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Middlefield, Ohio 44062
United States of America
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CERTIFICATION TEST REPORT

Manufacturer: **Current Products Corp.**
1995 Hollywood Avenue
Pensacola, Florida 32505 USA

Applicant: **Same As Above**

Product Name: **E-Wand™**

Product Description: A retrofit device used to automate vertical and horizontal window blinds.

Model: **CP180335E_01**

FCC ID: **2AJXX100619**

Testing Commenced: 2021-01-19

Testing Ended: 2021-08-18

Summary of Test Results: **In Compliance**

The EUT complies with the EMC requirements when manufactured identically as the unit tested in this report, including any required modifications and/or manufacturer's statement. Any changes to the design or build of this unit subsequent to this testing may deem it non-compliant.

Standards:

- **FCC Part 15 Subpart C, Section 15.247**
- **FCC Part 15.31(e)**
- **ANSI C63.10:2013**



Order Number: F2P24969A

Applicant: Current Products Corp.

Model: CP180335E_01

Evaluation Conducted by:

Julius Chiller, EMC/Wireless Engineer

Report Reviewed by:

Ken Littell, Vice President of EMC

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1 ADMINISTRATIVE INFORMATION

1.1 Measurement Location:

F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.

1.2 Measurement Procedure:

All measurements were performed according to the 2013 version of ANSI C63.10 and recommended FCC procedure of measurement of DTS operating under Section 15.247 and in KDB558074. A list of the measurement equipment can be found in Section 6.

1.3 Uncertainty Budget:

The uncertainty in EMC measurements arises from several factors which affect the results, some associated with environmental conditions in the measurement room, the test equipment being used and the measurement techniques adopted.

The measurement uncertainty budgets detailed below are calculated from the test and calibration data, and are expressed with a 95% confidence factor. Note: Only measurements listed below which relate to tests included in this Test Report are applicable to it.

Measurement Range	Expanded Uncertainty	Combined Uncertainty
Radiated Emissions <1 GHz @ 3m	±5.07dB	±2.54
Radiated Emissions <1 GHz @10m	±5.09dB	±2.55
Radiated Emissions 1 GHz to 2.7 GHz	±3.62dB	±1.81
Radiated Emissions 2.7 GHz to 18 GHz	±3.10dB	±1.55
AC Power Line Conducted Emissions, 150kHz to 30 MHz	±2.76dB	±1.38

This Uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.4 Document History

Document Number	Description	Issue Date	Approved By
F2P24969A-01E	First Issue	2021-08-18	K. Littell

**2 SUMMARY OF TEST RESULTS**

Test Name	Standard(s)	Results
Occupied Bandwidth	CFR 47 Part 15.247(a)(2) / KDB558074	Complies
Conducted Output Power	CFR 47 Part 15.247(b)(3) / KDB558074	Complies
Voltage Variations	CFR 47 Part 15.31(e)	Complies*
Conducted Spurious Emissions	CFR 47 Part 15.247(d) / Part 15.207 / KDB558074	Complies
Radiated Spurious Emission	CFR 47 Part 15.247(d) / Part 15.209 / KDB558074	Complies
Peak Power Spectral Density	CFR 47 Part 15.247(e) / KDB558074	Complies

*Product was battery-operated (9VDC).
Requirements of 15.31 were met by using new batteries.

Modifications Made to the Equipment
None

**3 TABLE OF MEASURED RESULTS**

Test	Low Channel 2.405 GHz	Mid Channel 2.440 GHz	High Channel 2.480 GHz
Conducted Output Power	1.14mW, 0.57dBm	1.13mW, 0.54dBm	1.23mW, 0.90dBm
Conducted Output Power Limit	1 Watt, 30dBm	1 Watt, 30dBm	1 Watt, 30dBm
EIRP w/5.19dBi Antenna	3.76mW, 5.76dBm	3.74mW, 5.73dBm	4.06mW, 6.09dBm
EIRP Limit	4 Watts, 36dBm	4 Watts, 36dBm	4 Watts, 36dBm
Peak Power Spectral Density	-15.35dBm	-15.14dBm	-14.57dBm
Peak Power Spectral Density Limit	8dBm	8dBm	8dBm
-6dB Occupied Bandwidth	1.650 MHz	1.652 MHz	1.628 MHz
-6dB Occupied Bandwidth Limit	≥ 500KHz	≥ 500KHz	≥ 500KHz



4 ENGINEERING STATEMENT

This report has been prepared on behalf of Current Products Corp. to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.247 of the FCC Rules using ANSI C63.10:2013 and KDB558074 standards. The test results found in this test report relate only to the items tested.

**5 EUT INFORMATION AND DATA****5.1 Equipment Under Test:**

Product: Window Controller

Model: CP180335E_01

Serial No.: None Specified

FCC ID: **2AJXX100619****5.2 Trade Name:**

Current Products Corp.

5.3 Power Supply:

Battery-Operated (9VDC)

5.4 Applicable Rules:

CFR 47, Part 15.247, subpart C

5.5 Equipment Category:

Radio Transmitter-DTS

5.6 Antenna:

Internal 5.19dBi

5.7 Accessories:

Device	Manufacturer	Model Number	Serial Number
Laptop*	Dell	Latitude 7490	10075
Programmer	Silicon Labs	PCB4001	Rev. 03

Indicates F2 Labs-supplied equipment.*5.8 Test Item Condition:**

The equipment to be tested was received in good condition.

5.9 Testing Algorithm:

EUT was programmed to continuously transmit a modulated signal at 100% duty cycle on a low, mid and high channel in the 2.4GHz band. Frequencies used were 2.405, 2.440 and 2.480 GHz. For conducted measurements the EUT was directly connected to the measuring receiver. For radiated measurements, the EUT was placed in a semi-anechoic chamber and measurements were made at 3m distance.

**6 LIST OF MEASUREMENT INSTRUMENTATION**

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber 2014	CL166-E	AlbatrossProjects	B83117-DF435-T261	US140023	2022-03-09
Temp/Hum. Recorder	CL261	Extech	445814	04	2022-03-19
Spectrum Analyzer	CL138	Agilent Technologies	E4407B	US41192779	2021-09-16
Receiver	CL151	Rohde & Schwarz	ESU40	100319	2022-07-08
Receiver	CL204	Rohde & Schwarz	ESR7	101714	2022-07-07
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	2021-11-05
Horn Antenna	CL098	Emco	3115	9809-5580	2022-01-08
Horn Antenna	CL114	AH Systems, Inc.	SAS-572	237	2023-07-30
Pre-Amplifier	CL250	Com-Power	PAM-118A	18040011	2022-07-07
Amplifier w/Monopole & 18" Loop	CL163-Loop	A.H. Systems, Inc.	EHA-52B	100	2021-10-15
Low Loss Cable Set	--	Pasternack	PE3C0666-252 / PE3C066-50CM	None Spec.	2023-10-12
Software:	EMC 32, Version 8.53.0 Software Verified: 2021-01-19 to 2021-01-21; 2021-07-28				



7 FCC PART 15.247(a)(2) – OCCUPIED BANDWIDTH

7.1 Requirements:

The 6dB bandwidth shall be greater than 500 kHz.

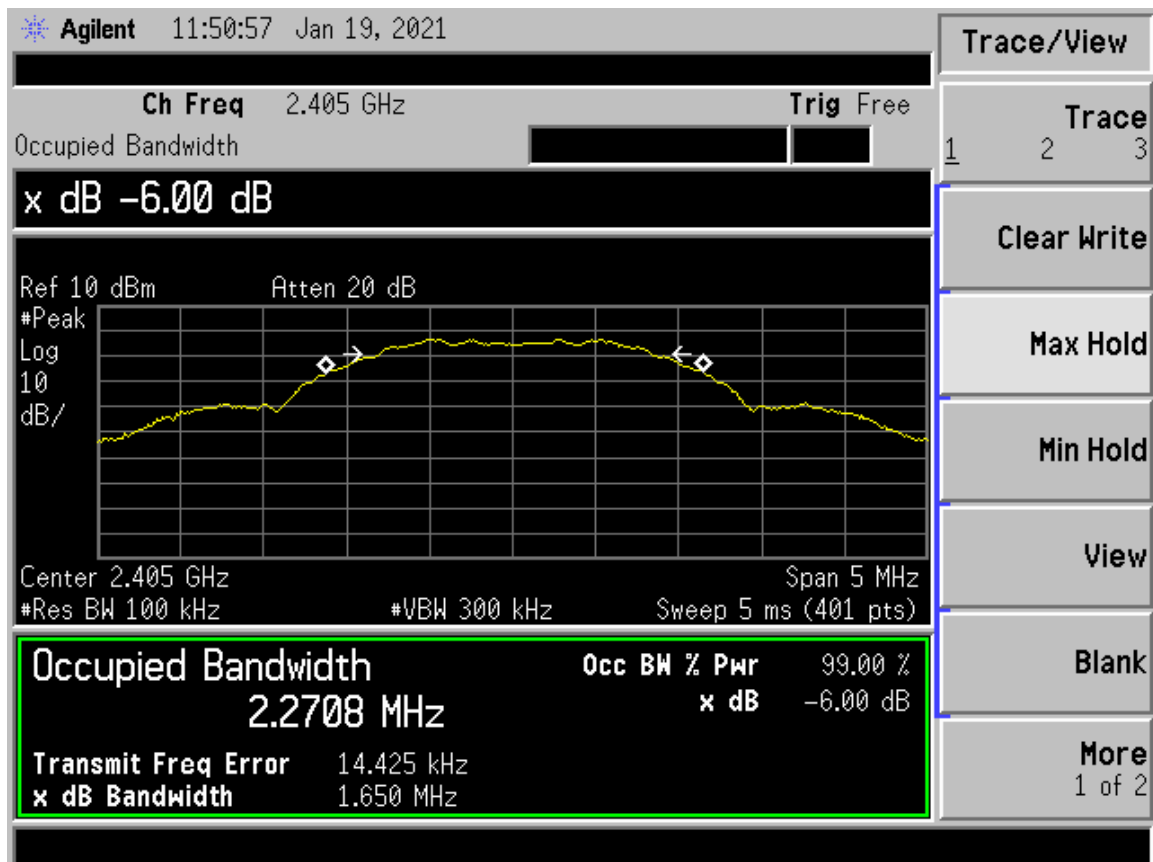
Bandwidth measurements were made at the low (2.405 GHz), mid (2.440 GHz) and upper (2.480 GHz) frequencies with the resolution Bandwidth set at 30 kHz (video bandwidth set at 100 kHz) while the span was set at 3 MHz. The bandwidth was measured using the analyzer's marker function.



7.2 Occupied Bandwidth Test Data

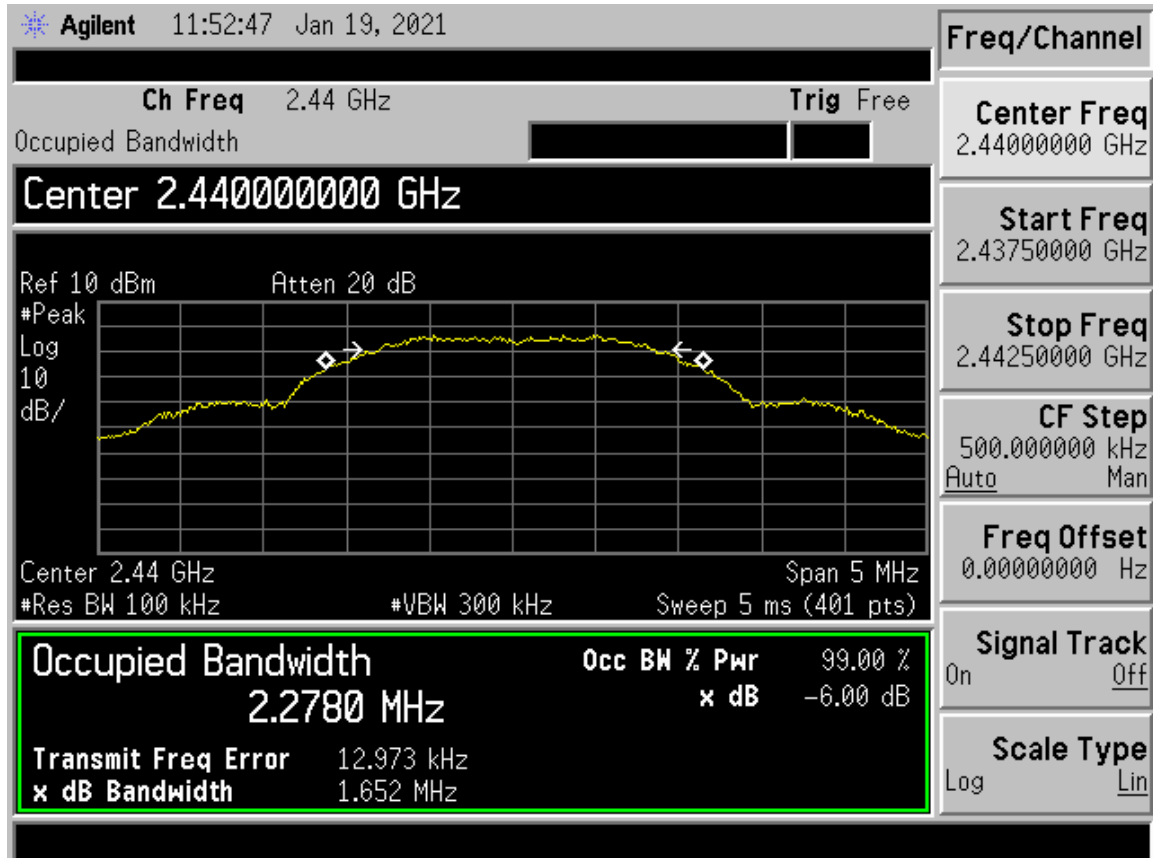
Test Date:	2021-01-19	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.247(a)(2); KDB558074	Air Temperature:	20.6°C
		Relative Humidity:	42%

Low Channel



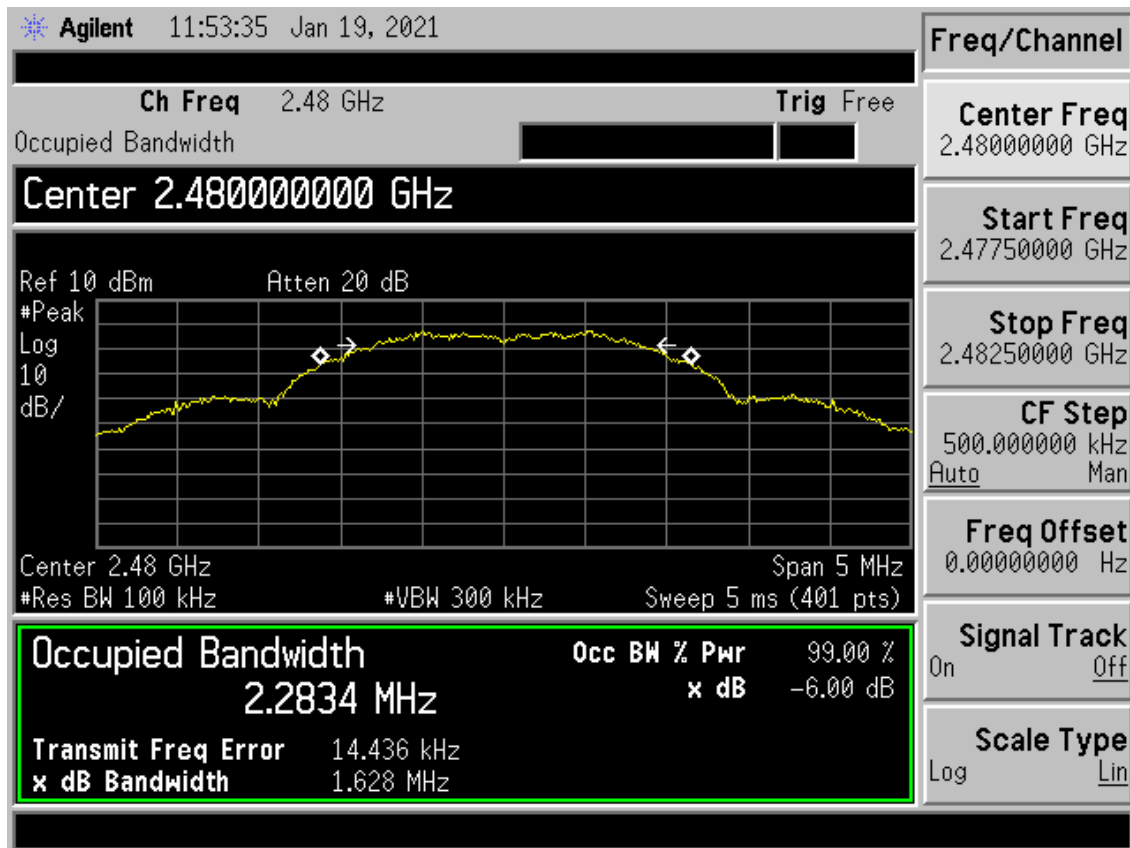


Mid Channel





High Channel





8 FCC PART 15.247(b)(3) – CONDUCTED OUTPUT POWER

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the receiver. The peak power output was measured.

8.1 Requirements:

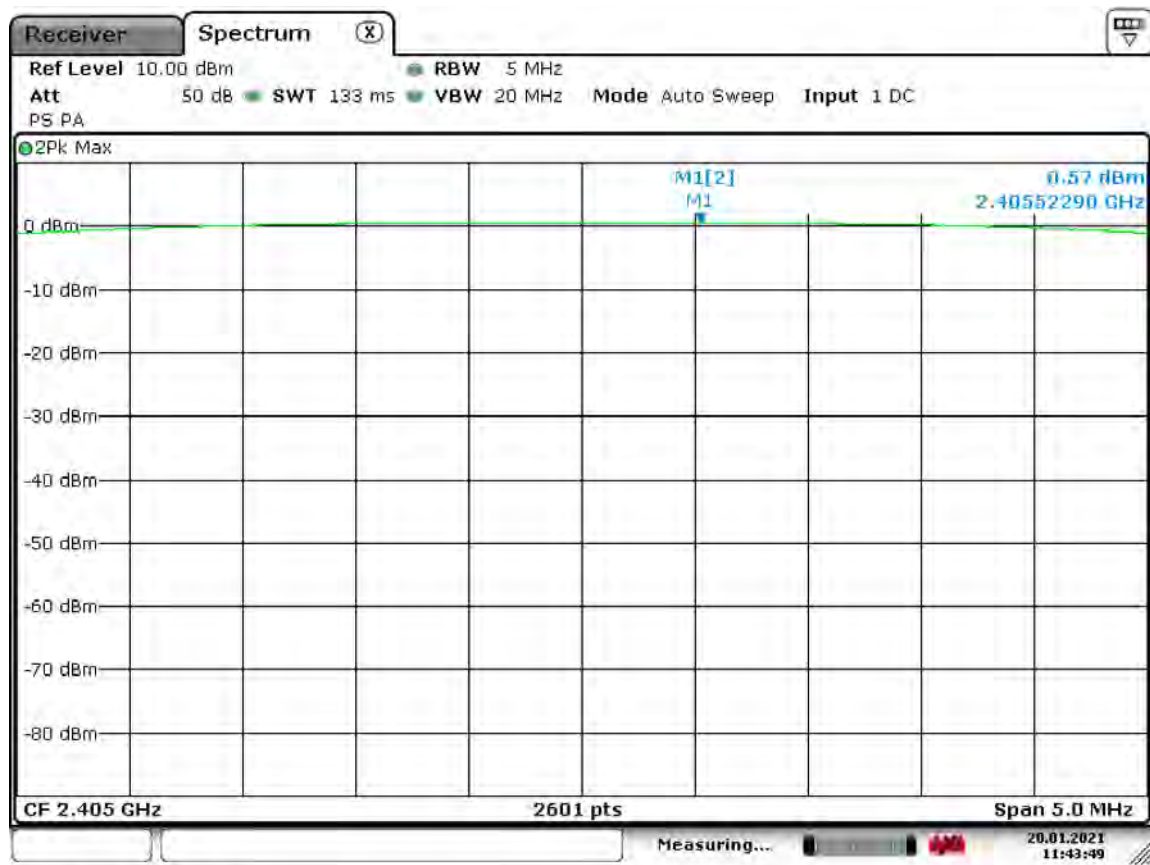
The peak power output shall be 1 watt (30 dBm) or less when using an antenna with a gain of less than 6dBi. For antennas having a gain of more than 6dBi, the limit is reduced by 1dB for every dB the antenna gain is over 6dBi.



8.2 Conducted Output Power Test Data

Test Date:	2021-01-20	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.247(b)(3); KDB558074	Air Temperature:	20.3°C
		Relative Humidity:	38%

Low Channel



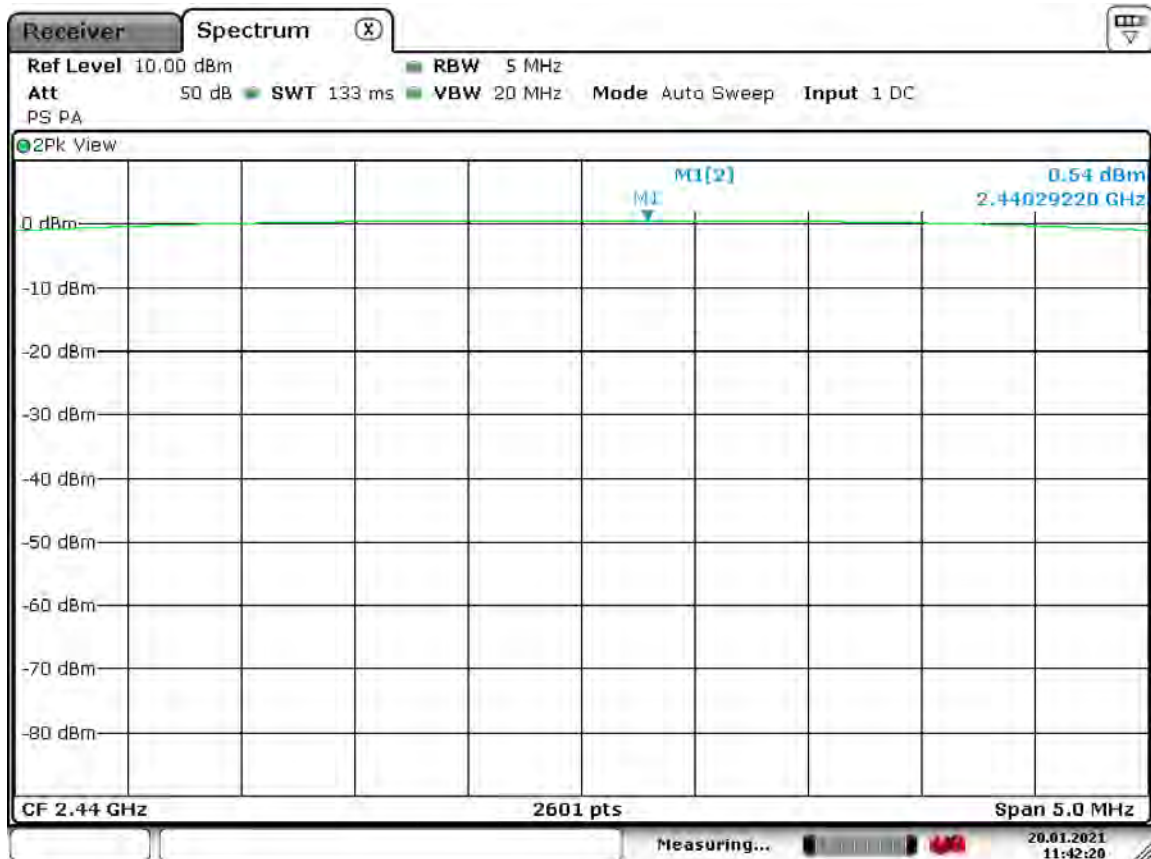


Order Number: F2P24969A

Applicant: Current Products Corp.

Model: CP180335E_01

Mid Channel



Date: 20.JAN.2021 11:42:20

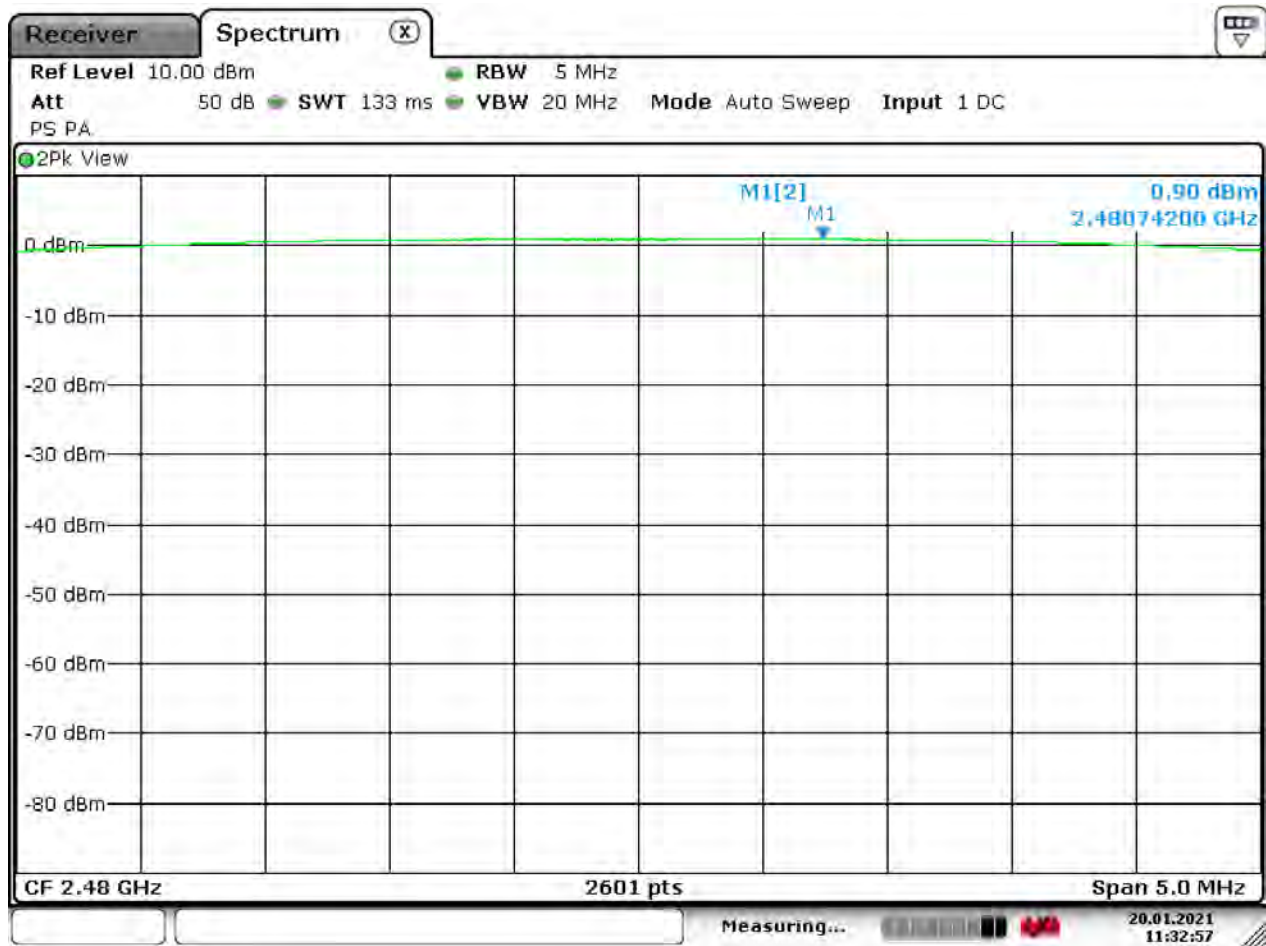


Order Number: F2P24969A

Applicant: Current Products Corp.

Model: CP180335E_01

High Channel



Date: 20.JAN.2021 11:32:56



9 FCC Part 15.247(d) – CONDUCTED SPURIOUS EMISSIONS

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the spectrum analyzer.

9.1 Requirements:

All Spurious Emissions must be at least 20dB down from the highest emission level measured within the authorized band up through the tenth harmonic.

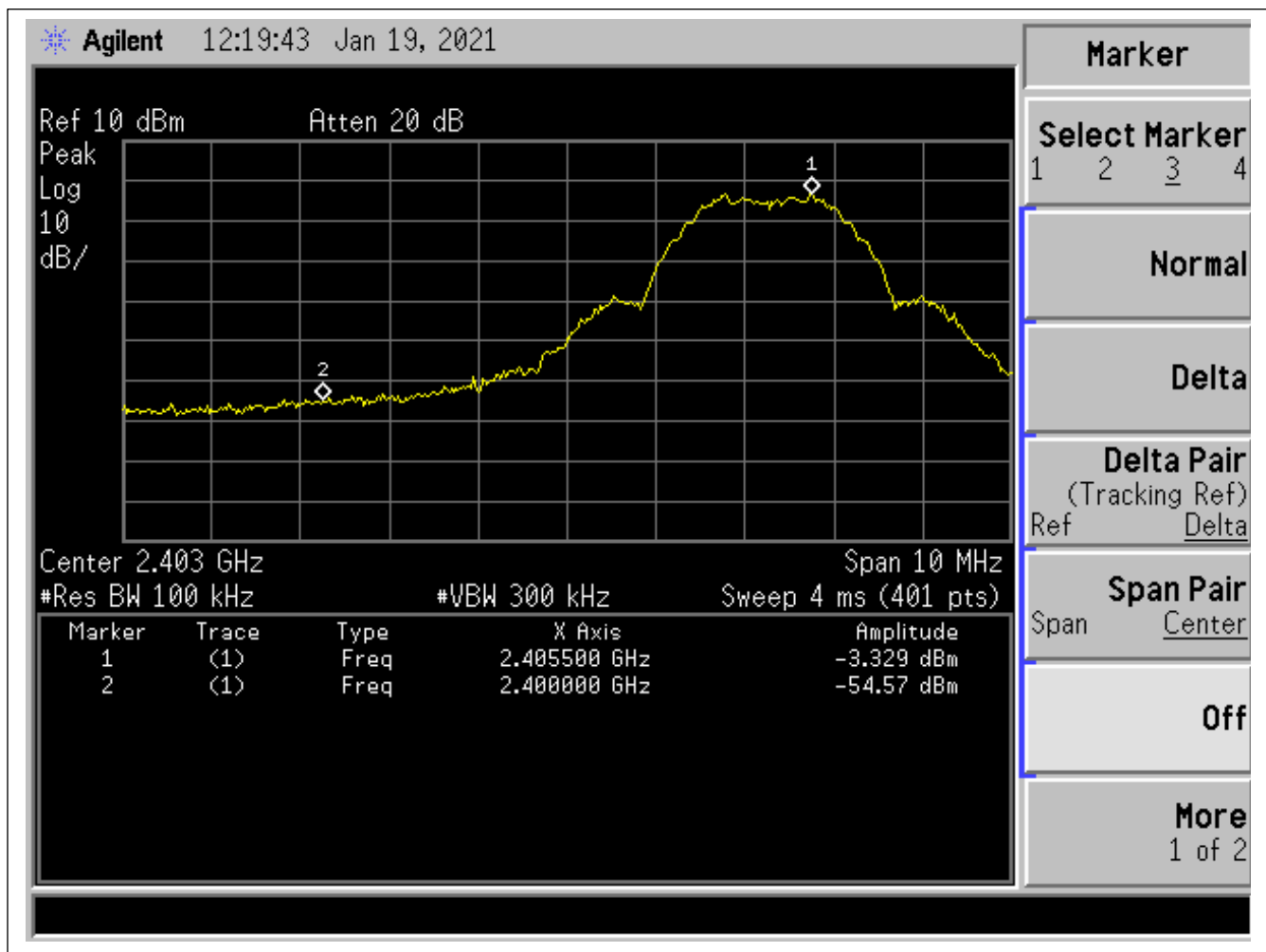
Spurious emissions measurements were made at the low, mid, and upper channels with the appropriate spectrum analyzer impulse bandwidth. Additionally, 20dB down points were measured for the low and high channels to verify band edge compliance.



9.2 Conducted Spurious Emissions Test Data

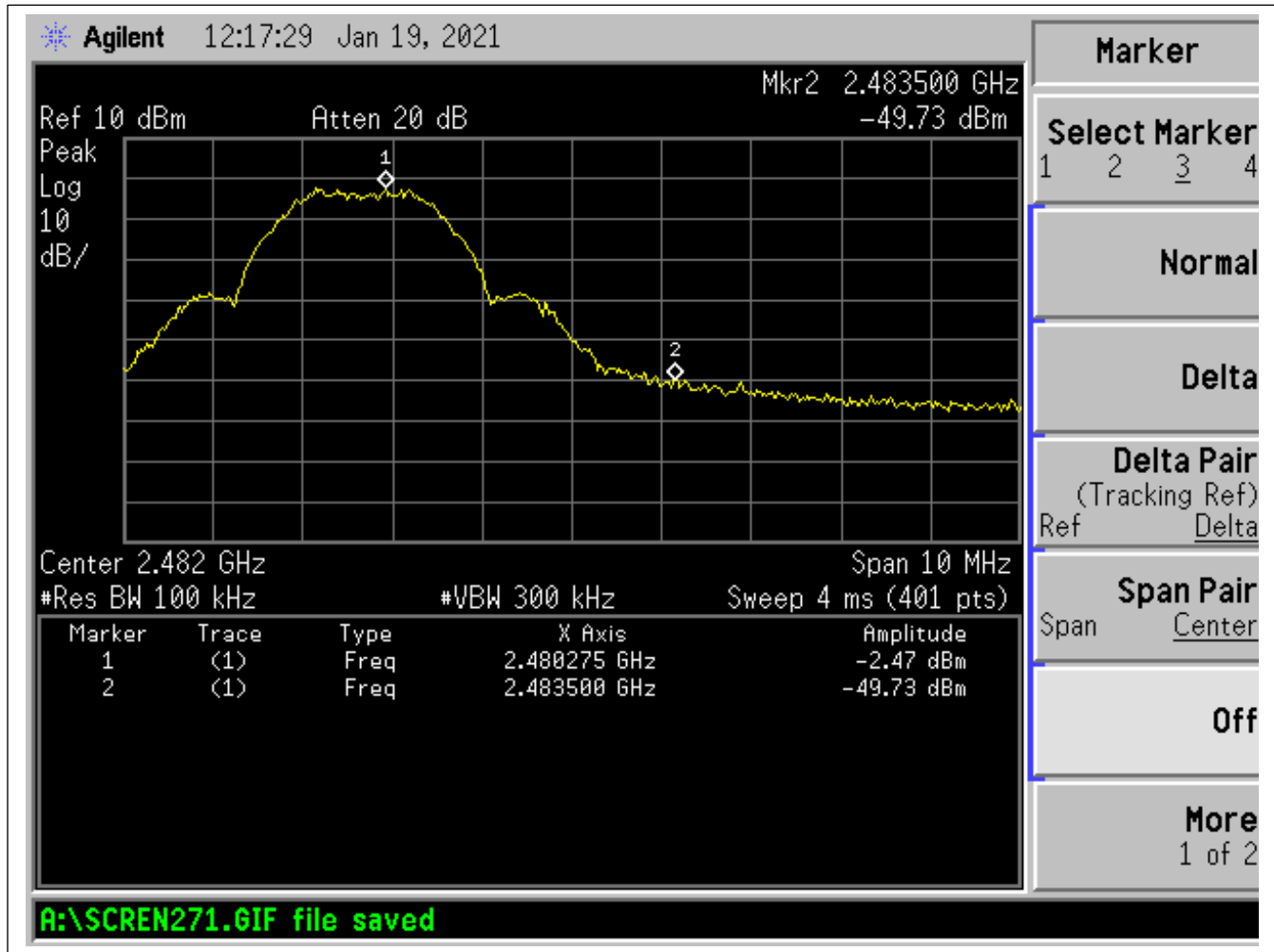
Test Date(s):	2021-01-19; 2021-07-28; 2021-08-18	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.247(d) / Part 15.207 KDB558074	Air Temperature:	20.6°C
		Relative Humidity:	38%

Lower Band Edge



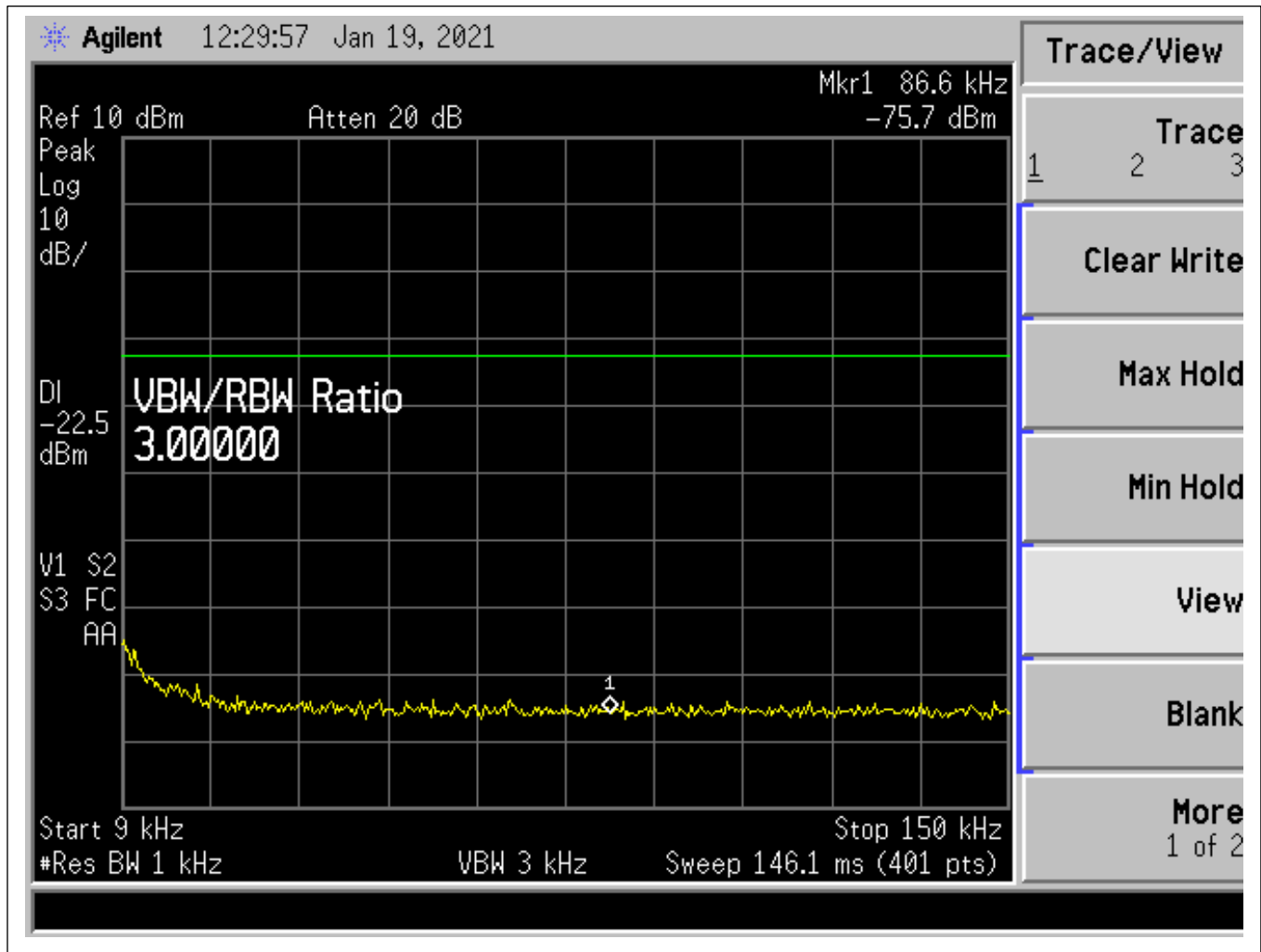


Upper Band Edge



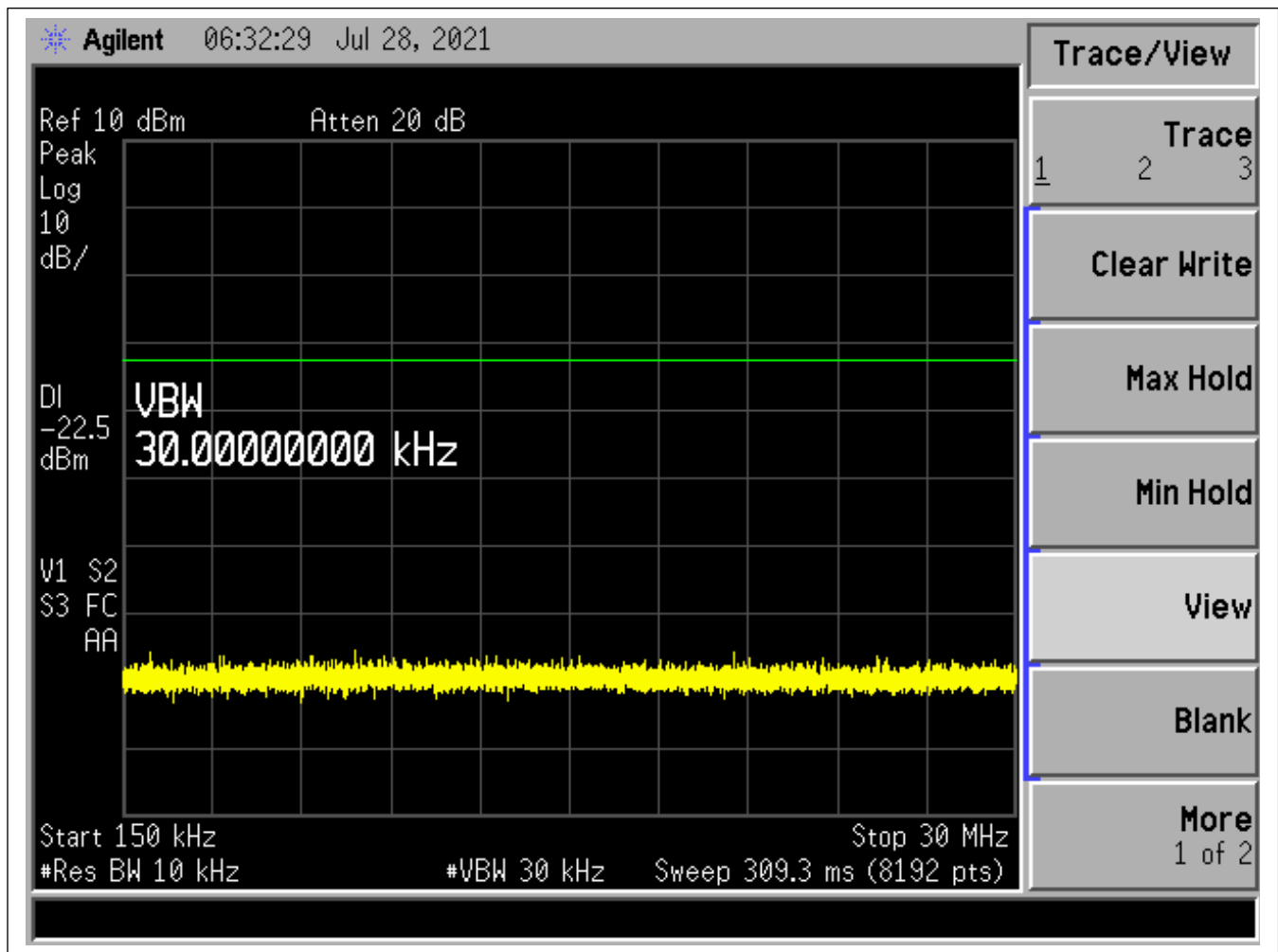


Low Channel, 0.009 MHz to 0.15 MHz



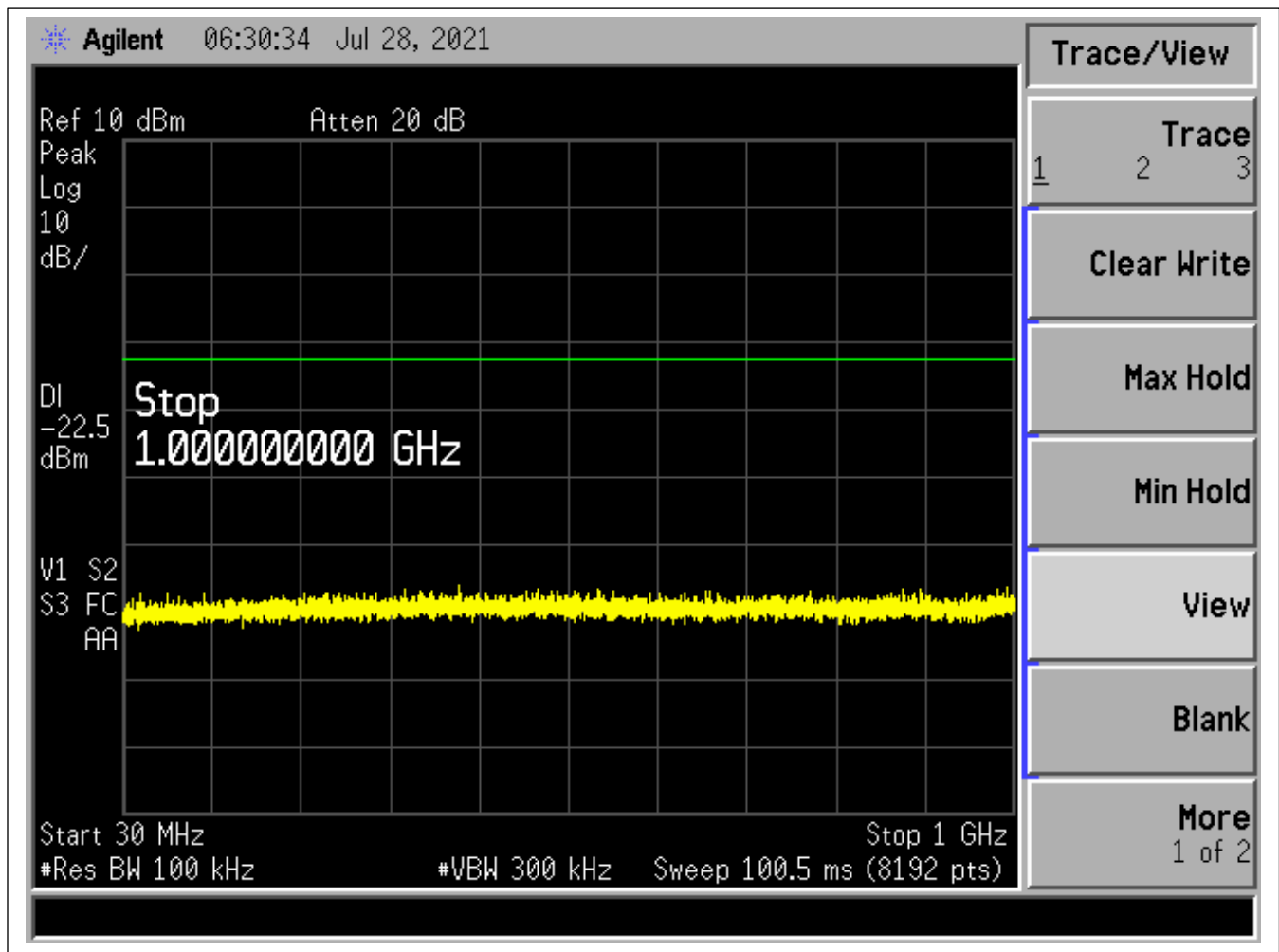


Low Channel, 0.15 MHz to 30 MHz





Low Channel, 30 MHz to 1000 MHz





Order Number: F2P24969A

Applicant: Current Products Corp.

Model: CP180335E_01

Low Channel, 1 GHz to 6 GHz



* RBW 100 kHz

Marker 1 [T1]

* VBW 300 kHz

-5.19 dBm

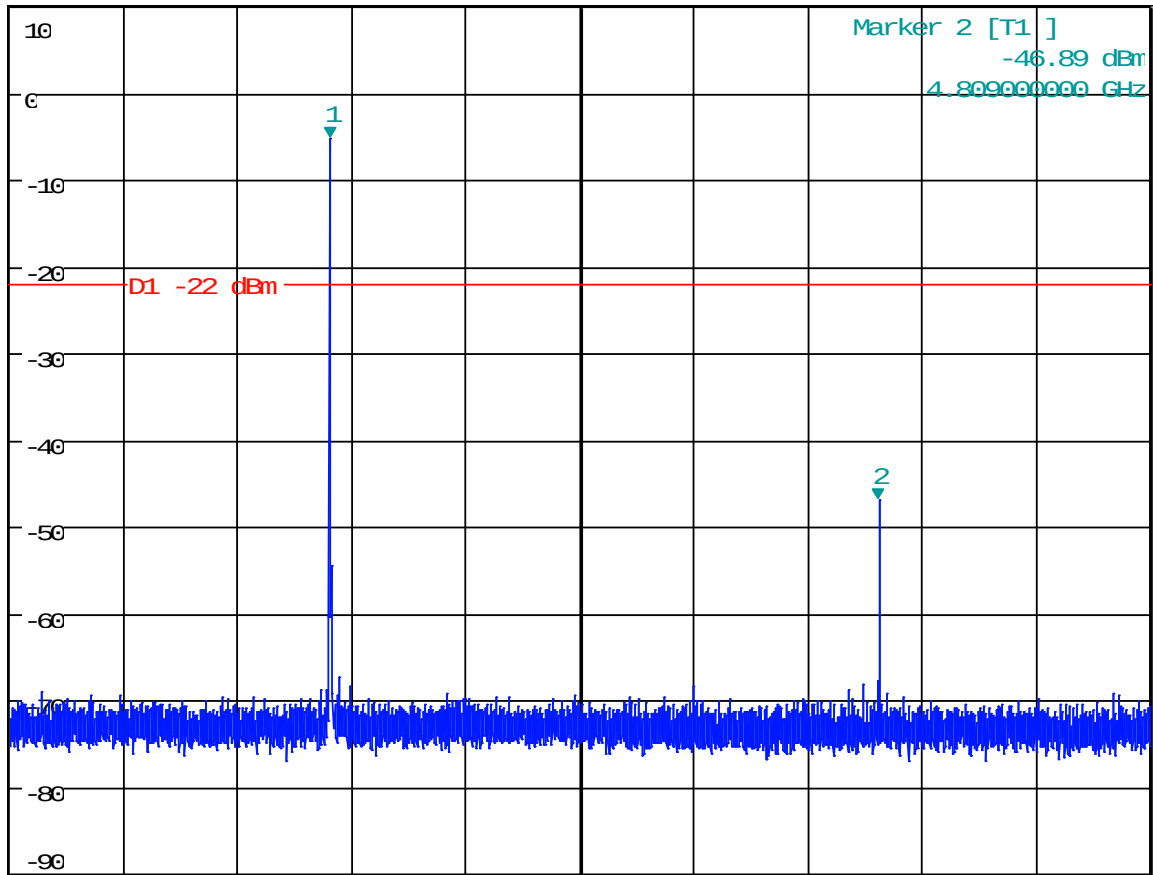
SWT 500 ms

2.405000000 GHz

Ref 10 dBm

* Att 10 dB

1 PK
VIEW



A

PS

3DB

AC

Start 1 GHz

500 MHz/

Stop 6 GHz



Order Number: F2P24969A

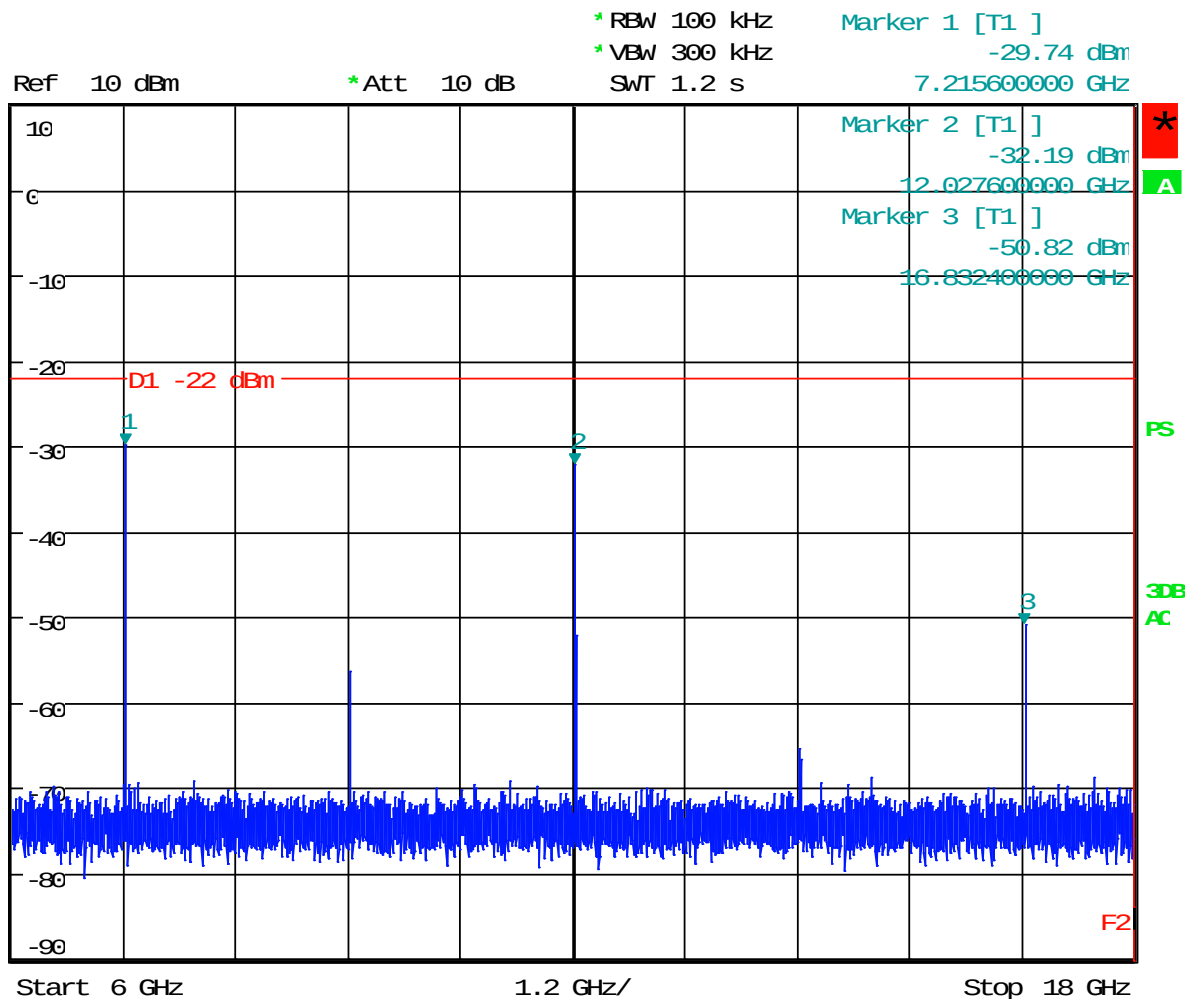
Applicant: Current Products Corp.

Model: CP180335E_01

Low Channel, 6 GHz to 18 GHz



1 F2
VIEW



Date: 18.AUG.2021 10:48:34



Order Number: F2P24969A

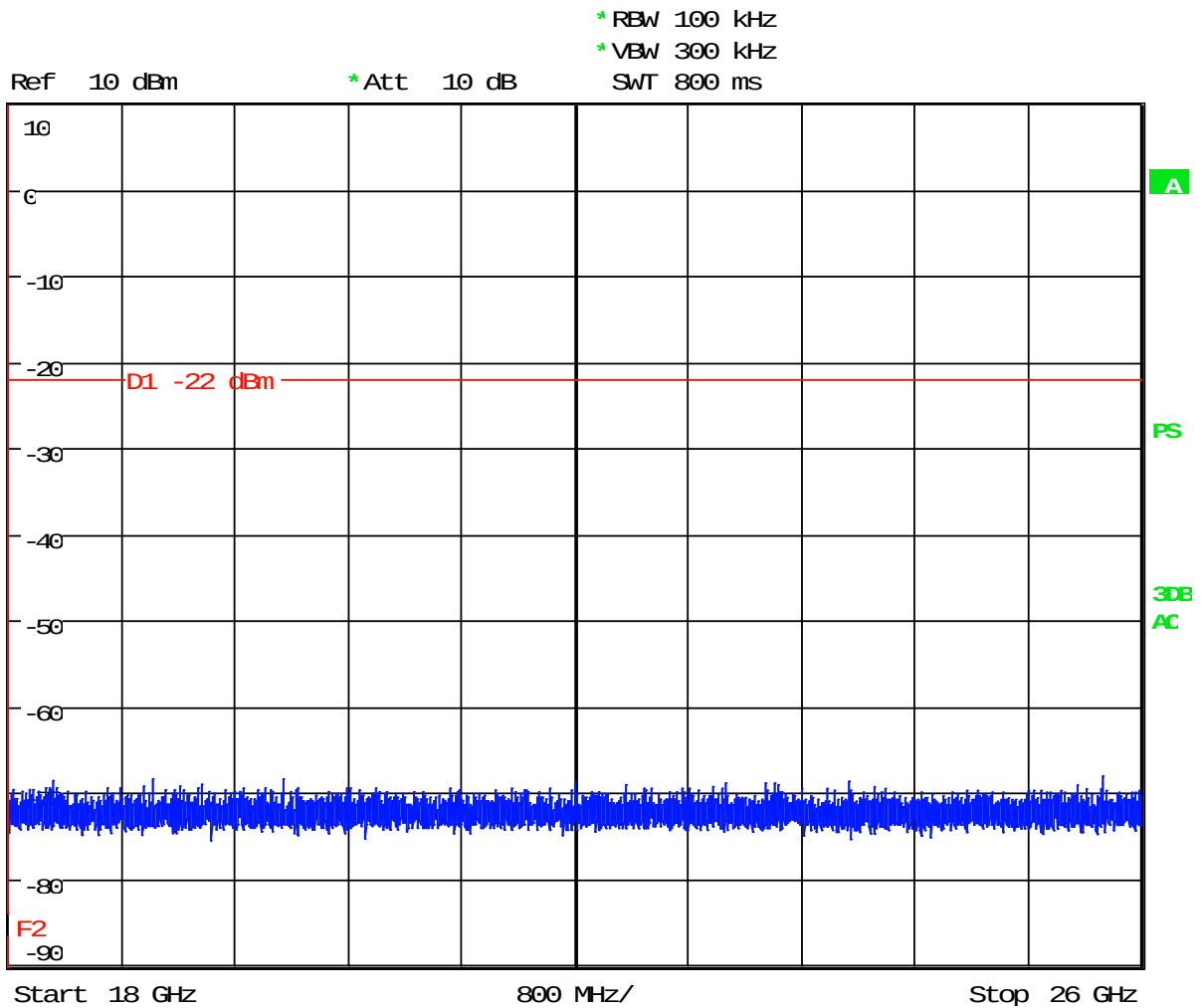
Applicant: Current Products Corp.

Model: CP180335E_01

Low Channel, 18 GHZ to 26 GHZ



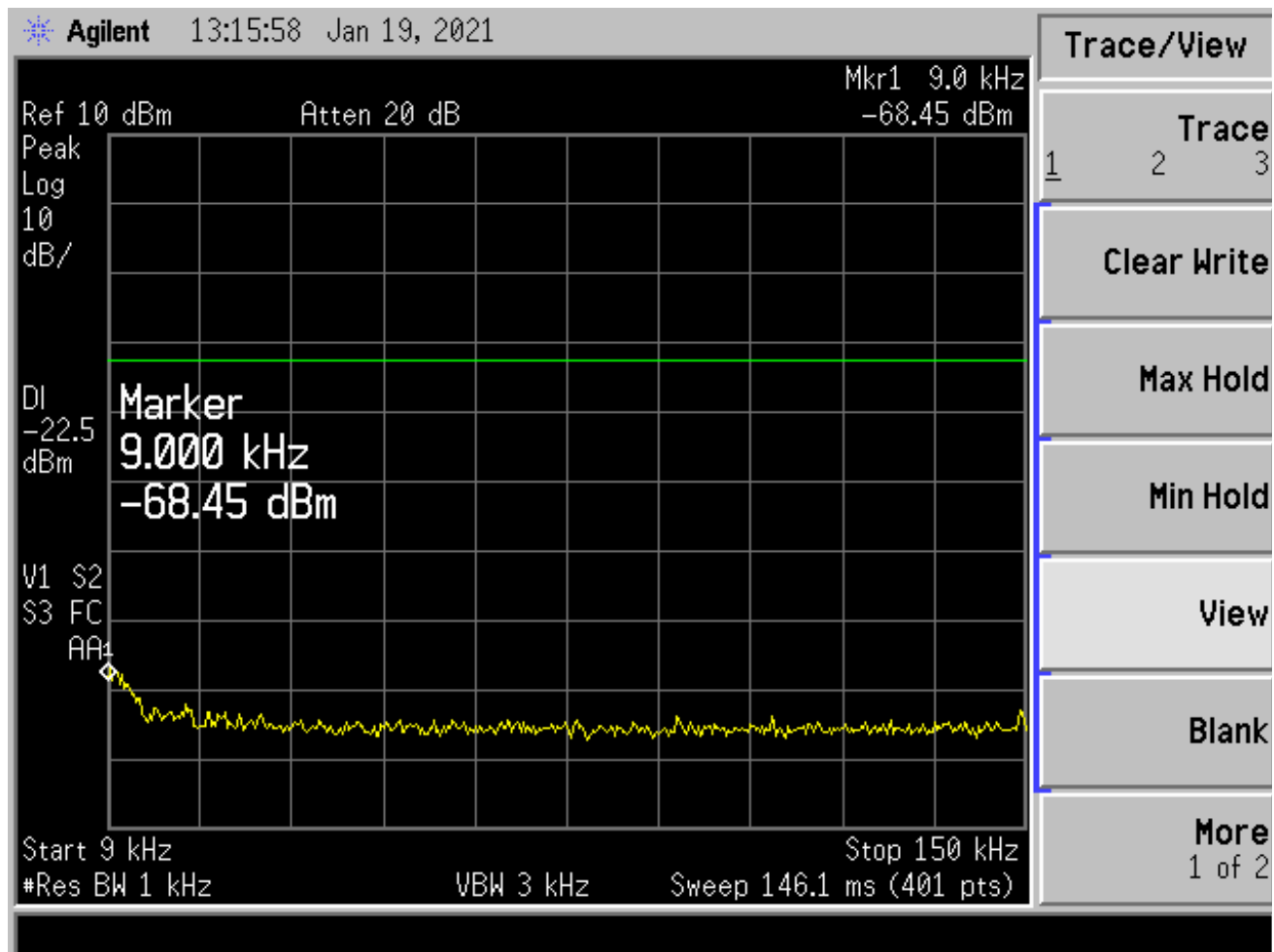
1 PK
VIEW



Date: 18.AUG.2021 10:49:13

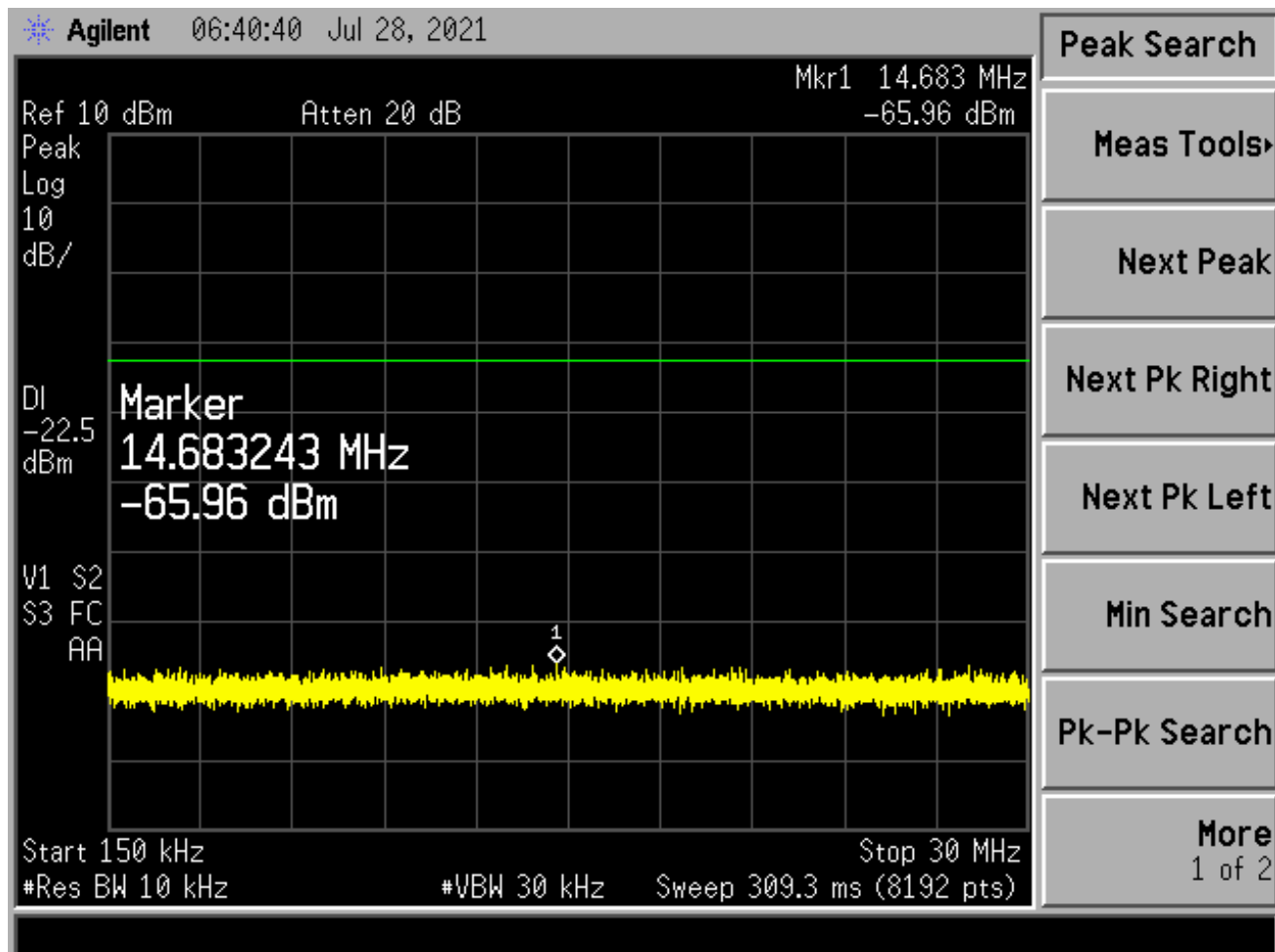


Mid Channel, 0.009 MHz to 0.15 MHz



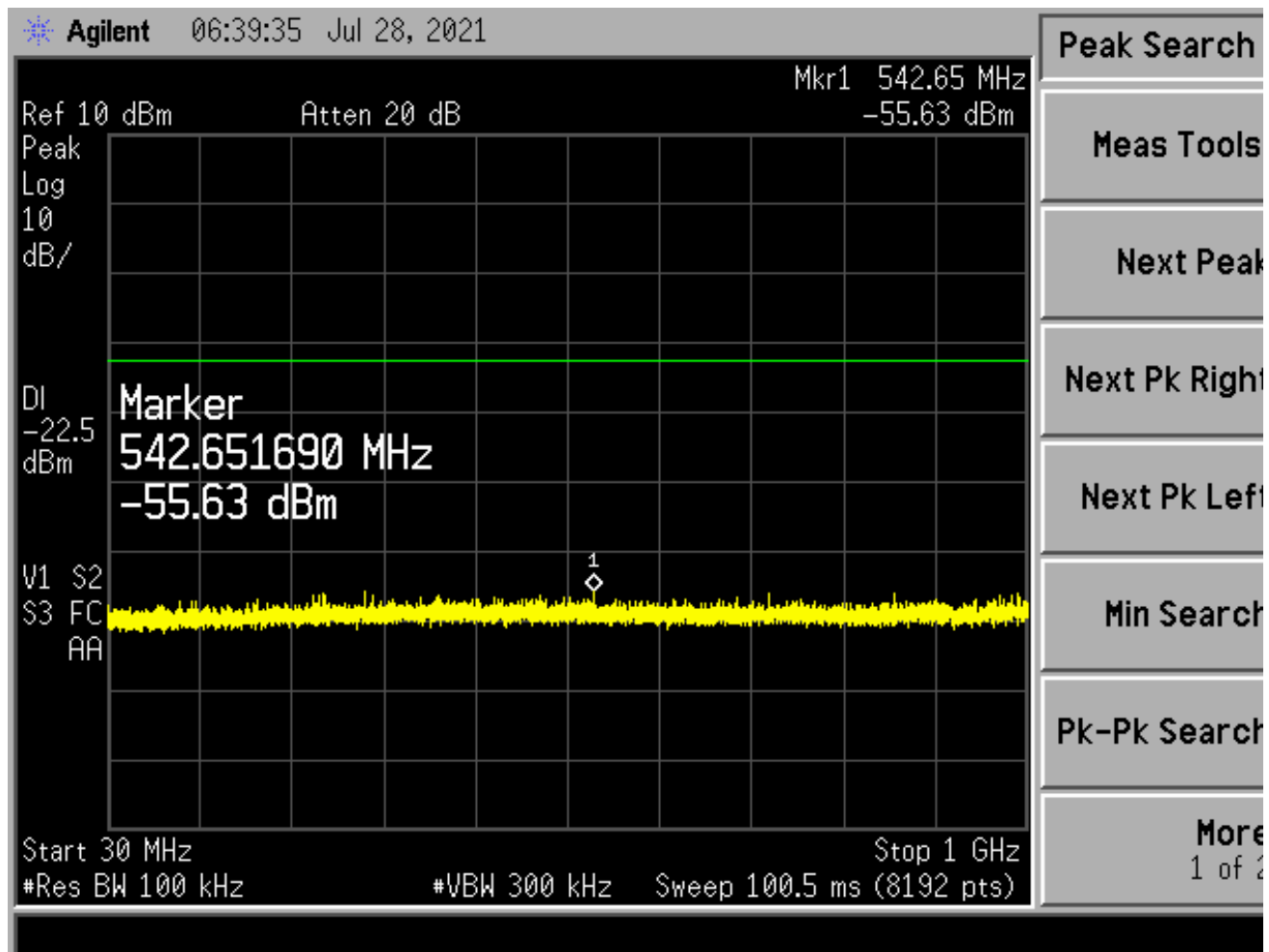


Mid Channel, 0.15 MHz to 30 MHz

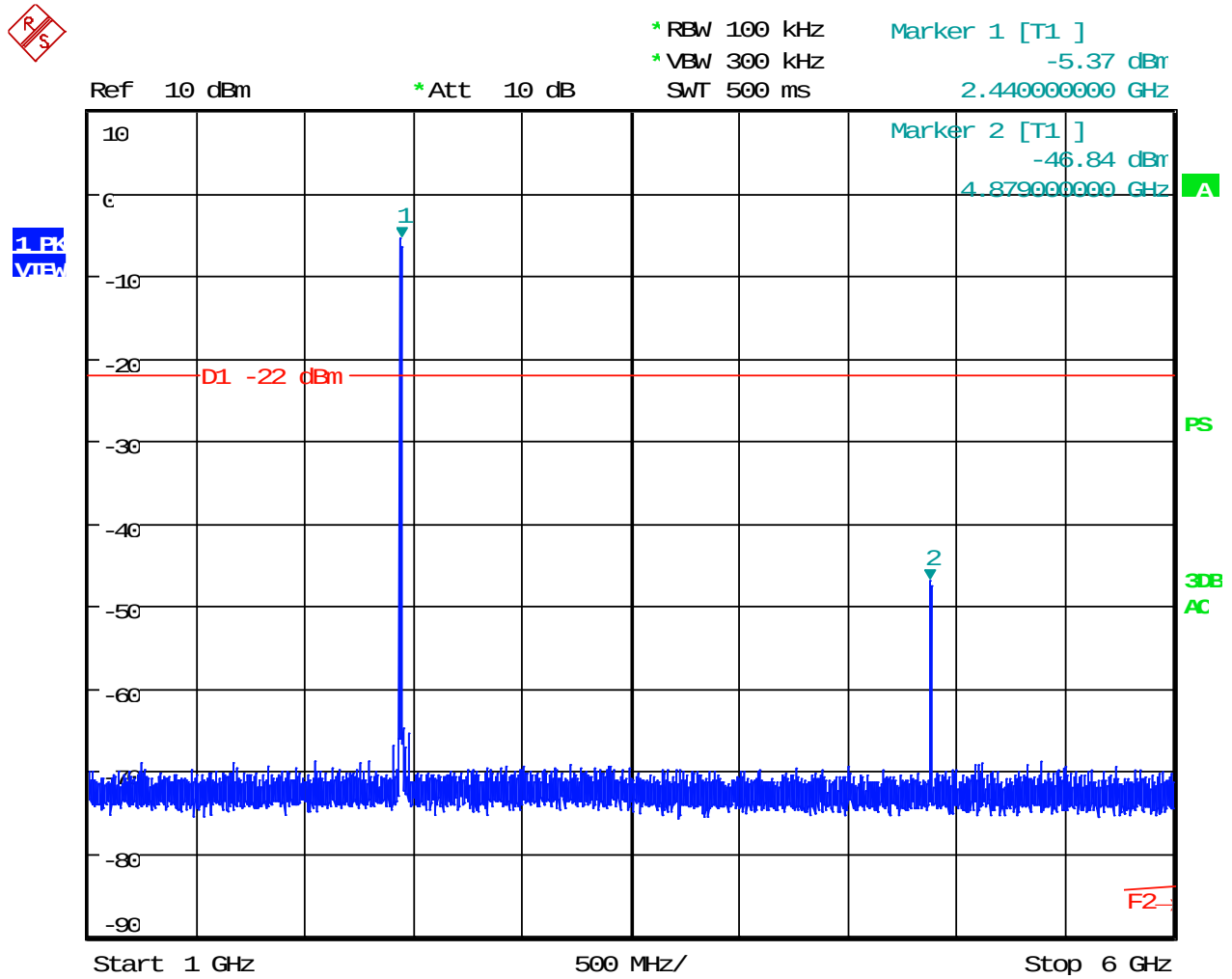




Mid Channel, 30 MHz to 1000 MHz



Mid Channel, 1 GHZ to 6 GHZ



Date: 18.AUG.2021 10:50:39



Order Number: F2P24969A

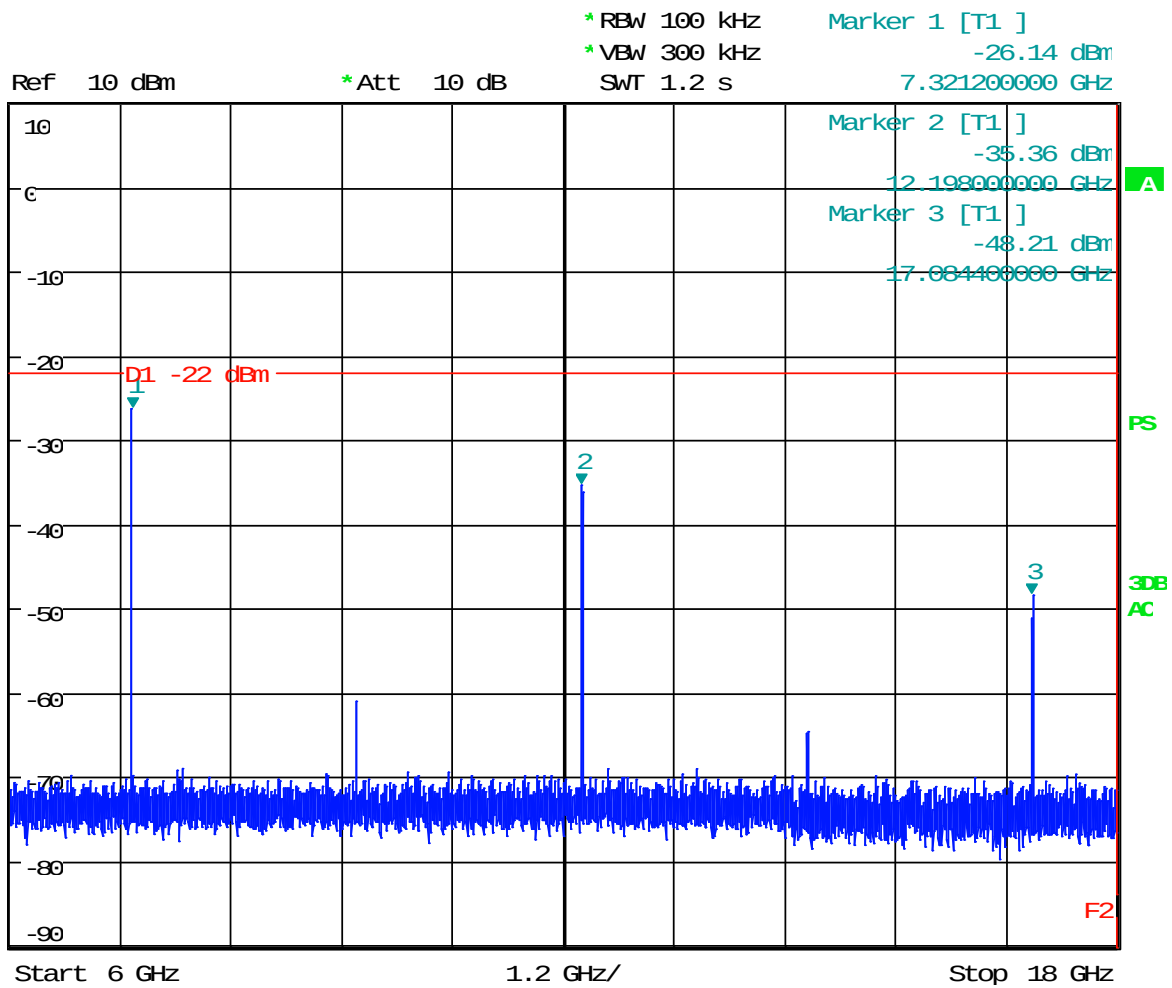
Applicant: Current Products Corp.

Model: CP180335E_01

Mid Channel, 6 GHz to 18 GHz



1.8K
VIEW



Date: 18.AUG.2021 10:51:49



Order Number: F2P24969A

Applicant: Current Products Corp.

Model: CP180335E_01

Mid Channel, 18 GHz to 26 GHz



* RBW 100 kHz

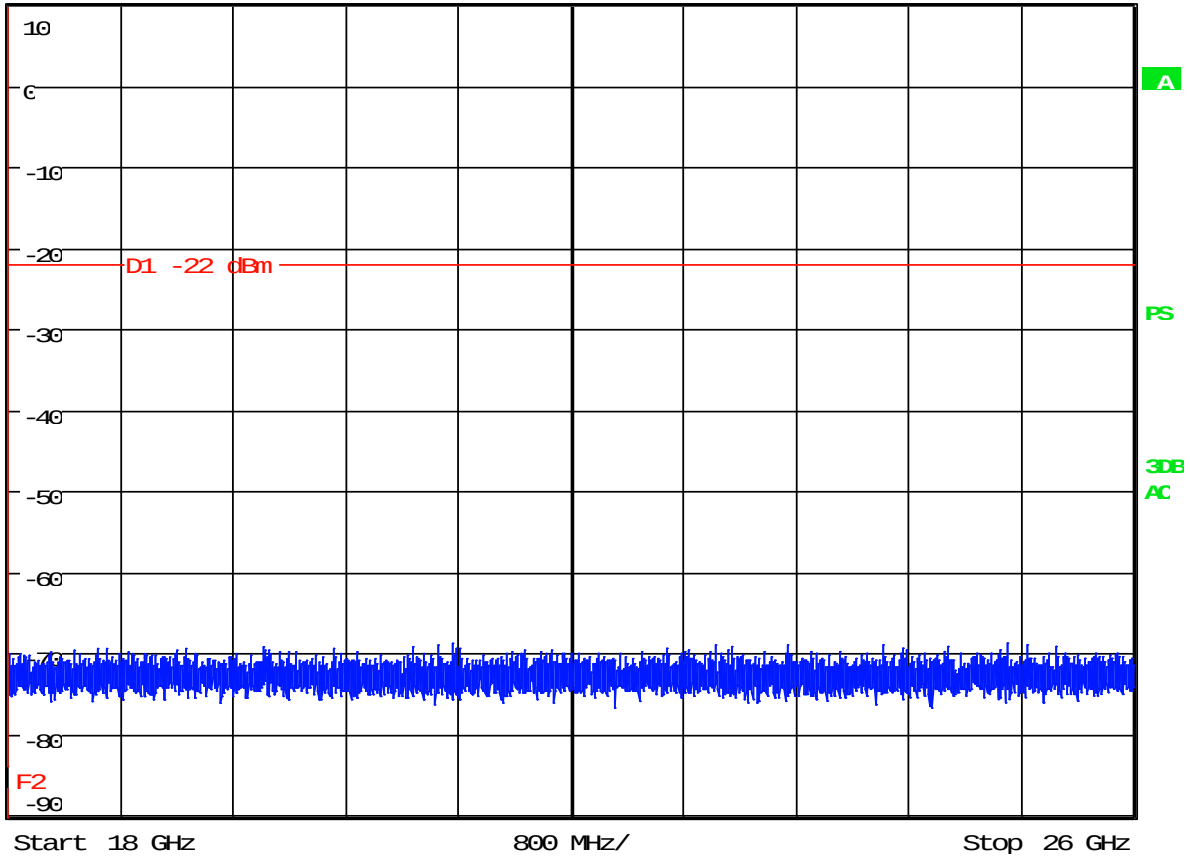
* VBW 300 kHz

SWT 800 ms

Ref 10 dBm

* Att 10 dB

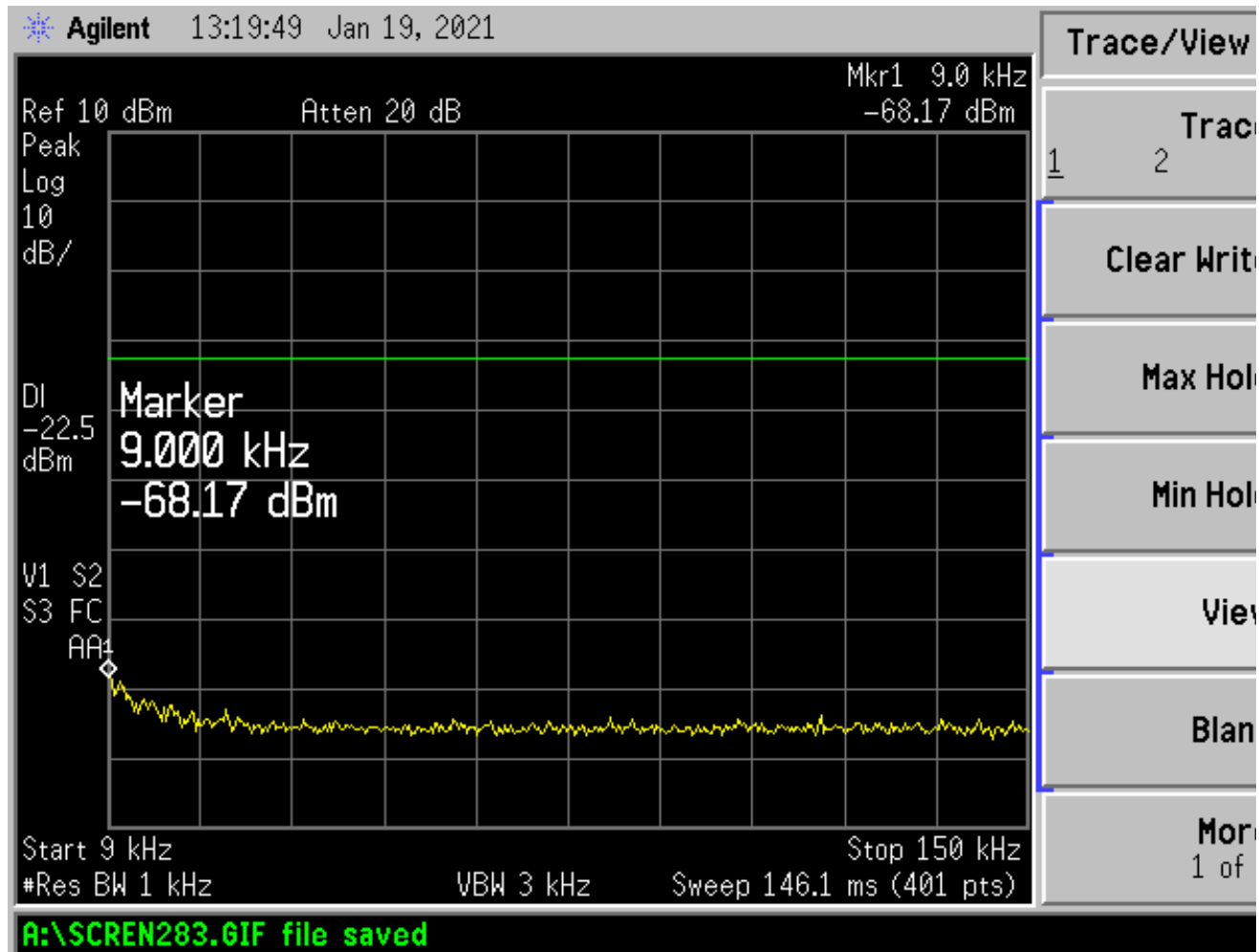
1 PK
VIEW



Date: 18 AUG 2021 10:53:15

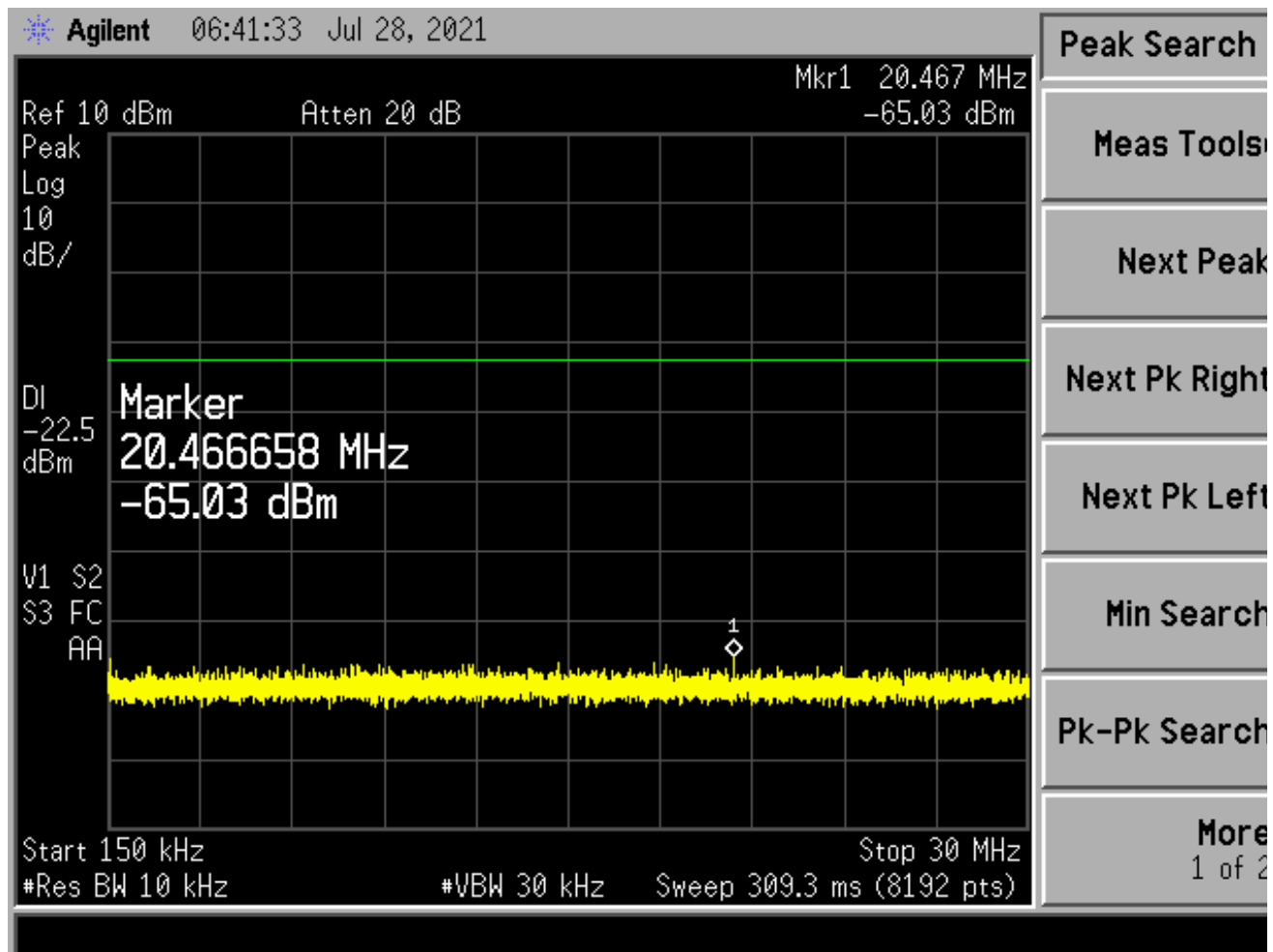


High Channel, 0.009 MHz to 0.15 MHz



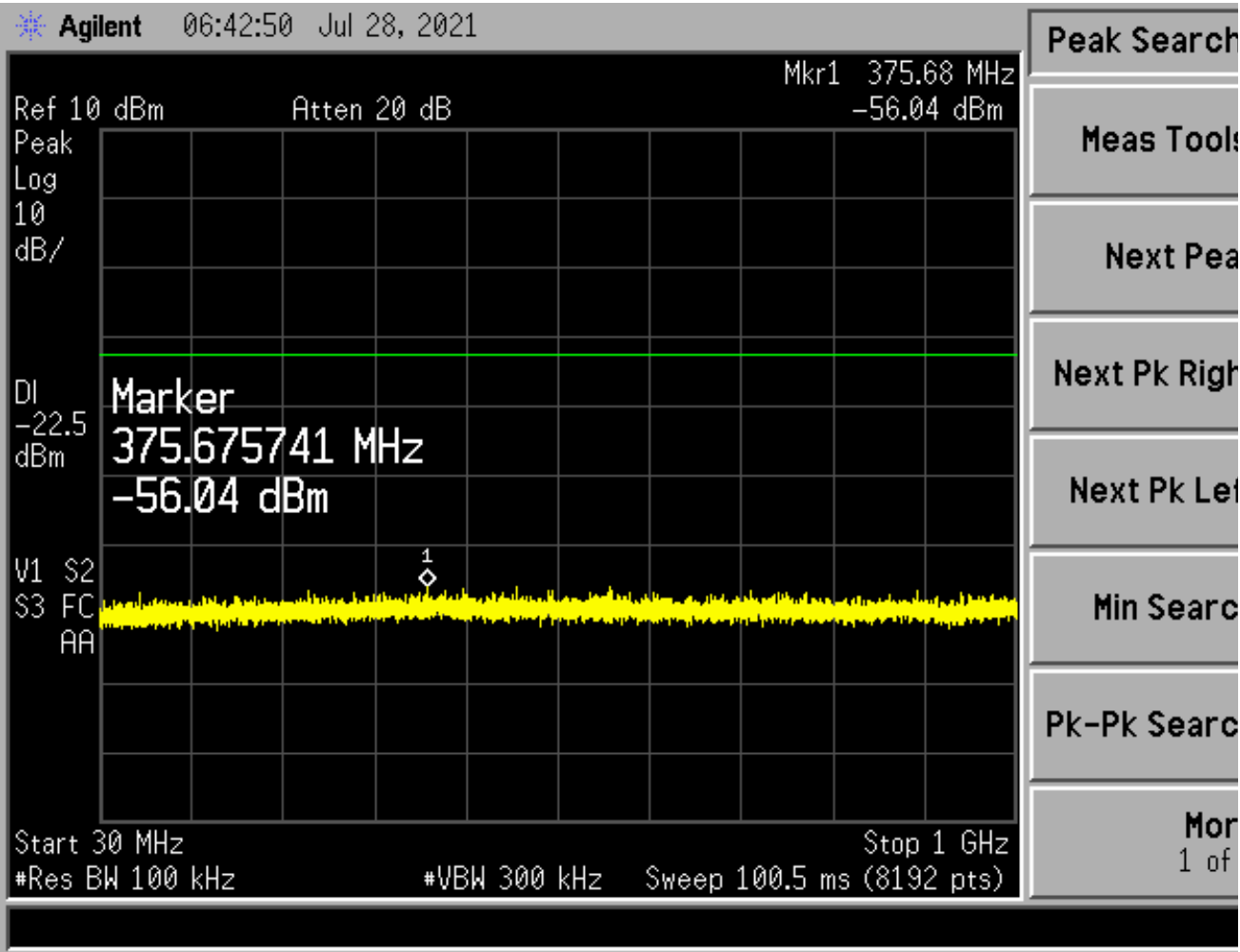


High Channel, 0.15 MHz to 30 MHz





High Channel, 30 MHz to 1000 MHz





Order Number: F2P24969A

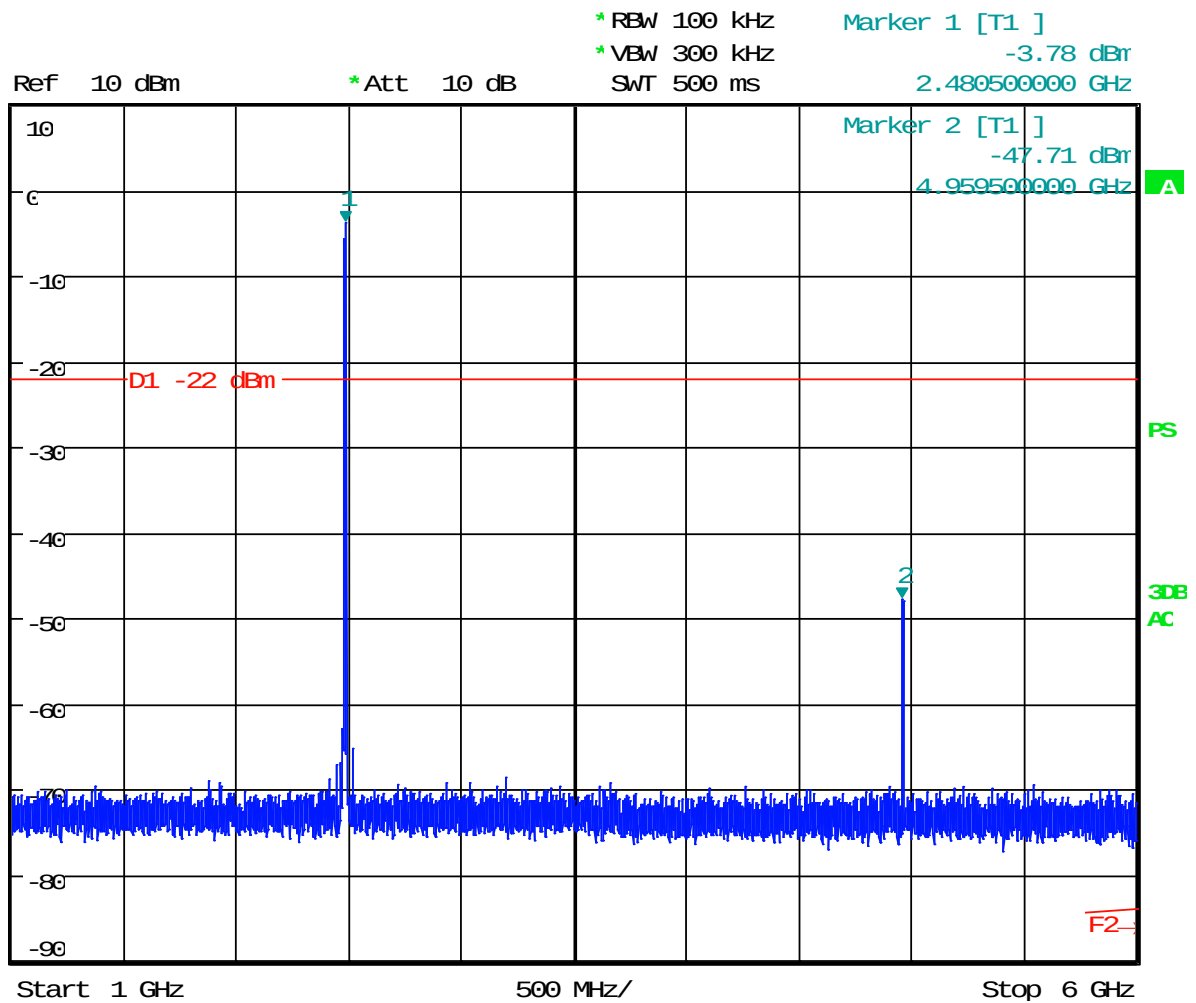
Applicant: Current Products Corp.

Model: CP180335E_01

High Channel, 1 GHz to 6 GHz



1. F2
VIEW



Date: 18.AUG.2021 10:53:38



Order Number: F2P24969A

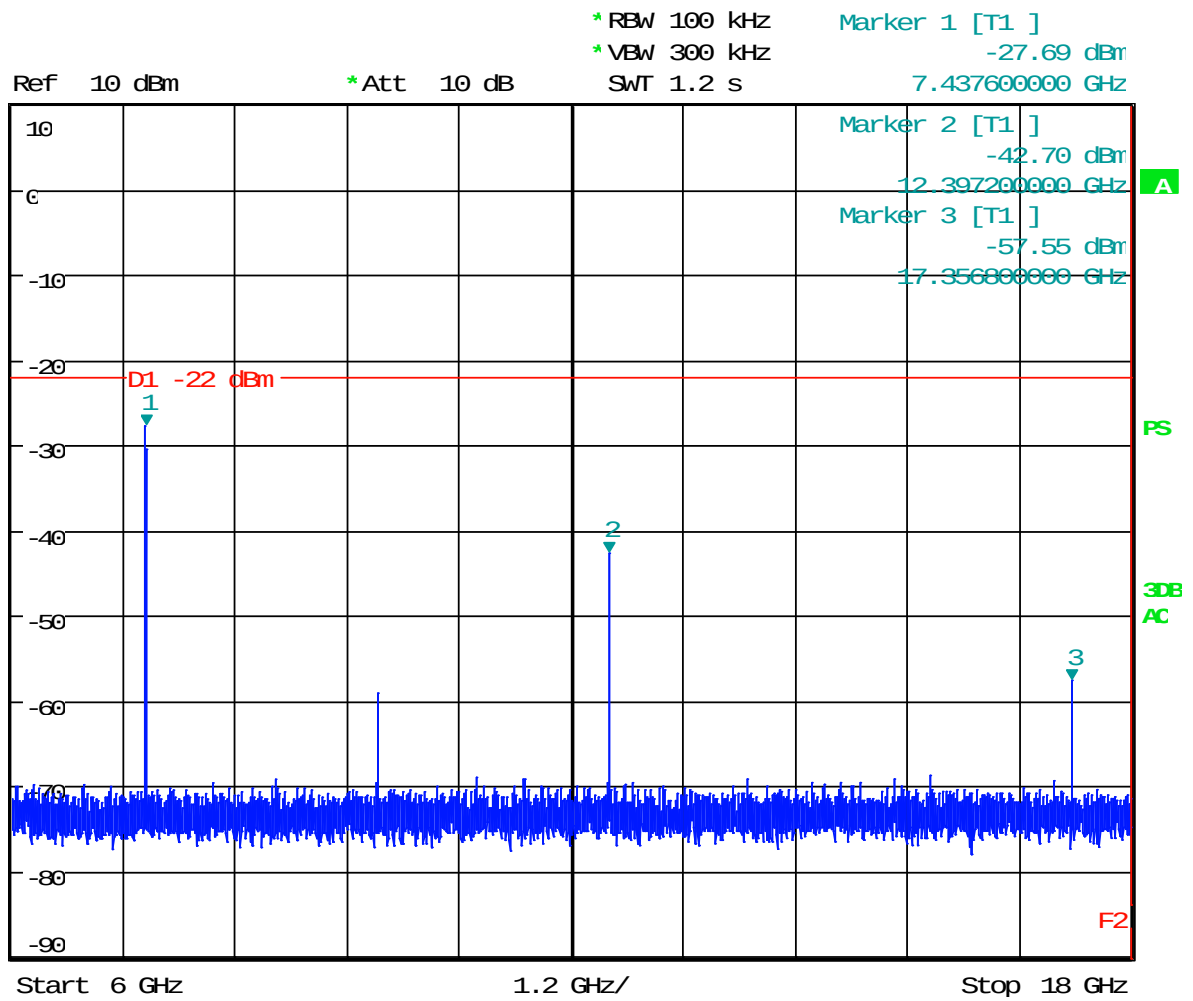
Applicant: Current Products Corp.

Model: CP180335E_01

High Channel, 6 GHz to 18 GHz



1. F2
VIBW



Date: 18.AUG.2021 10:55:33



Order Number: F2P24969A

Applicant: Current Products Corp.

Model: CP180335E_01

High Channel, 18 GHZ to 26 GHZ



* RBW 100 kHz

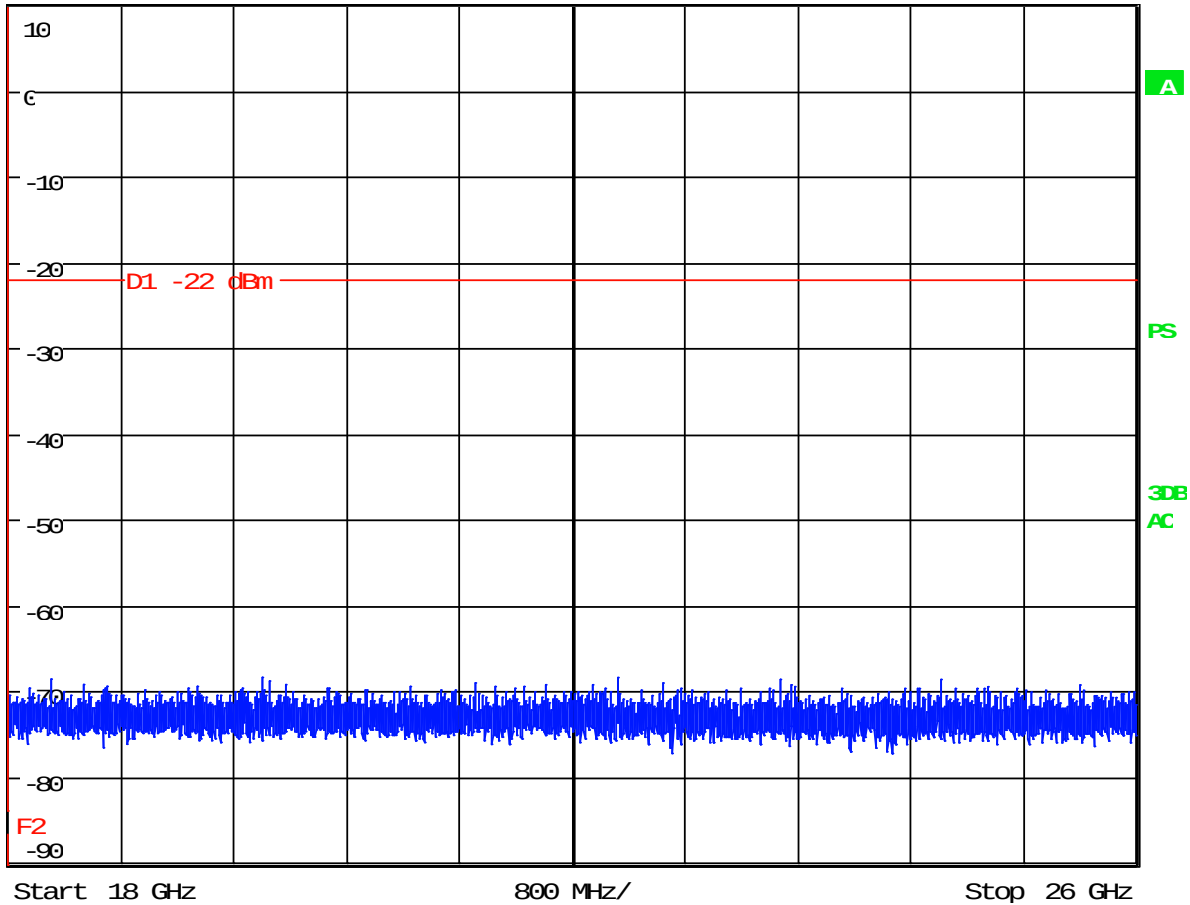
* VBW 300 kHz

SWT 800 ms

Ref 10 dBm

* Att 10 dB

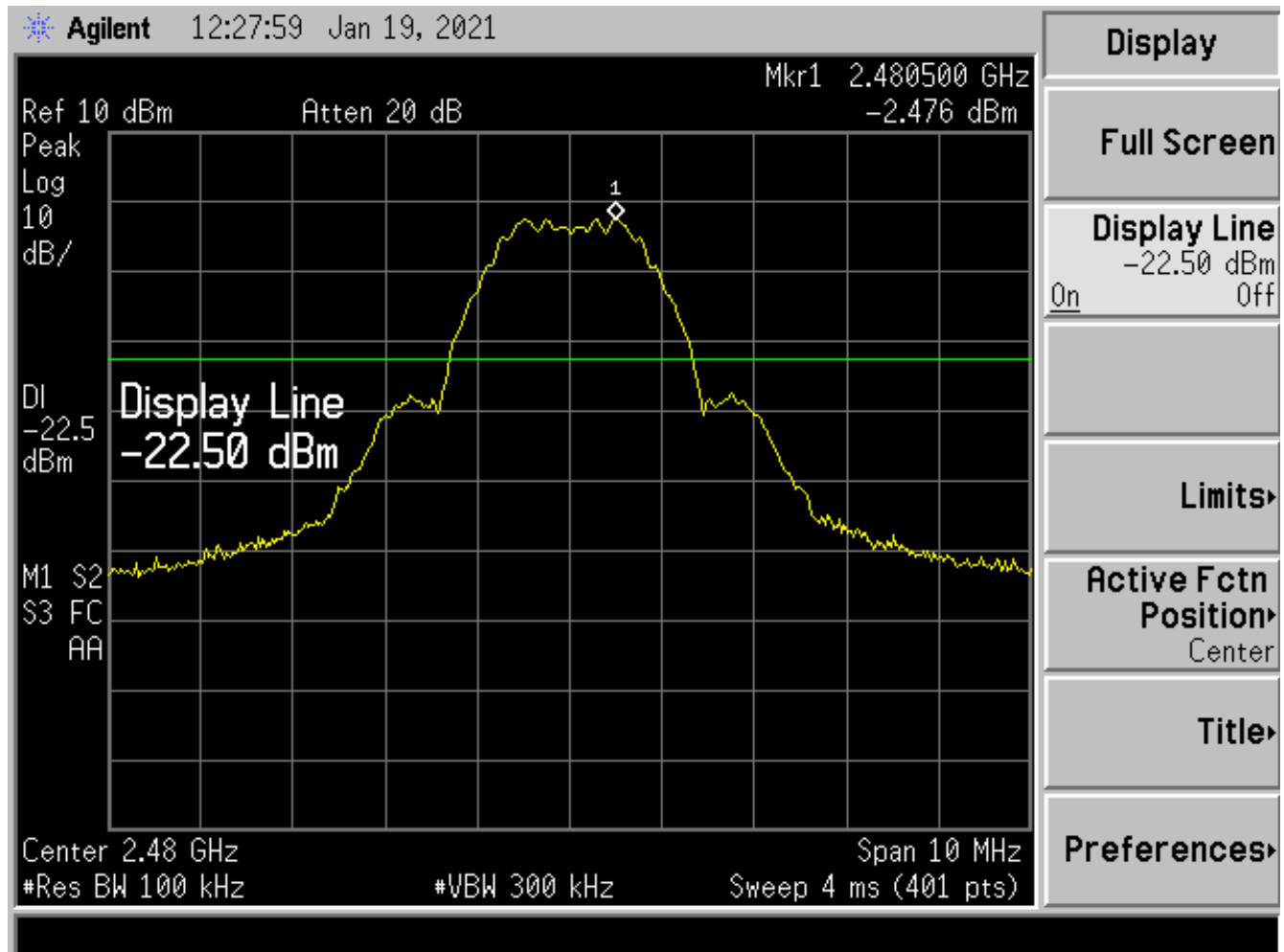
1 F2
VIEW



Date: 18.AUG.2021 10:55:57



Spur Reference





10 RADIATED SPURIOUS EMISSION

The EUT antenna port was fitted with its integral antenna. Radiated emissions were measured in a Semi-Anechoic Chamber. All emissions generated that fall in the restricted bands per FCC Part 15.205 were examined.

10.1 Requirements:

All emissions that fall in the restricted bands defined in FCC Part 15.205 shall not exceed the maximum field strength listed in FCC Part 15.209(a).



10.2 Radiated Spurious Emission Test Data

Test Date(s):	2021-01-21	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.247(d); Part 15.209 / KDB558074	Air Temperature:	21.3°C
		Relative Humidity:	38%

Notes: Plots are peak, max hold prescan data included only to determine what frequencies to investigate and measure. The EUT was initially placed in a semi-anechoic chamber, and rotated in all three orthogonal positions to maximize the emissions. Characterization measurements were then performed to determine at which frequencies significant emissions occurred. These graphs are shown below.

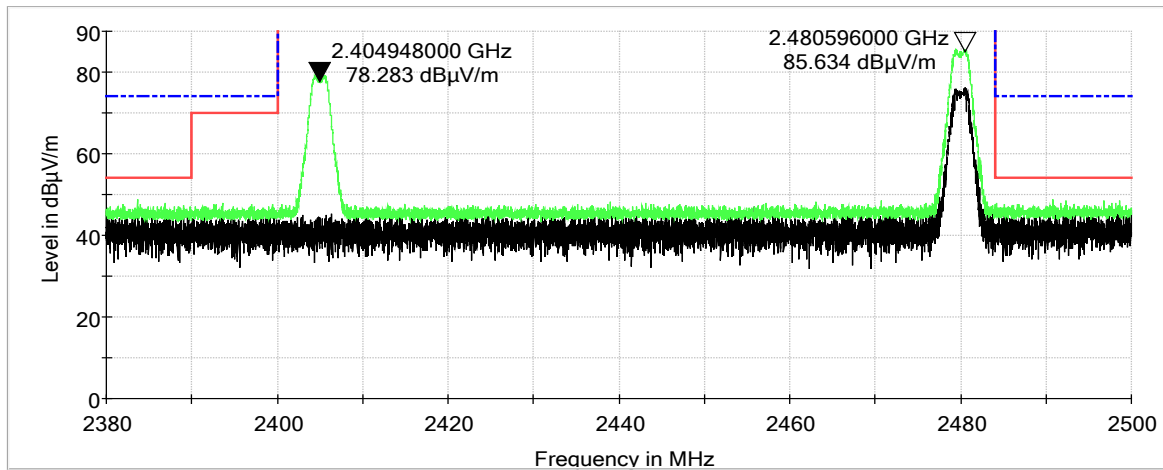
The equipment was fully exercised with all cabling attached to the EUT and was positioned for maximum emissions. While the equipment was energized, the receiving antenna was scanned from 1.0 meter to 4.0 meters in both vertical and horizontal polarities while the turntable was adjusted 360 degrees to determine the maximum field strength. The tables of measured results can be found below.

In the following plots, the black line indicates the active scan and the green line indicates the PK/hold level with the EUT on. Emissions from the EUT were measured and listed in tables. The plots are for reference only and the limit lines are not actual limit lines but merely a guide.

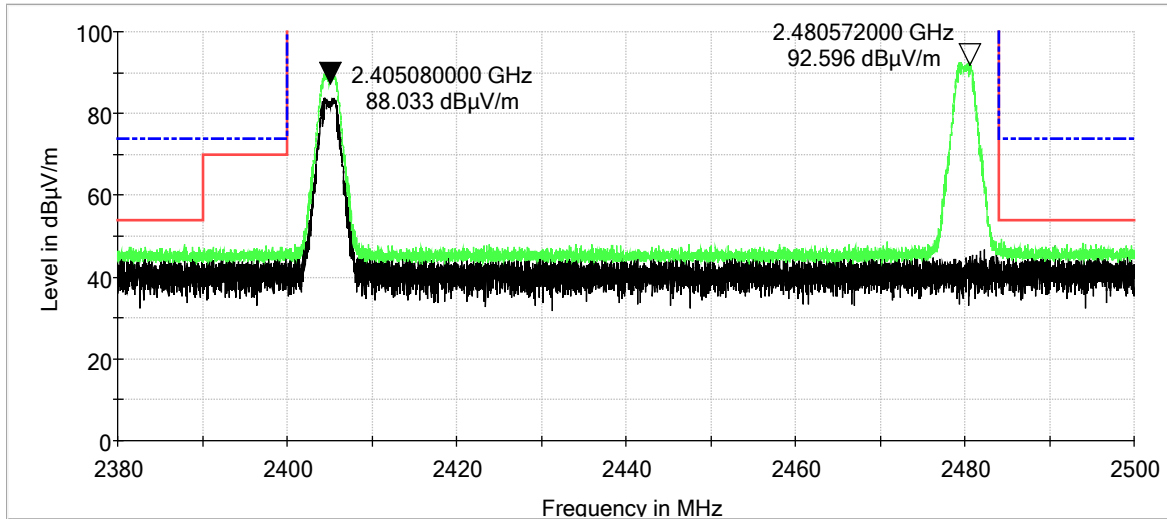
High Channel was found to be the worst-case emissions and the data presented is High Channel.



Radiated Band Edge, Vertical



Radiated Band Edge, Horizontal





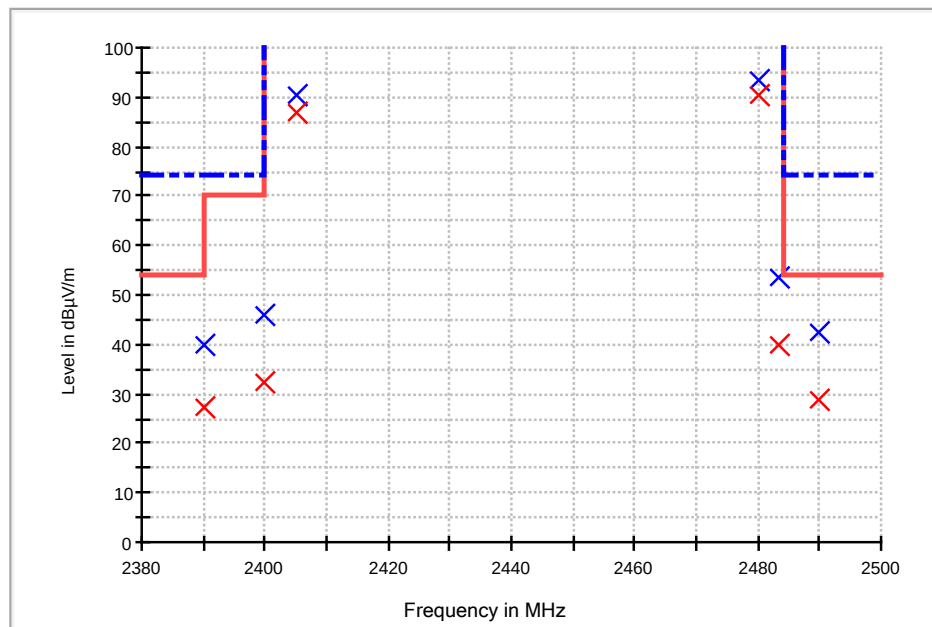
Measurements, Radiated Band Edge

MaxPeak

Frequency (MHz)	Antenna Polarization	Antenna Height (m)	Azimuth (deg)	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2390.000000	H	140.00	70.00	39.2	0.7	39.90	74.0	-34.1
2400.000000	H	140.00	70.00	45.2	0.6	45.80	74.0	-28.2
2405.000000	H	140.00	70.00	89.9	0.6	90.50	--	--
2480.000000	H	140.00	70.00	92.7	0.9	93.60	--	--
2483.500000	H	140.00	70.00	52.9	0.9	53.80	74.0	-20.2
2490.000000	H	140.00	70.00	41.6	1.0	42.60	74.0	-31.4

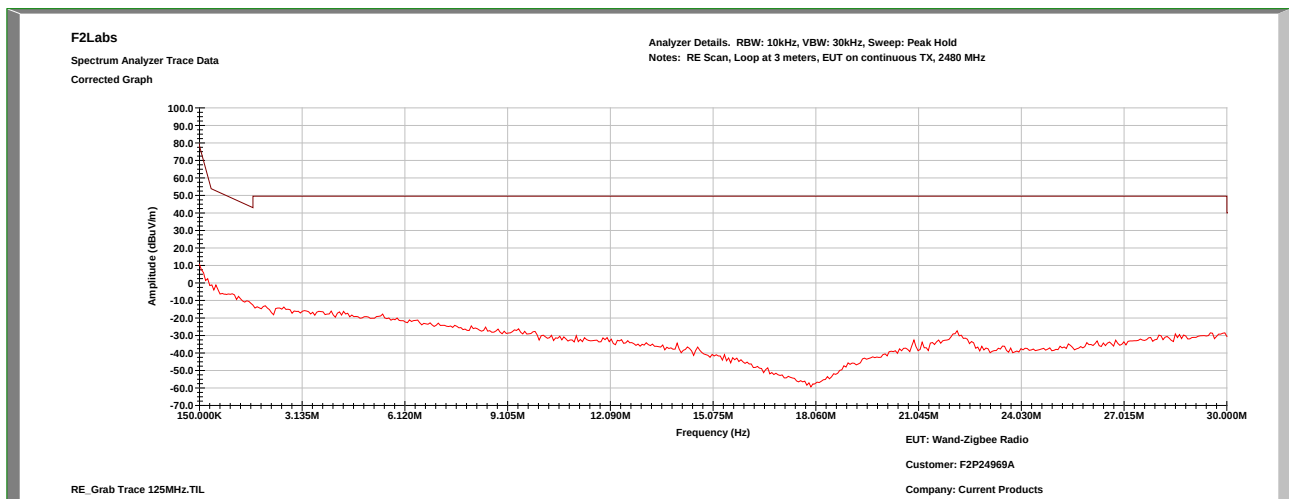
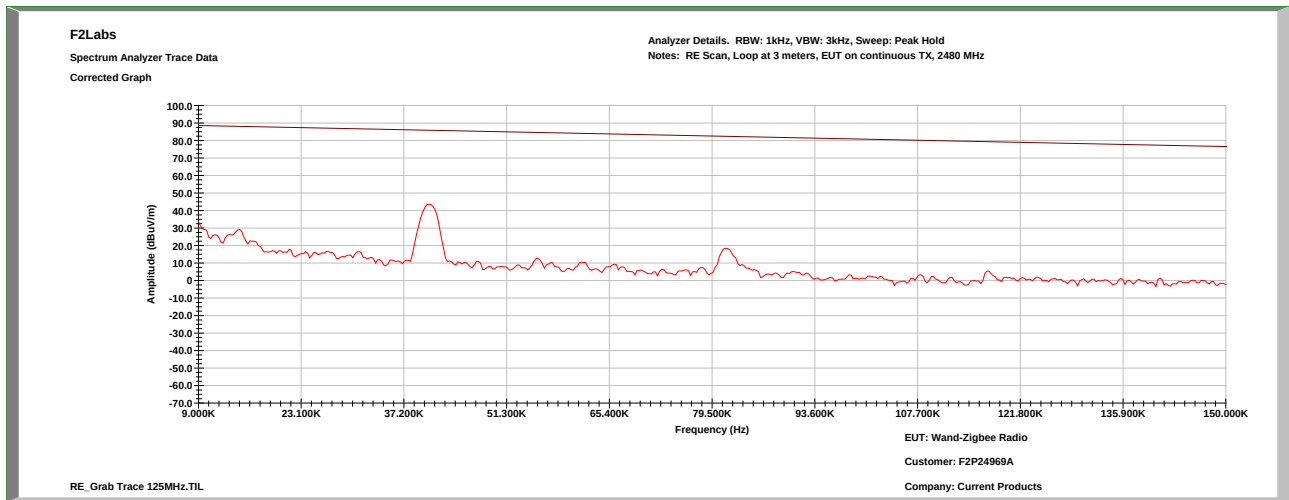
Average

Frequency (MHz)	Antenna Polarization	Antenna Height (m)	Azimuth (deg)	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2390.000000	H	140.00	70.00	26.4	0.7	27.10	54.0	-26.9
2400.000000	H	140.00	70.00	31.7	0.6	32.30	54.0	-21.7
2405.000000	H	140.00	70.00	86.5	0.6	87.10	--	--
2480.000000	H	140.00	70.00	89.5	0.9	90.40	--	--
2483.500000	H	140.00	70.00	39.0	0.9	39.90	54.0	-14.1
2490.000000	H	140.00	70.00	27.8	1.0	28.80	54.0	-25.2



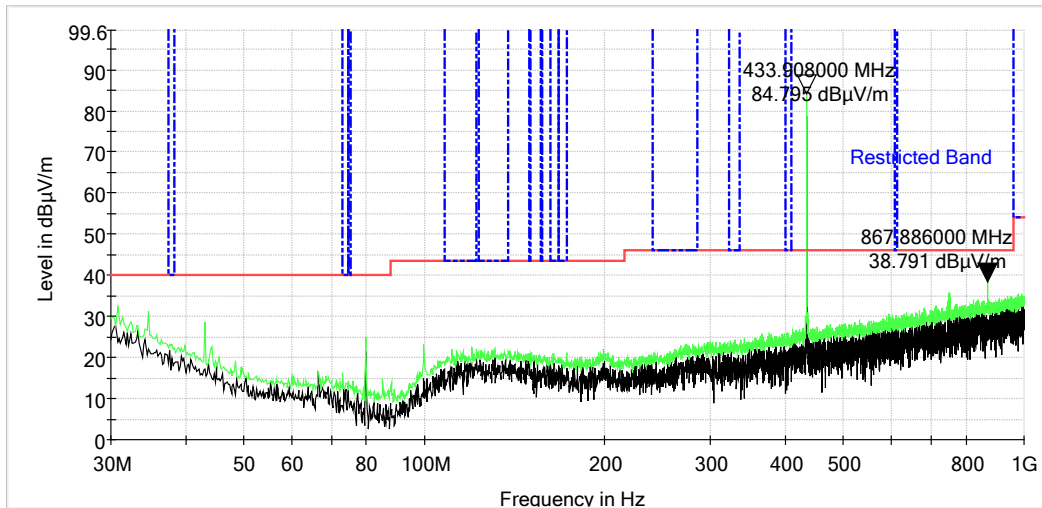


Characterization Scan, 0.009 MHz to 0.15 MHz

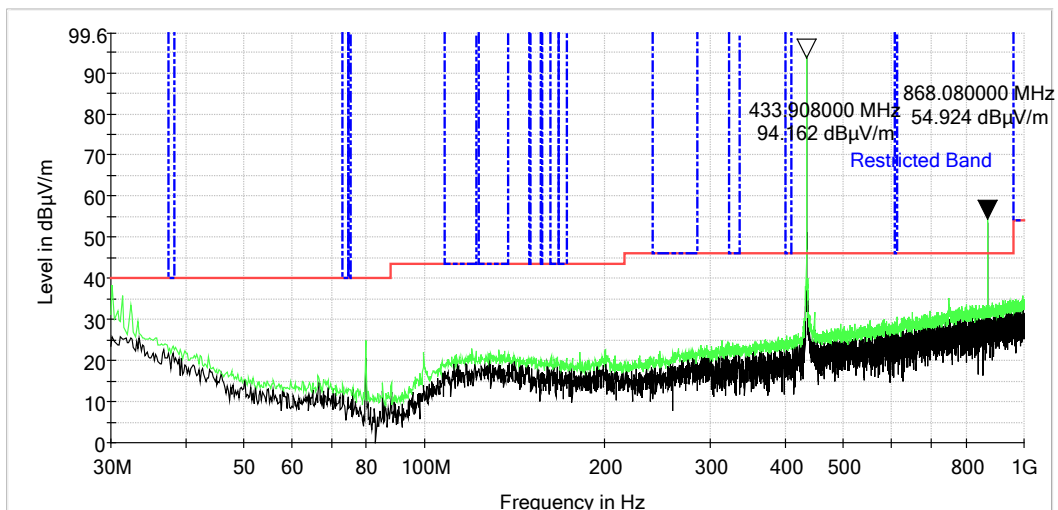




Characterization Scan: 30 MHz to 1000 MHz, Vertical



Characterization Scan: 30 MHz to 1000 MHz, Horizontal

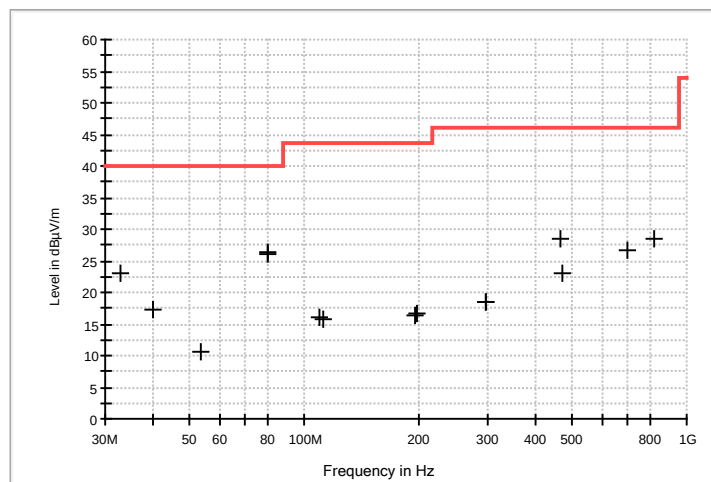


**The 433 MHz spike shown in the above graph, is a separate 433 MHz intermittent transmitter in the device.*



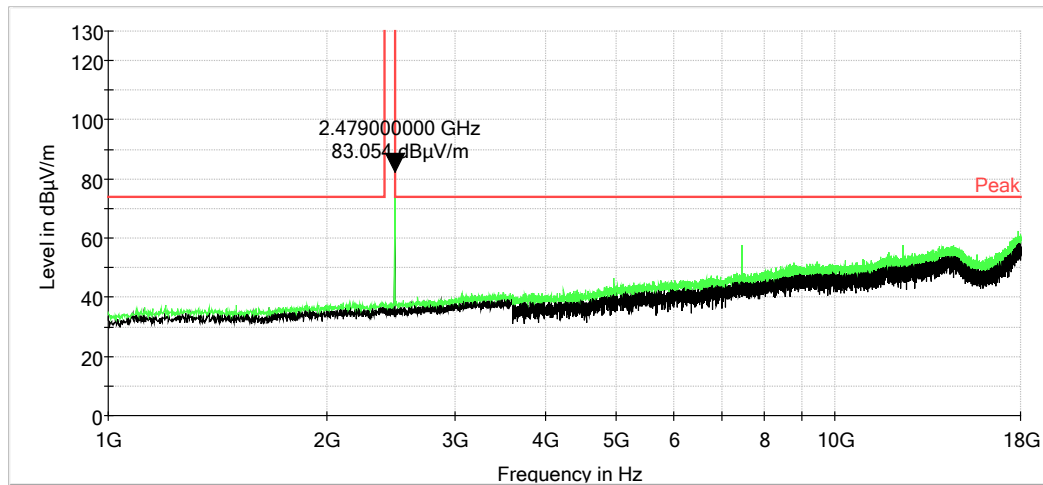
Measurements, 30 MHz to 1000 MHz

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	Reading (dB μ V)	Correction Factors (dB)	Emission (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
32.920000	V	100.00	0.00	26.3	-3.3	23.00	40.0	-17.0
40.080000	V	100.00	0.00	26.1	-8.8	17.30	40.0	-22.7
53.480000	V	100.00	0.00	25.3	-14.7	10.60	40.0	-29.4
80.000000	V	196.00	281.00	41.1	-14.8	26.30	40.0	-13.7
109.360000	H	162.00	21.00	25.8	-9.6	16.20	43.5	-27.3
111.280000	V	196.00	309.00	25.2	-9.4	15.80	43.5	-27.7
195.080000	V	100.00	294.00	25.7	-9.4	16.30	43.5	-27.2
197.600000	H	162.00	21.00	25.6	-8.9	16.70	43.5	-26.8
296.560000	V	100.00	0.00	26.1	-7.5	18.60	46.0	-27.4
296.560000	H	100.00	321.00	26.0	-7.5	18.50	46.0	-27.5
468.040000	H	100.00	205.00	31.1	-2.6	28.50	46.0	-17.5

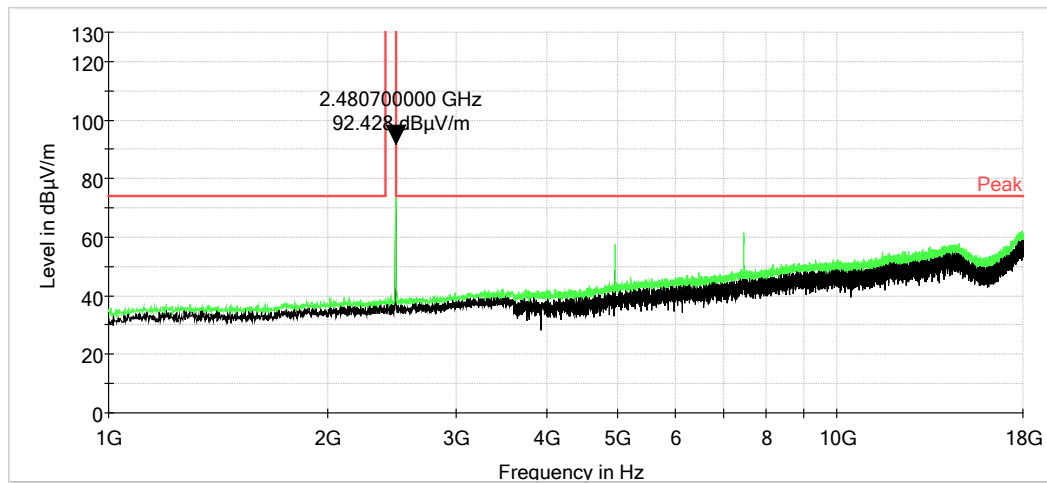




Characterization Scan: 1 GHz to 18 GHz, Vertical



Characterization Scan: 1 GHz to 18 GHz, Horizontal





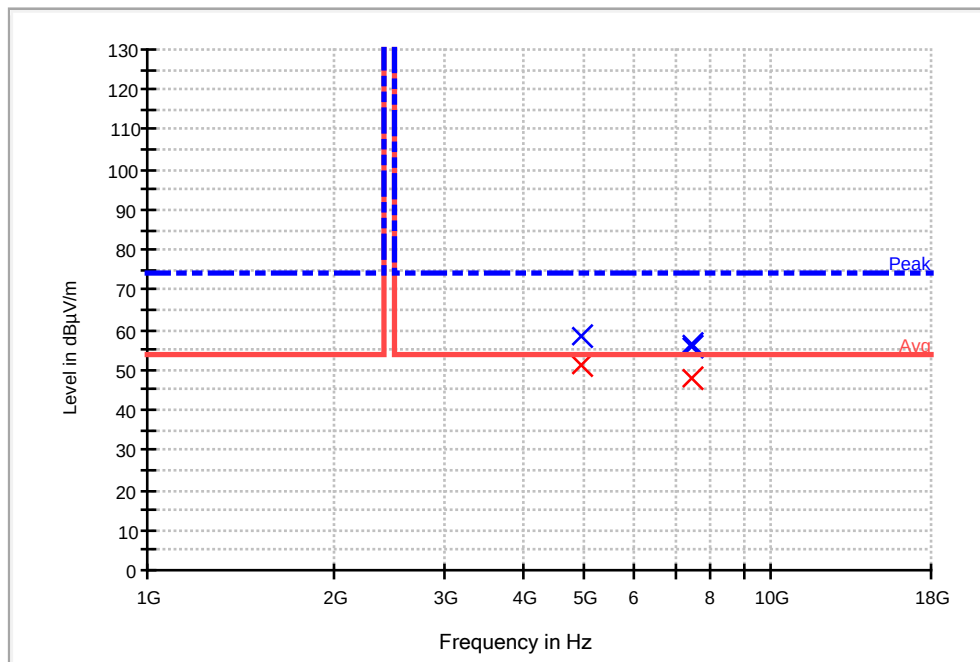
Measurements 1 GHz to 18 GHz

MaxPeak

Frequency (MHz)	Antenna Polarization	Antenna Heogjt)c,...	Azith (deg)	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4959.000000	H	140.00	70.00	61.2	-2.6	58.60	74.0	-15.4
7441.000000	H	140.00	29.00	53.5	2.2	55.70	74.0	-18.3

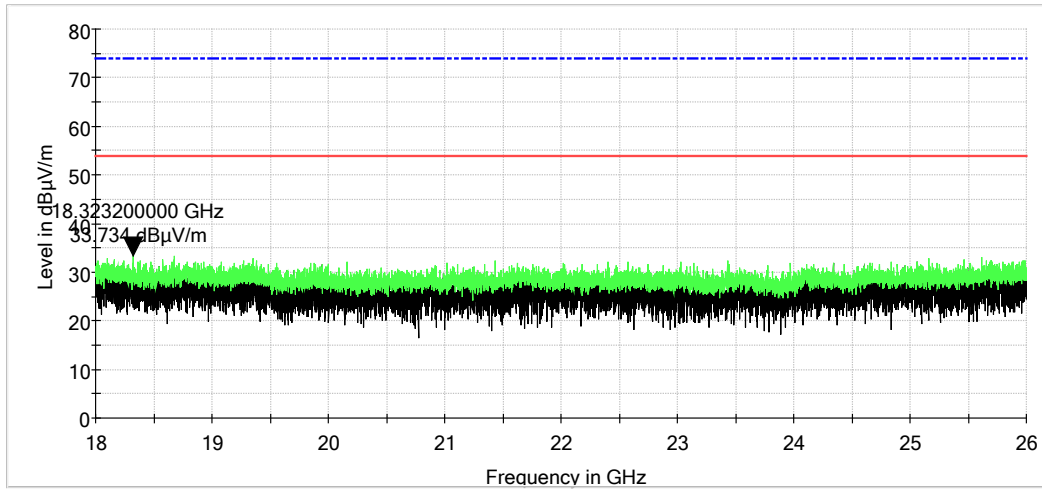
Average

Frequency (MHz)	Antenna Polarization	Antenna Heogjt)c,...	Azith (deg)	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4959.000000	H	140.00	70.00	54.1	-2.6	51.50	54.0	-2.5
7441.000000	H	140.00	29.00	45.9	2.2	48.10	54.0	-5.9

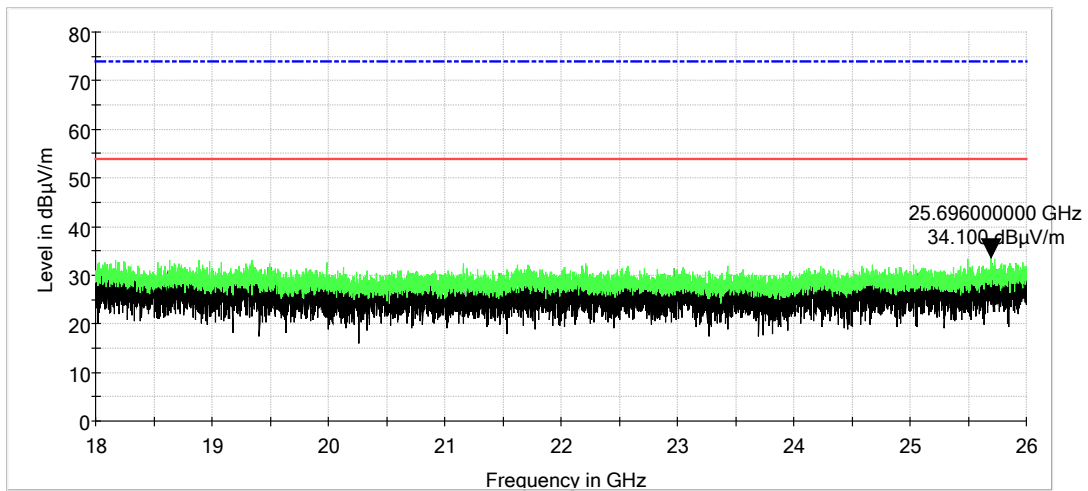




Characterization Scan: 18 GHz to 26 GHz, Vertical



Characterization Scan: 18 GHz to 26 GHz, Horizontal





11 FCC PART 15.247(e) – PEAK POWER SPECTRAL DENSITY (PSD)

Peak power spectral density measurements were performed.

11.1 Requirements:

The peak power spectral density shall not exceed +8dBm in any 3 kHz band during any time interval of continuous transmission.

Power spectral density measurements were performed at a resolution bandwidth of 3 kHz (video bandwidth set at 10 kHz). The peak spectral densities were measured at the low, mid, and upper channels.



11.2 Peak Power Spectral Density Test Data

Test Date(s):	2021-01-20	Test Engineer:	J. Chiller
Standards:	CFR 47 Part 15.247(e); KDB558074	Air Temperature:	21.1°C
		Relative Humidity:	37%

Low Channel



Date: 20. JAN 2021 11:28:42



Order Number: F2P24969A

Applicant: Current Products Corp.

Model: CP180335E_01

Mid Channel



Date: 20.JAN.2021 11:30:08

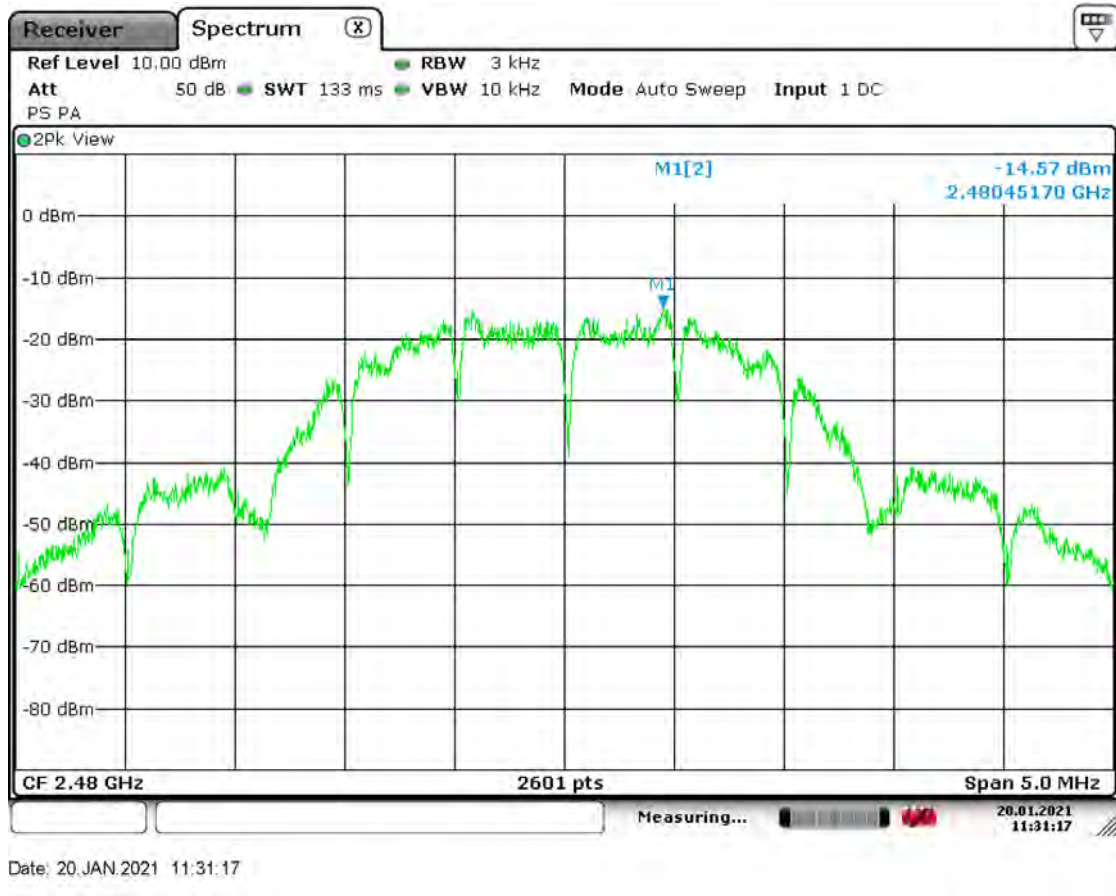


Order Number: F2P24969A

Applicant: Current Products Corp.

Model: CP180335E_01

High Channel



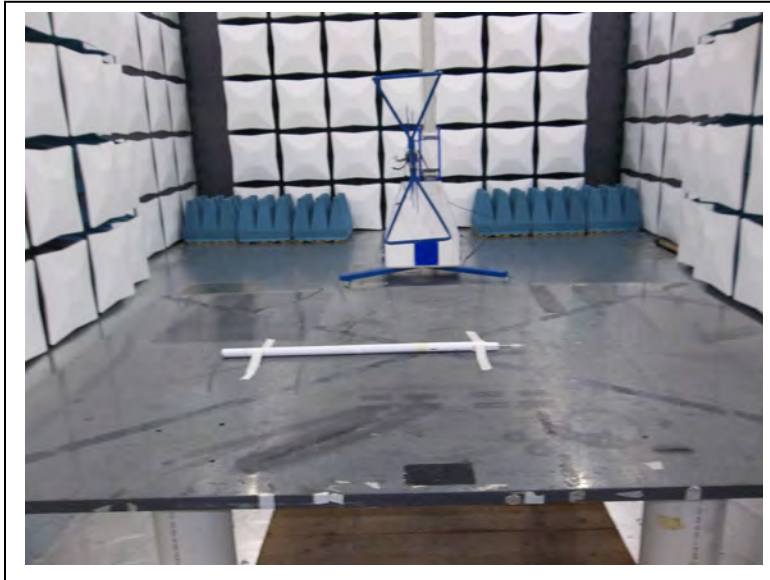


12 TEST SETUP PHOTOGRAPHS

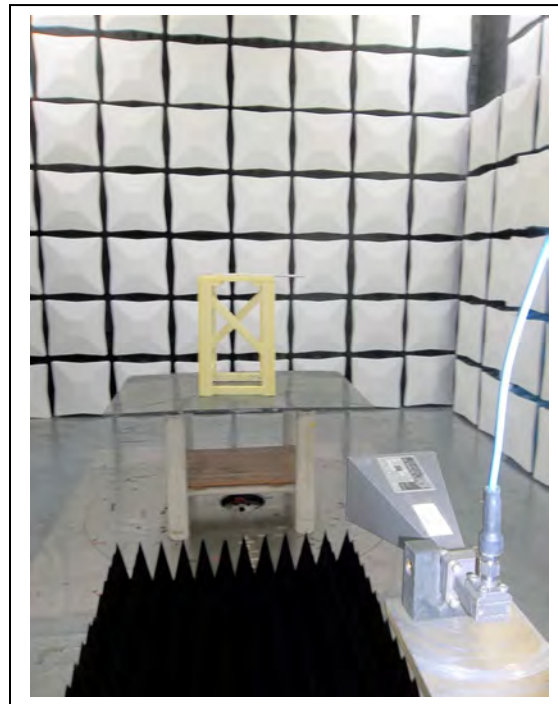
Radiated Spurious Emissions, Loop Antenna



Radiated Spurious Emissions, Less Than 1 GHz

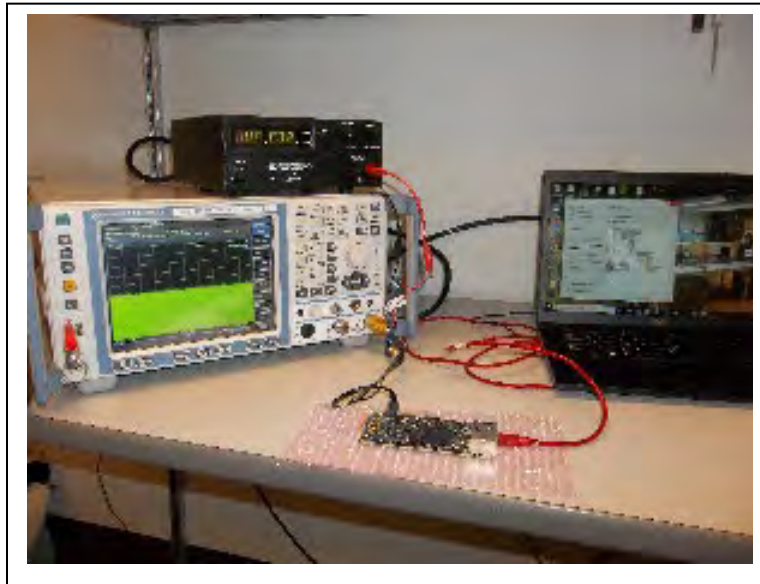


Radiated Spurious Emissions, Greater Than 1 GHz





RF Output Power, Peak Power Spectral Density



Occupied Bandwidth

