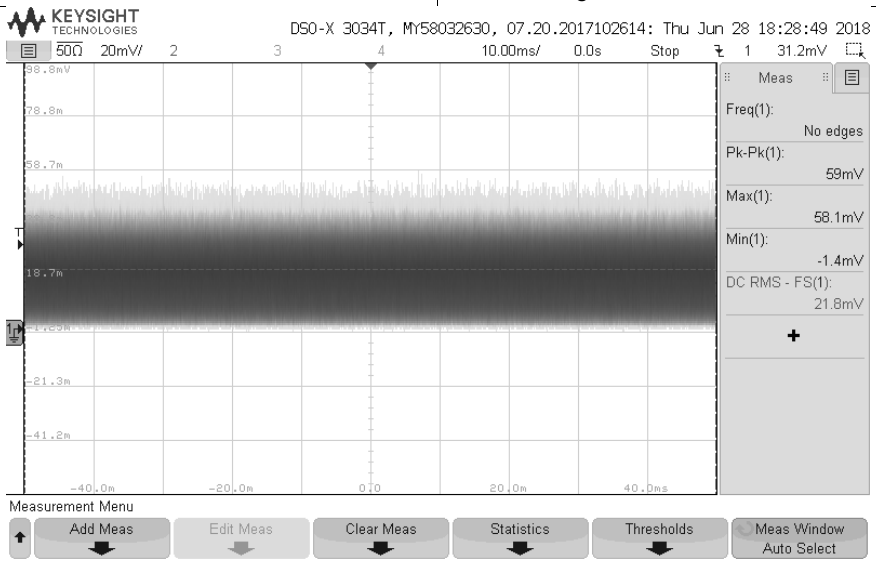
MODULATION"	16QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.57 Output power test result at the high frequency

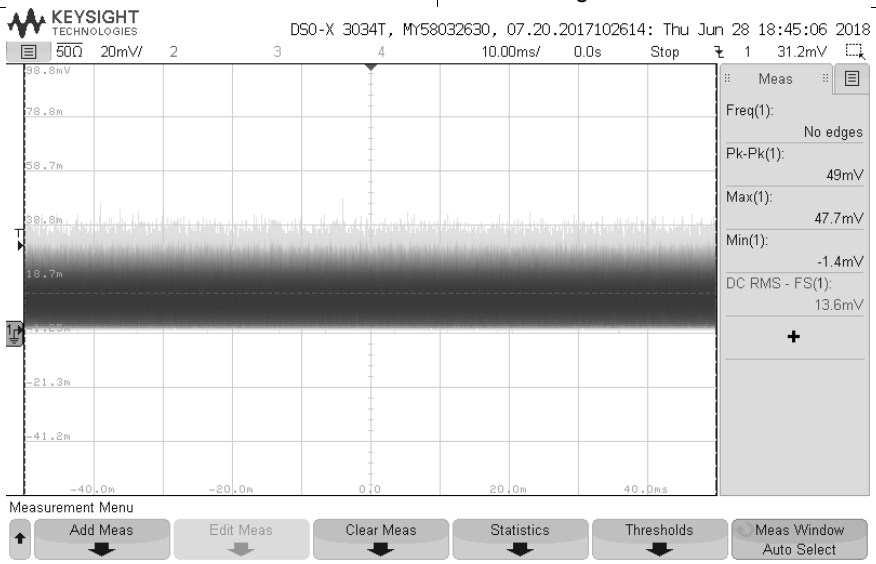
MODULATION"	16QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

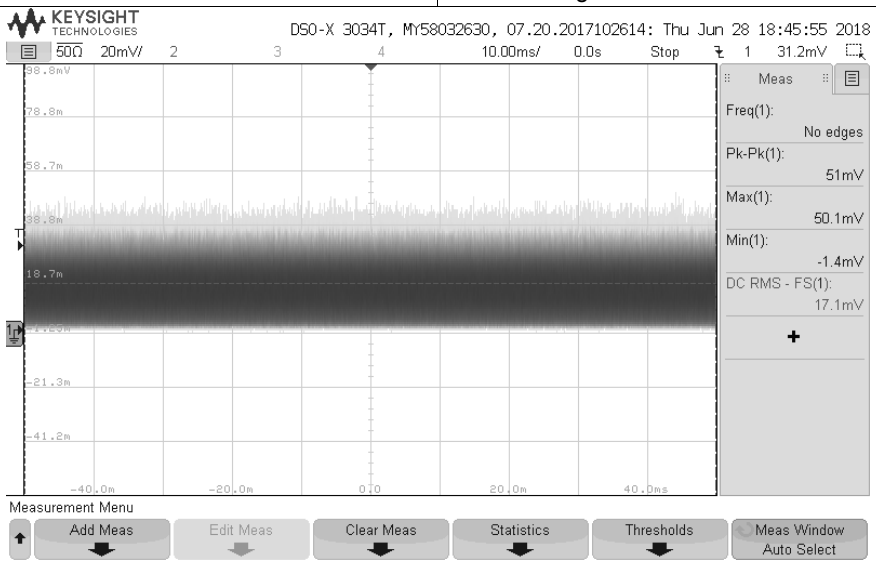
Plot 7.1.58 Output power test result at the low frequency

MODULATION"	32QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Plot 7.1.59 Output power test result at the mid frequency

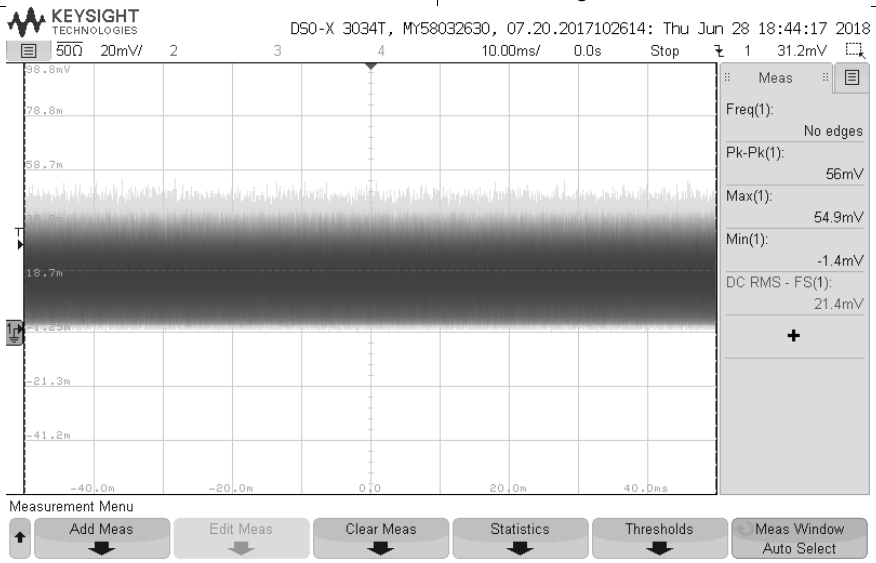
MODULATION"	32QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.60 Output power test result at the high frequency

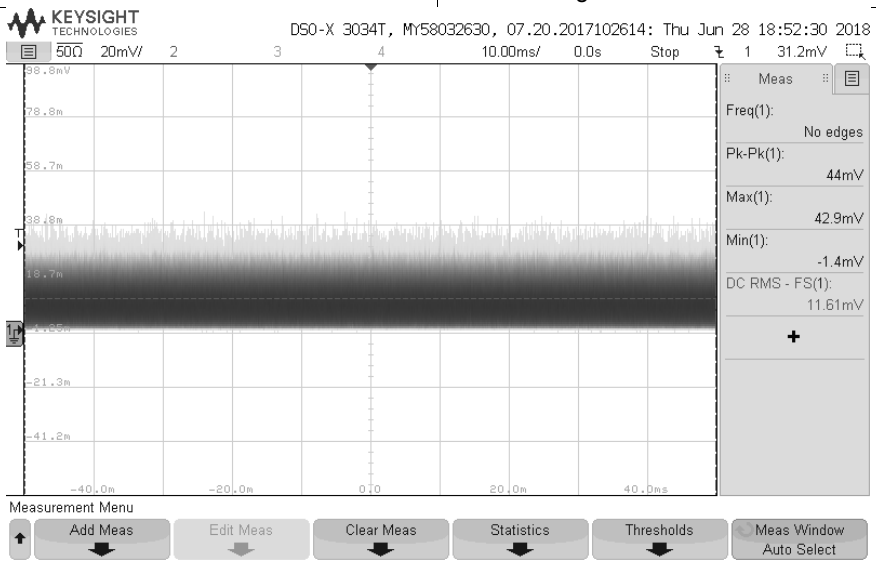
MODULATION"	32QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

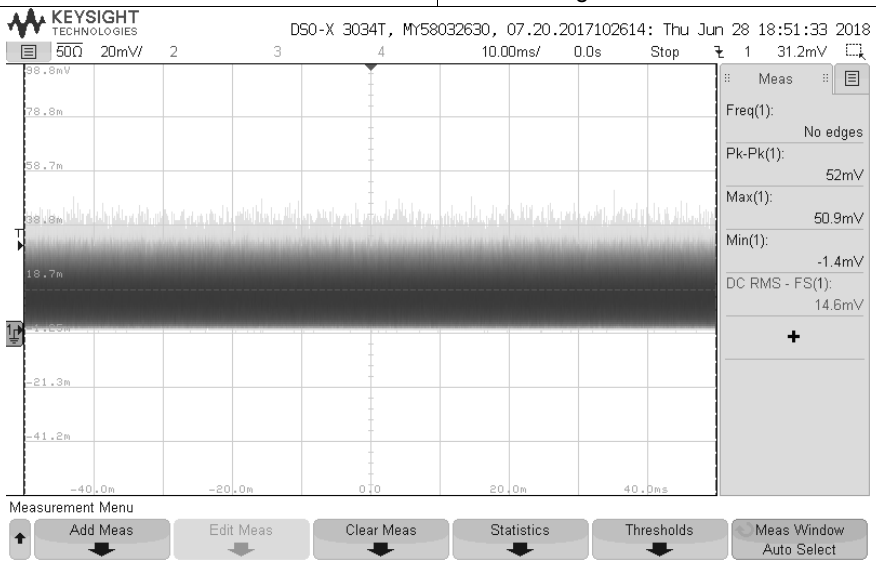
Plot 7.1.61 Output power test result at the low frequency

MODULATION"	64QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Plot 7.1.62 Output power test result at the mid frequency

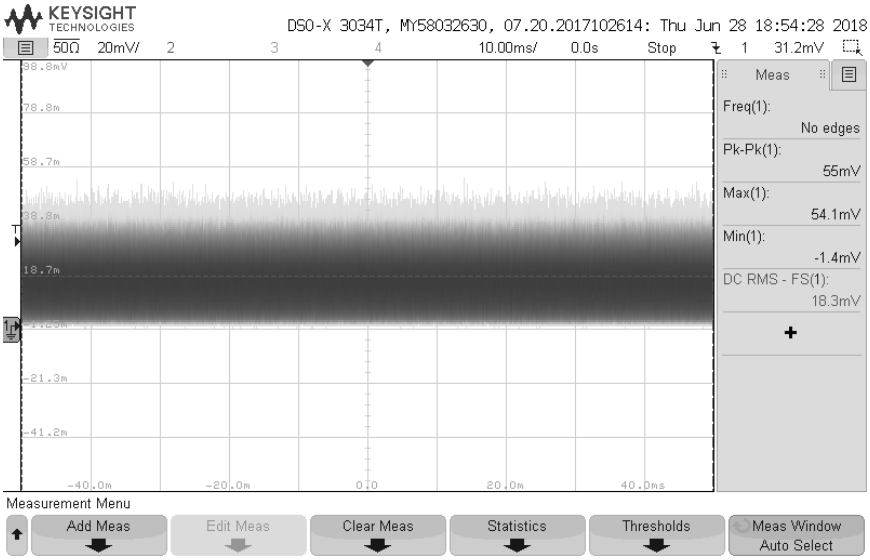
MODULATION"	64QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.63 Output power test result at the high frequency

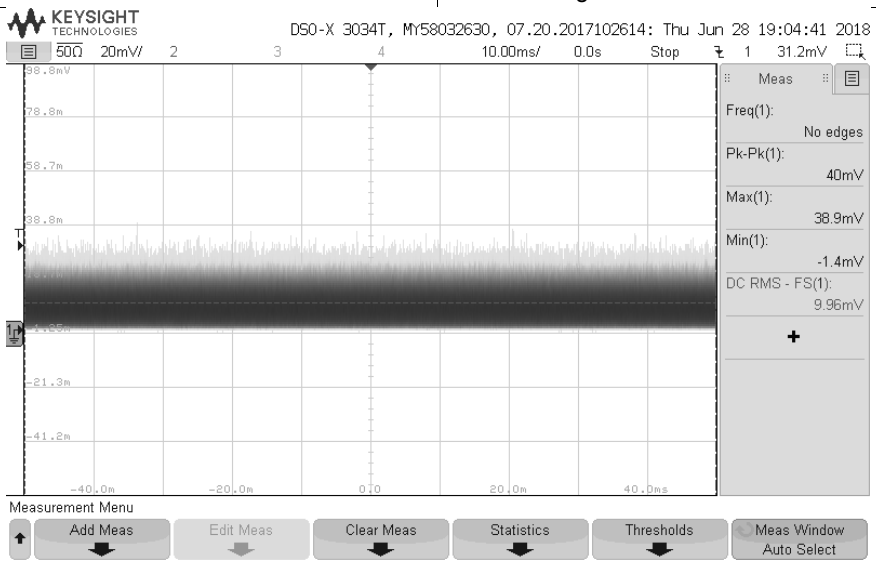
MODULATION”	64QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

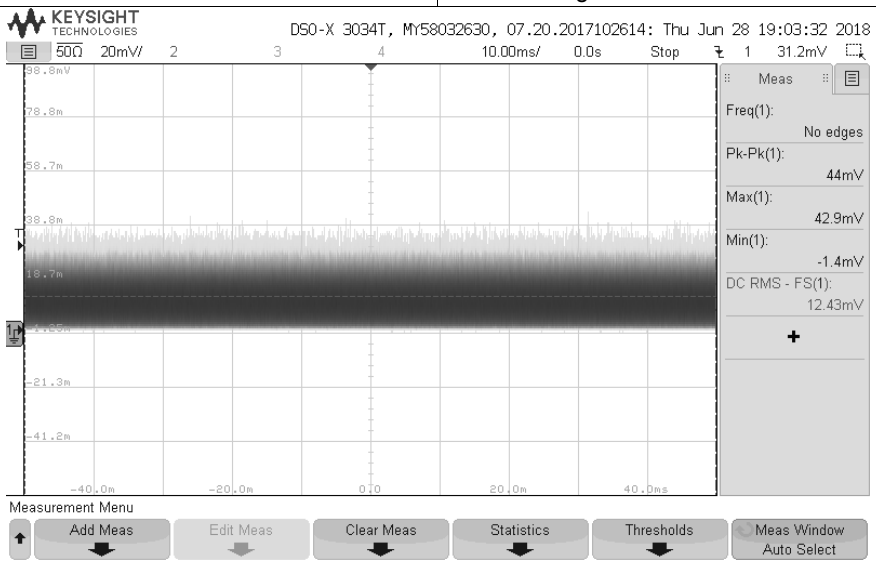
Plot 7.1.64 Output power test result at the low frequency

MODULATION"	128QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Plot 7.1.65 Output power test result at the mid frequency

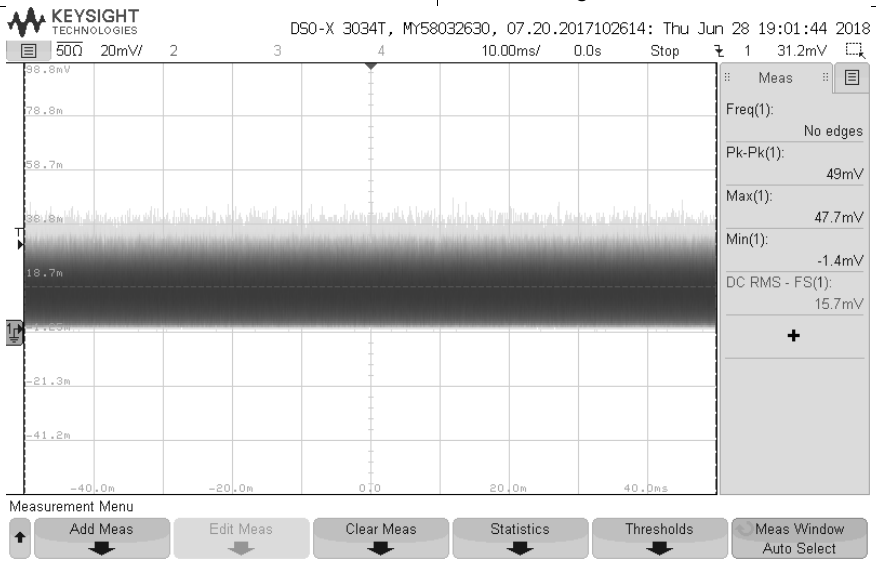
MODULATION"	128QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.66 Output power test result at the high frequency

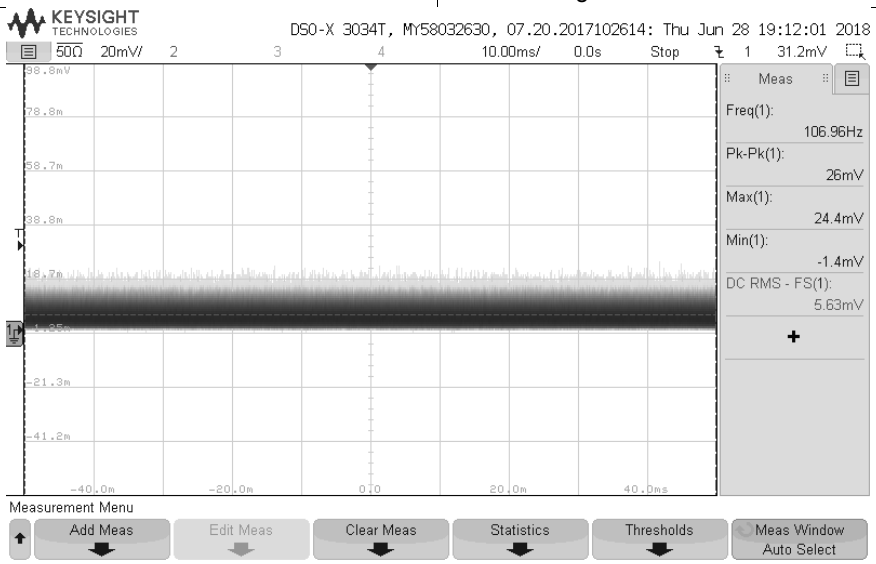
MODULATION"	128QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

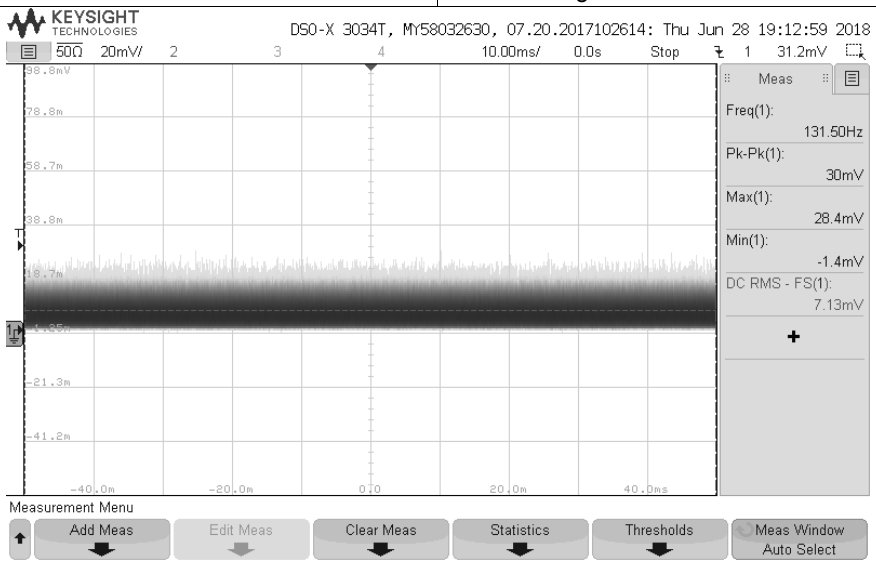
Plot 7.1.67 Output power test result at the low frequency

MODULATION"	256QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Plot 7.1.68 Output power test result at the mid frequency

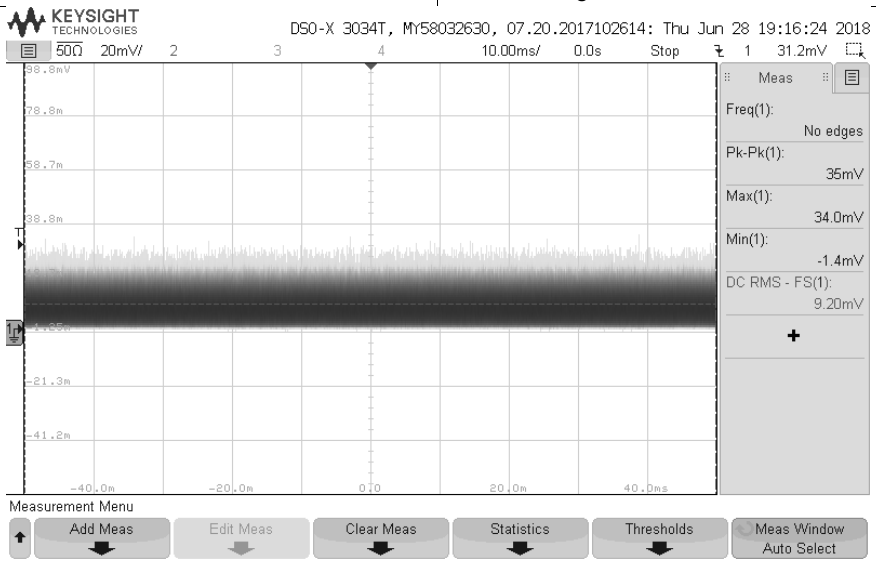
MODULATION"	256QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.69 Output power test result at the high frequency

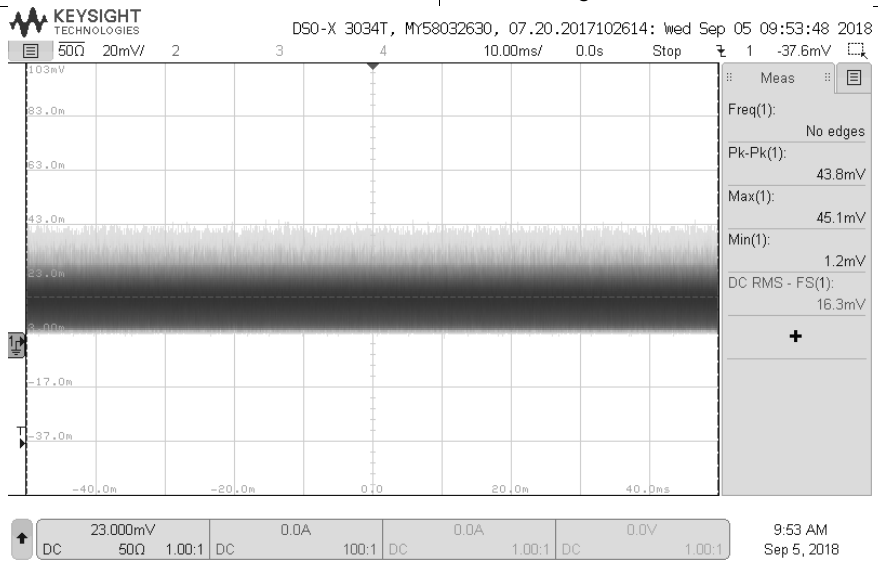
MODULATION"	256QAM
CHANNEL SPACING:	250 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

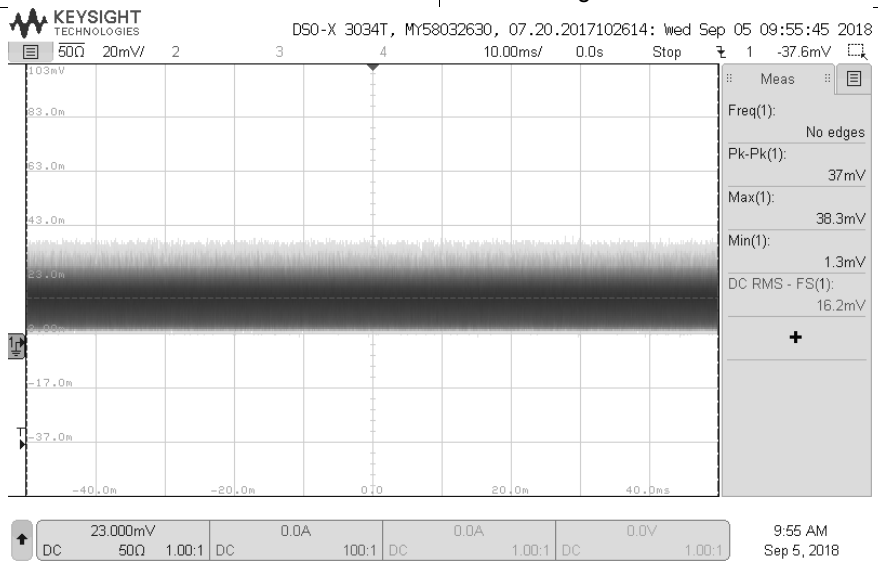
Plot 7.1.70 Output power test result at the low frequency

MODULATION"	2QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Plot 7.1.71 Output power test result at the mid frequency

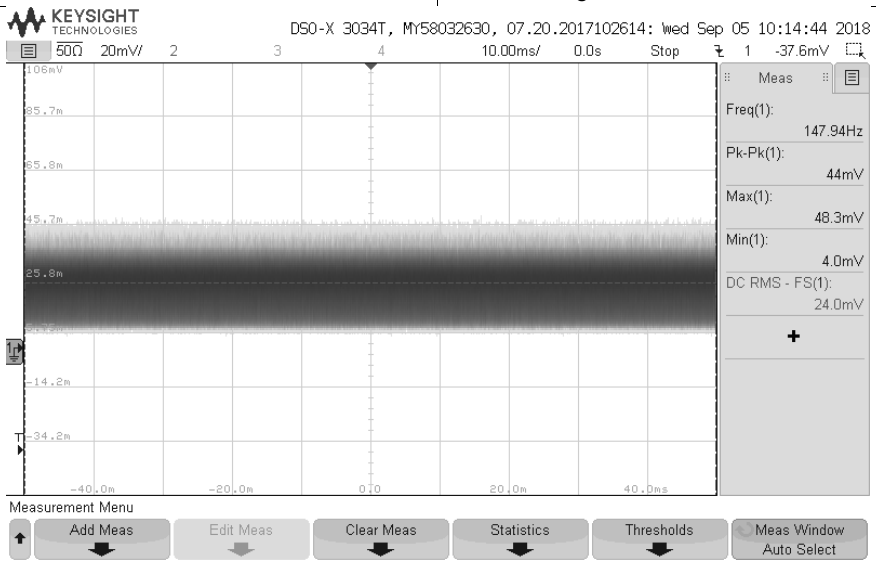
MODULATION"	2QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.72 Output power test result at the high frequency

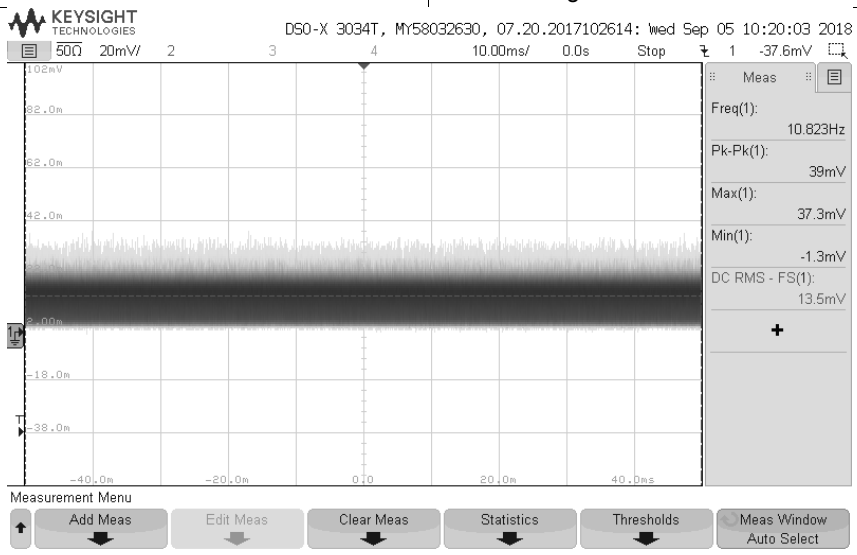
MODULATION"	2QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

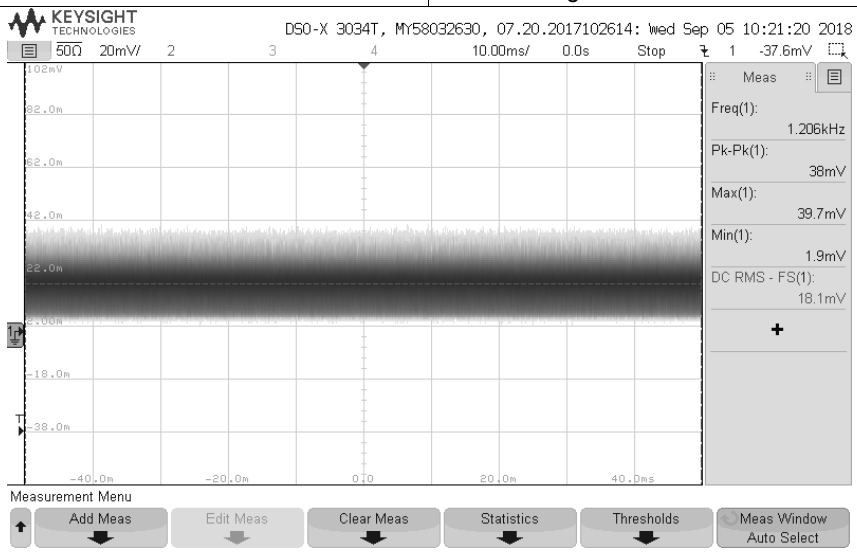
Plot 7.1.73 Output power test result at the low frequency

MODULATION"	4QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Plot 7.1.74 Output power test result at the mid frequency

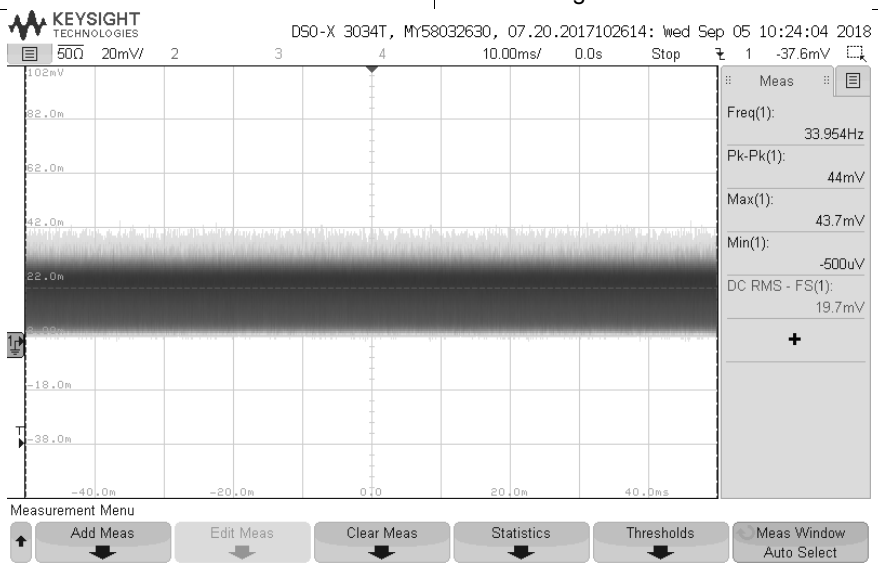
MODULATION"	4QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.75 Output power test result at the high frequency

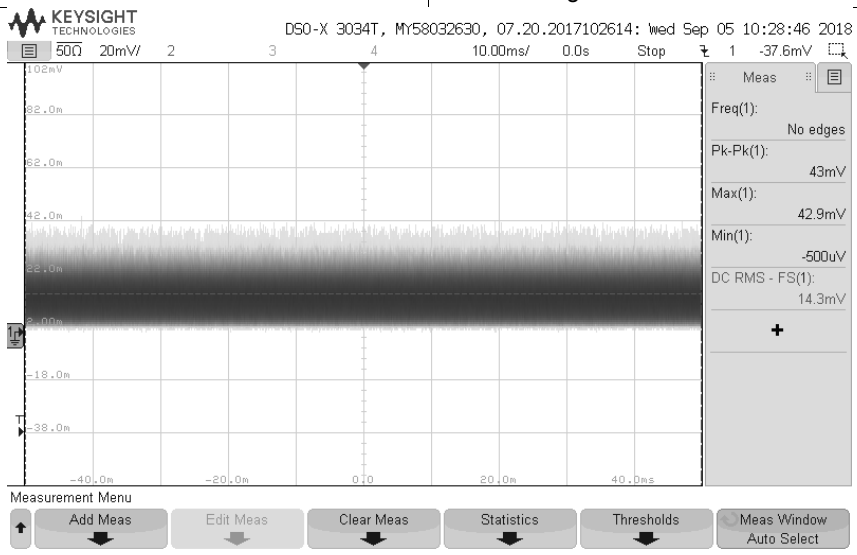
MODULATION”	4QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

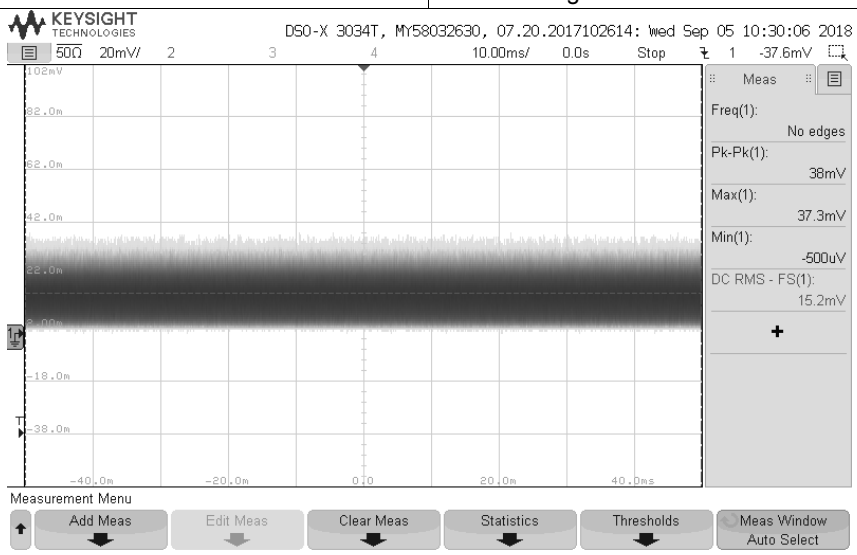
Plot 7.1.76 Output power test result at the low frequency

MODULATION"	8QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Plot 7.1.77 Output power test result at the mid frequency

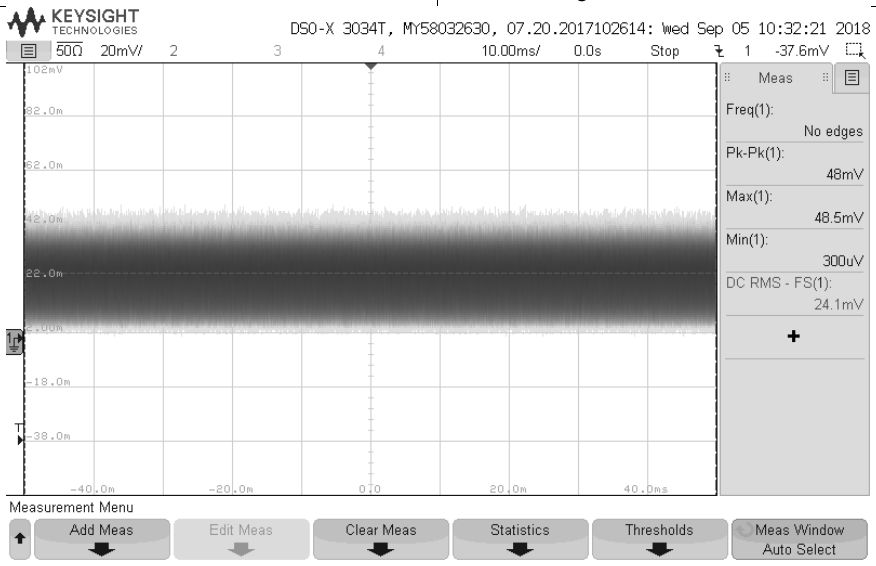
MODULATION"	8QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.78 Output power test result at the high frequency

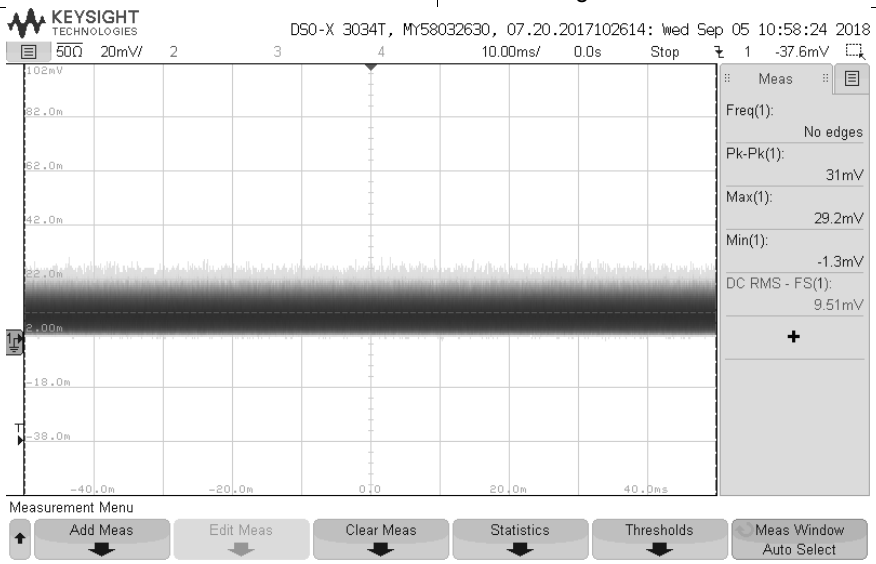
MODULATION"	8QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

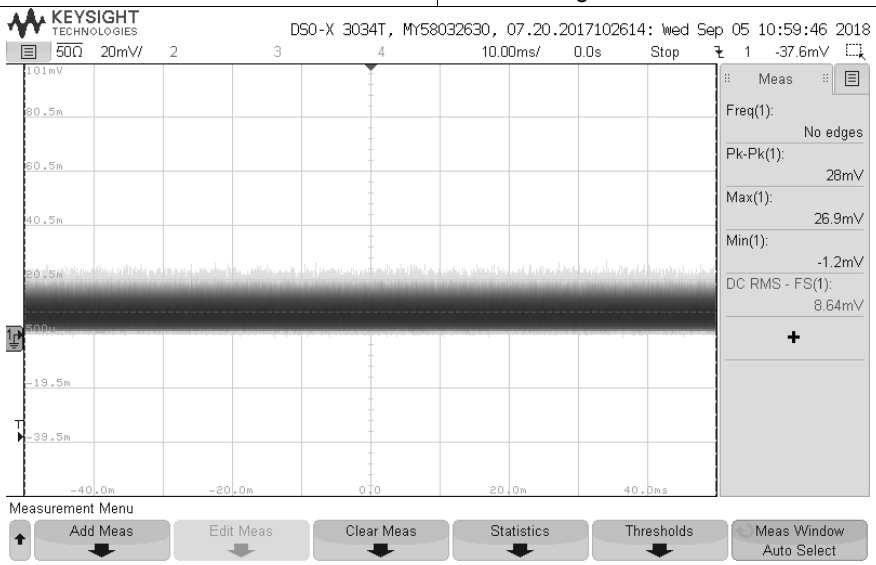
Plot 7.1.79 Output power test result at the low frequency

MODULATION"	16QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Plot 7.1.80 Output power test result at the mid frequency

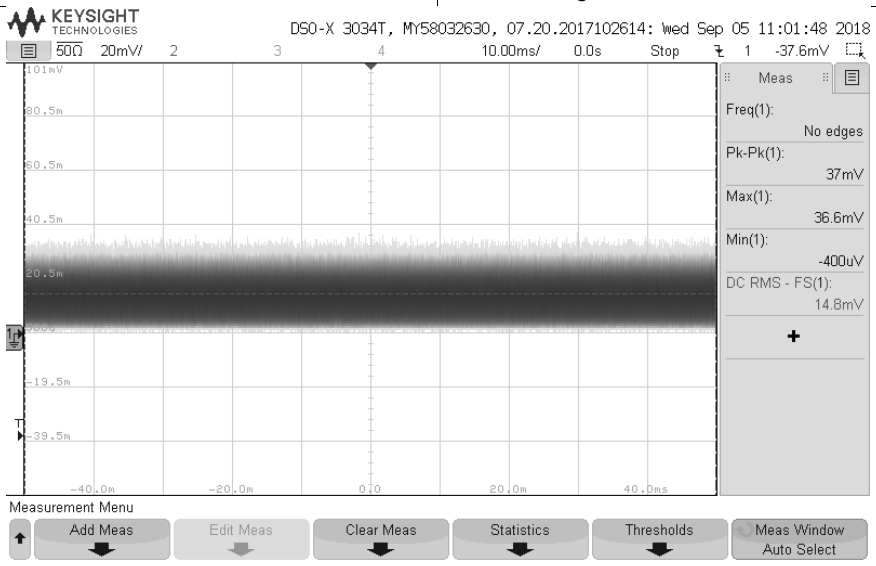
MODULATION"	16QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.81 Output power test result at the high frequency

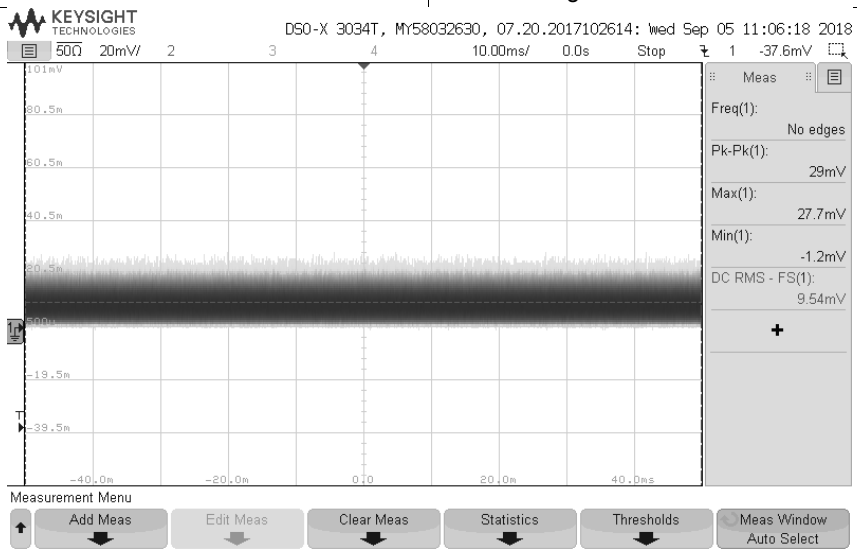
MODULATION"	16QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

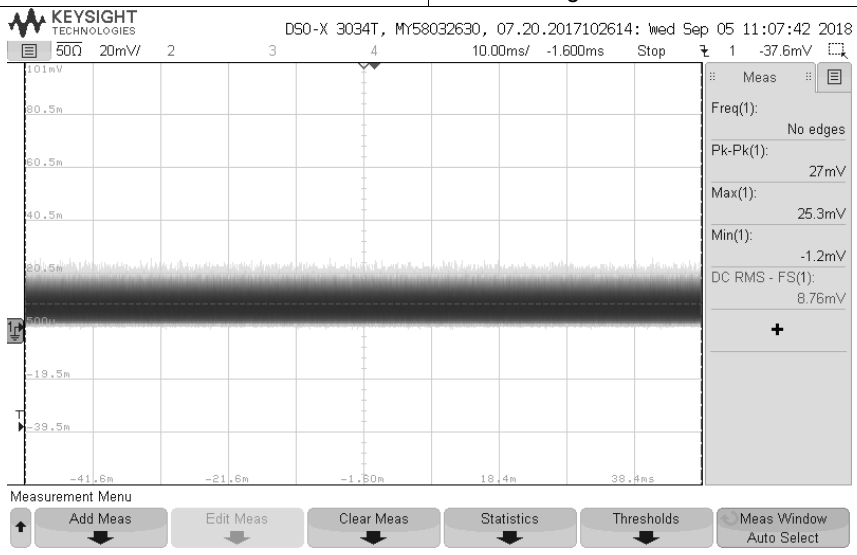
Plot 7.1.82 Output power test result at the low frequency

MODULATION"	32QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Plot 7.1.83 Output power test result at the mid frequency

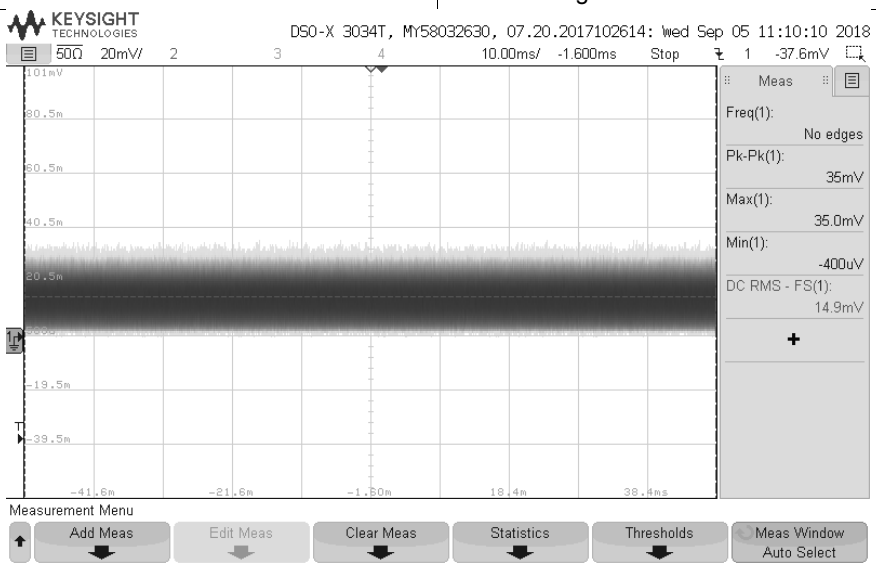
MODULATION"	32QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.84 Output power test result at the high frequency

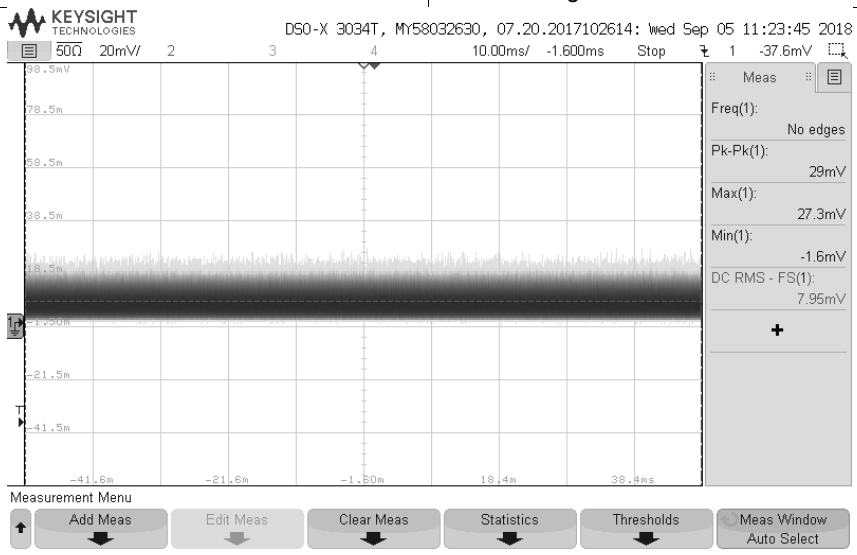
MODULATION"	32QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

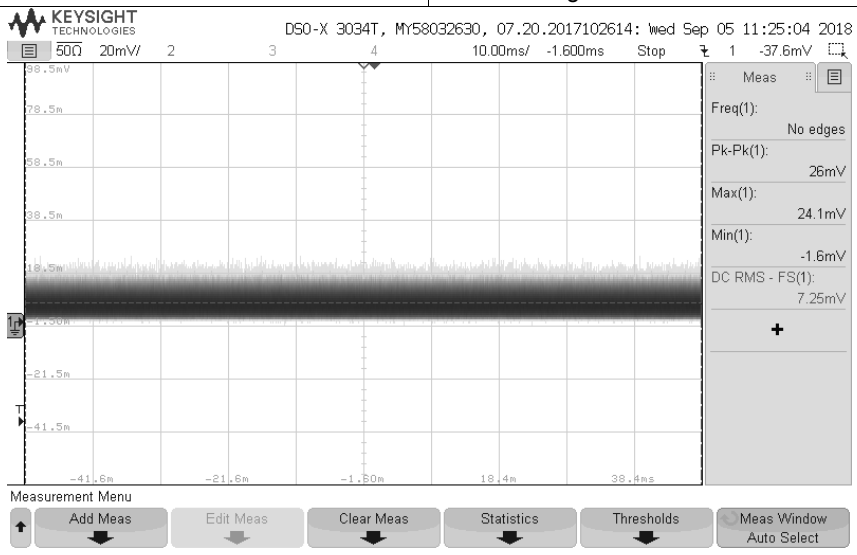
Plot 7.1.85 Output power test result at the low frequency

MODULATION"	64QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Plot 7.1.86 Output power test result at the mid frequency

MODULATION"	64QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average



Test specification:	Section 15.255(b)(ii),(d), Transmitter power and power spectral density		
Test procedure:	47 CFR, Section 2.1046; Section 15.255(b); ANSI C63.10, Section 9.11		
Test mode:	Compliance	Verdict:	PASS
Date(s):	21-Jun-18 - 05-Sep-18		
Temperature: 24.3 ºC	Relative Humidity: 46 %	Air Pressure: 1009 hPa	Power: -48 VDC
Remarks:			

Plot 7.1.87 Output power test result at the high frequency

MODULATION"	64QAM
CHANNEL SPACING:	500 MHz
DETECTOR:	Peak/Average