Report Reference ID:	447835TRFWL

Test specification:	Title 47 – Telecommunication Chapter I – Federal Communications Commission Subchapter B – Common carrier services Part 27 – Miscellaneous wireless communications services

Applicant:	TEKO Telecom Srl. Via Meucci, 24/a 40024 – Castel S. Pietro Terme (BO) – Italy
Apparatus:	Medium Power Remote Unit
Model:	TRU35T35TWM/AC-WT
FCC ID:	XM2-MP35T35T

Testing laboratory:	**Nemko Italy Spa** Via del Carroccio, 4 20853 Biassono (MB) – Italy Telephone: +39 039 2201201 Facsimile: +39 039 2201221

	Name and title	**Date**
Tested by:	P. Barbieri, Wireless/EMC Specialist	2021-09-17
Reviewed by:	R. Giampaglia, Wireless/EMC Specialist	2021-09-17

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Section 1: Report summary

1.1 Test specification

Specifications	**Part 27 – Miscellaneous wireless communications services**

1.2 Statement of compliance

Compliance	In the configuration tested the EUT was found compliant Yes ☒ No ☐ Test method: ANSI C63.26-2015, 662911 D01 Multiple Transmitter Output v02r01, 662911 D02 MIMO with Cross-Polarized Antennas v01, 935210 D05 Measurements guidance for industrial and non-consumer signal booster, repeater and amplifier devices v01r04

1.3 Exclusions

Exclusions	None

1.4 Registration number

FCC site number	682159

1.5 Test report revision history

Revision #	Details of changes made to test report
TRFWL	Original report issued

1.6 Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

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Section 2: Summary of test results

2.1 FCC Part 27, test results

Part	Methods	Test description	Verdict
	§ 935210 D05v01r04 (3.2)	AGC threshold	Pass
	§ 935210 D05v01r04 (3.3)	Out of band rejection	Pass
§27.53(l)(1)	§ 935210 D05v01r04 (3.4)	Occupied bandwidth	Pass
§27.50(j)	§ 935210 D05v01r04 (3.5)	Peak output power at RF antenna connector	Pass
§27.53(l)	§ 935210 D05v01r04 (3.6)	Spurious emissions at RF antenna connector	Pass
§27.53(l)	§ 935210 D05v01r04 (3.8)	Radiated spurious emissions	Pass
§27.54	§ 935210 D05v01r04 (3.7)	Frequency stability	N/A a)

Notes:

a) NOT APPLICABLE: Modulation/frequency conversion circuitry not in use. No frequency change in EUT (input and output have same frequency)

Section 3: Equipment under test (EUT) and application details

3.1 Applicant details

Applicant complete business name	Name:	Teko Telecom Srl
	Federal Registration Number (FRN):	0018963462
	Grantee code	XM2
Mailing address	Address: City: Province/State: Post code: Country:	Via Meucci, 24/a Castel S. Pietro Terme Bologna 40024 Italy

3.2 Modular equipment

a) Single modular approval	Single modular approval Yes ☐ No ☒
b) Limited single modular approval	Limited single modular approval Yes ☐ No ☒

3.3 Product details

FCC ID	Grantee code:	XM2
	Product code:	-MP35T35T
Equipment class	B2I	
Description of product as it is marketed	Booster	
	Model name/number:	TRU35T35TWM/AC-WT
	Serial number:	1028402002

3.4 Application purpose

Type of application	☒ Original certification ☐ Change in identification of presently authorized equipment Original FCC ID: Grant date: ☐ Class II permissive change or modification of presently authorized equipment

Section 3: Equipment under test

3.5 Composite/related equipment

a) Composite equipment	The EUT is a composite device subject to an additional equipment authorization Yes ☐ No ☒
b) Related equipment	The EUT is part of a system that operates with, or is marketed with, another device that requires an equipment authorization Yes ☐ No ☒
c) Related FCC ID	If either of the above is "yes": ☐ has been granted under the FCC ID(s) listed below: ☐ is in the process of being filled under the FCC ID(s) listed below: ☐ is pending with the FCC ID(s) listed below: ☐ has a mix of pending and granted statues under the FCC ID(s) listed below: i FCC ID: ii FCC ID:

3.6 Sample information

Receipt date:	09/01/2021
Nemko sample ID number:	4478350001

3.7 EUT technical specifications

Operating band:	Down Link – Up Link: 3700–3980 MHz
Operating frequency:	Wideband
Modulation type:	LTE-TDD (QAM and QPSK)
Occupied bandwidth:	LTE/5G NR: 5 MHz to 100 MHz
Channel spacing:	standard
Emission designator:	LTE: D7W
RF Output	Down Link: - max composite output power based on one carrier per path: 33dBm (2,00W) - MIMO max composite output power based on one carrier per path: 36dBm (4,00W) Up Link: N.A. (The EUT does not transmit over the air in the up-link direction)
Gain	Down Link: 38dB Up Link: N.A. (The EUT does not transmit over the air in the up-link direction)
Antenna type:	External Antenna is not provided, equipment that has an external 50 Ω RF connector
Power source:	100-240 Vac

Section 3: Equipment under test

3.8 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

Item # 1	
Type of equipment:	Master Unit - Subrack
Brand name:	Teko Telecom srl
Model name or number:	SUB-TRX-PSU
Serial number:	101083001
Nemko sample number:	----------
Connection port:	----------
Cable length and type:	----------
Item # 2	
Type of equipment:	Master Unit – Management Module
Brand name:	Teko Telecom srl
Model name or number:	TSPV-EBB
Serial number:	1007944006
Nemko sample number:	----------
Connection port:	LAN port
Cable length and type:	----------
Item # 3	
Type of equipment:	Master Unit – Optical Module
Brand name:	Teko Telecom srl
Model name or number:	TTRX24W-S-M
Serial number:	1023564001
Nemko sample number:	----------
Connection port:	DL/UL RF connector (to connect to the base station) Optical port (to connect to remote unit)
Cable length and type:	----------
Item # 4	
Type of equipment:	Master Unit – Power Supply
Brand name:	Teko Telecom srl
Model name or number:	TPSU/AC
Serial number:	081063004
Nemko sample number:	----------
Connection port:	----------
Cable length and type:	----------

Section 3: Equipment under test

3.9 Operation of the EUT during testing

Details:	In down-link direction, normal working at max gain with max RF power output.

3.10 EUT setup diagram

In this system, Remote Unit is the EUT. Master Unit includes only management module and optical module (to convert RF signal in optical signal in down link direction and viceversa optical signal in RF signal in up link direction). As described in “Operational description”, master unit is connected directly to base station, so the system doesn’t use another equipment (under another FCC ID) to exercise the EUT. Signal generator is linked directly to the RF connector of optical module in the Master Unit.

Test setup for output power, occupied bandwidth, spurious emissions:

Procedure

Connect the signal modulated generator to the input of the EUT, so that the EUT works at the max gain. Raise the input level to the EUT until reach the maximum output power. Connect the spectrum analyzer to the RF output connector of the EUT.

Section 4: Engineering considerations

4.1 Modifications incorporated in the EUT

Modifications	Modifications performed to the EUT during this assessment None ☒ Yes ☐, performed by Client ☐ or Nemko ☐ Details:

4.2 Deviations from laboratory tests procedures

Deviations	Deviations from laboratory test procedures None ☒ Yes ☐ - details are listed below:

4.3 Technical judgment

Judgment	None

Section 5: Test conditions

5.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

5.2 Test conditions, power source and ambient temperatures

Normal temperature, humidity and air pressure test conditions	Temperature: 18–33 °C Relative humidity: 25–75 % Air pressure: 86–106 kPa When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.
Power supply range:	The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

5.3 Measurement uncertainty

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002. The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:
P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.
F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.
Hereafter Nemko's measurement uncertainties are reported:

Section 5: Test conditions, continued

EUT	Type	Test	Range	Measurement Uncertainty	Notes
Transmitter	Conducted	Frequency error	0.001 MHz ÷ 40 GHz	0.08 ppm	(1)
		Carrier power RF Output Power	0.009 MHz ÷ 30 MHz	1.1 dB	(1)
			30 MHz ÷ 18 GHz	1.5 dB	(1)
			18 MHz ÷ 40 GHz	3.0 dB	(1)
			40 MHz ÷ 140 GHz	5.0 dB	(1)
		Adjacent channel power	1 MHz ÷ 18 GHz	1.4 dB	(1)
		Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)
		Intermodulation attenuation	1 MHz ÷ 18 GHz	2.2 dB	(1)
		Attack time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Attack time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Release time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Release time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Transient behaviour of the transmitter– Transient frequency behaviour	1 MHz ÷ 18 GHz	0.2 kHz	(1)
		Transient behaviour of the transmitter – Power level slope	1 MHz ÷ 18 GHz	9%	(1)
		Frequency deviation - Maximum permissible frequency deviation	0.001 MHz ÷ 18 GHz	1.3%	(1)
		Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz	0.001 MHz ÷ 18 GHz	0.5 dB	(1)
		Dwell time	-	3%	(1)
		Hopping Frequency Separation	0.01 MHz ÷ 18 GHz	1%	(1)
		Occupied Channel Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Modulation Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Effective radiated power transmitter	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
Receiver	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Sensitivity measurement	1 MHz ÷ 18 GHz	6.0 dB	(1)
	Conducted	Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)

NOTES:
(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 %

Section 5: Test conditions, continued

5.4 Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Vector Signal Generator	Keysight	N5172B EXG	MY57280565	2023-12
Vector Signal Generator	Keysight	N5172B EXG	MY57280574	2023-12
Spectrum Analyzer	Keysight	N9030B PXA	MY57142793	2021-12
Combiner	Miczen	MZP200506GA (0.5-6 GHz)	210314001	COU
Antenna Trilog 25MHz - 8GHz	Schwarzbeck	VULB9162	9162-025	2024-07
Antenna 1-18 GHz	Schwarzbeck	STLP 9148	STPL 9148-123	2024-06
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-04
Broadband Amplifier	Schwarzbeck	BBV9718C	00121	2022-01
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01	2022-04
EMI Receiver	Rohde & Schwarz	ESW44	101620	2022-08
Spectrum analyzer	R&S	FSW43	101767	2022-01
Controller	Maturo	FCU3.0	10041	NCR
Tilt antenna mast	Maturo	TAM4.0-E	10042	NCR
Turntable	Maturo	TT4.0-5T	2.527	NCR
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	NCR
Shielded room	Siemens	10m control room	1947	NCR

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
(*) Equipment supplied by manufacturer's

Appendix A: Test results

Clause 935210 D05v01r04 (3.2) AGC threshold

Measure of EUT AGC Threshold

Test date: 2021-09-01 to 2021-09-17

Test results: Pass

Special notes

– Broadband amplifiers: AWGN test signal used (5 MHz and 100 MHz LTE channel)

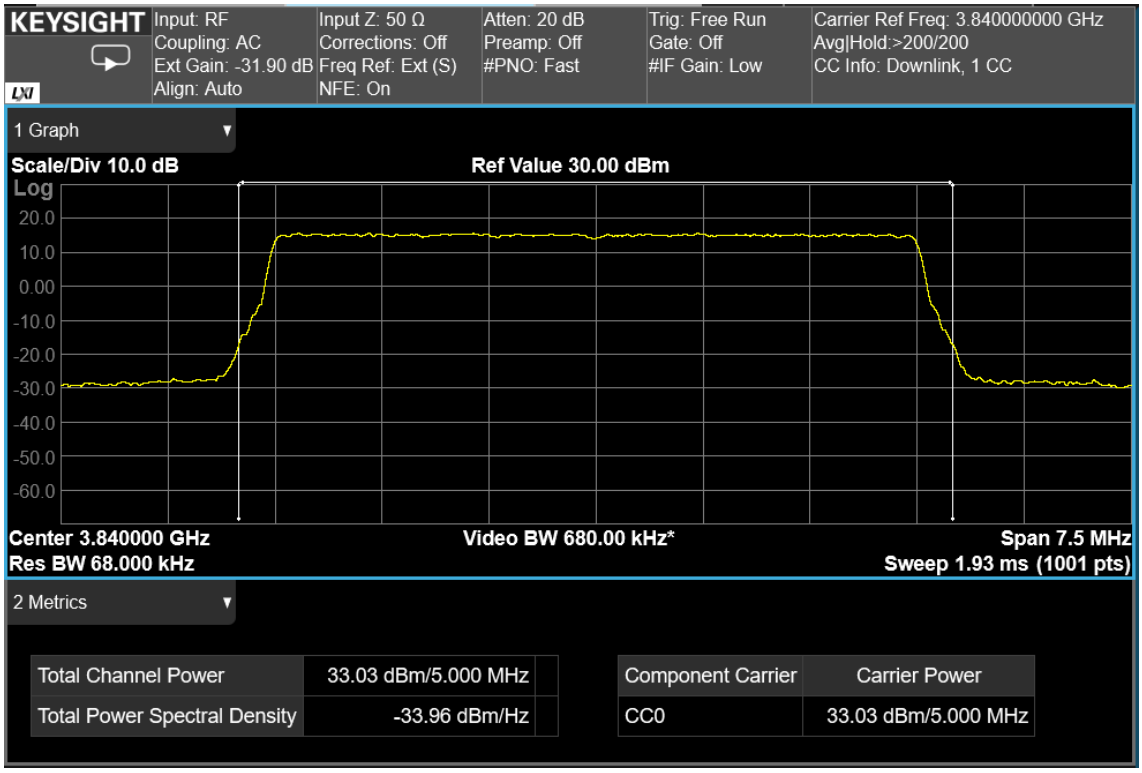
Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Vector Signal Generator	Keysight	N5172B EXG	MY57280565	2023-12
Spectrum Analyzer	Keysight	N9030B PXA	MY57142793	2021-12

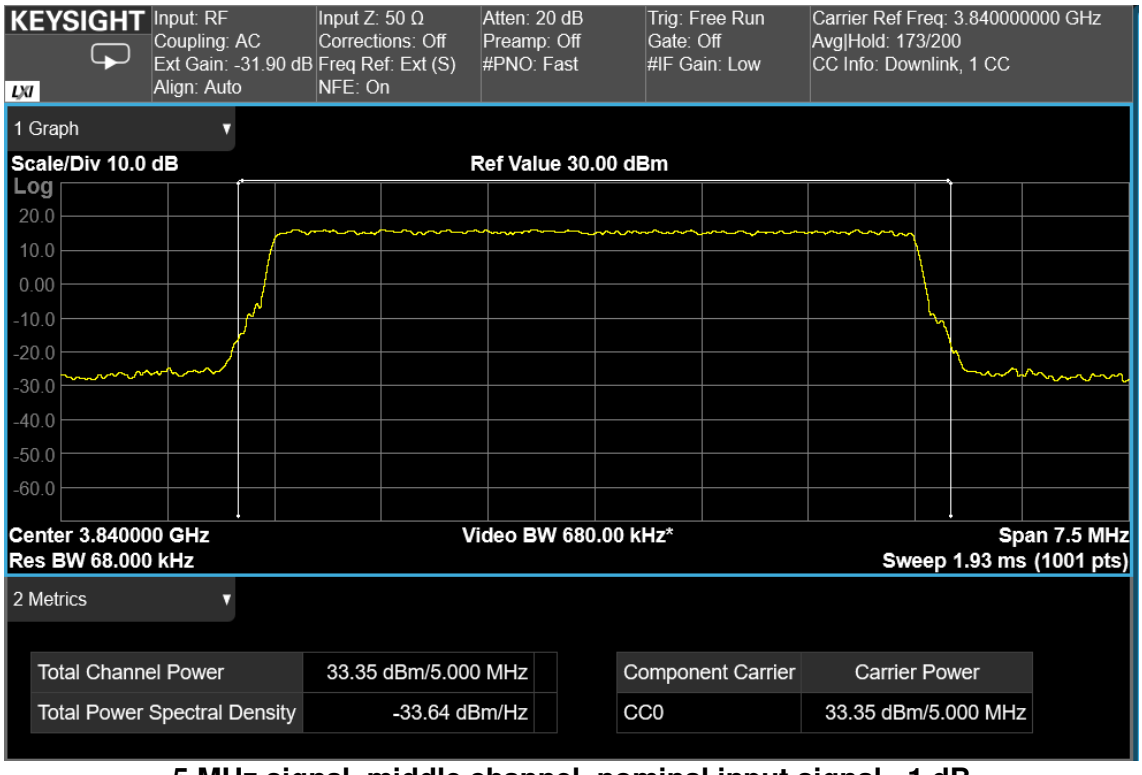
Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
(*) Equipment supplied by manufacturer's

Test data

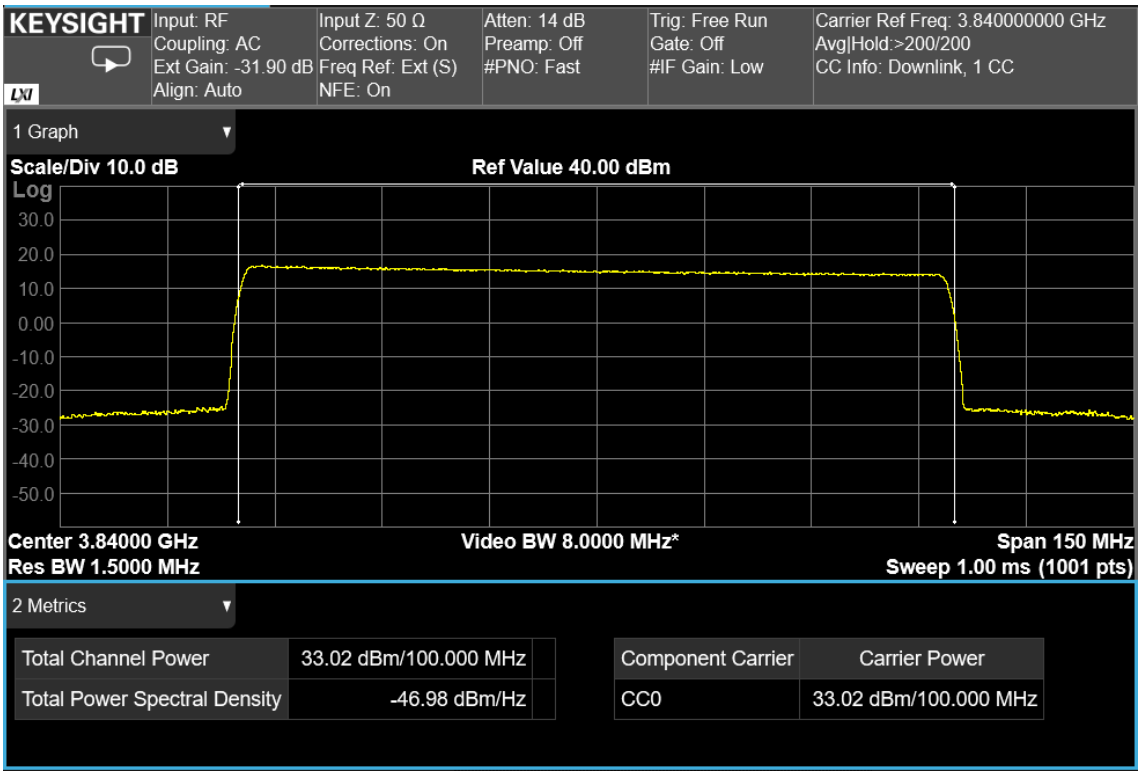
RF PORT 1



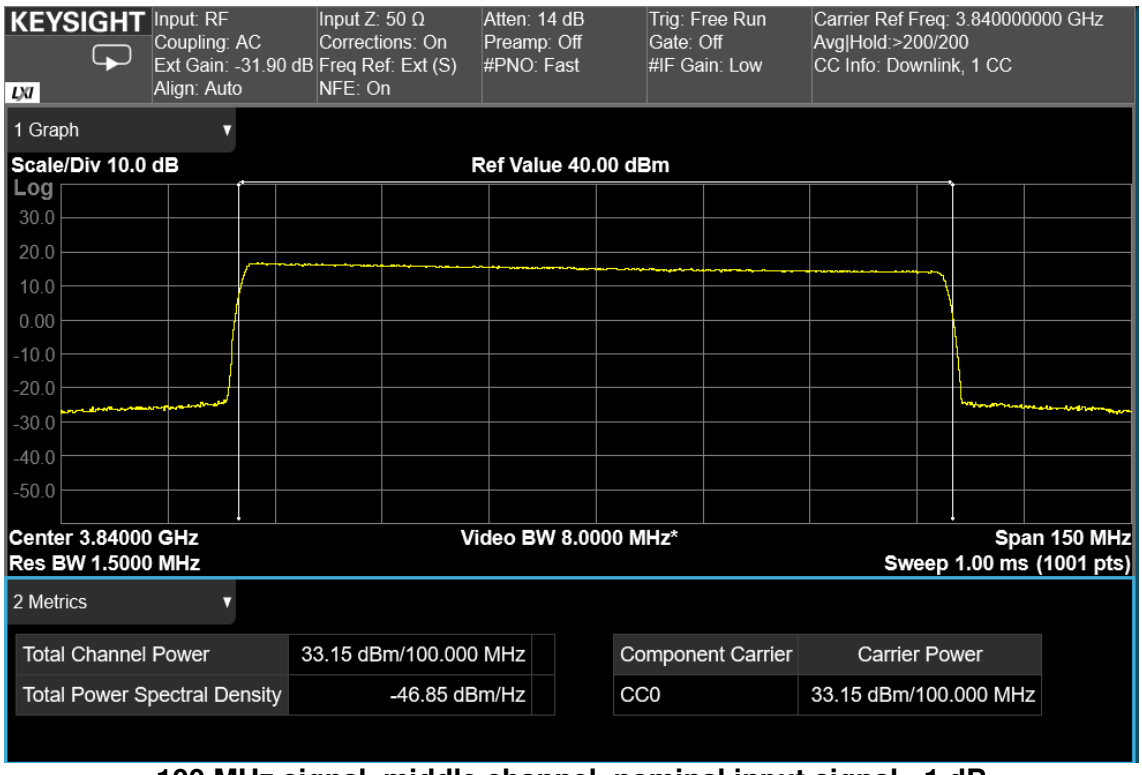
5 MHz signal, middle channel, nominal input signal



5 MHz signal, middle channel, nominal input signal +1 dB

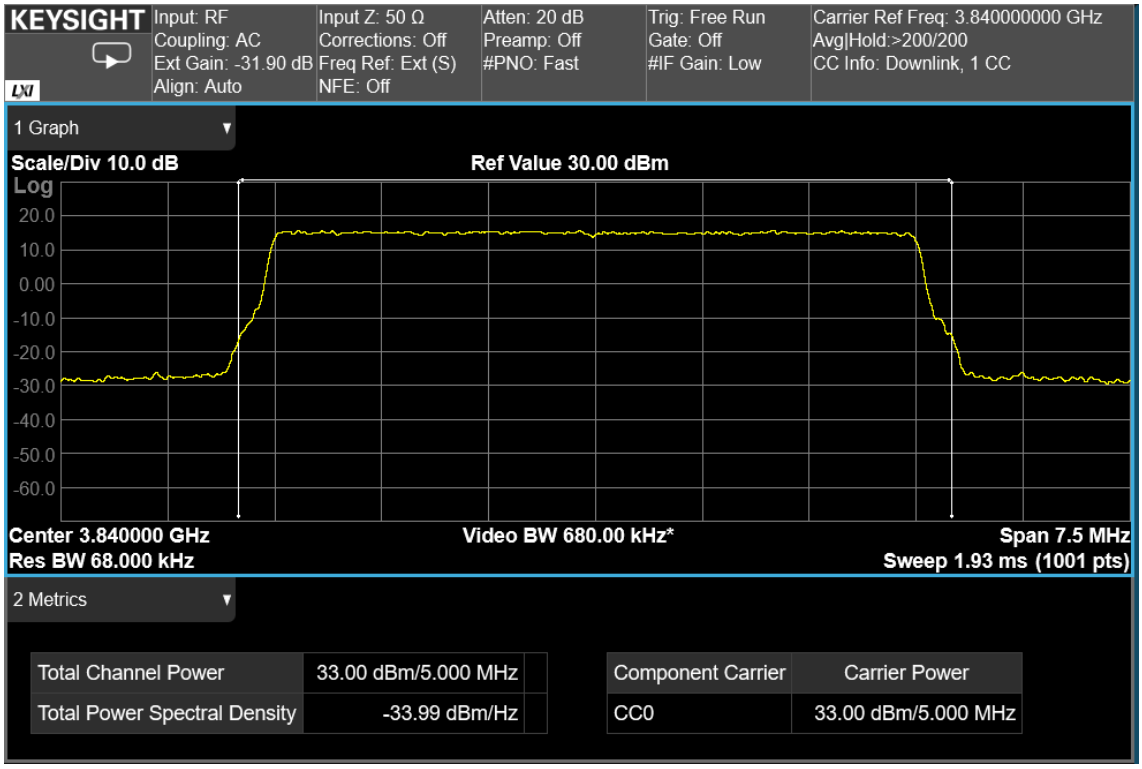


100 MHz signal, middle channel, nominal input signal

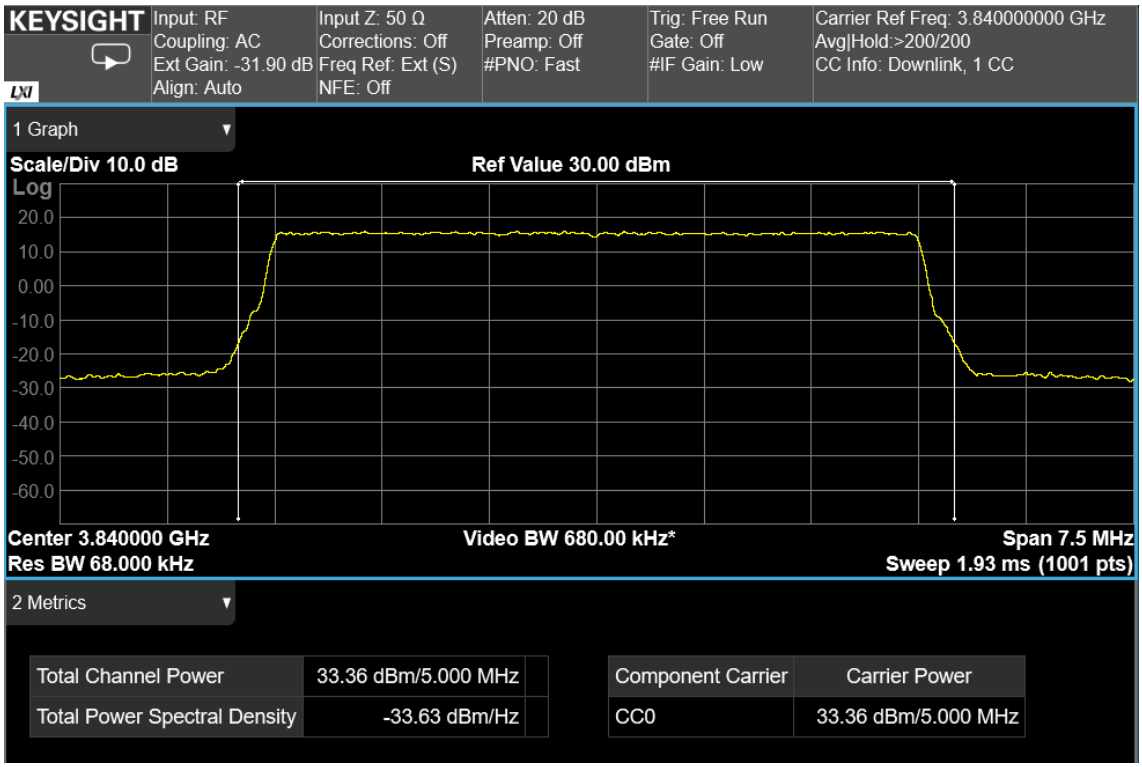


100 MHz signal, middle channel, nominal input signal +1 dB

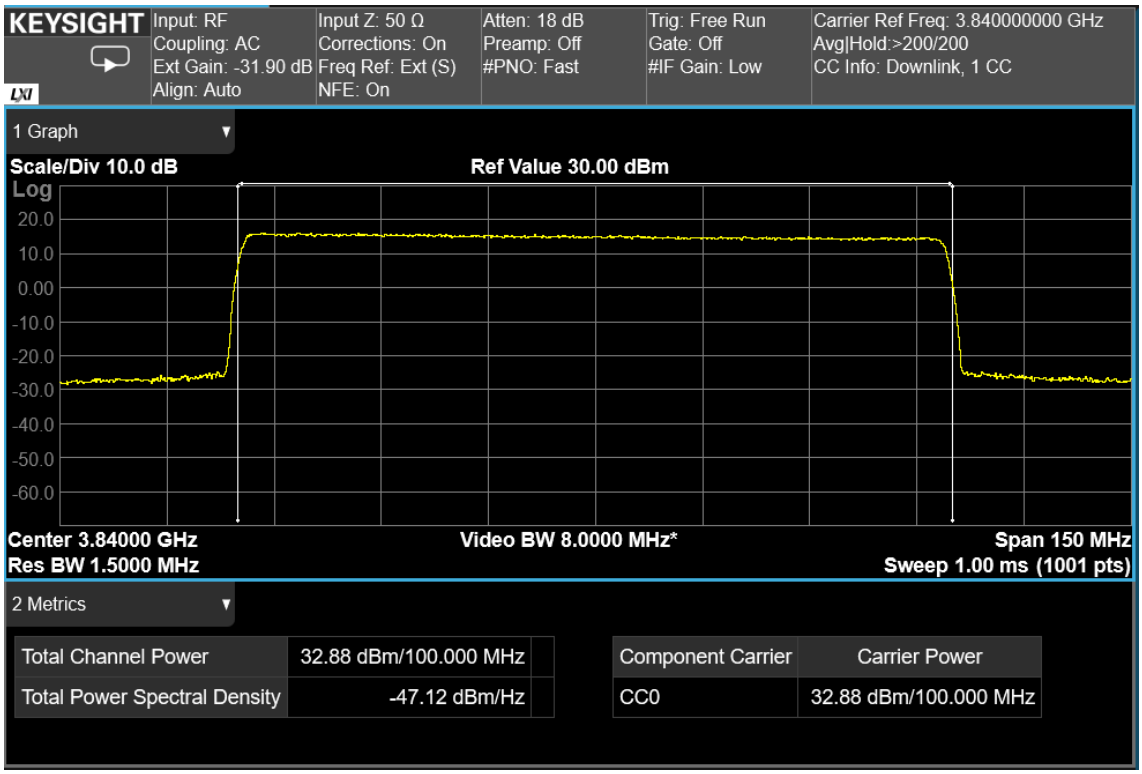
RF PORT 2



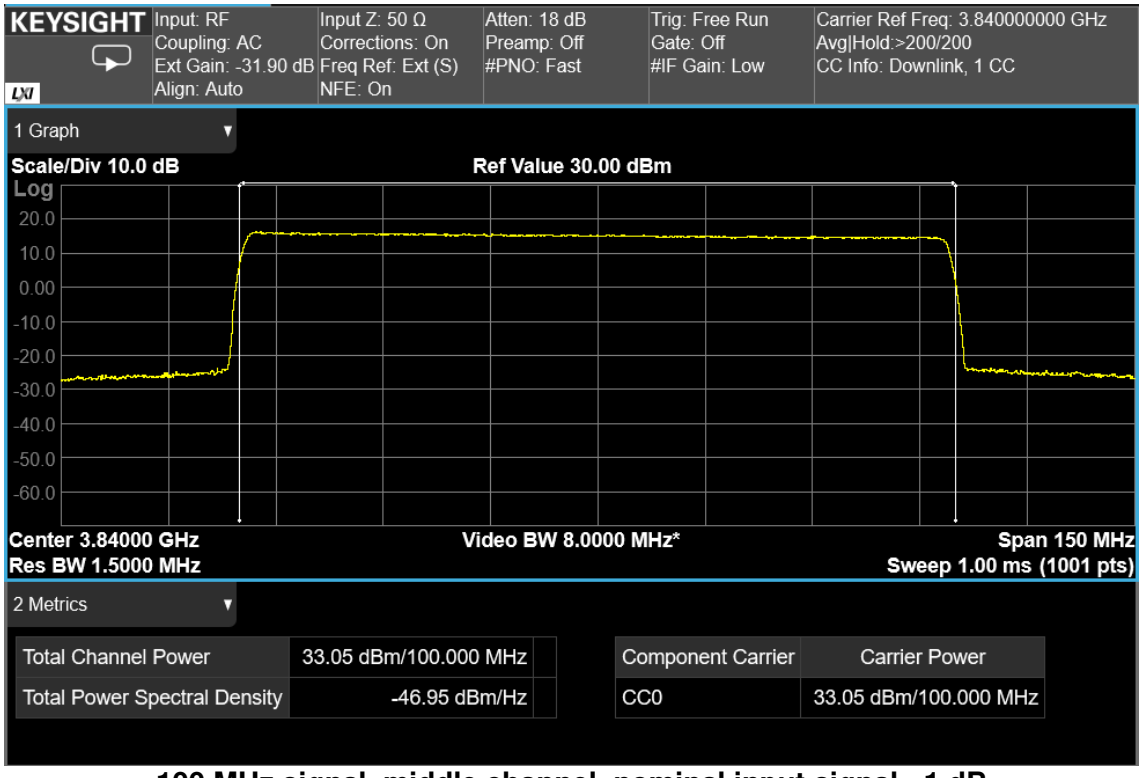
5 MHz signal, middle channel, nominal input signal



5 MHz signal, middle channel, nominal input signal +1 dB



100 MHz signal, middle channel, nominal input signal



100 MHz signal, middle channel, nominal input signal +1 dB

Clause 935210 D05v01r04 (3.3) Out of band rejection

Out of Band Rejection – Test for rejection of out of band signals.

Test date: 2021-09-01 to 2021-09-17

Test results: Pass

Special notes

–

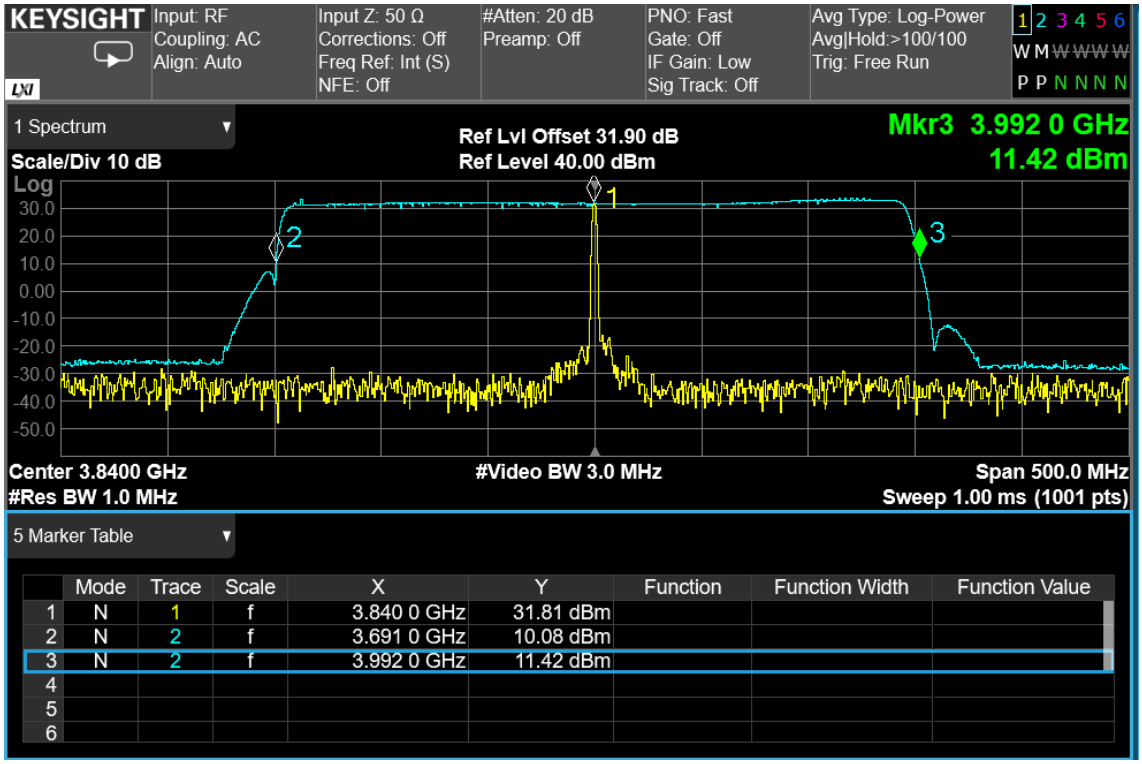
Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Vector Signal Generator	Keysight	N5172B EXG	MY57280565	2023-12
Spectrum Analyzer	Keysight	N9030B PXA	MY57142793	2021-12

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
(*) Equipment supplied by manufacturer's

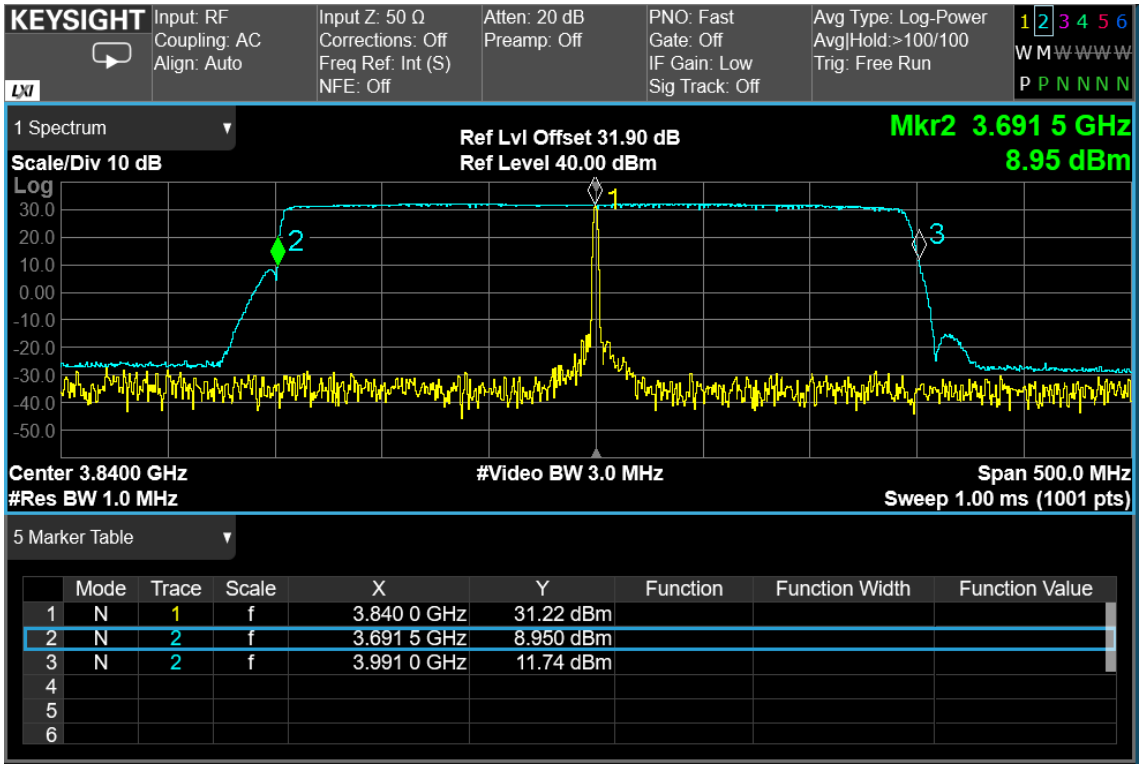
Test data

RF PORT 1



	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	3.840 0 GHz	31.81 dBm			
2	N	2	f	3.691 0 GHz	10.08 dBm			
3	N	2	f	3.992 0 GHz	11.42 dBm			
4								
5								
6								

RF PORT 2


KEYSIGHT
Input: RF
Coupling: AC
Align: Auto
Input Z: 50 Ω
Corrections: Off
Freq Ref: Int (S)
NFE: Off
Atten: 20 dB
Preamp: Off
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Log-Power
Avg|Hold:>100/100
Trig: Free Run
1 Spectrum
Ref Lvl Offset 31.90 dB
Ref Level 40.00 dBm
Mkr2 3.691 5 GHz
8.95 dBm
Scale/Div 10 dB
Log
30.0
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
Center 3.8400 GHz
#Res BW 1.0 MHz
#Video BW 3.0 MHz
Span 500.0 MHz
Sweep 1.00 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 3.840 0 GHz 31.22 dBm
2 N 2 f 3.691 5 GHz 8.950 dBm
3 N 2 f 3.991 0 GHz 11.74 dBm
4
5
6

Clause 27.53(l)(1) Occupied bandwidth

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test date: 2021-09-01 to 2021-09-17

Test results: Pass

Special notes

- Broadband amplifiers: AWGN test signal used (5 MHz and 100 MHz LTE channel)

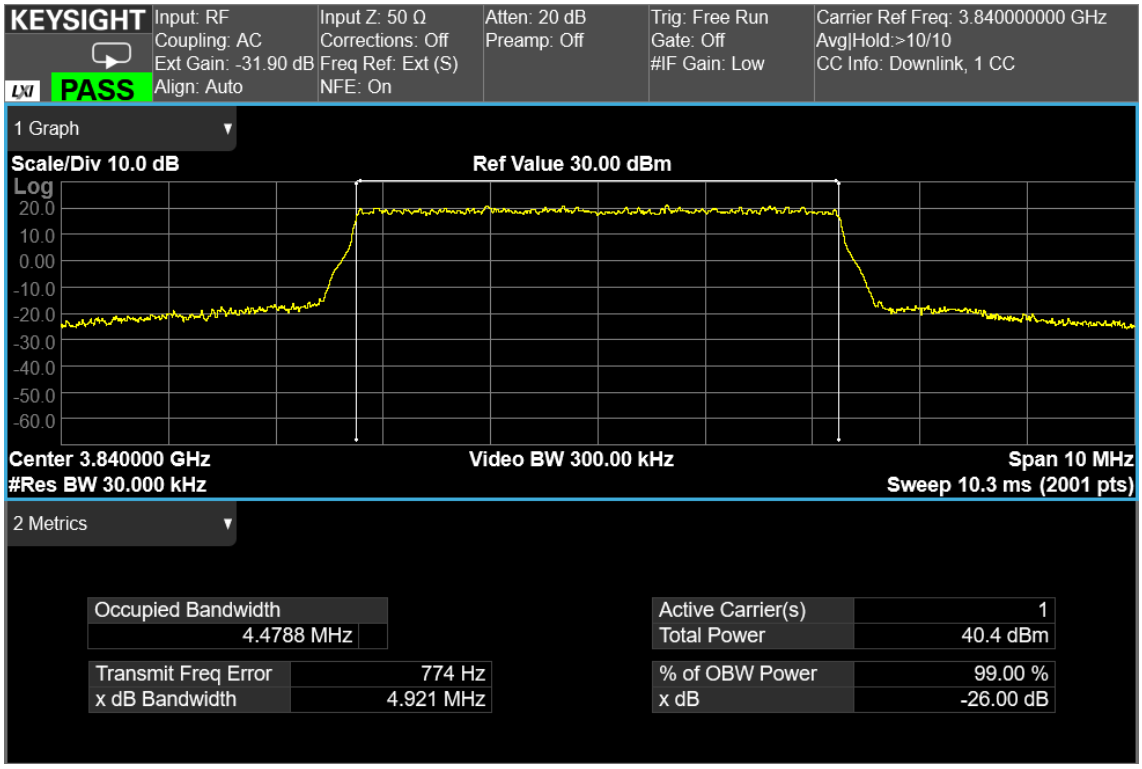
Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Vector Signal Generator	Keysight	N5172B EXG	MY57280565	2023-12
Spectrum Analyzer	Keysight	N9030B PXA	MY57142793	2021-12

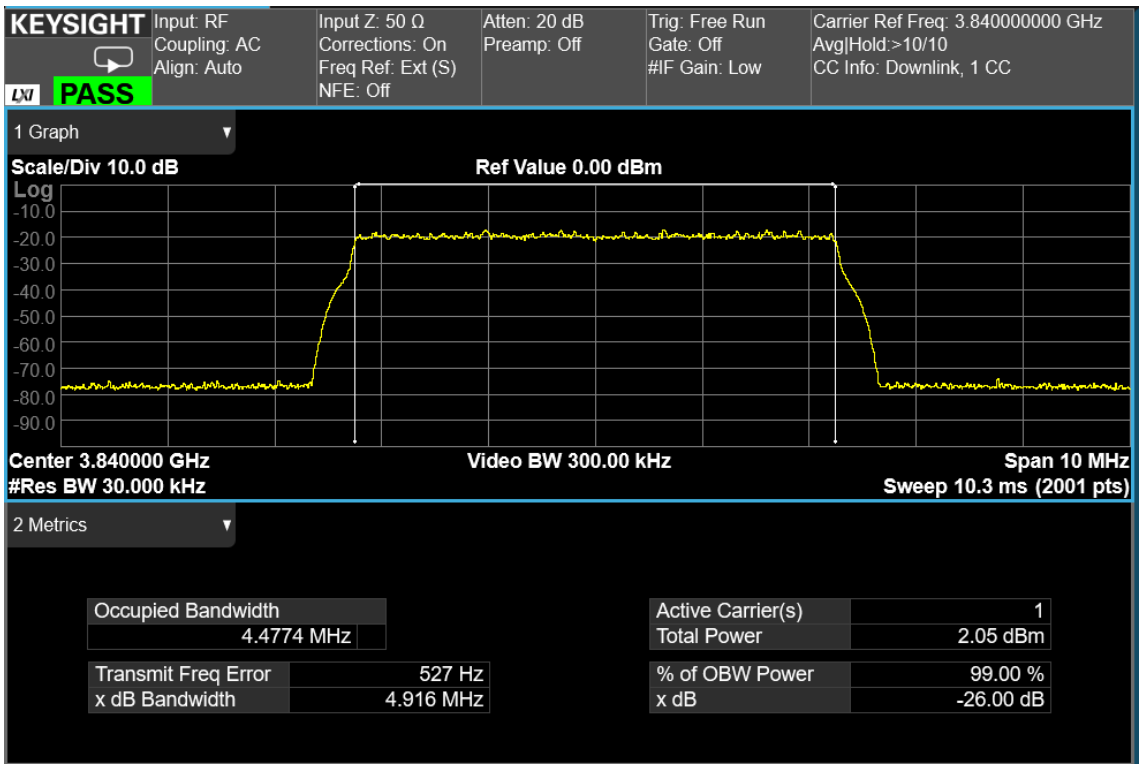
Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
(*) Equipment supplied by manufacturer's

Test data

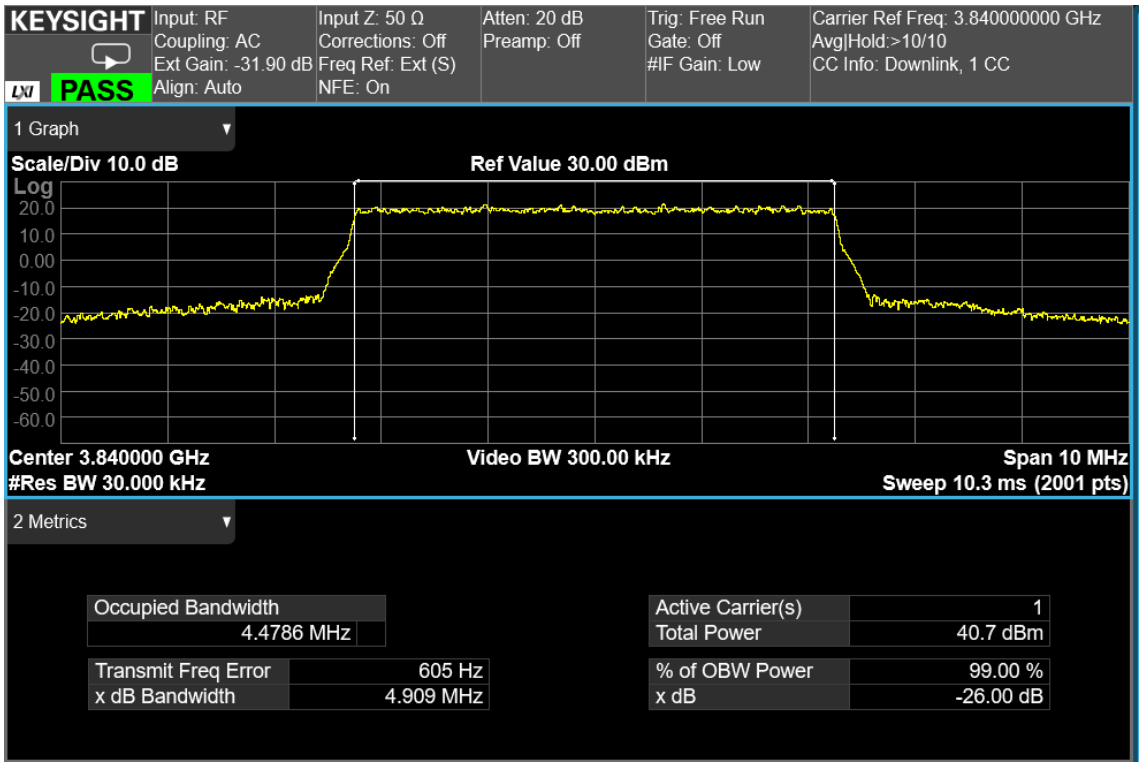
RF PORT 1



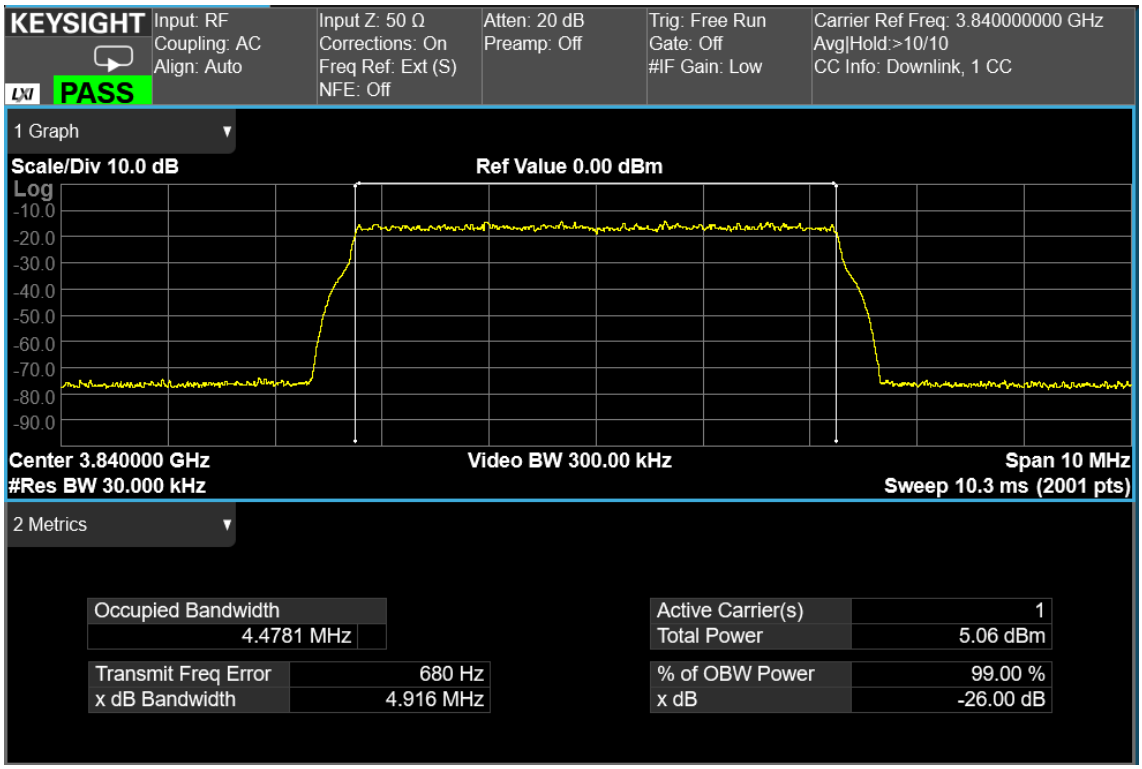
5 MHz signal, middle channel, nominal input signal - Output



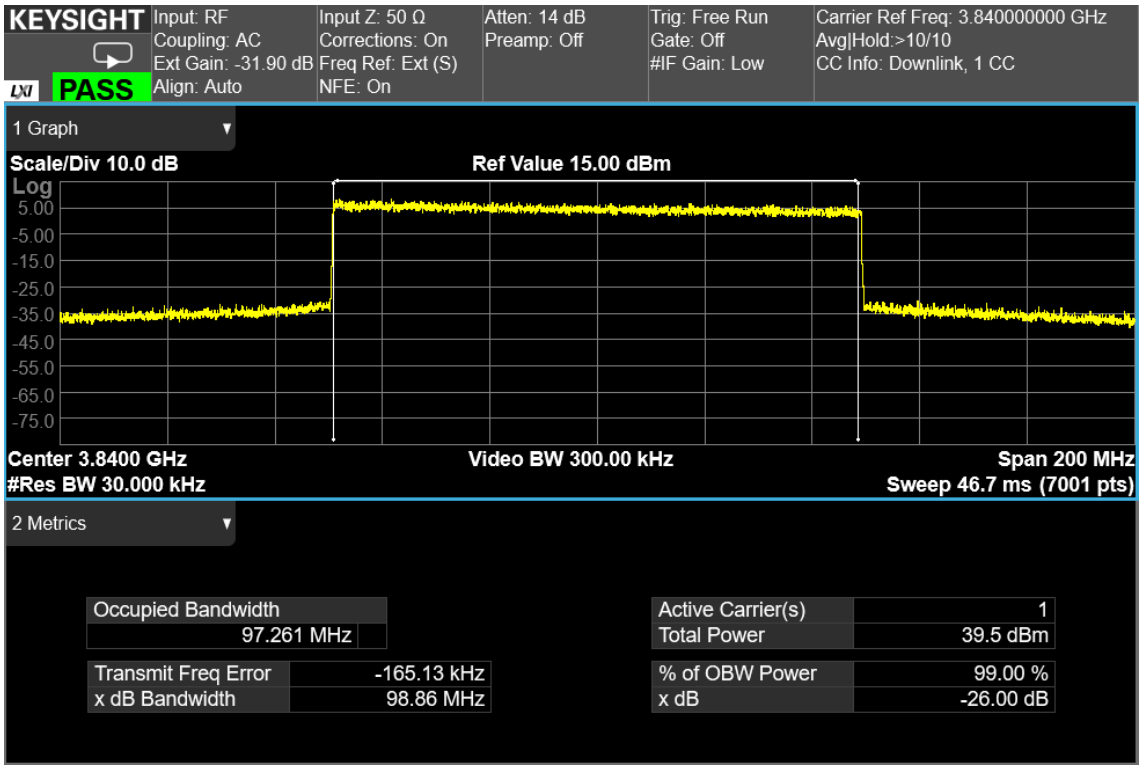
5 MHz signal, middle channel, nominal input signal - Input



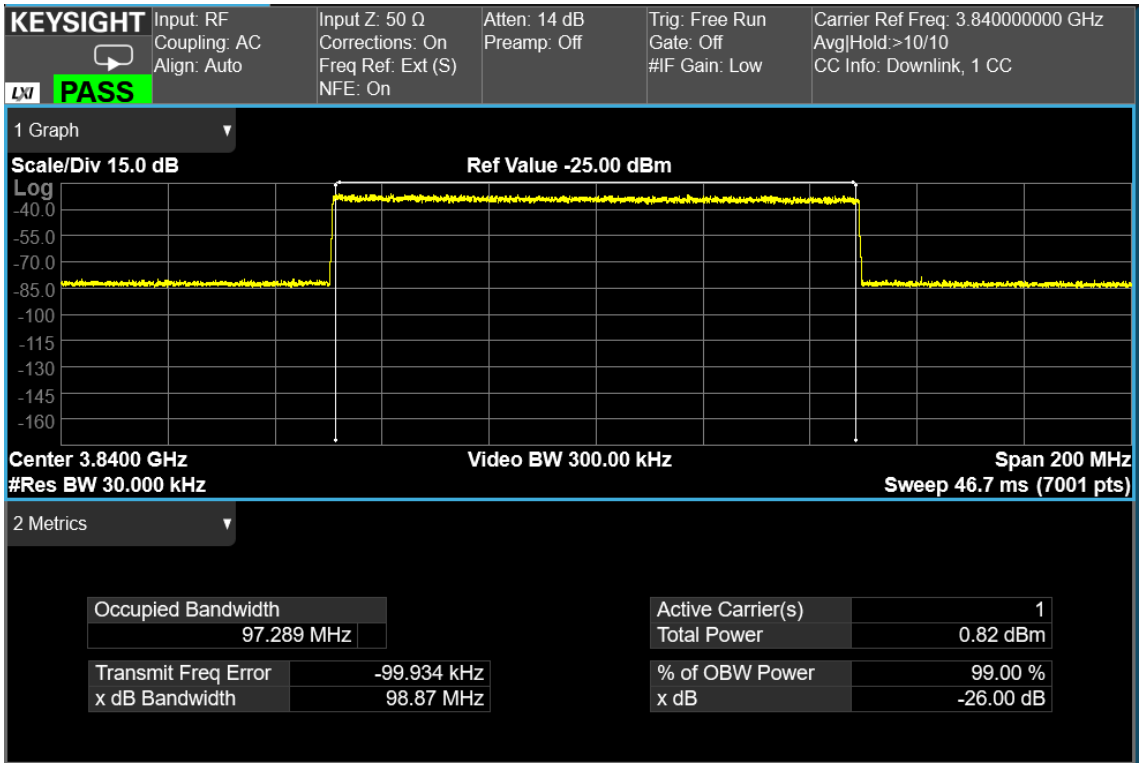
5 MHz signal, middle channel, nominal input signal + 3dB - Output



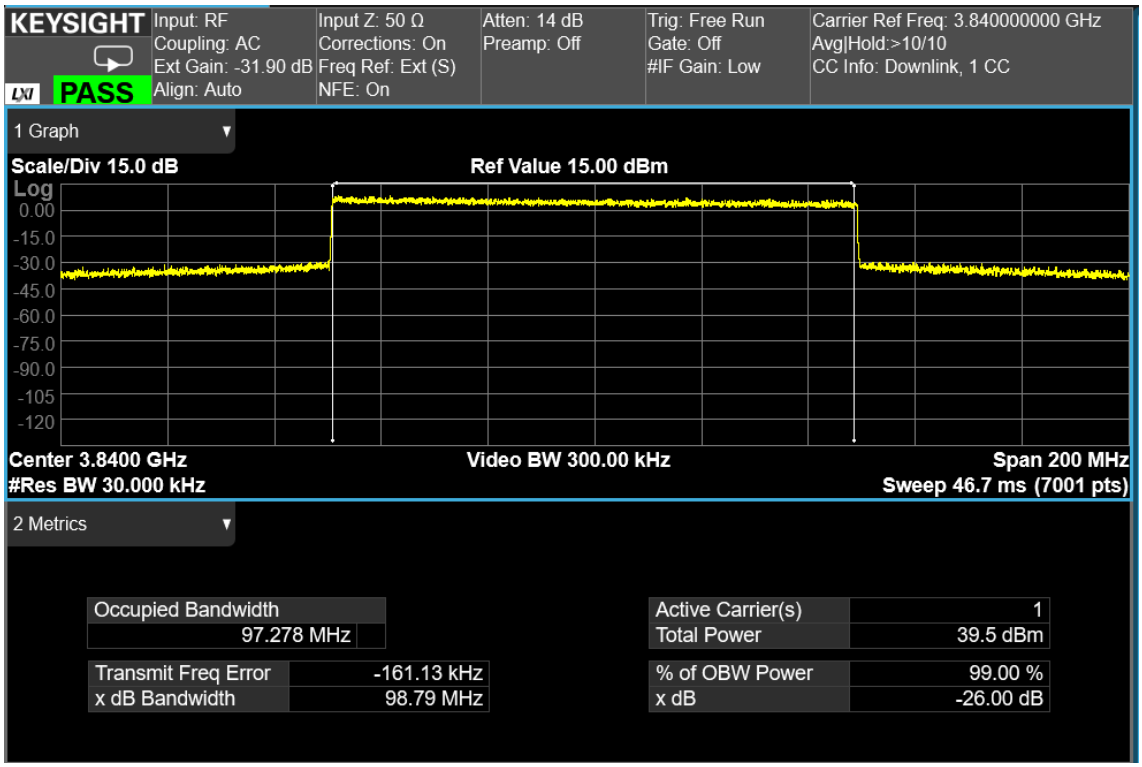
5 MHz signal, middle channel, nominal input signal + 3dB - Input



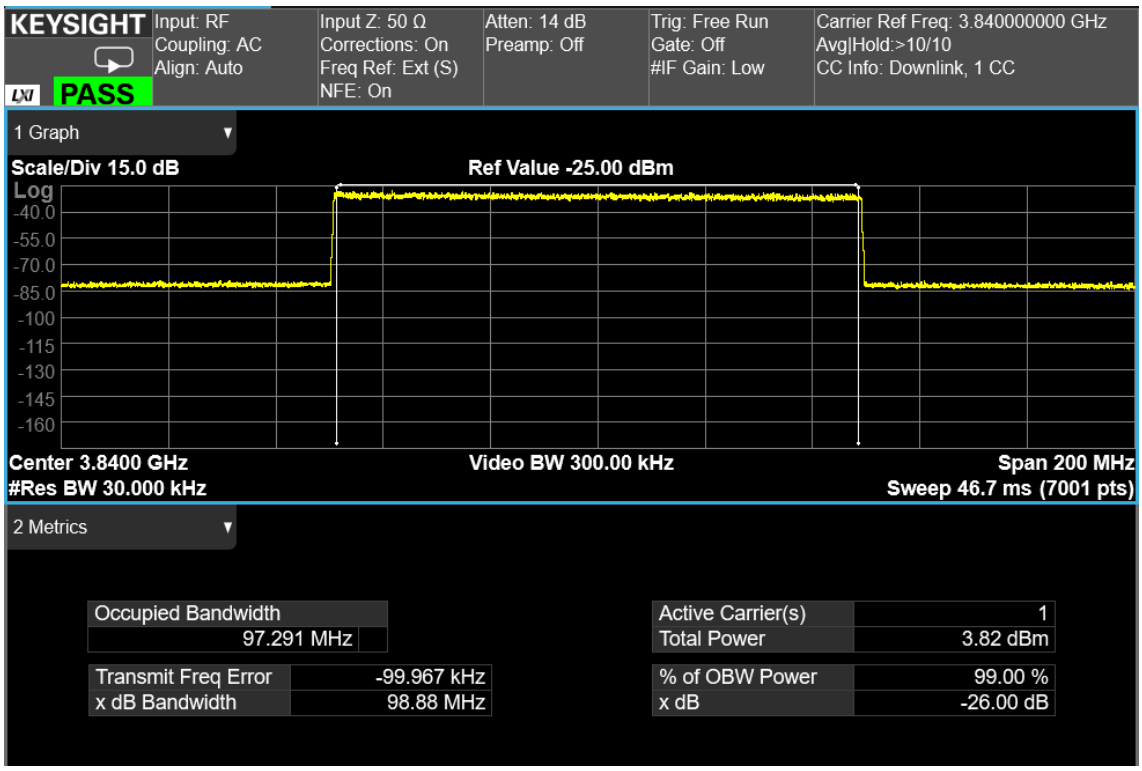
100 MHz signal, middle channel, nominal input signal - Output



100 MHz signal, middle channel, nominal input signal - Input

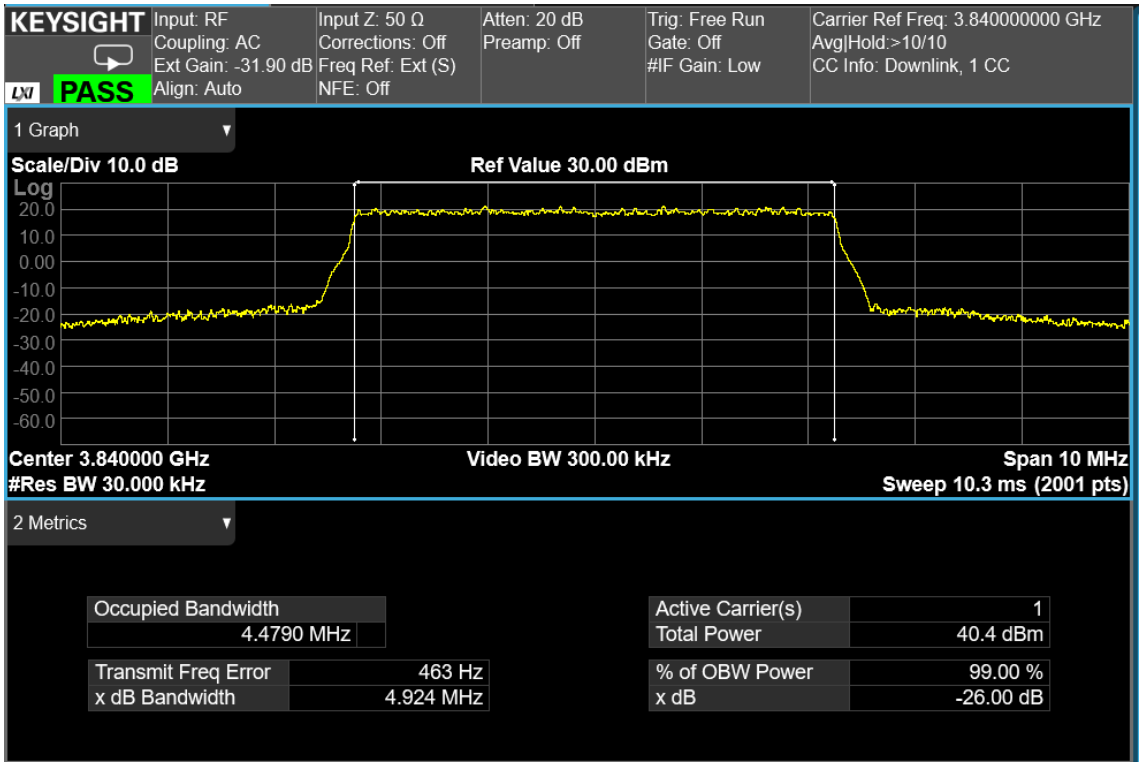


100 MHz signal, middle channel, nominal input signal + 3dB - Output

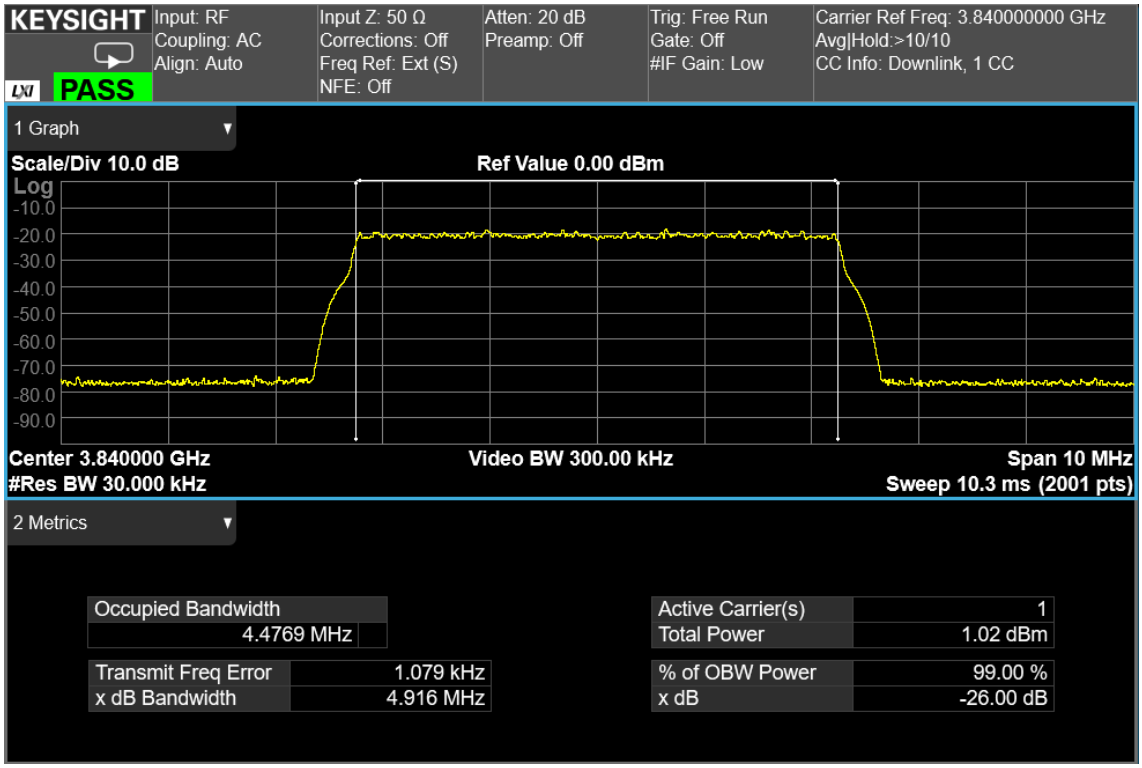


100 MHz signal, middle channel, nominal input signal + 3dB - Input

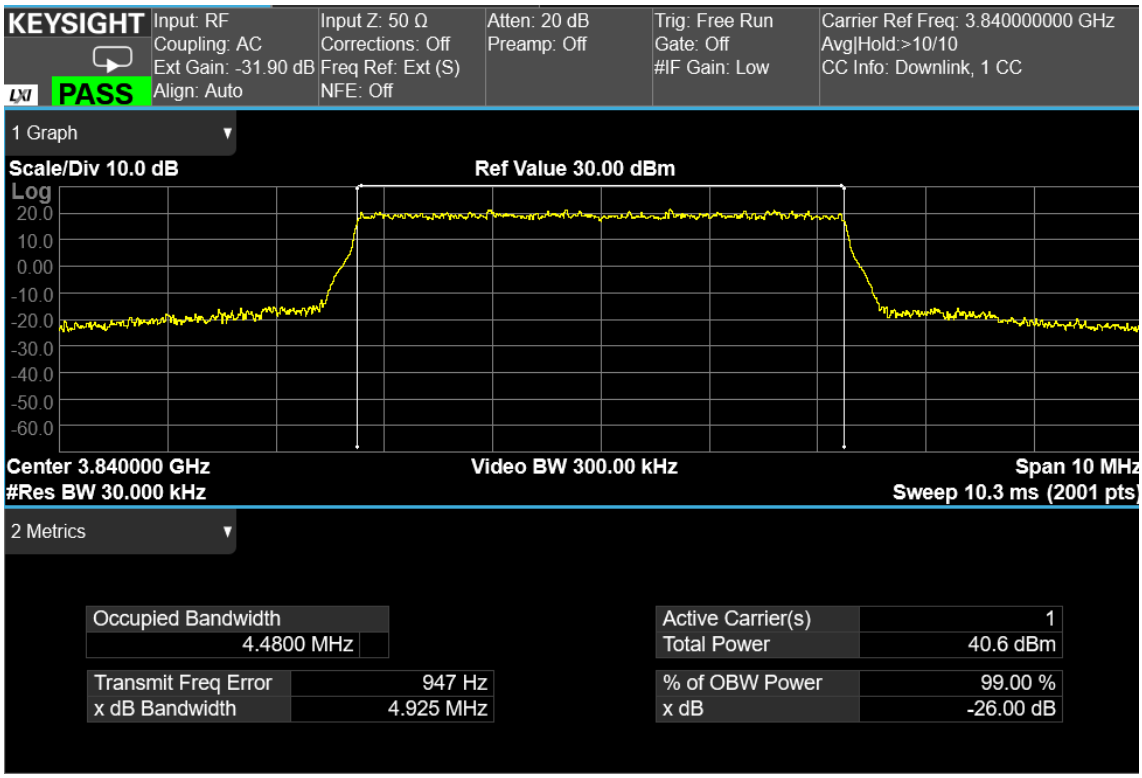
RF PORT 2



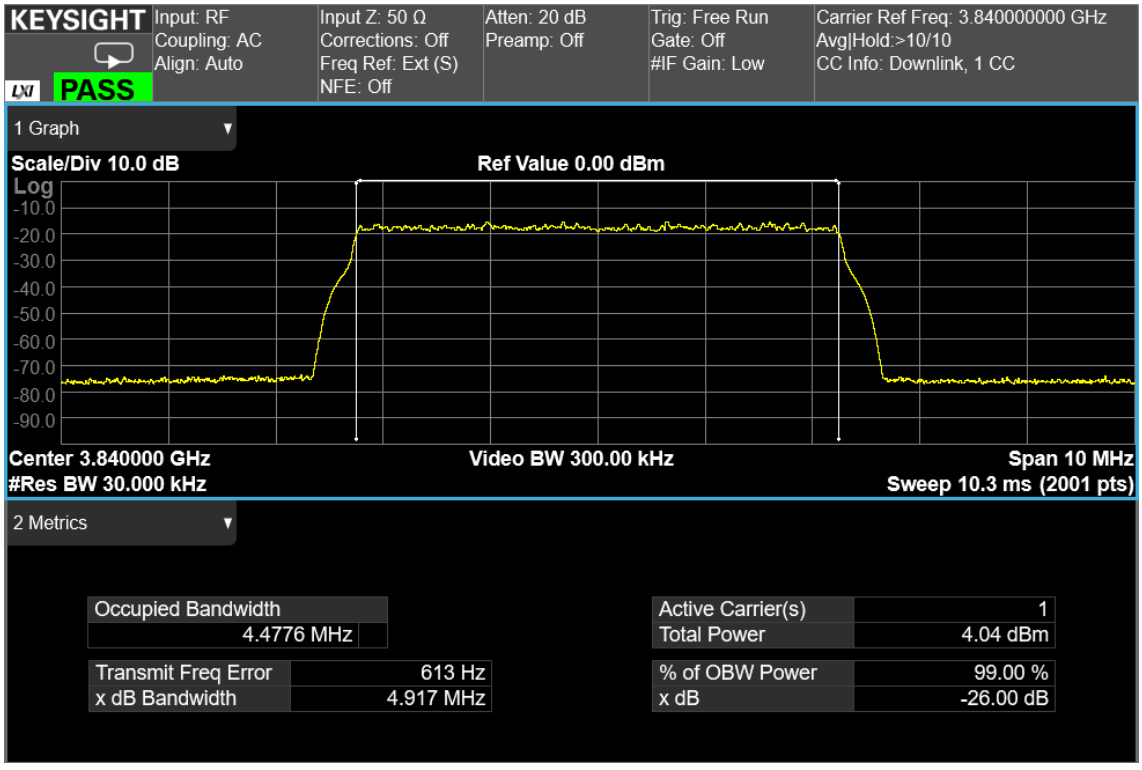
5 MHz signal, middle channel, nominal input signal - Output



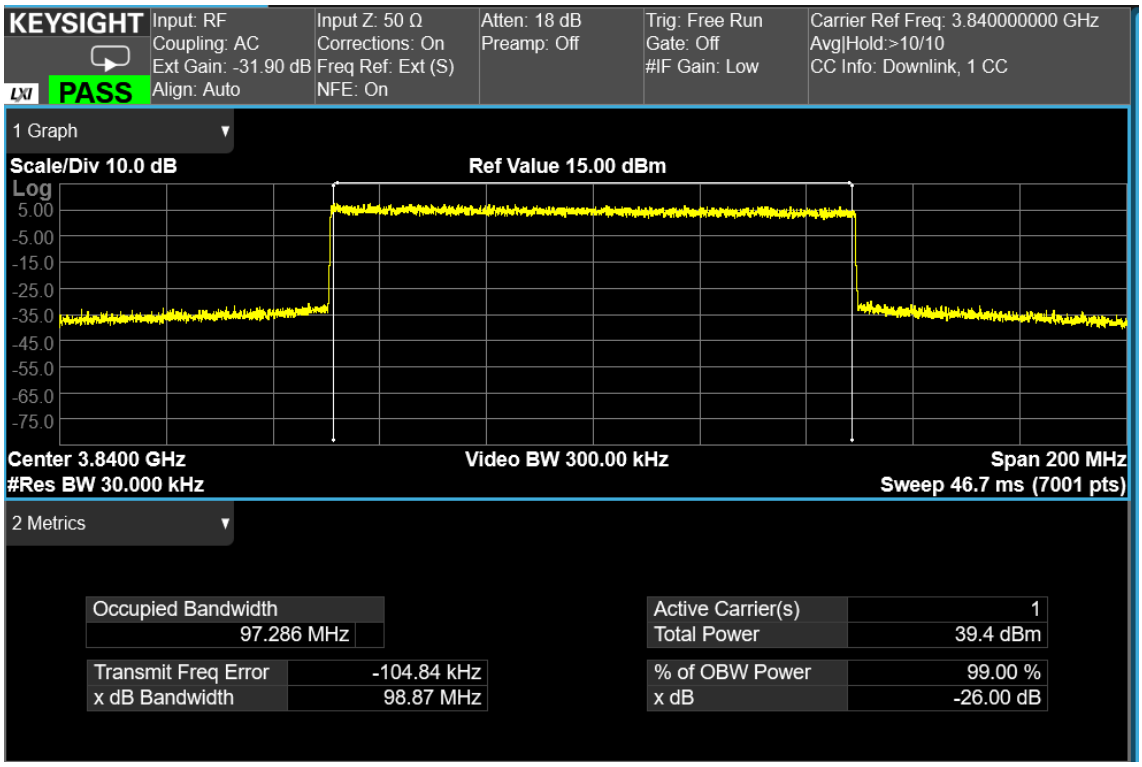
5 MHz signal, middle channel, nominal input signal - Input



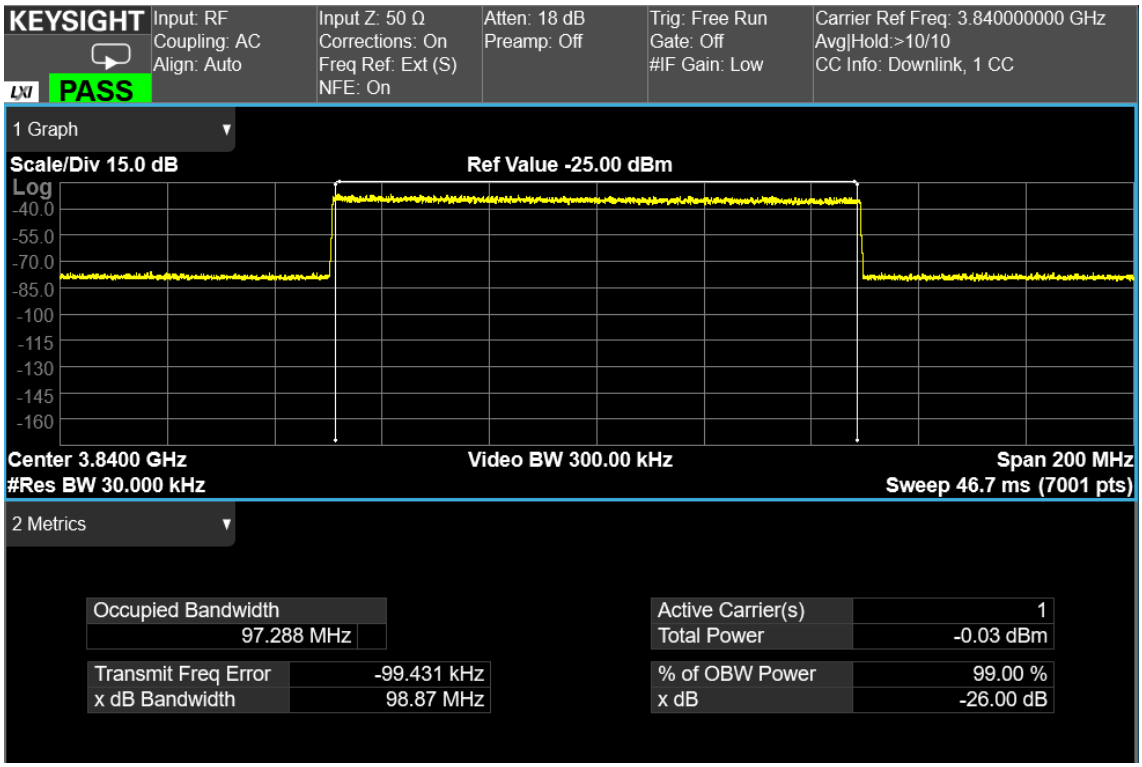
5 MHz signal, middle channel, nominal input signal + 3dB - Output



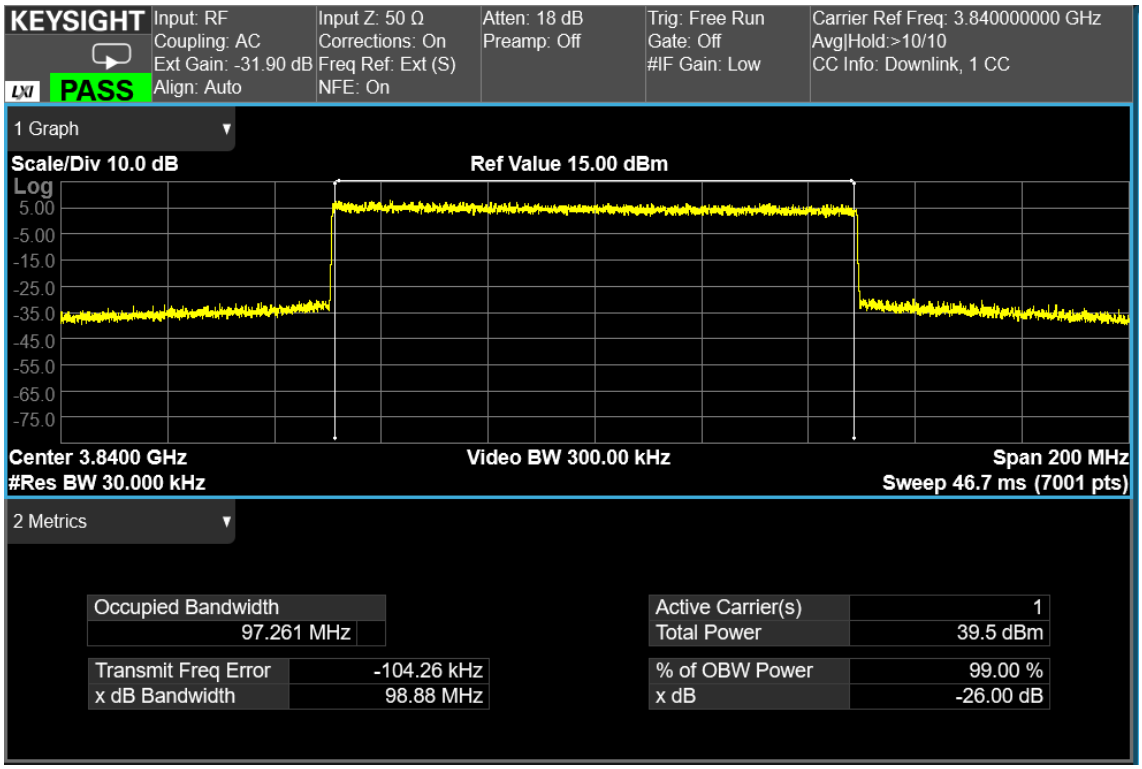
5 MHz signal, middle channel, nominal input signal + 3dB - Input



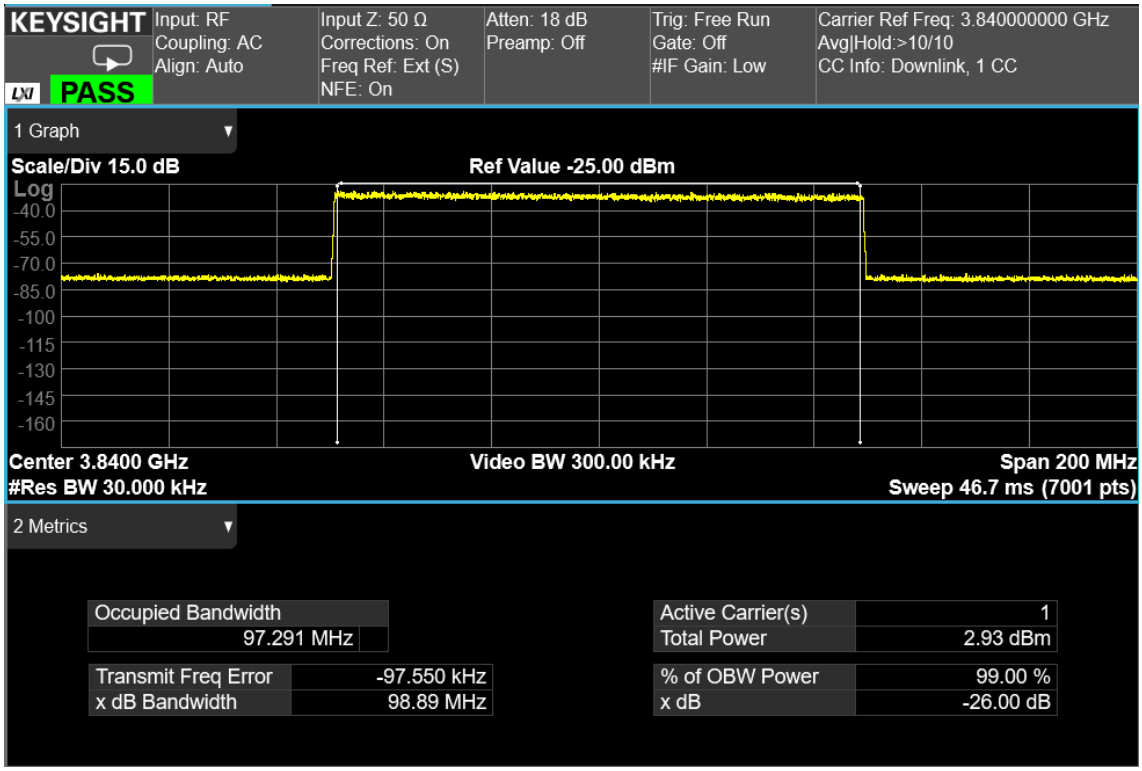
100 MHz signal, middle channel, nominal input signal - Output



100 MHz signal, middle channel, nominal input signal - Input



100 MHz signal, middle channel, nominal input signal + 3dB - Output



100 MHz signal, middle channel, nominal input signal + 3dB - Input

Clause 27.50(j) Peak output power at RF antenna connector

§ 27.50(j) The following power requirements apply to stations transmitting in the 3700-3980MHz band:

(1) The power of each fixed or base station transmitting in the 3700-3980 MHz bandand located in any county with population density of 100 or fewer persons per square mile,based upon the most recently available population statistics from the Bureau of theCensus, is limited to an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz.This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(2) The power of each fixed or base station transmitting in the 3700-3980 MHz bandand situated in any geographic location other than that described in paragraph (j)(1) of thissection is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate powerof all antenna elements in any given sector of a base station.

(4) Equipment employed must be authorized in accordance with the provisions of§27.51. Power measurements for transmissions by stations authorized under this sectionmay be made either in accordance with a Commission-approved average powertechnique or in compliance with paragraph (j)(5) of this section. In measuringtransmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(5) Peak transmit power must be measured over any interval of continuoustransmission using instrumentation calibrated in terms of an rms-equivalent voltage. Themeasurement results shall be properly adjusted for any instrument limitations, such asdetector response times, limited resolution bandwidth capability when compared to theemission bandwidth, sensitivity, and any other relevant factors, so as to obtain a true peakmeasurement for the emission in question over the full bandwidth of the channel.

Test date: 2021-09-01 to 2021-09-17

Test results: Pass

Special notes

- Broadband amplifiers: AWGN test signal used (5 MHz and 100 MHz LTE channel)

Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Vector Signal Generator	Keysight	N5172B EXG	MY57280565	2023-12
Spectrum Analyzer	Keysight	N9030B PXA	MY57142793	2021-12

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
(*) Equipment supplied by manufacturer's

Test data

RF PORT 1

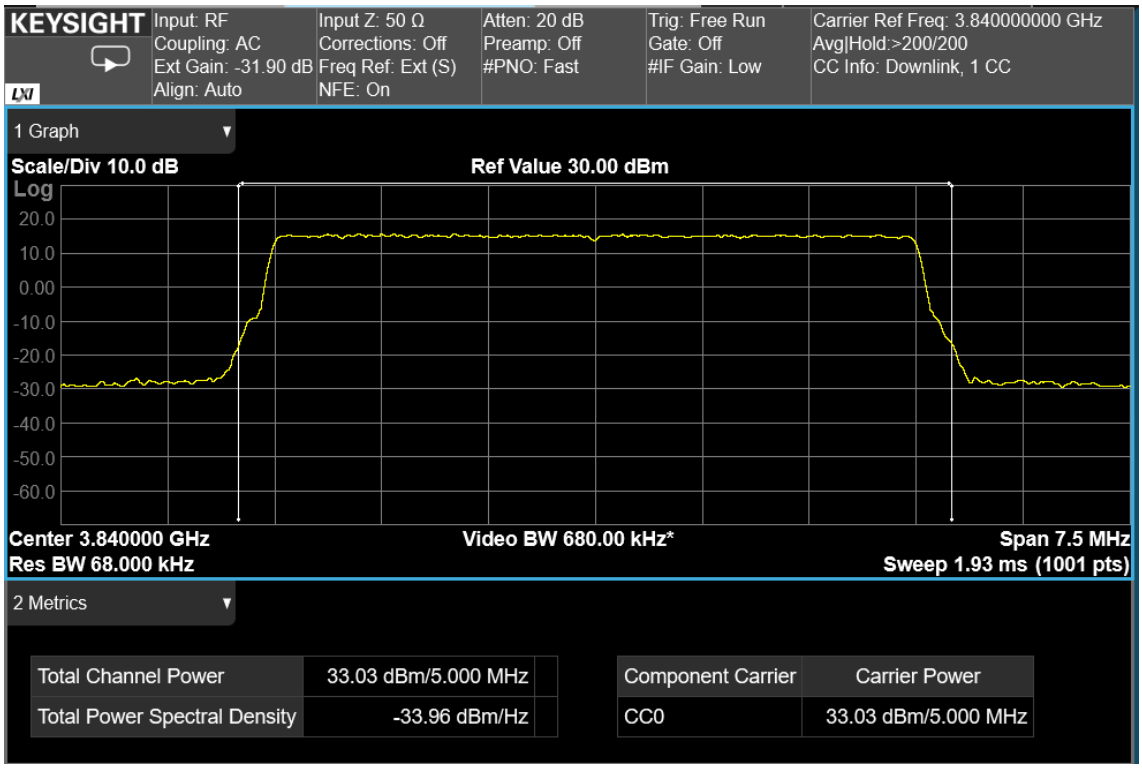
AWGN signal, nominal input signal

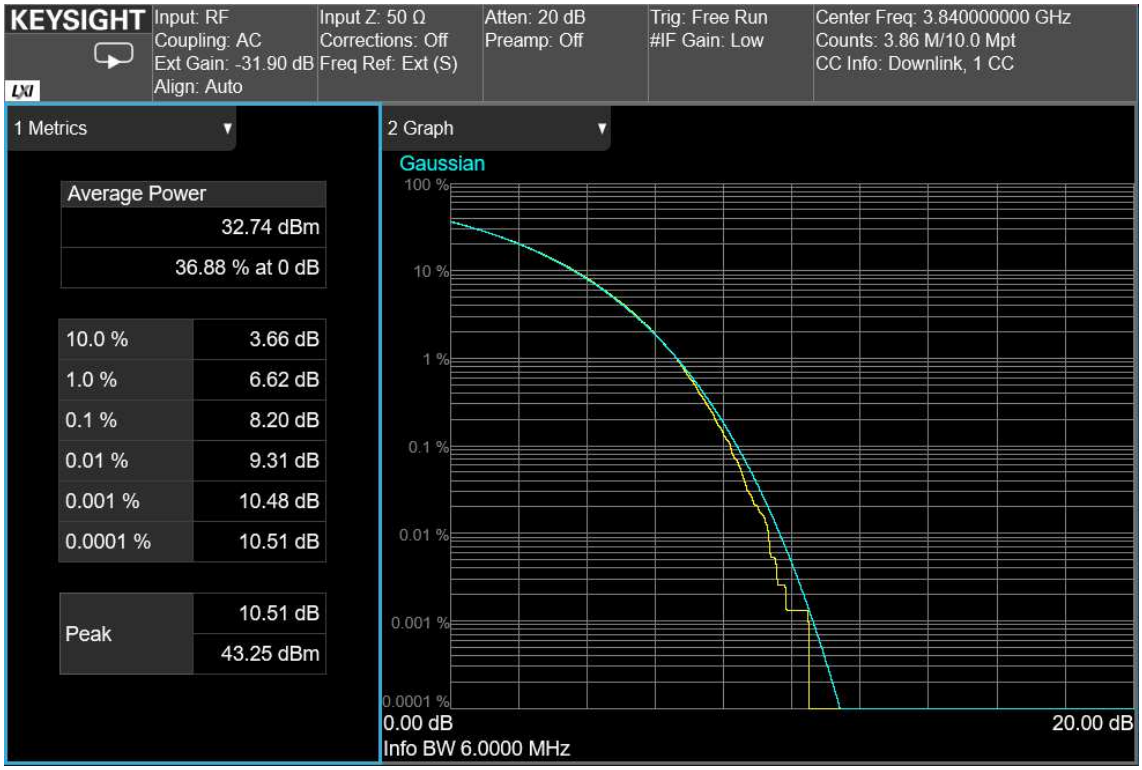
Test data						
Direction	Modulation	Frequency (MHz)	RF output Power (dBm)	RF output channel Power (W)	RF output Power (W/MHz)	PAR (dB)
Down-link	5G NR, 5 MHz	3840.0	33.0	2.0	0.4	10.5
Down-link	5G NR, 100 MHz	3840.0	33.0	2.0	0.4	10.8

AWGN signal, nominal input signal + 3dB

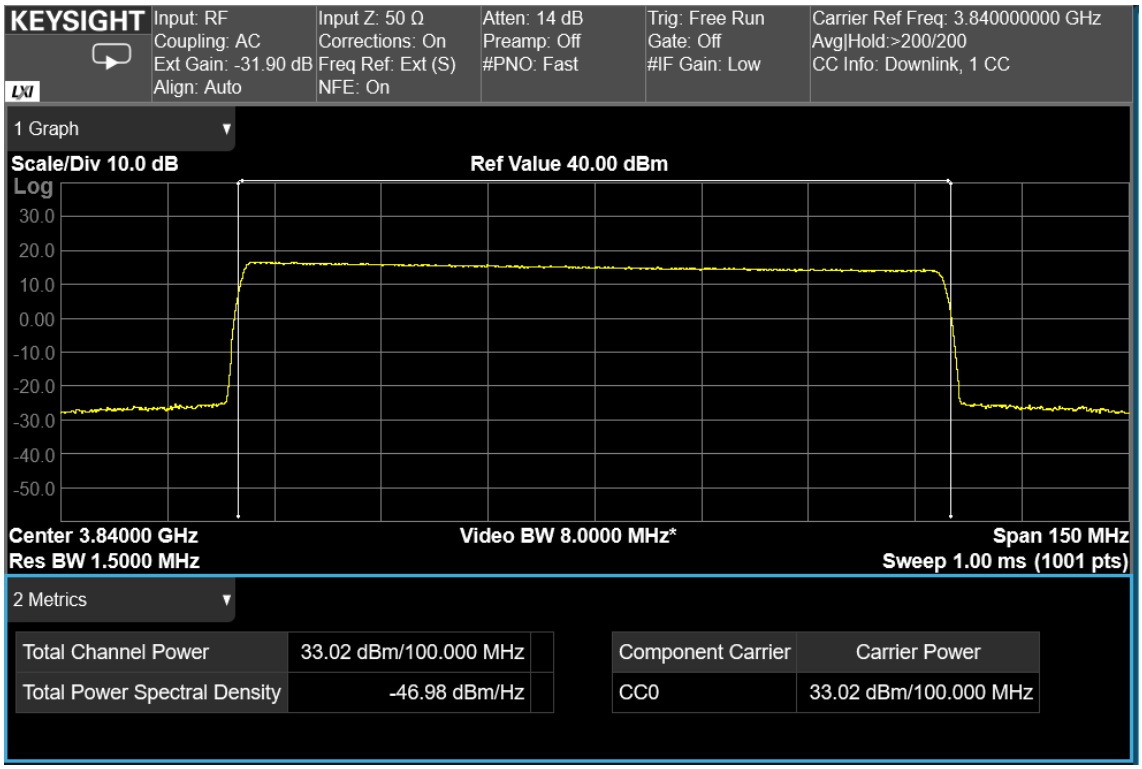
Test data						
Direction	Modulation	Frequency (MHz)	RF output Power (dBm)	RF output channel Power (W)	RF output Power (W/MHz)	PAR (dB)
Down-link	5G NR, 5 MHz	3840.0	33.4	2.2	0.4	10.4
Down-link	5G NR, 100 MHz	3840.0	33.2	2.1	0.4	10.7

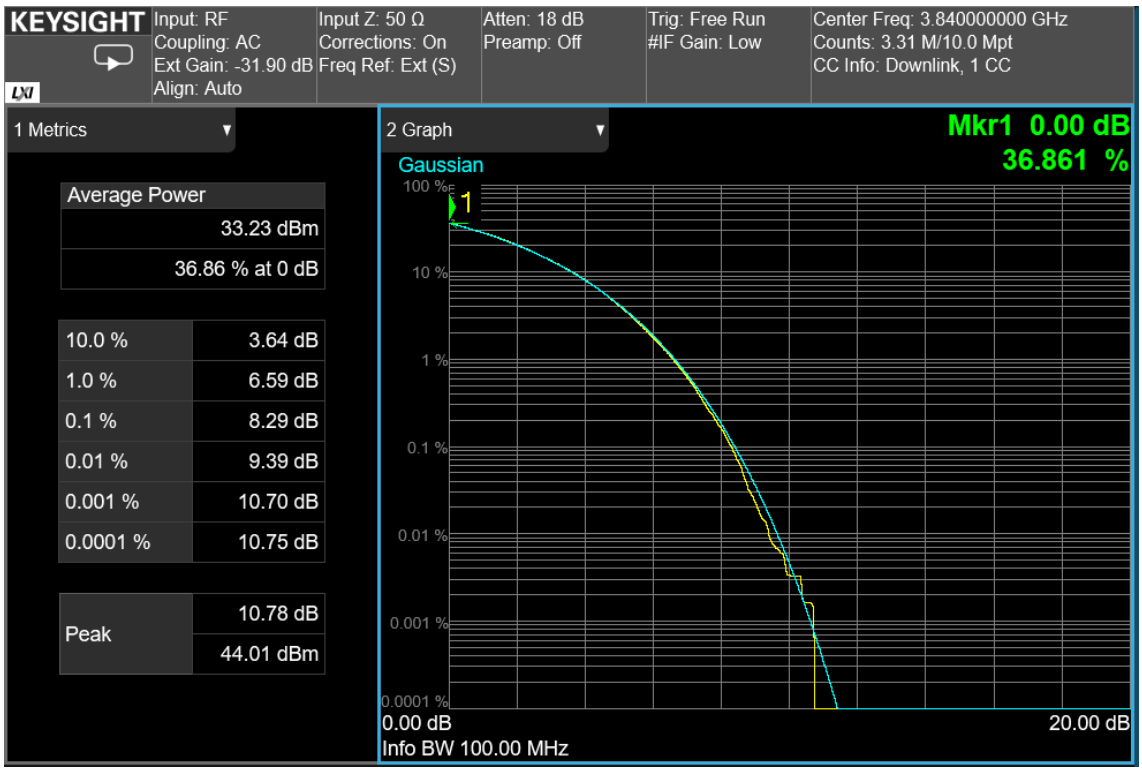
Note: PAR measure is performed by the “CCDF” function installed on Spectrum analyzer that provides average power (the same measured with “Channel power” function), peak power and PAR.



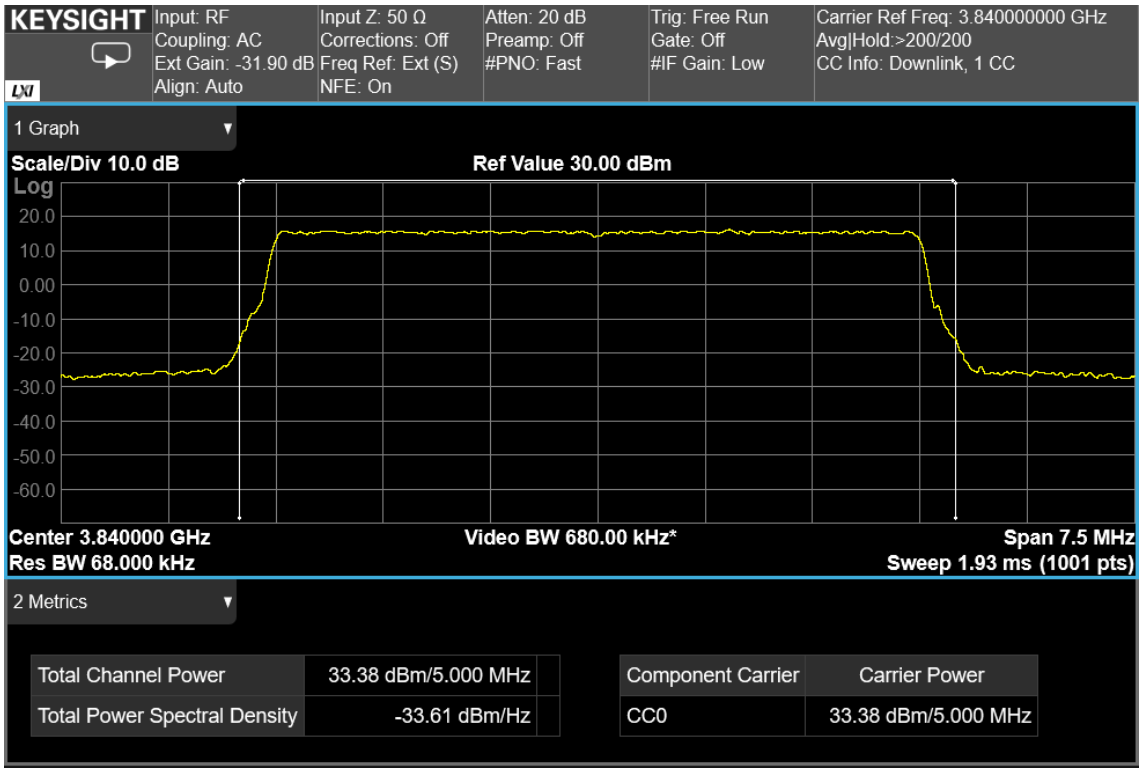


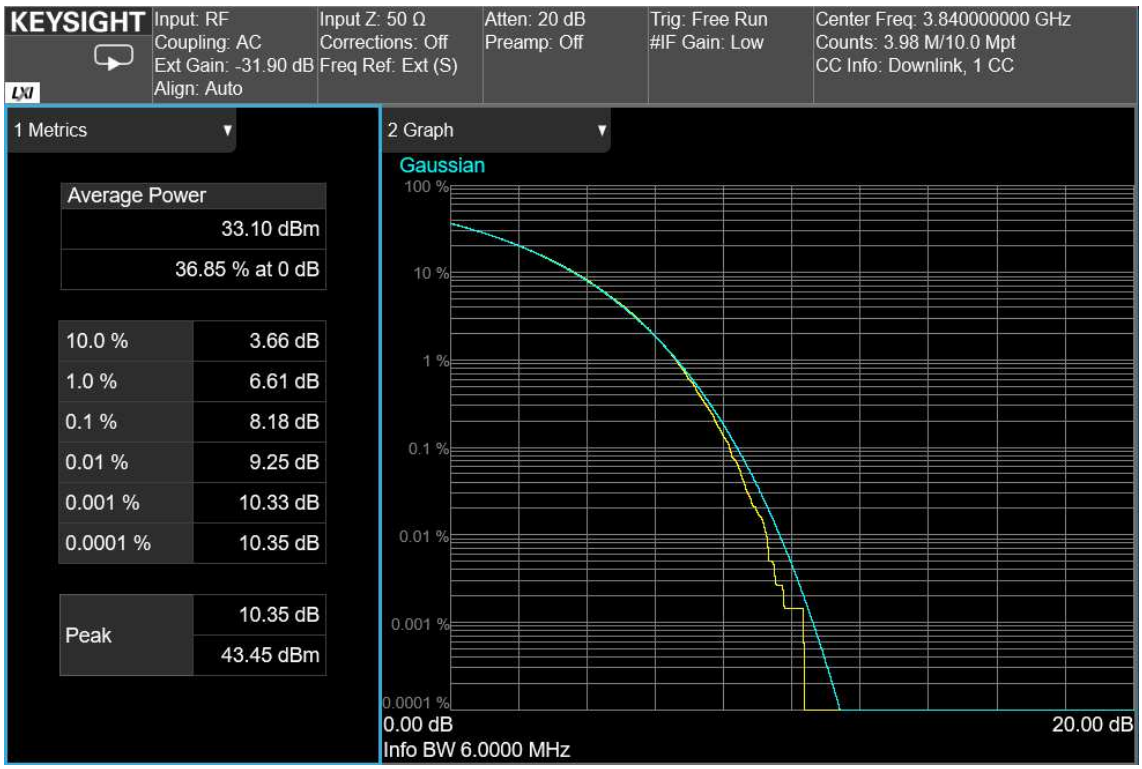
5 MHz signal, middle channel, nominal input signal



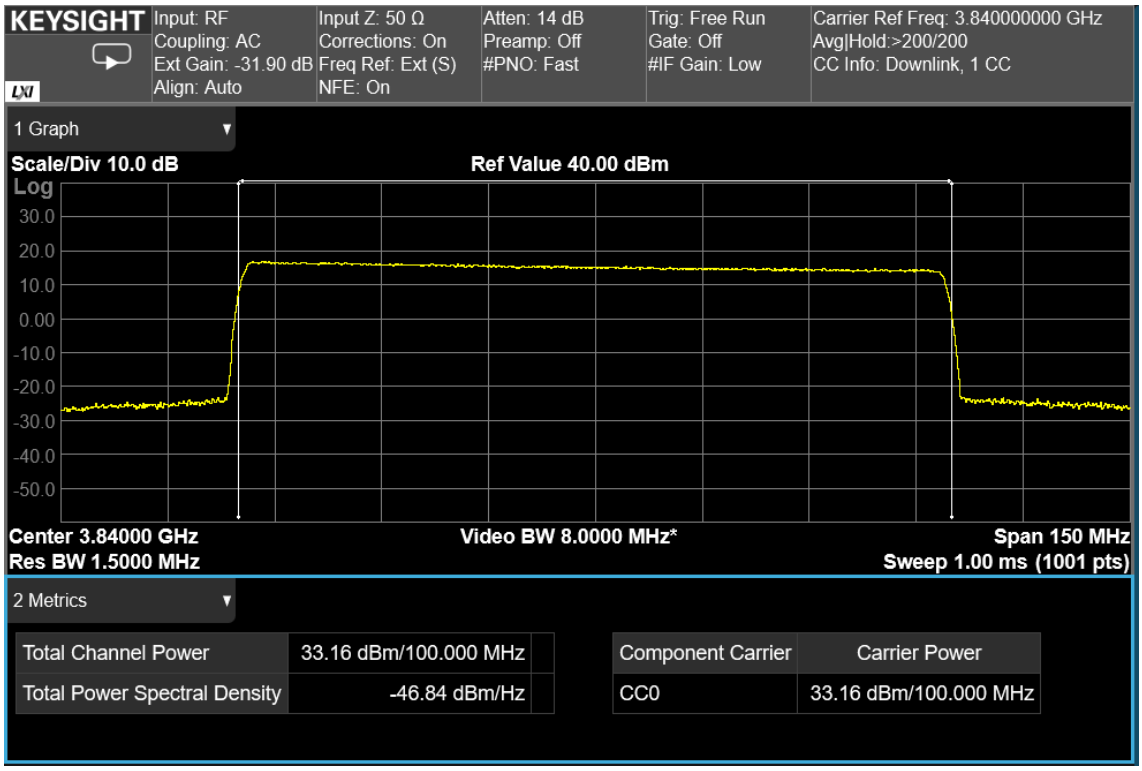


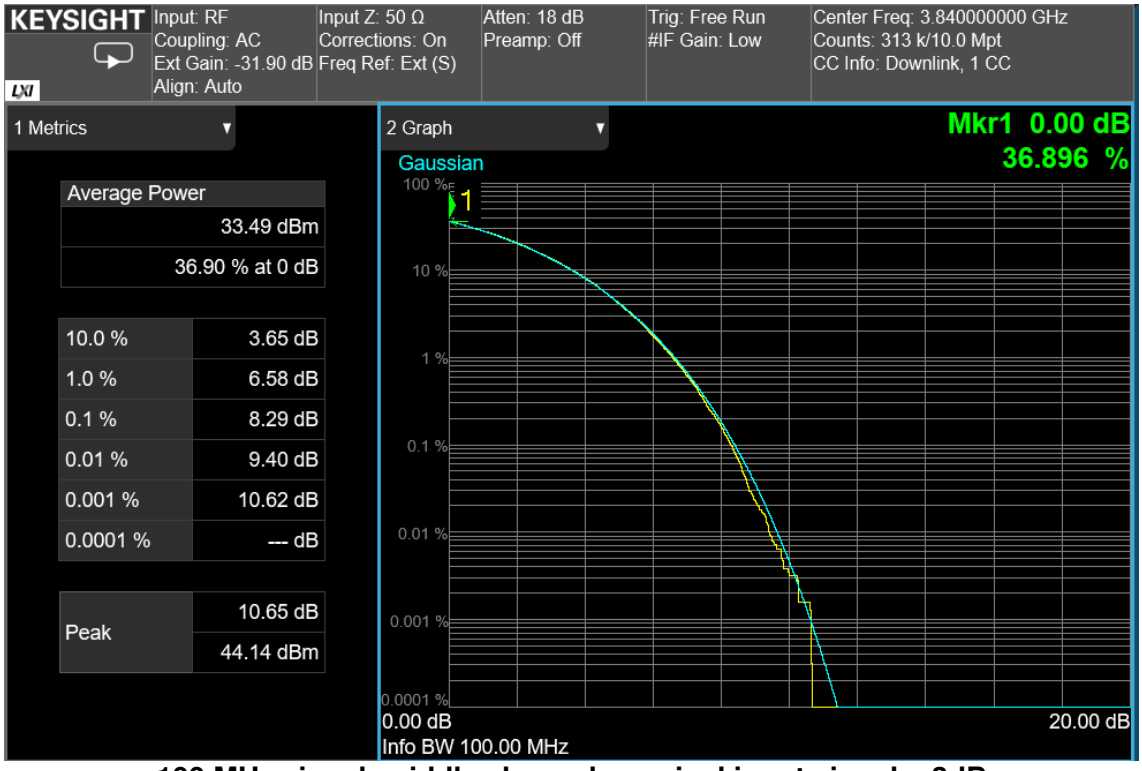
100 MHz signal, middle channel, nominal input signal





5 MHz signal, middle channel, nominal input signal + 3dB





100 MHz signal, middle channel, nominal input signal + 3dB

RF PORT 2

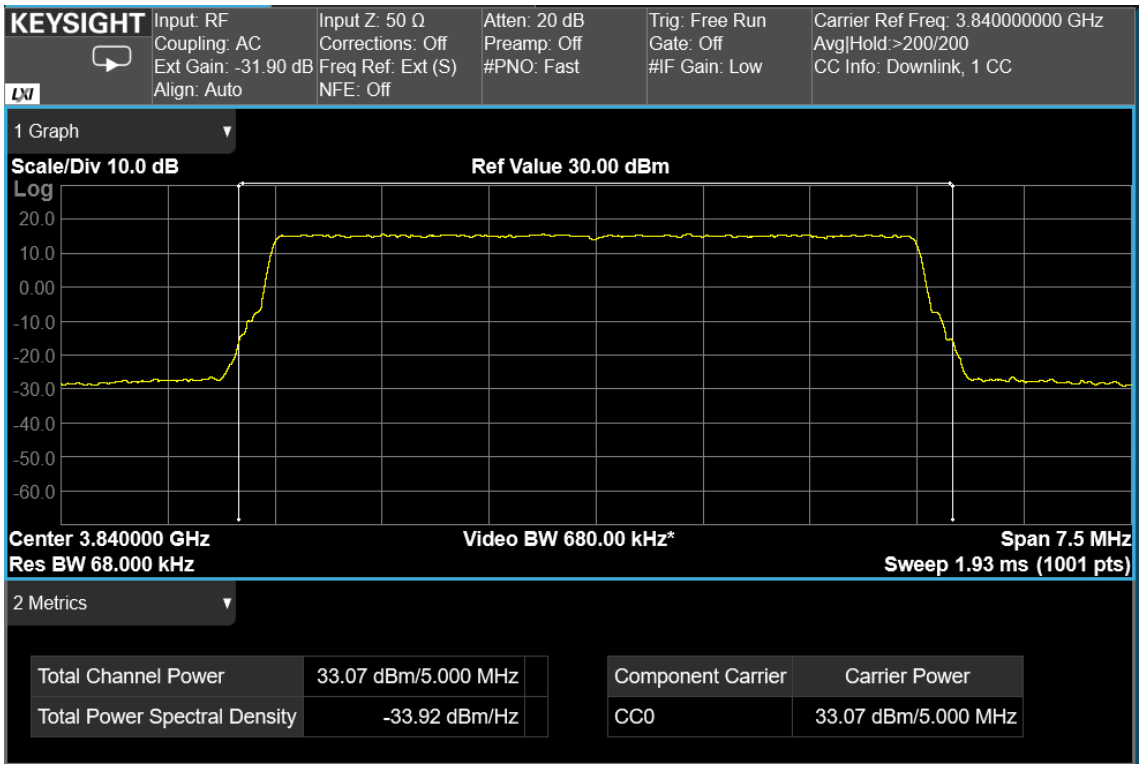
AWGN signal, nominal input signal

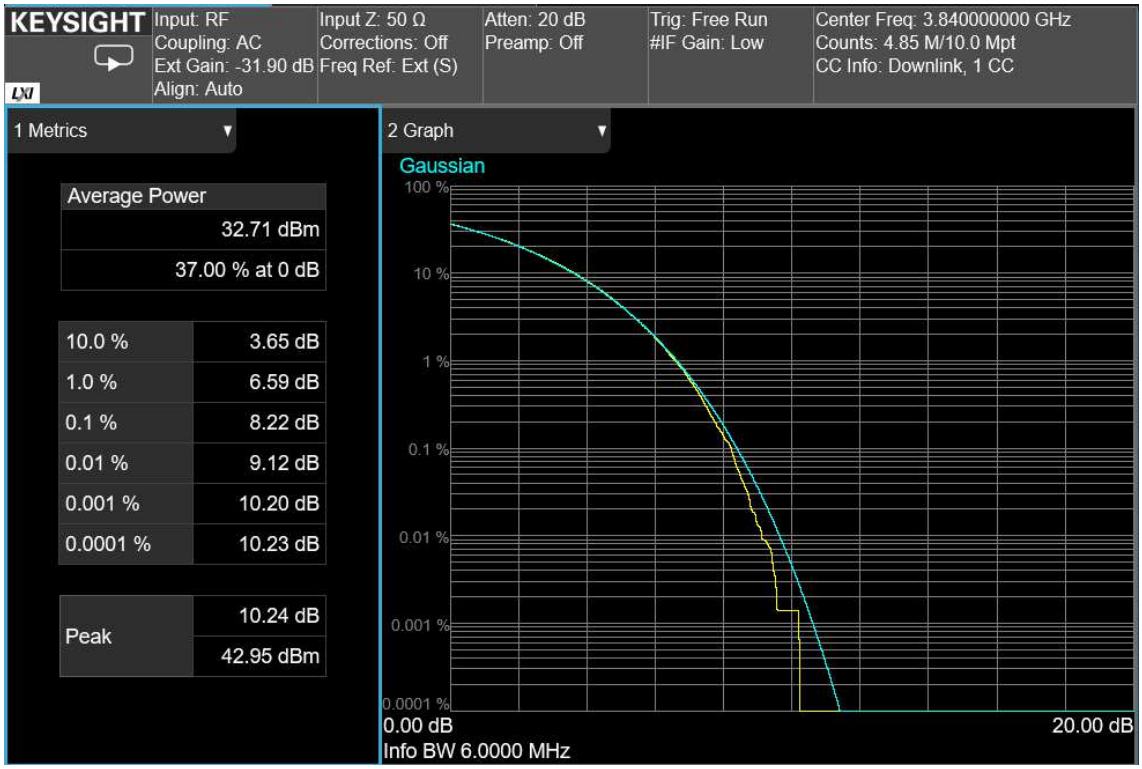
Test data						
Direction	Modulation	Frequency (MHz)	RF output Power (dBm)	RF output channel Power (W)	RF output Power (W/MHz)	PAR (dB)
Down-link	5G NR, 5 MHz	3840.0	33.1	2.0	0.4	10.2
Down-link	5G NR, 100 MHz	3840.0	32.9	2.0	0.4	10.7

AWGN signal, nominal input signal + 3dB

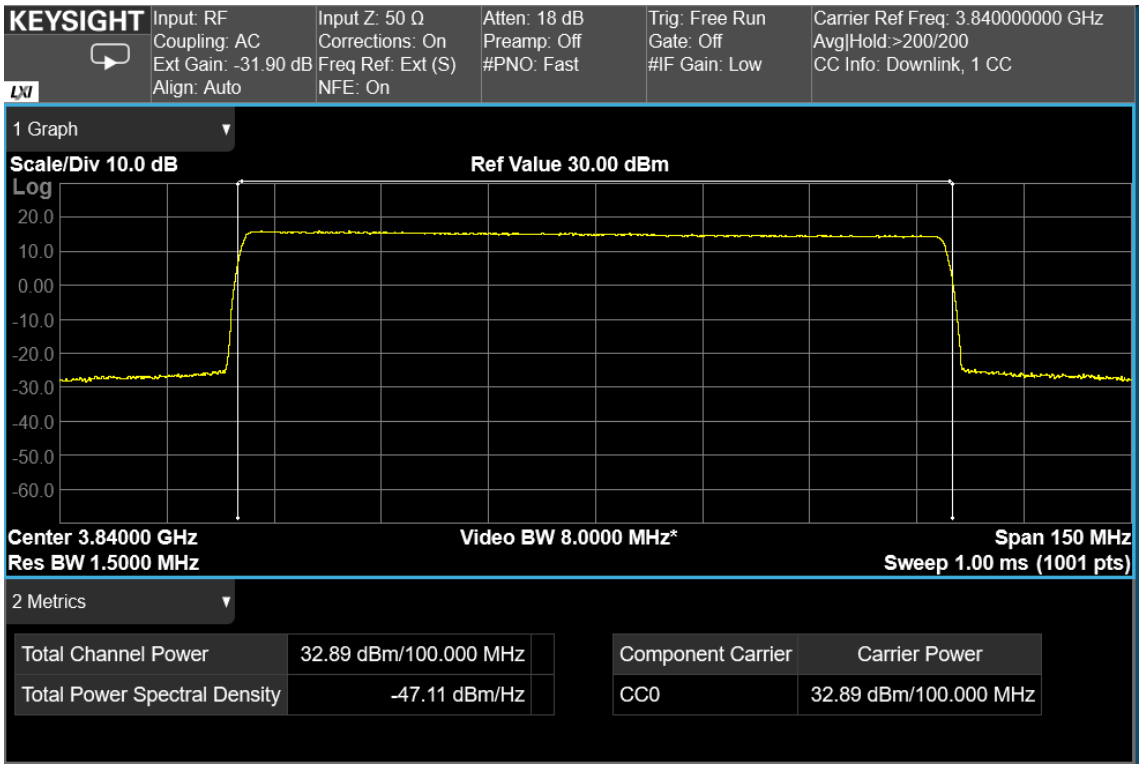
Test data						
Direction	Modulation	Frequency (MHz)	RF output Power (dBm)	RF output channel Power (W)	RF output Power (W/MHz)	PAR (dB)
Down-link	5G NR, 5 MHz	3840.0	33.3	2.2	0.4	10.2
Down-link	5G NR, 100 MHz	3840.0	33.1	2.0	0.4	10.7

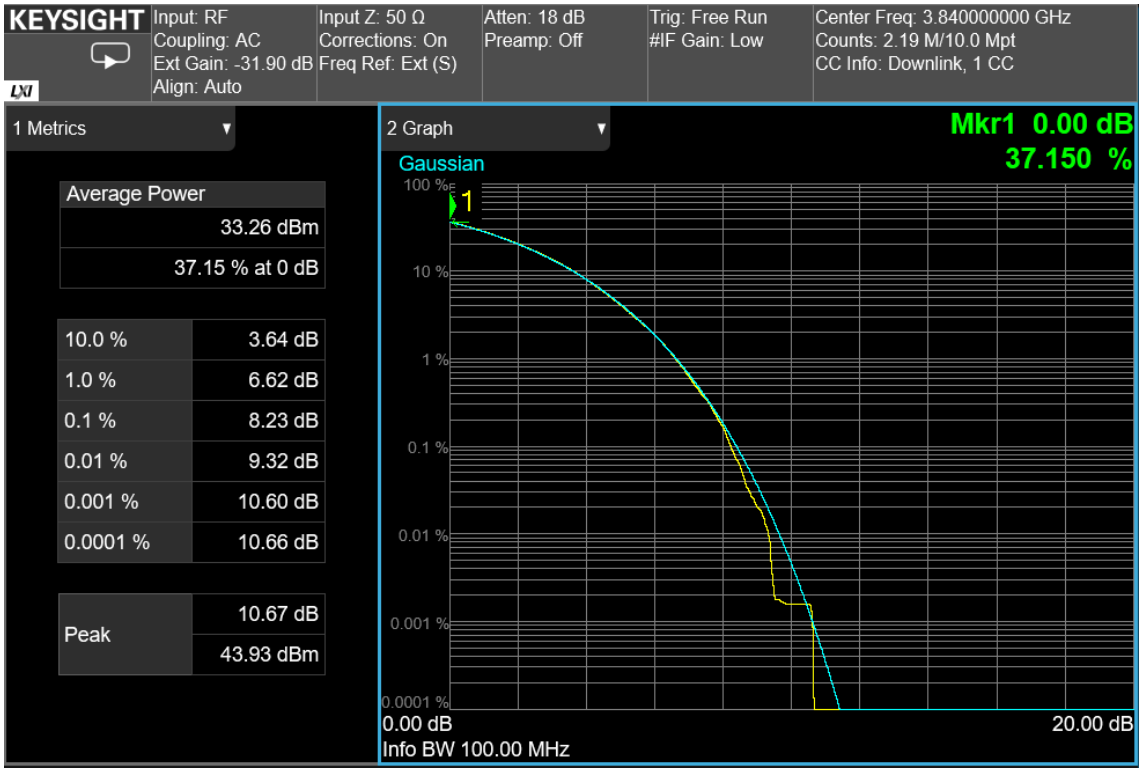
Note: PAR measure is performed by the “CCDF” function installed on Spectrum analyzer that provides average power (the same measured with “Channel power” function), peak power and PAR.



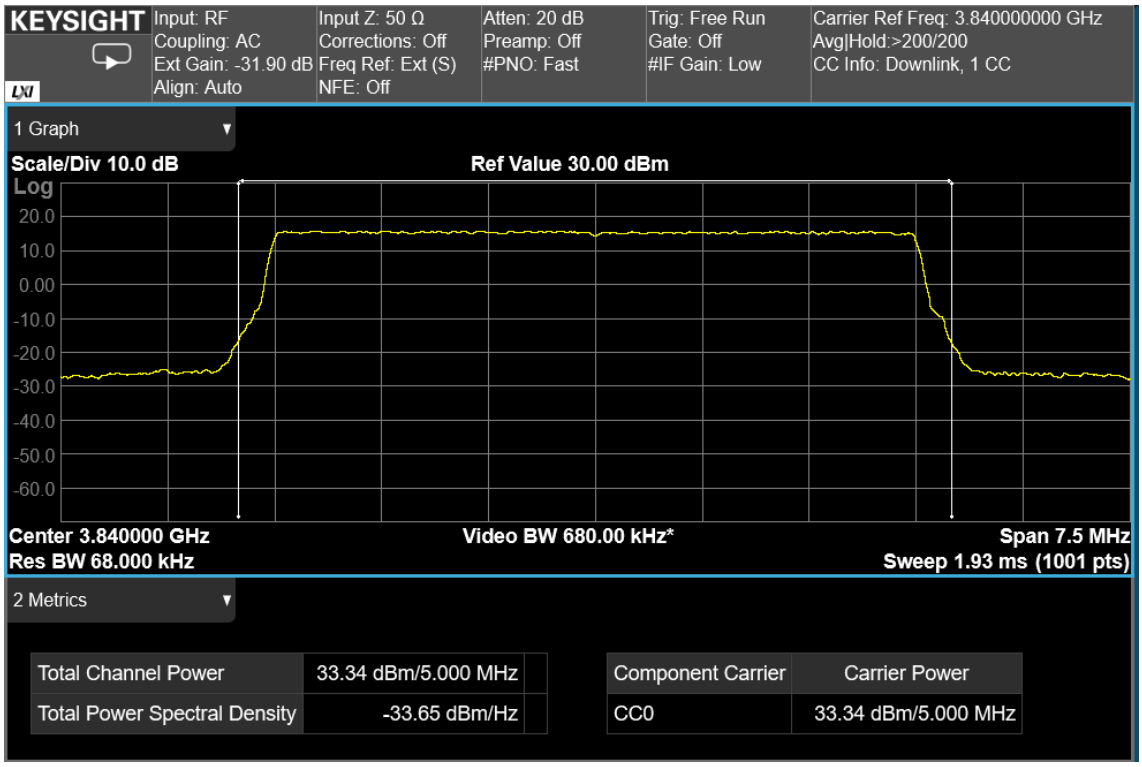


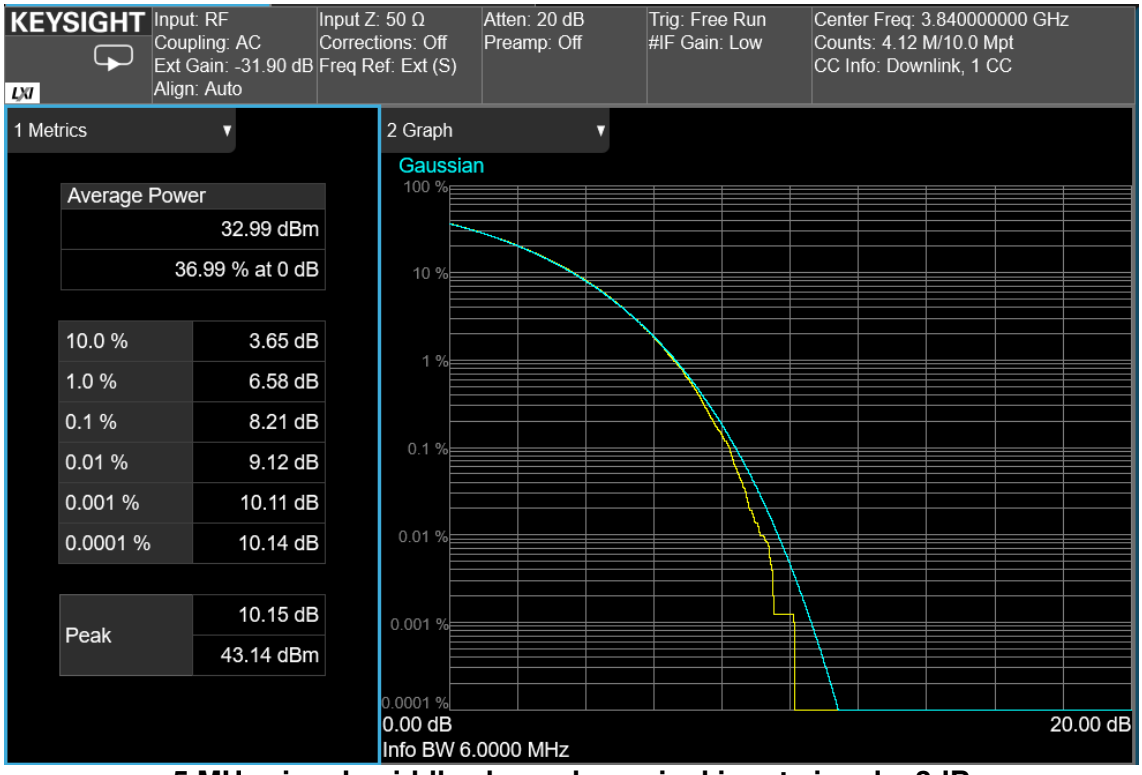
5 MHz signal, middle channel, nominal input signal



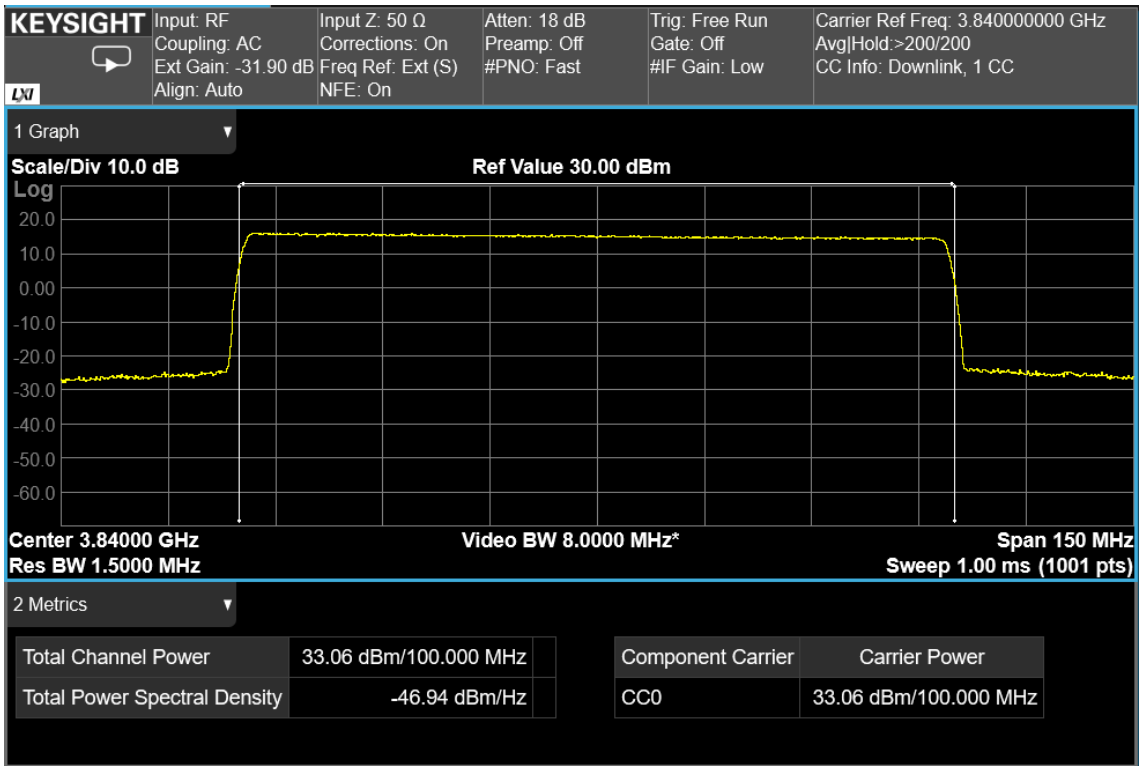


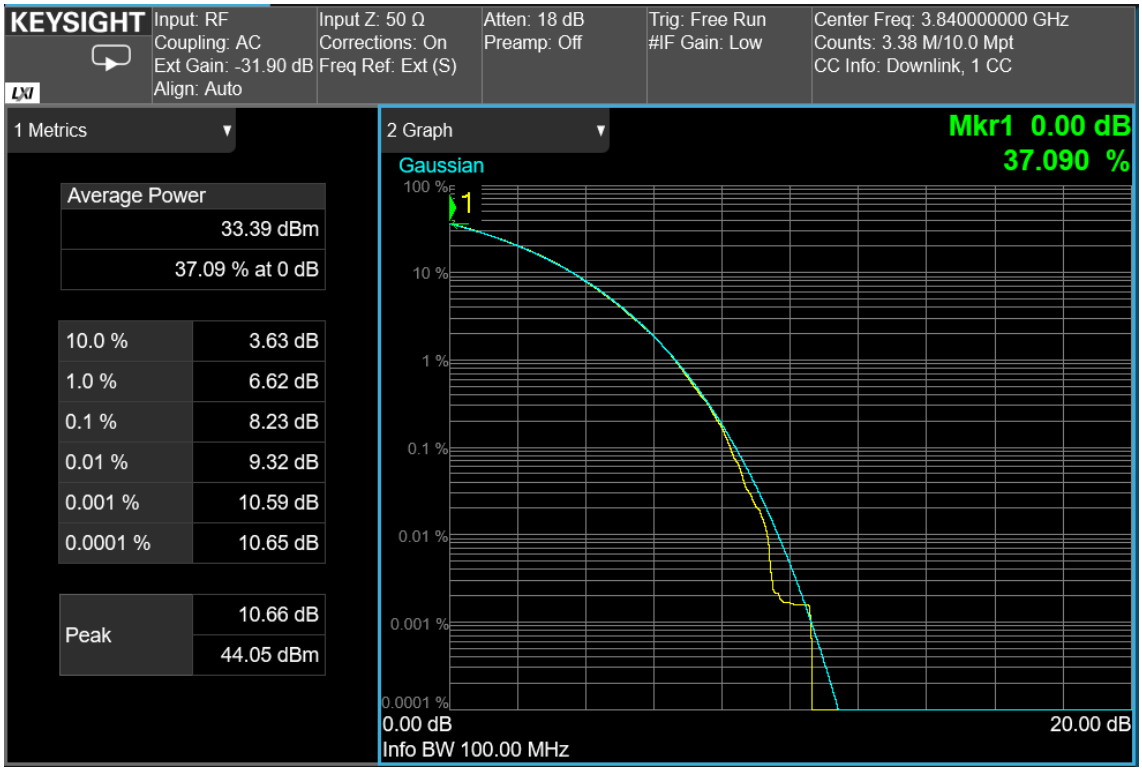
100 MHz signal, middle channel, nominal input signal





5 MHz signal, middle channel, nominal input signal + 3dB





100 MHz signal, middle channel, nominal input signal + 3dB

Clause 27.53(l) Spurious emissions at RF antenna connector

(l) 3.7 GHz Service. The following emission limits apply to stations transmitting in the3700-3980 MHz band:

(1) For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed –13 dBm/MHz. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test date: 2021-09-01 to 2021-09-17

Test results: Pass

Special notes

- Broadband amplifiers: AWGN test signal used (5 MHz and 100 MHz LTE channel)

Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Vector Signal Generator	Keysight	N5172B EXG	MY57280565	2023-12
Vector Signal Generator	Keysight	N5172B EXG	MY57280574	2023-12
Spectrum Analyzer	Keysight	N9030B PXA	MY57142793	2021-12
Combiner	Miczen	MZP200506GA (0.5-6 GHz)	210314001	COU

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
(*) Equipment supplied by manufacturer's

Test data			
See Plots below			
Spurious emissions measurement results:			
Frequency (MHz)	Spurious emission (dBm)	Limit (dBm)	Margin (dB)
Low channel			
Bottom channel	Negligible	-13	
Mid channel			
Middle channel	Negligible	-13	
High channel			
Last channel	Negligible	-13	

MIMO consideration

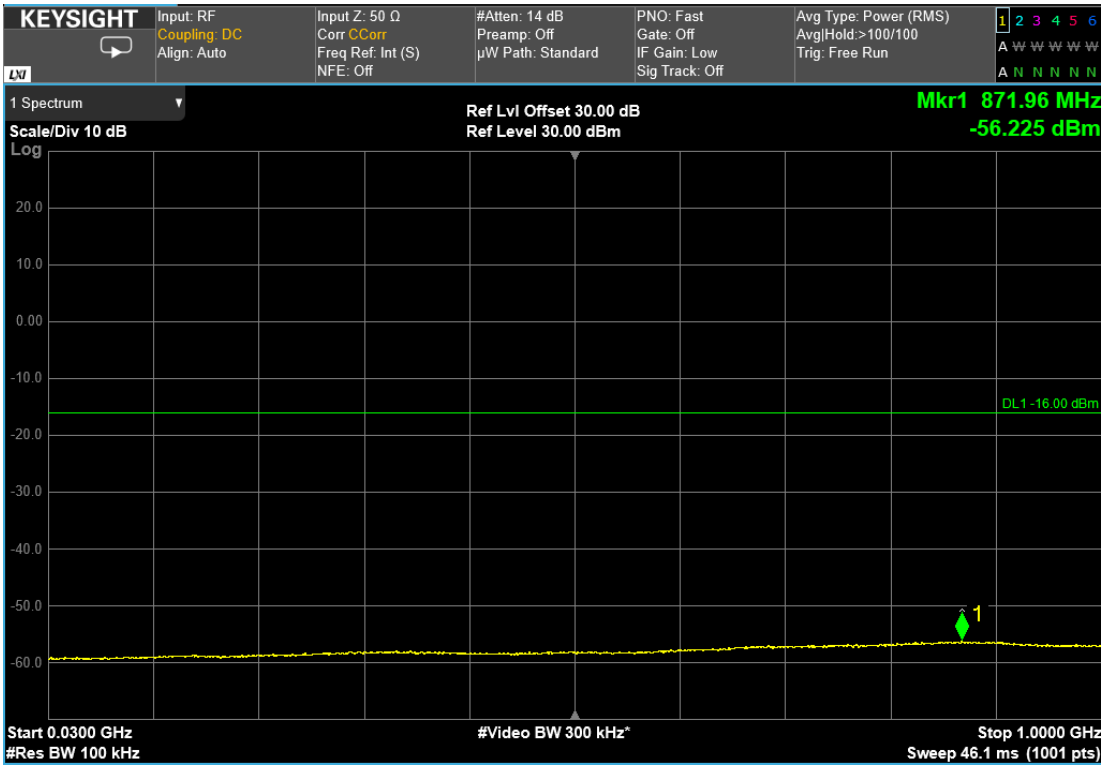
The EUT has two MIMO RF Port, so it's possible manage two MIMO RF paths.
If EUT is used in MIMO configuration according to KDB 662911-D01 v02r01 and 662911-D02 v01 with signals completely uncorrelated, the maximum emission is calculated as follows:

- MIMO Maximum Emission = Emission at each path + 10log(Nant) dB =
  = Emission at each path + 10log(2) = Emission at each path + 3dB

- Spurious emission are negligible.

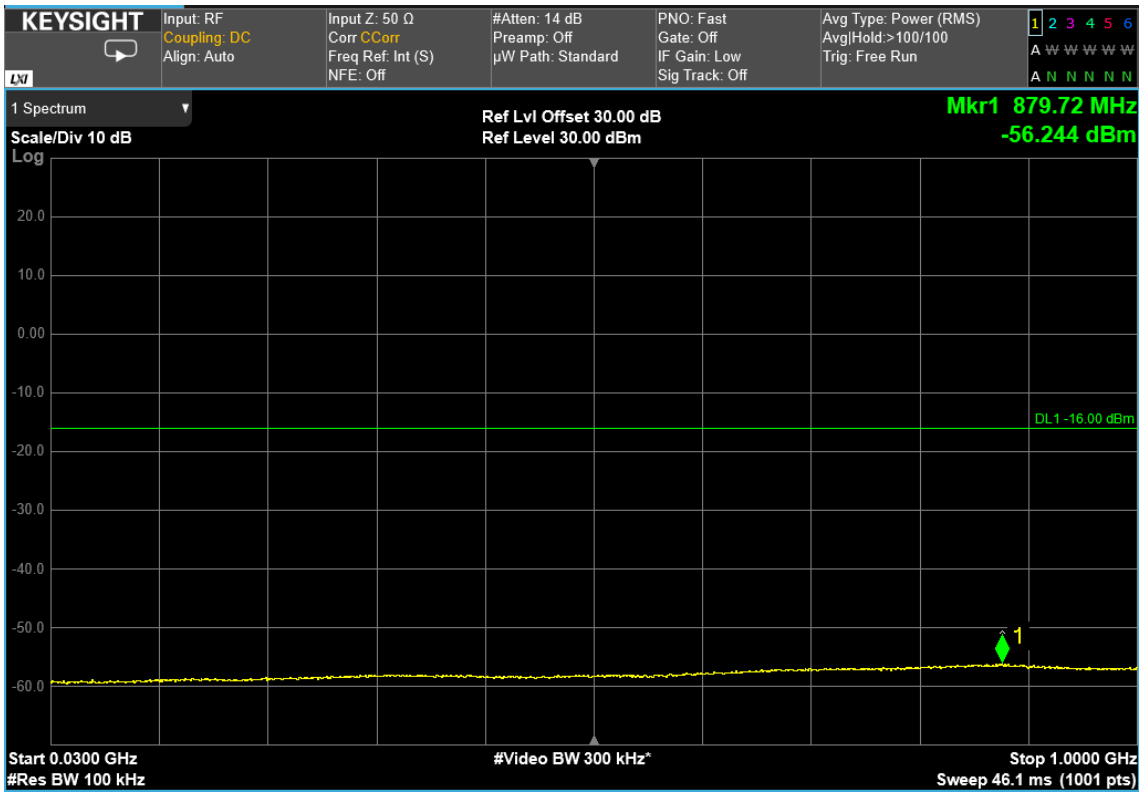
Test data, continued: spurious emissions at antenna terminal

RF PORT 1

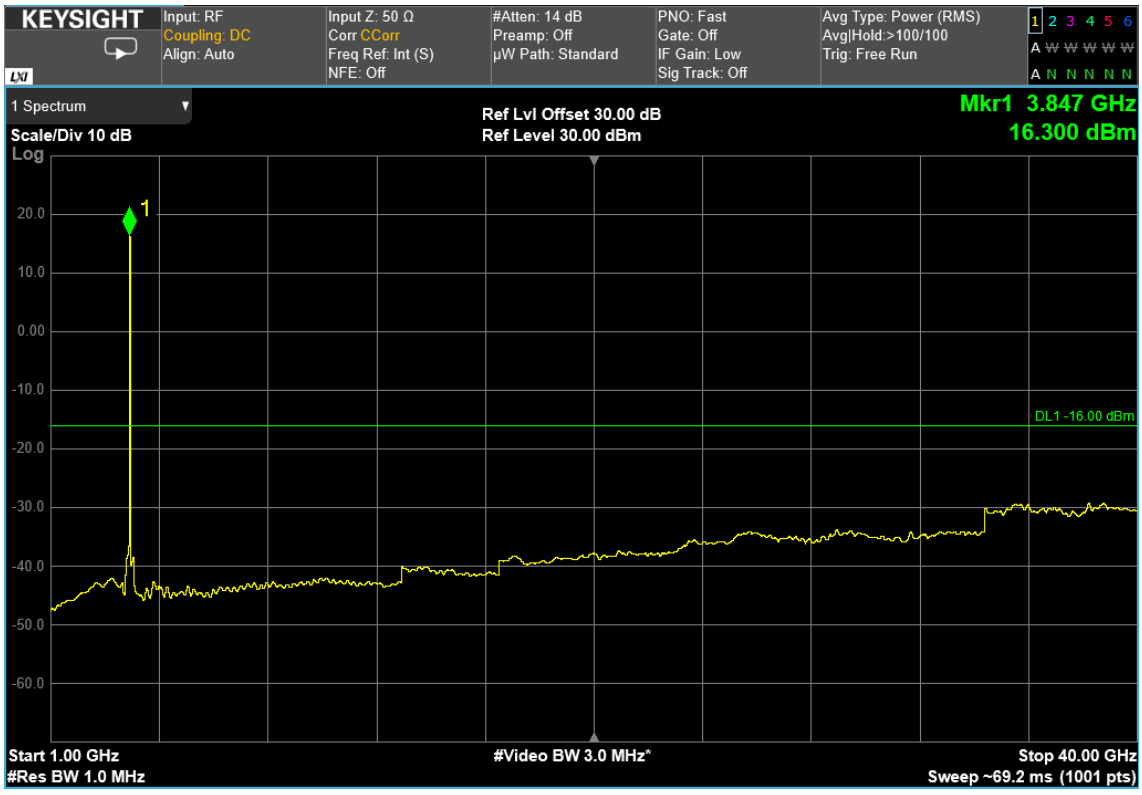


5 MHz signal, bottom channel, 30Mhz – 1GHz

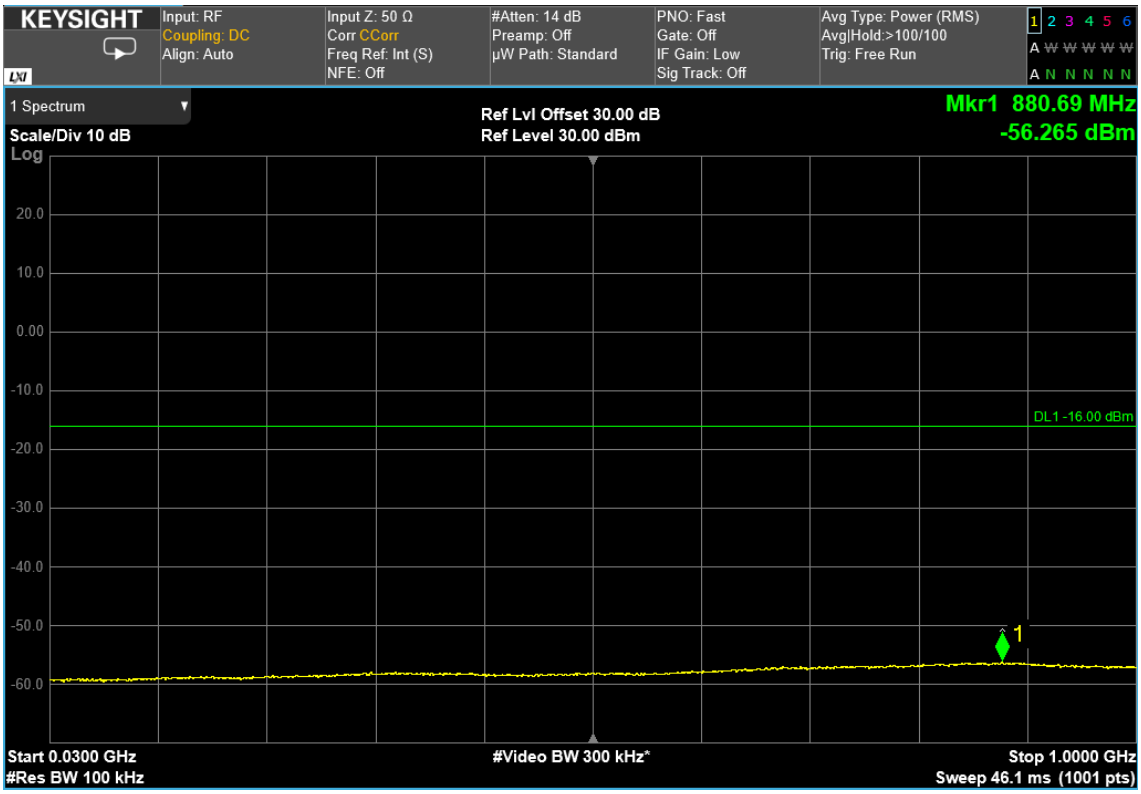
5 MHz signal, bottom channel, 1GHz – 40GHz



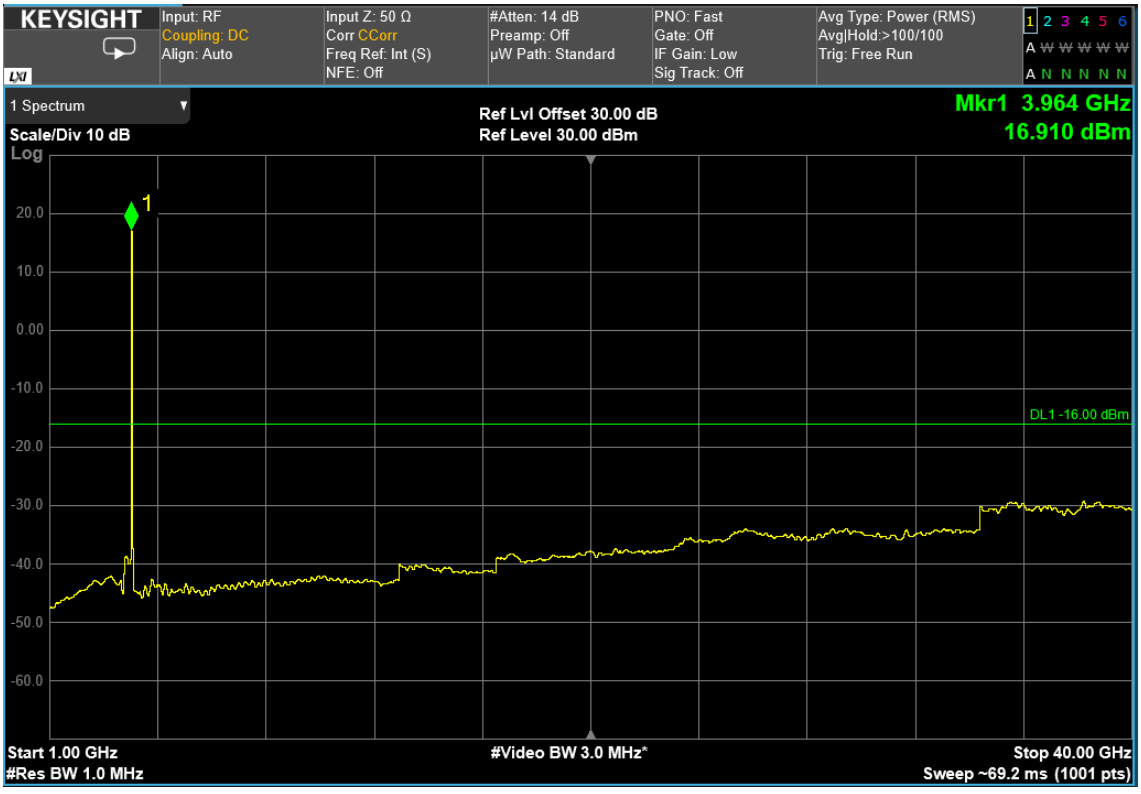
5 MHz signal, middle channel, 30Mhz – 1GHz



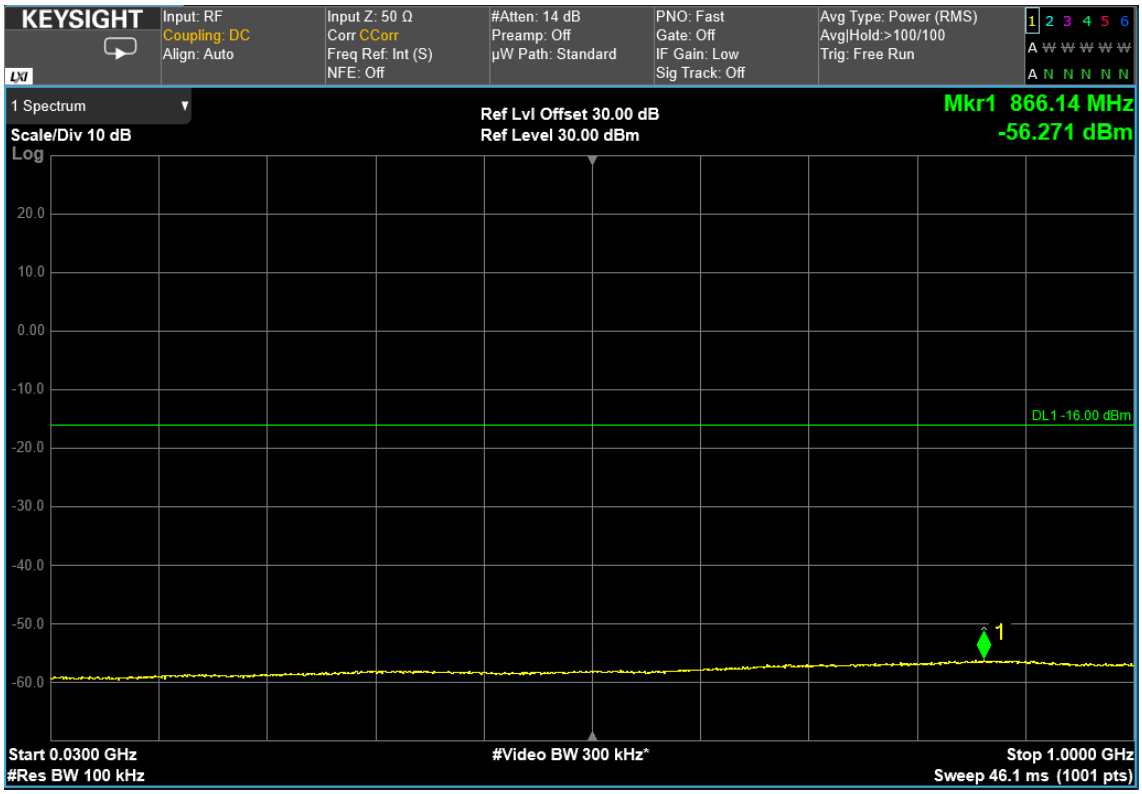
5 MHz signal, middle channel, 1GHz – 40GHz



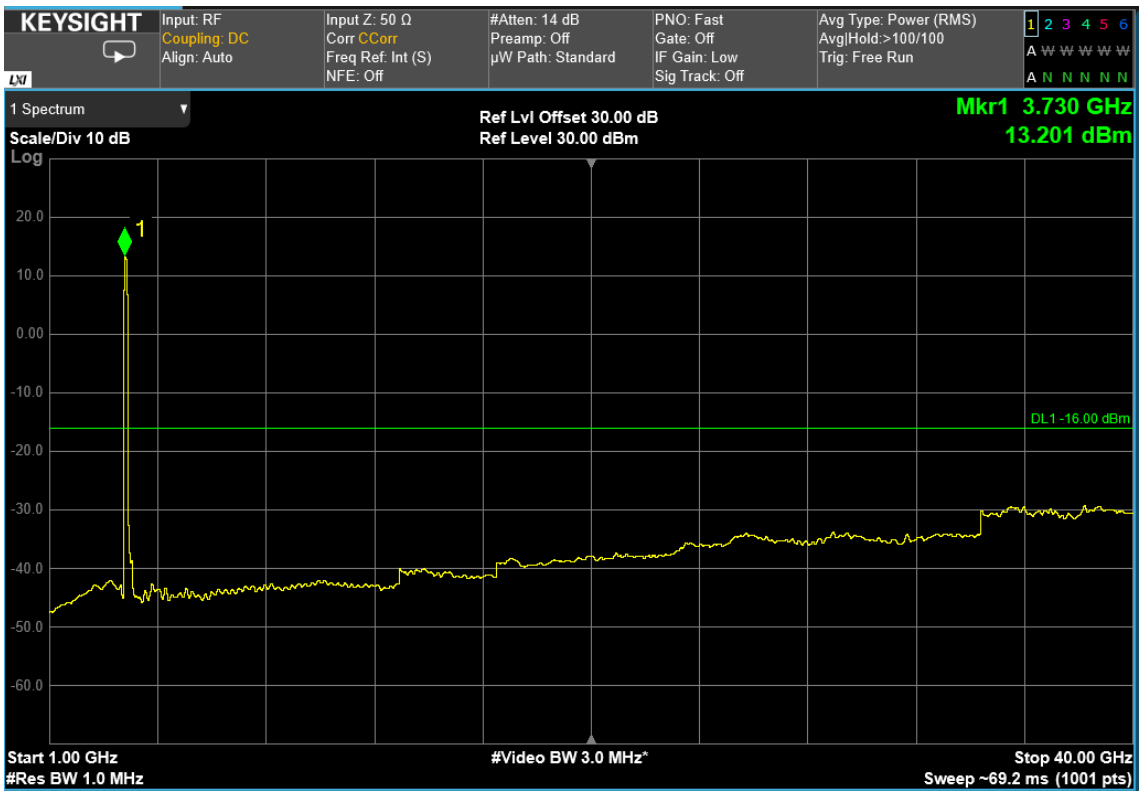
5 MHz signal, top channel, 30Mhz – 1GHz



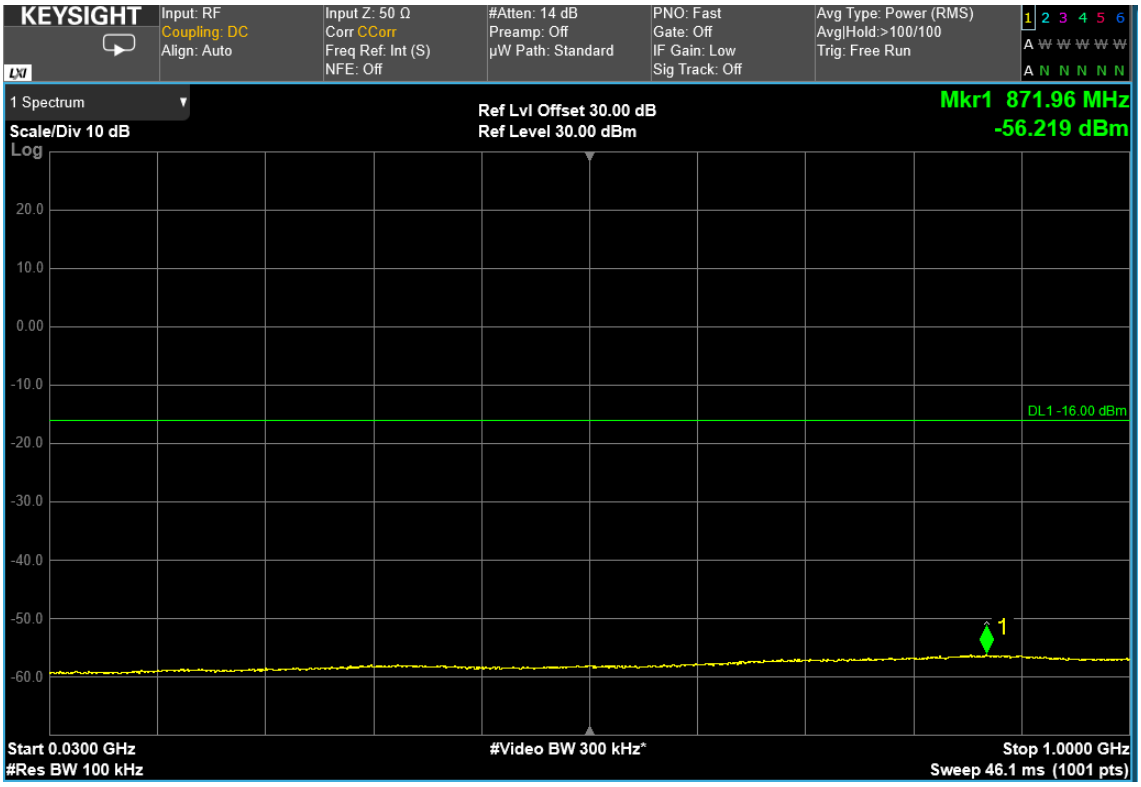
5 MHz signal, top channel, 1GHz – 40GHz



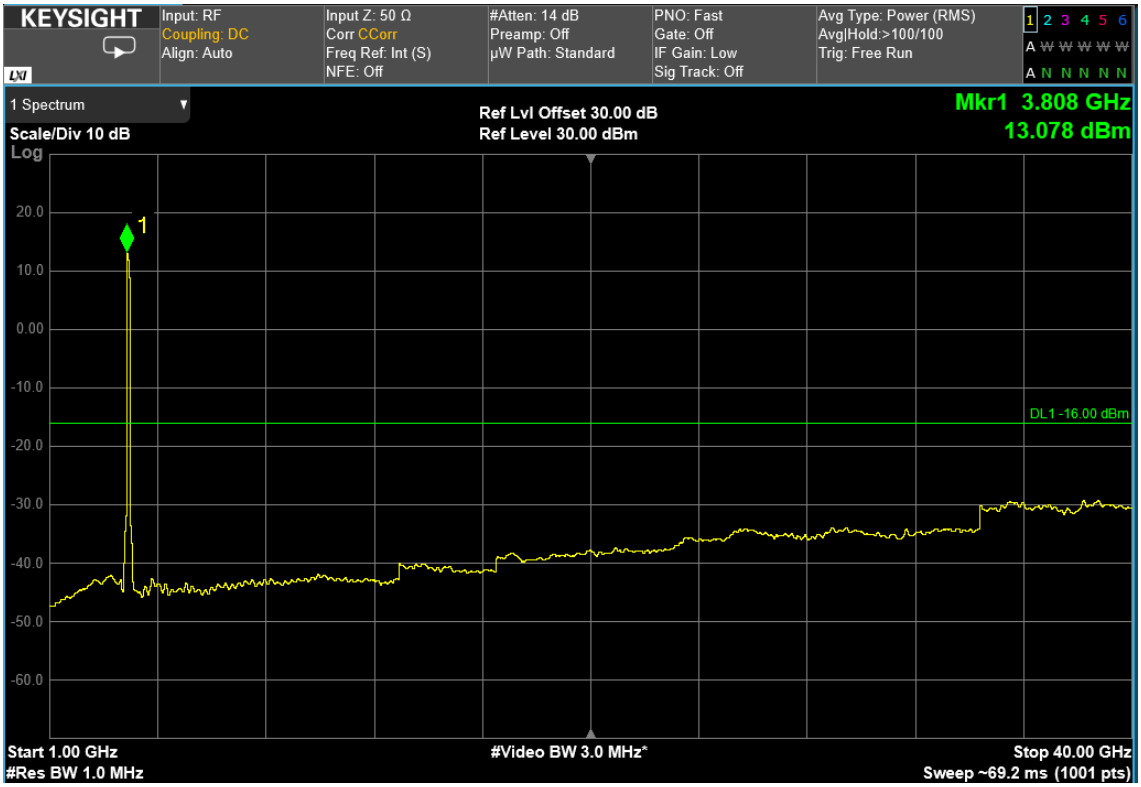
100 MHz signal, bottom channel, 30Mhz – 1GHz



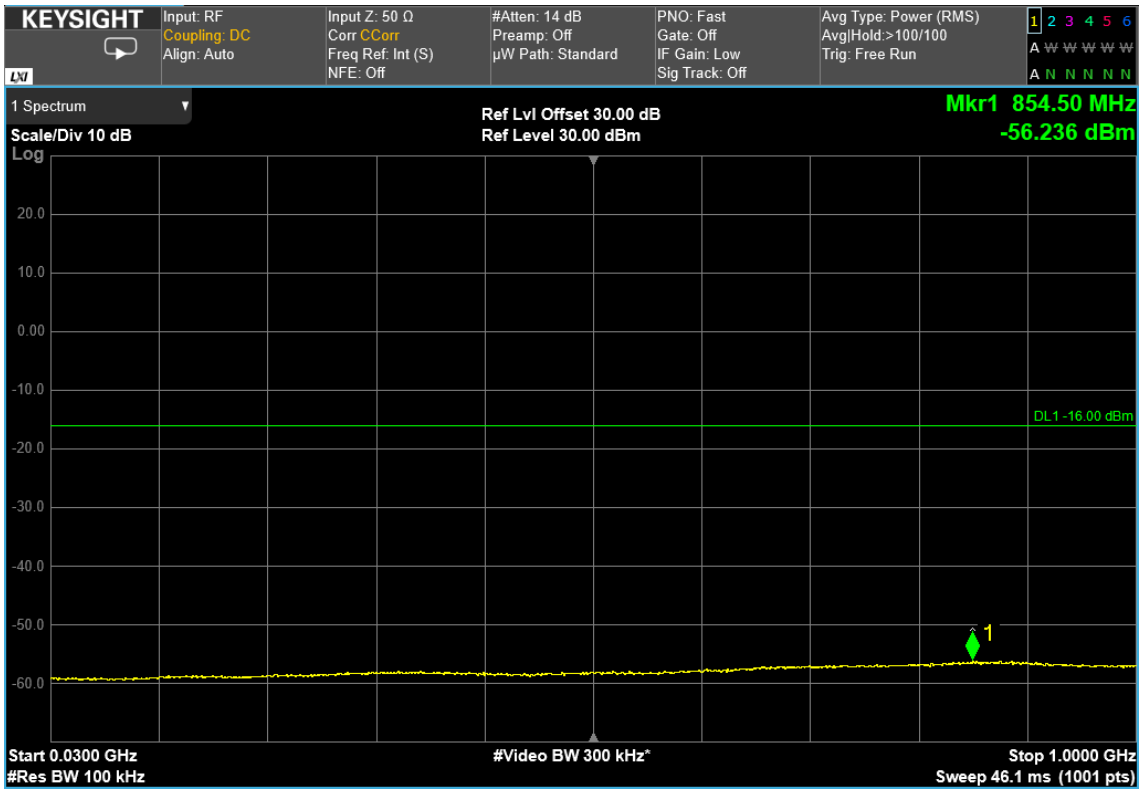
100 MHz signal, bottom channel, 1GHz – 40GHz



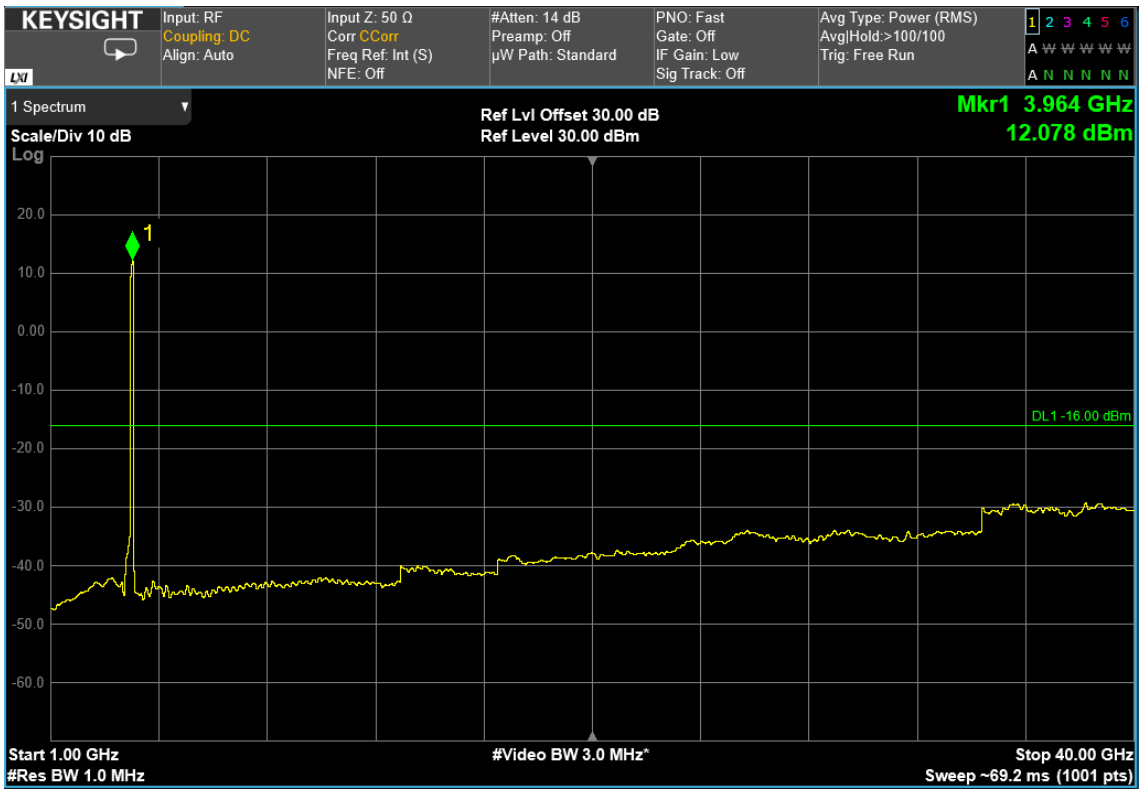
100 MHz signal, middle channel, 30Mhz – 1GHz



100 MHz signal, middle channel, 1GHz – 40GHz

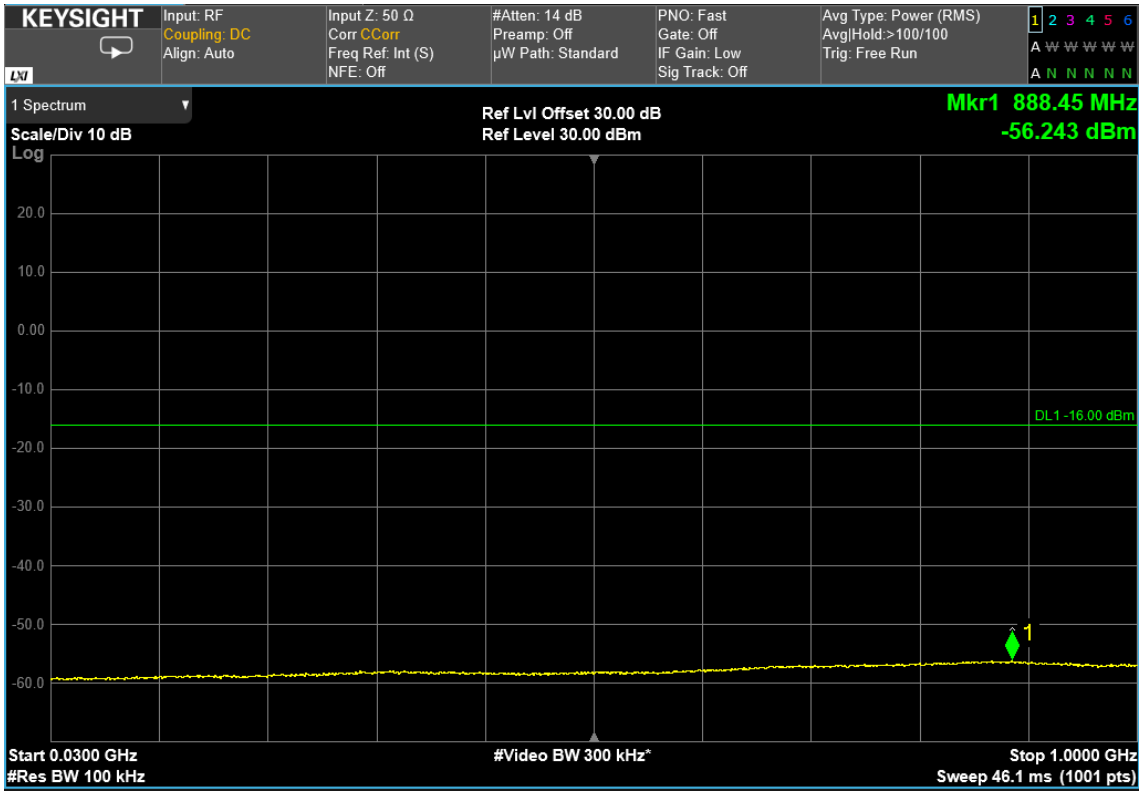


100 MHz signal, top channel, 30Mhz – 1GHz



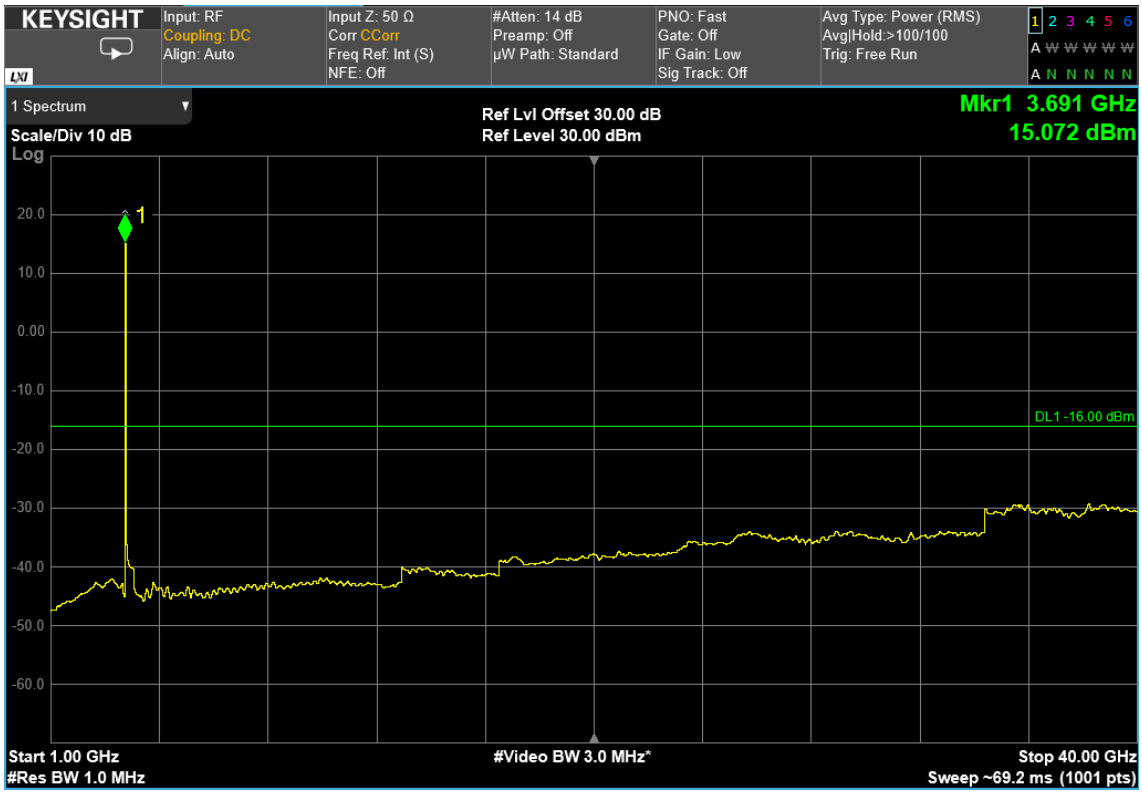
100 MHz signal, top channel, 1GHz – 40GHz

RF PORT 2

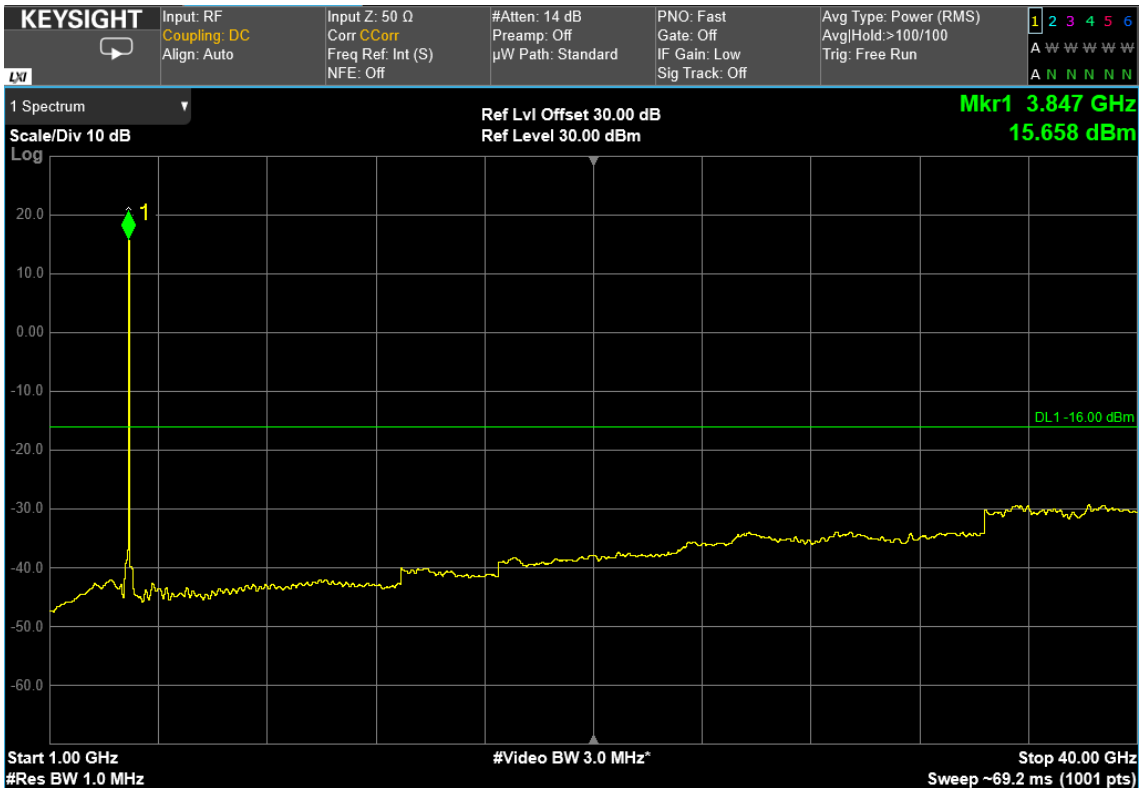


5 MHz signal, bottom channel, 30Mhz – 1GHz

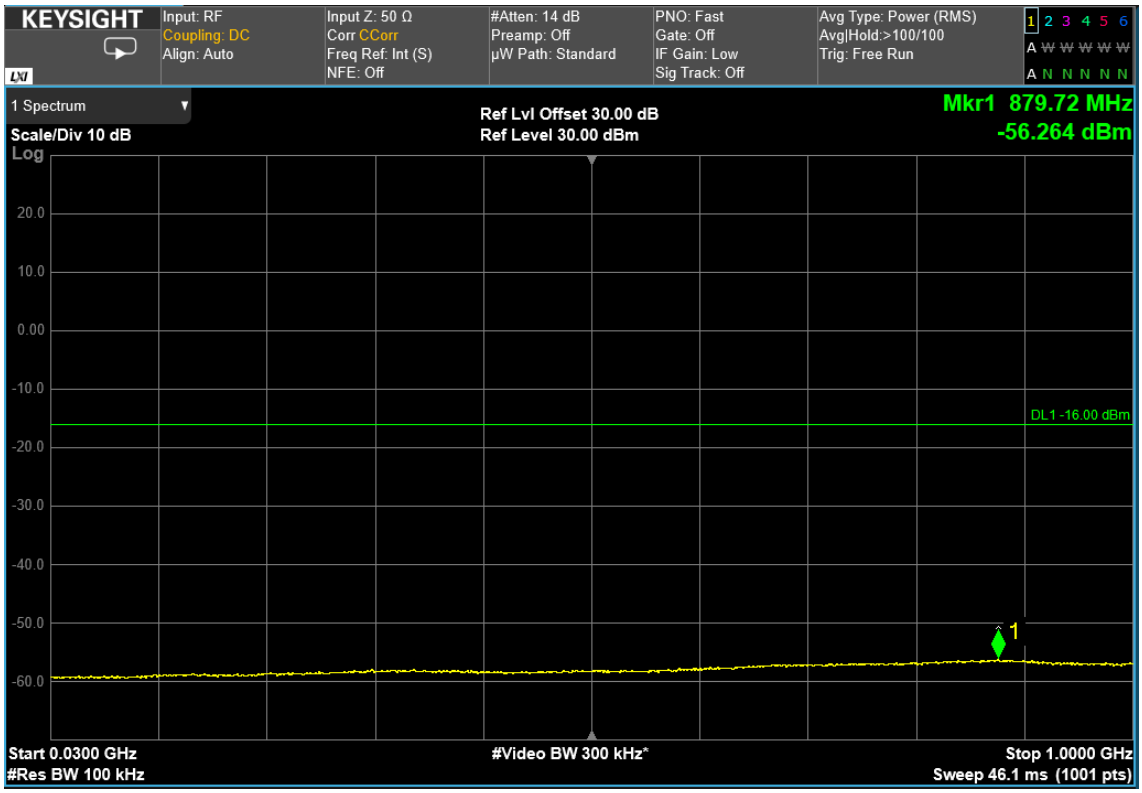
5 MHz signal, bottom channel, 1GHz – 40GHz



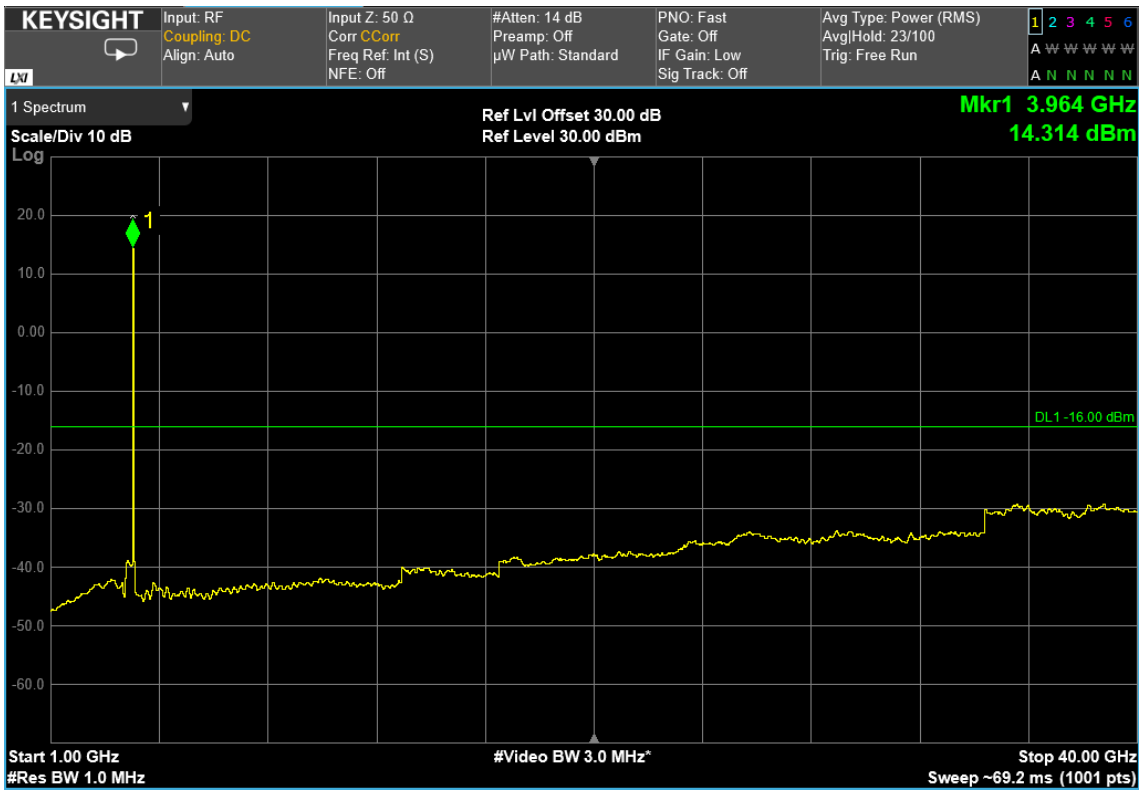
5 MHz signal, middle channel, 30Mhz – 1GHz



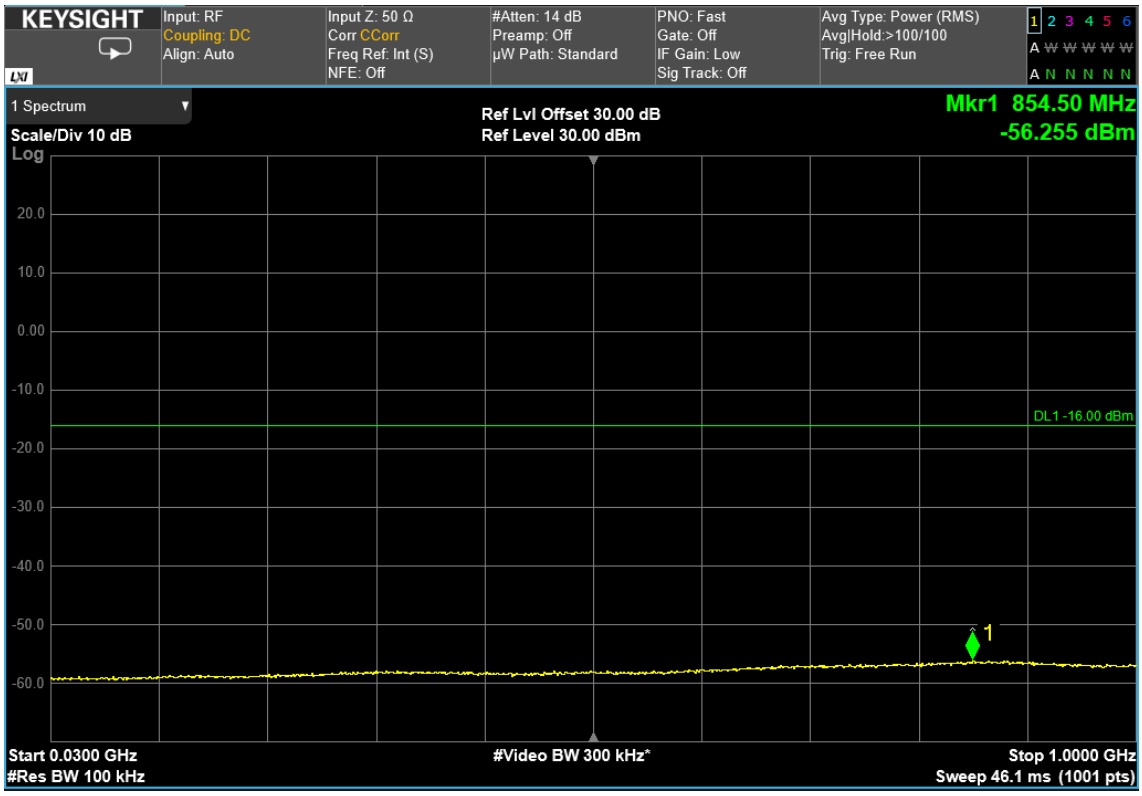
5 MHz signal, middle channel, 1GHz – 40GHz



5 MHz signal, top channel, 30Mhz – 1GHz

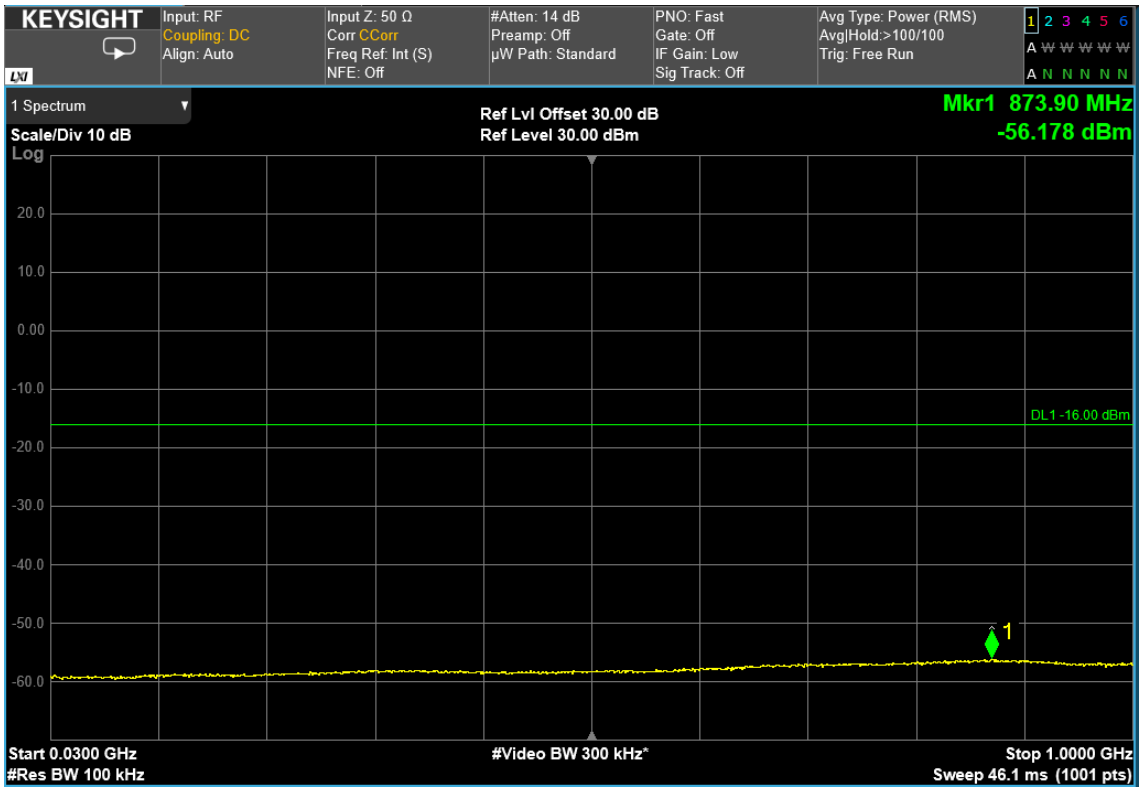


5 MHz signal, top channel, 1GHz – 40GHz

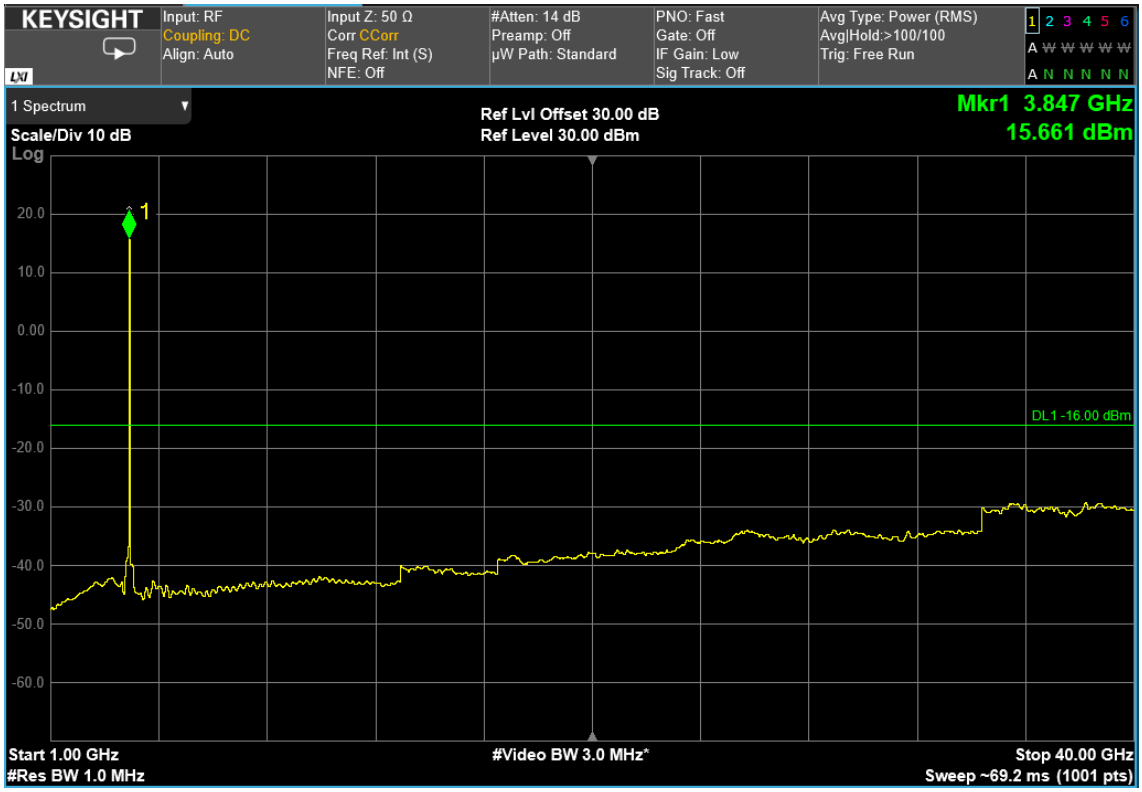


100 MHz signal, bottom channel, 30Mhz – 1GHz

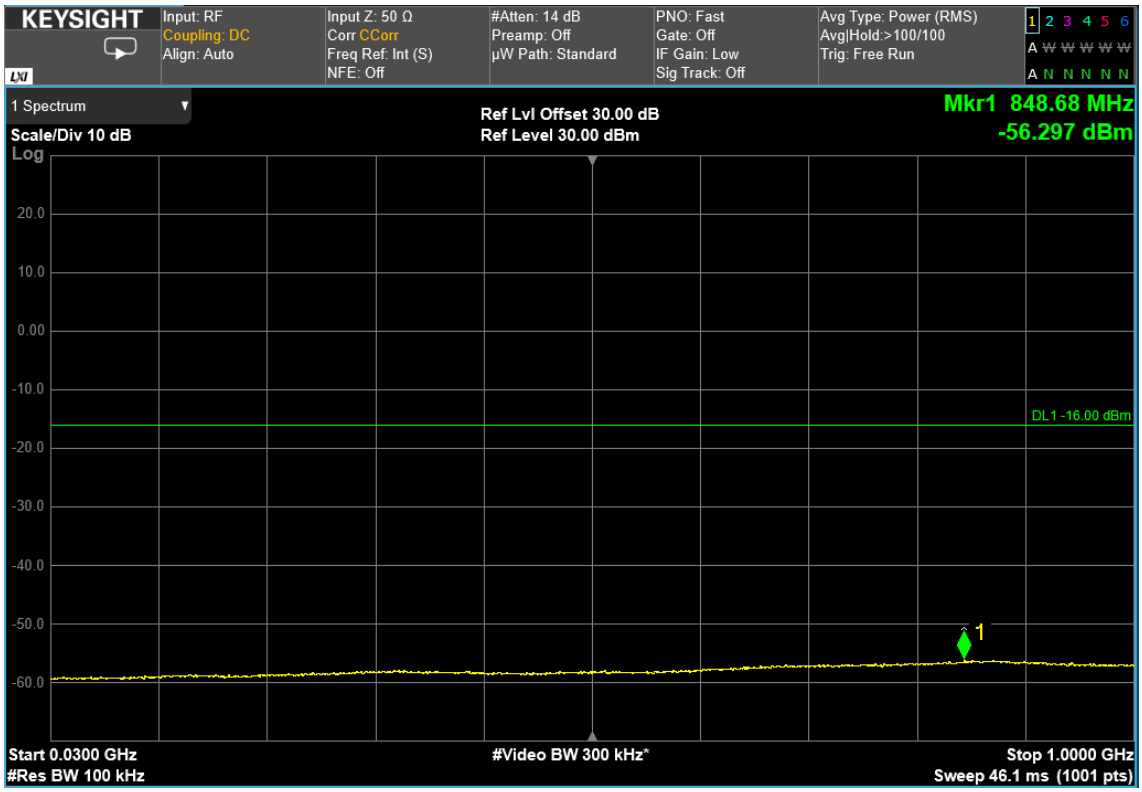
100 MHz signal, bottom channel, 1GHz – 40GHz



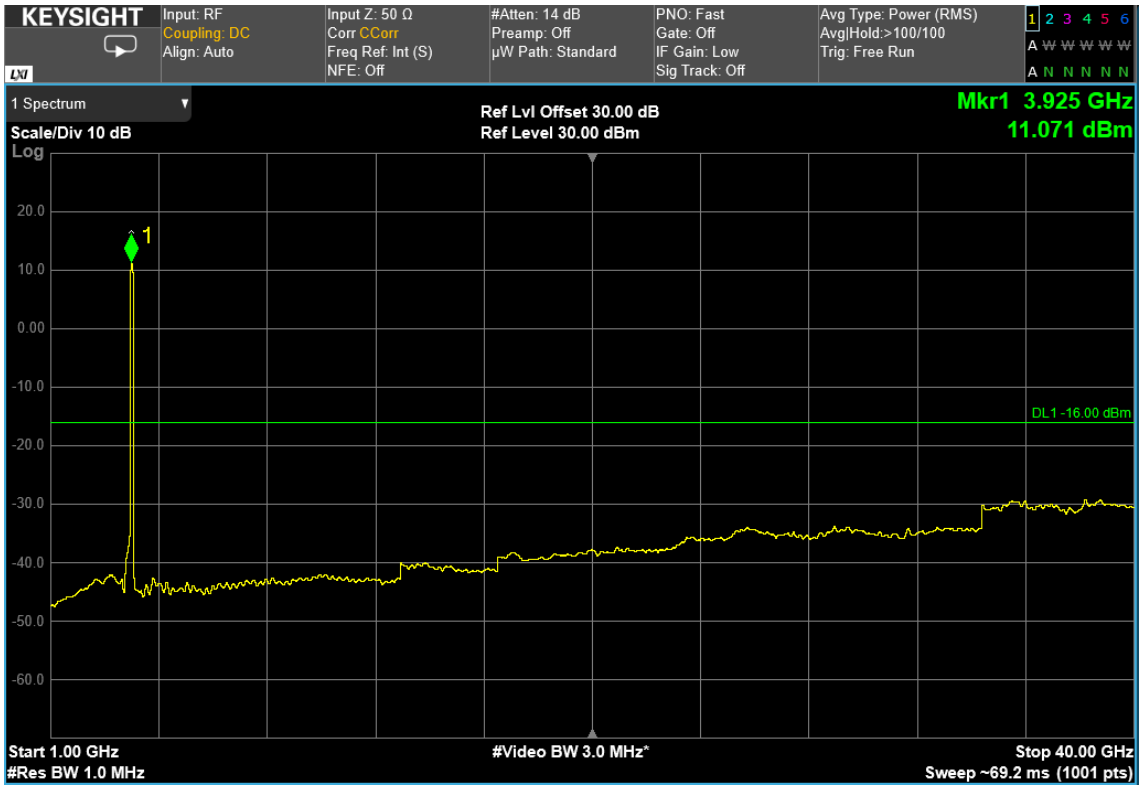
100 MHz signal, middle channel, 30Mhz – 1GHz



100 MHz signal, middle channel, 1GHz – 40GHz



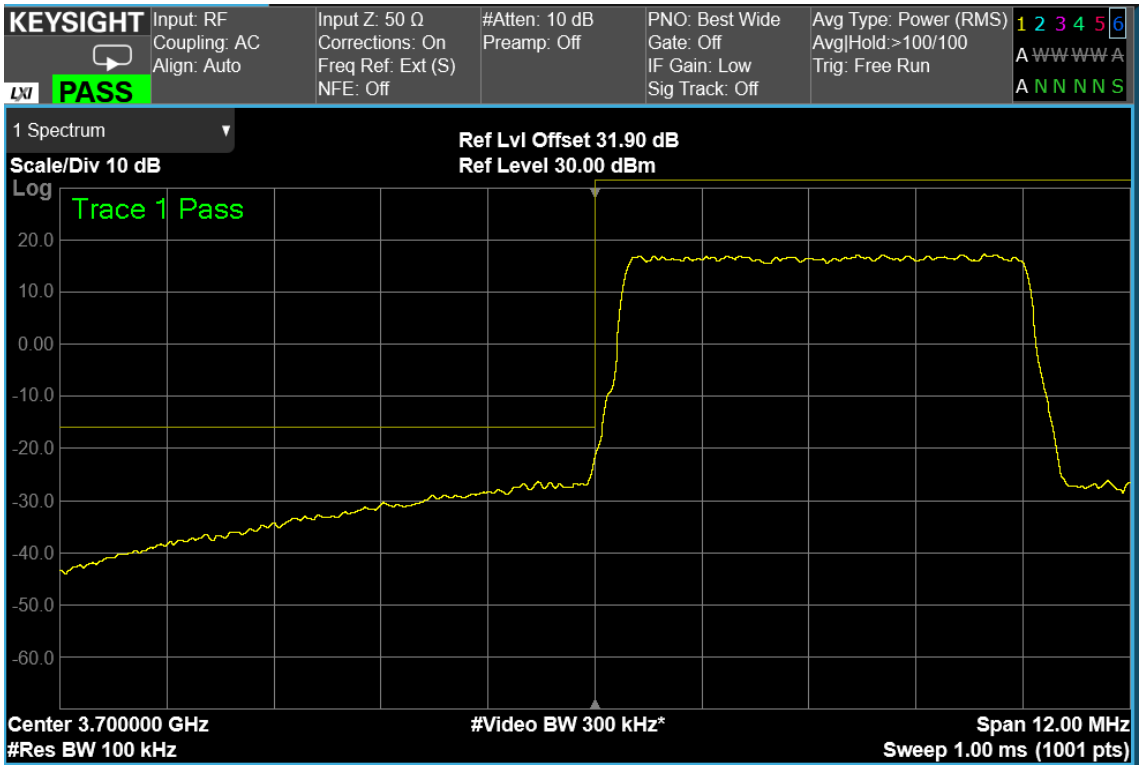
100 MHz signal, top channel, 30Mhz – 1GHz



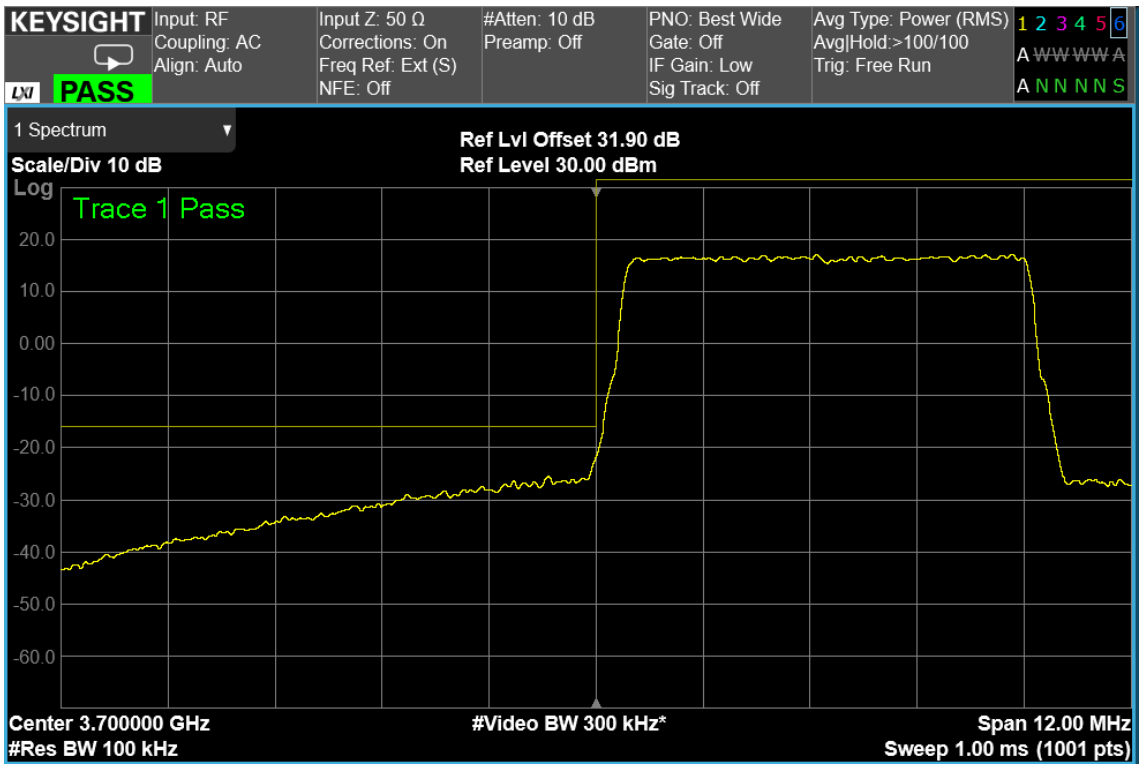
100 MHz signal, top channel, 1GHz – 40GHz

Test data, continued: band edges Inter modulation

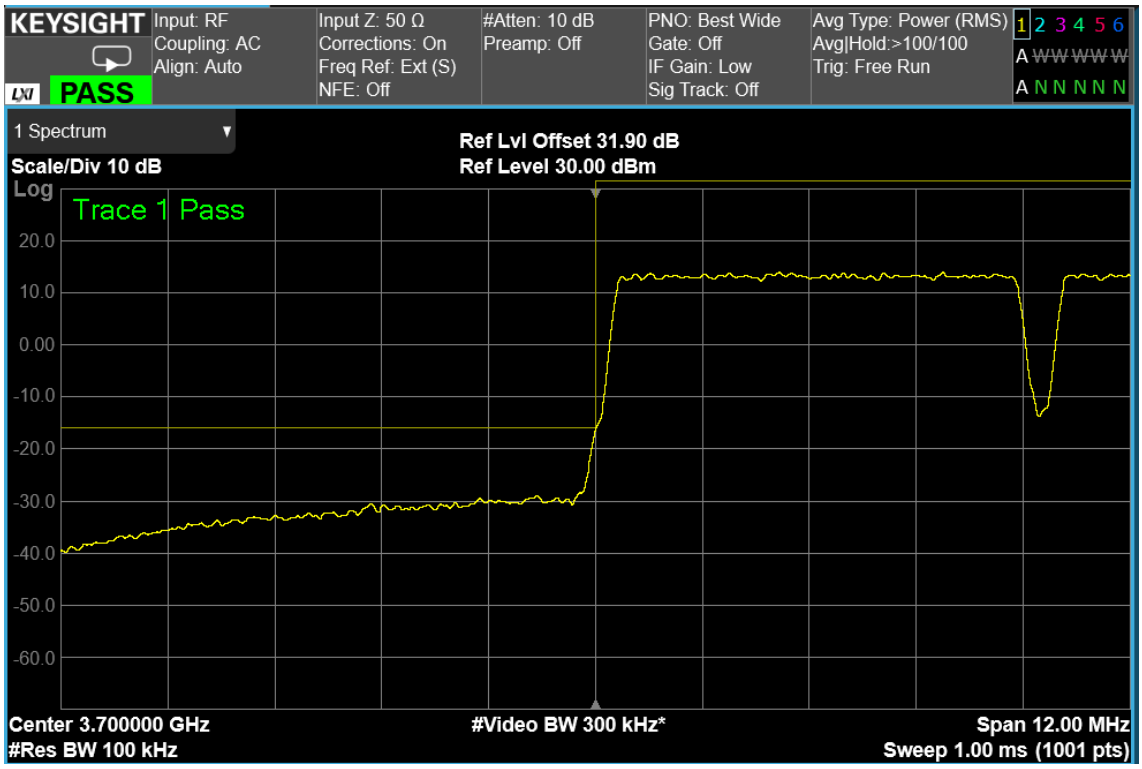
RF PORT 1



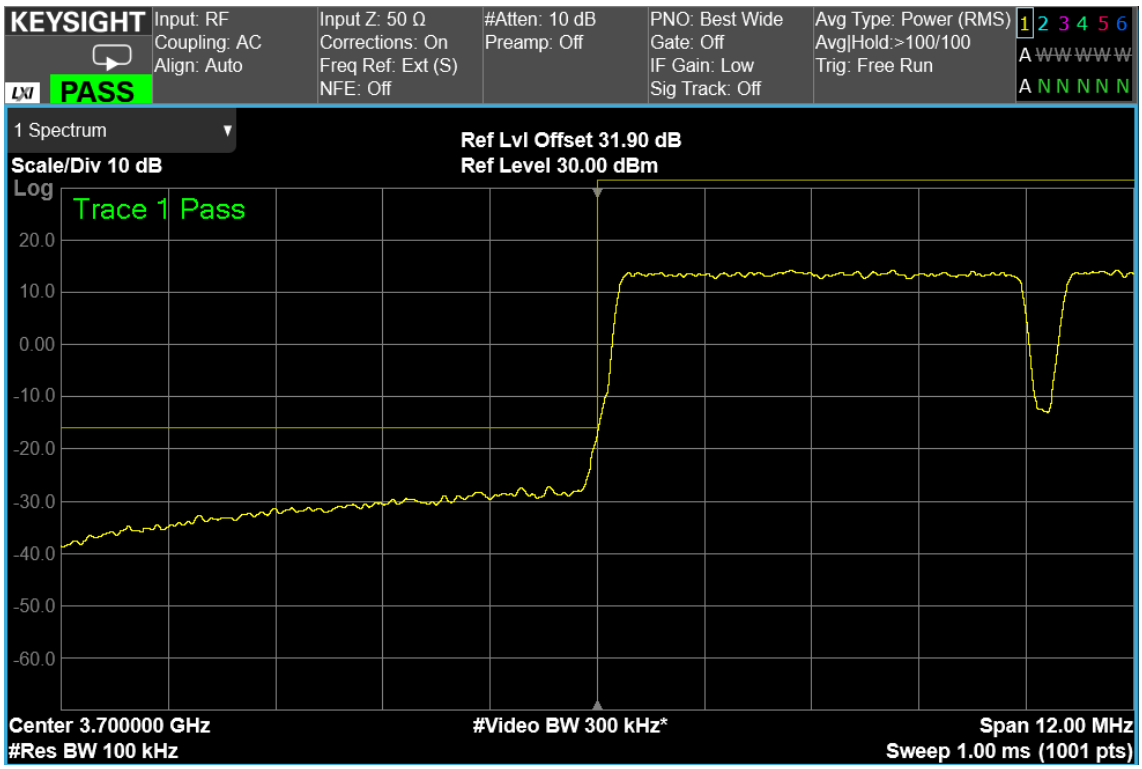
5 MHz signal, Low Band Edge, 1 carrier, nominal input signal



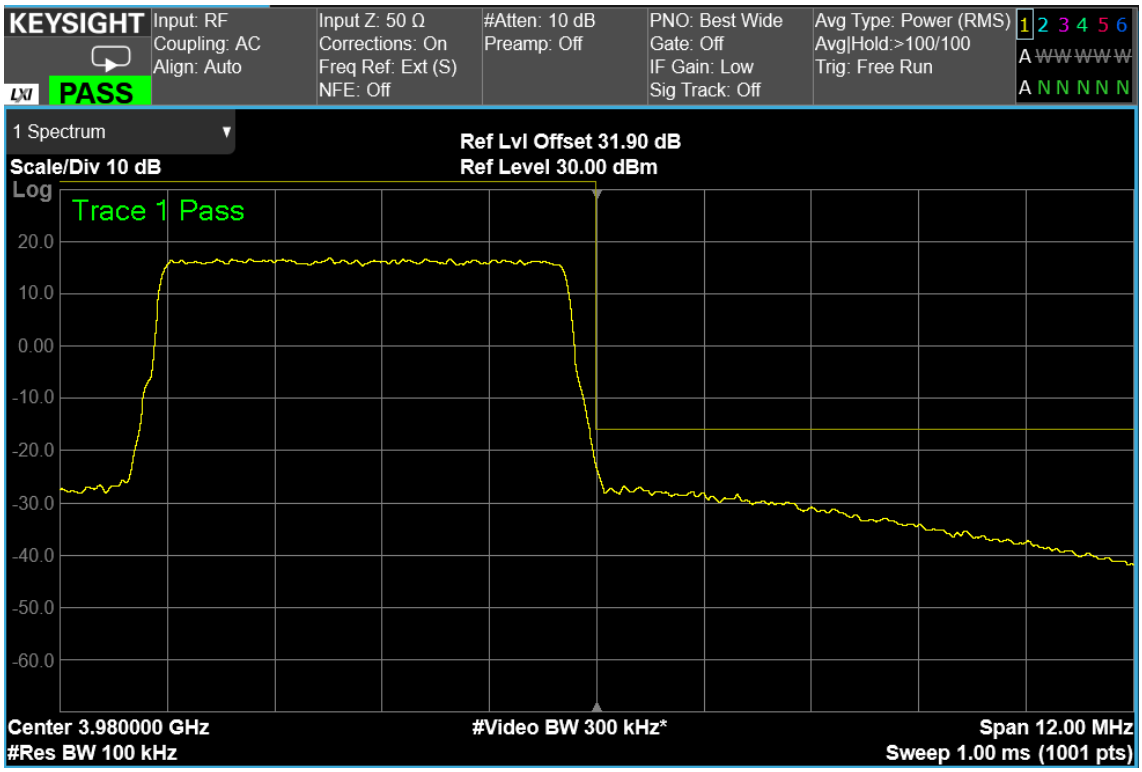
5 MHz signal, Low Band Edge, 1 carrier, nominal input signal + 3dB



5 MHz signal, Low Band Edge, 2 carrier, nominal input signal

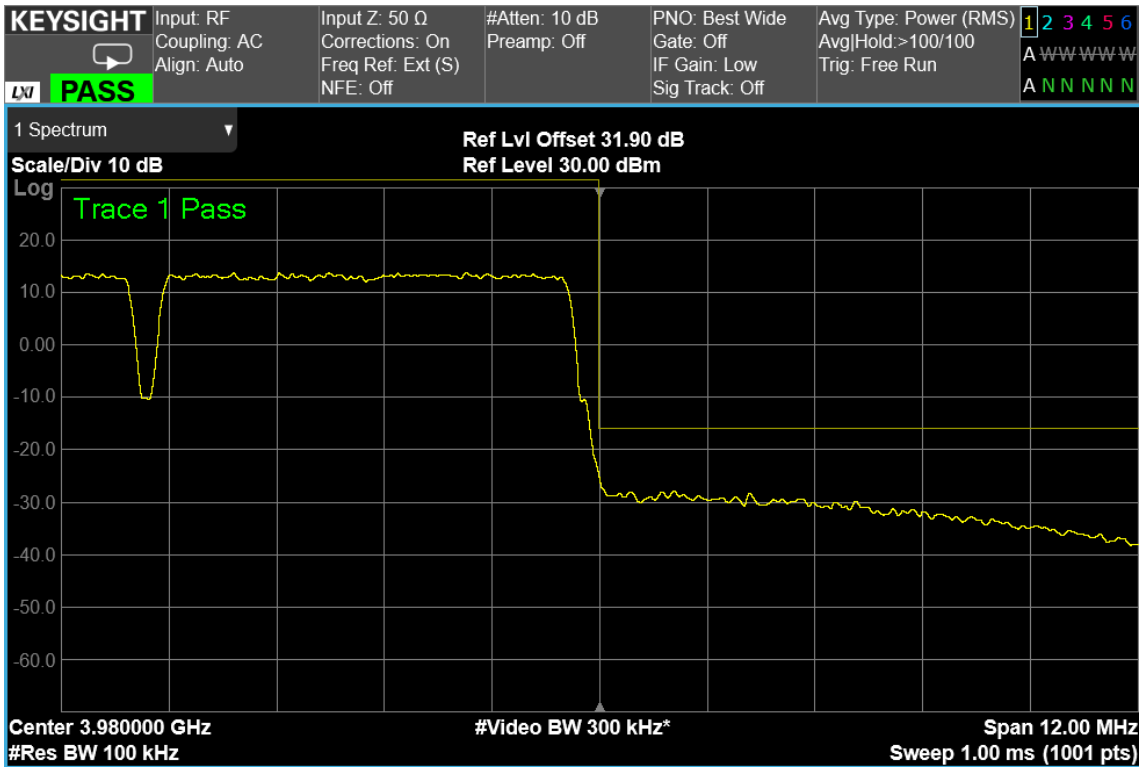


5 MHz signal, Low Band Edge, 2 carrier, nominal input signal + 3dB

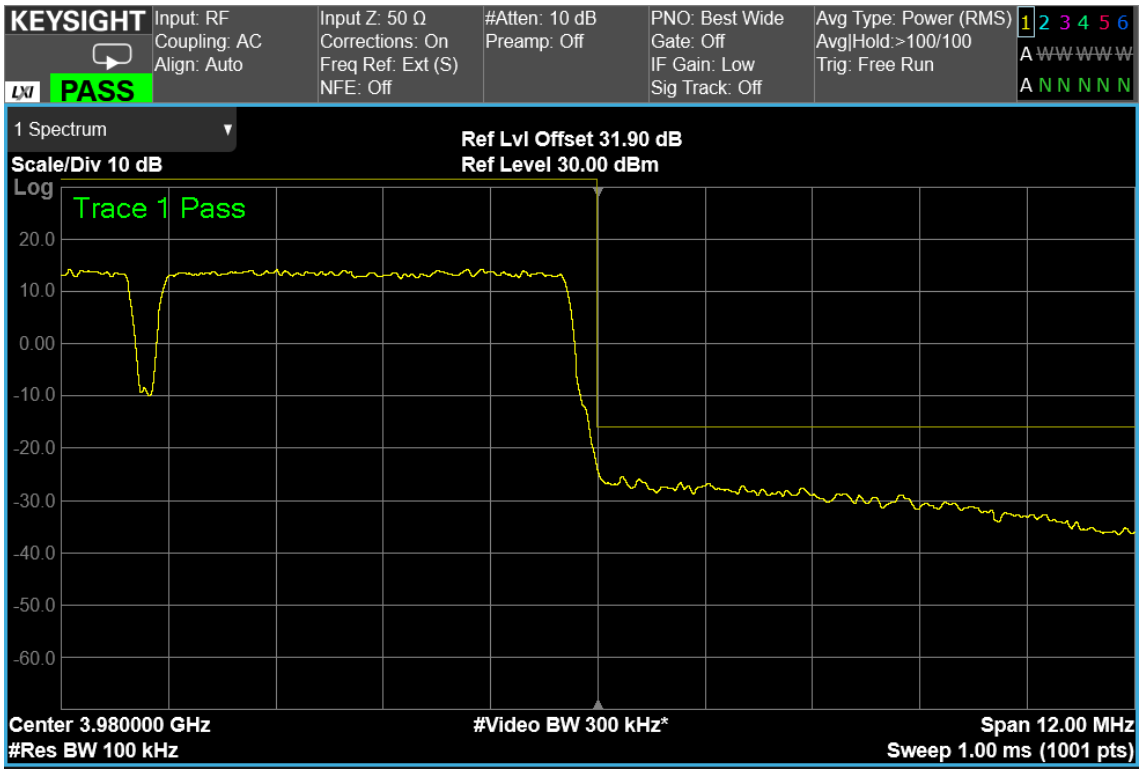


5 MHz signal, High Band Edge, 1 carrier, nominal input signal

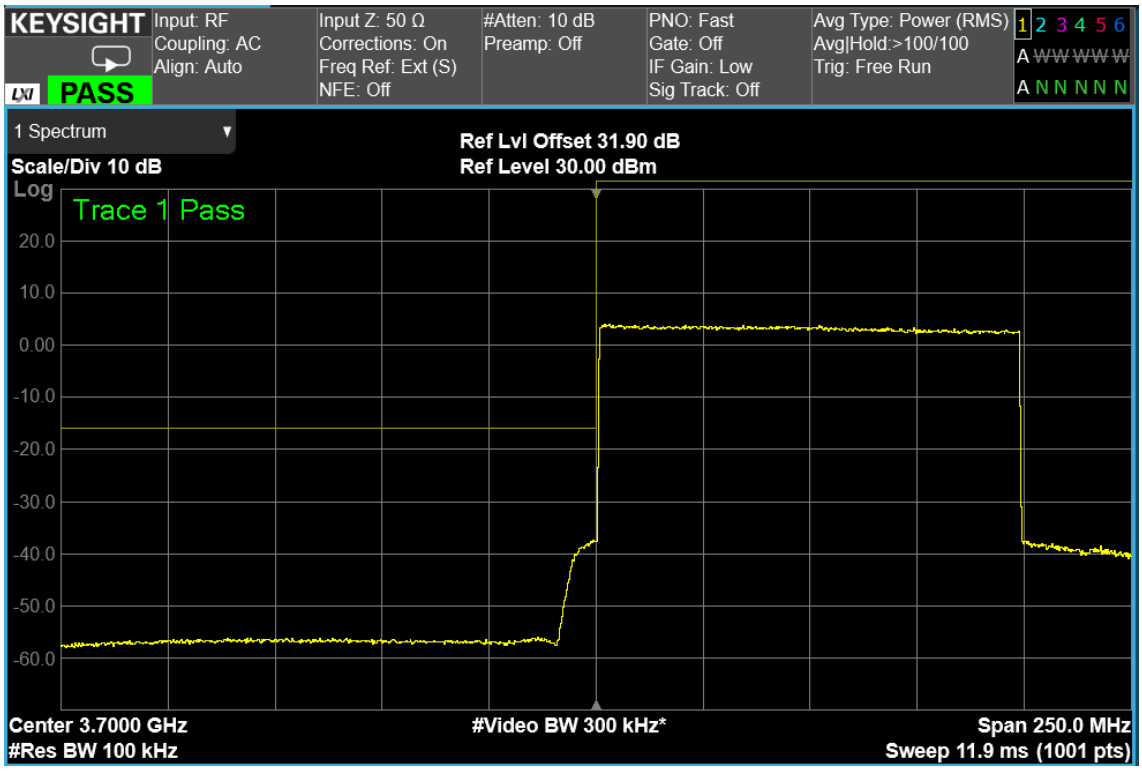
5 MHz signal, High Band Edge, 1 carrier, nominal input signal + 3dB



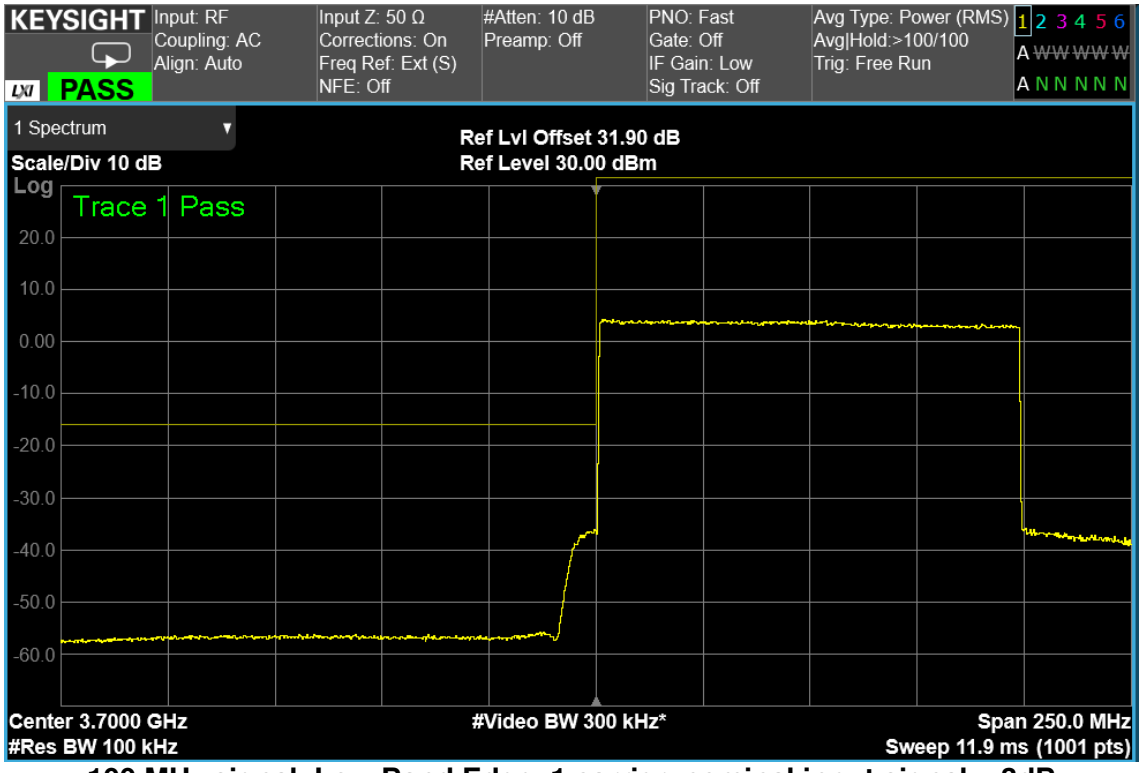
5 MHz signal, High Band Edge, 2 carrier, nominal input signal



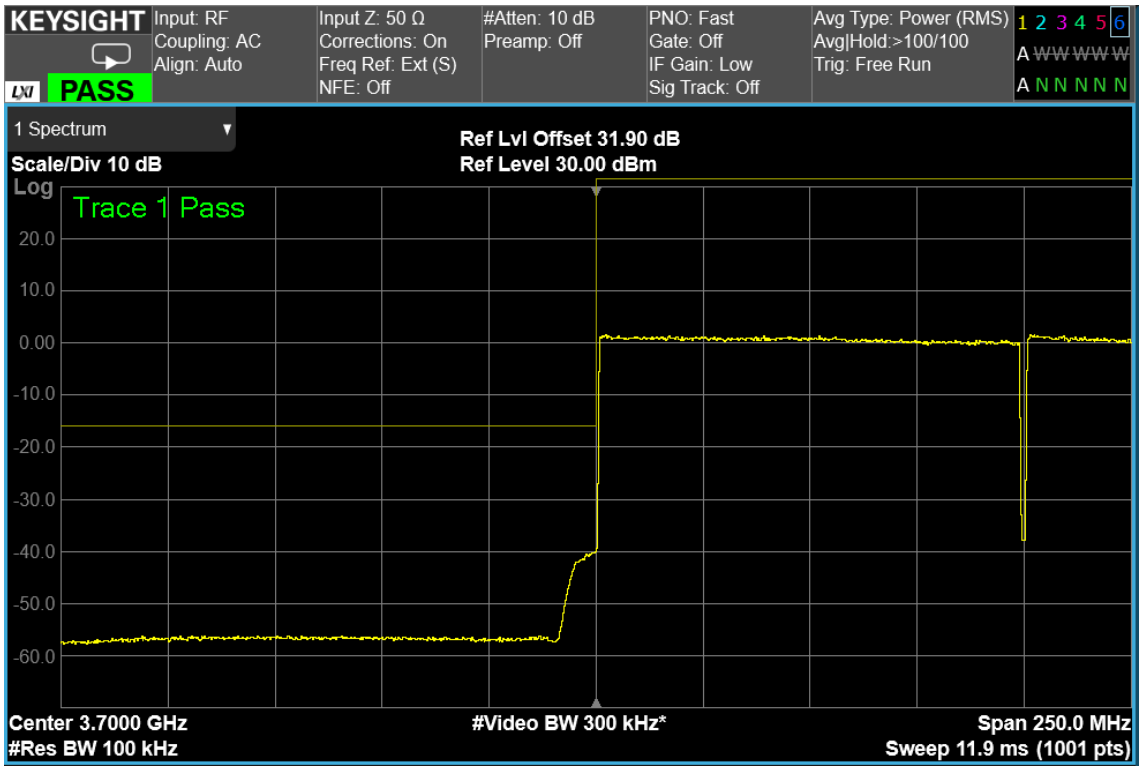
5 MHz signal, High Band Edge, 2 carrier, nominal input signal + 3dB



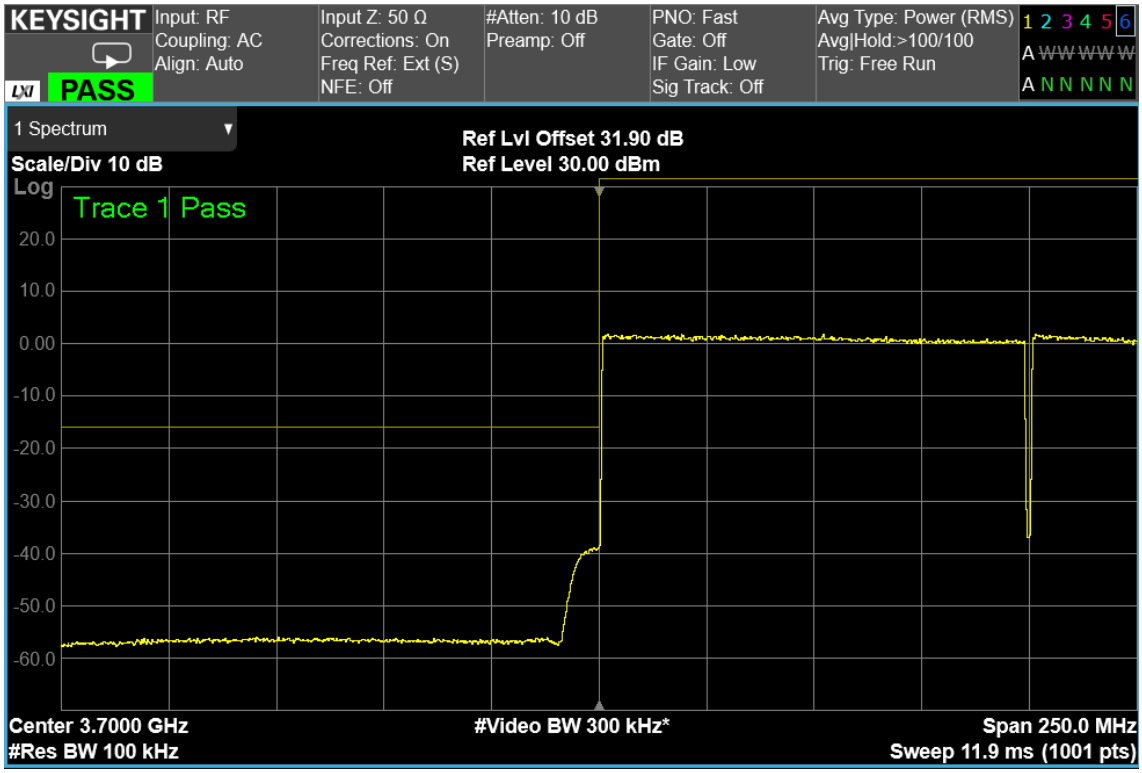
100 MHz signal, Low Band Edge, 1 carrier, nominal input signal



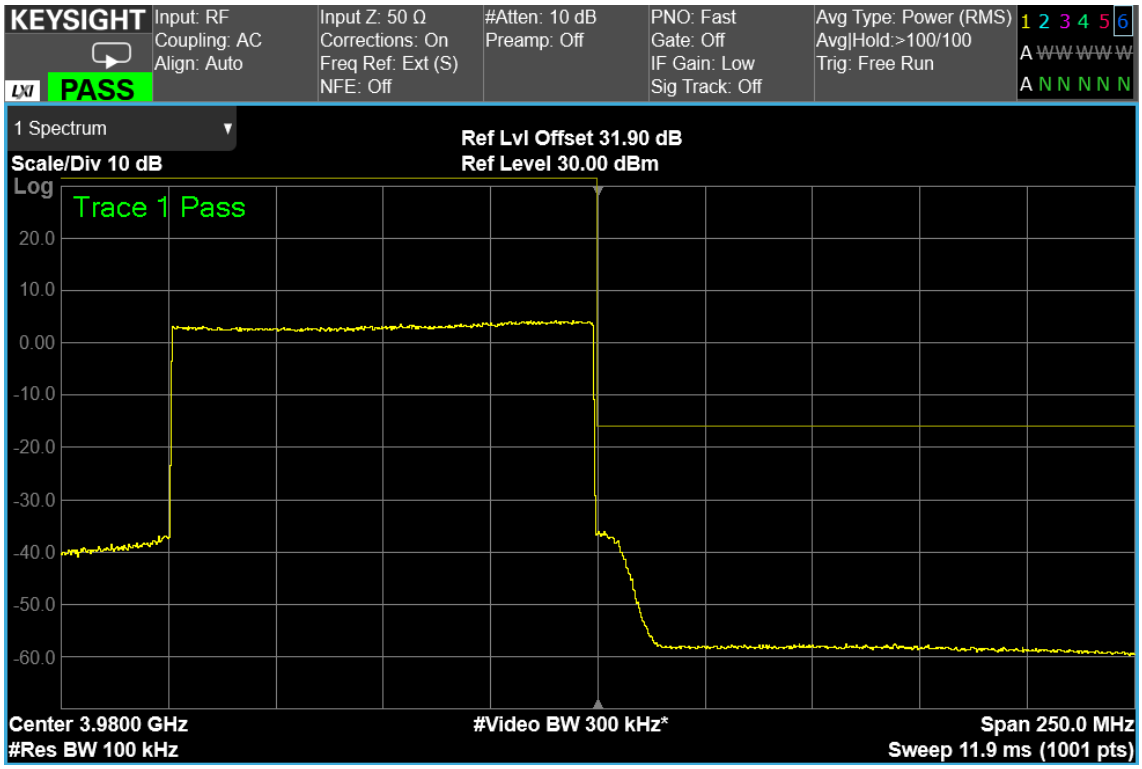
100 MHz signal, Low Band Edge, 1 carrier, nominal input signal + 3dB



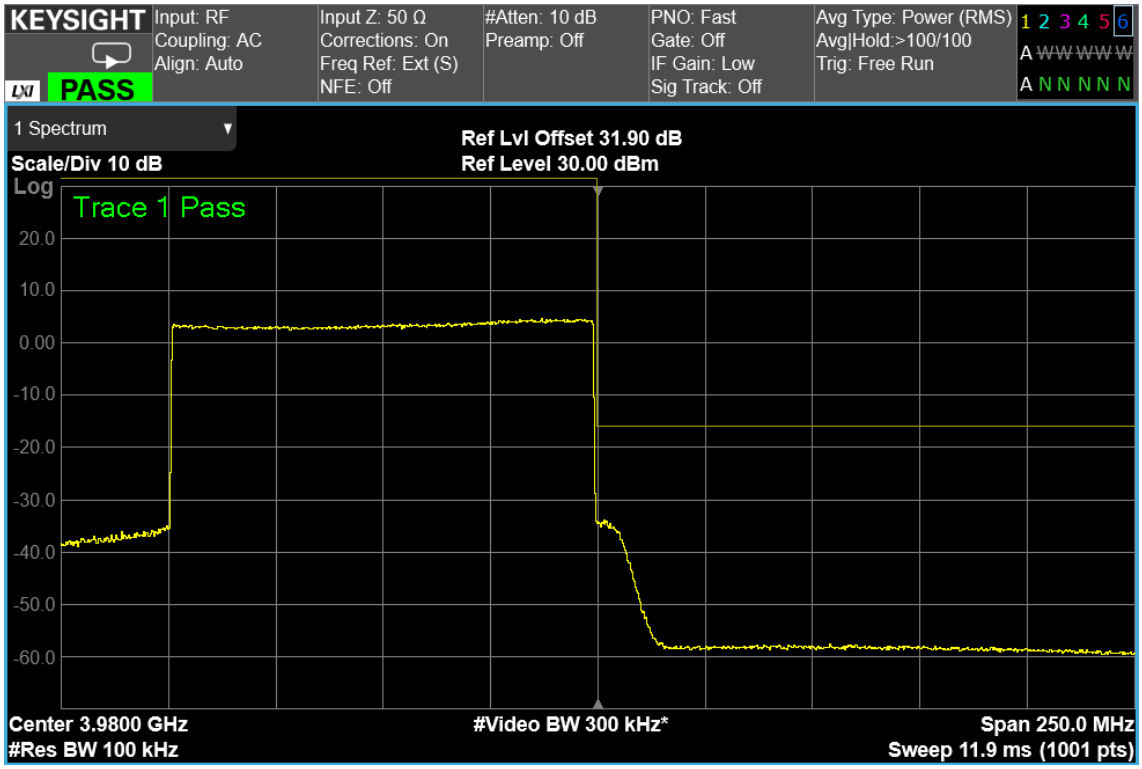
100 MHz signal, Low Band Edge, 2 carrier, nominal input signal



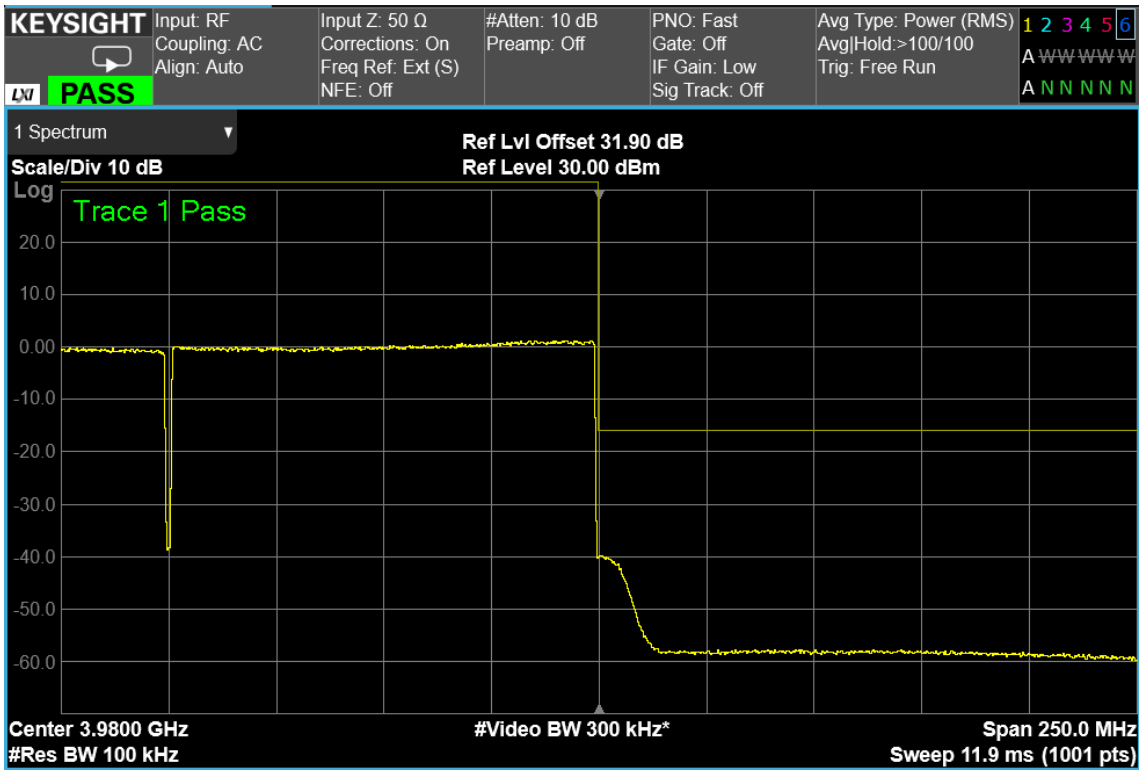
100 MHz signal, Low Band Edge, 2 carrier, nominal input signal + 3dB



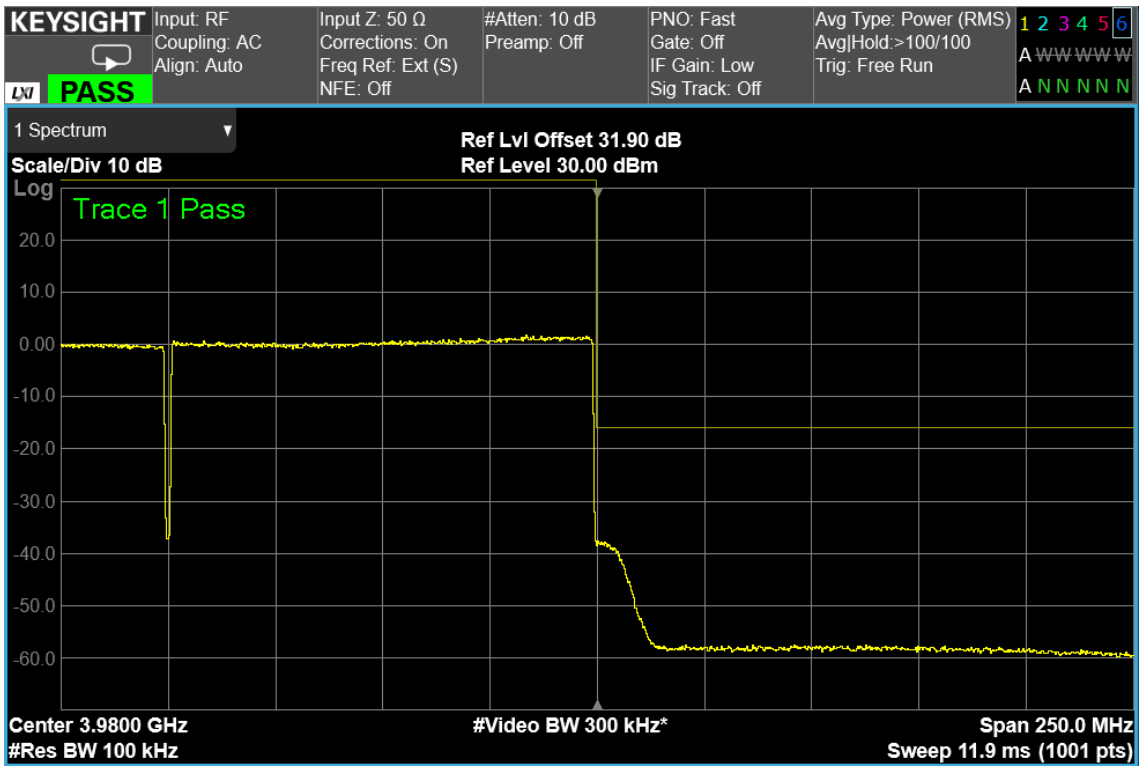
100 MHz signal, High Band Edge, 1 carrier, nominal input signal



100 MHz signal, High Band Edge, 1 carrier, nominal input signal + 3dB

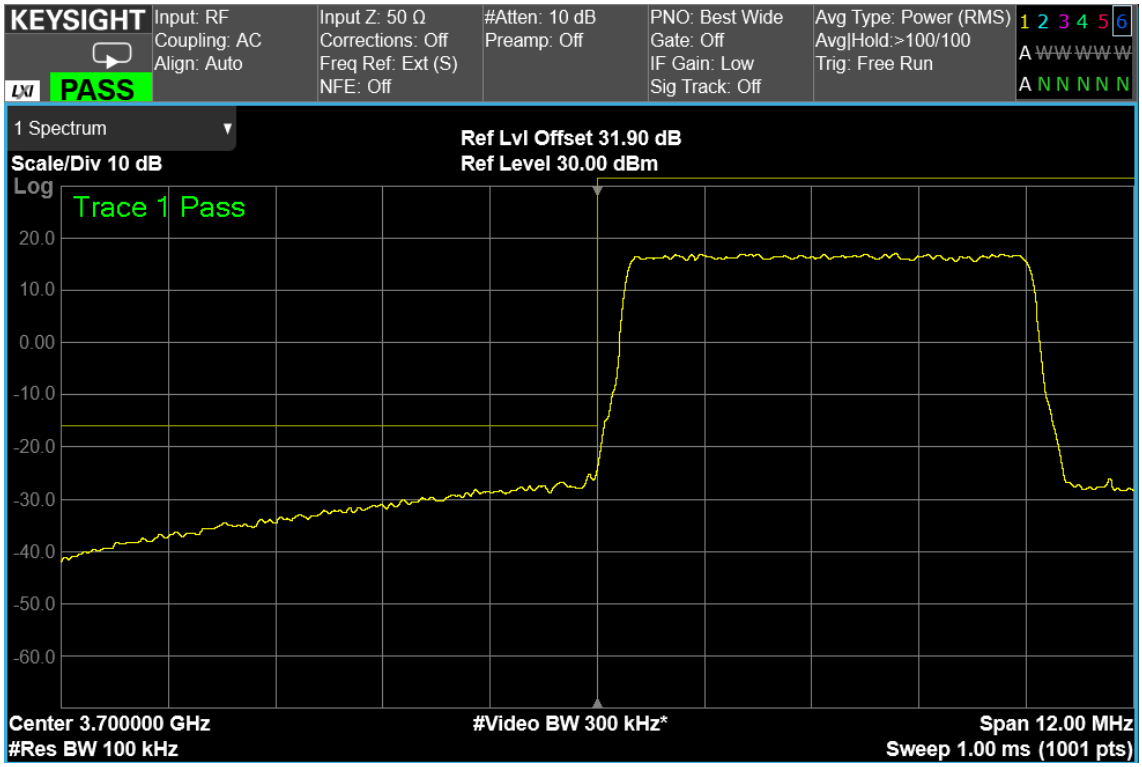


100 MHz signal, High Band Edge, 2 carrier, nominal input signal

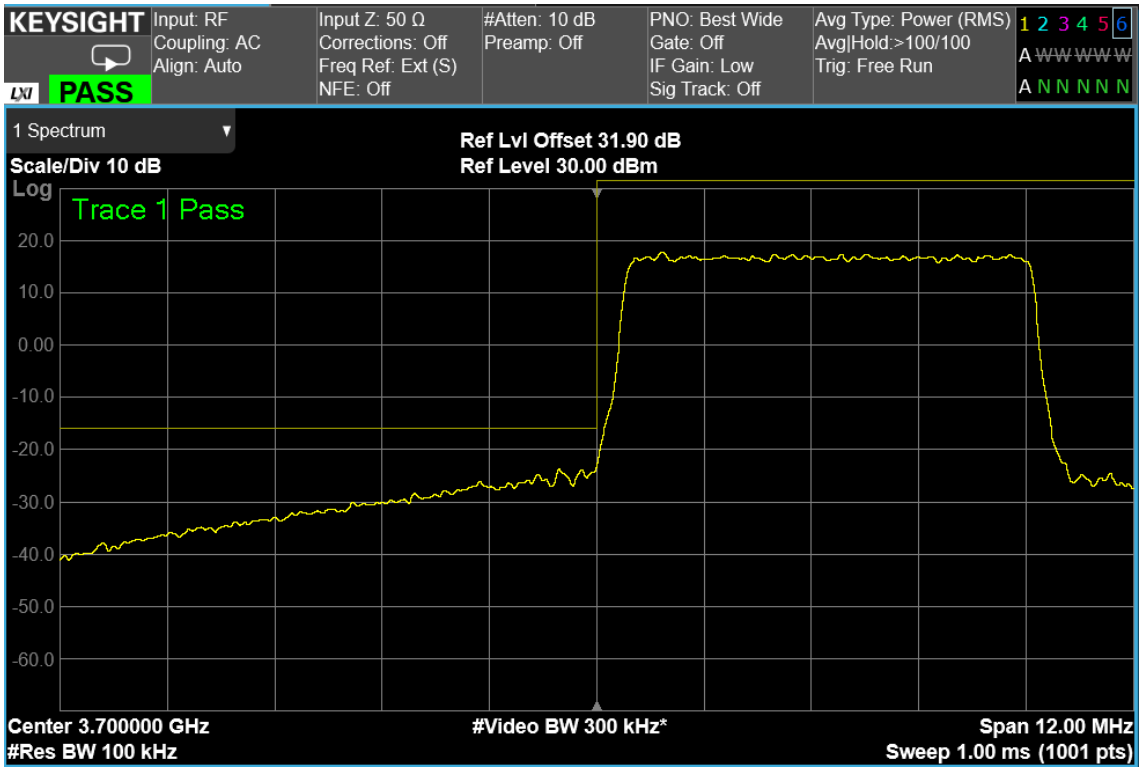


100 MHz signal, High Band Edge, 2 carrier, nominal input signal + 3dB

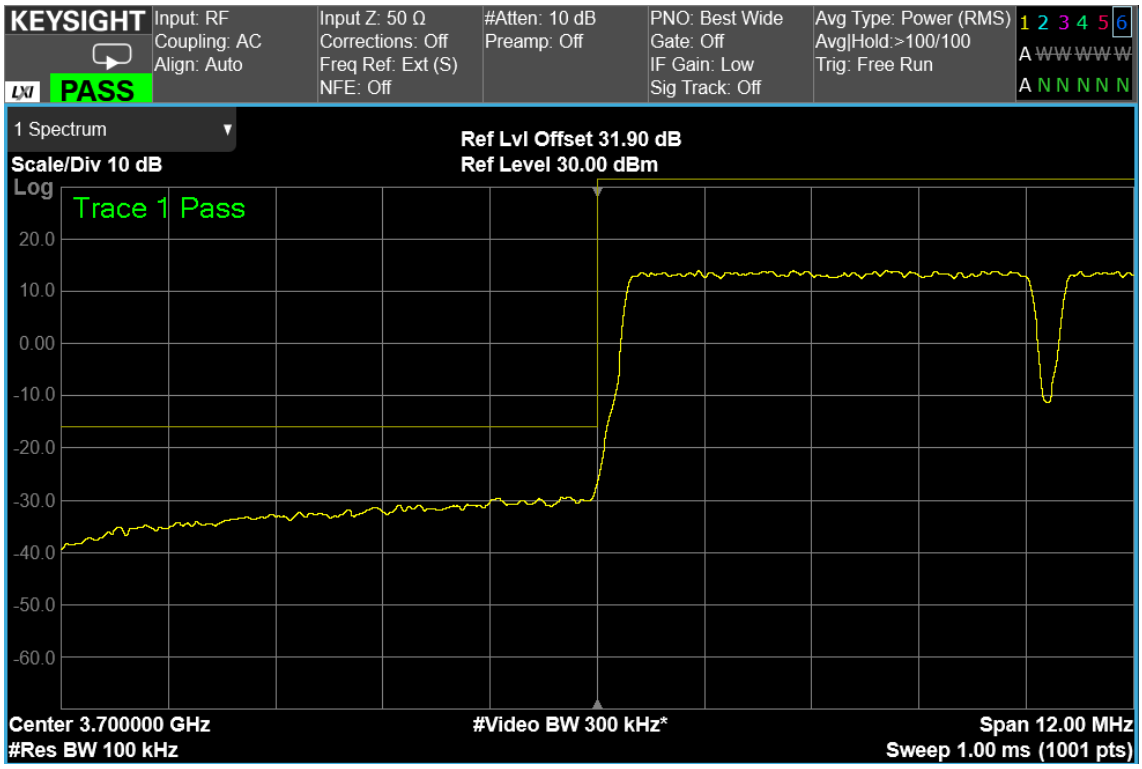
RF PORT 2



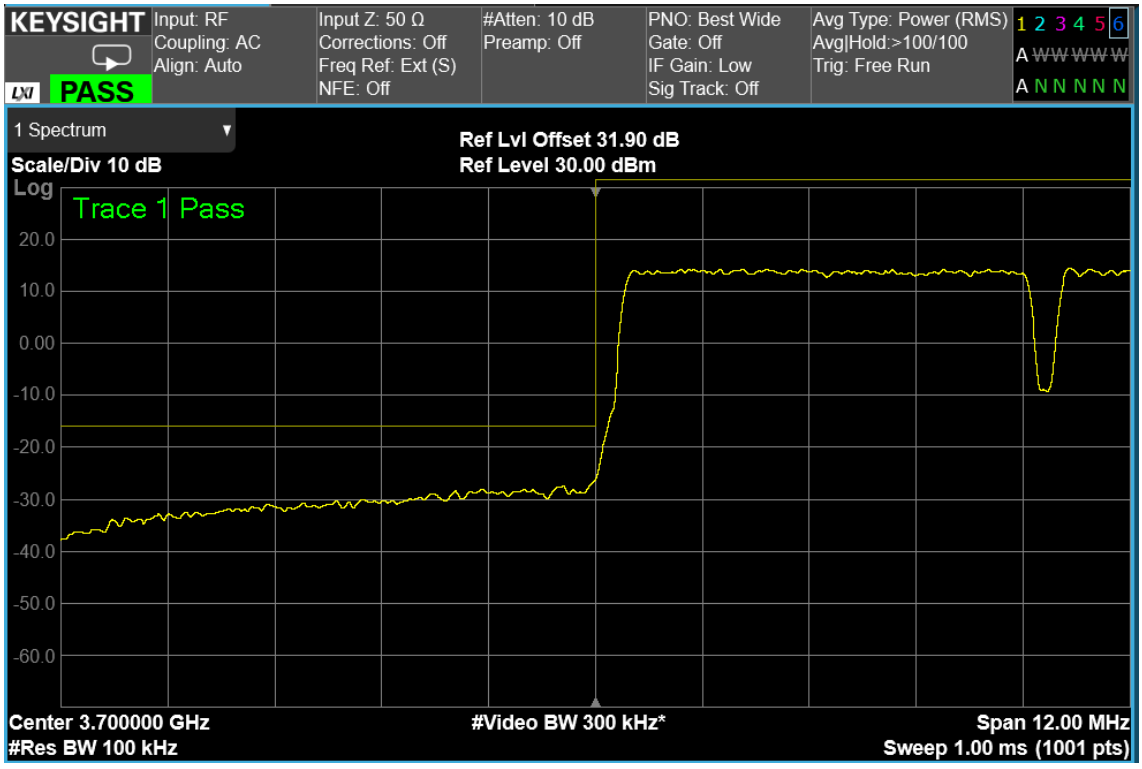
5 MHz signal, Low Band Edge, 1 carrier, nominal input signal



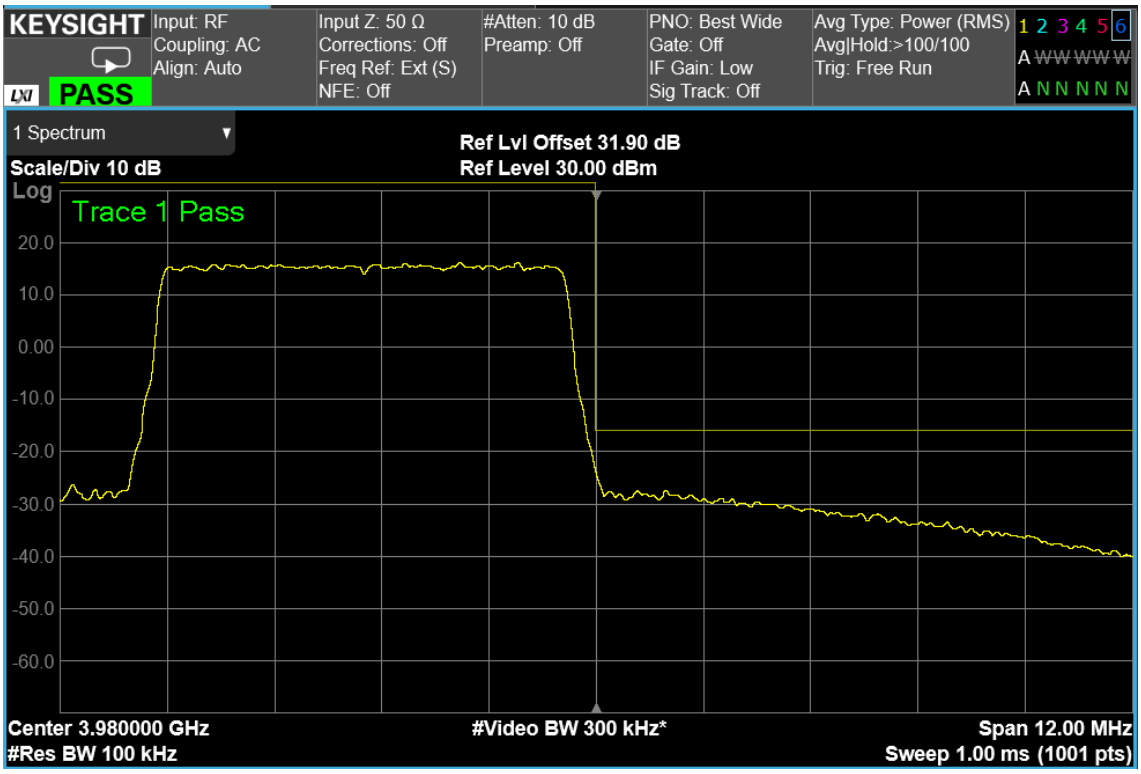
5 MHz signal, Low Band Edge, 1 carrier, nominal input signal + 3dB



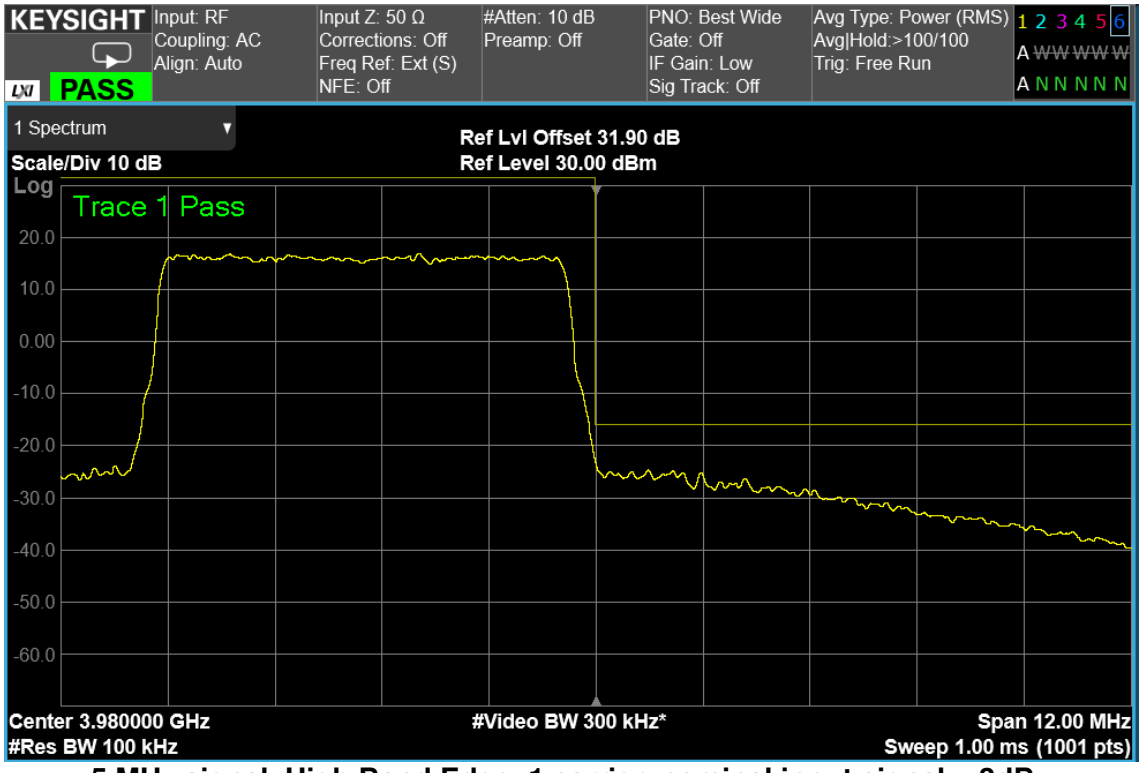
5 MHz signal, Low Band Edge, 2 carrier, nominal input signal



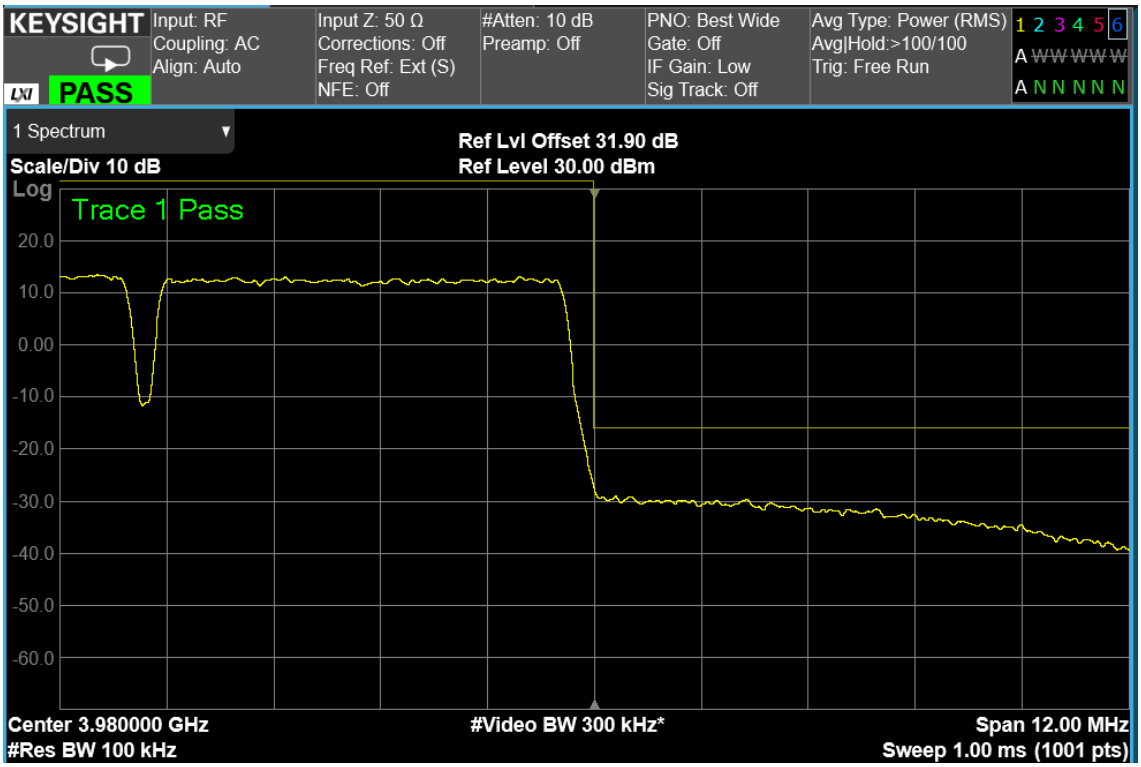
5 MHz signal, Low Band Edge, 2 carrier, nominal input signal + 3dB



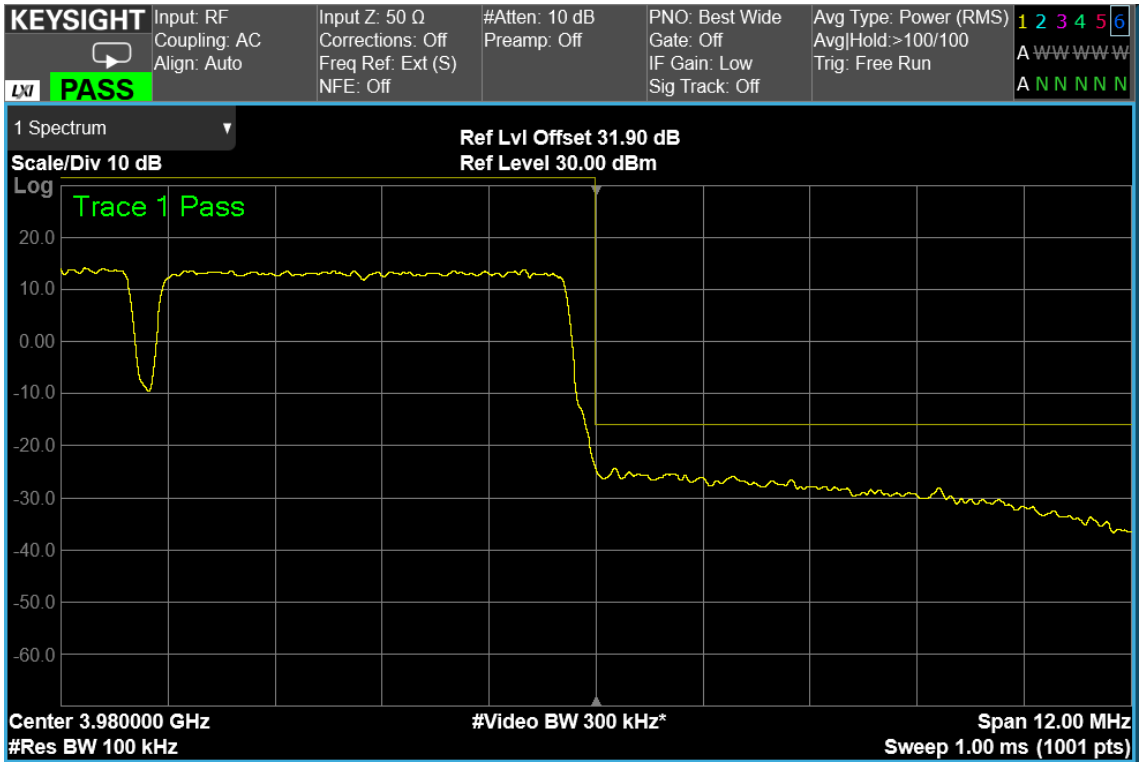
5 MHz signal, High Band Edge, 1 carrier, nominal input signal



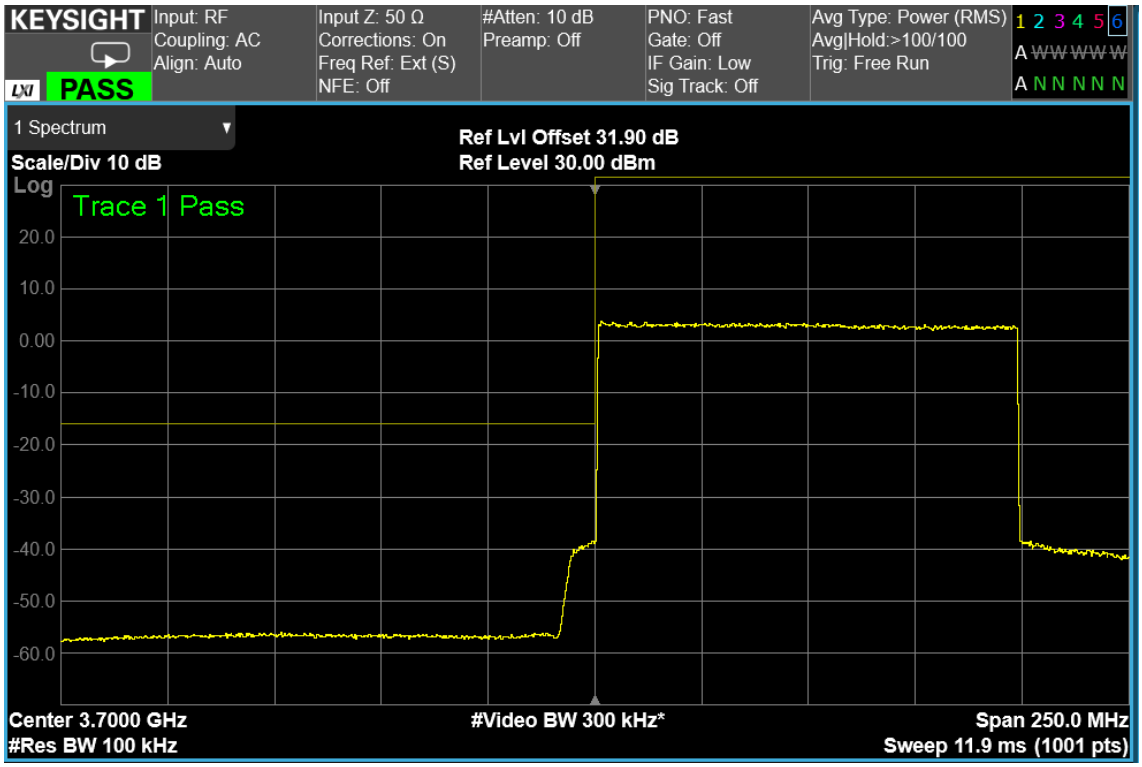
5 MHz signal, High Band Edge, 1 carrier, nominal input signal + 3dB



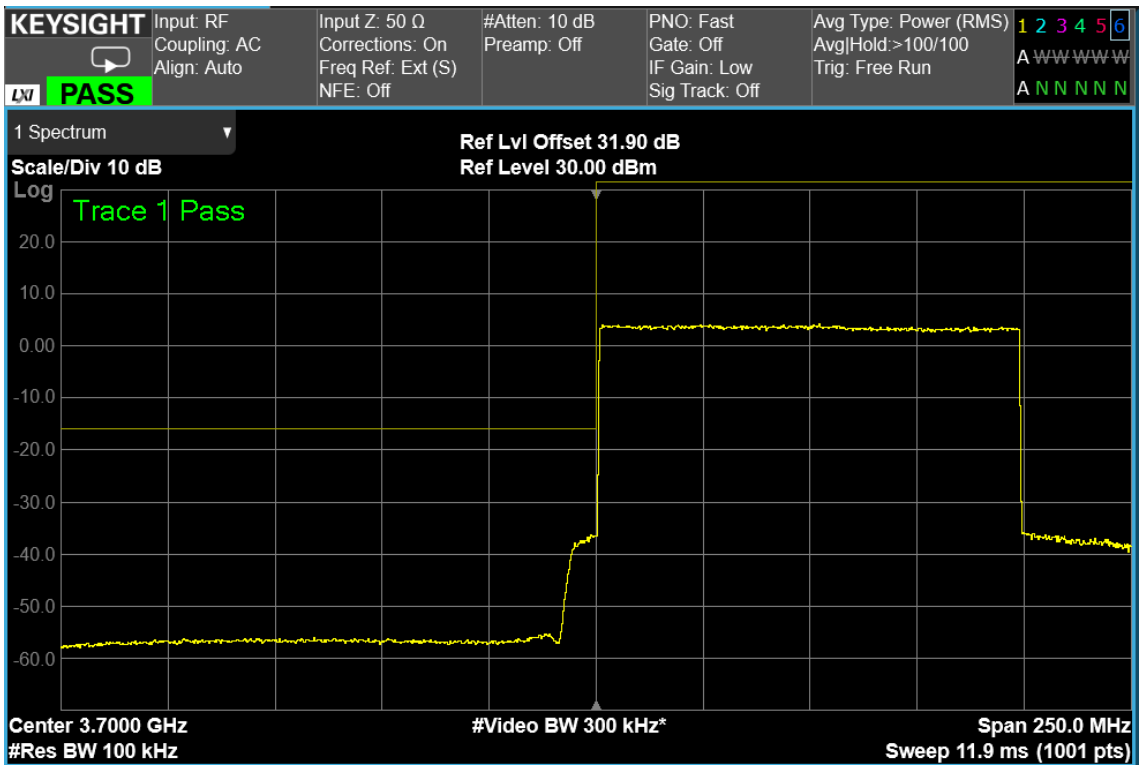
5 MHz signal, High Band Edge, 2 carrier, nominal input signal



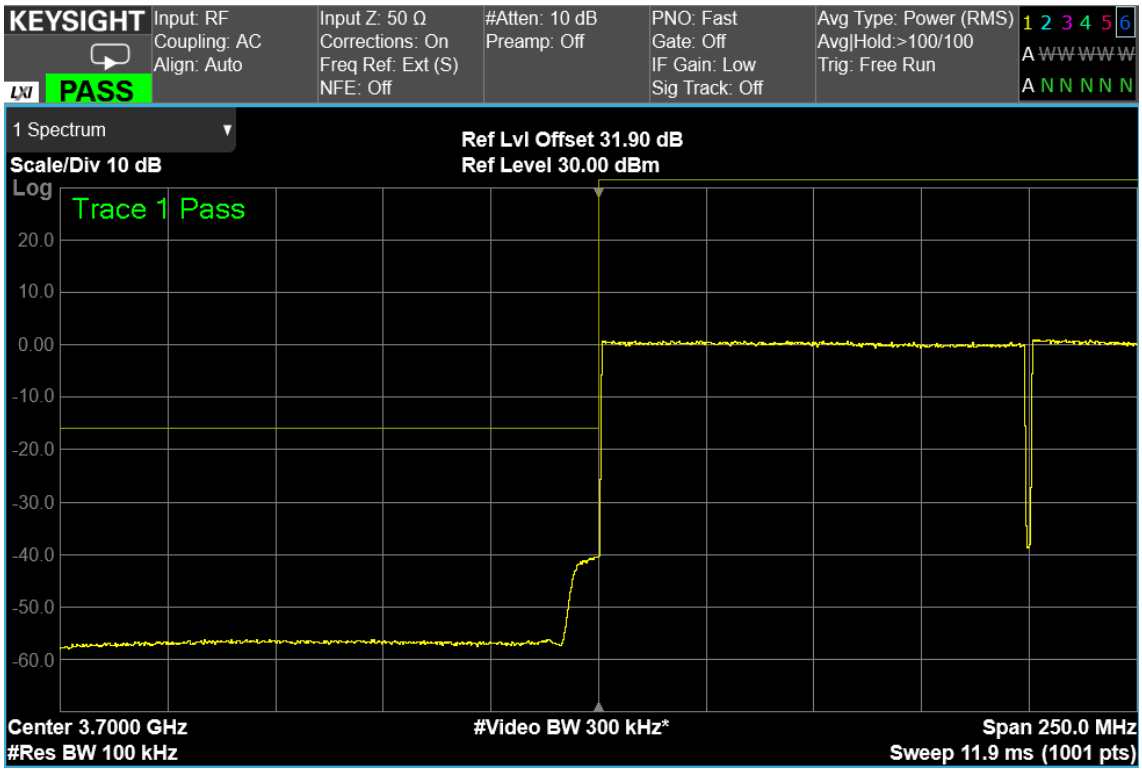
5 MHz signal, High Band Edge, 2 carrier, nominal input signal + 3dB



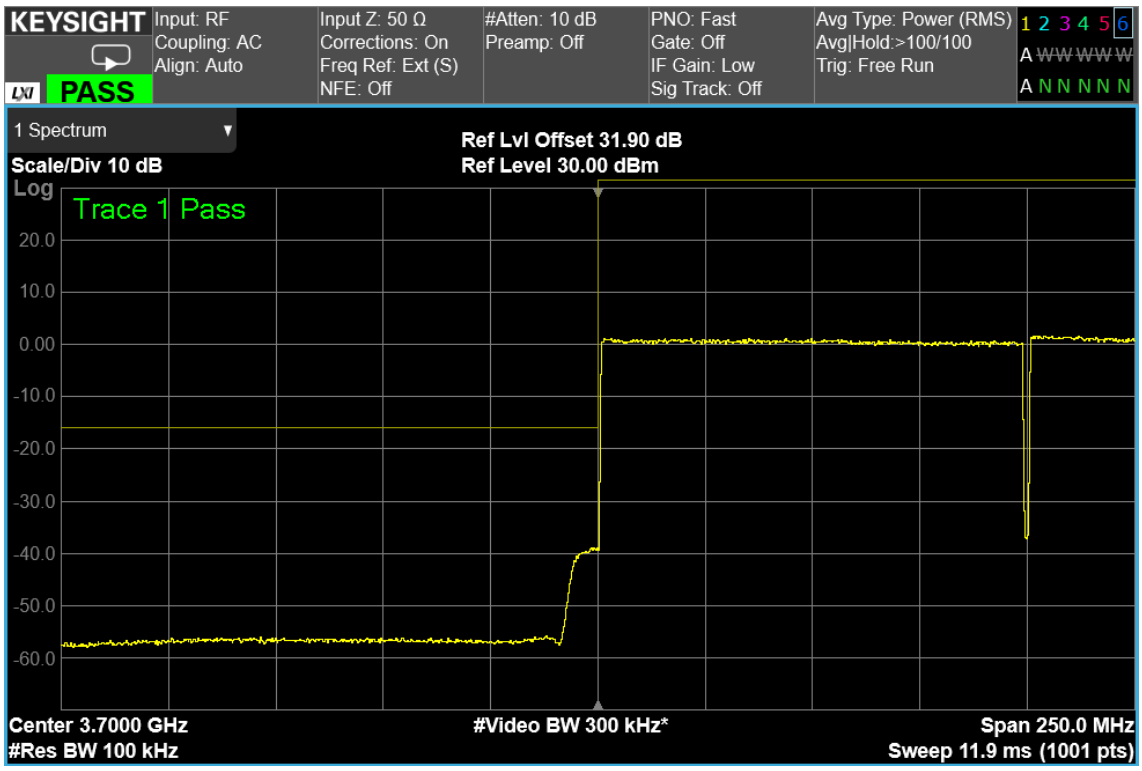
100 MHz signal, Low Band Edge, 1 carrier, nominal input signal



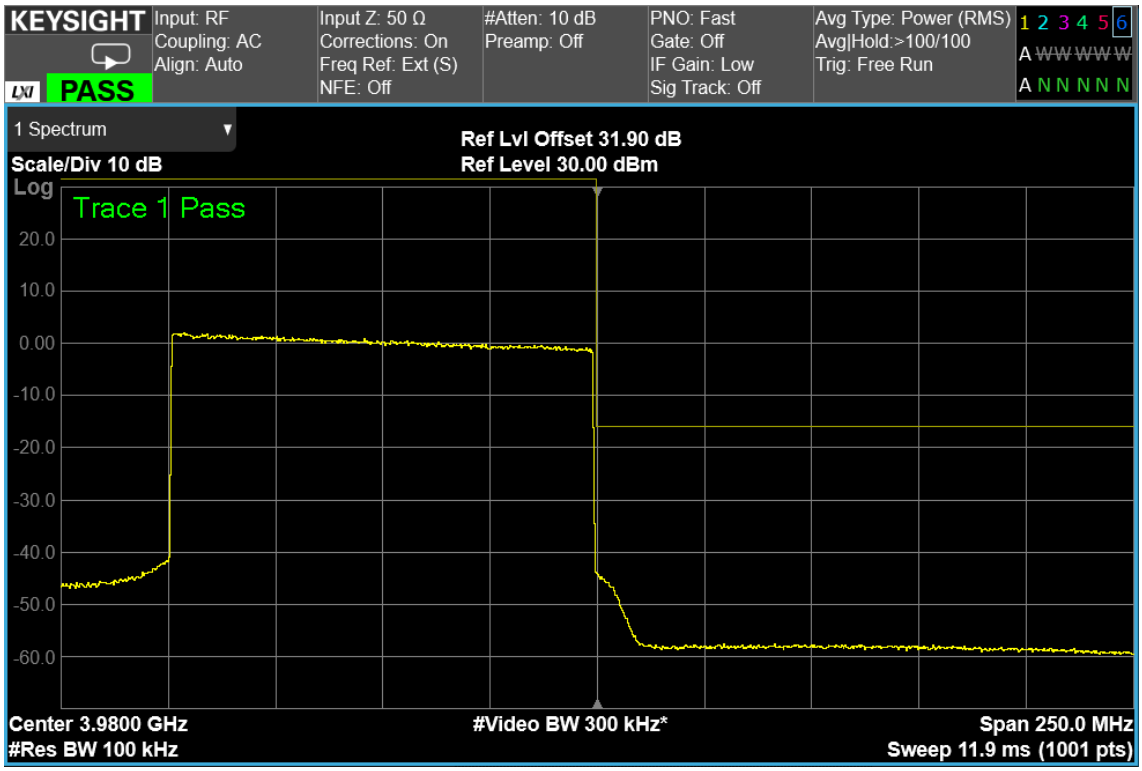
100 MHz signal, Low Band Edge, 1 carrier, nominal input signal + 3dB



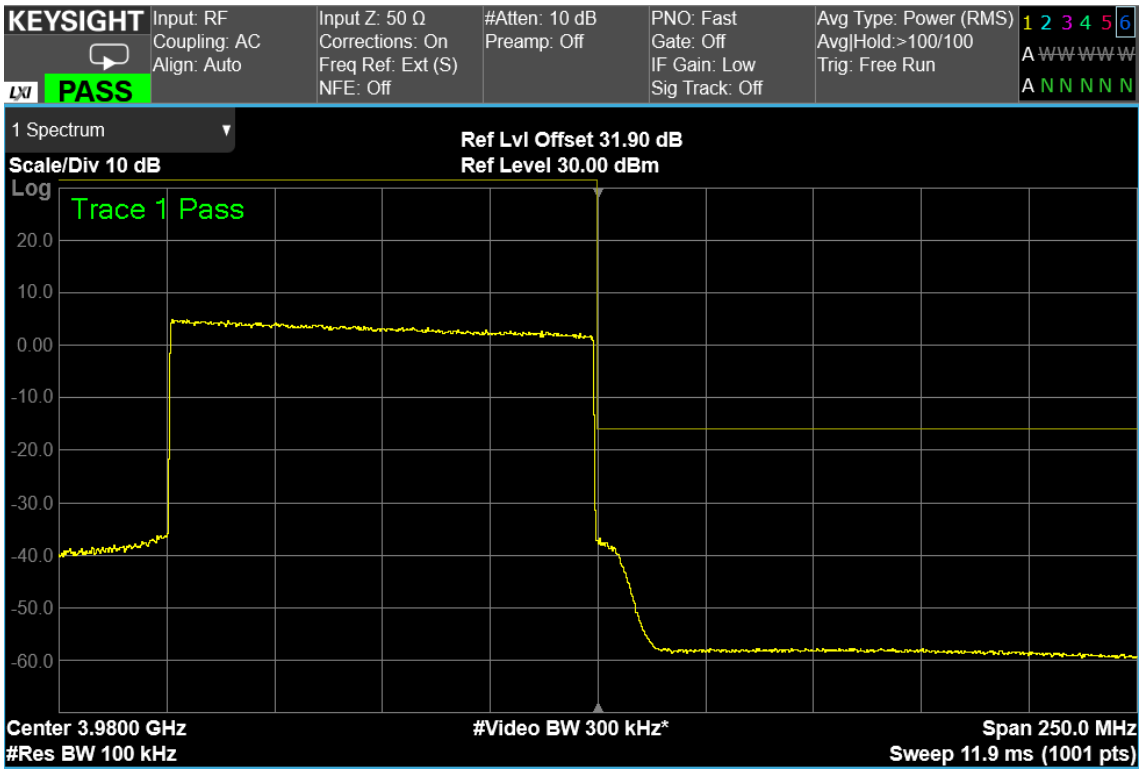
100 MHz signal, Low Band Edge, 2 carrier, nominal input signal



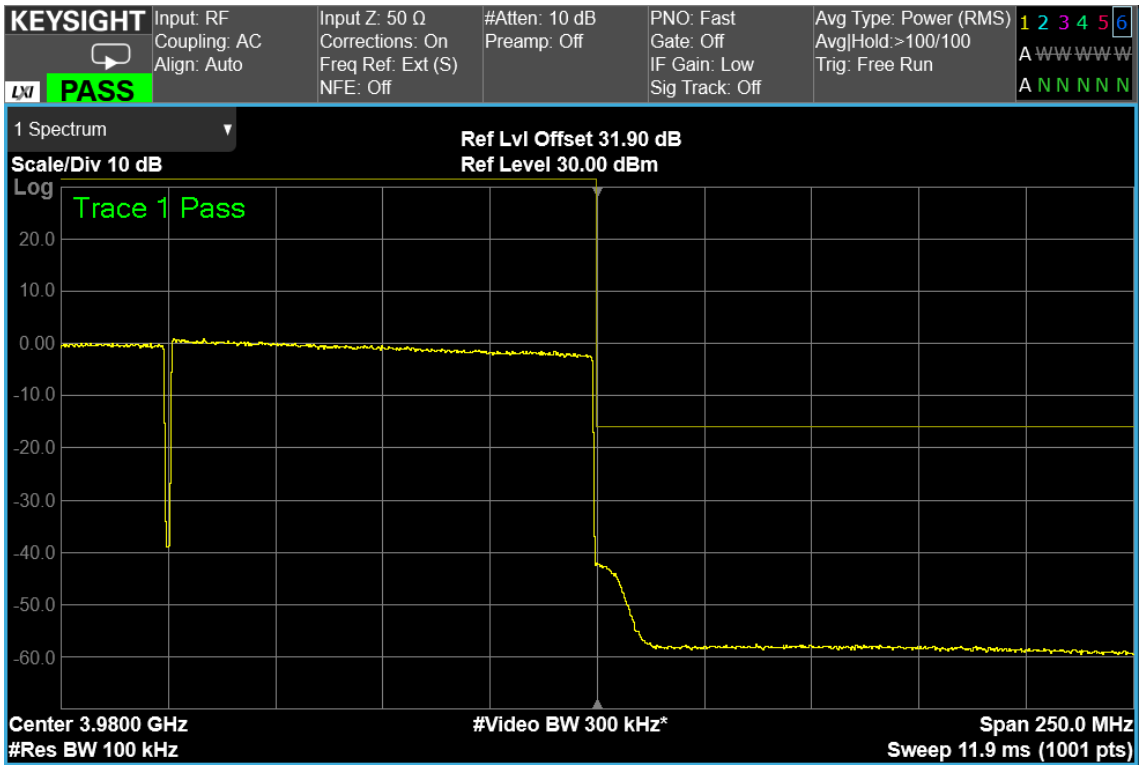
100 MHz signal, Low Band Edge, 2 carrier, nominal input signal + 3dB



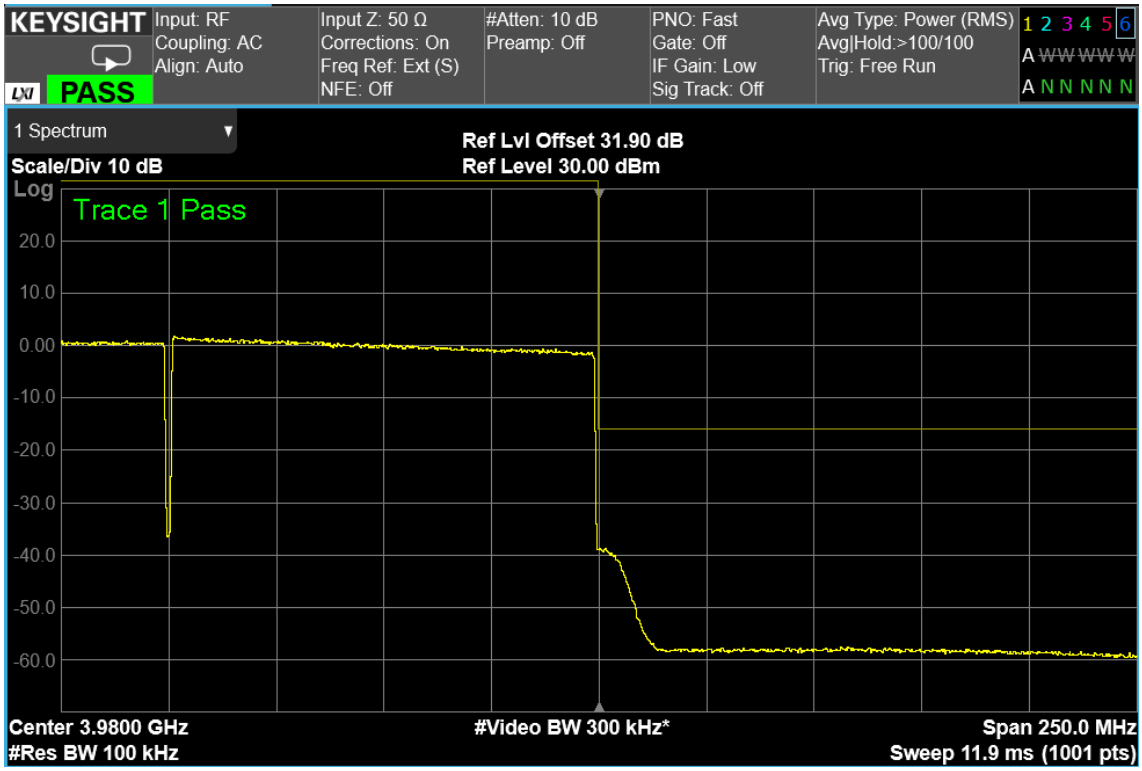
100 MHz signal, High Band Edge, 1 carrier, nominal input signal



100 MHz signal, High Band Edge, 1 carrier, nominal input signal + 3dB



100 MHz signal, High Band Edge, 2 carrier, nominal input signal



100 MHz signal, High Band Edge, 2 carrier, nominal input signal + 3dB

Clause 27.53(l) Radiated Spurious emissions

(l) 3.7 GHz Service. The following emission limits apply to stations transmitting in the3700-3980 MHz band:

(1) For base station operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed –13 dBm/MHz. Compliance with this paragraph (l)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test date: 2021-09-01 to 2021-09-17

Test results: Pass

Special notes

Broadband amplifiers: AWGN test signal used (5 MHz and 100 MHz LTE channel)

Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Antenna Trilog 25MHz - 8GHz	Schwarzbeck	VULB9162	9162-025	2024-07
Antenna 1-18 GHz	Schwarzbeck	STLP 9148	STPL 9148-123	2024-06
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2023-04
Broadband Amplifier	Schwarzbeck	BBV9718C	00121	2022-01
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01	2022-04
EMI Receiver	Rohde & Schwarz	ESW44	101620	2022-08
Spectrum analyzer	R&S	FSW43	101767	2022-01
Controller	Maturo	FCU3.0	10041	NCR
Tilt antenna mast	Maturo	TAM4.0-E	10042	NCR
Turntable	Maturo	TT4.0-5T	2.527	NCR
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	NCR
Shielded room	Siemens	10m control room	1947	NCR

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
(*) Equipment supplied by manufacturer's

Clause 27.53(m) Radiated spurious emissions, continued

Test data

The D.U.T. was positioned according to the radiated emissions set-up

The D.U.T. antenna connector was terminated by a 50 Ω shielded dummy load.

The spectrum was searched from 30 MHz to 1 GHz (RBW 100 kHz) & 1 GHz (RBW 1 MHz) to the tenth harmonic of the carrier.

There were no emissions detected above the noise floor which was at least 20 dB below the specification limit.

Spurious emissions measurement results:

Frequency (MHz)	Polarization. V/H	Field strength (dBm)	Limit (dBm)	Margin (dB)
Low channel				
7404.777	H	-37.5	-16	-21.5
7404.777	V	-30.7	-16	-14.7
Mid channel				
7680.481	H	-35.8	-16	-19.8
7680.481	V	-33.3	-16	-17.3
High channel				
7955.621	H	-26.6	-16	-10.6
7955.621	V	-25.9	-16	-9.9

Note 1: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.

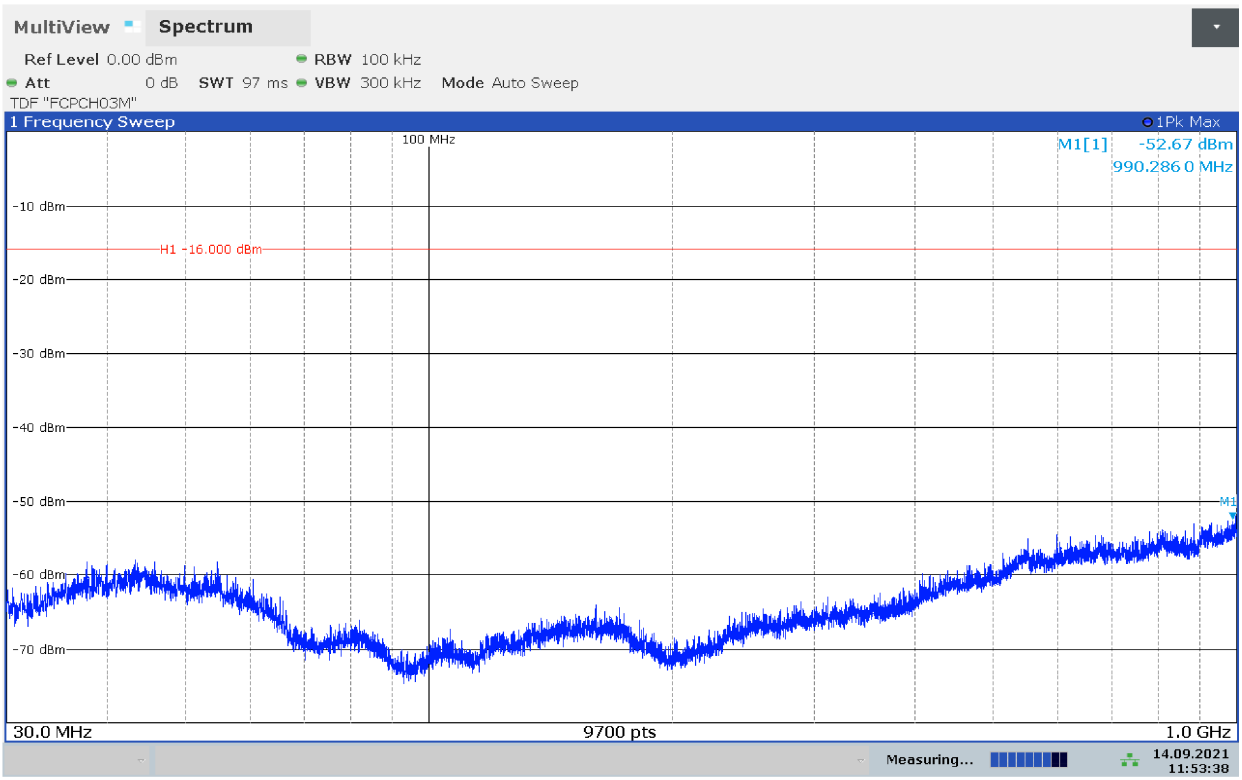
Note 2: Test performed with a 5 MHz and a 100 MHz input signal. Graphics report only the worst case (5 MHz). For 100 MHz input signal no spurious found.

MIMO consideration

The EUT has two MIMO RF Port, so it's possible manage two MIMO RF paths.
If EUT is used in MIMO configuration according to KDB 662911-D01 v02r01 and 662911-D02 v01 with signals completely uncorrelated, the maximum emission is calculated as follows:

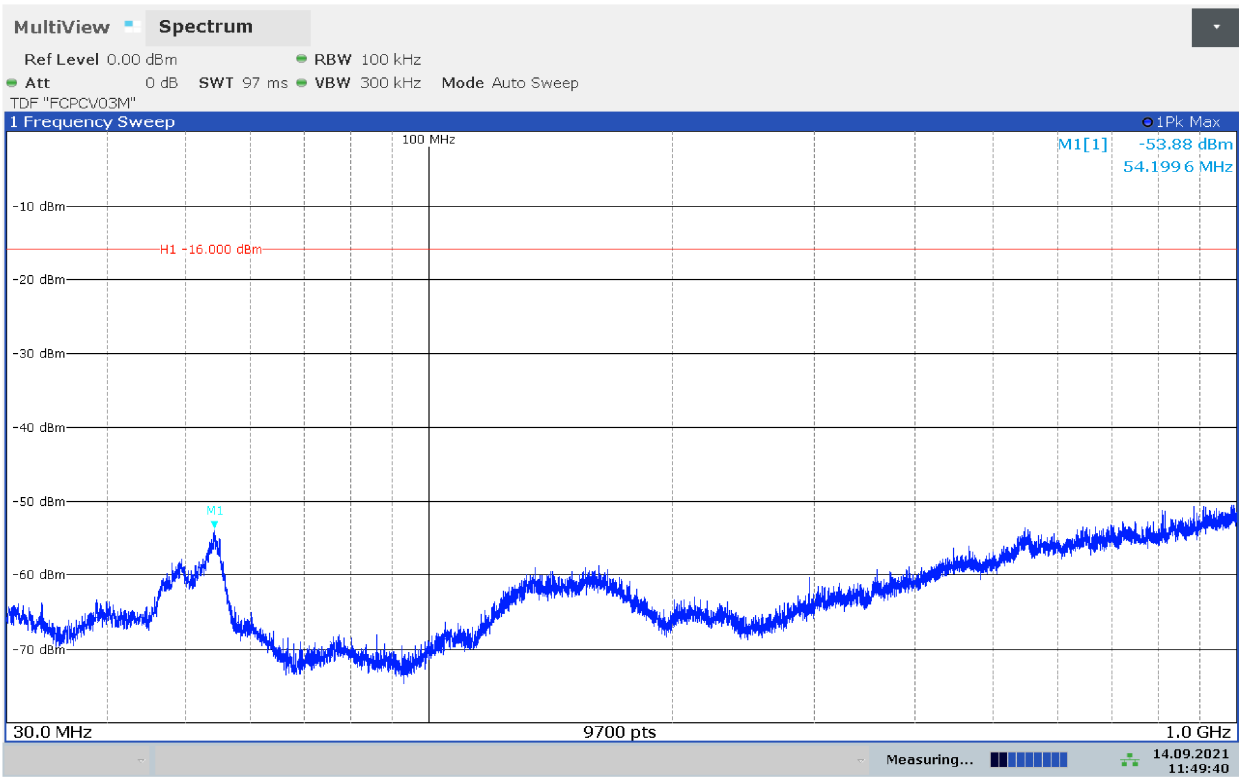
- MIMO Maximum Emission = Emission at each path + 10log(Nant) dB =
  = Emission at each path + 10log(2) = Emission at each path + 3dB

The limit has been reduced by 3 dB.



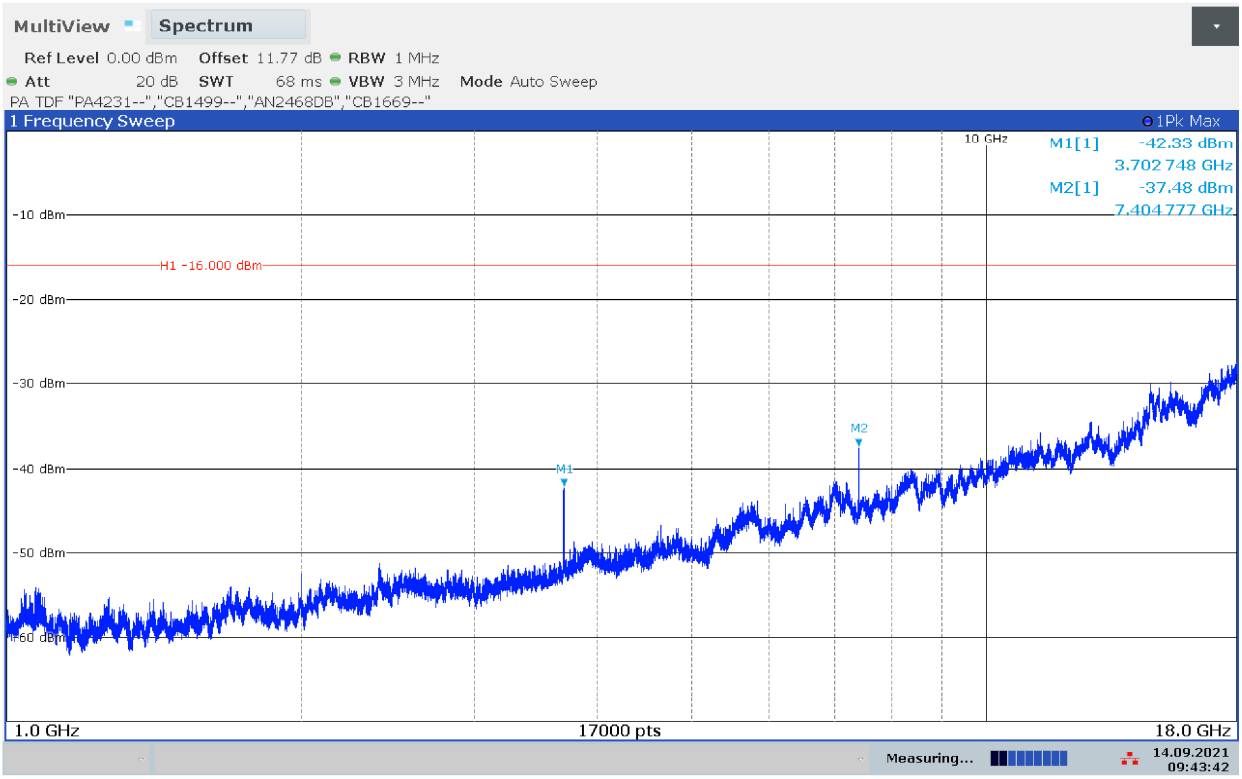
11:53:39 14.09.2021

Bottom Channel, 30MHz - 1GHz, H Pol



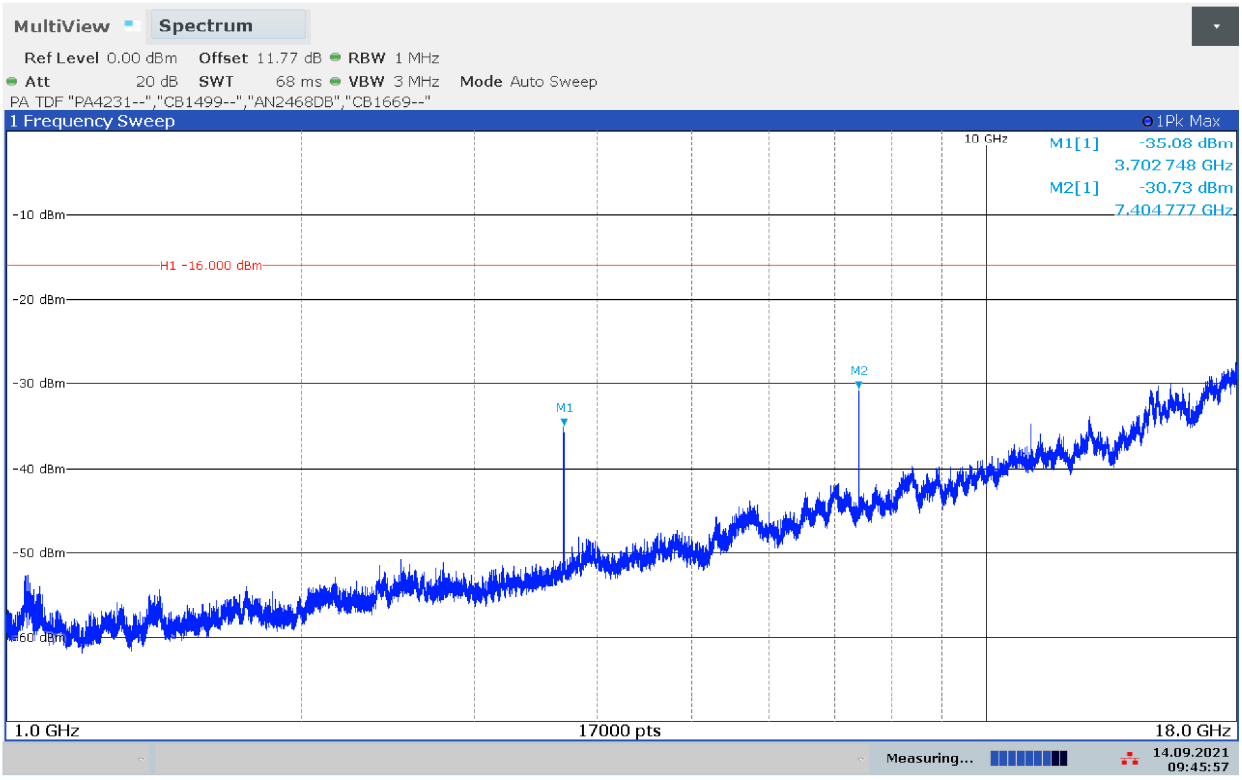
11:49:41 14.09.2021

Bottom Channel, 30MHz - 1GHz, V Pol



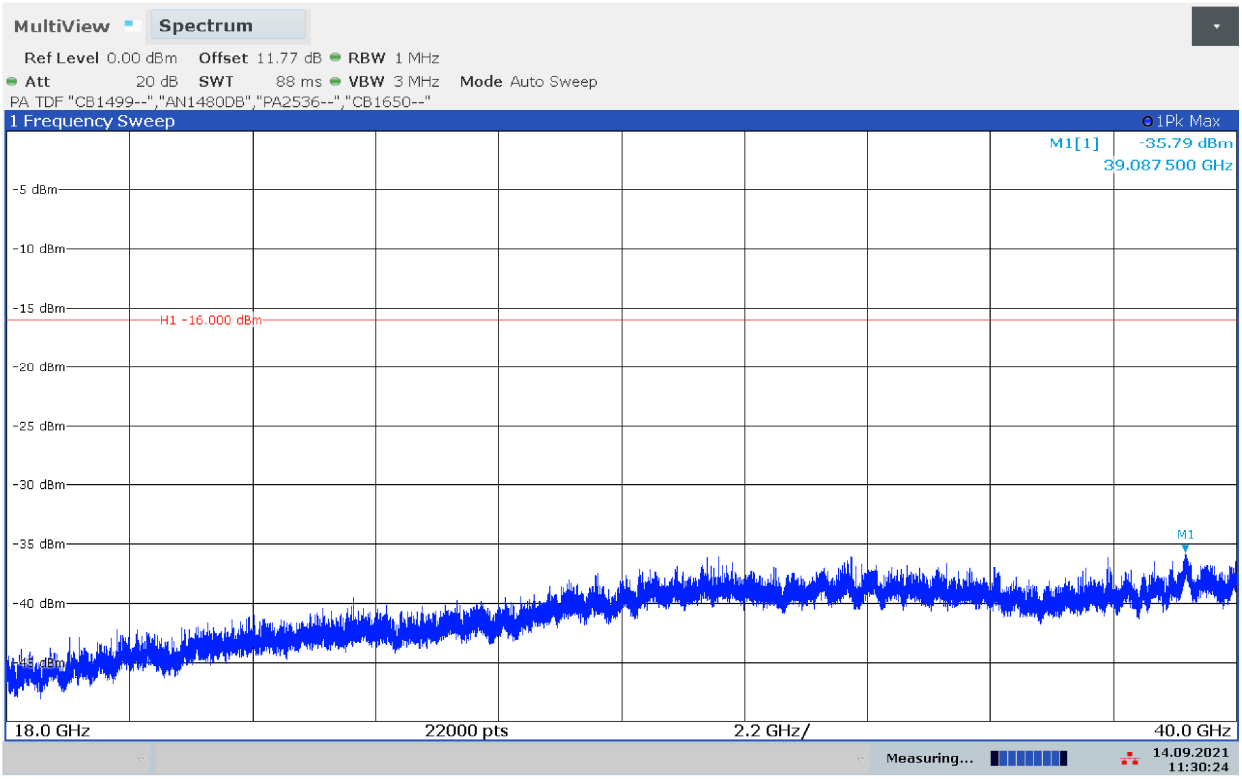
09:43:42 14.09.2021

Bottom Channel, 1GHz - 18GHz, H Pol



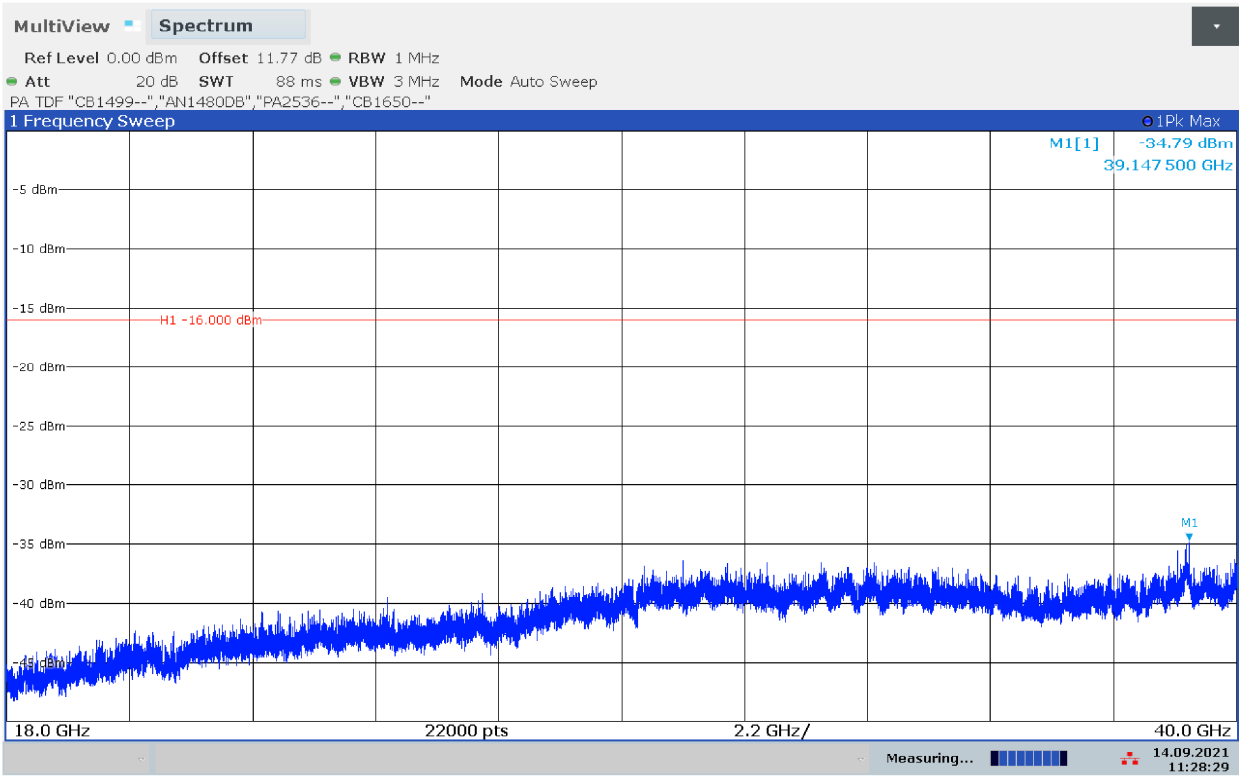
09:45:58 14.09.2021

Bottom Channel, 1GHz - 18GHz, V Pol



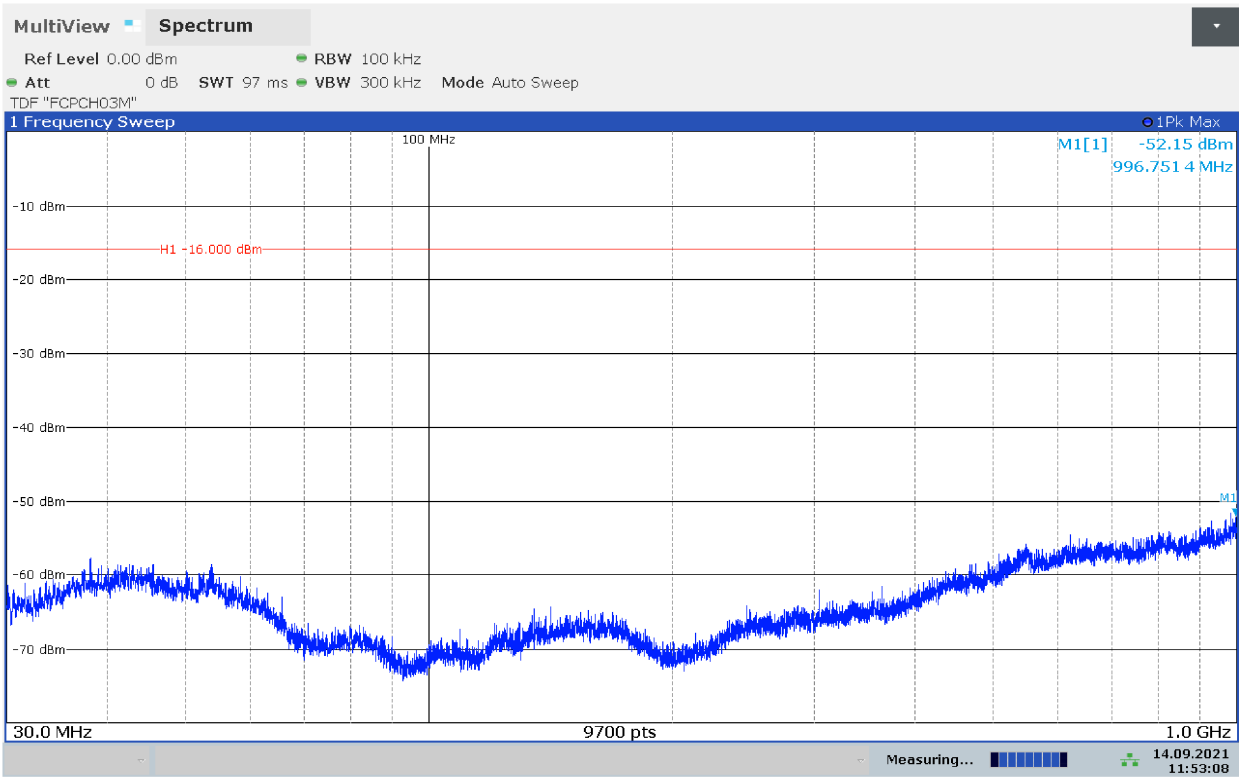
11:30:24 14.09.2021

Bottom Channel, 18GHz - 40GHz, H Pol



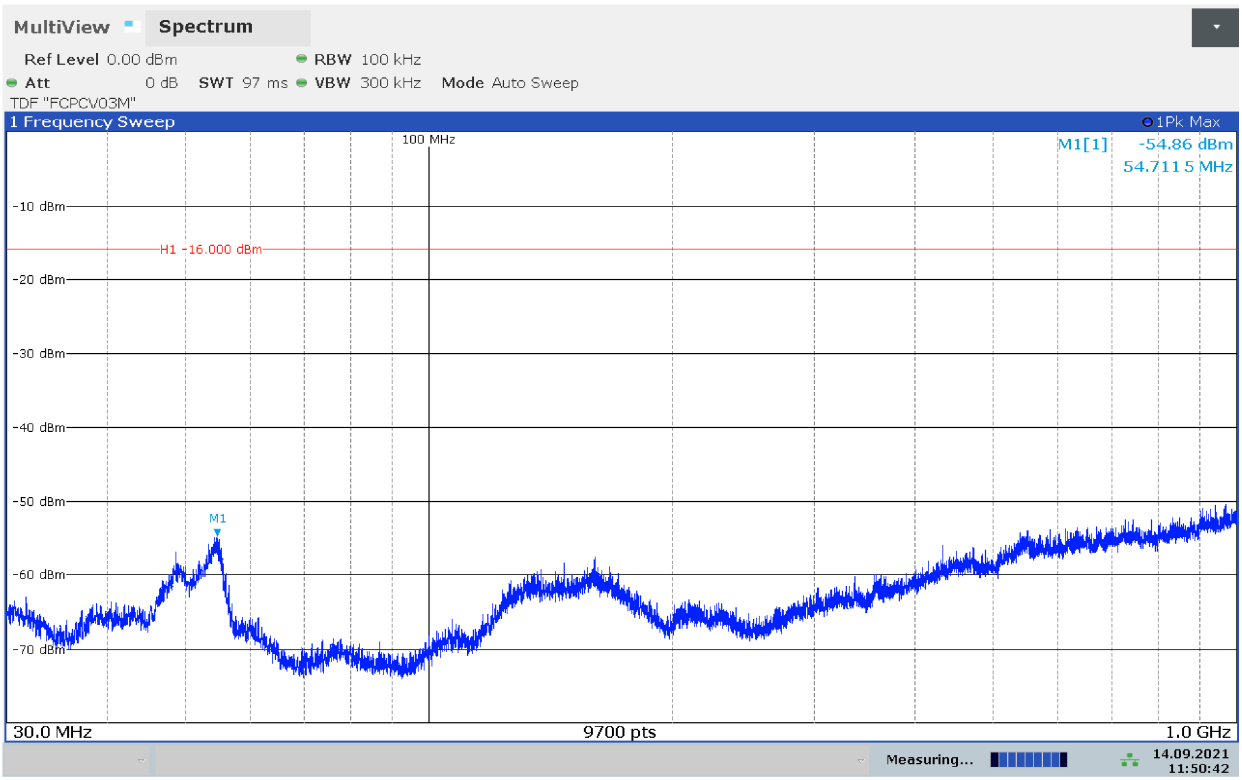
11:28:30 14.09.2021

Bottom Channel, 18GHz - 40GHz, V Pol



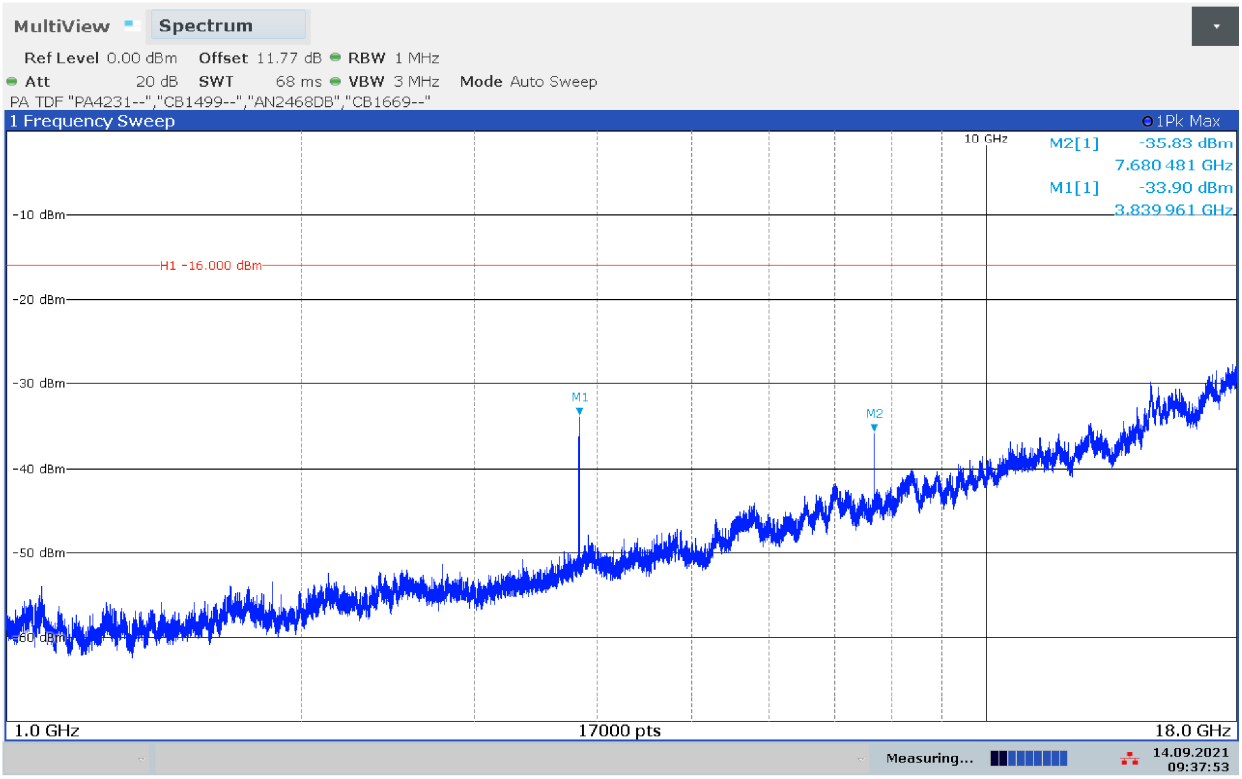
11:53:08 14.09.2021

Middle Channel, 30MHz - 1GHz, H Pol



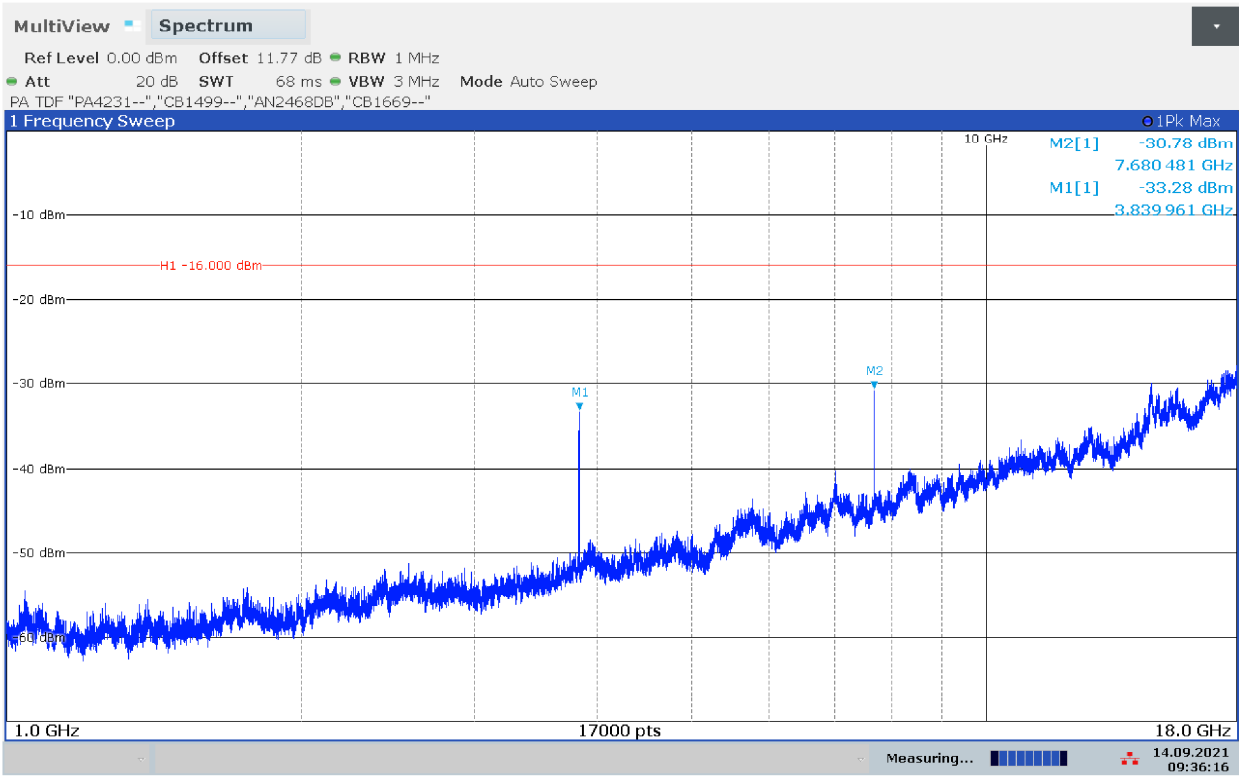
11:50:43 14.09.2021

Middle Channel, 30MHz - 1GHz, V Pol



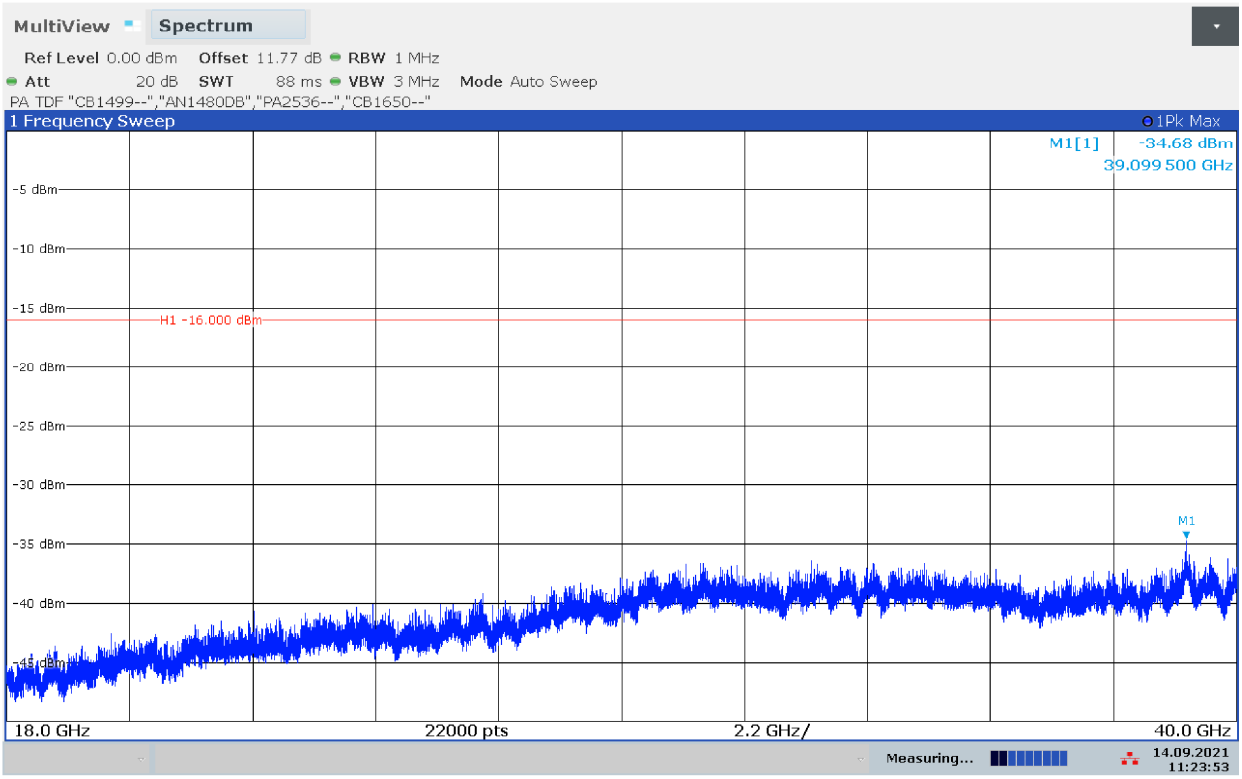
09:37:53 14.09.2021

Middle Channel, 1GHz - 18GHz, H Pol



09:36:17 14.09.2021

Middle Channel, 1GHz - 18GHz, V Pol



11:23:53 14.09.2021

Middle Channel, 18GHz - 40GHz, H Pol