TEST RECORDS

CONTENT

PART 1

TEST INFORMATION

1 General

Configuration	Description	
Date	Date of Receipt Sample :	2020-06-30
	Start Date of Test:	2020-06-30
	End Date of Test:	2020-07-23
Test Location	For Conducted Test Items:	TL#DG1
	For Radiated Test Items:	TL#DG1
Ambient Environment	Temperature:	15 to 30 °C
	Relative Humidity:	20 to 85 %
	Atmospheric Pressure:	Not applicable

2 Auxiliary Facilities Supporting Tests

NOTE: The EUT was tested together with other necessary auxiliary facilities so as to form representative EUT installation configurations and test setup configurations during the tests.

Facility	Manufacturer	Model	Identification	Remark
UMPT	HUAWEI	WD22UMPTe4	210305725510JA000014	Universal Main Processing & Transmission unit
UBBP	HUAWEI	WD22UBBPfw1	024RHK9WJB101084	Baseband Processing and Interface Unit
UBBP	HUAWEI	WD22UBBPg3	025MLS10K2000050	Baseband Processing and Interface Unit
UBBP	HUAWEI	WD22UBBPg3	025MLS10K2000007	Baseband Processing and Interface Unit

3 Main Measurement Instruments

NOTE 1: NCR = No calibration required, VOU = Verified on use.

NOTE 2: Unless otherwise specified, the calibration intervals for test instruments were Annual (per year). The other intervals, if applicable, are marked with (##y), which denotes ## years calibration interval.

Equipment Name	Manufacturer	Model	Serial Number	Cal. Due
For Conducted Test Items (TL#DG1)				
Spectrum Analyzer	Agilent	N9030A	MY49431033	2021-04-19
Spectrum Analyzer	Keysight	N9030B	MY56430377	2021-03-11
Spectrum Analyzer	R&S	FSU67	101159	2020-08-09
Power Supply (DC)	Chroma	62050P-100-100	62050PA01365	2021-04-19
Climate Chamber	ESPEC	EW0470S	12113066	2021-04-19
Conducted Test Paths (Cables, RF Switches, etc.)	HUAWEI	(Customized)	---	VOU
For Radiated Test Items (TL#DG1)				
EMI Test Receiver	R&S	ESU40	100144	2021-06-23
Bilog Antenna (30M-1GHz)	Schaffner	CBL 6112B	2941	2020-11-20(2y)
Horn Antenna (1G-18GHz)	R&S	HF906	359287/006	2020-09-25(2y)
Horn Antenna (18G-26.5GHz)	ETS	3160-9	053215-21874	2021-06-03(2y)
Horn Antenna (26.5G-40GHz)	ETS	3116	00031542	2021-06-03(2y)

PART 2

TEST PLANS

1 Test Environments

NOTE: The values used in tests may be stringent than that of declared.

Test Environment #	Temperature	Voltage	Relative Humidity
NTNV	See Ambient Environment	-48 VDC	See Ambient Environment
xT_NV	xT denotes the temperature specified by relevant rules/standards, e.g. -30 °C to +50 °C with step of 10 °C	-48 VDC	---
20°C_85%NV	+20 °C	-40.8 VDC	---
20°C_100%NV	+20 °C	-48 VDC	---
20°C_115%NV	+20 °C	-55.2 VDC	---

2 EUT Configurations

2.1 LTE Single-RAT

NOTE: For the column of “Antenna”,
(1) the expression “1,2,3,…,N” (discrete), “1-N” (continuous range), or “All” denotes N ports 1, 2, 3, …, N or all ports work independently (e.g. SISO), and
(2) the expression “1+2+3+…”, “SUM(1,2,3,…)”, or “SUM(All)” denotes work dependently (e.g. MIMO).

EUT Config. #	Ant	Sys	Gap next?	Band	Freq. [MHz]	ChBW [MHz]	Power [dBm]	Test Mode
TX_1L_20M_TM1.1_B	1–8	LTE	No	48	3560	20	22	LTE/TM1.1
TX_1L_20M_TM1.1_M	1–8	LTE	No	48	3625	20	22	LTE/TM1.1
TX_1L_20M_TM1.1_T	1–8	LTE	No	48	3690	20	22	LTE/TM1.1
TX_2L_20M_TM1_M	1–8	LTE	Yes	48	3560	20	22	LTE/TM1.1
	1–8	LTE	No	48	3690	20	22	LTE/TM1.1
TX_3L_20M_TM1_M	1–8	LTE	Yes	48	3560	20	22	LTE/TM1.1
	1–8	LTE	No	48	3670	20	22	LTE/TM1.1
	1–8	LTE	No	48	3690	20	22	LTE/TM1.1
TX_4L_20M_TM1_M	1–8	LTE	Yes	48	3560	20	22	LTE/TM1.1
	1–8	LTE	Yes	48	3610	20	22	LTE/TM1.1
	1–8	LTE	Yes	48	3640	20	22	LTE/TM1.1
	1–8	LTE	No	48	3690	20	22	LTE/TM1.1

3 Test Configurations

3.1 LTE Single-RAT

#	Test Item	Test Environment #	EUT Config. #
1	RF power output	NTNV	TX_1L_20M_TM1.1_B, TX_1L_20M_TM1.1_M, TX_1L_20M_TM1.1_T, TX_2L_20M_TM1_M, TX_3L_20M_TM1_M, TX_4L_20M_TM1_M
2	Bandwidth	NTNV	TX_1L_20M_TM1.1_B, TX_1L_20M_TM1.1_M, TX_1L_20M_TM1.1_T
3	Band Edges Compliance / Emission Mask	NTNV	TX_1L_20M_TM1.1_B, TX_1L_20M_TM1.1_M, TX_1L_20M_TM1.1_T, TX_2L_20M_TM1_M, TX_3L_20M_TM1_M, TX_4L_20M_TM1_M
4	Spurious emissions at antenna terminals	NTNV	TX_1L_20M_TM1.1_B, TX_1L_20M_TM1.1_M, TX_1L_20M_TM1.1_T, TX_2L_20M_TM1_M, TX_3L_20M_TM1_M, TX_4L_20M_TM1_M
5	Field strength of spurious radiation	NTNV	TX_4L_20M_TM1_M
6	Frequency stability	xT_NV 20°C_85%NV 20°C_100%NV 20°C_115%NV	Frequency error: TX_1L_20M_TM1.1_B, TX_1L_20M_TM1.1_M, TX_1L_20M_TM1.1_T

PART 3

TEST RESULTS

Test item 1
RF power output

1 Result Table

1.1 Channel Power, Total

NOTE 1: If applicable, the EIRP [dBm] = Channel Power [dBm] + Antenna Gain [dBi].

NOTE 2: The procedure in this item employs the measure-and-sum approach, and the channel power is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total channel power from the device.

1.1.1 LTE Carrier

EUT Conf.	Combined Conduct Output Power [dBm]	Antenna Gain [dBi]	EIRP [dBm]	EIRP [dBm/10MHz]	EIRP limit [dBm/10MHz]	Verdict
TX_1L_20M_TM1.1_B	31.96	17	48.96	45.96	47	Pass
TX_1L_20M_TM1.1_M	31.50	17	48.5	45.5	47	Pass
TX_1L_20M_TM1.1_T	31.51	17	48.51	45.51	47	Pass
TX_2L_20M_TM1_M	34.77	17	51.77	45.77	47	Pass
TX_3L_20M_TM1_M	36.47	17	53.47	45.70	47	Pass
TX_4L_20M_TM1_M	37.65	17	54.65	45.65	47	Pass

1.1.2 Test results for all various outputs

EUT Conf.	Carrier #	Output power of antenna port 1 [dBm]	Output power of antenna port 2 [dBm]	Output power of antenna port 3 [dBm]	Output power of antenna port 4 [dBm]	Output power of antenna port 5 [dBm]	Output power of antenna port 6 [dBm]	Output power of antenna port 7 [dBm]	Output power of antenna port 8 [dBm]	Total output power [dBm]
TX_1L_20M_TM1.1_B	# 1	22.61	22.79	22.78	22.9	23.05	23.15	22.95	23.2	31.96
TX_1L_20M_TM1.1_M	# 1	22.33	22.57	22.27	22.42	22.59	22.6	22.36	22.58	31.50
TX_1L_20M_TM1.1_T	# 1	22.46	22.44	22.25	22.22	22.7	22.54	22.56	22.61	31.51
TX_2L_20M_TM1_M	# 1	22.86	22.93	22.7	22.93	23.11	23.14	22.87	23.19	34.77
	# 2	22.59	22.37	22.18	22.24	22.68	22.56	22.49	22.63	
TX_3L_20M_TM1_M	# 1	22.59	23.03	22.77	23.05	23.13	23.27	23	23.2	36.47
	# 2	22.38	22.43	22.27	22.43	22.64	22.62	22.47	22.6	
	# 3	22.39	22.38	22.19	22.32	22.71	22.68	22.55	22.63	
TX_4L_20M_TM1_M	# 1	22.79	22.86	22.72	22.92	23.08	23.26	23.03	23.21	37.65
	# 2	22.37	22.35	22.25	22.44	22.59	22.72	22.32	22.6	
	# 3	22.43	22.46	22.23	22.44	22.58	22.69	22.3	22.59	
	# 4	22.56	22.29	22.22	22.3	22.68	22.66	22.39	22.65	

1.2 Power Spectral Density

NOTE 1: If applicable, the EIRP [dBm/MHz] = Power Spectral Density [dBm/MHz] + Antenna Gain [dBi].

NOTE 2: In-band power spectral density measurements is in accordance with the method of “Measure and sum spectral maxima across the outputs”.

1.2.1 EIRP evaluation

EUT Conf.	Max conducted PSD for all ports [dBm/MHz]	Maximum permissible Antenna Gain [dBi]	EIRP [dBm/MHz]	EIRP limit [dBm/MHz]	Verdict
TX_1L_20M_TM1.1_B	19.75	17	36.75	37	Pass
TX_1L_20M_TM1.1_M	19.36	17	36.36	37	Pass
TX_1L_20M_TM1.1_T	19.35	17	36.35	37	Pass
TX_2L_20M_TM1_M	19.33	17	36.33	37	Pass
TX_3L_20M_TM1_M	19.54	17	36.54	37	Pass
TX_4L_20M_TM1_M	19.44	17	36.44	37	Pass

1.2.2 Test records of various output ports

EUT Conf.	Power Spectral Density of antenna port 1 [dBm/MHz]	Power Spectral Density of antenna port 2 [dBm/MHz]	Power Spectral Density of antenna port 3 [dBm/MHz]	Power Spectral Density of antenna port 4 [dBm/MHz]	Power Spectral Density of antenna port 5 [dBm/MHz]	Power Spectral Density of antenna port 6 [dBm/MHz]	Power Spectral Density of antenna port 7 [dBm/MHz]	Power Spectral Density of antenna port 8 [dBm/MHz]	Total Power Spectral Density [dBm/MHz]
TX_1L_20M_TM1.1_B	10.7	10.64	10.49	10.64	10.75	10.89	10.69	10.91	19.75
TX_1L_20M_TM1.1_M	10.26	10.23	10.08	10.18	10.51	10.5	10.31	10.51	19.36
TX_1L_20M_TM1.1_T	10.29	10.39	10.13	10.13	10.45	10.36	10.33	10.43	19.35
TX_2L_20M_TM1_M	10.33	10.27	10.04	10.18	10.43	10.46	10.25	10.44	19.33
TX_3L_20M_TM1_M	10.41	10.43	10.3	10.36	10.65	10.66	10.51	10.73	19.54
TX_4L_20M_TM1_M	10.37	10.3	10.08	10.33	10.55	10.71	10.25	10.68	19.44

1.3 Peak-to-Average Ratio

EUT Conf.	Peak-to-Average Ratio@0.1% [dB]	Verdict
TX_1L_20M_TM1.1_B	6.60	Pass
TX_1L_20M_TM1.1_M	6.65	Pass
TX_1L_20M_TM1.1_T	6.60	Pass

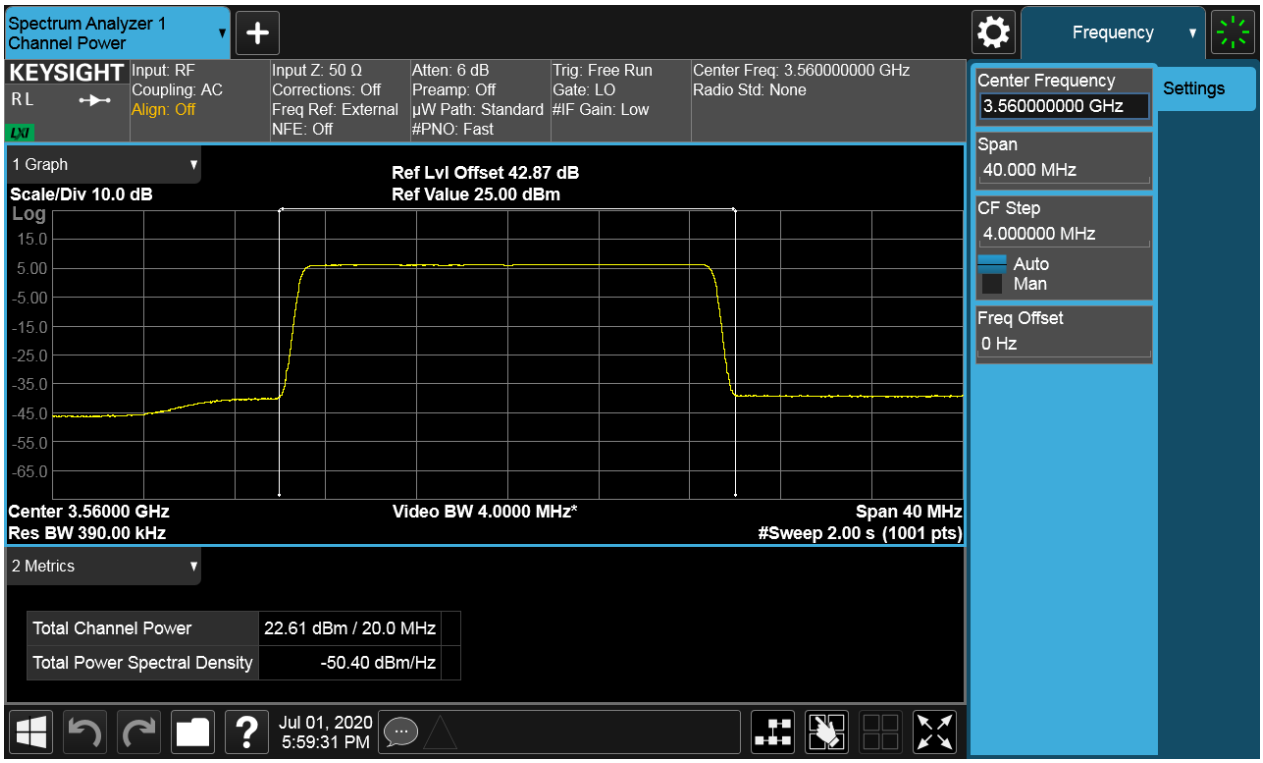
2 Test Plot

2.1 Channel Power

2.1.1 Channel Power of Ant1

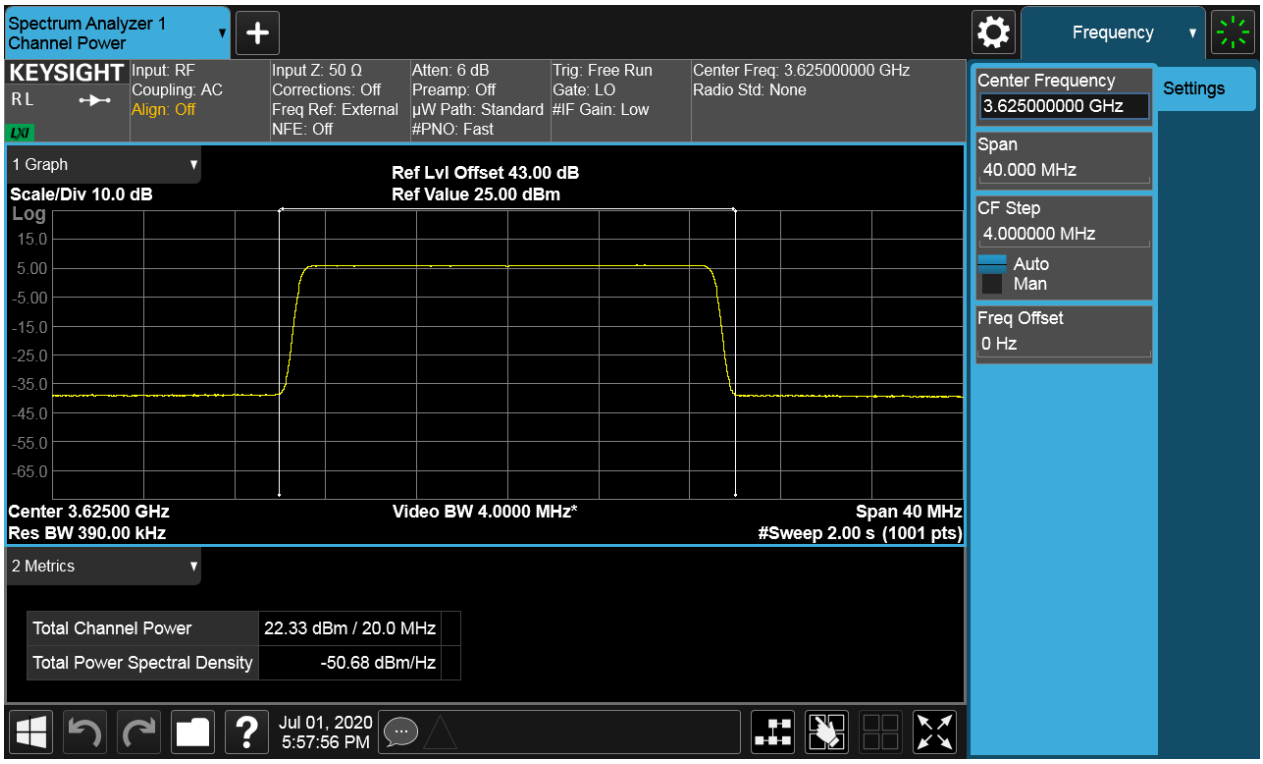
2.1.1.1 TX_1L_20M_TM1.1_B

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	42.87	22.61	Pass



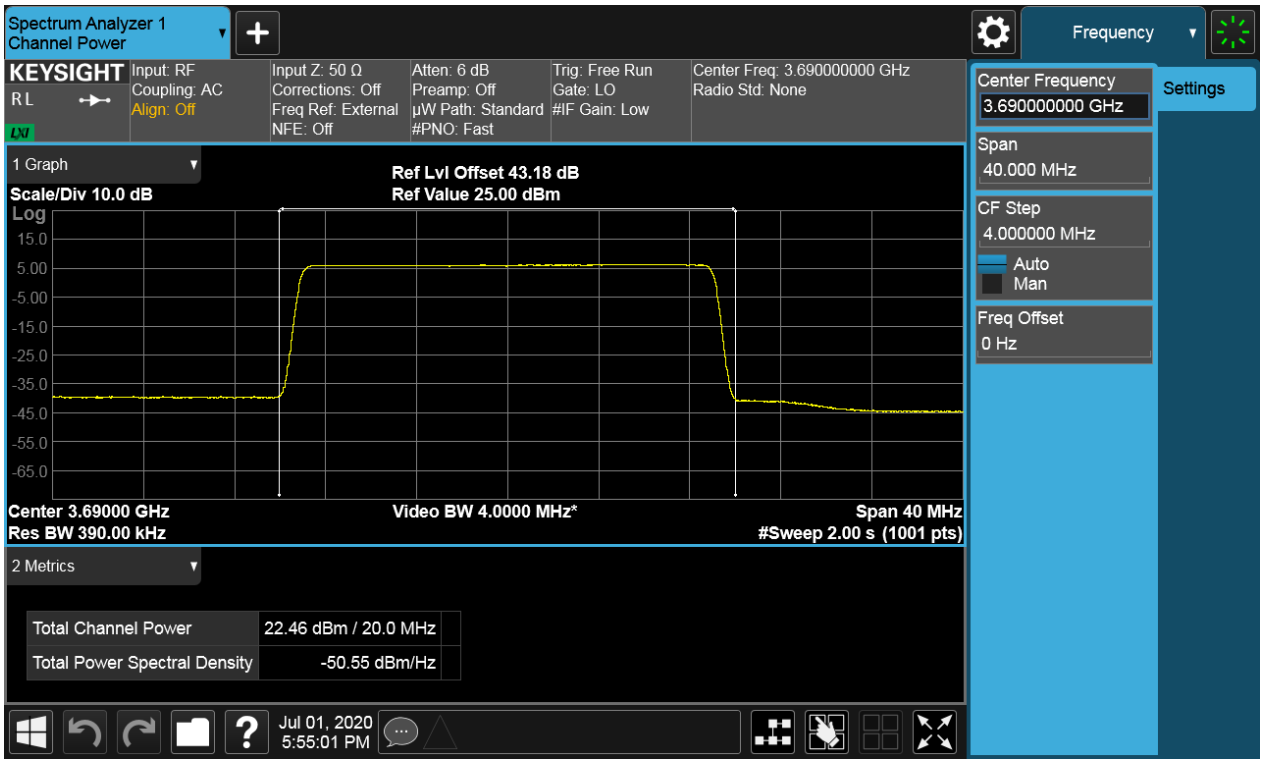
2.1.1.2 TX_1L_20M_TM1.1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3625	20	RMS	43	22.33	Pass



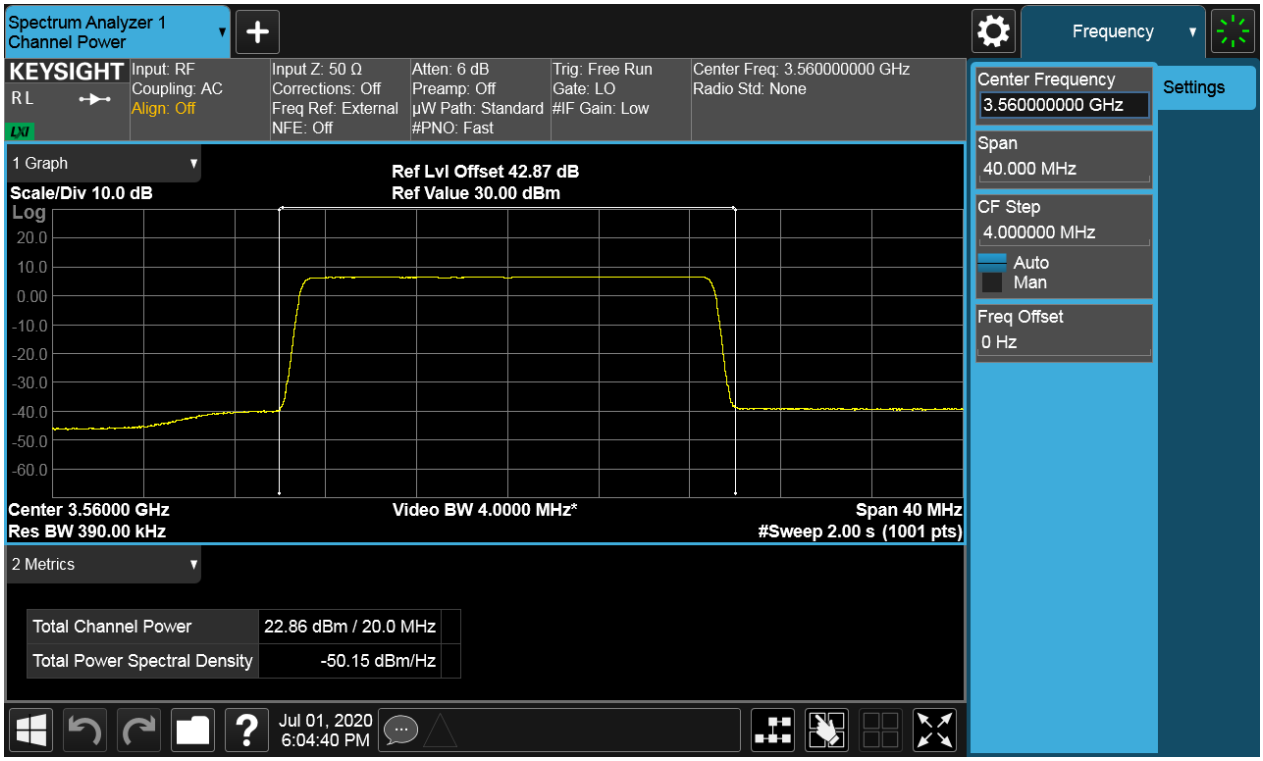
2.1.1.3 TX_1L_20M_TM1.1_T

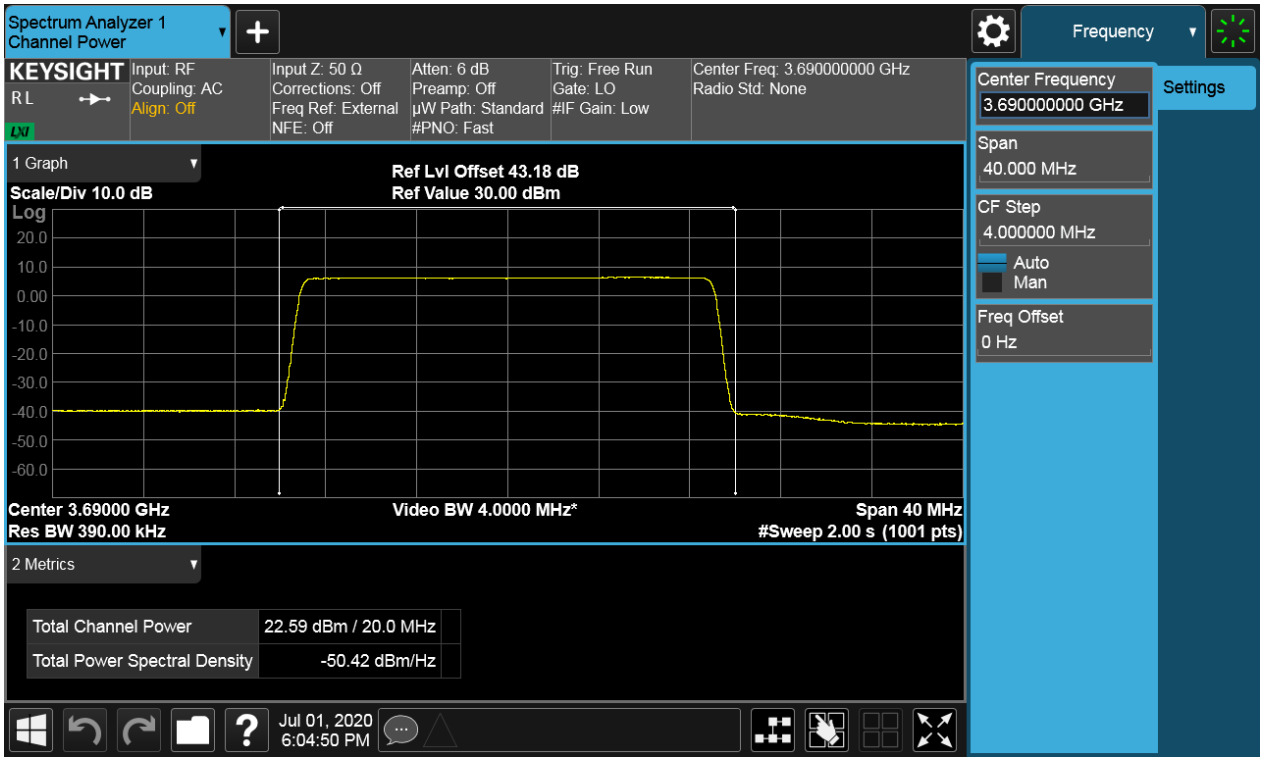
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3690	20	RMS	43.18	22.46	Pass



2.1.1.4 TX_2L_20M_TM1_M

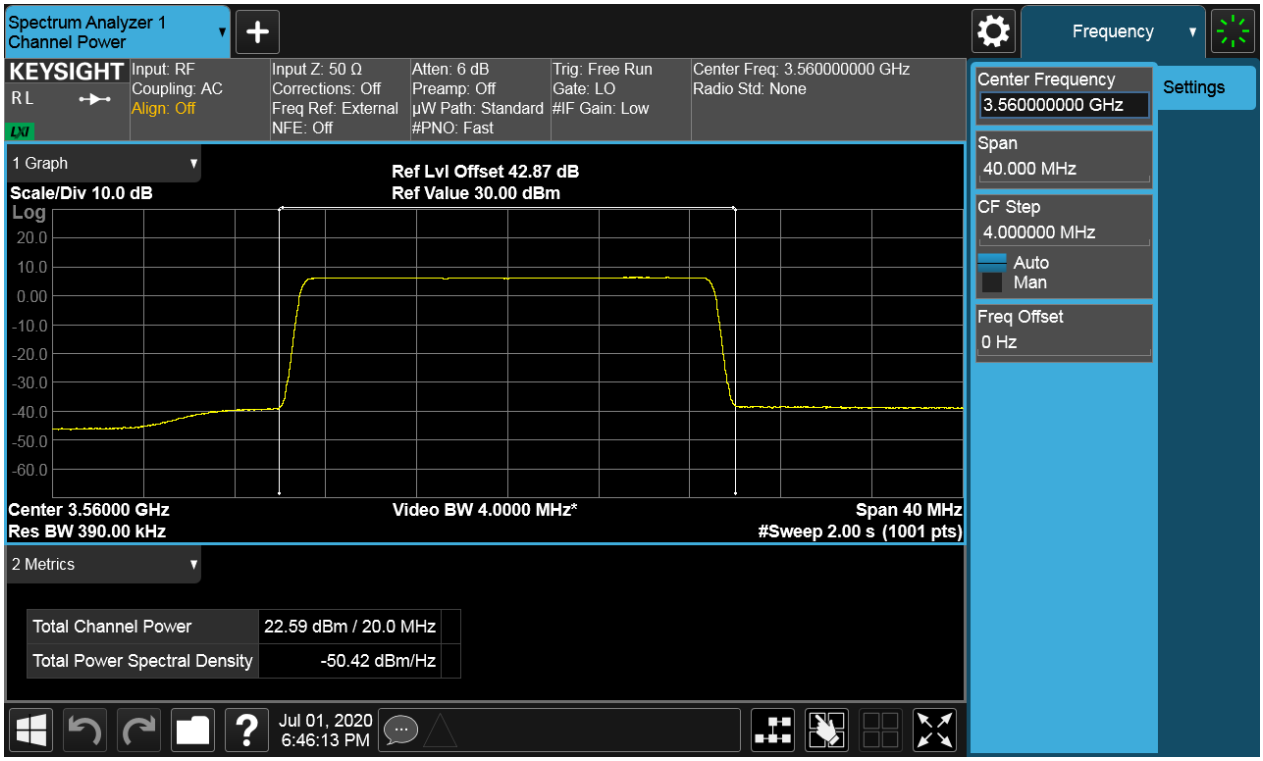
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	42.87	22.86	Pass
NTNV	3690	20	RMS	43.18	22.59	Pass



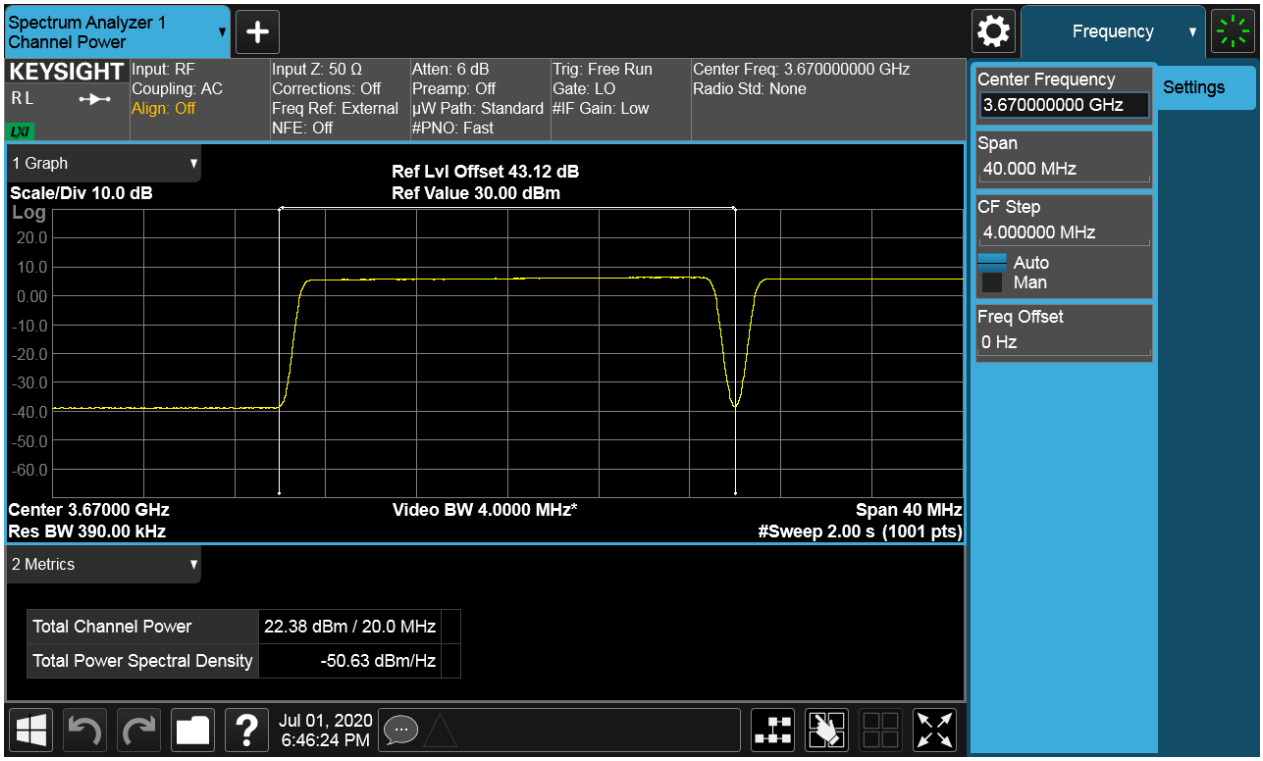


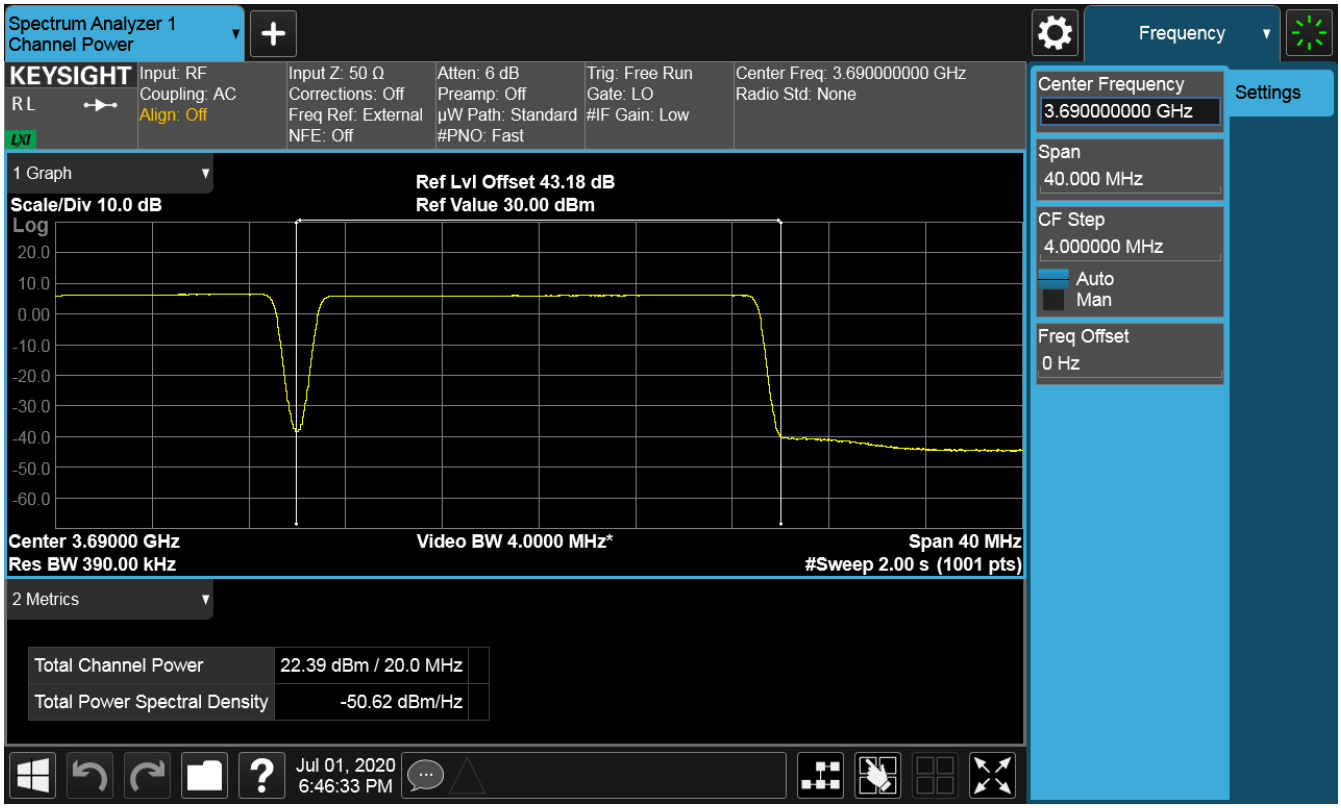
2.1.1.5 TX_3L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	42.87	22.59	Pass
NTNV	3670	20	RMS	43.12	22.38	Pass
NTNV	3690	20	RMS	43.18	22.39	Pass



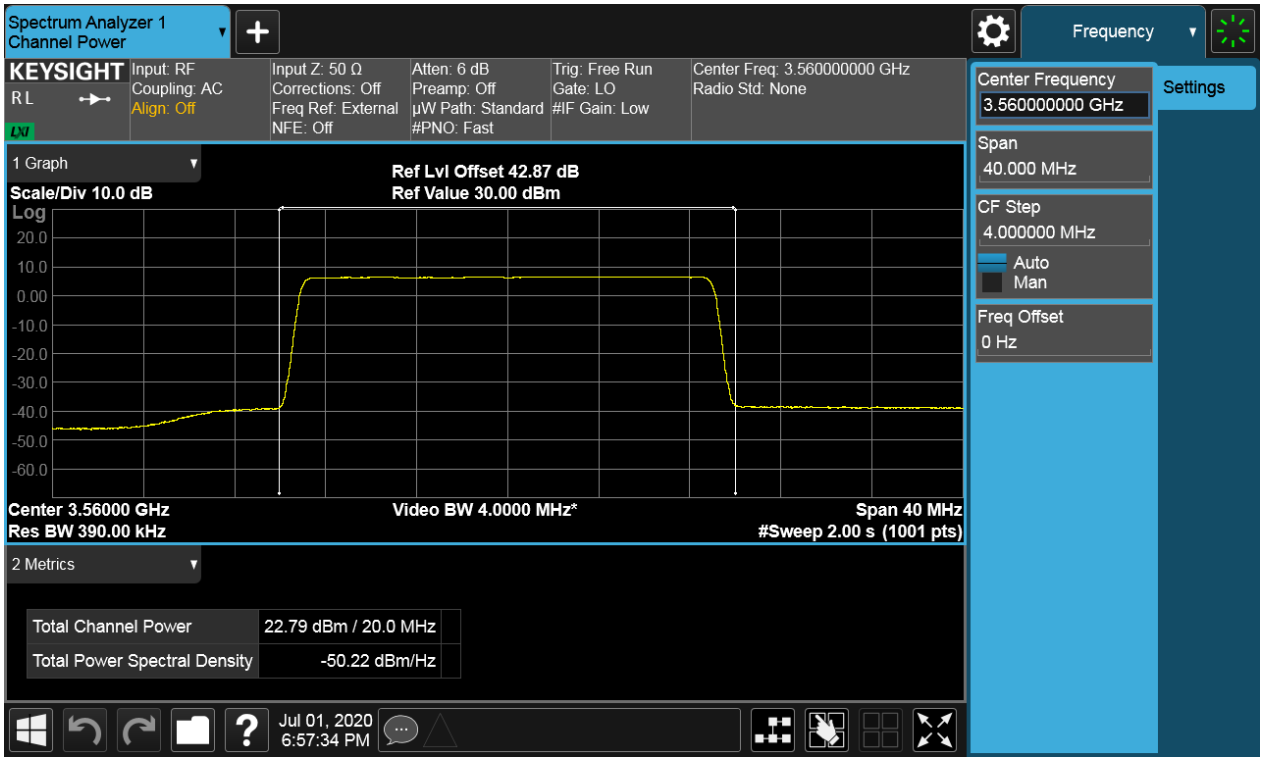
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict



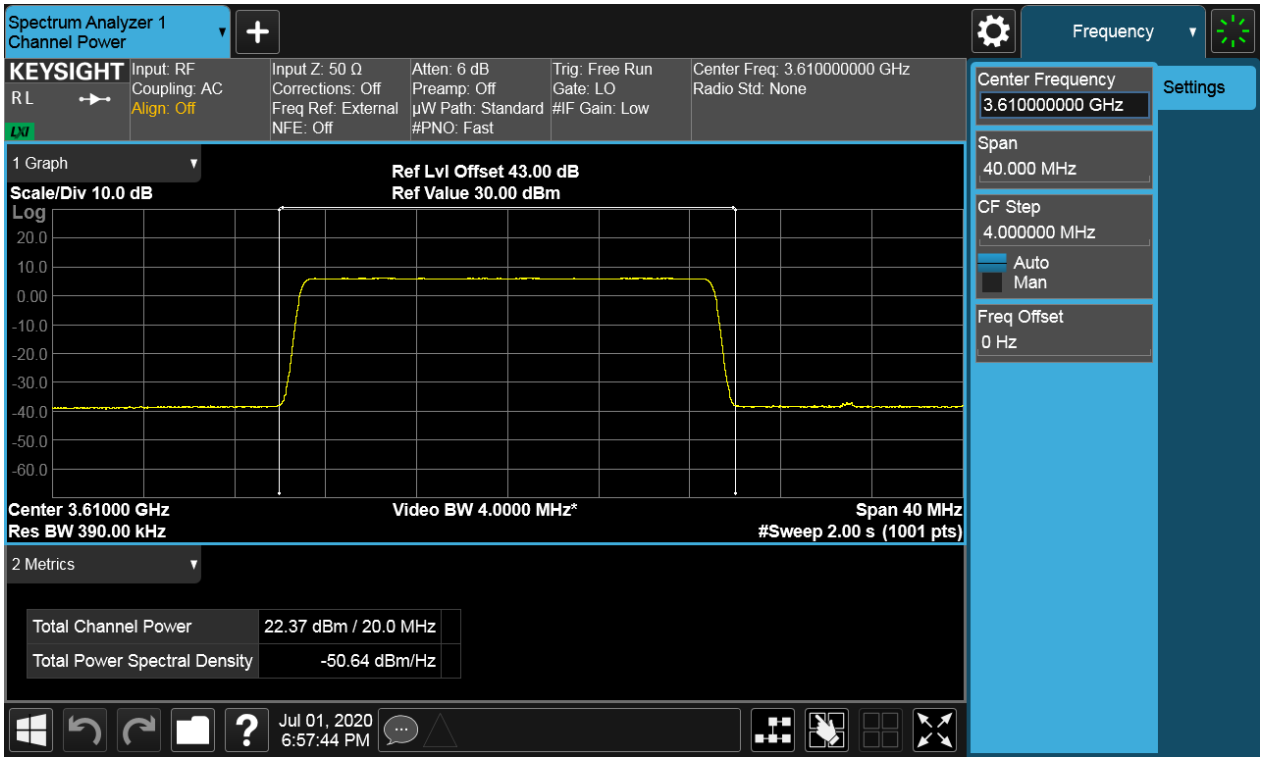


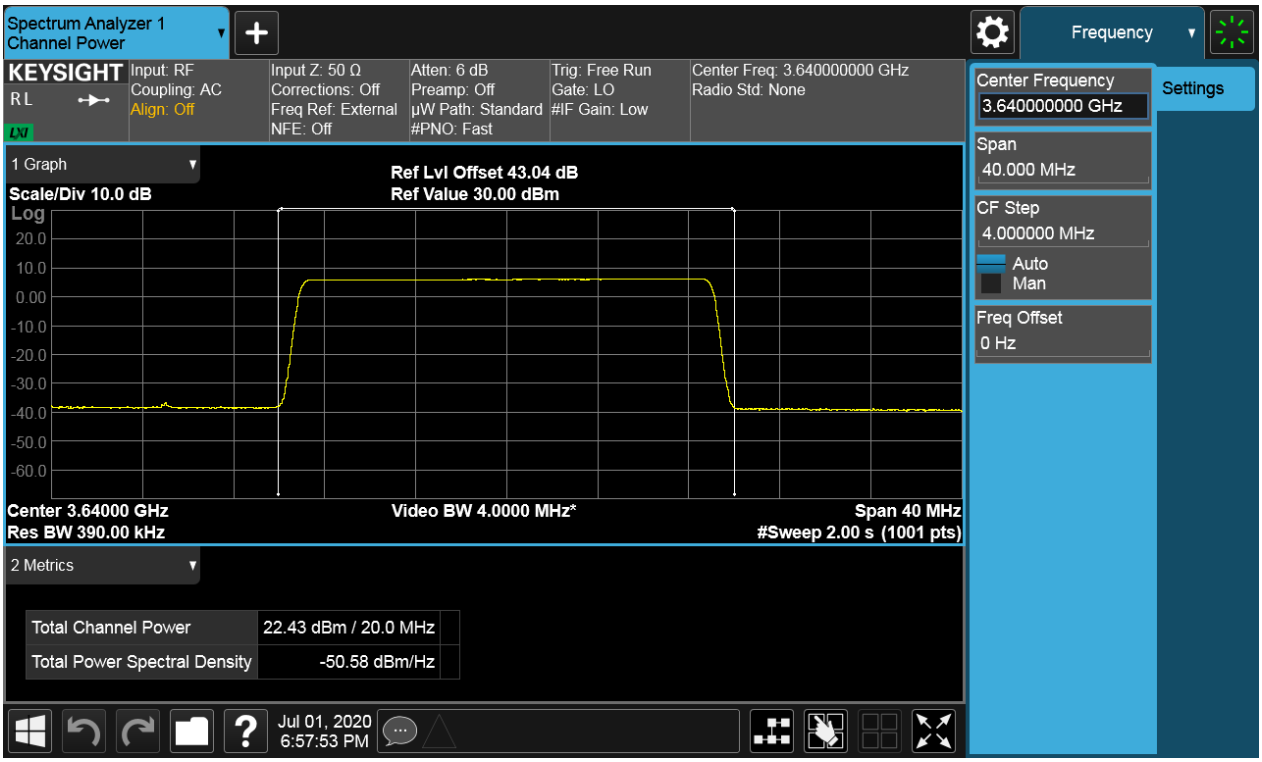
2.1.1.6 TX_4L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	42.87	22.79	Pass
NTNV	3610	20	RMS	43	22.37	Pass
NTNV	3640	20	RMS	43.04	22.43	Pass
NTNV	3690	20	RMS	43.18	22.56	Pass

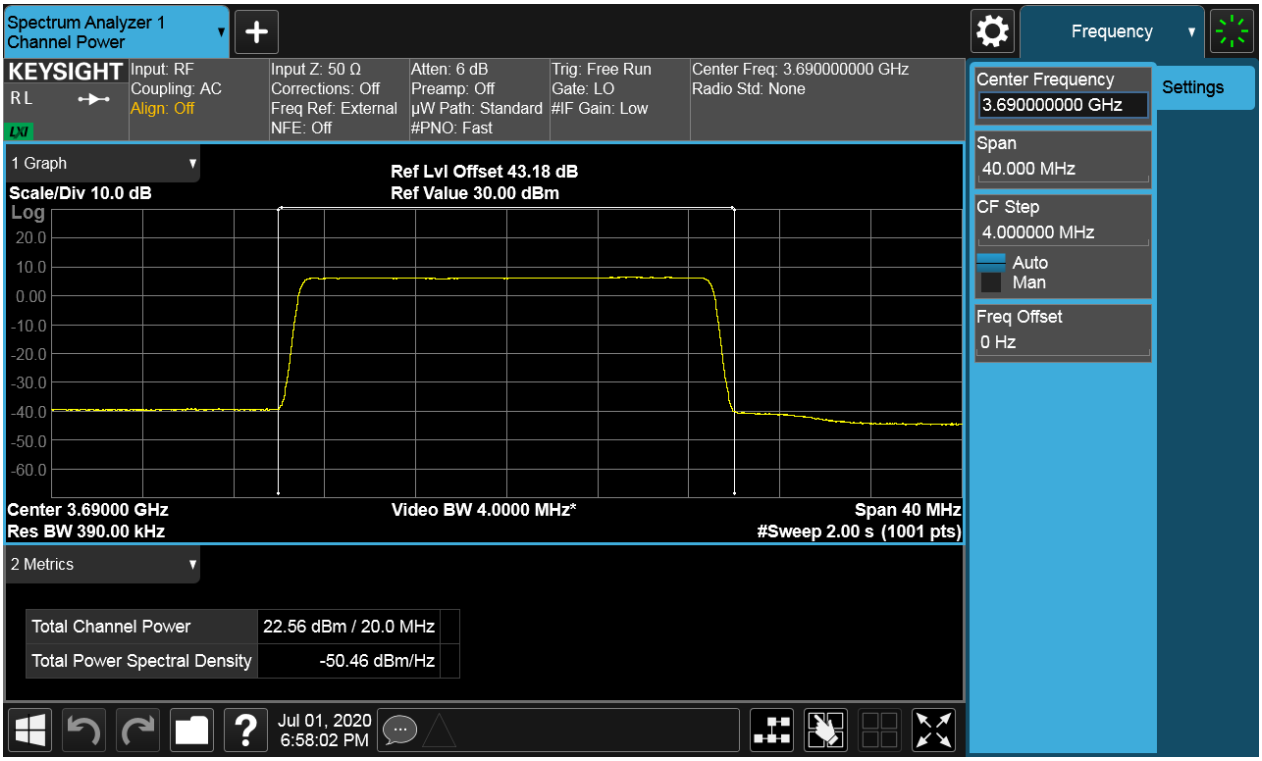


Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict





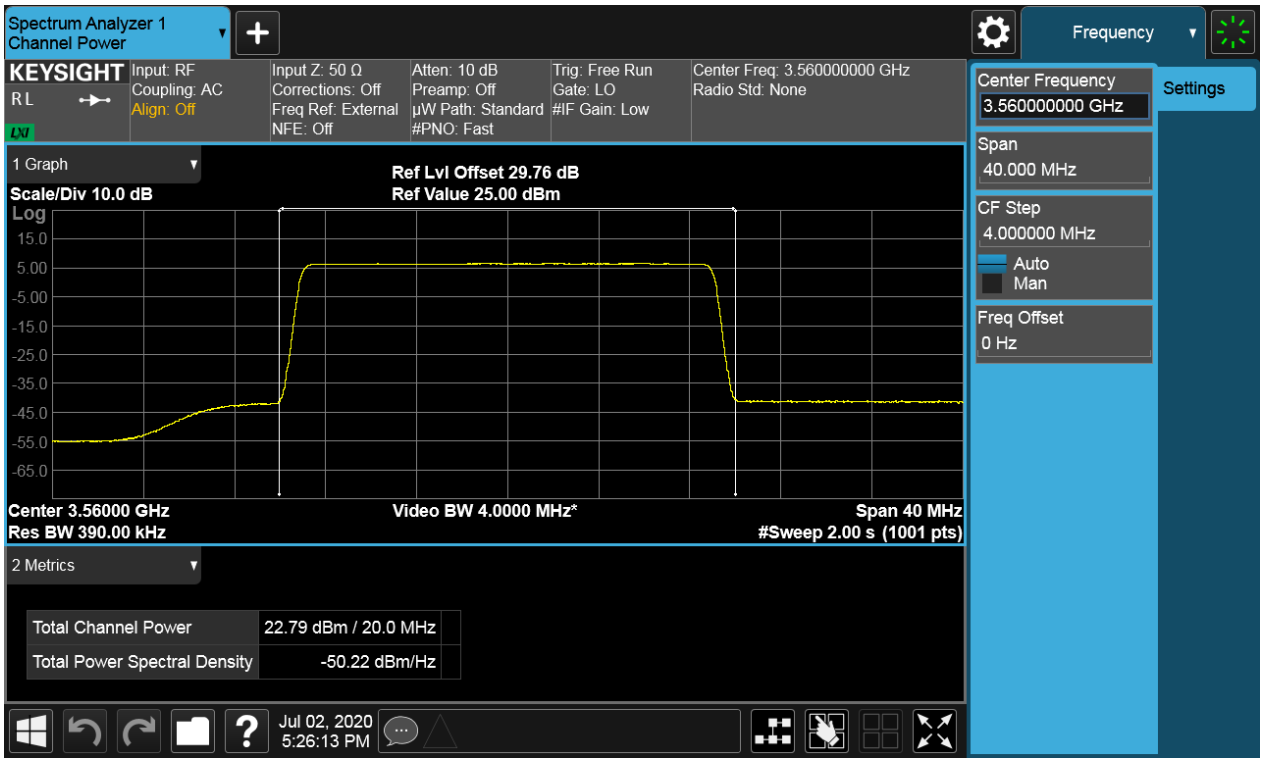
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict



2.1.2 Channel Power of Ant2

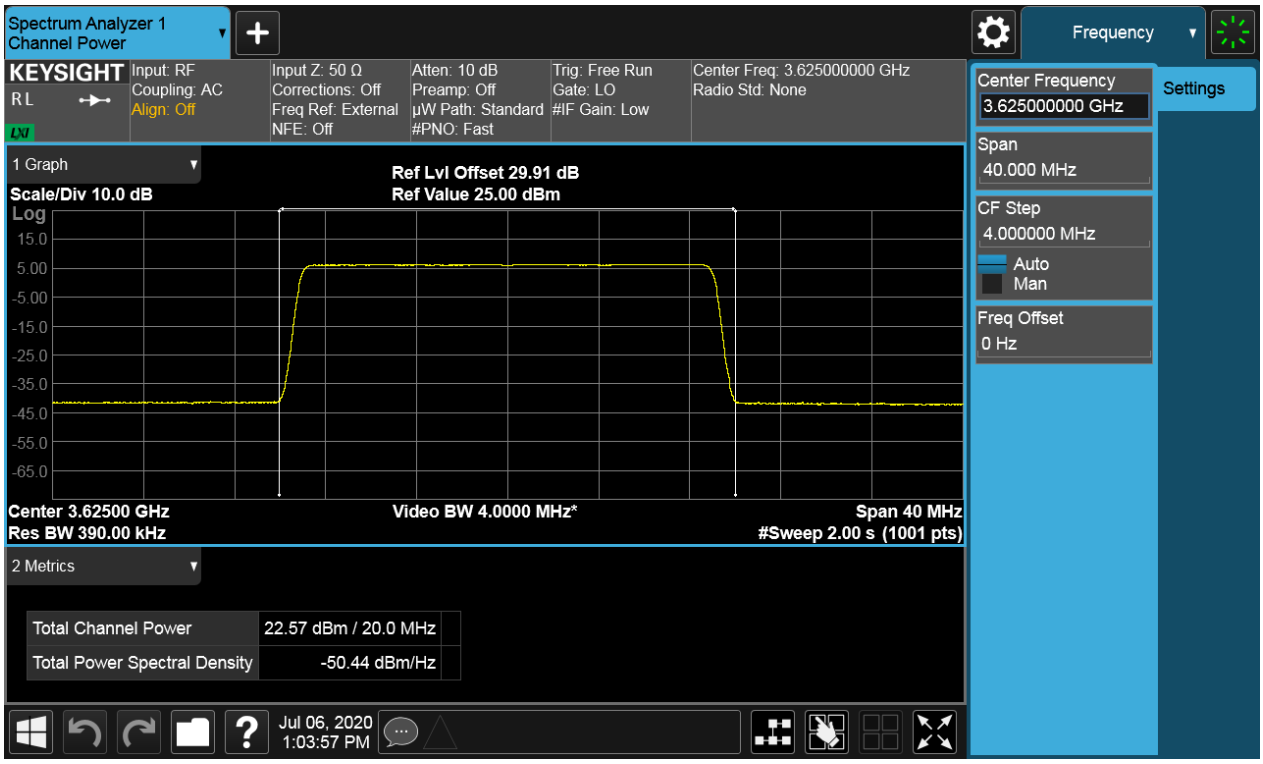
2.1.2.1 TX_1L_20M_TM1.1_B

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.79	Pass



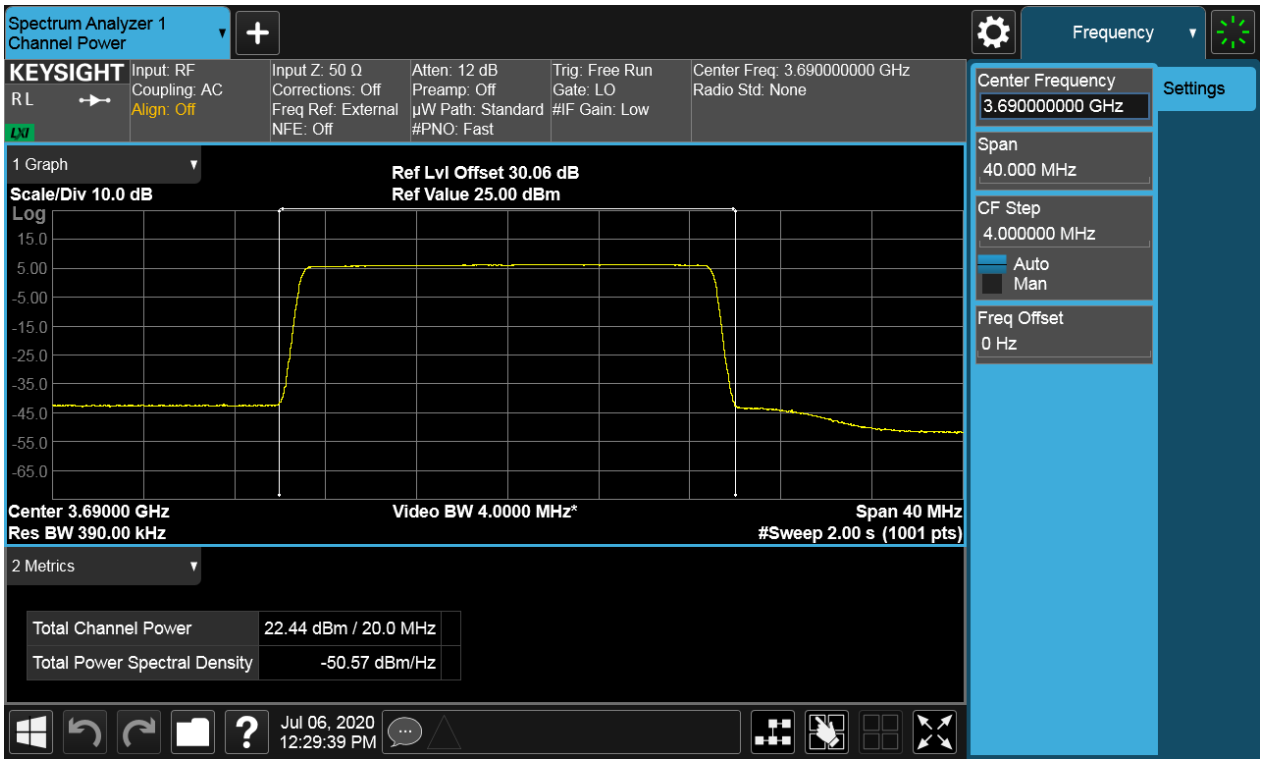
2.1.2.2 TX_1L_20M_TM1.1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3625	20	RMS	29.91	22.57	Pass



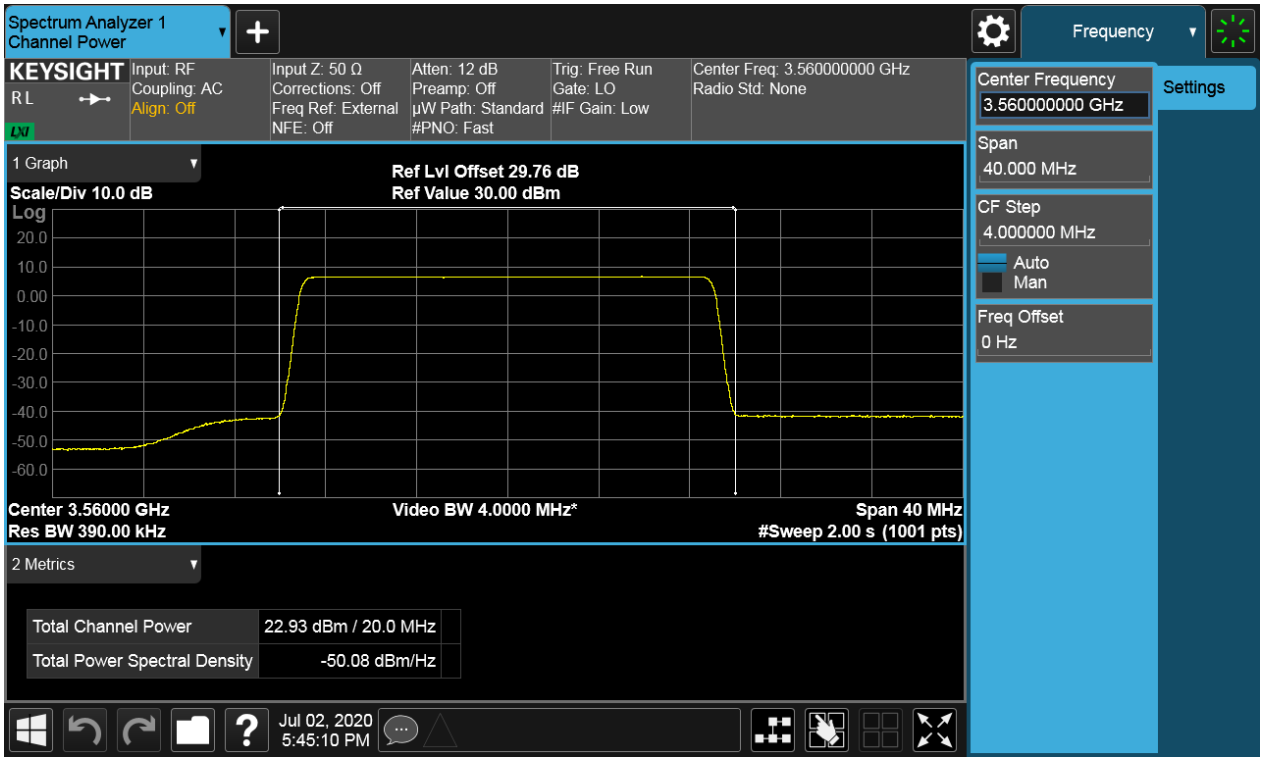
2.1.2.3 TX_1L_20M_TM1.1_T

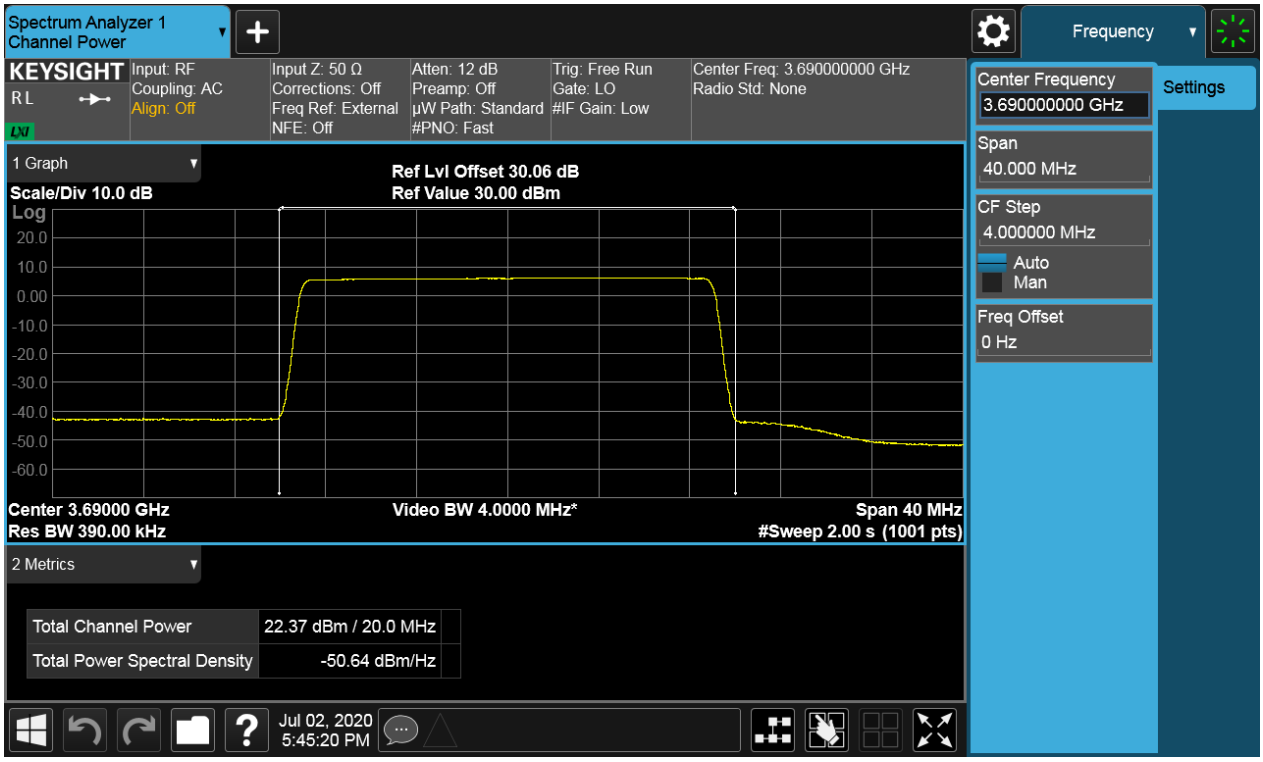
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3690	20	RMS	30.06	22.44	Pass



2.1.2.4 TX_2L_20M_TM1_M

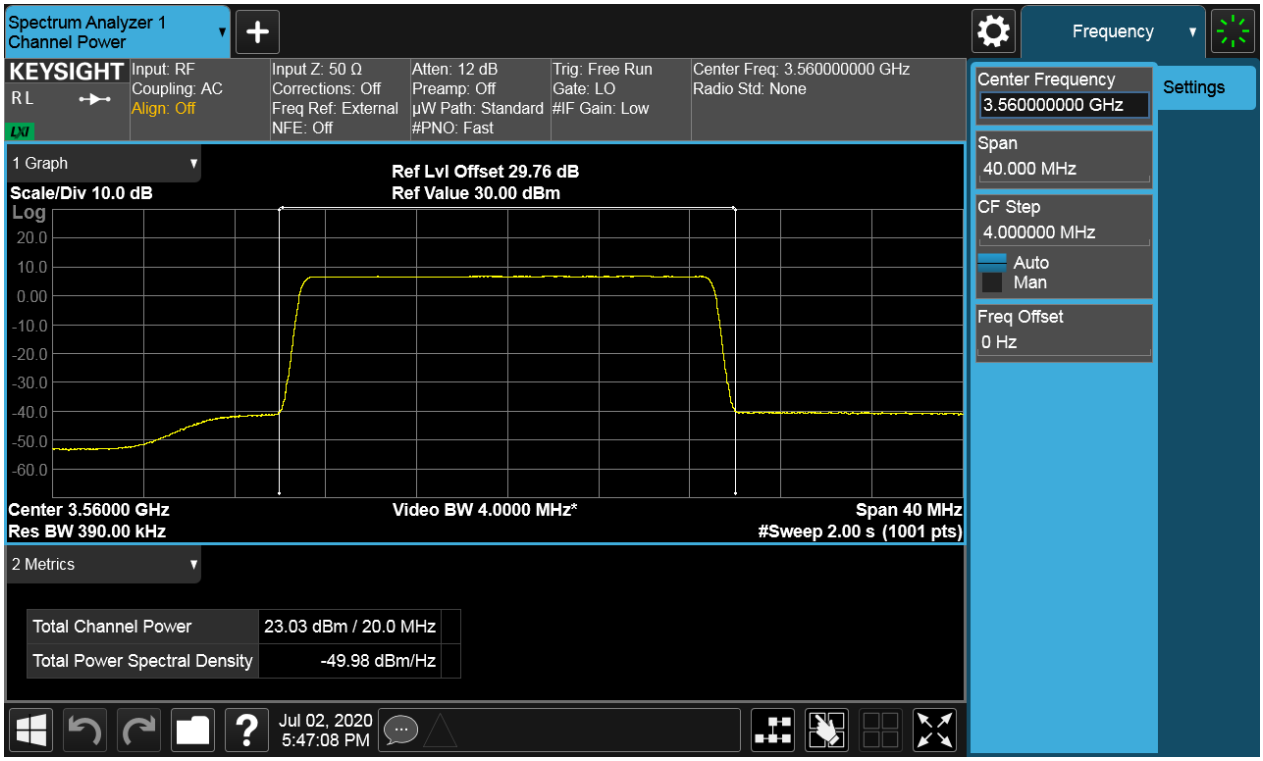
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.93	Pass
NTNV	3690	20	RMS	30.06	22.37	Pass



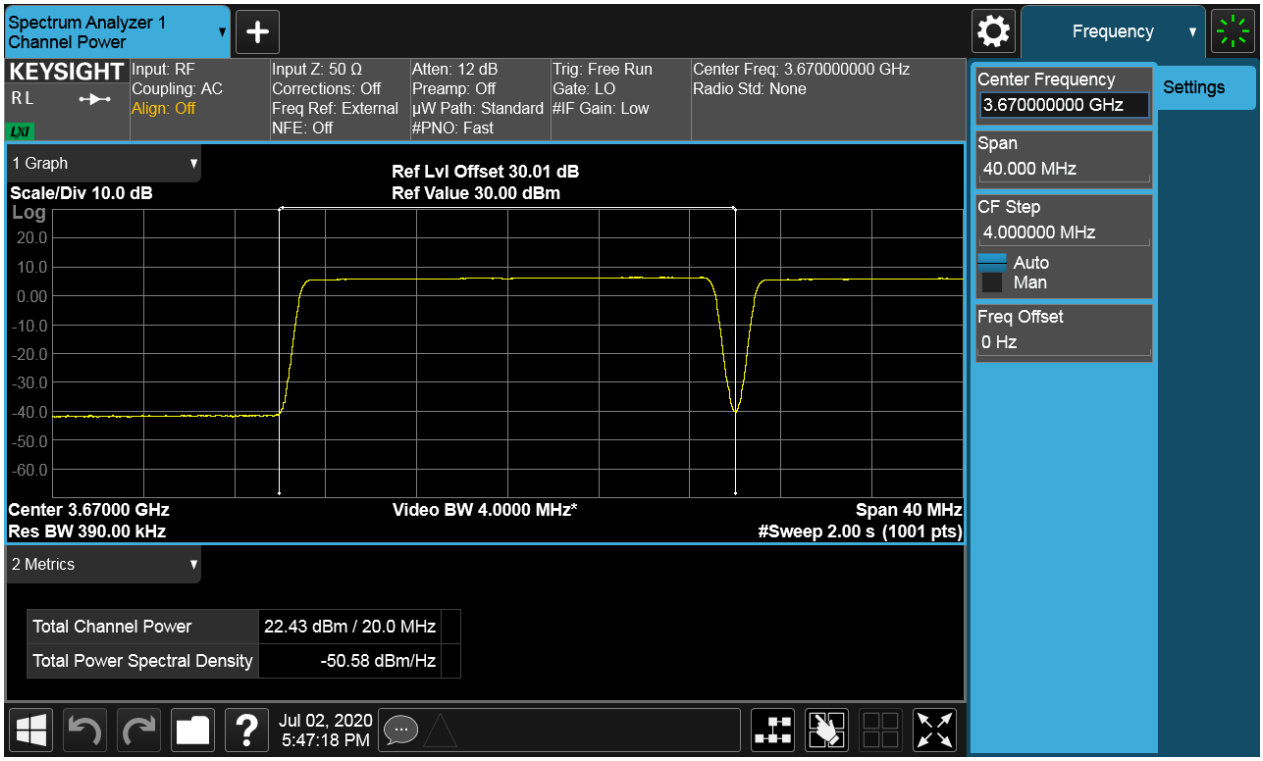


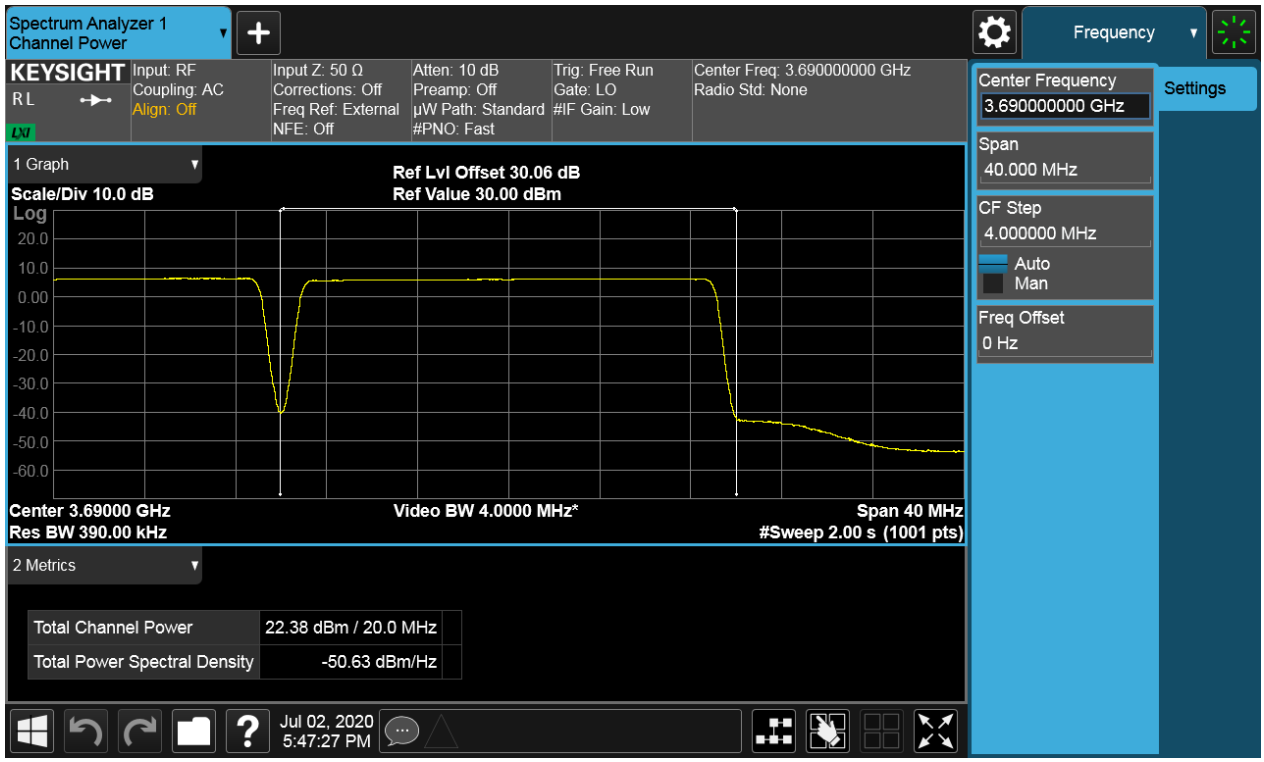
2.1.2.5 TX_3L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	23.03	Pass
NTNV	3670	20	RMS	30.01	22.43	Pass
NTNV	3690	20	RMS	30.06	22.38	Pass



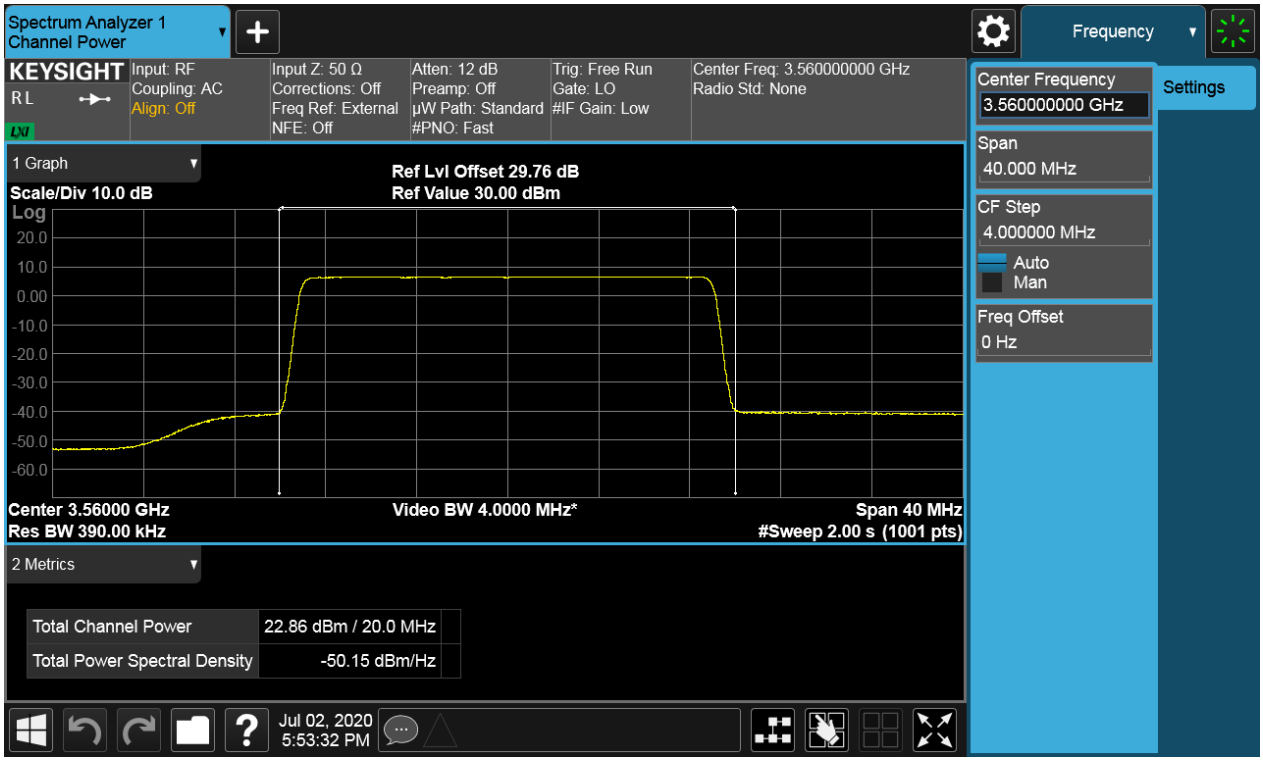
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict



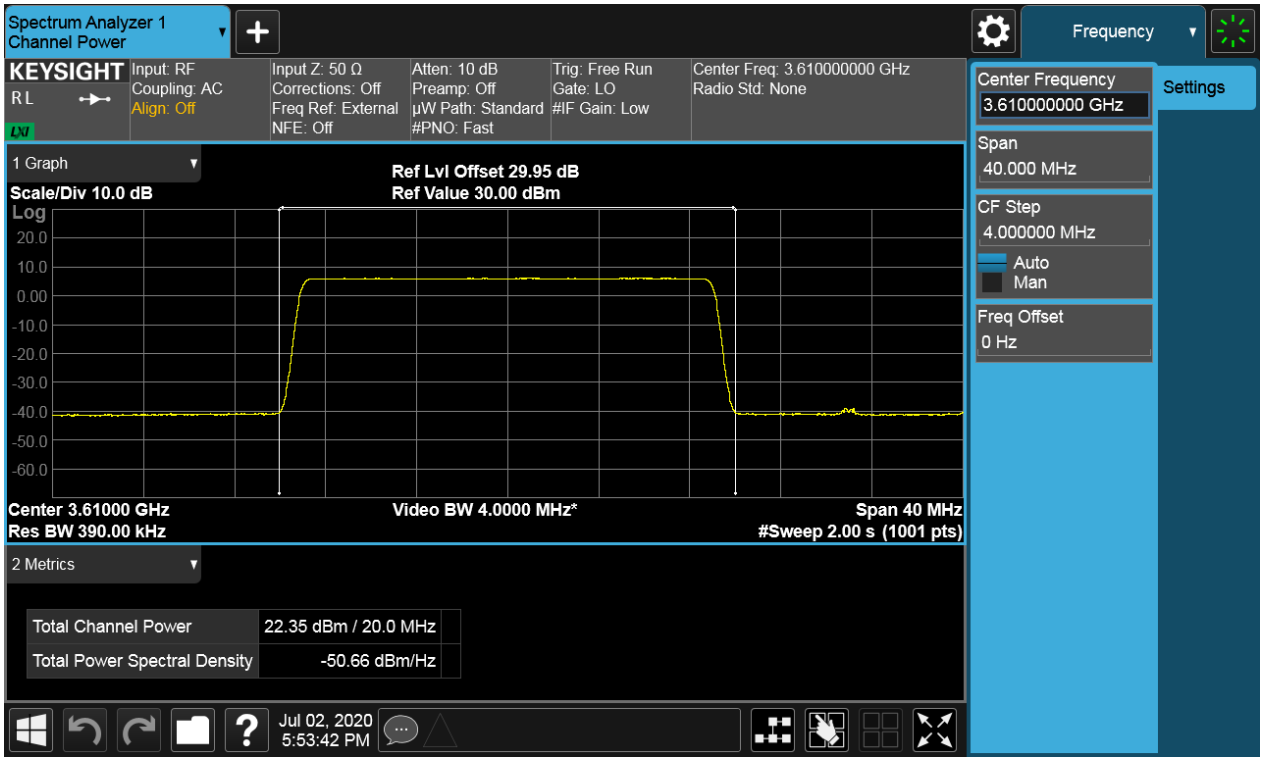


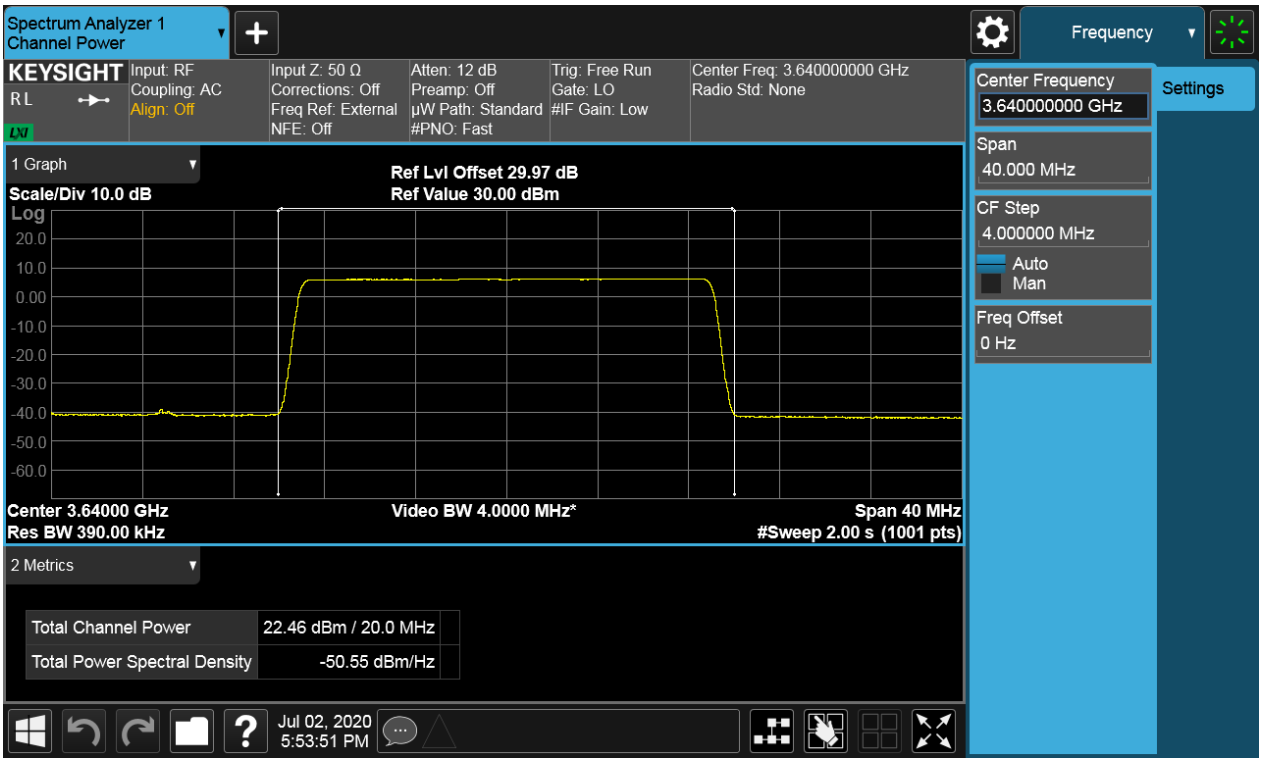
2.1.2.6 TX_4L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.86	Pass
NTNV	3610	20	RMS	29.95	22.35	Pass
NTNV	3640	20	RMS	29.97	22.46	Pass
NTNV	3690	20	RMS	30.06	22.29	Pass

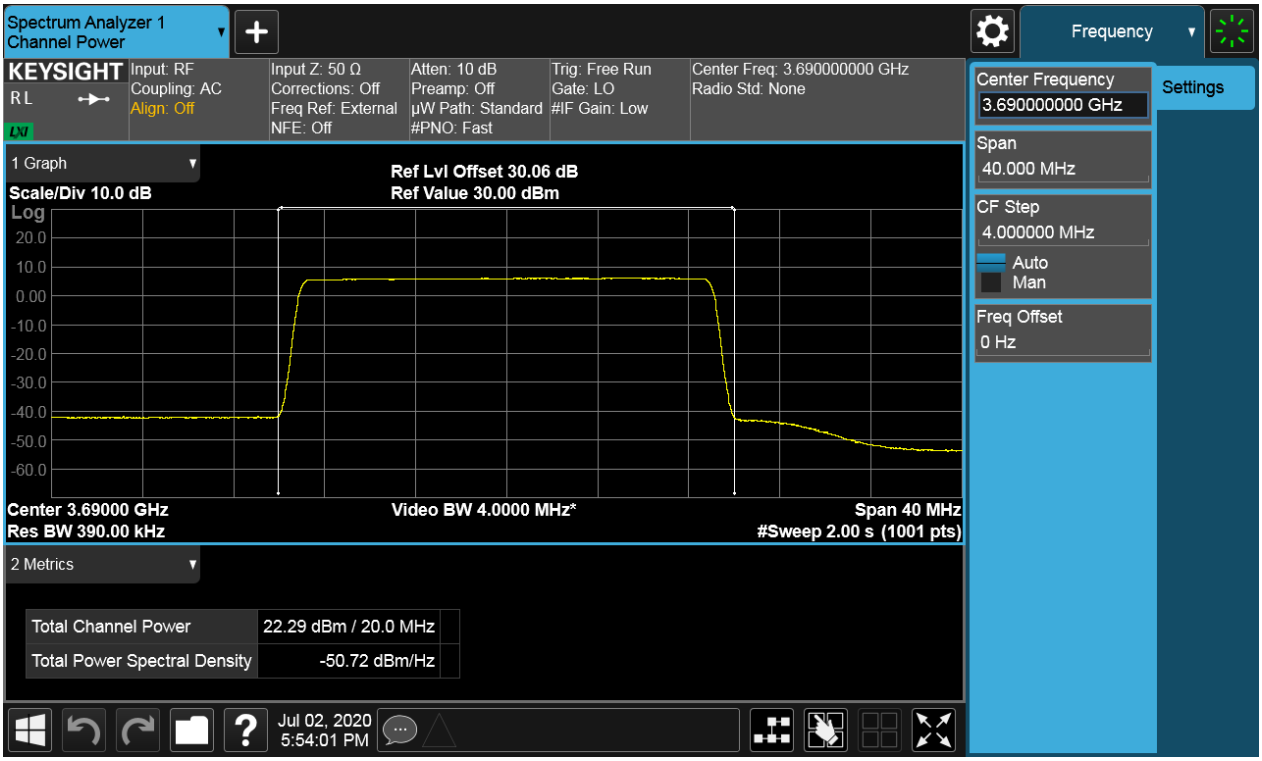


Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict





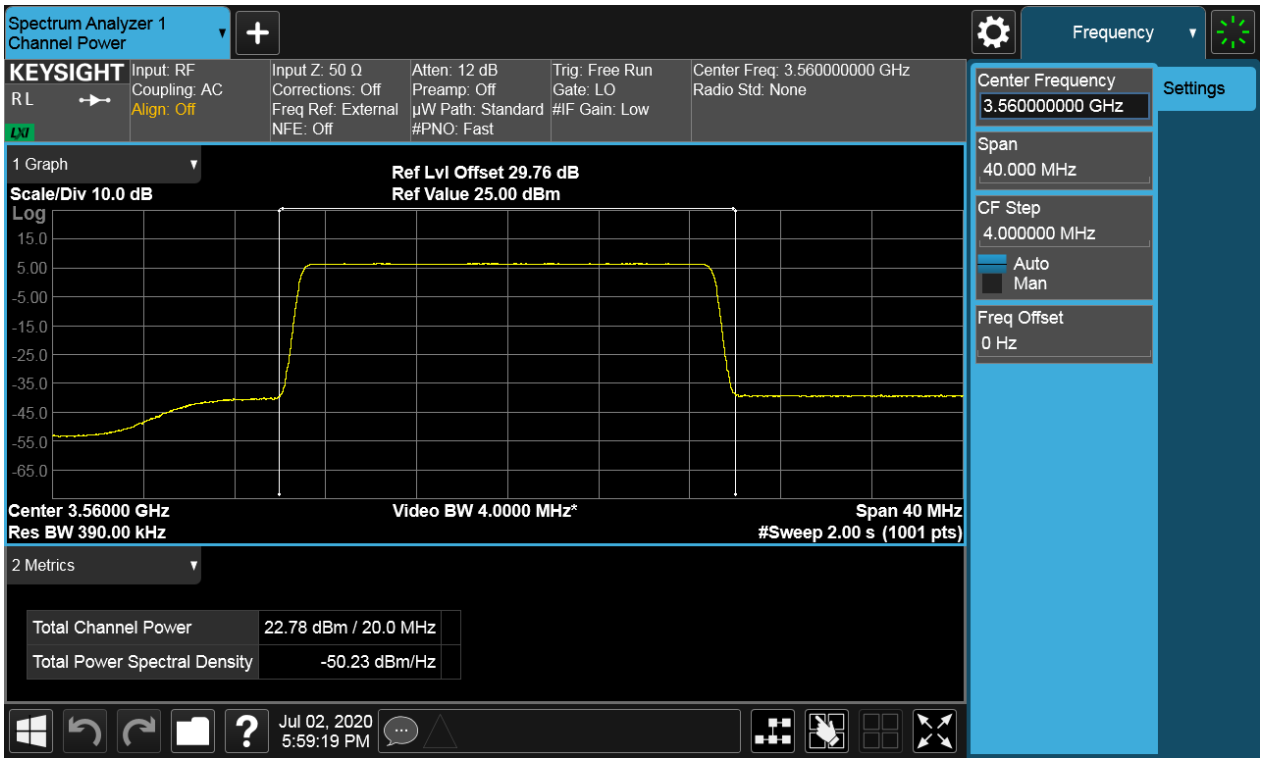
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict



2.1.3 Channel Power of Ant3

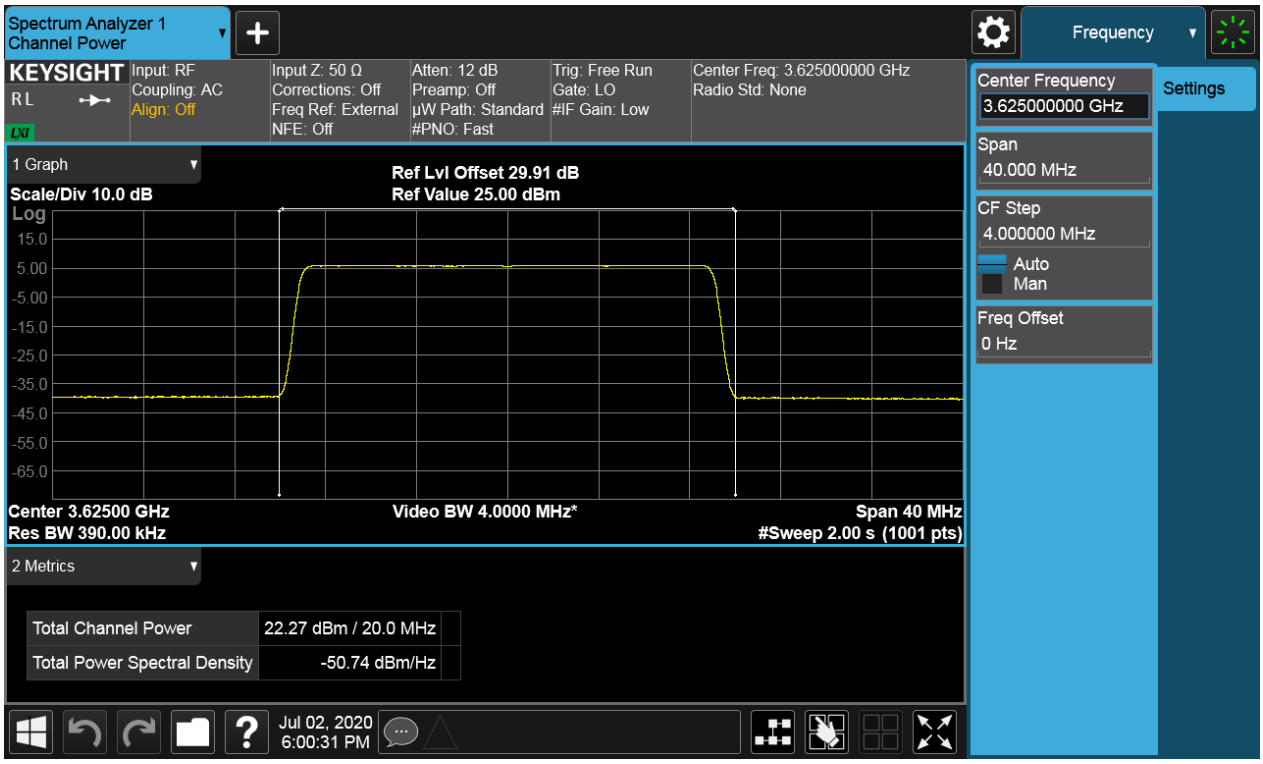
2.1.3.1 TX_1L_20M_TM1.1_B

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.78	Pass



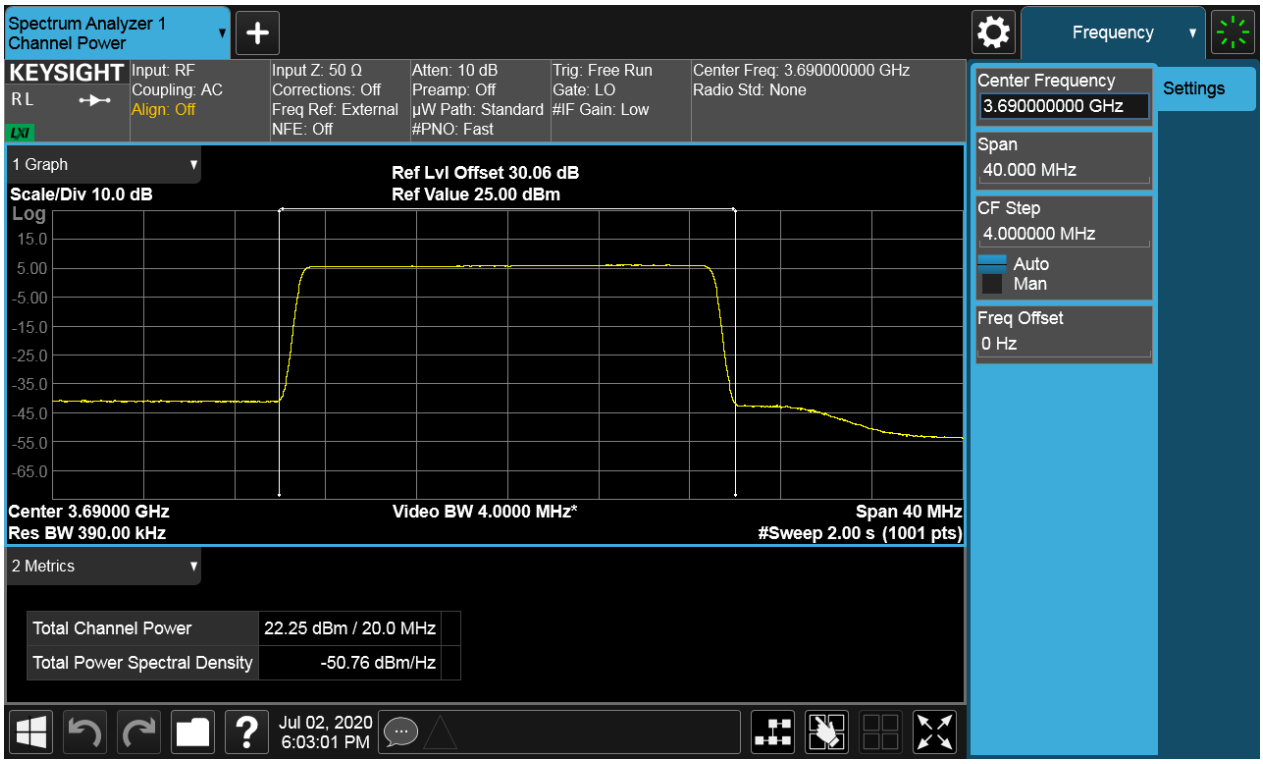
2.1.3.2 TX_1L_20M_TM1.1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3625	20	RMS	29.91	22.27	Pass



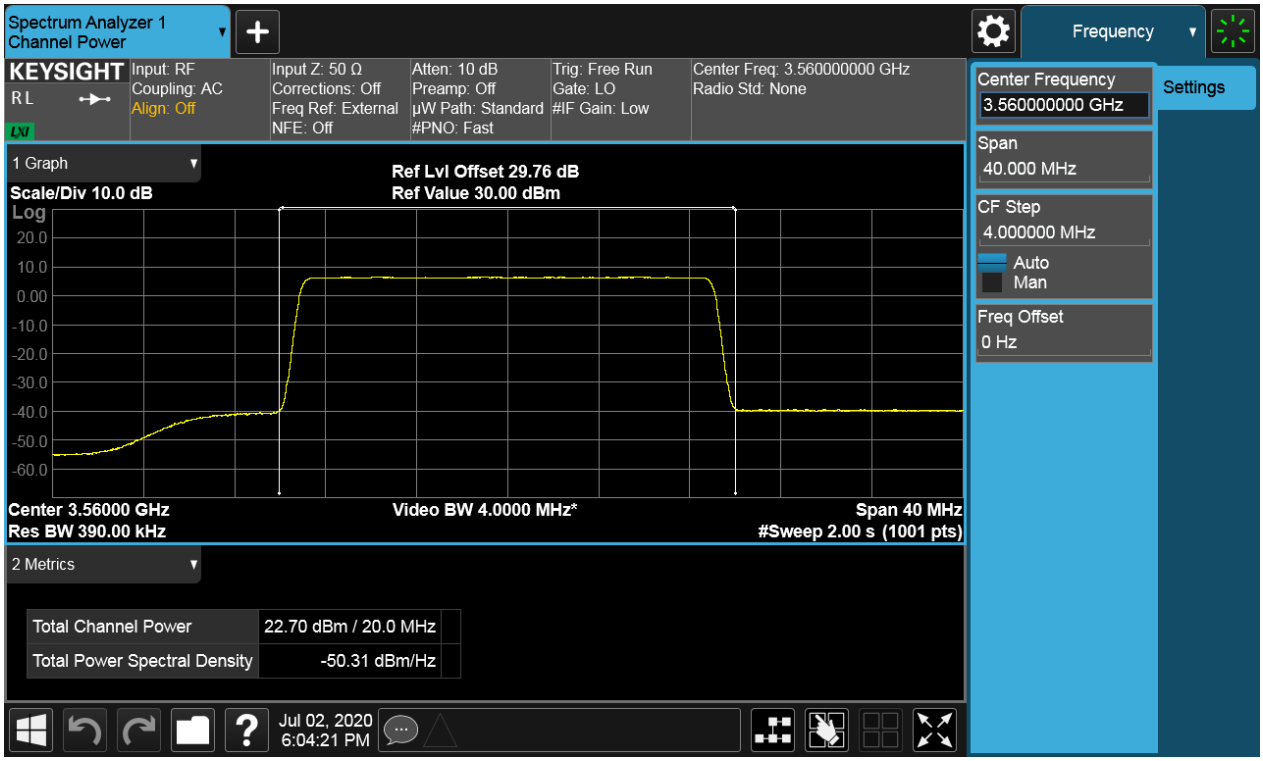
2.1.3.3 TX_1L_20M_TM1.1_T

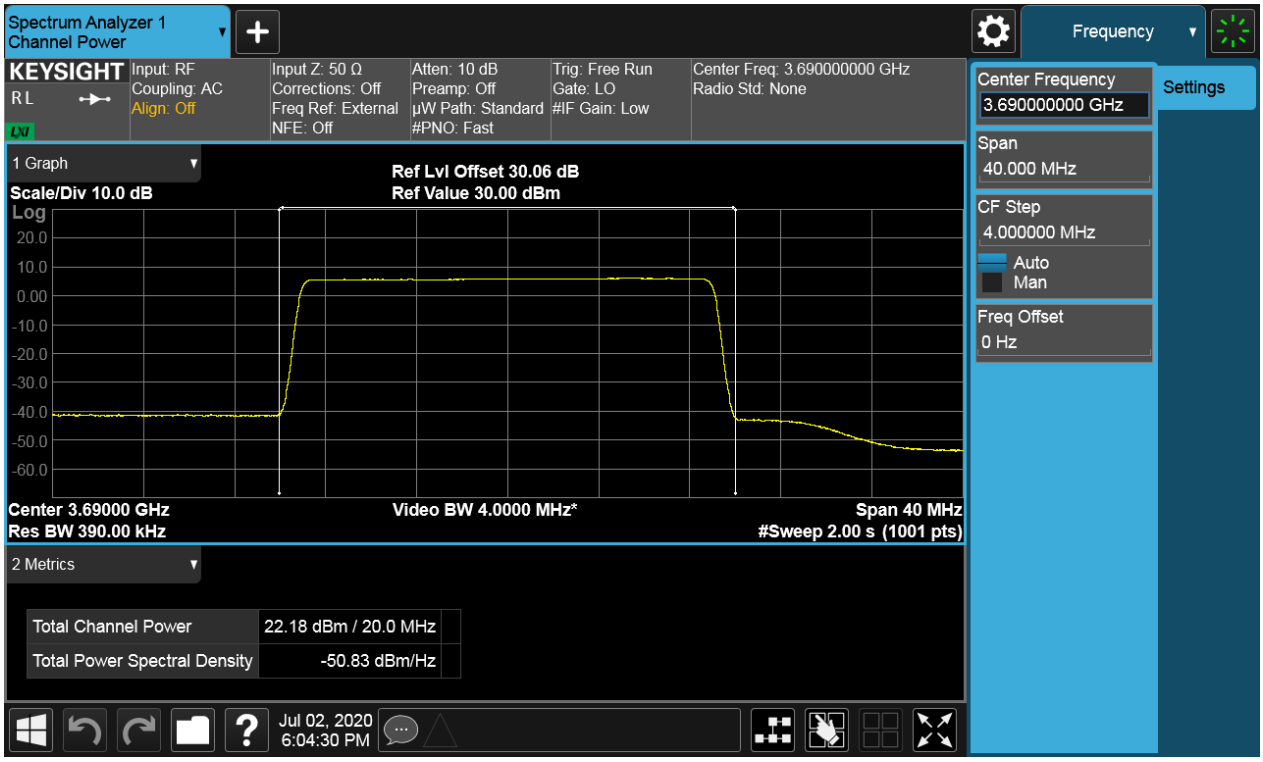
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3690	20	RMS	30.06	22.25	Pass



2.1.3.4 TX_2L_20M_TM1_M

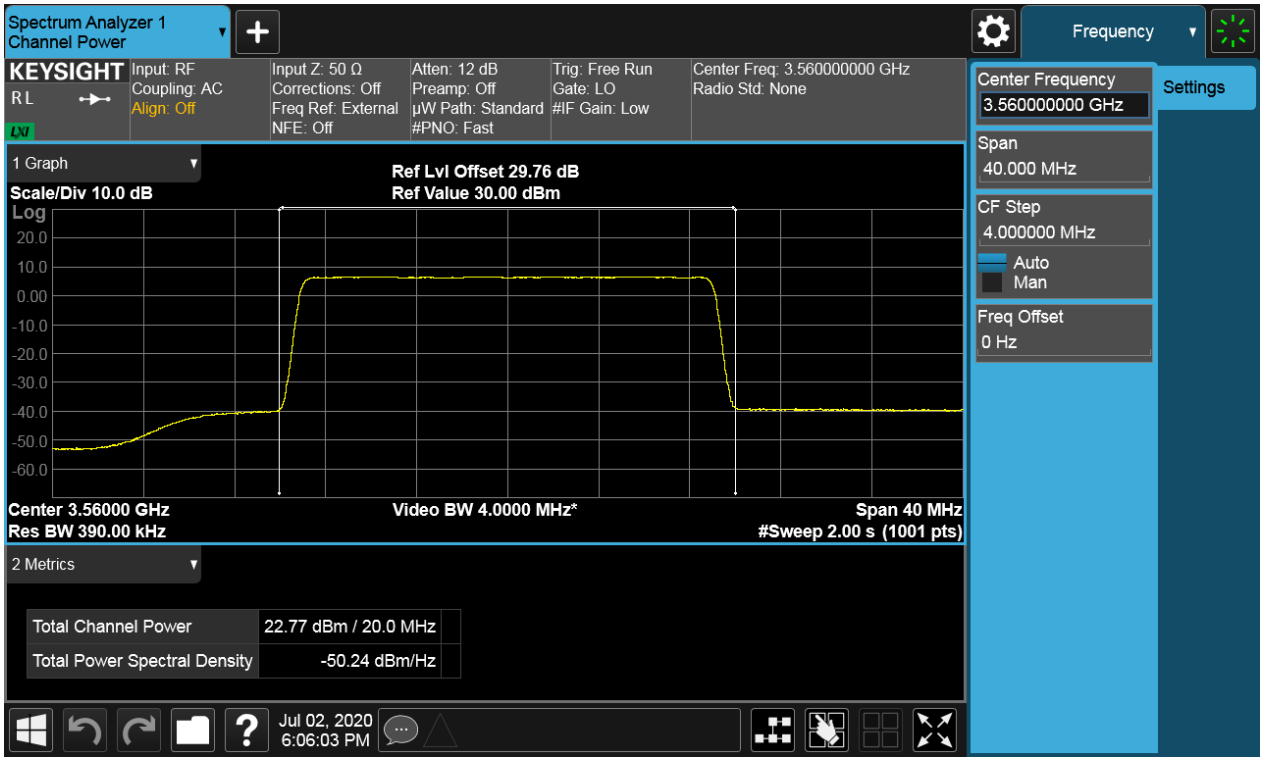
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.7	Pass
NTNV	3690	20	RMS	30.06	22.18	Pass



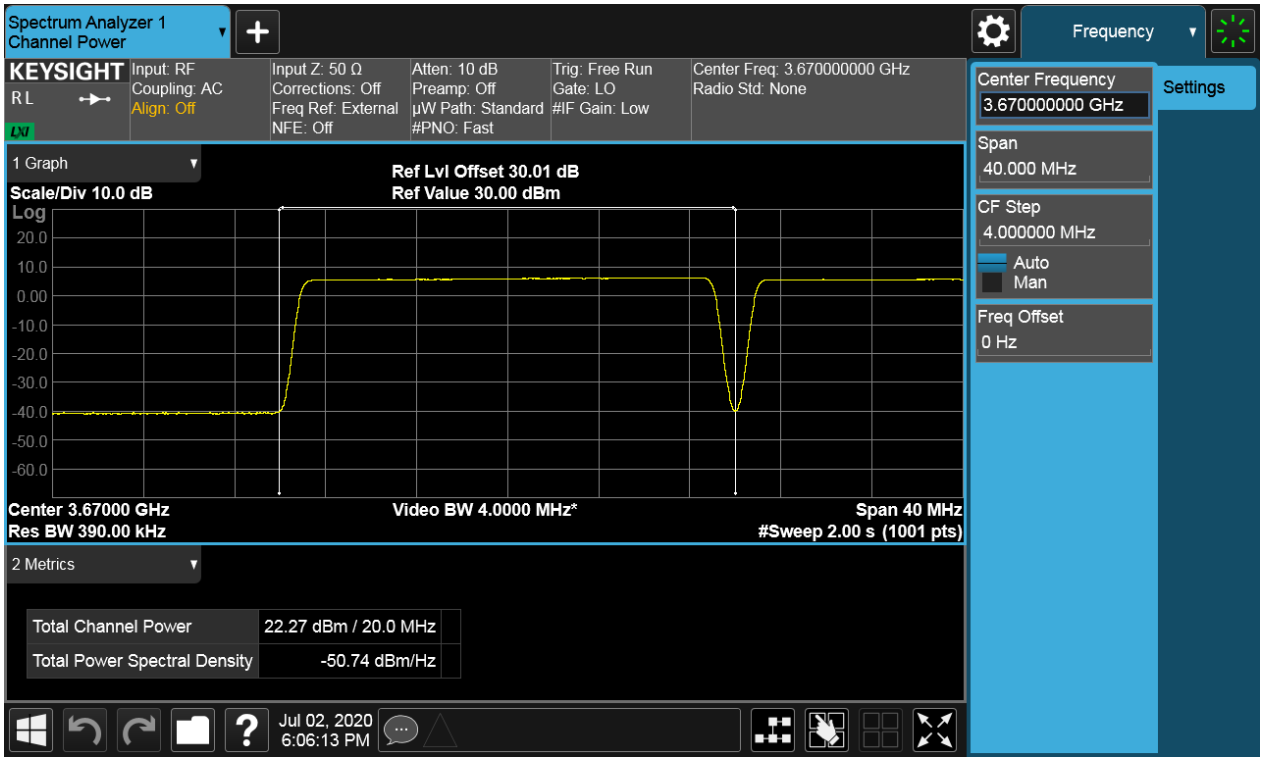


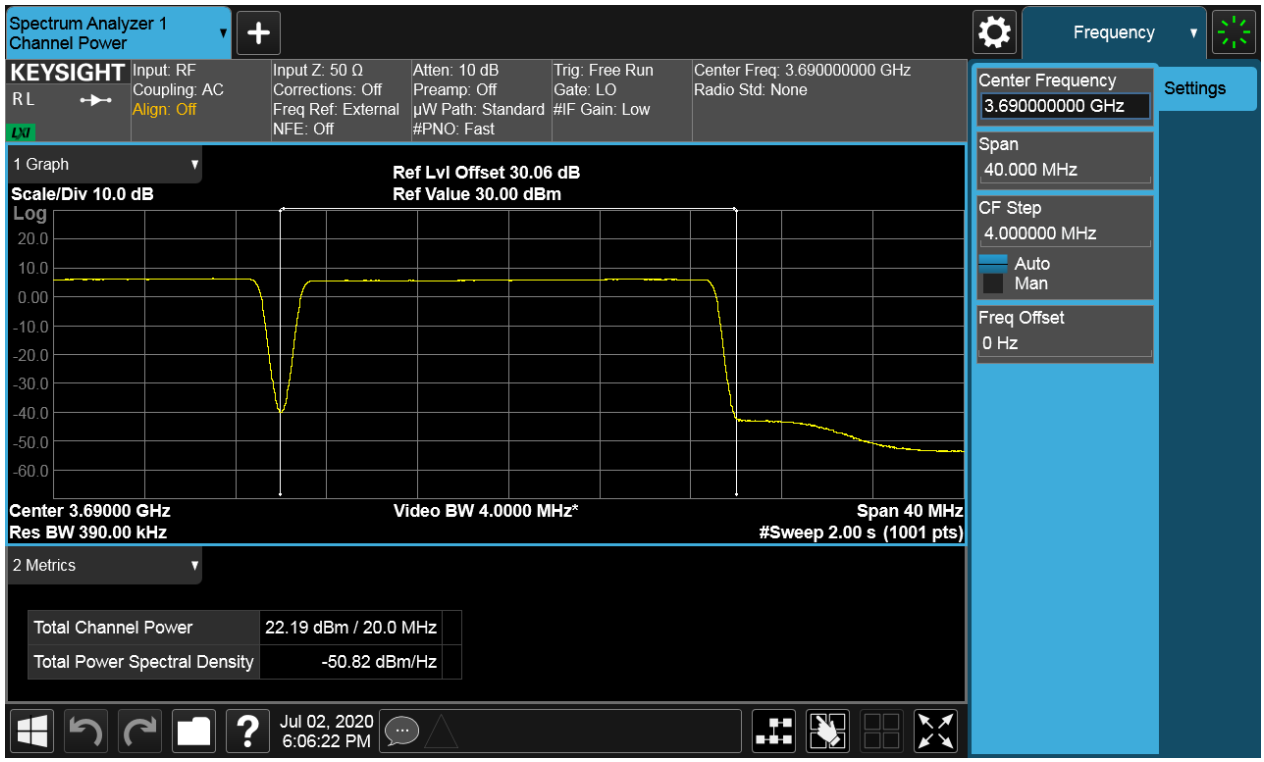
2.1.3.5 TX_3L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.77	Pass
NTNV	3670	20	RMS	30.01	22.27	Pass
NTNV	3690	20	RMS	30.06	22.19	Pass



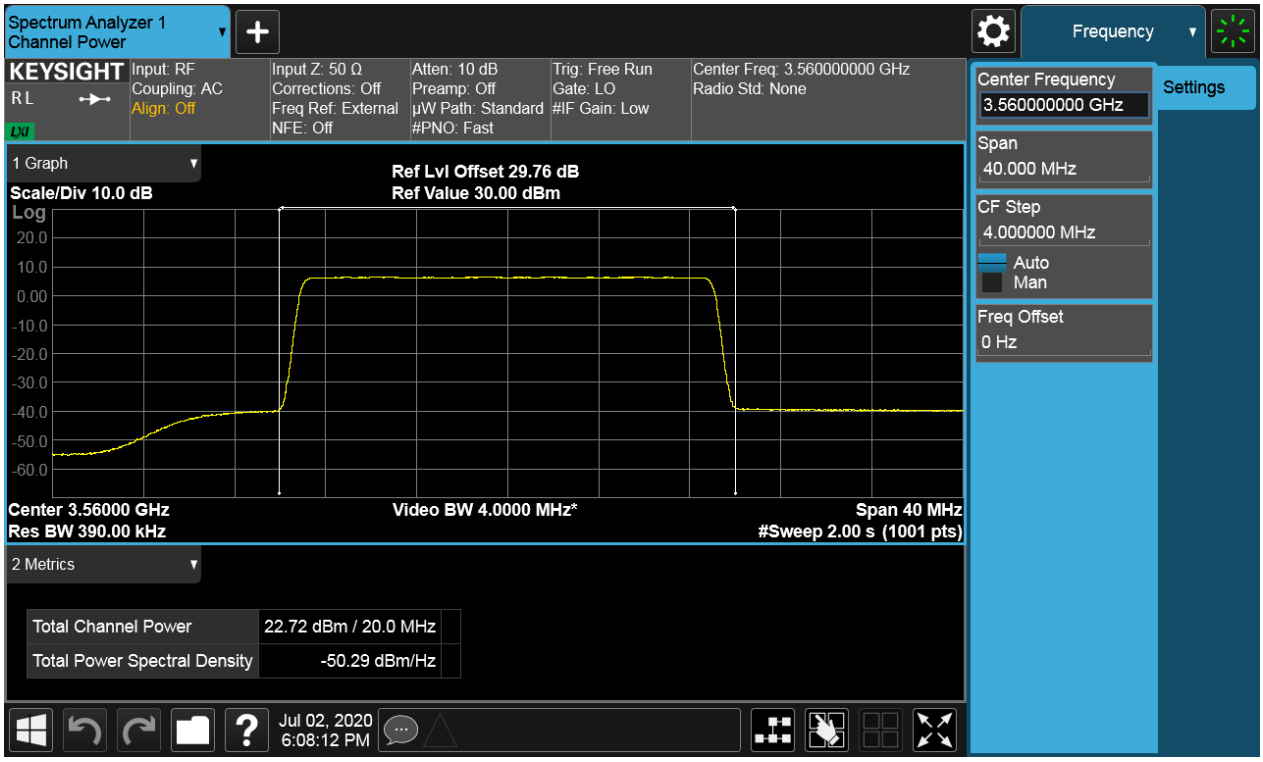
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict



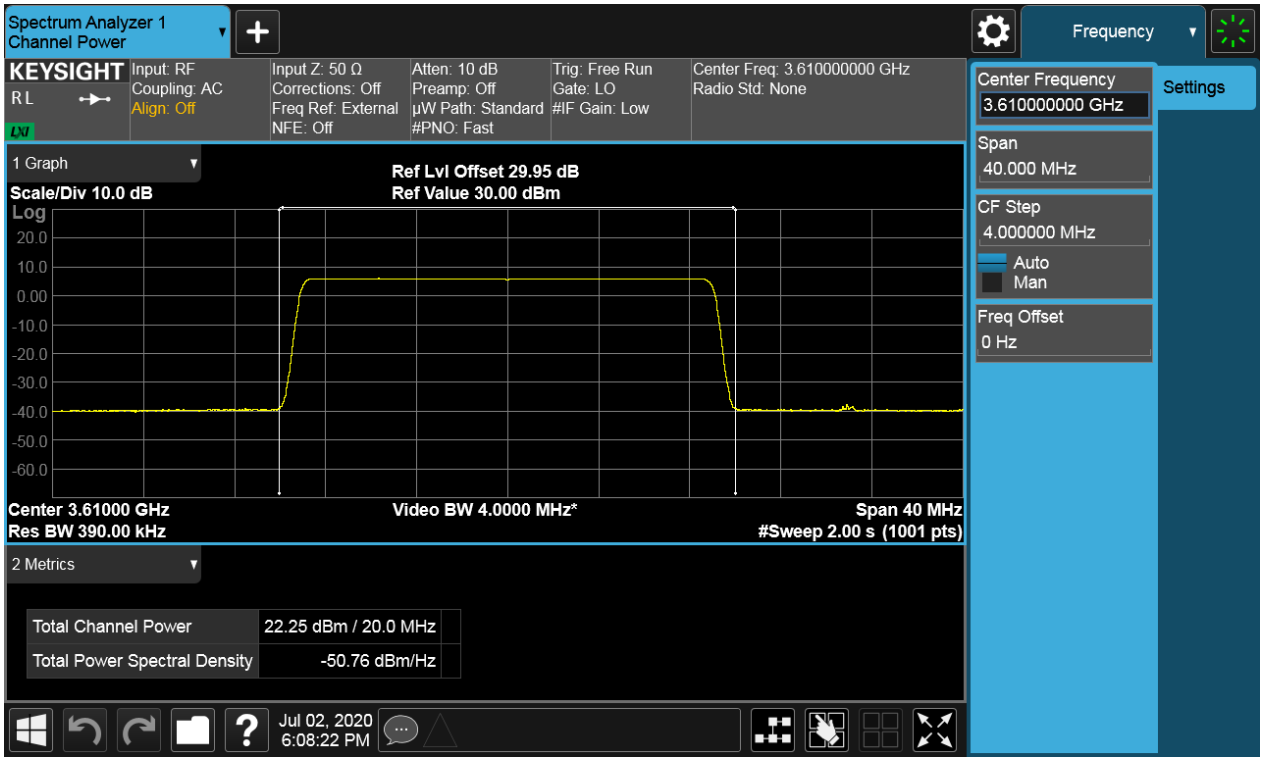


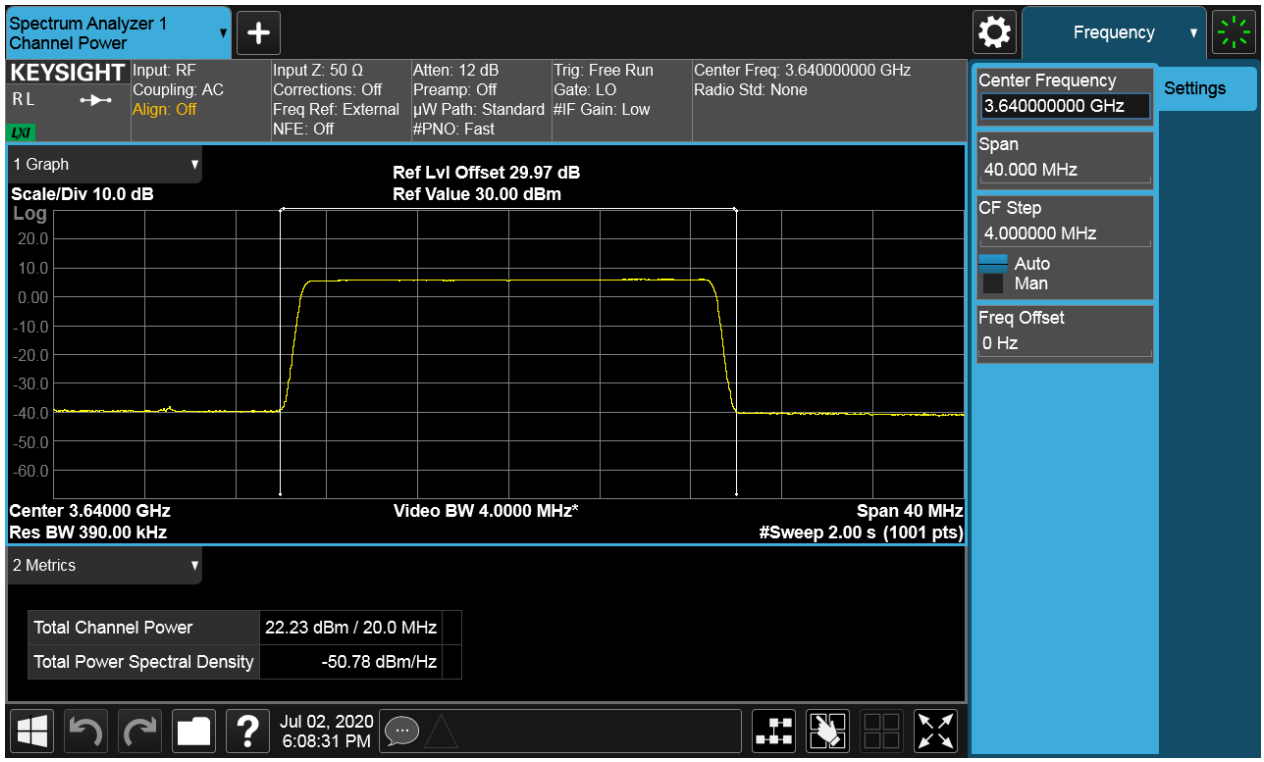
2.1.3.6 TX_4L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.72	Pass
NTNV	3610	20	RMS	29.95	22.25	Pass
NTNV	3640	20	RMS	29.97	22.23	Pass
NTNV	3690	20	RMS	30.06	22.22	Pass

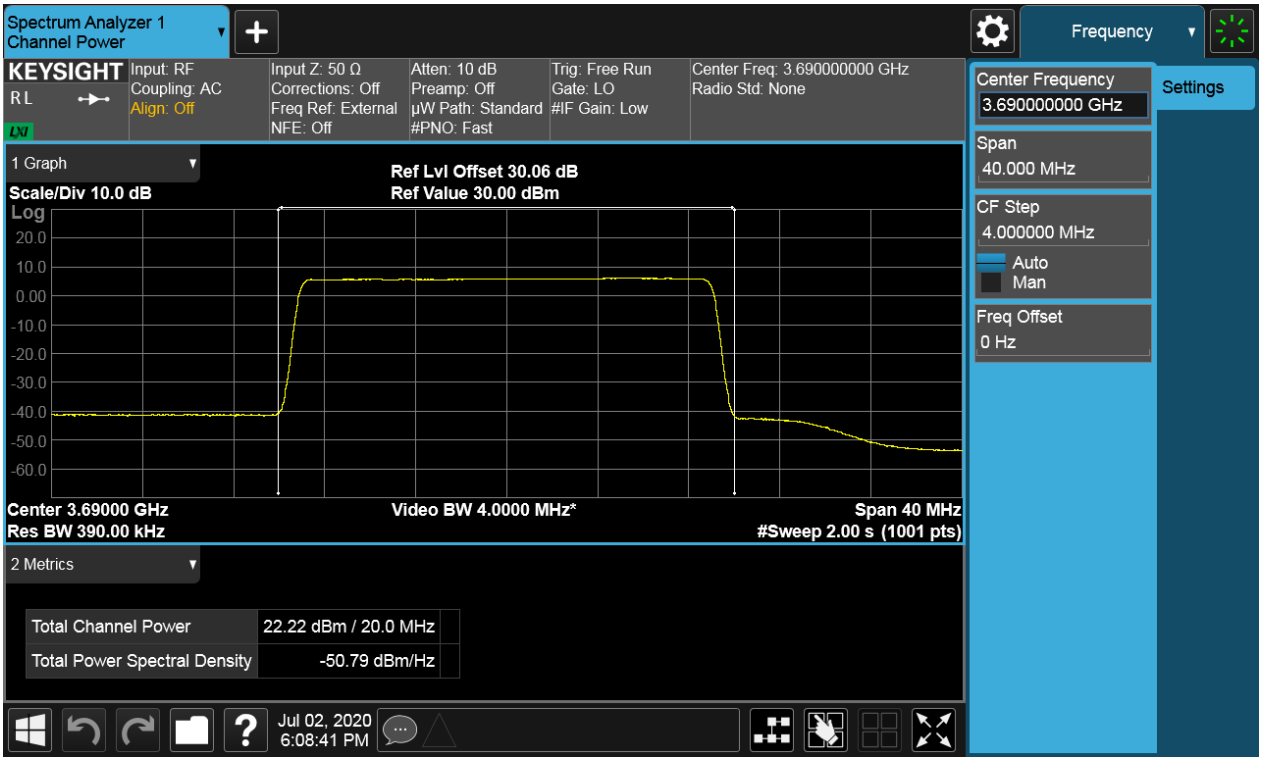


Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict





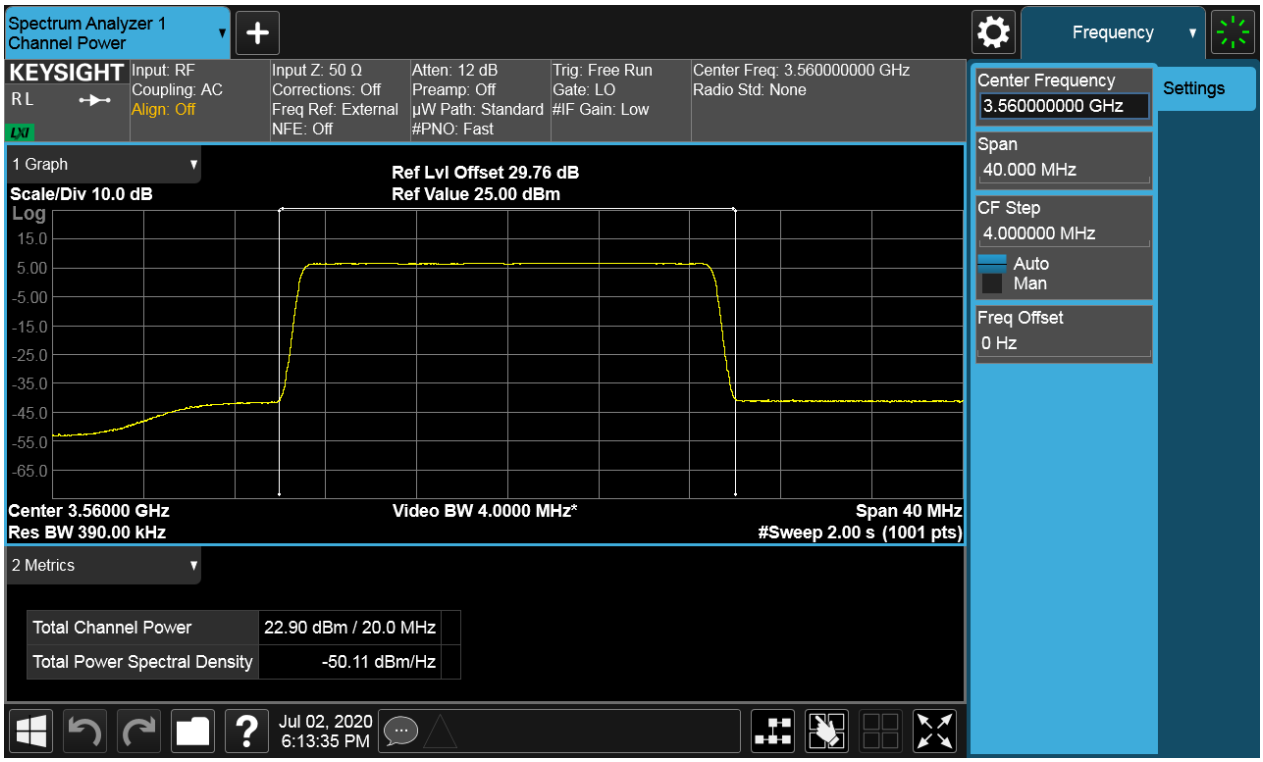
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict



2.1.4 Channel Power of Ant4

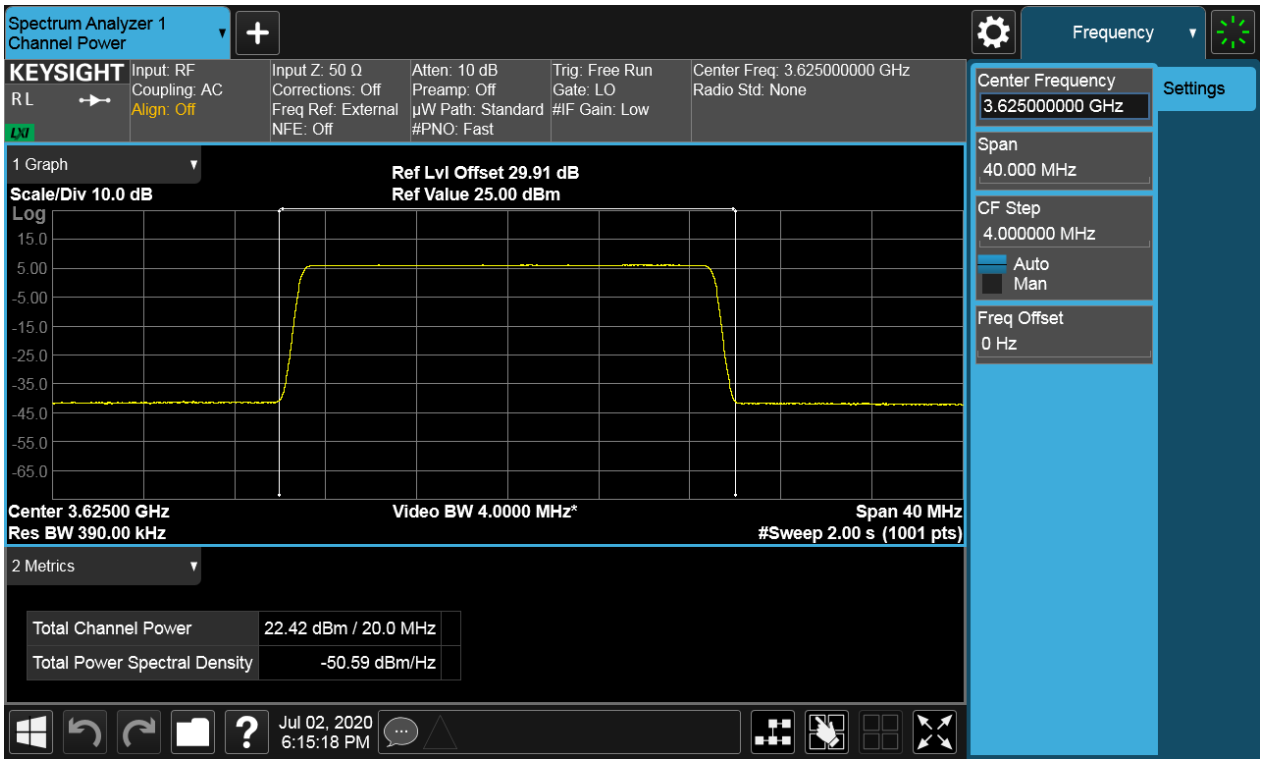
2.1.4.1 TX_1L_20M_TM1.1_B

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.9	Pass



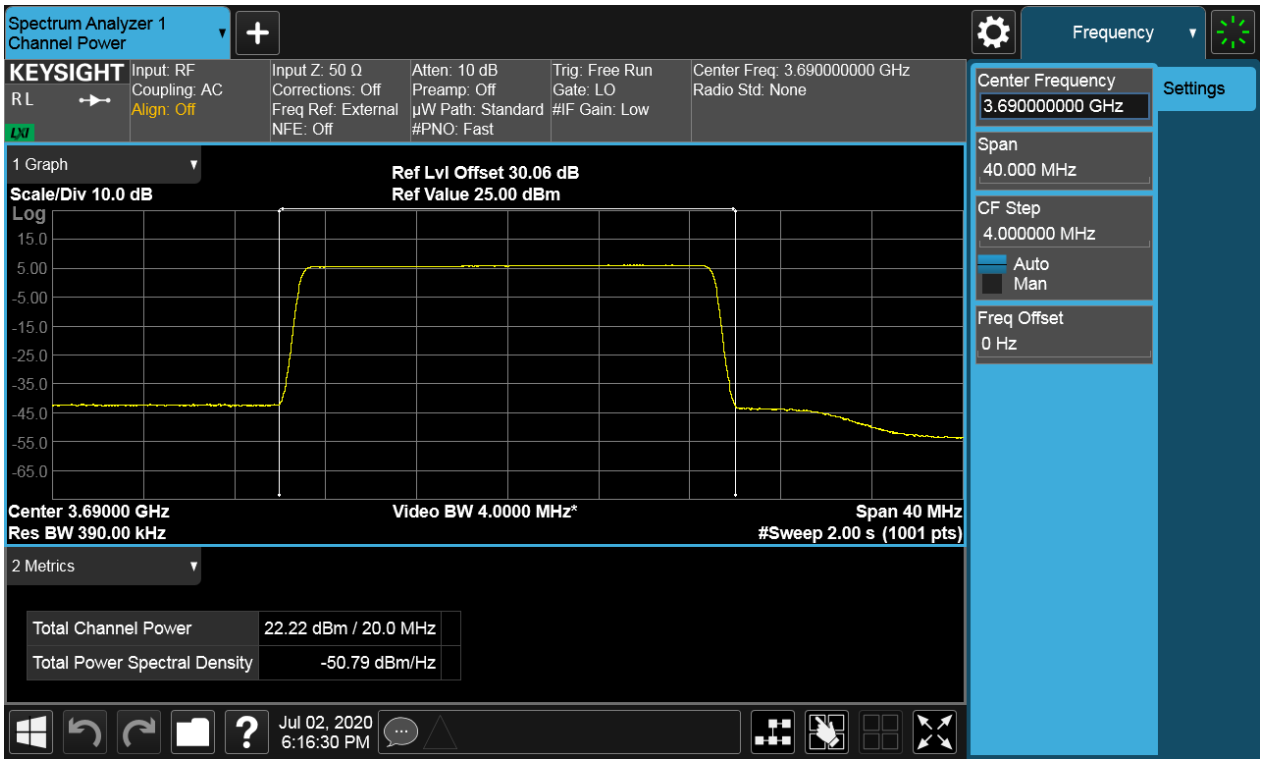
2.1.4.2 TX_1L_20M_TM1.1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3625	20	RMS	29.91	22.42	Pass



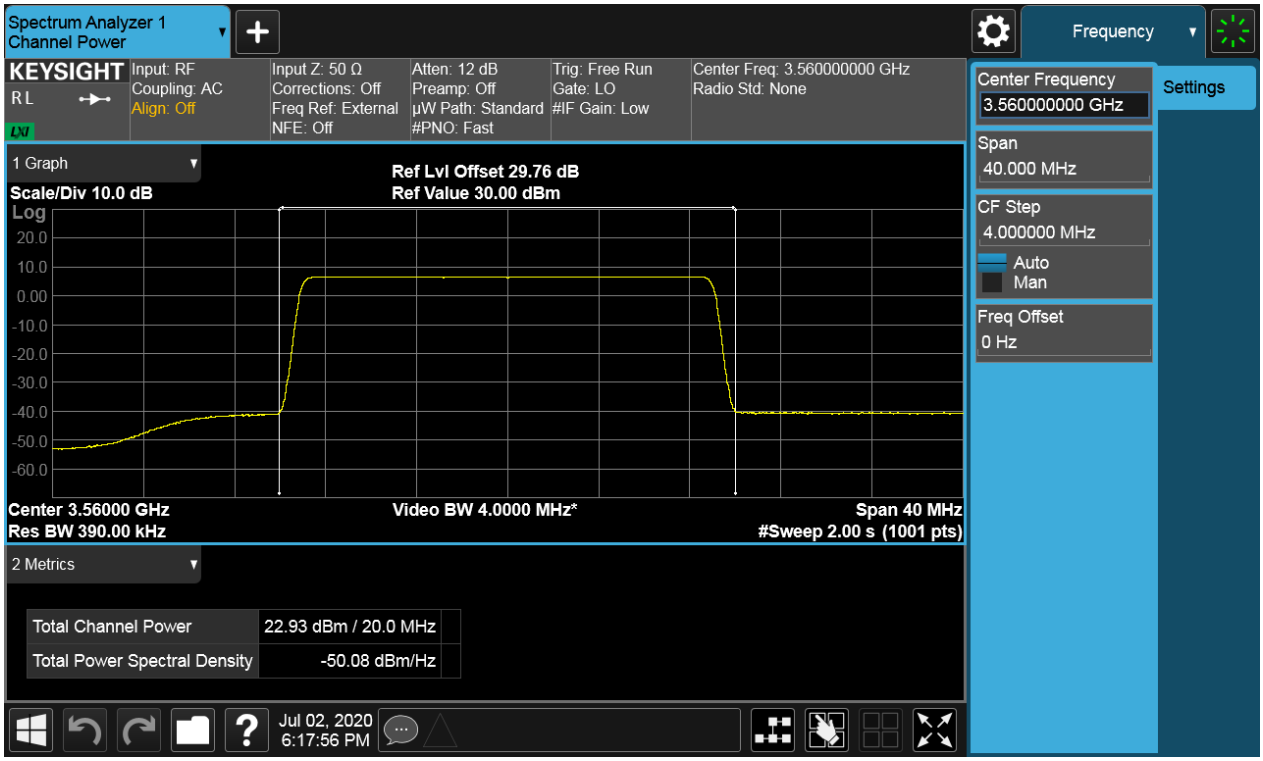
2.1.4.3 TX_1L_20M_TM1.1_T

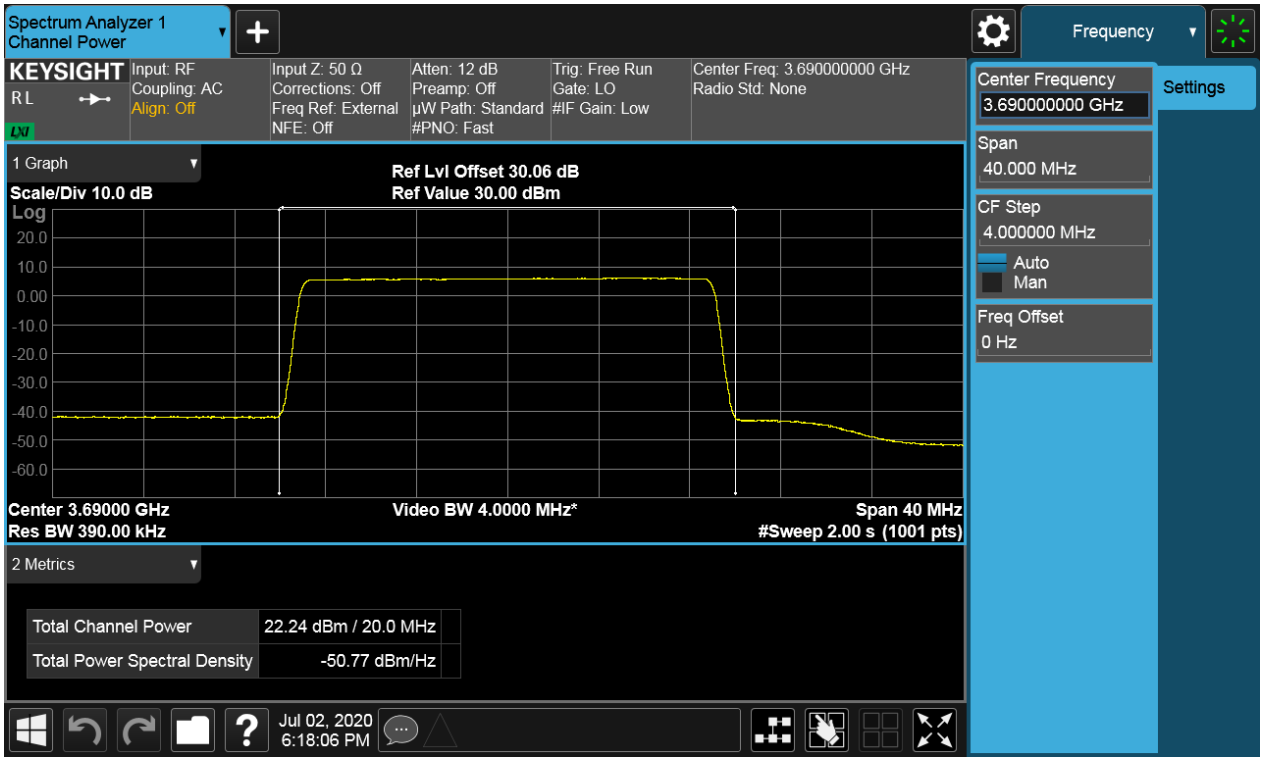
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3690	20	RMS	30.06	22.22	Pass



2.1.4.4 TX_2L_20M_TM1_M

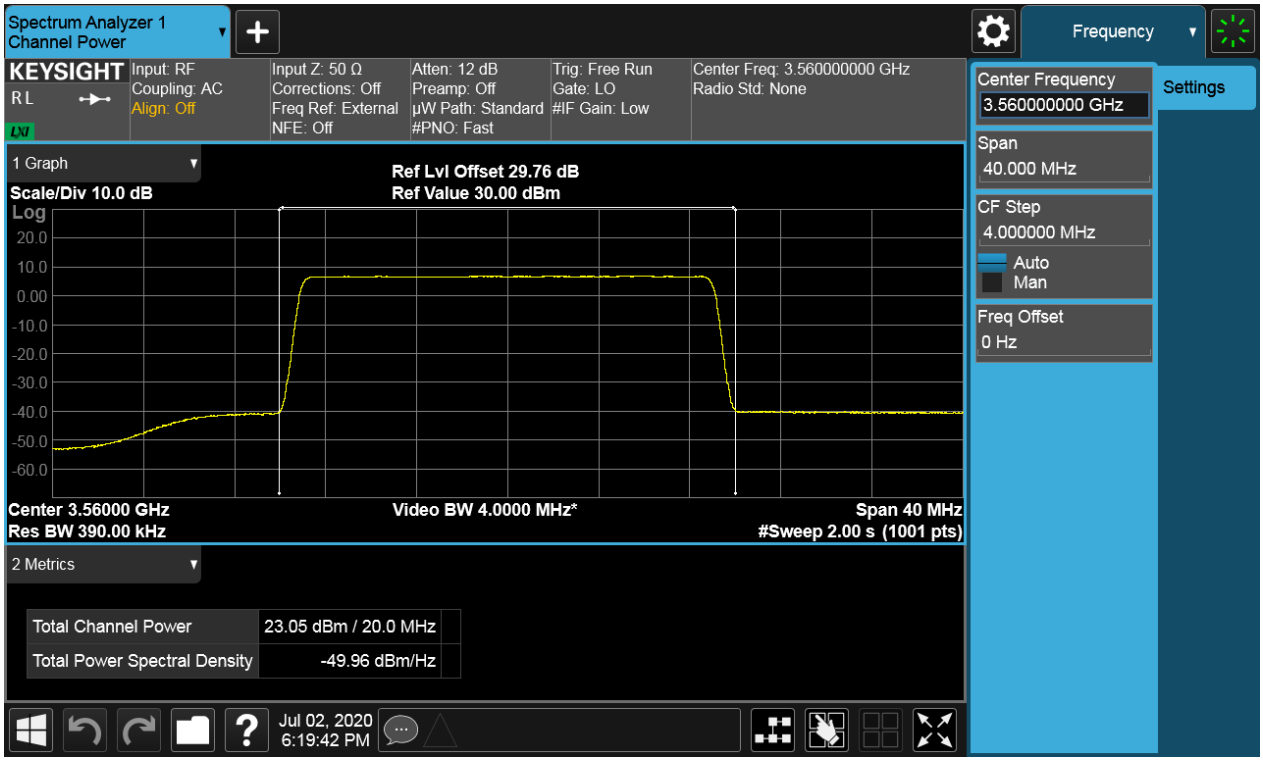
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.93	Pass
NTNV	3690	20	RMS	30.06	22.24	Pass



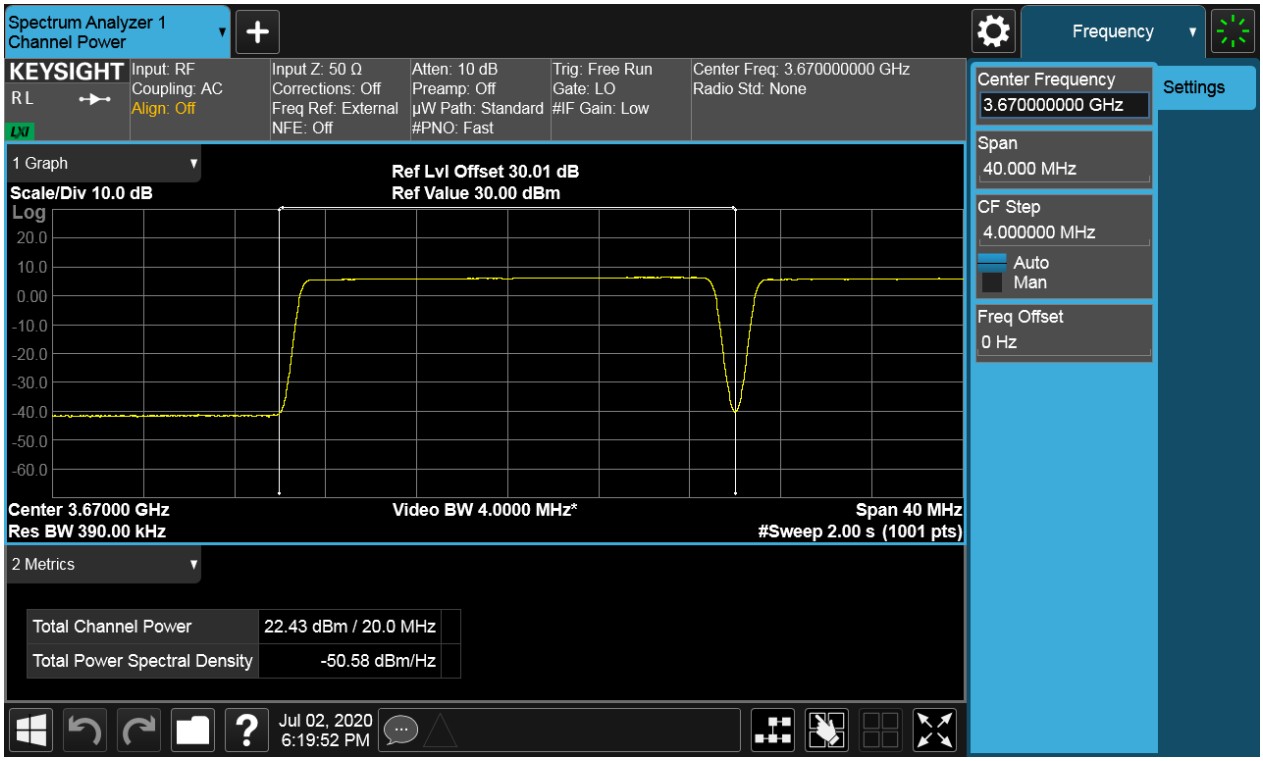


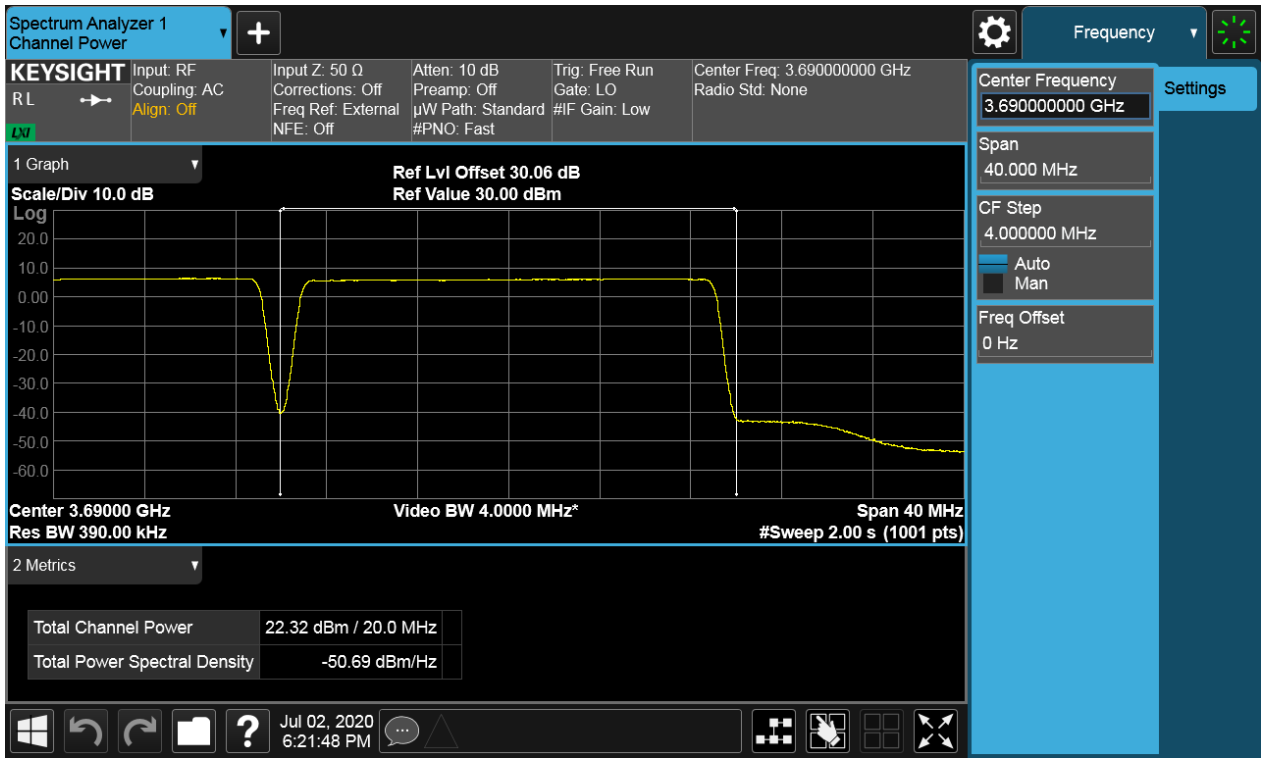
2.1.4.5 TX_3L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	23.05	Pass
NTNV	3670	20	RMS	30.01	22.43	Pass
NTNV	3690	20	RMS	30.06	22.32	Pass



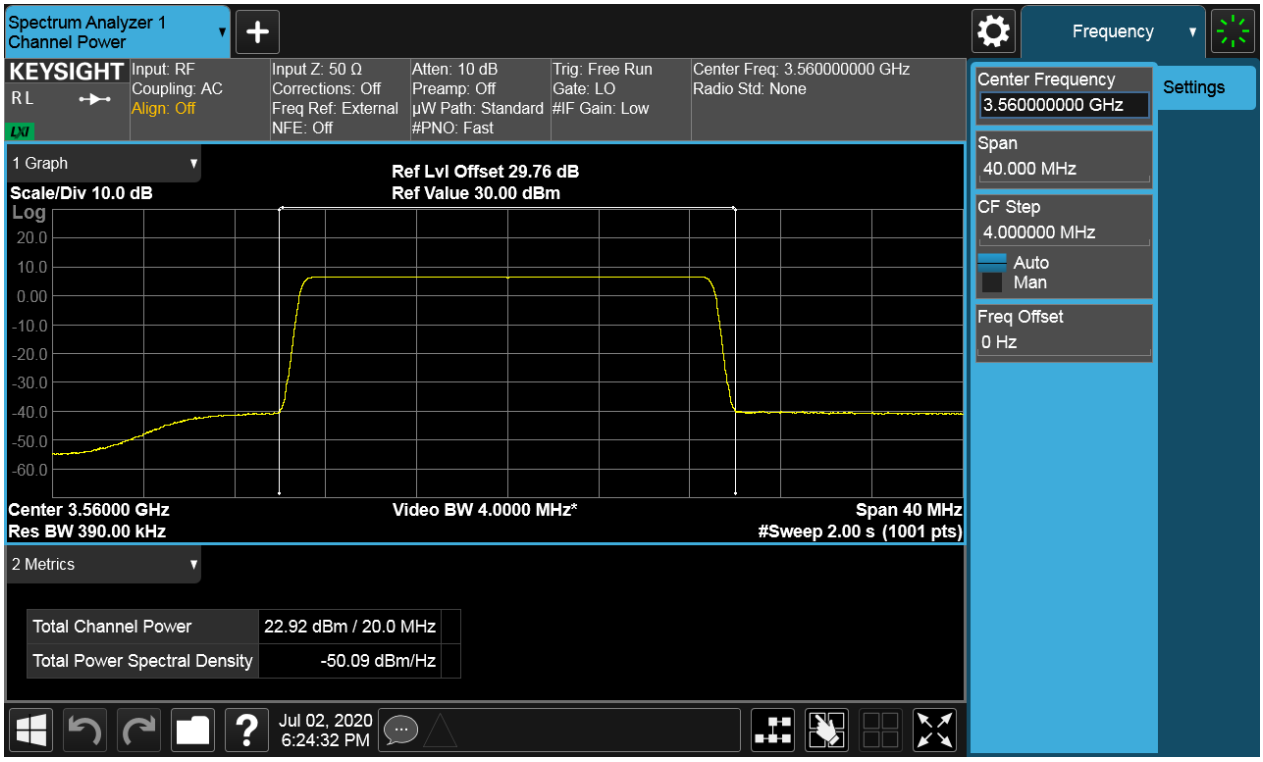
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict



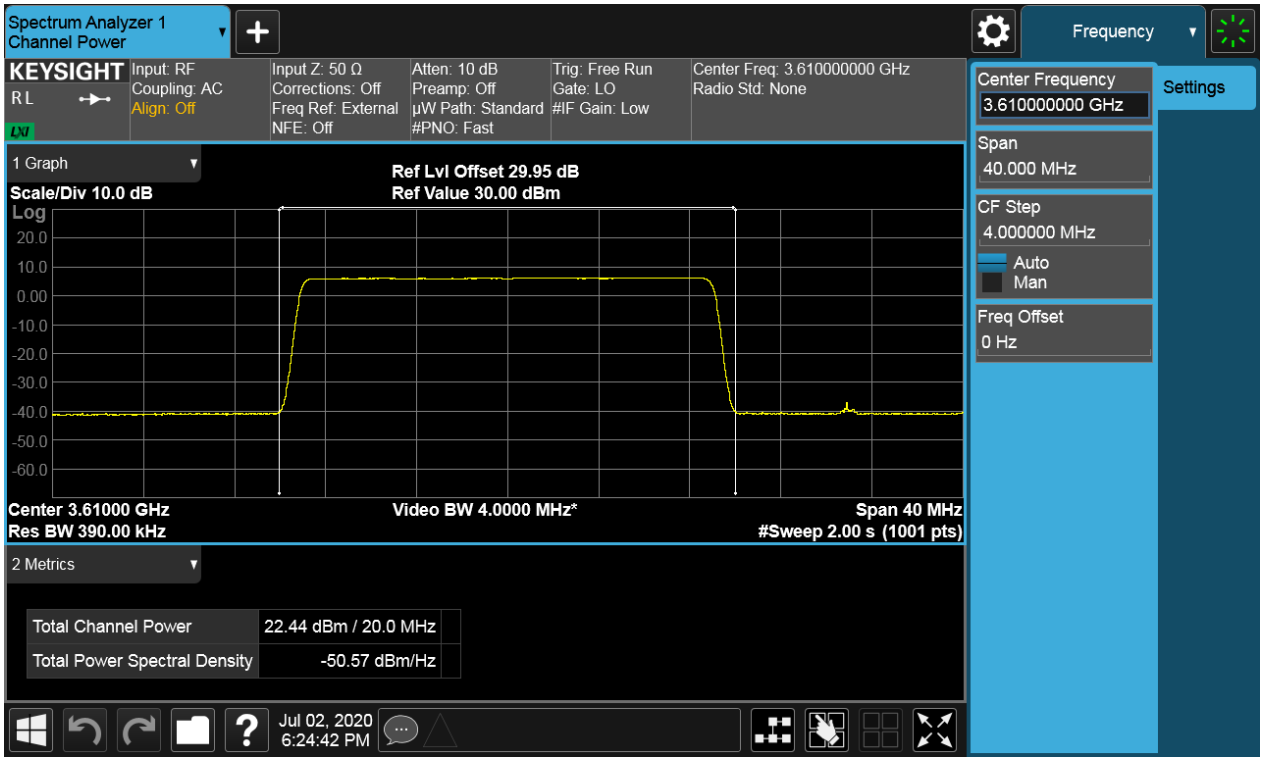


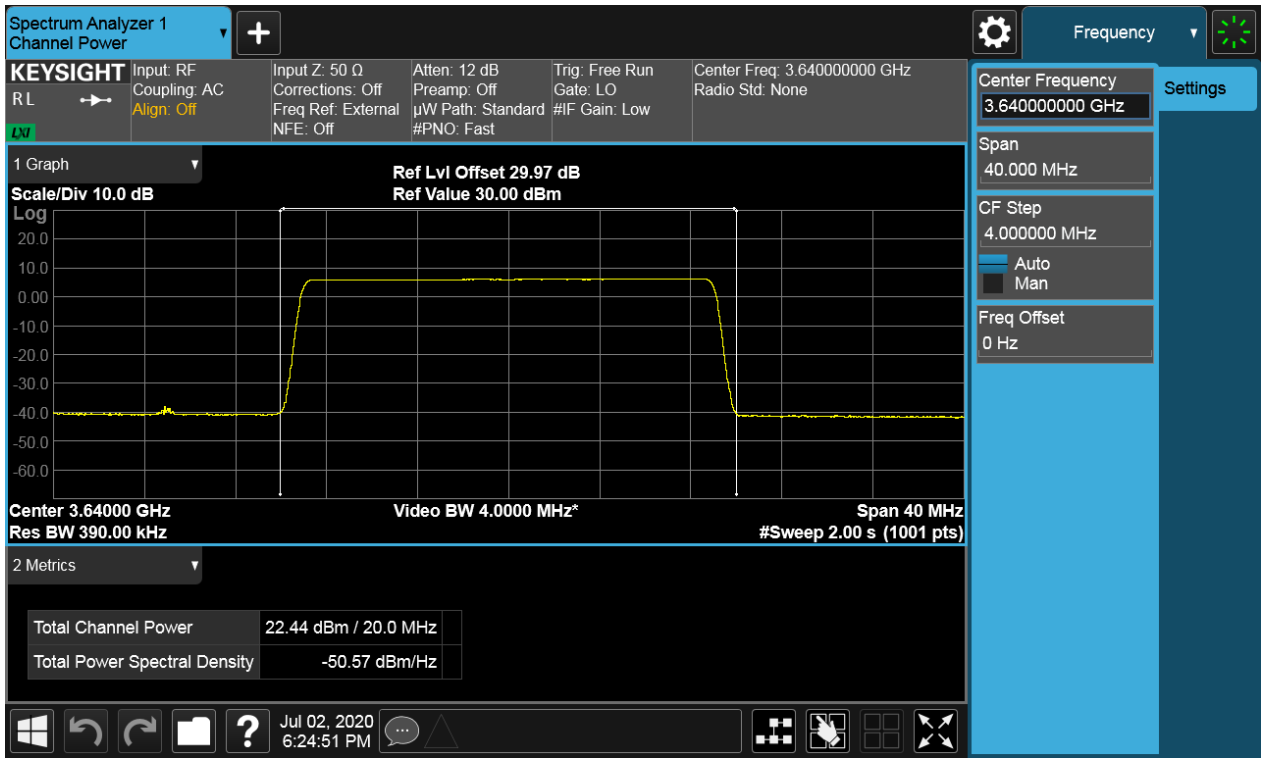
2.1.4.6 TX_4L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	22.92	Pass
NTNV	3610	20	RMS	29.95	22.44	Pass
NTNV	3640	20	RMS	29.97	22.44	Pass
NTNV	3690	20	RMS	30.06	22.3	Pass

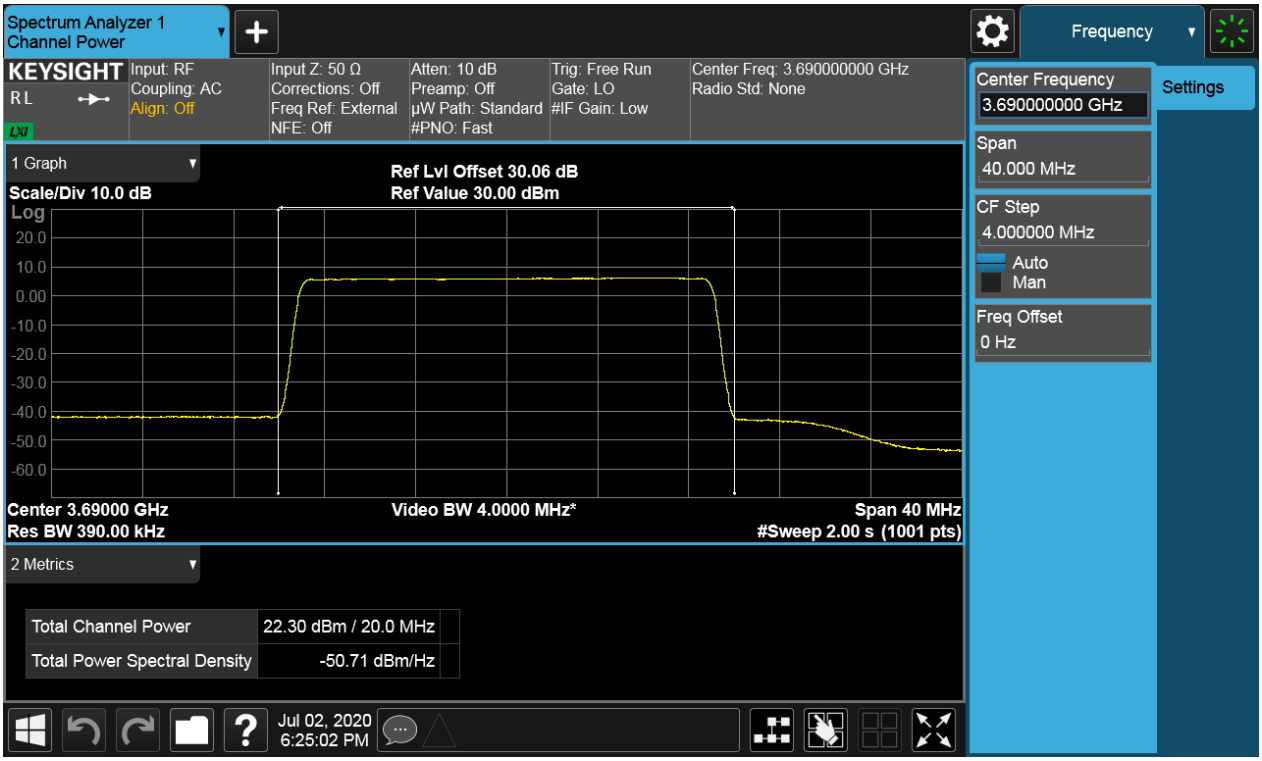


Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict





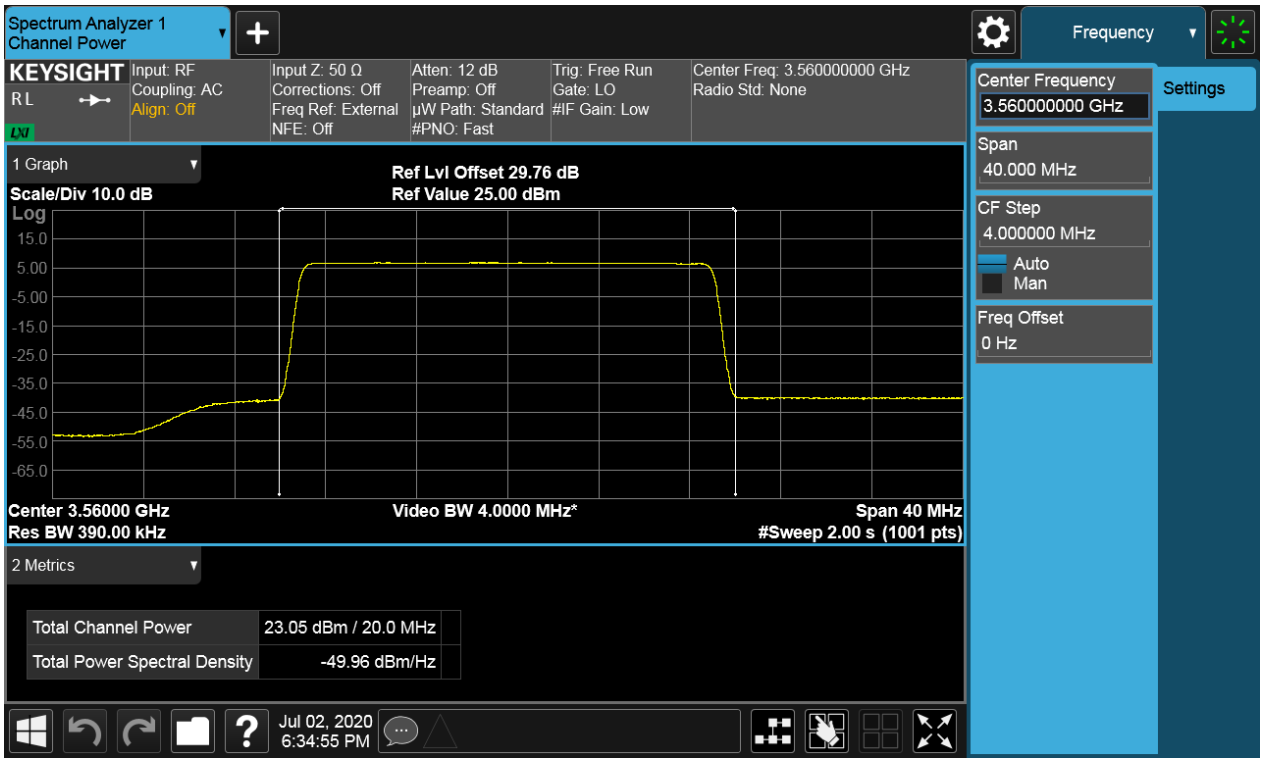
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict



2.1.5 Channel Power of Ant5

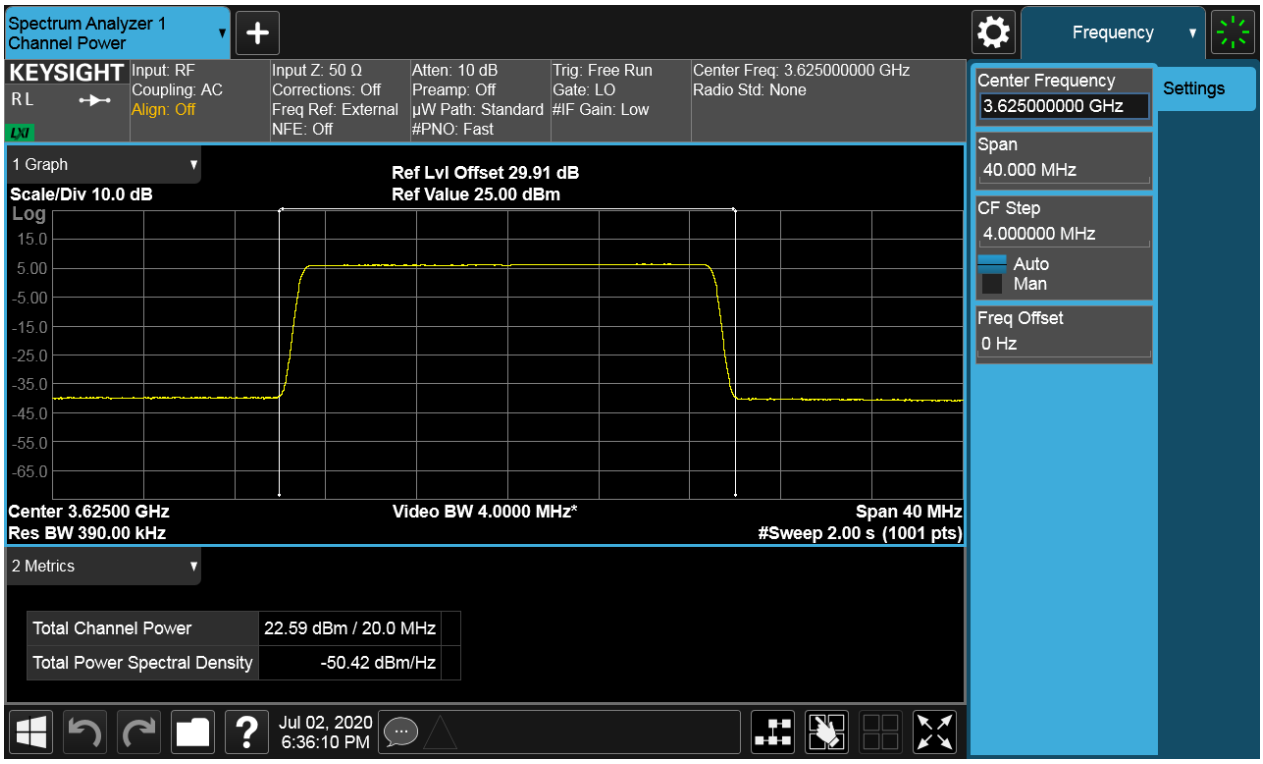
2.1.5.1 TX_1L_20M_TM1.1_B

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	23.05	Pass



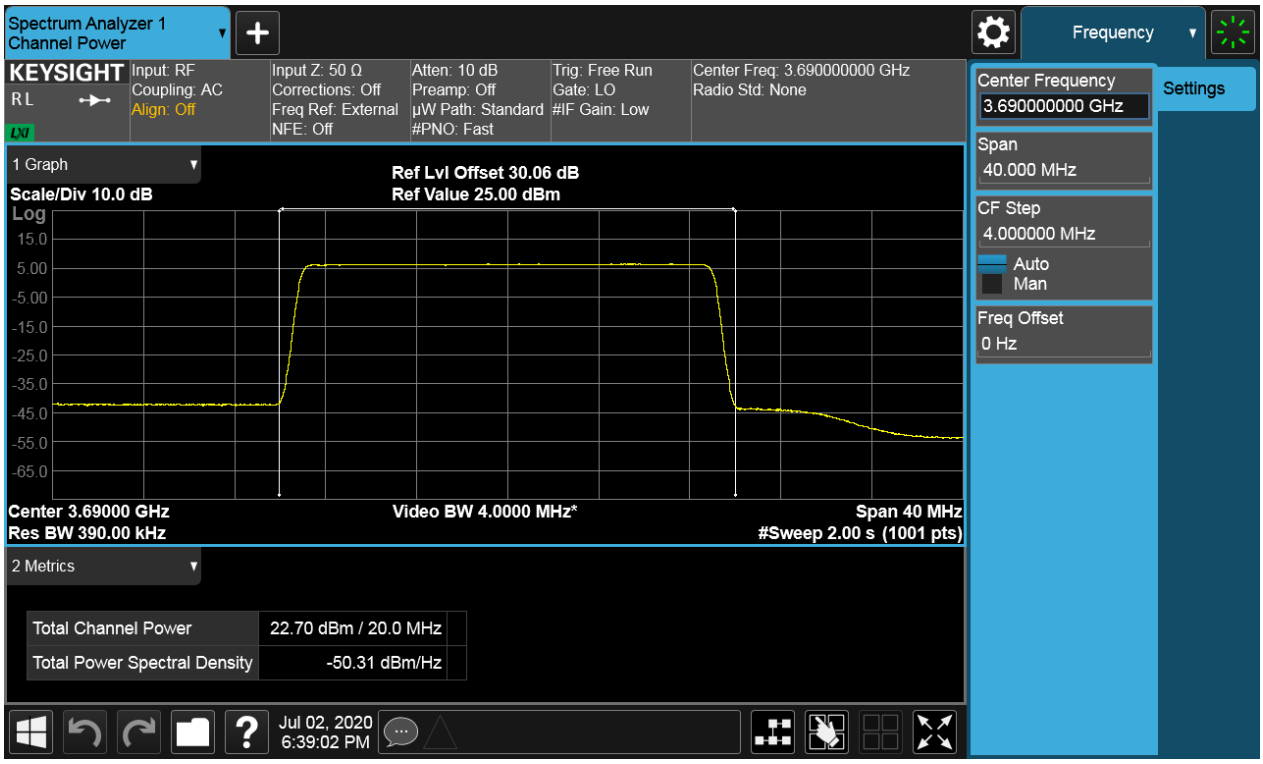
2.1.5.2 TX_1L_20M_TM1.1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3625	20	RMS	29.91	22.59	Pass



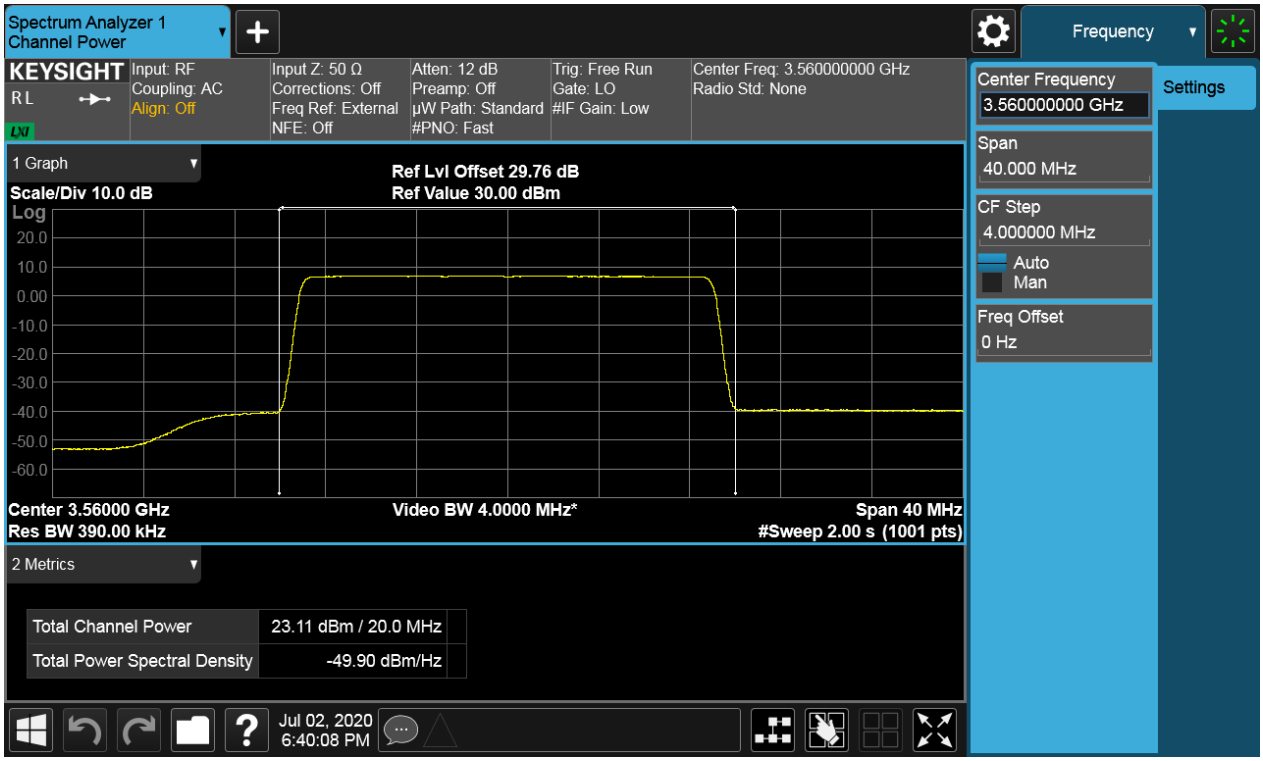
2.1.5.3 TX_1L_20M_TM1.1_T

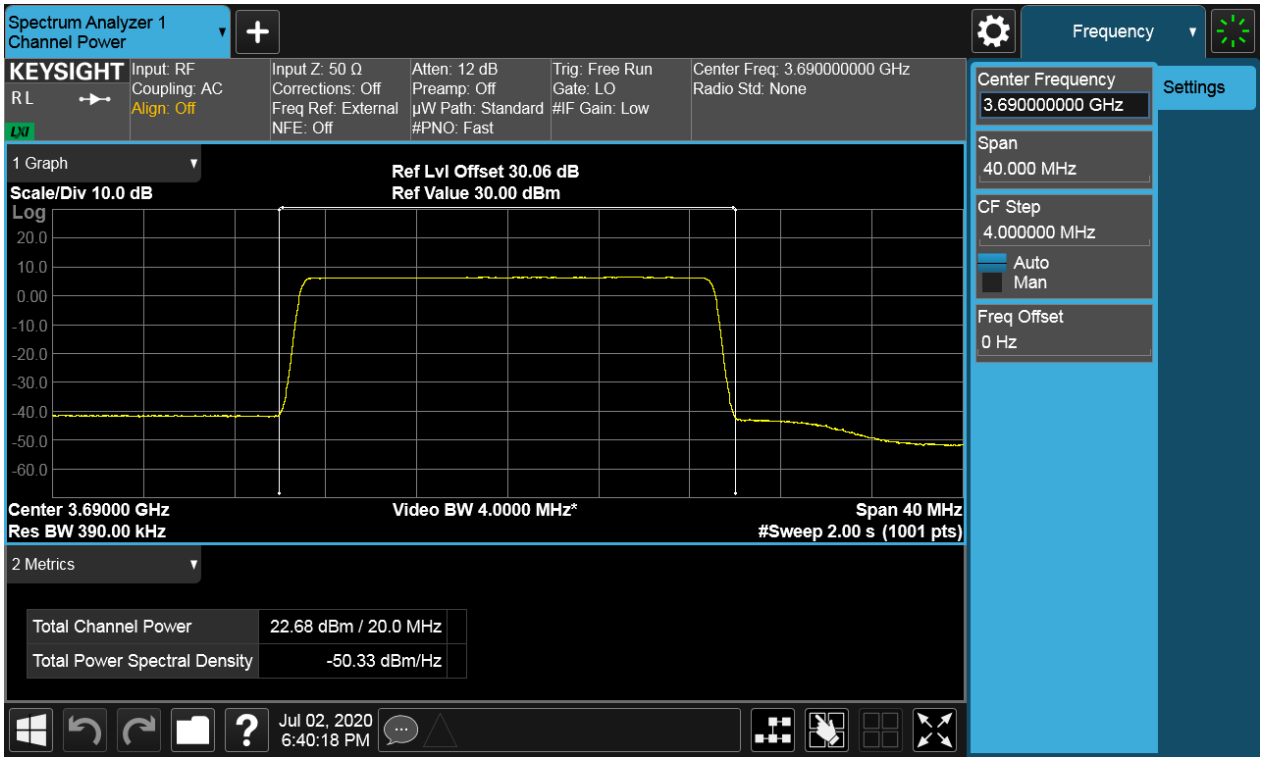
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3690	20	RMS	30.06	22.7	Pass



2.1.5.4 TX_2L_20M_TM1_M

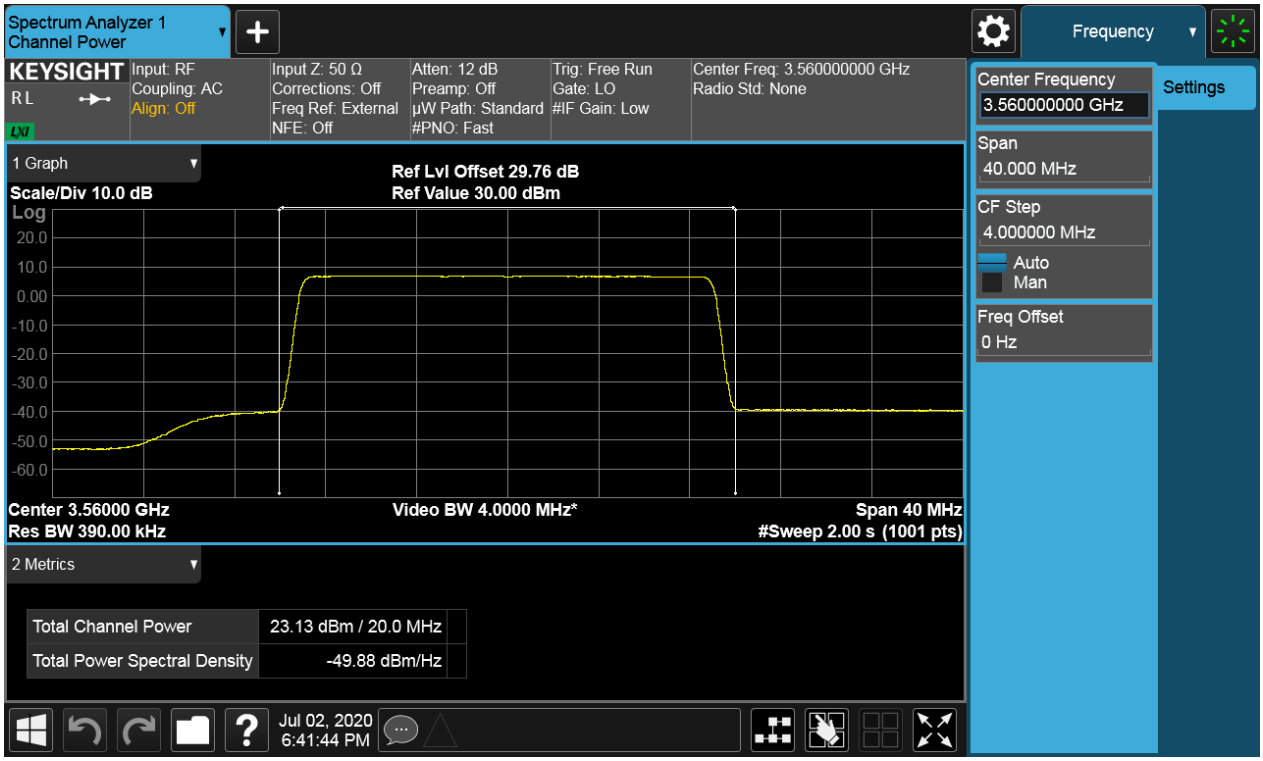
Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	23.11	Pass
NTNV	3690	20	RMS	30.06	22.68	Pass



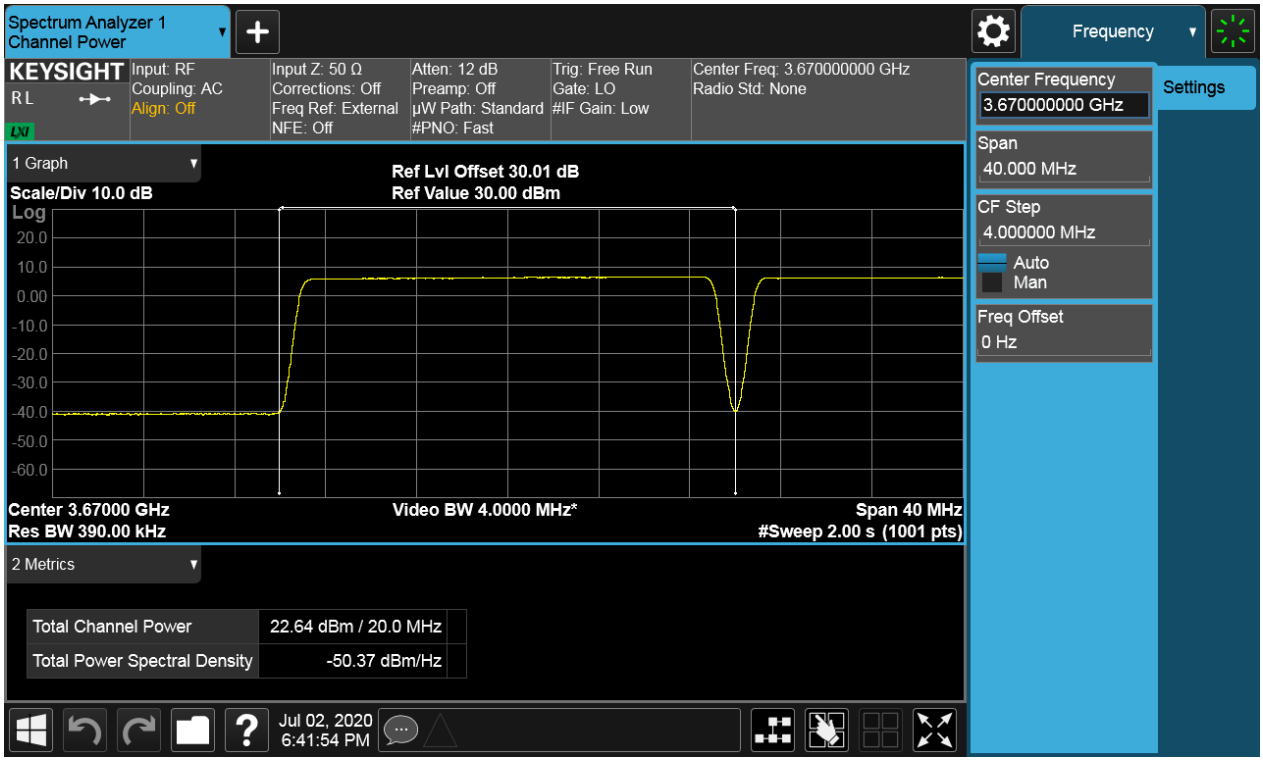


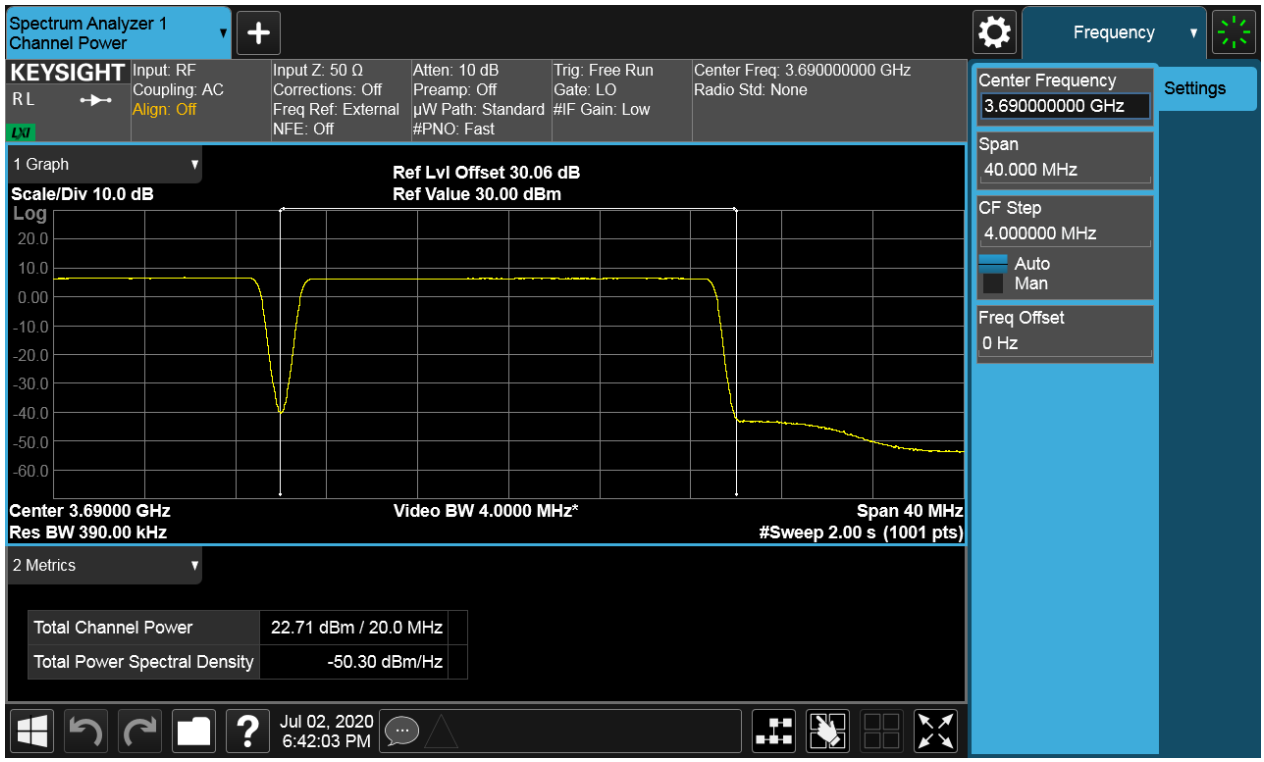
2.1.5.5 TX_3L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	23.13	Pass
NTNV	3670	20	RMS	30.01	22.64	Pass
NTNV	3690	20	RMS	30.06	22.71	Pass



Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict





2.1.5.6 TX_4L_20M_TM1_M

Test Environment	Center Frequency [MHz]	IBW [MHz]	Detector	Transducer [dB]	Power [dBm]	Verdict
NTNV	3560	20	RMS	29.76	23.08	Pass
NTNV	3610	20	RMS	29.95	22.59	Pass
NTNV	3640	20	RMS	29.97	22.58	Pass
NTNV	3690	20	RMS	30.06	22.68	Pass