Cellphone-Mate, Inc.

TEST REPORT FOR

Orion SC-O-28GHz

Tested to The Following Standard:

FCC Part 20.21 / 30

Report No.: 104339-26
Volume 2 of 2

Date of issue: November 5, 2020

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Test Certificate # 803.01

Testing the Future
CKC LABORATORIES, INC.

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SUMMARY OF RESULTS

Standard: FCC Part 30 Upper Microwave Flexible Use Service Measurement Guidance KDB 842590 D01v01r1 March 4, 2020

Correlation Matrix & Results					
Guidance Section	**Guidance Description**	**FCC Section**	**FCC Rule Description**	**Mods**	**Results**
4.2	Equivalent Isotropic Radiated Power	30.202 (a)	Power Limit	Mod. #1	Pass
4.4.2	Out of Band Emission at the Band Edge – Conducted and Radiated	30.203 (a)	Out of Band Emission	Mod. #1	Pass
4.4.2	Radiated Spurious Emission	2.1053/20.21/ 30.203 (a)	Spurious Emission	Mod. #1	Pass

ISO/IEC 17025 Decision Rule
The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
Modification 1: Lower output power of UL-V path by 1dB

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
Radiated emission measurements were performed with worst case configuration: AC powered.

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Orion SC-O-28GHz	Cellphone-Mate, Inc.	Orion SC-O-28GHz	1

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Equipment	Industrial Booster/Zone Enhancer
Operating Frequency Range:	UL: 27500-28350MHz DL: 27500-28350MHz
Emissions Type(s):	G7D W7D
Modulation Type(s):	Pi/2-BPSK (G7D) QPSK (G7D) 16AM (W7D) 64QAM (W7D) 256QAM (W7D)
Multiple Access Scheme	CP-OFDM for Downlink DFT-s-OFDM and CP-OFDM for Uplink
Number of TX Chains:	Refer to Operational Description
Antenna Type(s) and Gain:	Refer to Operational Description
Beamforming Type:	Refer to Operational Description
Antenna Connection Type:	Refer to Operational Description
Nominal Input Voltage:	120V, 60Hz
Firmware used for Test:	OrionMIMO_V0.0.15.hex

FCC PART 30

General Test Setup

Summary of Conditions
The equipment under test (EUT) is a 5GNR mm Wave Booster. It has 4 antennas for Server Ports and 4 antennas for Donor Ports.
Radiated Emission Method: The EUT is placed on Styrofoam table and mounted 1.5 height above the ground plan as the set-up picture to manipulate the EUT several positions in space. The measurement antenna is in the far field of the EUT per formula 2D^2/λ where D is the larger dimension of the measurement Antenna. The Signal Generator which is outside of the chamber is connected to the input of the EUT to produce the max power of the Pre AGC level. Absorbers are placed on the floor between the measurement antenna and turning table for above 1GHz to reduce the reflections. For below 1GHz, Absorbers are removed.
Conducted Emission Method: The EUT is placed on the table. It is connected straight to the Signal Generator and the Spectrum Analyzer as intended. The EUT Server and Donor ports are a 2.92 mmWave connector UL: 27500-28350MHz DL: 27500-28350MHz
Test procedure: The test was performed IAW the FCC document: 935210 D05 Indus Booster Basic Meas v01r04, 662911 D01 Multiple Transmitter Output v02r01, 842590 D01 Upper Microwave Flexible Use Service v01r01 and ANSI C63.26 2015 **Test Investigation:** 1/ Per 2.1057 (a) 2, Spurious Emission were investigated up to 100GHz. 2/ Multiple Access Scheme: CP-OFDM and DFT-s-OFDM, various modulations including Pi/2-BPSK, QPSK, 16QAM, 64QAM, 256 QAM with 120kHz subcarrier spacing, 100MHz and 400MHz Bandwidth, Single Carrier, Full and Single Number of Resource Block were tested. 3/The EUT was set up to produce the Pre-AGC power

4.2 Equivalent Isotropic Radiated Power

Test Setup/Conditions			
Test Location:	Fremont	Test Engineer:	H. Nguyenpham
Test Date(s):	8/27, 28, 31/2020 and 9/1/2020		
Configuration:	1		
Test Setup:	The EUT is placed on Styrofoam table and mounted 1.5 height above the ground plan as the set-up picture to manipulate the EUT several positions in space. It is 3meters away from the measurement antenna. The Signal Generator which is outside of the chamber is connected to the input of the EUT to produce the max power of the Pre AGC level. The measured quantity is the EIRP. Two partial values of EIRP for horizontal and vertical polarizations of the measurement antenna be recorded Test Setting: Spectrum Analyzer= Channel Power Function with integrated emission occupy bandwidth RBW=1-5% of EOW VBW ≥ 3XRBW Detector=RMS Trace Mode= Over 100 Sweeps Number of Sweep points ≥ 2 X Span/ RBW 30.202 Power limits (a) For fixed and base stations operating in connection with mobile systems, the average power of the sum of all antenna elements is limited to an equivalent isotopically radiated power (EIRP) density of +75dBm/100 MHz. For channel bandwidths less than 100 megahertz the EIRP must be reduced proportionally and linearly based on the bandwidth relative to 100 megahertz. Note 1/ The Maximum EIRP total was measured with respect to $(\theta, \emptyset)$ 2/ Base on the result of section 3.5 Mean output power and gain, investigation was on the worst scenarios such as below. 3/ Although linear sum of power for Crossed polarize antenna is not required, the power listed in EIRP below is linearly summed as worst case. Individual EIRP Vertical/Horizontal is included in the table. a/ DL-V and DL-H: Multiple Access Scheme CP-OFDM, Number of Resource Block= Full b/ UL-V and UL-H: Multiple Access Scheme DFT-s-OFDM, Number of Resource Block=Full		
Declaration:	Modification #1 was in place during testing.		

Environmental Conditions			
Test Date	**Temperature (ºC)**	**Relative Humidity (%):**	**Pressure: kPa**
8/27/2020	23.1	46	101.0
8/28/2020	22.7	49	100.9
8/31/2020	20.7	43	100.9
9/1/2020	22.1	50	101.3

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
01414	Horn Antenna	HP	84125-80008 RA28-K-F-4B-C	10/8/2019	10/8/2021
P00930	Cable	various	various	1/9/2020	1/9/2022
P06899	Cable	Astrolab	32022-29094K- 29094K-72TC	1/7/2020	1/7/2022
03619	Cable	Richardson RFPD	OKOCQoCQ177.2	11/5/2019	11/5/2021
02668	Spectrum Analyzer	Agilent	E4446A	12/17/2019	12/17/2020
R00173	Vector Signal Generator	Rohde & Schwarz	SMW200A-B140	7/22/2019	7/22/2022

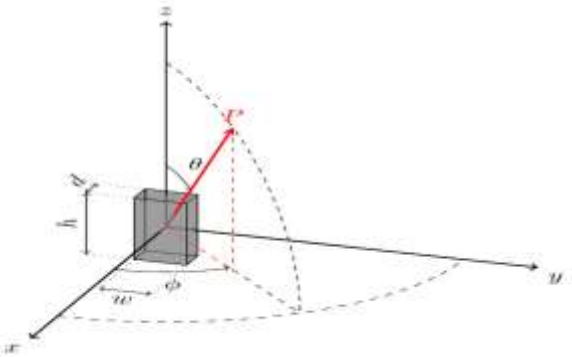
Summary of Results

Effective Isotropic Radiated Power Calculation

1**/ According to ANSI C63.26 2015 Section 5.2.7**
a/ E [Field Strength (dBm/m)] = Measure Value (dBm)+Antenna Factor (dB/m) + Cable Loss (dB)
b/ EIRP (dBm)= [E (dBm/m) +107] +20log(D) -104.8 Where D is measurement distance(m)
c/ Covert EIRP (dBm) = 10^(EIRP/10) mW

2/ Per KDB 842590 D1 v01r01
a/ The EIRP of an emission, per frequency *fn*, is expressed as

EIRP total $(\theta, \emptyset, fn)$= EIRP V $(\theta, \emptyset, fn)$ +EIRP H $(\theta, \emptyset, fn)$ where subscripts *V* and *H* denote orthogonal polarization measurements.



Spherical coordinates [1] and device dimensions, depth (d), width(w) and height (h)

b/ EIRP total (dBm)= 10LOG [EIRP V $(\theta, \emptyset, fn)$(mW)+EIRP H $(\theta, \emptyset, fn)$(mW)]

1/ UL-H

Multiple Access Scheme	Polarity of Measurement Antenna	Antenna Direction of EUT	Modulation	Channel Bandwidth (MHz)	No RBS	RB Offset	Center Frequency (MHz)	E (dBm/m)	EIRP (dBm)	EIRP (mW)	EIRP total (dBm)	Limit	Margin
DFT-s-OFDM	Vertical	UL-H	<pi>/2-BPSK	100	Full	0	27550	36.4	48.14	65162.8	51.735	75	-23.26
DFT-s-OFDM	Horizontal	UL-H	<pi>/2-BPSK	100	Full	0	27550	37.5	49.24	83946.0			
DFT-s-OFDM	Vertical	UL-H	<pi>/2-BPSK	100	Full	0	27925	36.8	48.54	71449.6	52.483	75	-22.52
DFT-s-OFDM	Horizontal	UL-H	<pi>/2-BPSK	100	Full	0	27925	38.5	50.24	105681.8			
DFT-s-OFDM	Vertical	UL-H	<pi>/2-BPSK	100	Full	0	28300	35.5	47.24	52966.3	51.551	75	-23.45
DFT-s-OFDM	Horizontal	UL-H	<pi>/2-BPSK	100	Full	0	28300	37.8	49.54	89949.8			
DFT-s-OFDM	Vertical	UL-H	<pi>/2-BPSK	400	Full	0	27700	37.9	49.64	92045.0	52.961	75	-22.04
DFT-s-OFDM	Horizontal	UL-H	<pi>/2-BPSK	400	Full	0	27700	38.5	50.24	105681.8			
DFT-s-OFDM	Vertical	UL-H	<pi>/2-BPSK	400	Full	0	27925	38.1	49.84	96382.9	53.107	75	-21.89
DFT-s-OFDM	Horizontal	UL-H	<pi>/2-BPSK	400	Full	0	27925	38.6	50.34	108143.4			
DFT-s-OFDM	Vertical	UL-H	<pi>/2-BPSK	400	Full	0	28150	37.7	49.44	87902.3	52.814	75	-22.19
DFT-s-OFDM	Horizontal	UL-H	<pi>/2-BPSK	400	Full	0	28150	38.4	50.14	103276.1			
DFT-s-OFDM	Vertical	UL-H	QPSK	100	Full	0	27550	37.2	48.94	78343.0	52.155	75	-22.85
DFT-s-OFDM	Horizontal	UL-H	QPSK	100	Full	0	27550	37.6	49.34	85901.4			
DFT-s-OFDM	Vertical	UL-H	QPSK	100	Full	0	27925	37.6	49.34	85901.4	52.769	75	-22.23
DFT-s-OFDM	Horizontal	UL-H	QPSK	100	Full	0	27925	38.4	50.14	103276.1			
DFT-s-OFDM	Vertical	UL-H	QPSK	100	Full	0	28300	36.9	48.64	73113.9	51.907	75	-23.09
DFT-s-OFDM	Horizontal	UL-H	QPSK	100	Full	0	28300	37.4	49.14	82035.2			
DFT-s-OFDM	Vertical	UL-H	QPSK	400	Full	0	27700	38.6	50.34	108143.4	53.555	75	-21.45
DFT-s-OFDM	Horizontal	UL-H	QPSK	400	Full	0	27700	39	50.74	118576.9			
DFT-s-OFDM	Vertical	UL-H	QPSK	400	Full	0	27925	38.7	50.44	110662.4	53.655	75	-21.35
DFT-s-OFDM	Horizontal	UL-H	QPSK	400	Full	0	27925	39.1	50.84	121338.9			
DFT-s-OFDM	Vertical	UL-H	QPSK	400	Full	0	28150	38.2	49.94	98627.9	53.369	75	-21.63
DFT-s-OFDM	Horizontal	UL-H	QPSK	400	Full	0	28150	39	50.74	118576.9			
DFT-s-OFDM	Vertical	UL-H	16QAM	100	Full	0	27550	36.6	48.34	68233.9	51.555	75	-23.45

DFT-s-OFDM	Horizontal	UL-H	16QAM	100	Full	0	27550	37	48.74	74817.0			
DFT-s-OFDM	Vertical	UL-H	16QAM	100	Full	0	27925	37.5	49.24	83946.0	52.507	75	-22.49
DFT-s-OFDM	Horizontal	UL-H	16QAM	100	Full	0	27925	38	49.74	94189.0			
DFT-s-OFDM	Vertical	UL-H	16QAM	100	Full	0	28300	36.7	48.44	69823.2	51.707	75	-23.29
DFT-s-OFDM	Horizontal	UL-H	16QAM	100	Full	0	28300	37.2	48.94	78343.0			
DFT-s-OFDM	Vertical	UL-H	16QAM	400	Full	0	27700	38	49.74	94189.0	53.169	75	-21.83
DFT-s-OFDM	Horizontal	UL-H	16QAM	400	Full	0	27700	38.8	50.54	113240.0			
DFT-s-OFDM	Vertical	UL-H	16QAM	400	Full	0	27925	38.1	49.84	96382.9	53.324	75	-21.68
DFT-s-OFDM	Horizontal	UL-H	16QAM	400	Full	0	27925	39	50.74	118576.9			
DFT-s-OFDM	Vertical	UL-H	16QAM	400	Full	0	28150	37.9	49.64	92045.0	52.961	75	-22.04
DFT-s-OFDM	Horizontal	UL-H	16QAM	400	Full	0	28150	38.5	50.24	105681.8			
DFT-s-OFDM	Vertical	UL-H	64QAM	100	Full	0	27550	36.7	48.44	69823.2	51.603	75	-23.40
DFT-s-OFDM	Horizontal	UL-H	64QAM	100	Full	0	27550	37	48.74	74817.0			
DFT-s-OFDM	Vertical	UL-H	64QAM	100	Full	0	27925	37.4	49.14	82035.2	52.355	75	-22.65
DFT-s-OFDM	Horizontal	UL-H	64QAM	100	Full	0	27925	37.8	49.54	89949.8			
DFT-s-OFDM	Vertical	UL-H	64QAM	100	Full	0	28300	37.1	48.84	76559.7	51.951	75	-23.05
DFT-s-OFDM	Horizontal	UL-H	64QAM	100	Full	0	28300	37.3	49.04	80167.8			
DFT-s-OFDM	Vertical	UL-H	64QAM	400	Full	0	27700	37.9	49.64	92045.0	52.803	75	-22.20
DFT-s-OFDM	Horizontal	UL-H	64QAM	400	Full	0	27700	38.2	49.94	98627.9			
DFT-s-OFDM	Vertical	UL-H	64QAM	400	Full	0	27925	38	49.74	94189.0	52.955	75	-22.05
DFT-s-OFDM	Horizontal	UL-H	64QAM	400	Full	0	27925	38.4	50.14	103276.1			
DFT-s-OFDM	Vertical	UL-H	64QAM	400	Full	0	28150	37.8	49.54	89949.8	52.755	75	-22.25
DFT-s-OFDM	Horizontal	UL-H	64QAM	400	Full	0	28150	38.2	49.94	98627.9			
DFT-s-OFDM	Vertical	UL-H	256QAM	100	Full	0	27550	36.4	48.14	65162.8	51.514	75	-23.49
DFT-s-OFDM	Horizontal	UL-H	256QAM	100	Full	0	27550	37.1	48.84	76559.7			
DFT-s-OFDM	Vertical	UL-H	256QAM	100	Full	0	27925	37.4	49.14	82035.2	52.407	75	-22.59
DFT-s-OFDM	Horizontal	UL-H	256QAM	100	Full	0	27925	37.9	49.64	92045.0			

DFT-s-OFDM	Vertical	UL-H	256QAM	100	Full	0	28300	37	48.74	74817.0	51.955	75	-23.05
DFT-s-OFDM	Horizontal	UL-H	256QAM	100	Full	0	28300	37.4	49.14	82035.2			
DFT-s-OFDM	Vertical	UL-H	256QAM	400	Full	0	27700	37.2	48.94	78343.0	52.369	75	-22.63
DFT-s-OFDM	Horizontal	UL-H	256QAM	400	Full	0	27700	38	49.74	94189.0			
DFT-s-OFDM	Vertical	UL-H	256QAM	400	Full	0	27925	37.7	49.44	87902.3	52.655	75	-22.35
DFT-s-OFDM	Horizontal	UL-H	256QAM	400	Full	0	27925	38.1	49.84	96382.9			
DFT-s-OFDM	Vertical	UL-H	256QAM	400	Full	0	28150	37.4	49.14	82035.2	52.407	75	-22.59
DFT-s-OFDM	Horizontal	UL-H	256QAM	400	Full	0	28150	37.9	49.64	92045.0			

2/ UL-V

Multiple Access Scheme	Polarity of Measurement Antenna	Antenna Direction of EUT	Modulation	Channel Bandwidth (MHz)	No RBS	RB Offset	Center Frequency (MHz)	E (dBm/m)	EIRP (dBm)	EIRP (mW)	EIRP total (dBm)	Limit	Margin
DFT-s-OFDM	Vertical	UL-V	<pi>/2-BPSK	100	Full	0	27550	38.2	49.94	98627.9	53.5	75	-21.52
DFT-s-OFDM	Horizontal	UL-V	<pi>/2-BPSK	100	Full	0	27550	39.2	50.94	124165.2			
DFT-s-OFDM	Vertical	UL-V	<pi>/2-BPSK	100	Full	0	27925	38.9	50.64	115877.7	53.8	75	-21.20
DFT-s-OFDM	Horizontal	UL-V	<pi>/2-BPSK	100	Full	0	27925	39.2	50.94	124165.2			
DFT-s-OFDM	Vertical	UL-V	<pi>/2-BPSK	100	Full	0	28300	37.5	49.24	83946.0	52.6	75	-22.44
DFT-s-OFDM	Horizontal	UL-V	<pi>/2-BPSK	100	Full	0	28300	38.1	49.84	96382.9			
DFT-s-OFDM	Vertical	UL-V	<pi>/2-BPSK	400	Full	0	27700	38.4	50.14	103276.1	53.5	75	-21.49
DFT-s-OFDM	Horizontal	UL-V	<pi>/2-BPSK	400	Full	0	27700	39.1	50.84	121338.9			
DFT-s-OFDM	Vertical	UL-V	<pi>/2-BPSK	400	Full	0	27925	38.6	50.34	108143.4	53.8	75	-21.18
DFT-s-OFDM	Horizontal	UL-V	<pi>/2-BPSK	400	Full	0	27925	39.5	51.24	133045.4			
DFT-s-OFDM	Vertical	UL-V	<pi>/2-BPSK	400	Full	0	28150	38	49.74	94189.0	53.3	75	-21.72
DFT-s-OFDM	Horizontal	UL-V	<pi>/2-BPSK	400	Full	0	28150	39	50.74	118576.9			
DFT-s-OFDM	Vertical	UL-V	QPSK	100	Full	0	27550	37.6	49.34	85901.4	52.8	75	-22.23
DFT-s-OFDM	Horizontal	UL-V	QPSK	100	Full	0	27550	38.4	50.14	103276.1			
DFT-s-OFDM	Vertical	UL-V	QPSK	100	Full	0	27925	38.4	50.14	103276.1	53.5	75	-21.49
DFT-s-OFDM	Horizontal	UL-V	QPSK	100	Full	0	27925	39.1	50.84	121338.9			

DFT-s-OFDM	Vertical	UL-V	QPSK	100	Full	0	28300	37.3	49.04	80167.8	52.4	75	-22.64
DFT-s-OFDM	Horizontal	UL-V	QPSK	100	Full	0	28300	37.9	49.64	92045.0			
DFT-s-OFDM	Vertical	UL-V	QPSK	400	Full	0	27700	38.4	50.14	103276.1	53.5	75	-21.54
DFT-s-OFDM	Horizontal	UL-V	QPSK	400	Full	0	27700	39	50.74	118576.9			
DFT-s-OFDM	Vertical	UL-V	QPSK	400	Full	0	27925	38.7	50.44	110662.4	53.8	75	-21.19
DFT-s-OFDM	Horizontal	UL-V	QPSK	400	Full	0	27925	39.4	51.14	130017.0			
DFT-s-OFDM	Vertical	UL-V	QPSK	400	Full	0	28150	38	49.74	94189.0	53.2	75	-21.83
DFT-s-OFDM	Horizontal	UL-V	QPSK	400	Full	0	28150	38.8	50.54	113240.0			
DFT-s-OFDM	Vertical	UL-V	16QAM	100	Full	0	27550	37.2	48.94	78343.0	52.4	75	-22.58
DFT-s-OFDM	Horizontal	UL-V	16QAM	100	Full	0	27550	38.1	49.84	96382.9			
DFT-s-OFDM	Vertical	UL-V	16QAM	100	Full	0	27925	38.2	49.94	98627.9	53.4	75	-21.63
DFT-s-OFDM	Horizontal	UL-V	16QAM	100	Full	0	27925	39	50.74	118576.9			
DFT-s-OFDM	Vertical	UL-V	16QAM	100	Full	0	28300	37.1	48.84	76559.7	52.2	75	-22.84
DFT-s-OFDM	Horizontal	UL-V	16QAM	100	Full	0	28300	37.7	49.44	87902.3			
DFT-s-OFDM	Vertical	UL-V	16QAM	400	Full	0	27700	38.7	50.44	110662.4	53.6	75	-21.40
DFT-s-OFDM	Horizontal	UL-V	16QAM	400	Full	0	27700	39	50.74	118576.9			
DFT-s-OFDM	Vertical	UL-V	16QAM	400	Full	0	27925	38.8	50.54	113240.0	53.9	75	-21.14
DFT-s-OFDM	Horizontal	UL-V	16QAM	400	Full	0	27925	39.4	51.14	130017.0			
DFT-s-OFDM	Vertical	UL-V	16QAM	400	Full	0	28150	38.4	50.14	103276.1	53.4	75	-21.59
DFT-s-OFDM	Horizontal	UL-V	16QAM	400	Full	0	28150	38.9	50.64	115877.7			
DFT-s-OFDM	Vertical	UL-V	64QAM	100	Full	0	27550	37.2	48.94	78343.0	52.4	75	-22.63
DFT-s-OFDM	Horizontal	UL-V	64QAM	100	Full	0	27550	38	49.74	94189.0			
DFT-s-OFDM	Vertical	UL-V	64QAM	100	Full	0	27925	38.2	49.94	98627.9	53.4	75	-21.58
DFT-s-OFDM	Horizontal	UL-V	64QAM	100	Full	0	27925	39.1	50.84	121338.9			
DFT-s-OFDM	Vertical	UL-V	64QAM	100	Full	0	28300	37	48.74	74817.0	52.1	75	-22.89
DFT-s-OFDM	Horizontal	UL-V	64QAM	100	Full	0	28300	37.7	49.44	87902.3			
DFT-s-OFDM	Vertical	UL-V	64QAM	400	Full	0	27700	38.2	49.94	98627.9	53.3	75	-21.74

DFT-s-OFDM	Horizontal	UL-V	64QAM	400	Full	0	27700	38.8	50.54	113240.0			
DFT-s-OFDM	Vertical	UL-V	64QAM	400	Full	0	27925	38.5	50.24	105681.8	53.7	75	-21.33
DFT-s-OFDM	Horizontal	UL-V	64QAM	400	Full	0	27925	39.3	51.04	127057.4			
DFT-s-OFDM	Vertical	UL-V	64QAM	400	Full	0	28150	38.1	49.84	96382.9	53.3	75	-21.73
DFT-s-OFDM	Horizontal	UL-V	64QAM	400	Full	0	28150	38.9	50.64	115877.7			
DFT-s-OFDM	Vertical	UL-V	256QAM	100	Full	0	27550	37.1	48.84	76559.7	52.4	75	-22.56
DFT-s-OFDM	Horizontal	UL-V	256QAM	100	Full	0	27550	38.2	49.94	98627.9			
DFT-s-OFDM	Vertical	UL-V	256QAM	100	Full	0	27925	38.1	49.84	96382.9	53.4	75	-21.62
DFT-s-OFDM	Horizontal	UL-V	256QAM	100	Full	0	27925	39.1	50.84	121338.9			
DFT-s-OFDM	Vertical	UL-V	256QAM	100	Full	0	28300	37.1	48.84	76559.7	52.2	75	-22.79
DFT-s-OFDM	Horizontal	UL-V	256QAM	100	Full	0	28300	37.8	49.54	89949.8			
DFT-s-OFDM	Vertical	UL-V	256QAM	400	Full	0	27700	38.3	50.04	100925.3	53.4	75	-21.59
DFT-s-OFDM	Horizontal	UL-V	256QAM	400	Full	0	27700	39	50.74	118576.9			
DFT-s-OFDM	Vertical	UL-V	256QAM	400	Full	0	27925	38.5	50.24	105681.8	53.6	75	-21.39
DFT-s-OFDM	Horizontal	UL-V	256QAM	400	Full	0	27925	39.2	50.94	124165.2			
DFT-s-OFDM	Vertical	UL-V	256QAM	400	Full	0	28150	37.9	49.64	92045.0	53.1	75	-21.88
DFT-s-OFDM	Horizontal	UL-V	256QAM	400	Full	0	28150	38.8	50.54	113240.0			

3/ DL-H

Multiple Access Scheme	Polarity of Measurement Antenna	Antenna Direction of EUT	Modulation	Channel Bandwidth (MHz)	No RBS	RB Offset	Center Frequency (MHz)	E (dBm/m)	EIRP (dBm)	EIRP (mW)	EIRP total (dBm)	Limit	Margin
CP-OFDM	Vertical	DL-H	QPSK	100	Full	0	27550	24.6	36.34	4305.3	40.3	75	-34.72
CP-OFDM	Horizontal	DL-H	QPSK	100	Full	0	27550	26.3	38.04	6368.0			
CP-OFDM	Vertical	DL-H	QPSK	100	Full	0	27925	25.4	37.14	5176.1	40.4	75	-34.65
CP-OFDM	Horizontal	DL-H	QPSK	100	Full	0	27925	25.8	37.54	5675.4			
CP-OFDM	Vertical	DL-H	QPSK	100	Full	0	28300	25.3	37.04	5058.2	40.1	75	-34.95
CP-OFDM	Horizontal	DL-H	QPSK	100	Full	0	28300	25.3	37.04	5058.2			
CP-OFDM	Vertical	DL-H	QPSK	400	Full	0	27700	25.5	37.24	5296.6	40.9	75	-34.05
CP-OFDM	Horizontal	DL-H	QPSK	400	Full	0	27700	26.8	38.54	7145.0			
CP-OFDM	Vertical	DL-H	QPSK	400	Full	0	27925	25.5	37.24	5296.6	40.6	75	-34.39
CP-OFDM	Horizontal	DL-H	QPSK	400	Full	0	27925	26.2	37.94	6223.0			
CP-OFDM	Vertical	DL-H	QPSK	400	Full	0	28150	24.6	36.34	4305.3	40.0	75	-35.01
CP-OFDM	Horizontal	DL-H	QPSK	400	Full	0	28150	25.8	37.54	5675.4			
CP-OFDM	Vertical	DL-H	16QAM	100	Full	0	27550	25	36.74	4720.6	40.4	75	-34.55
CP-OFDM	Horizontal	DL-H	16QAM	100	Full	0	27550	26.3	38.04	6368.0			
CP-OFDM	Vertical	DL-H	16QAM	100	Full	0	27925	25.4	37.14	5176.1	40.5	75	-34.49

CP-OFDM	Horizontal	DL-H	16QAM	100	Full	0	27925	26.1	37.84	6081.4			
CP-OFDM	Vertical	DL-H	16QAM	100	Full	0	28300	24.9	36.64	4613.2	39.9	75	-35.15
CP-OFDM	Horizontal	DL-H	16QAM	100	Full	0	28300	25.3	37.04	5058.2			
CP-OFDM	Vertical	DL-H	16QAM	400	Full	0	27700	25.5	37.24	5296.6	40.8	75	-34.16
CP-OFDM	Horizontal	DL-H	16QAM	400	Full	0	27700	26.6	38.34	6823.4			
CP-OFDM	Vertical	DL-H	16QAM	400	Full	0	27925	25.7	37.44	5546.3	40.7	75	-34.29
CP-OFDM	Horizontal	DL-H	16QAM	400	Full	0	27925	26.2	37.94	6223.0			
CP-OFDM	Vertical	DL-H	16QAM	400	Full	0	28150	24.6	36.34	4305.3	40.2	75	-34.84
CP-OFDM	Horizontal	DL-H	16QAM	400	Full	0	28150	26.1	37.84	6081.4			
CP-OFDM	Vertical	DL-H	64QAM	100	Full	0	27550	25.6	37.34	5420.0	40.9	75	-34.06
CP-OFDM	Horizontal	DL-H	64QAM	100	Full	0	27550	26.7	38.44	6982.3			
CP-OFDM	Vertical	DL-H	64QAM	100	Full	0	27925	25.7	37.44	5546.3	40.8	75	-34.19
CP-OFDM	Horizontal	DL-H	64QAM	100	Full	0	27925	26.4	38.14	6516.3			
CP-OFDM	Vertical	DL-H	64QAM	100	Full	0	28300	25	36.74	4720.6	39.9	75	-35.15
CP-OFDM	Horizontal	DL-H	64QAM	100	Full	0	28300	25.2	36.94	4943.1			
CP-OFDM	Vertical	DL-H	64QAM	400	Full	0	27700	25.1	36.84	4830.6	40.7	75	-34.28
CP-OFDM	Horizontal	DL-H	64QAM	400	Full	0	27700	26.7	38.44	6982.3			
CP-OFDM	Vertical	DL-H	64QAM	400	Full	0	27925	25.7	37.44	5546.3	40.7	75	-34.29
CP-OFDM	Horizontal	DL-H	64QAM	400	Full	0	27925	26.2	37.94	6223.0			
CP-OFDM	Vertical	DL-H	64QAM	400	Full	0	28150	24.7	36.44	4405.5	40.1	75	-34.91
CP-OFDM	Horizontal	DL-H	64QAM	400	Full	0	28150	25.9	37.64	5807.6			
CP-OFDM	Vertical	DL-H	256QAM	100	Full	0	27550	25.4	37.14	5176.1	40.6	75	-34.43
CP-OFDM	Horizontal	DL-H	256QAM	100	Full	0	27550	26.2	37.94	6223.0			
CP-OFDM	Vertical	DL-H	256QAM	100	Full	0	27925	25.8	37.54	5675.4	40.8	75	-34.25
CP-OFDM	Horizontal	DL-H	256QAM	100	Full	0	27925	26.2	37.94	6223.0			
CP-OFDM	Vertical	DL-H	256QAM	100	Full	0	28300	25.3	37.04	5058.2	40.1	75	-34.95
CP-OFDM	Horizontal	DL-H	256QAM	100	Full	0	28300	25.3	37.04	5058.2			
CP-OFDM	Vertical	DL-H	256QAM	400	Full	0	27700	25.4	37.14	5176.1	40.8	75	-34.15
CP-OFDM	Horizontal	DL-H	256QAM	400	Full	0	27700	26.7	38.44	6982.3			
CP-OFDM	Vertical	DL-H	256QAM	400	Full	0	27925	25.7	37.44	5546.3	40.8	75	-34.24
CP-OFDM	Horizontal	DL-H	256QAM	400	Full	0	27925	26.3	38.04	6368.0			
CP-OFDM	Vertical	DL-H	256QAM	400	Full	0	28150	24.8	36.54	4508.2	40.1	75	-34.86
CP-OFDM	Horizontal	DL-H	256QAM	400	Full	0	28150	25.9	37.64	5807.6			

4/DL-V

Multiple Access Scheme	Polarity of Measurement Antenna	Antenna Direction of EUT	Modulation	Channel Bandwidth (MHz)	No RBS	RB Offset	Center Frequency (MHz)	E (dBm/m)	EIRP (dBm)	EIRP (mW)	EIRP total (dBm)	Limit	Margin
CP-OFDM	Vertical	DL-V	QPSK	100	Full	0	27550	24.3	36.04	4017.9	39.4	75	-35.59
CP-OFDM	Horizontal	DL-V	QPSK	100	Full	0	27550	25	36.74	4720.6			
CP-OFDM	Vertical	DL-V	QPSK	100	Full	0	27925	25.7	37.44	5546.3	40.7	75	-34.35
CP-OFDM	Horizontal	DL-V	QPSK	100	Full	0	27925	26.1	37.84	6081.4			
CP-OFDM	Vertical	DL-V	QPSK	100	Full	0	28300	24.5	36.24	4207.3	39.4	75	-35.65
CP-OFDM	Horizontal	DL-V	QPSK	100	Full	0	28300	24.7	36.44	4405.5			
CP-OFDM	Vertical	DL-V	QPSK	400	Full	0	27700	25.6	37.34	5420.0	40.5	75	-34.50
CP-OFDM	Horizontal	DL-V	QPSK	400	Full	0	27700	25.9	37.64	5807.6			
CP-OFDM	Vertical	DL-V	QPSK	400	Full	0	27925	26	37.74	5942.9	40.8	75	-34.25
CP-OFDM	Horizontal	DL-V	QPSK	400	Full	0	27925	26	37.74	5942.9			
CP-OFDM	Vertical	DL-V	QPSK	400	Full	0	28150	25.4	37.14	5176.1	40.4	75	-34.65
CP-OFDM	Horizontal	DL-V	QPSK	400	Full	0	28150	25.8	37.54	5675.4			
CP-OFDM	Vertical	DL-V	16QAM	100	Full	0	27550	24.7	36.44	4405.5	39.6	75	-35.40
CP-OFDM	Horizontal	DL-V	16QAM	100	Full	0	27550	25	36.74	4720.6			
CP-OFDM	Vertical	DL-V	16QAM	100	Full	0	27925	25.8	37.54	5675.4	40.6	75	-34.40

CP-OFDM	Horizontal	DL-V	16QAM	100	Full	0	27925	25.9	37.64	5807.6			
CP-OFDM	Vertical	DL-V	16QAM	100	Full	0	28300	24.3	36.04	4017.9	39.0	75	-36.05
CP-OFDM	Horizontal	DL-V	16QAM	100	Full	0	28300	24.1	35.84	3837.1			
CP-OFDM	Vertical	DL-V	16QAM	400	Full	0	27700	25.2	36.94	4943.1	40.4	75	-34.63
CP-OFDM	Horizontal	DL-V	16QAM	400	Full	0	27700	26	37.74	5942.9			
CP-OFDM	Vertical	DL-V	16QAM	400	Full	0	27925	26	37.74	5942.9	40.9	75	-34.15
CP-OFDM	Horizontal	DL-V	16QAM	400	Full	0	27925	26.2	37.94	6223.0			
CP-OFDM	Vertical	DL-V	16QAM	400	Full	0	28150	25.6	37.34	5420.0	40.3	75	-34.75
CP-OFDM	Horizontal	DL-V	16QAM	400	Full	0	28150	25.4	37.14	5176.1			
CP-OFDM	Vertical	DL-V	64QAM	100	Full	0	27550	24.9	36.64	4613.2	39.6	75	-35.45
CP-OFDM	Horizontal	DL-V	64QAM	100	Full	0	27550	24.7	36.44	4405.5			
CP-OFDM	Vertical	DL-V	64QAM	100	Full	0	27925	25.9	37.64	5807.6	40.9	75	-34.15
CP-OFDM	Horizontal	DL-V	64QAM	100	Full	0	27925	26.3	38.04	6368.0			
CP-OFDM	Vertical	DL-V	64QAM	100	Full	0	28300	24.8	36.54	4508.2	39.5	75	-35.55
CP-OFDM	Horizontal	DL-V	64QAM	100	Full	0	28300	24.6	36.34	4305.3			
CP-OFDM	Vertical	DL-V	64QAM	400	Full	0	27700	25.6	37.34	5420.0	40.4	75	-34.60
CP-OFDM	Horizontal	DL-V	64QAM	400	Full	0	27700	25.7	37.44	5546.3			
CP-OFDM	Vertical	DL-V	64QAM	400	Full	0	27925	25.9	37.64	5807.6	40.8	75	-34.25
CP-OFDM	Horizontal	DL-V	64QAM	400	Full	0	27925	26.1	37.84	6081.4			
CP-OFDM	Vertical	DL-V	64QAM	400	Full	0	28150	25.6	37.34	5420.0	40.5	75	-34.50
CP-OFDM	Horizontal	DL-V	64QAM	400	Full	0	28150	25.9	37.64	5807.6			
CP-OFDM	Vertical	DL-V	256QAM	100	Full	0	27550	24.5	36.24	4207.3	39.6	75	-35.44
CP-OFDM	Horizontal	DL-V	256QAM	100	Full	0	27550	25.1	36.84	4830.6			
CP-OFDM	Vertical	DL-V	256QAM	100	Full	0	27925	25.6	37.34	5420.0	40.4	75	-34.65
CP-OFDM	Horizontal	DL-V	256QAM	100	Full	0	27925	25.6	37.34	5420.0			
CP-OFDM	Vertical	DL-V	256QAM	100	Full	0	28300	24.7	36.44	4405.5	39.6	75	-35.40
CP-OFDM	Horizontal	DL-V	256QAM	100	Full	0	28300	25	36.74	4720.6			
CP-OFDM	Vertical	DL-V	256QAM	400	Full	0	27700	25.5	37.24	5296.6	40.5	75	-34.55
CP-OFDM	Horizontal	DL-V	256QAM	400	Full	0	27700	25.9	37.64	5807.6			
CP-OFDM	Vertical	DL-V	256QAM	400	Full	0	27925	26	37.74	5942.9	40.9	75	-34.10
CP-OFDM	Horizontal	DL-V	256QAM	400	Full	0	27925	26.3	38.04	6368.0			
CP-OFDM	Vertical	DL-V	256QAM	400	Full	0	28150	25.5	37.24	5296.6			
CP-OFDM	Horizontal	DL-V	256QAM	400	Full	0	28150	25.7	37.44	5546.3	40.4	75	-34.65

4.4.2 Out of Band Emission at the Band Edge – Conducted

Test Setup/Conditions			
Test Location:	Fremont	Test Engineer:	H. Nguyenpham
Test Date(s):	8/14/2020		
Configuration:	1		
Test Setup:	According to Section 30.203(a), 12 the conductive power or the total radiated power of any emission outside a licensee's frequency block13 shall be −13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10% of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm/MHz or lower The MIMO Band Edges Factor according to Section 6.4.3.2.2 of ANSI C63.26 2015 "Measure and add 10 Log (Nant)dB" is not applicable since the EUT has directional antenna ports: four inputs and four outputs **Based on the result of section 3.5 Mean output power and gain, all the modes and the worst configuration are reported in this section as below** 1/ DL-H and DL-V: Low and High Channel with all modulation types, all multiple access schemes, Number of Resource Blocks =Full 2/ UL-H and UL-V: Low and High Channel with all modulation types, all multiple access schemes, Number of Resource Blocks =Full		
Declaration:	Modification #1 was in place during testing.		

Environmental Conditions					
Temperature (ºC)	21.6	Relative Humidity (%):	53	Pressure: kPa	102.2

Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
P05411	Attenuator	Weinschel	54A-10	11/27/2019	11/27/2021
P07192	Cable	Astro	32022-29094K-29094K-48TC	11/27/2019	11/27/2021
03360	Cable	Astrolab	32022-2-29094-36TC	4/9/2020	4/9/2022
02668	Spectrum Analyzer	Agilent	E4446A	12/17/2019	12/17/2020
R00173	Vector Signal Generator	Rohde & Schwarz	SMW200A-B140	7/22/2019	7/22/2022

Summary of Results

Pass: As indicated in plots below, all out-of-band/block emissions are under the limit of -13dBm.

1/ UL-H

Multiple Access Scheme	Polarity	CH	Channel BW (MHz)	Modulation	OOB PreAGC (dBm)	OOB AGC+3dB (dBm)	OOB Limit (dBm)	Margin OOB Pre AGC (dB)	Margin OOB AGC+3 (dB)
CP-OFDM	UL_H	L	100	QPSK	-21.11	-21.29	-13	-8.11	-8.29
CP-OFDM	UL_H	H	100	QPSK	-24.93	-28.10	-13	-11.93	-15.10
CP-OFDM	UL_H	L	400	QPSK	-22.98	-24.51	-13	-9.98	-11.51
CP-OFDM	UL_H	H	400	QPSK	-25.19	-26.90	-13	-12.19	-13.90
CP-OFDM	UL_H	L	100	16QAM	-20.27	-21.52	-13	-7.27	-8.52
CP-OFDM	UL_H	H	100	16QAM	-25.68	-26.71	-13	-12.68	-13.71
CP-OFDM	UL_H	L	400	16QAM	-23.05	-23.64	-13	-10.05	-10.64
CP-OFDM	UL_H	H	400	16QAM	-25.18	-26.08	-13	-12.18	-13.08
CP-OFDM	UL_H	L	100	64QAM	-20.71	-21.12	-13	-7.71	-8.12
CP-OFDM	UL_H	H	100	64QAM	-25.38	-27.05	-13	-12.38	-14.05
CP-OFDM	UL_H	L	400	64QAM	-23.28	-23.09	-13	-10.28	-10.09
CP-OFDM	UL_H	H	400	64QAM	-25.24	-26.24	-13	-12.24	-13.24
CP-OFDM	UL_H	L	100	256QAM	-21.28	-20.85	-13	-8.28	-7.85
CP-OFDM	UL_H	H	100	256QAM	-25.94	-28.54	-13	-12.94	-15.54
CP-OFDM	UL_H	L	400	256QAM	-24.32	-25.01	-13	-11.32	-12.01
CP-OFDM	UL_H	H	400	256QAM	-25.53	-27.38	-13	-12.53	-14.38
DFT-s-OFDM	UL_H	L	100	Pi/2 BPSK	-20.19	-22.60	-13	-7.19	-9.60
DFT-s-OFDM	UL_H	H	100	Pi/2 BPSK	-27.60	-27.66	-13	-14.60	-14.66
DFT-s-OFDM	UL_H	L	400	Pi/2 BPSK	-26.10	-26.49	-13	-13.10	-13.49
DFT-s-OFDM	UL_H	H	400	Pi/2 BPSK	-28.20	-26.84	-13	-15.20	-13.84
DFT-s-OFDM	UL_H	L	100	QPSK	-19.89	-18.27	-13	-6.89	-5.27
DFT-s-OFDM	UL_H	H	100	QPSK	-22.85	-22.47	-13	-9.85	-9.47
DFT-s-OFDM	UL_H	L	400	QPSK	-22.71	-22.88	-13	-9.71	-9.88
DFT-s-OFDM	UL_H	H	400	QPSK	-26.10	-27.42	-13	-13.10	-14.42
DFT-s-OFDM	UL_H	L	100	16QAM	-19.10	-21.04	-13	-6.10	-8.04
DFT-s-OFDM	UL_H	H	100	16QAM	-24.75	-26.52	-13	-11.75	-13.52
DFT-s-OFDM	UL_H	L	400	16QAM	-23.13	-24.22	-13	-10.13	-11.22
DFT-s-OFDM	UL_H	H	400	16QAM	-25.79	-27.88	-13	-12.79	-14.88
DFT-s-OFDM	UL_H	L	100	64QAM	-19.99	-22.07	-13	-6.99	-9.07
DFT-s-OFDM	UL_H	H	100	64QAM	-25.32	-27.19	-13	-12.32	-14.19
DFT-s-OFDM	UL_H	L	400	64QAM	-23.50	-24.45	-13	-10.50	-11.45

Multiple Access Scheme	Polarity	CH	Channel BW (MHz)	Modulation	OOB PreAGC (dBm)	OOB AGC+3dB (dBm)	OOB Limit (dBm)	Margin OOB Pre AGC (dB)	Margin OOB AGC+3 (dB)
DFT-s-OFDM	UL_H	H	400	64QAM	-26.37	-28.87	-13	-13.37	-15.87
DFT-s-OFDM	UL_H	L	100	256QAM	-19.99	-21.38	-13	-6.99	-8.38
DFT-s-OFDM	UL_H	H	100	256QAM	-25.55	-25.87	-13	-12.55	-12.87
DFT-s-OFDM	UL_H	L	400	256QAM	-24.965	-25.841	-13	-11.97	-12.84
DFT-s-OFDM	UL_H	H	400	256QAM	-26.677	-27.174	-13	-13.68	-14.17

2/ UL-V

Multiple Access Scheme	Polarity	CH	Channel BW (MHz)	Modulation	OOB PreAGC (dBm)	OOB AGC+3dB (dBm)	OOB Limit (dBm)	Margin OOB Pre AGC (dB)	Margin OOB AGC+3 (dB)
CP-OFDM	UL_V	L	100	QPSK	-18.86	-18.47	-13	-5.86	-5.47
CP-OFDM	UL_V	H	100	QPSK	-20.22	-20.38	-13	-7.22	-7.38
CP-OFDM	UL_V	L	400	QPSK	-20.15	-20.74	-13	-7.15	-7.74
CP-OFDM	UL_V	H	400	QPSK	-22.17	-22.68	-13	-9.17	-9.68
CP-OFDM	UL_V	L	100	16QAM	-16.90	-18.19	-13	-3.90	-5.19
CP-OFDM	UL_V	H	100	16QAM	-20.30	-19.41	-13	-7.30	-6.41
CP-OFDM	UL_V	L	400	16QAM	-19.37	-22.55	-13	-6.37	-9.55
CP-OFDM	UL_V	H	400	16QAM	-22.23	-21.59	-13	-9.23	-8.59
CP-OFDM	UL_V	L	100	64QAM	-19.61	-18.25	-13	-6.61	-5.25
CP-OFDM	UL_V	H	100	64QAM	-21.03	-19.94	-13	-8.03	-6.94
CP-OFDM	UL_V	L	400	64QAM	-20.68	-21.07	-13	-7.68	-8.07
CP-OFDM	UL_V	H	400	64QAM	-21.33	-23.26	-13	-8.33	-10.26
CP-OFDM	UL_V	L	100	256QAM	-18.25	-17.42	-13	-5.25	-4.42
CP-OFDM	UL_V	H	100	256QAM	-20.93	-20.65	-13	-7.93	-7.65
CP-OFDM	UL_V	L	400	256QAM	-20.81	-21.06	-13	-7.81	-8.06
CP-OFDM	UL_V	H	400	256QAM	-21.63	-23.74	-13	-8.63	-10.74
DFT-s-OFDM	UL_V	L	100	Pi/2 BPSK	-18.13	-18.46	-13	-5.13	-5.46
DFT-s-OFDM	UL_V	H	100	Pi/2 BPSK	-19.77	-23.11	-13	-6.77	-10.11
DFT-s-OFDM	UL_V	L	400	Pi/2 BPSK	-22.74	-24.16	-13	-9.74	-11.16
DFT-s-OFDM	UL_V	H	400	Pi/2 BPSK	-23.10	-27.00	-13	-10.10	-14.00
DFT-s-OFDM	UL_V	L	100	QPSK	-19.69	-19.77	-13	-6.69	-6.77
DFT-s-OFDM	UL_V	H	100	QPSK	-18.47	-16.06	-13	-5.47	-3.06
DFT-s-OFDM	UL_V	L	400	QPSK	-20.75	-21.81	-13	-7.75	-8.81
DFT-s-OFDM	UL_V	H	400	QPSK	-21.57	-22.17	-13	-8.57	-9.17

Multiple Access Scheme	Polarity	CH	Channel BW (MHz)	Modulation	OOB PreAGC (dBm)	OOB AGC+3dB (dBm)	OOB Limit (dBm)	Margin OOB Pre AGC (dB)	Margin OOB AGC+3 (dB)
DFT-s-OFDM	UL_V	L	100	16QAM	-17.75	-18.51	-13	-4.75	-5.51
DFT-s-OFDM	UL_V	H	100	16QAM	-20.65	-19.70	-13	-7.65	-6.70
DFT-s-OFDM	UL_V	L	400	16QAM	-20.96	-23.69	-13	-7.96	-10.69
DFT-s-OFDM	UL_V	H	400	16QAM	-23.08	-23.42	-13	-10.08	-10.42
DFT-s-OFDM	UL_V	L	100	64QAM	-16.22	-17.90	-13	-3.22	-4.90
DFT-s-OFDM	UL_V	H	100	64QAM	-20.86	-21.11	-13	-7.86	-8.11
DFT-s-OFDM	UL_V	L	400	64QAM	-20.79	-21.44	-13	-7.79	-8.44
DFT-s-OFDM	UL_V	H	400	64QAM	-22.62	-23.06	-13	-9.62	-10.06
DFT-s-OFDM	UL_V	L	100	256QAM	-17.84	-19.08	-13	-4.84	-6.08
DFT-s-OFDM	UL_V	H	100	256QAM	-20.45	-19.99	-13	-7.45	-6.99
DFT-s-OFDM	UL_V	L	400	256QAM	-20.86	-22.44	-13	-7.86	-9.44
DFT-s-OFDM	UL_V	H	400	256QAM	-22.90	-24.25	-13	-9.90	-11.25

3/ DL-H

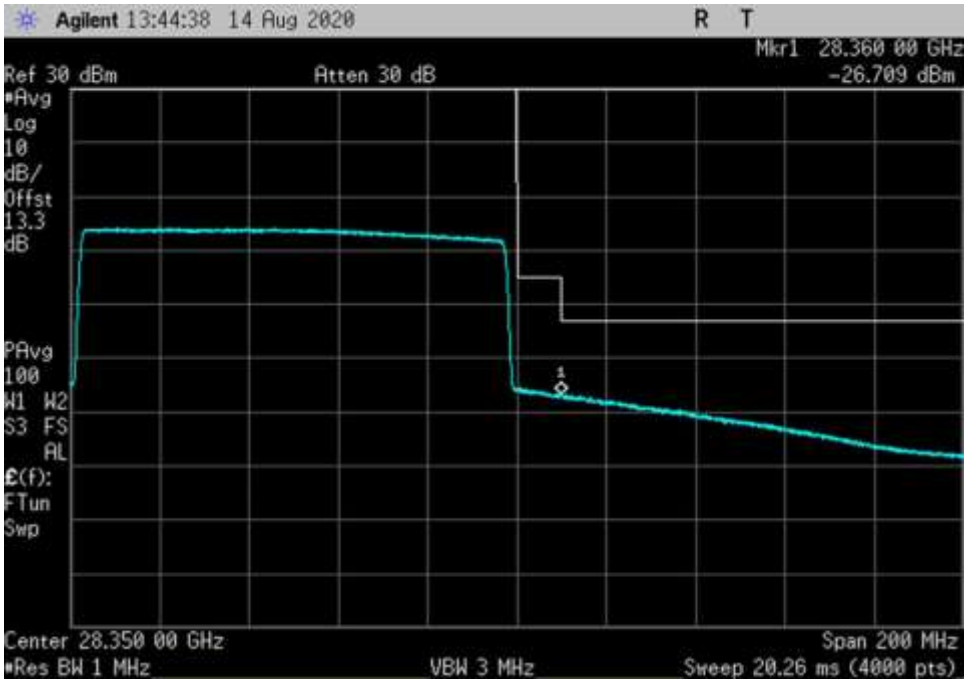
Multiple Access Scheme	Polarity	CH	Channel BW (MHz)	Modulation	OOB PreAGC (dBm)	OOB AGC+3dB (dBm)	OOB Limit (dBm)	Margin OOB Pre AGC (dB)	Margin OOB AGC+3 (dB)
CP-OFDM	DL_H	L	100	QPSK	-16.76	-18.59	-13	-3.76	-5.59
CP-OFDM	DL_H	H	100	QPSK	-20.89	-22.01	-13	-7.89	-9.01
CP-OFDM	DL_H	L	400	QPSK	-20.36	-22.70	-13	-7.36	-9.70
CP-OFDM	DL_H	H	400	QPSK	-23.56	-24.65	-13	-10.56	-11.65
CP-OFDM	DL_H	L	100	16QAM	-18.01	-17.83	-13	-5.01	-4.83
CP-OFDM	DL_H	H	100	16QAM	-20.61	-21.88	-13	-7.61	-8.88
CP-OFDM	DL_H	L	400	16QAM	-20.26	-20.55	-13	-7.26	-7.55
CP-OFDM	DL_H	H	400	16QAM	-22.87	-23.14	-13	-9.87	-10.14
CP-OFDM	DL_H	L	100	64QAM	-17.47	-17.37	-13	-4.47	-4.37
CP-OFDM	DL_H	H	100	64QAM	-20.43	-23.70	-13	-7.43	-10.70
CP-OFDM	DL_H	L	400	64QAM	-20.23	-19.88	-13	-7.23	-6.88
CP-OFDM	DL_H	H	400	64QAM	-22.35	-24.51	-13	-9.35	-11.51
CP-OFDM	DL_H	L	100	256QAM	-18.74	-17.78	-13	-5.74	-4.78
CP-OFDM	DL_H	H	100	256QAM	-21.56	-21.83	-13	-8.56	-8.83
CP-OFDM	DL_H	L	400	256QAM	-20.65	-21.31	-13	-7.65	-8.31
CP-OFDM	DL_H	H	400	256QAM	-22.47	-23.65	-13	-9.47	-10.65

4/ DL-V

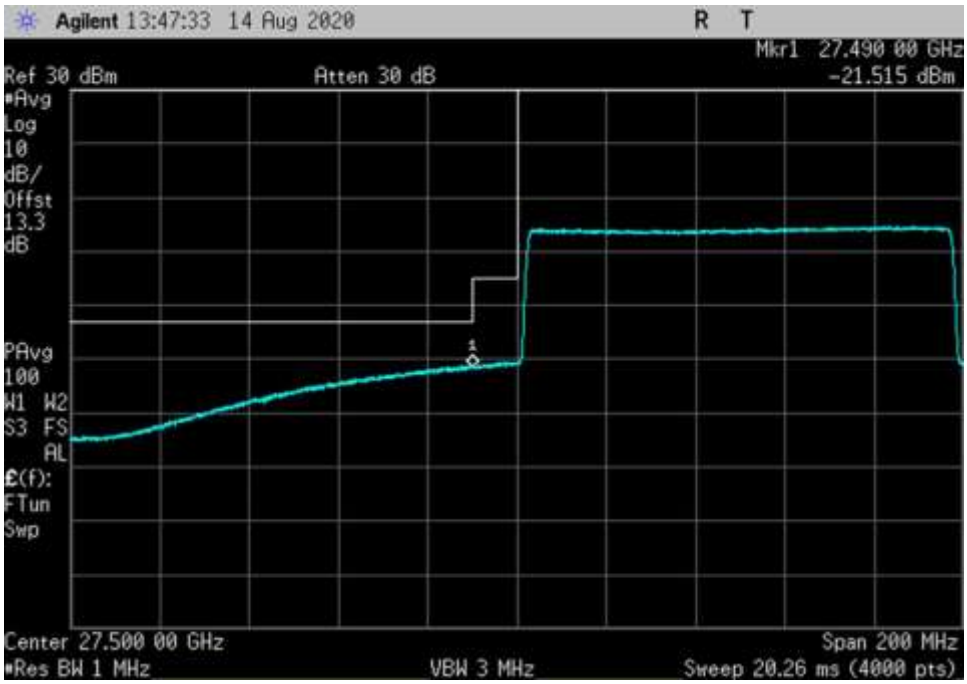
Multiple Access Scheme	Polarity	CH	Channel BW (MHz)	Modulation	OOB Pre AGC (dBm)	OOB AGC+3dB (dBm)	OOB Limit (dBm)	Margin OOB Pre AGC (dB)	Margin OOB AGC+3 (dB)
CP-OFDM	DL_V	L	100	QPSK	-18.10	-19.34	-13	-5.10	-6.34
CP-OFDM	DL_V	H	100	QPSK	-23.36	-24.38	-13	-10.36	-11.38
CP-OFDM	DL_V	L	400	QPSK	-22.04	-21.84	-13	-9.04	-8.84
CP-OFDM	DL_V	H	400	QPSK	-24.11	-24.69	-13	-11.11	-11.69
CP-OFDM	DL_V	L	100	16QAM	-17.55	-18.92	-13	-4.55	-5.92
CP-OFDM	DL_V	H	100	16QAM	-23.17	-25.19	-13	-10.17	-12.19
CP-OFDM	DL_V	L	400	16QAM	-22.97	-20.93	-13	-9.97	-7.93
CP-OFDM	DL_V	H	400	16QAM	-23.77	-24.25	-13	-10.77	-11.25
CP-OFDM	DL_V	L	100	64QAM	-17.94	-18.57	-13	-4.94	-5.57
CP-OFDM	DL_V	H	100	64QAM	-22.85	-22.65	-13	-9.85	-9.65
CP-OFDM	DL_V	L	400	64QAM	-22.11	-23.06	-13	-9.11	-10.06
CP-OFDM	DL_V	H	400	64QAM	-23.77	-24.02	-13	-10.77	-11.02
CP-OFDM	DL_V	L	100	256QAM	-18.06	-17.98	-13	-5.06	-4.98
CP-OFDM	DL_V	H	100	256QAM	-22.37	-25.58	-13	-9.37	-12.58
CP-OFDM	DL_V	L	400	256QAM	-22.24	-23.33	-13	-9.24	-10.33
CP-OFDM	DL_V	H	400	256QAM	-24.07	-26.39	-13	-11.07	-13.39

Plots

CP – UL H



UL_27500-28350-16QAM-100MHz-H-AGC+3-CP OFDM_HC



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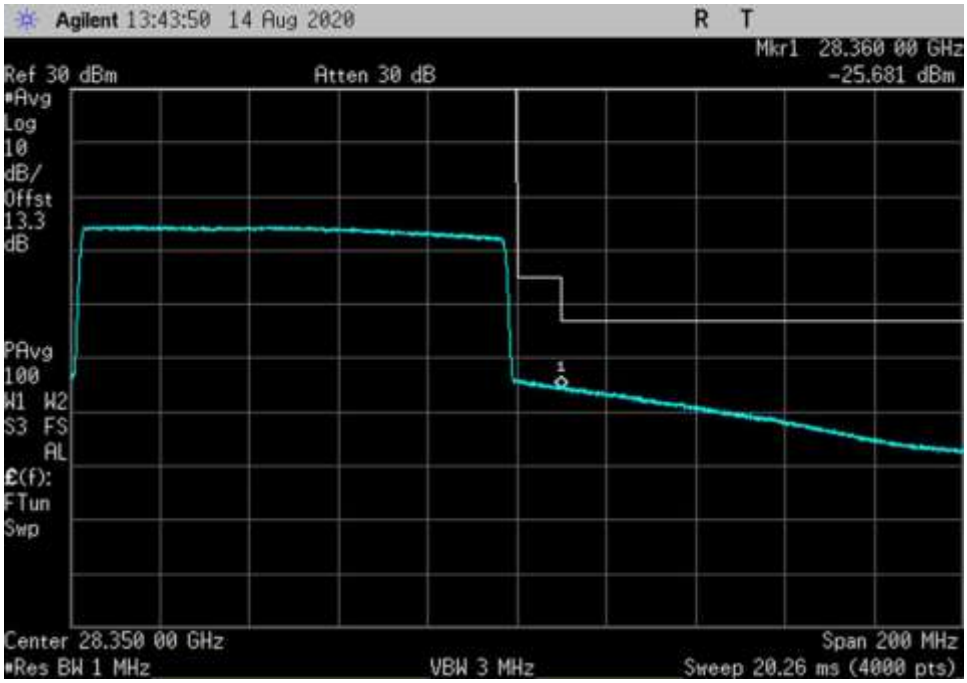

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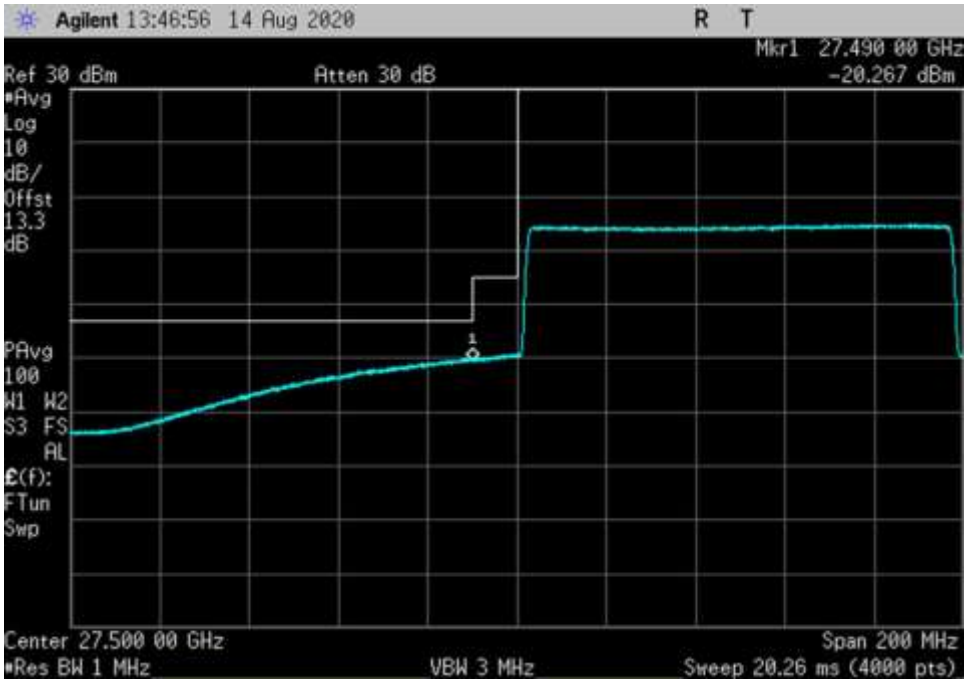

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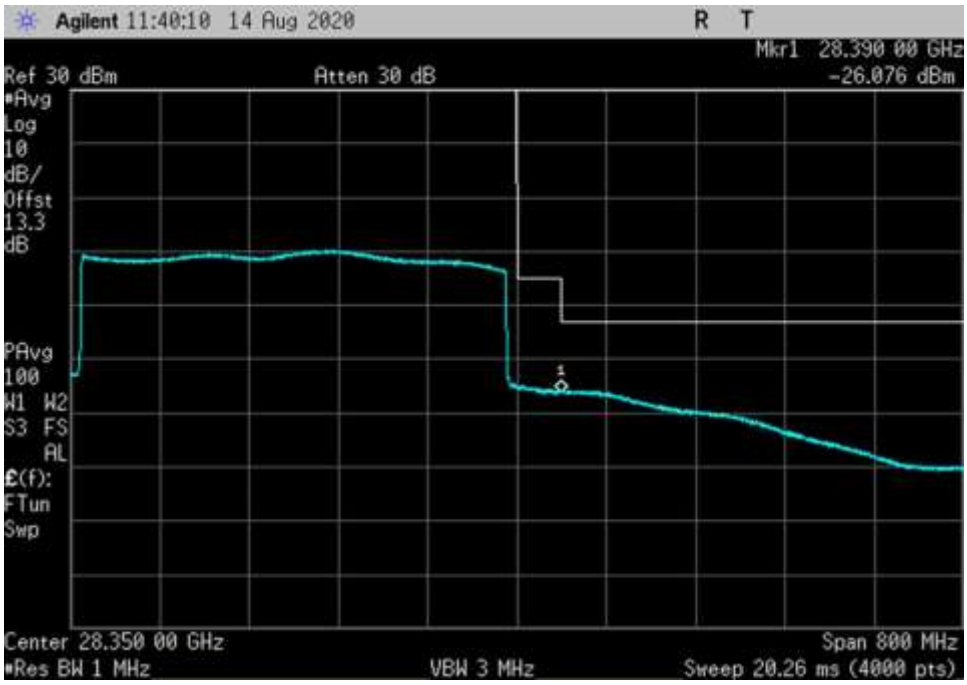
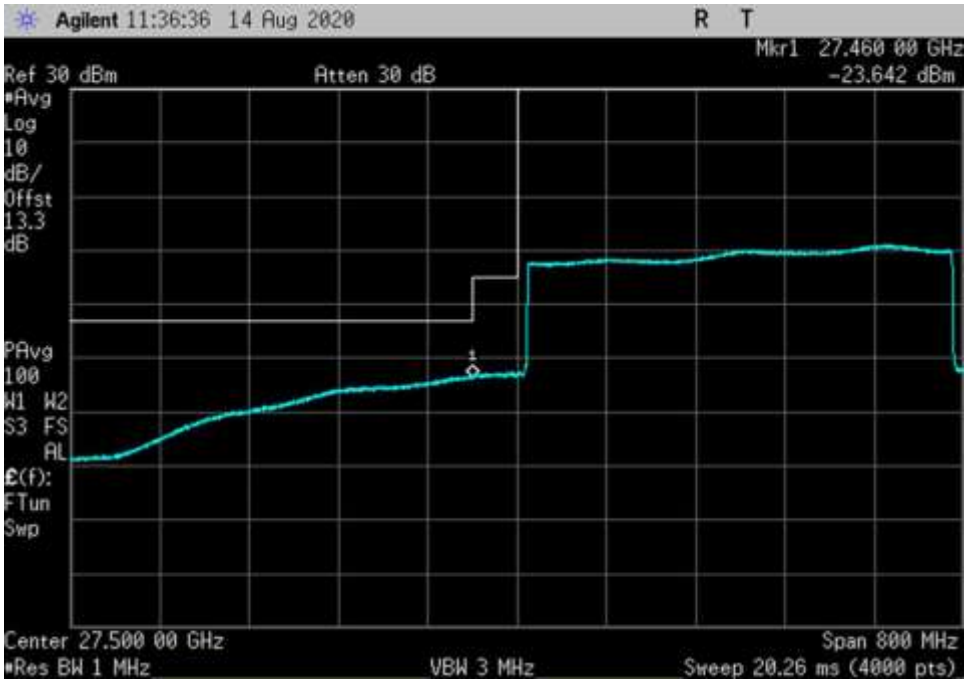


UL_27500-28350-16QAM-400MHz-H-AGC+3-CP OFDM_HC



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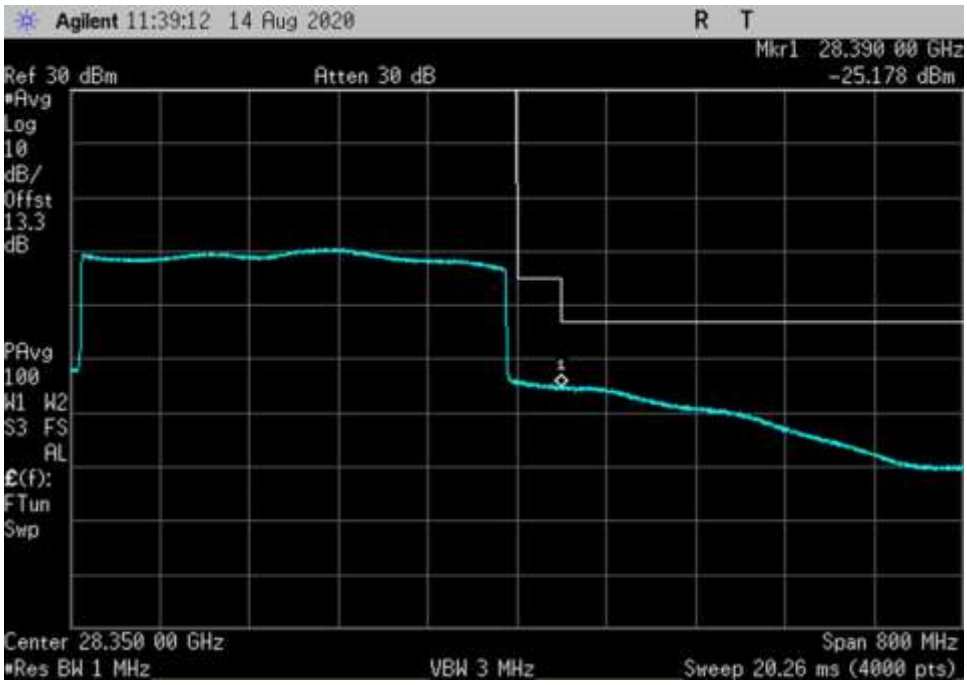

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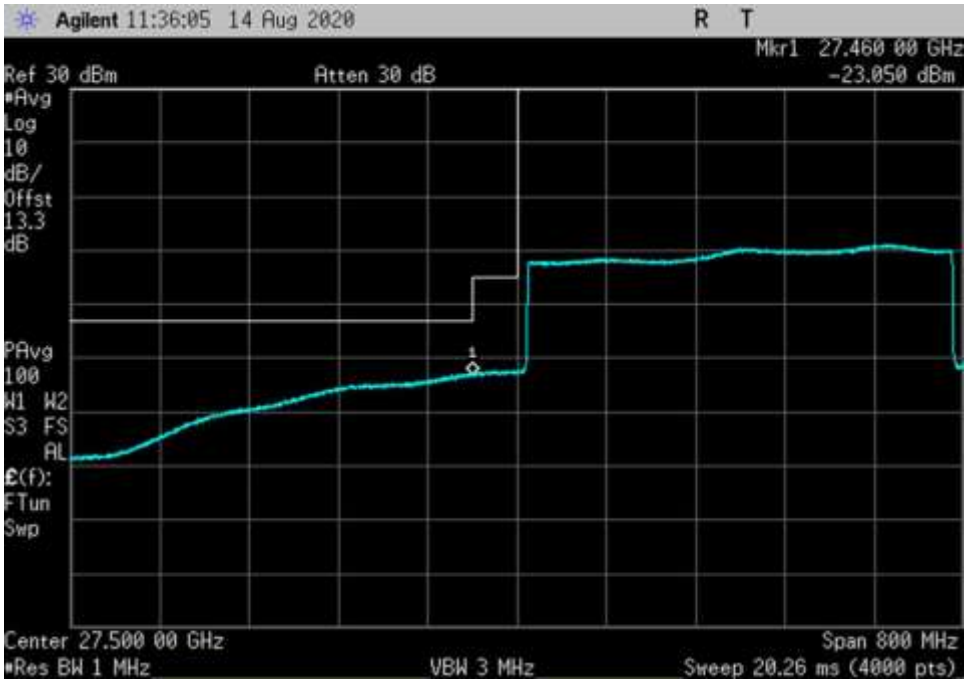

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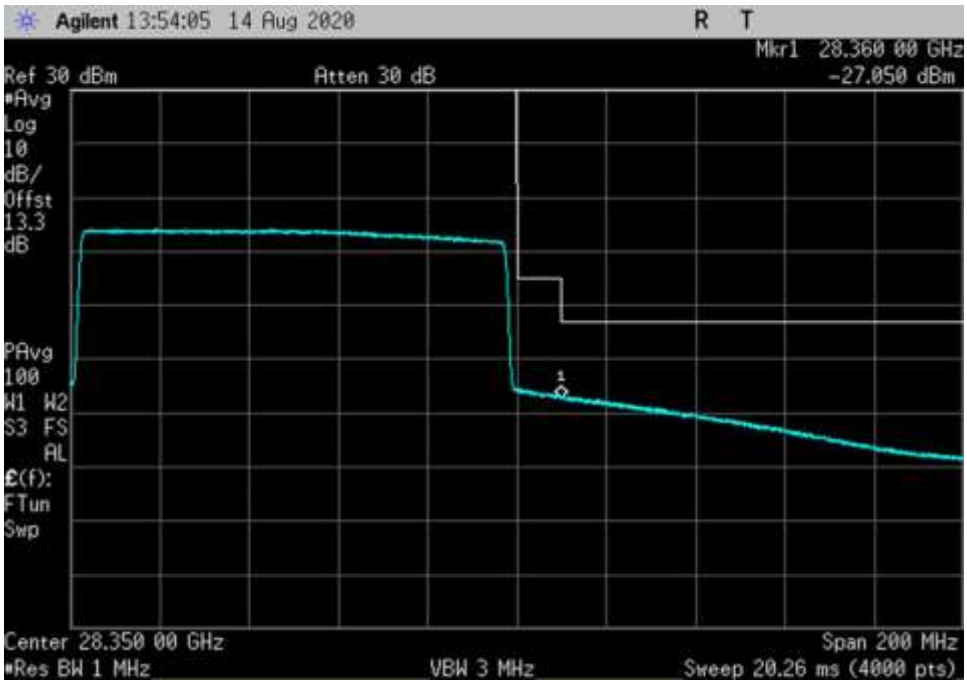
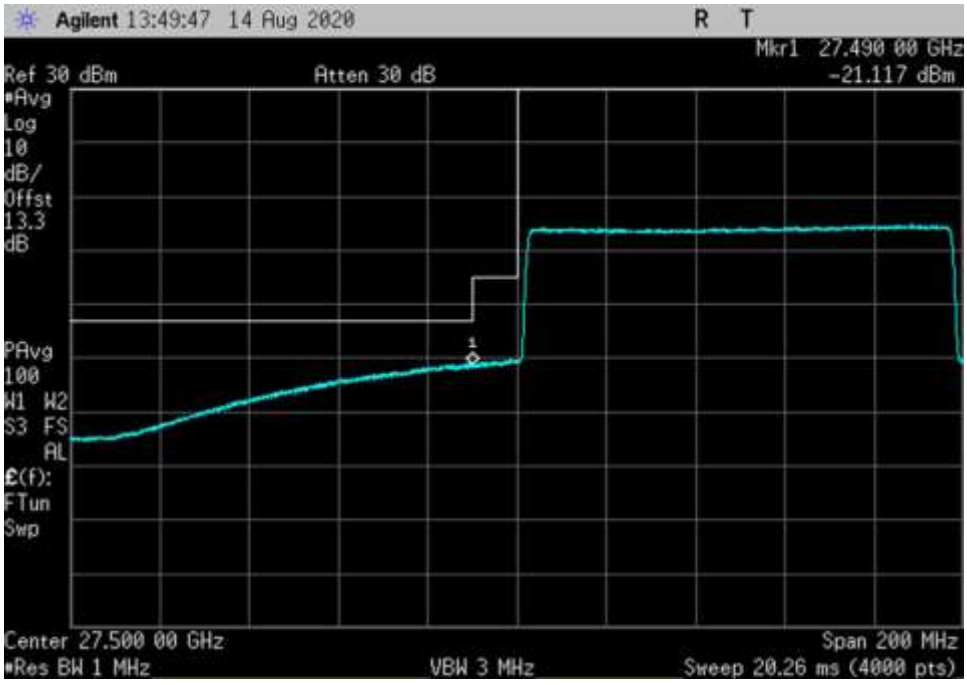


UL_27500-28350-64QAM-100MHz-H-AGC+3-CP OFDM_HC



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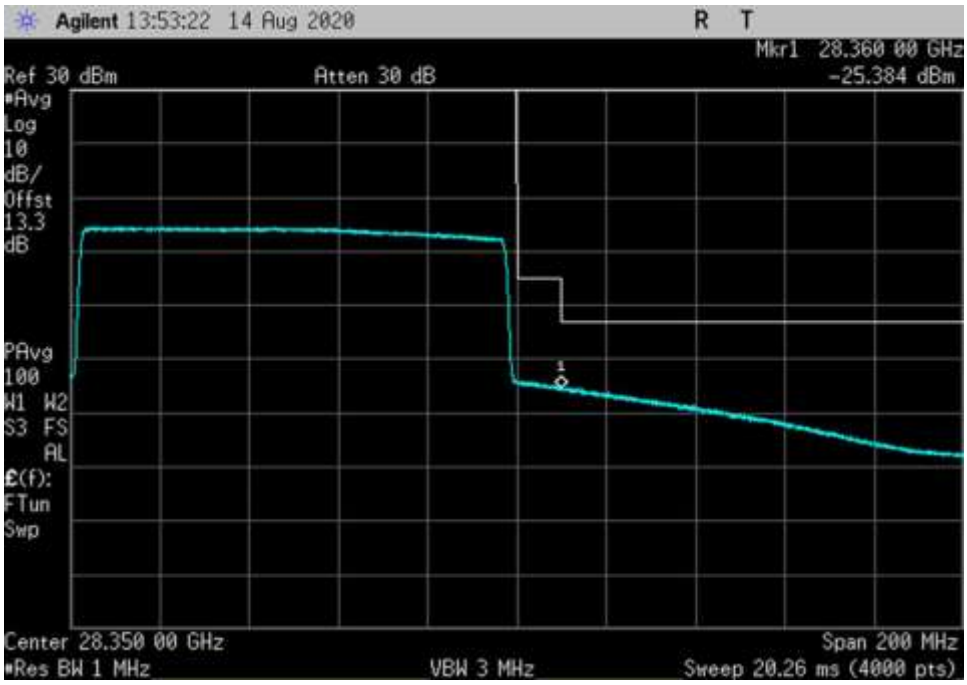

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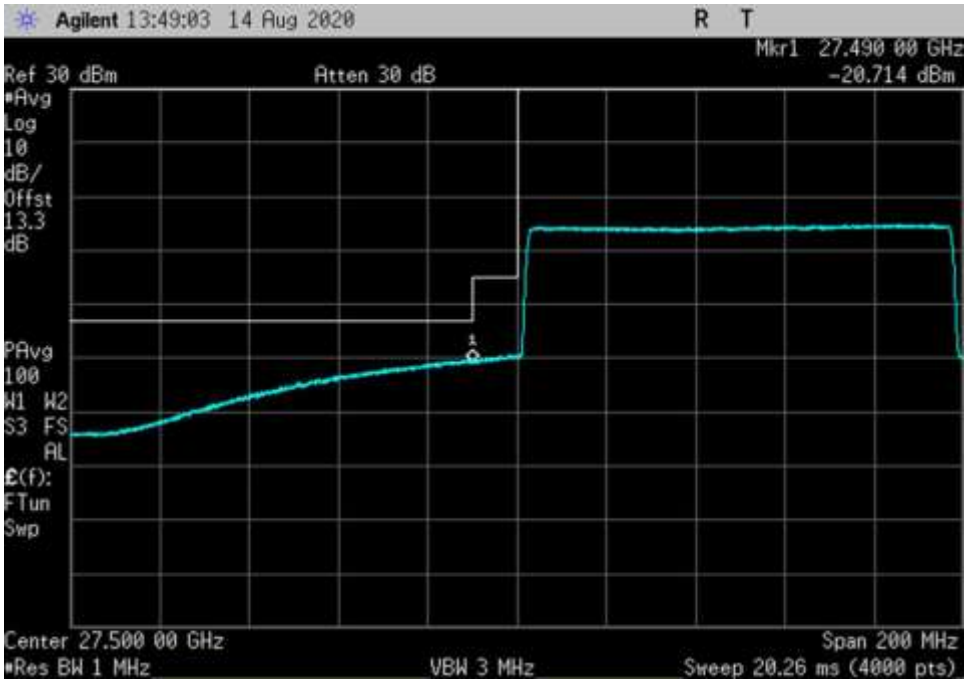

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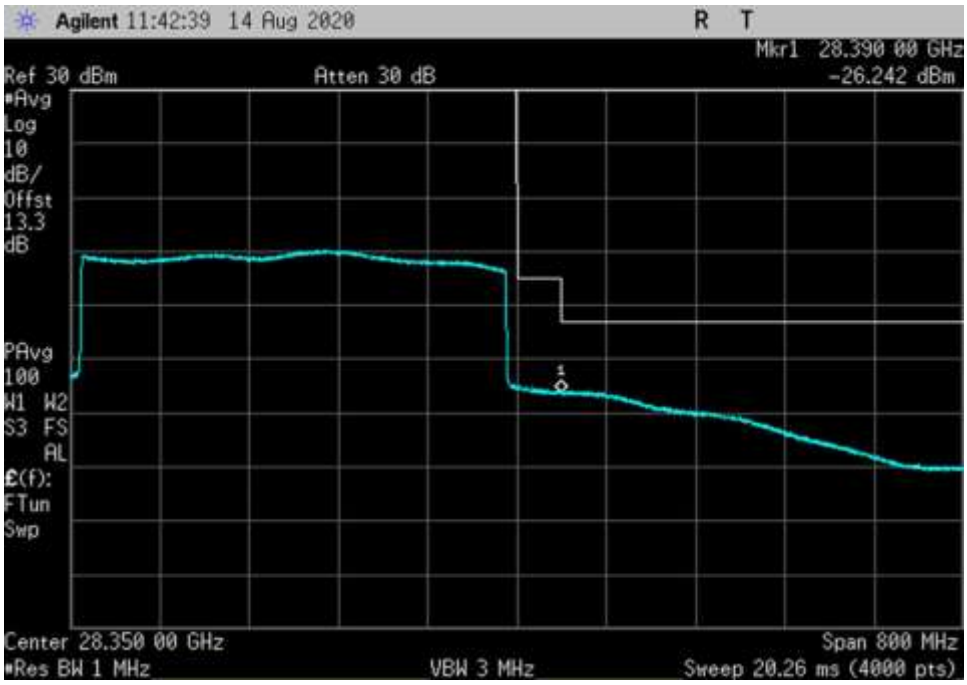

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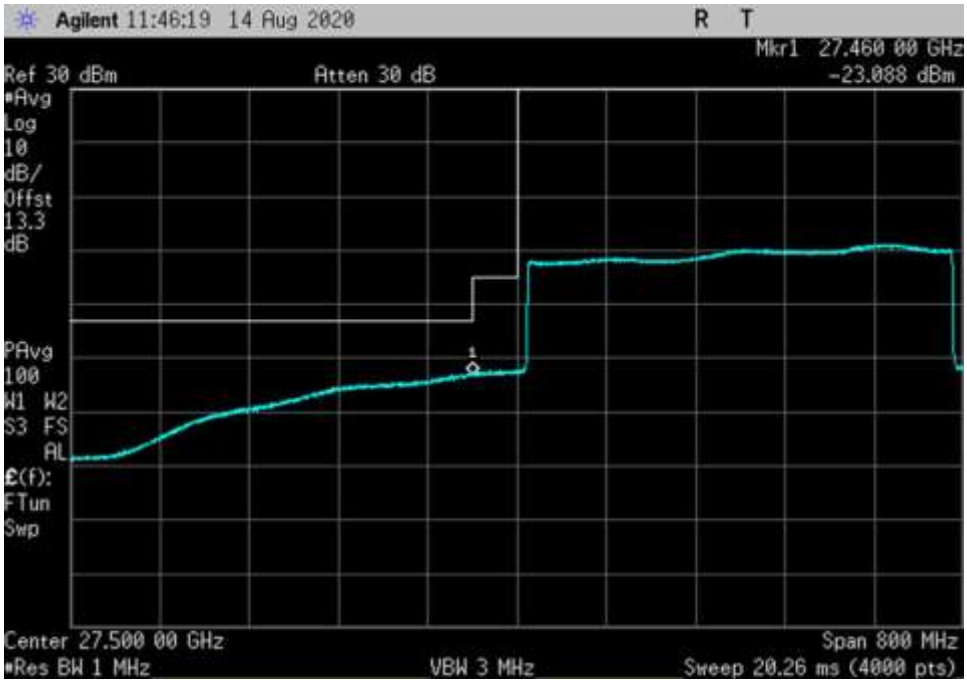

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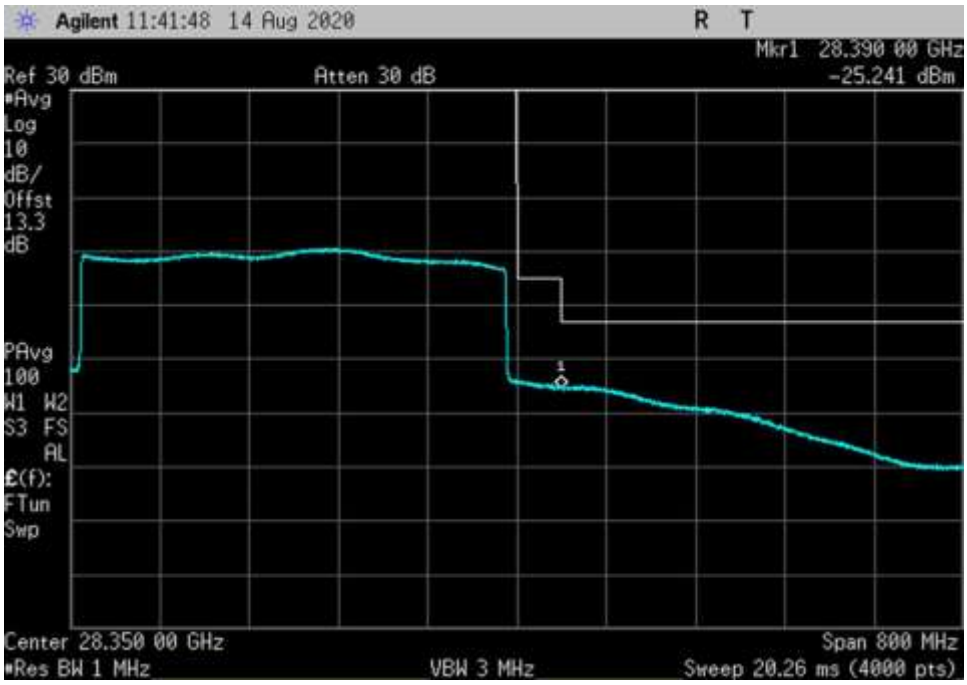
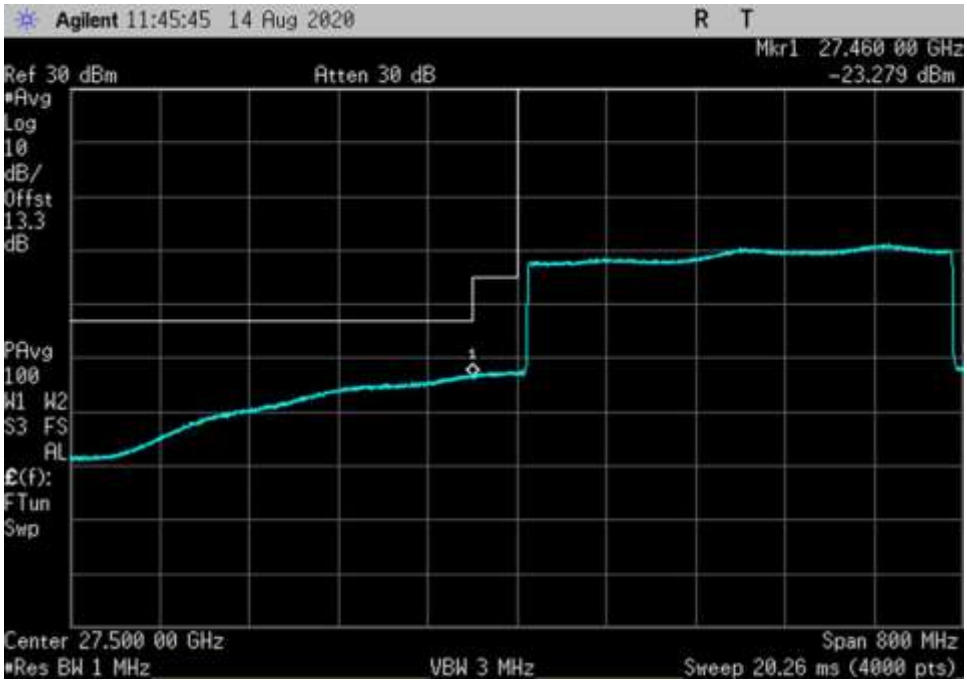


UL_27500-28350-64QAM-400MHz-H-CP OFDM_HC



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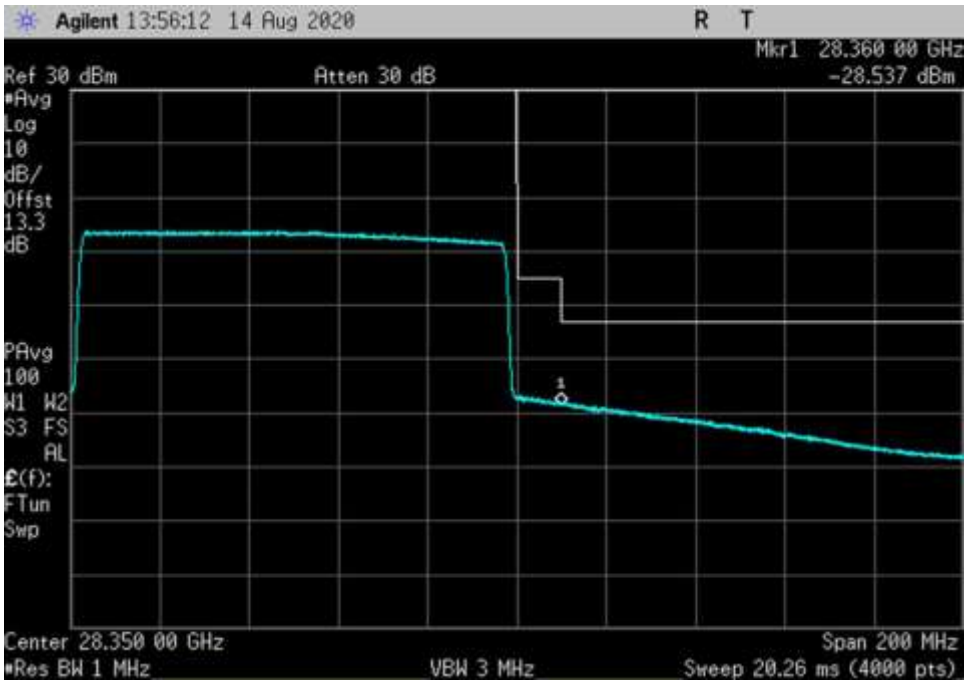
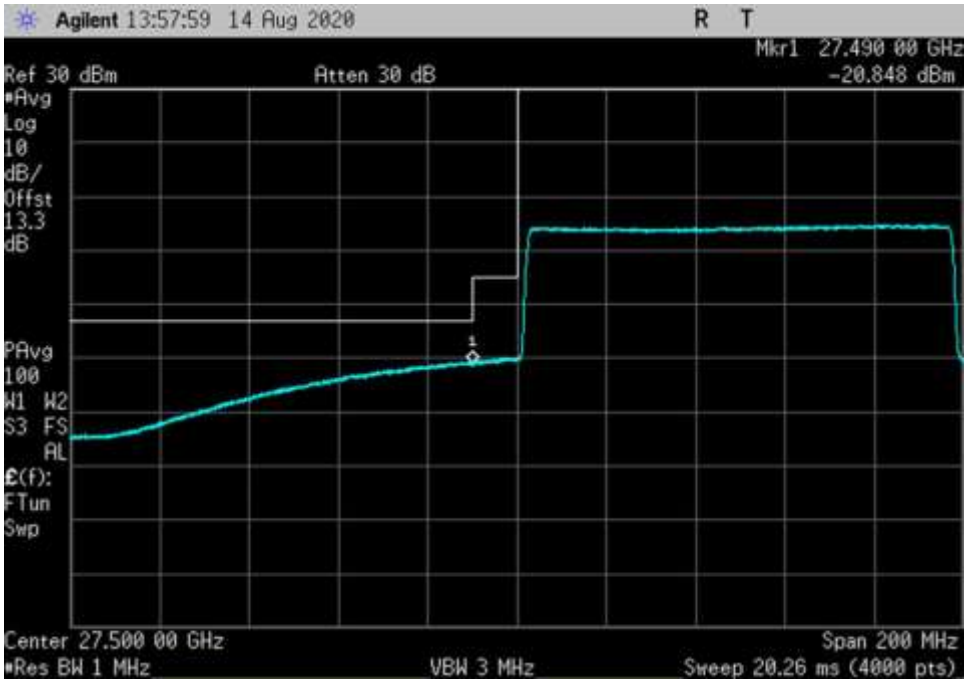


UL_27500-28350-256QAM-100MHz-H-AGC+3-CP OFDM_HC



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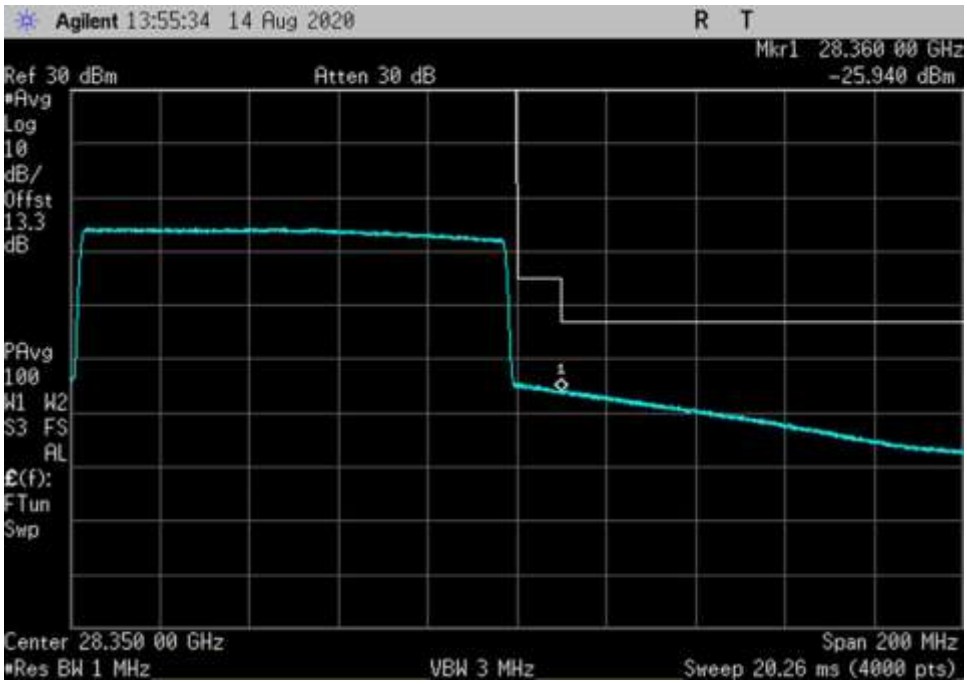

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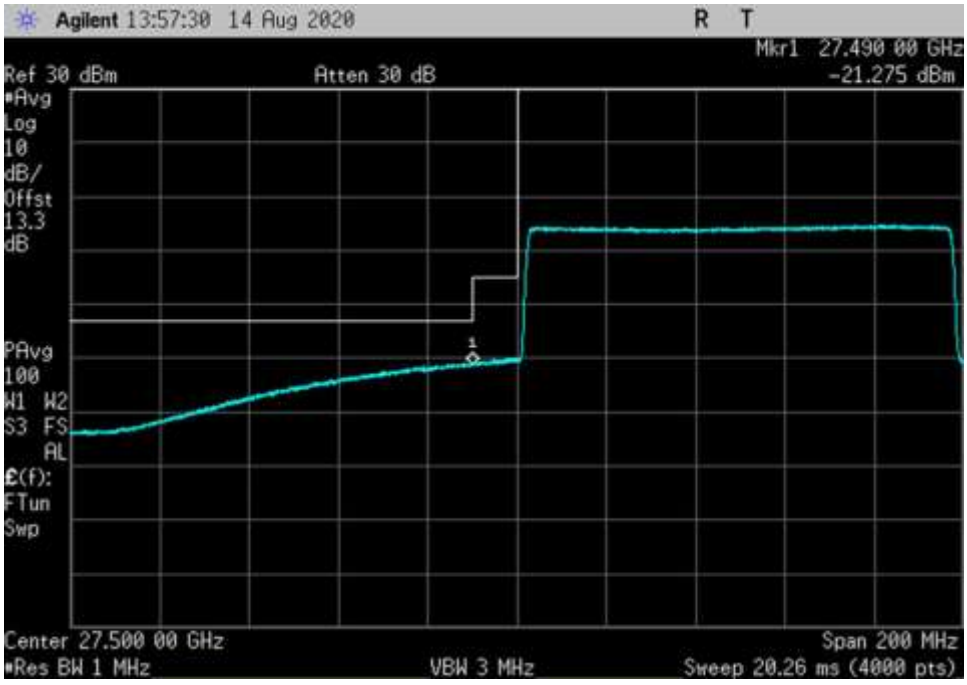

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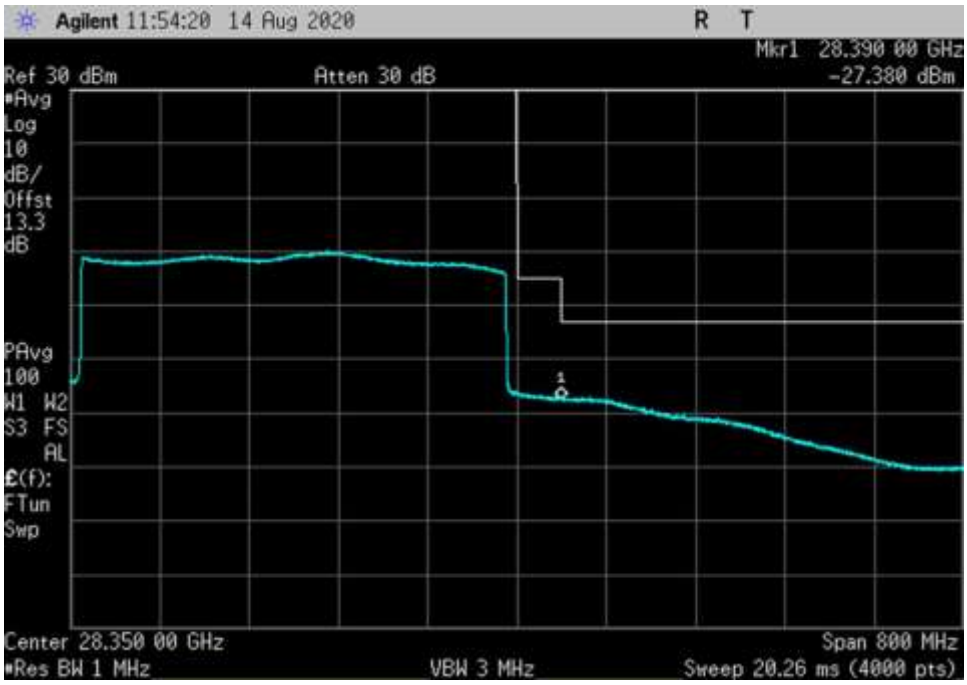
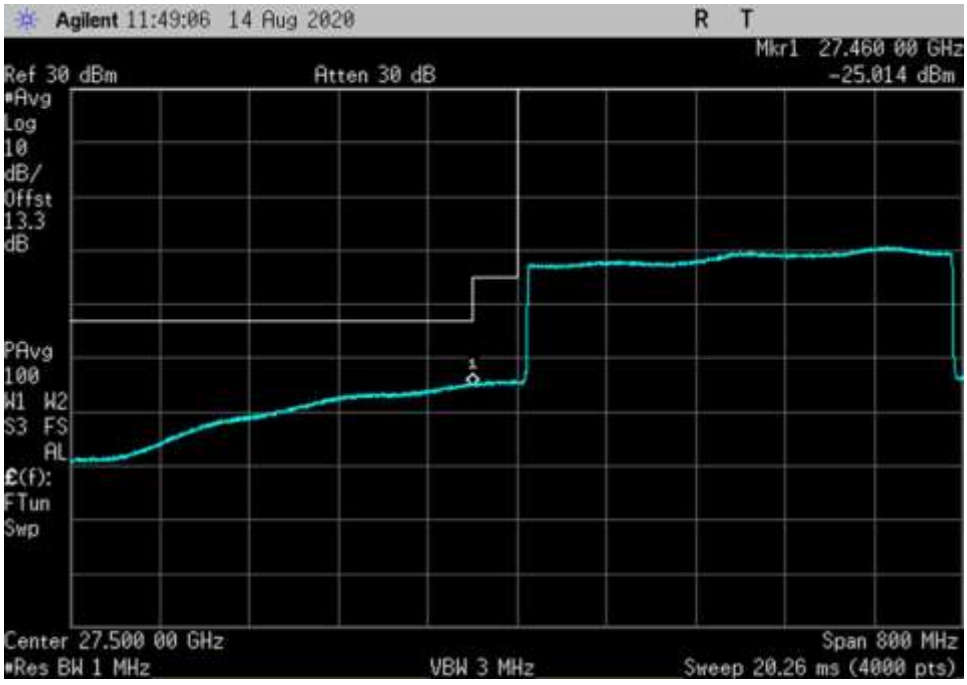


UL_27500-28350-256QAM-400MHz-H-AGC+3-CP OFDM_HC



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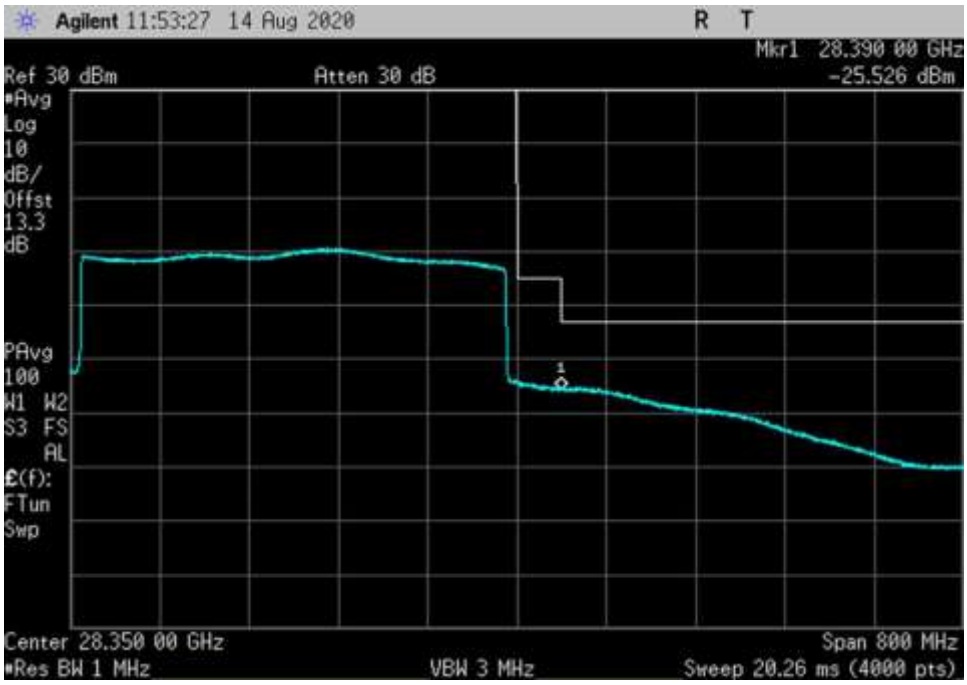

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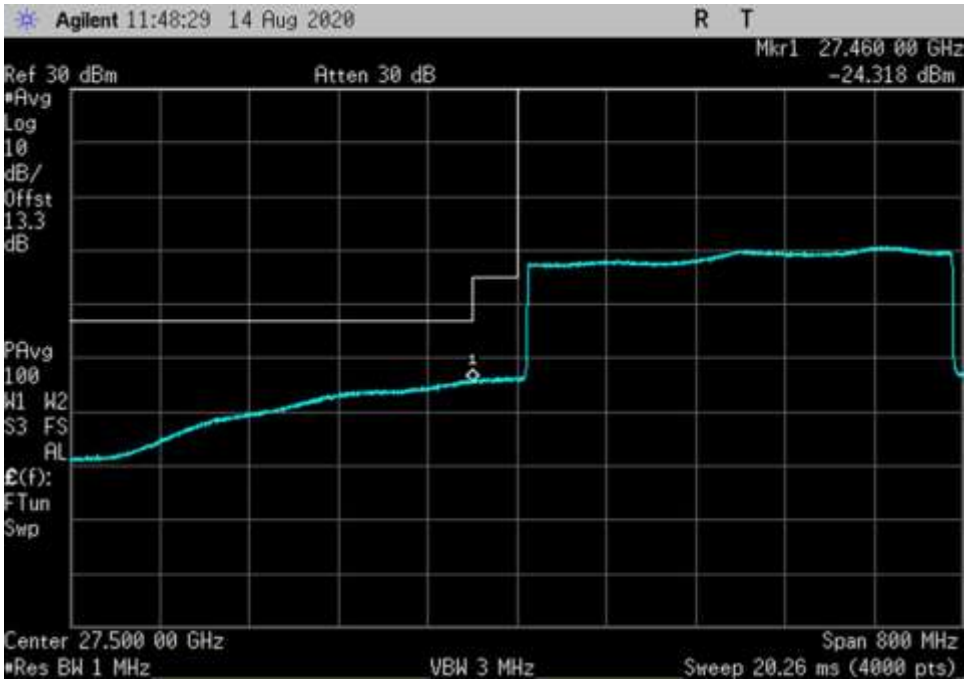

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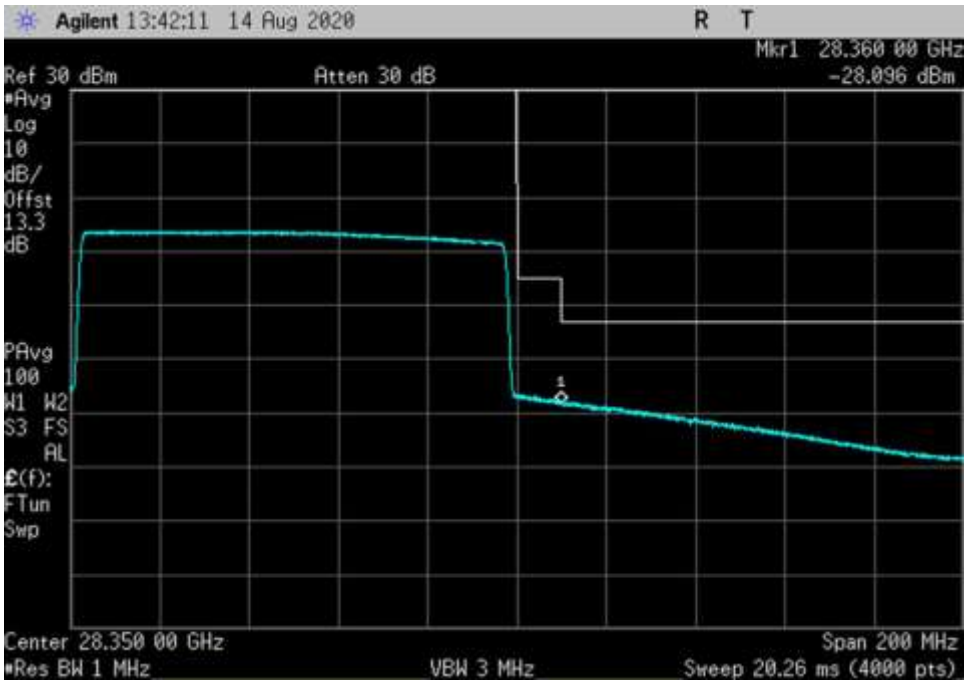

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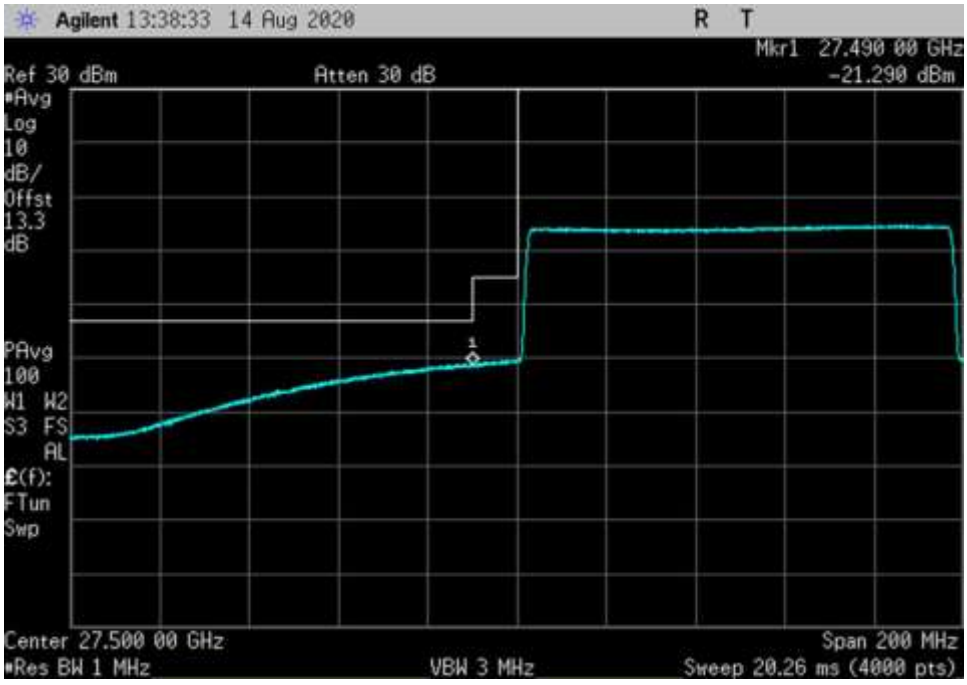

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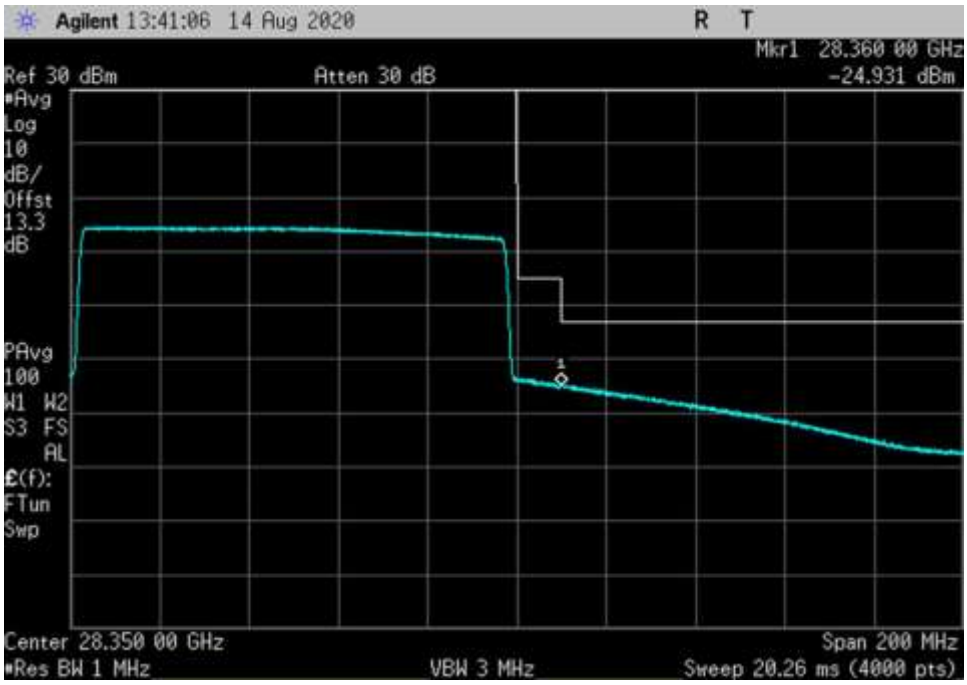

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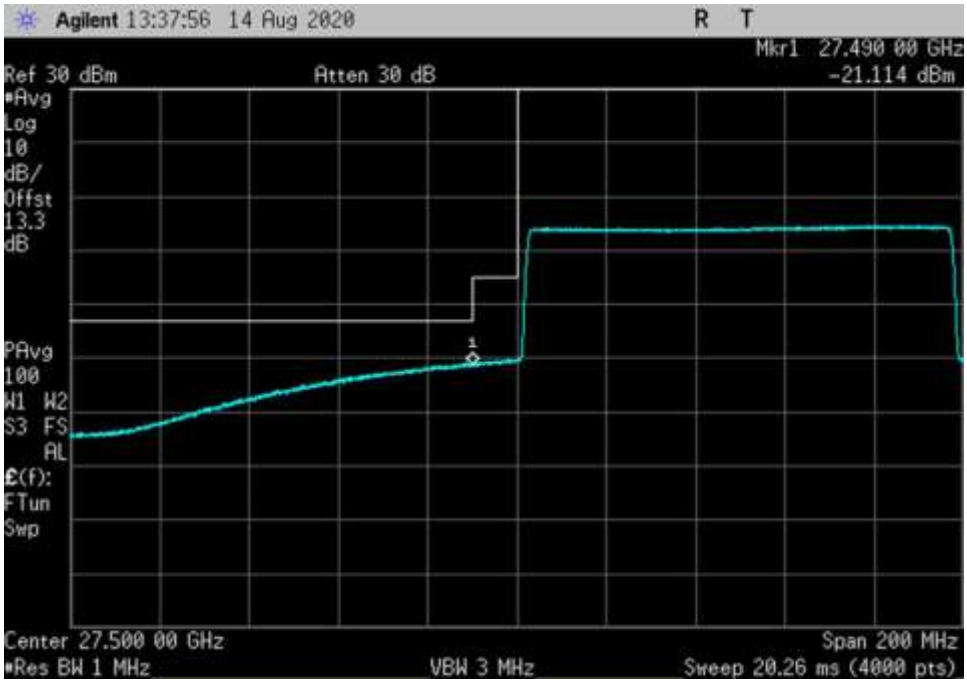

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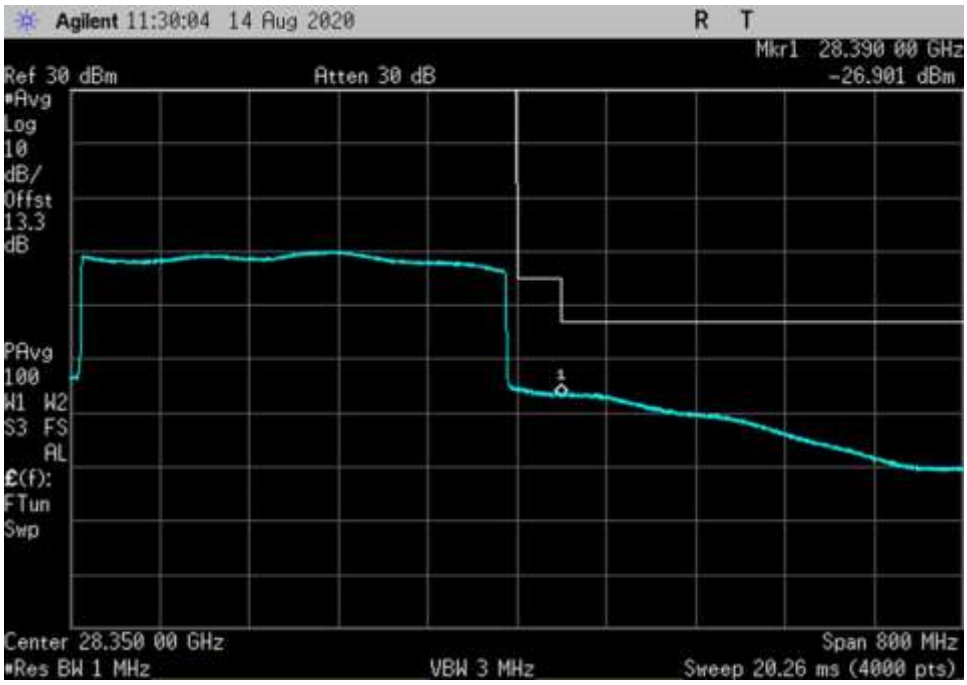

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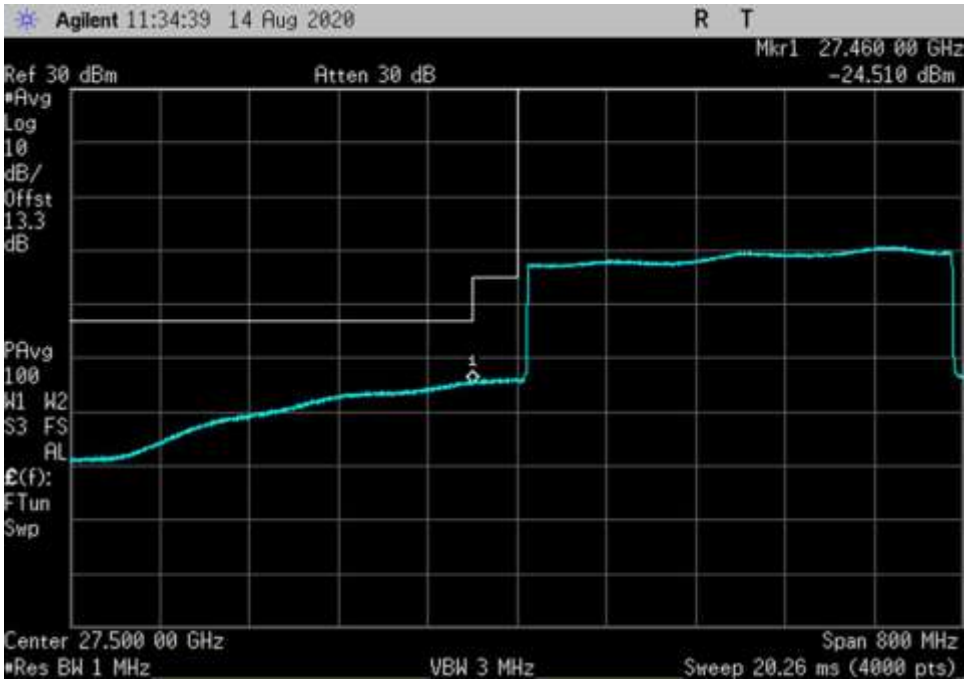

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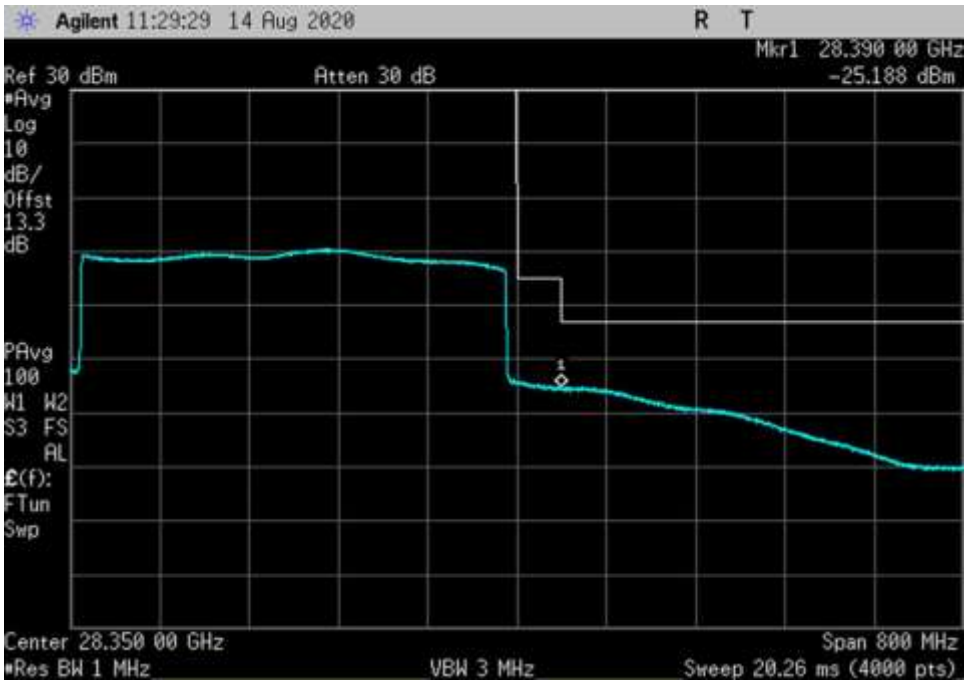

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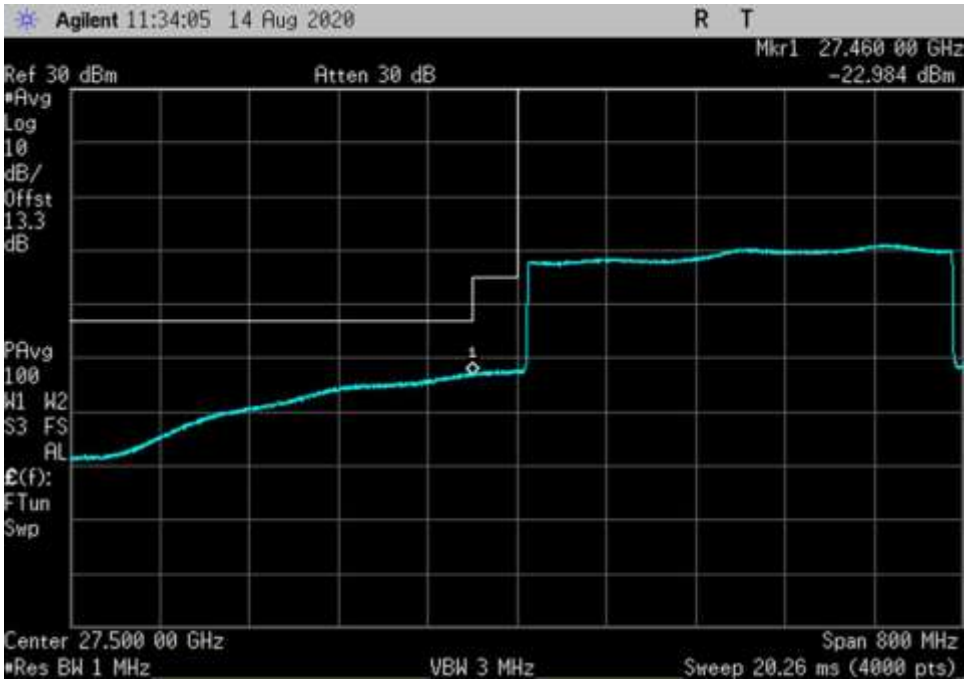
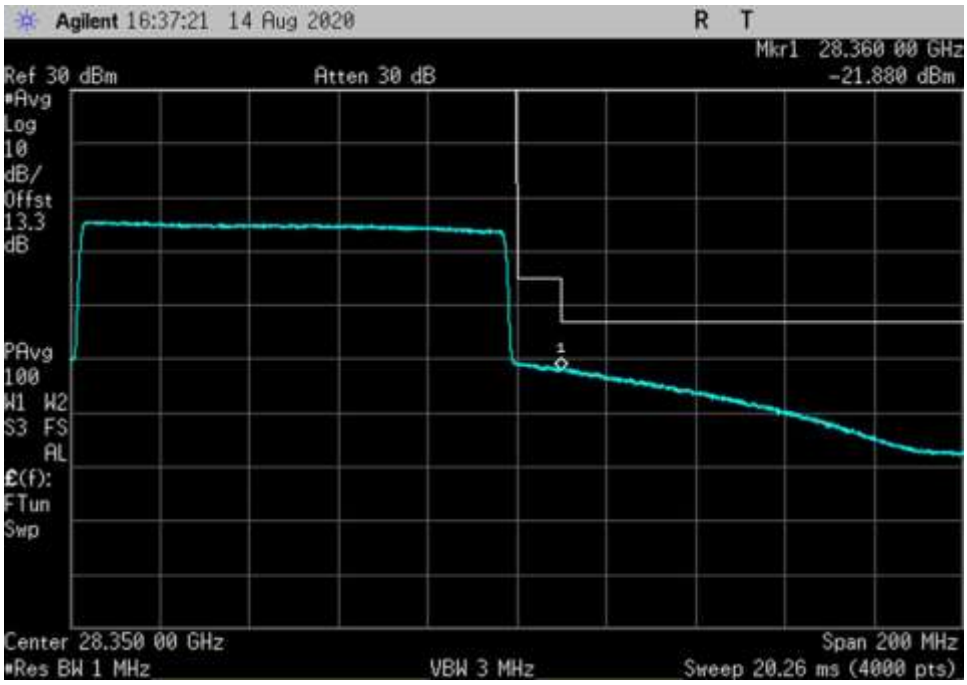
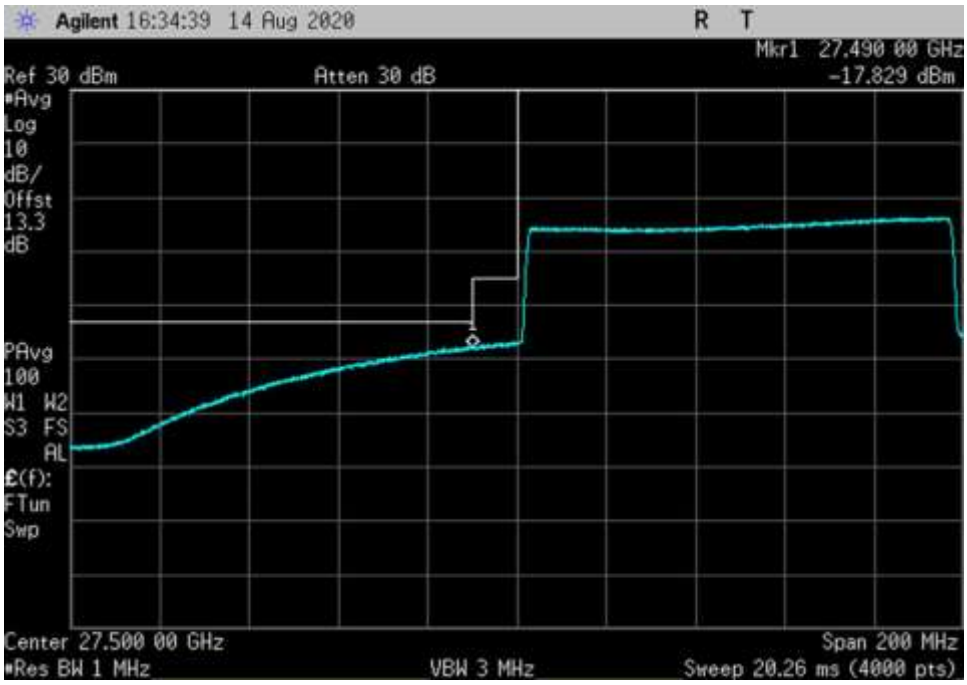


UL_27500-28350-QPSK-400MHz-H-CP OFDM_LC

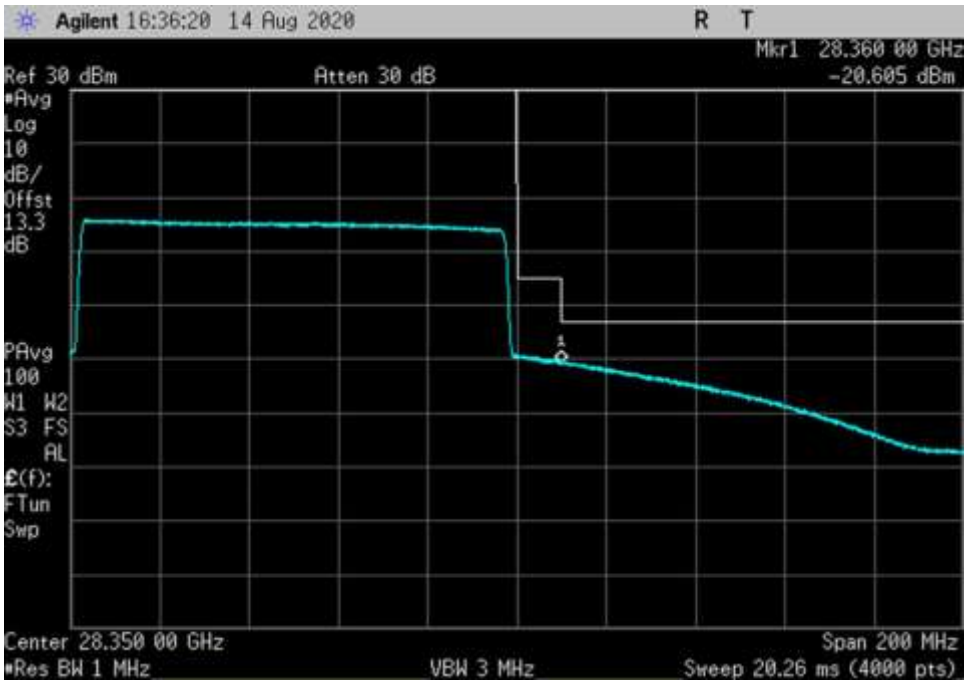
CP – DL H



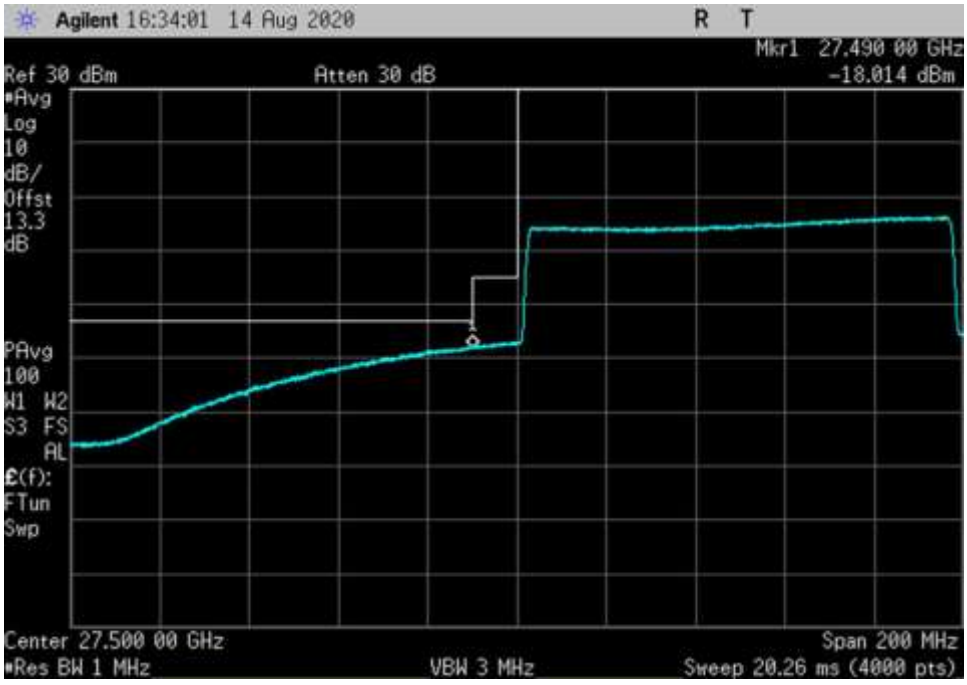
DL_27500-28350_16QAM-100MHz-H-AGC+3-CP OFDM_HC



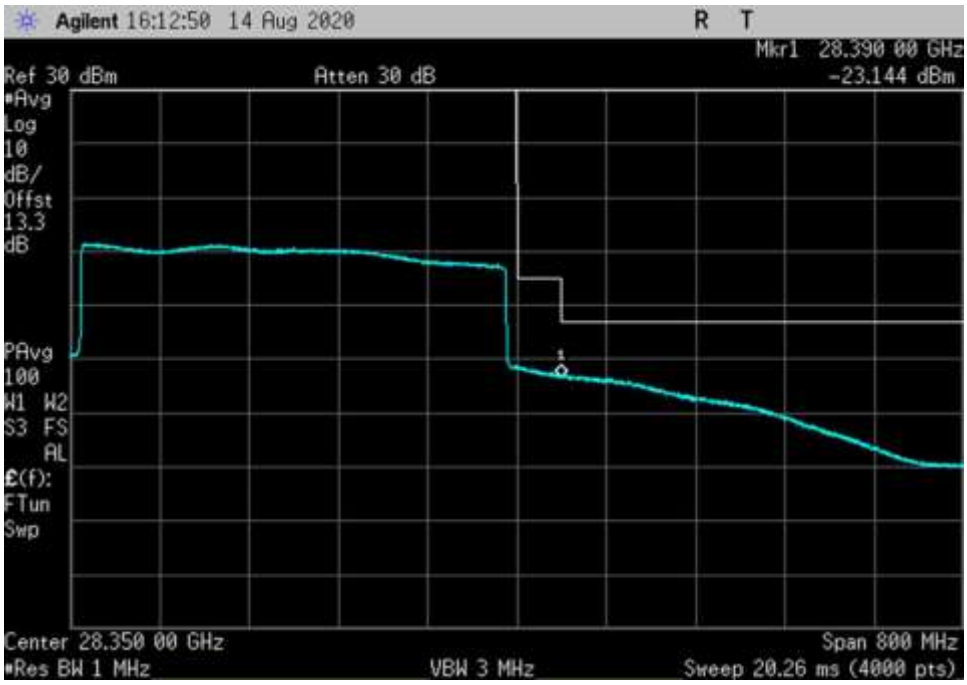
DL_27500-28350_16QAM-100MHz-H-AGC+3-CP OFDM_LC



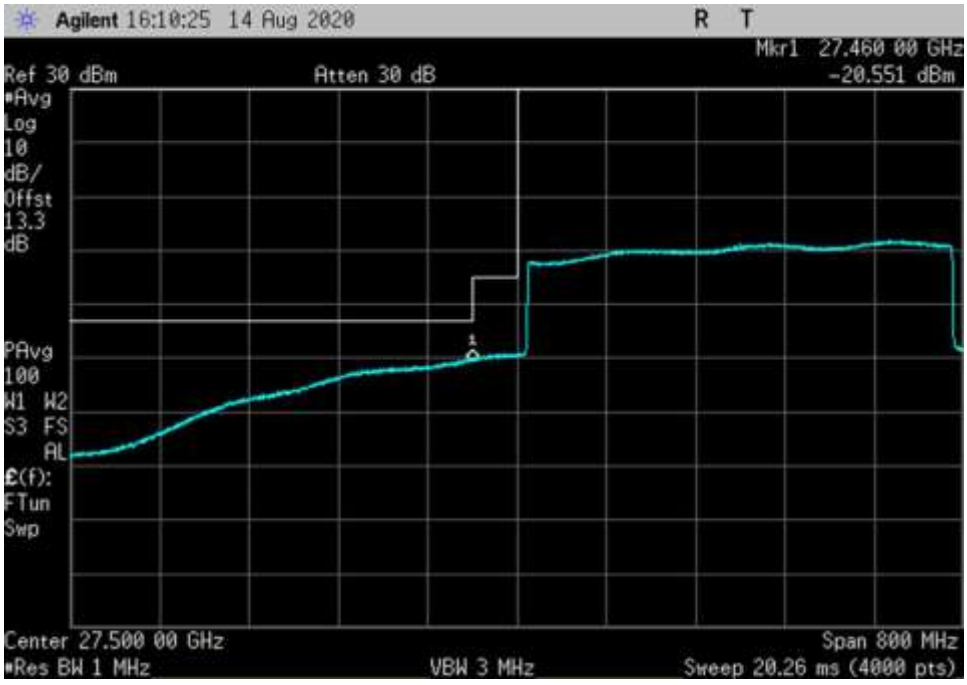
DL_27500-28350_16QAM-100MHz-H-CP OFDM_HC



DL_27500-28350_16QAM-100MHz-H-CP OFDM_LC



DL_27500-28350_16QAM-400MHz-H-AGC+3-CP OFDM_HC



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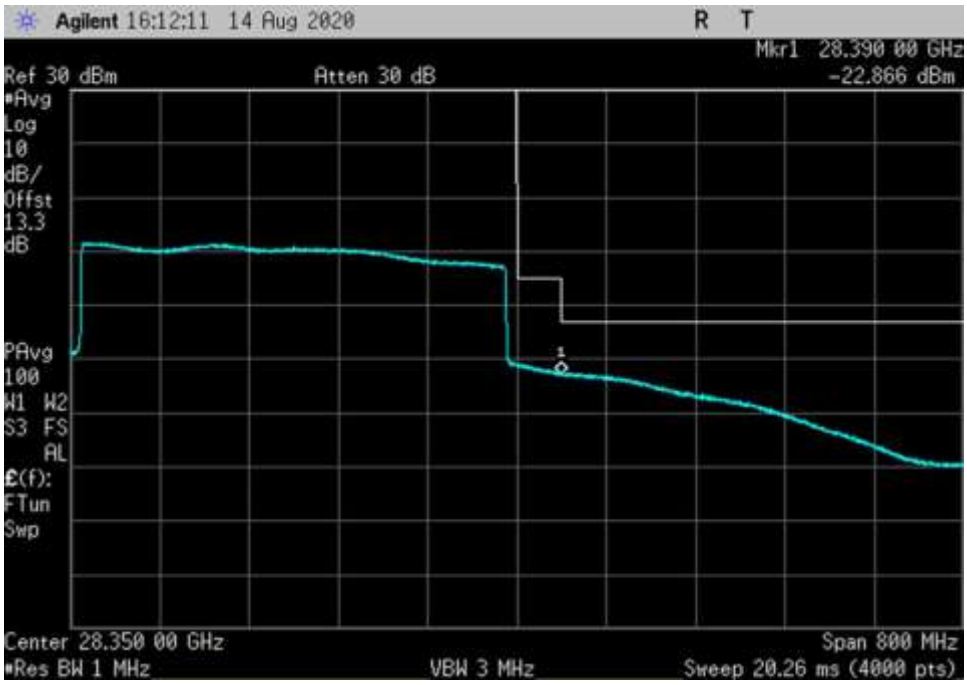

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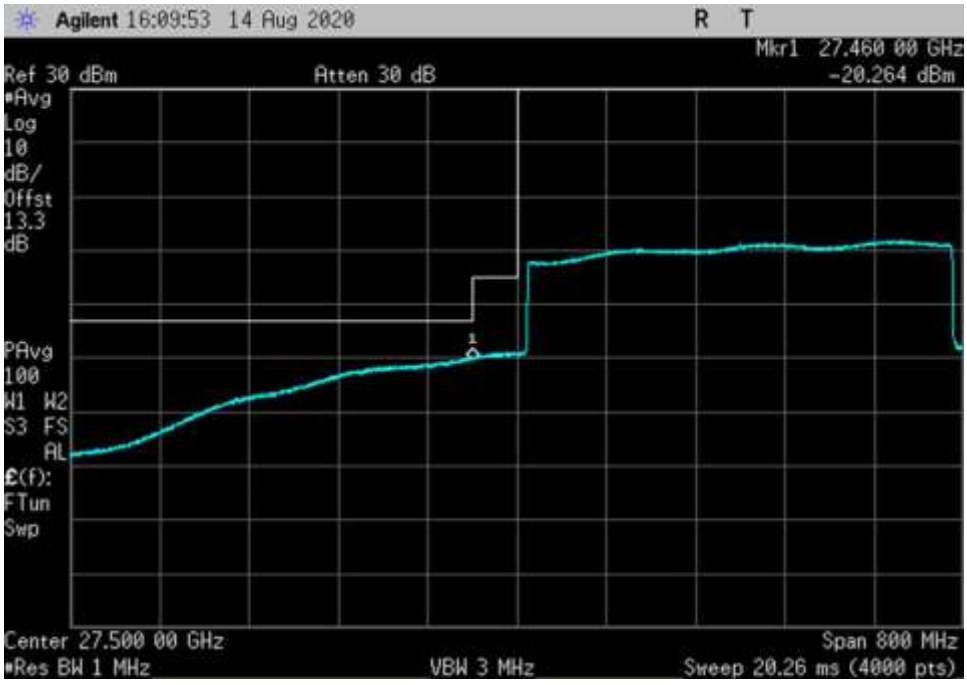

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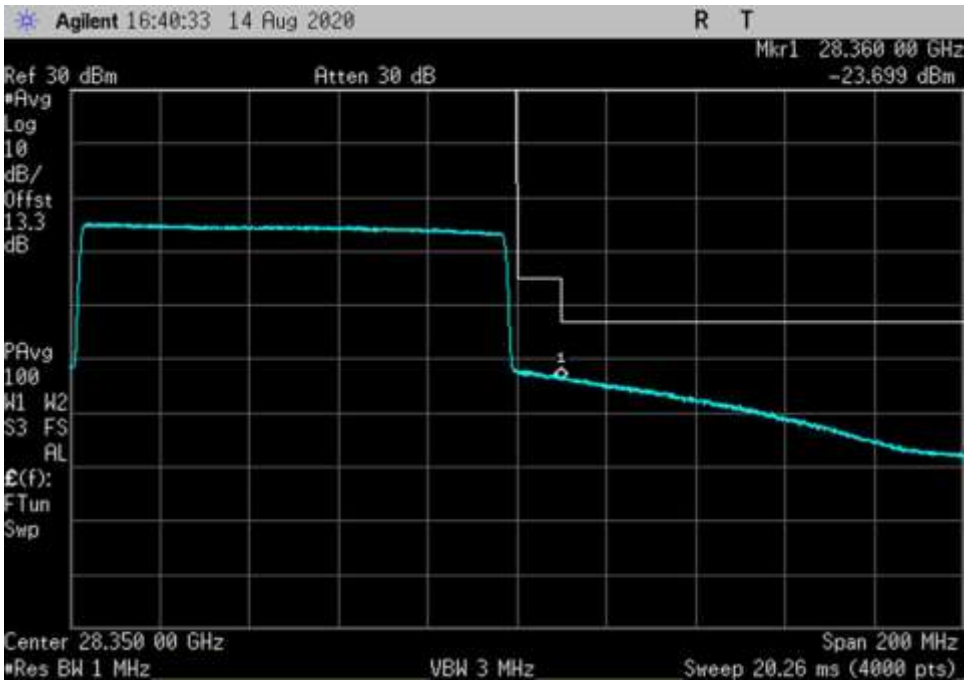

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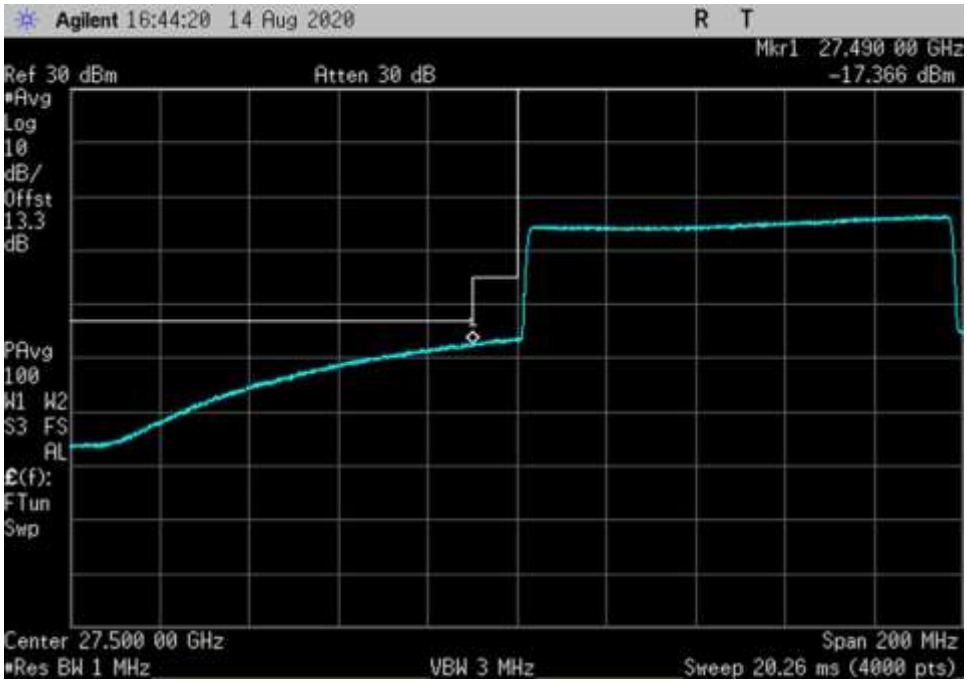

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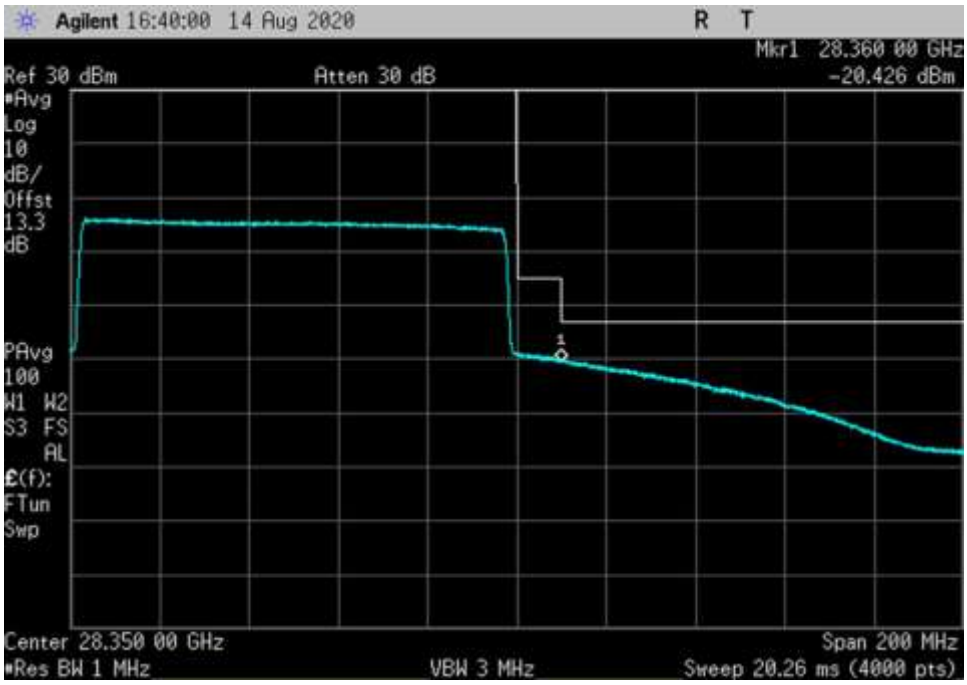

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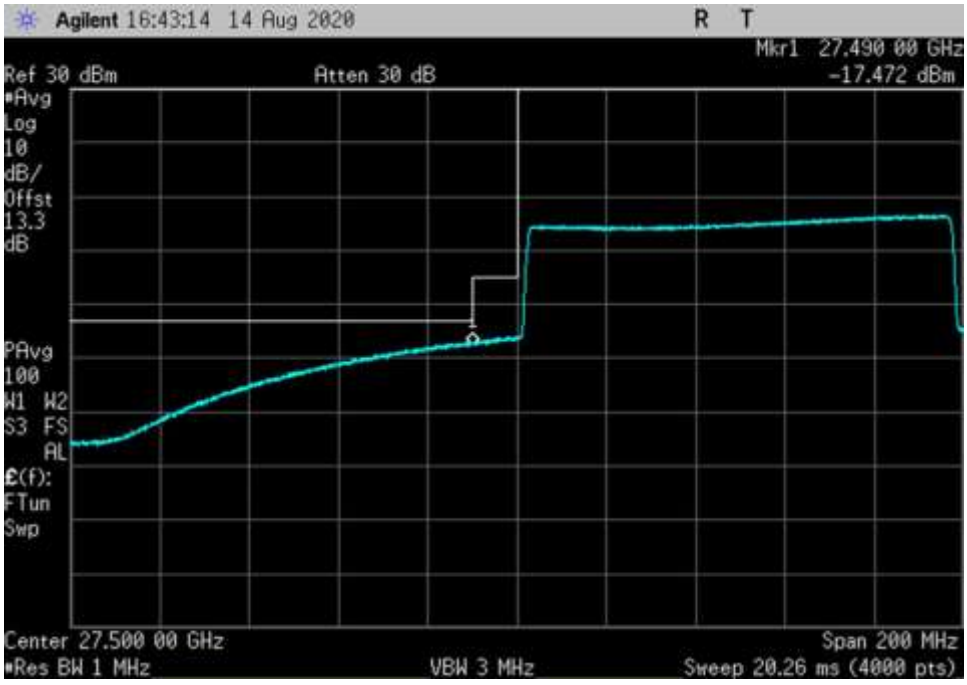

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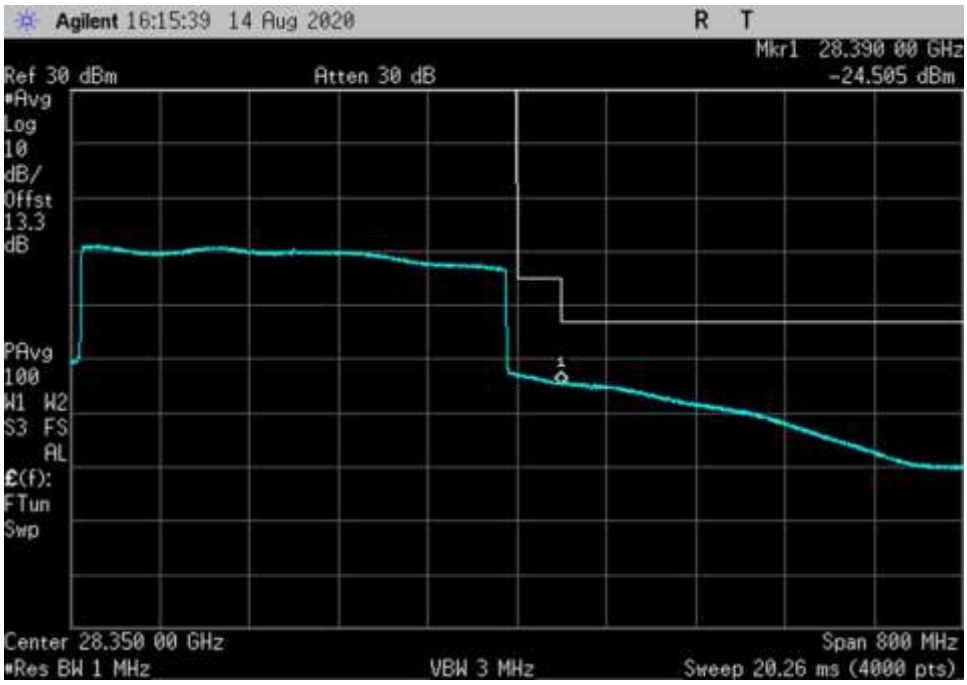

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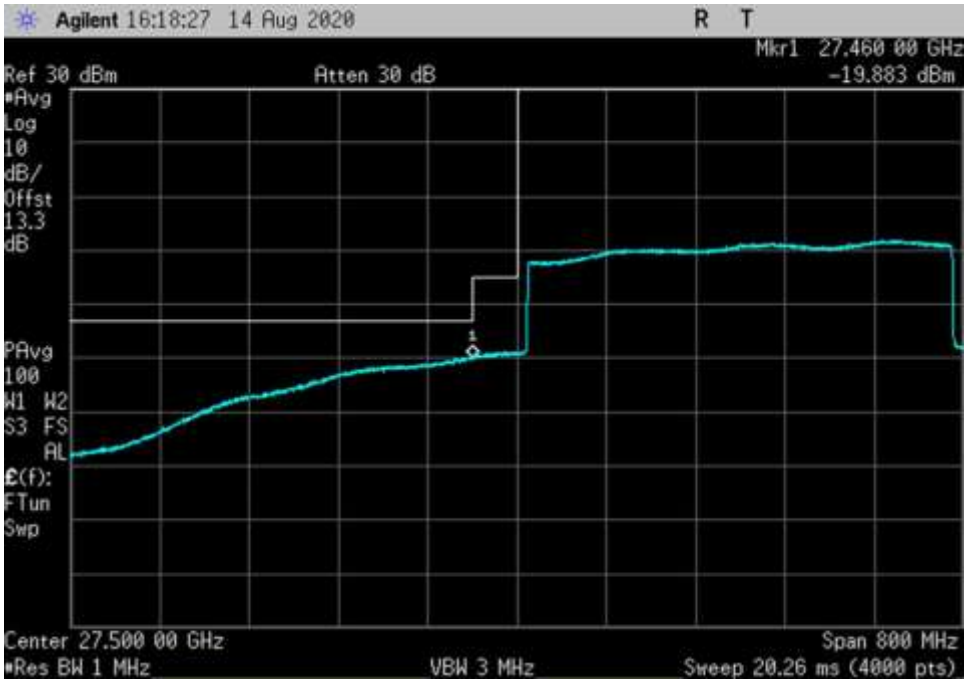

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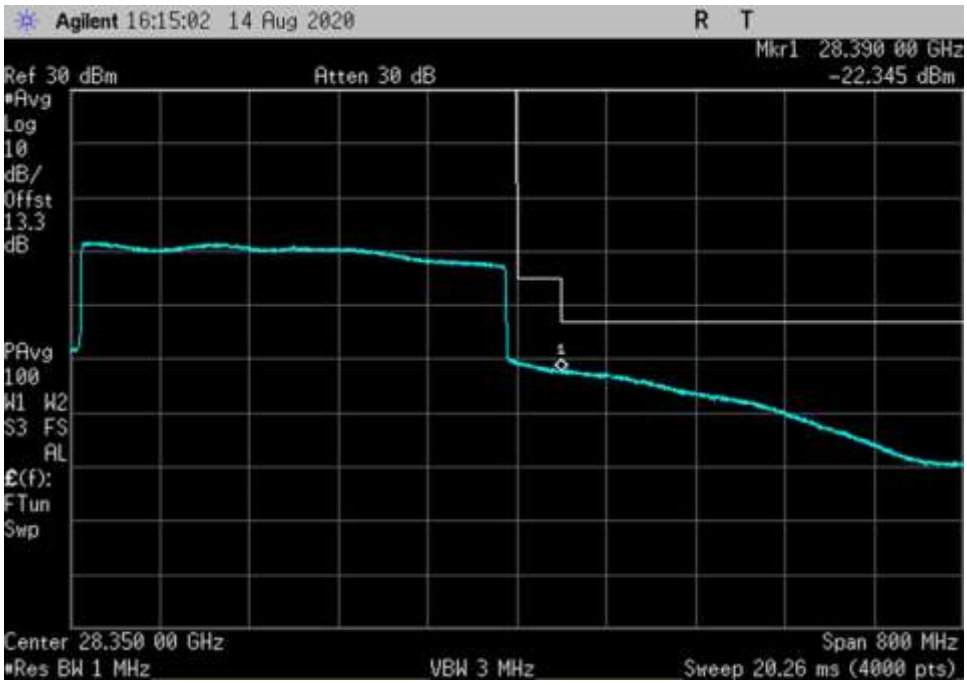

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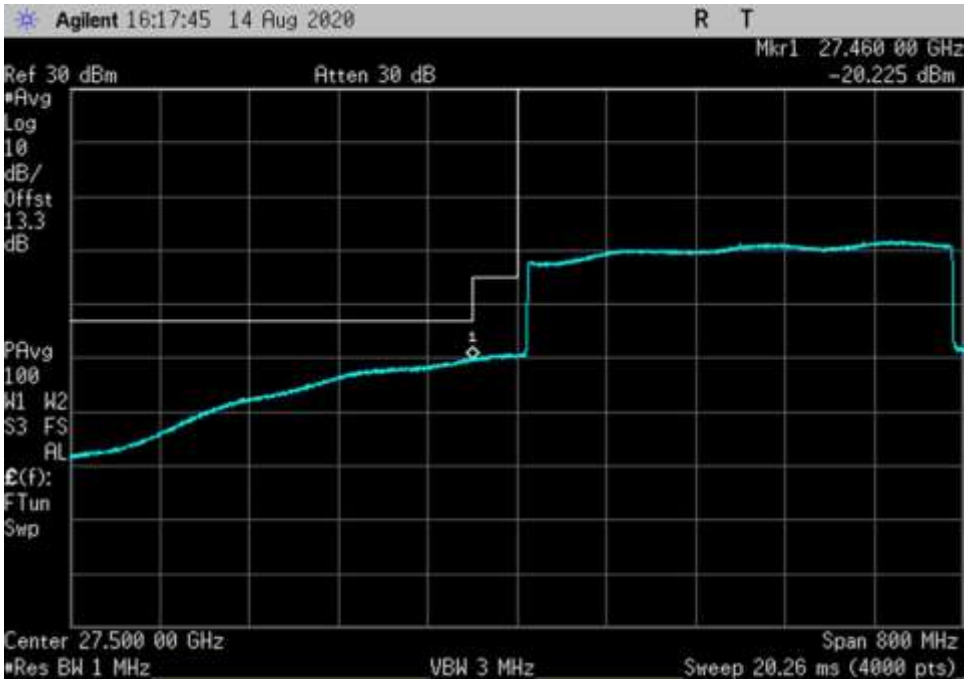

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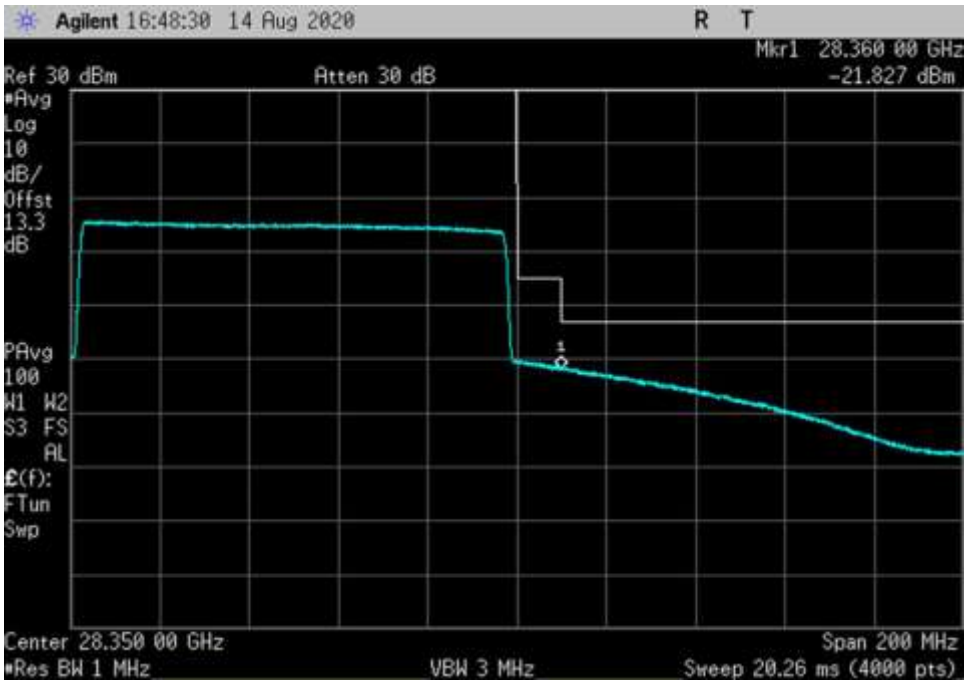

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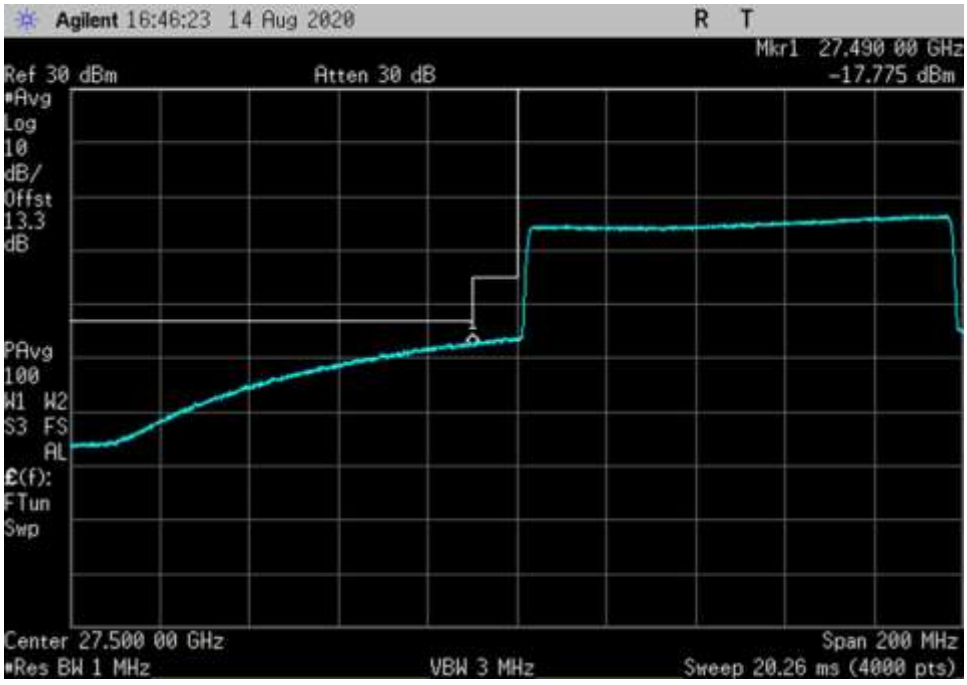

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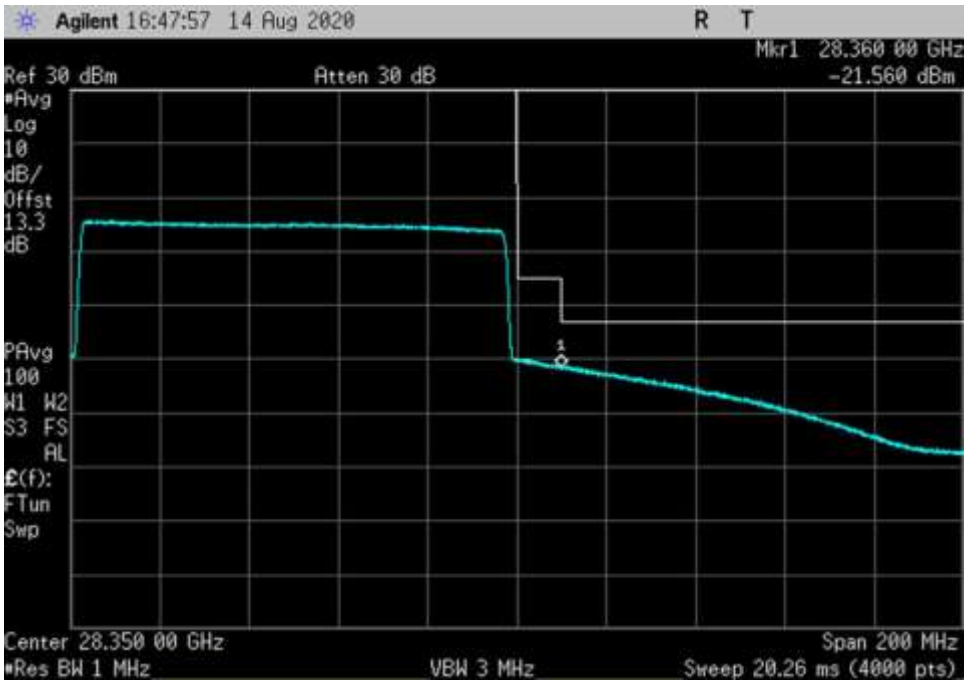

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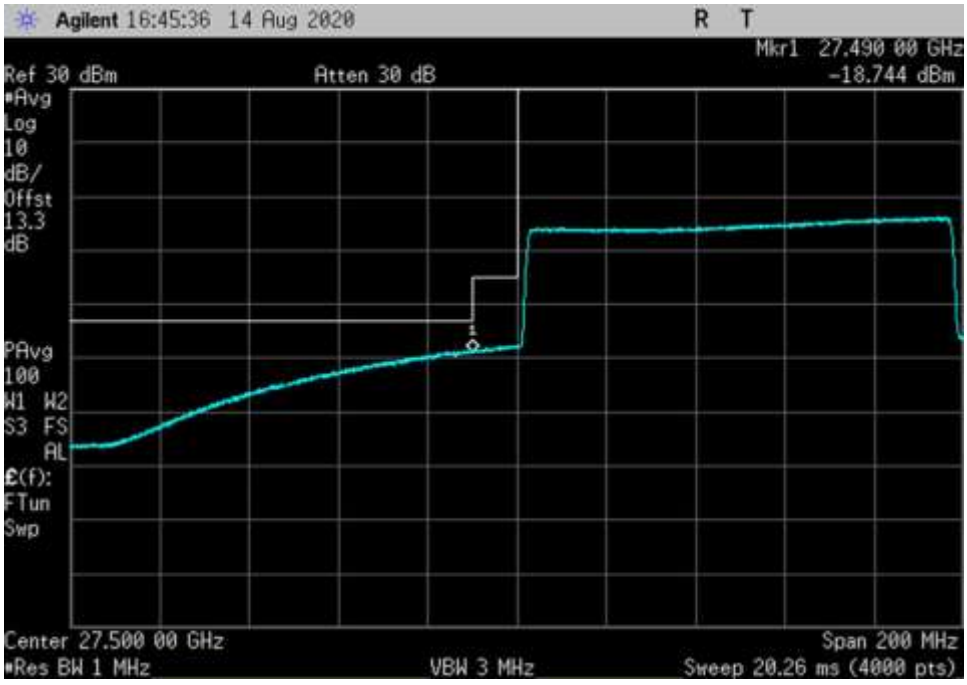

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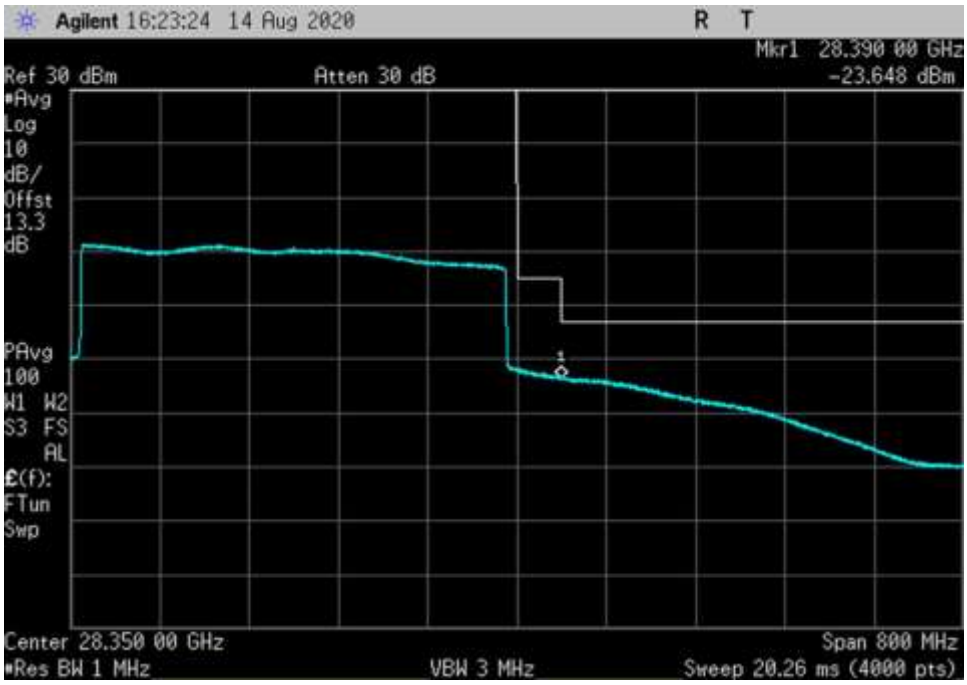

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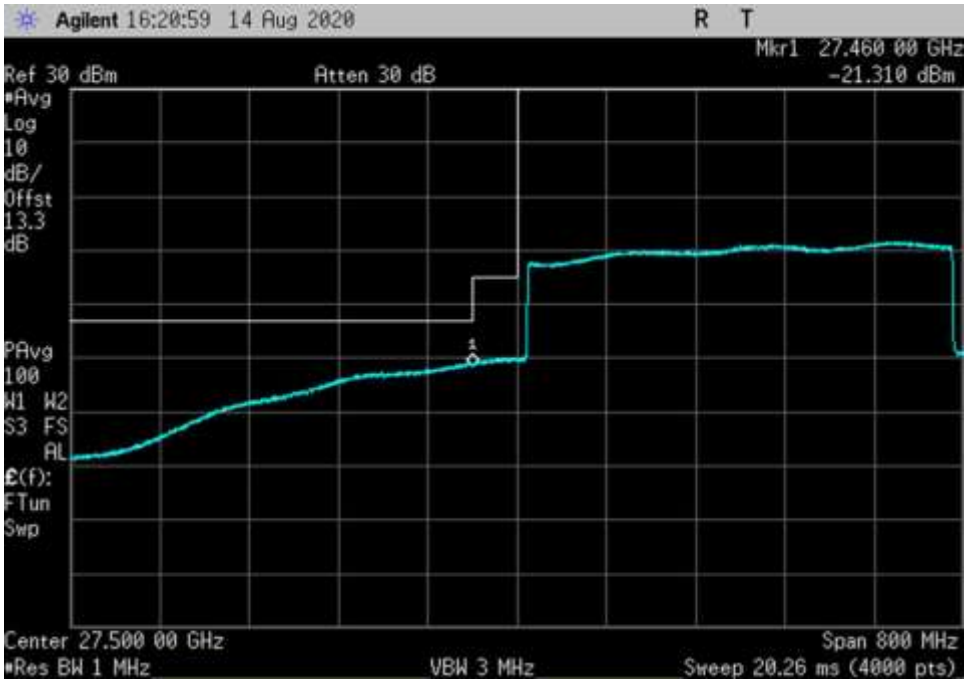

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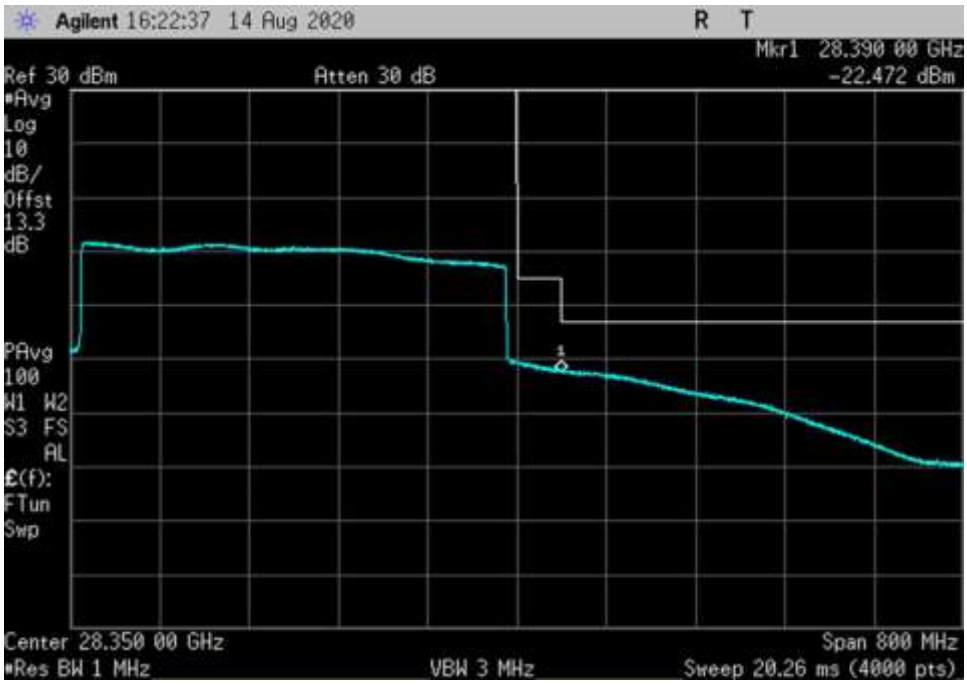

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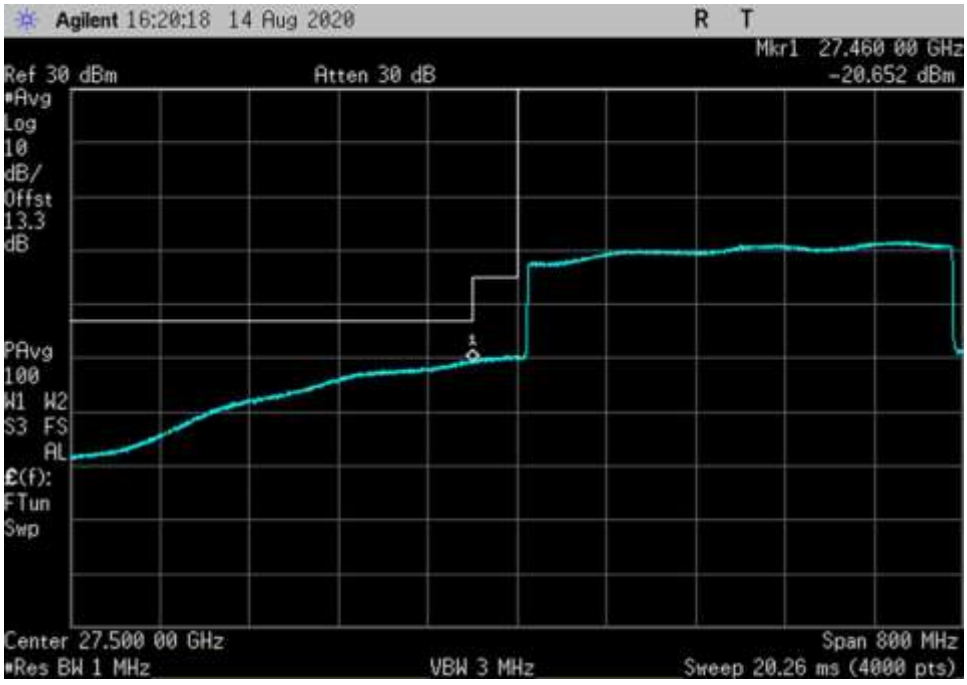

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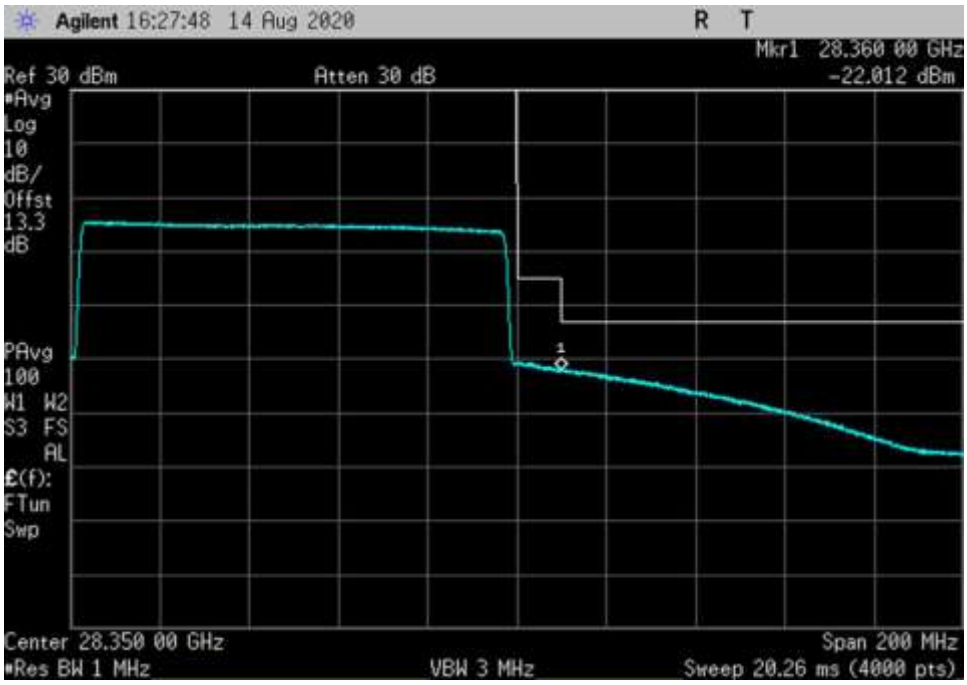

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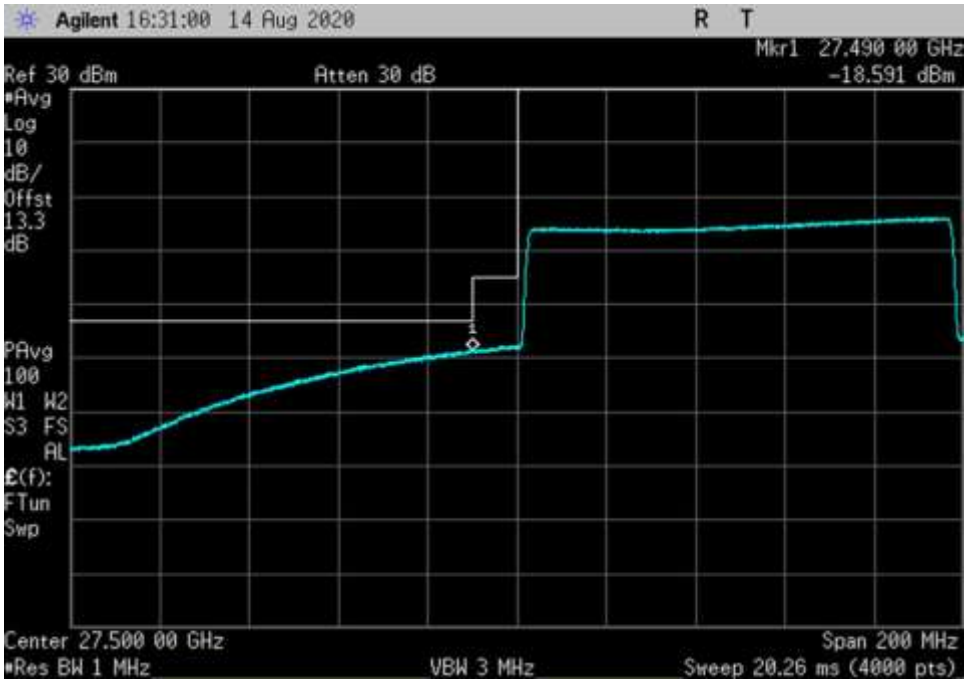

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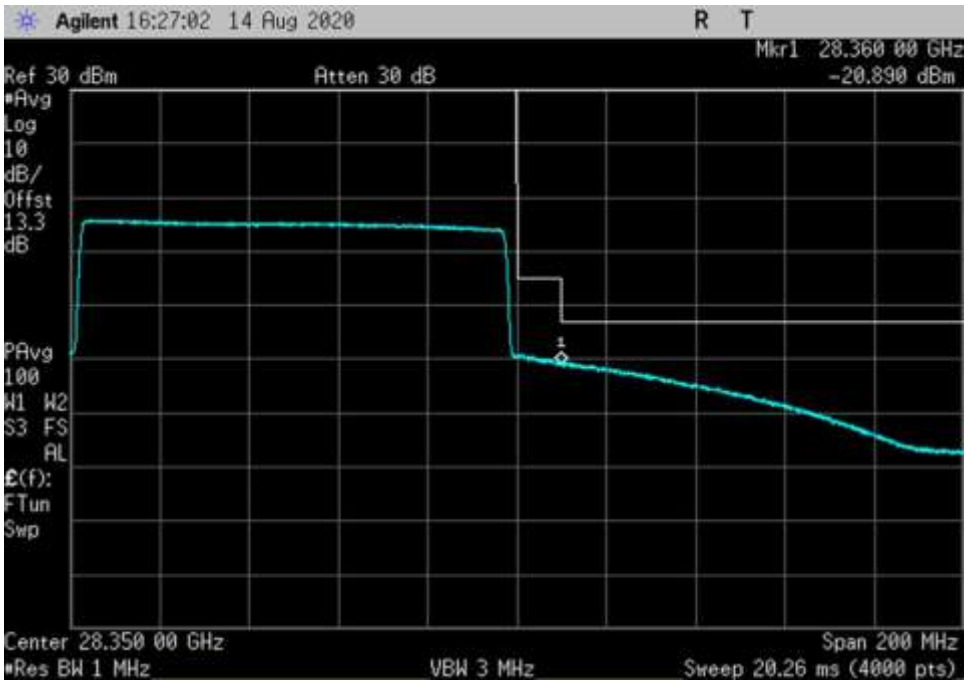

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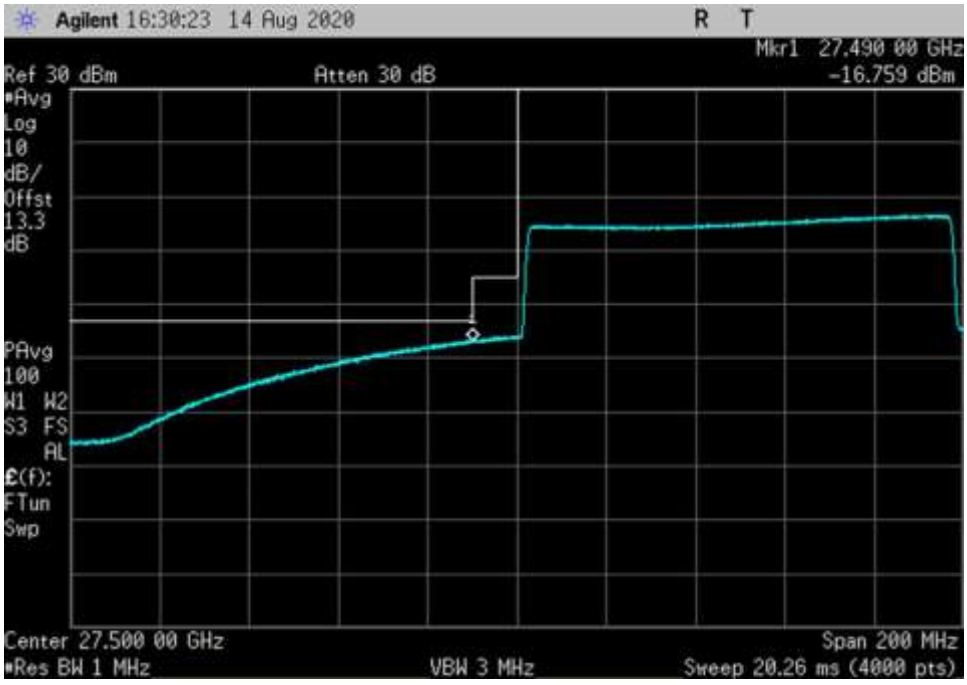

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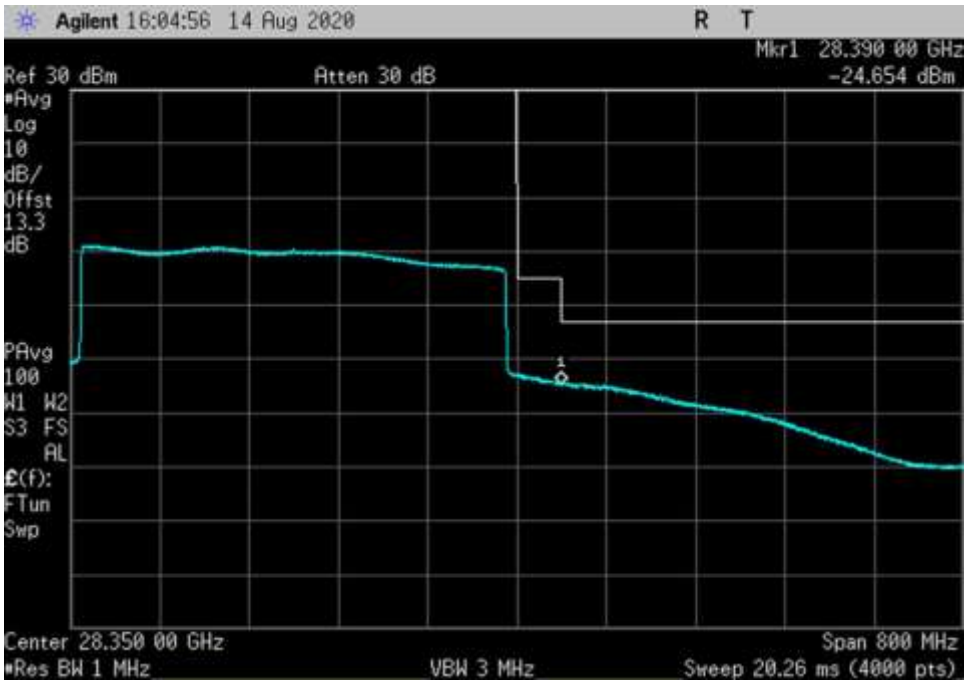

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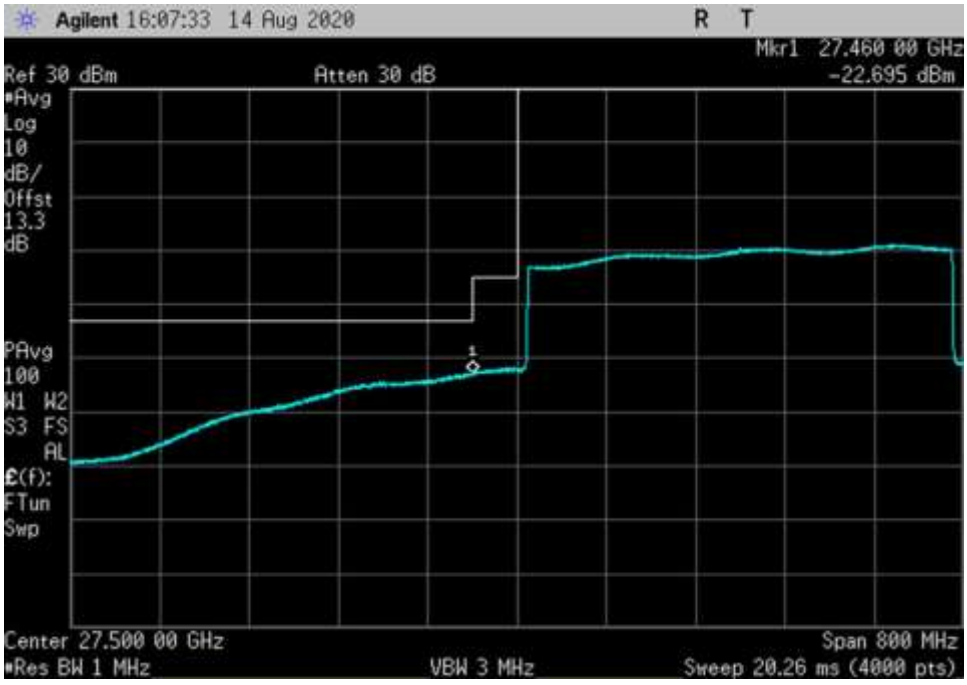

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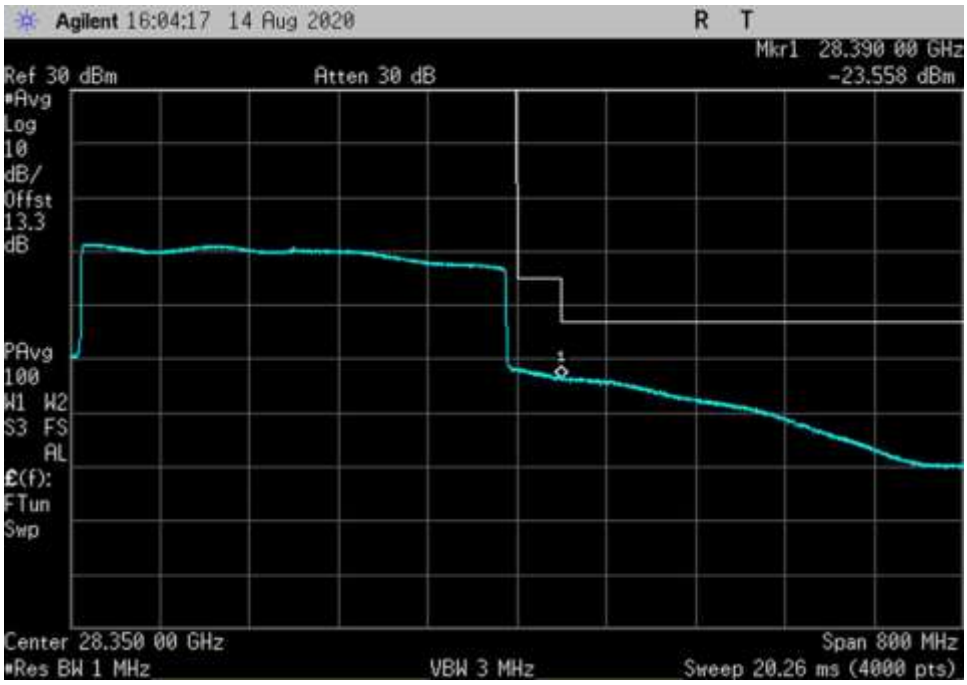

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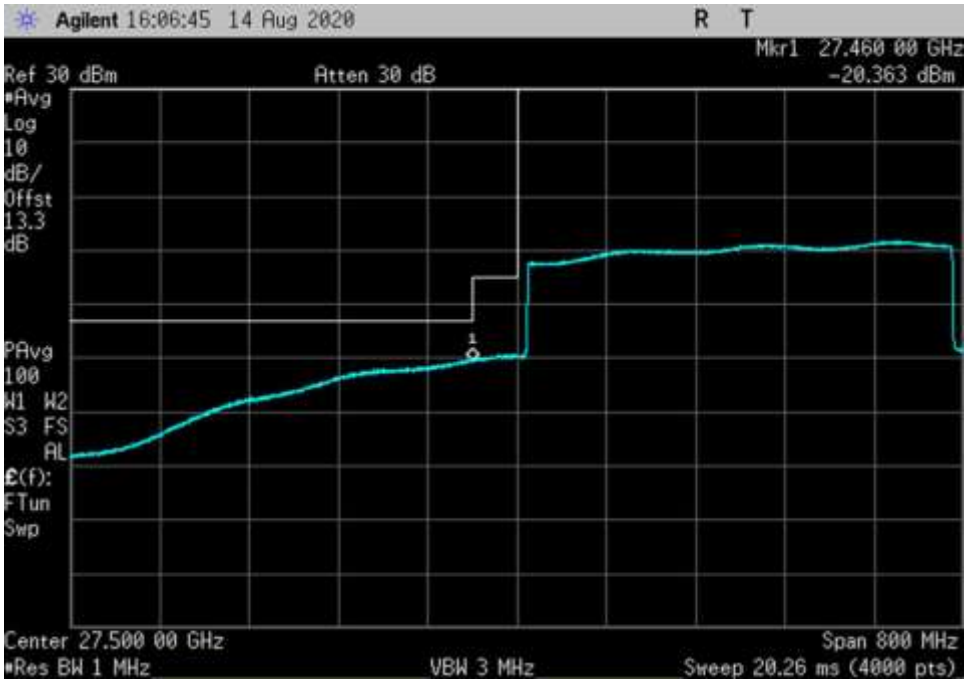
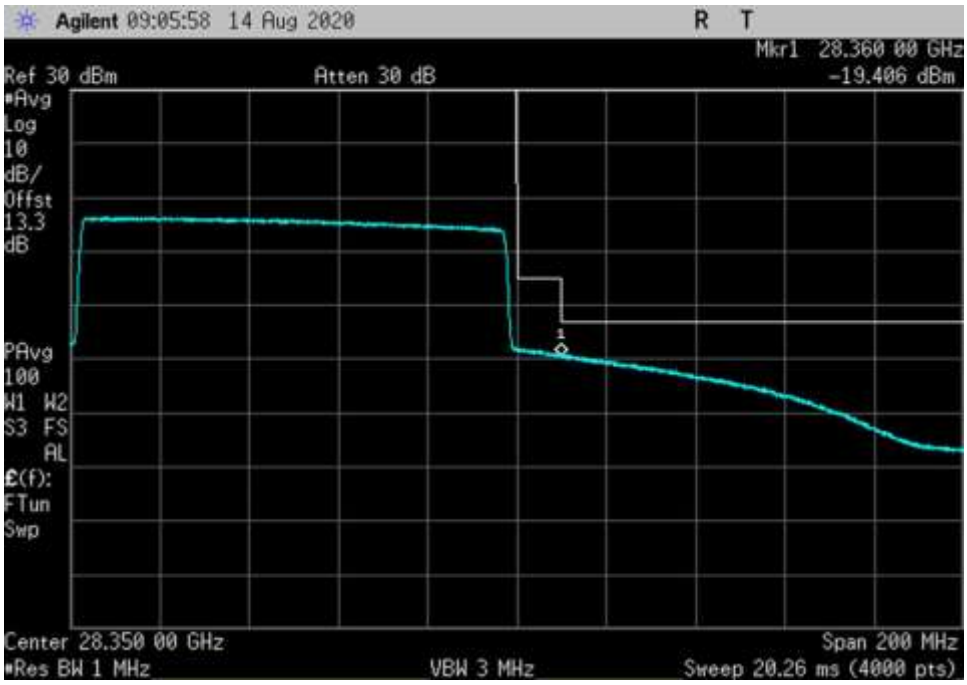
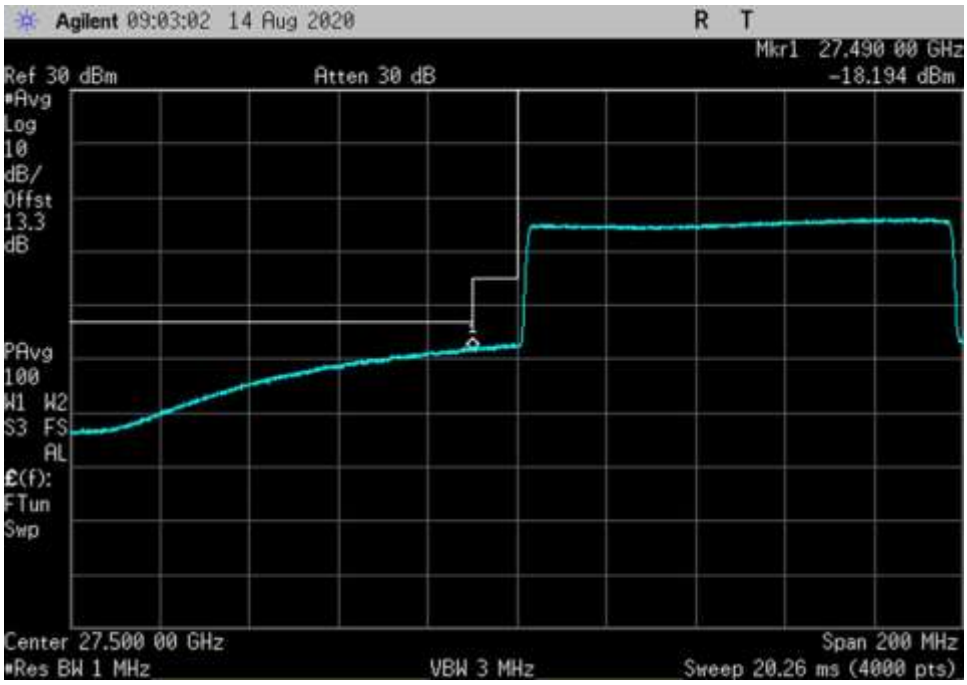


DL_27500-28350_QPSK-400MHz-H-CP OFDM_LC

CP – UL V



UL_27500-28350-16QAM-100MHz-V-AGC+3-CP OFDM_HC



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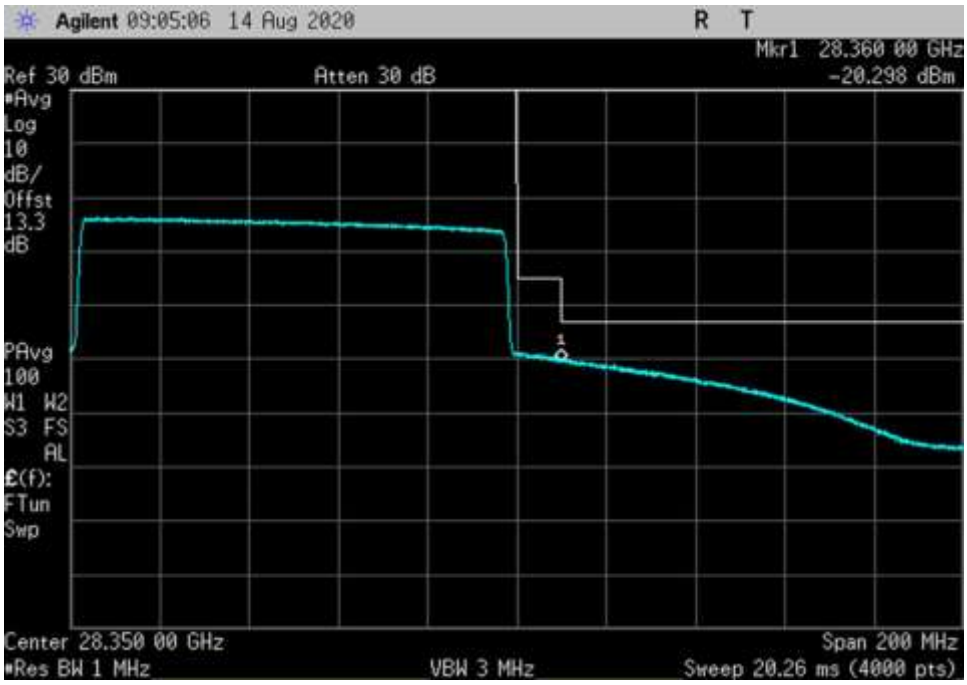

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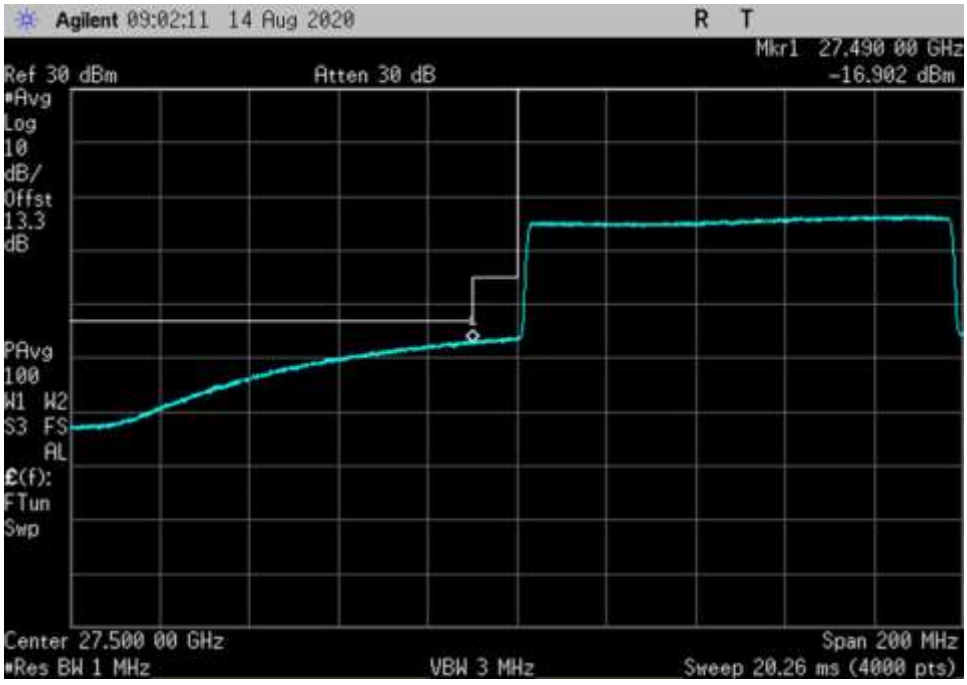

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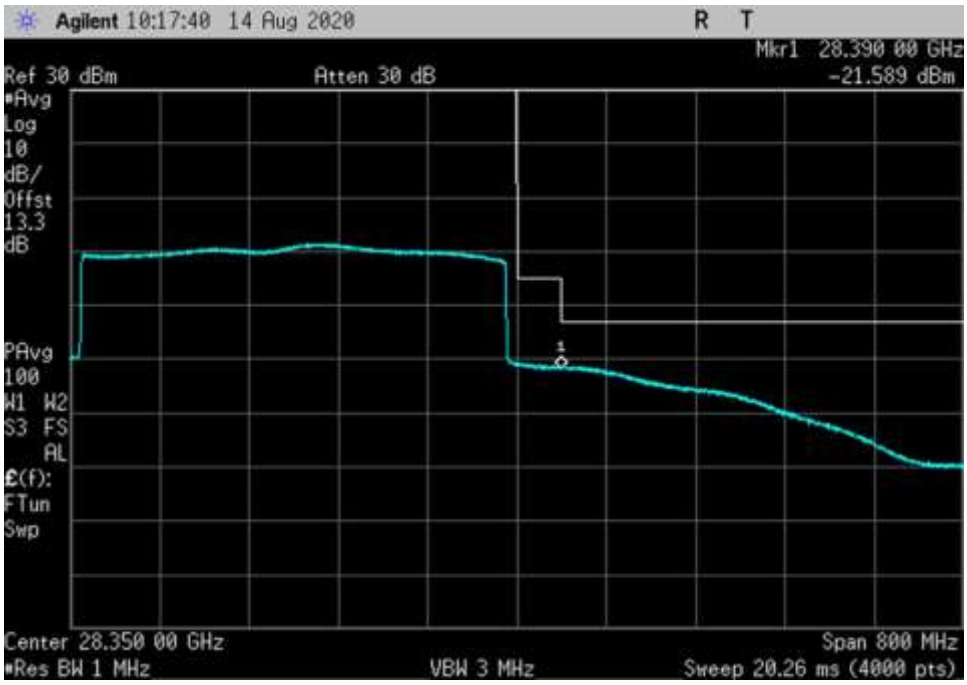
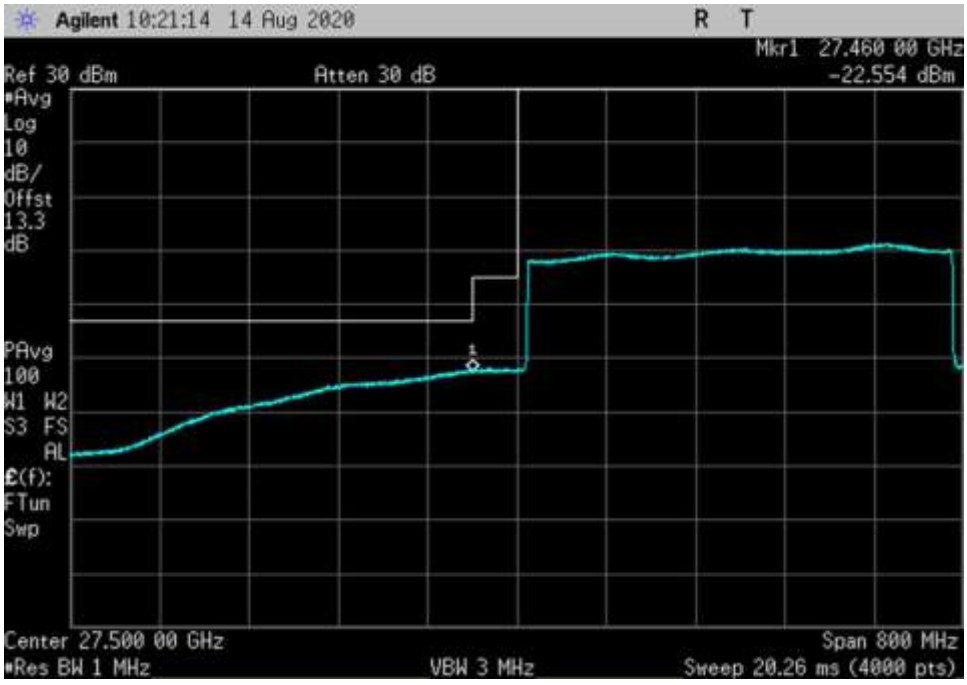


UL_27500-28350-16QAM-400MHz-V-AGC+3-CP OFDM_HC



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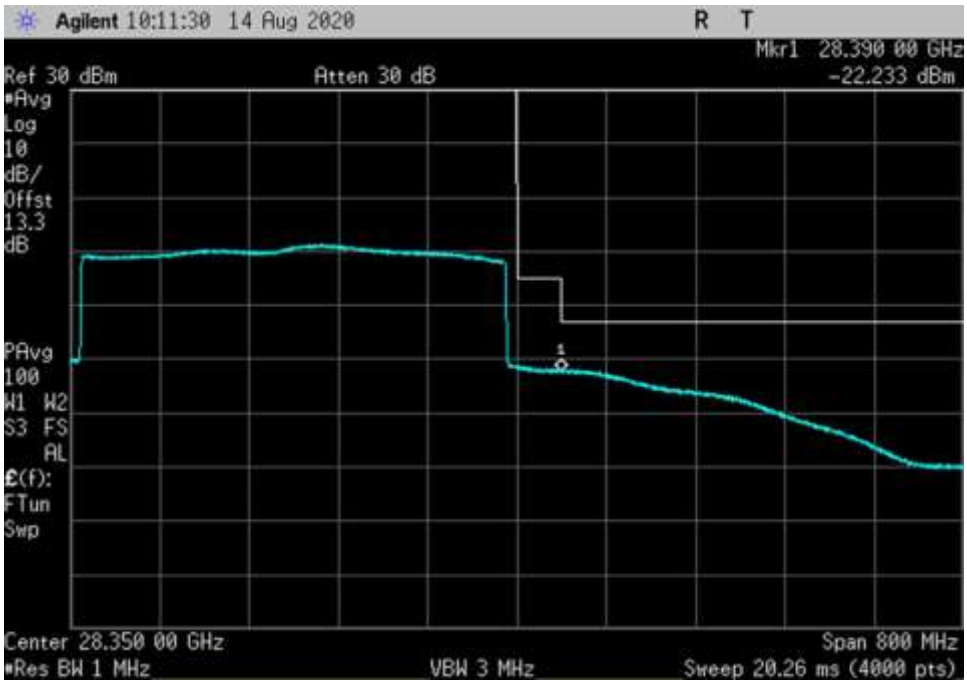

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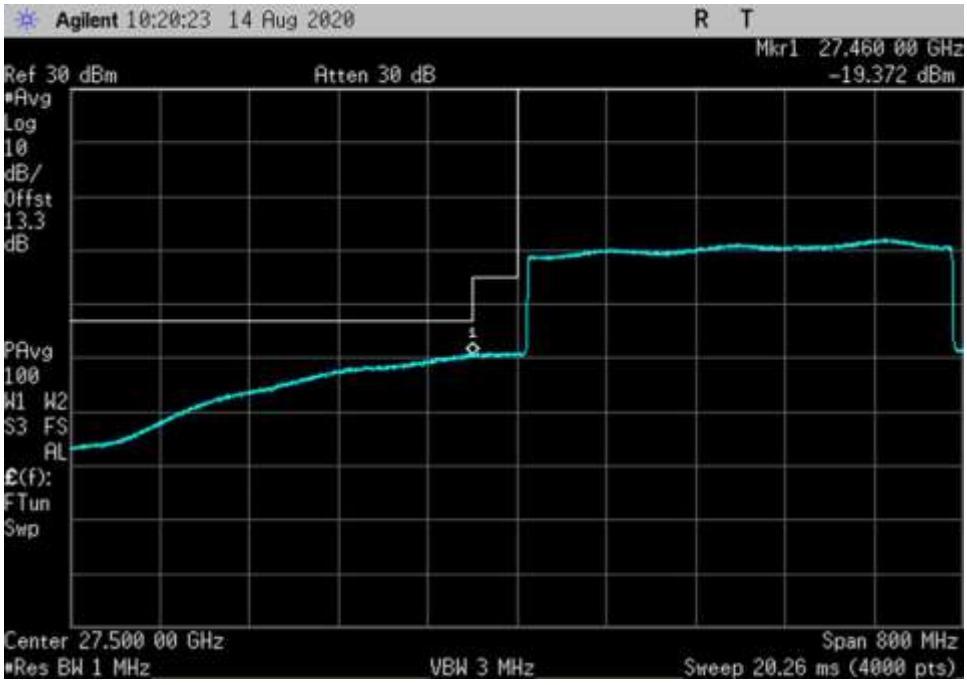

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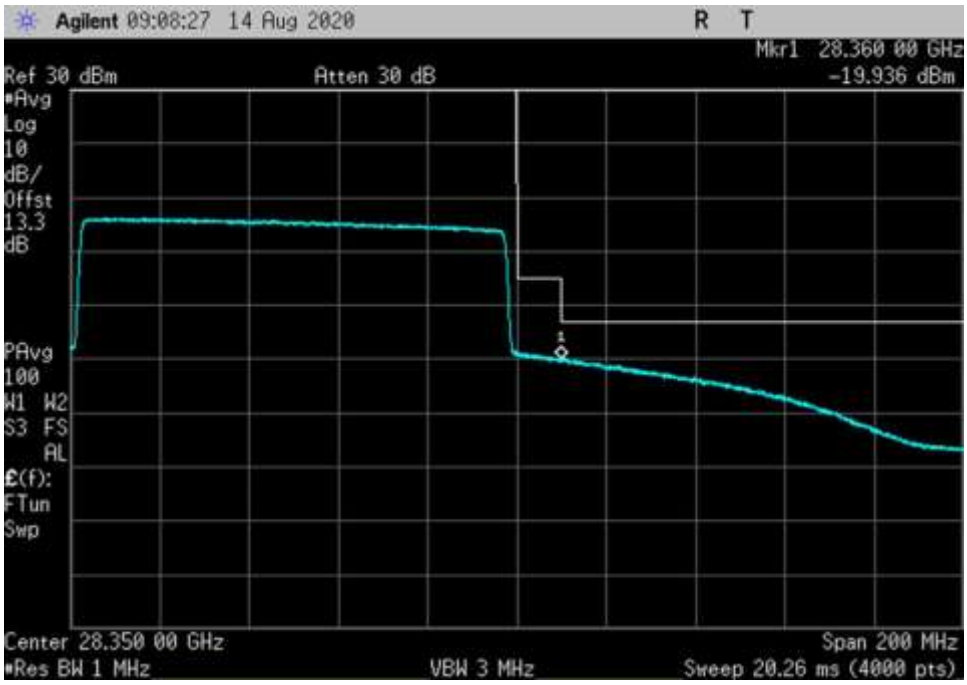
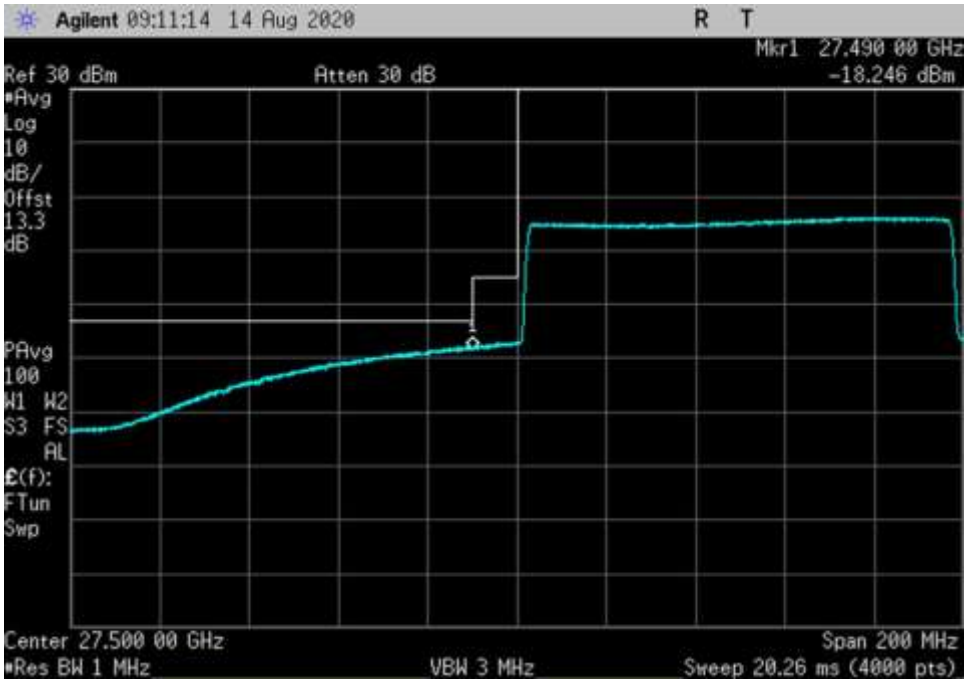
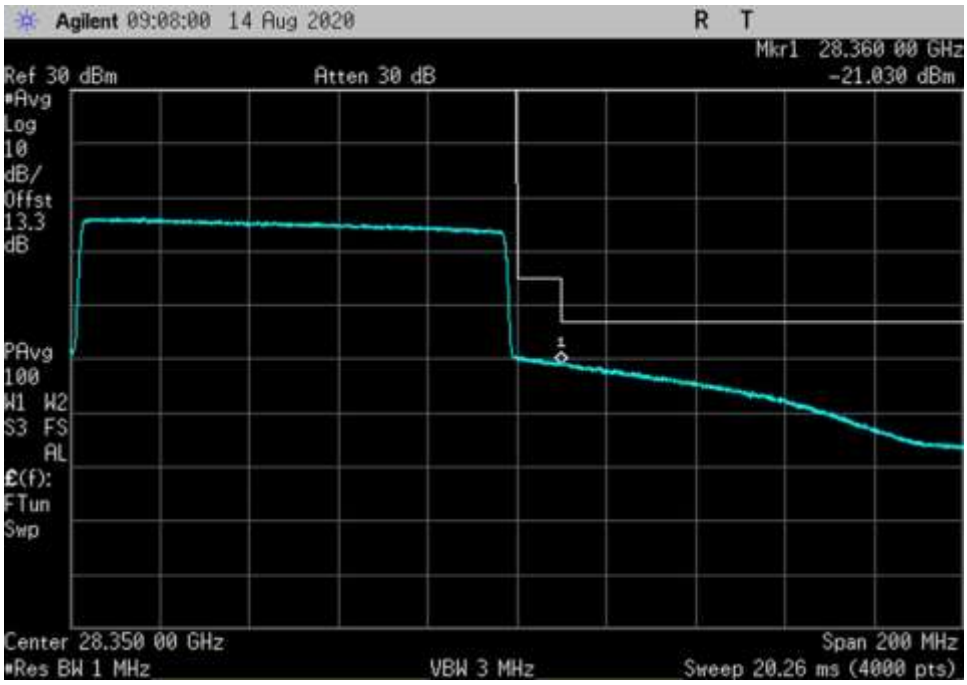


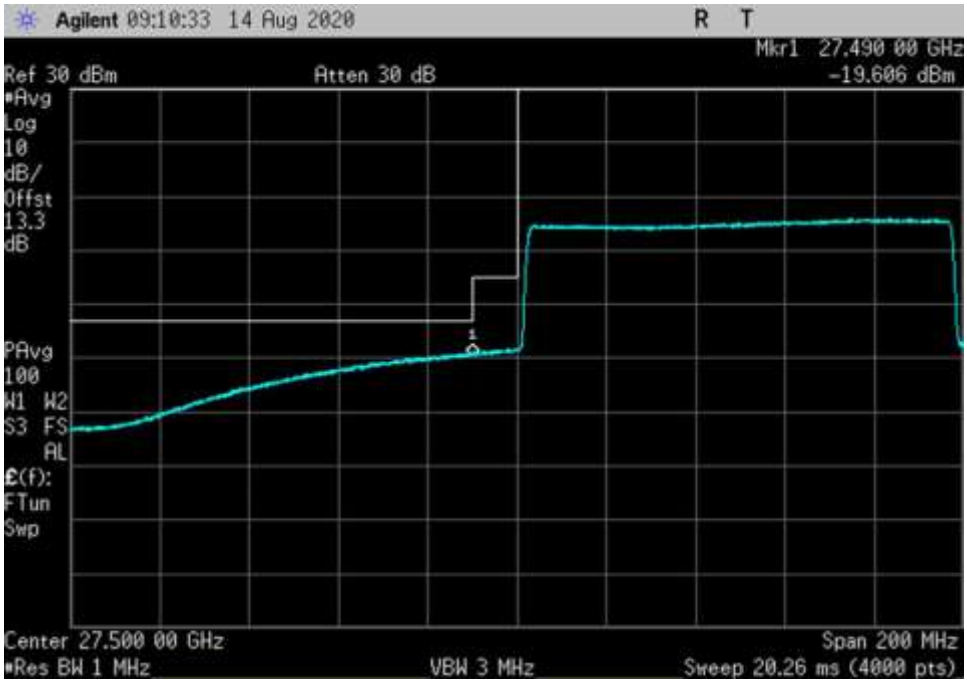
UL_27500-28350-64QAM-100MHz-V-AGC+3-CP OFDM_HC



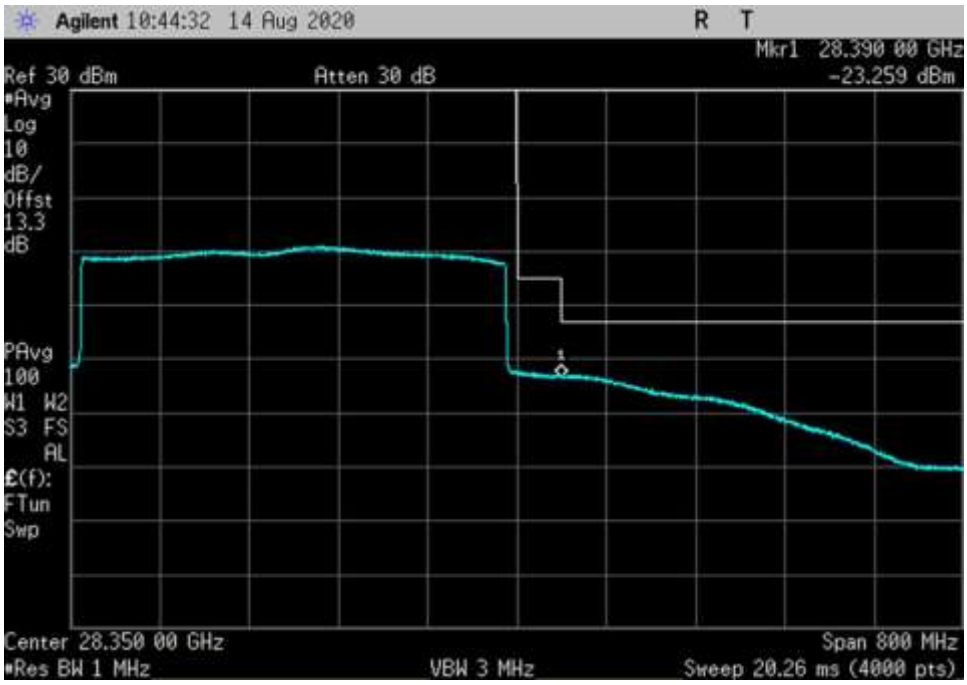
UL_27500-28350-64QAM-100MHz-V-AGC+3-CP OFDM_LC



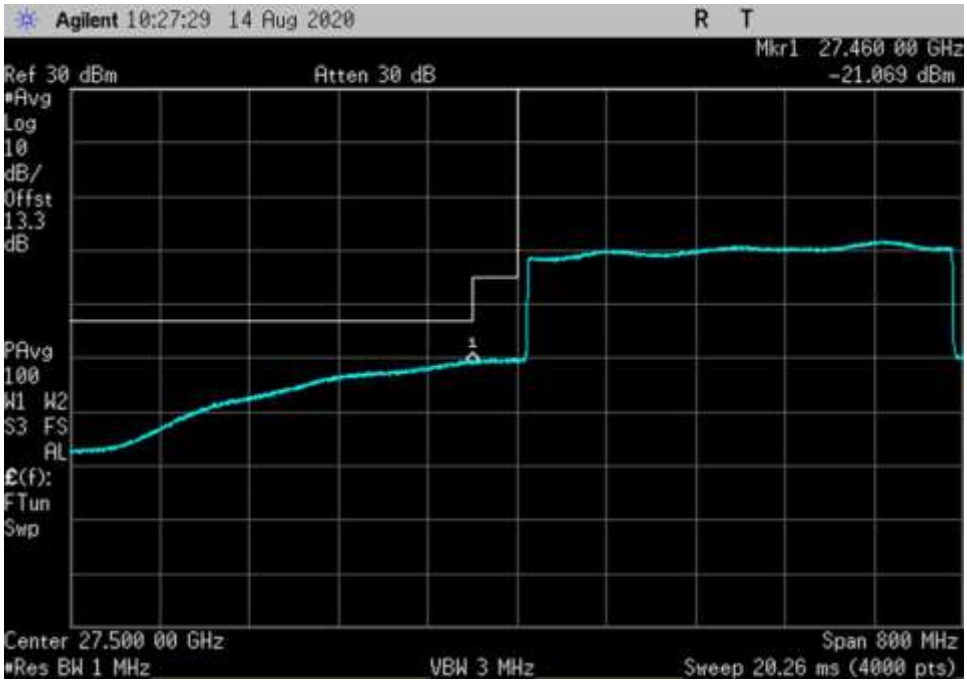
UL_27500-28350-64QAM-100MHz-V-CP OFDM_HC



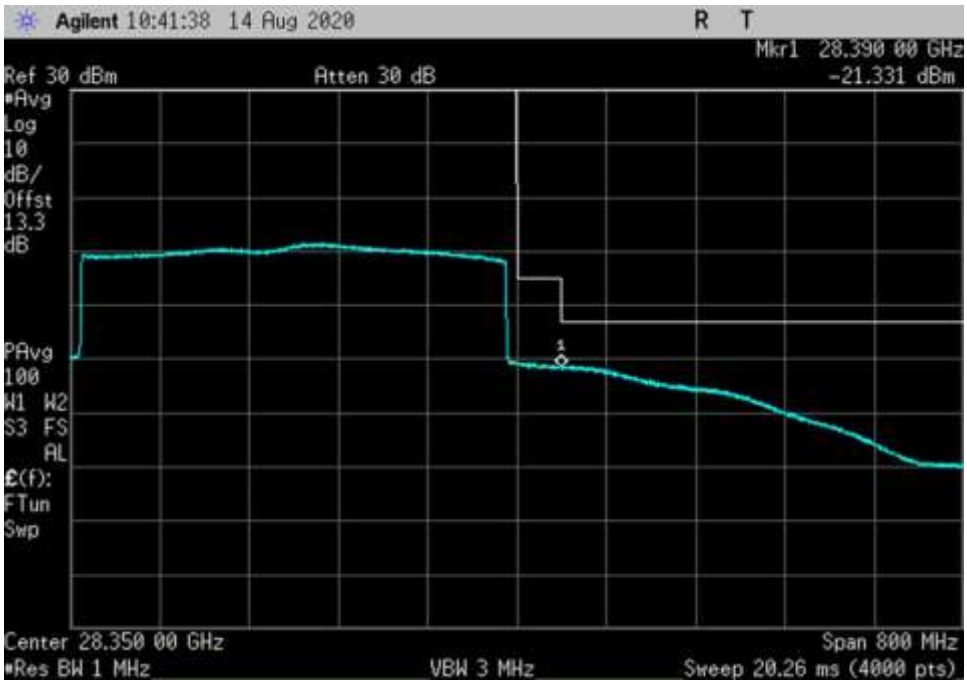
UL_27500-28350-64QAM-100MHz-V-CP OFDM_LC



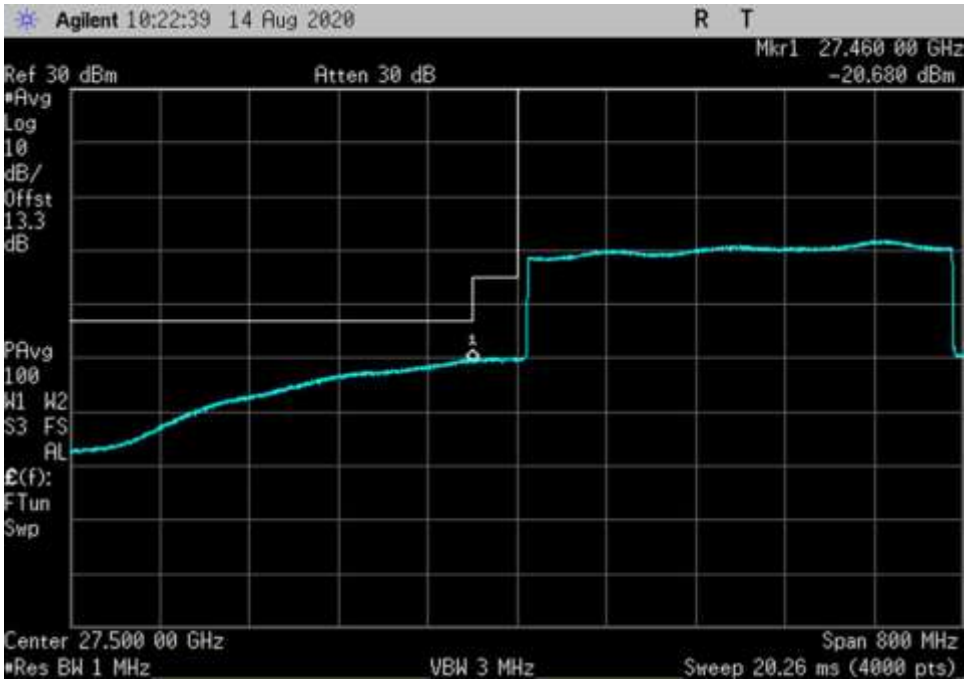
UL_27500-28350-64QAM-400MHz-V-AGC+3-CP OFDM_HC



UL_27500-28350-64QAM-400MHz-V-AGC+3-CP OFDM_LC



UL_27500-28350-64QAM-400MHz-V-CP OFDM_HC



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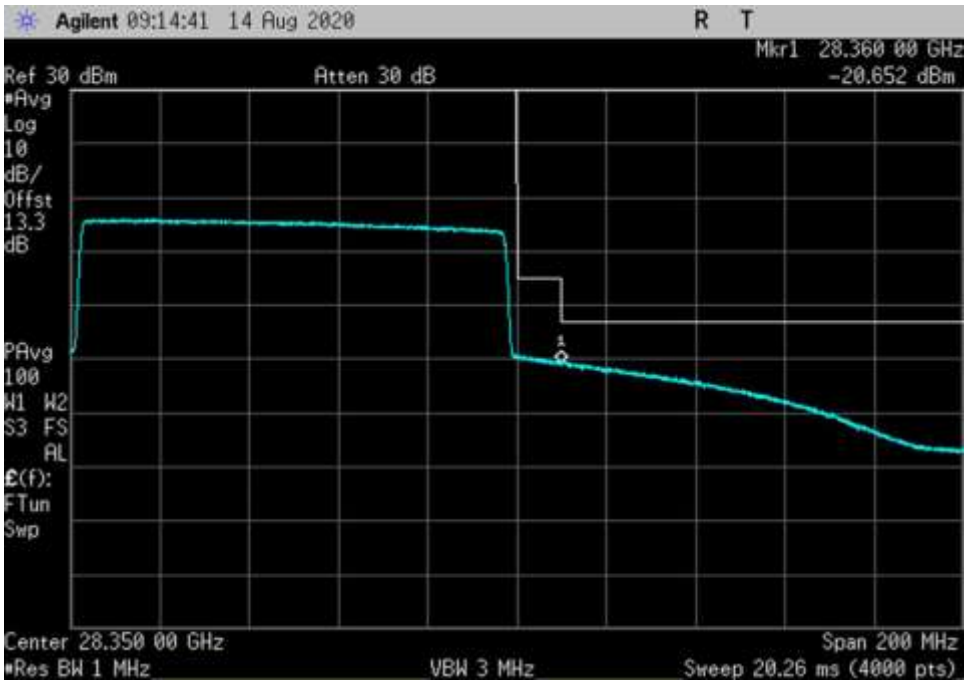

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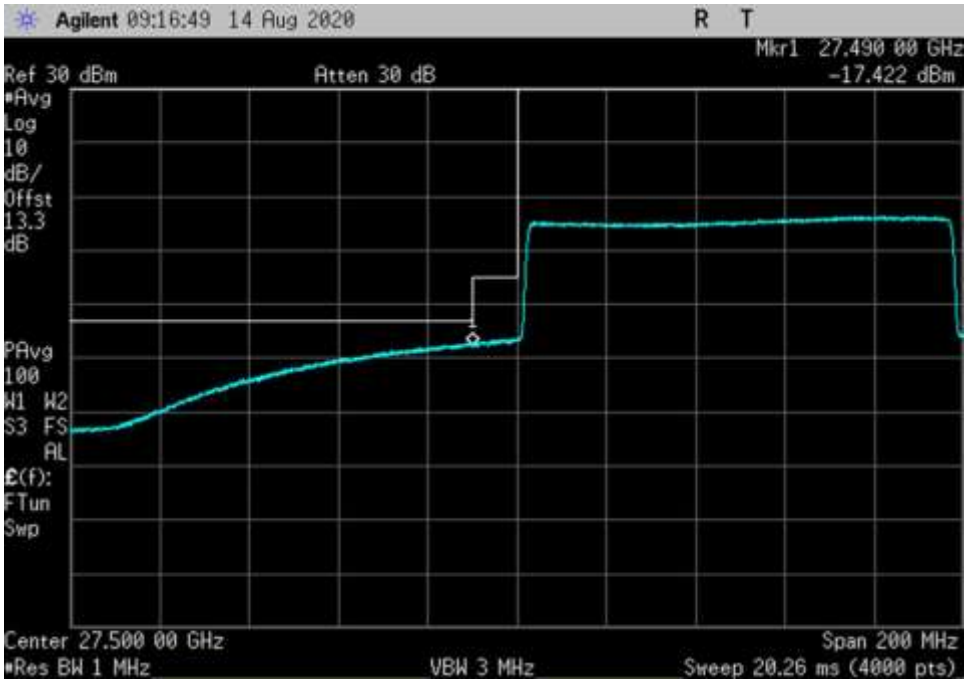

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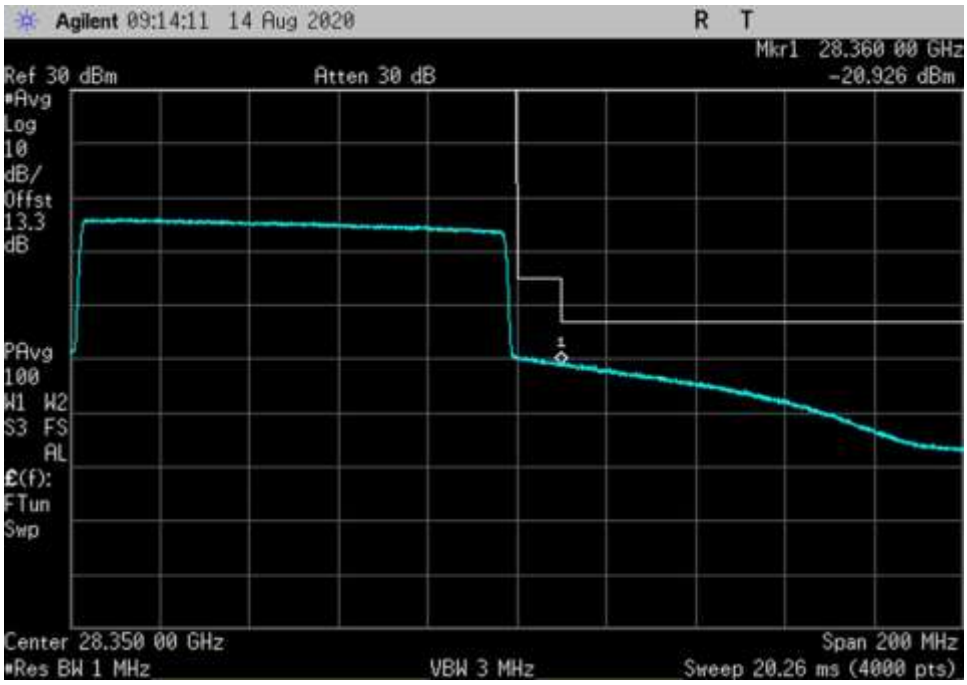

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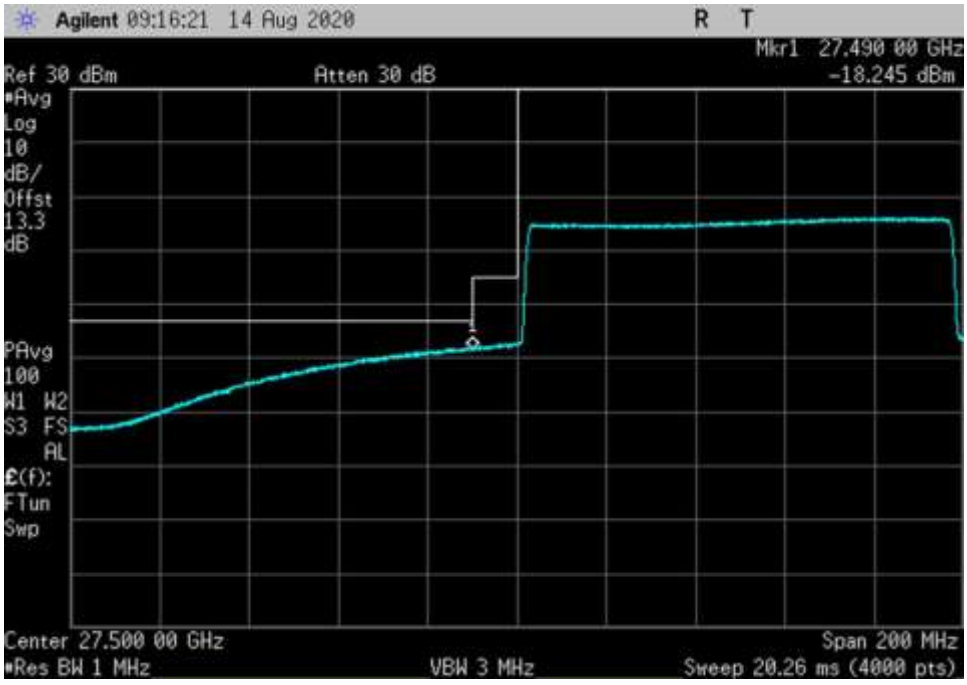

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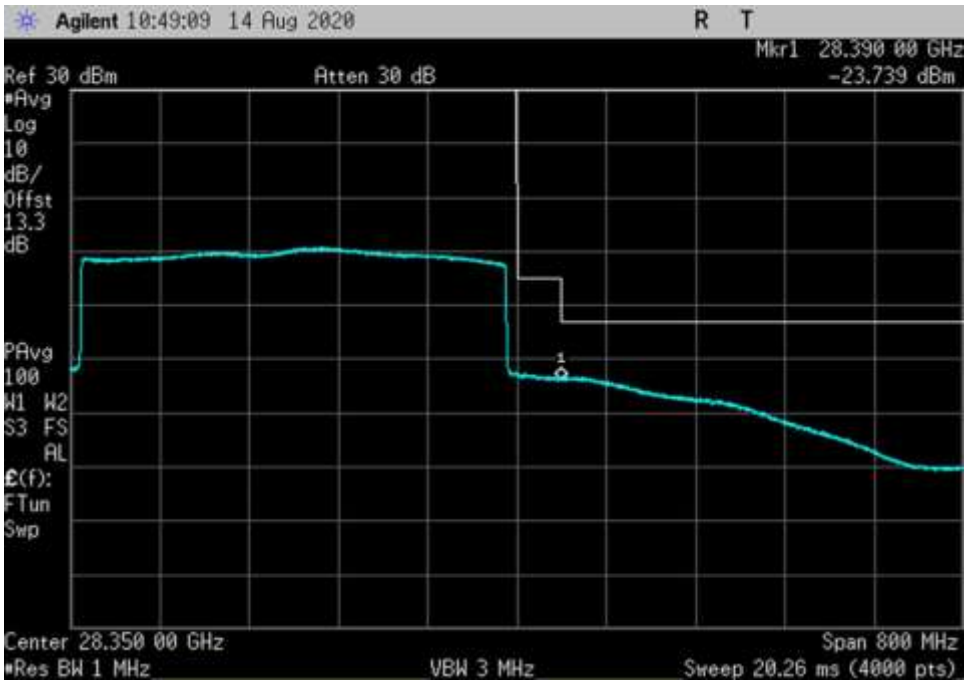
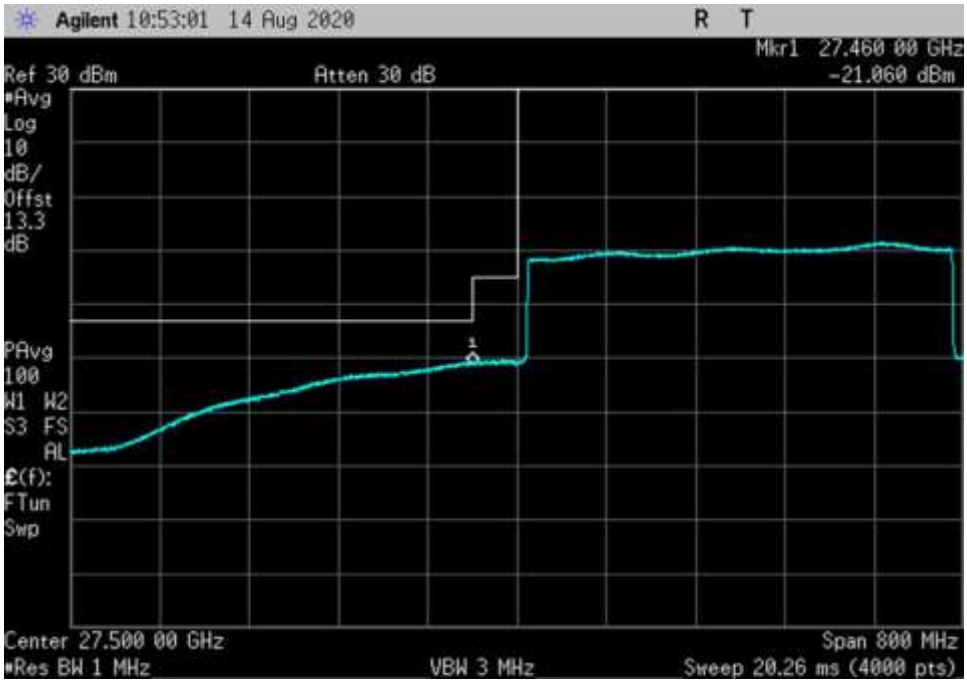


UL_27500-28350-256QAM-400MHz-V-AGC+3-CP OFDM_HC



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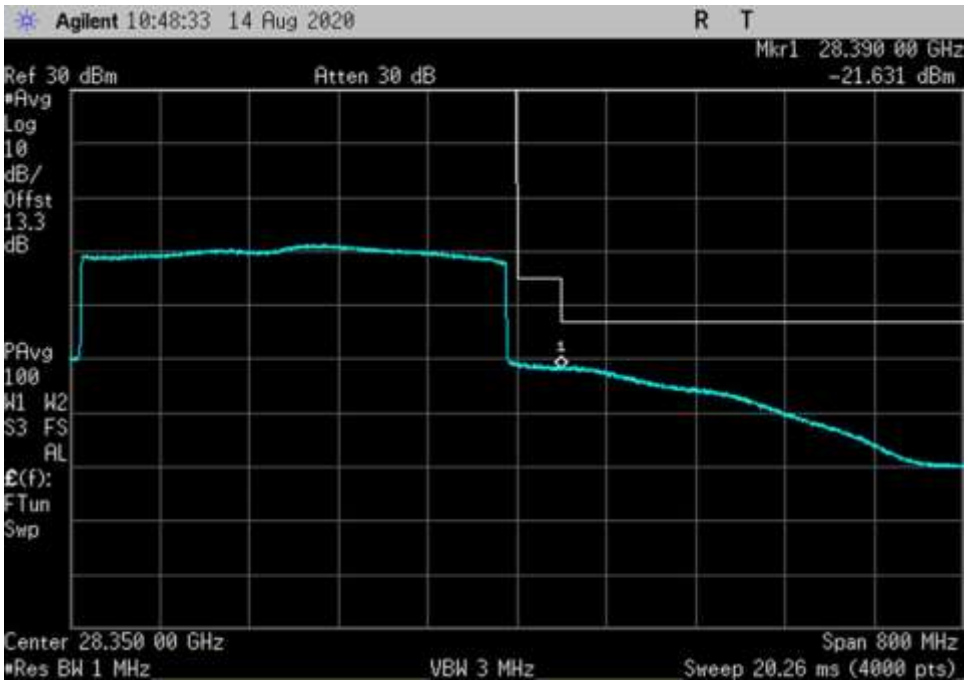

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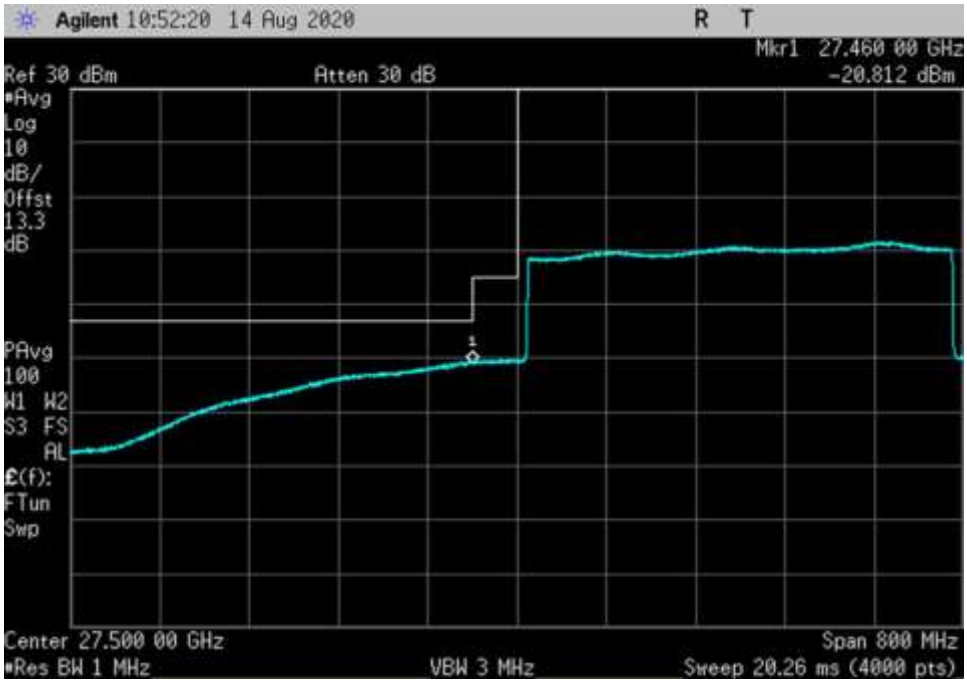
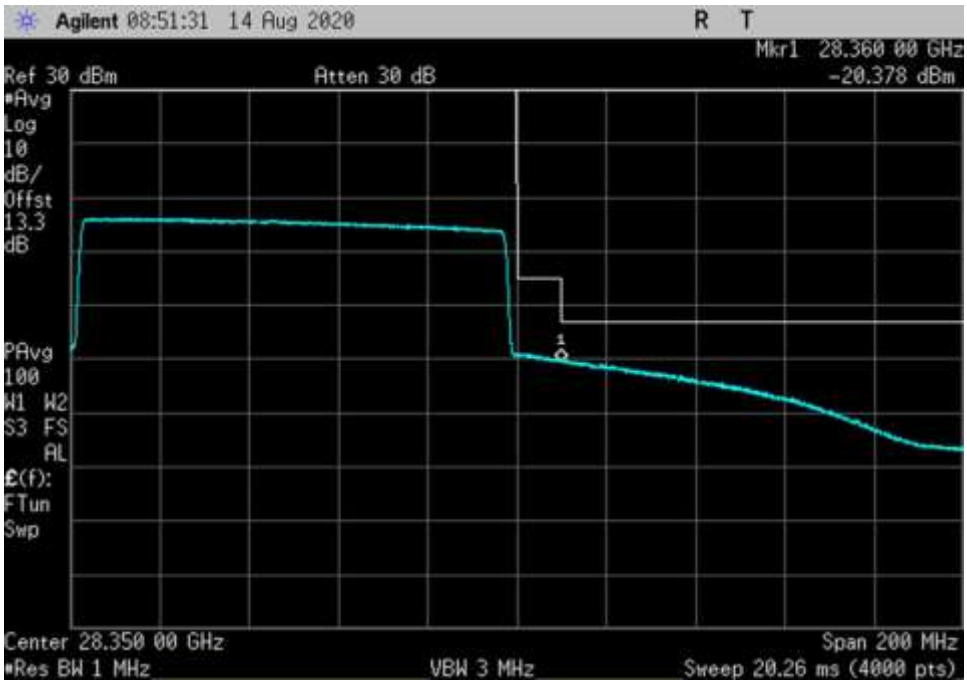


UL_27500-28350-256QAM-400MHz-V-CP OFDM_LC



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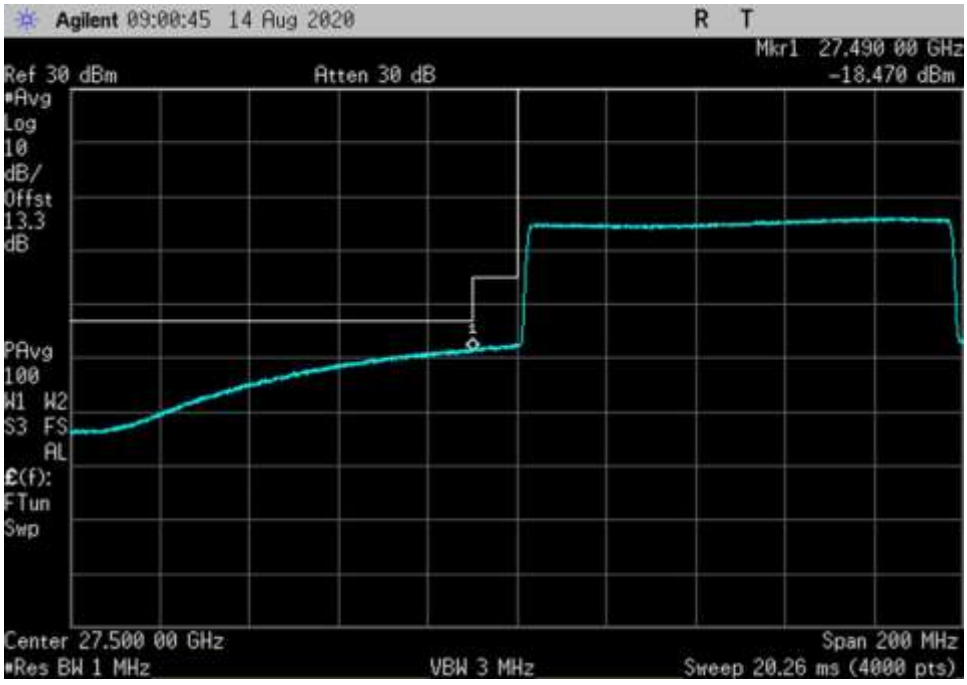

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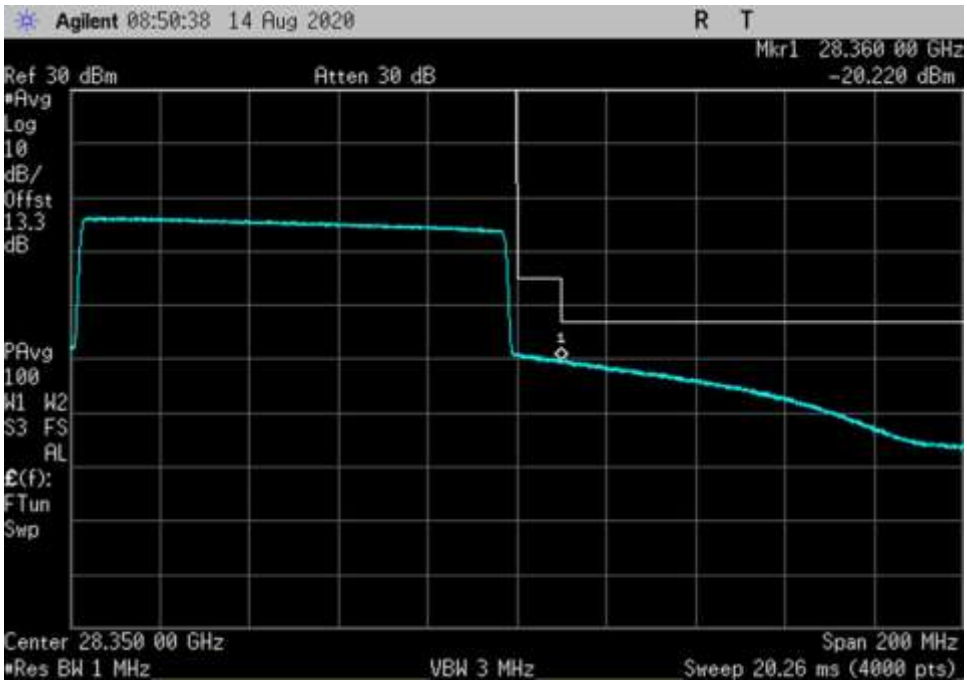

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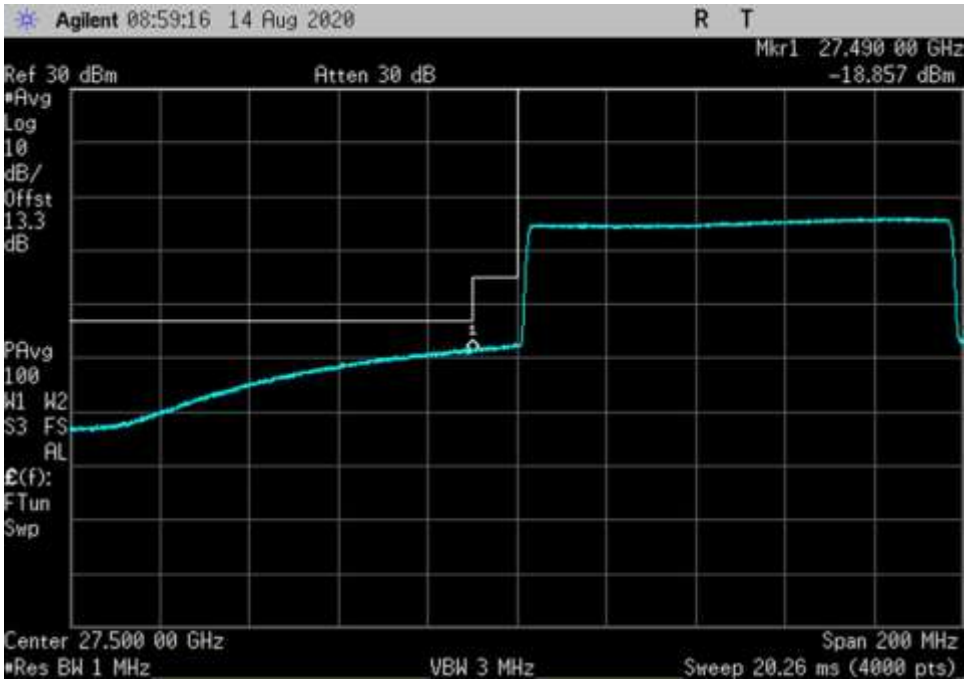

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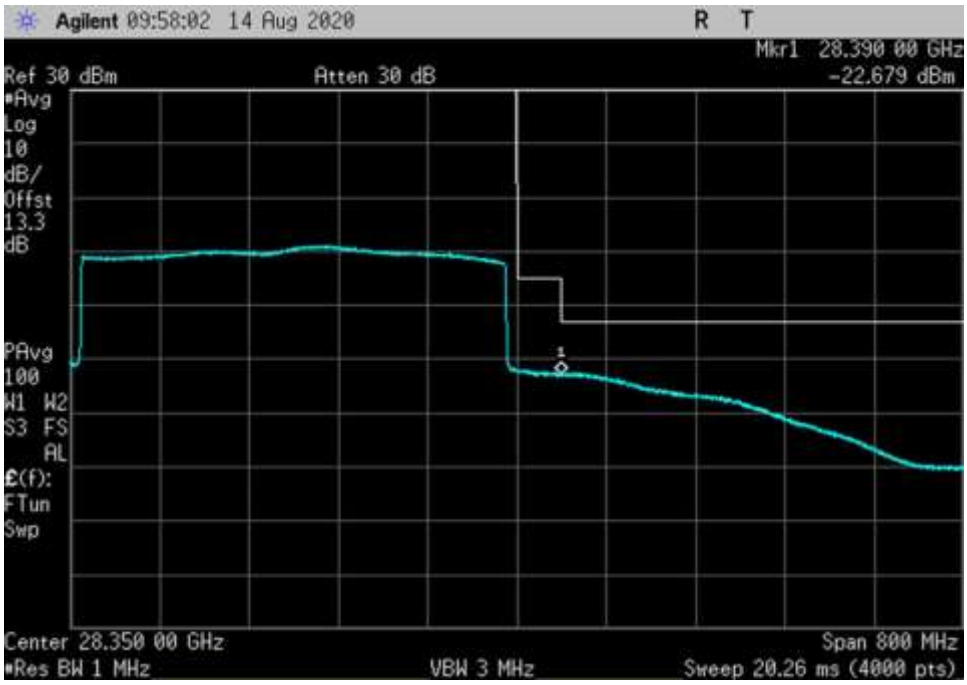

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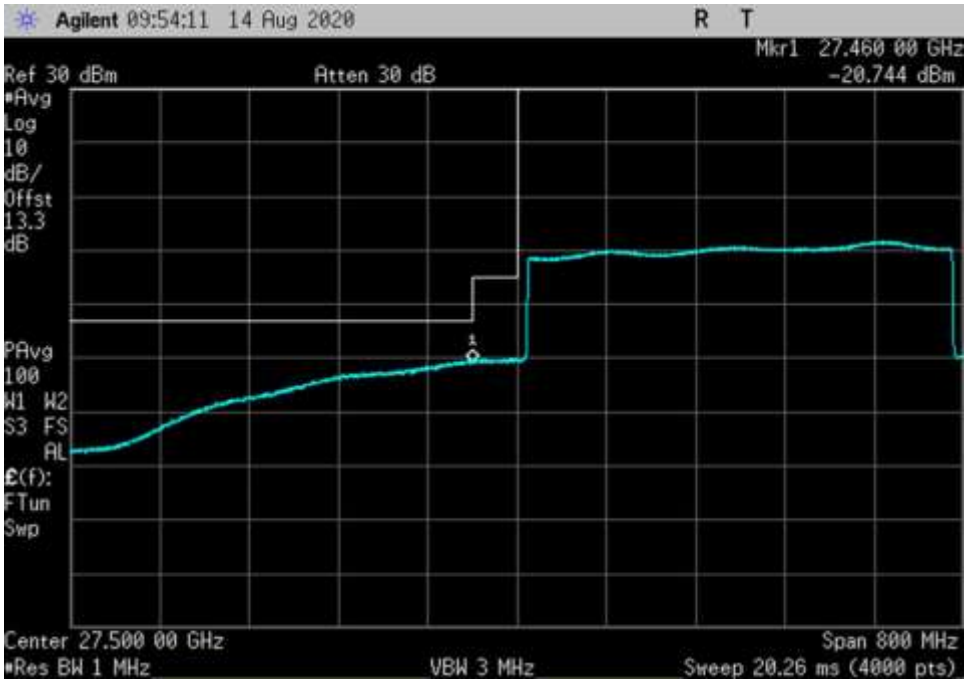

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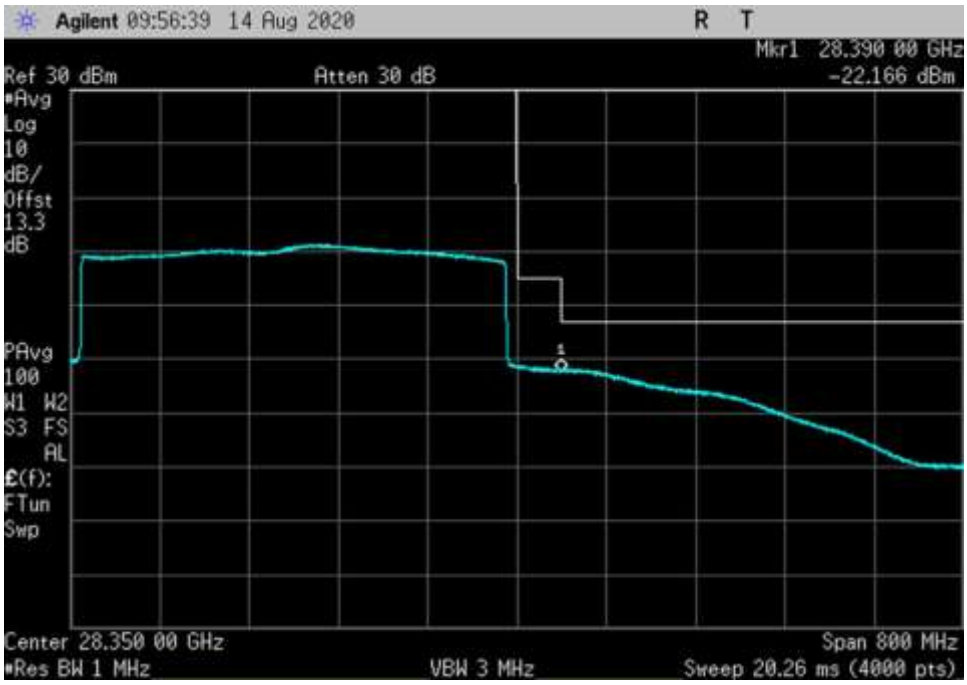

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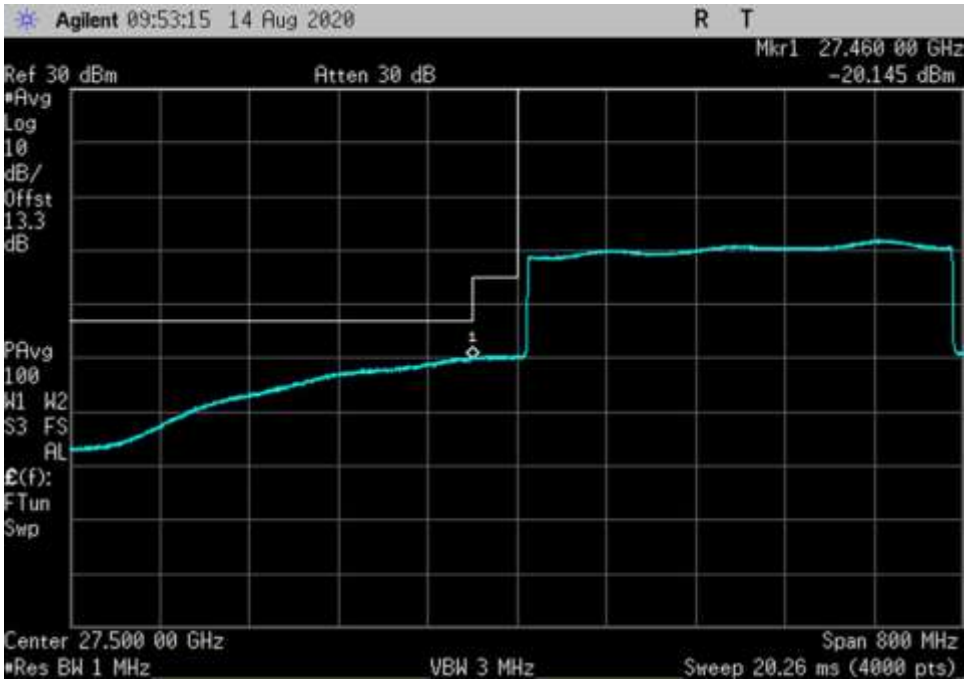

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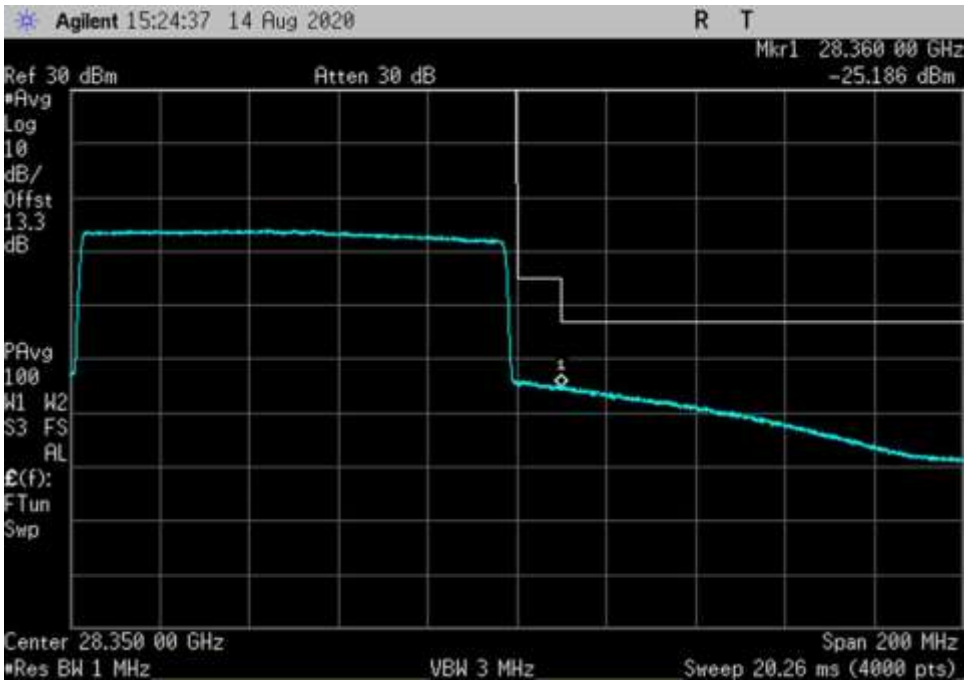
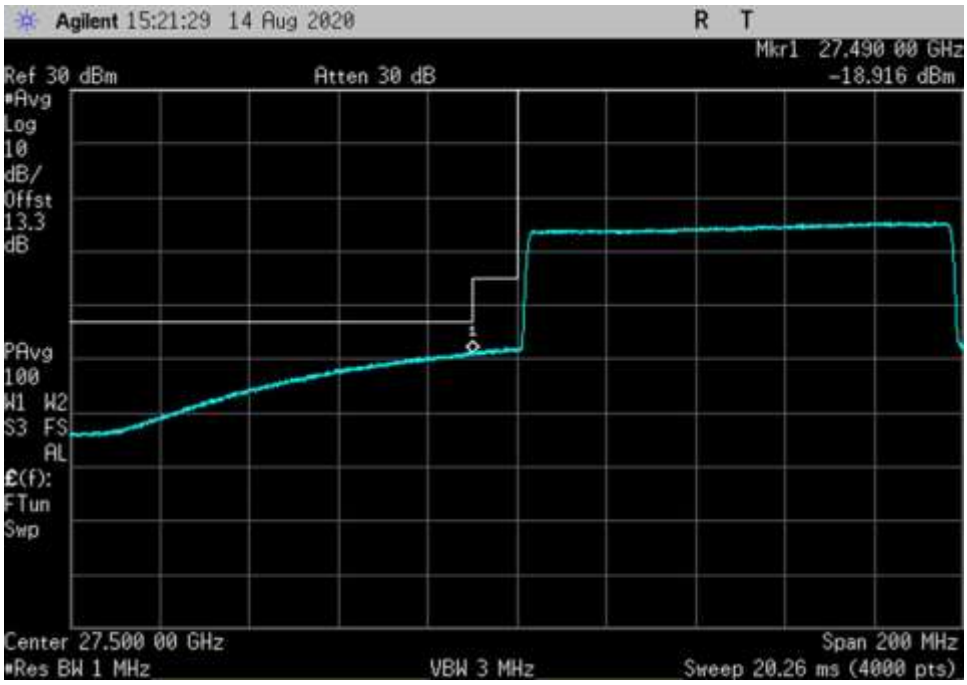


DL_27500-28350_16QAM-100MHz-V-AGC+3-CP OFDM_HC



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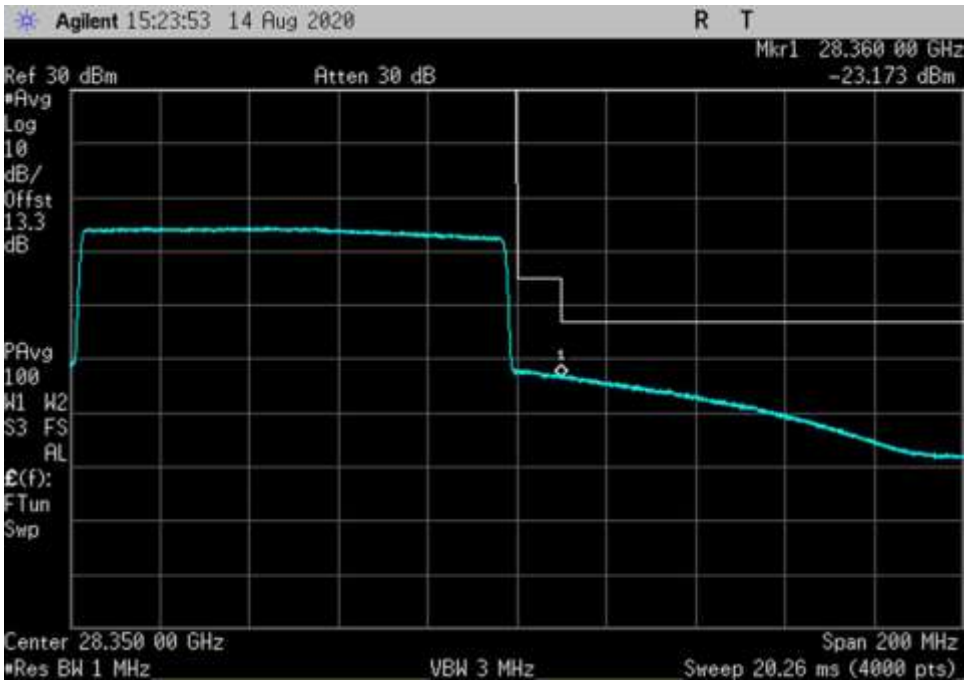

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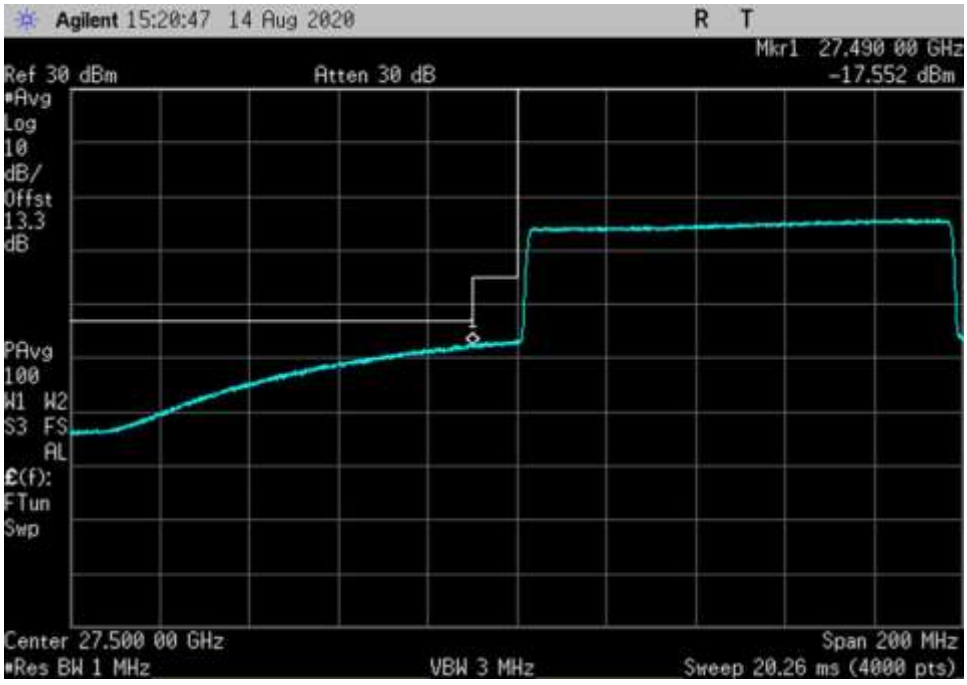

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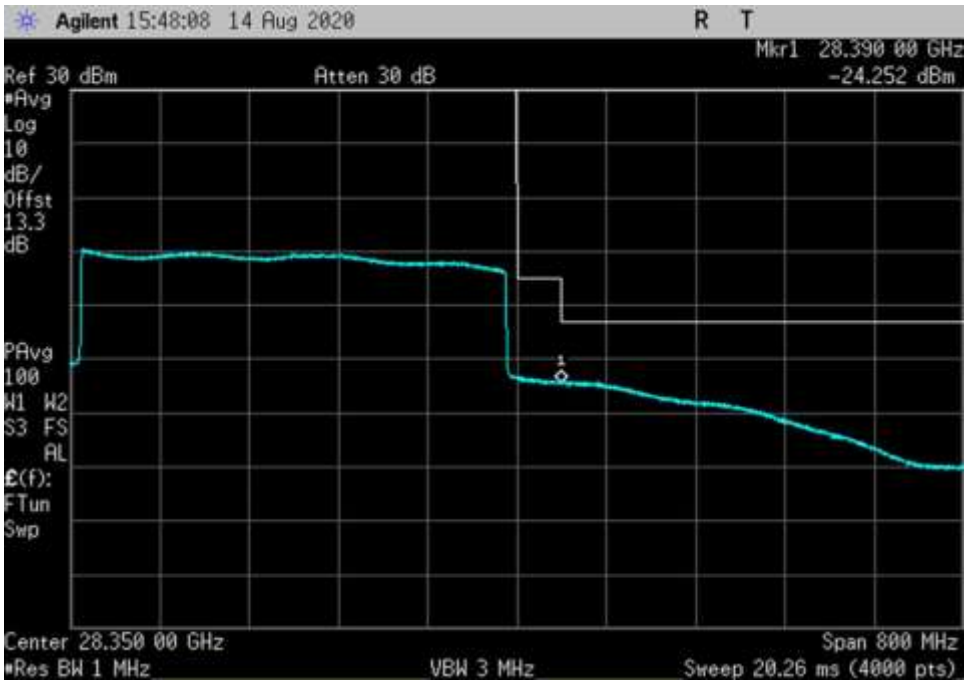

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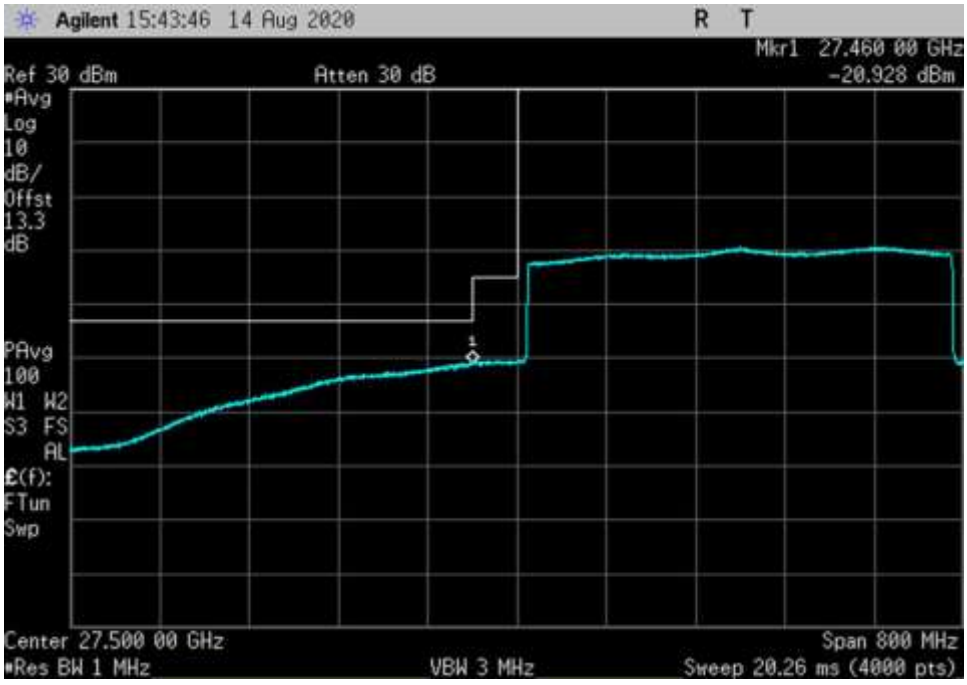

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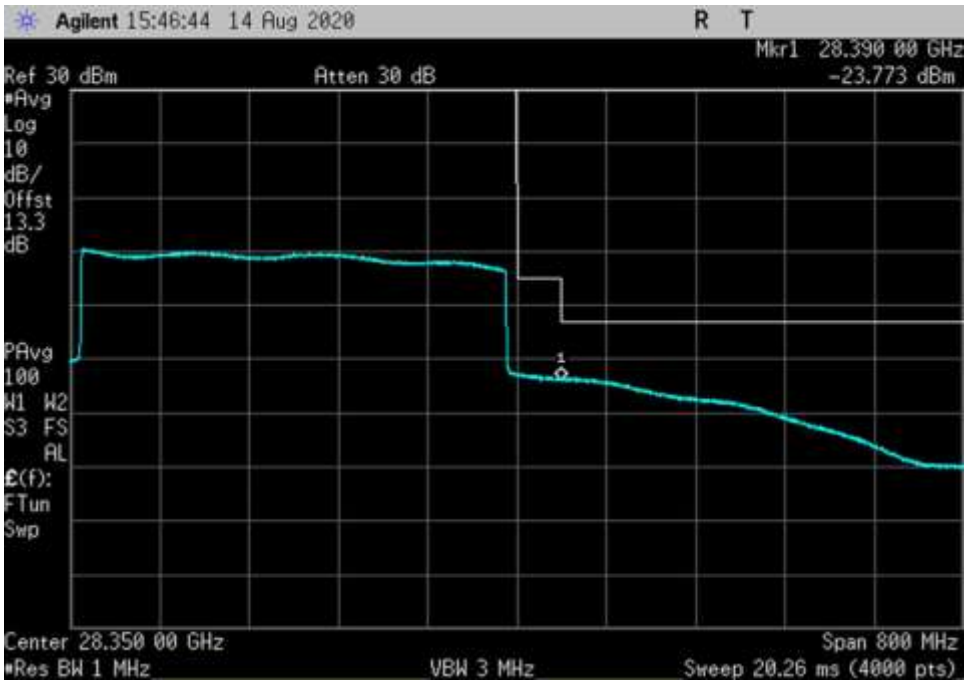

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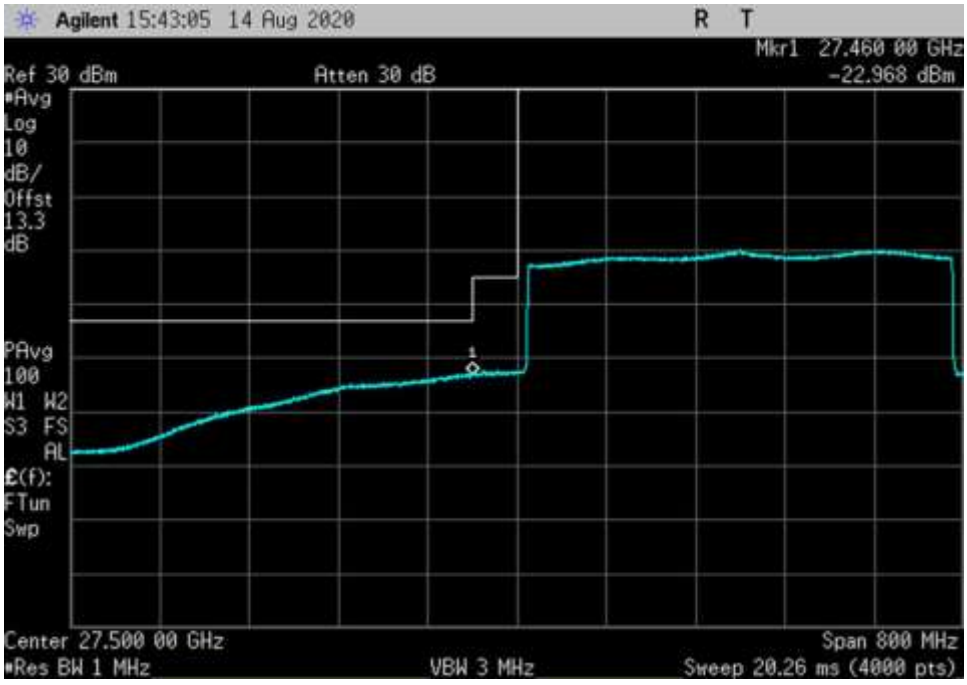

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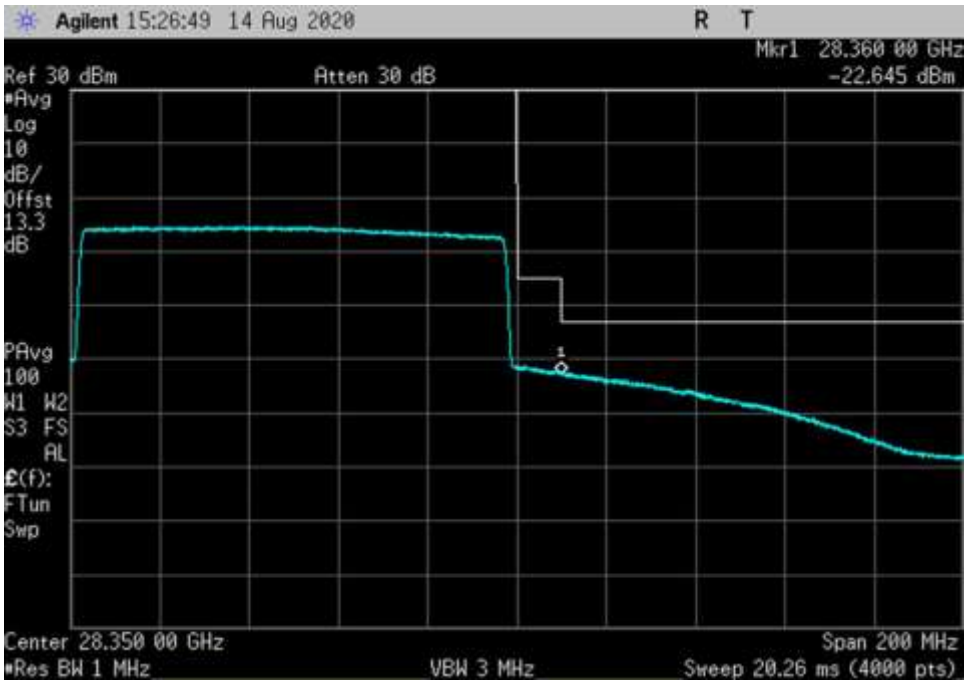
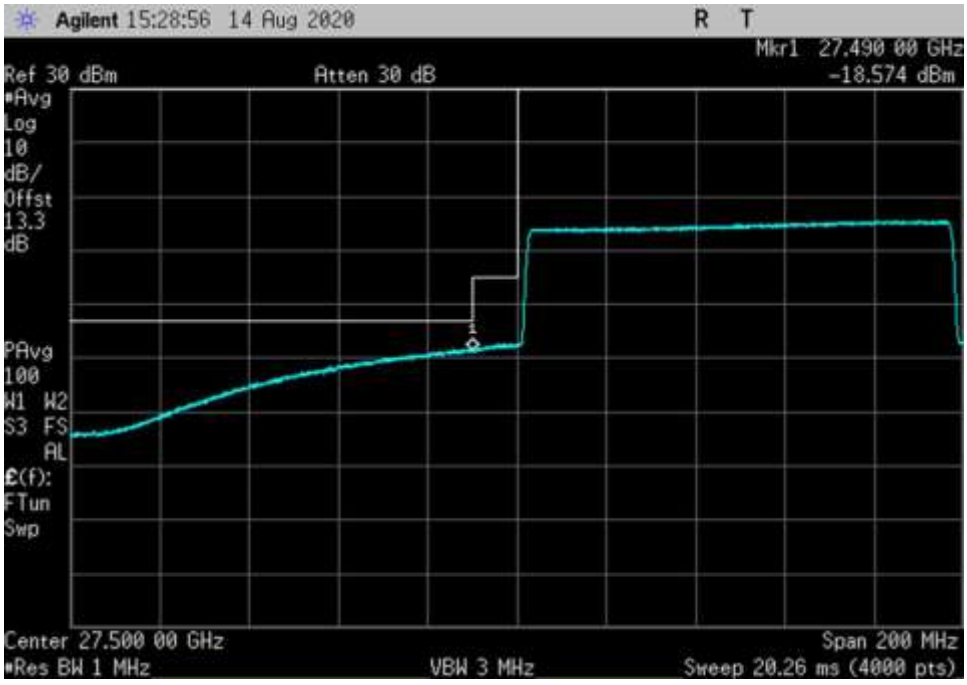


DL_27500-28350_64QAM-100MHz-V-AGC+3-CP OFDM_HC



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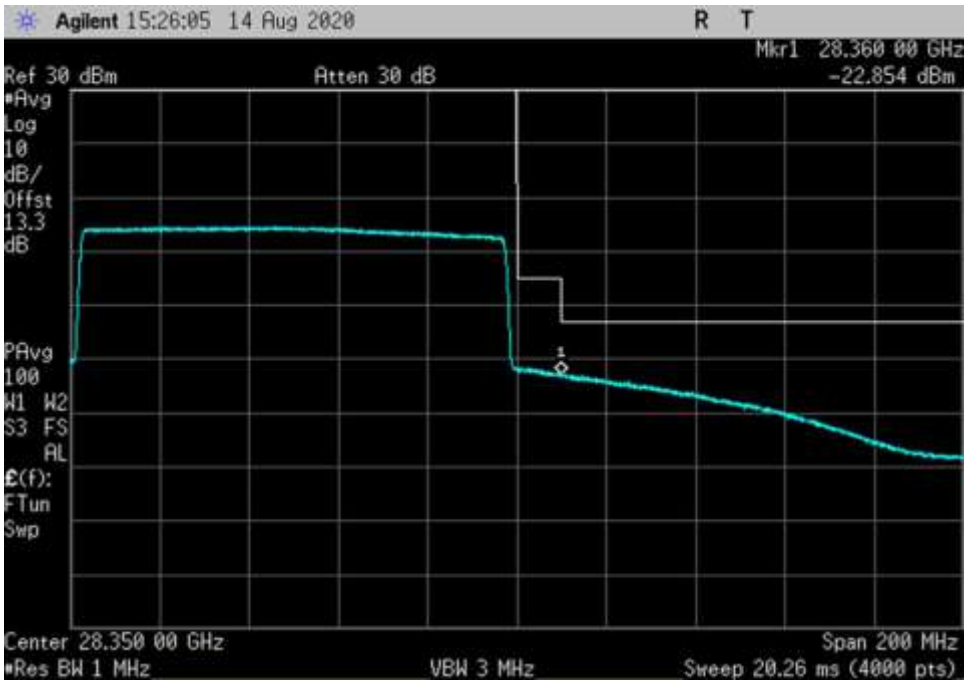

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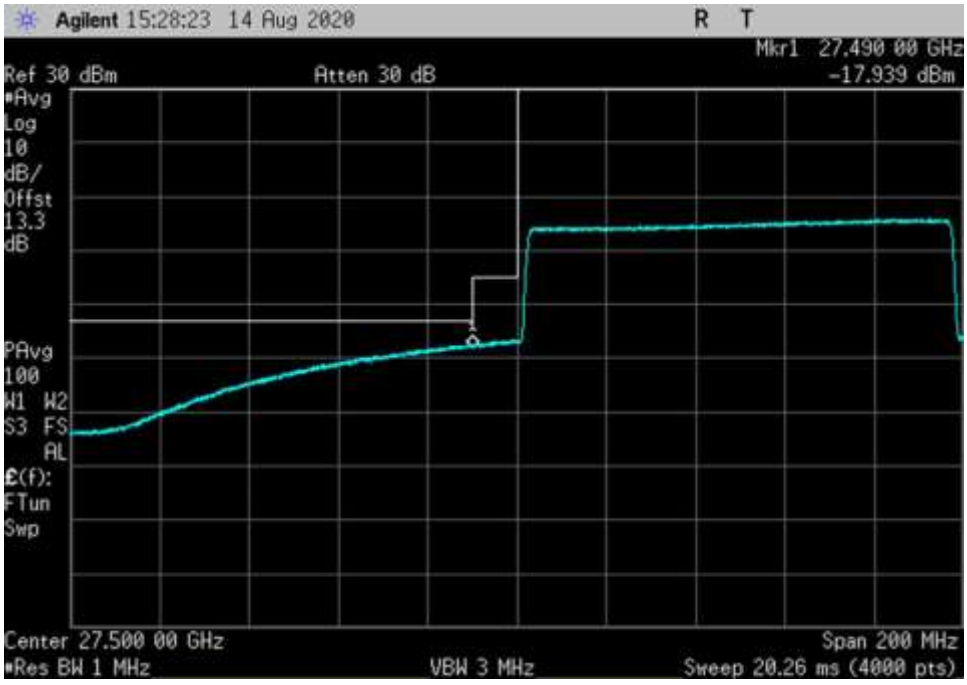

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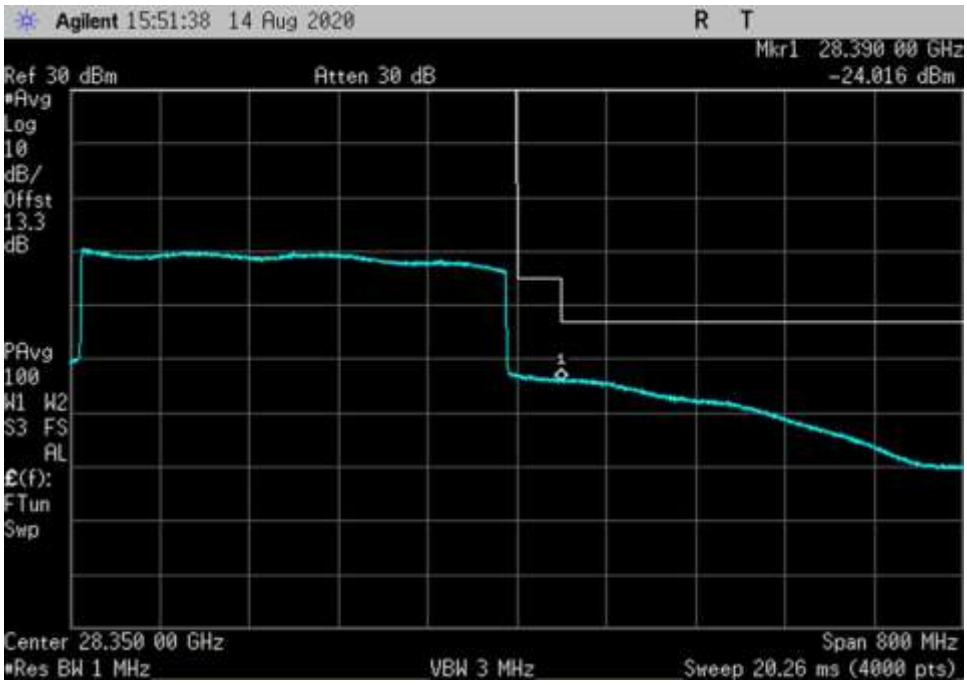

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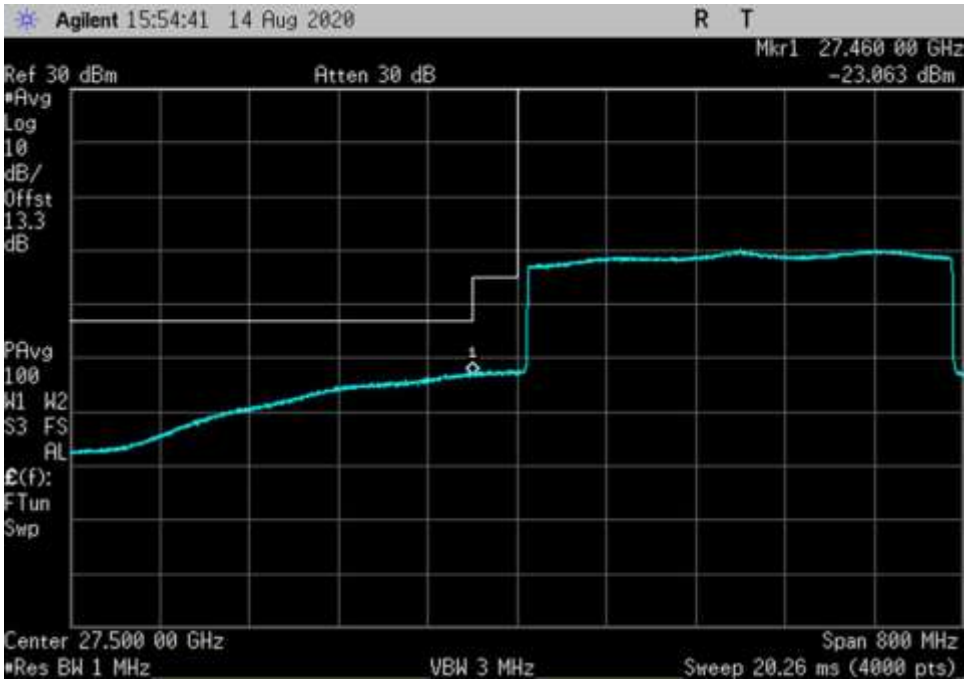
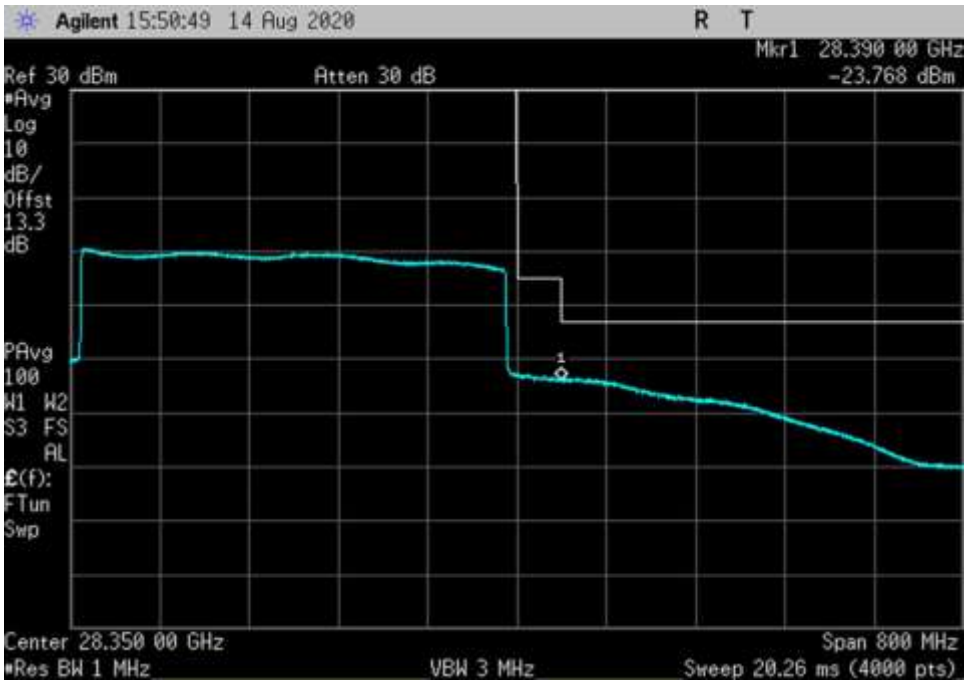


DL_27500-28350_64QAM-400MHz-V-AGC+3-CP OFDM_LC



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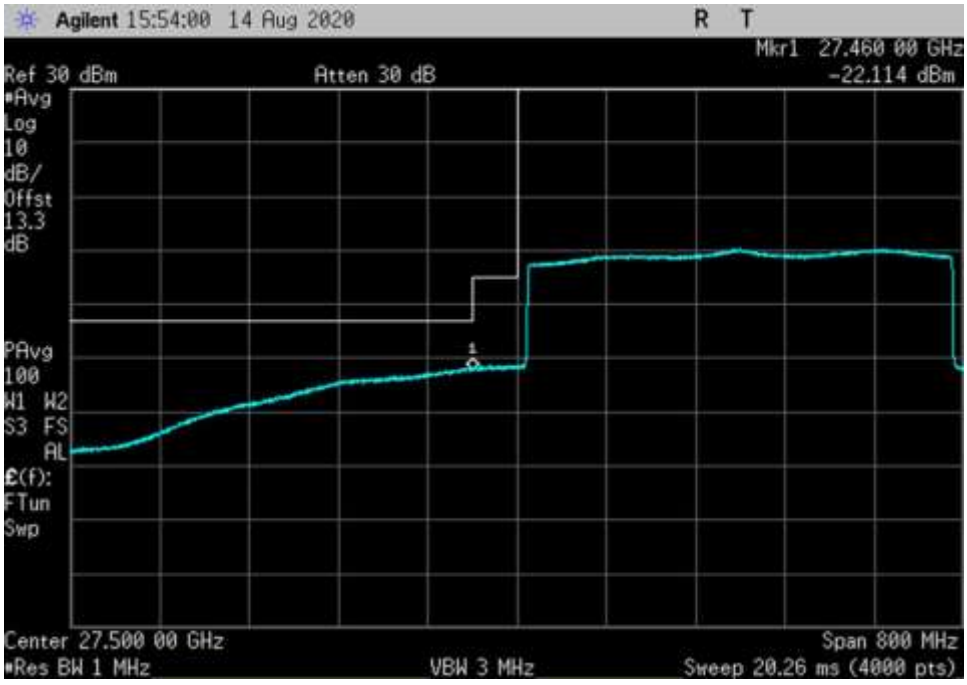

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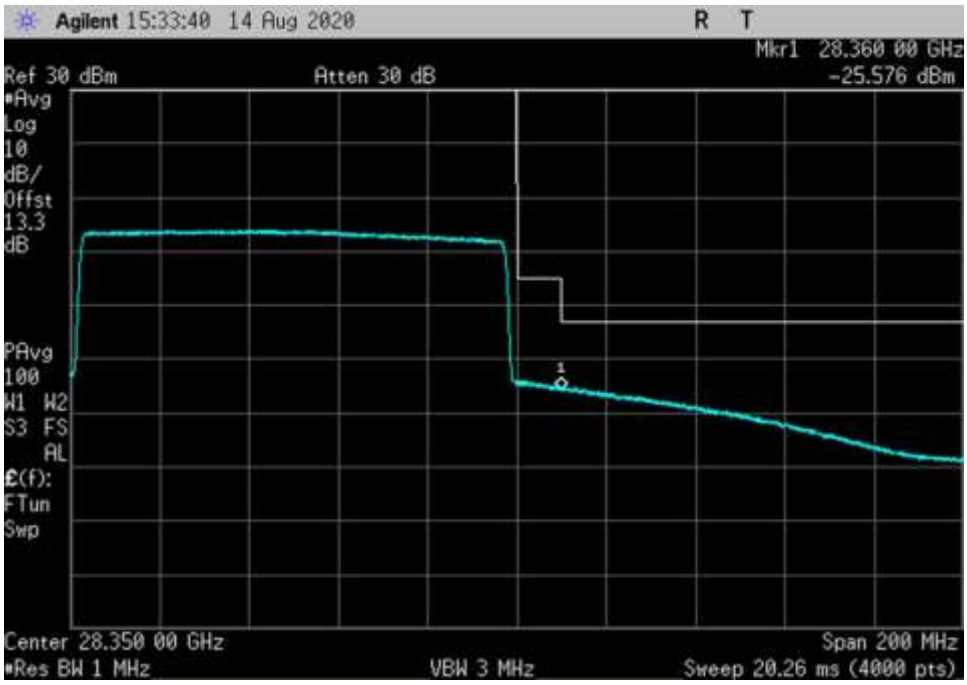

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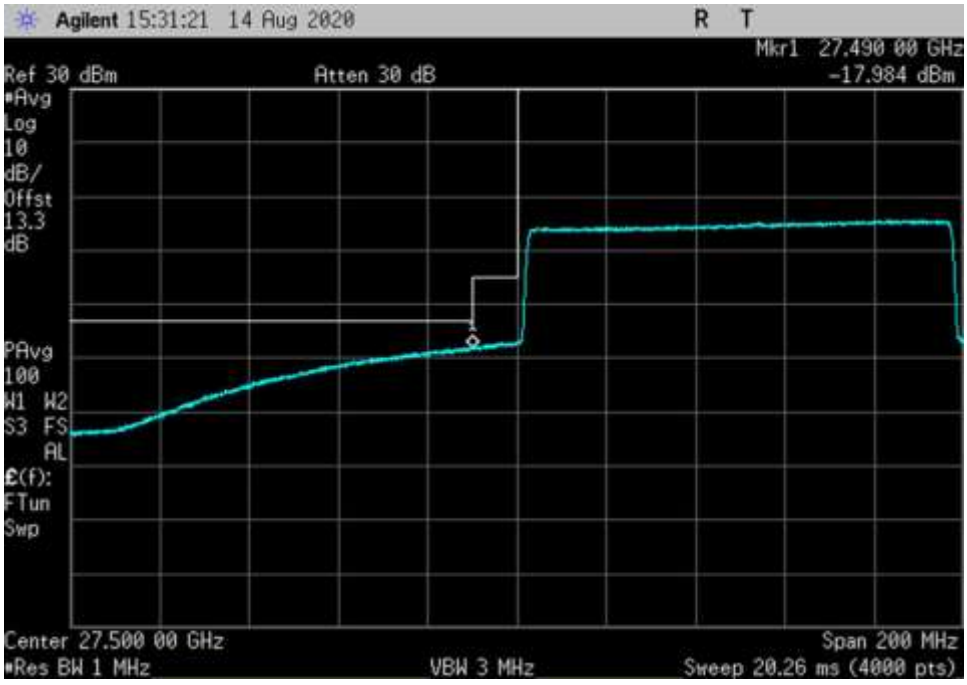

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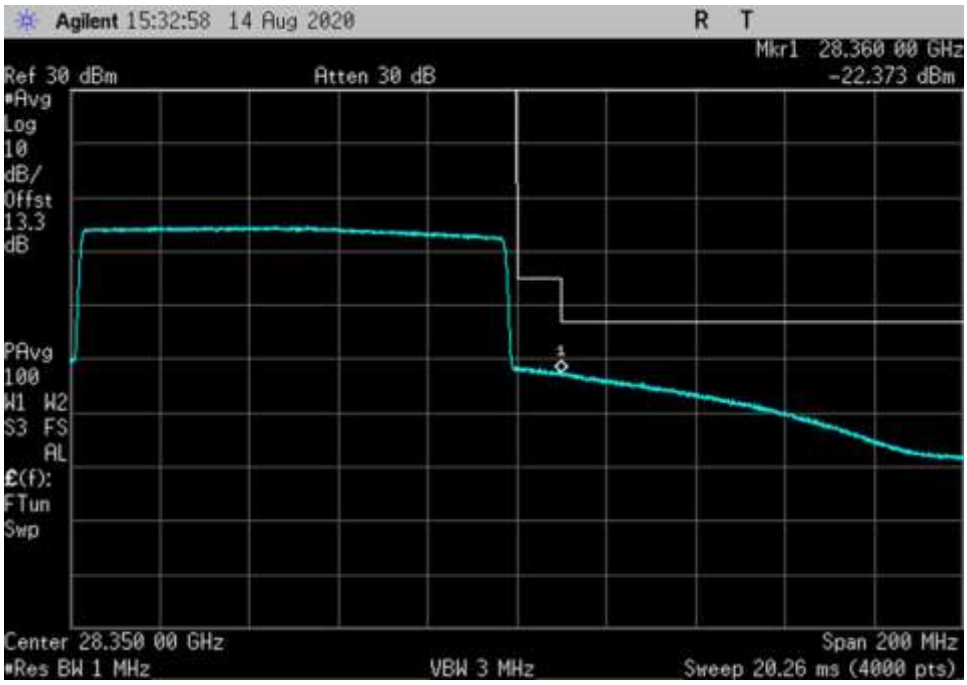

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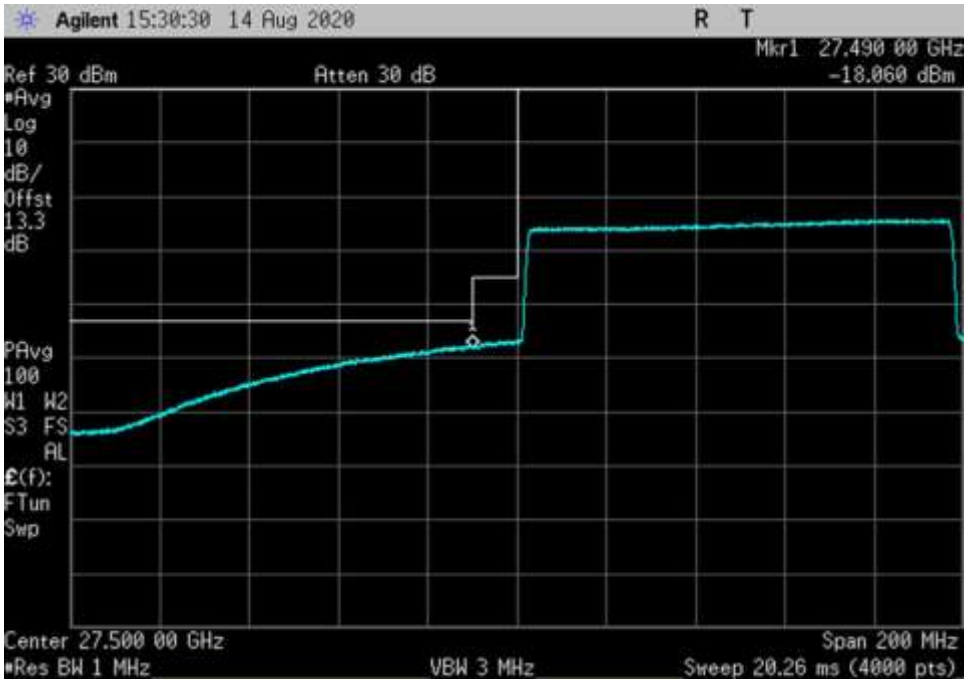

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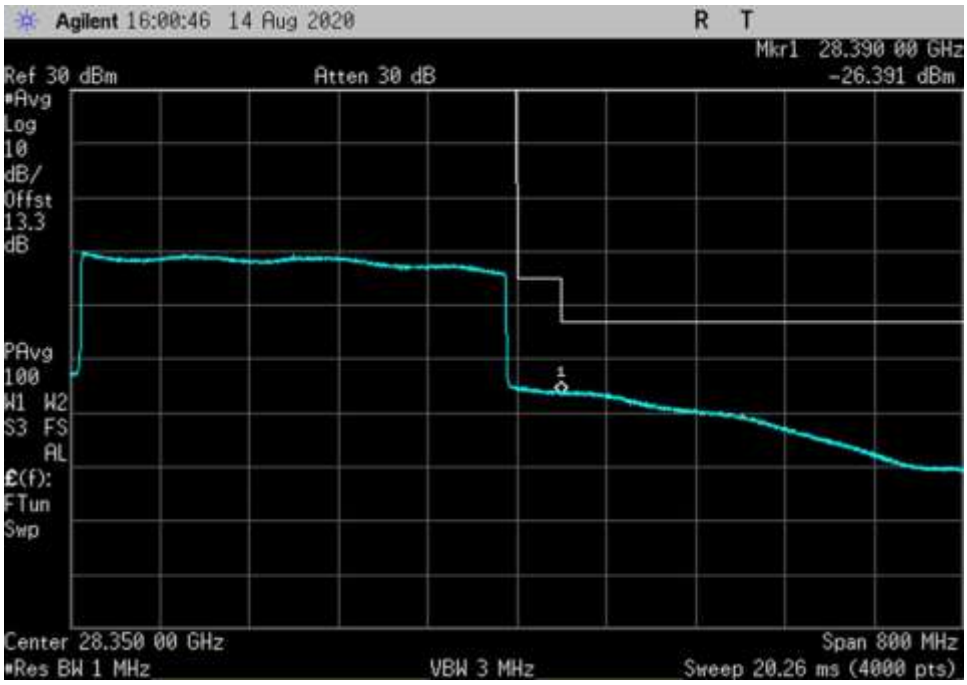

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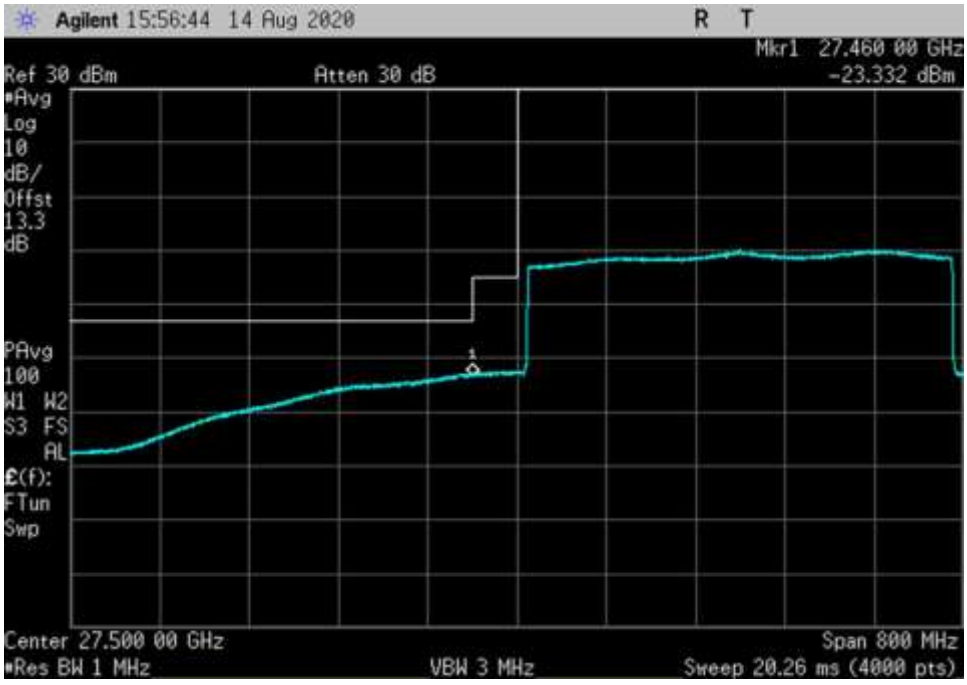

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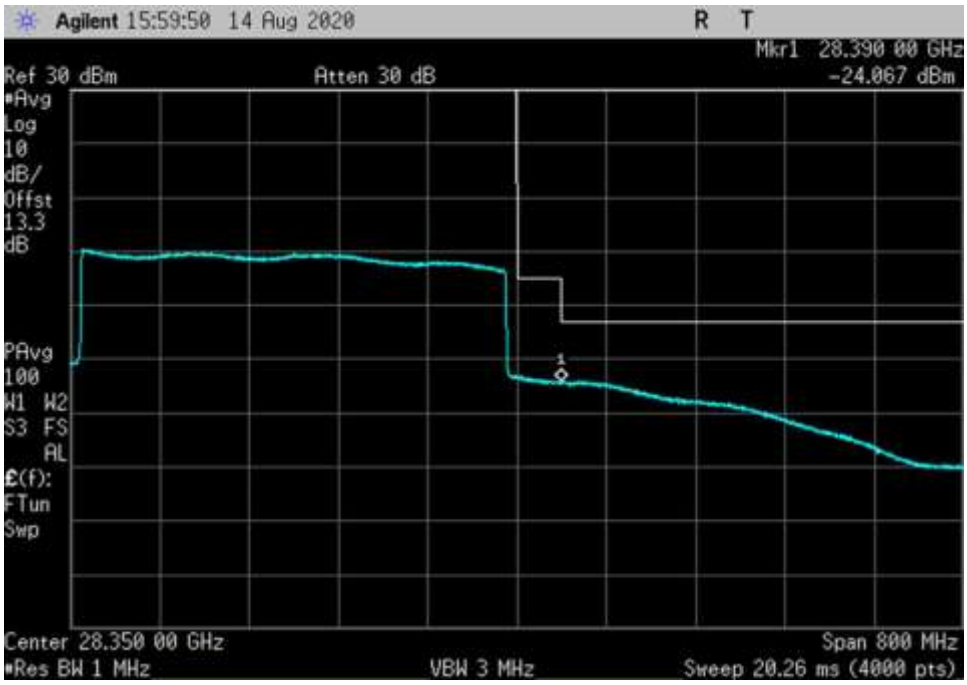

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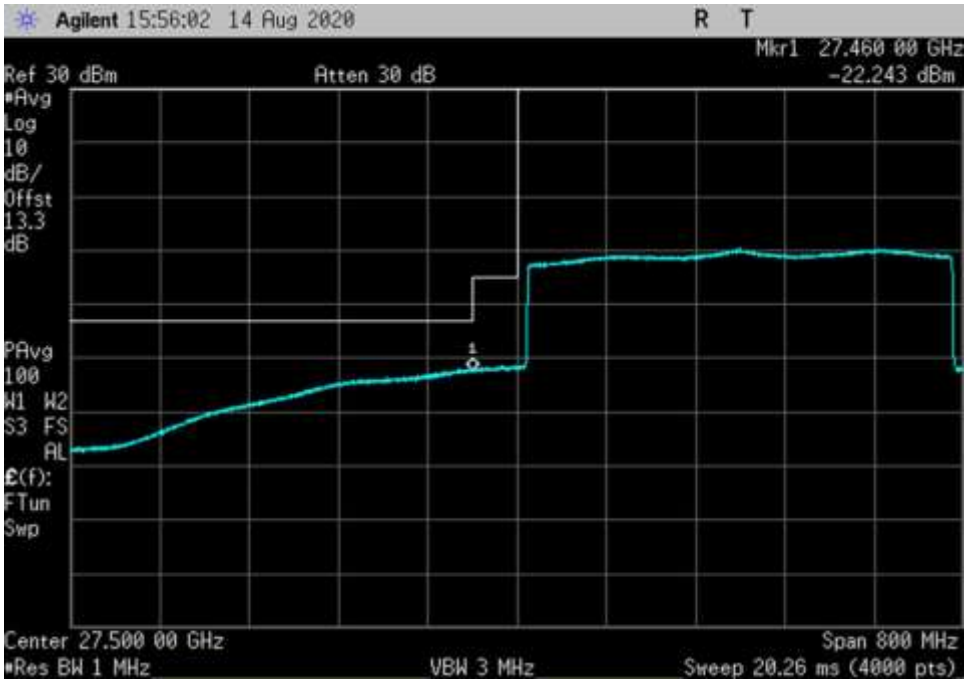

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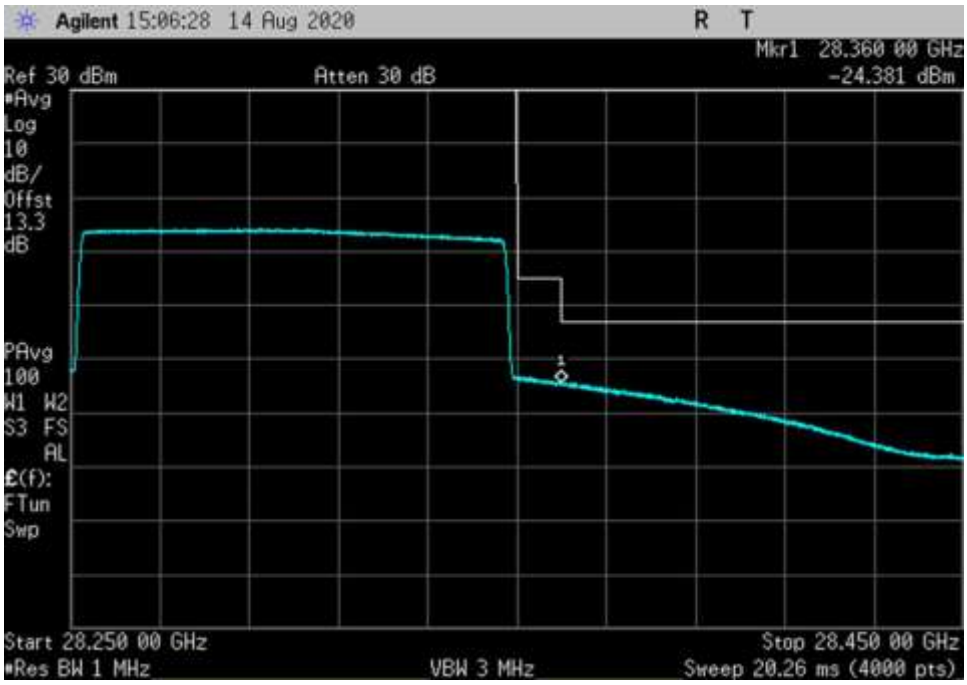
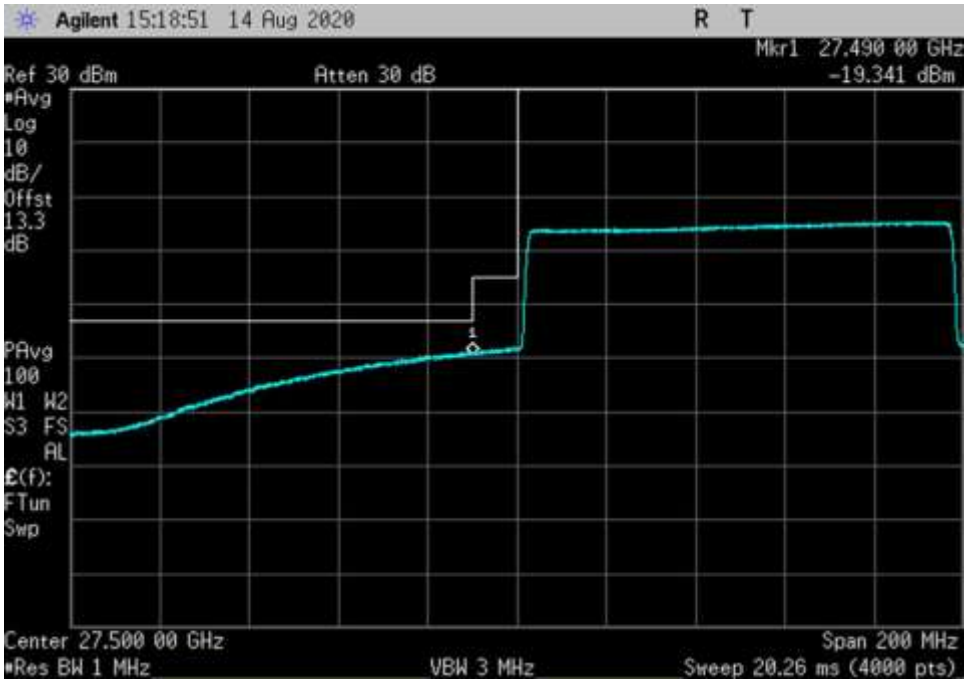


DL_27500-28350_QPSK-100MHz-V-AGC+3-CP OFDM_HC



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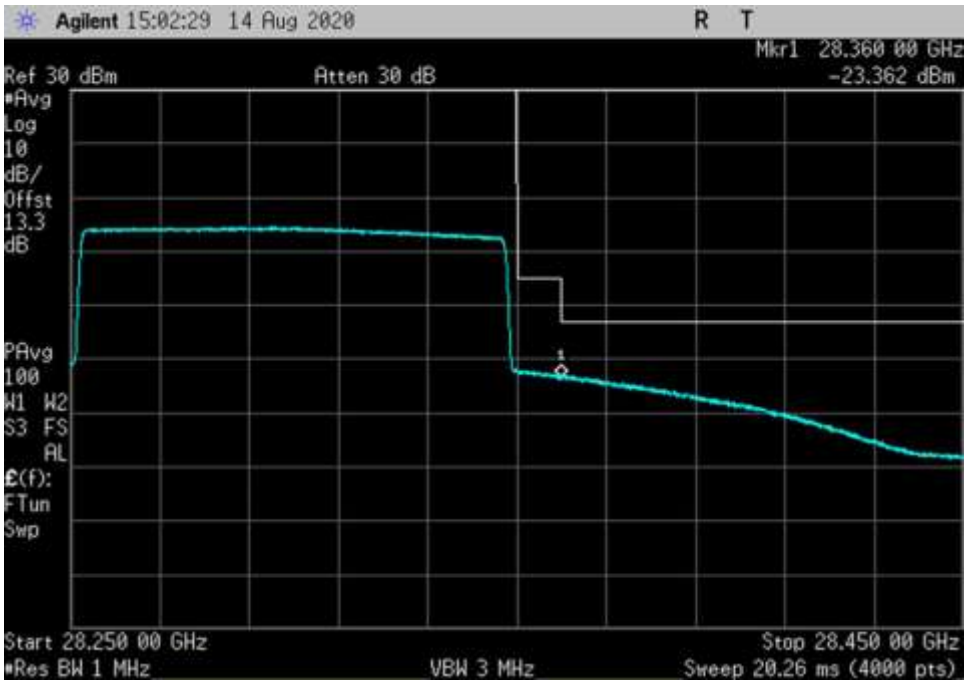

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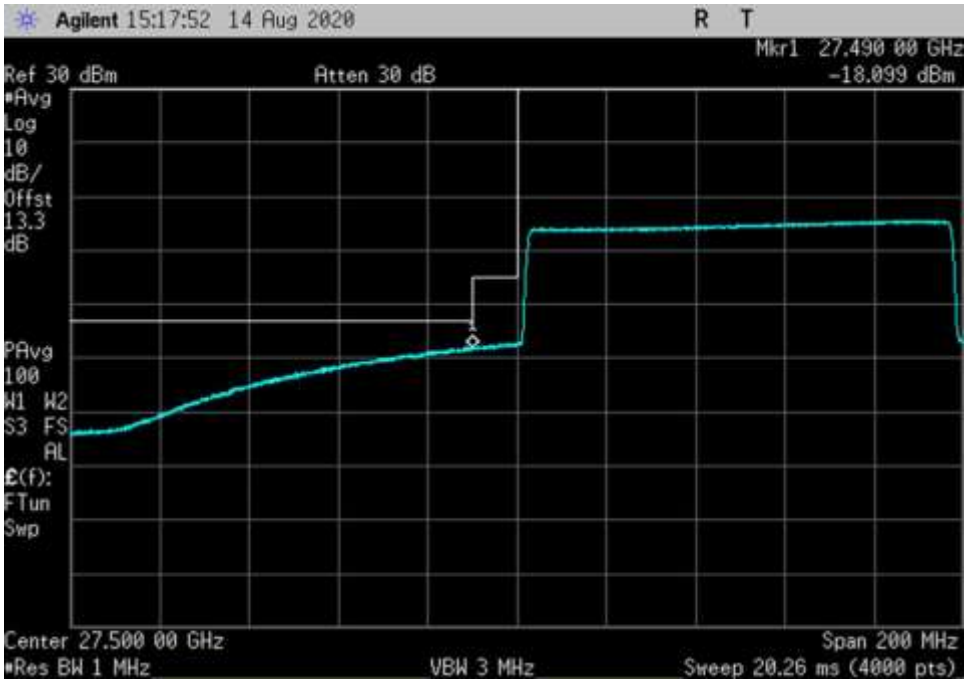

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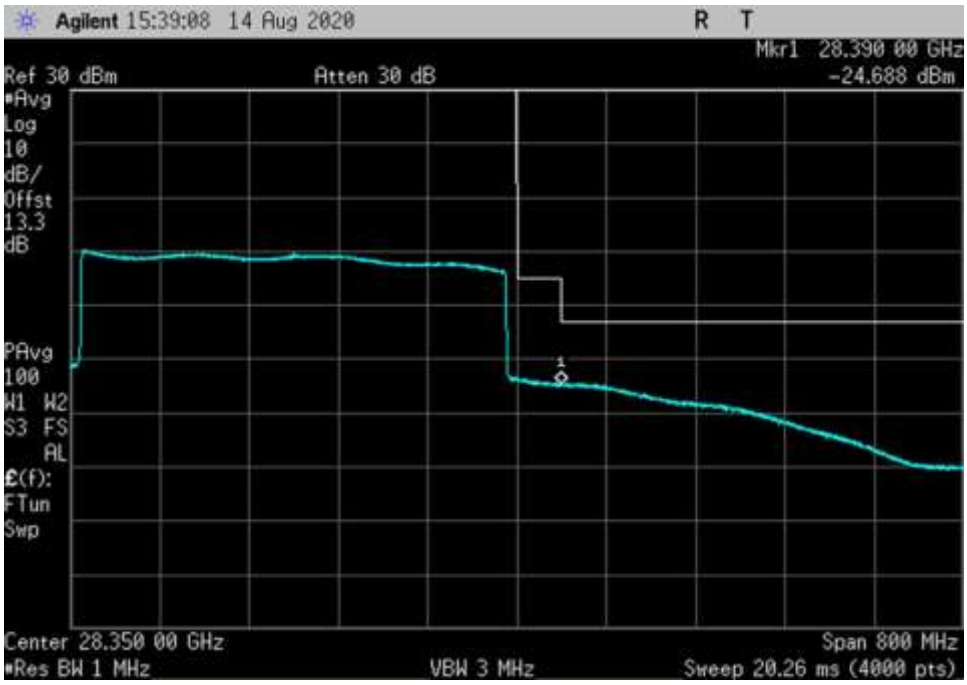
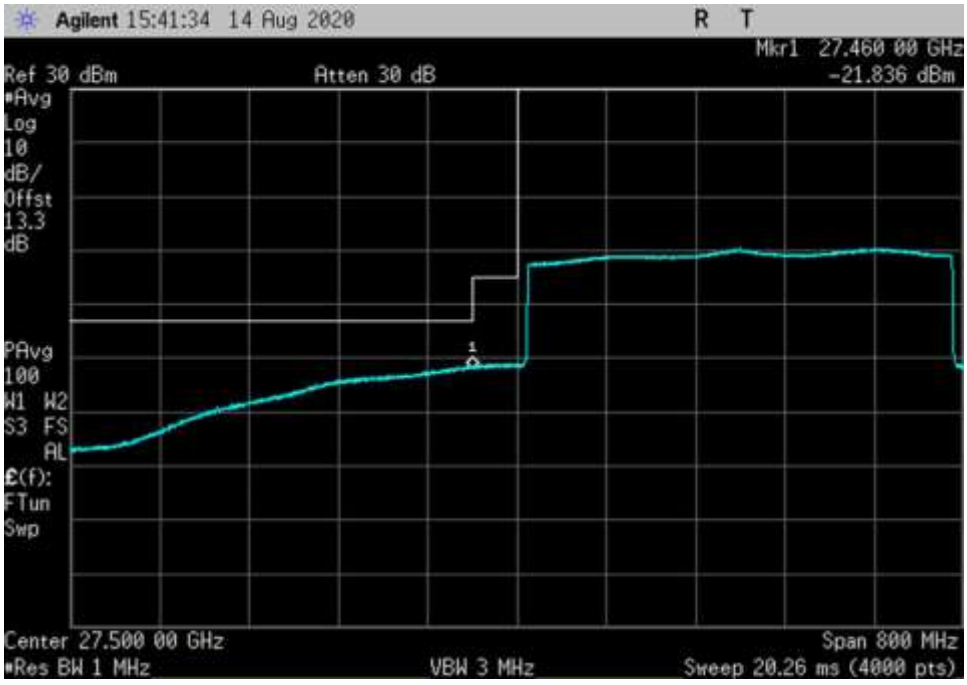
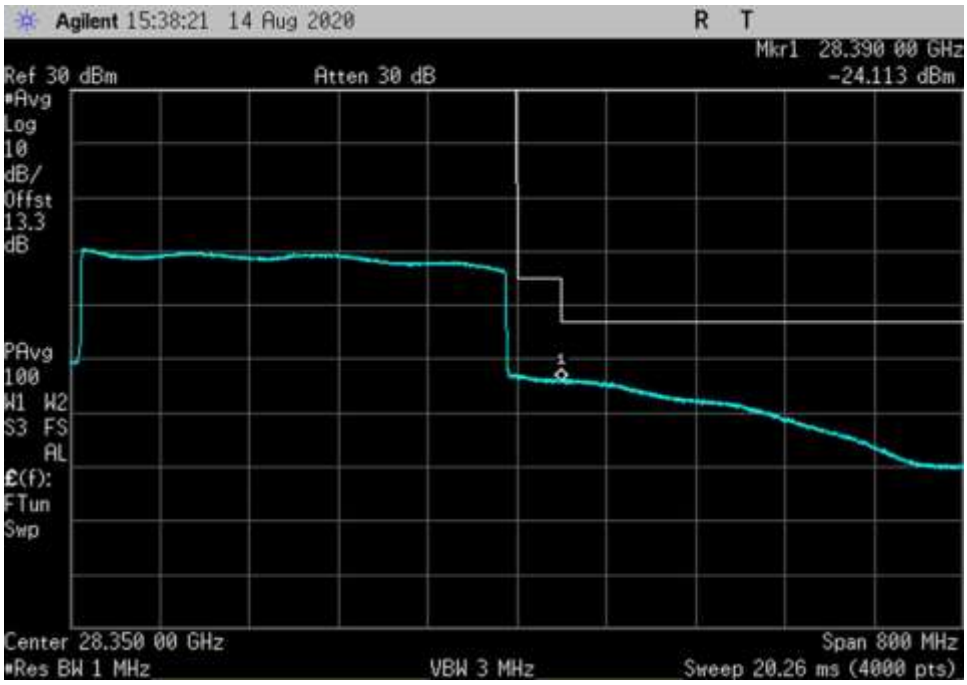


DL_27500-28350_QPSK-400MHz-V-AGC+3-CP OFDM_HC



DL_27500-28350_QPSK-400MHz-V-AGC+3-CP OFDM_LC



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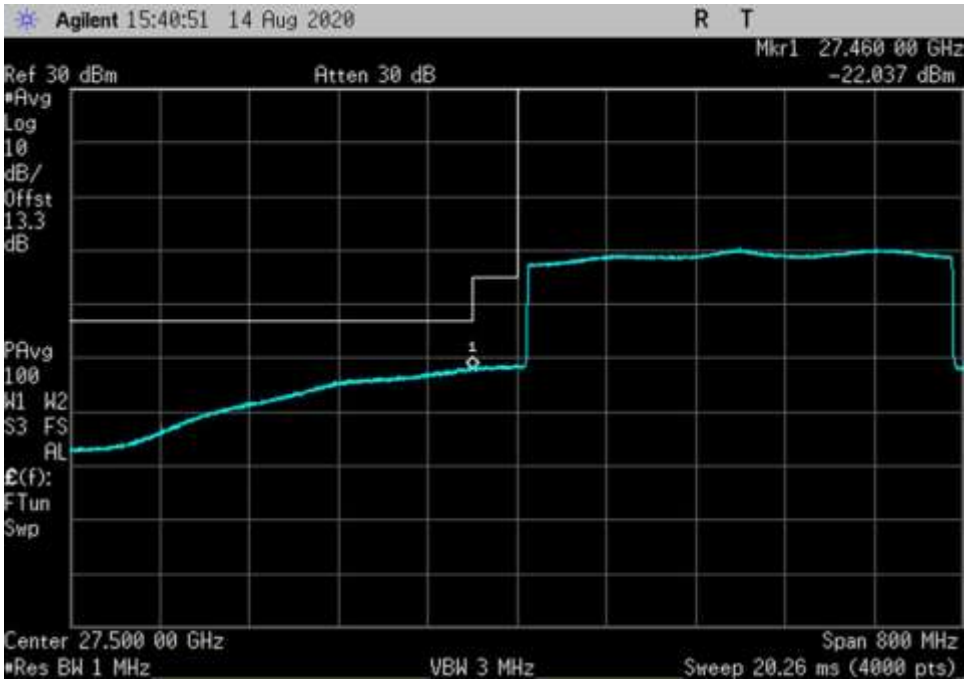

DL_27500-28350_QPSK-400MHz-V-CP OFDM_LC

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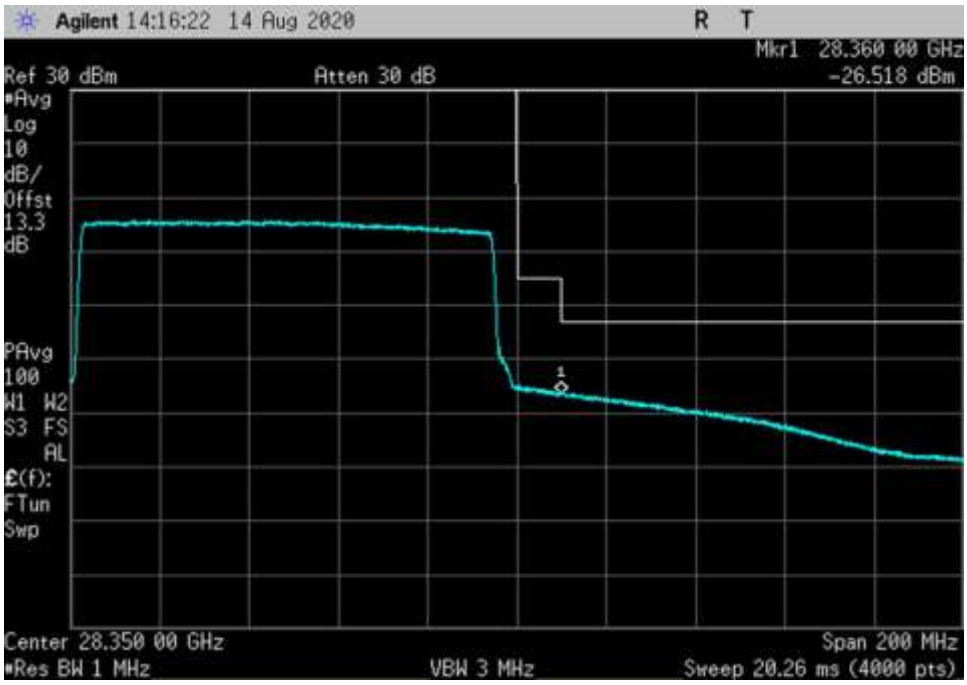
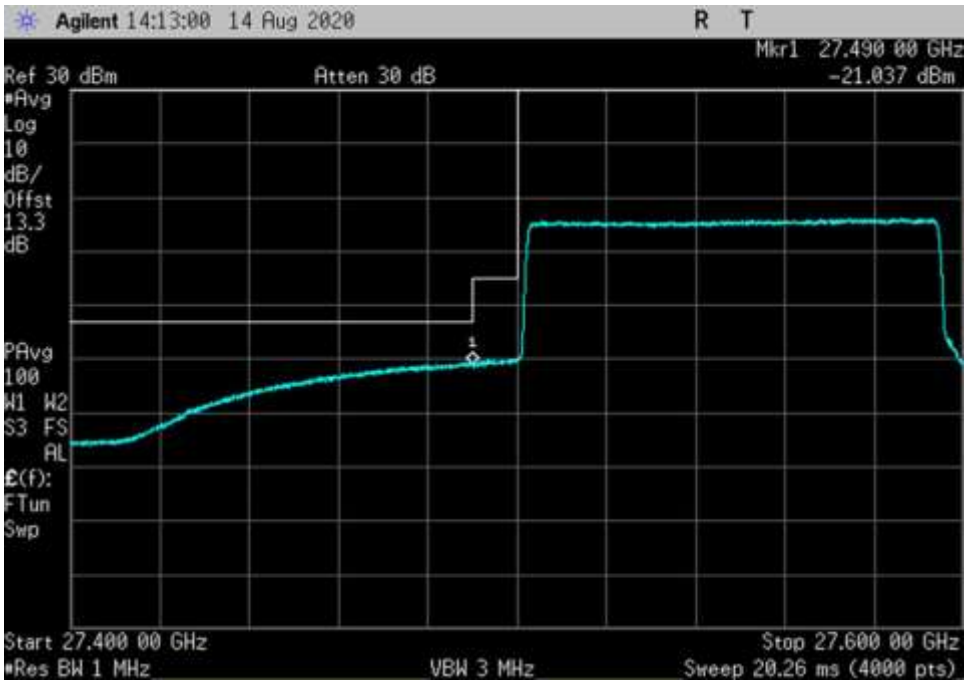
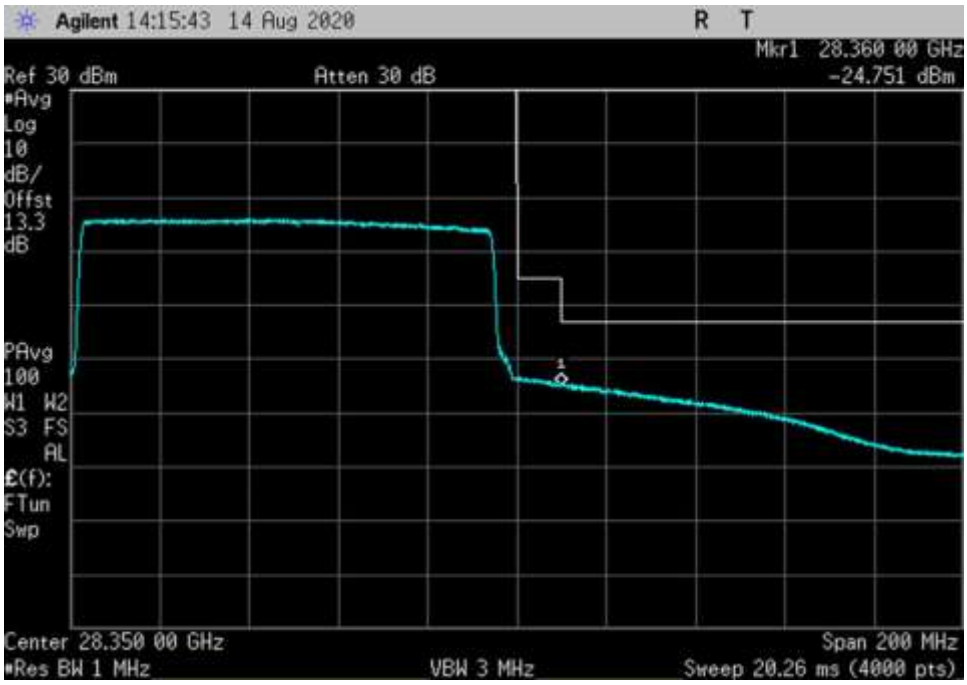


UL_27500-28350-16QAM-100MHz-H-AGC+3-DFT OFDM_HC



UL_27500-28350-16QAM-100MHz-H-AGC+3-DFT OFDM_LC



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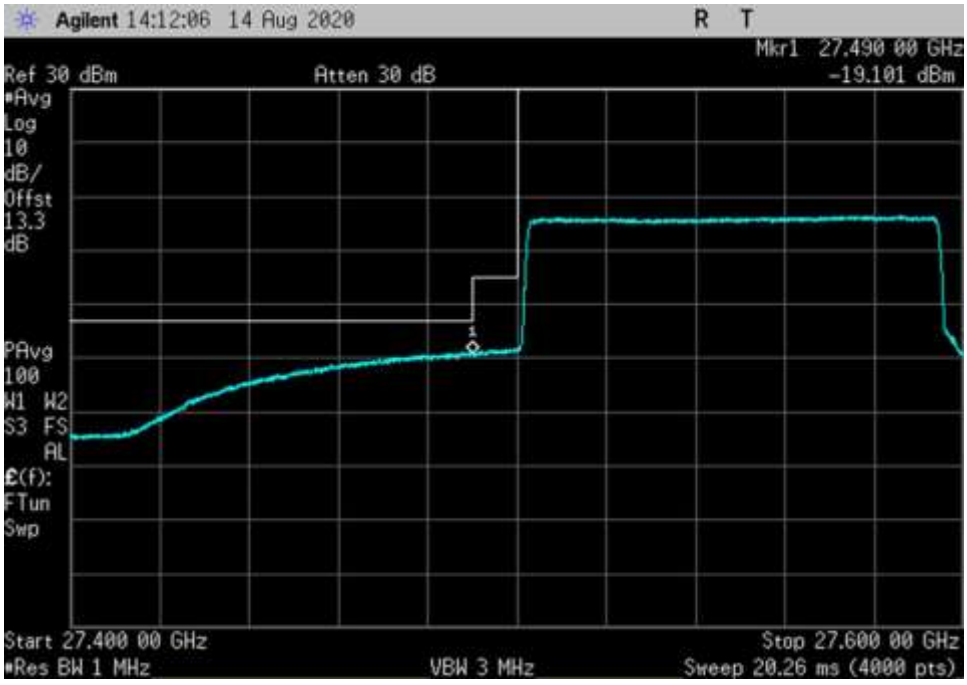
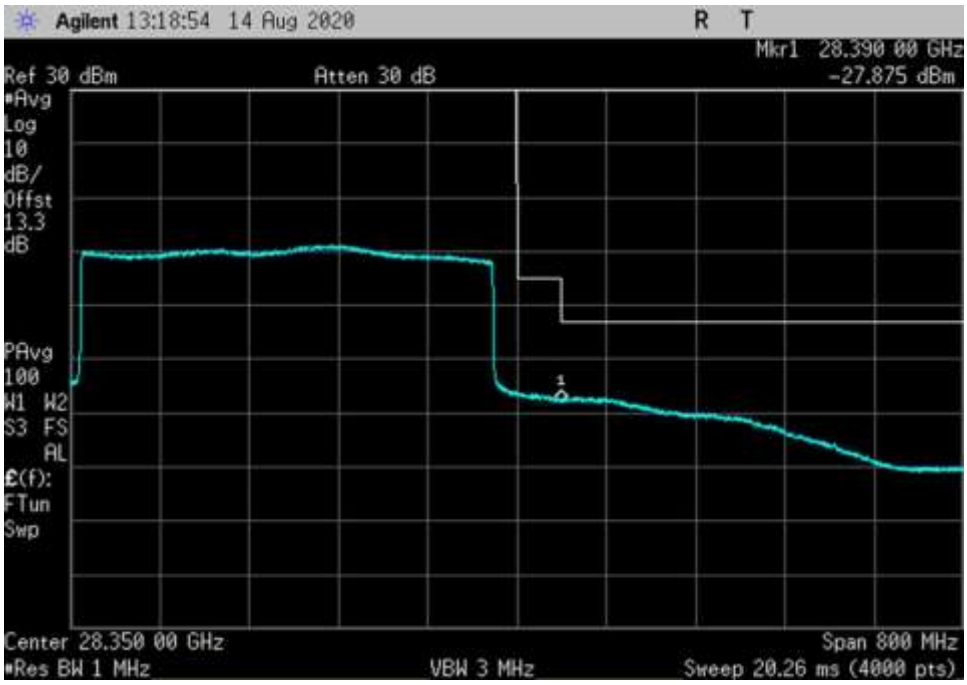
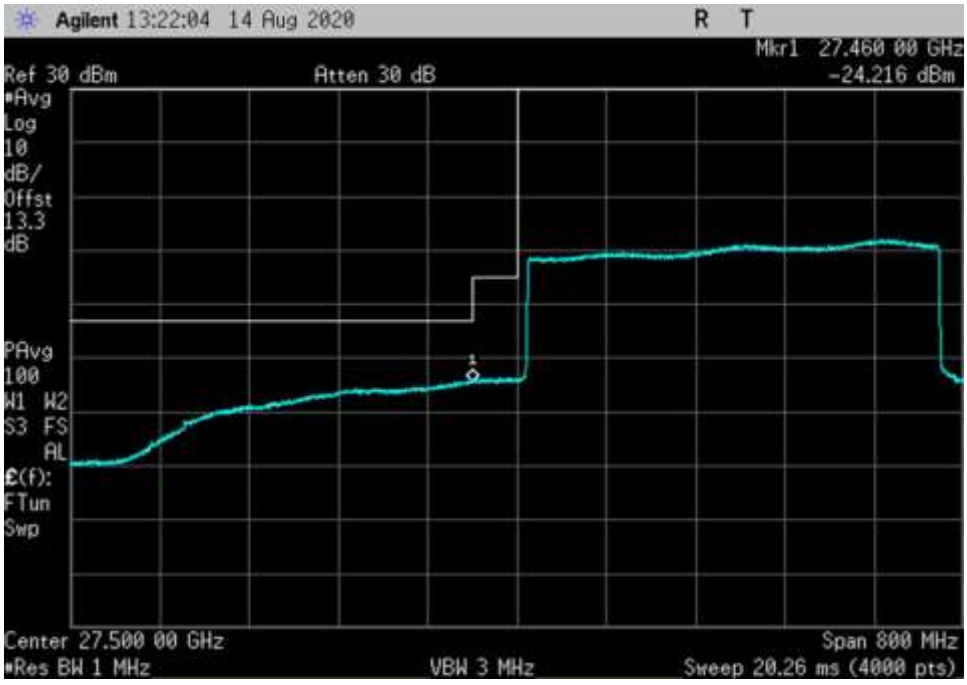


UL_27500-28350-16QAM-100MHz-H-DFT OFDM_LC



UL_27500-28350-16QAM-400MHz-H-AGC+3-DFT OFDM_HC



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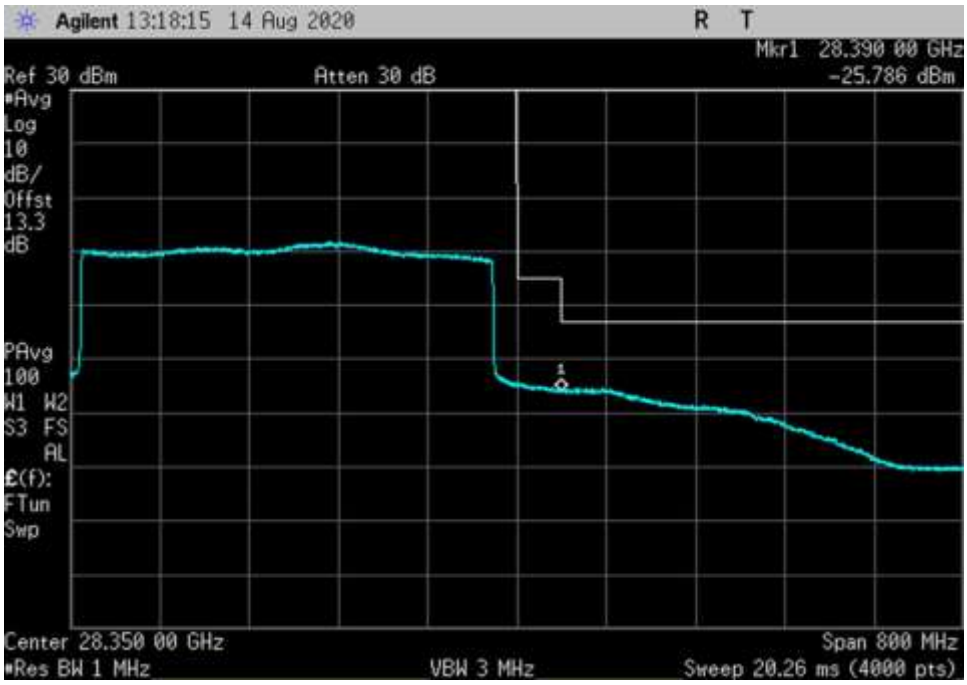

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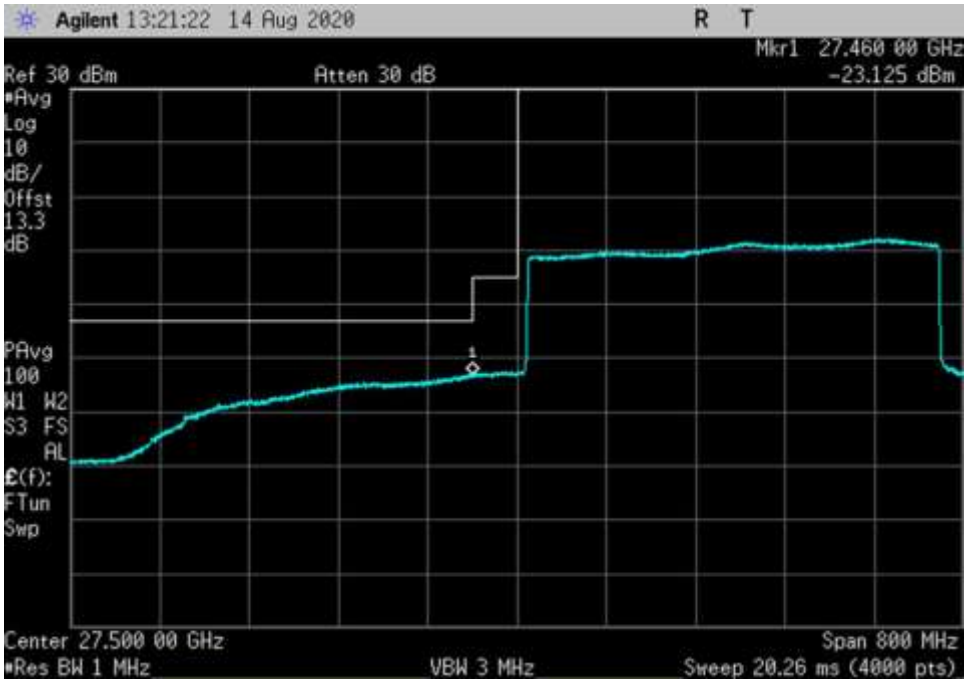

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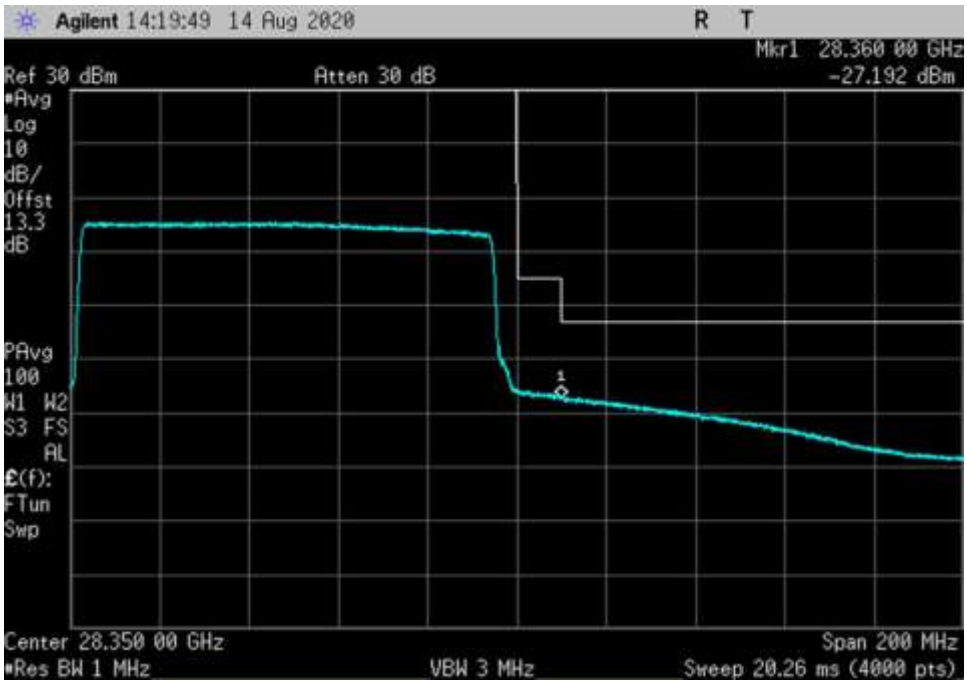
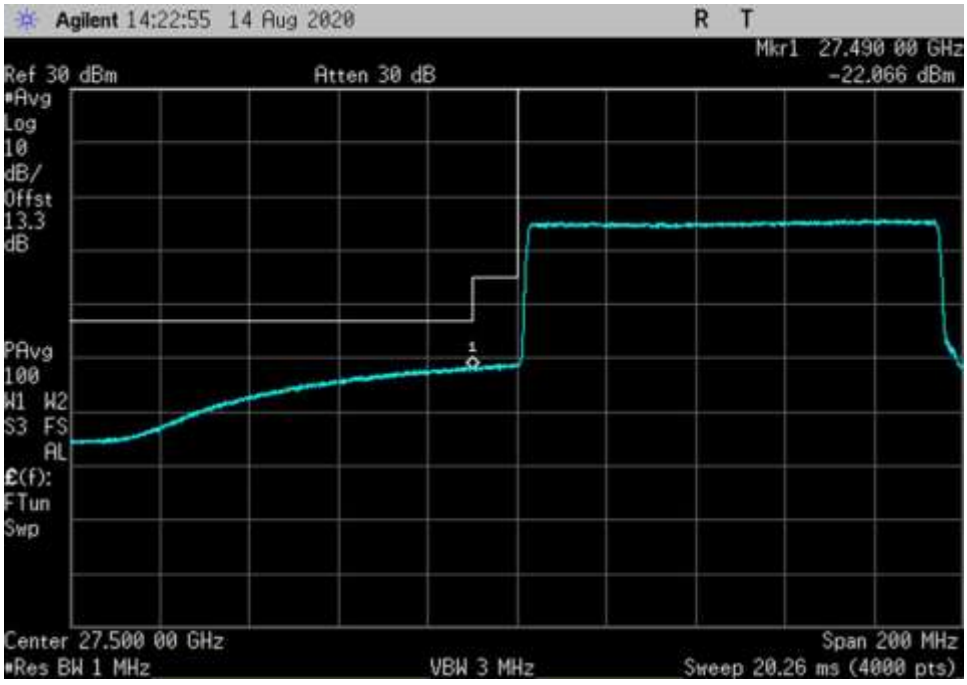
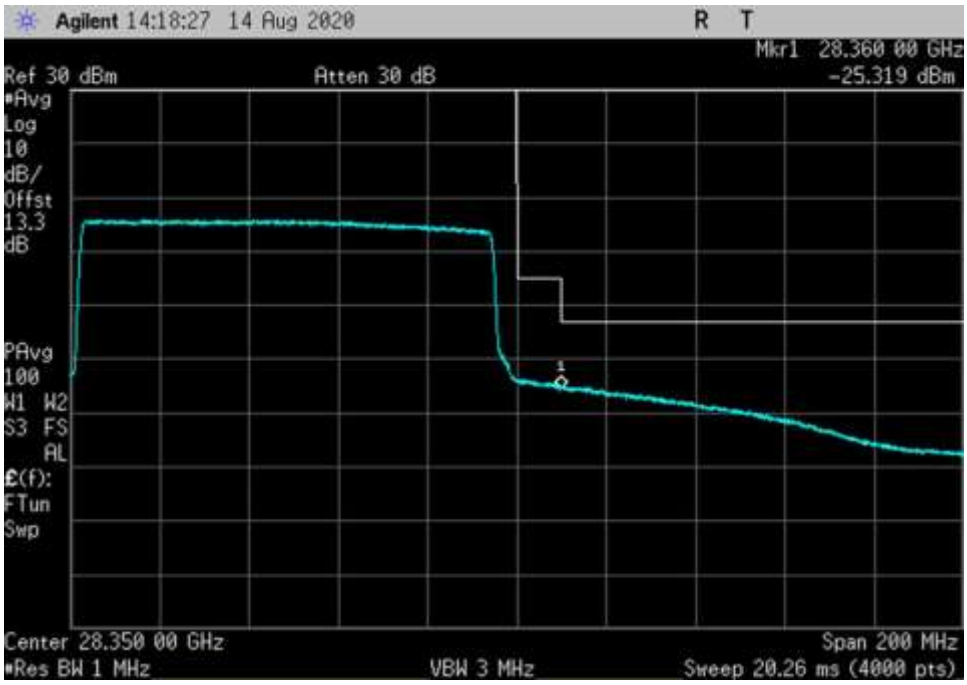


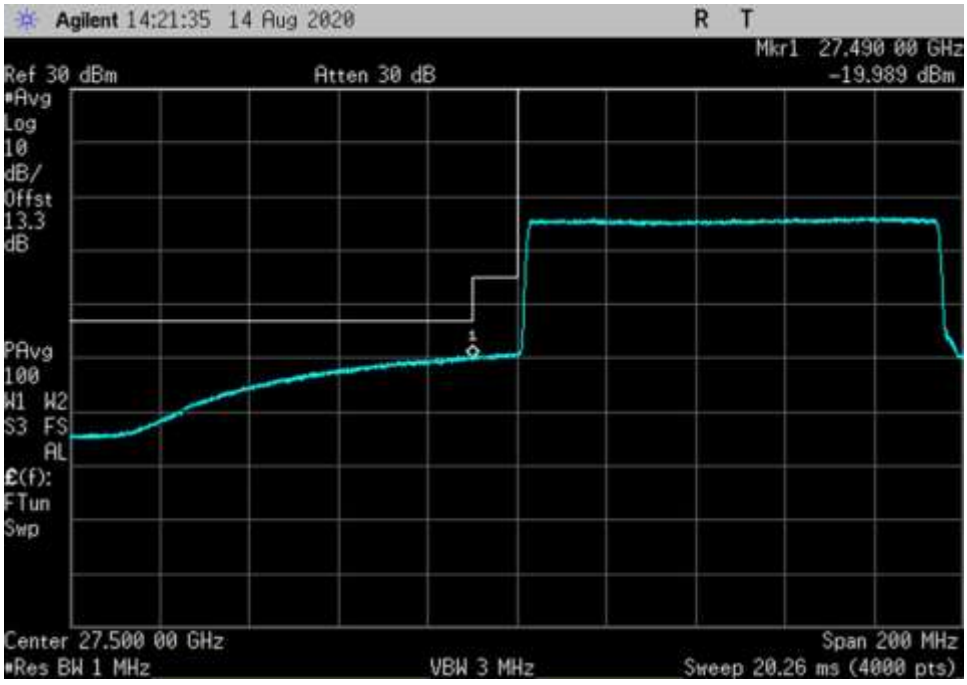
UL_27500-28350-64QAM-100MHz-H-AGC+3-DFT OFDM_HC



UL_27500-28350-64QAM-100MHz-H-AGC+3-DFT OFDM_LC



UL_27500-28350-64QAM-100MHz-H-DFT OFDM_HC



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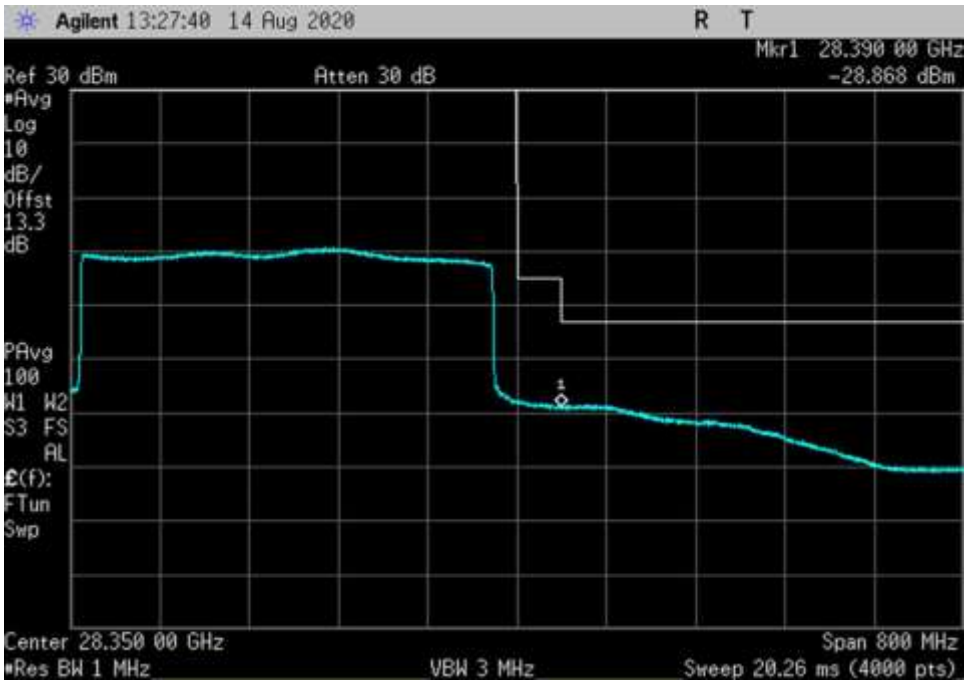

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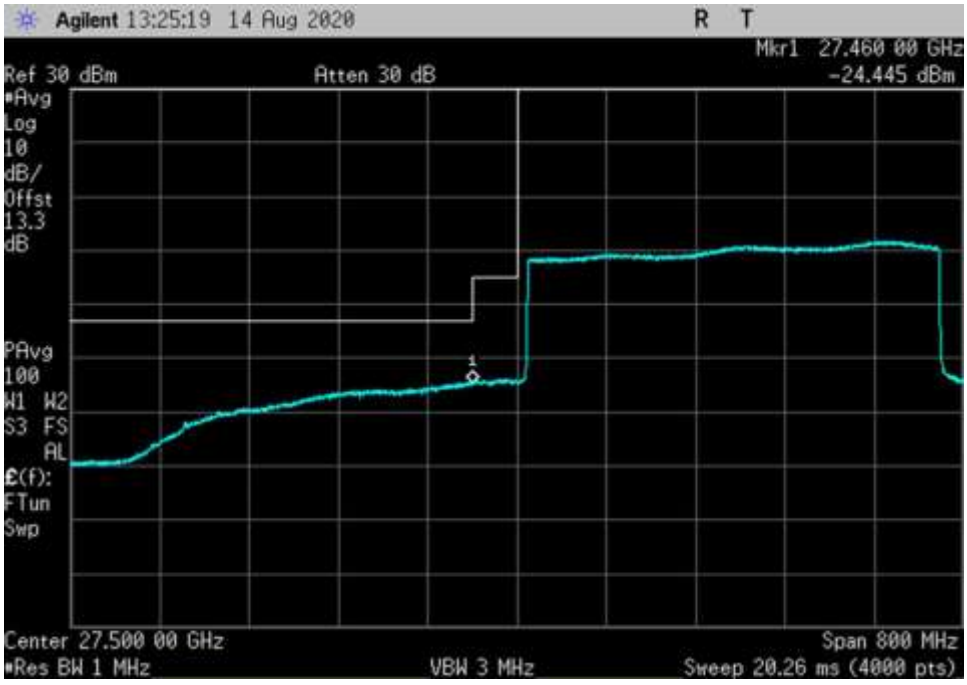

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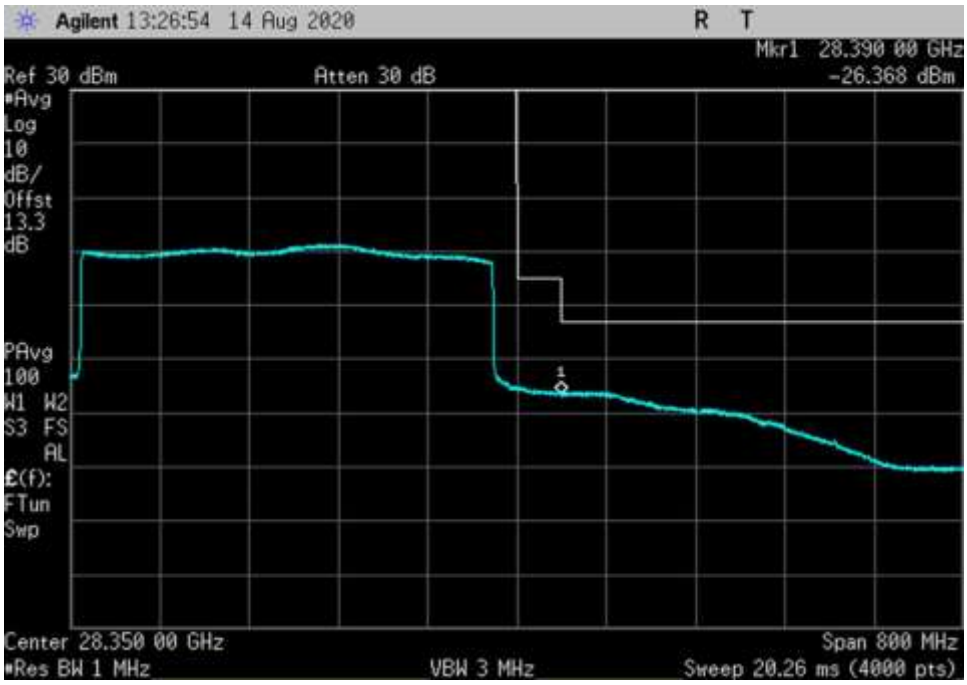

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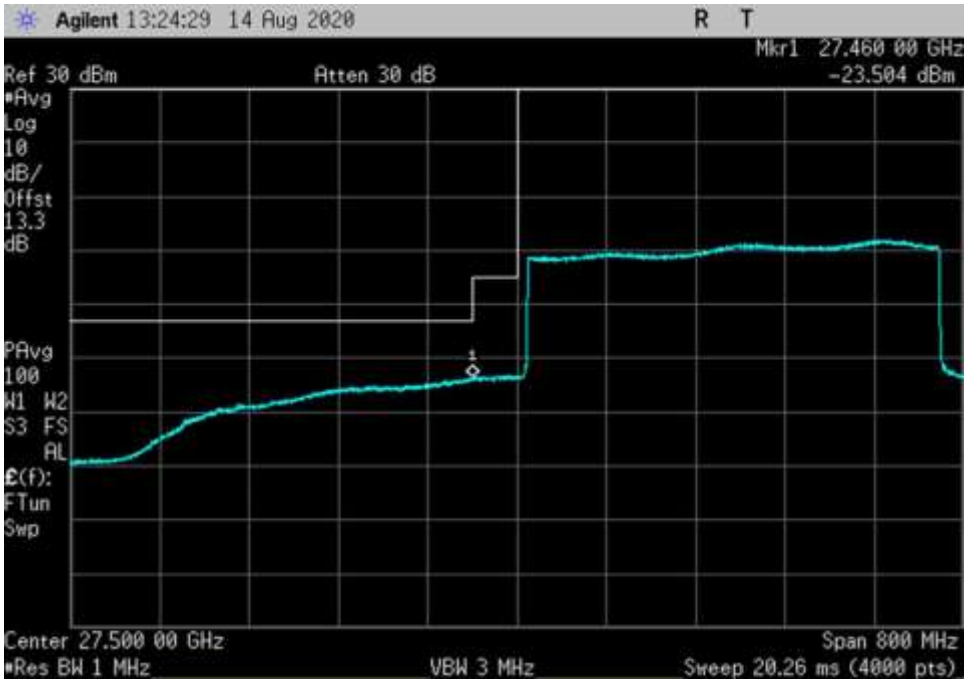

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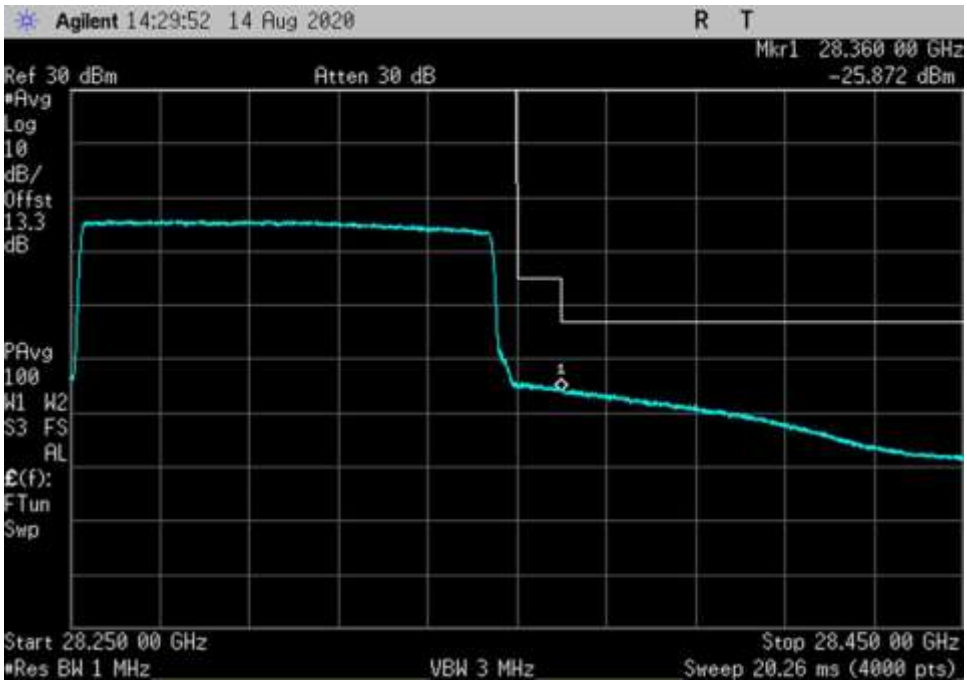

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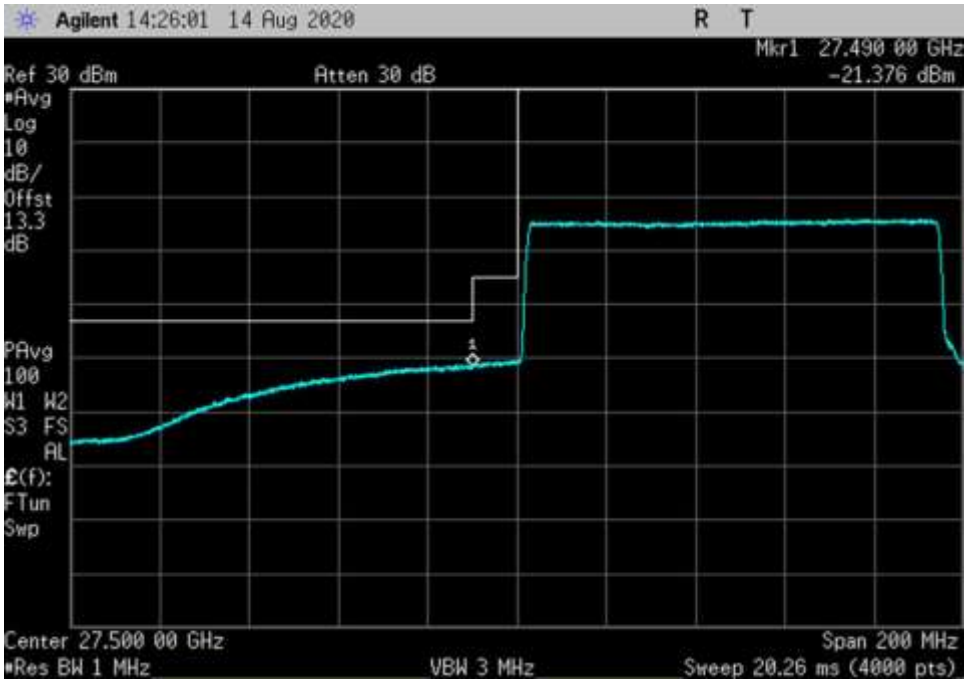

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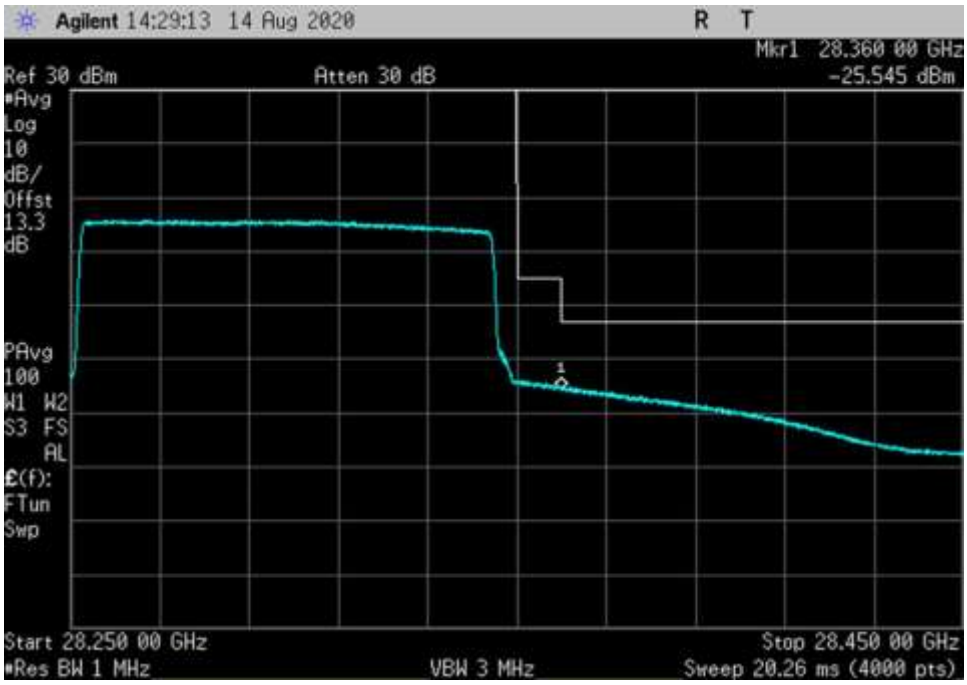

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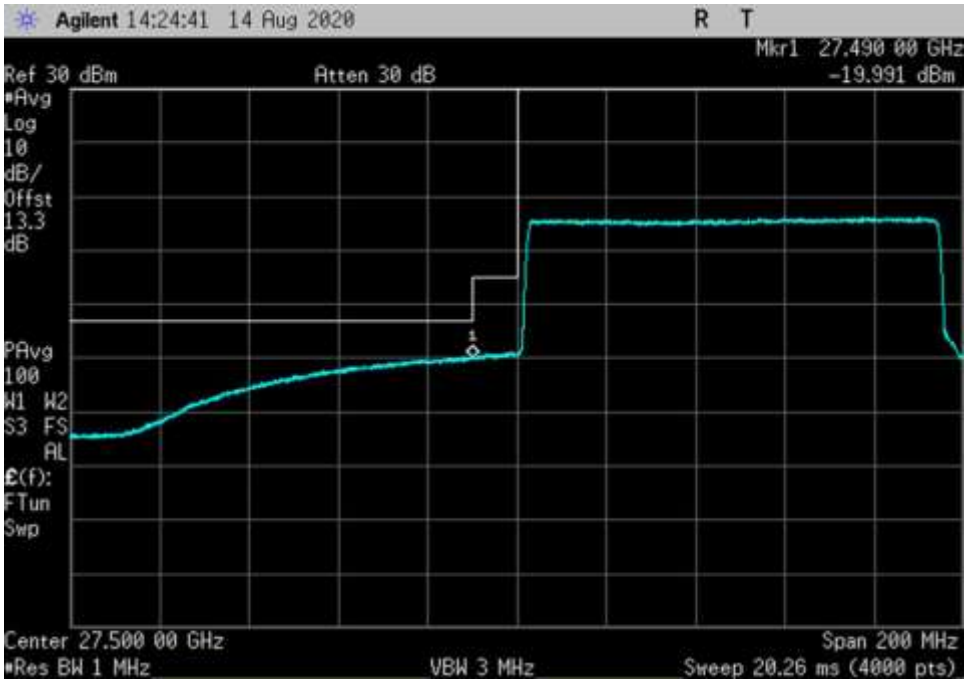

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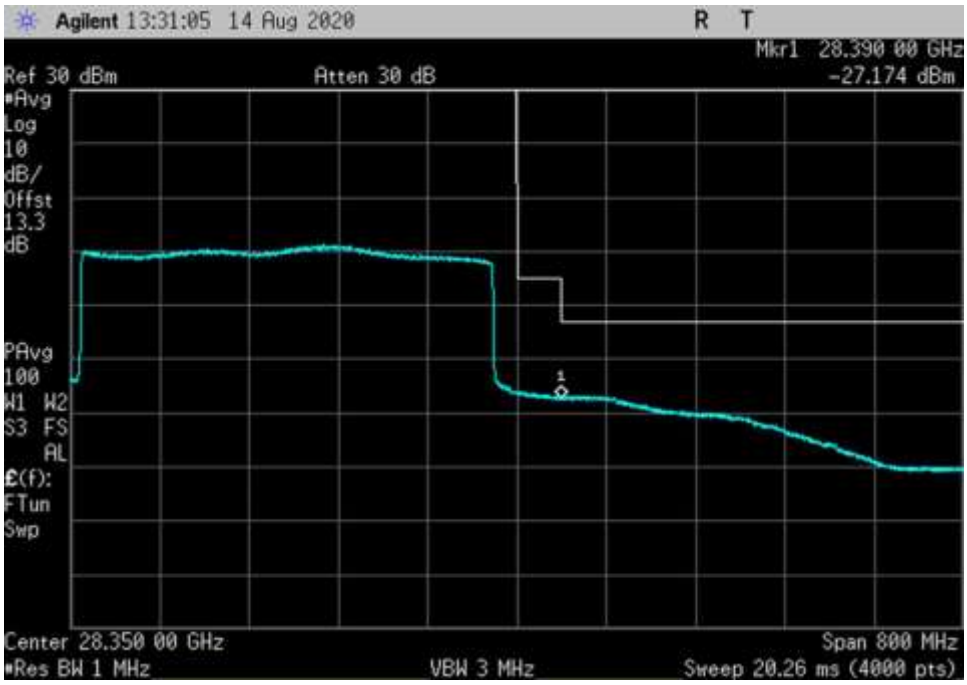

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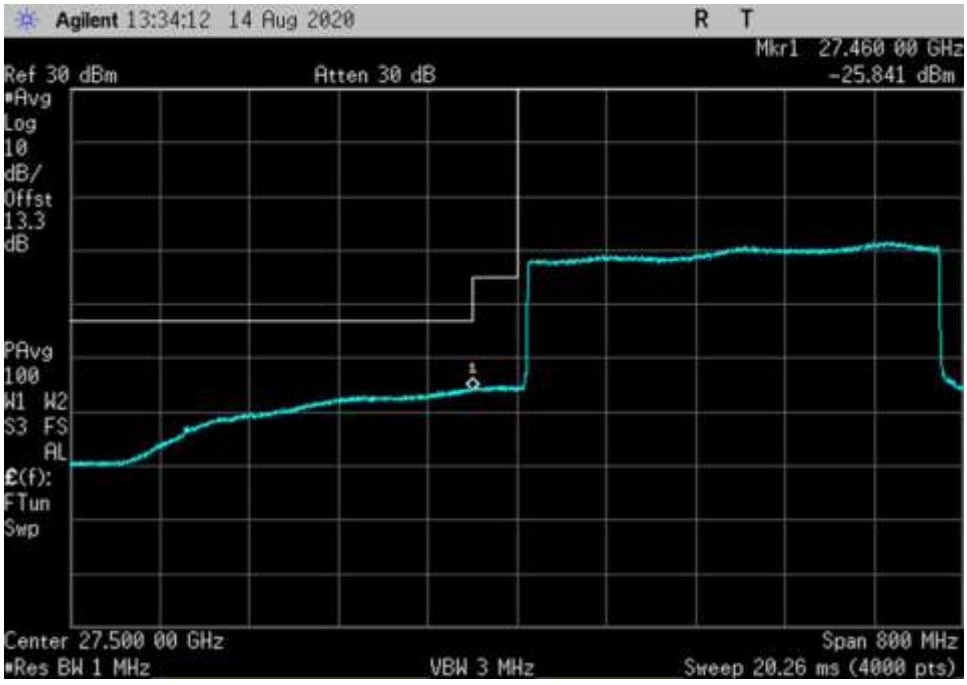

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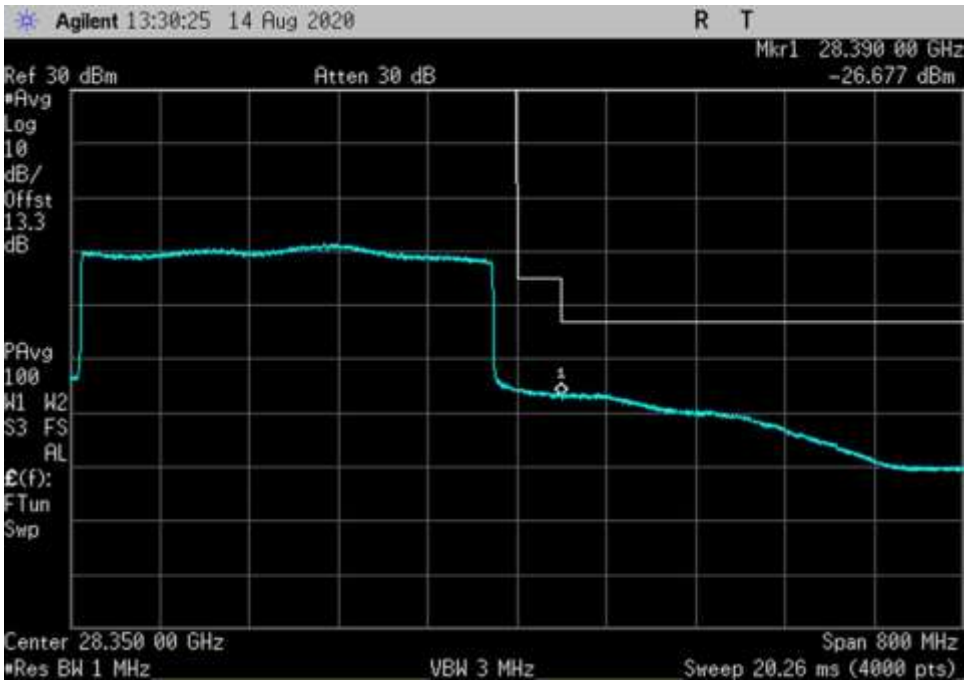

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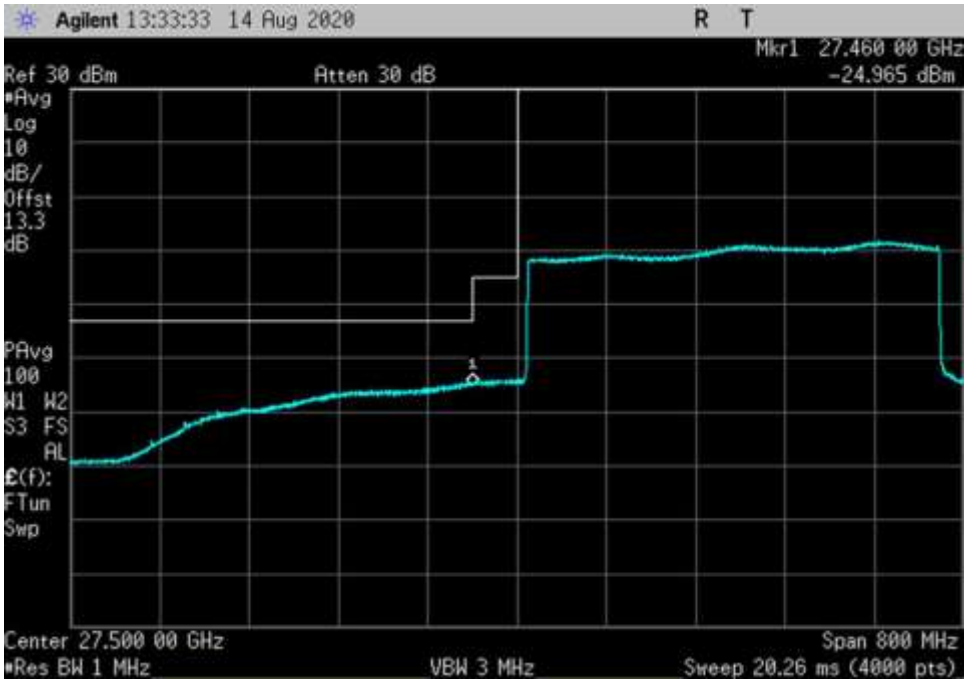

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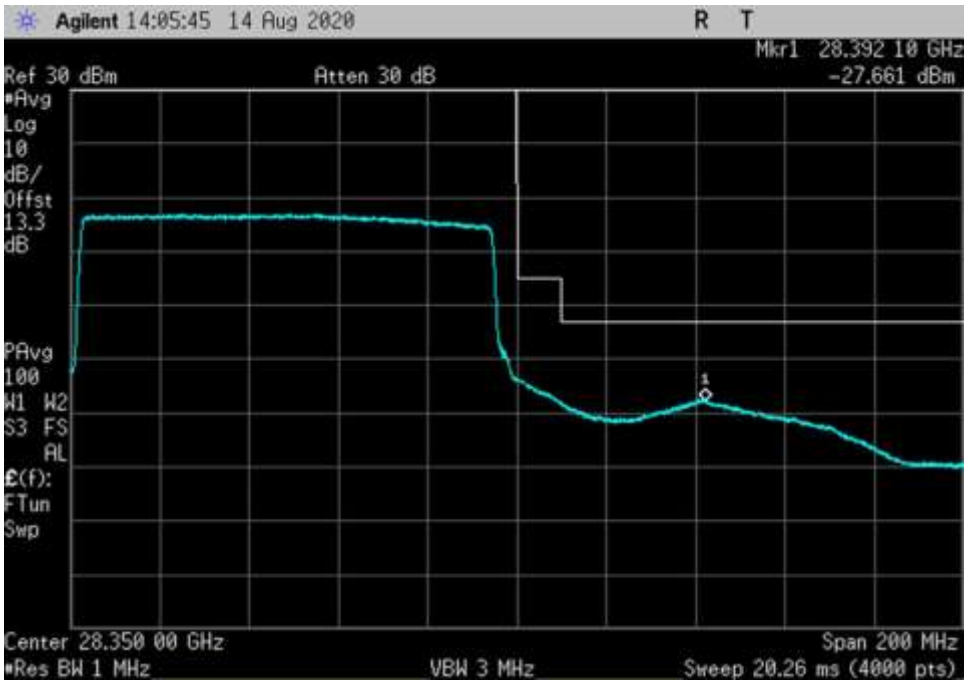
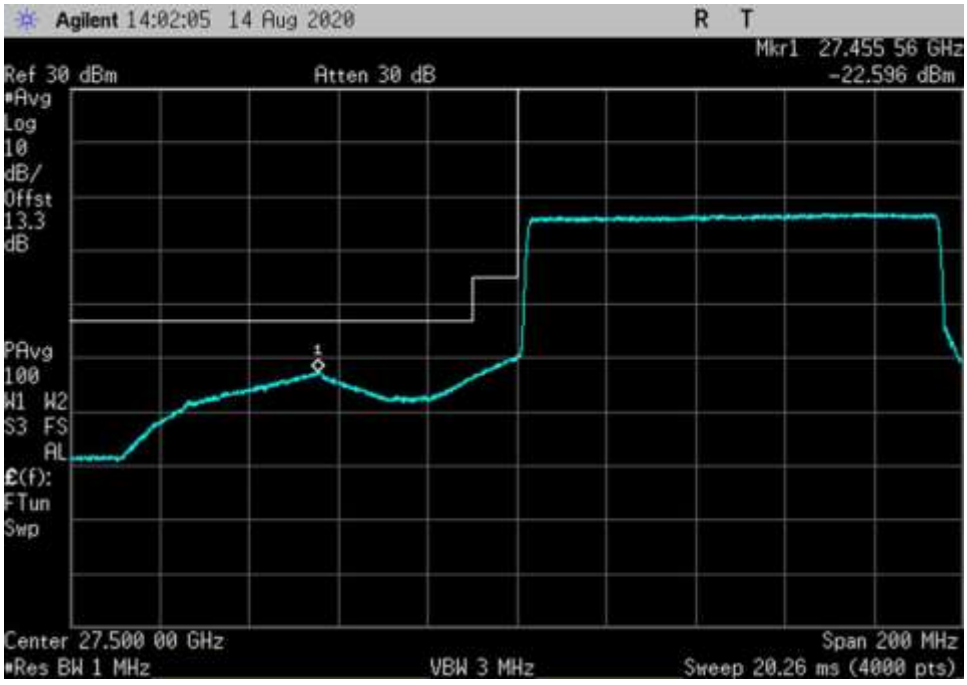


UL_27500-28350-Pi/2-BPSK-100MHz-H-AGC+3-DFT OFDM_HC



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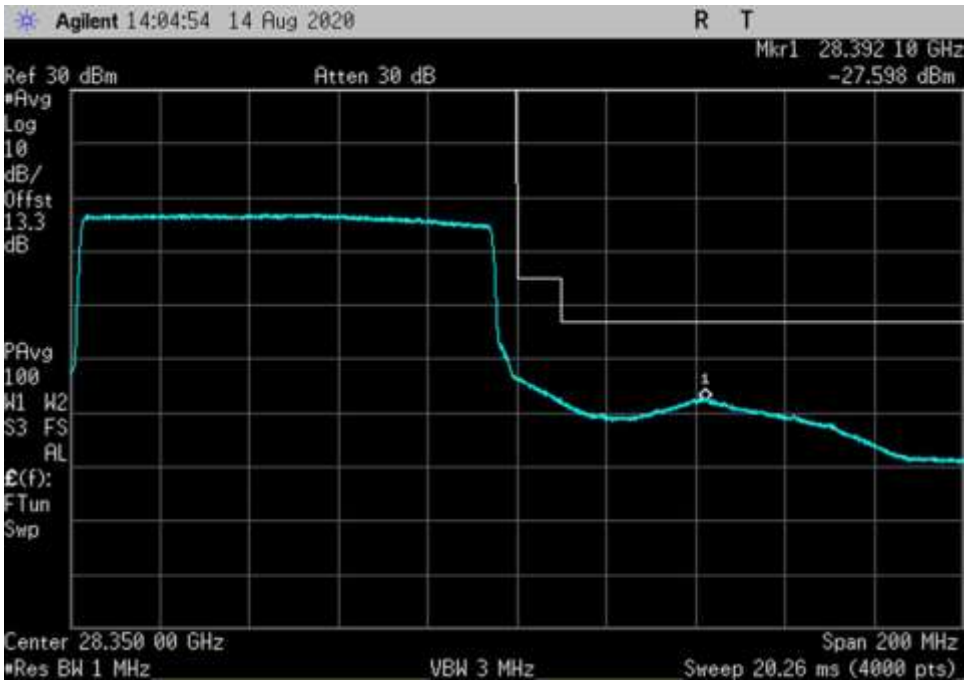

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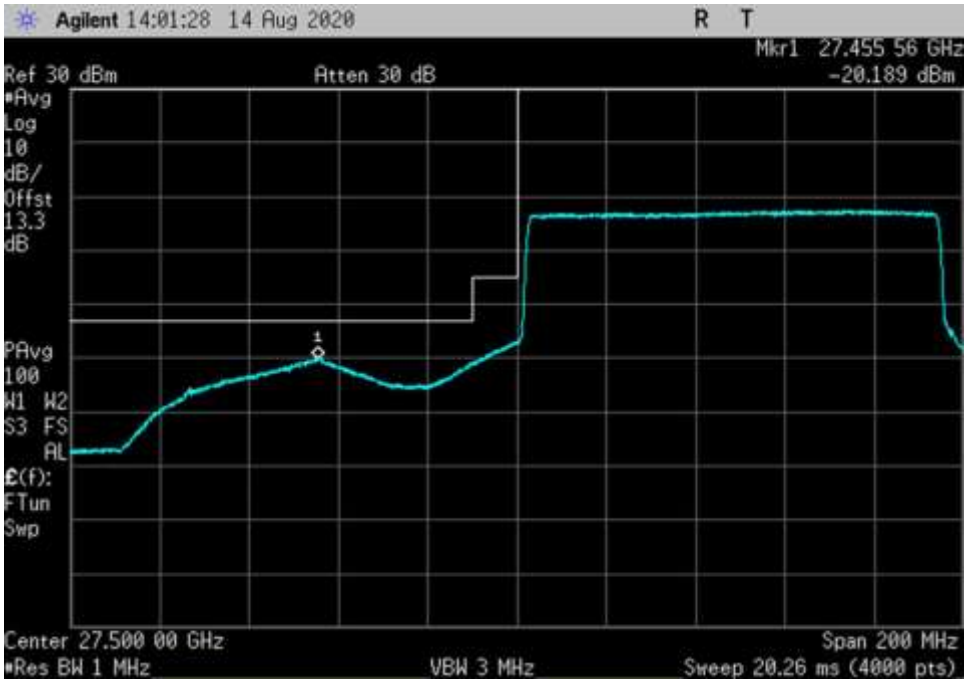

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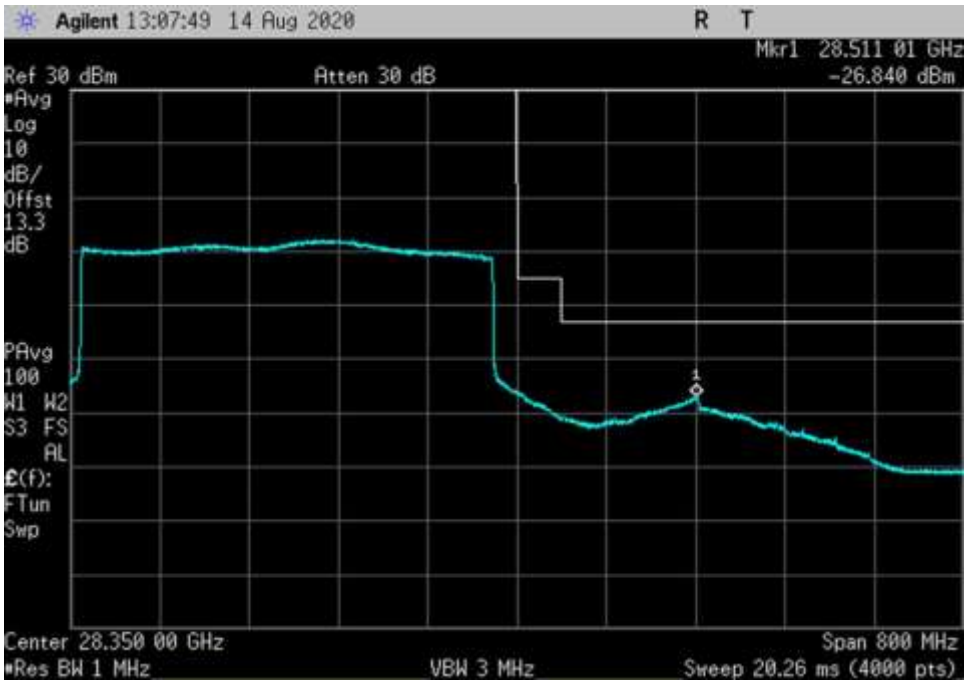

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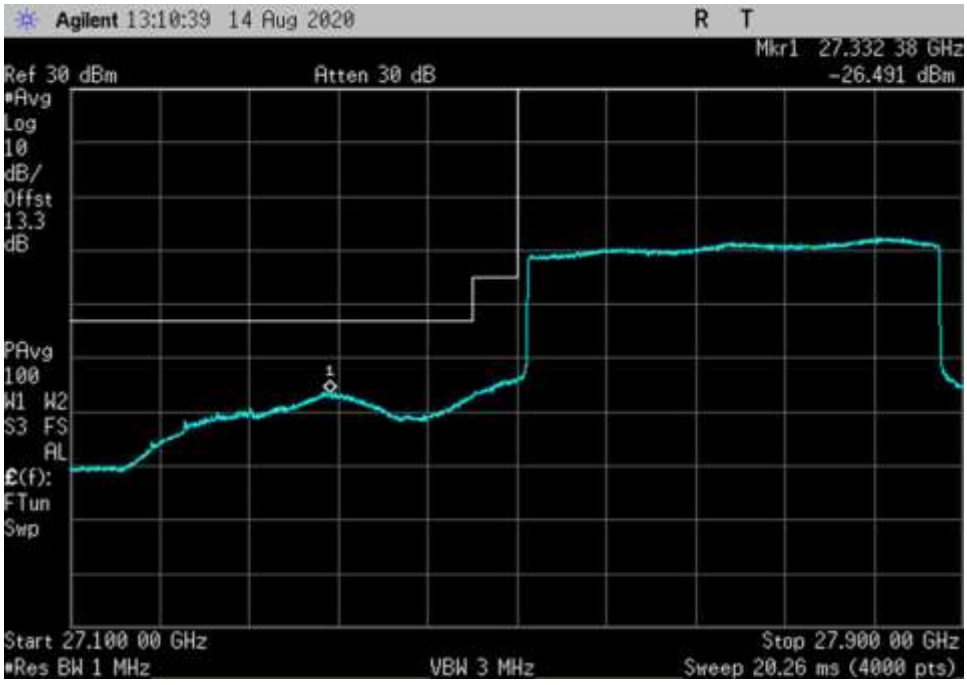

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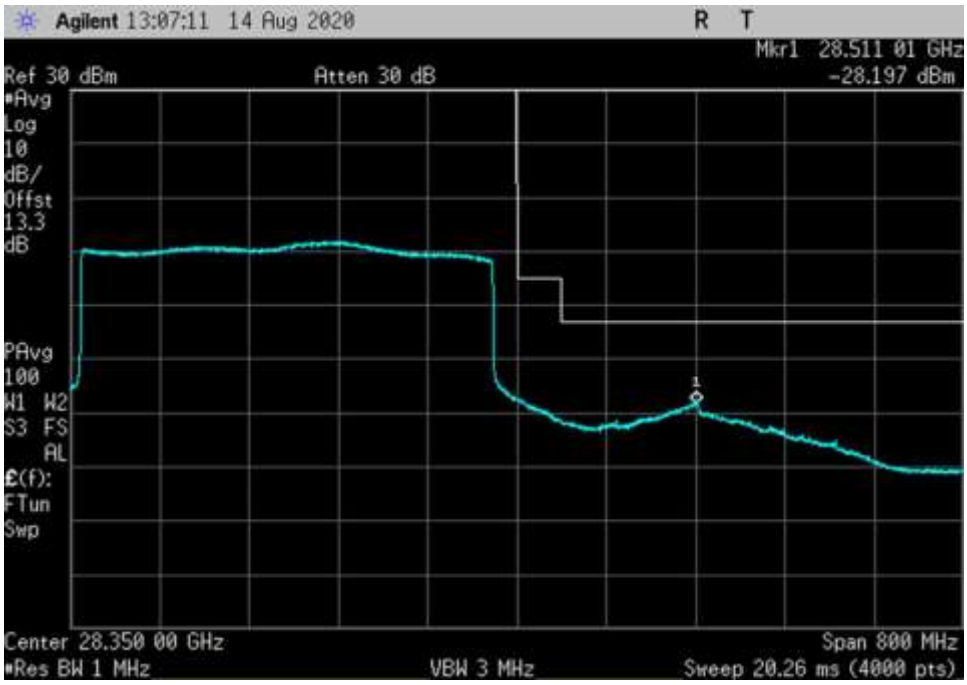

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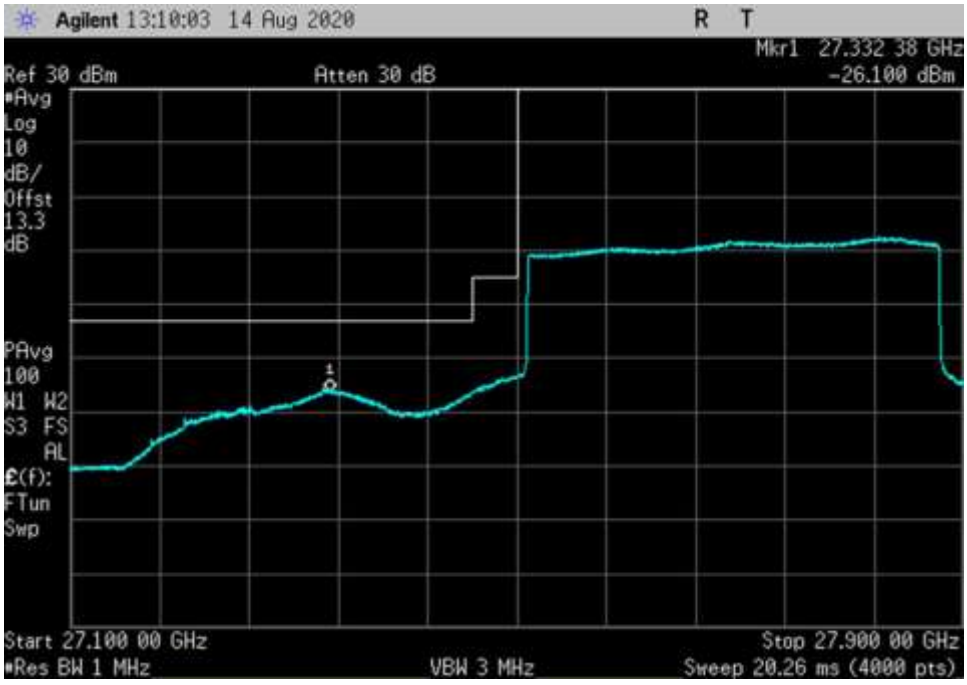

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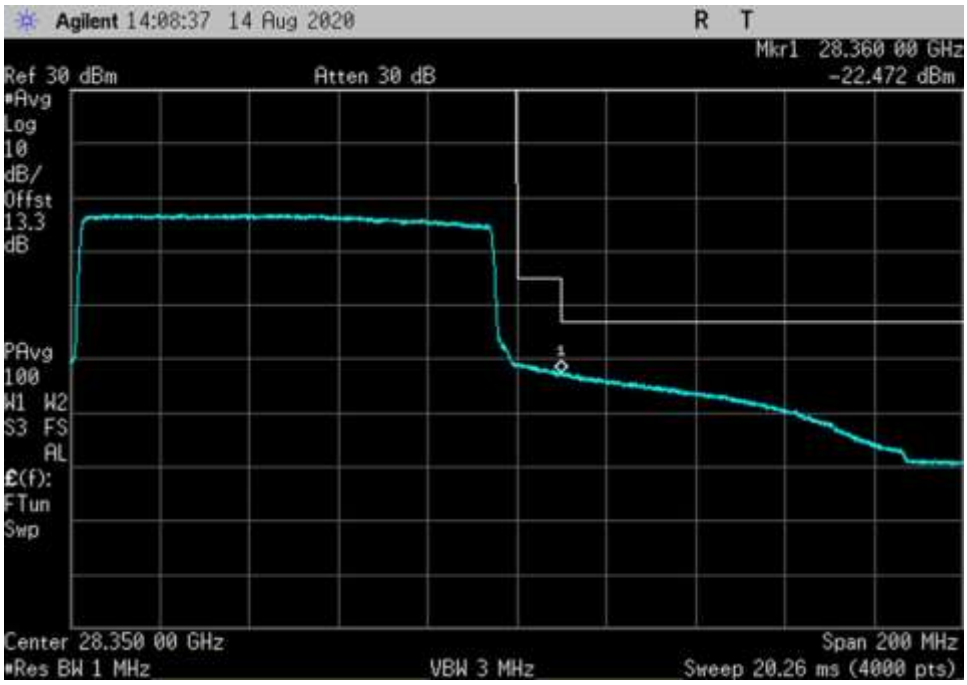

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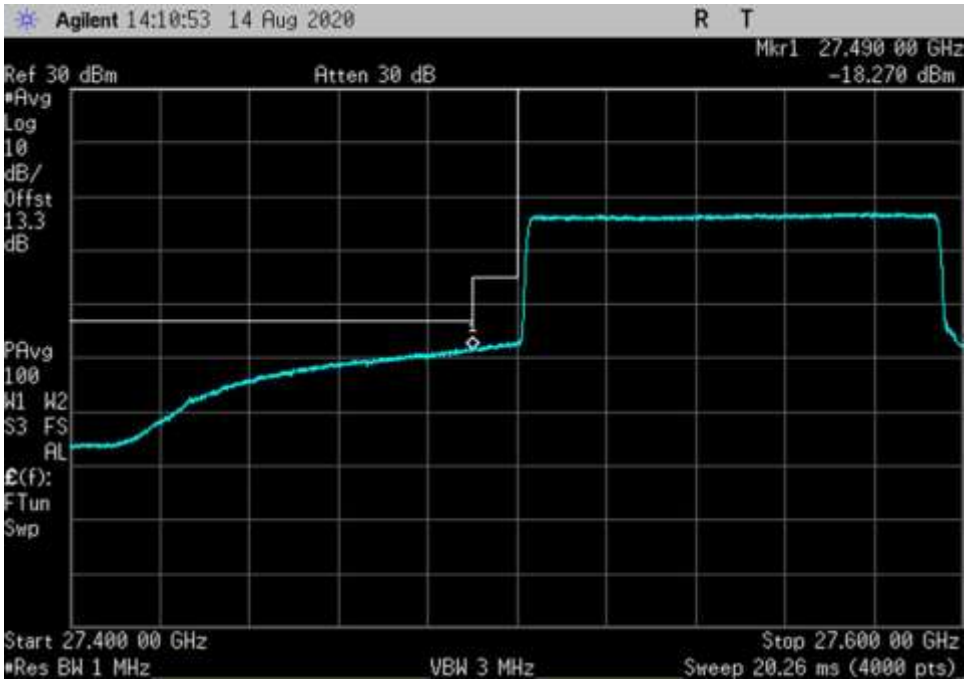

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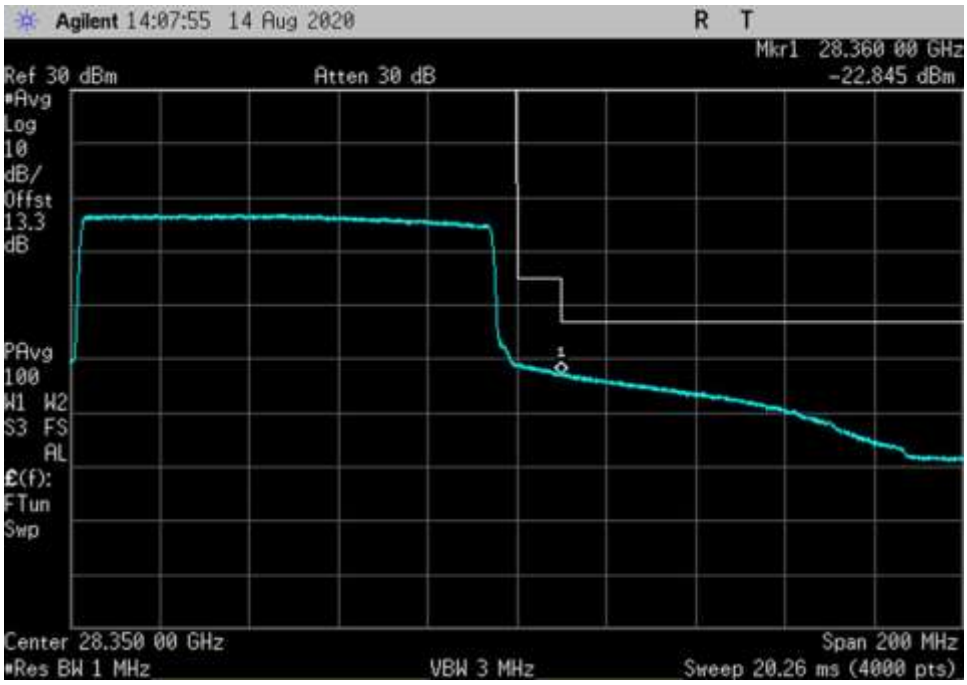

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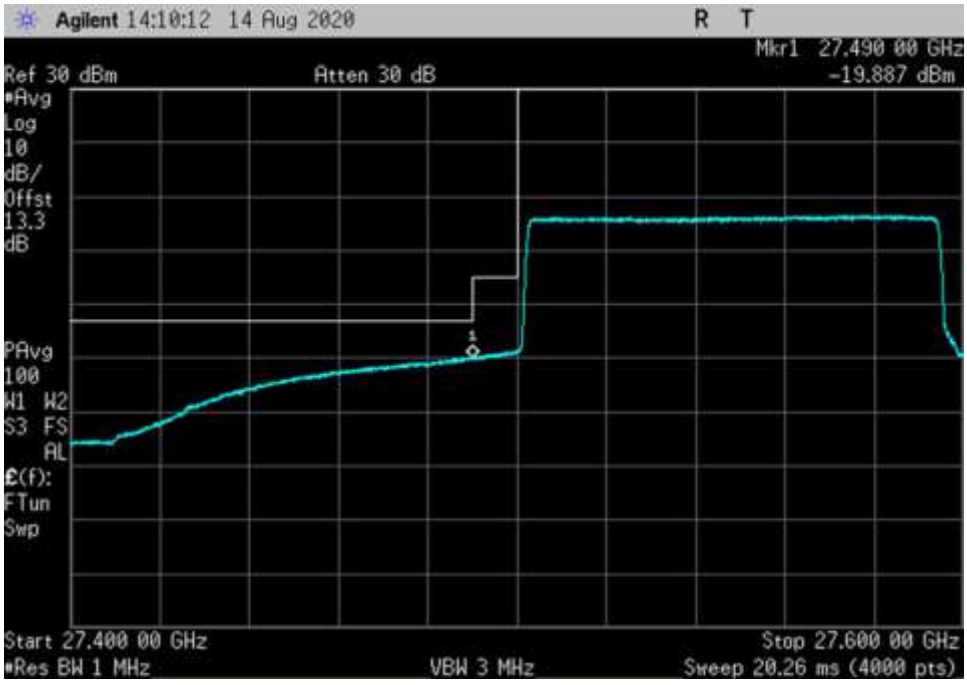

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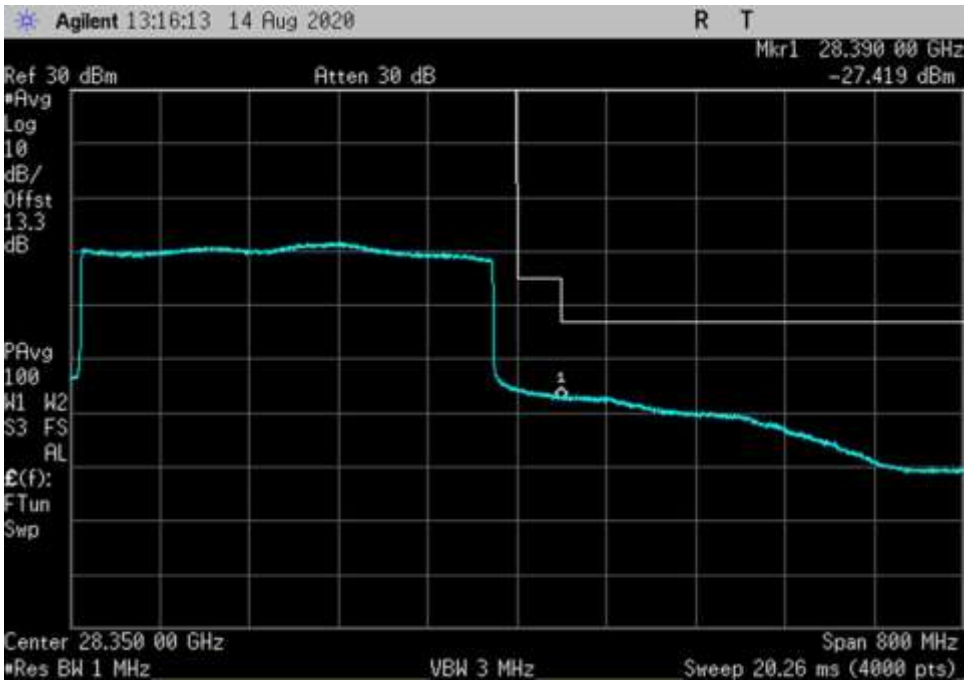

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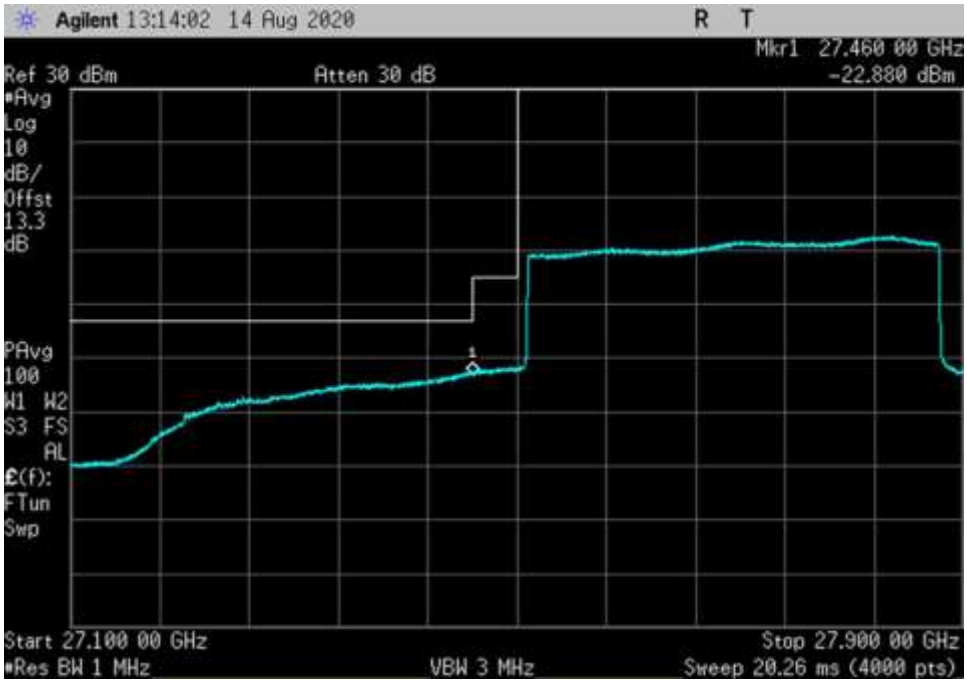

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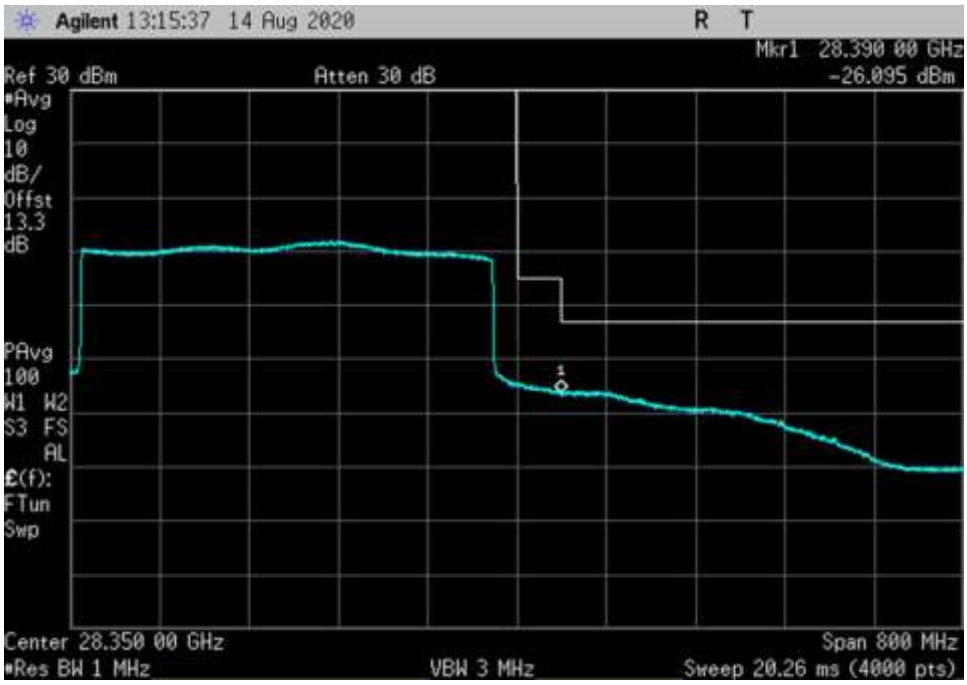

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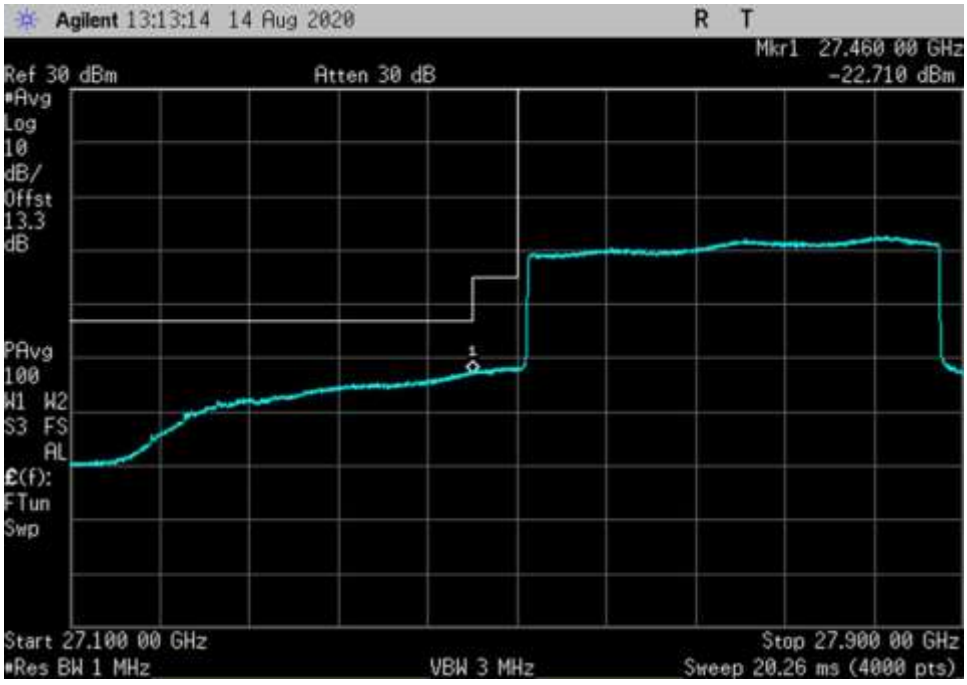
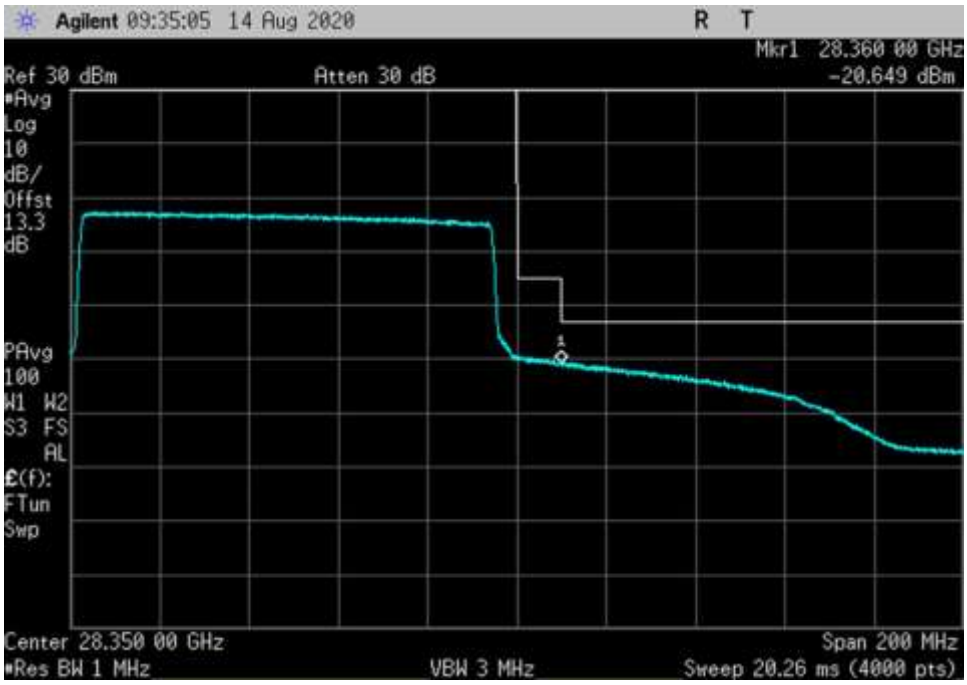
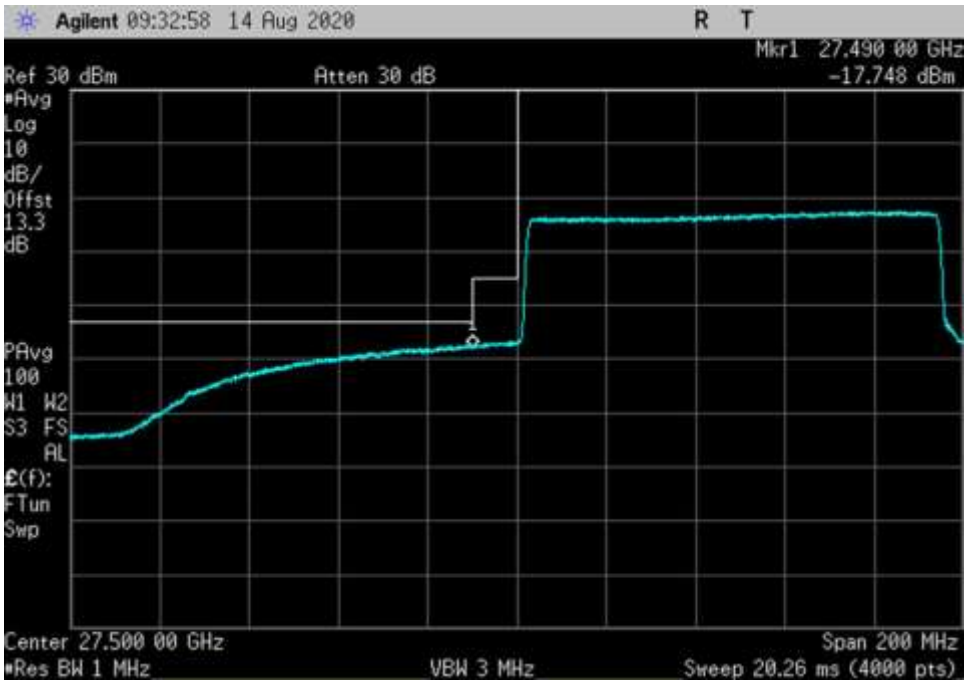


UL_27500-28350-QPSK-400MHz-H-DFT OFDM_LC

DFT - UL V



UL_27500-28350-16QAM-100MHz-V- DFT OFDM_HC



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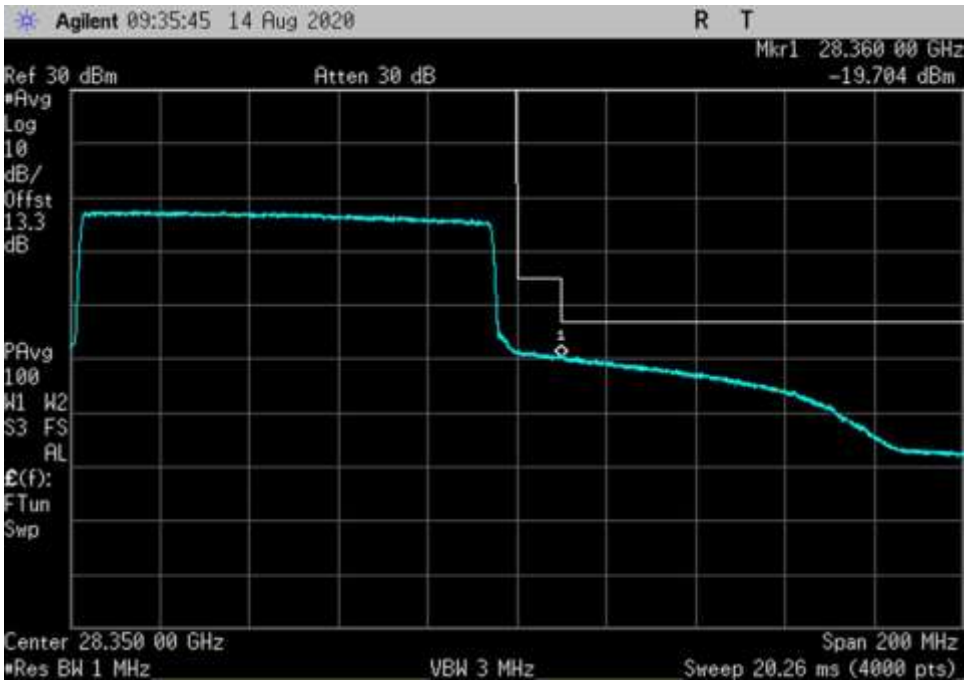

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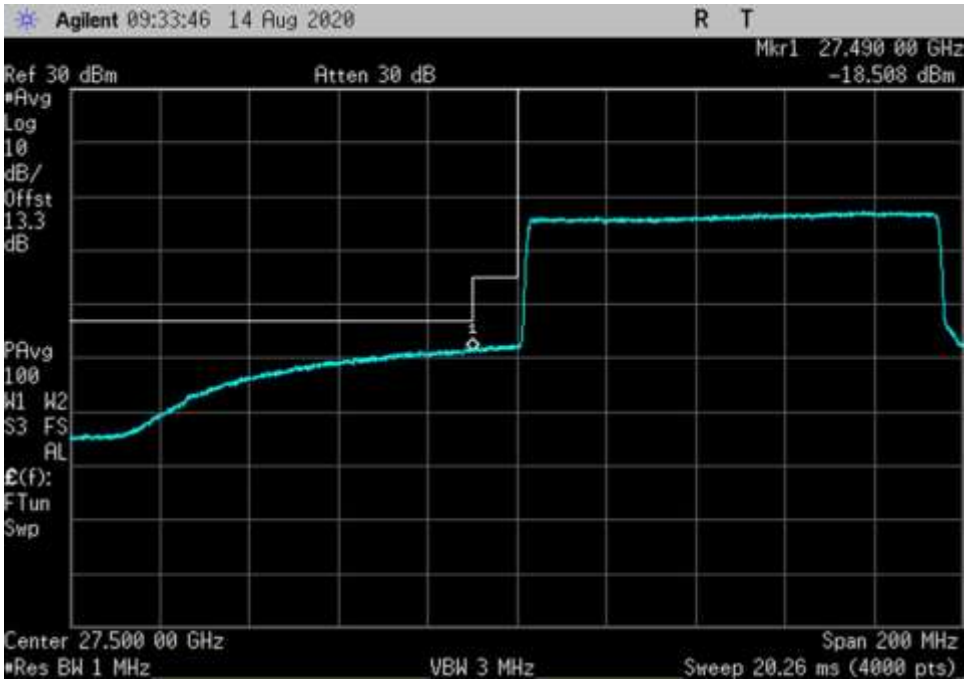

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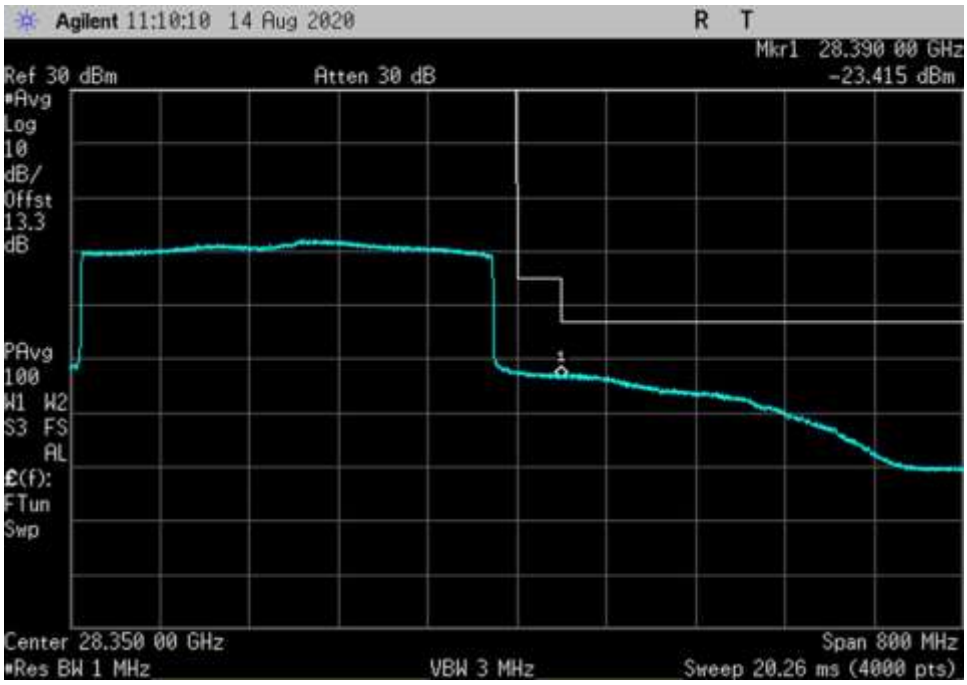

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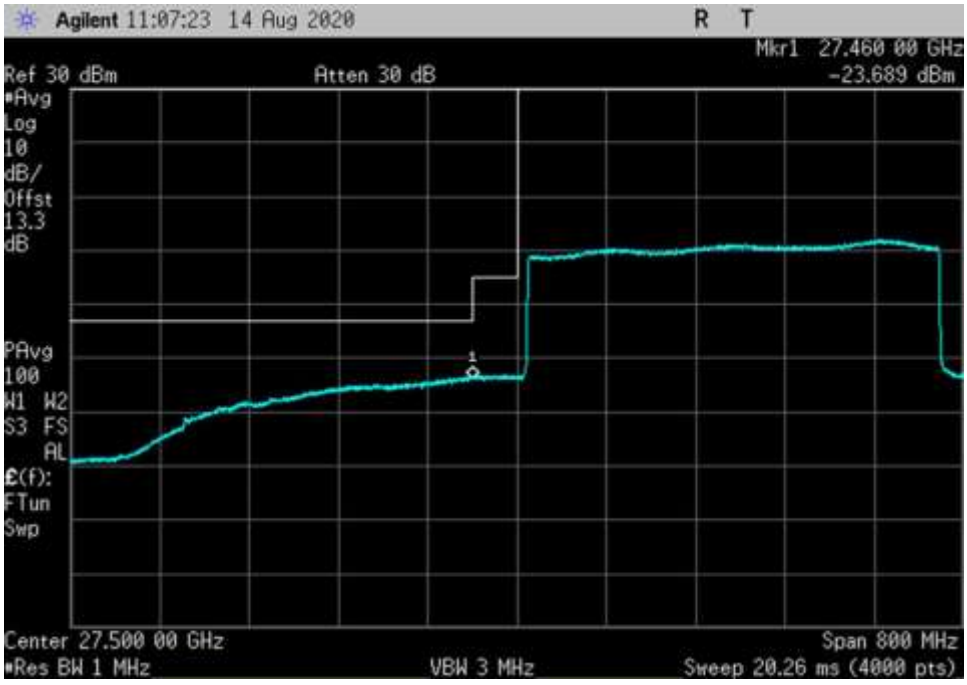

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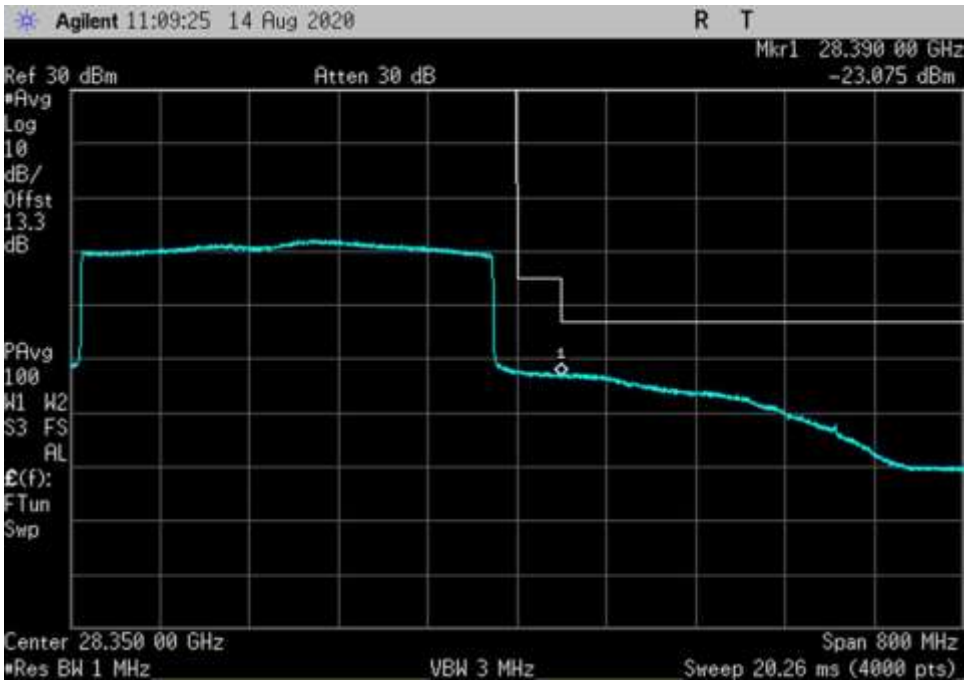

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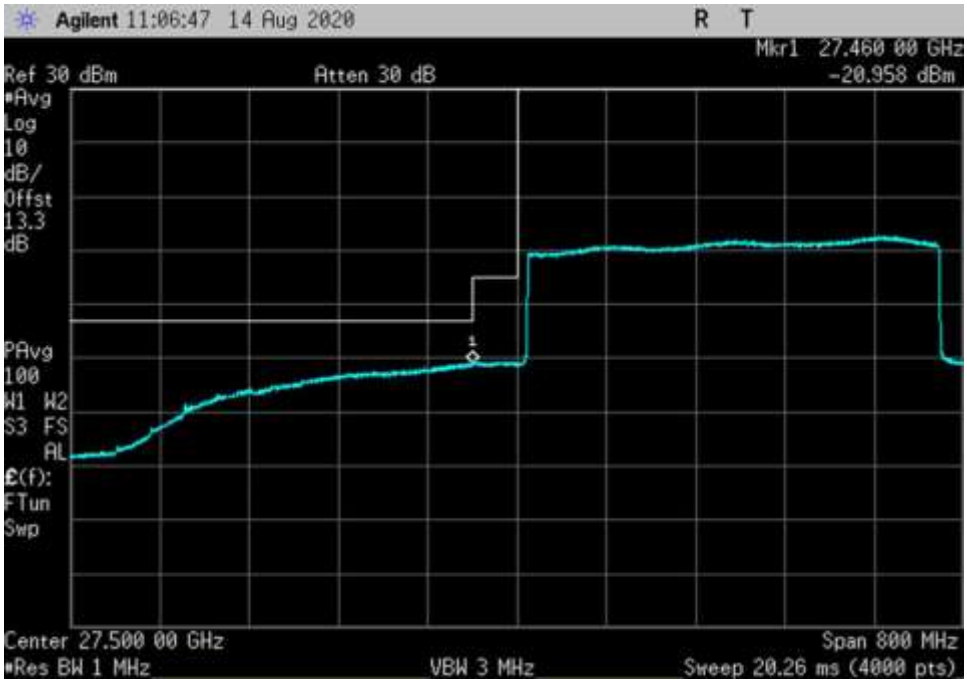

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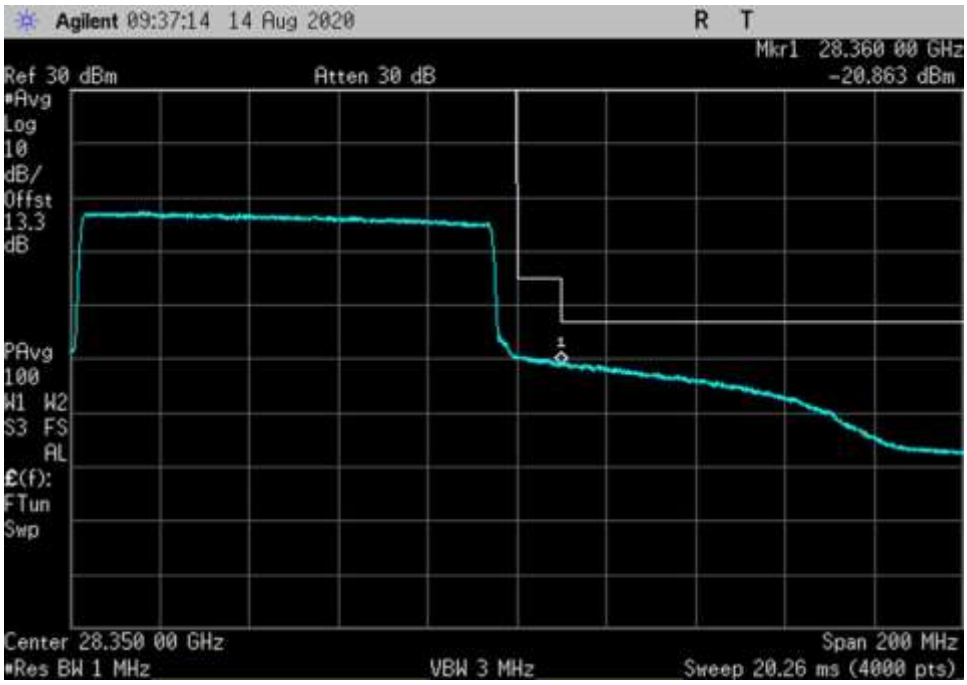

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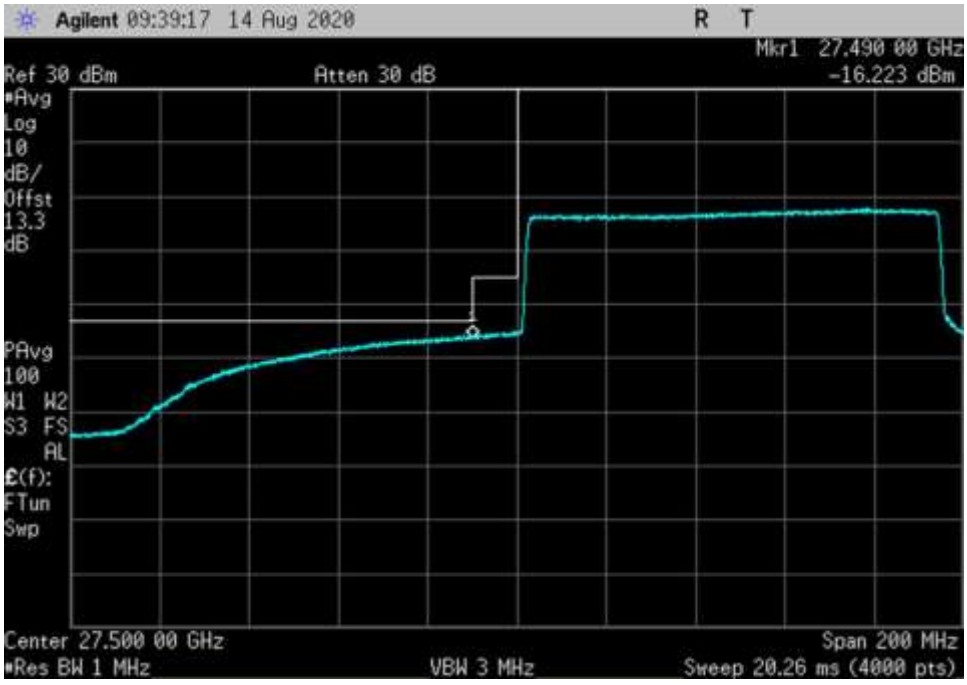

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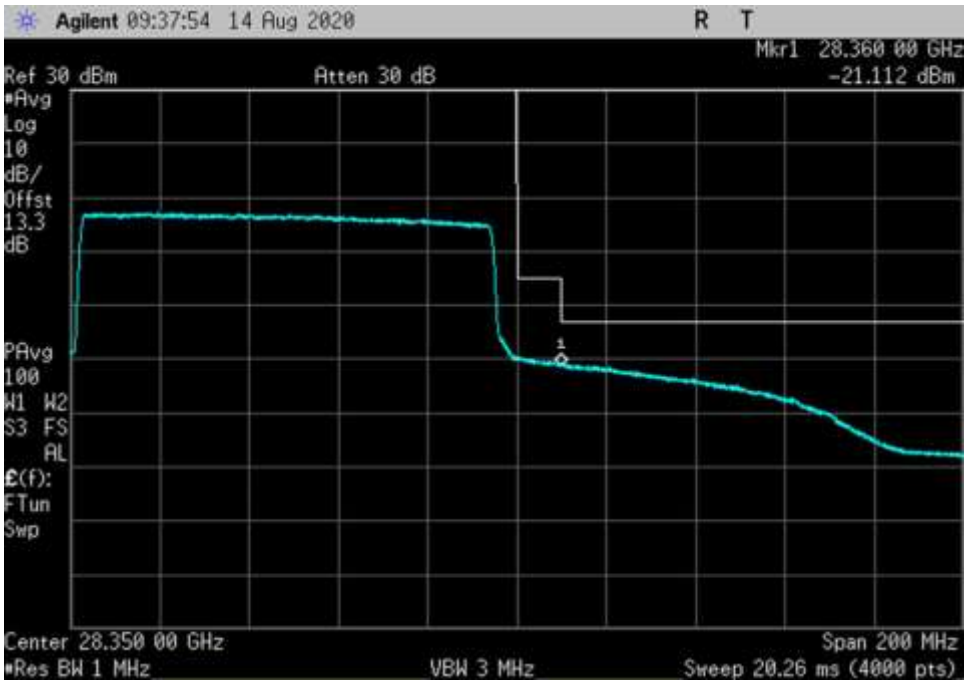

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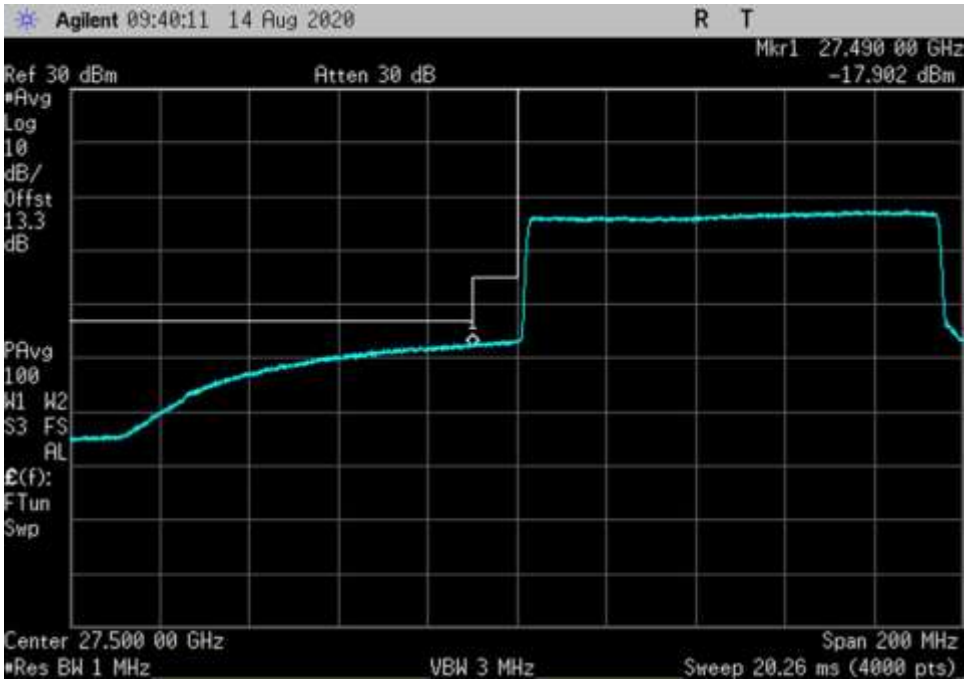
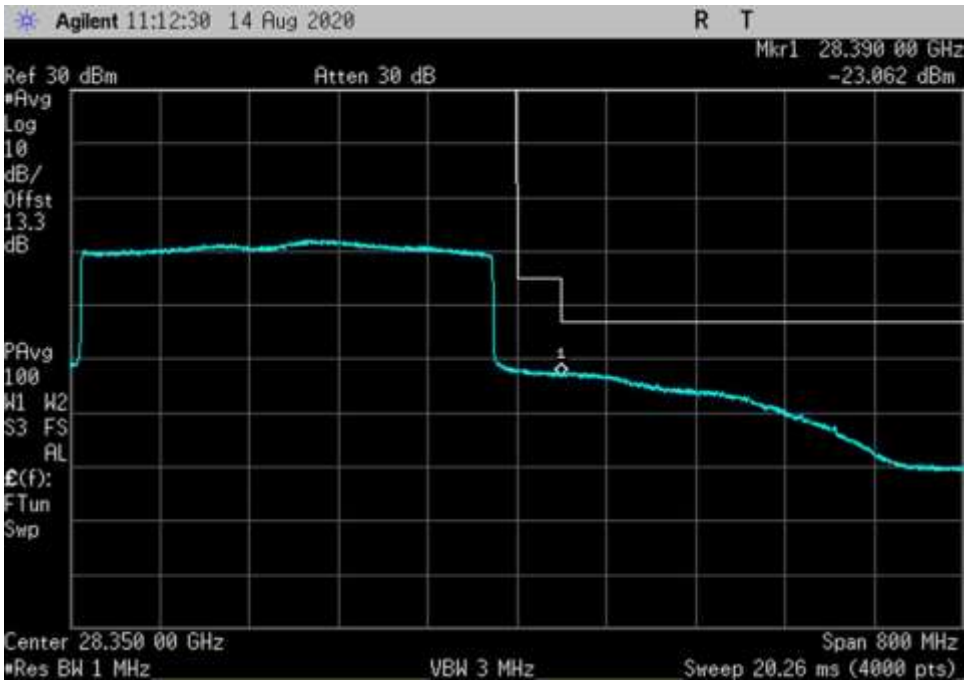
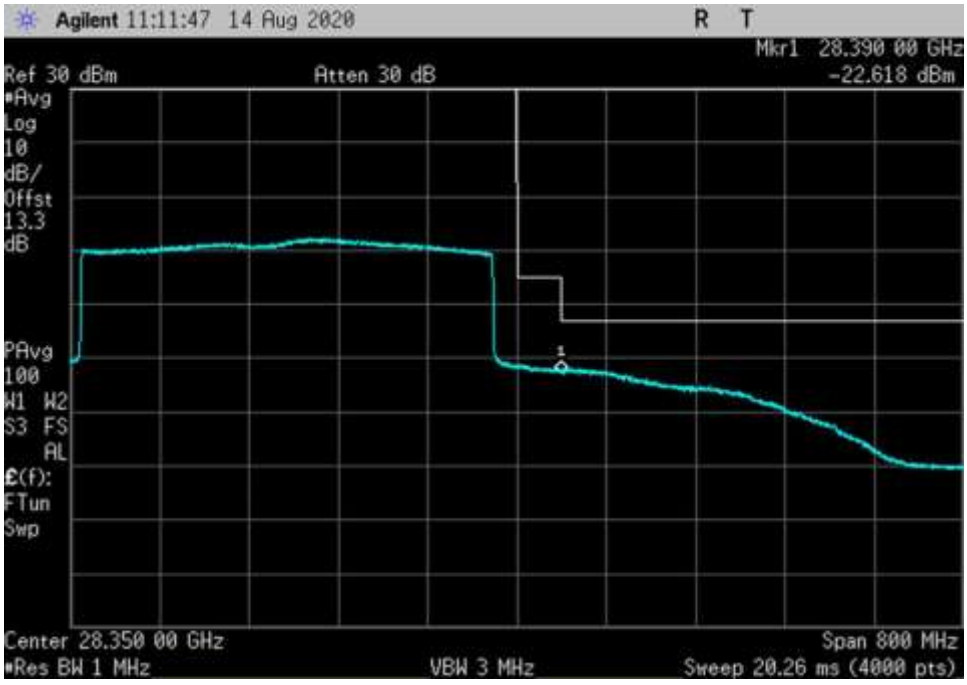


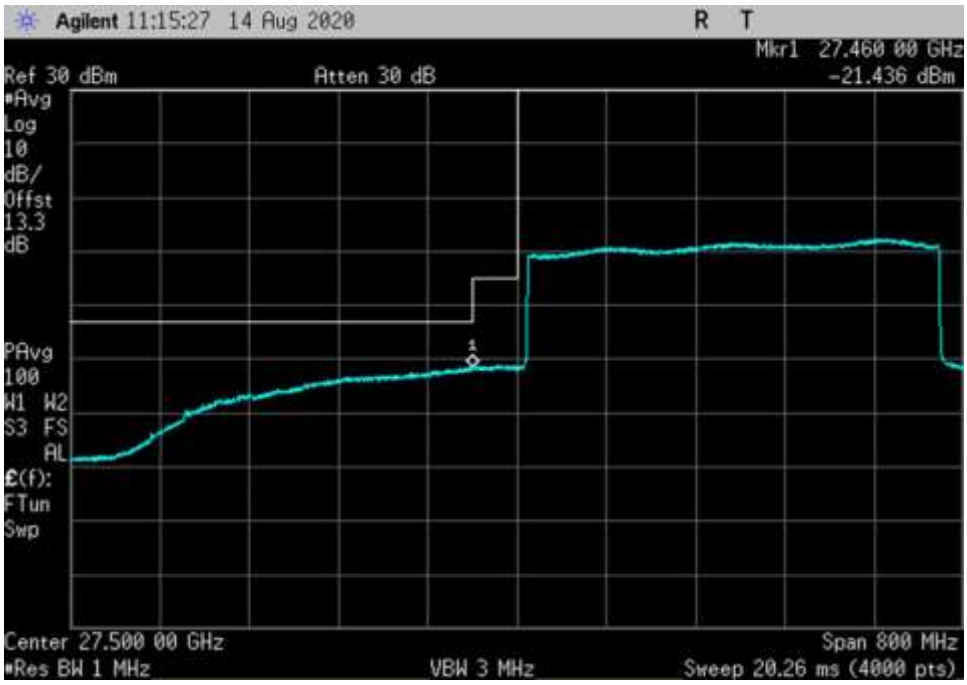
UL_27500-28350-64QAM-100MHz-V-AGC+3- DFT OFDM_LC



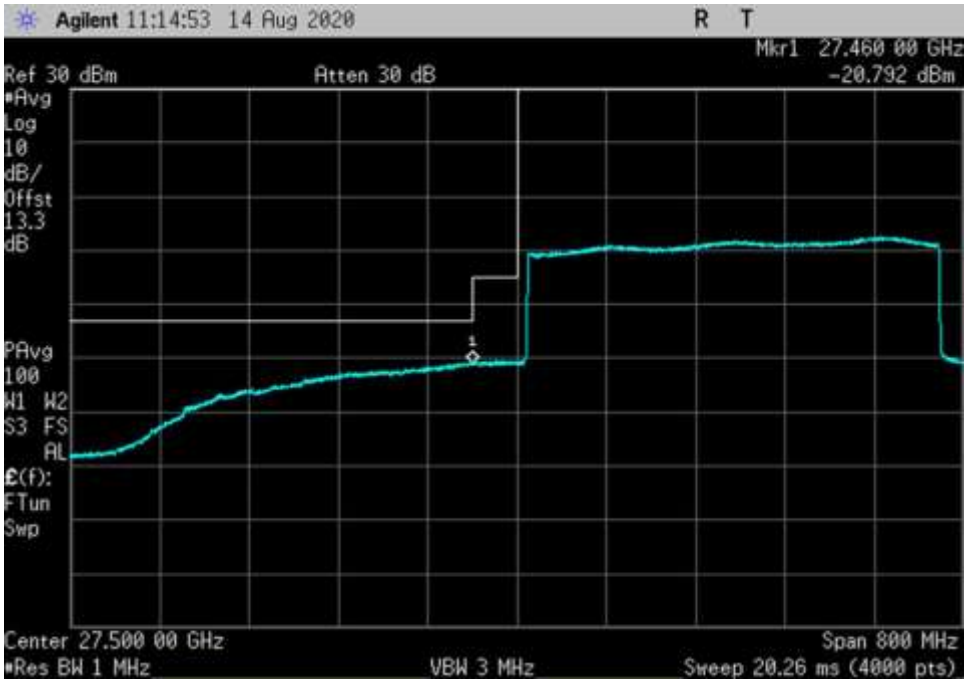
UL_27500-28350-64QAM-400MHz-V-AGC+3-AGC+3-DFT OFDM_HC



UL_27500-28350-64QAM-400MHz-V-AGC+3-DFT OFDM_HC



UL_27500-28350-64QAM-400MHz-V-AGC+3-DFT OFDM_LC



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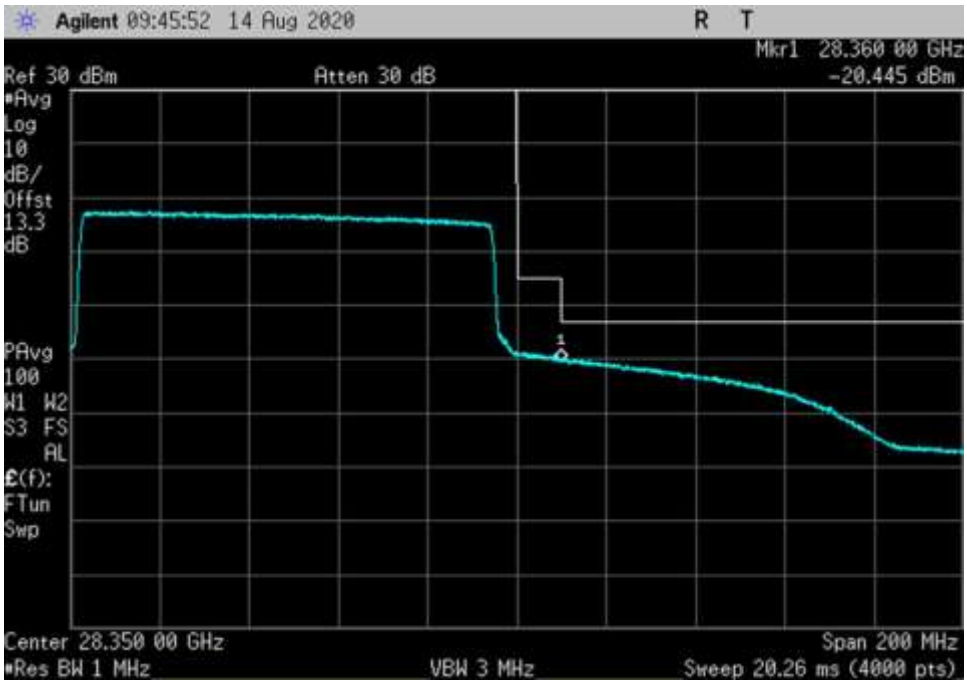

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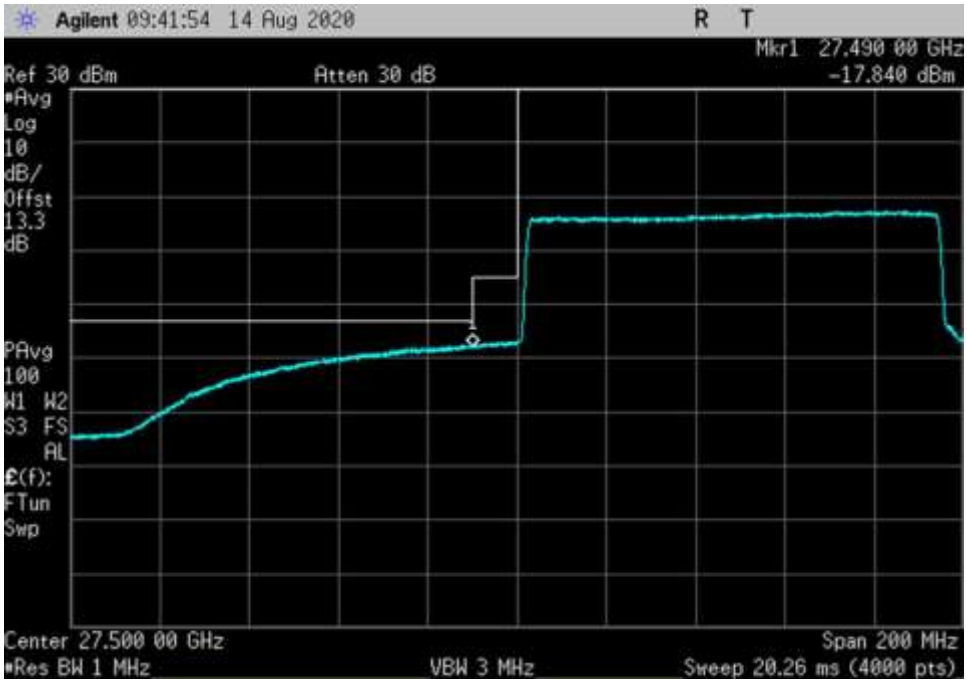

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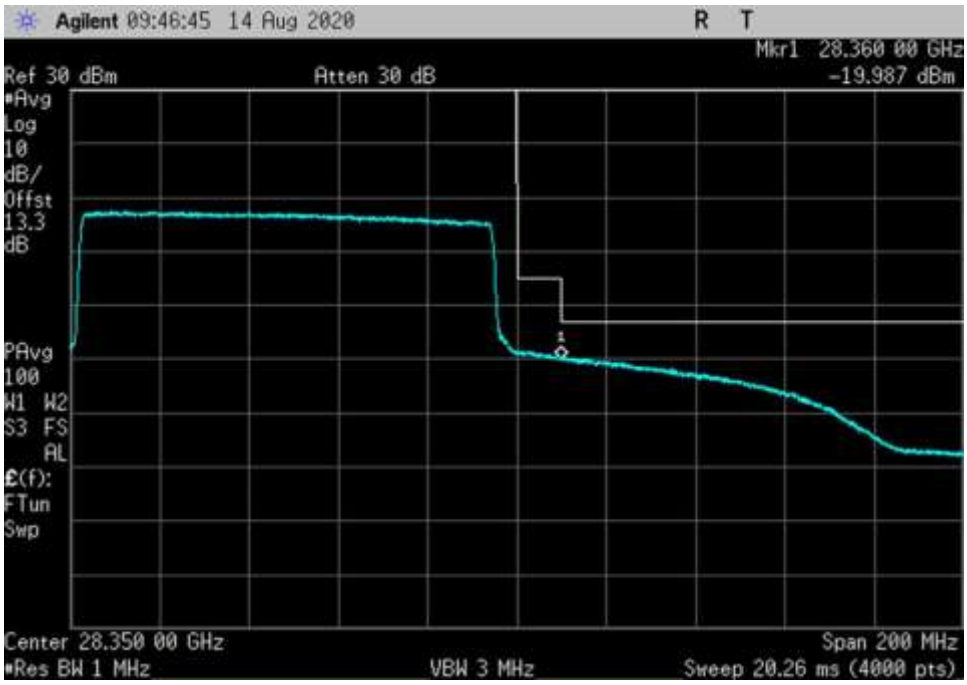

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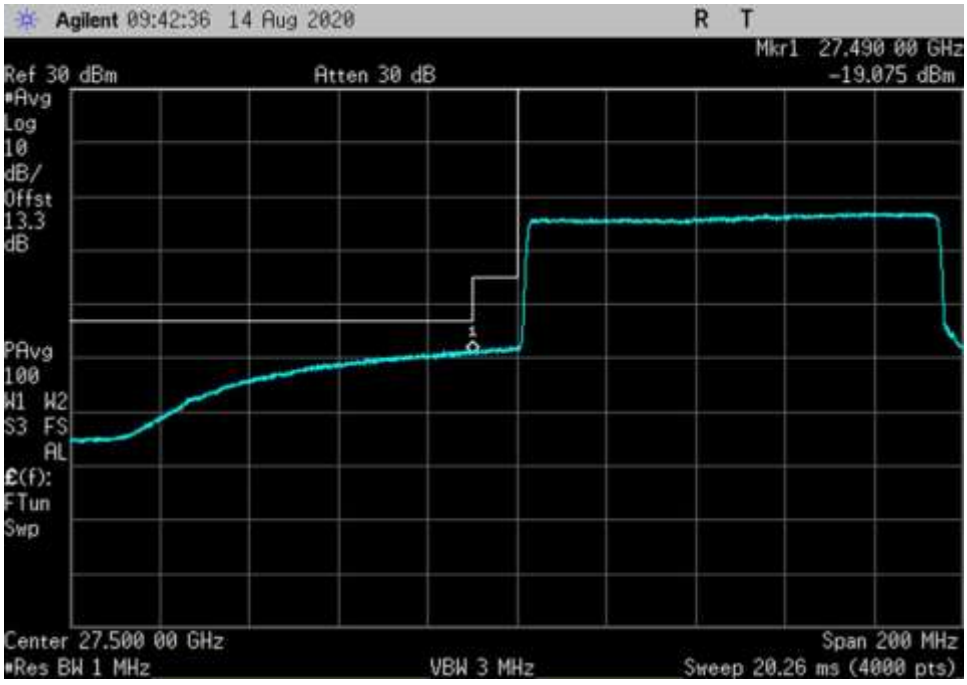
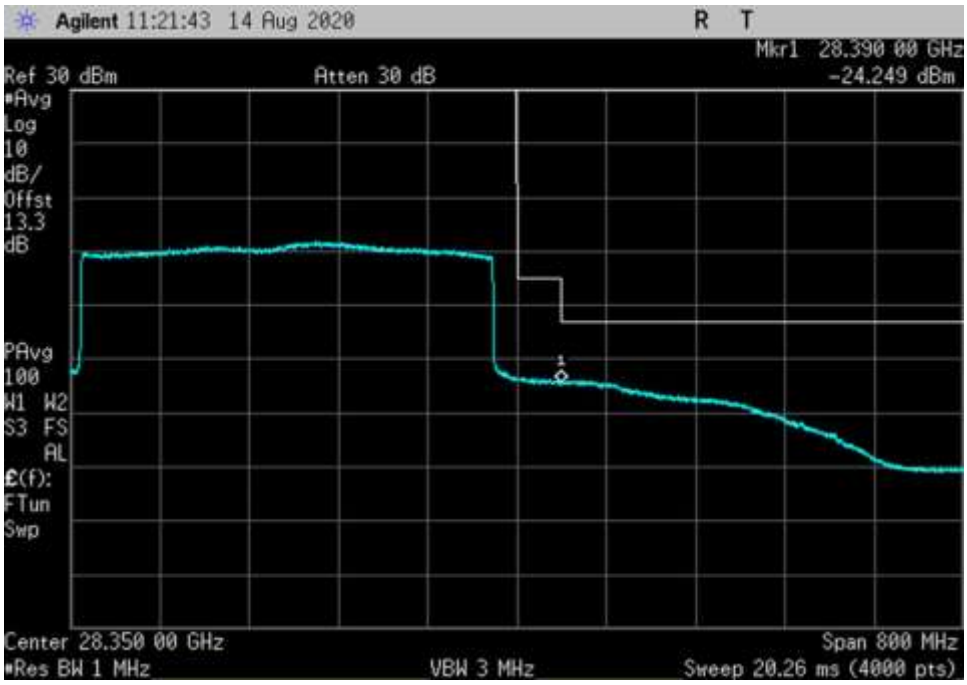


UL_27500-28350-256QAM-100MHz-V-AGC+3- DFT OFDM_LC



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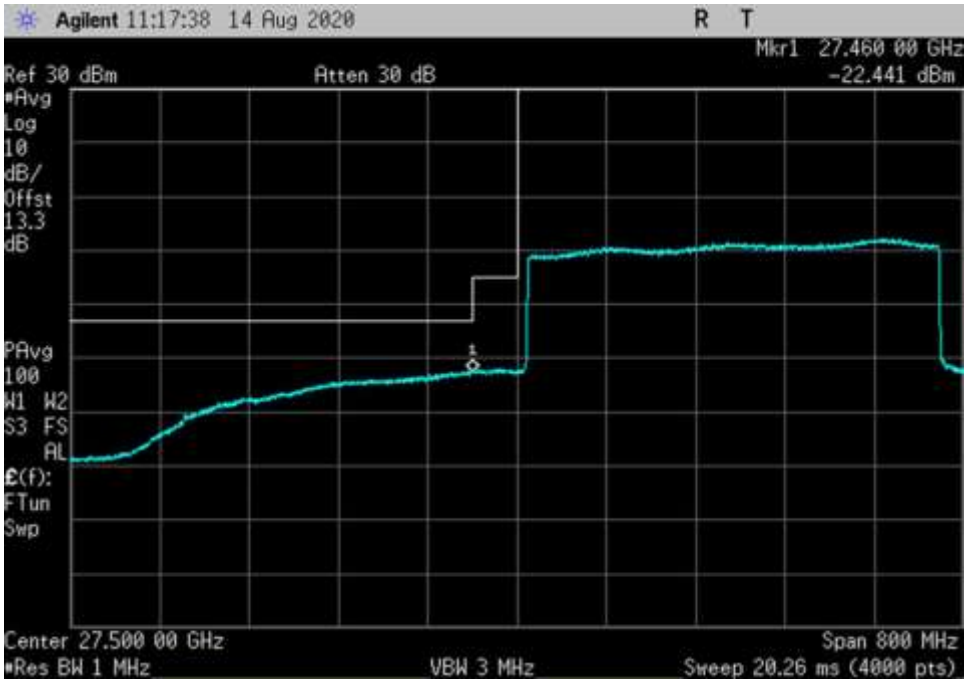
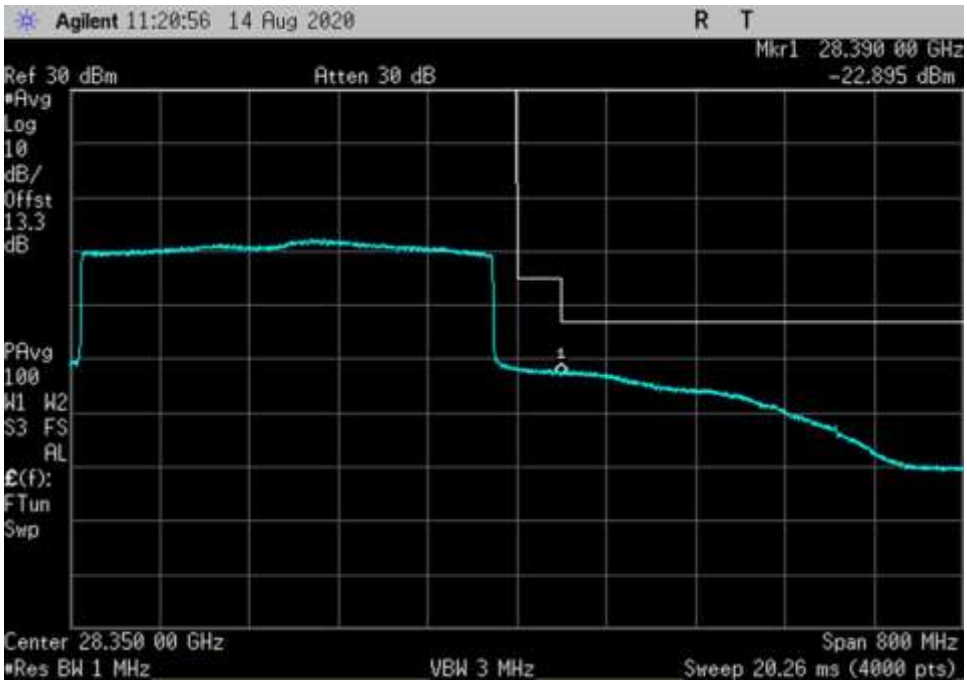
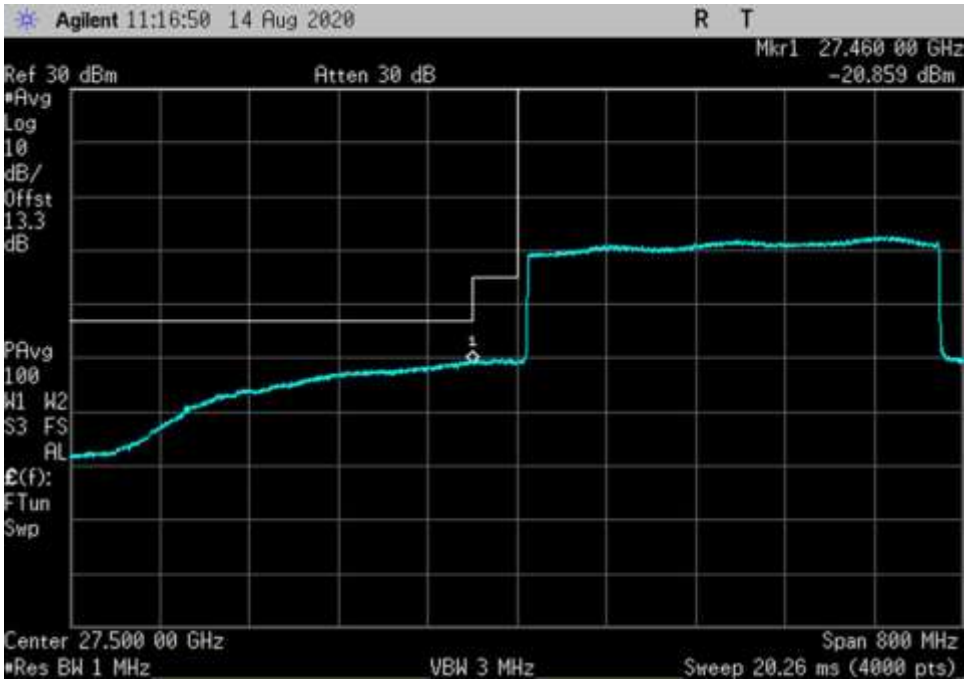


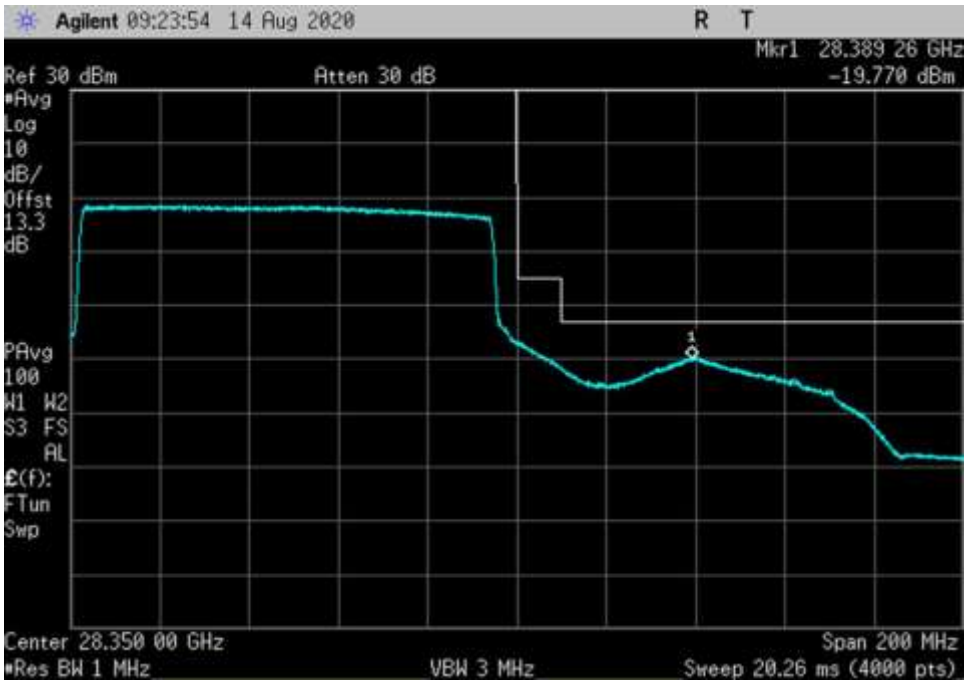
UL_27500-28350-256QAM-400MHz-V-AGC+3-DFT OFDM_LC



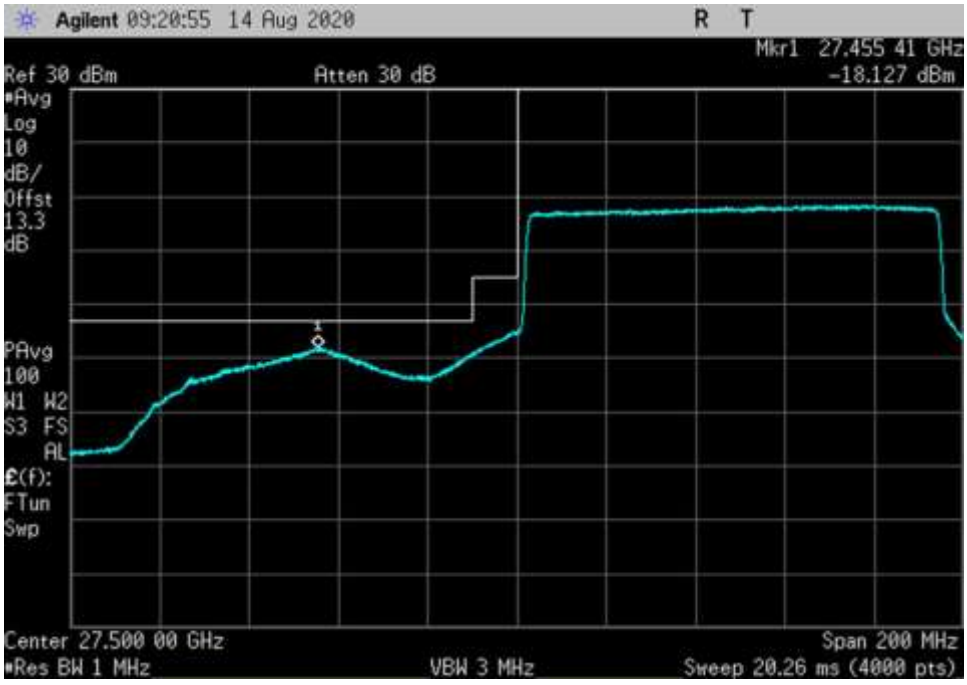
UL_27500-28350-256QAM-400MHz-V-DFT OFDM_HC



UL_27500-28350-256QAM-400MHz-V-DFT OFDM_LC



UL_27500-28350-Pi/2- BPSK-100MHz-V- DFT OFDM_HC



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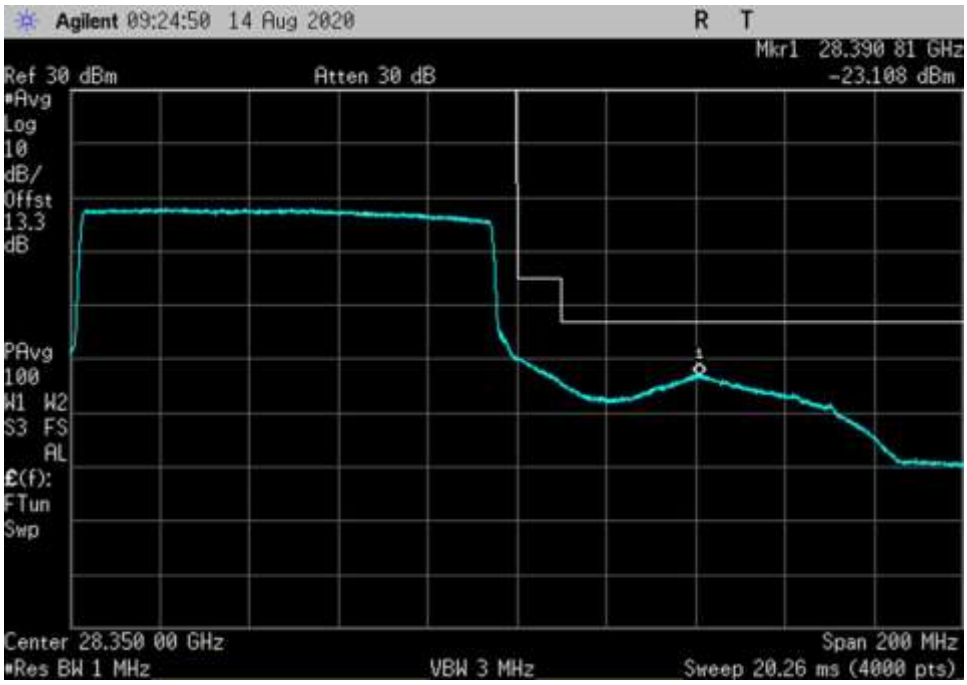

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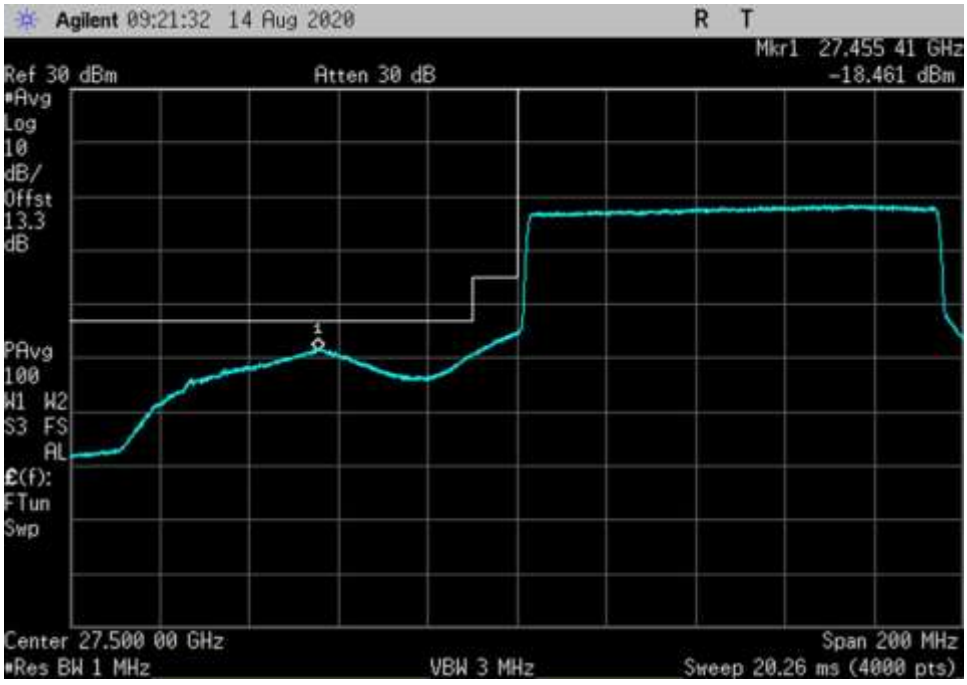
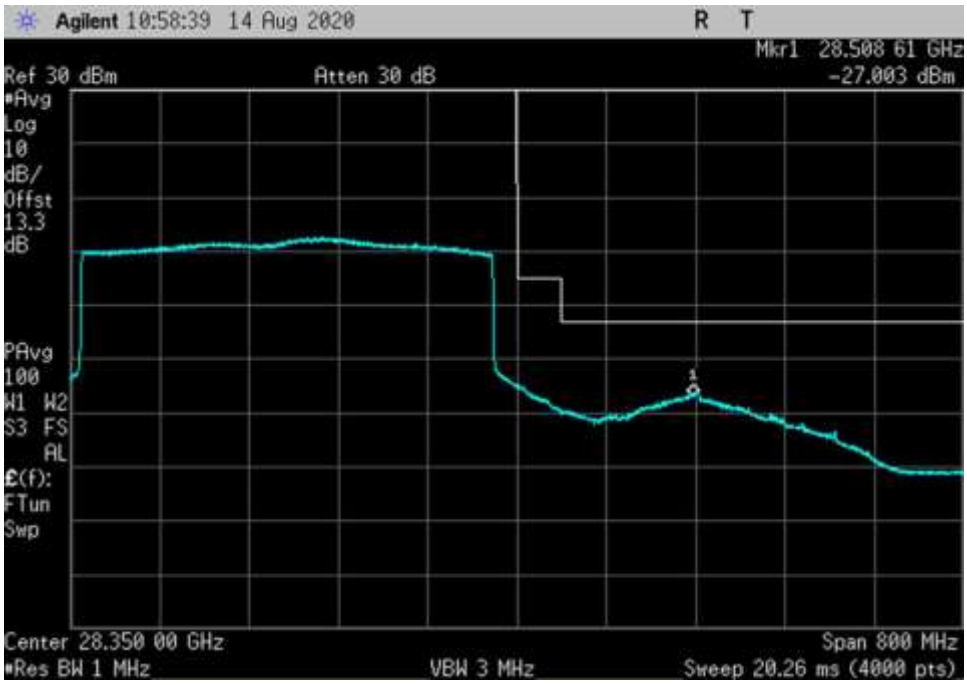
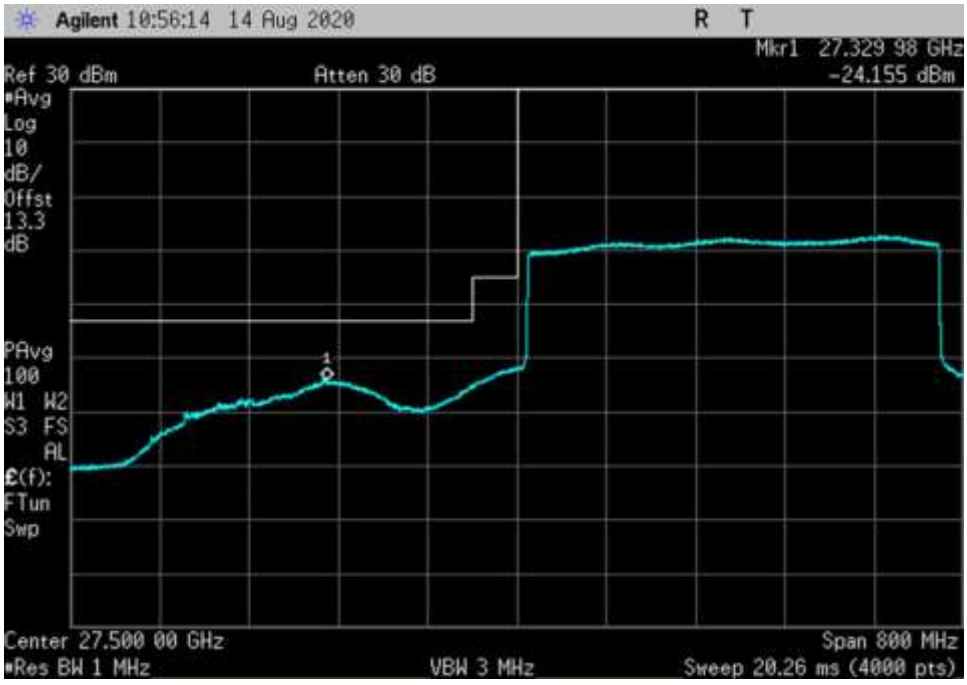


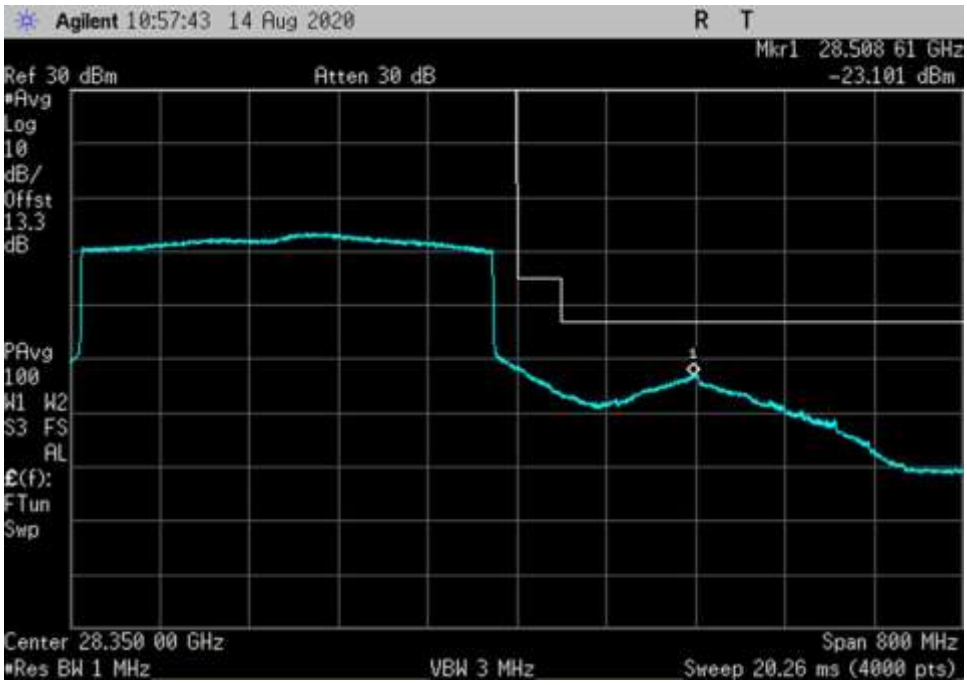
UL_27500-28350-Pi/2- BPSK-100MHz-V-AGC+3- DFT OFDM_LC



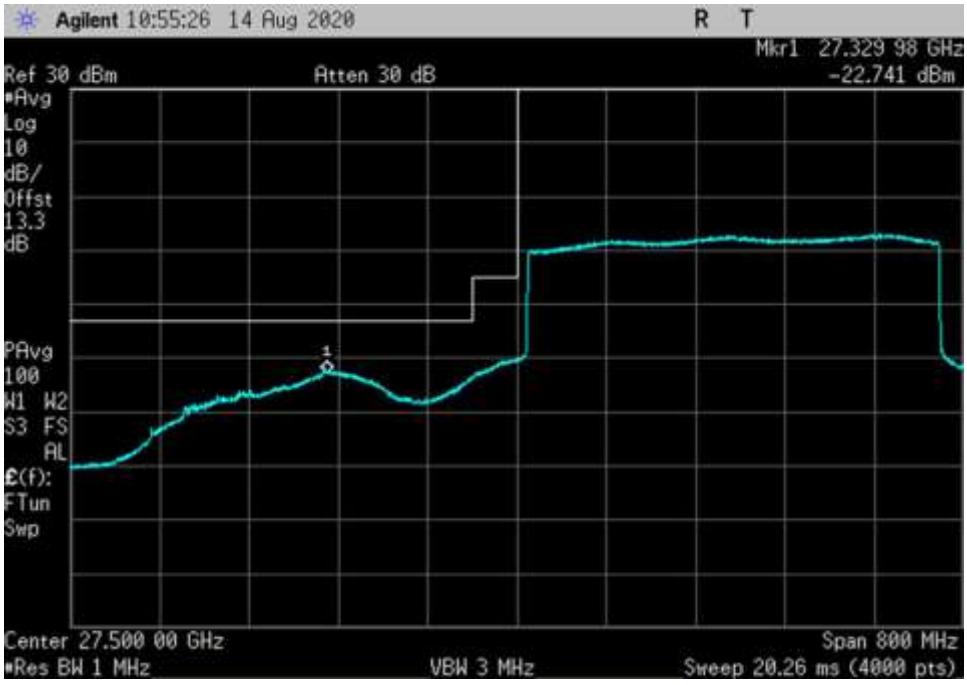
UL_27500-28350-Pi/2- BPSK-400MHz-V-AGC+3-DFT OFDM_HC



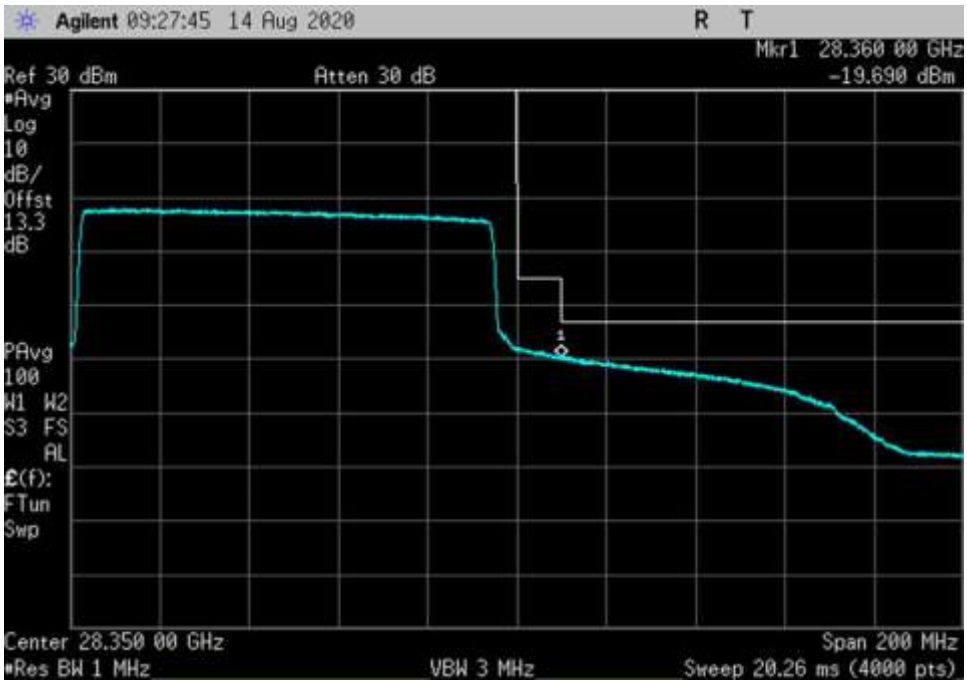
UL_27500-28350-Pi/2- BPSK-400MHz-V-AGC+3-DFT OFDM_LC



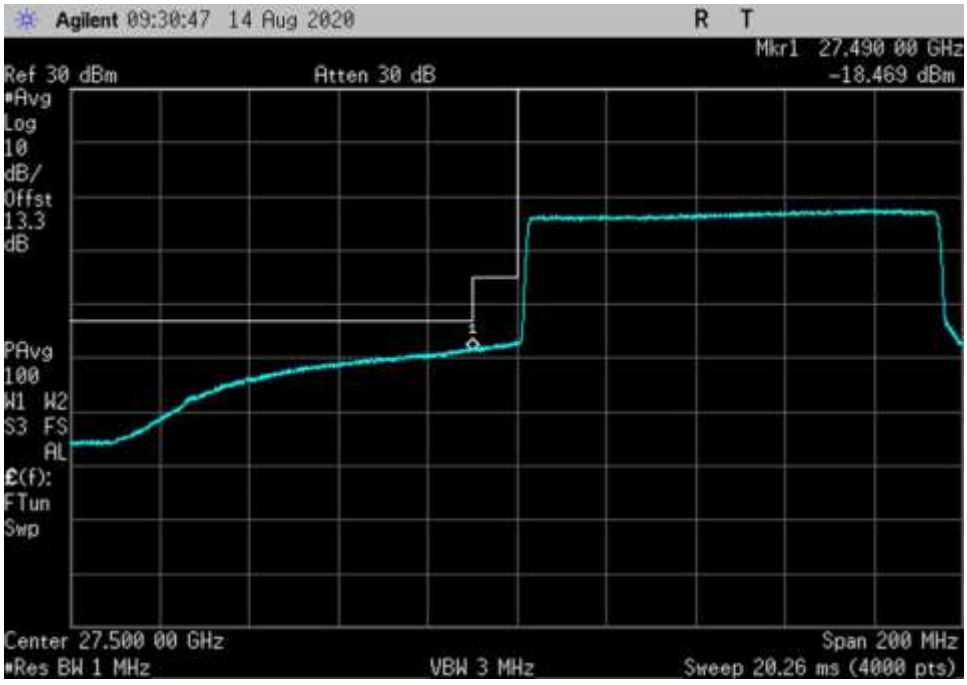
UL_27500-28350-Pi/2- BPSK-400MHz-V-DFT OFDM_HC



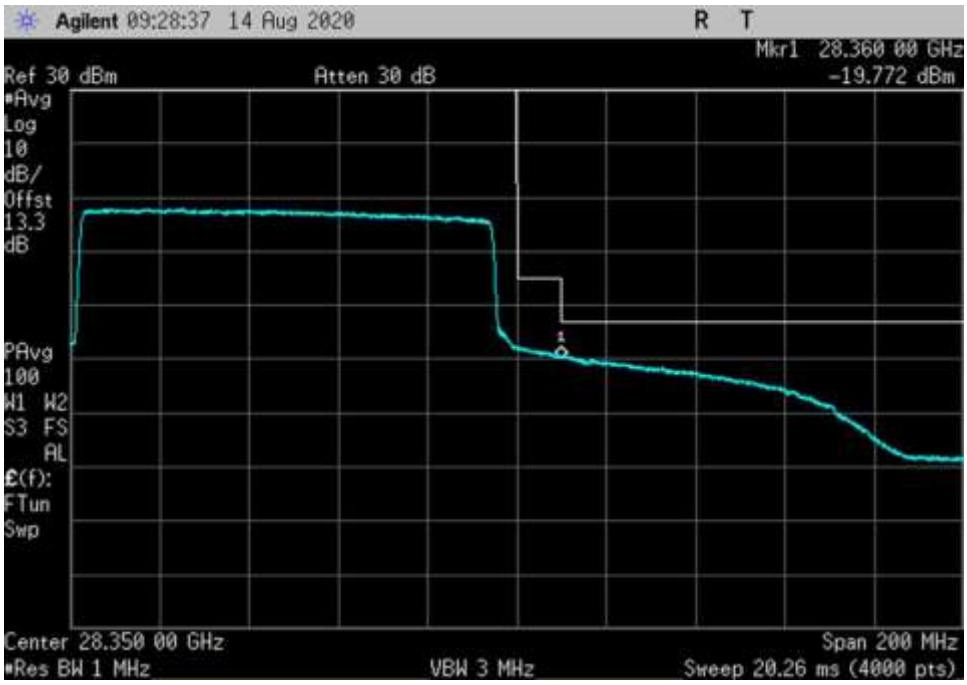
UL_27500-28350-Pi/2- BPSK-400MHz-V-DFT OFDM_LC



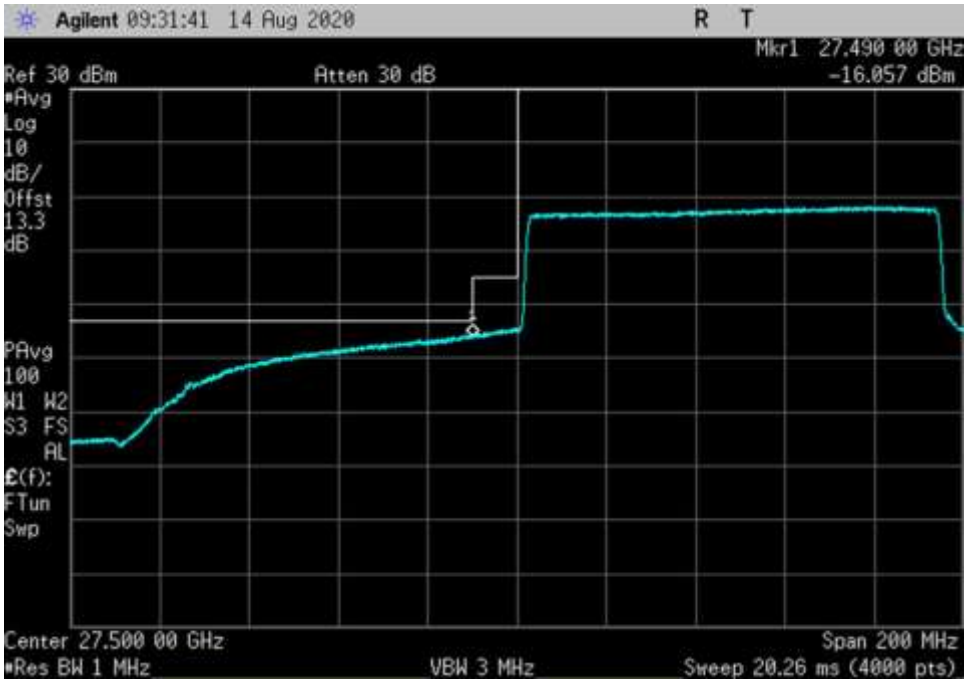
UL_27500-28350-QPSK-100MHz-V- DFT OFDM_HC



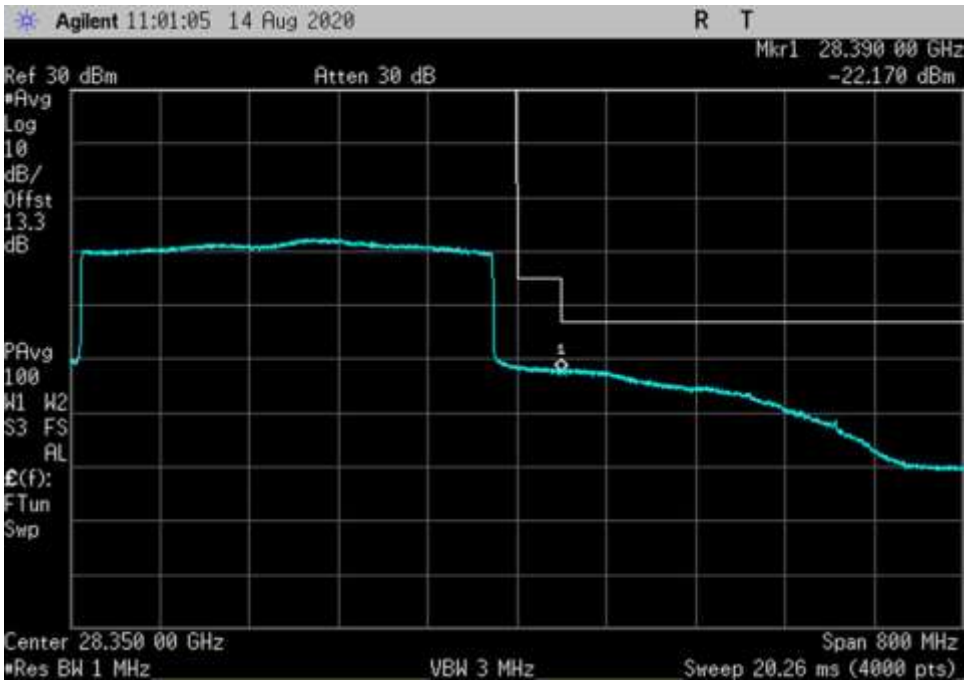
UL_27500-28350-QPSK-100MHz-V- DFT OFDM_LC



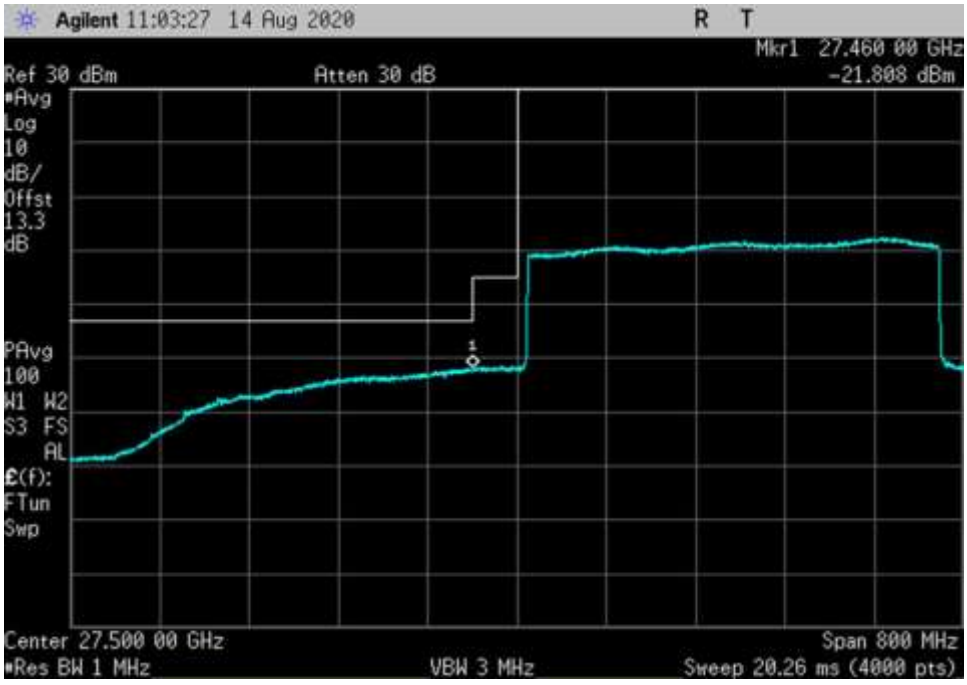
UL_27500-28350-QPSK-100MHz-V-AGC+3- DFT OFDM_HC



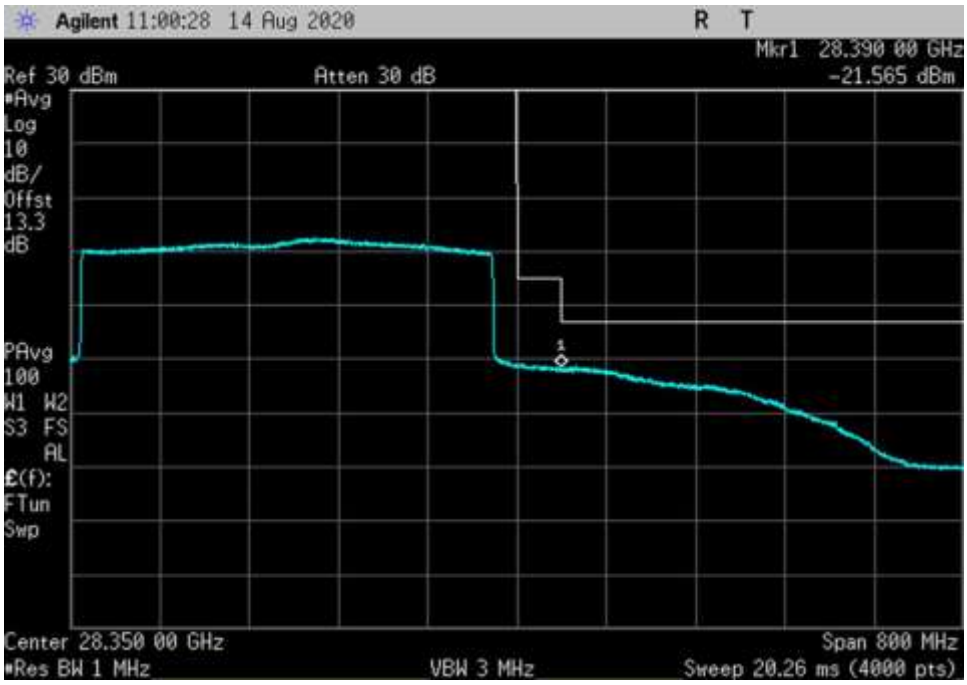
UL_27500-28350-QPSK-100MHz-V-AGC+3- DFT OFDM_LC



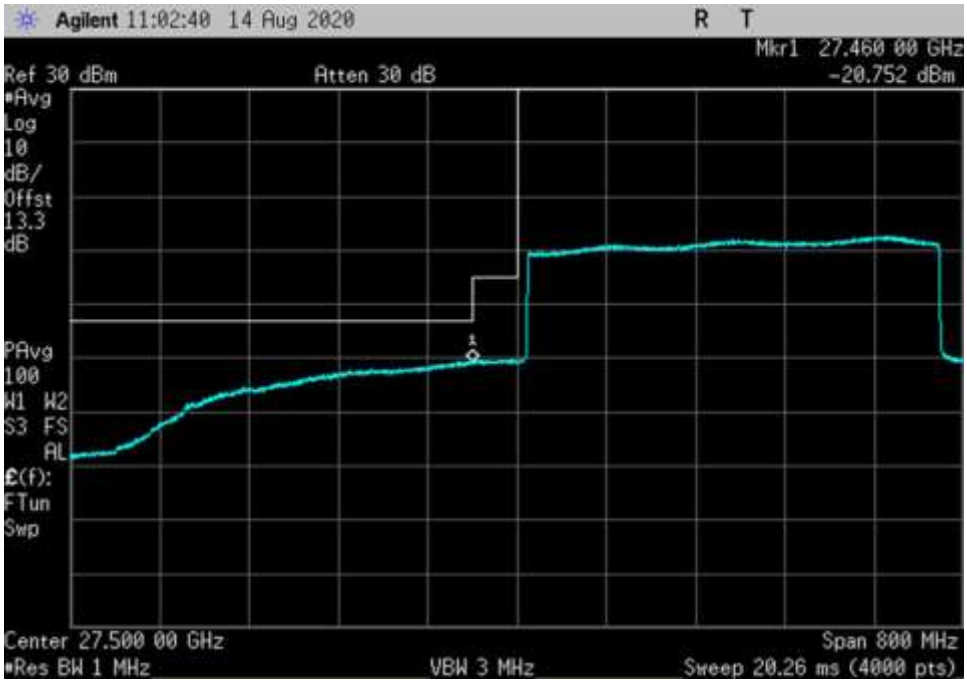
UL_27500-28350-QPSK-400MHz-V-AGC+3-DFT OFDM_HC



UL_27500-28350-QPSK-400MHz-V-AGC+3-DFT OFDM_LC



UL_27500-28350-QPSK-400MHz-V-DFT OFDM_HC



UL_27500-28350-QPSK-400MHz-V-DFT OFDM_LC

4.4.2 Out of Band Emission at the Band Edge - Radiated

Test Setup/Conditions			
Test Location:	Fremont	Test Engineer:	H. Nguyenpham
Test Date(s):	9/1/2020		
Configuration:	1		
Test Setup:	The EUT is placed on Styrofoam table and mounted 1.5 height above the ground plan. It is 3meters away from the measurement antenna. The Signal Generator which is outside of the chamber is connected to the input of the EUT to produce the max power of the Pre AGC level According to Section 30.203(a), 12 the conductive power or the total radiated power of any emission outside a licensee's frequency block13 shall be −13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10% of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm/MHz or lower For frequencies ≤40GHz, unwanted emissions measurements are performed using radiated method with antenna port terminated in accordance with ANSI C63.26 Clause 5.5.2.3.1. Per Section 4.4.2.1 a) Perform maximum EIRP measurement as described in 5.5.3 of ANSI C63.26 (substitution method) or 5.5.4 of ANSI C63.26 (field strength method). Note: EIRP measurements are performed using linearly polarized antenna. Both horizontal and vertical polarizations are measured separately and not summed. The highest amplitude signal measured from horizontal or vertical polarization is used for compliance to the unwanted emission limit. b) Compare the measured maximum EIRP at each frequency with the applicable TRP limit. c) If the maximum EIRP is less than TRP limit then early exit condition is met, and no further measurements are required for that frequency. Base on the result of section 30.202 (c) Equivalent Isotropic Radiated Power, all the modes and the worst configuration are reported in this section as below 1/ UL-H: modulation type Pi/2-BPSK, Chanel Bandwidth=100MHz and 400MHz, No RB= Full 2/ UL-V: modulation type QPSK, Chanel Bandwidth=100MHz and 400MHz, No RB= Full 3/DL-H: modulation type 64QAM for Chanel Bandwidth=100MHz and modulation type QPSK for Chanel Bandwidth= 400MHz, No RB= Full		
Declaration:	Modification #1 was in place during testing.		

Environmental Conditions					
Temperature (ºC)	21.6	Relative Humidity (%):	53	Pressure: kPa	102.2

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
01414	Horn Antenna	HP	84125-80008 RA28-K-F-4B-C	10/8/2019	10/8/2021
P00930	Cable	various	various	1/9/2020	1/9/2022
P06899	Cable	Astrolab	32022-29094K- 29094K-72TC	1/7/2020	1/7/2022
03619	Cable	Richardson RFPD	OKOCQoCQ177.2	11/5/2019	11/5/2021
02668	Spectrum Analyzer	Agilent	E4446A	12/17/2019	12/17/2020
R00173	Vector Signal Generator	Rohde & Schwarz	SMW200A-B140	7/22/2019	7/22/2022
02810	Preamp	HP	83051A	7/16/2019	7/16/2021

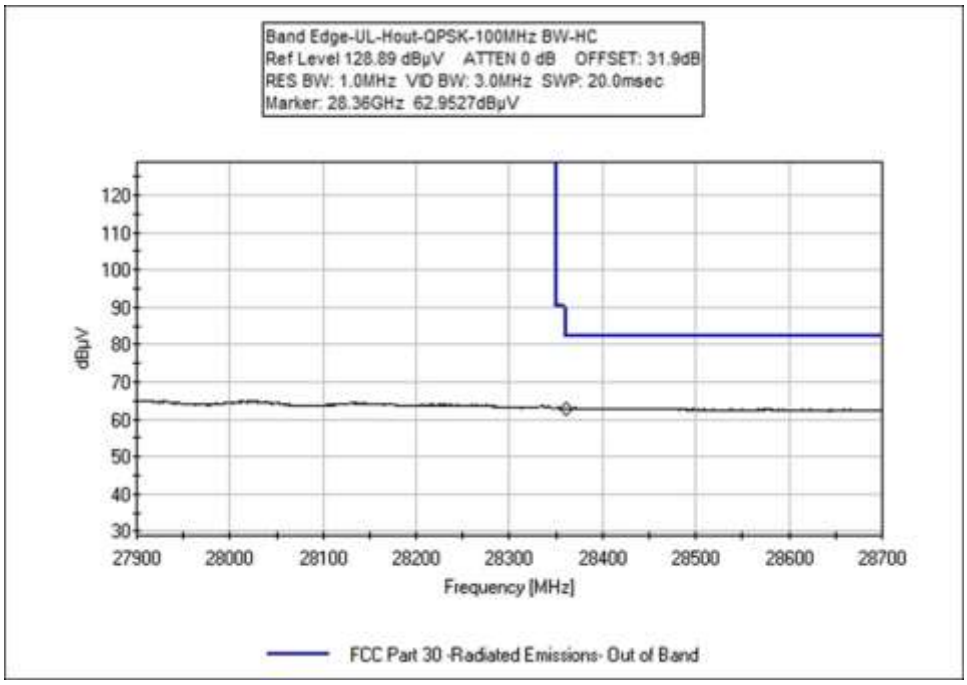
Limit Line For Spurious Radiated Emission

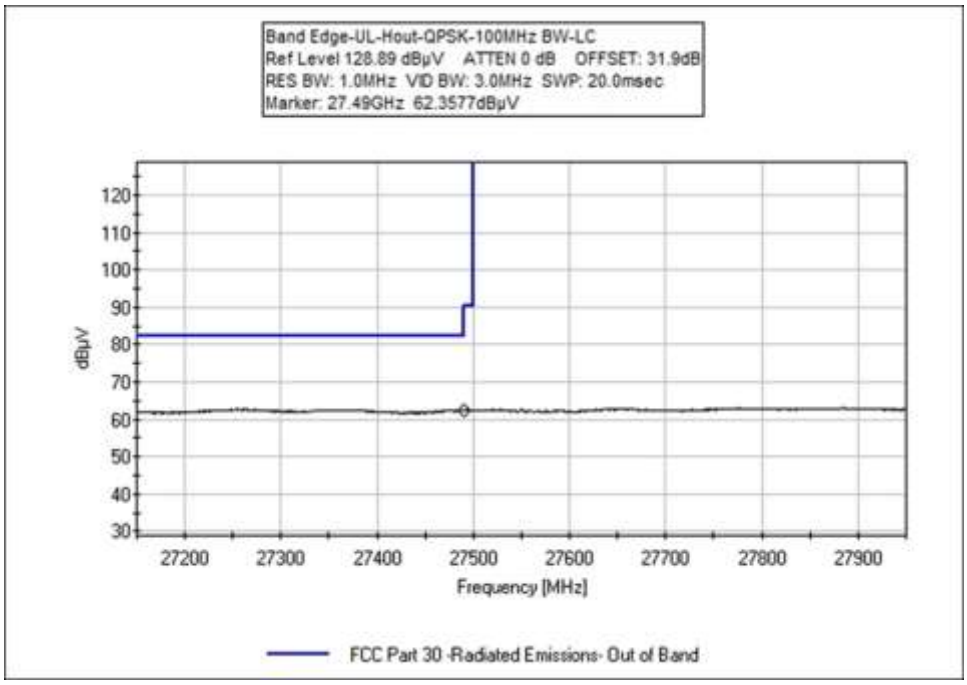
Per ANSI C63.26 2015 Section 5.2.7

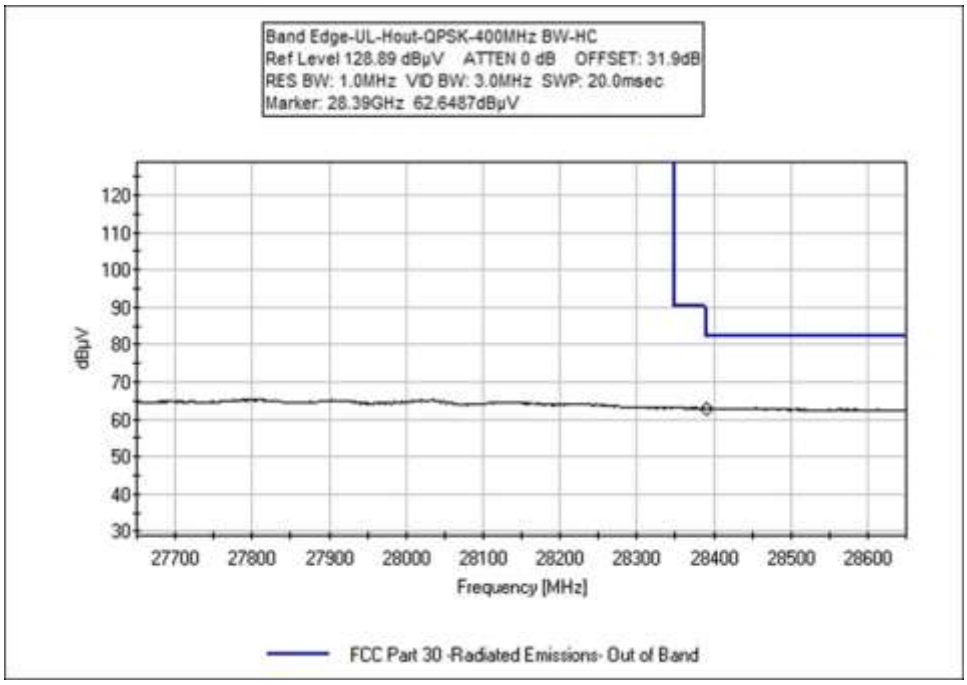
E (dBµV/m) = EIRP (dBm) − 20log(D) + 104.8
= -13(dBm)-20log (3) +104.8= 82.3
where D is the measurement distance (in the far field region) in 3m.

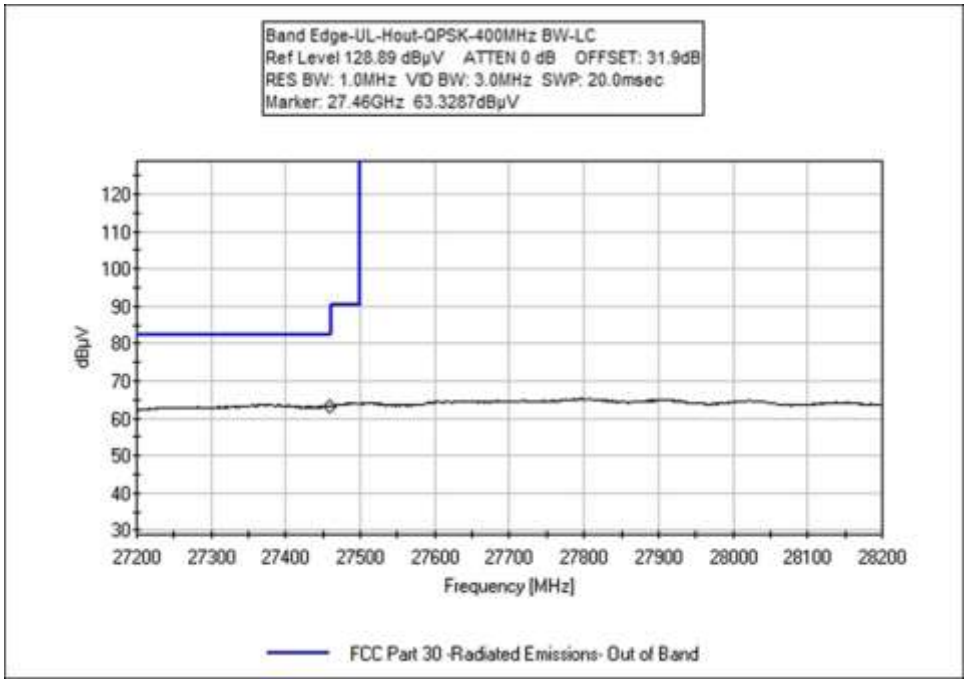
Band Edge Summary of Results							
Frequency (MHz)	**Directional**	**Modulation**	**Channel Bandwidth (MHz)**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
27550	UL-H	QPSK	100	External	62.3577	<82.3	Pass
28300	UL-H	QPSK	100	External	62.9527	<82.3	Pass
27700	UL-H	QPSK	400	External	63.3287	<82.3	Pass
28150	UL-H	QPSK	400	External	62.6487	<82.3	Pass
27550	UL-V	Pi/2-BPSK	100	External	63.7837	<82.3	Pass
28300	UL-V	Pi/2-BPSK	100	External	62.9877	<82.3	Pass
27700	UL-V	Pi/2-BPSK	400	External	63.8097	<82.3	Pass
28150	UL-V	Pi/2-BPSK	400	External	63.0607	<82.3	Pass
27550	DL-H	64QAM	100	External	81.7527	<82.3	Pass
28300	DL-H	64QAM	100	External	80.3917	<82.3	Pass
27700	DL-H	QPSK	400	External	81.0227	<82.3	Pass
28150	DL-H	QPSK	400	External	80.6677	<82.3	Pass
27550	DL-V	64QAM	100	External	81.5177	<82.3	Pass
28300	DL-V	64QAM	100	External	81.7887	<82.3	Pass
27700	DL-V	256QAM	400	External	81.9577	<82.3	Pass
28150	DL-V	256QAM	400	External	80.6277	<82.3	Pass

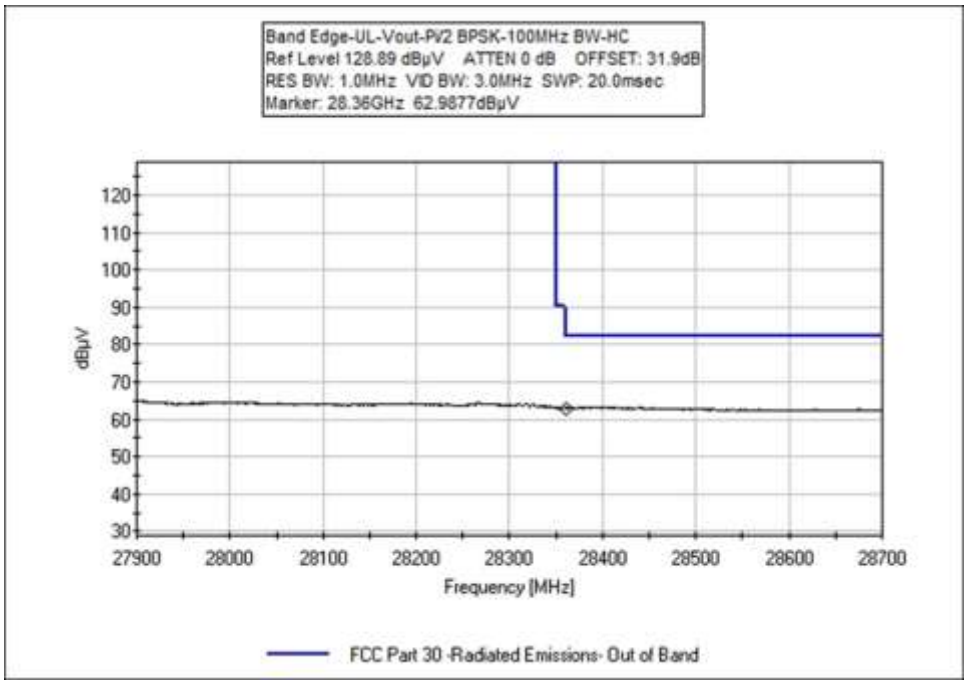
Plots

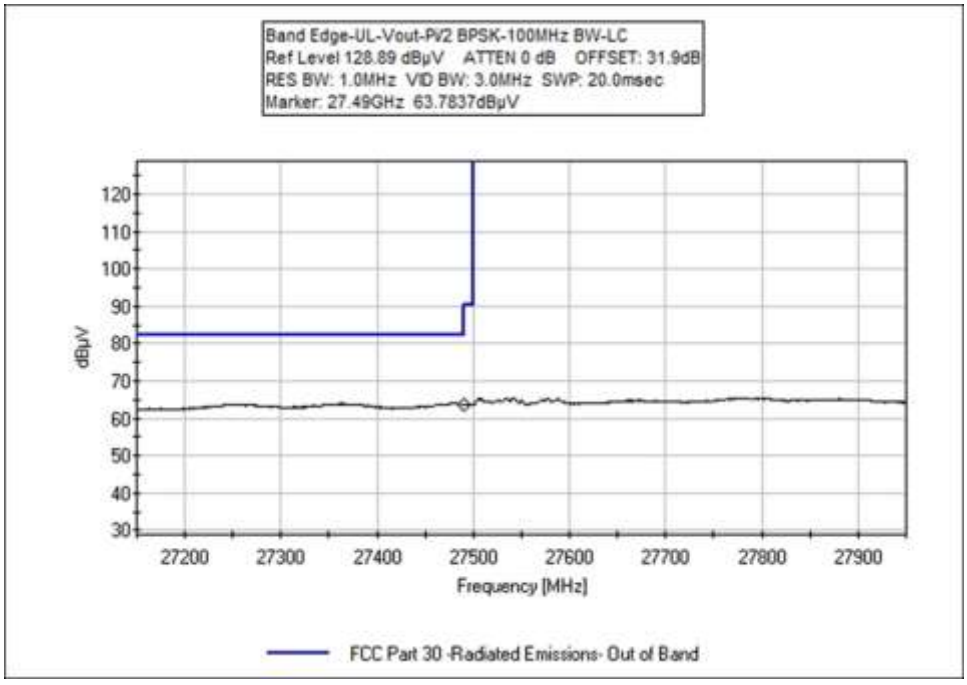

Band Edge-UL-Hout-QPSK-100MHz BW-HC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 28.36GHz 62.9527dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27900
28000
28100
28200
28300
28400
28500
28600
28700
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

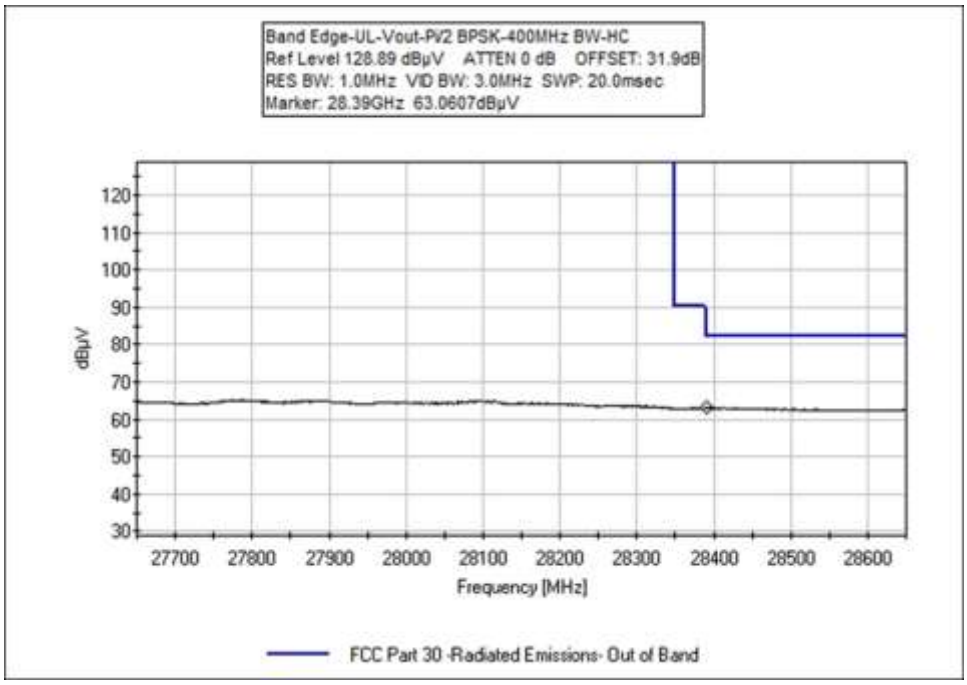

Band Edge-UL-Hout-QPSK-100MHz BW-LC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 27.49GHz 62.3577dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27200
27300
27400
27500
27600
27700
27800
27900
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

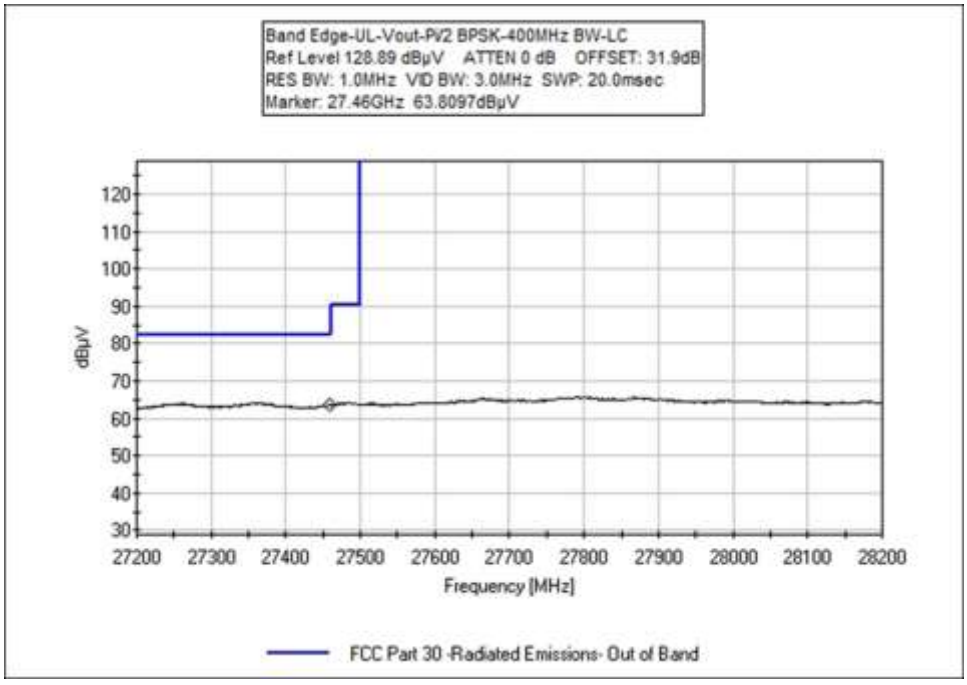

Band Edge-UL-Hout-QPSK-400MHz BW-HC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 28.39GHz 62.6487dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27700 27800 27900 28000 28100 28200 28300 28400 28500 28600
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

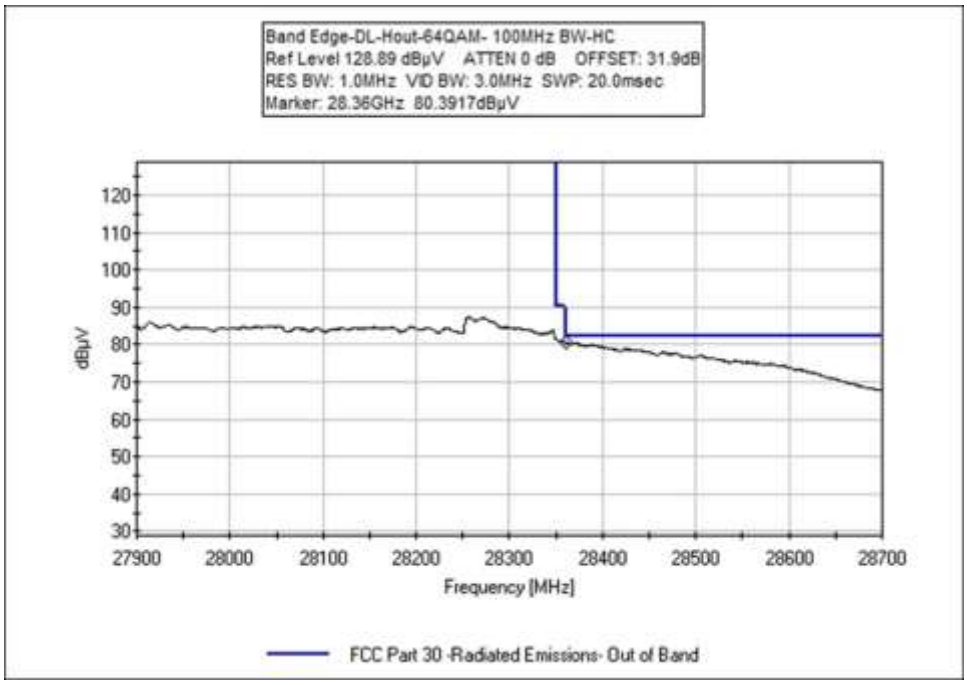

Band Edge-UL-Hout-QPSK-400MHz BW-LC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 27.46GHz 63.3287dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27200 27300 27400 27500 27600 27700 27800 27900 28000 28100 28200
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

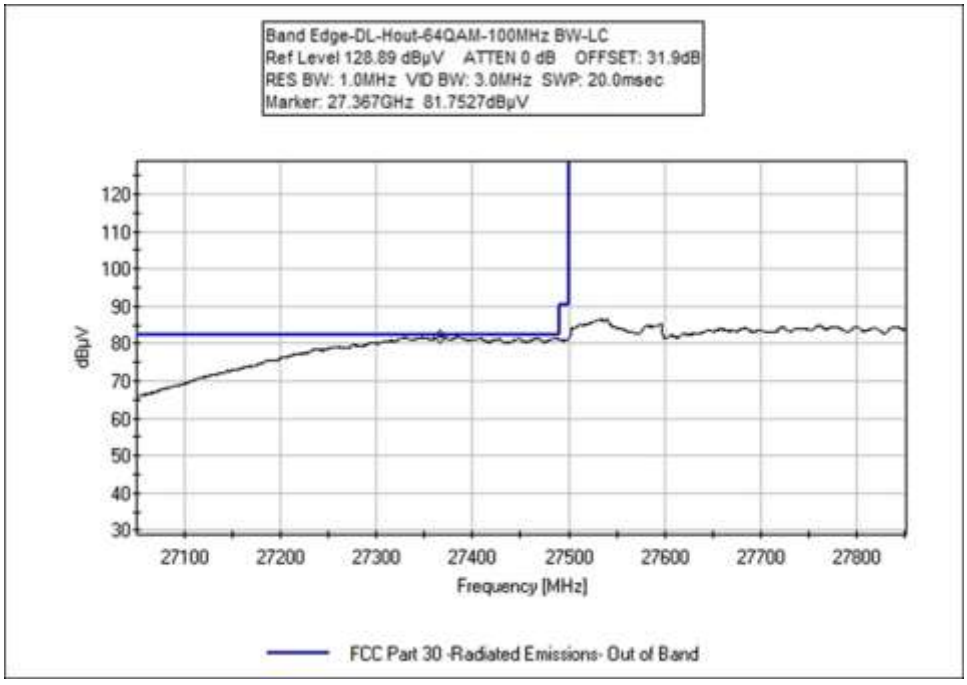

Band Edge-UL-Vout-PV2 BPSK-100MHz BW-HC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 28.36GHz 62.9877dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27900
28000
28100
28200
28300
28400
28500
28600
28700
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

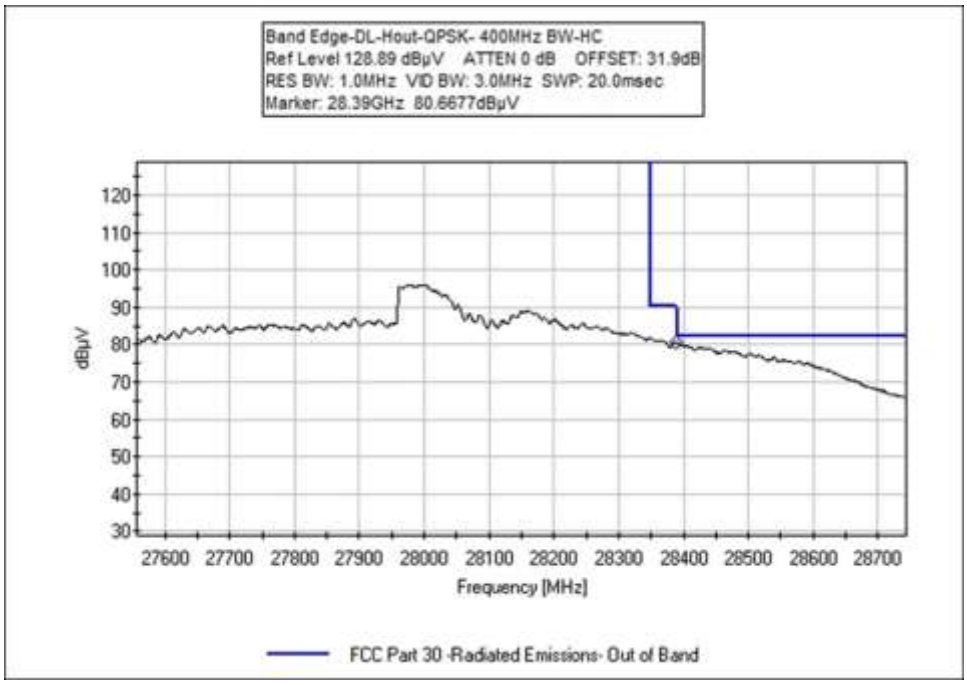

Band Edge-UL-Vout-PV2 BPSK-100MHz BW-LC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 27.49GHz 63.7837dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27200
27300
27400
27500
27600
27700
27800
27900
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

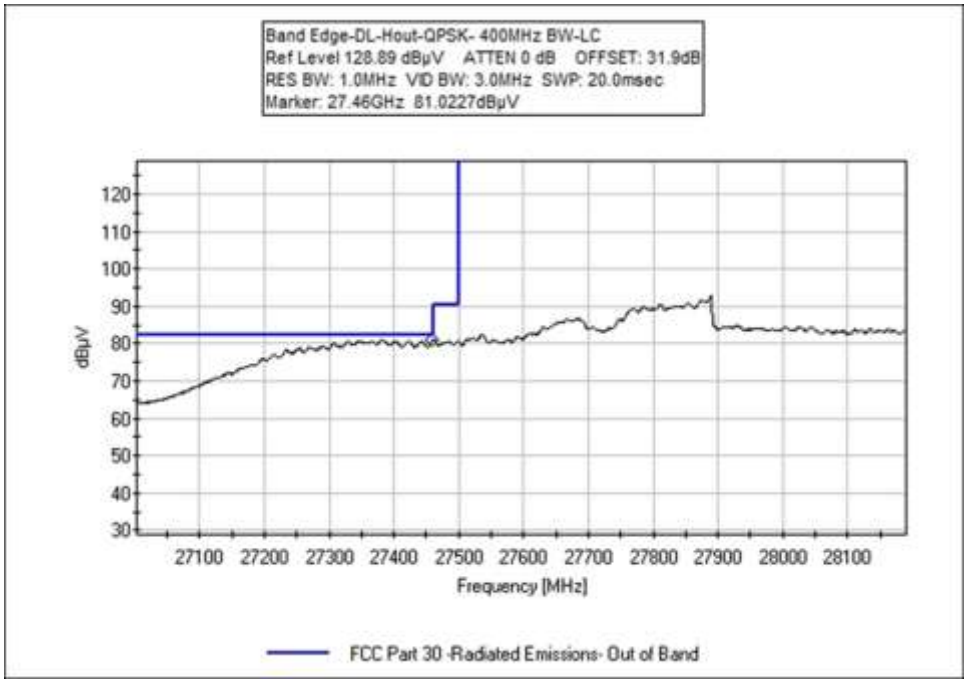

Band Edge-UL-Vout-Pv2 BPSK-400MHz BW-HC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 28.39GHz 63.0607dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27700 27800 27900 28000 28100 28200 28300 28400 28500 28600
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

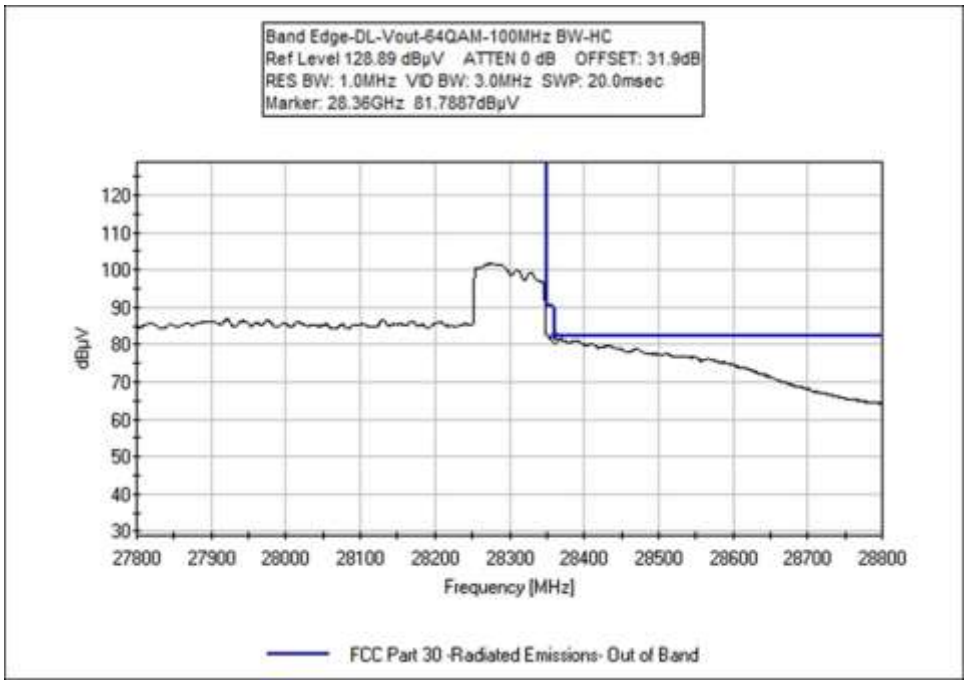

Band Edge-UL-Vout-Pv2 BPSK-400MHz BW-LC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 27.46GHz 63.8097dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27200 27300 27400 27500 27600 27700 27800 27900 28000 28100 28200
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

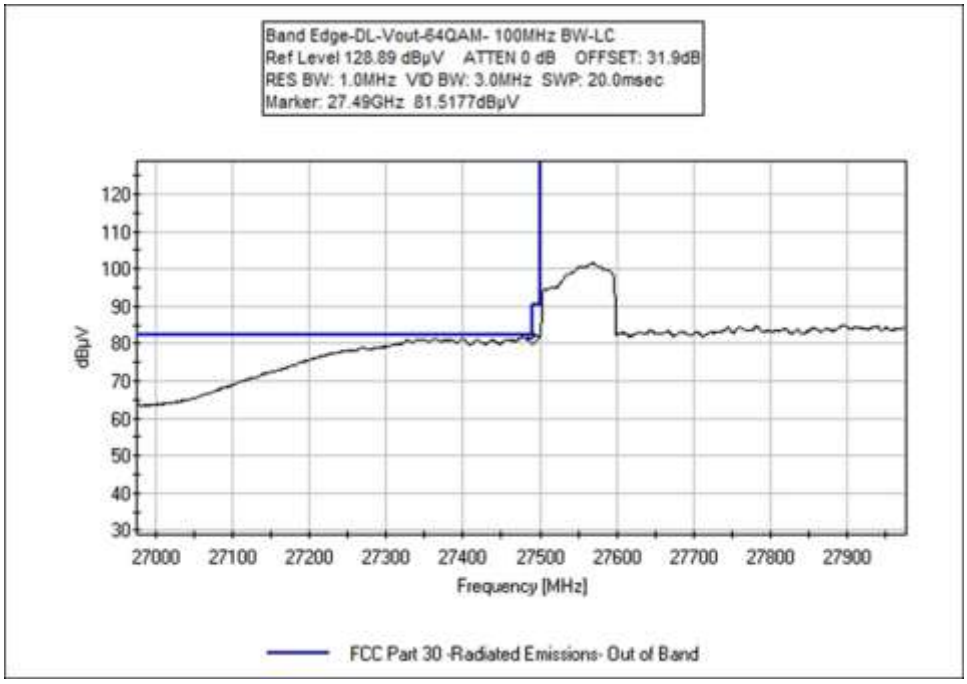

Band Edge-DL-Hout-64QAM- 100MHz BW-HC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 28.36GHz 80.3917dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27900
28000
28100
28200
28300
28400
28500
28600
28700
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

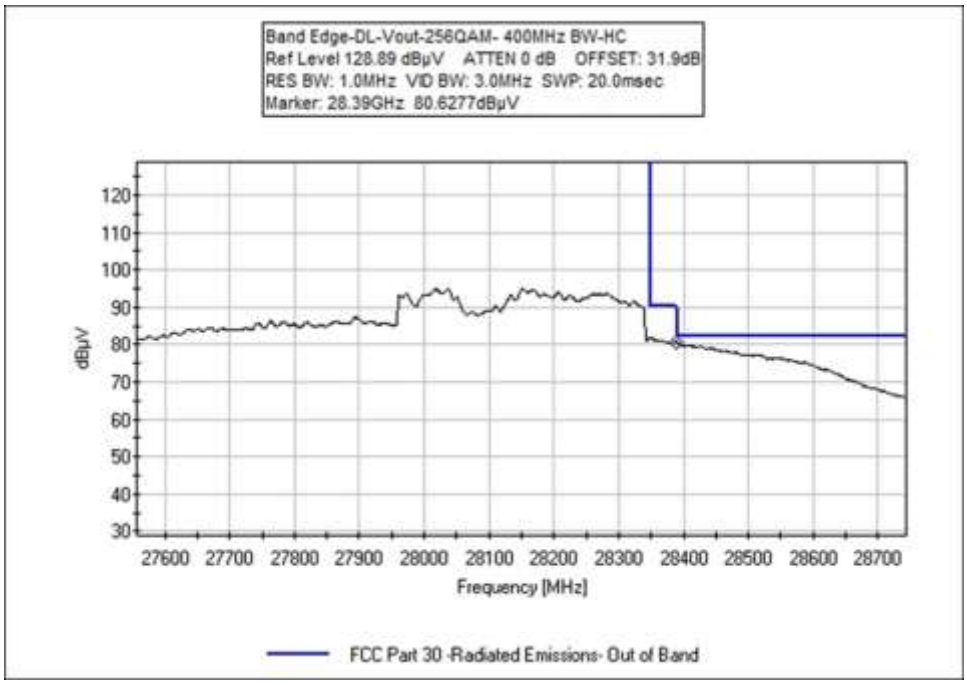

Band Edge-DL-Hout-64QAM-100MHz BW-LC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 27.367GHz 81.7527dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27100
27200
27300
27400
27500
27600
27700
27800
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

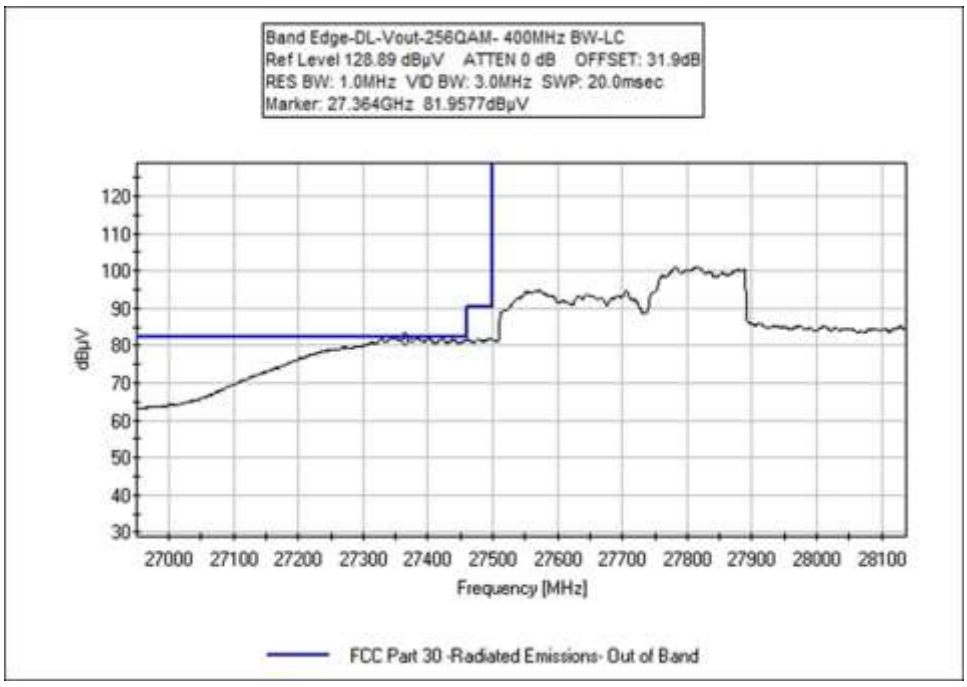

Band Edge-DL-Hout-QPSK- 400MHz BW-HC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 28.39GHz 80.6677dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27600 27700 27800 27900 28000 28100 28200 28300 28400 28500 28600 28700
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band


Band Edge-DL-Hout-QPSK- 400MHz BW-LC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 27.46GHz 81.0227dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27100 27200 27300 27400 27500 27600 27700 27800 27900 28000 28100
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band


Band Edge-DL-Vout-64QAM-100MHz BW-HC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 28.36GHz 81.7887dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27800 27900 28000 28100 28200 28300 28400 28500 28600 28700 28800
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band


Band Edge-DL-Vout-64QAM- 100MHz BW-LC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 27.49GHz 81.5177dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27000 27100 27200 27300 27400 27500 27600 27700 27800 27900
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band


Band Edge-DL-Vout-256QAM- 400MHz BW-HC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 28.39GHz 80.6277dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27600 27700 27800 27900 28000 28100 28200 28300 28400 28500 28600 28700
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band


Band Edge-DL-Vout-256QAM- 400MHz BW-LC
Ref Level 128.89 dBµV ATTEN 0 dB OFFSET: 31.9dB
RES BW: 1.0MHz VID BW: 3.0MHz SWP: 20.0msec
Marker: 27.364GHz 81.9577dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
27000 27100 27200 27300 27400 27500 27600 27700 27800 27900 28000 28100
Frequency [MHz]
FCC Part 30 -Radiated Emissions- Out of Band

4.4.2 Radiated Spurious Emission

Test Setup/Conditions			
Test Location:	Fremont	Test Engineer:	H. Nguyenpham
Test Date(s):	9/1, 2, 3/2020		
Configuration:	1		
Test Setup:	The EUT is placed on Styrofoam table and mounted 1.5 height above the ground plan as the set-up picture to manipulate the EUT several positions in space. The measurement antenna is in the far field of the EUT per formula 2D^2/λ where D is the larger dimension of the measurement Antenna. The Signal Generator which is outside of the chamber is connected to the input of the EUT to produce the max power of the Pre AGC level. Absorbers are placed on the floor between the measurement antenna and turning table for above 1GHz to reduce the reflections. For below 1GHz, Absorbers are removed. Frequency range of measurement = 9 kHz- 100GHz. 9 kHz - 150 kHz -> RBW=200 Hz VBW=1kHz 150 kHz - 30 MHz -> RBW=9 kHz VBW= 30kHz 30 MHz - 1000MHz -> RBW=120 kHz VBW=1MHz 1GHz-100GHz -> RBW=1 MHz VBW=3MHz For frequencies 1GHz-40GHz, unwanted emissions measurements are performed radiated method with antenna port terminated in accordance with ANSI C63.26 Clause 5.5.2.3.1. Except of frequencies band 1GHz to 40GHz, unwanted emissions measurements are performed radiated method with antenna attached as normal A/ the measurement distance from 9kHz to 40GHz is 3m B/ the measurement distance 40GHz to 90GHz is 1m C/ the measurement distance 90GHz to 100GHz is 0.5m D/ Base on the result of section 30.202 (c) Equivalent Isotropic Radiated Power, all the modes and the worst configuration are reported in this section as below 1/ UL-H: modulation type Pi/2-BPSK, Chanel Bandwidth=100MHz and 400MHz, No RB= Full, Middle Channel 2/ UL-V: modulation type QPSK, Chanel Bandwidth=100MHz and 400MHz, No RB= Full, Middle Channel 3/DL-H: modulation type 64QAM for Chanel Bandwidth=100MHz and modulation type QPSK for Chanel Bandwidth= 400MHz, No RB= Full, Middle Channel 4/DL-V: modulation type 64QAM for Chanel Bandwidth=100MHz and modulation type 256QAM for Chanel Bandwidth= 400MHz, No RB= Full, Middle Channel		
Declaration:	Modification #1 was in place during testing.		

Environmental Conditions			
Test Date	**Temperature (ºC)**	**Relative Humidity (%):**	**Pressure: kPa**
9/1/2020	22.1	50	101.3
9/2/2020	22.6	52	101.7
9/3/2020	22.6	50	101.5

Test Equipment for 40GHz – 100GHz					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
03471	Spectrum Analyzer	Agilent	E4440A	2/11/2020	2/11/2022
02347	Horn Antenna	OML	M19HWA	3/6/2019	3/6/2021
02348	Horn Antenna	OML	M12HWA	3/6/2019	3/6/2021
02349	Horn Antenna	OML	M08HWA	3/6/2019	3/6/2021
P05915	Diplexor	OML	DPL26	3/6/2019	3/6/2021
R00173	Vector Signal Generator	Rohde & Schwarz	SMW200A-B140	7/22/2019	7/22/2022

Summary of Results

1/ Frequency Range of measurement 9kHz to 40GHz: PASS
2/ Frequency Range of measurement 40GHz to 100GHz: PASS
a/ the dimension of the measurement antenna from 40GHz to 60GHz (Model: M19HWA)
d = 0.0047752m (H) X 0.0023876m (W)
b/ the dimension of the measurement antenna from 60GHz to 90GHz (Model: M12HWA)
d = 0.0030988m (H) X 0.0015494m (W)
c/ the dimension of the measurement antenna from 60GHz to 90GHz (Model: M08HWA)
d = 0.002032m (H) X 0.001016m (W)

As summarized in plots below, radiated spurious emissions are within EIRP limits.

Limit line for Spurious Radiated Emission

Per ANSI C63.26 2015 Section 5.2.7

1/ the measurement distance=3m
E (dBµV/m) = EIRP (dBm) − 20log(D) + 104.8
= -13(dBm)-20log (3) +104.8= 82.3
where D is the measurement distance (in the far field region)

2/ the measurement distance=1m
E (dBµV/m) = EIRP (dBm) − 20log(D) + 104.8
= -13(dBm)-20log (1) +104.8= 91.8
where D is the measurement distance (in the far field region)

3/ the measurement distance=0.5m
E (dBµV/m) = EIRP (dBm) − 20log(D) + 104.8
= -13(dBm)-20log (0.5) +104.8= 97.8
where D is the measurement distance (in the far field region)

Test Data

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 •		
Customer:	**Cellphone-Mate, Inc.**		
Specification:	**30.203 Radiated Emissions**		
Work Order #:	**104339**	Date:	9/3/2020
Test Type:	**Radiated Scan**	Time:	15:00:49
Tested By:	Hieu Song Nguyenpham	Sequence#:	22
Software:	EMITest 5.03.19		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Radiated Emission
Frequency Range: 9kHz to 1GHz

Temperature: 22.7°C
Humidity: 52 %
Atmospheric Pressure:101.7Pa
Highest Generation Frequency: 28.3GHz
Method: ANSI C63.26 Clause 5.5.2.3.1.

The EUT is operated and set up as intended. The input of antenna port is connected to the signal generation which is outside of the chamber and sending the intended signal to Pre AGC Level. Other the ports are connected as normal.

Note:
Worst Scenario for UL-H out
QPSK-Middle Channel-100MHz Channel Bandwidth