

**FCC LISTED, REGISTRATION
 NUMBER: 720267**

Test report No:

**IC LISTED REGISTRATION
 NUMBER IC 4621A-1**

NIE: 44136RRF.001

**Test report
 REFERENCE STANDARD:
 USA FCC Part 90
 CANADA IC RSS-119**

Identificación del objeto ensayado.....: Identification of item tested	Outdoor Mast Mounted Base Station based on TETRA Technology
Marca Trade	PowerTrunk Inc.
Modelo y/o referencia tipo Model and /or type reference	Model: MBS Unit -K
Other identification of the product	Commercial name: MBS Unit Code: D148K01PT FCC ID: WT7PTRNKTMB5760 IC: 8624A-PTMBS760
Final HW version	CPP: 00.08.09.07
Final SW version	ENT 14.23
Serial number	870761, 870763
Características Features	Power Supply: 220/110 VAC (2A) 50/60 Hz 24 VDC (9A) Frequency Band: TX: 763-776MHz RX: 793-806 MHz RF Nominal Power: 40 dBm (10W) Access scheme: TDMA with 4 physical channels per RF channel. RF Channel Bandwidth (Channel spacing): 25 kHz. Spectrum efficiency: one voice channel per 6.25 kHz of channel bandwidth. Modulation scheme: $\pi/4$ -DQPSK with 18 Ksym/sec. modulation rate, equivalent to 36 Kbits/sec. Data rate on each physical channel: 9000 bits/sec. per 6.25 kHz of channel bandwidth. Modulation low pass filter: Root-raised-cosine filter (RRC), with a previous audio filter. Emissions Designators: 20 kHz Bandwidth Modulation: 20K0D7W, 20K0D7E, 20K0D7D. 22 kHz Bandwidth Modulation: 22K0D7W, 22K0D7E, 22K0D7D. Other Options included: - Air Interface Encryption - SNI IP Router - FallBack mode (LSC)
Peticionario Applicant	TELTRONIC, S.A.U. Polígono Malpica, Calle F-Oeste (50016). Zaragoza. España.

	VAT: A50035518 Contact person: Alexandra González Telephone: +34 976 465656/ +34 976 465722 e-mail: agonzalez@teltronic.es
Método de ensayo solicitado, norma.....: Test method requested, standard	USA FCC Part 90 10-01-13 Edition. CANADA IC RSS-119 Issue 11, June 2011. CANADA RSS-Gen Issue 4 (November 2014). Measurement Guidance 971168 D01 v02r01 for certification of Licensed Digital Transmitters
Resultado.....: Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) Approved by (name / position & signature)	A. Llamas RF Lab. Manager
Fecha de realización Date of issue	2014-12-16
Formato de informe No.....: Report template No	FDT08_15

Index

Competences and guarantees.....	4
General conditions.....	4
Uncertainty	4
Usage of samples.....	5
Test sample description	5
Test samples supplier	5
Testing period.....	5
Environmental conditions.....	6
Remarks and comments.....	7
Testing verdicts	8
Appendix A – Test results	9

Competences and guarantees

AT4 wireless is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 720267.

AT4 wireless is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: IC 4621A-1.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

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

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of AT4 wireless.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the AT4 wireless internal document PODT000.

Usage of samples

Samples undergoing test have been selected by: **the client**.

Sample M/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
44136/001	MBS Unit DC	MBS Unit -K	870761	2014-12-02
44136/009	DC cable	---	---	2014-12-02

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

All radiated tests for the DC unit and clause 90.539 Frequency stability for the DC unit indicated in appendix A.

Sample M/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
44136/002	MBS Unit AC	MBS Unit-K	870763	2014-12-02
44136/008	AC cable	---	---	2014-12-02

1. Sample M/02 has undergone the test(s):

All tests indicated in appendix A except the radiated tests for the DC unit and clause 90.539 Frequency stability for the DC unit.

Test sample description

MBS Unit is an outdoor Mast Mounted Base Station based on TETRA Technology.

Test samples supplier

TELTRONIC, S.A.U.

Polígono Malpica, Calle F-Oeste (50016). Zaragoza. España.

VAT: A50035518

Contact person: Alexandra González

Telephone: +34 976 465656/ +34 976 465722

e-mail: agonzalez@teltronic.es

Testing period

The performed test started on 2014-12-03 and finished on 2014-12-05.

The tests have been performed at AT4 wireless.

Environmental conditions

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

Temperature	Min. = 22.08 °C Max. = 23.68 °C
Relative humidity	Min. = 32.09 % Max. = 47.07 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber the following limits were not exceeded during the test.

Temperature	Min. = 21.40 °C Max. = 22.71 °C
Relative humidity	Min. = 41.52 % Max. = 43.82 %
Air pressure	Min. = 1019 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

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

Temperature	Min. = 22.7 °C Max. = 25.2 °C
Relative humidity	Min. = 49.9 % Max. = 47.3 %
Air pressure	Min. = 1019 mbar Max. = 1019 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

Remarks and comments

1: Used instrumentation.

Conducted Measurements

		Last Cal. date	Cal. due date
1.	Spectrum analyser Agilent PSA E4440A	2014/05	2016/05
2.	Climatic chamber CTS C-70/600	2014/01	2015/01
3.	DC power supply R&S NGPE 40/40	2014/11	2017/11
4.	AC power supply CHROMA 6490	2013/11	2015/11
5.	Radiocommunication analyser HP 8920A	2014/01	2017/01
6.	Wideband Power sensor R&S NRP-Z81	2014/03	2016/03

Radiated Measurements

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber ETS FACT3 200STP	N.A.	N.A.
2.	BiconicalLog antenna ETS LINDGREN 3142E	2014/03	2017/03
3.	Multi Device Controller EMCO 2090	N.A.	N.A.
4.	Double-ridge Guide Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2013/11	2016/11
5.	EMI Test Receiver R&S ESU 26	2013/08	2015/08
6.	Spectrum analyser Rohde & Schwarz FSW50	2013/10	2015/10
7.	RF pre-amplifier 10 MHz-6 GHz SCHWARZBECK BBV9743	2014/02	2015/02
8.	RF pre-amplifier 1-18 GHz Schwarzbeck BBV 9718	2014/02	2015/02
9.	DC power supply R&S NGPE 40/40	2014/11	2017/11
10.	AC power supply CHROMA 6490	2013/11	2015/11

2: This information has been provided by the applicant.

Testing verdicts

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

FCC PART 90 / IC RSS-119 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 90.207 / RSS-119 Clause 5.2: Modulation characteristics				NM ²
Clause 90.543 / RSS-119 Clause 5.5: Occupied Bandwidth		P		
Clause 90.205, 90.541, 90.635 / RSS-119 Clause 4.1, 5.4: RF output power		P		
Clause 90.543 / RSS-119 5.5, 5.8.9.: Emission limitations. ACP		P		
Clause 90.539 / RSS-119 Clause 5.3: Frequency stability		P		
Clause 90.543 / RSS-119 Clause 5.8.9.2: Spurious emissions at antenna terminals		P		
Clause 90.543 / RSS-119 Clause 5.8.9.2: Radiated emissions		P		

2: see point "Remarks and comments".

Appendix A – Test results

INDEX

TEST CONDITIONS	11
Clause 90.207 / RSS-119 Clause 5.2: Modulation characteristics.....	12
Clause 90.543 / RSS-119 Clause 5.5: Occupied Bandwidth	14
Clause 90.205, 90.541, 90.635 / RSS-119 Clause 4.1, 5.4: RF output power (conducted).....	19
Clause 90.543 / RSS-119 5.5, 5.8.9.: Emission limitations.ACP	20
Clause 90.539 / RSS-119 Clause 5.3: Frequency stability	40
Clause 90.543 / RSS-119 Clause 5.8.9.2: Spurious emissions at antenna terminals	42
Clause 90.543 / RSS-119 Clause 5.8.9.2: Radiated emissions	50

TEST CONDITIONS

Power supply DC (V):

$$V_{\text{nom}} = 24 \text{ Vdc}$$

$$V_{\text{max}} = 27.6 \text{ Vdc}$$

$$V_{\text{min}} = 20.4 \text{ Vdc}$$

Power supply AC (V):

$$V_{\text{nom}} = 110 \text{ Vac (60 Hz)}$$

$$V_{\text{max}} = 126.5 \text{ Vac}$$

$$V_{\text{min}} = 93.5 \text{ Vac}$$

The subscripts nom, min and max indicate voltage test conditions (nominal, minimum and maximum respectively, as declared by the applicant).

Type of power supply = DC/AC Voltage from external power supply

Type of antenna = external connectable antenna

RF Output Power: 40 dBm (10W).

TEST FREQUENCIES:

FCC 20 kHz bandwidth	769-775 MHz band
Lowest channel	769.0125 MHz
Middle channel	772.0125 MHz
Highest channel	774.9875 MHz
IC 20 kHz and 22 kHz bandwidth	768-776 MHz band
Lowest channel	768.0125 MHz
Middle channel	772.0125 MHz
Highest channel	775.9875 MHz

Clause 90.207 / RSS-119 Clause 5.2: Modulation characteristics

SPECIFICATION

FCC §2.1047 and §90.207

(a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

(b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

(c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power. A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of § 2.1049 for the occupied bandwidth tests.

(d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

IC RSS-119 5.2.

Equipment that operates in frequency bands other than 764-776 MHz and 794-806 MHz may employ any type of modulation. Equipment that operates in the bands 764-776 MHz and 794-806 MHz shall use digital modulation.

Mobile and portable transmitters that operate in these bands may have analogue modulation capability only as a secondary mode in addition to their primary digital mode. However, mobile and portable transmitters that operate only on the low-power channel as defined in SRSP-511 may employ any type of modulation.

RESULTS (The following information has been provided by the applicant)

TRANSMITTER LOW PASS FILTER

The EUT operates with $\pi/4$ -shifted Differential Quaternary Phase Shift Keying ($\pi/4$ -DQPSK), with a modulation rate of 18k symbol/sec (36kbits/sec).

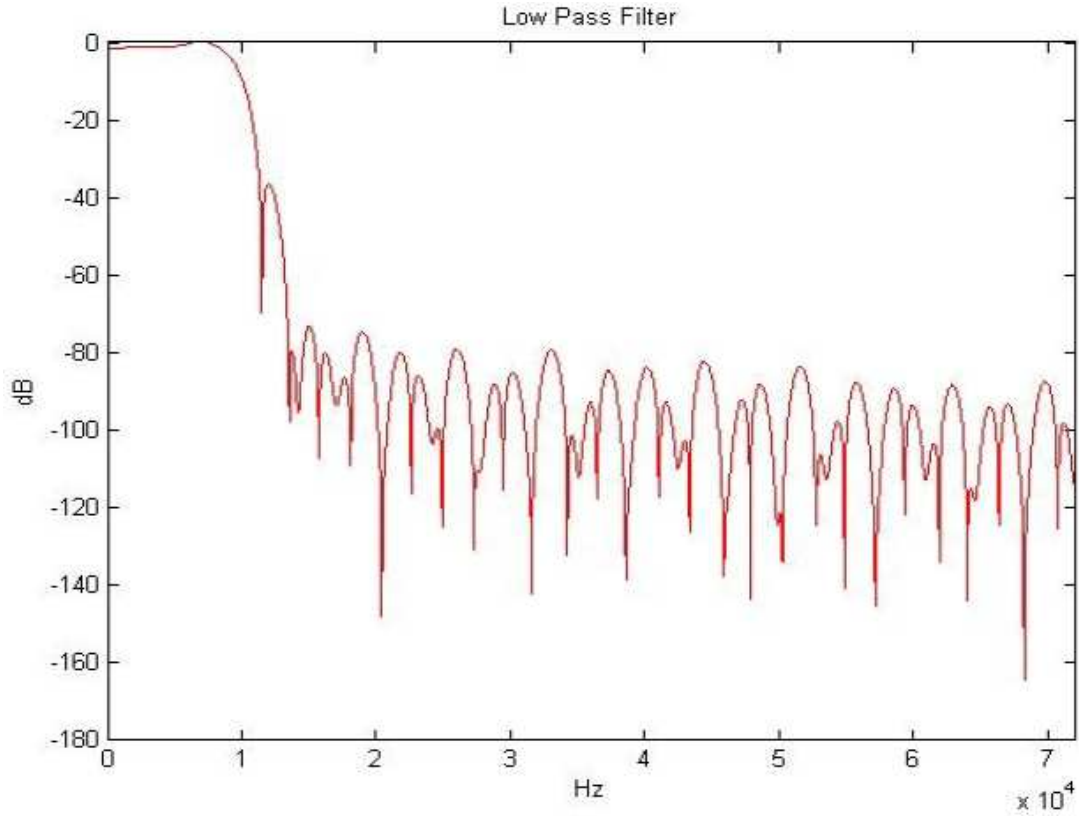
The access scheme is TDMA with 4 physical channels per carrier.

A root-raised-cosine filter (RRC) is used as a transmitting and receiving filter in this digital communication system to perform matched filtering. The combined response of such two filters is that of the raised-cosine filter.

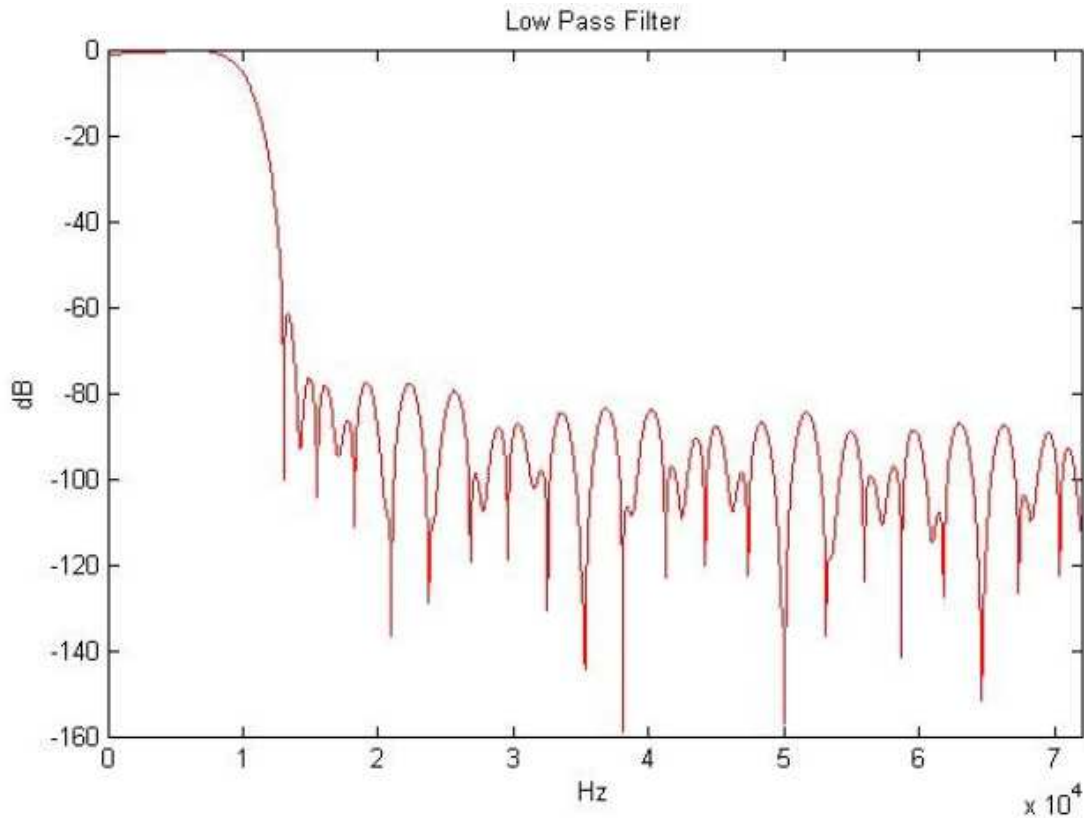
The raised-cosine filter is often used for pulse-shaping in digital modulation, known for its ability to minimize intersymbol interference (ISI).

The two graphs of the next page show the transfer function of the aforementioned filter when the authorized modulation bandwidth is 20 kHz and 22 kHz respectively.

MBS Unit Transmitter low pass filter for 20 kHz bandwidth modulation.



MBS Unit Transmitter low pass filter for 22 kHz bandwidth modulation.



Clause 90.543 / RSS-119 Clause 5.5: Occupied Bandwidth

SPECIFICATION

FCC §2.1046, §90.543

(d) Authorized bandwidth. Provided that the ACP requirements of this section are met, applicants may request any authorized bandwidth that does not exceed the channel size.

RSS-Gen 6.6, RSS-119 5.5

Frequency Band (MHz)	Related SRSP for Channelling Plan and e.r.p.	Channel Spacing (kHz)	Authorized Bandwidth (kHz)
764-776 and 794-806	SRSP-511	6.25	Note 2
		12.5	
		25	
		50	

Note 2: Provided that the ACP requirements in Section 5.8.9.1 are met, any authorized bandwidth that does not exceed the channel bandwidth can be used.

METHOD

The EUT was configured to transmit a modulated carrier signal. An IF bandwidth of 300 Hz was used to determine the occupied bandwidth of the modulated emission. The 99% occupied bandwidth and the -26 dBc bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyser E4440A.

The occupied Bandwidth was measured according to point 4.2 of Guidance 971168 D01 Power Meas License Digital Systems v02r01.

RESULTS (see next plots)

FCC 769-775 MHz band. 20 kHz.

Channel	Lowest	Highest
99% Occupied bandwidth (kHz)	19.2895	19.1989
-26 dBc bandwidth (kHz)	21.516	21.547
Measurement uncertainty (kHz)	<±0.32	

IC 768-776 MHz band. 20 kHz.

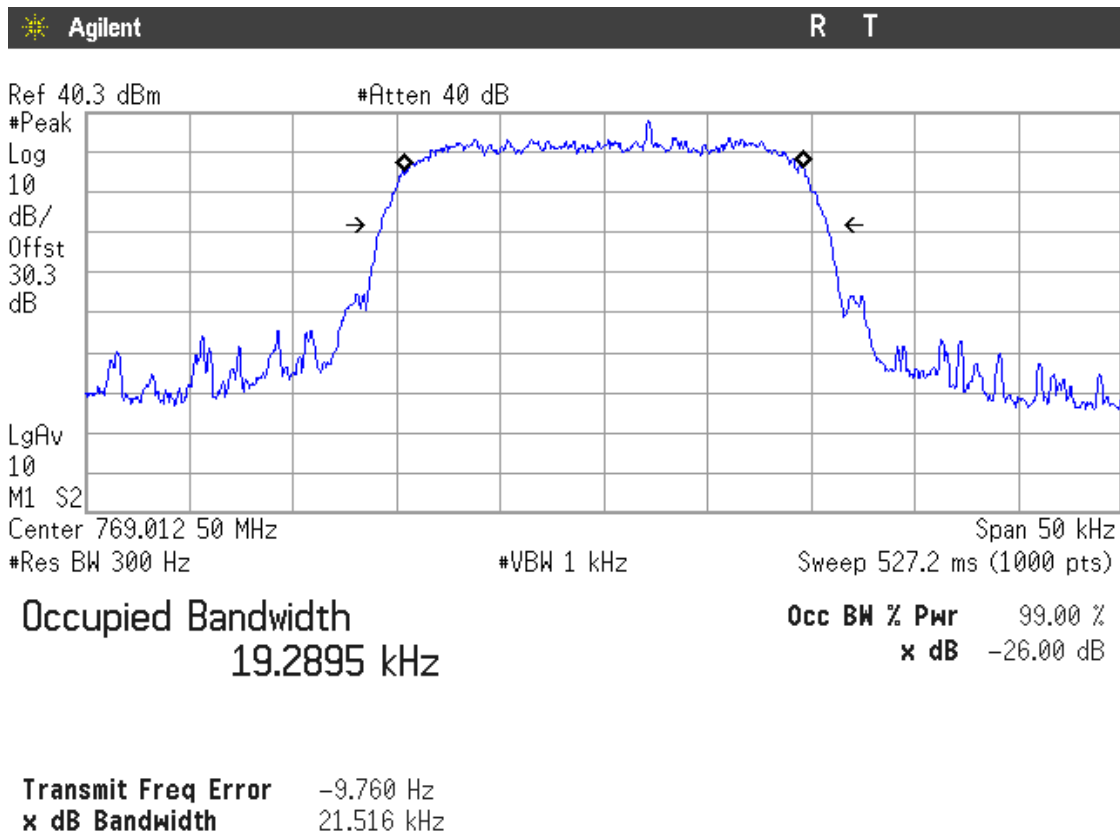
Channel	Lowest	Highest
99% Occupied bandwidth (kHz)	19.3181	19.1991
-26 dBc bandwidth (kHz)	21.895	21.736
Measurement uncertainty (kHz)	<±0.32	

IC 768-776 MHz band. 22 kHz.

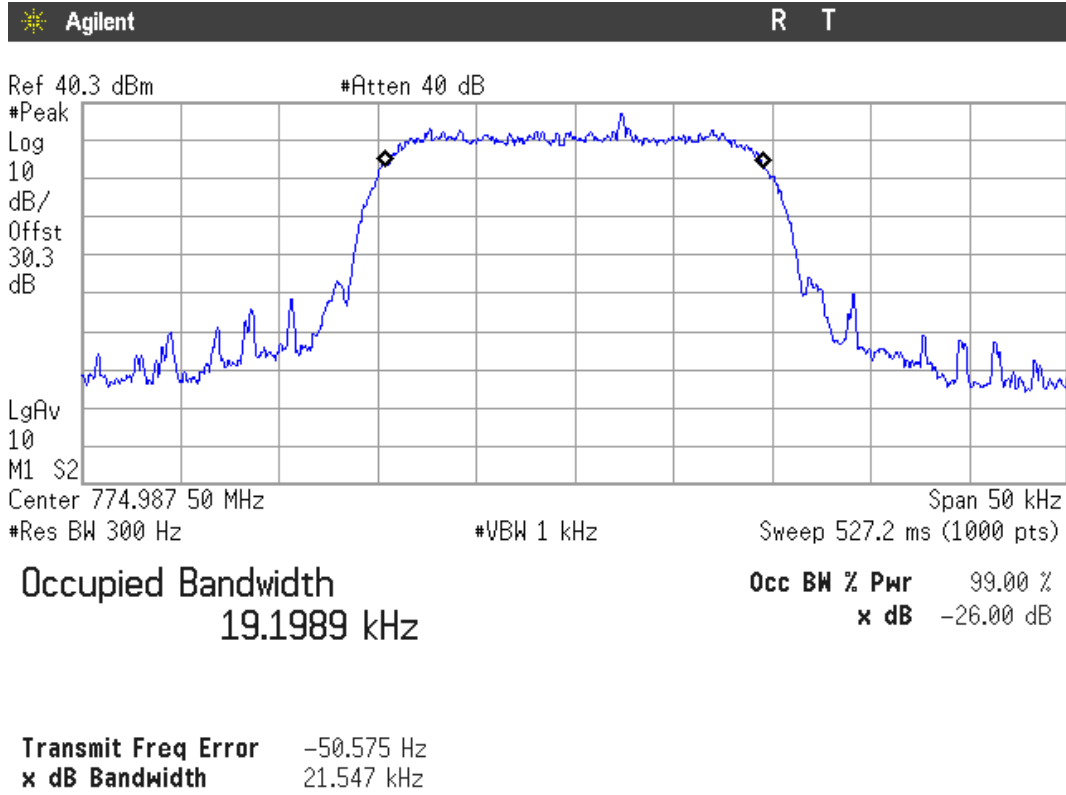
Channel	Lowest	Highest
99% Occupied bandwidth (kHz)	20.4229	20.4046
-26 dBc bandwidth (kHz)	23.434	23.446
Measurement uncertainty (kHz)	<±0.32	

FCC 769-775 MHz band. 20 kHz.

Lowest Channel

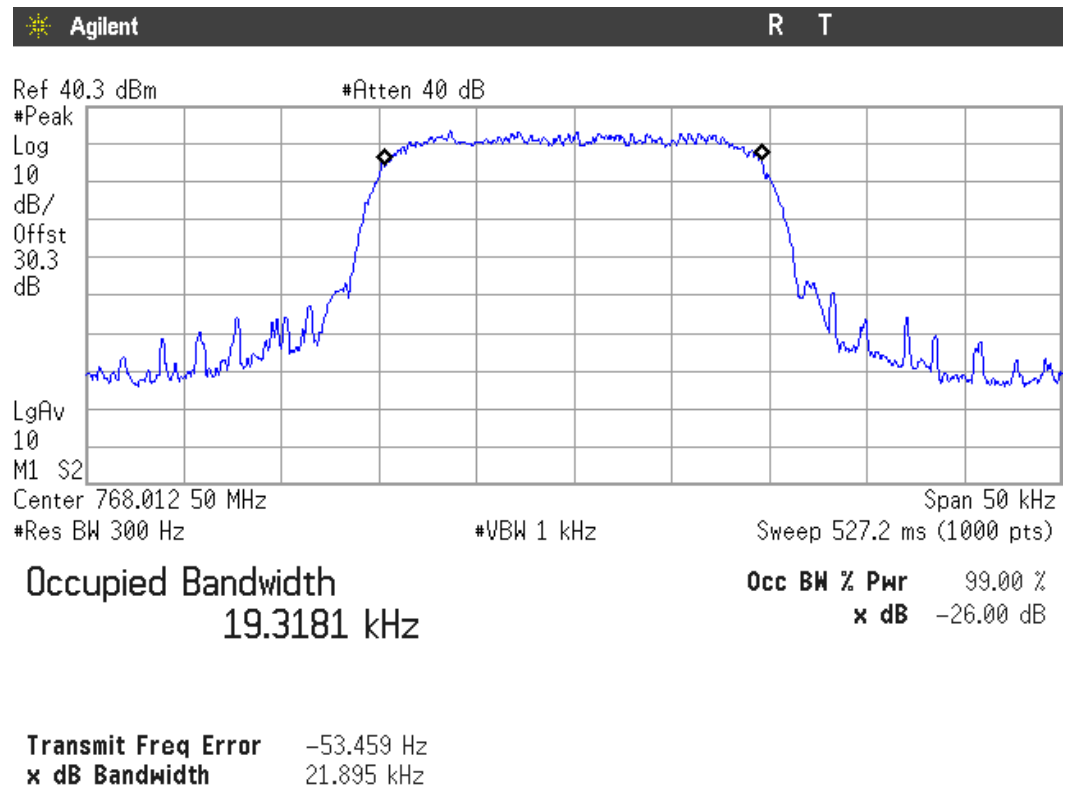


Highest Channel

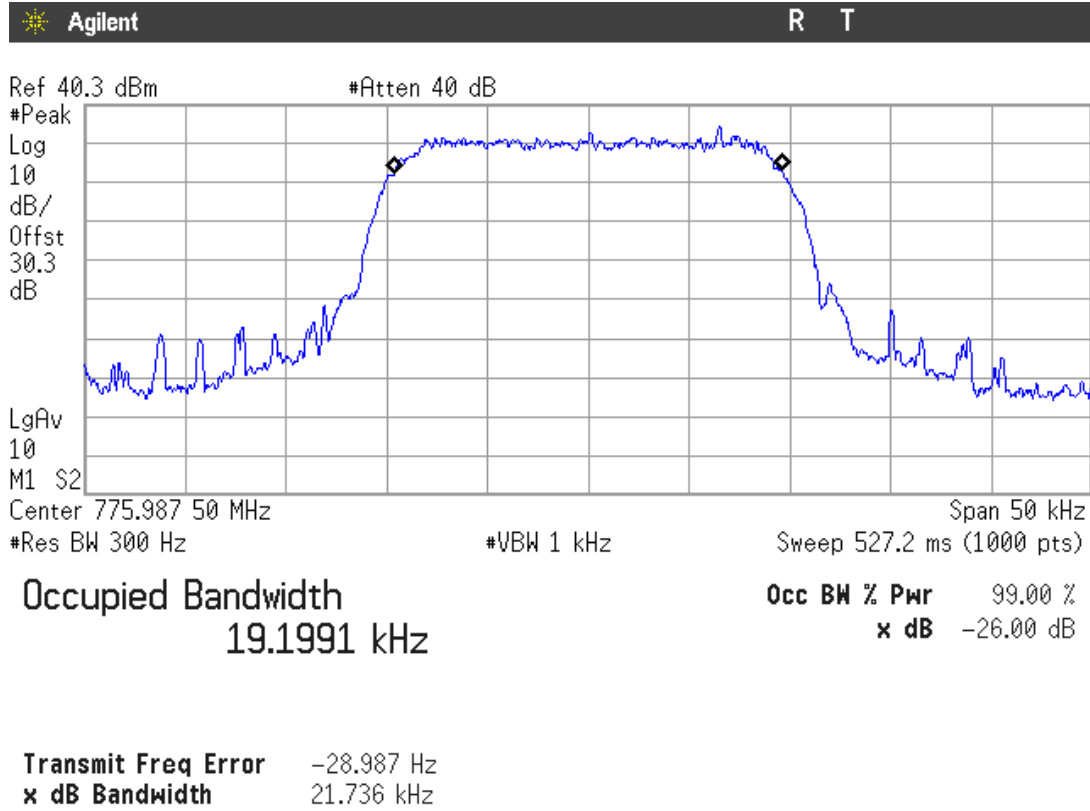


IC 768-776 MHz band. 20 kHz.

Lowest Channel

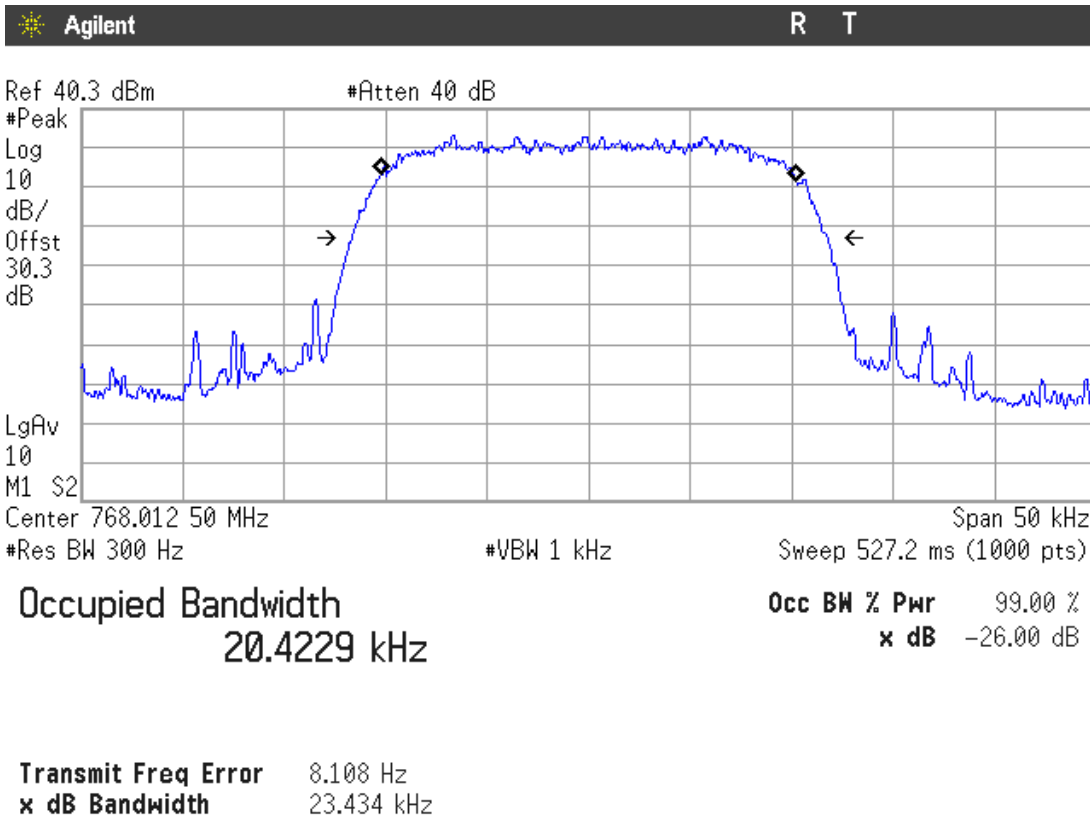


Highest Channel

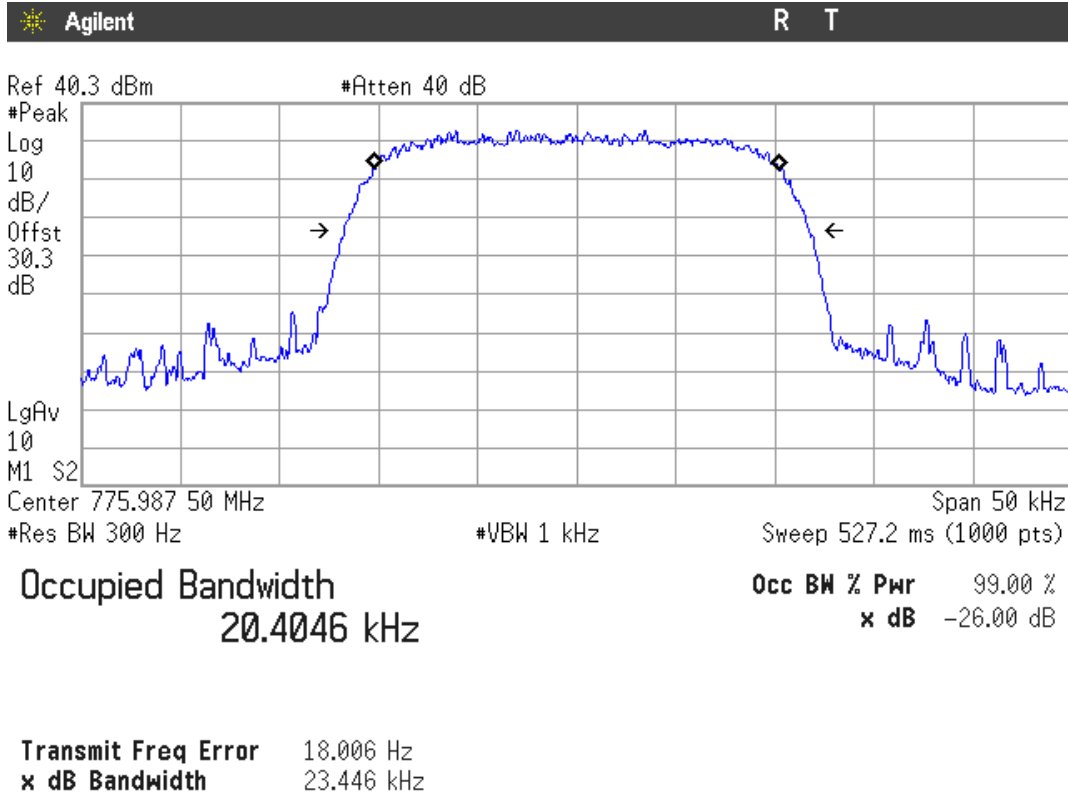


IC 768-776 MHz band. 22 kHz.

Lowest Channel



Highest Channel



Clause 90.205, 90.541, 90.635 / RSS-119 Clause 4.1, 5.4: RF output power (conducted)

SPECIFICATION

FCC §2.1046, §90.205, §90.541 and §90.635.

(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw/60dBm) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

RSS-Gen 6.12, RSS-119 4.1, 5.4.

The output power shall be within ± 1.0 dB of the manufacturer's rated power.

METHOD

The conducted RF output power measurements were made at the RF output terminals of the EUT using an attenuator and a calibrated wideband power sensor.

RESULTS

RF declared rated Average Power: 40dBm (10W).

FCC. 769-775 MHz band	Frequency (MHz)	Maximum average power (dBm)	Maximum peak power (dBm)
20 kHz Bandwidth	769.0125	40.77	45.21
	774.9875	40.32	45.16
Measurement uncertainty (dB)		± 0.5	

IC. 768-776 MHz band	Frequency (MHz)	Maximum average power (dBm)	Maximum deviation (dB)
20 kHz Bandwidth	768.0125	40.84	0.84
	775.9875	40.20	0.20
22 kHz Bandwidth	768.0125	40.61	0.61
	775.9875	39.97	-0.03
Measurement uncertainty (dB)		± 0.5	

Verdict: PASS

Clause 90.543 / RSS-119 5.5, 5.8.9.: Emission limitations.ACP

SPECIFICATION

FCC §90.543.

(a) The Adjacent Channel Power (ACP) requirements for Base transmitter and 25 kHz channel size are shown in the following table. The table specify a value for the ACP as a function of the displacement from the channel center frequency and measurement bandwidth. In the following tables, “(s)” indicates a swept measurement may be used.

25 KHZ BASE TRANSMITTER ACP REQUIREMENTS

Offset from center frequency (kHz)	Measurement bandwidth (kHz)	Maximum ACP (dBc)
15.625	6.25	-40
21.875	6.25	-60
37.5	25	-60
62.5	25	-65
87.5	25	-65
150	100	-65
250	100	-65
350	100.00	-65
>400 kHz to 12 MHz	30 (s)	-80
12 MHz to paired receive band	30 (s)	-80
In the paired receive band	30 (s)	-100

RSS-119 5.5, 5.8.9.

The ACP of transmitters operating in the bands 764-776 MHz and 794-806 MHz shall comply with the requirements in the following tables for Base transmitter with 25 kHz channel size. The tables specify a maximum value for the ACP relative to the maximum output power as a function of the displacement, f_d , from the channel centre frequency. In the tables, “(s)” indicates that a swept measurement may be used.

Table 14 – 25 kHz Transmitter ACP Requirements

Displacement Frequency, f_d (kHz)	Maximum Relative ACP (dBc)		Measurement Bandwidth (kHz)
	Mobile Station	Base Station	
15.625	-40	-40	6.25
21.875	-60	-60	6.25
37.50	-60	-60	25.00
62.50	-65	-65	25.00
87.50			25.00
150.00	-65	-65	100.00
250.00			
350.00			
$400 \leq f_d \leq 12 \text{ MHz}$	-75	-80	30(s)
$12 \text{ MHz} \leq f_d \leq \text{paired receive band}$			
In the paired receive band	-100	-100	

METHOD

The Adjacent Channel Power measurements were made at the RF output terminals of the EUT using an attenuator and a spectrum analyser with a built-in adjacent channel power (ACP) measurement function.

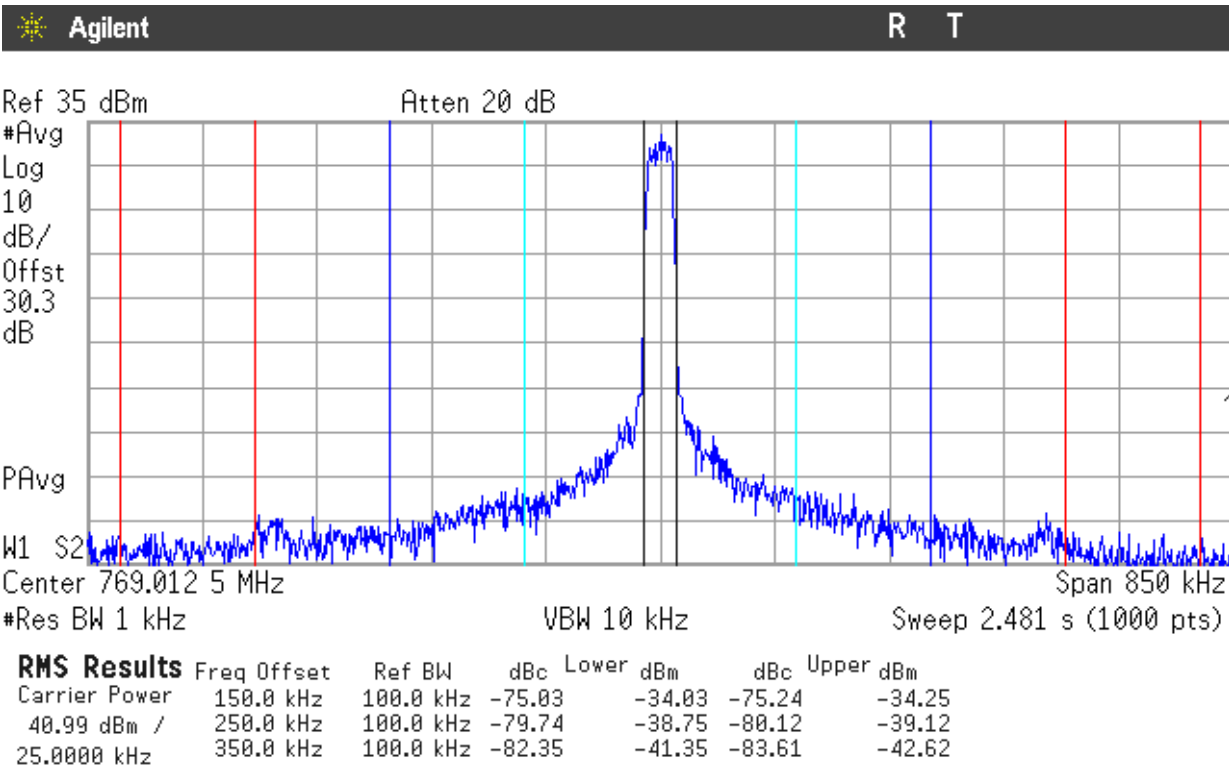
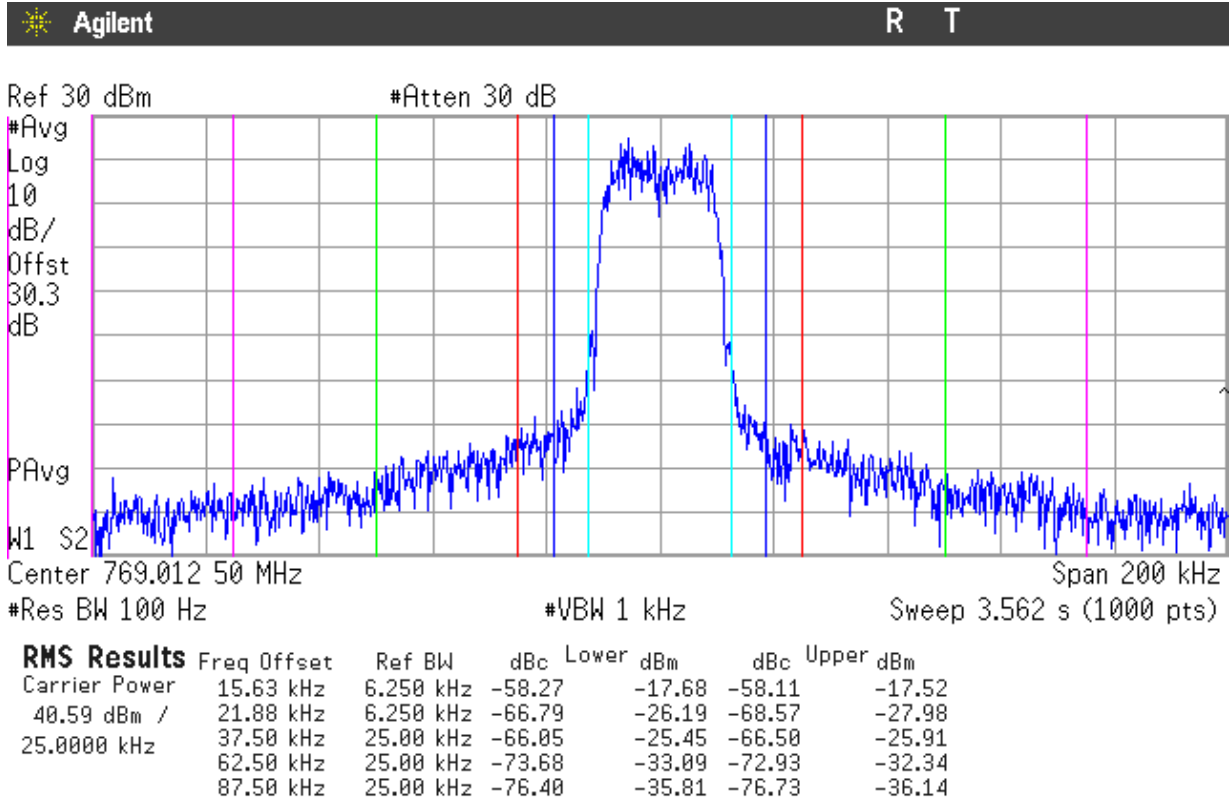
RESULTS

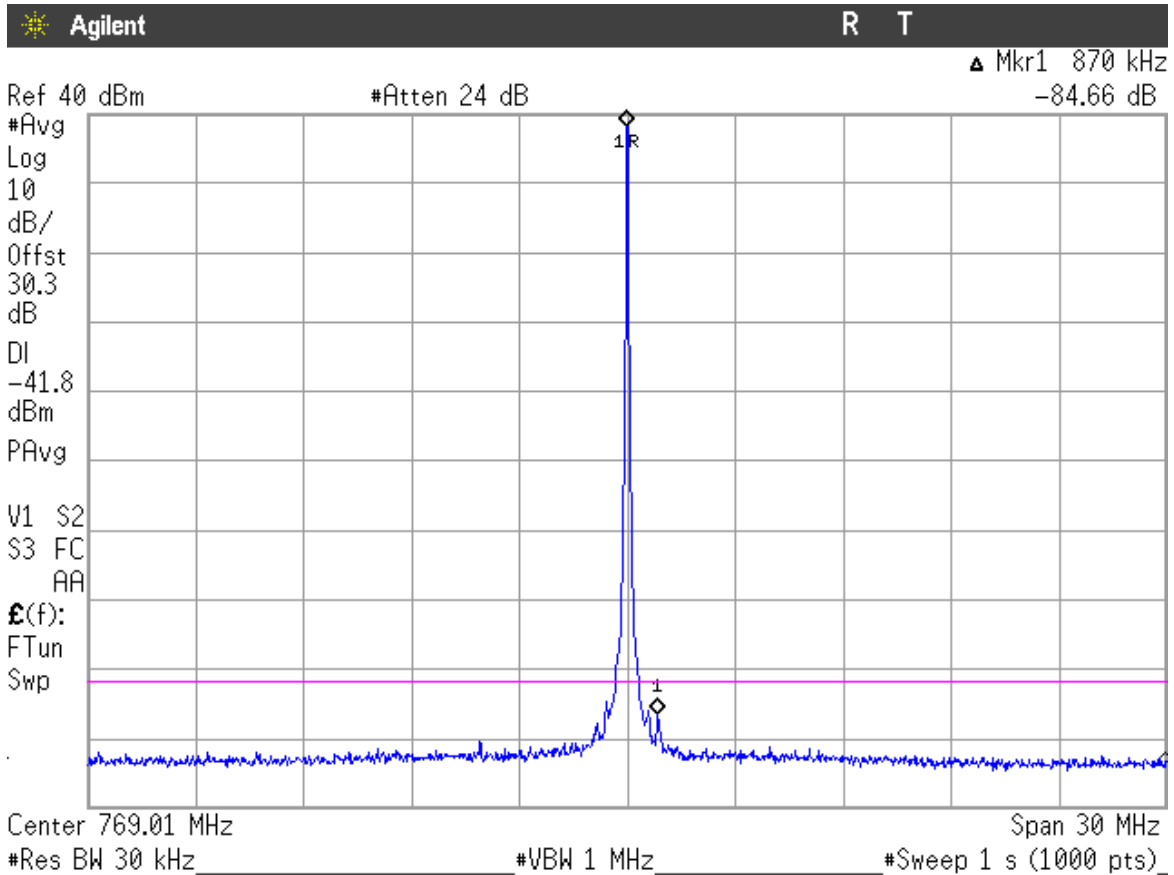
See next plots.

Verdict: PASS

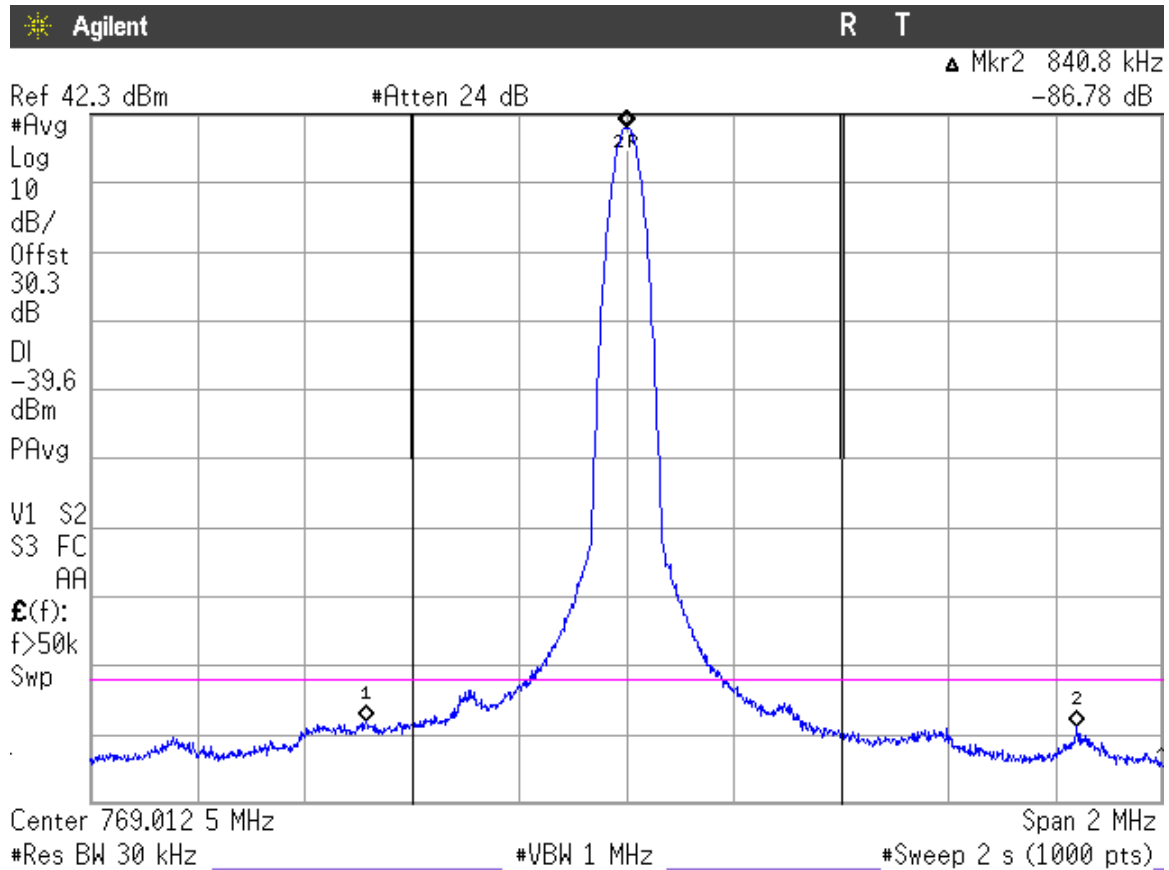
FCC 769-775 MHz band. 20 kHz.

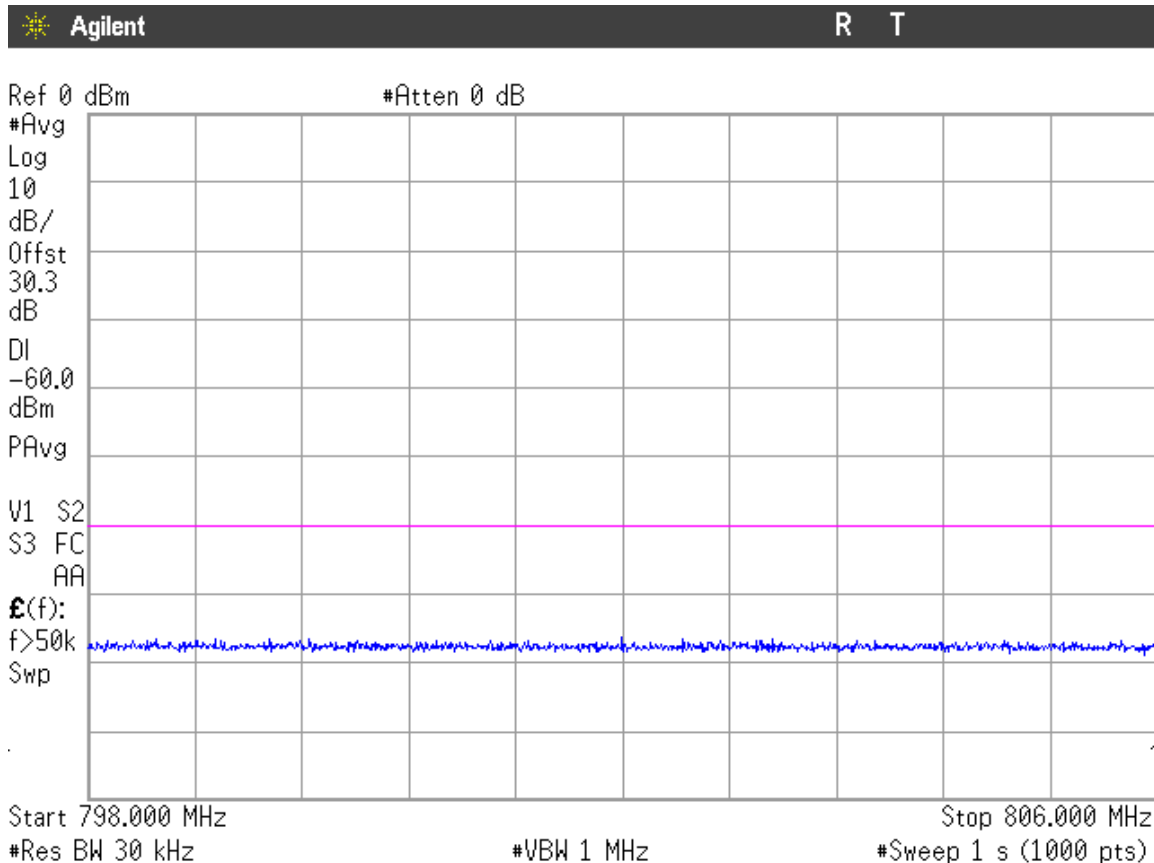
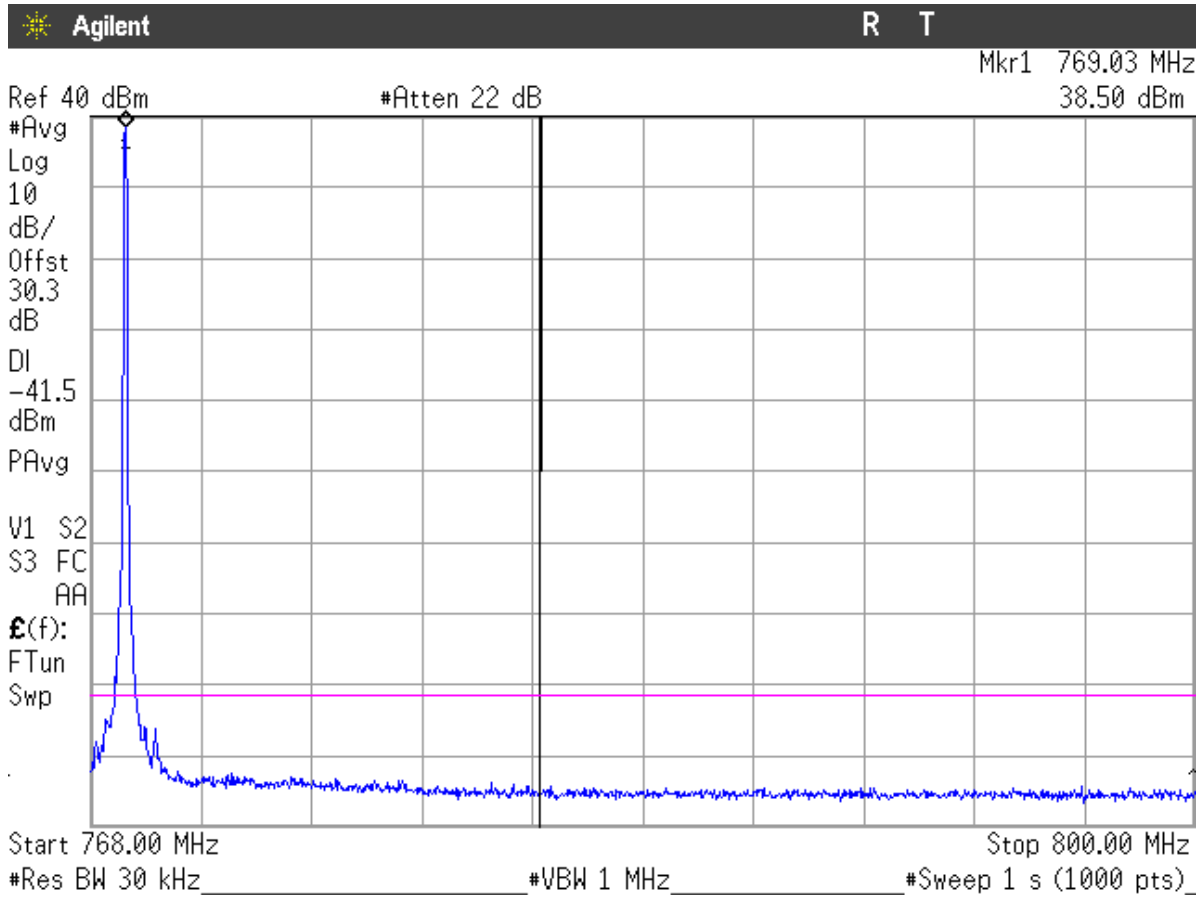
Lowest Channel



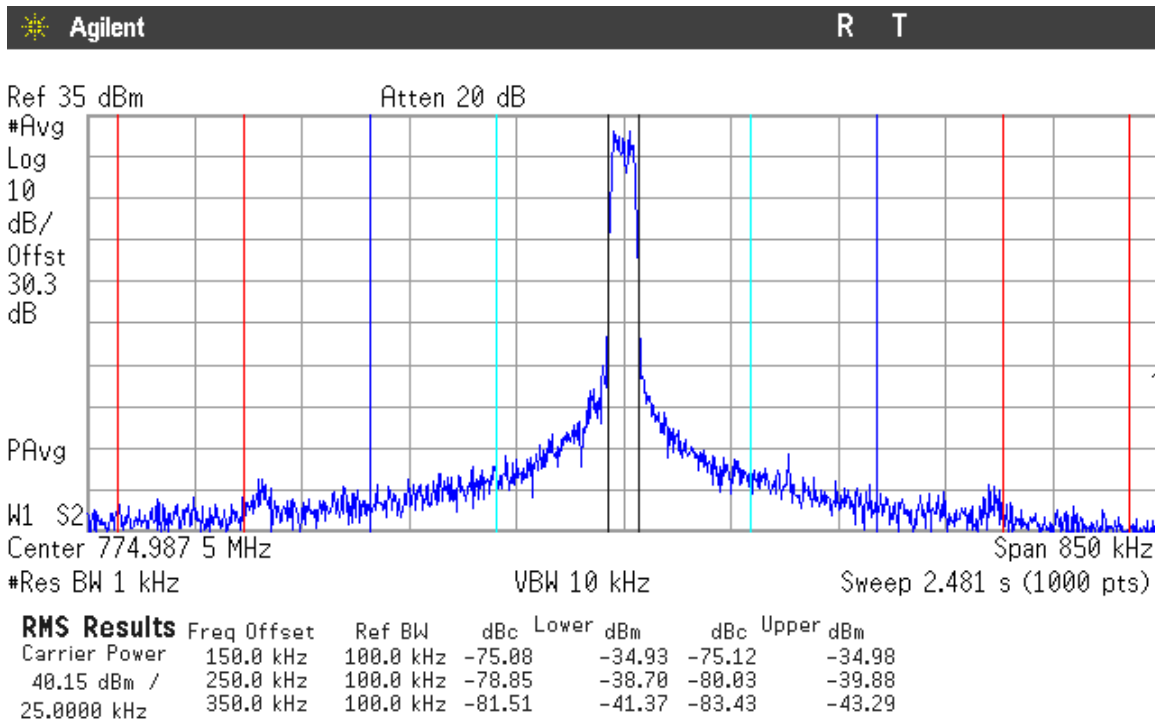
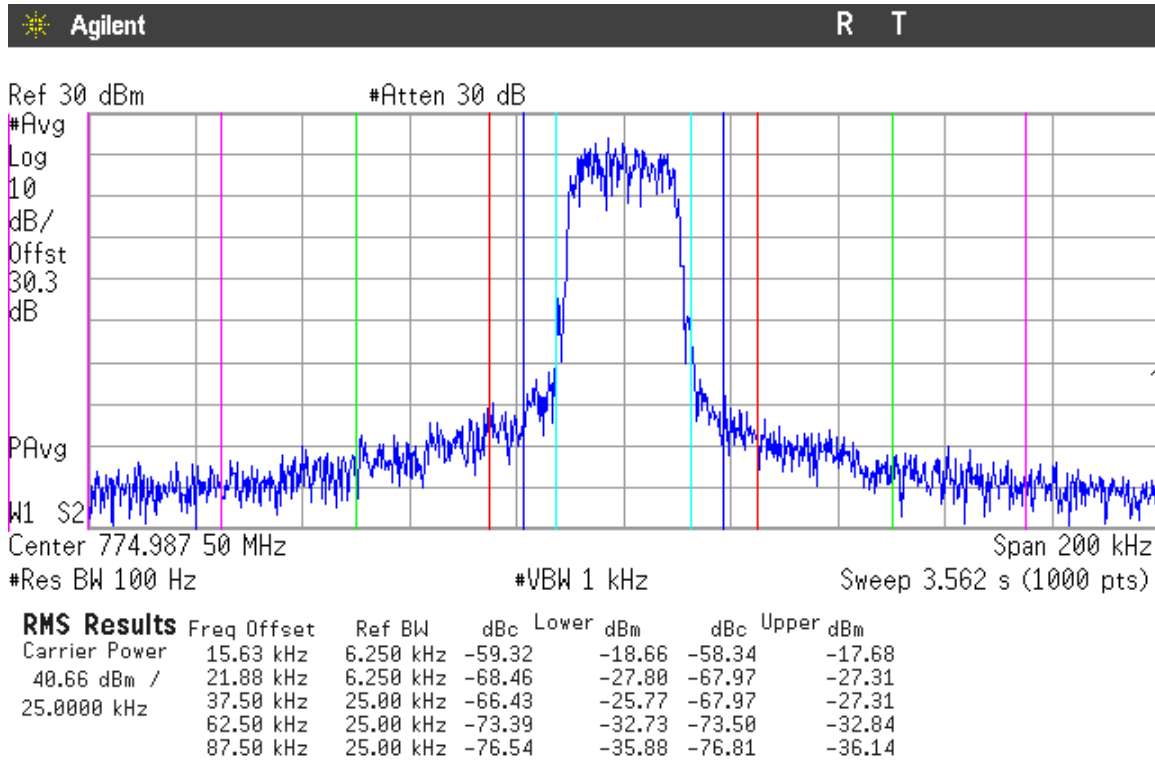


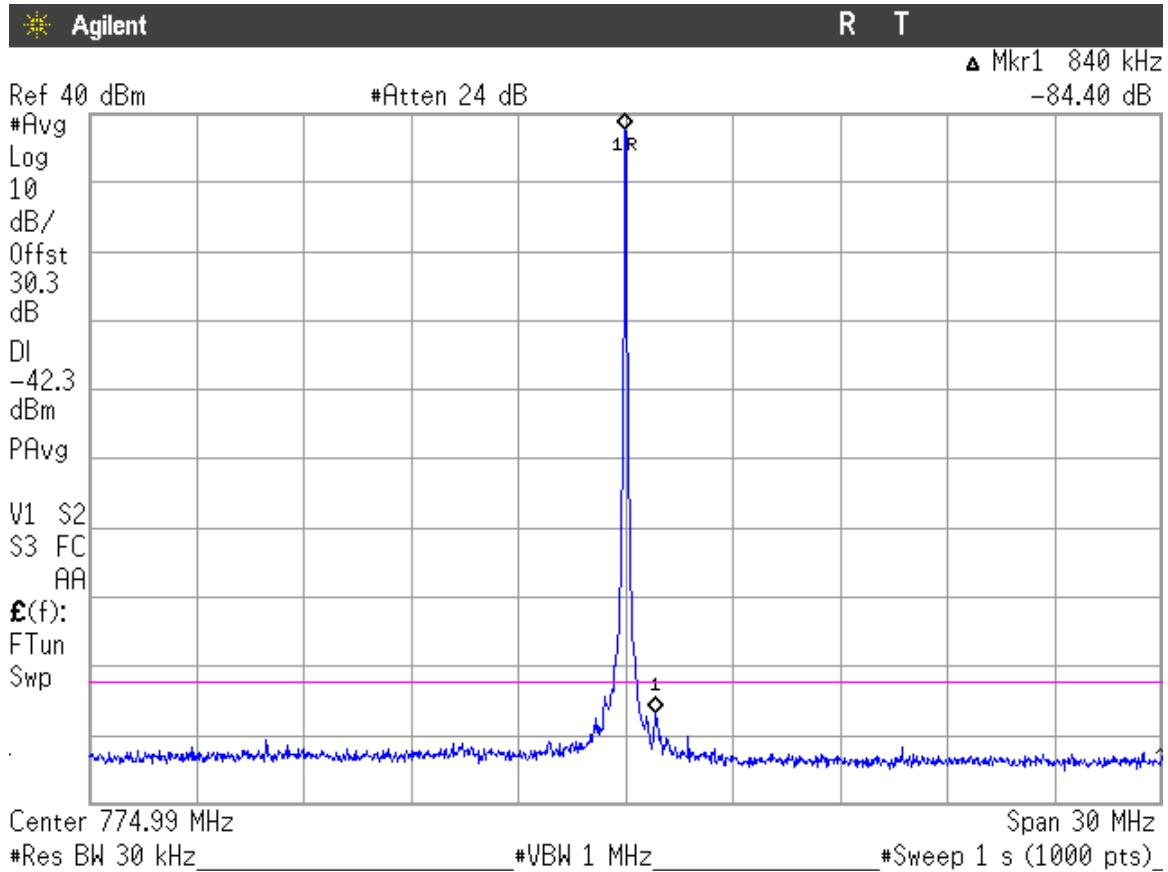
Band Edge measurement close to carrier.



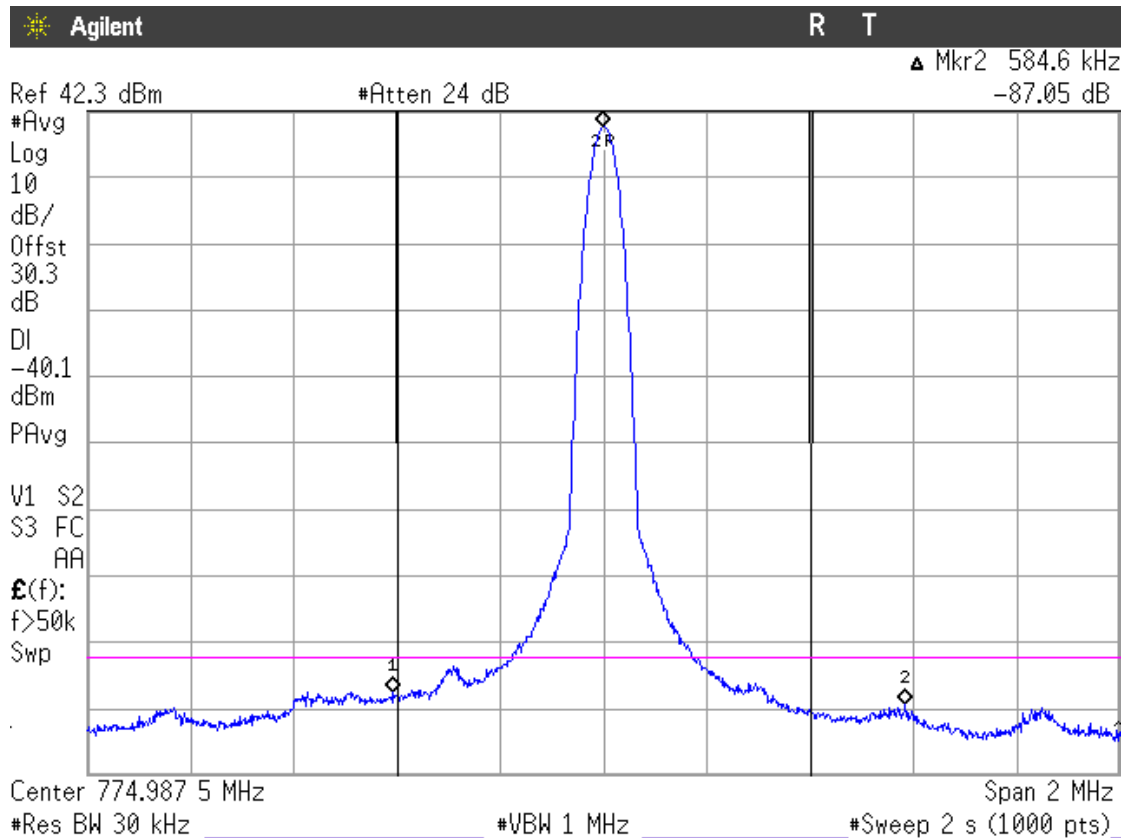


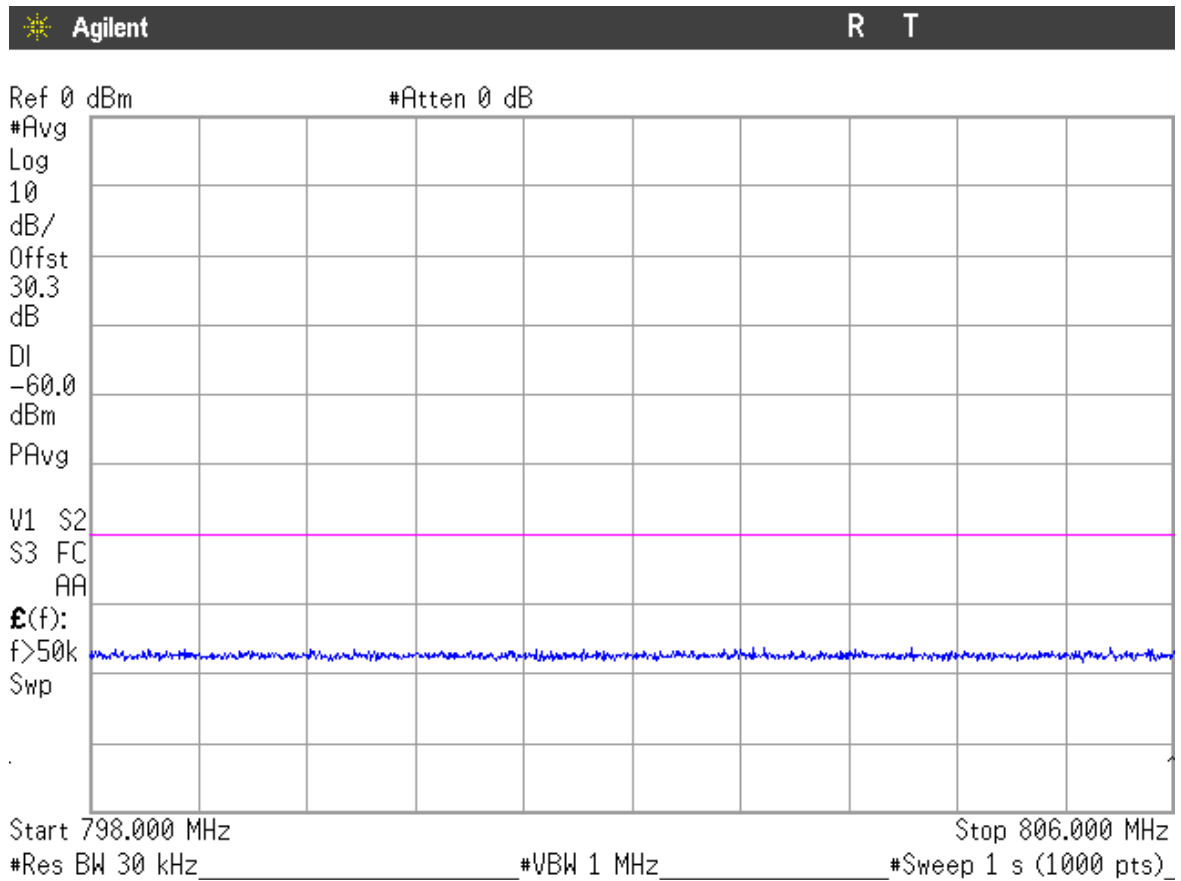
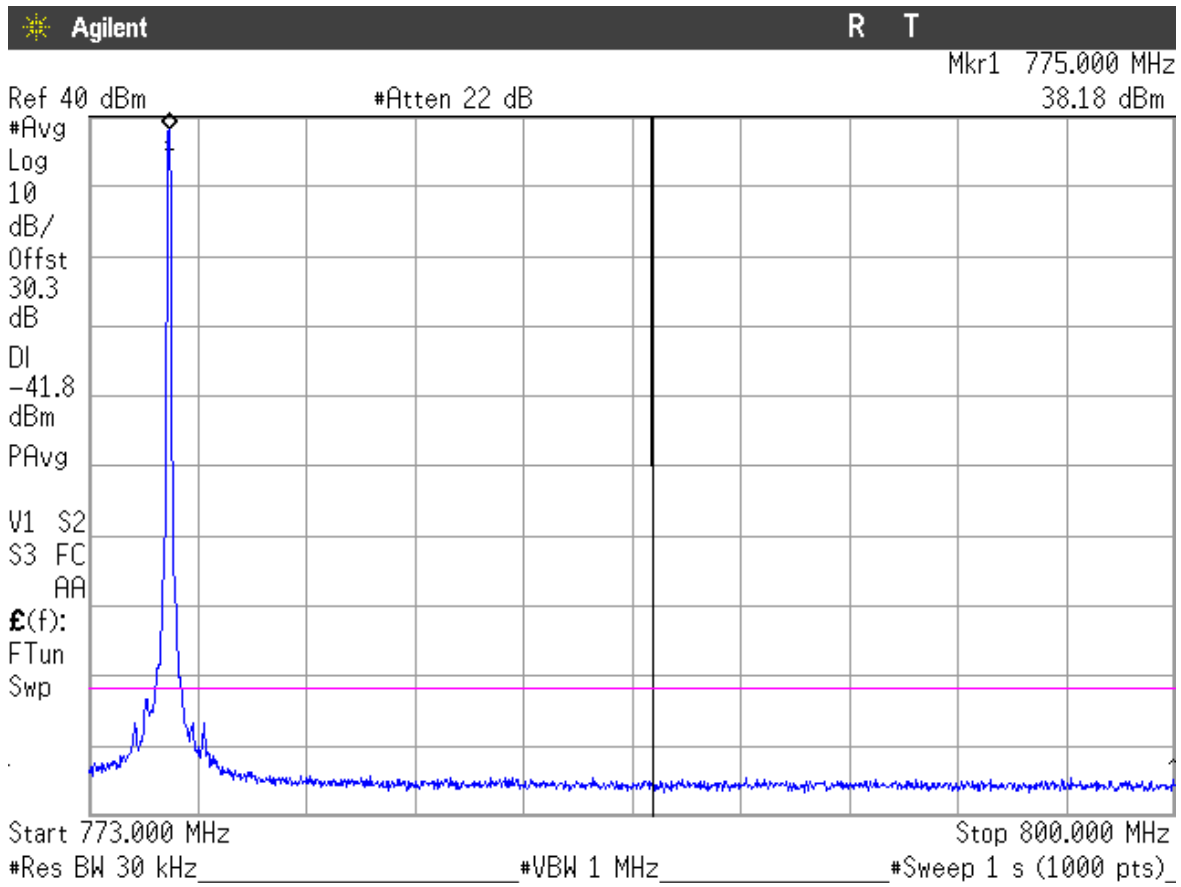
Highest Channel





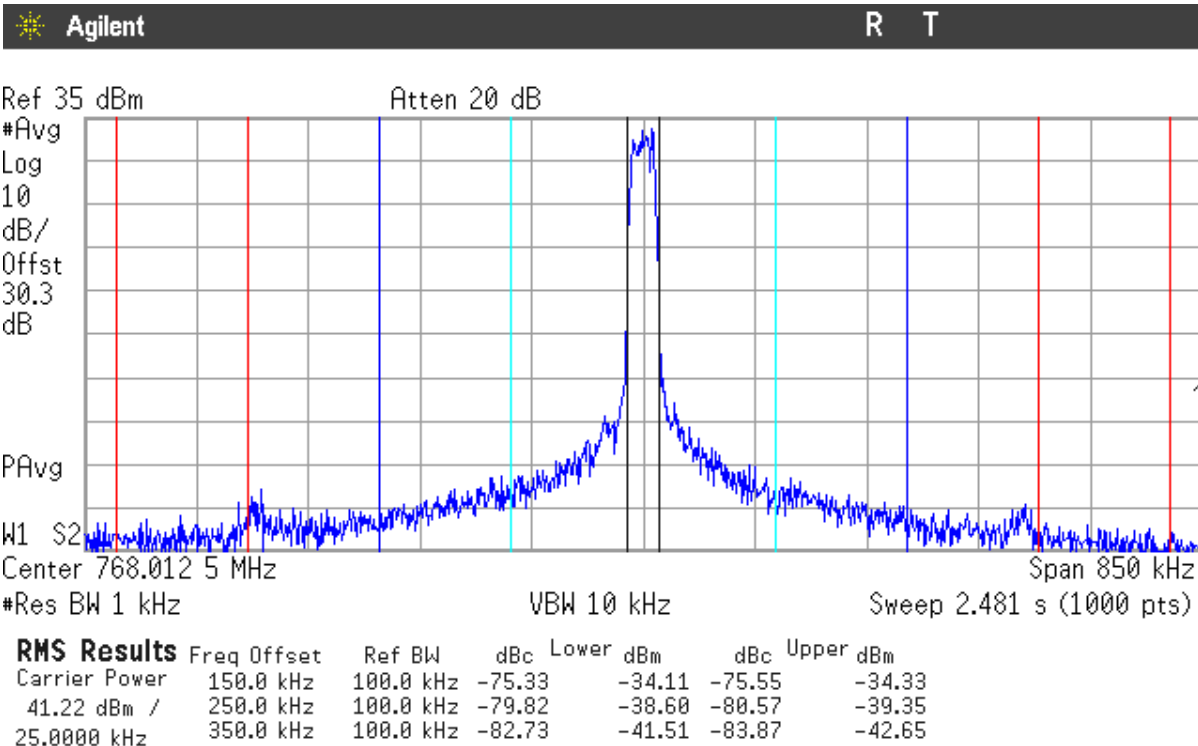
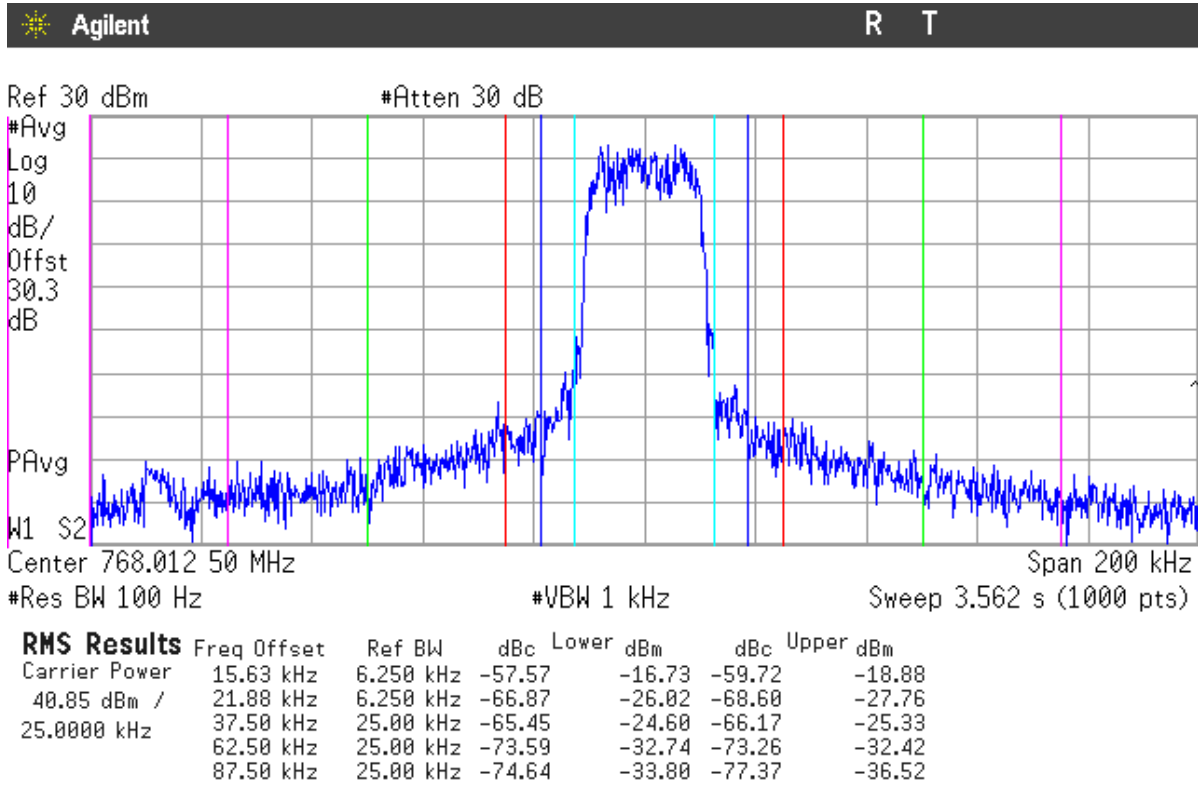
Band Edge measurement close to carrier.

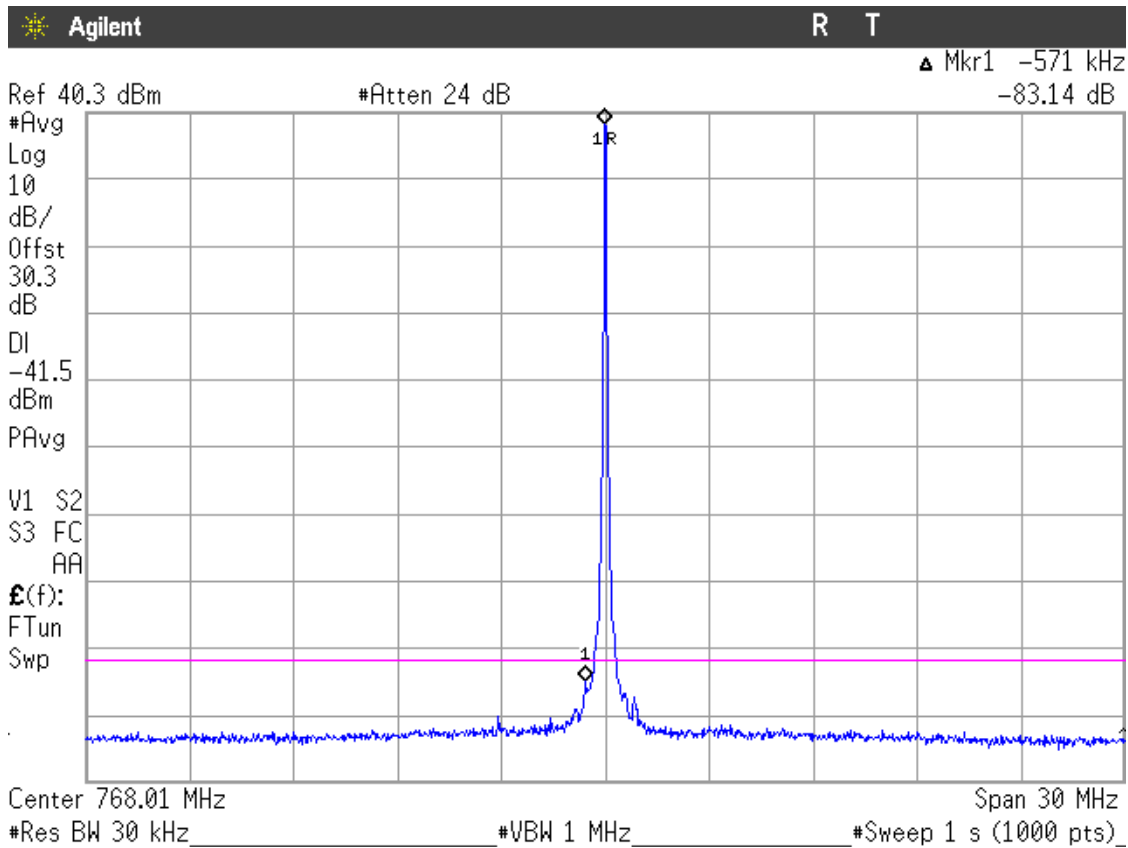




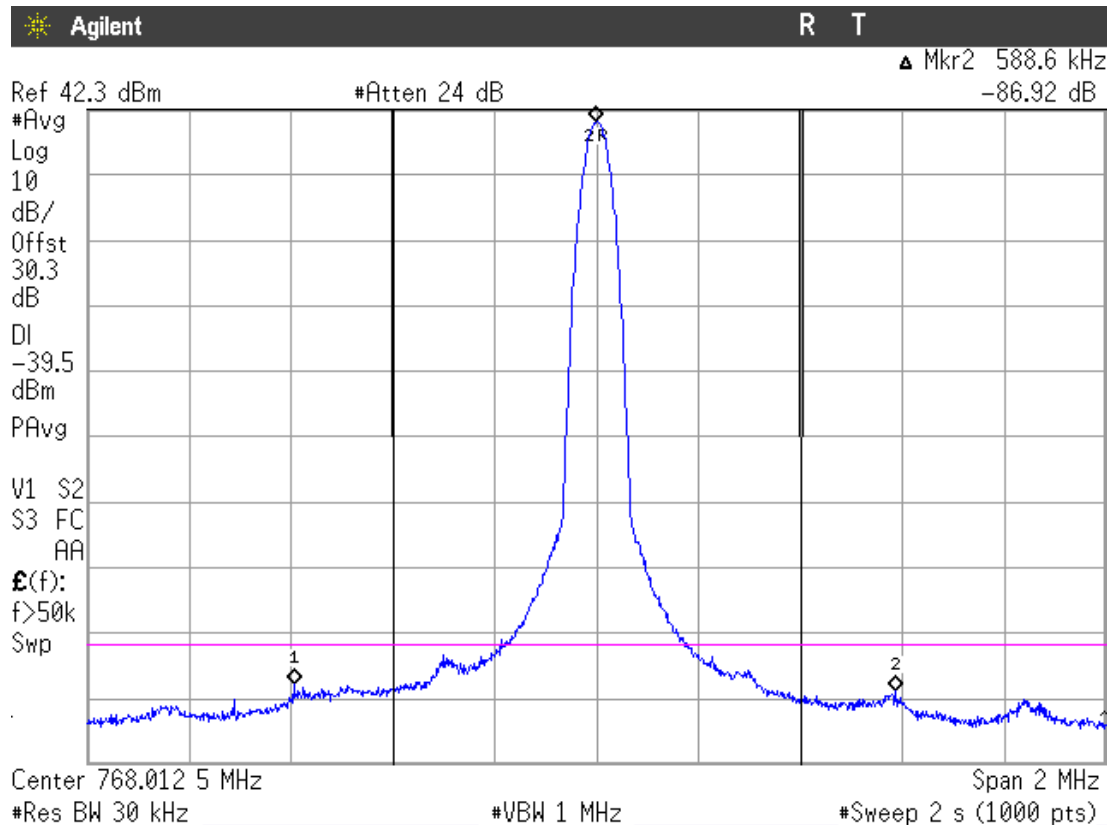
IC 768-776 MHz band. 20 kHz.

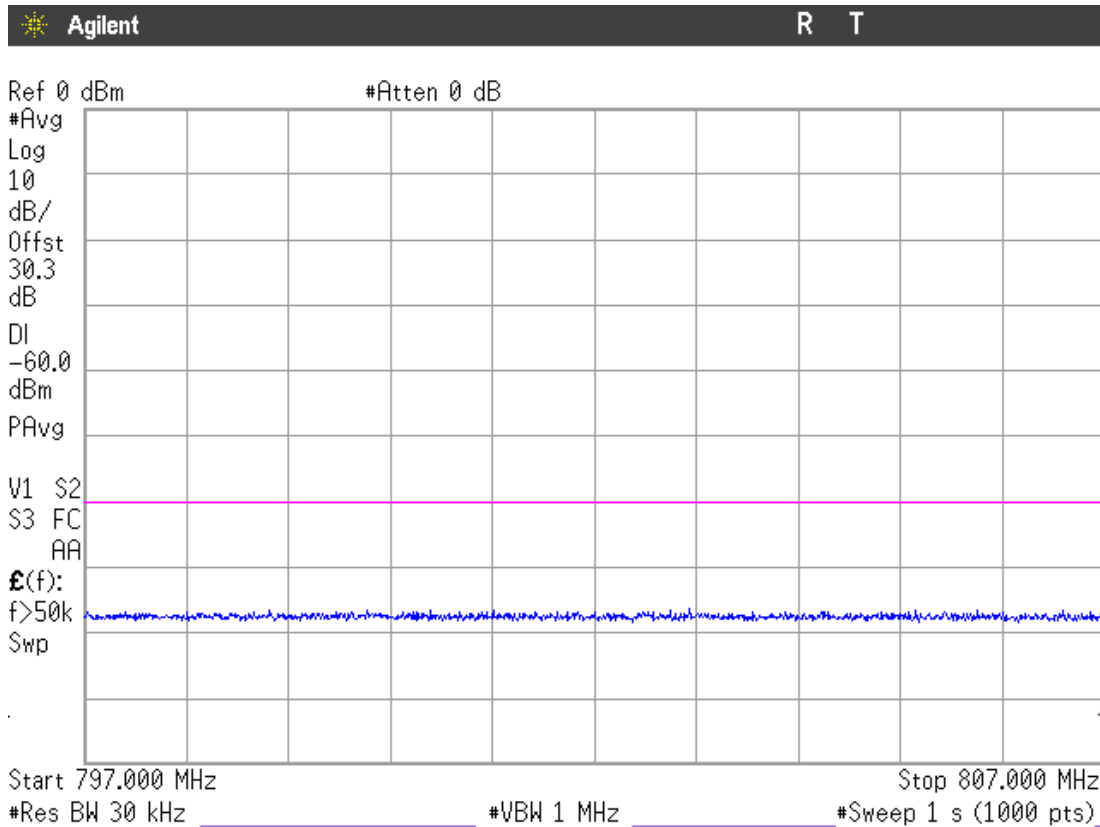
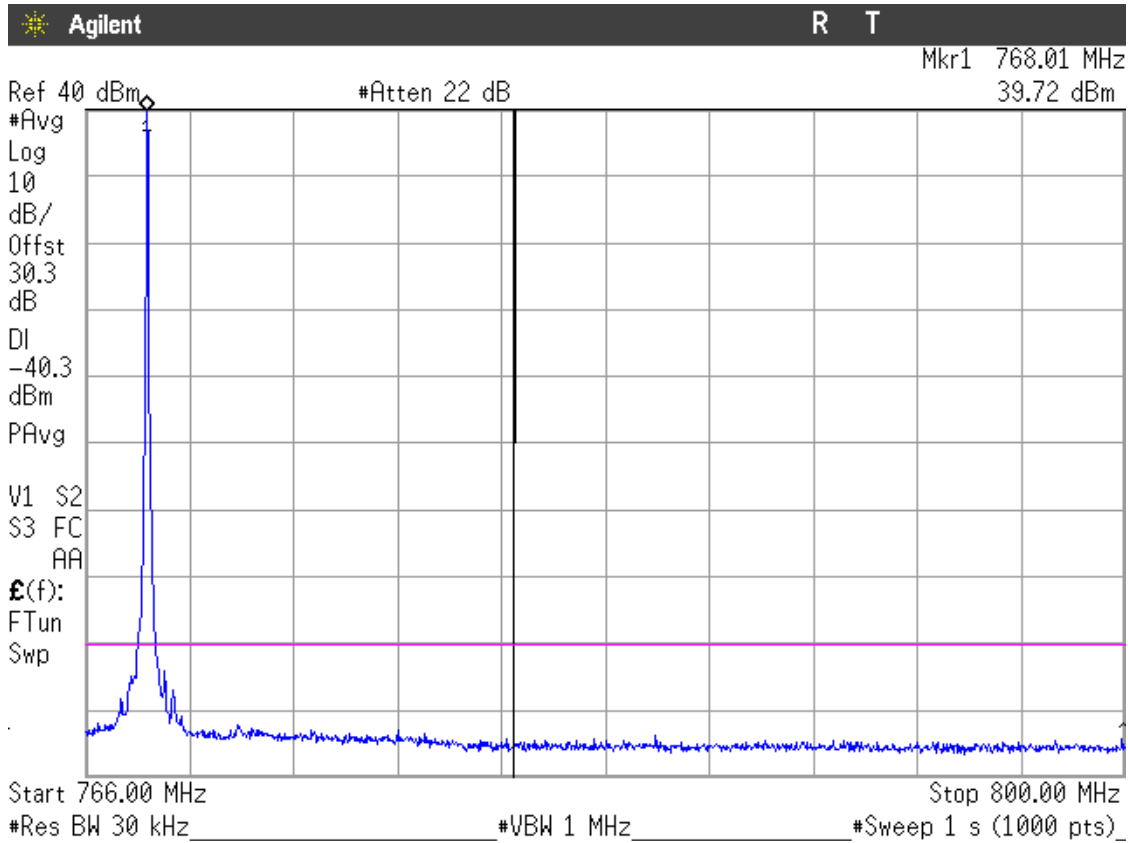
Lowest Channel



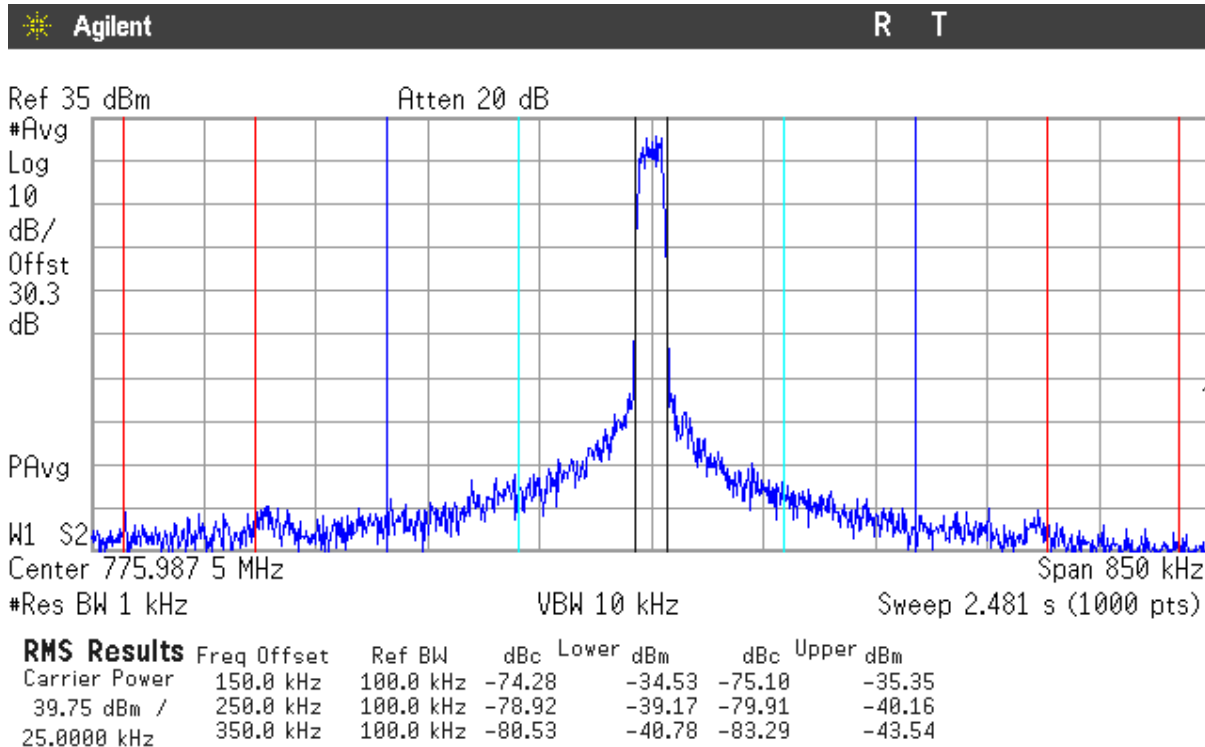
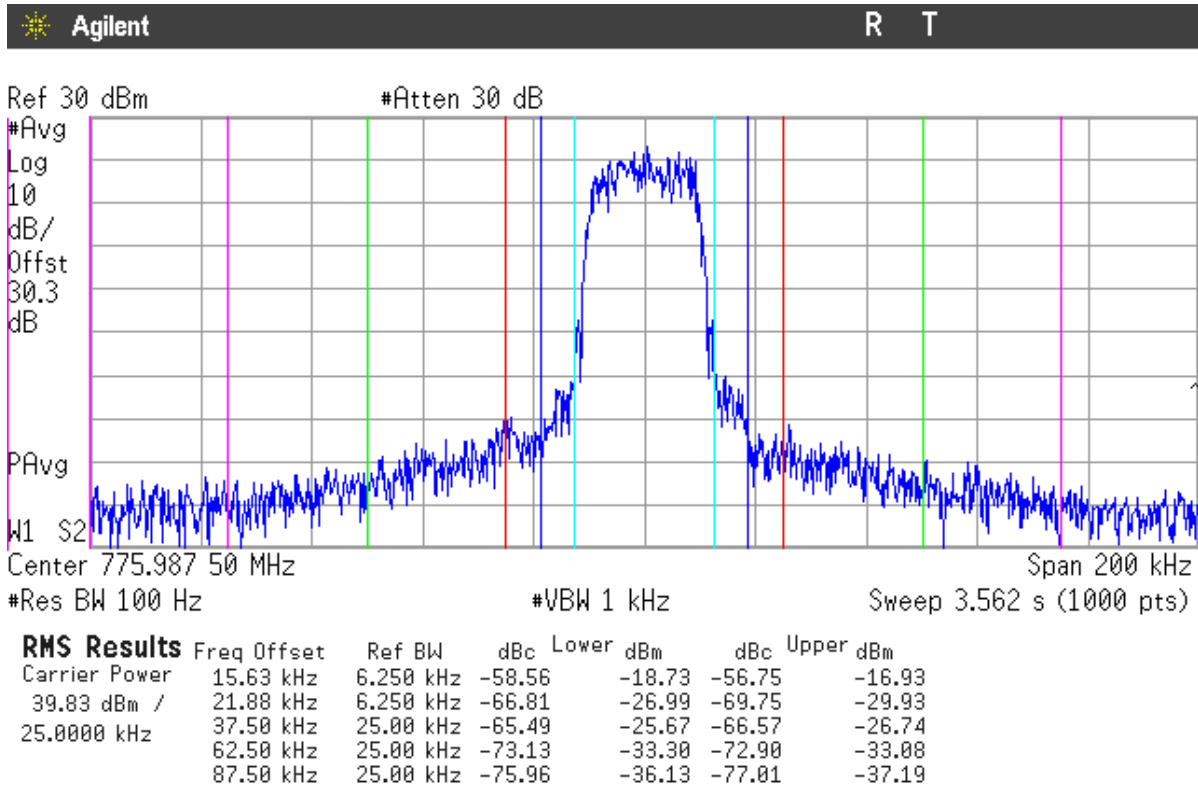


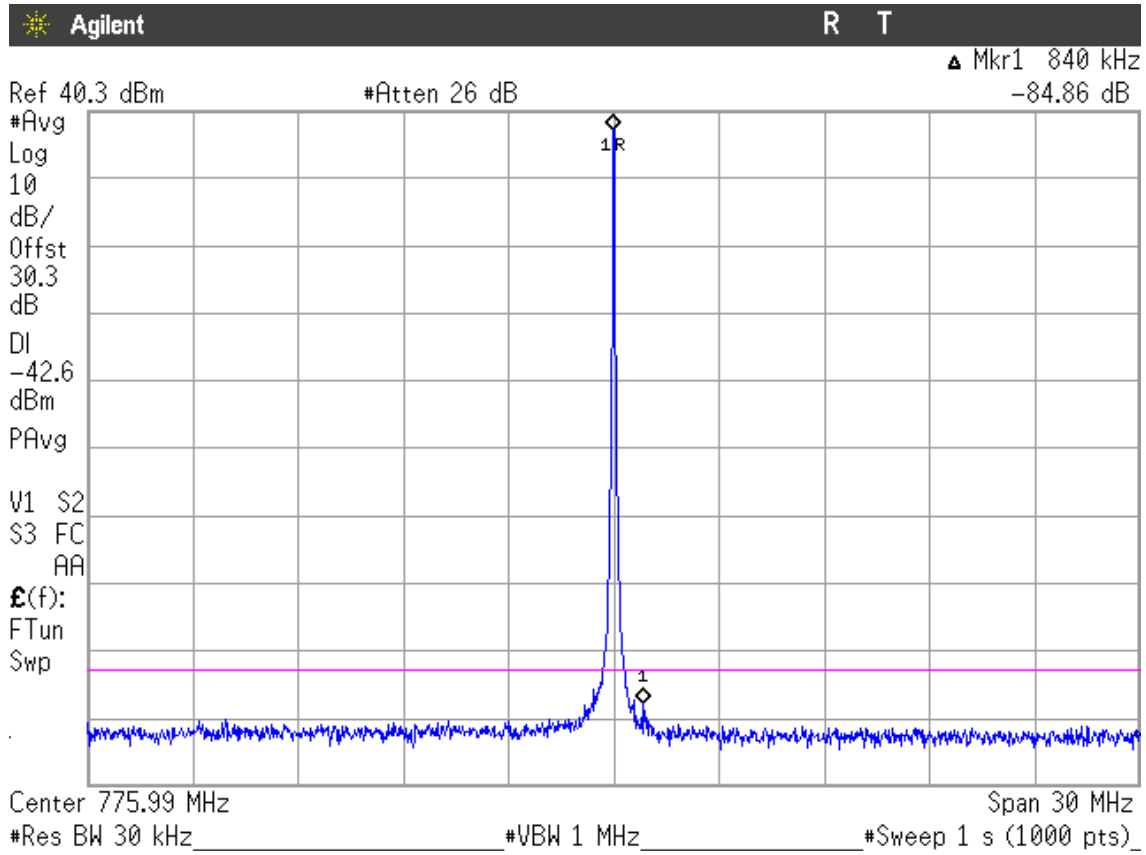
Band Edge measurement close to carrier.



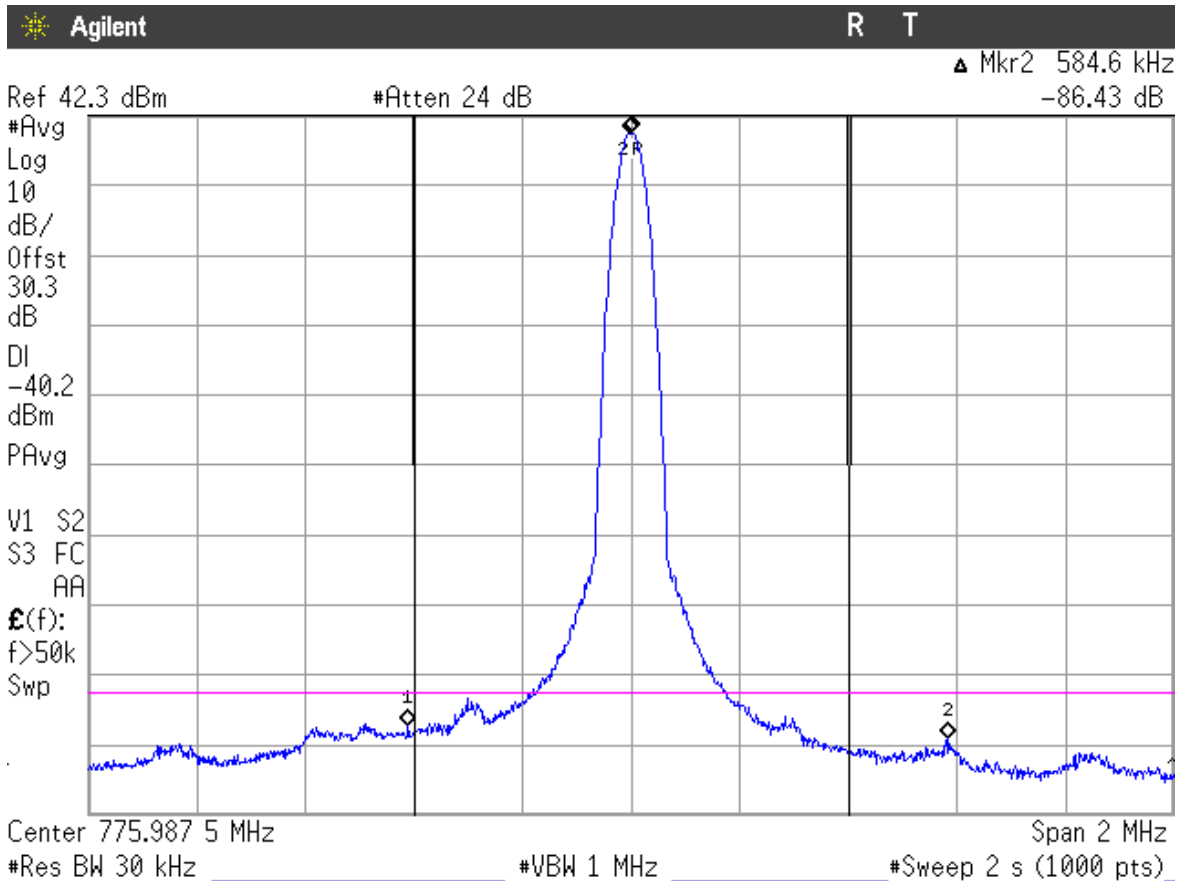


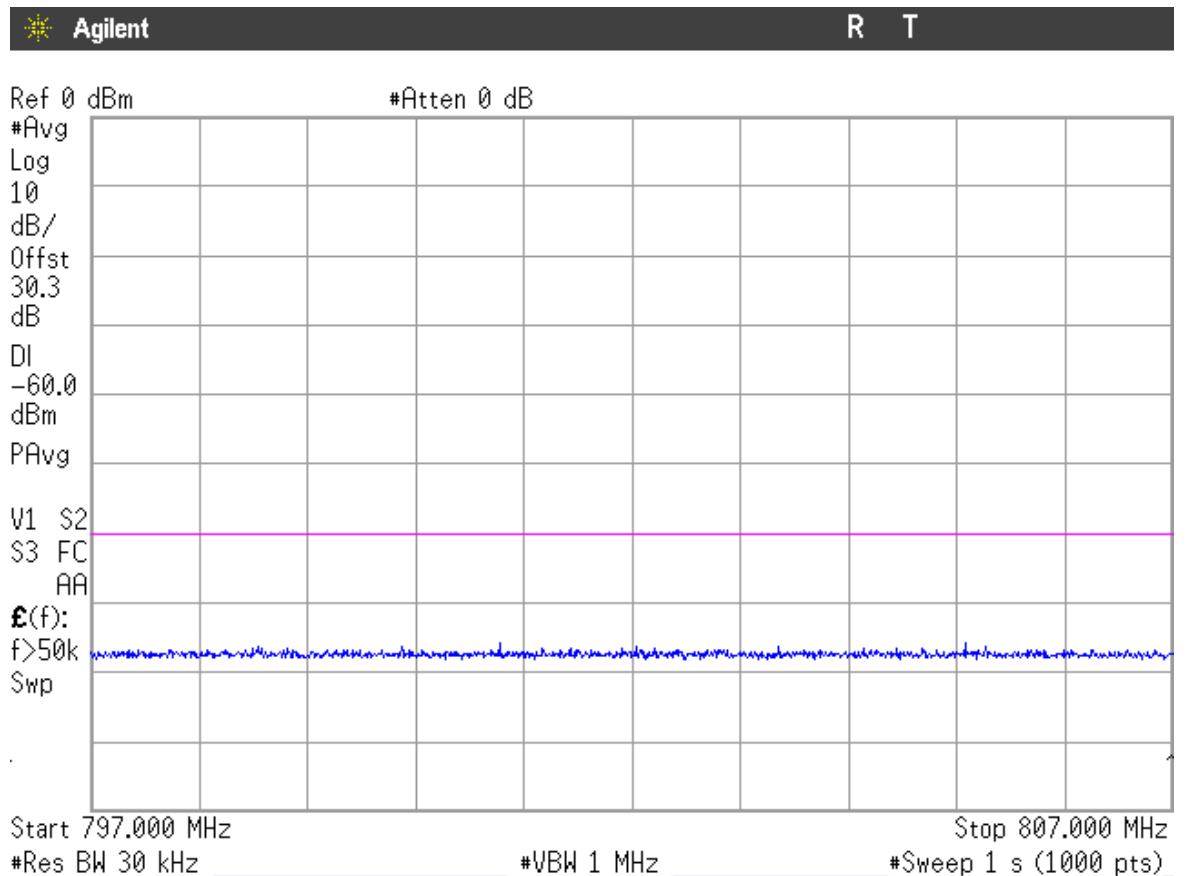
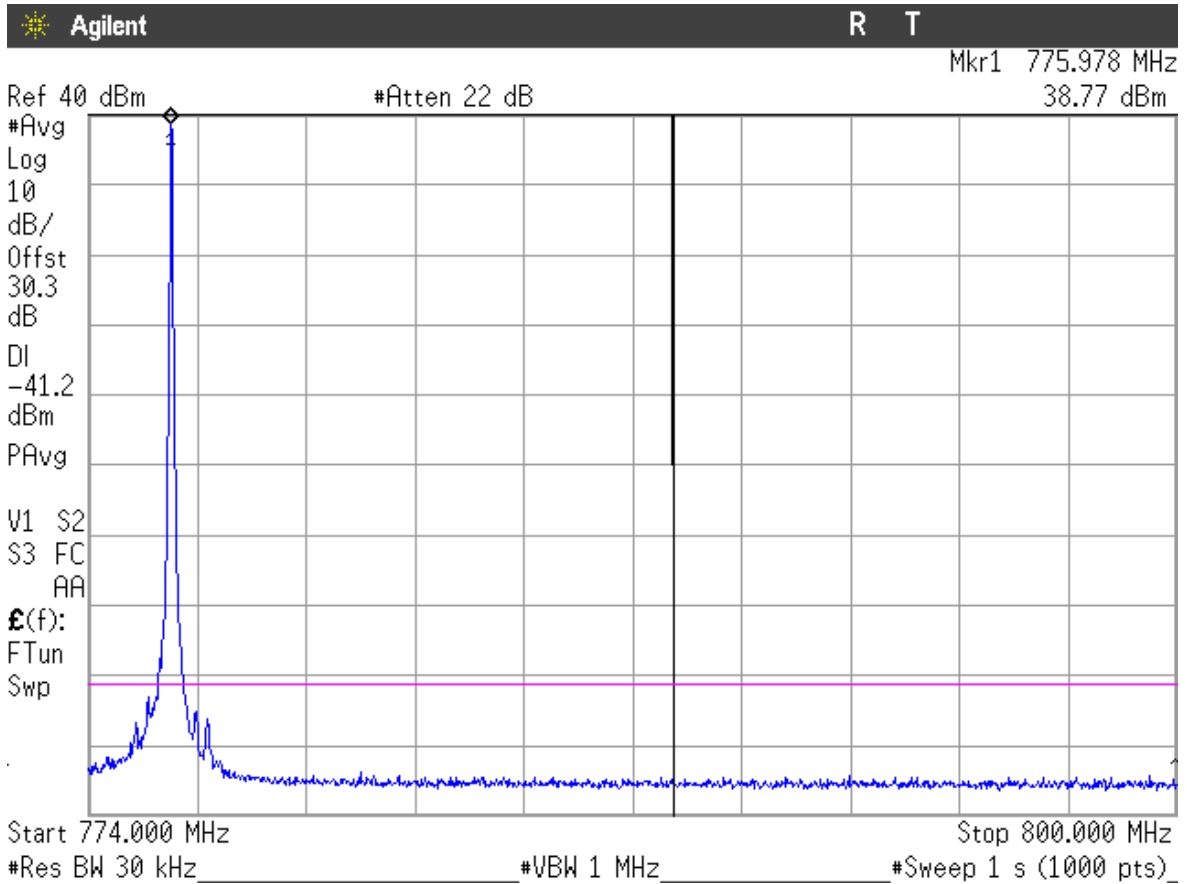
Highest Channel





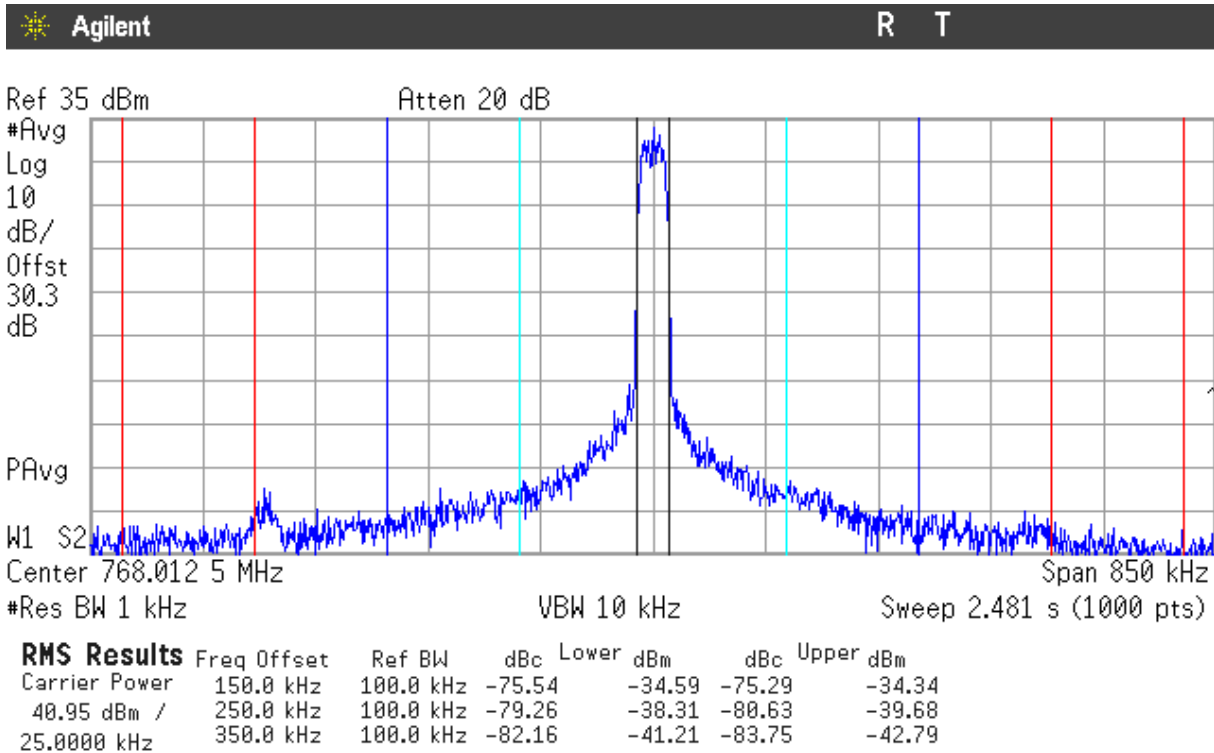
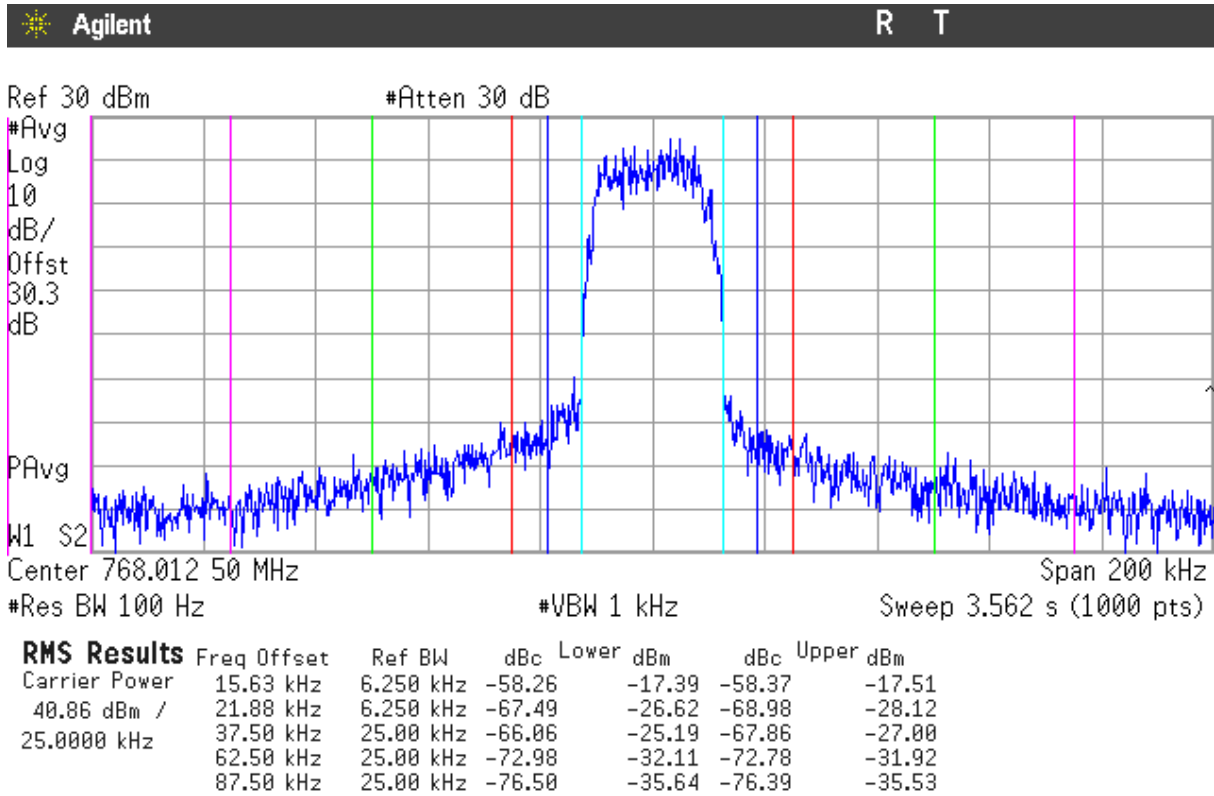
Band Edge measurement close to carrier.

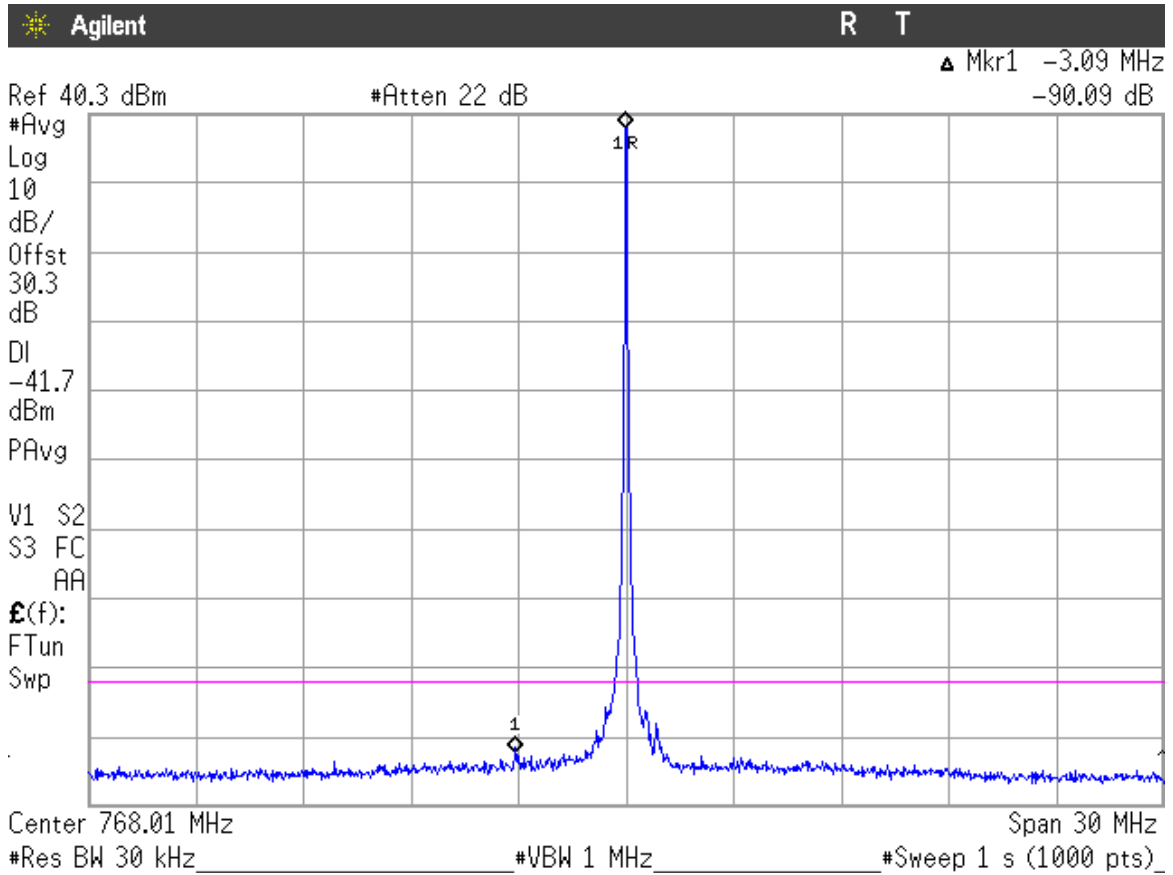




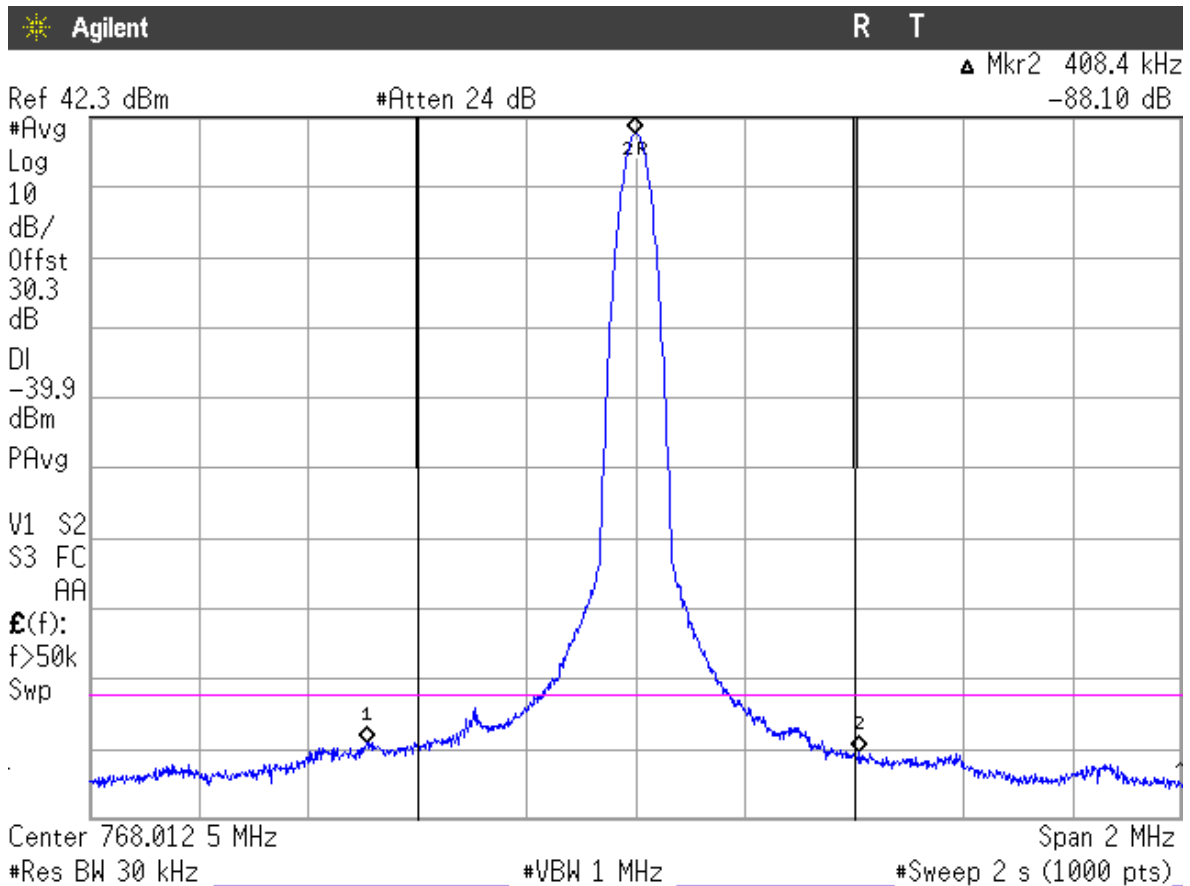
IC 768-776 MHz band. 22 kHz.

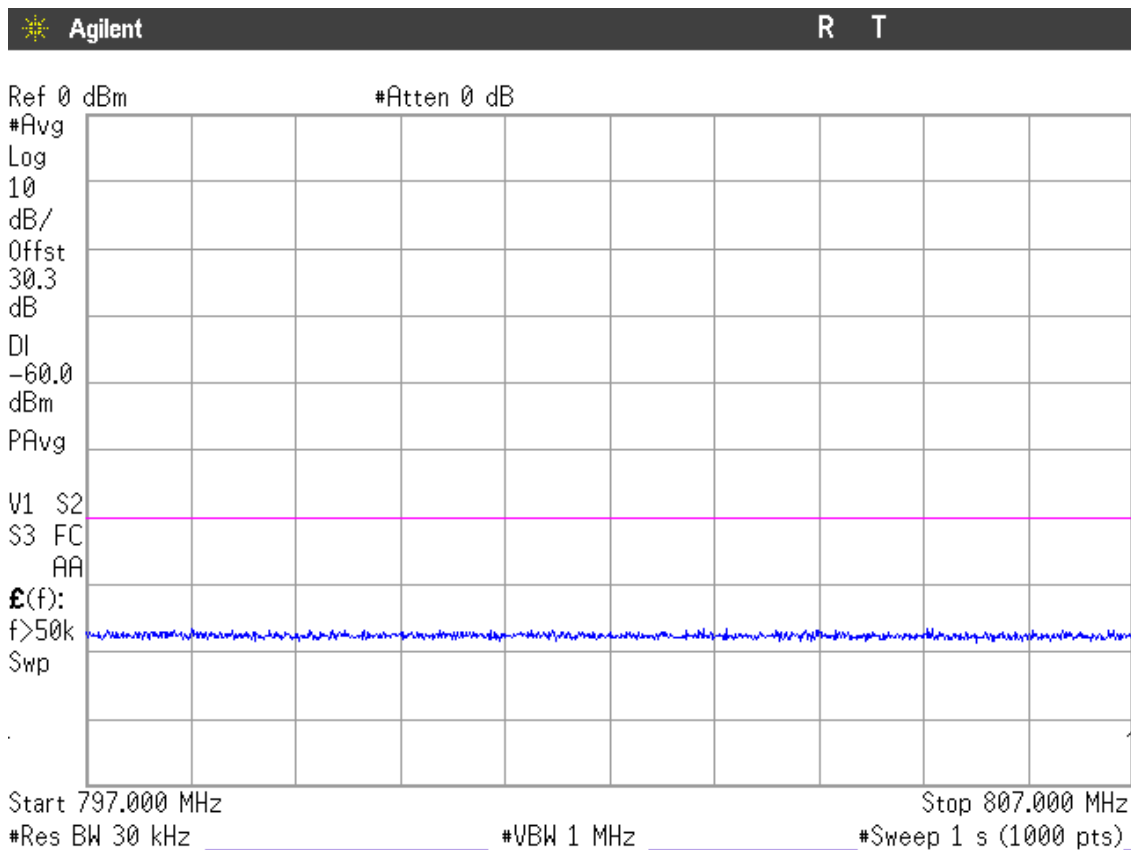
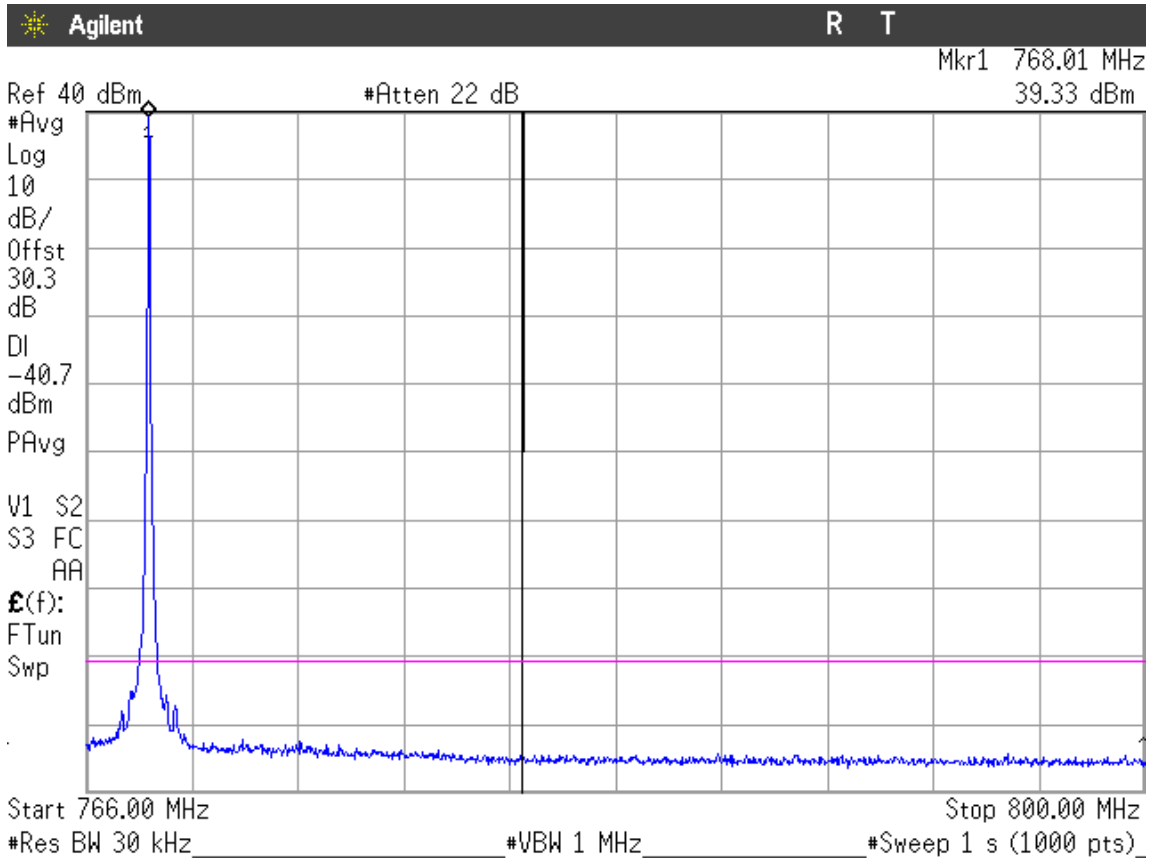
Lowest Channel



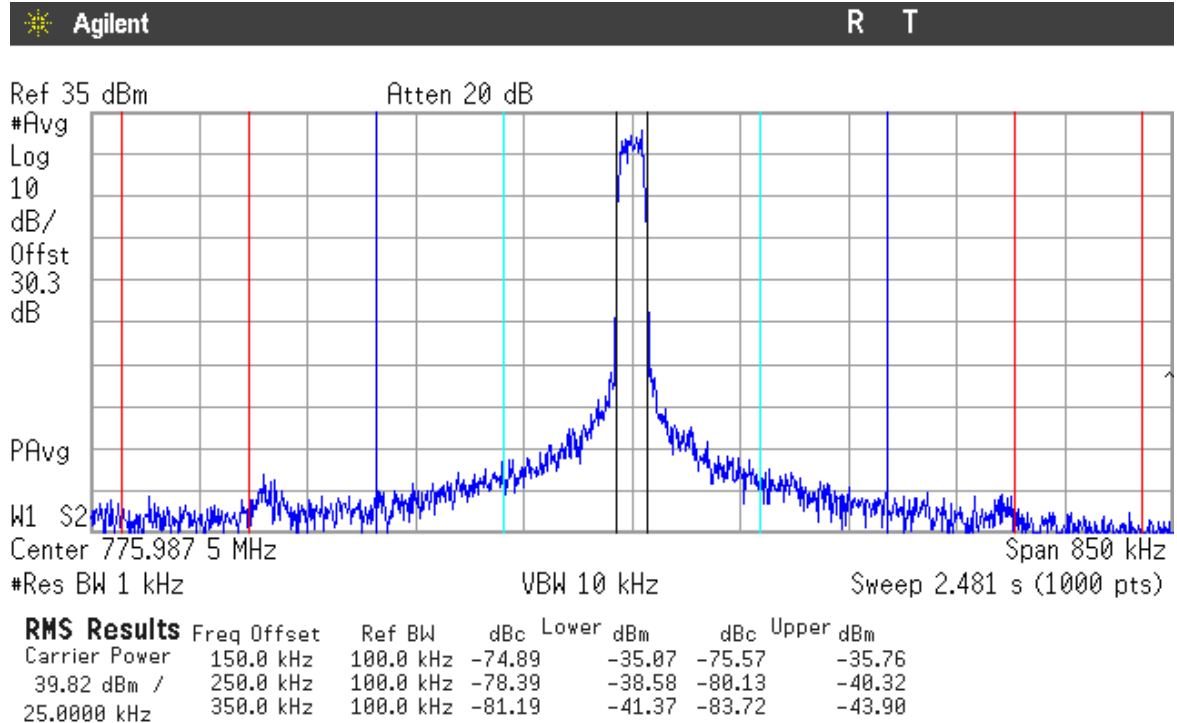
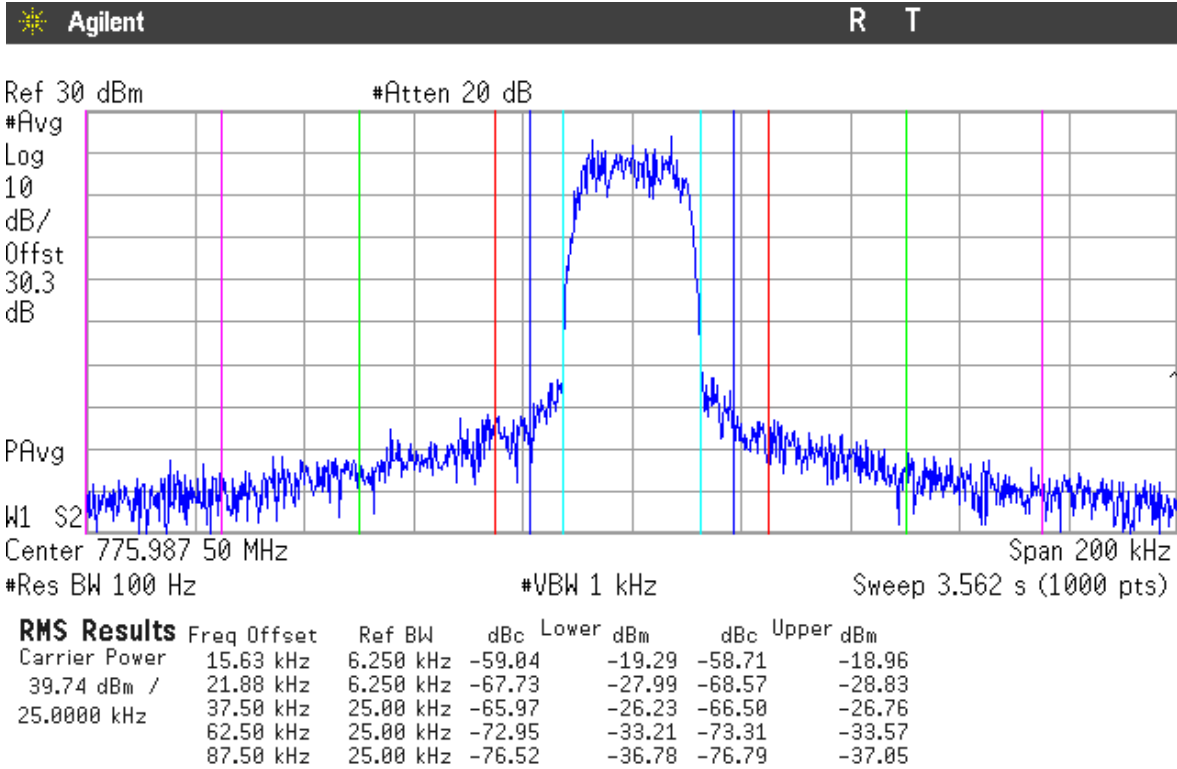


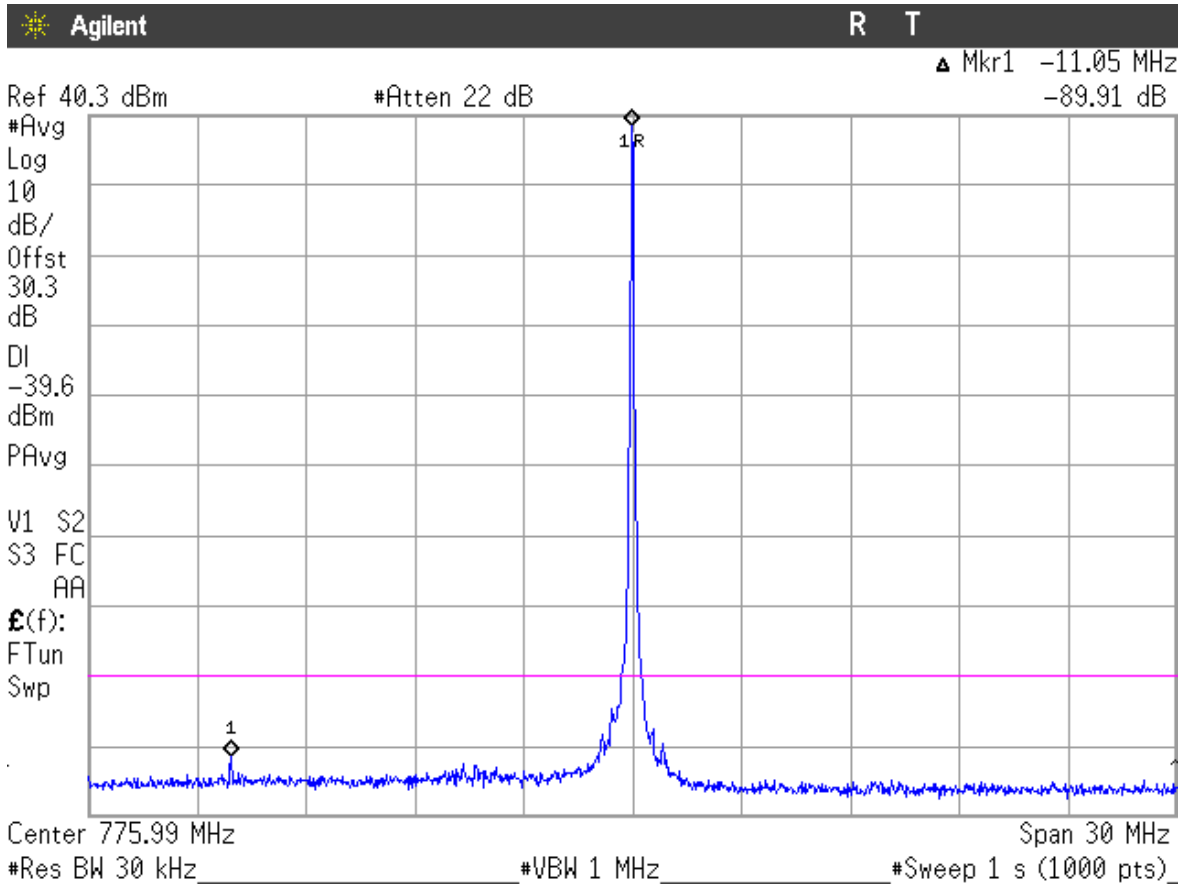
Band Edge measurement close to carrier.



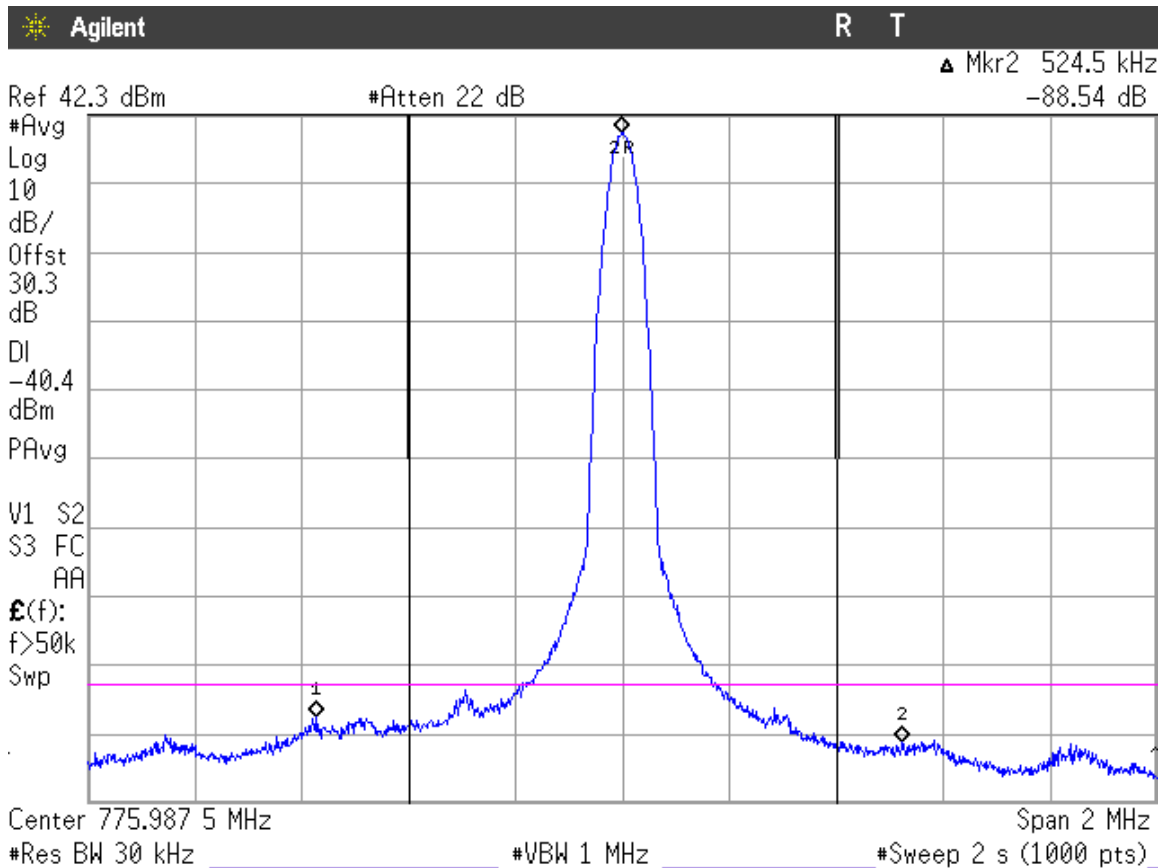


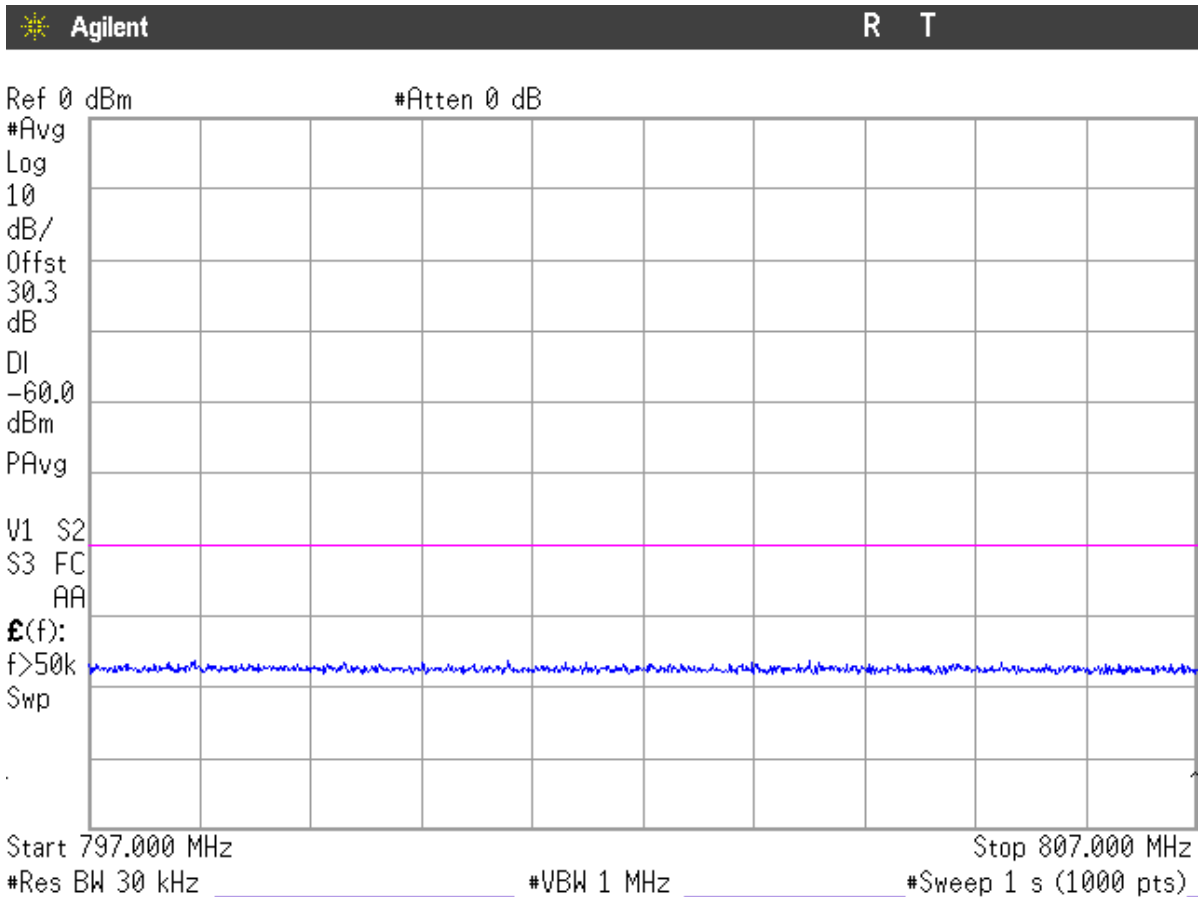
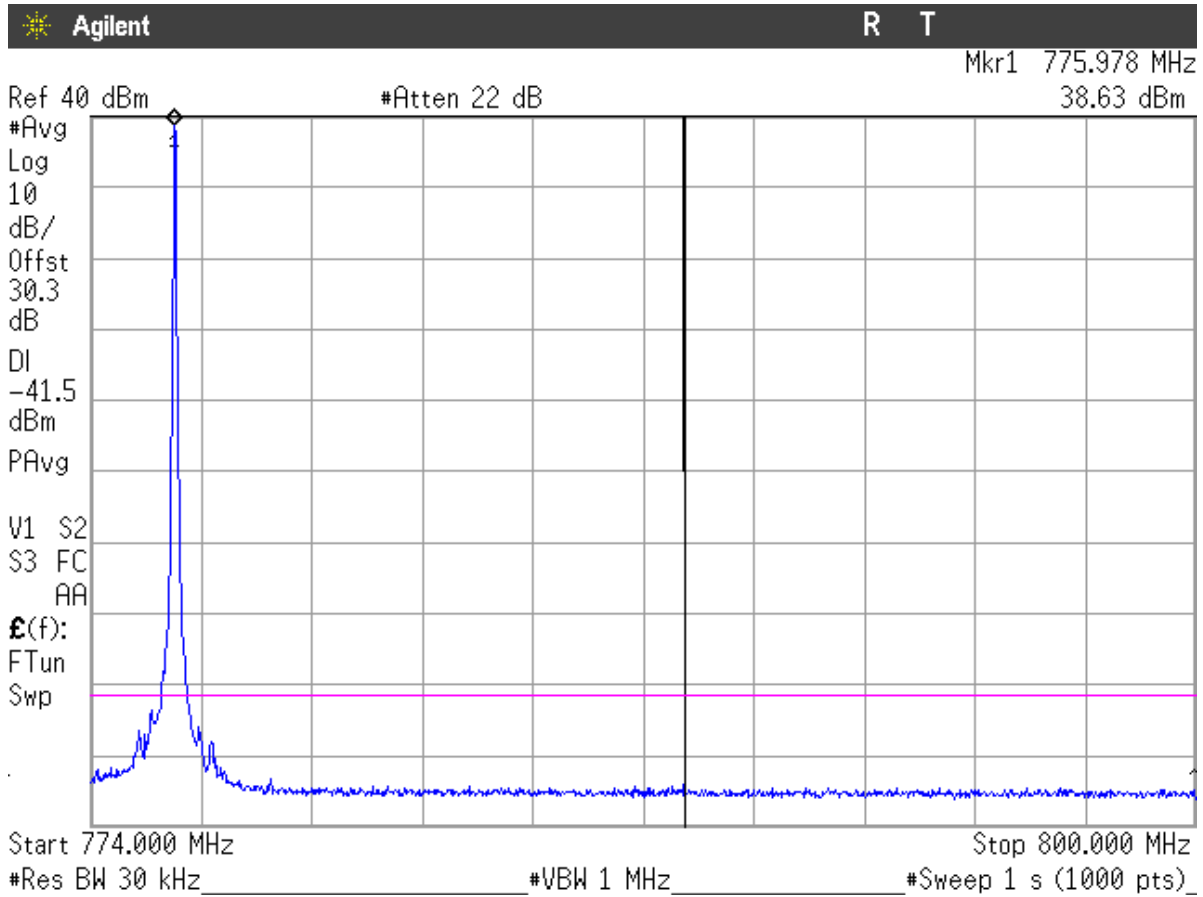
Highest Channel





Band Edge measurement close to carrier.





Clause 90.539 / RSS-119 Clause 5.3: Frequency stability

SPECIFICATION

FCC §2.1055, §90.539.

(b) The frequency stability of base transmitters operating in the narrowband segment must be 100 parts per billion (0.1 ppm) or better.

RSS-Gen 4.7, RSS-119 §5.3.

The carrier frequency shall not depart from the reference frequency in excess of the values given in the following table:

Frequency Band (MHz)	Channel Spacing (kHz)	Frequency Stability (ppm)
		Base/Fixed
764-776 and 794-806 (Note 3)	6.25	0.1
	12.5	
	25	
	50	1

Note 3: Mobile, portable and control transmitters operating in the 764-776 MHz and 794-806 MHz must normally use automatic frequency control (AFC) to lock onto the base station signal. The mobile station's frequency stability given in Table 1 are for mobile stations operating under this condition.

METHOD

The frequency tolerance measurements over temperature variations were made over the temperature range of -30°C to +50°C. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10°C steps from -30°C up to +50°C.

Frequency Stability vs Voltage: Vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.

The EUT is set in continuous transmission without modulation (only carrier) and the frequency is measured with the frequency meter of Radiocommunication analyser HP8920A.

RESULTS

Middle Channel: 772.0125 MHz

Voltage (Vdc)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
Frequency stability with Temperature			
24	+50	35	0.04534
	+40	34	0.04404
	+30	34	0.04404
	+20	34	0.04404
	+10	33	0.04275
	0	33	0.04275
	-10	32	0.04145
	-20	31	0.04015
	-30	31	0.04015
Frequency stability with Supply Voltage			
20.4	20	34	0.04404
27.6	20	34	0.04404

Voltage (Vac)	Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
Frequency stability with Supply Voltage			
93.5	20	37	0.04793
126.5	20	36	0.04663

Verdict: PASS

Clause 90.543 / RSS-119 Clause 5.8.9.2: Spurious emissions at antenna terminals

SPECIFICATION

FCC §90.543, RSS-Gen 6.13, RSS-119 §5.8.9.2

Out-of-band emission limit. On any frequency outside of the frequency ranges covered by the ACP tables, the power of any emission must be reduced below the mean output power (P) by at least $43 + 10\log(P)$ dB measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

METHOD

The EUT RF output connector was connected to a spectrum analyser using a 50 ohm attenuator and the resolution bandwidth of the spectrum analyser was set to 100 kHz for frequencies < 1GHz and 1 MHz for frequencies > 1GHz. The spectrum was investigated from 9 kHz to 8 GHz.

The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

RESULTS (see plots in next pages)

FCC 769-775 MHz band. 20 kHz.

1. CHANNEL: LOWEST

No spurious signals were found in all the range.

2. CHANNEL: HIGHEST

No spurious signals were found in all the range.

IC 768-776 MHz band. 20 kHz.

1. CHANNEL: LOWEST

No spurious signals were found in all the range.

2. CHANNEL: HIGHEST

No spurious signals were found in all the range.

IC 768-776 MHz band. 22 kHz.

1. CHANNEL: LOWEST

No spurious signals were found in all the range.

2. CHANNEL: HIGHEST

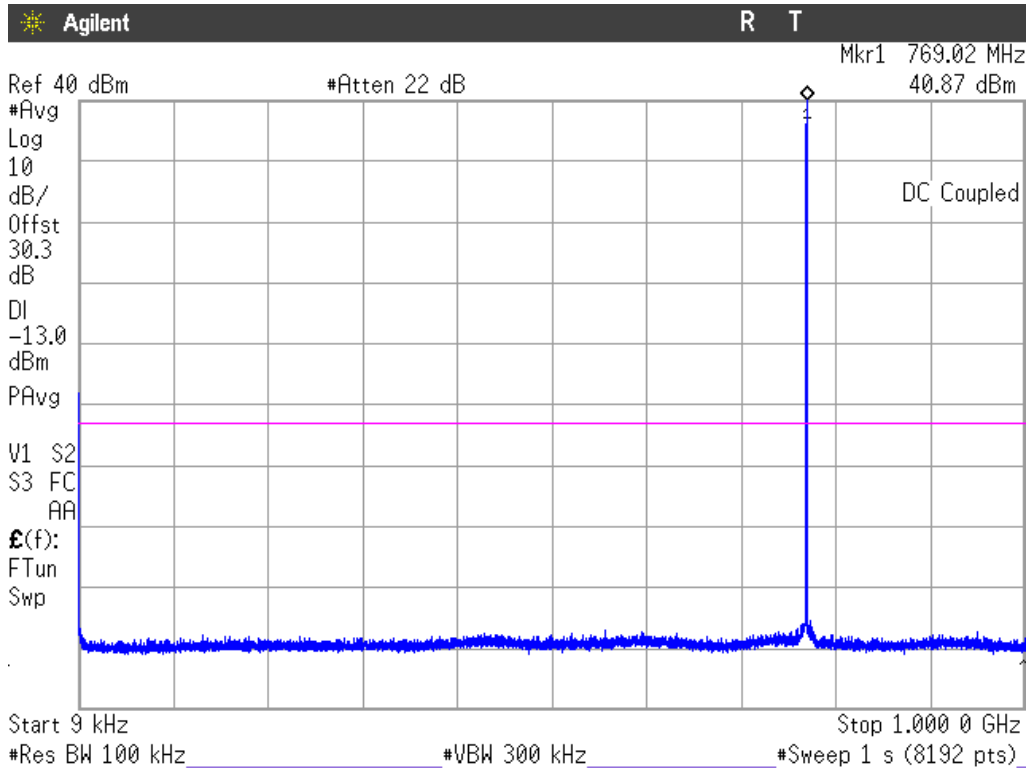
No spurious signals were found in all the range.

Verdict: PASS

Frequency range 9 kHz to 1000 MHz

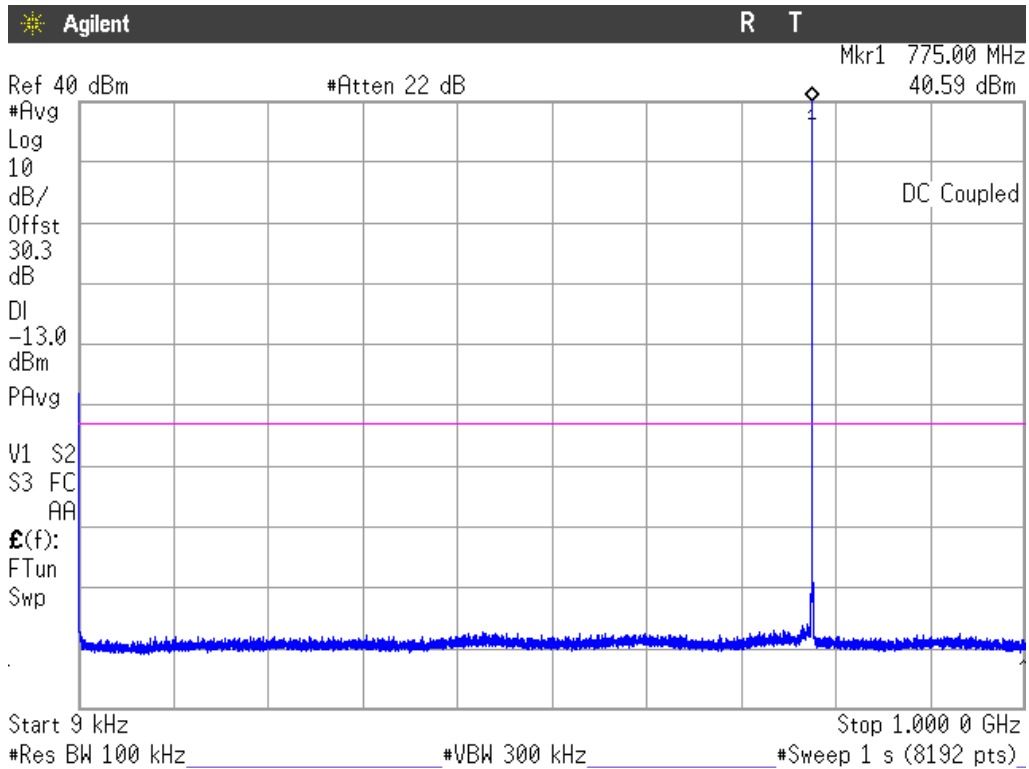
FCC 769-775 MHz band. 20 kHz.

1. CHANNEL LOWEST. 769.0125 MHz.



Note: The peak above the limit is the carrier frequency.

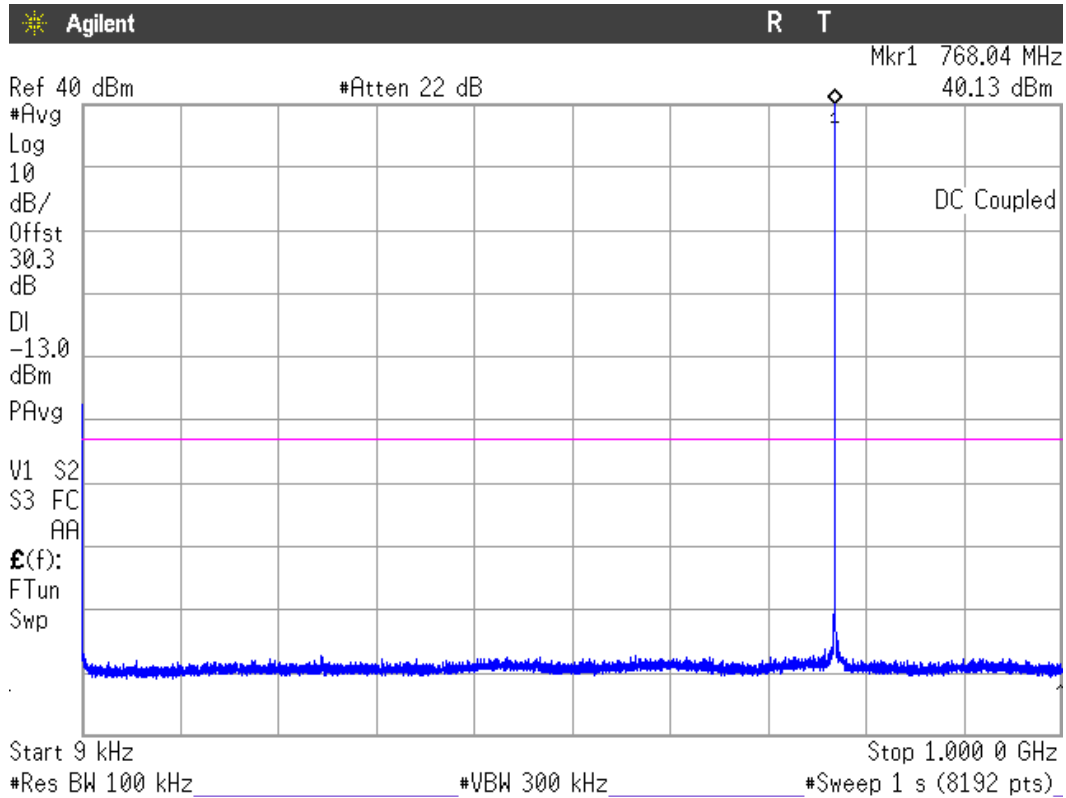
2. CHANNEL HIGHEST. 774.9875 MHz.



Note: The peak above the limit is the carrier frequency.

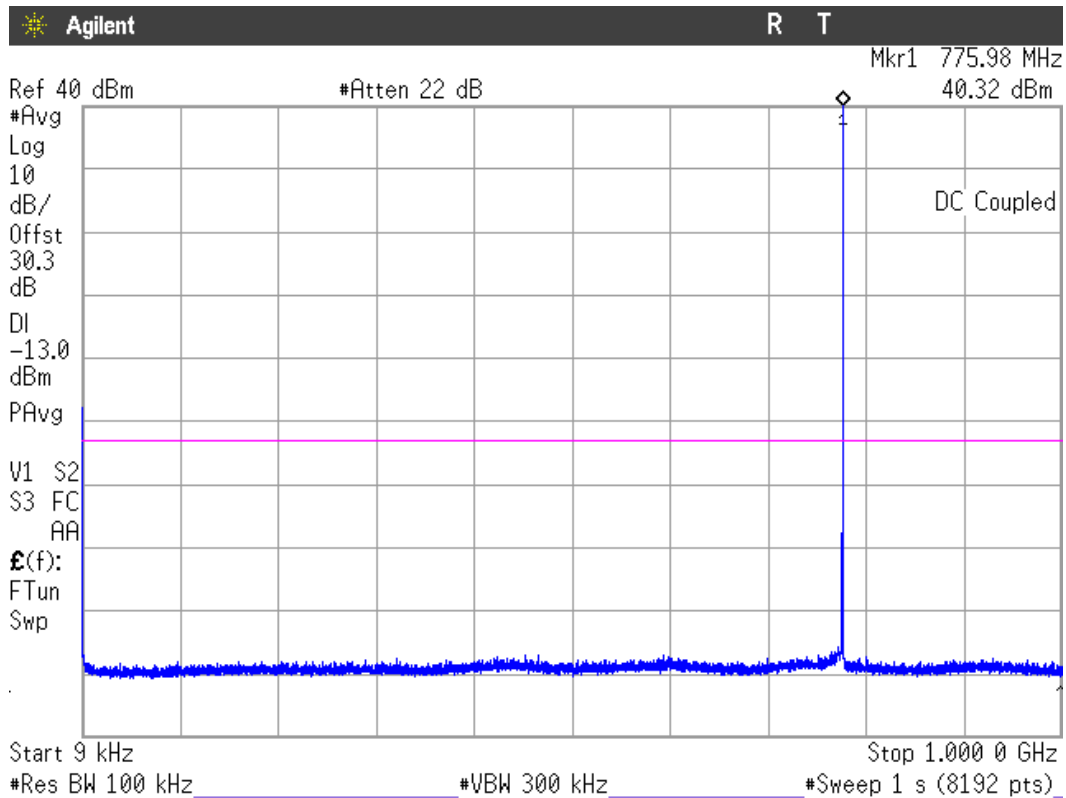
IC 768-776 MHz band. 20 kHz.

1. CHANNEL LOWEST. 768.0125 MHz.



Note: The peak above the limit is the carrier frequency.

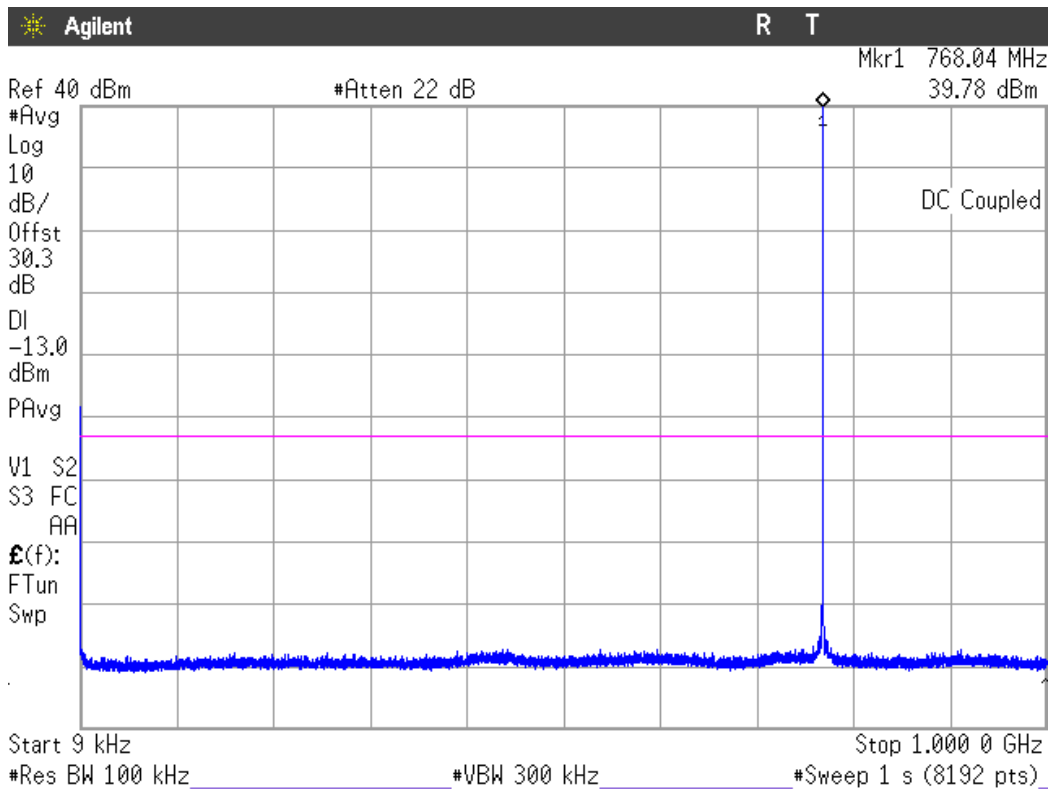
2. CHANNEL HIGHEST. 775.9875 MHz.



Note: The peak above the limit is the carrier frequency.

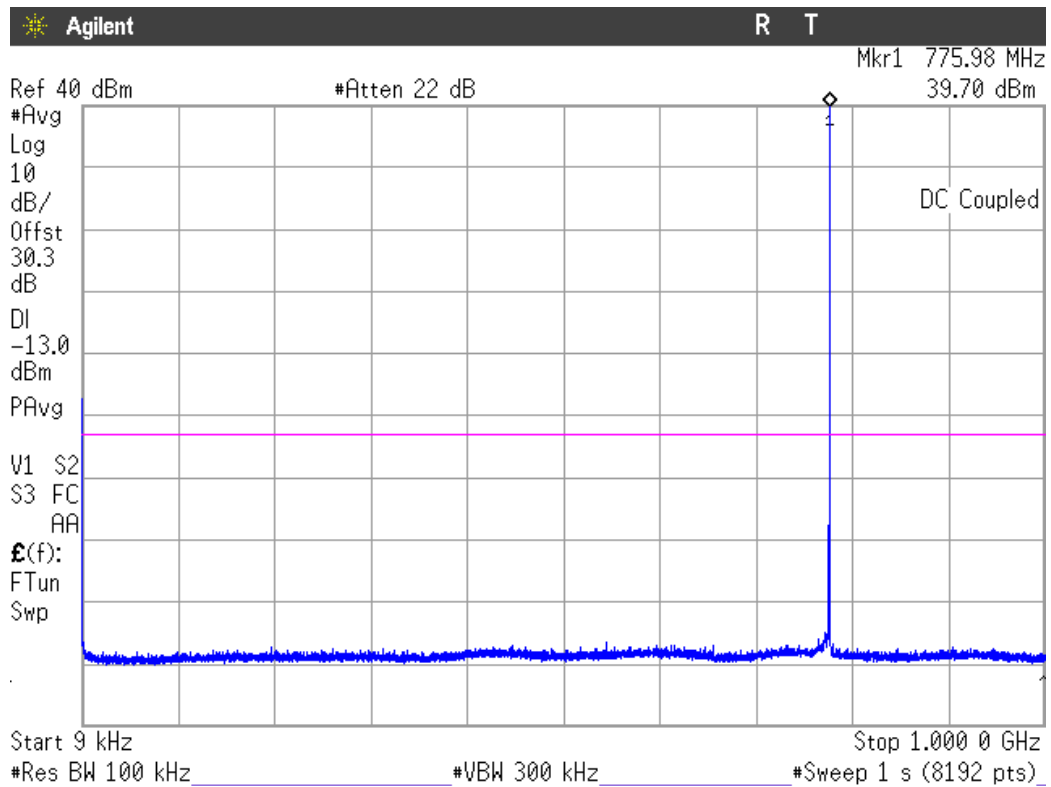
IC 768-776 MHz band. 22 kHz.

1. CHANNEL LOWEST. 768.0125 MHz.



Note: The peak above the limit is the carrier frequency.

2. CHANNEL HIGHEST. 775.9875 MHz.

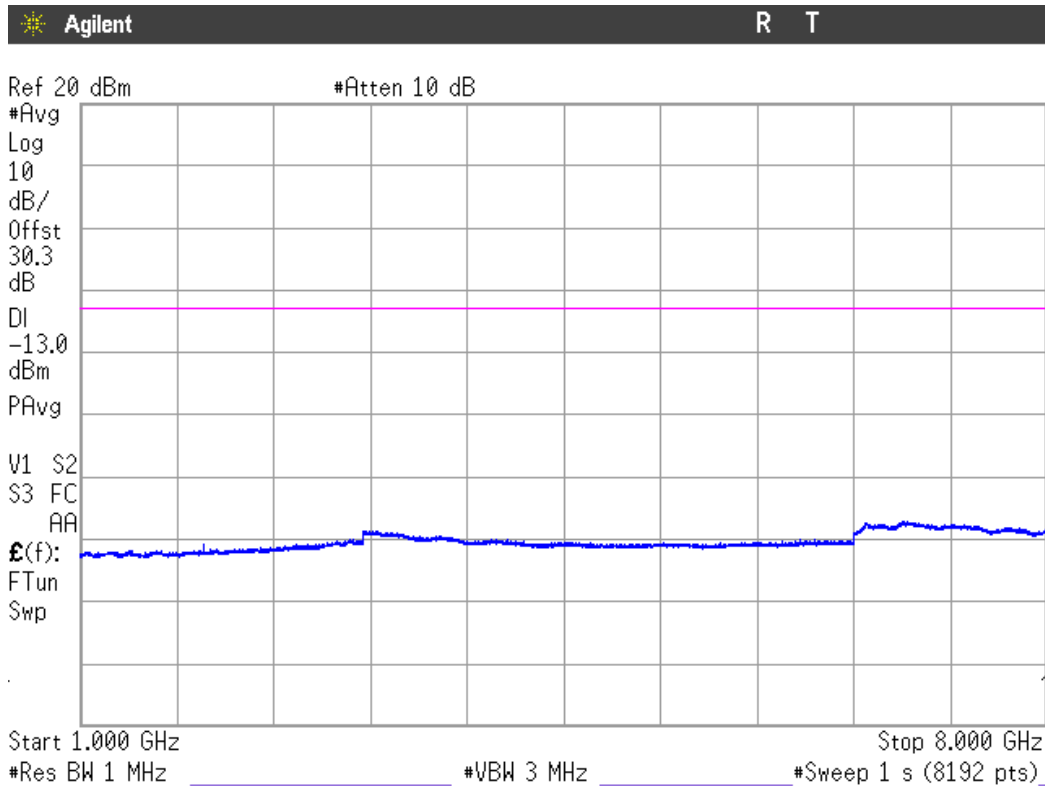


Note: The peak above the limit is the carrier frequency.

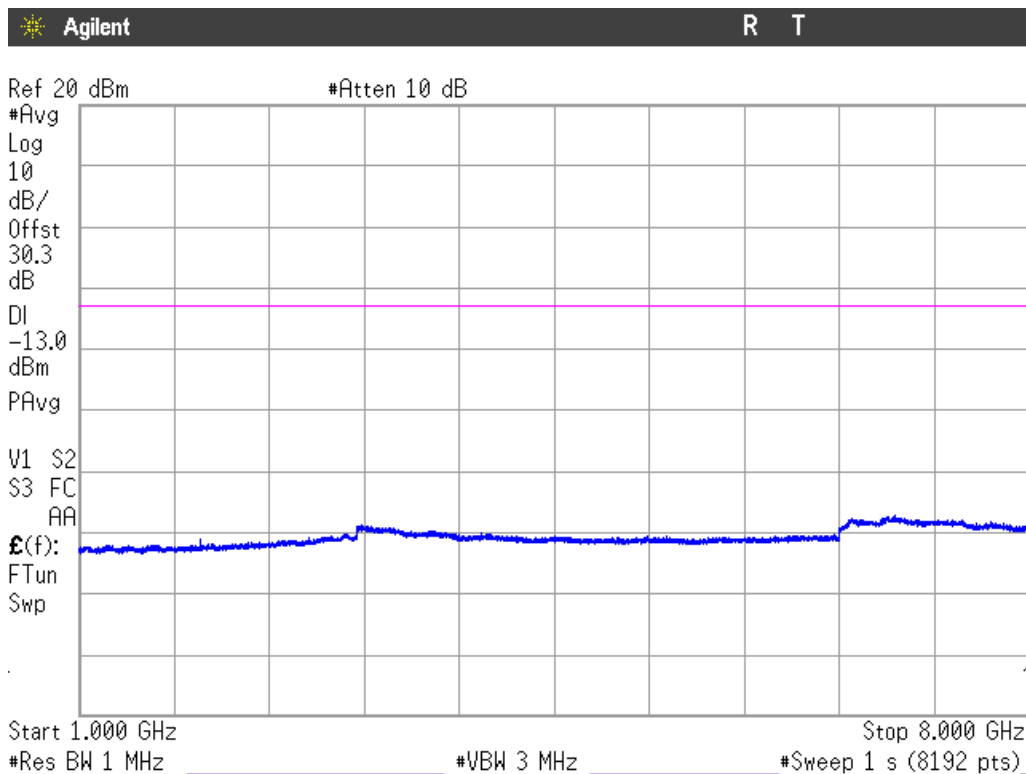
Frequency range 1 GHz to 8 GHz

FCC 769-775 MHz band. 20 kHz.

1. CHANNEL LOWEST. 769.0125 MHz.

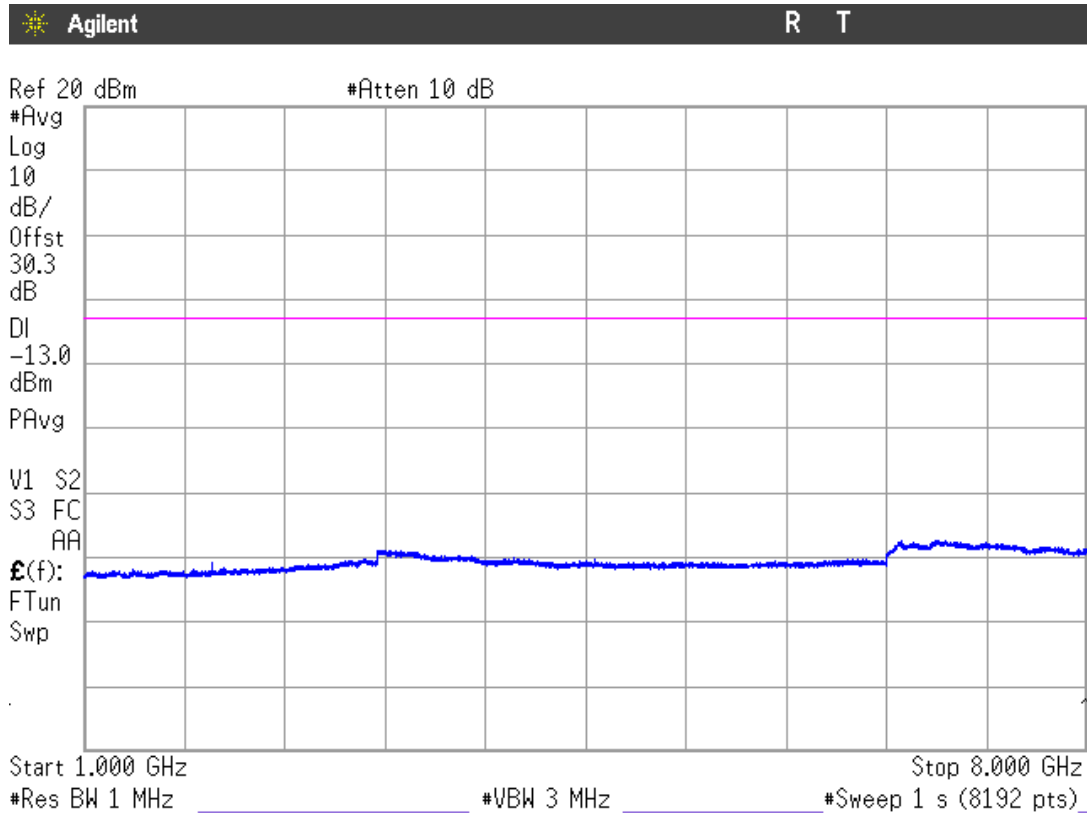


2. CHANNEL HIGHEST. 774.9875 MHz.

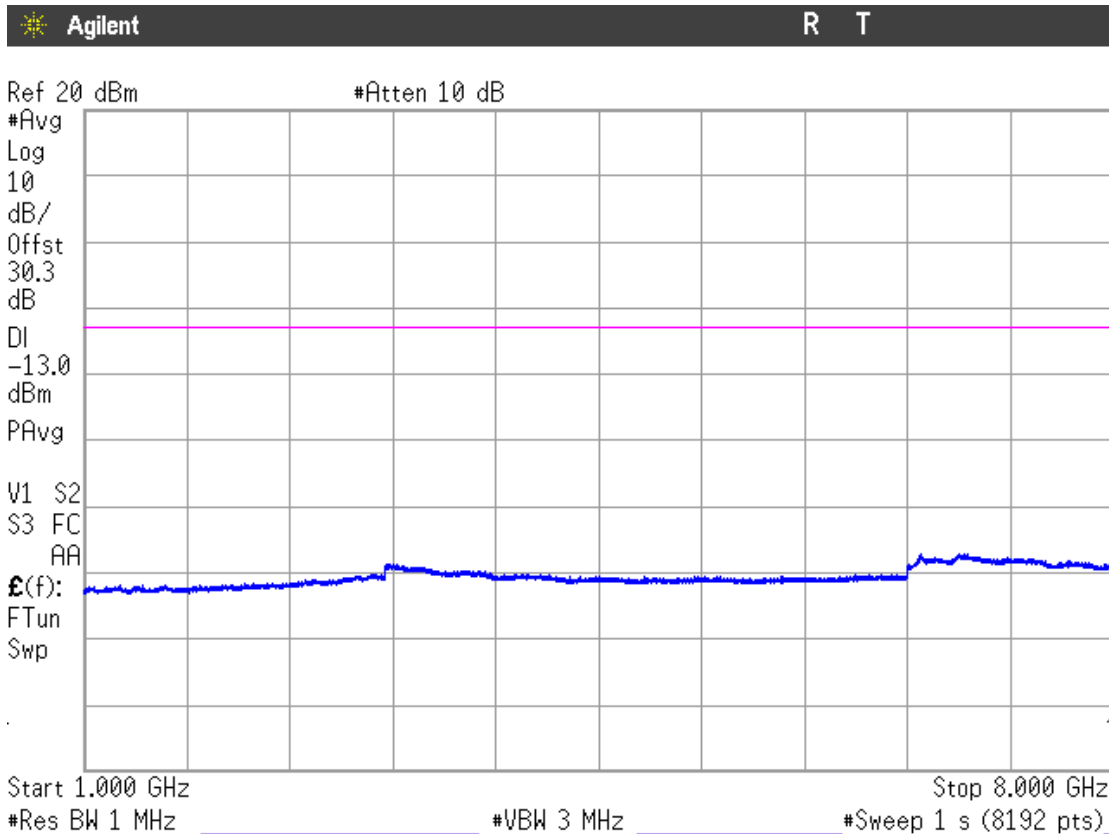


IC 768-776 MHz band. 20 kHz.

1. CHANNEL LOWEST. 768.0125 MHz.

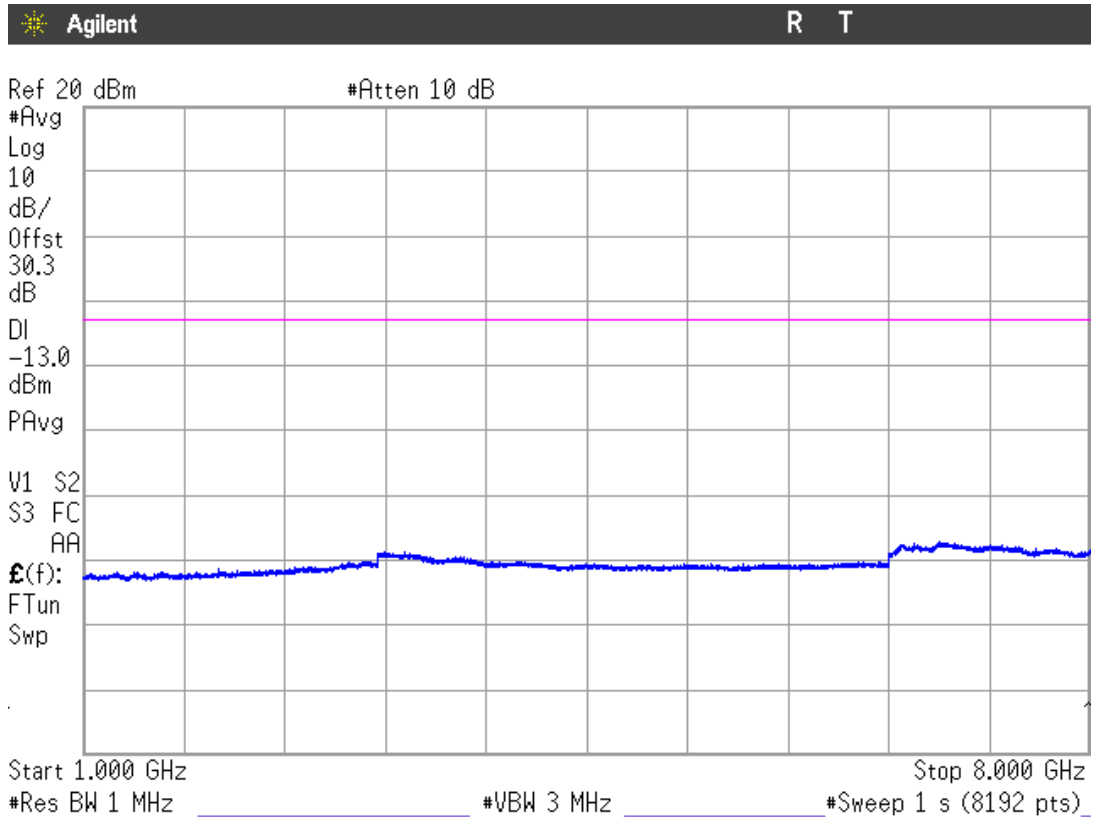


2. CHANNEL HIGHEST. 775.9875 MHz.

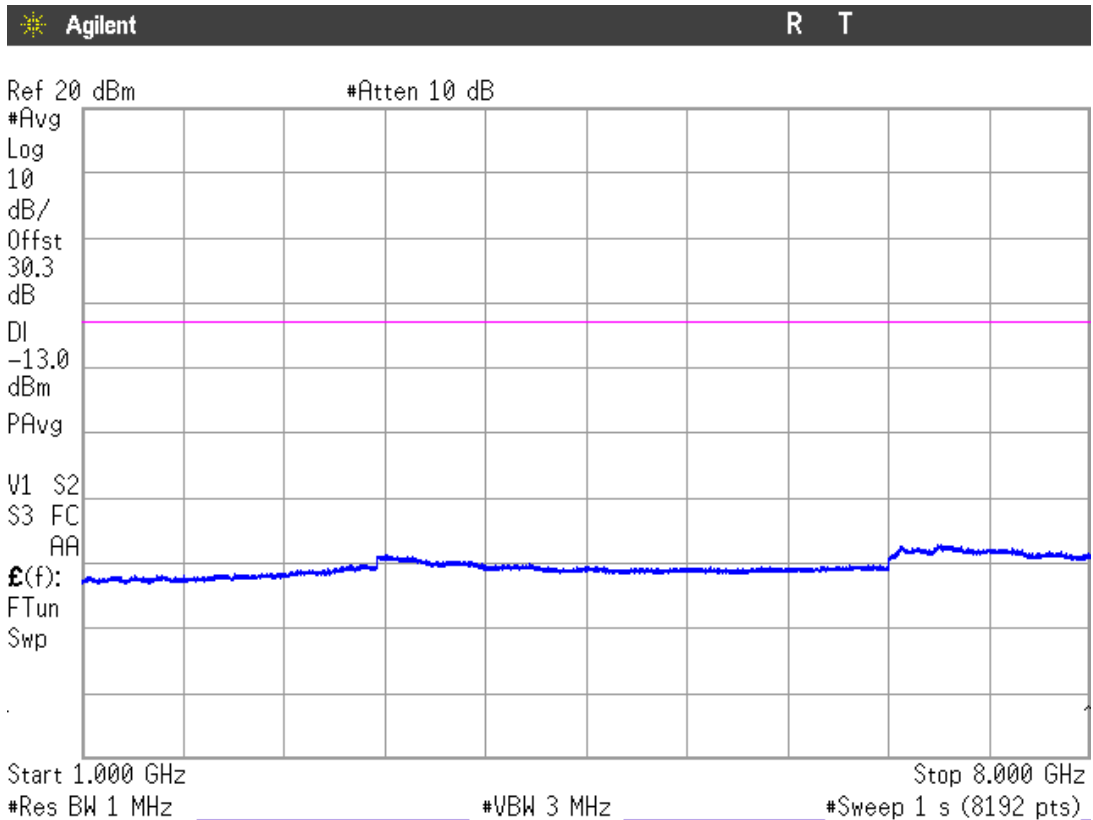


IC 768-776 MHz band. 22 kHz.

1. CHANNEL LOWEST. 768.0125 MHz.



2. CHANNEL HIGHEST. 775.9875 MHz.



Clause 90.543 / RSS-119 Clause 5.8.9.2: Radiated emissions

SPECIFICATION

FCC §90.543.

(c) Out-of-band emission limit. On any frequency outside of the frequency ranges covered by the ACP tables in this section, the power of any emission must be reduced below the mean output power (P) by at least $43 + 10\log(P)$ dB measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

RSS-119 §5.8.9.2

In addition, for operations in the 764-776 MHz and 794-806 MHz, all emissions (including harmonics in the band 155-1610 MHz), shall not exceed -70dBW/MHz (-40 dBm/MHz) e.i.r.p. for wideband emissions, and -80dBW/kHz (-50 dBm/MHz) e.i.r.p. for discrete emissions of less than 700 Hz bandwidth.

METHOD

The measurement was performed with the EUT inside an anechoic chamber. The RF output connector of the EUT is terminated with an attenuator and a 50 ohm load.

The spectrum was scanned from 30 MHz to at least the 10th harmonic of the highest frequency generated within the equipment.

The EUT was placed on a 1 meter high non-conductive table at a 3 meter distance from the measuring antenna for measurements below 1 GHz and at 1 m distance for measurements above 1 GHz.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded.

Each detected emission at less than 20 dB below the limit is substituted by the Substitution method in accordance with the ANSI/TIA/EIA-603-C: 2004.

RESULTS

MBS Unit DC

FCC (769-775MHz band). 20 kHz bandwidth.

1. CHANNEL: LOWEST. 769.0125 MHz.

Frequency range 30 MHz-1000 MHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

Frequency range 1 GHz-8 GHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

2. CHANNEL: HIGHEST. 774.9875 MHz.

Frequency range 30 MHz-1000 MHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

Frequency range 1 GHz-8 GHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

IC (768-776 MHz band) for 22 kHz and 20 kHz bandwidth.

A preliminary scan determined the TETRA 22 kHz bandwidth as the worst case. The following tables and plots show the results for 22 kHz bandwidth.

1. CHANNEL: LOWEST. 768.0125 MHz.

Frequency range 30 MHz-1000 MHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

Frequency range 1 GHz-8 GHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

2. CHANNEL: HIGHEST. 775.9875 MHz.

Frequency range 30 MHz-1000 MHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

Frequency range 1 GHz-8 GHz.

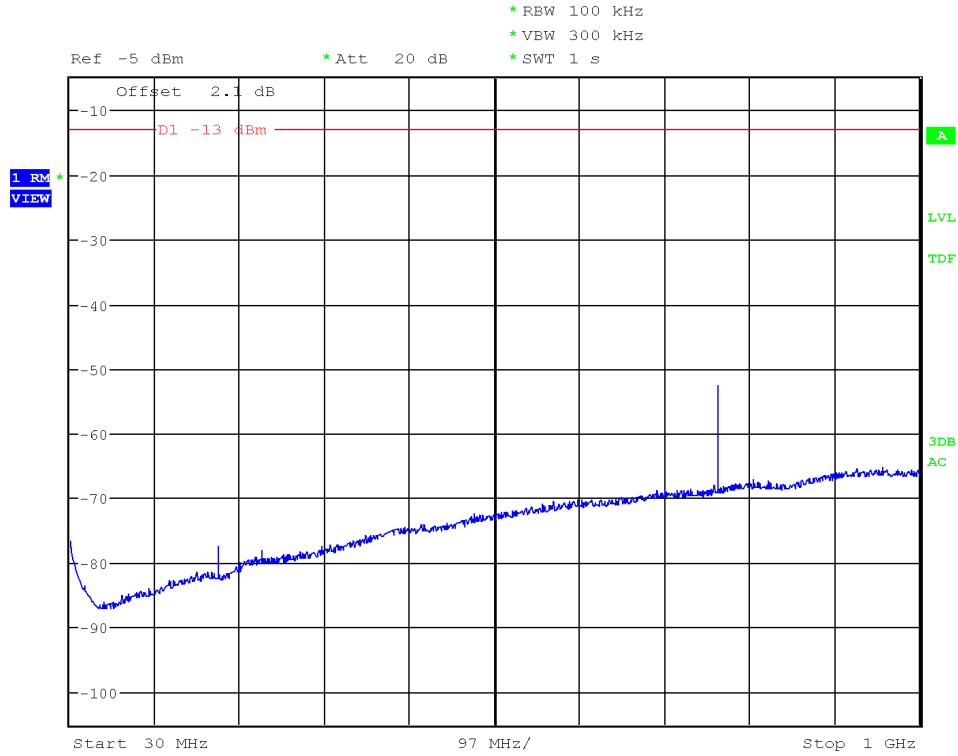
No spurious signals at less than 20 dB respect to the limit were found in all the range.

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz.

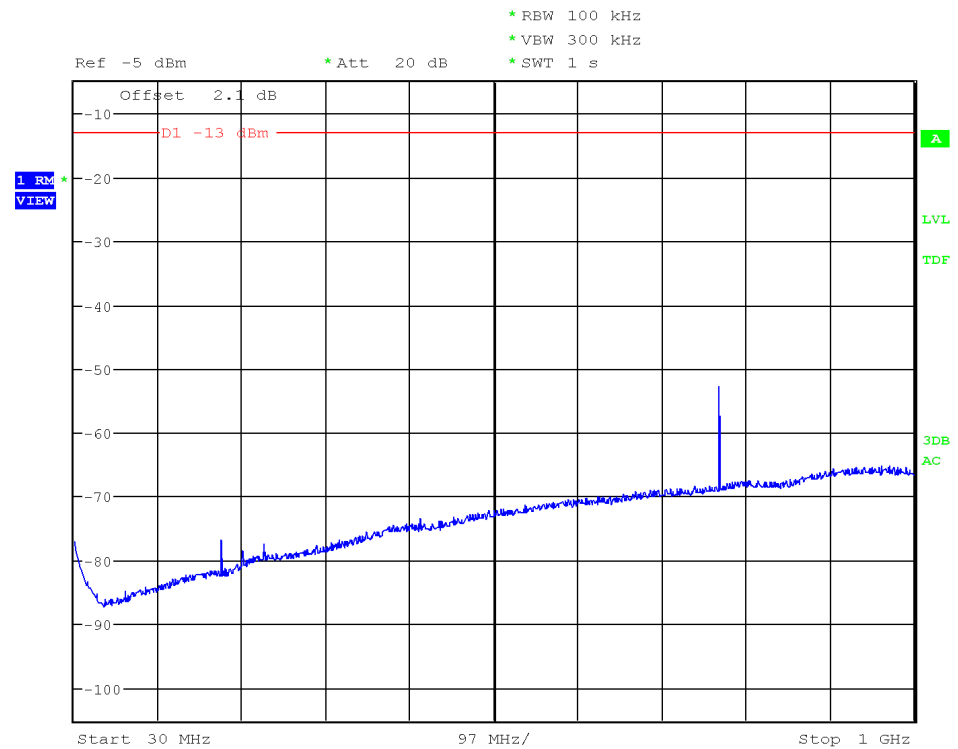
FCC (769-775 MHz) band.

CHANNEL: LOWEST. 769.0125 MHz.



Note: The peak nearest the limit in the above plot is the carrier frequency.

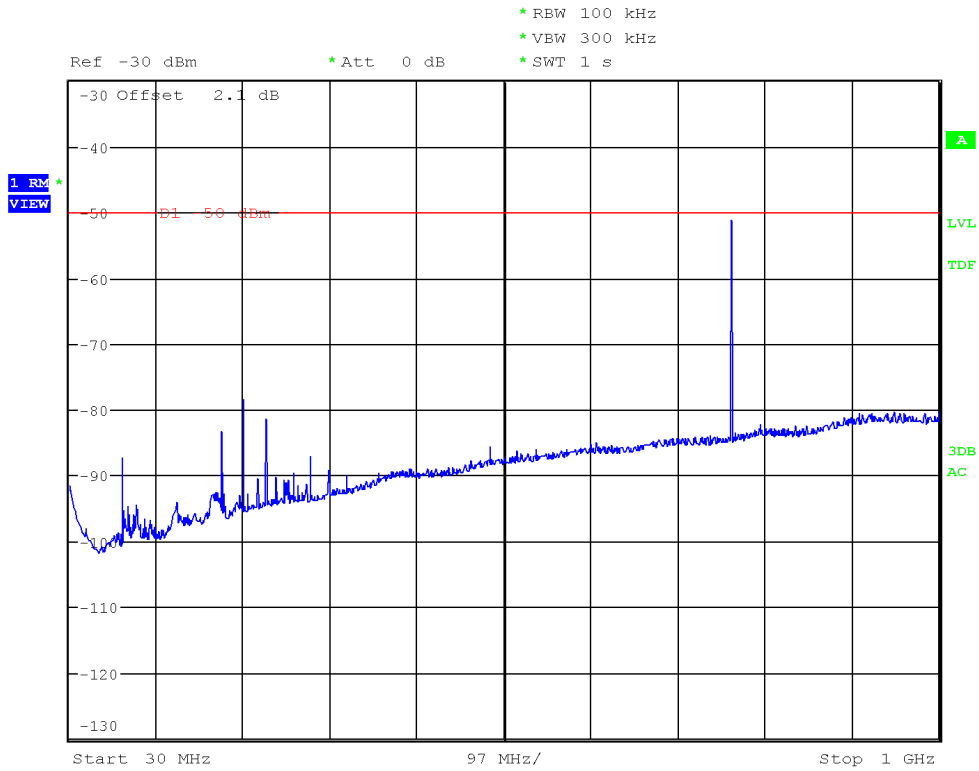
CHANNEL: HIGHEST. 774.9875 MHz.



Note: The peak nearest the limit in the above plot is the carrier frequency.

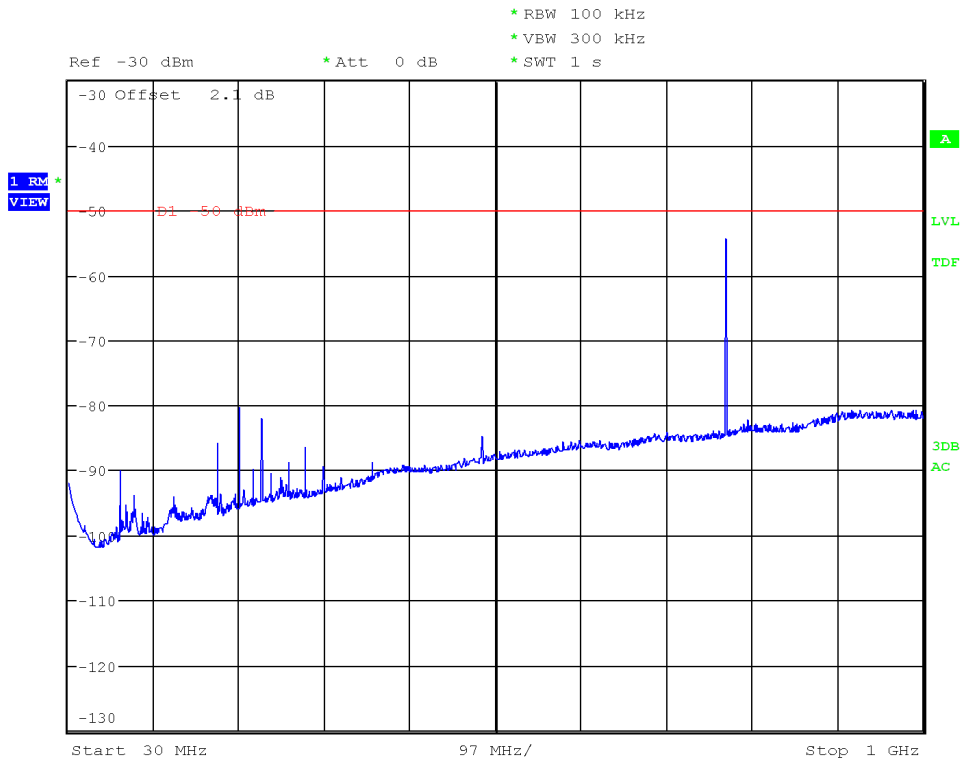
IC (768-776 MHz) band.

CHANNEL: LOWEST. 768.0125 MHz.



Note: The peak nearest the limit in the above plot is the carrier frequency.

CHANNEL: HIGHEST. 775.9875 MHz.

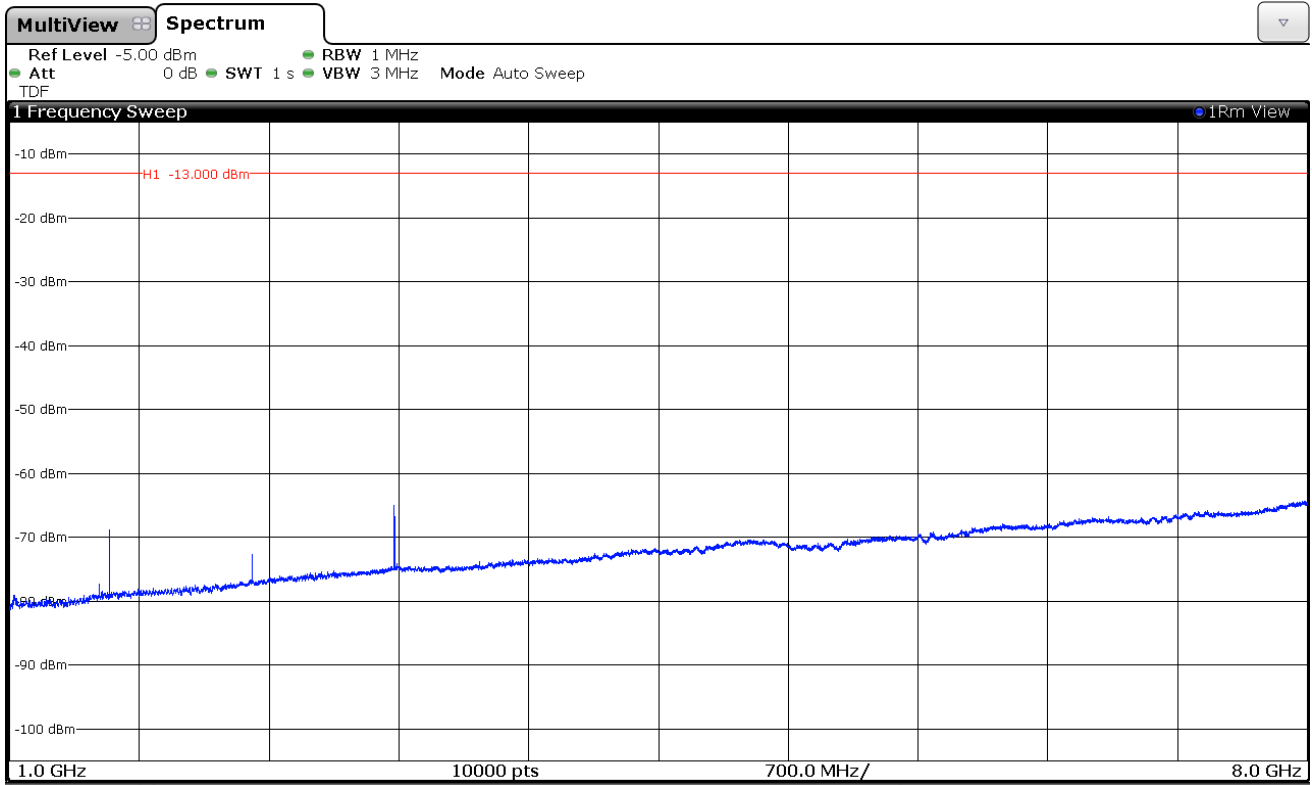


Note: The peak nearest the limit in the above plot is the carrier frequency.

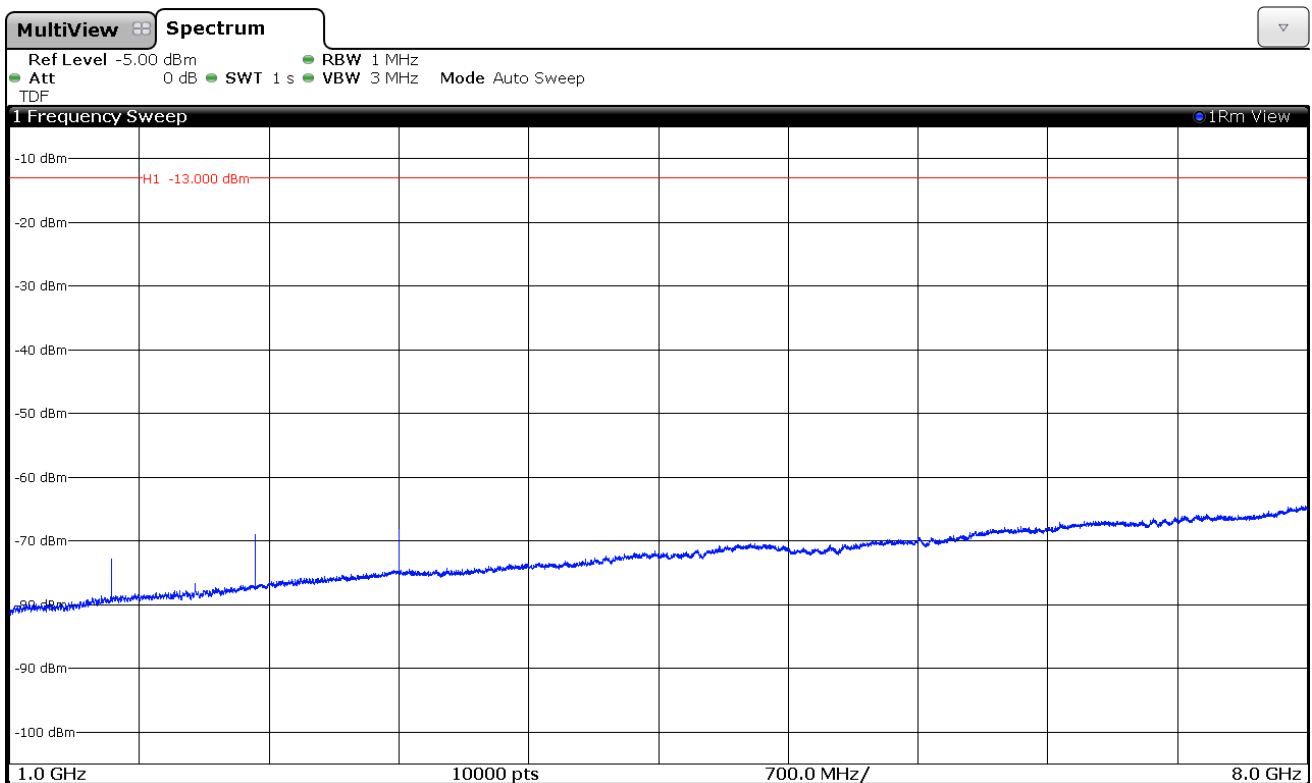
FREQUENCY RANGE 1 GHz to 8 GHz.

FCC (769-775 MHz) band.

CHANNEL: LOWEST. 769.0125 MHz.

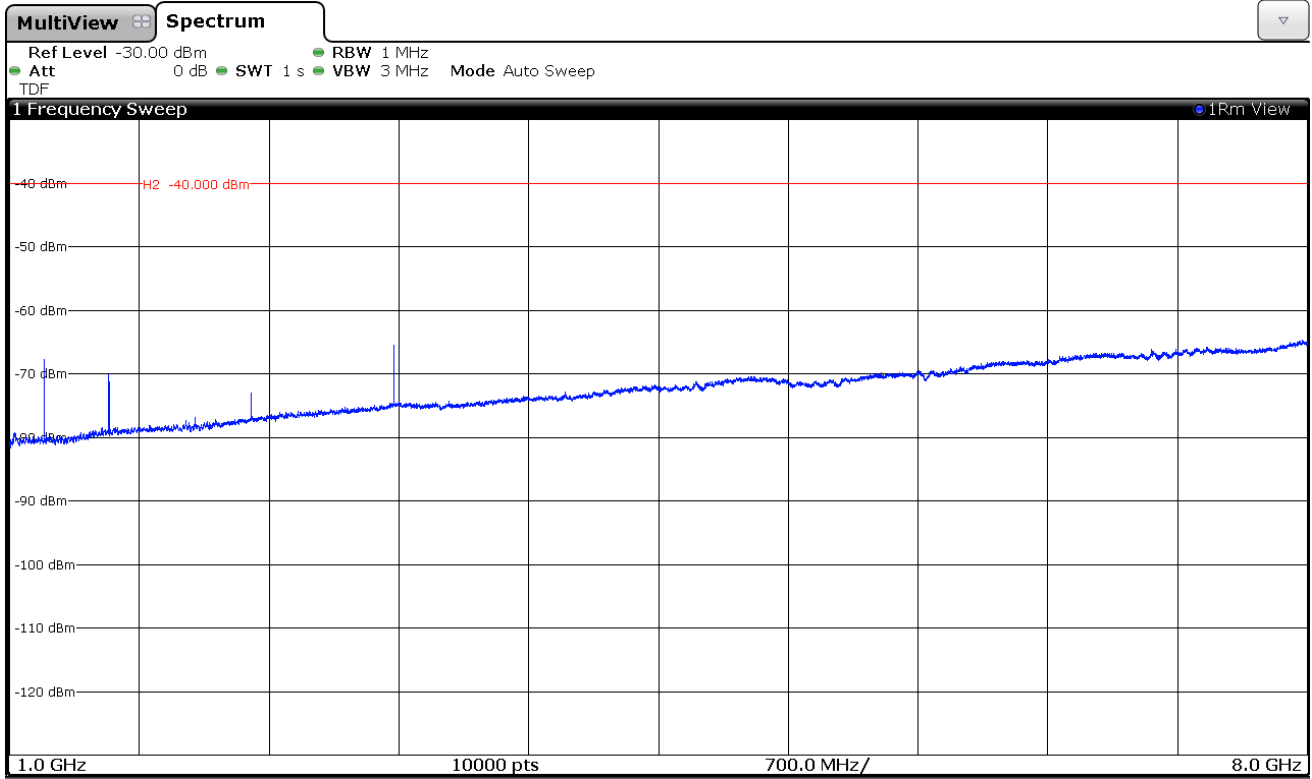


CHANNEL: HIGHEST. 774.9875 MHz.

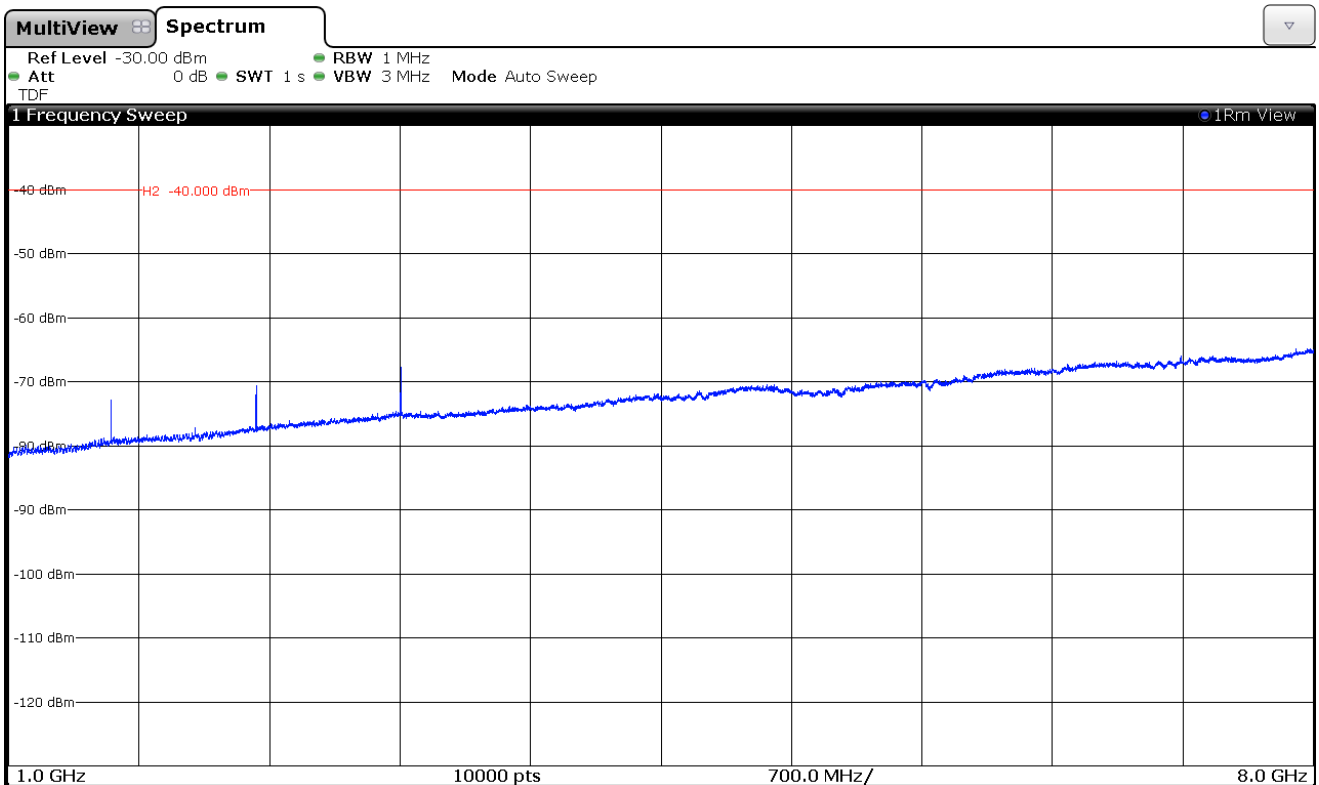


IC (768-776 MHz) band.

CHANNEL: LOWEST. 768.0125 MHz.



CHANNEL: HIGHEST. 775.9875 MHz.



MBS Unit AC

FCC (769-775MHz band). 20 kHz bandwidth.

1. CHANNEL: LOWEST. 769.0125 MHz.

Frequency range 30 MHz-1000 MHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

Frequency range 1 GHz-8 GHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

2. CHANNEL: HIGHEST. 774.9875 MHz.

Frequency range 30 MHz-1000 MHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

Frequency range 1 GHz-8 GHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

IC (768-776 MHz band) for 22 kHz and 20 kHz bandwidth.

A preliminary scan determined the TETRA 22 kHz bandwidth as the worst case. The following tables and plots show the results for 22 kHz bandwidth.

1. CHANNEL: LOWEST. 768.0125 MHz.

Frequency range 30 MHz-1000 MHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

Frequency range 1 GHz-8 GHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

2. CHANNEL: HIGHEST. 775.9875 MHz.

Frequency range 30 MHz-1000 MHz.

No spurious signals at less than 20 dB respect to the limit were found in all the range.

Frequency range 1 GHz-8 GHz.

Substitution method data

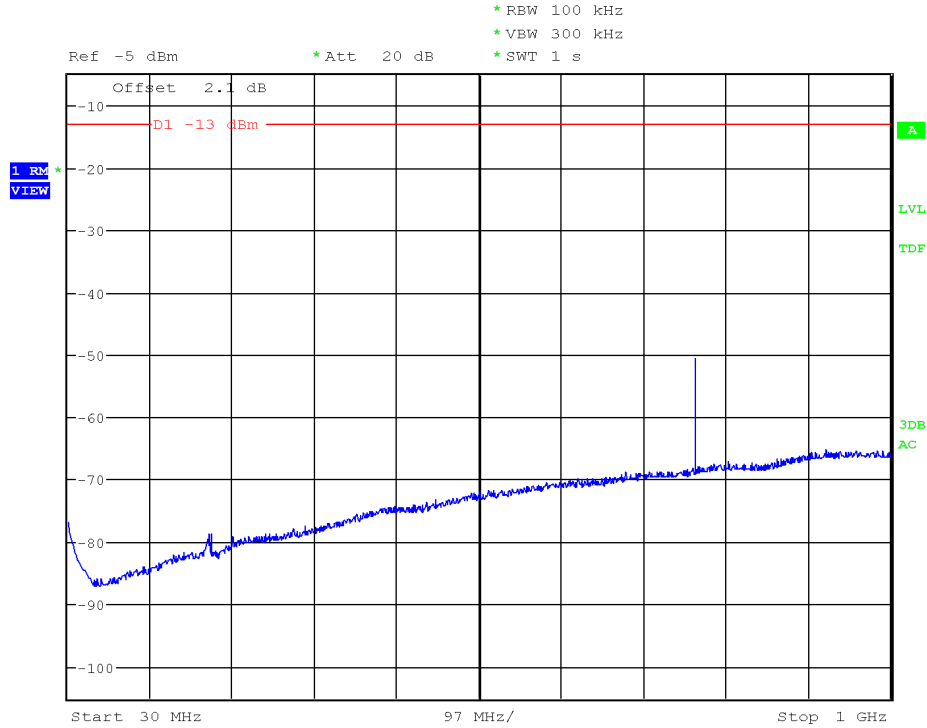
Frequency (MHz)	Type of signal	Instrument reading (dBm)	Polarization	(1) Generator output (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain Gi (respect to isotropic radiator) (dB)	E.I.R.P. (dBm) = (1) – (2) + (3)
3103.85	Wideband	-52.90	Horizontal	-63.45	4.35	11.30	-56.50

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz.

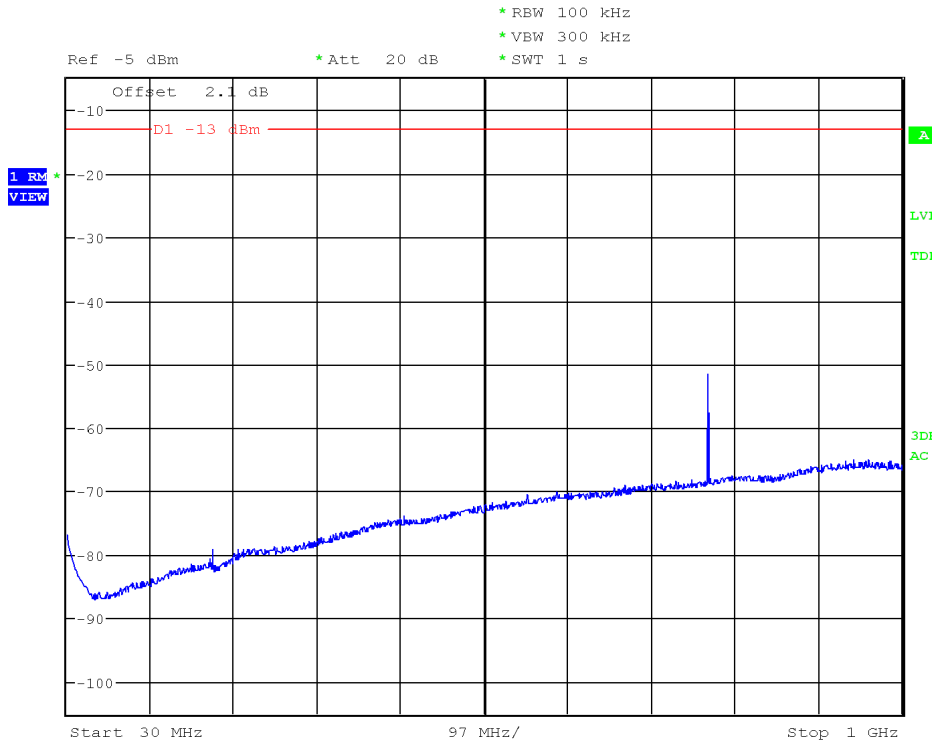
FCC (769-775 MHz) band.

CHANNEL: LOWEST. 769.0125 MHz.



Note: The peak nearest the limit in the above plot is the carrier frequency.

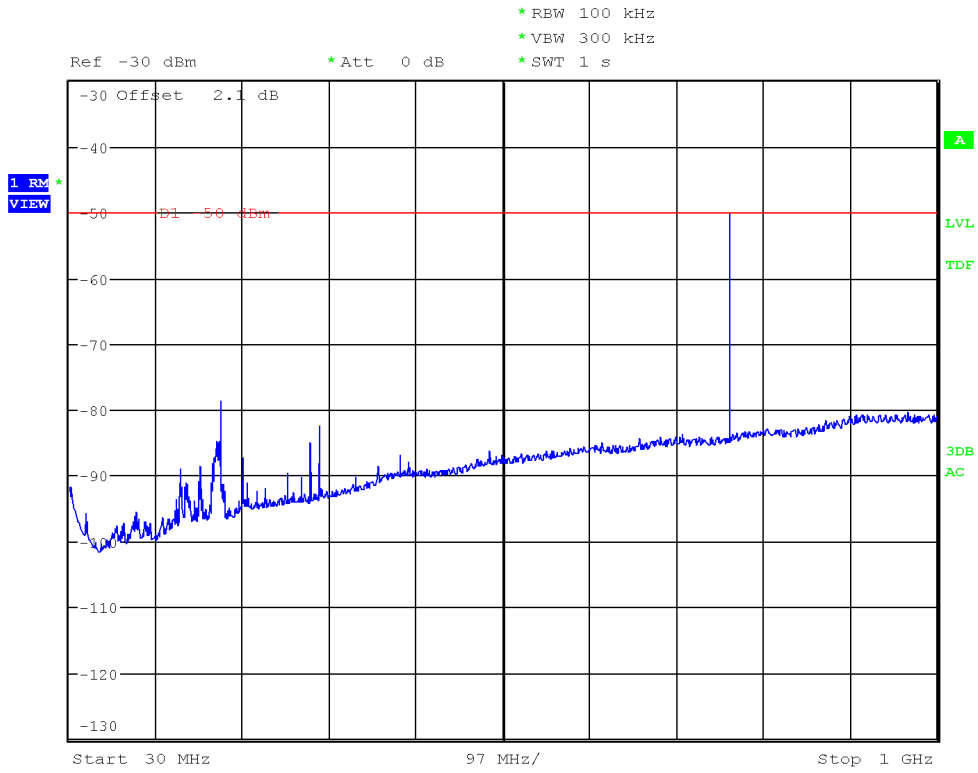
CHANNEL: HIGHEST. 774.9875 MHz.



Note: The peak nearest the limit in the above plot is the carrier frequency.

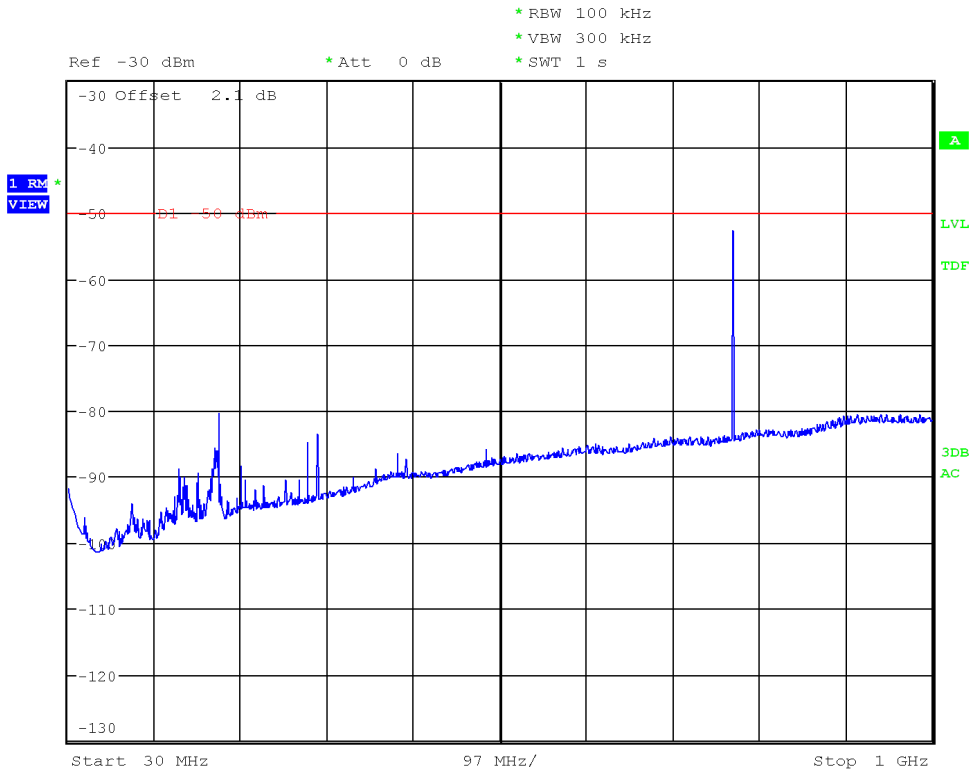
IC (768-776 MHz) band.

CHANNEL: LOWEST. 768.0125 MHz.



Note: The peak nearest the limit in the above plot is the carrier frequency.

CHANNEL: HIGHEST. 775.9875 MHz.

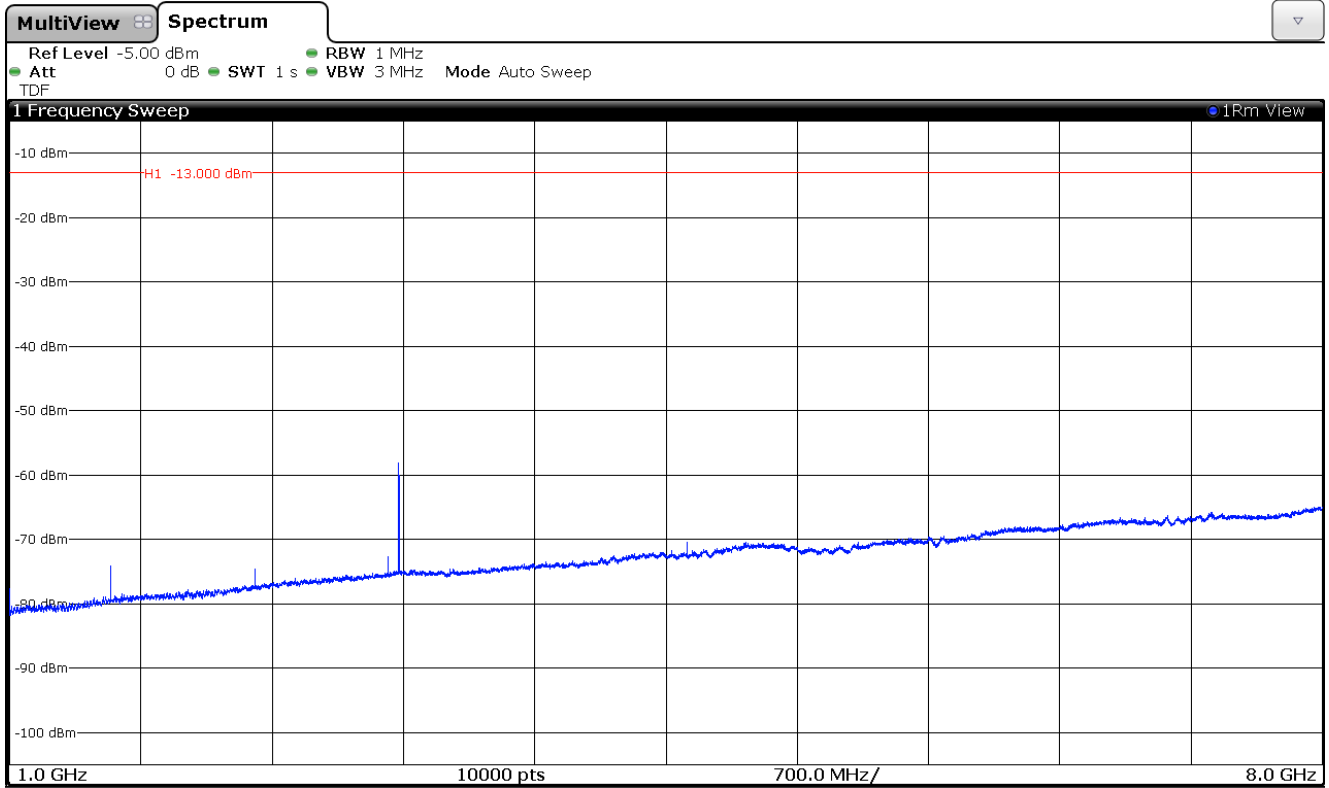


Note: The peak nearest the limit in the above plot is the carrier frequency.

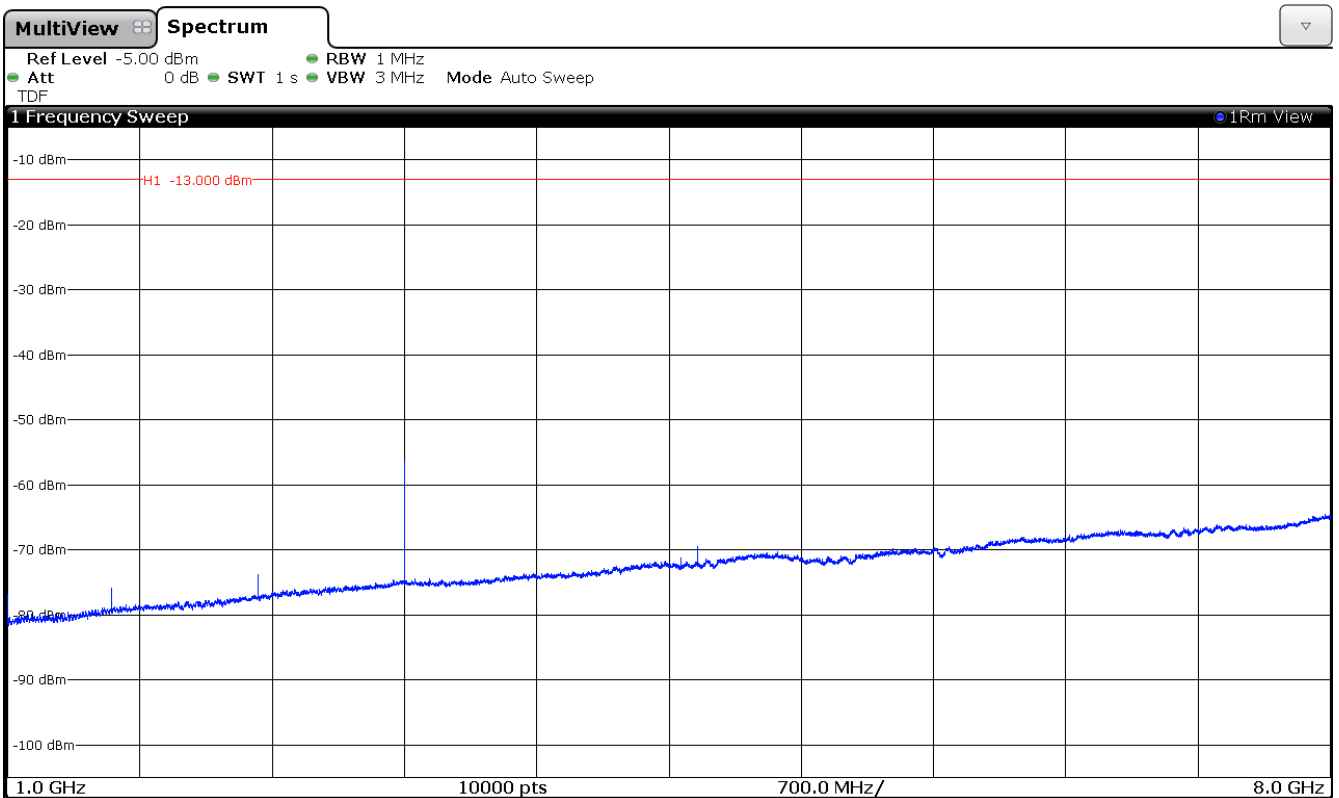
FREQUENCY RANGE 1 GHz to 8 GHz.

FCC (769-775 MHz) band.

CHANNEL: LOWEST. 769.0125 MHz.

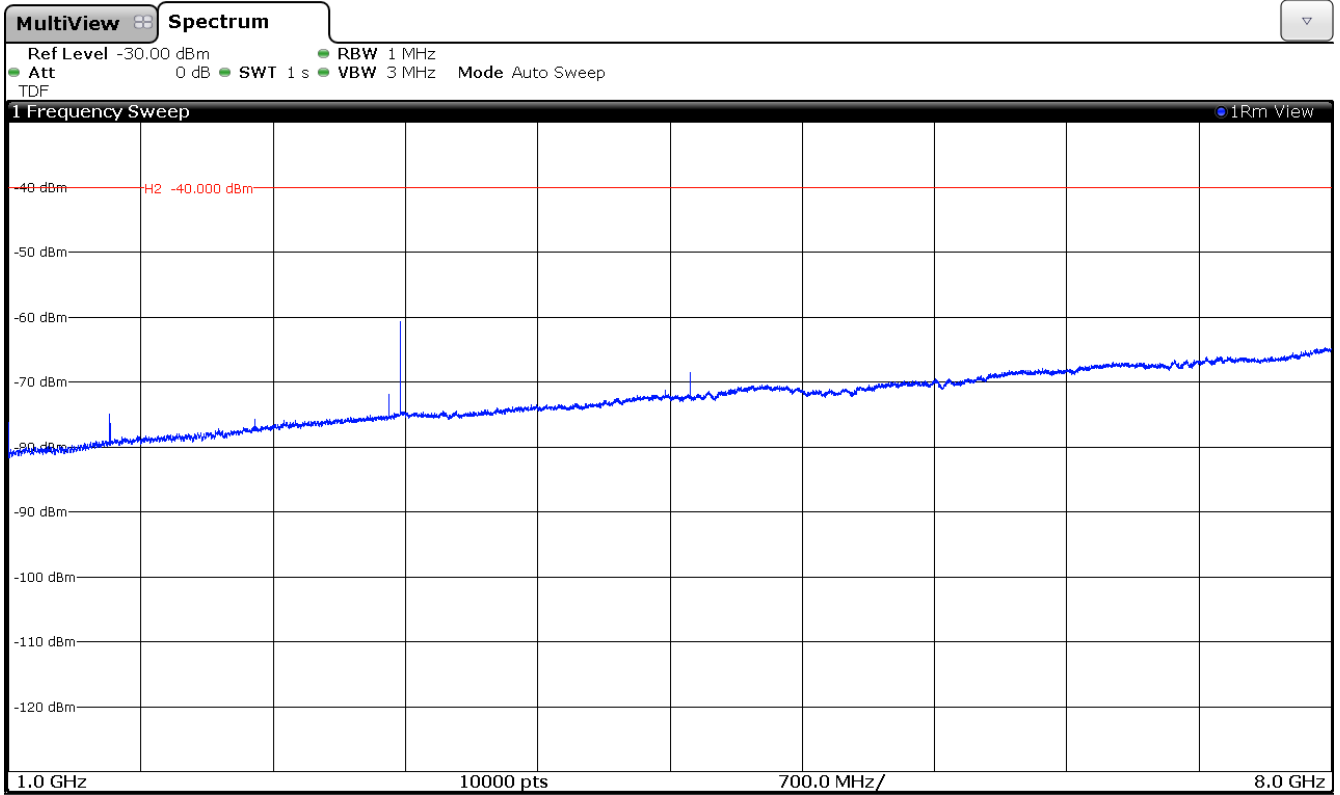


CHANNEL: HIGHEST. 774.9875 MHz.



IC (768-776 MHz) band.

CHANNEL: LOWEST. 768.0125 MHz.



CHANNEL: HIGHEST. 775.9875 MHz.

