N° 1-6736
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CERTIFICATE #3478.01

PARTIAL TEST REPORT

EUT Description	**WLAN and BT, 2x2 PCIe HMC adapter card**
Brand Name	**Intel® Dual Band Wireless-AC 5001**
Model Name	**PBA5001**
FCC ID ISED ID	**PD9PBA5001** **1000M-PBA5001**
Date of Test Start/End	**2020-03-02 / 2020-03-02**
Features	**802.11 a/b/g/n/ac Wireless LAN + BDR/EDR/BLE 4.0** (see section 5)

Applicant	**Intel Mobile Communications**
Address	**100 Center Point Circle, Suite 200** **Columbia, South Carolina 29210** **USA**
Contact Person	**Steven Hackett**
Telephone/Fax/ Email	**steven.c.hackett@intel.com**

Reference Standards	**FCC CFR Title 47 Part 15 E** **RSS-247 issue 2, RSS-Gen issue 5 A1** (see section 1)

Test Report identification	**200225-01.TR01**
Revision Control	**Rev. 00** **This test report revision replaces any previous test report revision** (see section 0)

The test results relate only to the samples tested.
The test report shall not be reproduced in full, without written approval of the laboratory.
Reference to accreditation shall be used only by full reproduction of test report.

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Digitally signed by Z.OUACHICHA Date: 2020.03.06 11:55:21 +01'00'	Digitally signed by In Cheiel Date: 2020.03.06 15:22:59 +01'00'
Zayd OUACHICHA (Test Engineer Lead)	Cheiel IN (Technical Manager)

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Table of Contents

1. Standards, reference documents and applicable test methods

1. FCC 47 CFR part 15 – Subpart E – Unlicensed National Information Infrastructure Devices.
2. FCC 47 CFR part 15 - Subpart C – §15.209 Radiated emission limits; general requirements.
3. FCC OET KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 – Guidelines for compliance testing of Unlicensed National Information Infrastructure (U-NII) Devices (Part 15, Subpart E)
4. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
5. RSS-247 Issue 2 - Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.
6. RSS-Gen Issue 5 Amendement 1- General Requirements for Compliance of Radio Apparatus.

2. General conditions, competences and guarantees

- ✓ Tests performed under FCC standards identified on section 1 are covered by A2LA accreditation.
- ✓ Tests performed under ISED standards identified on section 1 are covered by Cofrac accreditation.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 testing laboratory accredited by the French Committee for Accreditation (Cofrac) with the certificate number 1-6736.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by ISED, with ISED #1000Y.
- ✓ Intel WRF Lab declines any responsibility with respect to the identified information provided by the customer and that may affect the validity of results.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

3. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	23.5°C ± 0.5°C
Humidity	42% ± 2%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt
#01	180219-01.S14	Module	PBA5001	WFM:001DE0E28D49	2018-03-07
#02	200225-01.S02	Extender Board	PE-MINI-FLEX	N/A	2020-02-24
#03	200225-01.S01	Laptop	Latitude E5420	27081750709	2020-02-24

5. EUT Features

Brand Name	Intel® Dual Band Wireless-AC 5001
Model Name	PBA5001
FCC ID	PD9PBA5001
ISED ID	1000M-PBA5001
Software Version	DRTU 03376-1.7.7
Driver Version	18.33.3.1
Prototype / Production	Production
Supported Radios	802.11b/g/n 2.4GHz (2400.0 – 2483.5 MHz) 802.11a/n/ac 5.2GHz (5150.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz) Bluetooth 5 2.4GHz (2400.0 – 2483.5 MHz)
Antenna Information	CHAIN A: PIFA antenna. WiFi 2.4GHz & 5GHz and BT CHAIN B: PIFA antenna. WiFi 2.4GHz & 5GHz
Additional Information	

6. Remarks and comments

1. According to the applicant the device PBA5001 has formerly been tested in conformity with the FCC Part15 Subpart C as per Report ID R93647
2. According to the applicant this partial report presents only the results for Undesirable emissions limits: Band Edge.

7. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

7.1. 802.11 a/n/ac – U-NII- 3

FCC part	RSS part	Test name	Verdict
15.407 (a) (3)	RSS-247 Clause 6.2.4.1	Power Limits. Maximum output power	NR
15.407 (a) (3)	RSS-247 Clause 6.2.4.1	Peak power spectral density	NR
15.407 (b) (3)	RSS-247 Clause 6.2.4.2	Undesirable emissions limits: Band Edge (conducted)	P
15.407 (b) (3) 15.209	RSS-247 Clause 6.2.4.2 RSS-GEN Clause 8.9	Undesirable emissions limits (radiated)	NR
15.407 (6) 15.207	RSS-GEN Clause 8.8	AC power-line conducted emission measurements	NR

P: Pass
F: Fail
NM: Not Measured
NA: Not Applicable
NR: Not Requested

8. Document Revision History

Revision #	Date	Modified by	Revision Details
Rev. 00	2020-02-03	G. ROUSTAN	First Issue

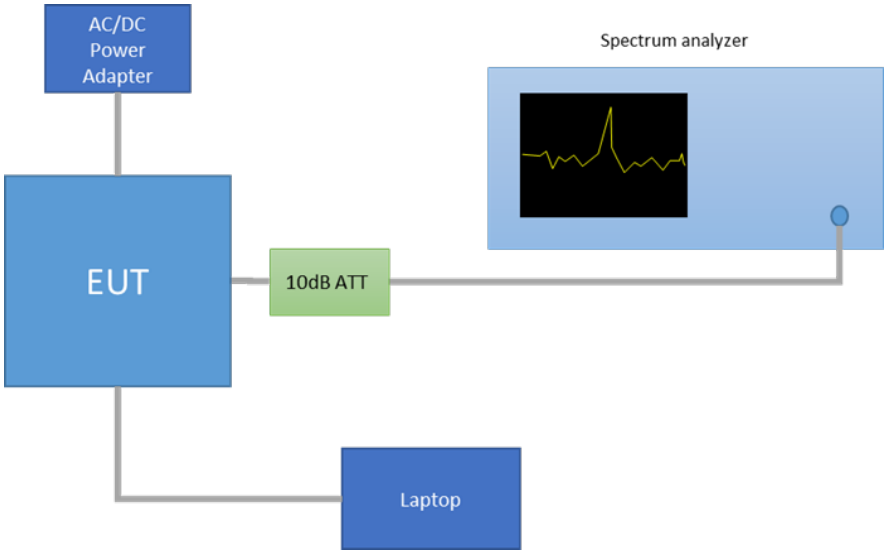
Annex A. Test & System Description

A.1 Measurement System

Measurements were performed using the following setups, made in accordance to the general provisions of FCC KDB 789033 D02 General UNII Test Procedures.

The DUT was installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the Intel proprietary tool DRTU.

Conducted Setup



A.2 Test Equipment List

Conducted Setup

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0315	Spectrum analyzer	FSV30	103307	Rohde & Schwarz	2018-04-10	2020-04-10

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the below table:

Measurement type	Uncertainty	Unit
RF Output Power, conducted	±0.49	dB
Unwanted Emission, conducted	±1.53	dB
Temperature	1.52	ºC
Time	±0.12	%

Annex B. Test Results U-NII-3

B.1 Test Conditions

For 802.11a mode the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, but not simultaneously.

For 802.11n20 (20 MHz channel bandwidth), 802.11n40 (40MHz channel bandwidth) and 802.11ac80 (80MHz channel bandwidth) modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, and also simultaneously.

The conducted RF output power at each chain was adjusted according to the client's supplied target values (see following table) using the Intel DRTU tool and measuring the power by using a spectrum analyser with the channel integration method according to section II) E) 2) e) (Method SA-2 Alternative) of Guidance KDB 789033 D02 .
Measured values for adjustment were within +/- 0.25 dB from the declared target values..

U-NII-3					Conducted Power, Target Value (dBm)		
Mode	BW (MHz)	Data Rate	CH #	Freq. (MHz)	SISO Chain A	SISO Chain B	MIMO at both ports A and B
802.11a	20	6Mbps	149	5745	8.5	8.5	-
			157	5785	8.5	8.5	-
			165	5825	8.5	8.5	-
802.11n	20	HT0 HT8*	149	5745	8.5	8.5	5.5
			157	5785	8.5	8.5	5.5
			165	5825	8.5	8.5	5.5
802.11n	40	HT0 HT8*	151	5755	8.5	8.5	5.5
			159	5795	8.5	8.5	5.5
802.11ac	80	VHT0	155	5775	8.5	8.5	5.5

* Note: HT8 for MIMO modes only

The following data rates were selected based on preliminary testing that identified those rates as the worst cases for output power and spurious levels at the band edges:

Transmission	Mode	Bandwidth (MHz)	Worst Case Data Rate
SISO	802.11a	20	6Mbps
	802.11n	20	HT0
		40	HT0
	802.11ac	80	VHT0
MIMO	802.11n	20/40	HT8
	802.11ac	80	VHT0

Alternative channels to the lowest and highest channels per band have been also tested for Band Edge compliance.

B.2 Test Results

B.2.1 Undesirable emission limits : Band Edge (Conducted)

Test limits

FCC part	RSS part	Limits
15.407 (b) (4)	RSS-247 Clause 6.2.4.2	For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Test procedure

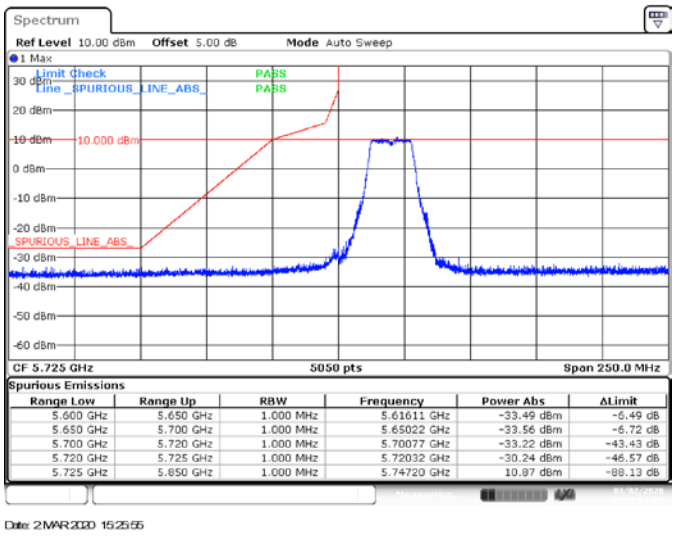
The conducted setup shown in section *Test & System Description* was used to measure undesirable emissions on the Band Edge domain. The antenna terminal of the EUT is connected to the spectrum analyzer through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss and the declared Antenna Gain.

The declared maximum antenna gain is +5dBi.

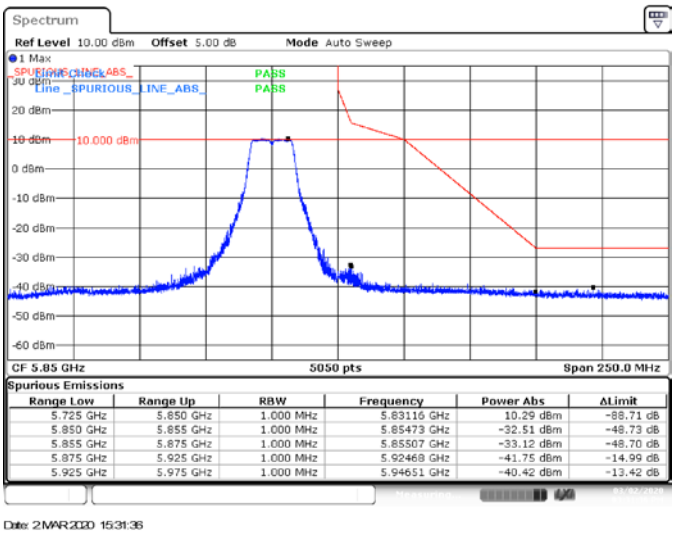
See Section B.3.1 for the screenshot results.

B.3 Test Results Screenshot

B.3.1 Undesirable emission limits : Band Edge (Conducted)



SISO A, 802.11a, 6Mbps, CH149, BE Low Peak



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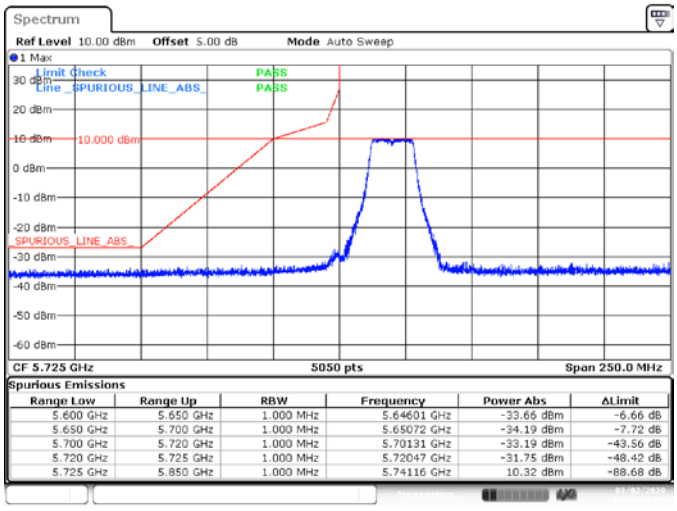
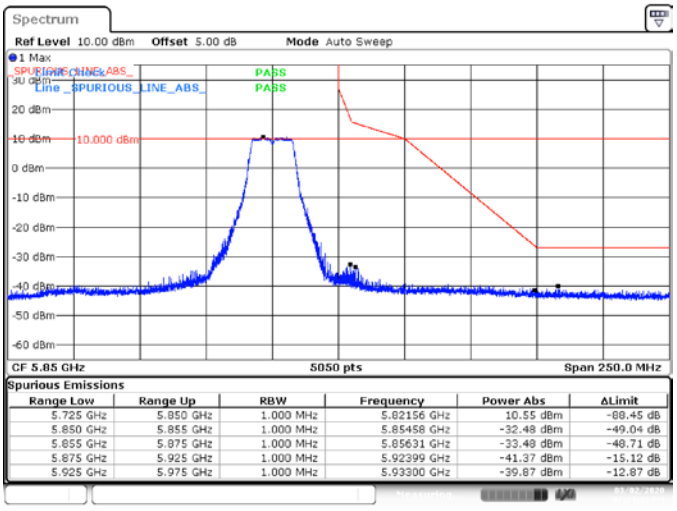
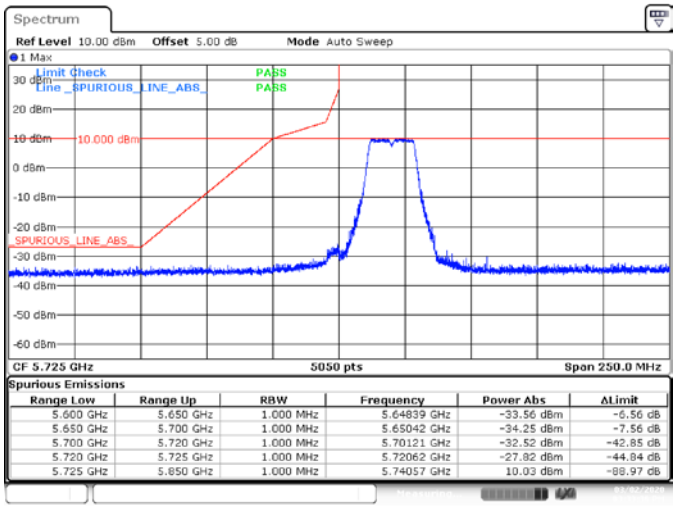


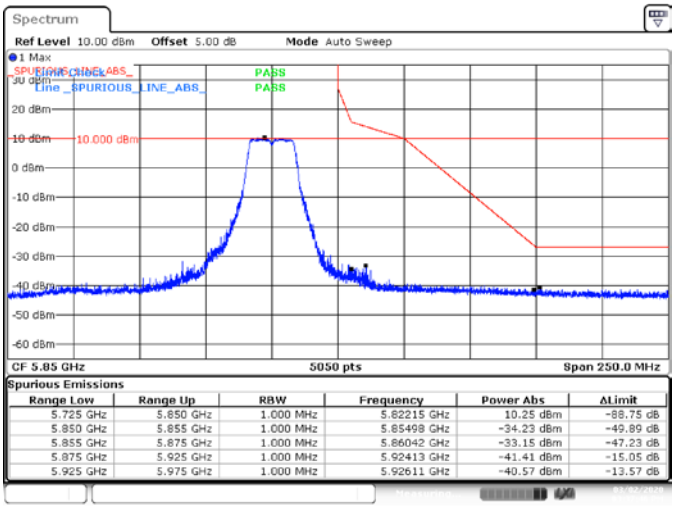
SISO B, 802.11a, 6Mbps, CH149, BE Low Peak



SISO B, 802.11a, 6Mbps, CH165, BE High Peak



SISO A, 802.11n20, HT0, CH149, BE Low Peak



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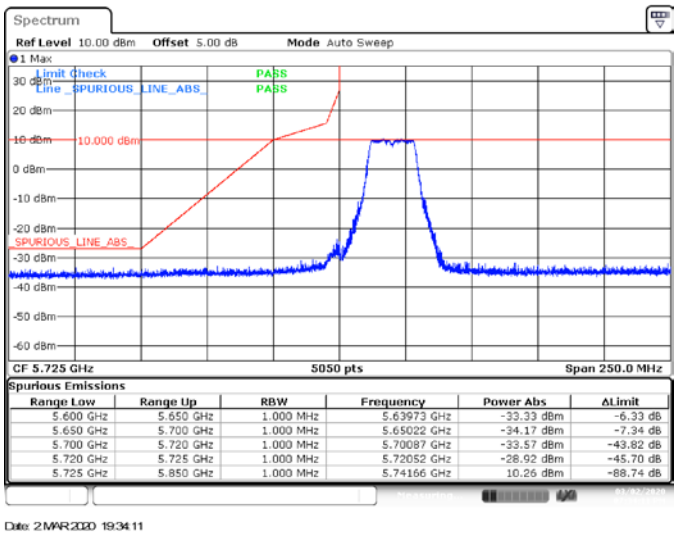

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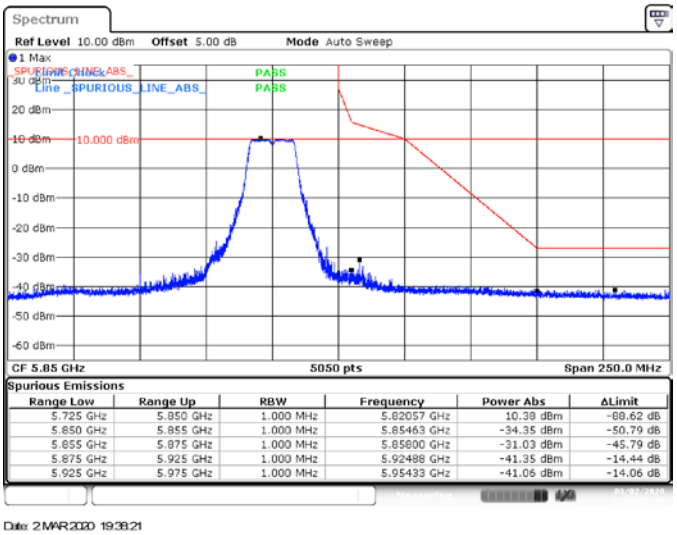

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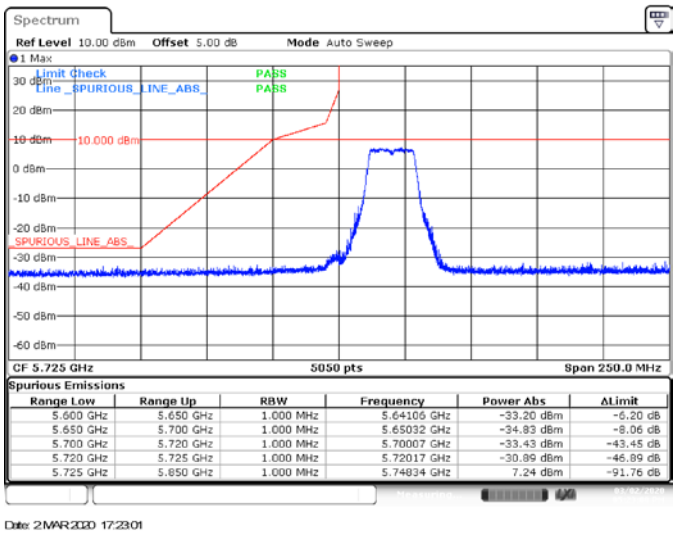
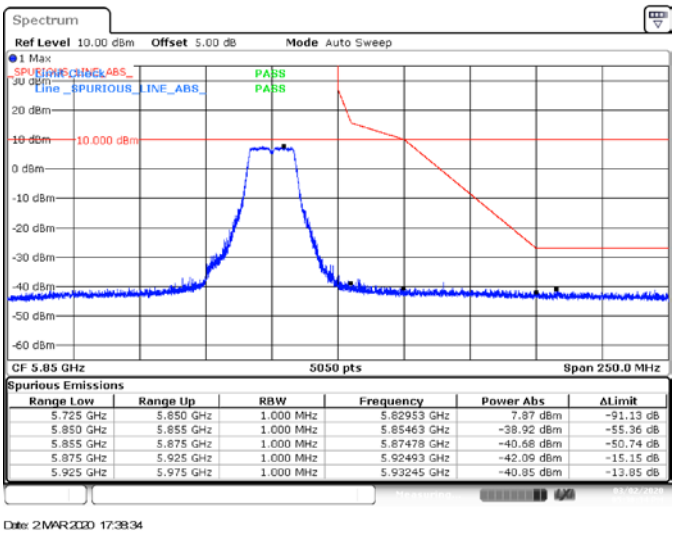


MIMO A, 802.11n20, HT8, CH149, BE Low Peak



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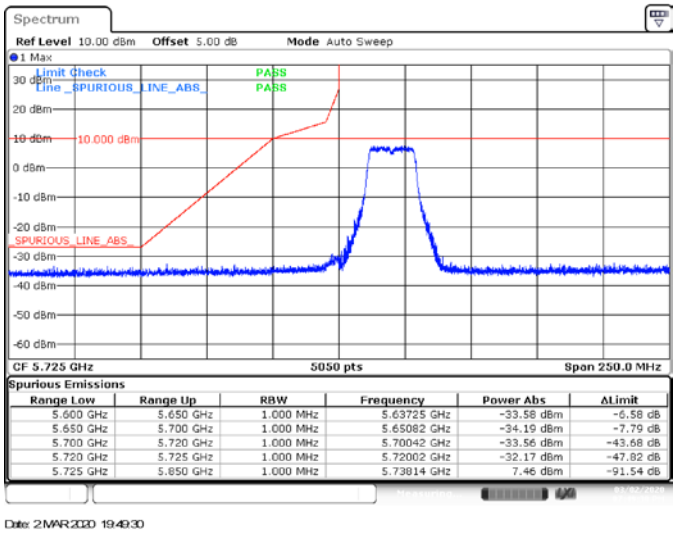

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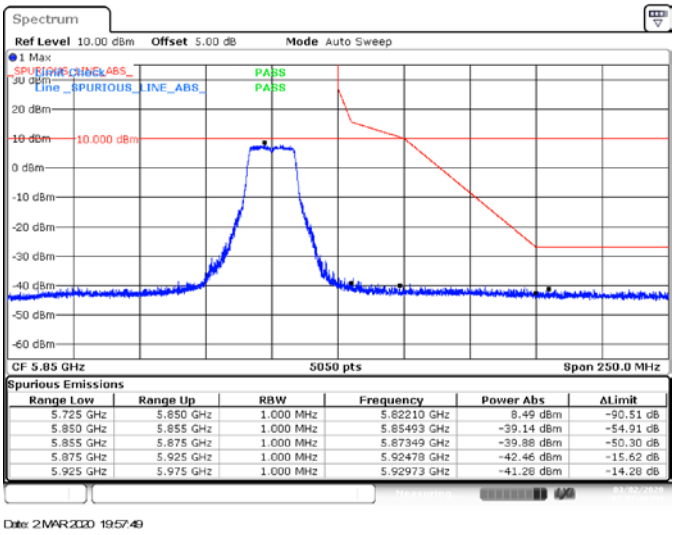
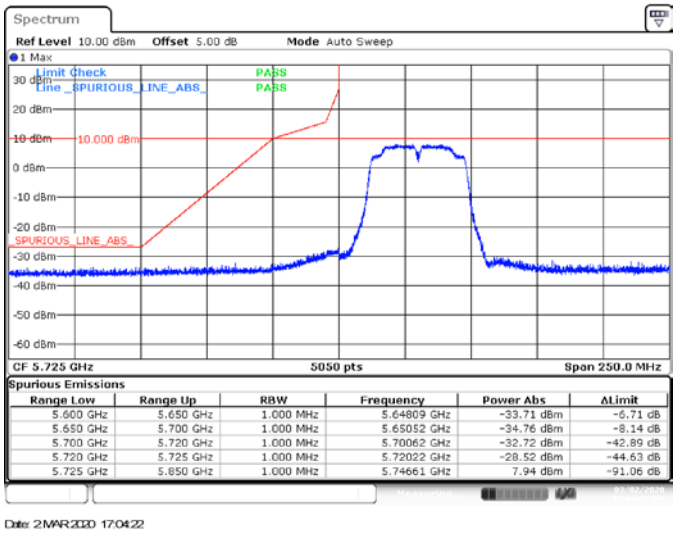
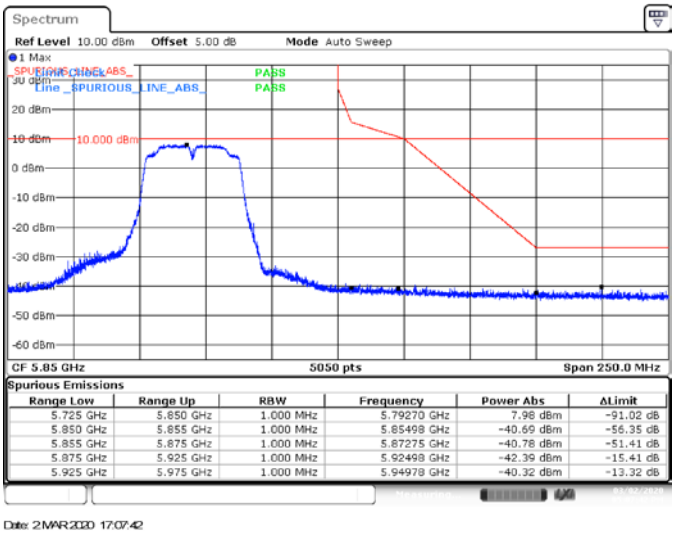


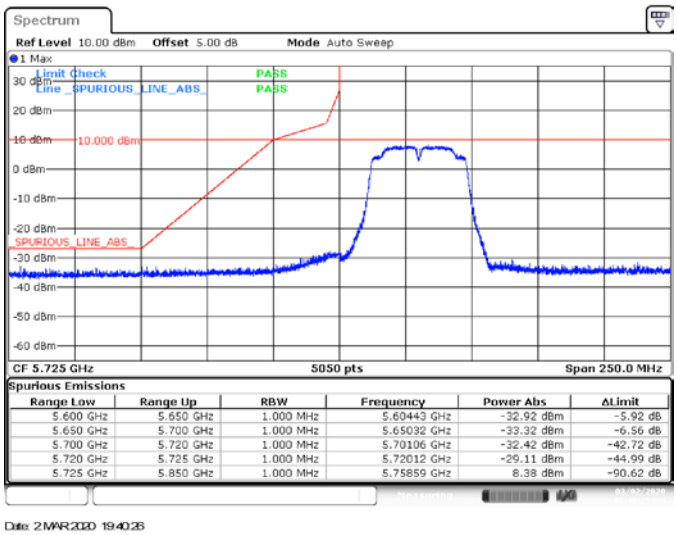
MIMO B, 802.11n20, HT8, CH165, BE High Peak



SISO A, 802.11n40, HT0, CH151, BE Low Peak



SISO A, 802.11n40, HT0, CH159, BE High Peak



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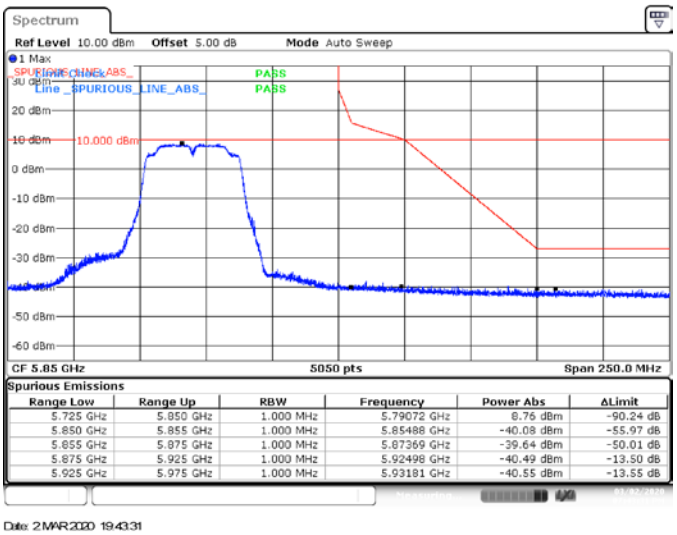

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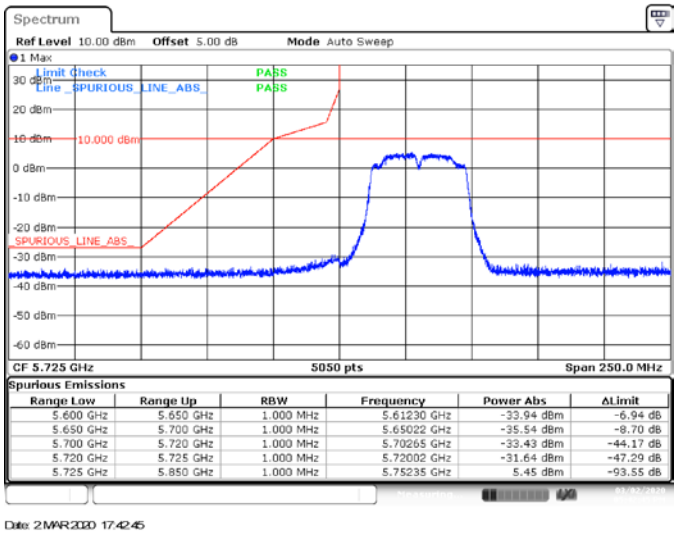

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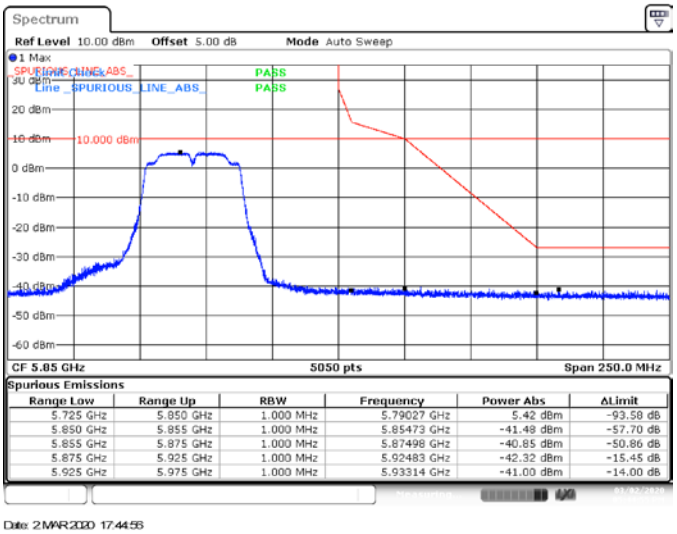

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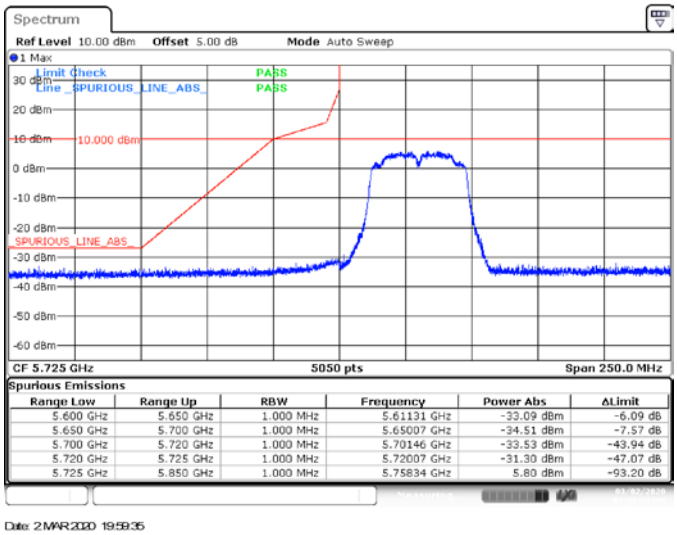

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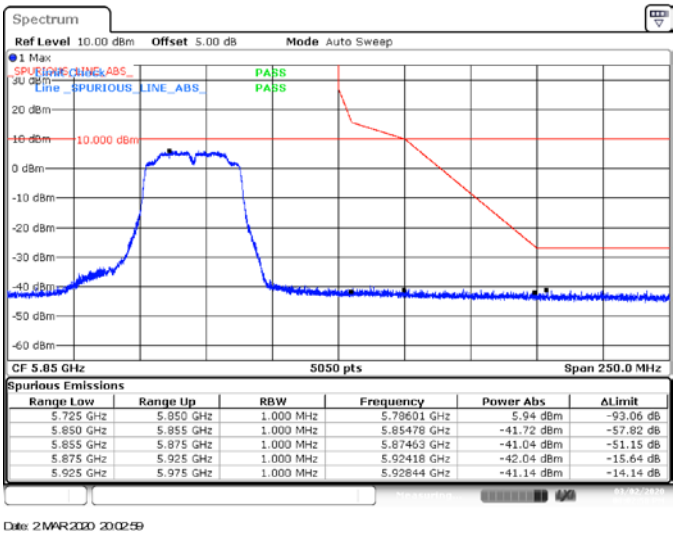

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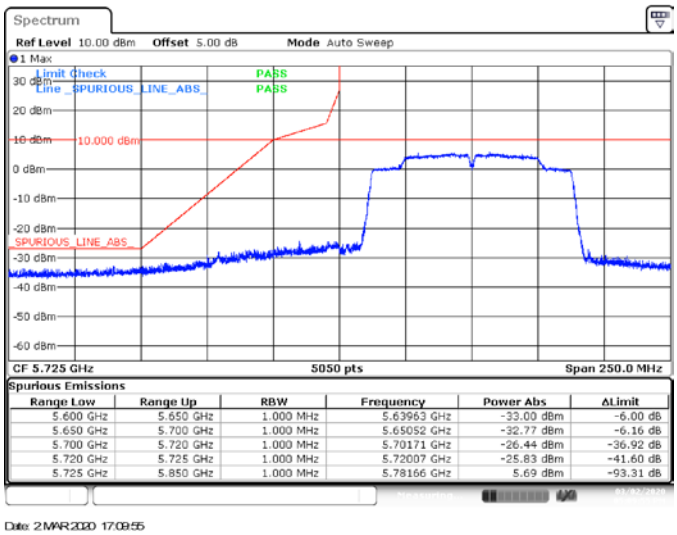
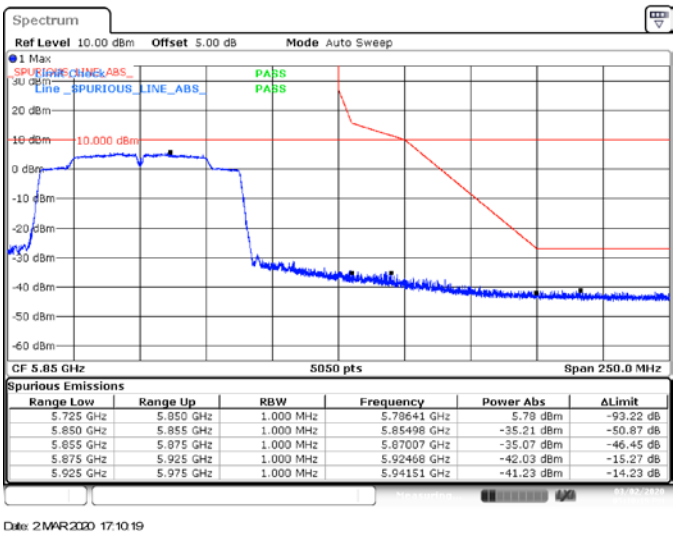


SISO A, 802.11ac80, VHT0, CH155, BE Low Peak



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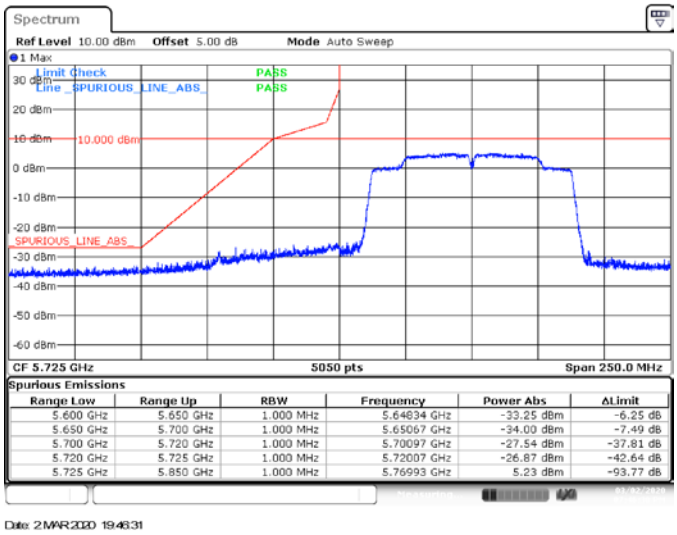

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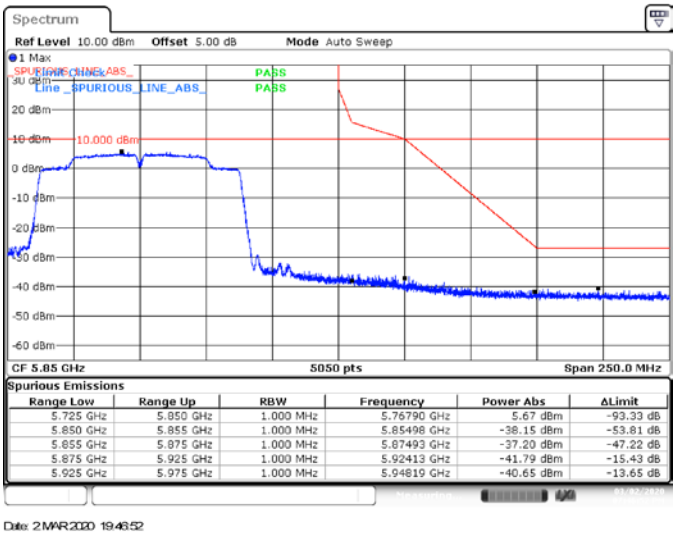

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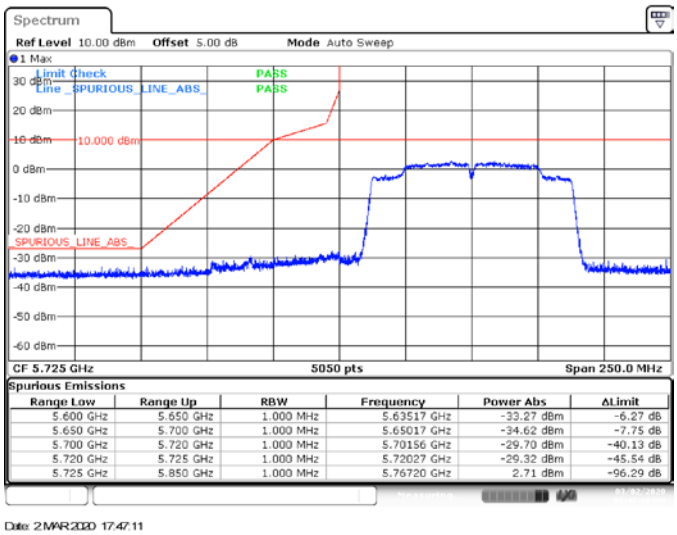

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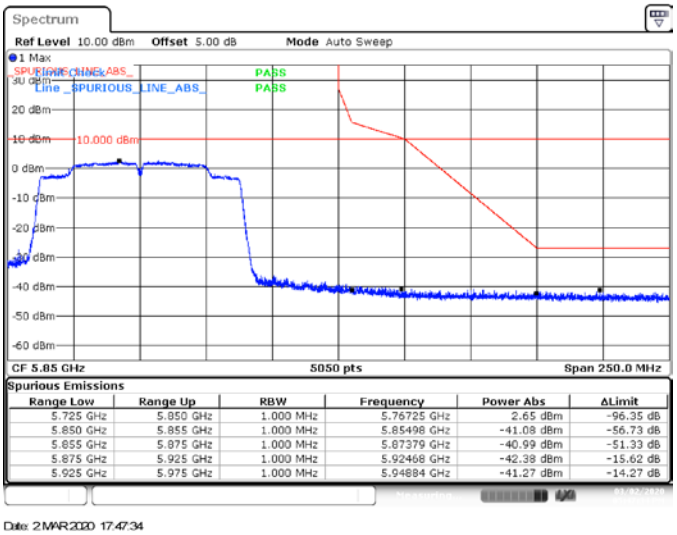

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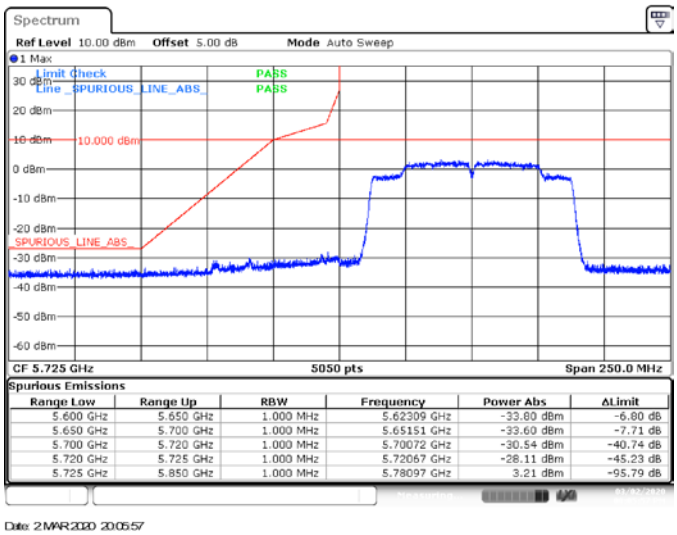

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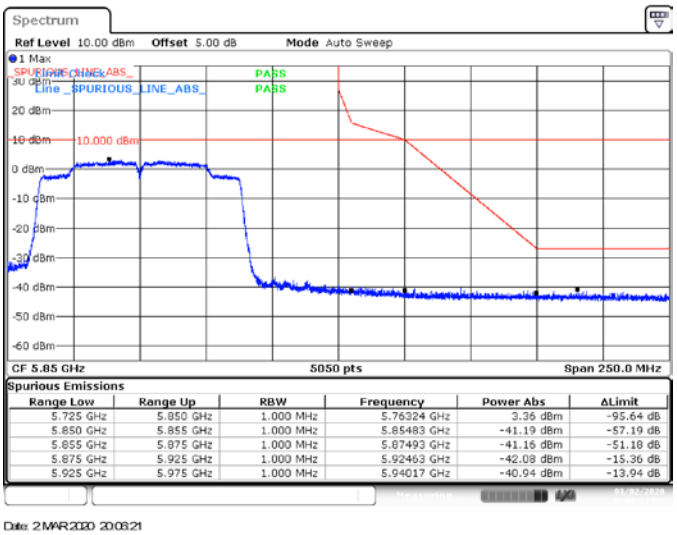

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