



## CTC Laboratories, Inc.

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China  
Tel: +86-755- 27521059 Fax: +86-755- 27521011 Http://www.sz-ctc.org.cn

# TEST REPORT

<b>Report No.</b>	<b>CTC20201784E05</b>
<b>FCC ID</b>	<b>2AYD5-M2-203</b>
<b>Applicant</b>	<b>Imin Technology Pte Ltd</b>
Address	63 Ubi Ave 1 #07-02 63@Ubi Singapore 408937
Manufacturer	Imin Technology Pte Ltd
Address	63 Ubi Ave 1 #07-02 63@Ubi Singapore 408937
<b>Product Name</b>	<b>Mobile POS</b>
Trade Mark	N/A
Model/Type reference	M2-203
Listed Model(s)	N/A
<b>Standard</b>	<b>FCC CFR47 PART 22H, 24E, 27L AND 90S</b>
Date of receipt of test sample:	Dec. 02, 2020
Date of testing	Dec. 03, 2020 ~ Dec. 26, 2020
Date of issue	Dec. 27, 2020
<b>Result</b>	<b>PASS</b>

Compiled by:	
(Printed name+signature)	Terry Su
<i>Terry Su</i>	
Supervised by:	
(Printed name+signature)	Miller Ma
<i>Miller Ma</i>	
Approved by:	
(Printed name+signature)	Walter Chen
<i>Walter Chen</i>	
<b>Testing Laboratory Name...</b>	<b>CTC Laboratories, Inc.</b>
Address	1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

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CTC Laboratories, Inc.

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel.: (86)755-27521059

Fax: (86)755-27521011

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# 1. SUMMARY

## 1.1. Test Standards

[FCC Rules Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[FCC Rules Part 22](#): PRIVATE LAND MOBILE RADIO SERVICES.

[FCC Rules Part 24](#): PUBLIC MOBILE SERVICES

[FCC Rules Part 27](#): MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

[FCC Rules Part 90S](#): Regulations Governing Licensing and Use of Frequencies in the 806-824, 851-869, 896-901, and 935-940 MHz Bands

[TIA/EIA 603 E March 2016](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[ANSI C63.26: 2015](#): American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[KDB 971168 D01 Power Meas License Digital Systems v03](#): MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

[RSS-Gen Issue 5](#): General Requirements for Compliance of Radio Apparatus.

[RSS-132 Issue 3](#): Cellular Telephone Systems Operating in the Bands 824-849MHz and 869-894MHz.

[RSS-133 Issue 6](#): 2 GHz Personal Communications Services.

## 1.2. Report version

Revised No.	Date of issue	Description
01	Dec. 27, 2020	Original

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### 1.3. Test Description

Test Item	Section in CFR 47	RSS Rule	Result	Test Engineer
Conducted Output Power	Part 2.1046 Part 22.913(a) Part 24.232(c) Part 27.50	RSS-132(5.4) RSS-133(6.4)	Pass	Rod Luo
Peak-to-Average Ratio	Part 24.232 Part 27.50	RSS-132(5.4) RSS-133(6.4)	Pass	Rod Luo
99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b) Part 27.53	RSS-GEN(6.6) RSS-133(6.5)	Pass	Rod Luo
Band Edge	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	RSS-132(5.5) RSS-133(6.5)	Pass	Rod Luo
Conducted Spurious Emissions	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	RSS-132(5.5) RSS-133(6.5)	Pass	Rod Luo
Frequency stability vs temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54	RSS-GEN(6.11) RSS-132(5.3)	Pass	Rod Luo
Frequency stability vs voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54	RSS-GEN(6.11) RSS-132(5.3)	Pass	Rod Luo
ERP and EIRP	Part 22.913(a) Part 24.232(b) Part 27.50	RSS-132(5.4) RSS-133(6.4)	Pass	Rod Luo
Radiated Spurious Emissions	Part 2.1053 Part 22.917 Part 24.238 Part 27.53	RSS-132(5.5) RSS-133(6.5)	Pass	Rod Luo

Note: The measurement uncertainty is not included in the test result.

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, Part 22, Part 24, Part 27, and Part 90, FCC KDB 971168 D01 v03r01/ D02 v02r01, KDB 412172 D01 v01r01, ANSI C63.26:2015, IC RSS-132, RSS-133 and RSS-139.



## 1.4. Test Facility

### Address of the report laboratory

**CTC Laboratories, Inc.**

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

### Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

#### **CNAS-Lab Code: L5365**

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation. Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025:2017 General Requirements) the Competence of Testing and Calibration Laboratories.

#### **A2LA-Lab Cert. No.: 4340.01**

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### **Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)**

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

#### **FCC (Registration No.: 951311, Designation Number CN1208)**

CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC)Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 951311, Aug 26, 2017.

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## 1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for General Testing & Inspection laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-12.75 GHz	1.60 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	-----	(1)
Emission Mask	-----	(1)
Modulation Characteristic	-----	(1)
Transmitter Frequency Behavior	-----	(1)

Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

## 1.6. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	20°C-25°C
Relative Humidity:	50 %-55 %
Air Pressure:	101kPa

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## 2. GENERAL INFORMATION

### 2.1. Client Information

Applicant:	Imin Technology Pte Ltd
Address:	63 Ubi Ave 1 #07-02 63@Ubi Singapore 408937
Manufacturer:	Imin Technology Pte Ltd
Address:	63 Ubi Ave 1 #07-02 63@Ubi Singapore 408937

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## 2.2. General Description of EUT

Product Name:	Mobile POS
Trade Mark:	N/A
Model/Type reference:	M2-203
Listed Model(s):	N/A
Power supply:	5Vdc/2A from AC/DC Adapter 7.4Vdc from 2600mAh Li-ion Battery
Adapter Model:	TPA-46050200UU Input:100-240V~ 50/60Hz 0.3A Output: 5Vdc/2A
Hardware version:	Z2-MB-V2.0
Software version:	M2_1.1.6SG

### GSM

Operation Band:	GPRS/EGPRS850: UL: 824MHz~849MHz, DL: 869MHz~894MHz GPRS/EGPRS1900: UL: 1850MHz~1910, DL: 1930MHz~1990MHz
Supported Type:	GPRS/EGPRS
Modulation Type:	GMSK for GPRS, 8PSK for EGPRS
Antenna Type:	PIFA Antenna
Antenna Gain:	Main Antenna: GPRS/EDGE850: 1.19dBi Max GPRS/EDGE850: 2.67dBi Max

### WCDMA

Operation Band:	Band II: UL: 1852.4MHz~1907.6MHz, DL: 1932.6MHz~1987.4MHz Band V: UL: 826.4MHz~846.6MHz, DL: 871.6MHz~1891.4MHz
Modulation Type:	QPSK for WCDMA/HSUPA/HSDPA
Antenna Type:	PIFA Antenna
Antenna Gain:	Main Antenna: WCDMA II: 2.67dBi Max WCDMA V: 1.19dBi Max

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## 2.3. Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing.

### Test Frequency:

GPRS/EDGE850		GPRS/EDGE1900	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20
190	836.60	661	1880.00
251	848.80	810	1909.80

WCDMA Band II		WCDMA Band V	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
9262	1852.40	4132	826.40
9400	1880.00	4183	836.60
9538	1907.60	4233	846.60

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## 2.4. Measurement Instruments List

Output Power (Radiated) & Radiated Spurious Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100967	Dec. 27, 2020
2	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 27, 2020
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 27, 2020
4	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4181	Dec. 27, 2020
5	Spectrum Analyzer	HP	8563E	02052	Dec. 27, 2020
6	Horn Antenna	Schwarzbeck	BBHA 9120D	648	Dec. 27, 2020
7	Horn Antenna	Schwarzbeck	BBHA 9120D	649	Dec. 27, 2020
8	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 27, 2020
9	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25842	Dec. 27, 2020
10	Pre-Amplifier	HP	8447D	1937A03050	Dec. 27, 2020
11	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 27, 2020
12	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 27, 2020
13	Signal Generator	Agilent	N5182A	1019356	Dec. 27, 2020
14	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 27, 2020
15	Antenna Mast	UC	UC3000	N/A	N/A
16	Antenna mast	MATURO	TAM-4.0-P	N/A	N/A
17	Turn Table	UC	UC3000	N/A	N/A
18	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 27, 2020
19	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Dec. 27, 2020

Output Power(Conducted) & Occupied Bandwidth & Emission Bandwidth & Band Edge Compliance & Conducted Spurious Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 27, 2020
2	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Dec. 27, 2020
3	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Mar. 15, 2021
4	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 27, 2020
5	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 27, 2020
6	RF Connection Cable	Chengdu E-Microwave	---	---	Dec. 27, 2020
7	Attenuator	Chengdu E-Microwave	EMCAXX-10RN Z-3	---	Dec. 27, 2020

Frequency Stability					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 27, 2020
2	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Dec. 27, 2020

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3	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Mar. 15, 2021
4	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 27, 2020
5	Climate Chamber	ESPEC	EL-10KA	05107008	Dec. 27, 2020

Note: 1. The Cal. Interval was one year.

2. The cable loss has calculated in test result which connection between each test instruments.

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### 3. TEST ITEM AND RESULTS

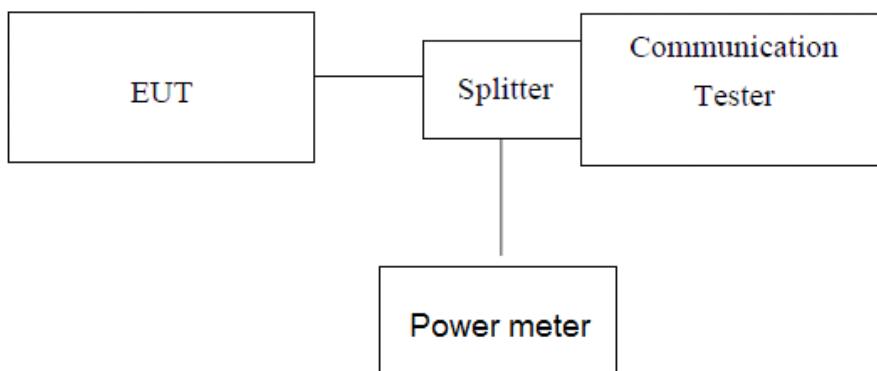
#### 3.1. Conducted Output Power

##### LIMIT

FCC: §2.1046, §22.913, §24.232, §27.50 and §90.635

IC: RSS132§5.4; RSS133§6.4 and RSS139§6.5.

##### TEST CONFIGURATION



*Note: Measurement setup for testing on Antenna connector*

##### TEST PROCEDURE

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum PK burst power and maximum Avg. burst power.

##### TEST RESULTS

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GSM850		Conducted Power (dBm)		
		CH128	CH190	CH251
		824.20MHz	836.60MHz	848.80MHz
GPRS (GMSK)	1TXslot	32.41	32.38	32.34
	2TXslots	31.73	31.70	31.67
	3TXslots	30.04	30.01	29.98
	4TXslots	28.74	28.90	28.85
EGPRS (8PSK)	1TXslot	26.28	25.74	25.67
	2TXslots	24.68	24.46	24.47
	3TXslots	22.10	21.90	21.98
	4TXslots	20.50	20.34	20.52

GSM1900		Conducted Power (dBm)		
		CH512	CH661	CH810
		1850.2MHz	1880.0MHz	1909.8MHz
GPRS (GMSK)	1TXslot	28.93	29.01	29.11
	2TXslots	28.24	28.54	28.43
	3TXslots	26.43	26.52	26.62
	4TXslots	25.21	25.29	25.40
EGPRS (8PSK)	1TXslot	23.66	23.70	23.98
	2TXslots	22.27	22.50	22.93
	3TXslots	19.78	20.07	20.43
	4TXslots	18.20	18.63	18.90

WCDMA Band II		Conducted Power (dBm)		
		CH9262	CH9400	CH9538
		1852.40	1880.00	1907.60
RMC 12.2K		22.33	22.48	22.39
HSDPA	Subtest-1	21.44	21.39	21.48
	Subtest-2	21.02	20.95	20.99
	Subtest-3	21.09	21.01	21.00
	Subtest-4	21.06	20.97	21.02
HSUPA	Subtest-1	19.43	19.37	19.41
	Subtest-2	19.92	19.86	19.94
	Subtest-3	20.50	20.44	20.46
	Subtest-4	19.54	19.38	19.39
	Subtest-5	21.33	20.48	20.59

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WCDMA Band V		Conducted Power (dBm)		
		CH4132	CH4182	CH4233
		826.40	836.40	846.60
RMC 12.2K		22.54	22.90	22.85
HSDPA	Subtest-1	21.52	21.69	21.83
	Subtest-2	20.96	21.12	21.31
	Subtest-3	21.00	21.17	21.29
	Subtest-4	20.96	21.14	21.27
HSUPA	Subtest-1	19.44	19.62	19.72
	Subtest-2	19.53	19.65	19.72
	Subtest-3	19.51	19.64	19.79
	Subtest-4	19.51	19.66	19.78
	Subtest-5	19.55	19.64	19.85

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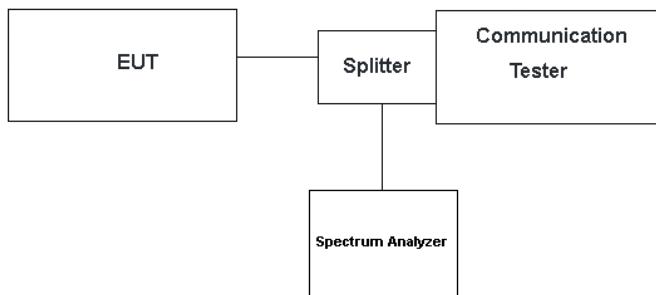
## 3.2. Peak-to-Average Ratio

### LIMIT

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

### TEST CONFIGURATION

- For Peak-to-Average Ratio



### TEST PROCEDURE

- For Peak-to-Average Ratio

1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to spectrum and communication tester via a splitter
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyser.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
6. Record the deviation as Peak to Average Ratio.

### TEST RESULTS

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EUT Mode	Channel	Frequency (MHz)	Peak-to-Average Ratio(dB)	Limit (dB)	Result
GSM 850 GPRS	128	824.20	9.71	13	PASS
	190	836.60	9.74	13	
	251	848.80	9.74	13	
GSM 850 EGPRS	128	824.20	12.79	13	PASS
	190	836.60	12.82	13	
	251	848.80	12.79	13	
PCS 1900 GPRS	512	1850.20	9.74	13	PASS
	661	1880.00	9.71	13	
	810	1909.80	9.74	13	
PCS 1900 EGPRS	512	1850.20	12.95	13	PASS
	661	1880.00	12.82	13	
	810	1909.80	12.76	13	

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EUT Mode	Channel	Frequency (MHz)	Peak-to-Average Ratio(dB)	Limit (dB)	Result
WCDMA Band II WCDMA	9262	1852.40	3.30	13	PASS
	9400	1880.00	3.33	13	
	9538	1907.60	3.17	13	
WCDMA Band II HSDPA	9262	1852.40	4.23	13	PASS
	9400	1880.00	4.20	13	
	9538	1907.60	4.10	13	
WCDMA Band II HSUPA	9262	1852.40	3.72	13	PASS
	9400	1880.00	5.00	13	
	9538	1907.60	5.06	13	
WCDMA Band V WCDMA	4132	826.40	3.33	13	PASS
	4183	836.60	3.30	13	
	4233	846.60	2.92	13	
WCDMA Band V HSDPA	4132	826.40	4.10	13	PASS
	4183	836.60	4.07	13	
	4233	846.60	3.94	13	
WCDMA Band V HSUPA	4132	826.40	8.40	13	PASS
	4183	836.60	8.40	13	
	4233	846.60	8.40	13	

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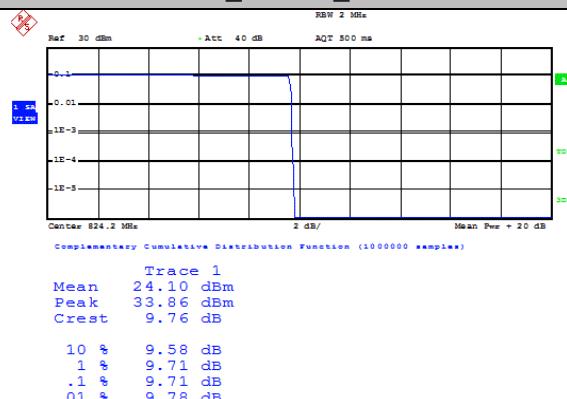
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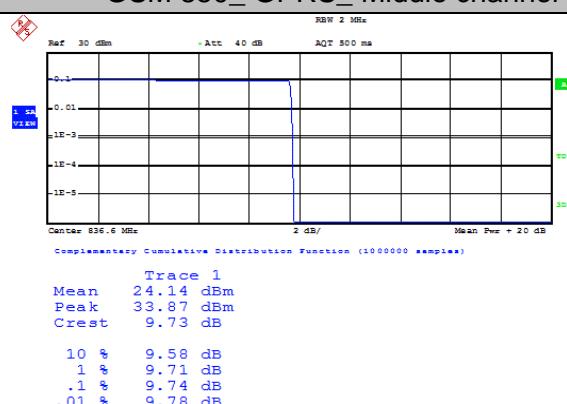
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### GSM 850\_GPRS\_Lowest channel



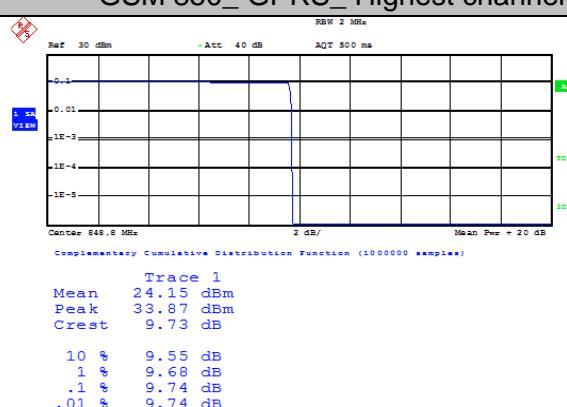
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### GSM 850\_GPRS\_Middle channel



Date: 8.DEC.2020 15:25:37

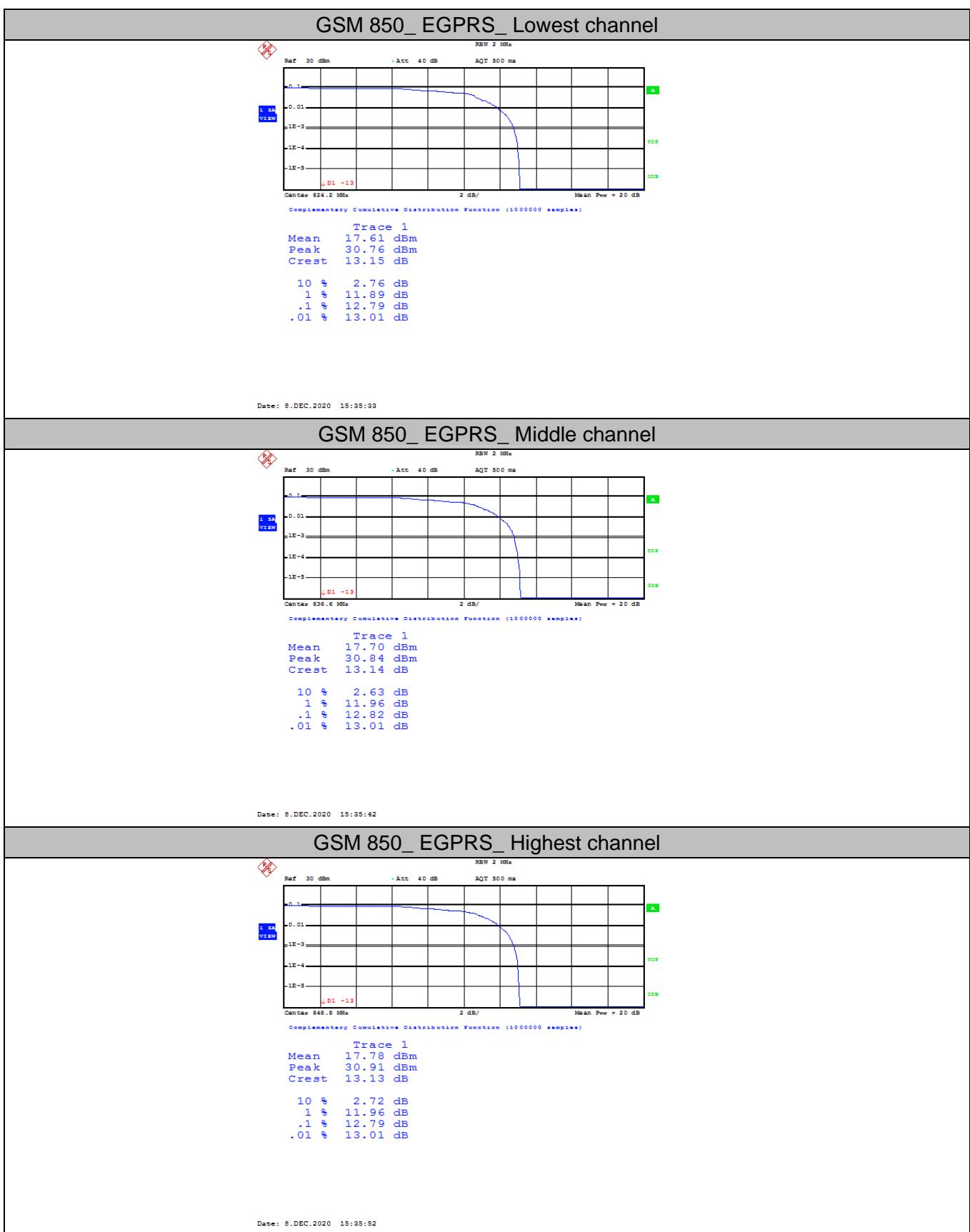
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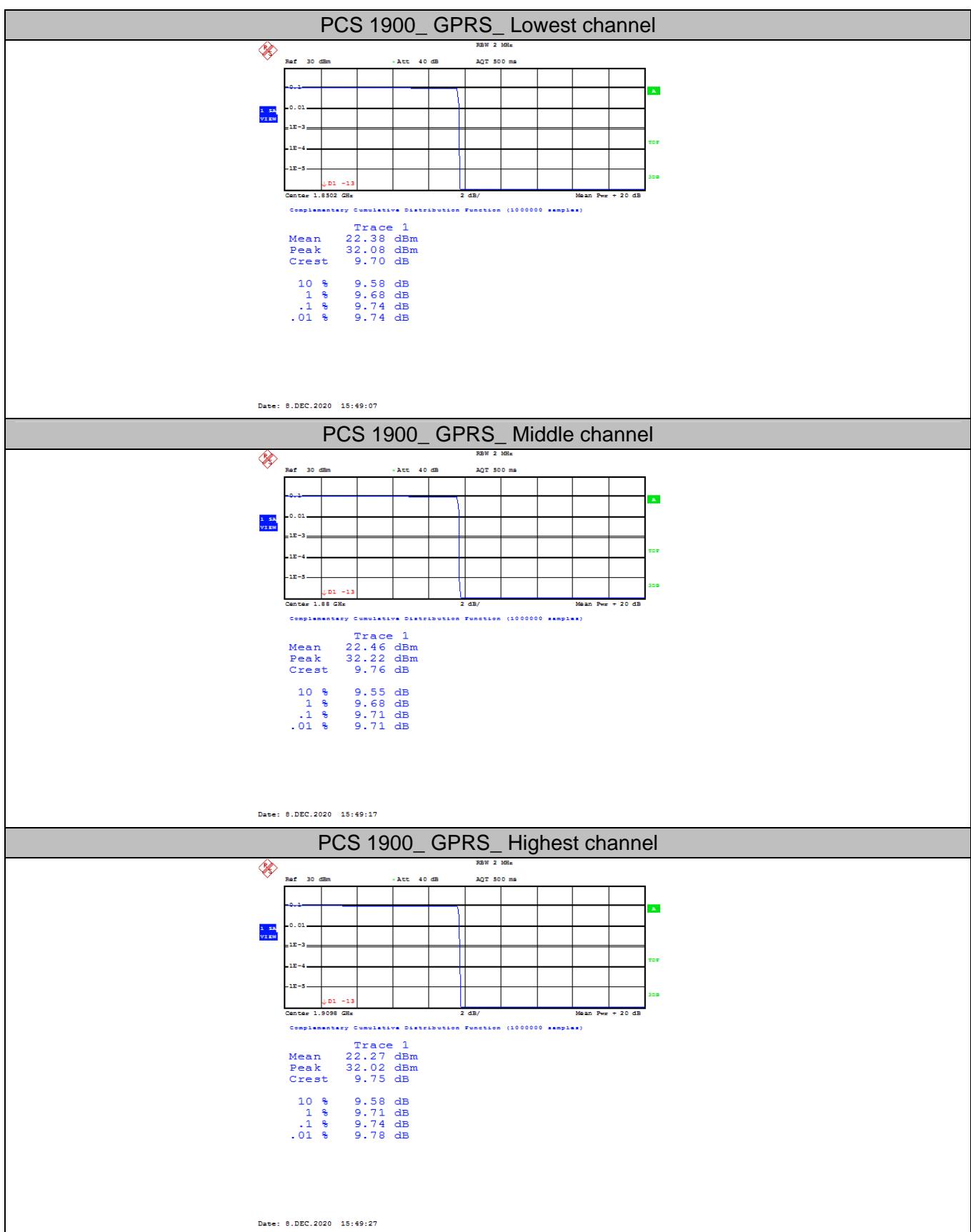


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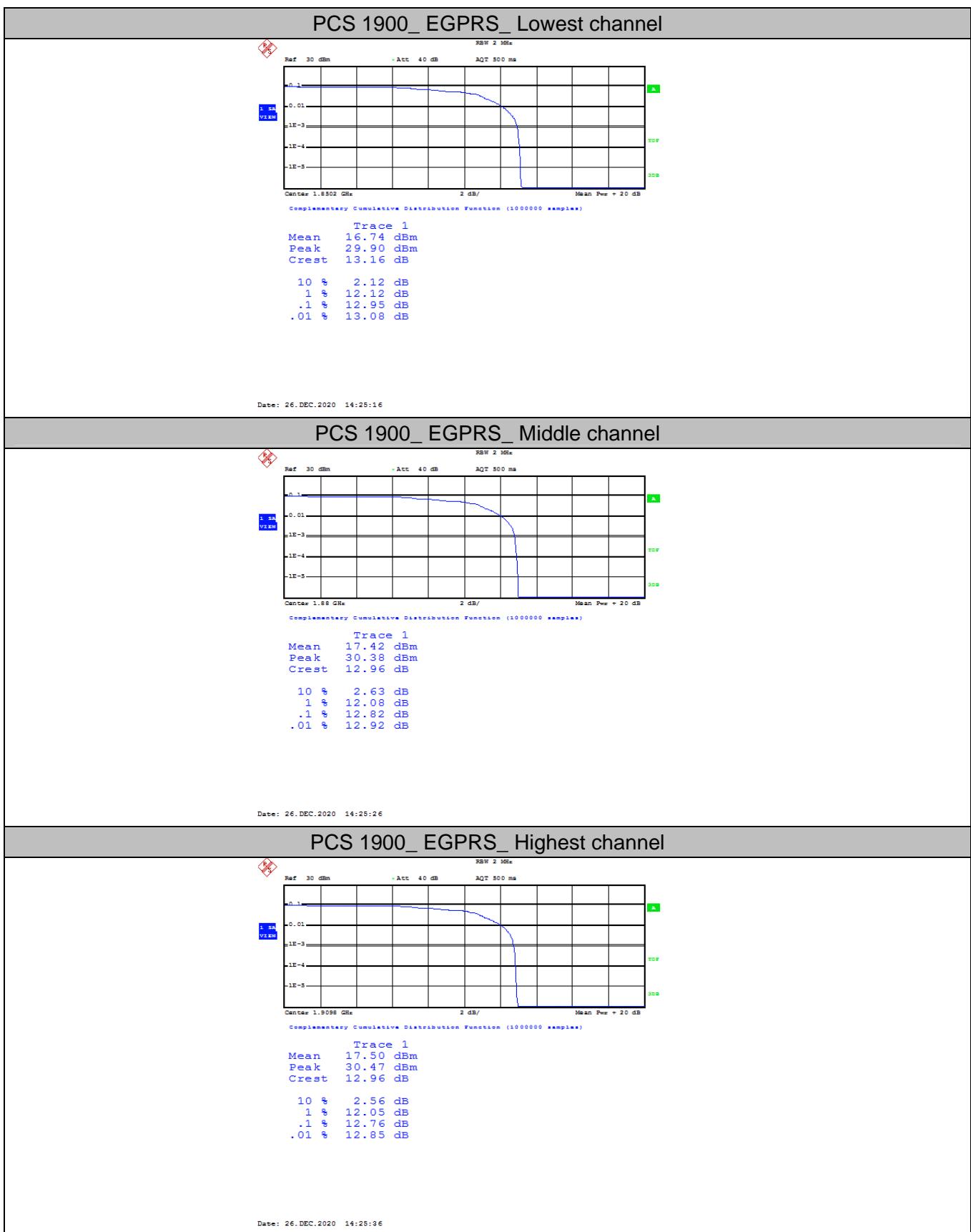
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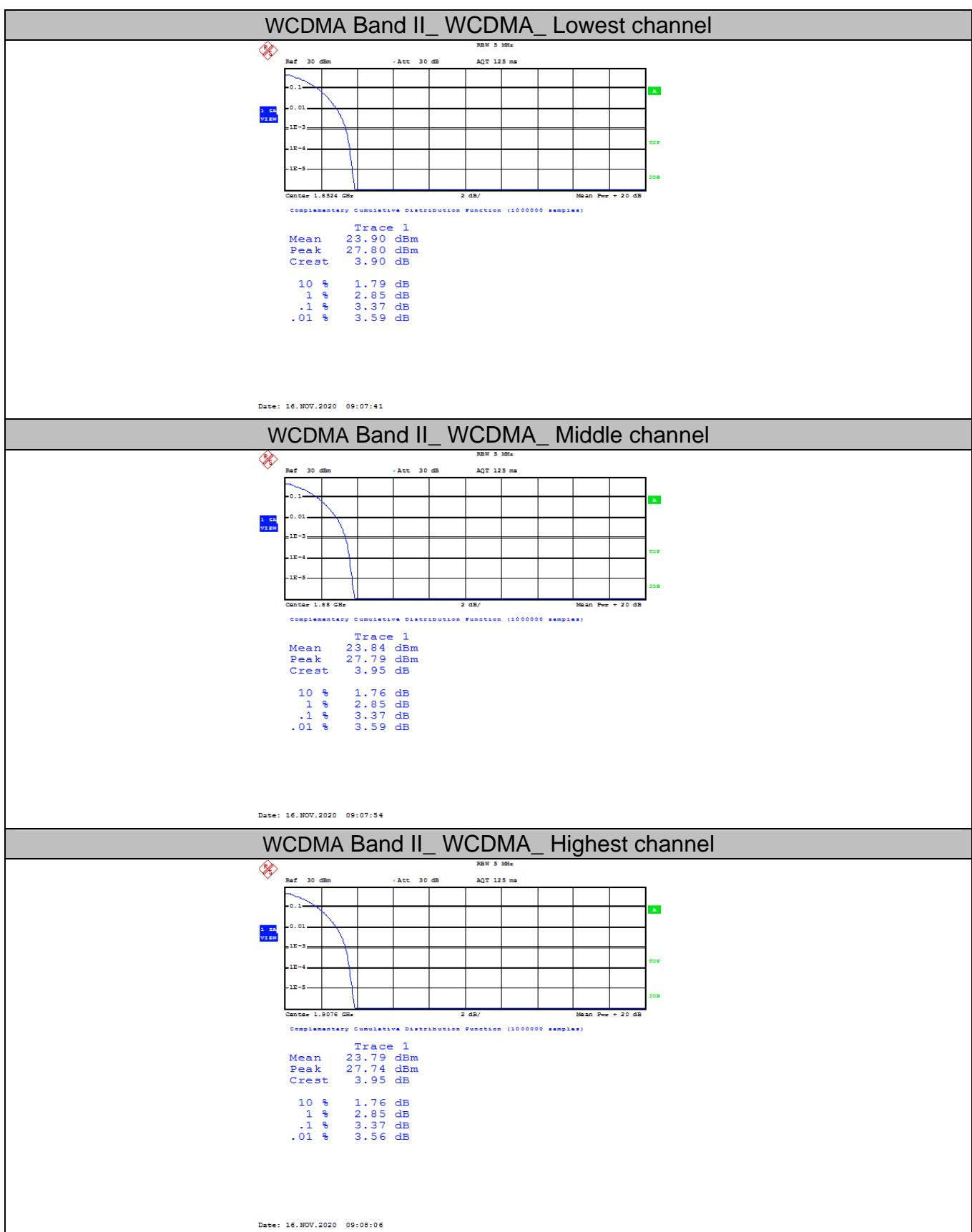


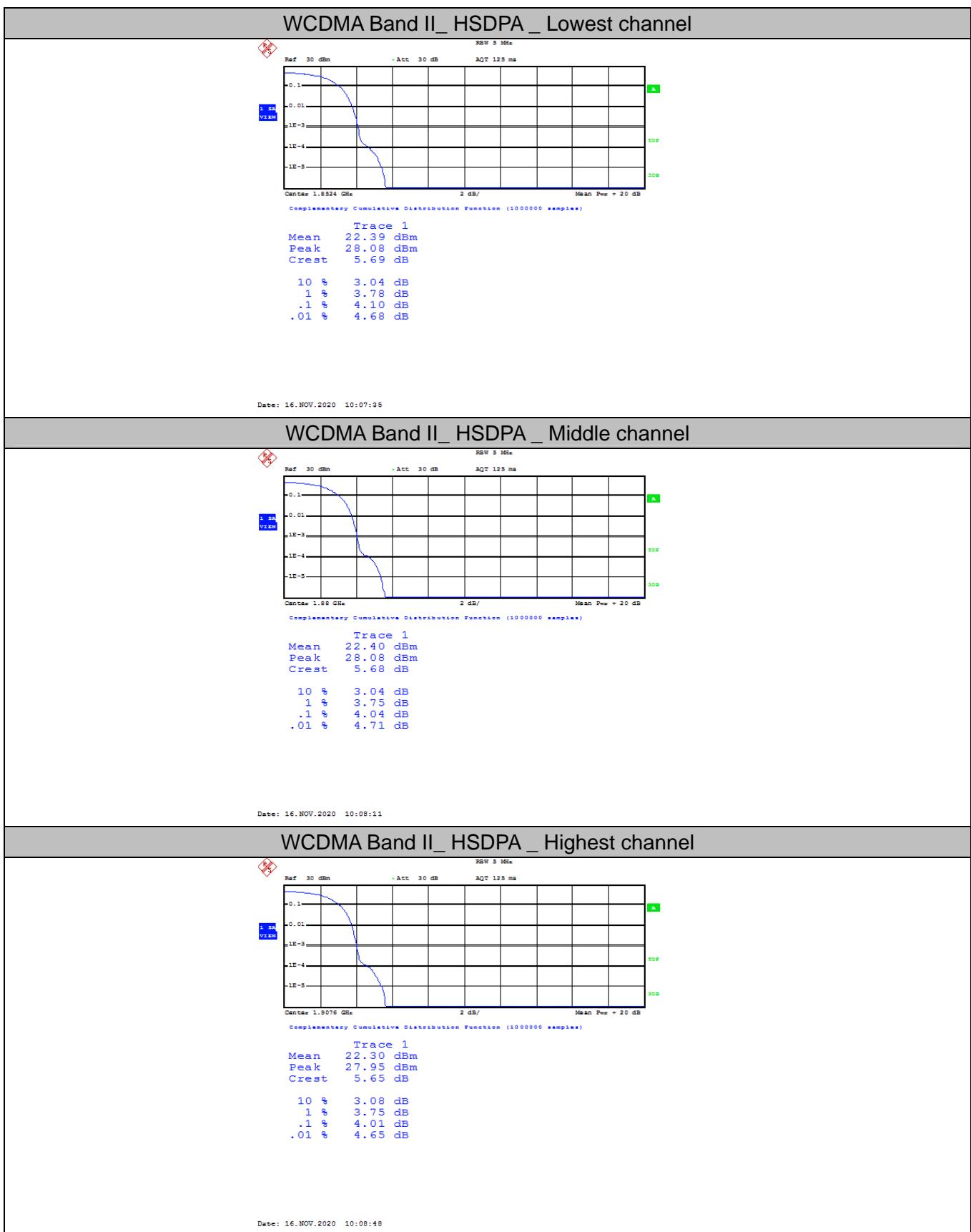


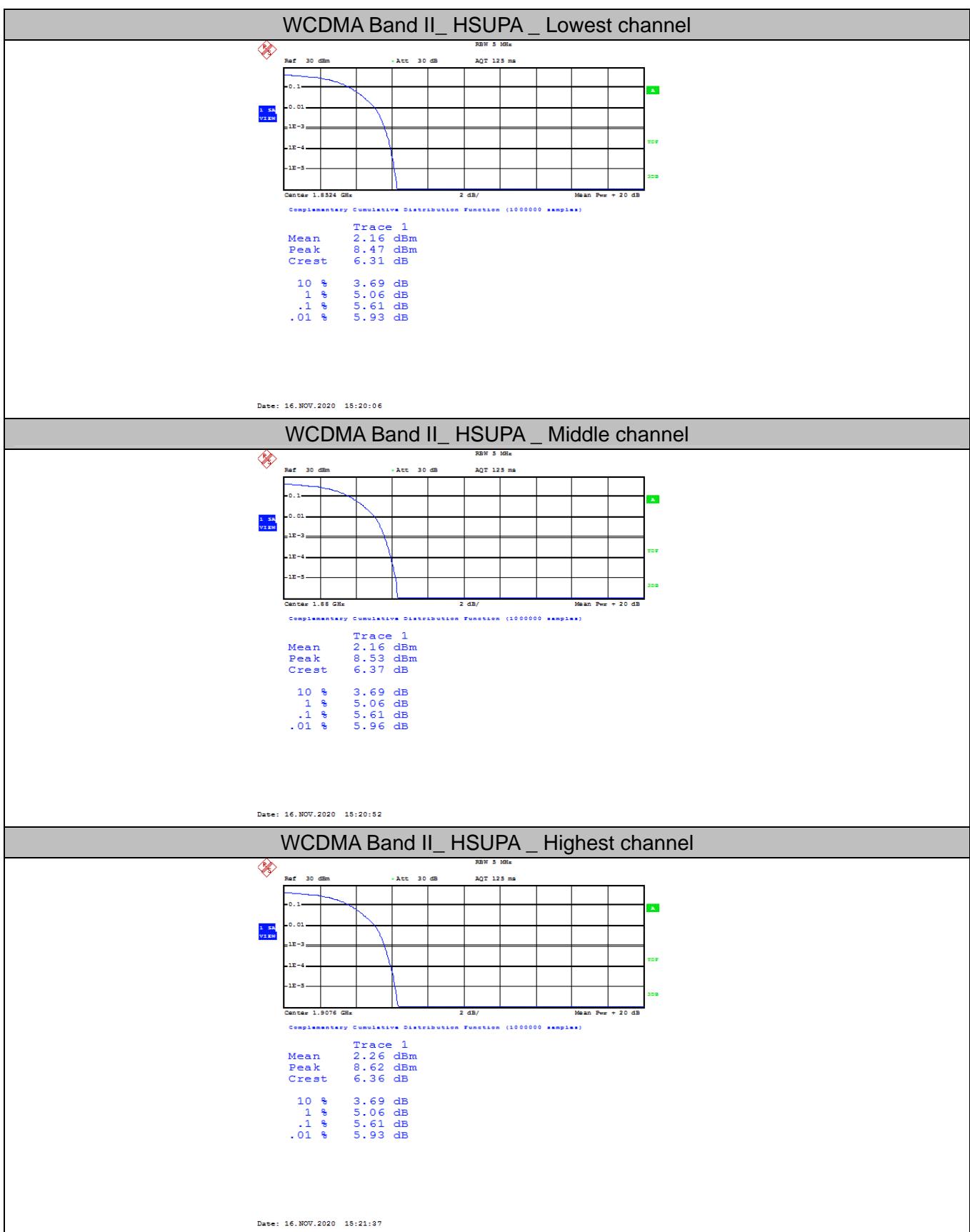
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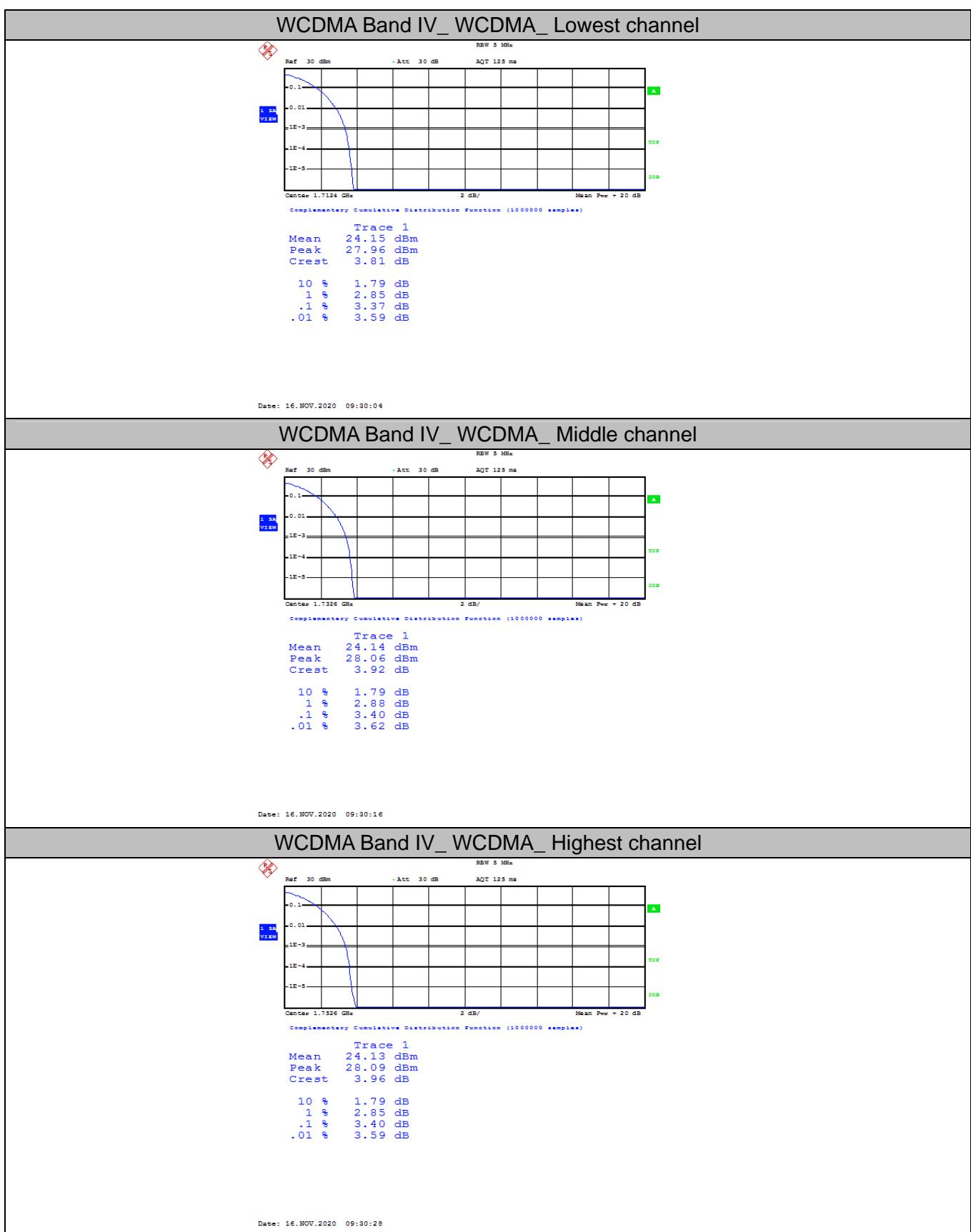
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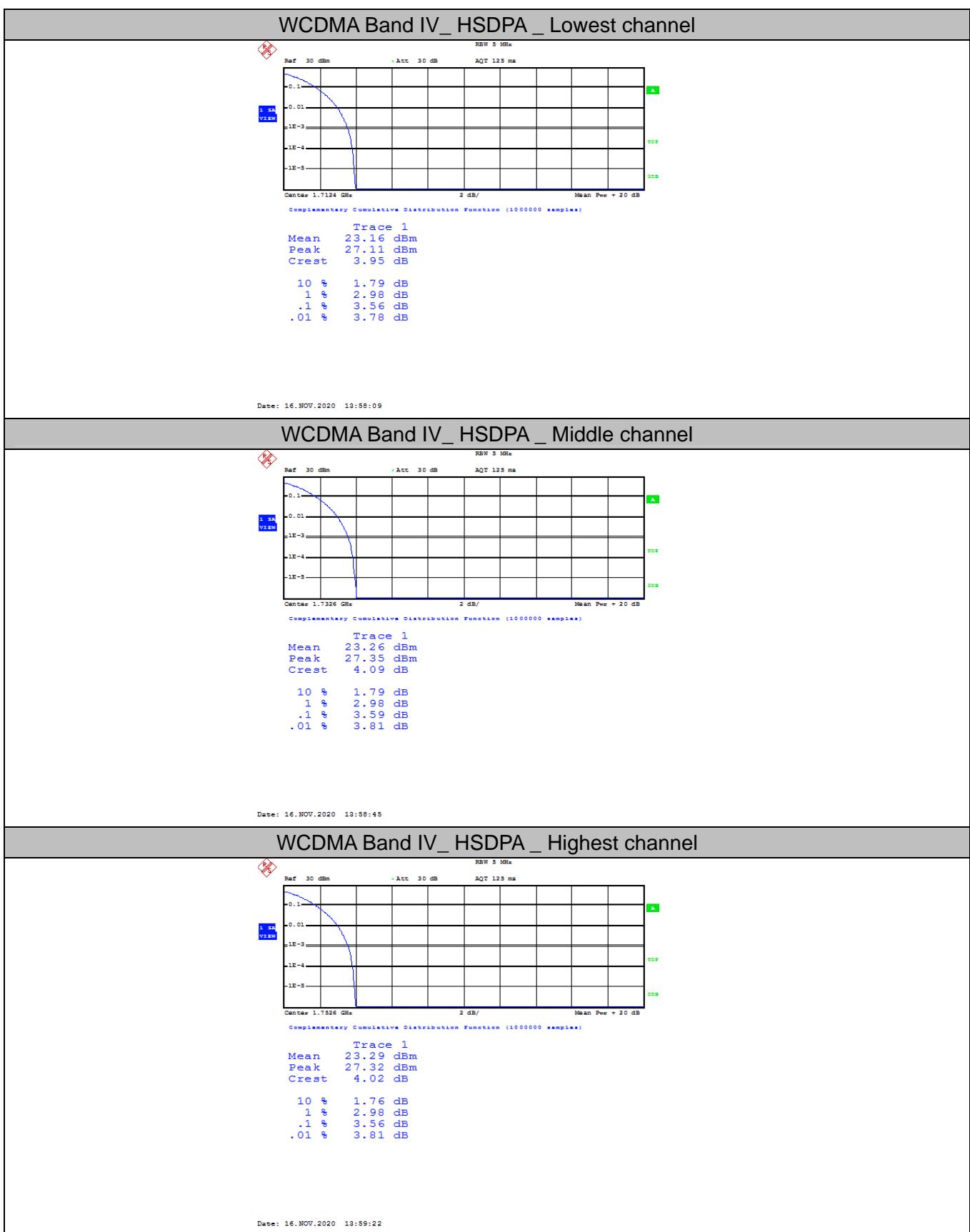


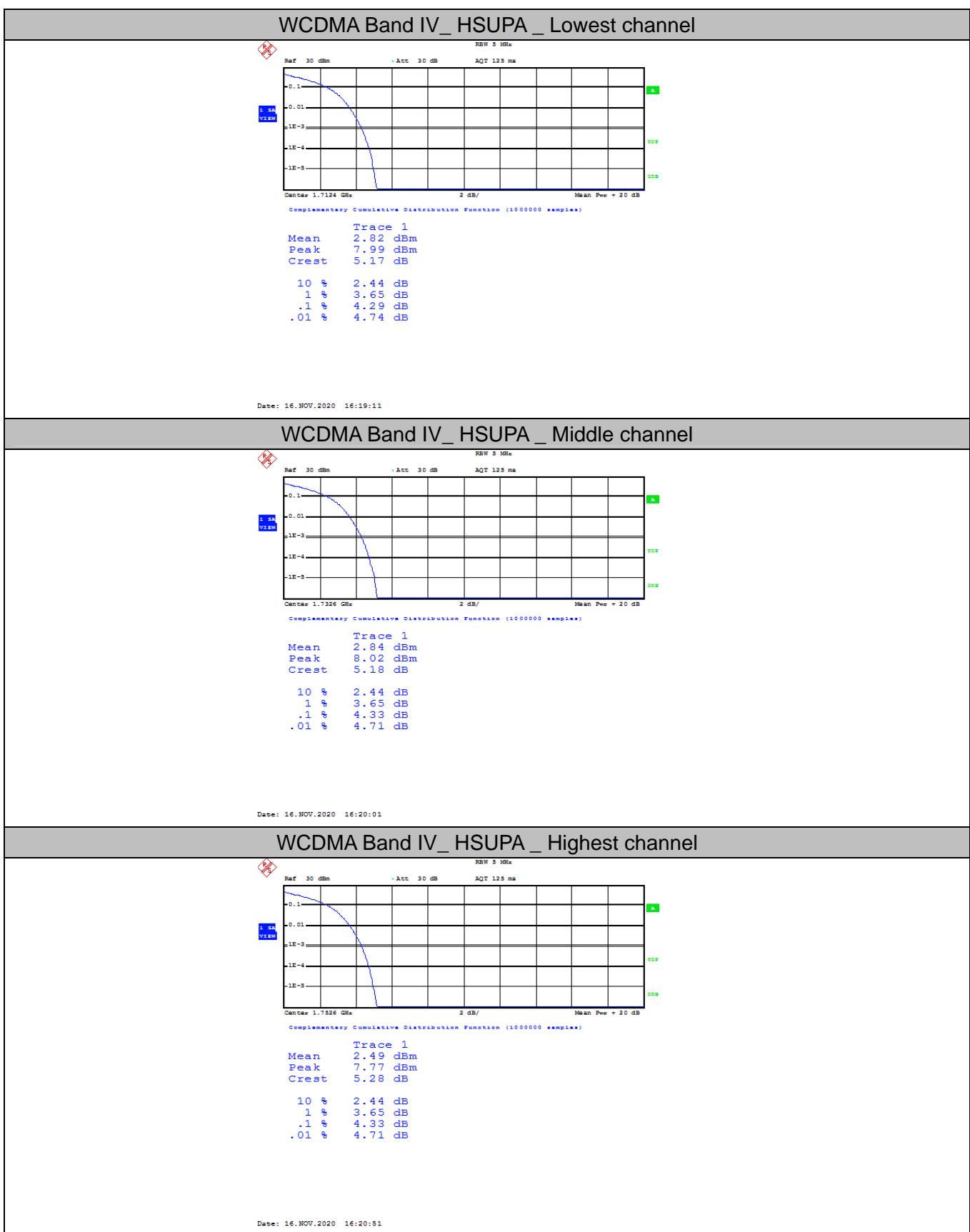


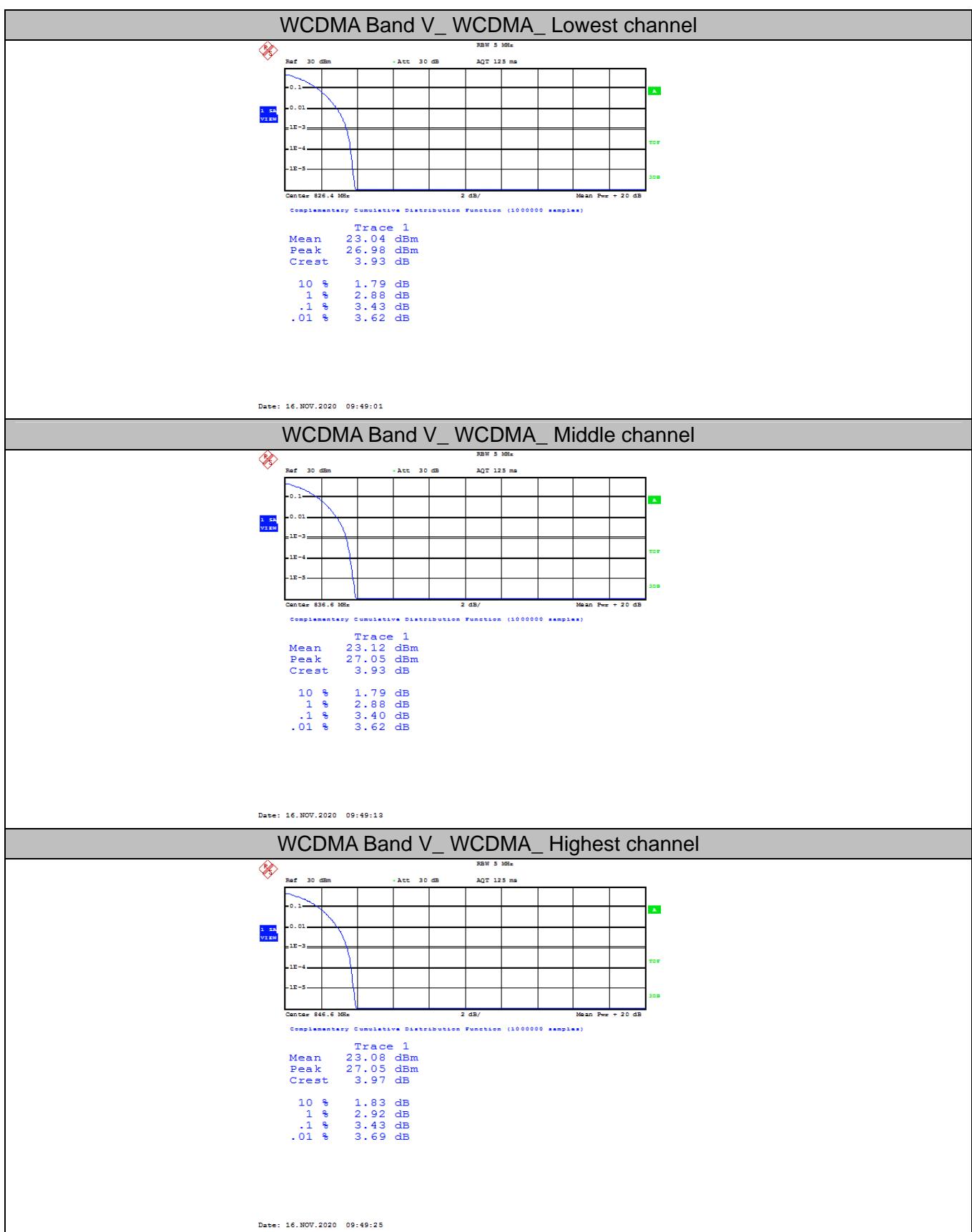


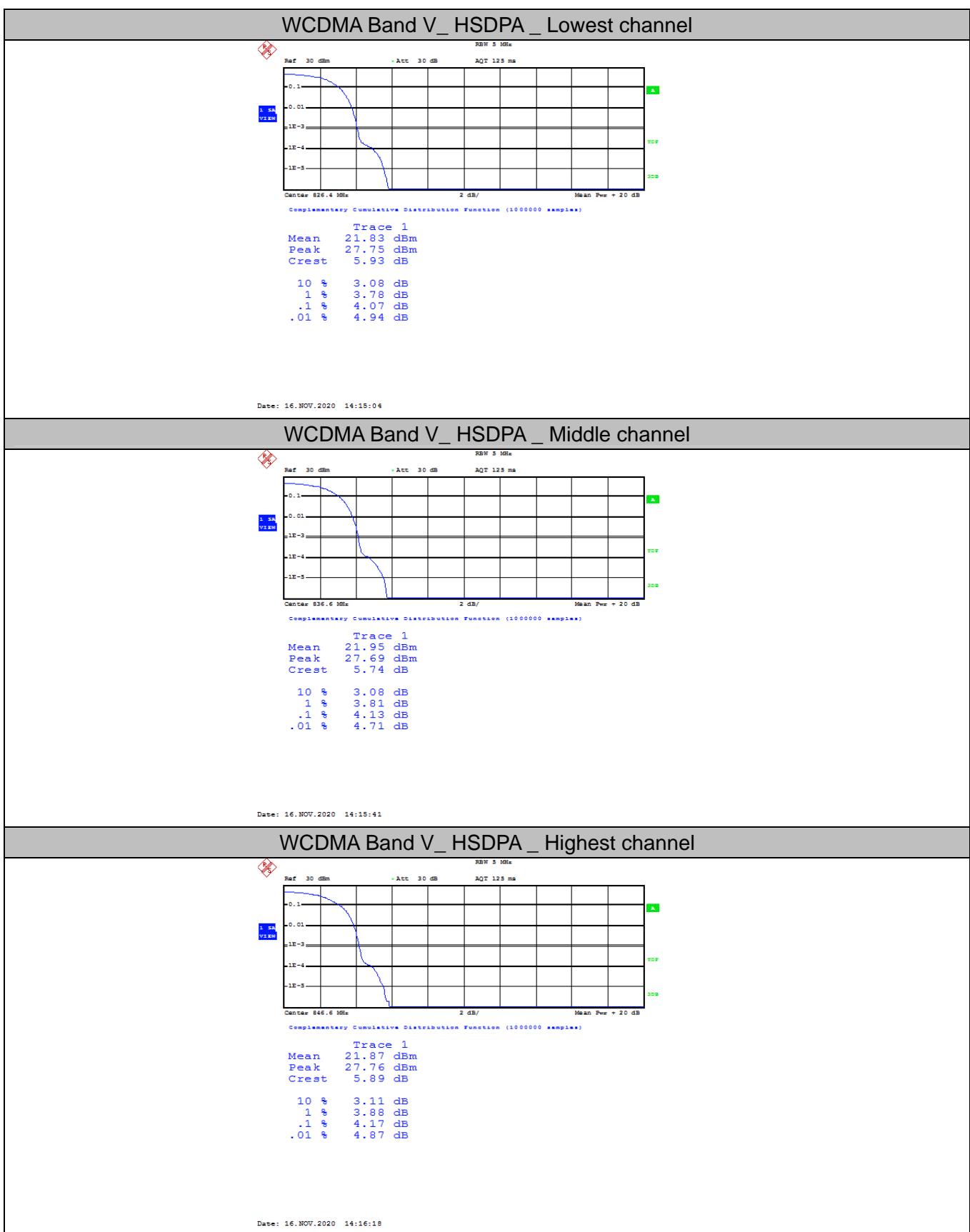


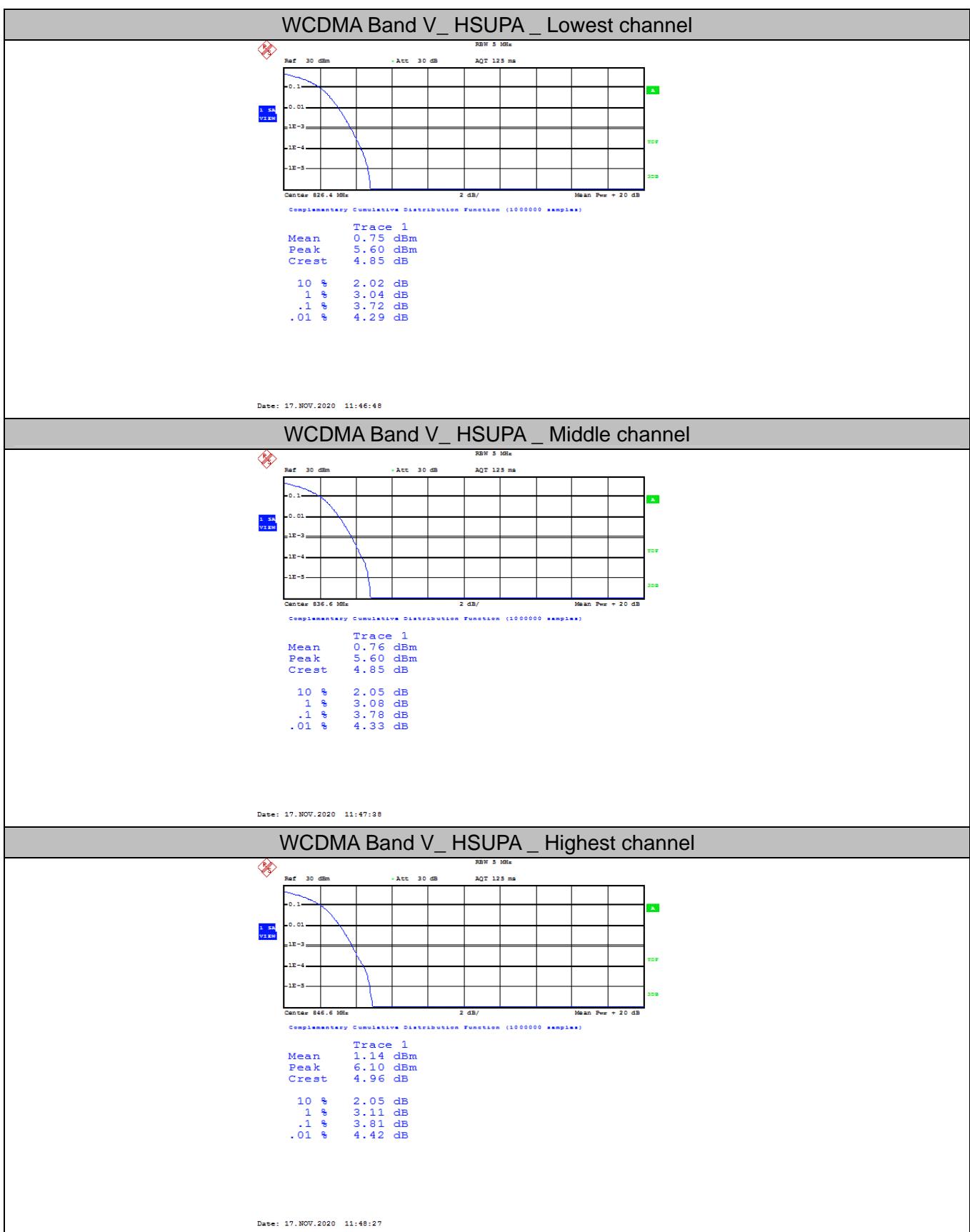










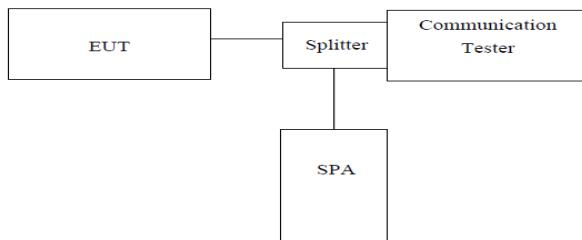


### 3.3. Occupy Bandwidth

#### LIMIT

For reporting purposes only.

#### TEST CONFIGURATION



*Note: Measurement setup for testing on Antenna connector*

#### TEST PROCEDURE

1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBW was set to about 1% of emission BW,  $VBW \geq 3$  times RBW.
3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

#### TEST RESULTS

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EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (MHz)	-26dB bandwidth (MHz)
GSM 850 (GPRS)	128	824.20	0.245	0.317
	190	836.60	0.246	0.315
	251	848.80	0.252	0.320
EGPRS850 (8PSK,1Slot)	128	824.20	0.253	0.319
	190	836.60	0.249	0.320
	251	848.80	0.246	0.302
PCS1900 (GPRS)	512	1850.20	0.247	0.320
	661	1880.00	0.244	0.317
	810	1909.80	0.247	0.322
EGPRS1900 (8PSK,1Slot)	512	1850.20	0.247	0.306
	661	1880.00	0.247	0.307
	810	1909.80	0.247	0.309
WCDMA Band II (QPSK)	9262	1852.40	4.200	4.730
	9400	1880.00	4.190	4.720
	9538	1907.60	4.190	4.730
WCDMA Band V (QPSK)	4132	826.40	4.200	4.740
	4183	836.60	4.210	4.740
	4233	846.60	4.200	4.770

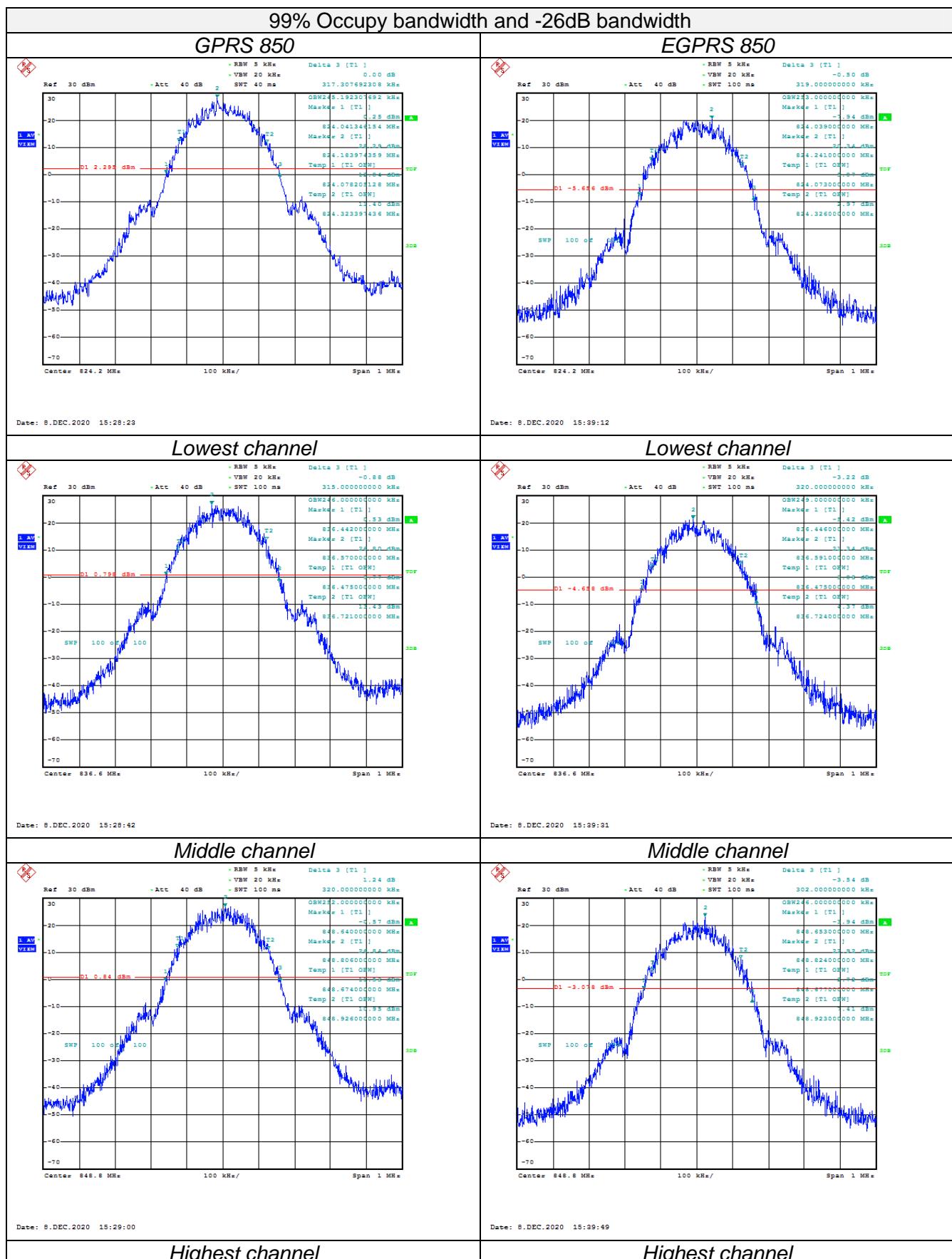
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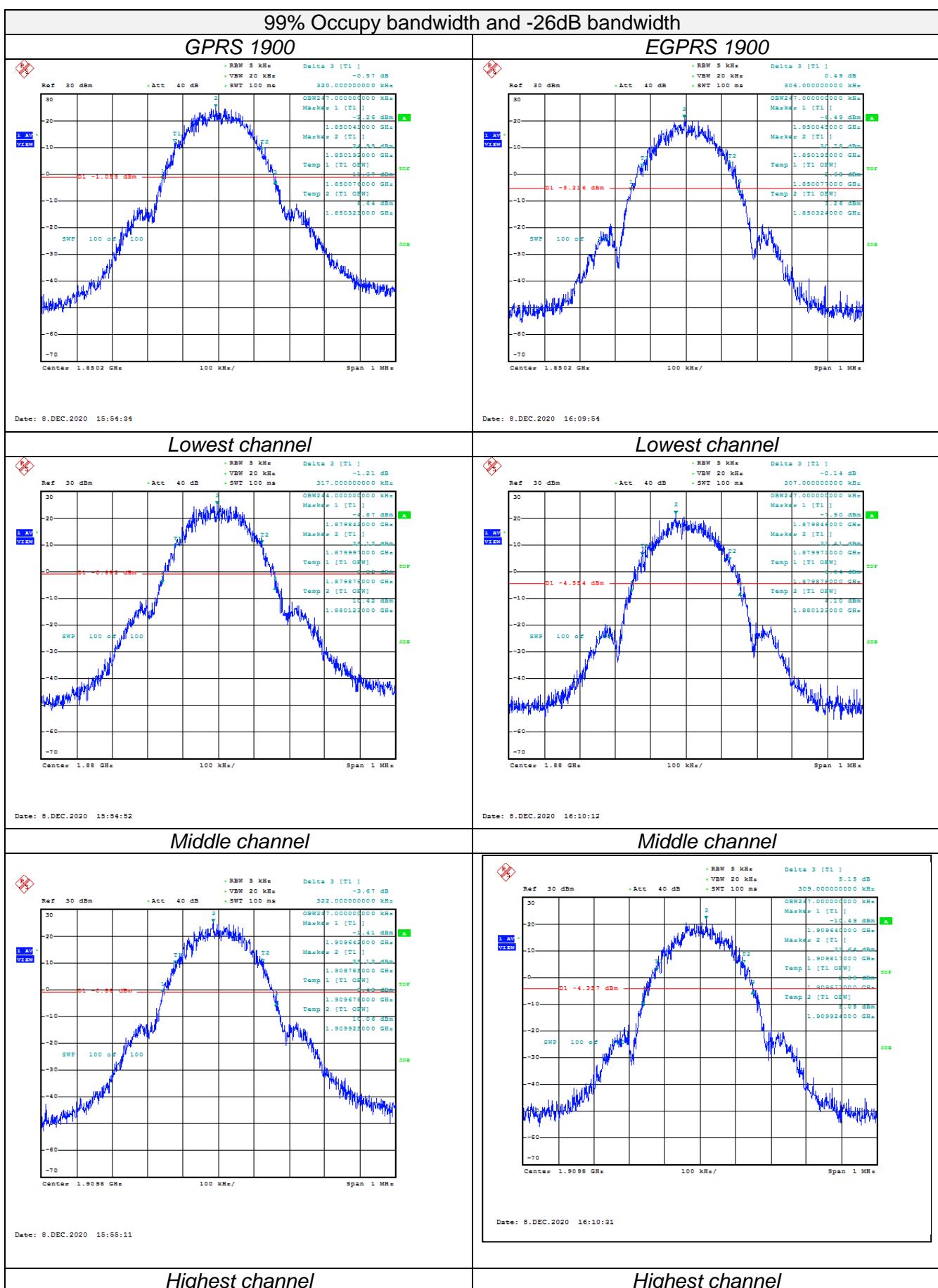
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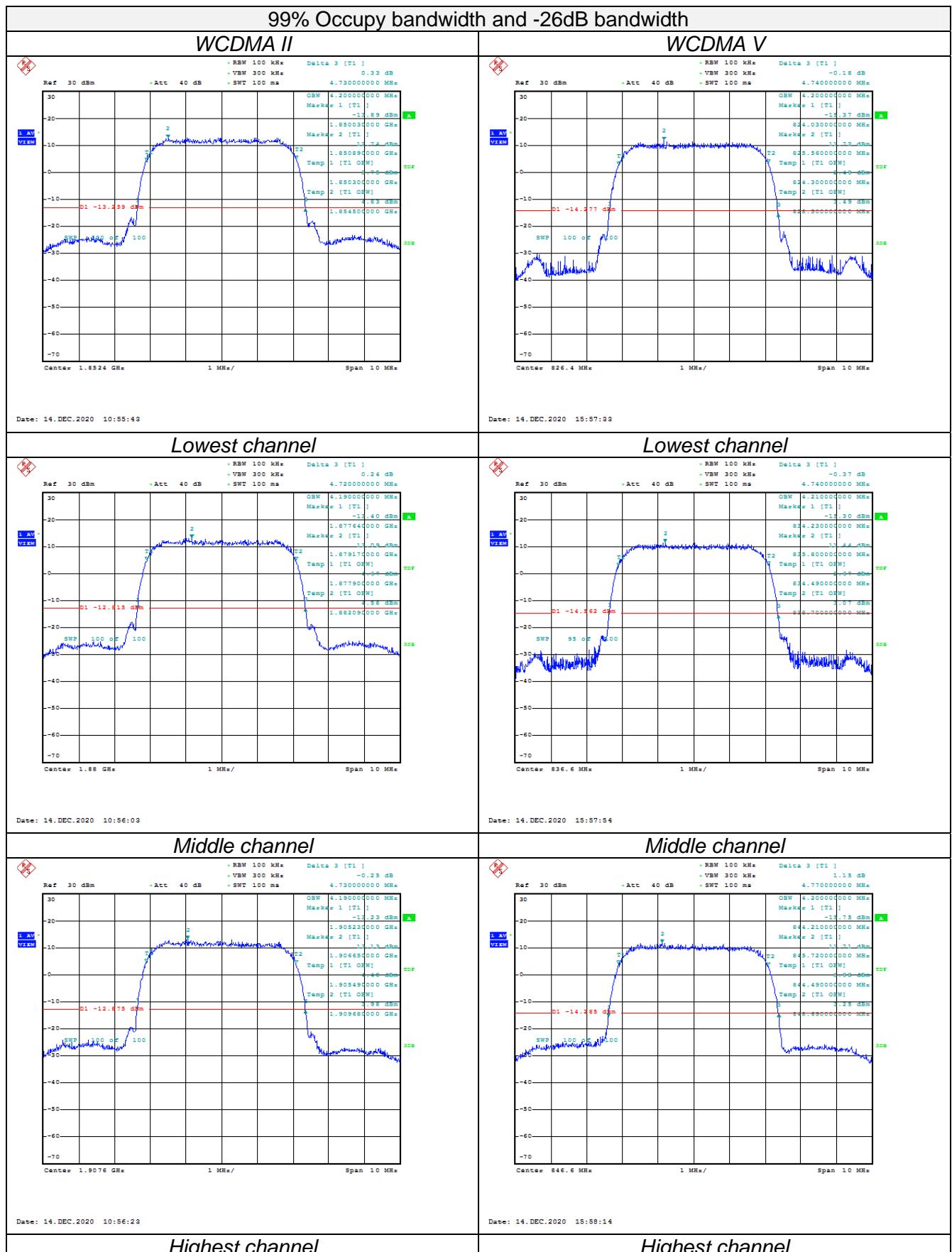
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### 3.4. Out Of Band Emissions

#### LIMIT

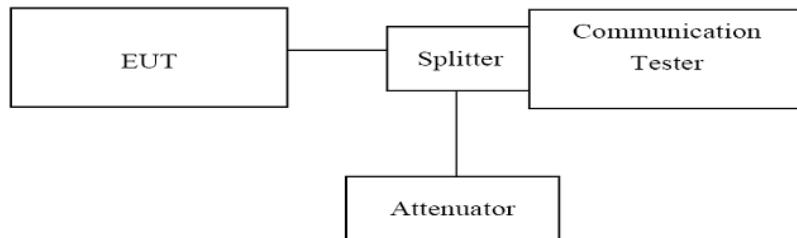
FCC: §22.917, §24.238, §27.53 (h), §90.691

The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P)$  dB where transmitting power (P) in Watts.

RSS132§5.5, RSS133§6.5, RSS139§6.6

The minimum permissible attenuation level of any spurious emissions is  $43 + 10 \log (P)$  dB where transmitting power (P) in Watts.

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. Sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

#### TEST RESULTS

Band	Channel	Frequency Range(MHz)	Max.Freq. (MHz)	Result (dBm)	Limit (dBm)	Verdict
GPRS850	128	0.009~0.15MHz	0.01	-61.82	-33	PASS
GPRS850	128	0.15~30MHz	0.64	-48.94	-13	PASS
GPRS850	128	30~1000MHz	631.85	-40.59	-13	PASS
GPRS850	128	1000~3000MHz	1697.47	-32.58	-13	PASS
GPRS850	128	3000~10000MHz	3395.27	-32.22	-13	PASS
GPRS850	190	0.009~0.15MHz	0.01	-62.07	-33	PASS
GPRS850	190	0.15~30MHz	0.69	-48.54	-13	PASS
GPRS850	190	30~1000MHz	599.13	-39.21	-13	PASS
GPRS850	190	1000~3000MHz	1697.33	-33.27	-13	PASS
GPRS850	190	3000~10000MHz	3395.27	-32.21	-13	PASS
GPRS850	251	0.009~0.15MHz	0.01	-61.67	-33	PASS
GPRS850	251	0.15~30MHz	0.69	-49.47	-13	PASS
GPRS850	251	30~1000MHz	996.9	-40.83	-13	PASS
GPRS850	251	1000~3000MHz	1697.6	-32.4	-13	PASS
GPRS850	251	3000~10000MHz	3394.8	-33.29	-13	PASS
EGPRS850	128	0.009~0.15MHz	0.04	-61.45	-33	PASS
EGPRS850	128	0.15~30MHz	0.66	-49.08	-13	PASS

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EGPRS850	128	30~1000MHz	454.54	-23.36	-13	PASS
EGPRS850	128	1000~3000MHz	1697.27	-39.86	-13	PASS
EGPRS850	128	3000~10000MHz	3395.03	-51.52	-13	PASS
EGPRS850	190	0.009~0.15MHz	0.02	-61.31	-33	PASS
EGPRS850	190	0.15~30MHz	0.62	-50.82	-13	PASS
EGPRS850	190	30~1000MHz	708.64	-28.83	-13	PASS
EGPRS850	190	1000~3000MHz	1697.27	-39.22	-13	PASS
EGPRS850	190	3000~10000MHz	3395.27	-50.48	-13	PASS
EGPRS850	251	0.009~0.15MHz	0.04	-60.21	-33	PASS
EGPRS850	251	0.15~30MHz	0.62	-49.41	-13	PASS
EGPRS850	251	30~1000MHz	454.76	-23.02	-13	PASS
EGPRS850	251	1000~3000MHz	1697.53	-38.16	-13	PASS
EGPRS850	251	3000~10000MHz	3395.03	-52.2	-13	PASS
GPRS1900	512	0.009~0.15MHz	0.01	-56.29	-43	PASS
GPRS1900	512	0.15~30MHz	0.62	-49.35	-23	PASS
GPRS1900	512	30~1000MHz	966.92	-40.34	-13	PASS
GPRS1900	512	1000~3000MHz	2666	-45.49	-13	PASS
GPRS1900	512	3000~10000MHz	3819.7	-36.93	-13	PASS
GPRS1900	512	10000~18000MHz	11459.2	-40.53	-13	PASS
GPRS1900	661	0.009~0.15MHz	0.01	-56.09	-43	PASS
GPRS1900	661	0.15~30MHz	0.62	-48.17	-23	PASS
GPRS1900	661	30~1000MHz	898.8	-40.31	-13	PASS
GPRS1900	661	1000~3000MHz	2640.87	-45.42	-13	PASS
GPRS1900	661	3000~10000MHz	3819	-40.18	-13	PASS
GPRS1900	661	10000~18000MHz	11459.73	-45.86	-13	PASS
GPRS1900	810	0.009~0.15MHz	0.01	-56.38	-43	PASS
GPRS1900	810	0.15~30MHz	0.66	-48.54	-23	PASS
GPRS1900	810	30~1000MHz	905.49	-40.45	-13	PASS
GPRS1900	810	1000~3000MHz	2614.53	-45.46	-13	PASS
GPRS1900	810	3000~10000MHz	3819.47	-36.67	-13	PASS
GPRS1900	810	10000~18000MHz	11458.67	-38.48	-13	PASS
EGPRS1900	512	0.009~0.15MHz	0.02	-57.67	-43	PASS
EGPRS1900	512	0.15~30MHz	0.63	-48.41	-23	PASS
EGPRS1900	512	30~1000MHz	141.55	-25.56	-13	PASS
EGPRS1900	512	1000~3000MHz	2667.33	-45.27	-13	PASS
EGPRS1900	512	3000~10000MHz	3819.93	-45.91	-13	PASS
EGPRS1900	512	10000~18000MHz	17797.6	-51.04	-13	PASS
EGPRS1900	661	0.009~0.15MHz	0.02	-55.22	-43	PASS
EGPRS1900	661	0.15~30MHz	0.66	-49.54	-23	PASS
EGPRS1900	661	30~1000MHz	136.15	-25.78	-13	PASS
EGPRS1900	661	1000~3000MHz	2660.6	-45.49	-13	PASS
EGPRS1900	661	3000~10000MHz	3819.7	-42.65	-13	PASS
EGPRS1900	661	10000~18000MHz	17816.8	-50.85	-13	PASS

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EGPRS1900	810	0.009~0.15MHz	0.05	-55.76	-43	PASS
EGPRS1900	810	0.15~30MHz	0.65	-49.52	-23	PASS
EGPRS1900	810	30~1000MHz	155.62	-26.61	-13	PASS
EGPRS1900	810	1000~3000MHz	2589.8	-45.56	-13	PASS
EGPRS1900	810	3000~10000MHz	9499.5	-54.67	-13	PASS
EGPRS1900	810	10000~18000MHz	17802.13	-50.98	-13	PASS

Band	Channel	Frequency Range (Mhz)	Frequency (dBm)	Result (dBm)	Limit (dBm)	Verdict
Band2	9262	0.15~30MHz	0.68	-48.24	-23	PASS
Band2	9262	30~1000MHz	492.85	-39.97	-13	PASS
Band2	9262	1000~3000MHz	2663.93	-45.43	-13	PASS
Band2	9262	3000~10000MHz	3706.3	-38.01	-13	PASS
Band2	9262	10000~20000MHz	19151	-48.02	-13	PASS
Band2	9262	0.009~0.15MHz	0.03	-70.8	-43	PASS
Band2	9400	30~1000MHz	639.52	-39.86	-13	PASS
Band2	9400	10000~20000MHz	19186	-47.96	-13	PASS
Band2	9400	1000~3000MHz	2555.6	-45.38	-13	PASS
Band2	9400	0.15~30MHz	0.64	-49.27	-23	PASS
Band2	9400	0.009~0.15MHz	0.03	-70.12	-43	PASS
Band2	9400	3000~10000MHz	3758.33	-36.97	-13	PASS
Band2	9538	10000~20000MHz	19252.67	-47.87	-13	PASS
Band2	9538	3000~10000MHz	3813.4	-36.69	-13	PASS
Band2	9538	0.009~0.15MHz	0.03	-71.35	-43	PASS
Band2	9538	0.15~30MHz	0.66	-49.05	-23	PASS
Band2	9538	30~1000MHz	927.19	-40.75	-13	PASS
Band2	9538	1000~3000MHz	1730.33	-41.43	-13	PASS
Band5	4132	0.15~30MHz	0.68	-48.76	-13	PASS
Band5	4132	30~1000MHz	973	-40.52	-13	PASS
Band5	4132	1000~3000MHz	2594.4	-44.68	-13	PASS
Band5	4132	3000~10000MHz	9398.93	-54.72	-13	PASS
Band5	4132	10000~18000MHz	12058.13	-47.37	-13	PASS
Band5	4132	0.009~0.15MHz	0.03	-70.28	-33	PASS
Band5	4183	30~1000MHz	687.24	-40.73	-13	PASS
Band5	4183	10000~18000MHz	11978.93	-47.52	-13	PASS
Band5	4183	1000~3000MHz	2569.33	-44.74	-13	PASS
Band5	4183	0.15~30MHz	0.63	-49.85	-13	PASS
Band5	4183	0.009~0.15MHz	0.03	-69.85	-33	PASS
Band5	4183	3000~10000MHz	9973.17	-54.52	-13	PASS
Band5	4233	10000~18000MHz	12050.13	-47.49	-13	PASS
Band5	4233	0.009~0.15MHz	0.03	-70.98	-33	PASS
Band5	4233	0.15~30MHz	0.64	-49.3	-13	PASS
Band5	4233	30~1000MHz	683.94	-40.46	-13	PASS

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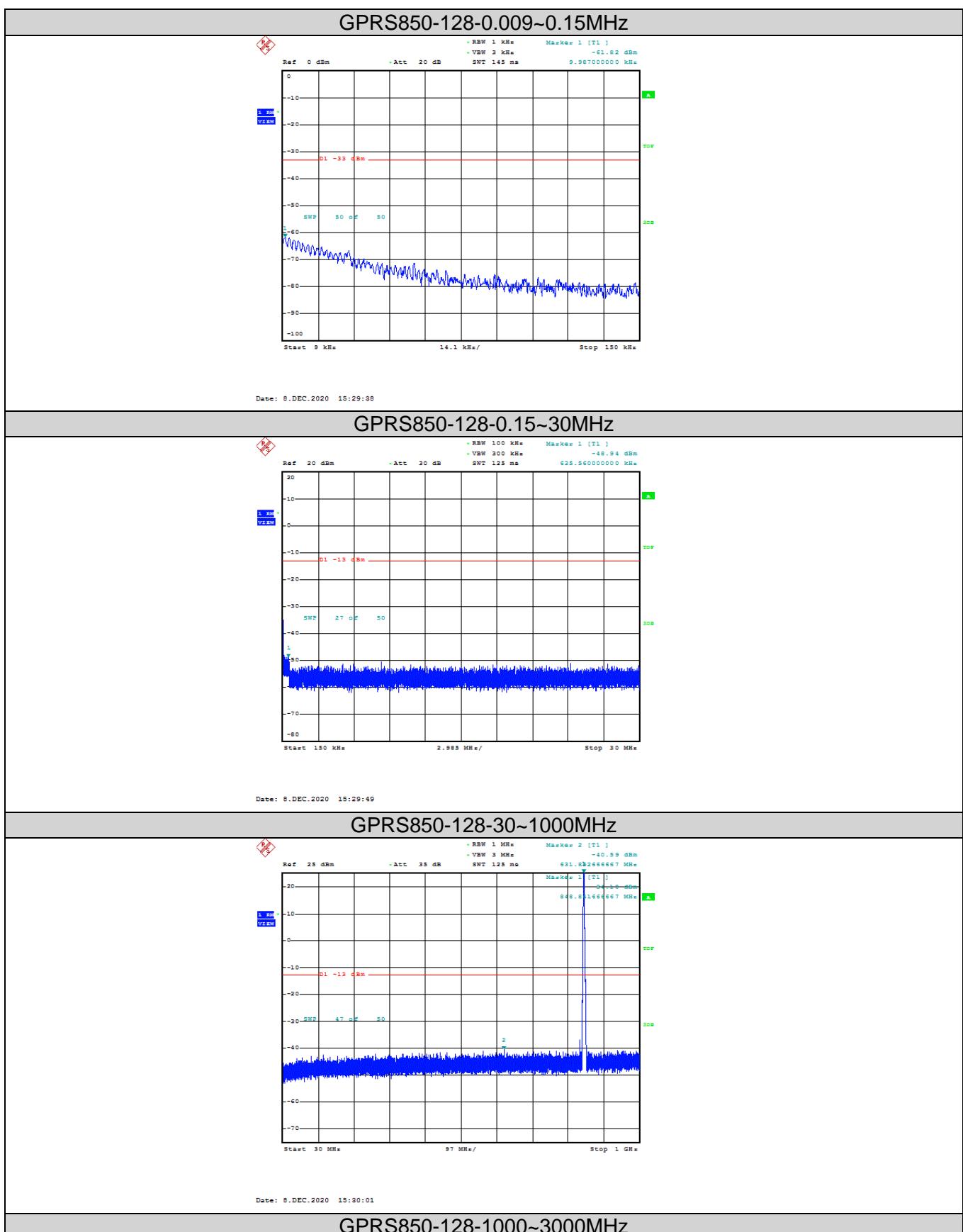
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Band5	4233	1000~3000MHz	2550.33	-44.96	-13	PASS
Band5	4233	3000~10000MHz	9943.53	-54.76	-13	PASS

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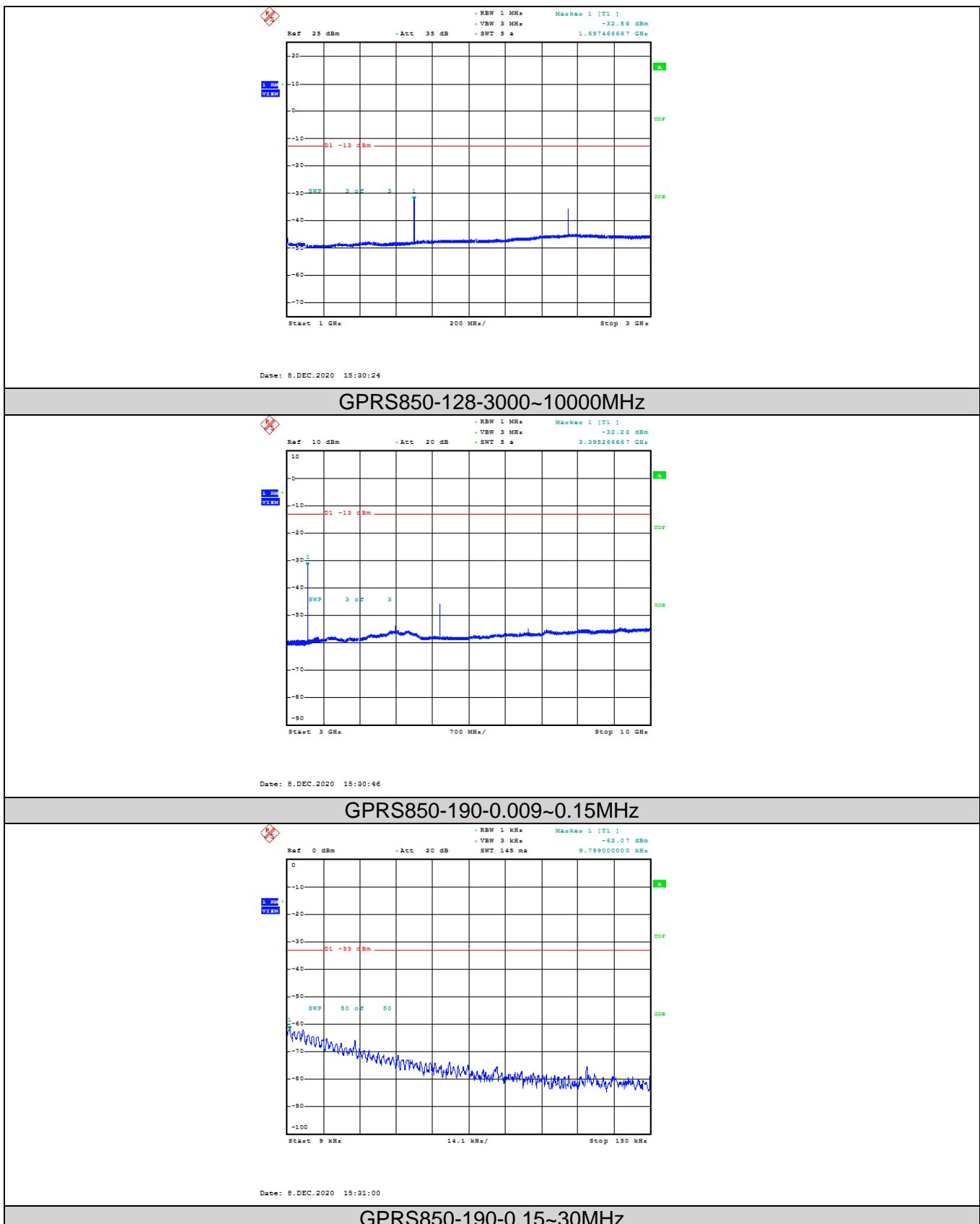


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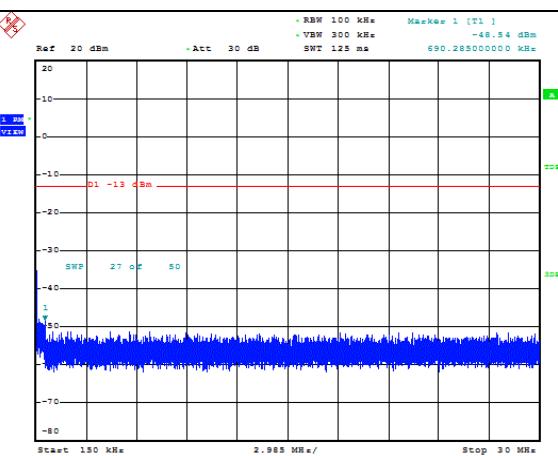


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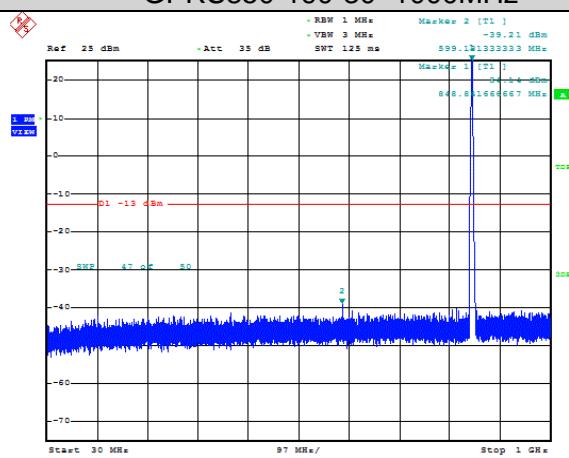
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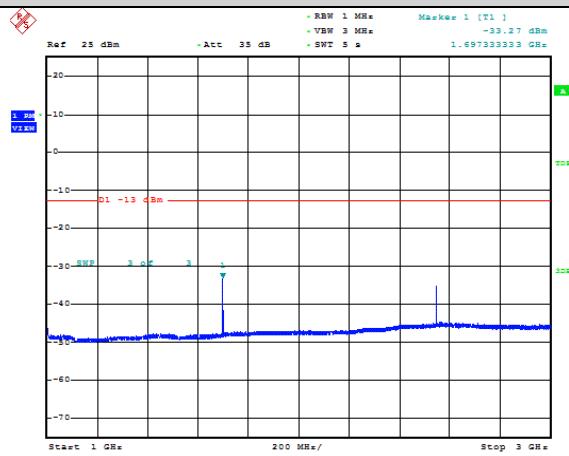
Date: 8.DEC.2020 15:51:11

### GPRS850-190-30~1000MHz



Date: 8.DEC.2020 15:51:28

### GPRS850-190-1000~3000MHz



Date: 8.DEC.2020 15:51:46

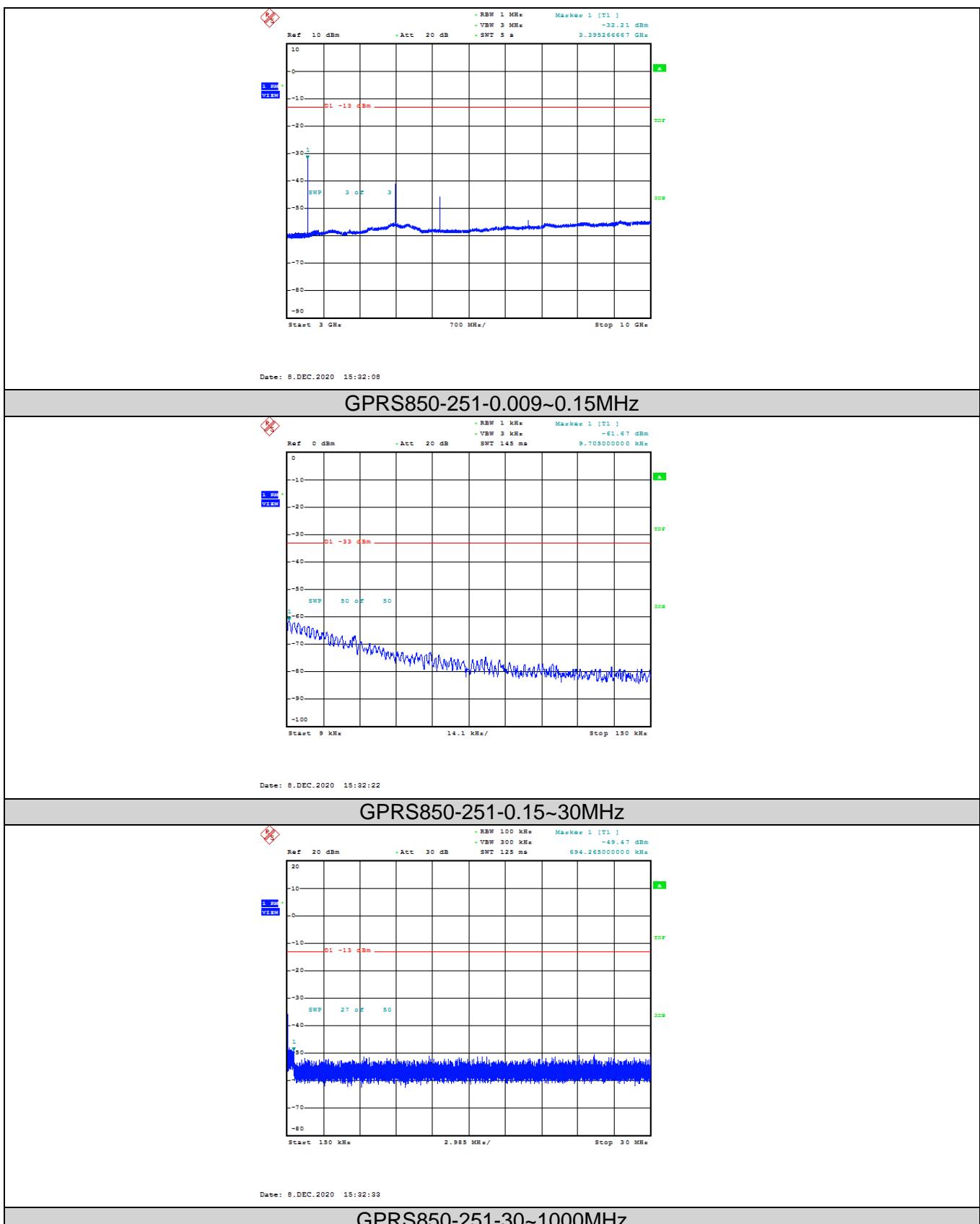
### GPRS850-190-3000~10000MHz

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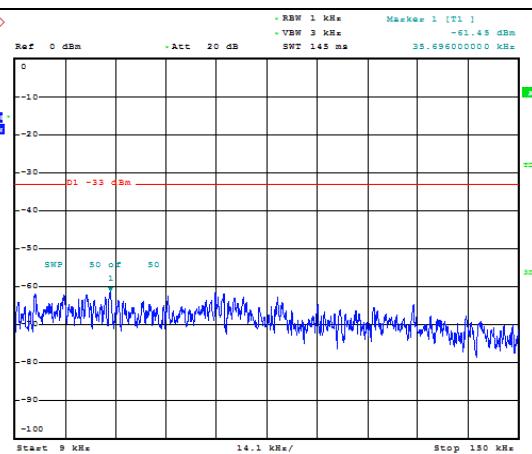
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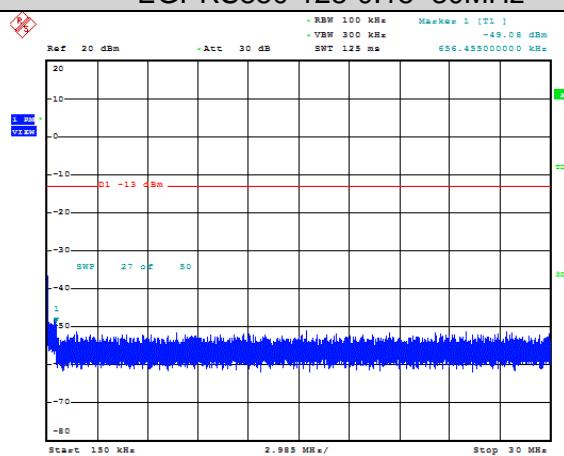






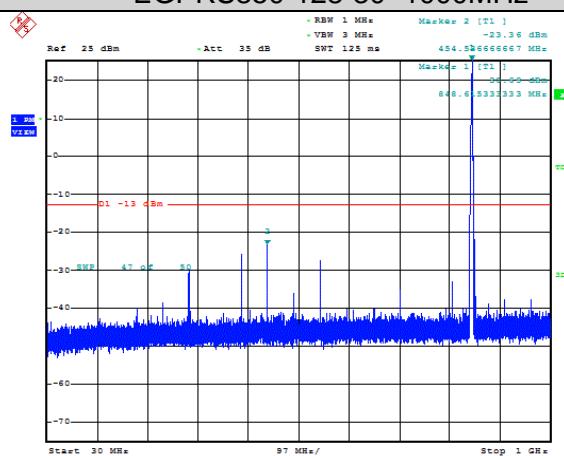
Date: 8.DEC.2020 15:40:40

### EGPRS850-128-0.15~30MHz



Date: 8.DEC.2020 15:40:51

### EGPRS850-128-30~1000MHz



Date: 8.DEC.2020 15:41:03

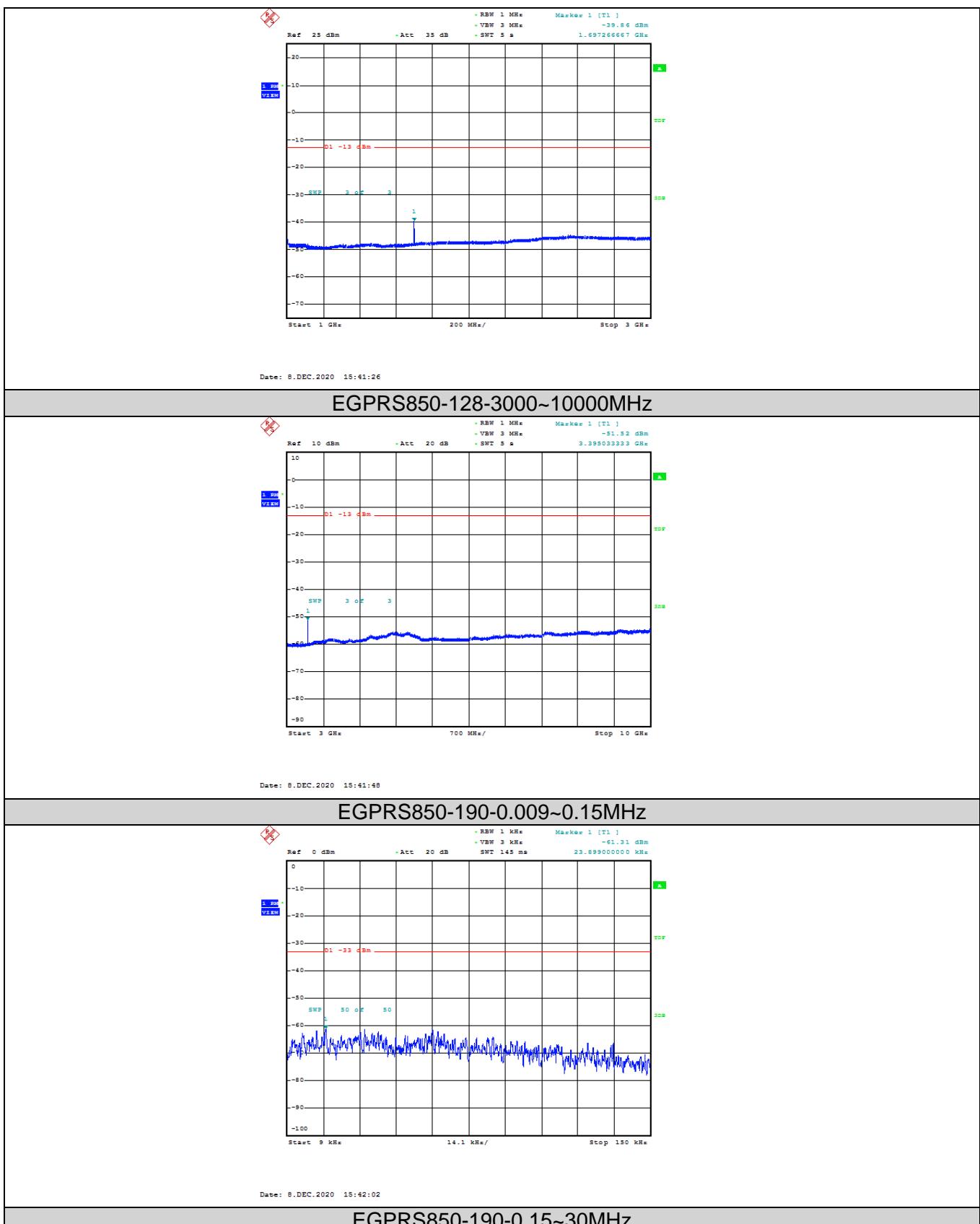
### EGPRS850-128-1000~3000MHz

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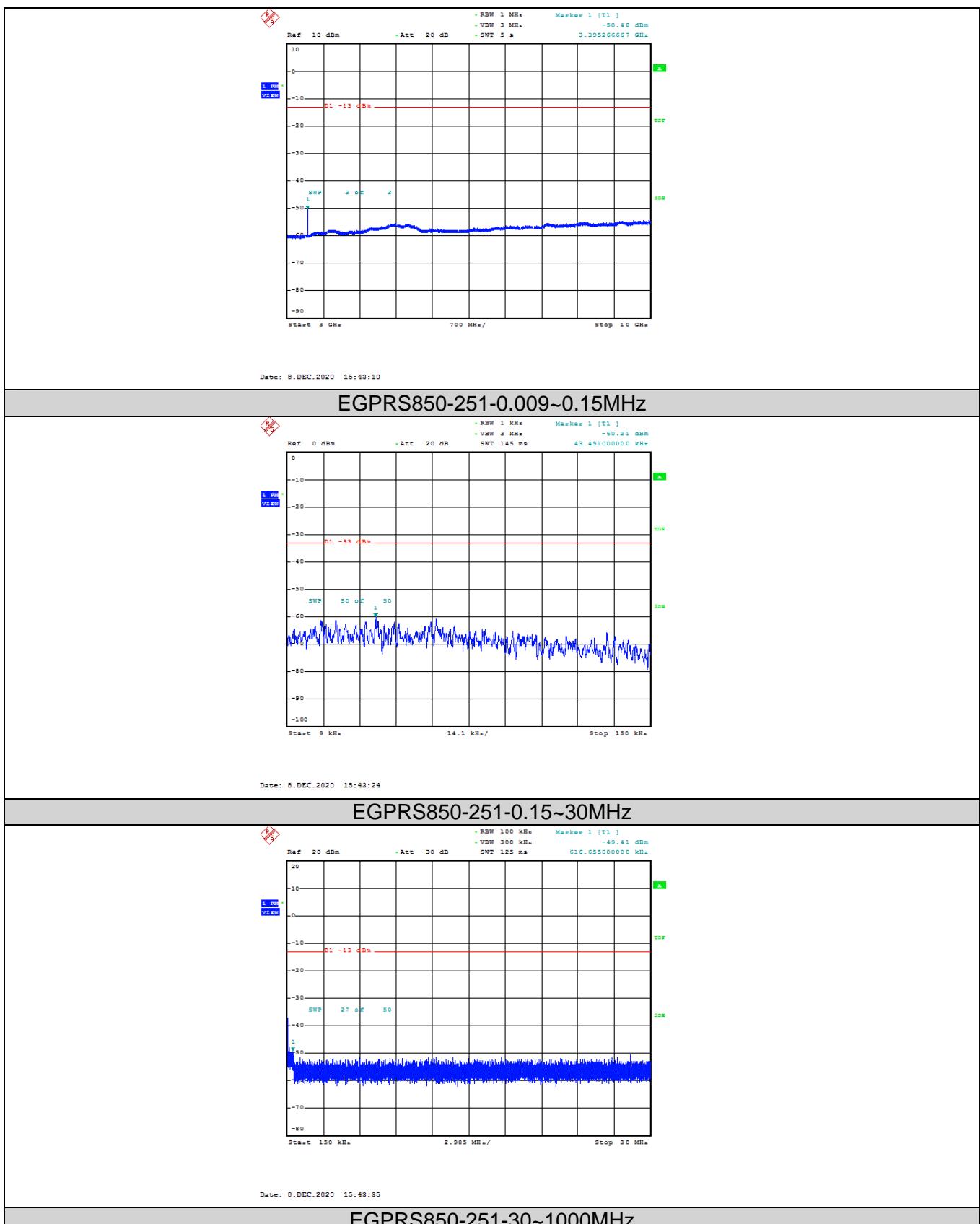
1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China  
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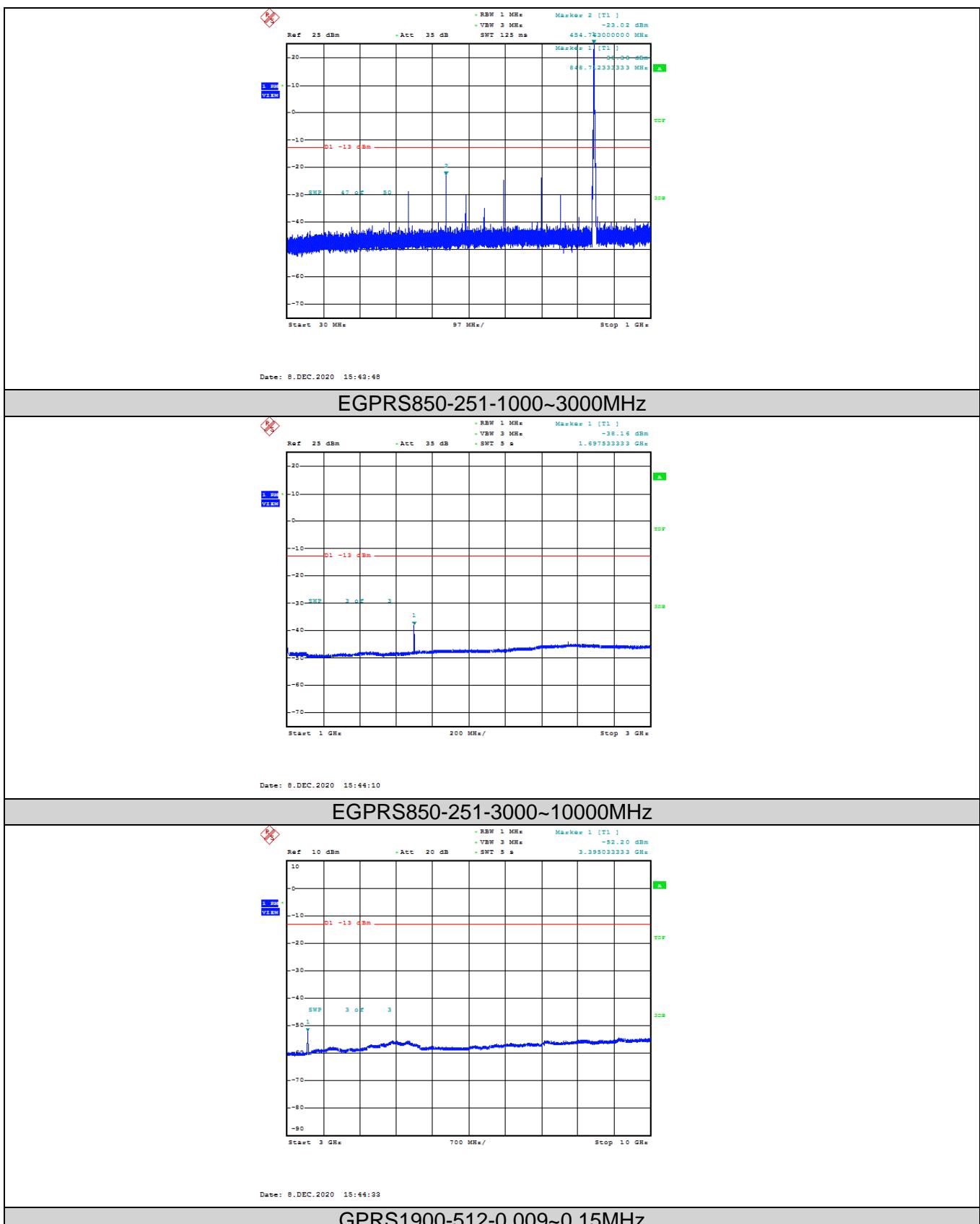


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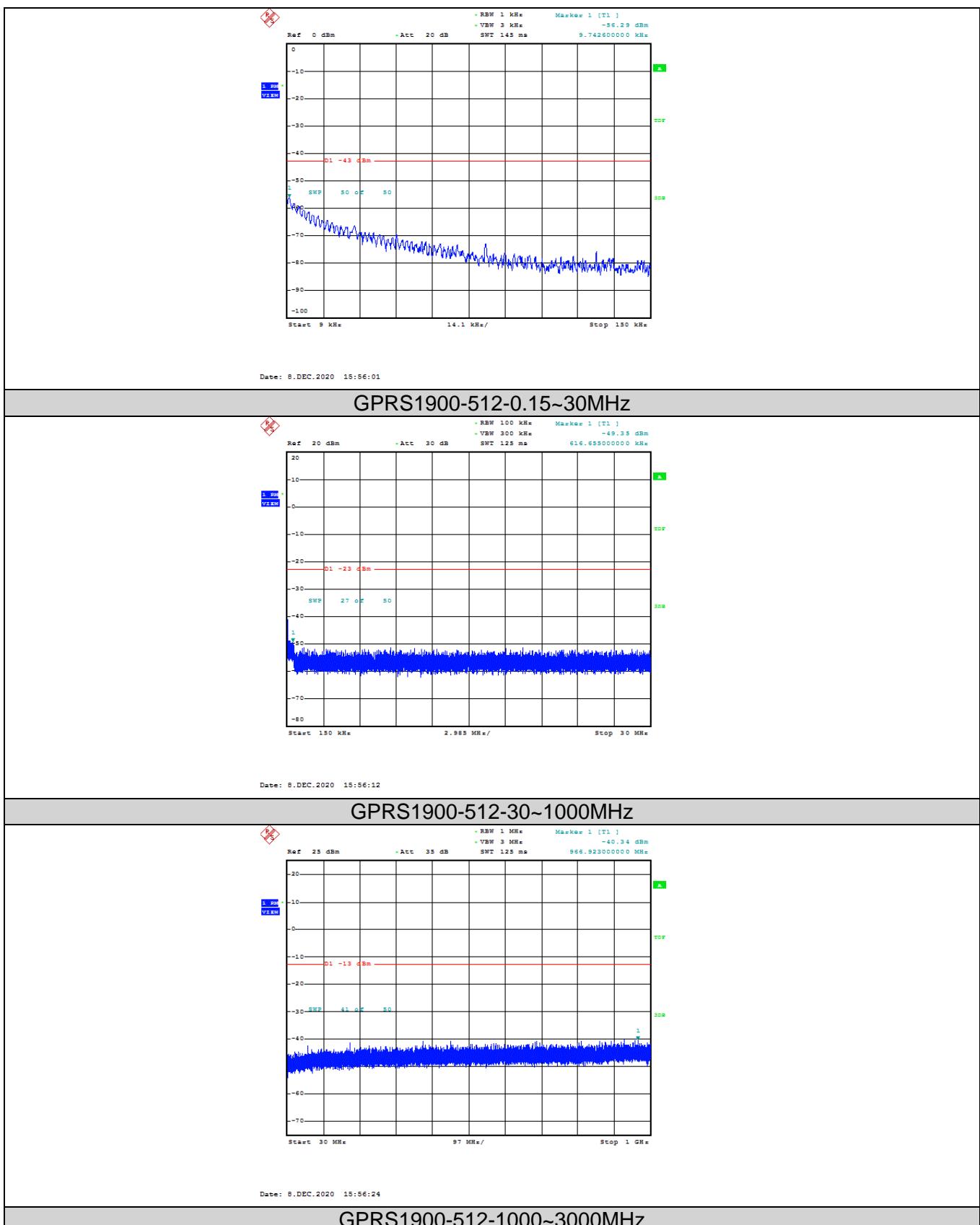


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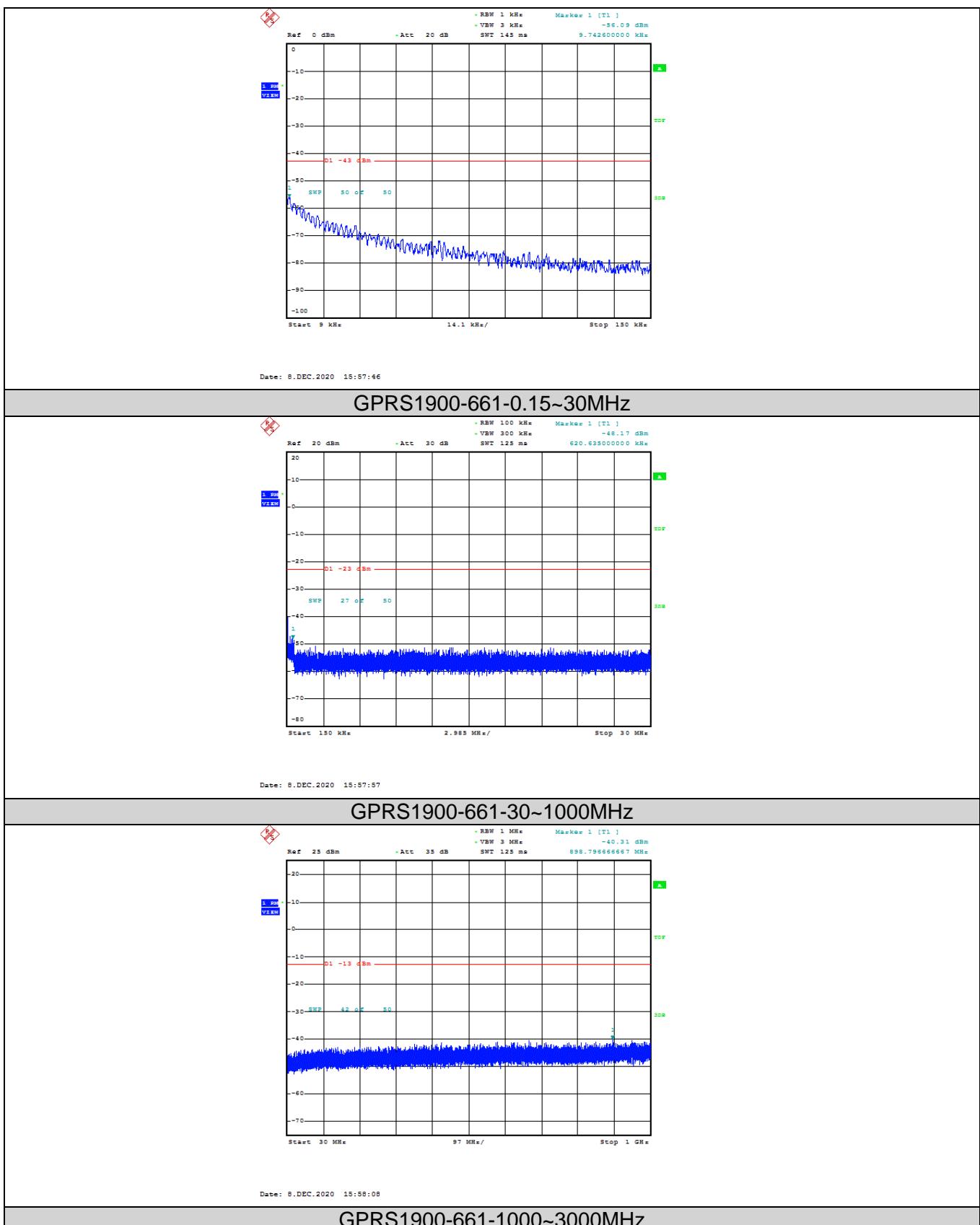
CTC Laboratories, Inc.

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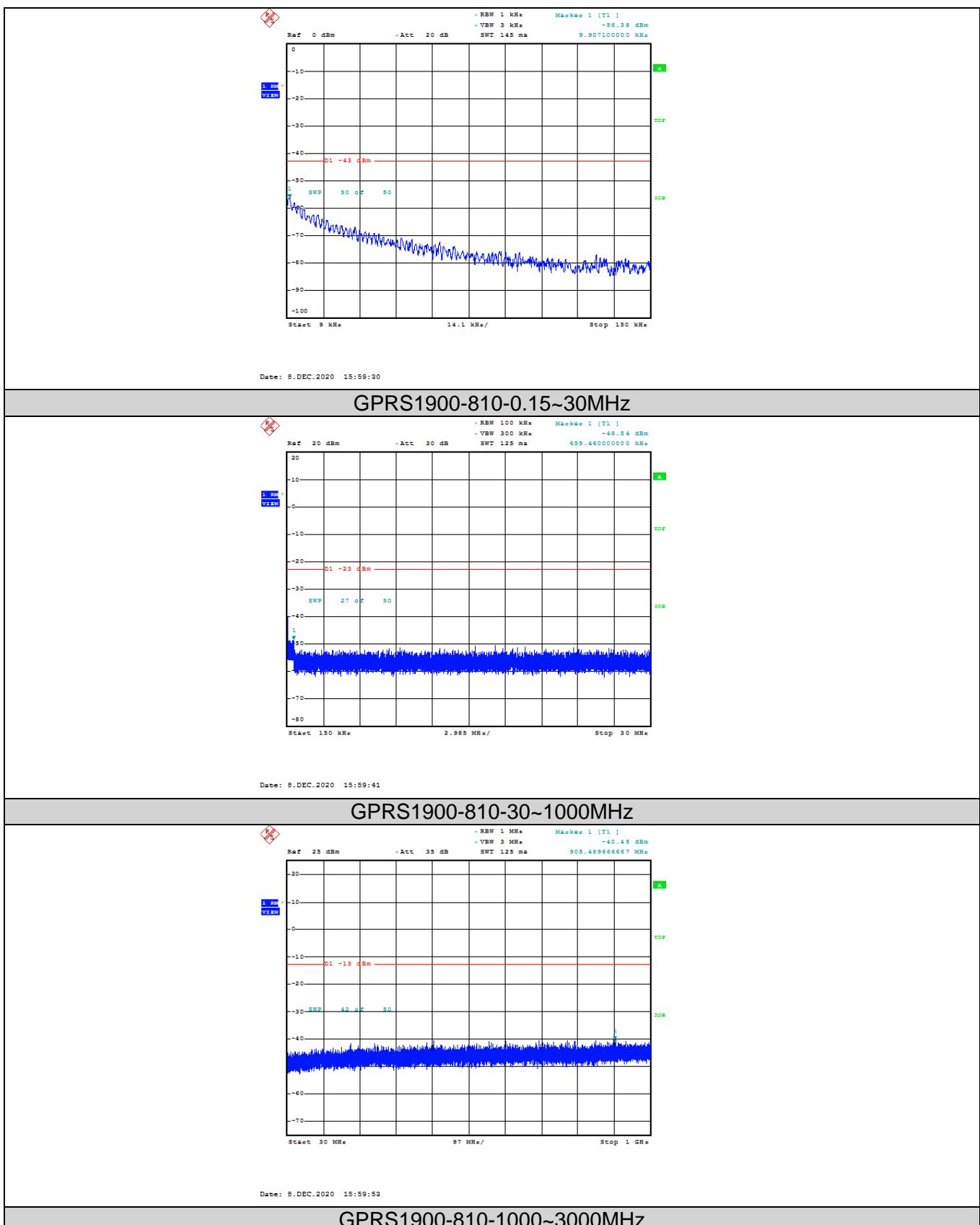


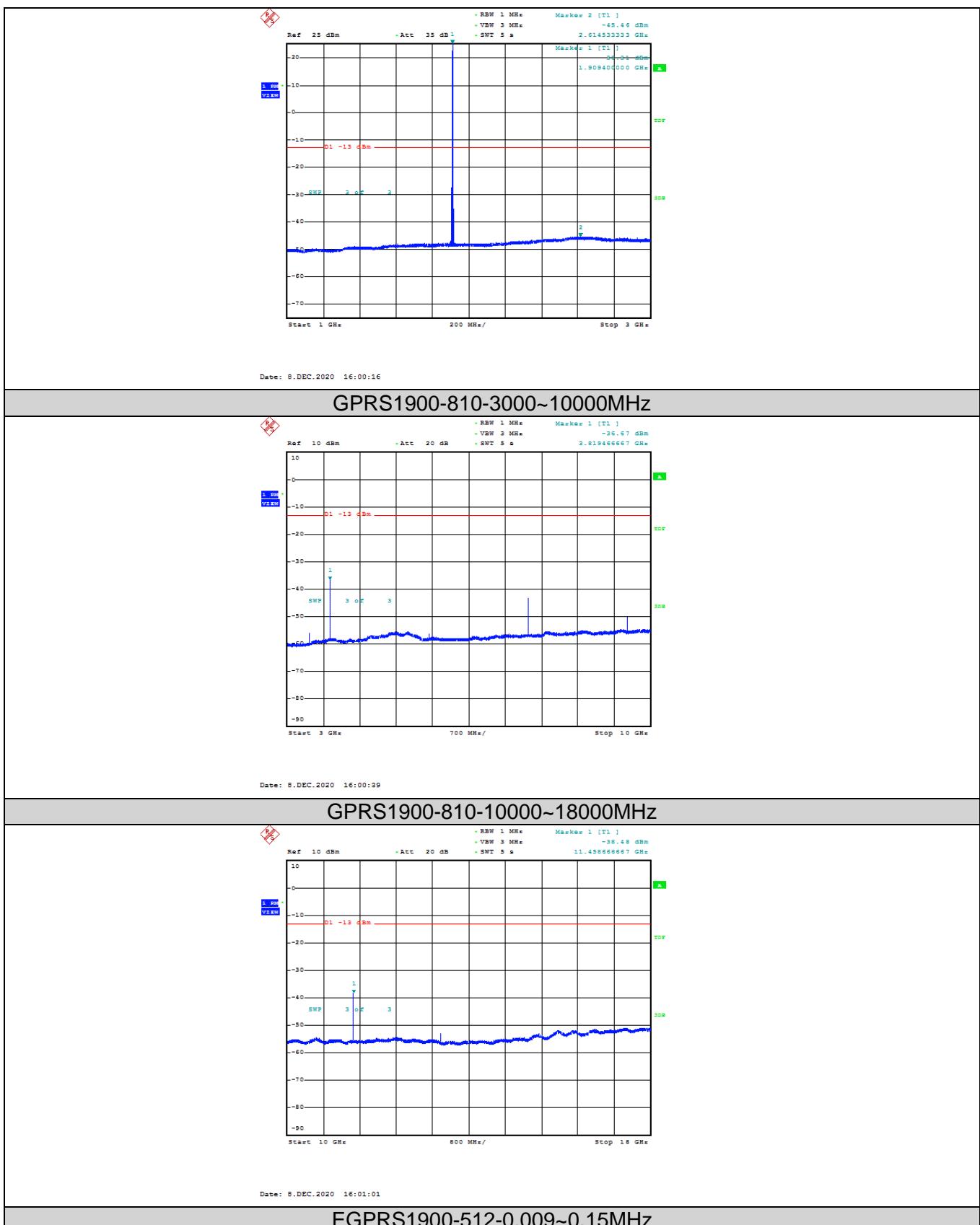
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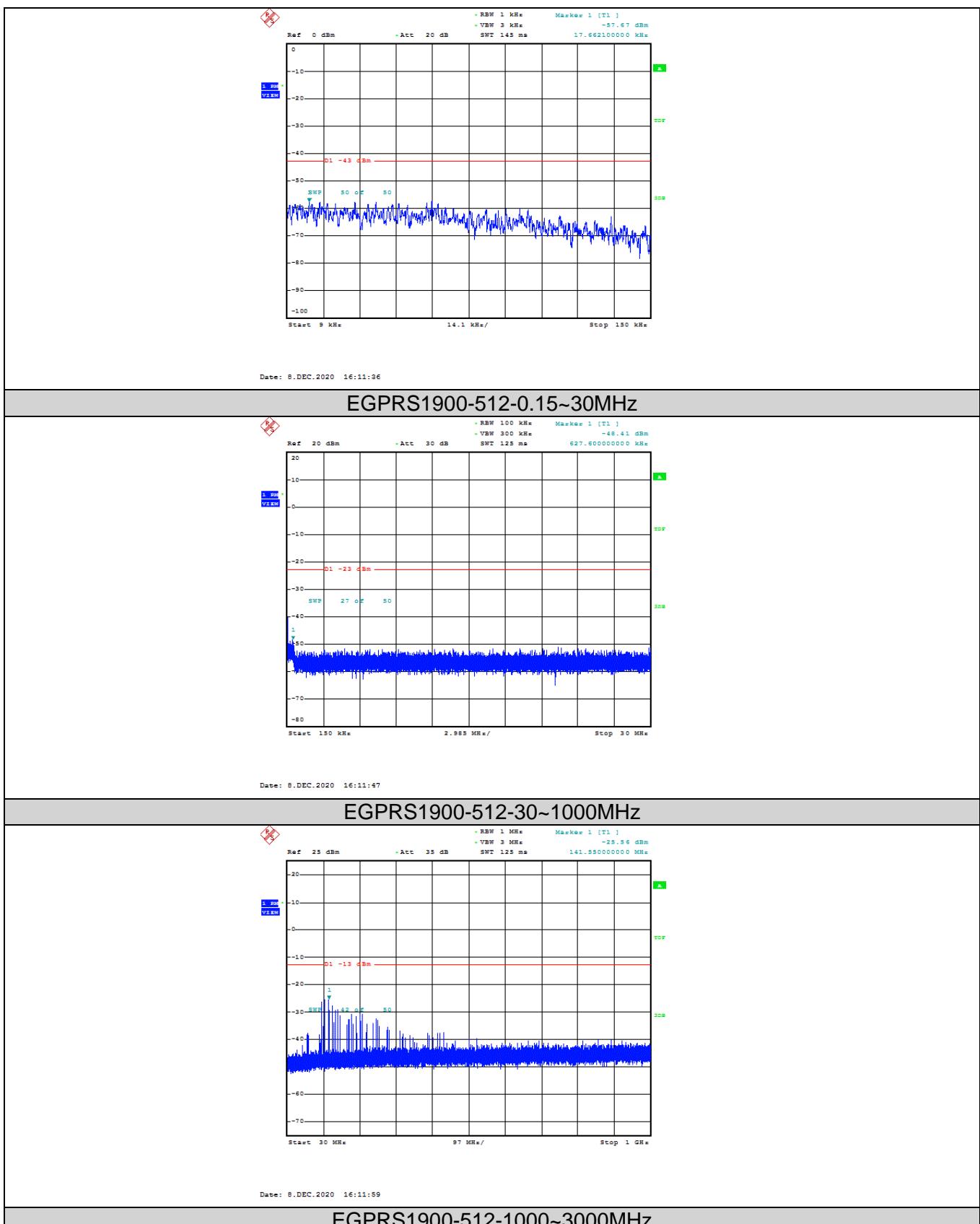
1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China  
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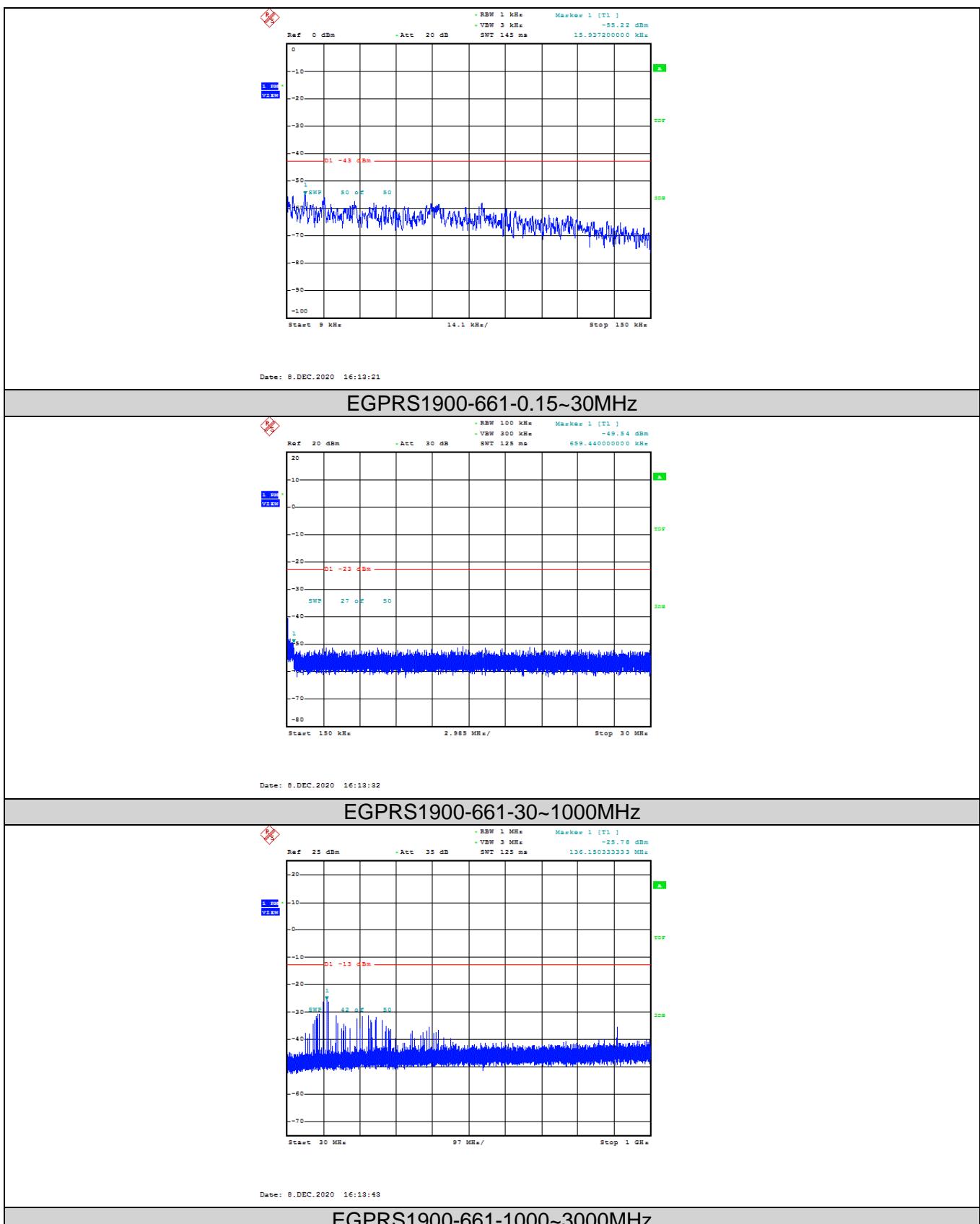
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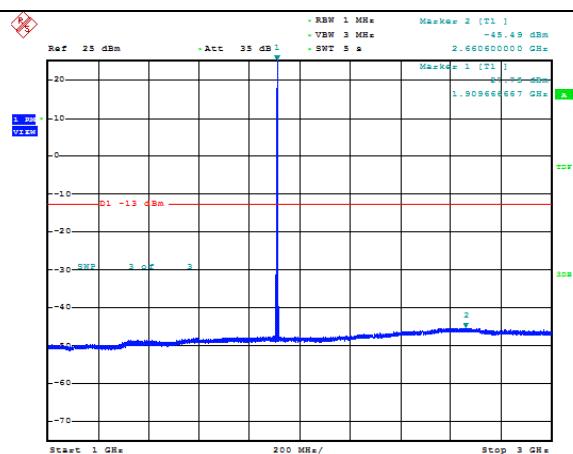


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Tel.: (86)755-27521059

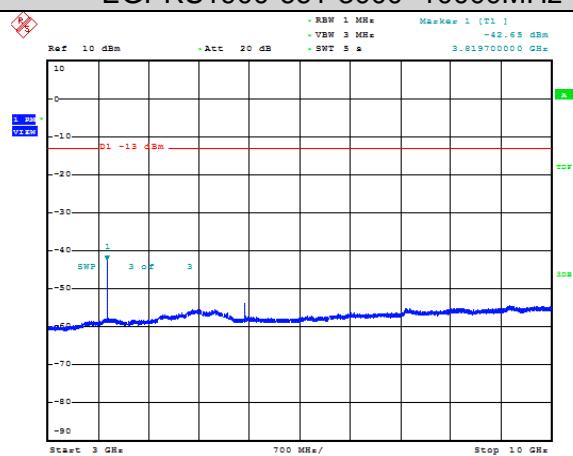
Fax: (86)755-27521011 [Http://www.sz-ctc.org.cn](http://www.sz-ctc.org.cn)

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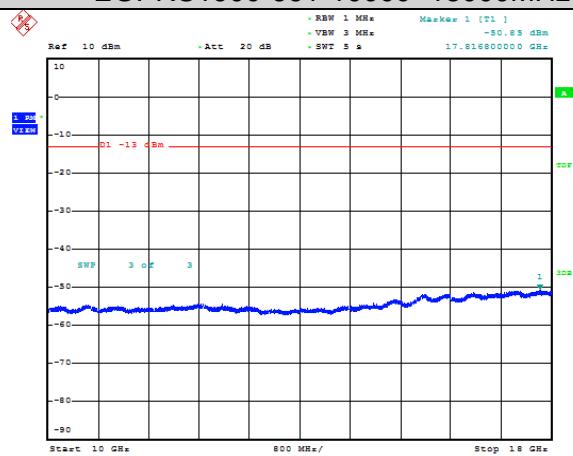
Date: 8.DEC.2020 16:14:07

EGPRS1900-661-3000~10000MHz



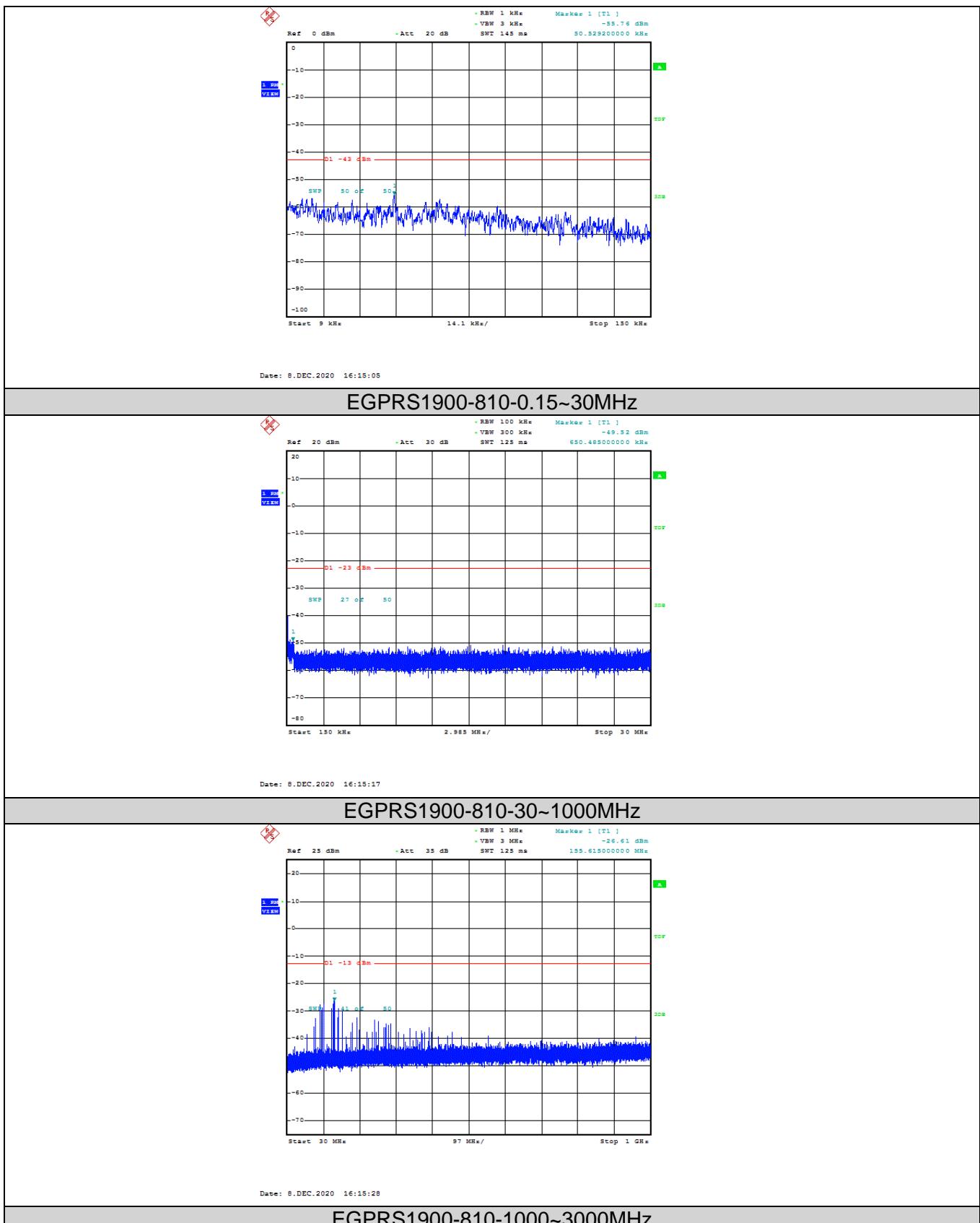
Date: 8.DEC.2020 16:14:29

EGPRS1900-661-10000~18000MHz



Date: 8.DEC.2020 16:14:52

EGPRS1900-810-0.009~0.15MHz

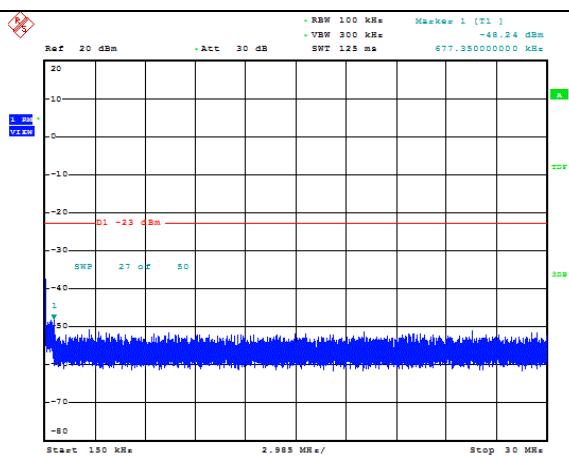




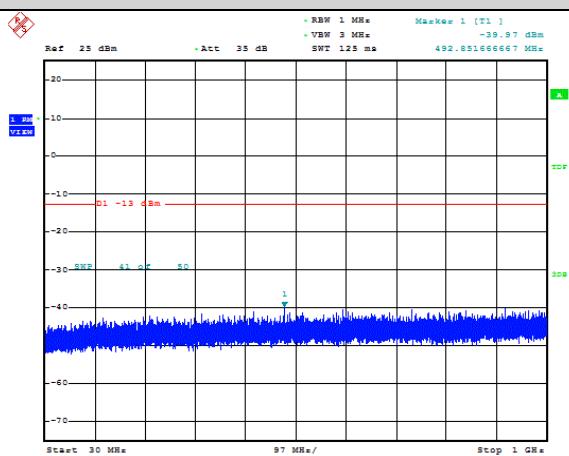
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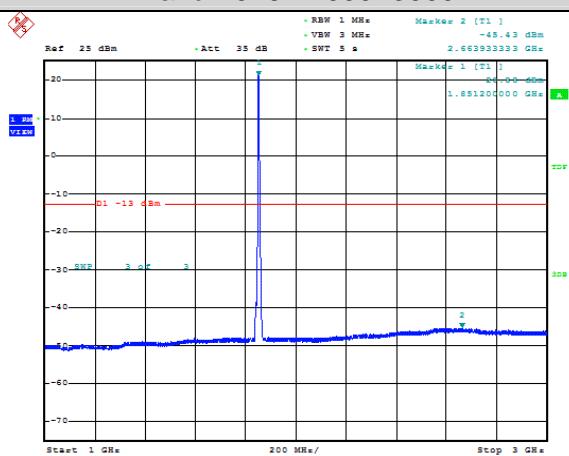
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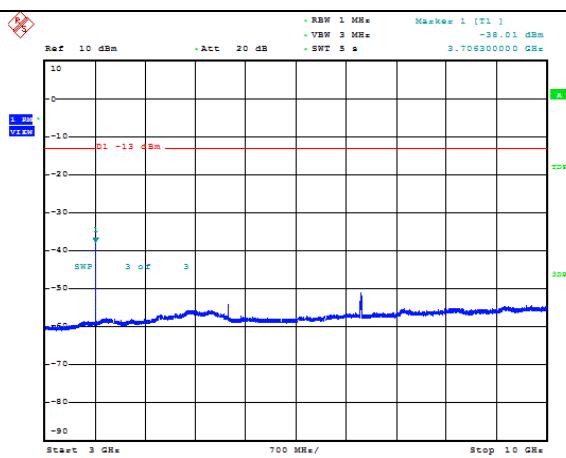
### Band2-9262-30~1000MHz



### Band2-9262-1000~3000MHz

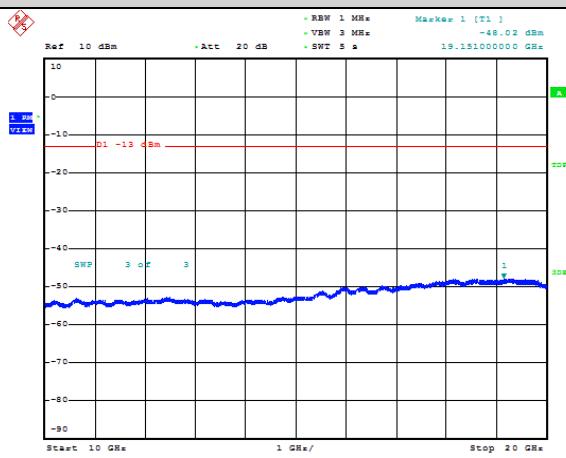


### Band2-9262-3000~10000MHz



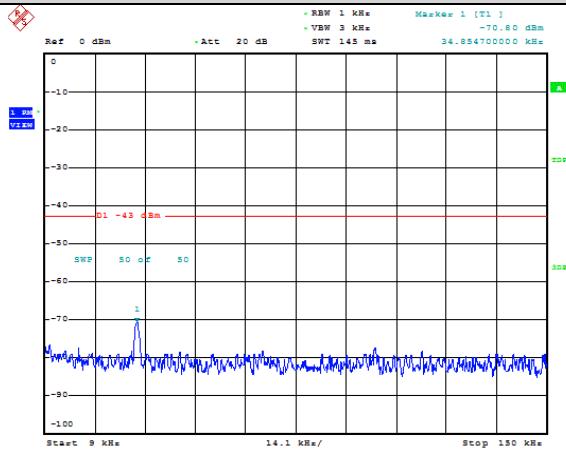
Date: 14.DEC.2020 10:58:29

### Band2-9262-10000~20000MHz



Date: 14.DEC.2020 10:58:52

### Band2-9262-0.009~0.15MHz



Date: 14.DEC.2020 10:57:21

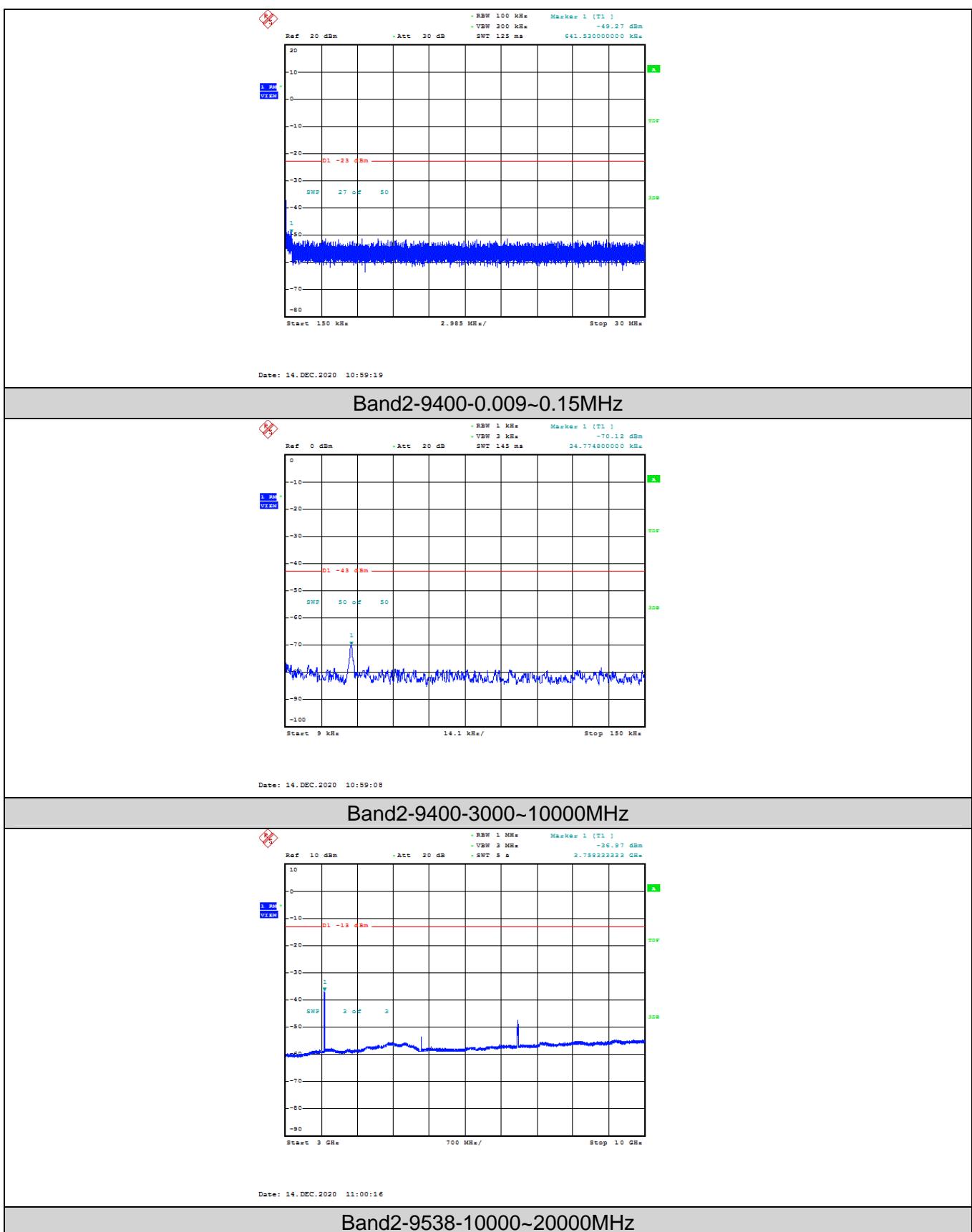
### Band2-9400-30~1000MHz

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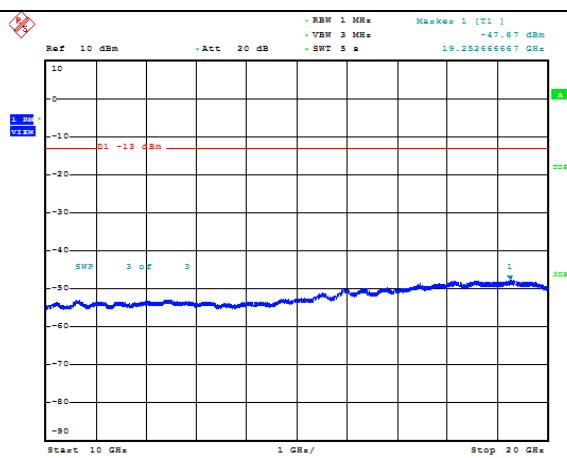


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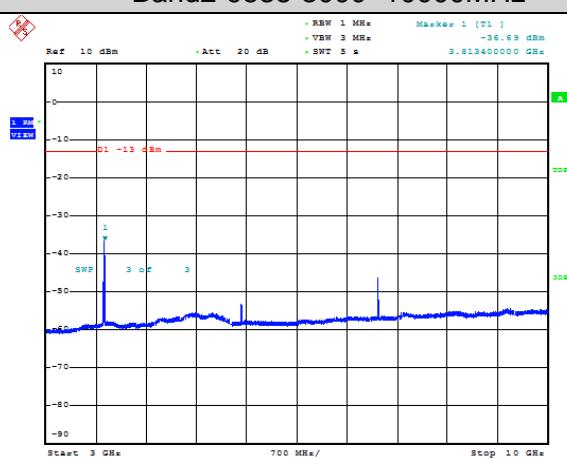
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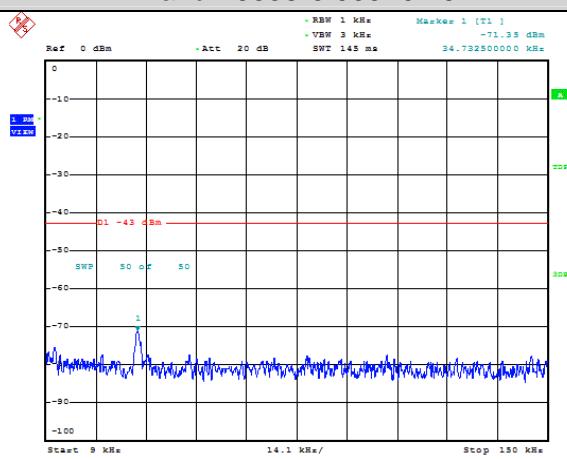
Date: 14.DEC.2020 11:02:26

### Band2-9538-3000~10000MHz



Date: 14.DEC.2020 11:02:03

### Band2-9538-0.009~0.15MHz



Date: 14.DEC.2020 11:00:55

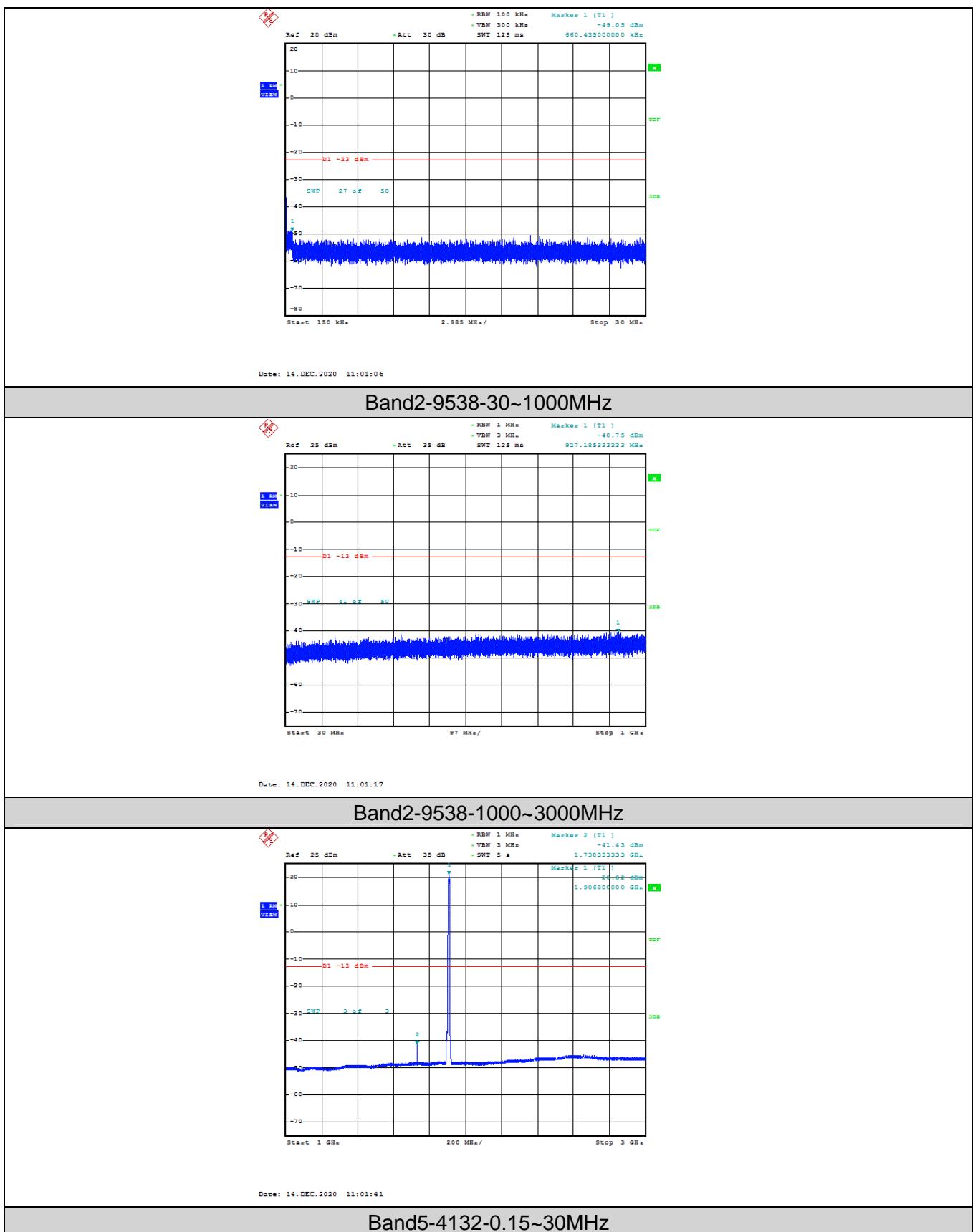
### Band2-9538-0.15~30MHz

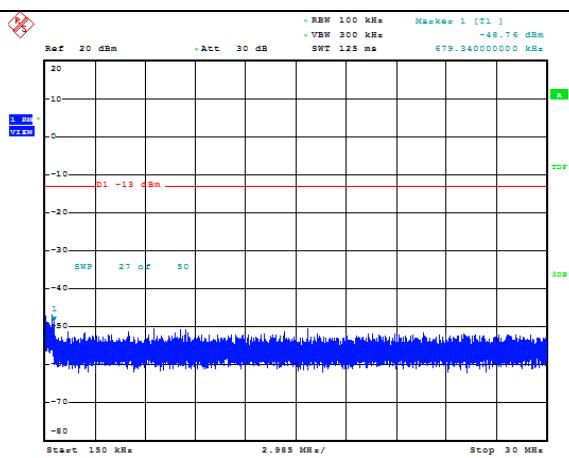
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Fax: (86)755-27521011 [Http://www.sz-ctc.org.cn](http://www.sz-ctc.org.cn)

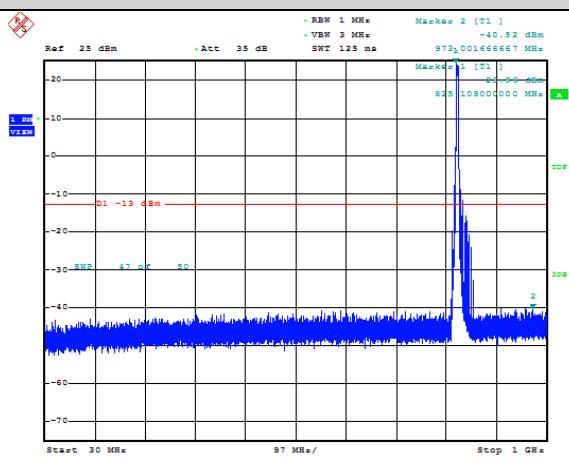
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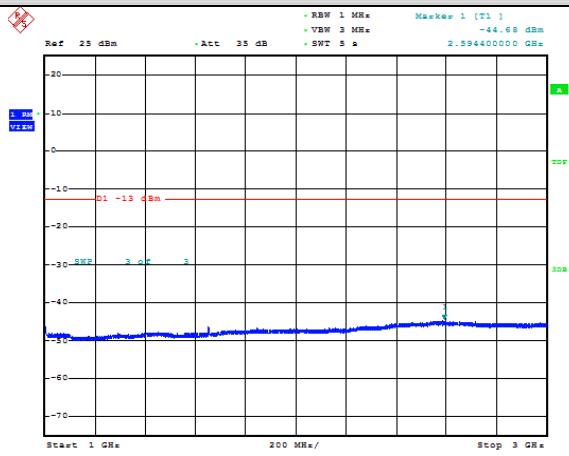
Date: 14.DEC.2020 15:59:23

### Band5-4132-30~1000MHz



Date: 14.DEC.2020 15:59:35

### Band5-4132-1000~3000MHz



Date: 14.DEC.2020 15:59:57

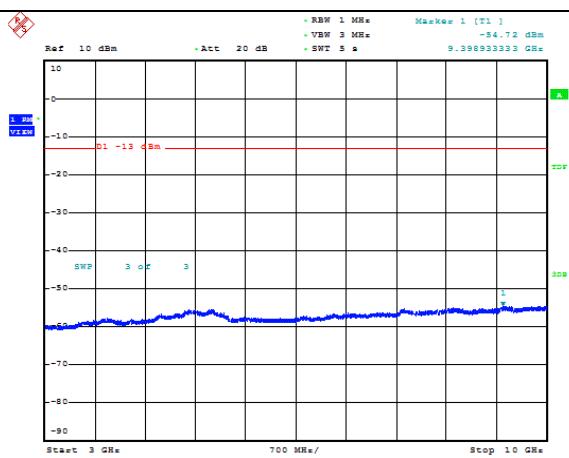
### Band5-4132-3000~10000MHz

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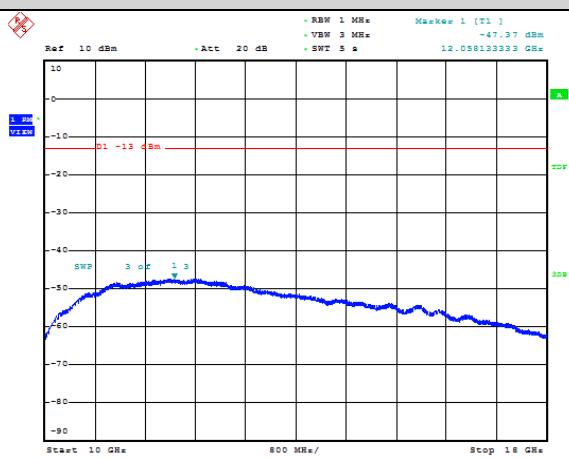
Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

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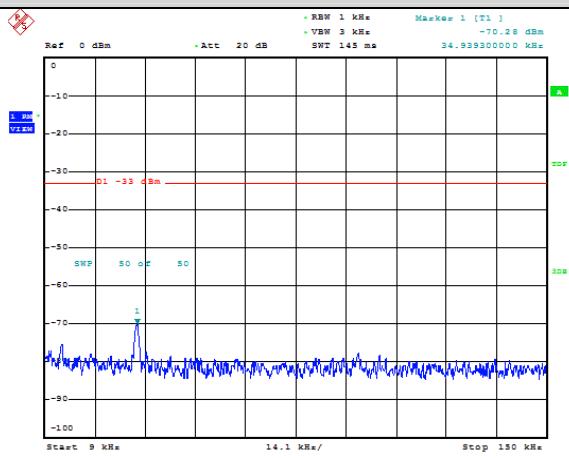
Date: 14.DEC.2020 16:00:20

### Band5-4132-10000~18000MHz



Date: 14.DEC.2020 16:00:42

### Band5-4132-0.009~0.15MHz



Date: 14.DEC.2020 15:59:11

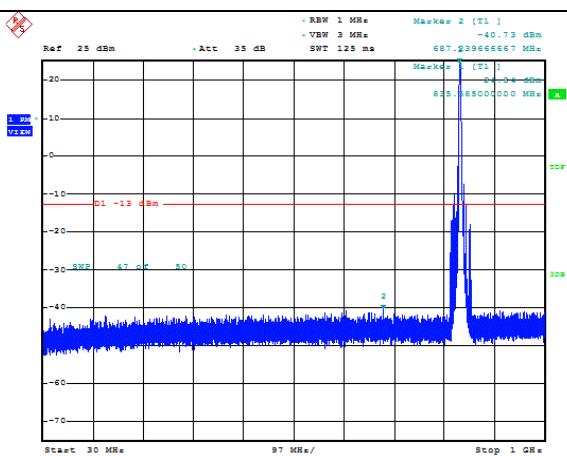
### Band5-4183-30~1000MHz

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Tel.: (86)755-27521059

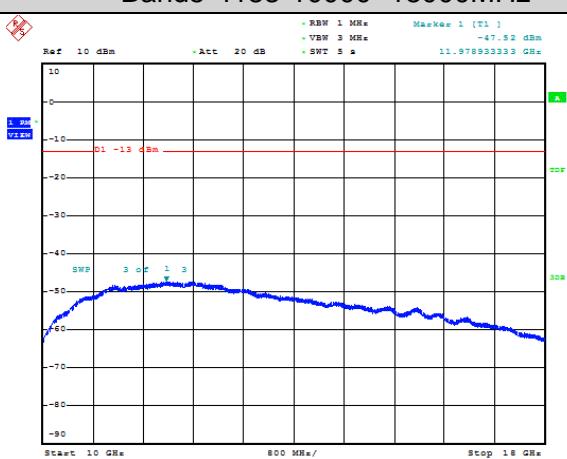
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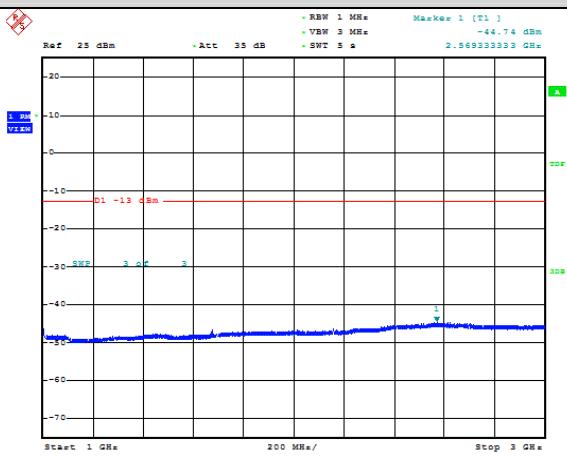
Date: 14.DEC.2020 16:01:22

### Band5-4183-10000~18000MHz



Date: 14.DEC.2020 16:02:00

### Band5-4183-1000~3000MHz



Date: 14.DEC.2020 16:01:45

### Band5-4183-0.15~30MHz

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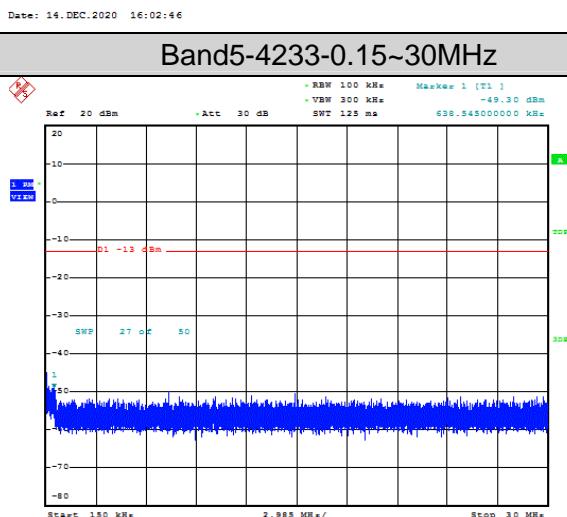
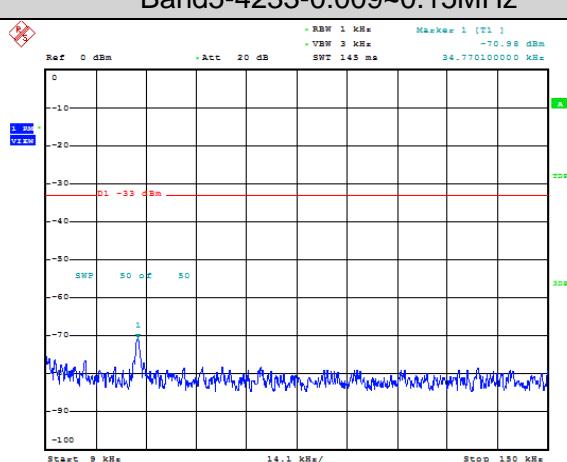
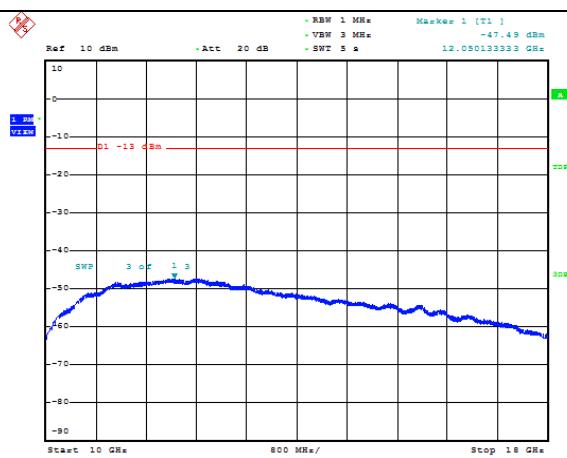


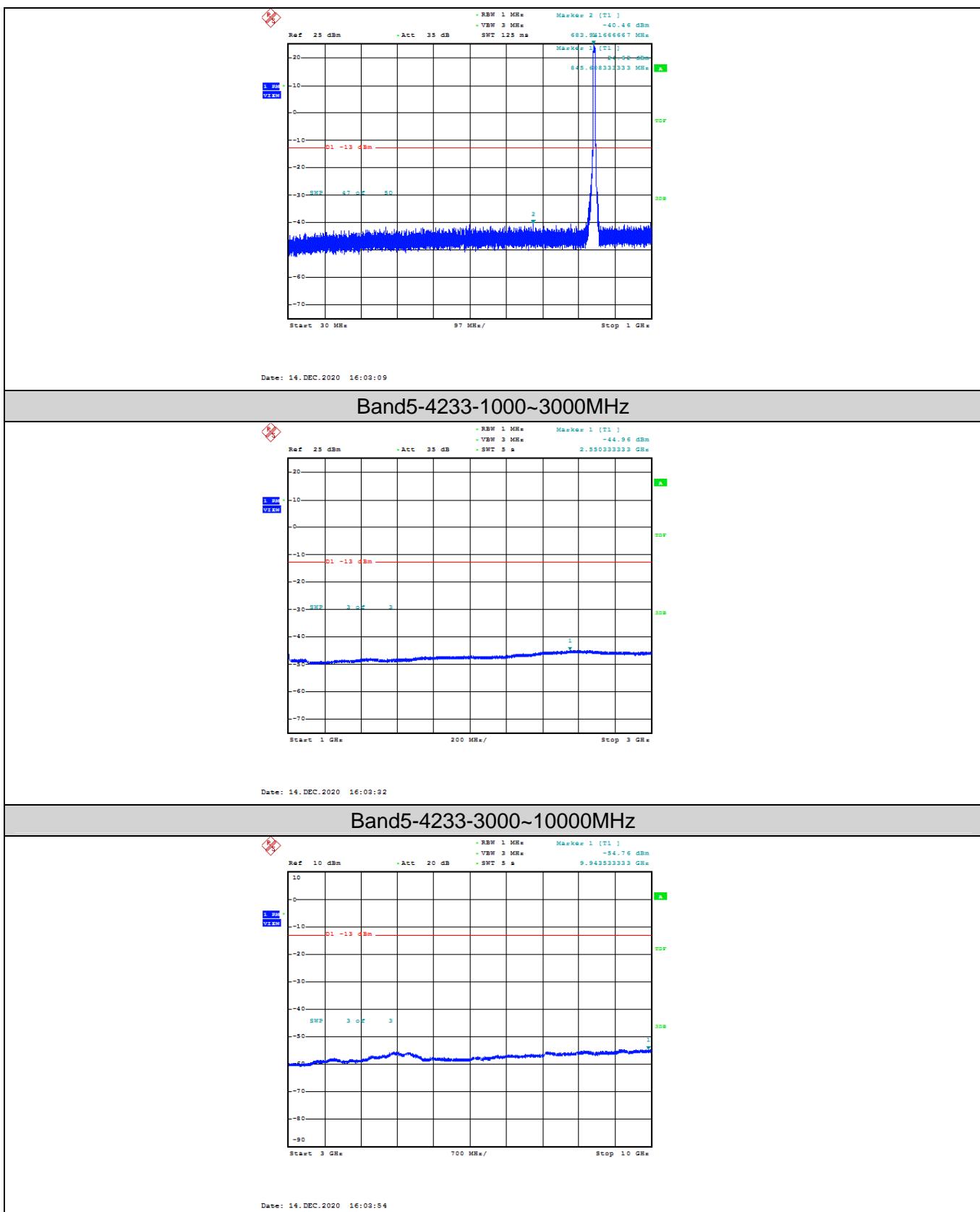
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### 3.5. Band Edge compliance

#### LIMIT

FCC: §22.917, §24.238, §27.53 (h)

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

FCC: §90.691 Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10\log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10\log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

RSS132§5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10}p$  (watts).

(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS133§6.5

Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10}p$  (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10}p$  (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

RSS139§6.6

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can

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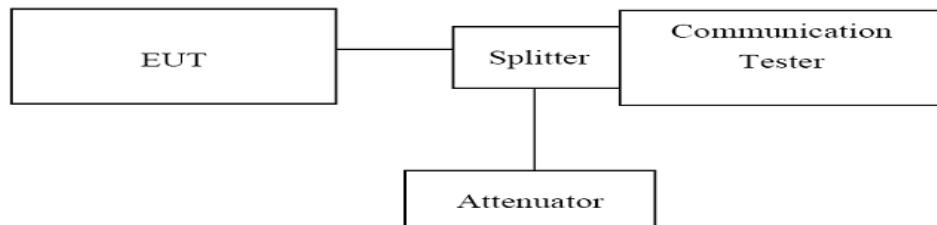
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contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

## TEST CONFIGURATION



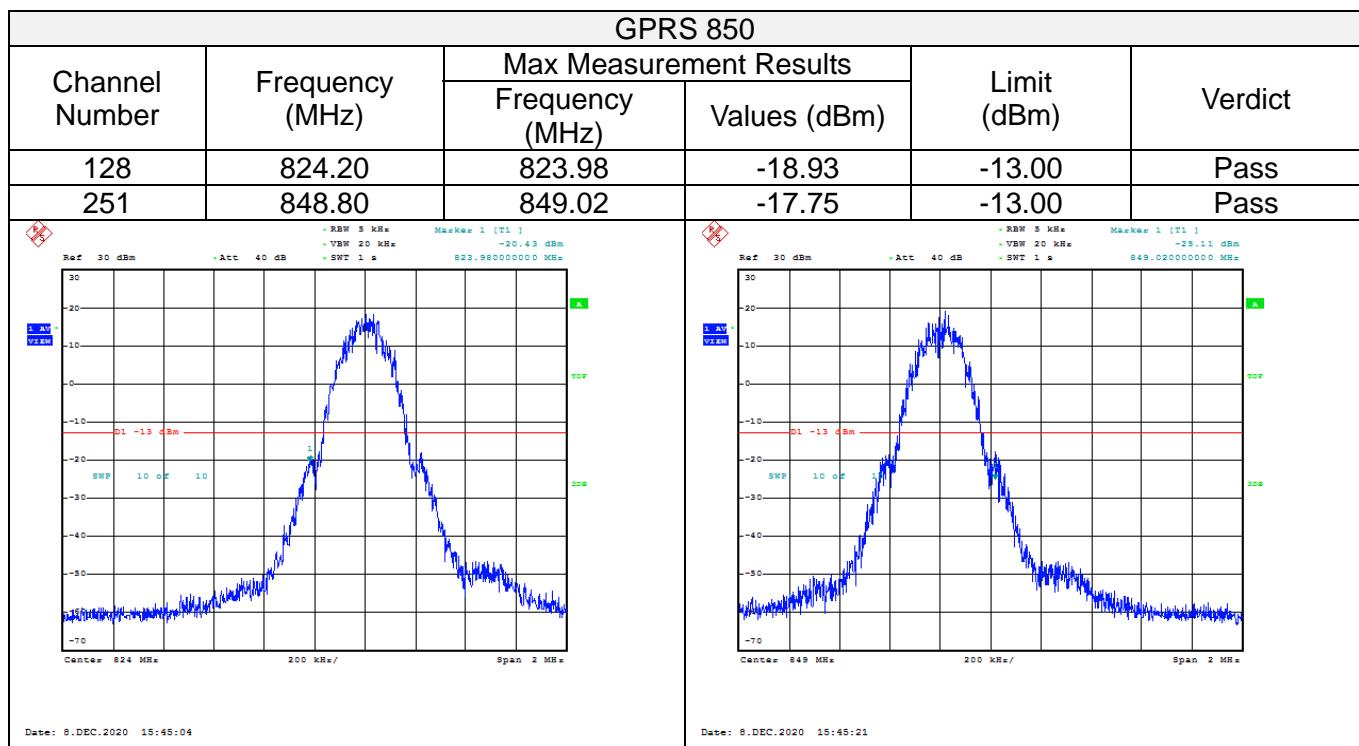
## TEST PROCEDURE

The transmitter output was connected to a R&S CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

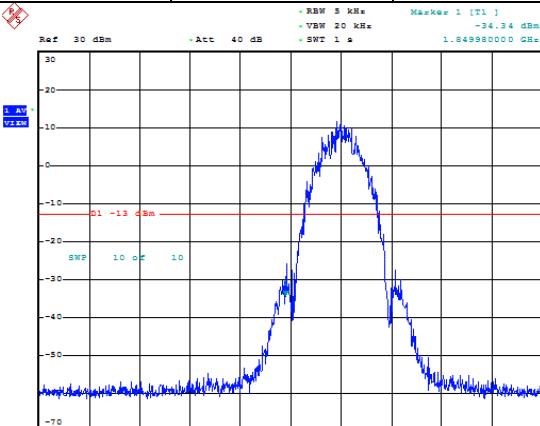
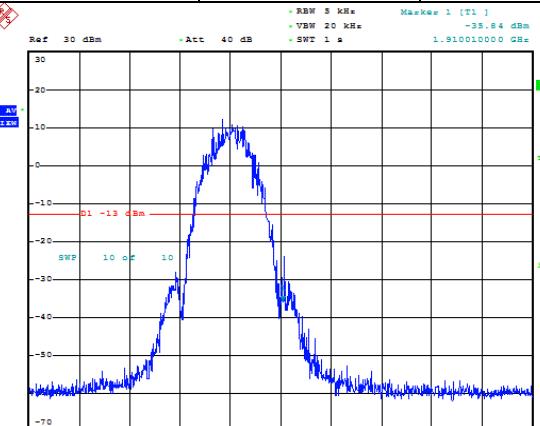
- Set the spectrum analyzer span to include the block edge frequency.
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

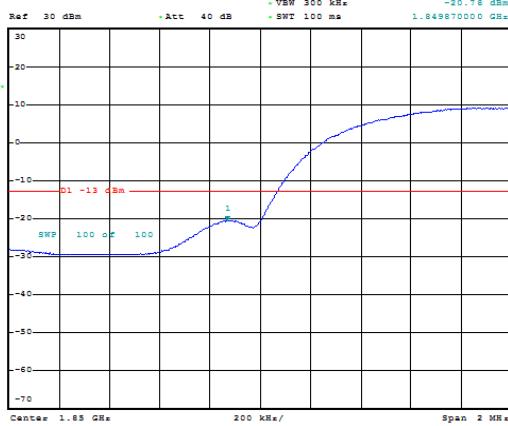
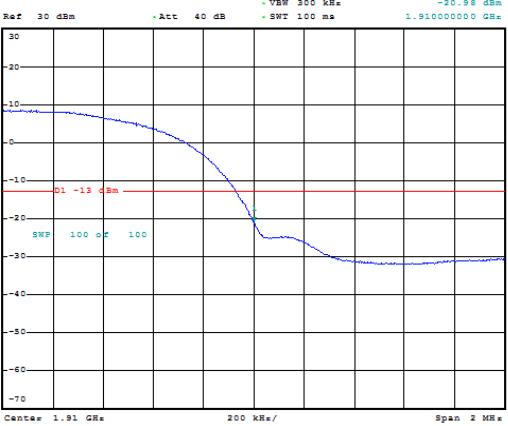
## TEST RESULTS



EGPRS 850					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
128	824.20	823.96	-29.85	-13.00	Pass
251	848.80	849.01	-30.18	-13.00	Pass
Date: 8.DEC.2020 15:40:08					

GPRS 1900								
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict			
		Frequency (MHz)	Values (dBm)					
512	1850.20	1849.98	-20.68	-13.00	Pass			
810	1909.80	1910.02	-20.10	-13.00	Pass			
Date: 8.DEC.2020 15:55:29								
Date: 8.DEC.2020 15:55:47								

EGPRS 1900					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
512	1850.20	1849.98	-26.00	-13.00	Pass
810	1909.80	1910.01	-23.92	-13.00	Pass
 <p>Ref 30 dBm, Att 40 dB, SWR 1.0, Center 1.85 GHz, Span 2 MHz, Date: 8.DEC.2020 16:11:04</p>		 <p>Ref 30 dBm, Att 40 dB, SWR 1.0, Center 1.91 GHz, Span 2 MHz, Date: 8.DEC.2020 16:11:22</p>			

WCDMA Band II					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
9262	1852.40	1849.87	-20.54	-13.00	Pass
9538	1907.60	1910.00	-20.98	-13.00	Pass
 <p>Ref 30 dBm, Att 40 dB, SWR 1.0, Center 1.85 GHz, Span 2 MHz, Date: 14.DEC.2020 10:56:44</p>		 <p>Ref 30 dBm, Att 40 dB, SWR 1.0, Center 1.91 GHz, Span 2 MHz, Date: 14.DEC.2020 10:57:03</p>			



WCDMA Band V					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
4132	826.40	824.00	-22.46	-13.00	Pass
4233	846.60	849.00	-20.16	-13.00	Pass

Date: 14. DEC. 2020 15:58:35

Date: 14. DEC. 2020 15:58:54

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### 3.6. Radiated Power Measurement

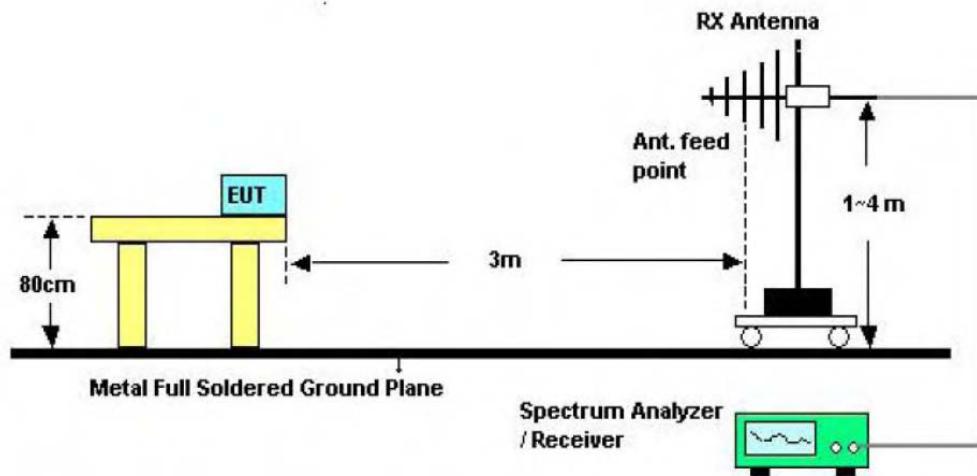
#### LIMIT

FCC: §2.1046, §22.913, §24.232, §27.50 and §90.635

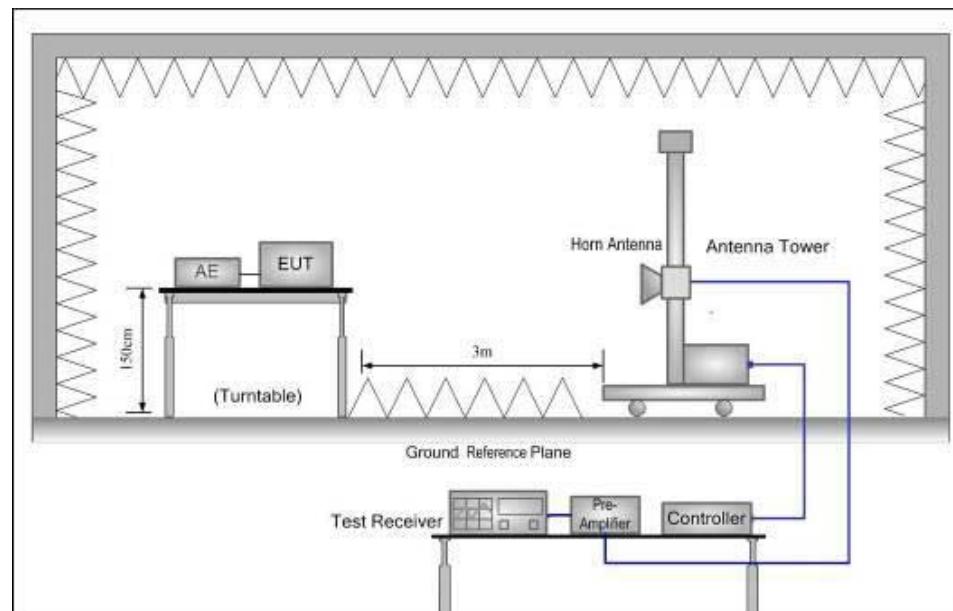
IC: RSS132§5.4; RSS133§6.4 and RSS139§6.5.

#### TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

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## TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:  
Power(EIRP)=PMea- PAg - Pcl + Ga  
We used N5182A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; The measurement results are amend as described below:  
Power(EIRP)=PMea- Pcl + Ga
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.  
ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

## TEST RESULTS

Remark:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "X axis" position was the worst, and test data recorded in this report.

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## Measurement Data (worst case) :

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
GPRS850	128	V	33.32	38.45	Pass
		H	25.02		
	190	V	32.72		
		H	26.39		
	251	V	31.76		
		H	27.15		
EGPRS850	128	V	31.79	38.45	Pass
		H	27.34		
	190	V	33.67		
		H	27.05		
	251	V	32.66		
		H	27.93		

Mode	Channel	Antenna Pol.	ERIP	Limit (dBm)	Result
GPRS1900	512	V	28.48	33.00	Pass
		H	25.48		
	661	V	29.40		
		H	25.78		
	810	V	29.62		
		H	24.97		
EGPRS1900	512	V	29.18	33.00	Pass
		H	25.47		
	661	V	28.99		
		H	24.02		
	810	V	29.82		
		H	24.61		

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Mode	Channel	Antenna Pol.	EIRP	Limit (dBm)	Result
WCDMA Band II (QPSK)	9262	V	27.35	33.00	Pass
		H	23.94		
	9400	V	26.93		
		H	23.81		
	9538	V	27.30		
		H	23.36		

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
WCDMA Band V (QPSK)	4132	V	27.88	38.45	Pass
		H	24.56		
	4183	V	26.02		
		H	23.70		
	4233	V	26.47		
		H	23.18		

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### 3.7. Radiated Spurious Emission

#### LIMIT

FCC: §22.917(a), §24.238(a), §27.53 (h), §90.691

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

RSS132§5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts).

(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS133§6.5

Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

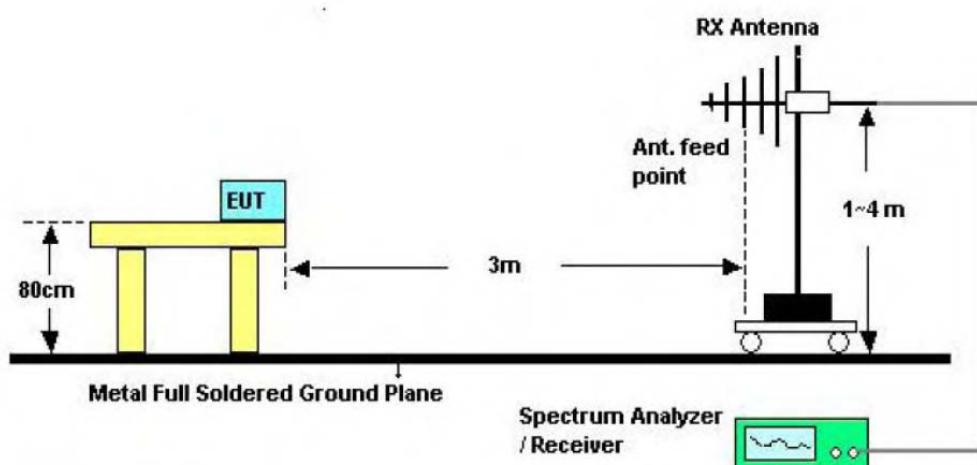
RSS139§6.6

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

#### TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



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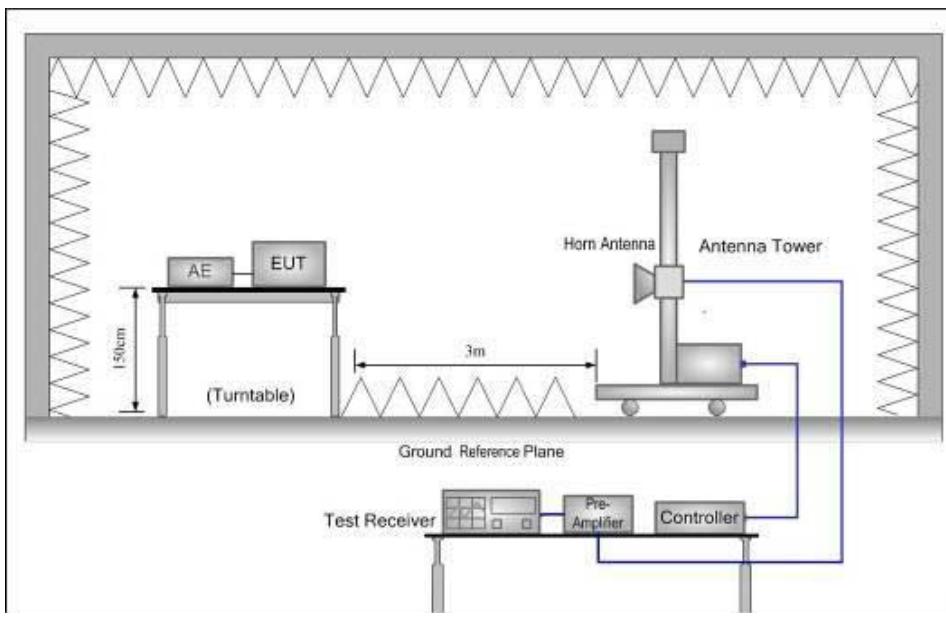
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Above 1GHz

## TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:

$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$

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We used SMF100A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; The measurement results are amend as described below:

$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$

7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dBi) and known input power.  
ERP can be calculated from EIRP by subtracting the gain of the dipole,  $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$ .
8. Test frequency range should extend to 10<sup>th</sup> harmonic of highest fundamental frequency.

## **TEST RESULTS**

Remark:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, and test data recorded in this report.

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GPRS 850					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
128	1648.8	Vertical	-44.04	-13.00	Pass
	2473.2	Vertical	-49.45		
	1648.8	Horizontal	-46.06		
	2473.2	Horizontal	-53.26		
190	1673.2	Vertical	-40.62	-13.00	Pass
	2509.8	Vertical	-49.83		
	1673.2	Horizontal	-43.81		
	2509.8	Horizontal	-51.97		
251	1697.6	Vertical	-33.32	-13.00	Pass
	2546.4	Vertical	-44.00		
	1697.6	Horizontal	-42.17		
	2546.4	Horizontal	-48.74		

EGPRS 850					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
128	1648.8	Vertical	-43.40	-13.00	Pass
	2473.2	Vertical	-47.52		
	1648.8	Horizontal	-49.43		
	2473.2	Horizontal	-50.62		
190	1673.2	Vertical	-43.73	-13.00	Pass
	2509.8	Vertical	-47.55		
	1673.2	Horizontal	-44.53		
	2509.8	Horizontal	-50.27		
251	1697.6	Vertical	-36.91	-13.00	Pass
	2546.4	Vertical	-42.44		
	1697.6	Horizontal	-44.26		
	2546.4	Horizontal	-48.73		

Remark :

1. The emission levels of below 1 GHz are very lower than the limit above 10dB and not show in test report.

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GPRS 1900					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
512	3700.4	Vertical	-46.98	-13.00	Pass
	5550.6	Vertical	-48.16		
	3700.4	Horizontal	-48.51		
	5550.6	Horizontal	-53.44		
661	3760	Vertical	-44.05	-13.00	Pass
	5640	Vertical	-53.53		
	3760	Horizontal	-48.13		
	5640	Horizontal	-55.70		
810	3819.6	Vertical	-37.77	-13.00	Pass
	5729.4	Vertical	-42.63		
	3819.6	Horizontal	-45.86		
	5729.4	Horizontal	-52.25		

EGPRS 1900					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
512	3700.4	Vertical	-46.61	-13.00	Pass
	5550.6	Vertical	-51.12		
	3700.4	Horizontal	-52.03		
	5550.6	Horizontal	-52.96		
661	3760	Vertical	-46.92	-13.00	Pass
	5640	Vertical	-52.28		
	3760	Horizontal	-45.41		
	5640	Horizontal	-54.50		
810	3819.6	Vertical	-38.89	-13.00	Pass
	5729.4	Vertical	-44.09		
	3819.6	Horizontal	-47.64		
	5729.4	Horizontal	-52.43		

Remark :

1. The emission levels of below 1 GHz are very lower than the limit above 10dB and not show in test report.



WCDMA Band II					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
9262	3705.20	Vertical	-43.34	-13.00	Pass
	5557.80	Vertical	-50.78		
	3705.20	Horizontal	-47.79		
	5557.80	Horizontal	-50.47		
9400	3760.00	Vertical	-42.60	-13.00	Pass
	5640.00	Vertical	-51.18		
	3760.00	Horizontal	-42.97		
	5640.00	Horizontal	-53.54		
9538	3814.80	Vertical	-39.11	-13.00	Pass
	5722.20	Vertical	-53.87		
	3814.80	Horizontal	-44.77		
	5722.20	Horizontal	-49.38		

Remark :

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

WCDMA Band V					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
4132	1653.20	Vertical	-42.97	-13.00	Pass
	2479.80	Vertical	-52.26		
	1653.20	Horizontal	-47.13		
	2479.80	Horizontal	-50.49		
4183	1672.80	Vertical	-41.35	-13.00	Pass
	2509.20	Vertical	-51.56		
	1672.80	Horizontal	-45.96		
	2509.20	Horizontal	-53.93		
4233	1692.80	Vertical	-39.73	-13.00	Pass
	2539.20	Vertical	-54.49		
	1692.80	Horizontal	-45.57		
	2539.20	Horizontal	-53.55		

Remark :

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

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### 3.8. Frequency stability

#### LIMIT

FCC §22.355, §90.213

The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

FCC §24.235 & §27.54

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS132§5.3

The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  SRSP for mobile stations and  $\pm 1.5$  ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the occupied bandwidth stays within each of the sub-bands (see Section 5.1) when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS133§6.3

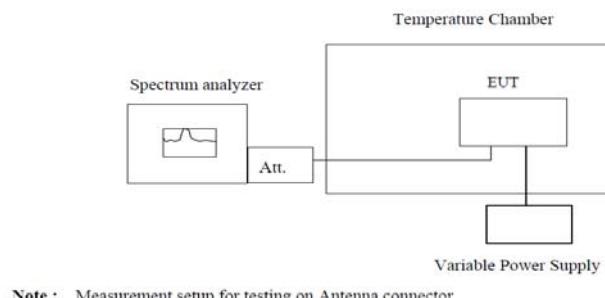
The carrier frequency shall not depart from the reference frequency, in excess of  $\pm 2.5$  ppm for mobile stations and  $\pm 1.0$  ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS139§6.4

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

#### TEST CONFIGURATION



**Note :** Measurement setup for testing on Antenna connector

#### TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and

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measure EUT 25°C operating frequency as reference frequency.

5. Turn EUT off and set the chamber temperature to -10°C. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of +40°C reached.
7. Reduce the input voltage to specified extreme voltage variation (+/- 10%) and endpoint, record the maximum frequency change.

## TEST RESULTS

Voltage									
Band	Channel	PCL	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict	
GPRS850	128	3	VL	NT	5.29	0.006418	±2.5	PASS	
GPRS850	128	3	VN	NT	2.52	0.003058	±2.5	PASS	
GPRS850	128	3	VH	NT	0.81	0.000983	±2.5	PASS	
GPRS850	190	3	VL	NT	4.78	0.005714	±2.5	PASS	
GPRS850	190	3	VN	NT	1.42	0.001697	±2.5	PASS	
GPRS850	190	3	VH	NT	2.81	0.003359	±2.5	PASS	
GPRS850	251	3	VL	NT	-2.71	-0.003193	±2.5	PASS	
GPRS850	251	3	VN	NT	-4.23	-0.004984	±2.5	PASS	
GPRS850	251	3	VH	NT	0.03	0.000035	±2.5	PASS	
EGPRS850	128	8	VL	NT	-7.68	-0.009318	±2.5	PASS	
EGPRS850	128	8	VN	NT	-9.07	-0.011005	±2.5	PASS	
EGPRS850	128	8	VH	NT	-4.65	-0.005642	±2.5	PASS	
EGPRS850	190	8	VL	NT	-11.91	-0.014236	±2.5	PASS	
EGPRS850	190	8	VN	NT	-14.33	-0.017129	±2.5	PASS	
EGPRS850	190	8	VH	NT	-13.85	-0.016555	±2.5	PASS	
EGPRS850	251	8	VL	NT	-11.56	-0.013619	±2.5	PASS	
EGPRS850	251	8	VN	NT	-15.05	-0.017731	±2.5	PASS	
EGPRS850	251	8	VH	NT	-12.79	-0.015068	±2.5	PASS	
GPRS1900	512	0	VL	NT	11.85	0.006405	±2.5	PASS	
GPRS1900	512	0	VN	NT	13.17	0.007118	±2.5	PASS	
GPRS1900	512	0	VH	NT	21.08	0.011393	±2.5	PASS	
GPRS1900	661	0	VL	NT	17.72	0.009426	±2.5	PASS	
GPRS1900	661	0	VN	NT	16.37	0.008707	±2.5	PASS	
GPRS1900	661	0	VH	NT	19.37	0.010303	±2.5	PASS	
GPRS1900	810	0	VL	NT	18.08	0.009467	±2.5	PASS	
GPRS1900	810	0	VN	NT	20.76	0.010870	±2.5	PASS	
GPRS1900	810	0	VH	NT	20.82	0.010902	±2.5	PASS	
EGPRS1900	512	2	VL	NT	-16.05	-0.008675	±2.5	PASS	
EGPRS1900	512	2	VN	NT	-14.43	-0.007799	±2.5	PASS	
EGPRS1900	512	2	VH	NT	-13.85	-0.007486	±2.5	PASS	

CTC Laboratories, Inc.

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel.: (86)755-27521059

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EGPRS1900	661	2	VL	NT	-15.08	-0.008021	±2.5	PASS
EGPRS1900	661	2	VN	NT	-13.11	-0.006973	±2.5	PASS
EGPRS1900	661	2	VH	NT	-17.98	-0.009564	±2.5	PASS
EGPRS1900	810	2	VL	NT	-22.79	-0.011933	±2.5	PASS
EGPRS1900	810	2	VN	NT	-17.01	-0.008907	±2.5	PASS
EGPRS1900	810	2	VH	NT	-13.40	-0.007016	±2.5	PASS

Temperature								
Band	Channel	PCL	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
GPRS850	128	3	NV	-10	1.36	0.001650	±2.5	PASS
GPRS850	128	3	NV	0	2.39	0.002900	±2.5	PASS
GPRS850	128	3	NV	10	1.45	0.001759	±2.5	PASS
GPRS850	128	3	NV	20	6.49	0.007874	±2.5	PASS
GPRS850	128	3	NV	30	11.53	0.013989	±2.5	PASS
GPRS850	128	3	NV	40	8.27	0.010034	±2.5	PASS
GPRS850	190	3	NV	-10	4.04	0.004829	±2.5	PASS
GPRS850	190	3	NV	0	-0.39	-0.000466	±2.5	PASS
GPRS850	190	3	NV	10	-0.81	-0.000968	±2.5	PASS
GPRS850	190	3	NV	20	-0.71	-0.000849	±2.5	PASS
GPRS850	190	3	NV	30	5.13	0.006132	±2.5	PASS
GPRS850	190	3	NV	40	9.20	0.010997	±2.5	PASS
GPRS850	251	3	NV	-10	0.71	0.000836	±2.5	PASS
GPRS850	251	3	NV	0	-1.94	-0.002286	±2.5	PASS
GPRS850	251	3	NV	10	0.84	0.000990	±2.5	PASS
GPRS850	251	3	NV	20	-0.81	-0.000954	±2.5	PASS
GPRS850	251	3	NV	30	-0.81	-0.000954	±2.5	PASS
GPRS850	251	3	NV	40	6.42	0.007564	±2.5	PASS
EGPRS850	128	8	NV	-10	-4.52	-0.005484	±2.5	PASS
EGPRS850	128	8	NV	0	-8.07	-0.009791	±2.5	PASS
EGPRS850	128	8	NV	10	-14.01	-0.016998	±2.5	PASS
EGPRS850	128	8	NV	20	-7.04	-0.008542	±2.5	PASS
EGPRS850	128	8	NV	30	-5.36	-0.006503	±2.5	PASS
EGPRS850	128	8	NV	40	-4.00	-0.004853	±2.5	PASS
EGPRS850	190	8	NV	-10	-15.27	-0.018252	±2.5	PASS
EGPRS850	190	8	NV	0	-8.65	-0.010339	±2.5	PASS
EGPRS850	190	8	NV	10	-10.04	-0.012001	±2.5	PASS
EGPRS850	190	8	NV	20	-7.81	-0.009335	±2.5	PASS
EGPRS850	190	8	NV	30	-11.24	-0.013435	±2.5	PASS
EGPRS850	190	8	NV	40	-8.10	-0.009682	±2.5	PASS
EGPRS850	251	8	NV	-10	-17.14	-0.020193	±2.5	PASS
EGPRS850	251	8	NV	0	-10.33	-0.012170	±2.5	PASS

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EGPRS850	251	8	NV	10	-15.56	-0.018332	±2.5	PASS
EGPRS850	251	8	NV	20	-13.43	-0.015822	±2.5	PASS
EGPRS850	251	8	NV	30	-16.69	-0.019663	±2.5	PASS
EGPRS850	251	8	NV	40	-7.14	-0.008412	±2.5	PASS
GPRS1900	512	0	NV	-10	13.62	0.007361	±2.5	PASS
GPRS1900	512	0	NV	0	17.40	0.009404	±2.5	PASS
GPRS1900	512	0	NV	10	17.37	0.009388	±2.5	PASS
GPRS1900	512	0	NV	20	17.92	0.009685	±2.5	PASS
GPRS1900	512	0	NV	30	29.54	0.015966	±2.5	PASS
GPRS1900	512	0	NV	40	29.22	0.015793	±2.5	PASS
GPRS1900	661	0	NV	-10	18.92	0.010064	±2.5	PASS
GPRS1900	661	0	NV	0	16.59	0.008824	±2.5	PASS
GPRS1900	661	0	NV	10	17.34	0.009223	±2.5	PASS
GPRS1900	661	0	NV	20	15.40	0.008191	±2.5	PASS
GPRS1900	661	0	NV	30	15.24	0.008106	±2.5	PASS
GPRS1900	661	0	NV	40	23.99	0.012761	±2.5	PASS
GPRS1900	810	0	NV	-10	21.41	0.011211	±2.5	PASS
GPRS1900	810	0	NV	0	20.79	0.010886	±2.5	PASS
GPRS1900	810	0	NV	10	25.57	0.013389	±2.5	PASS
GPRS1900	810	0	NV	20	27.31	0.014300	±2.5	PASS
GPRS1900	810	0	NV	30	17.40	0.009111	±2.5	PASS
GPRS1900	810	0	NV	40	30.54	0.015991	±2.5	PASS
EGPRS1900	512	2	NV	-10	-13.33	-0.007205	±2.5	PASS
EGPRS1900	512	2	NV	0	-16.63	-0.008988	±2.5	PASS
EGPRS1900	512	2	NV	10	-13.08	-0.007070	±2.5	PASS
EGPRS1900	512	2	NV	20	-21.95	-0.011864	±2.5	PASS
EGPRS1900	512	2	NV	30	-6.68	-0.003610	±2.5	PASS
EGPRS1900	512	2	NV	40	-9.52	-0.005145	±2.5	PASS
EGPRS1900	661	2	NV	-10	-14.85	-0.007899	±2.5	PASS
EGPRS1900	661	2	NV	0	-11.91	-0.006335	±2.5	PASS
EGPRS1900	661	2	NV	10	-15.46	-0.008223	±2.5	PASS
EGPRS1900	661	2	NV	20	-14.04	-0.007468	±2.5	PASS
EGPRS1900	661	2	NV	30	-11.88	-0.006319	±2.5	PASS
EGPRS1900	661	2	NV	40	-5.55	-0.002952	±2.5	PASS
EGPRS1900	810	2	NV	-10	-21.02	-0.011006	±2.5	PASS
EGPRS1900	810	2	NV	0	-12.20	-0.006388	±2.5	PASS
EGPRS1900	810	2	NV	10	-20.47	-0.010718	±2.5	PASS
EGPRS1900	810	2	NV	20	-19.69	-0.010310	±2.5	PASS
EGPRS1900	810	2	NV	30	-2.68	-0.001403	±2.5	PASS
EGPRS1900	810	2	NV	40	-19.66	-0.010294	±2.5	PASS

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Voltage							
Band	Channel	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band2	9262	VL	NT	-14.81	-0.007995	±2.5	PASS
Band2	9262	VN	NT	-14.76	-0.007968	±2.5	PASS
Band2	9262	VH	NT	-14.48	-0.007817	±2.5	PASS
Band2	9400	VL	NT	-12.09	-0.006431	±2.5	PASS
Band2	9400	VN	NT	-14.61	-0.007771	±2.5	PASS
Band2	9400	VH	NT	-10.46	-0.005564	±2.5	PASS
Band2	9538	VL	NT	-11.60	-0.006081	±2.5	PASS
Band2	9538	VN	NT	-8.88	-0.004655	±2.5	PASS
Band2	9538	VH	NT	-12.20	-0.006395	±2.5	PASS
Band5	4132	VL	NT	-8.25	-0.009983	±2.5	PASS
Band5	4132	VN	NT	-9.58	-0.011592	±2.5	PASS
Band5	4132	VH	NT	-10.93	-0.013226	±2.5	PASS
Band5	4183	VL	NT	-7.32	-0.008750	±2.5	PASS
Band5	4183	VN	NT	-9.46	-0.011308	±2.5	PASS
Band5	4183	VH	NT	-11.89	-0.014212	±2.5	PASS
Band5	4233	VL	NT	-5.79	-0.006839	±2.5	PASS
Band5	4233	VN	NT	-8.81	-0.010406	±2.5	PASS
Band5	4233	VH	NT	-9.47	-0.011186	±2.5	PASS

Temperature							
Band	Channel	Voltage (Vdc)	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band2	9262	NV	-10	-14.24	-0.007687	±2.5	PASS
Band2	9262	NV	0	-14.31	-0.007725	±2.5	PASS
Band2	9262	NV	10	-12.87	-0.006948	±2.5	PASS
Band2	9262	NV	20	-14.27	-0.007704	±2.5	PASS
Band2	9262	NV	30	-14.64	-0.007903	±2.5	PASS
Band2	9262	NV	40	-14.84	-0.008011	±2.5	PASS
Band2	9400	NV	-10	-12.21	-0.006495	±2.5	PASS
Band2	9400	NV	0	-14.45	-0.007686	±2.5	PASS
Band2	9400	NV	10	-13.14	-0.006989	±2.5	PASS
Band2	9400	NV	20	-10.86	-0.005777	±2.5	PASS
Band2	9400	NV	30	-14.57	-0.007750	±2.5	PASS
Band2	9400	NV	40	-13.07	-0.006952	±2.5	PASS
Band2	9538	NV	-10	-11.31	-0.005929	±2.5	PASS
Band2	9538	NV	0	-9.99	-0.005237	±2.5	PASS
Band2	9538	NV	10	-9.47	-0.004964	±2.5	PASS
Band2	9538	NV	20	-9.13	-0.004786	±2.5	PASS
Band2	9538	NV	30	-11.71	-0.006139	±2.5	PASS

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Band2	9538	NV	40	-13.78	-0.007224	±2.5	PASS
Band5	4132	NV	-10	-8.73	-0.010564	±2.5	PASS
Band5	4132	NV	0	-11.41	-0.013807	±2.5	PASS
Band5	4132	NV	10	-11.26	-0.013625	±2.5	PASS
Band5	4132	NV	20	-11.88	-0.014376	±2.5	PASS
Band5	4132	NV	30	-10.01	-0.012113	±2.5	PASS
Band5	4132	NV	40	-11.33	-0.013710	±2.5	PASS
Band5	4183	NV	-10	-9.19	-0.010985	±2.5	PASS
Band5	4183	NV	0	-8.05	-0.009622	±2.5	PASS
Band5	4183	NV	10	-4.54	-0.005427	±2.5	PASS
Band5	4183	NV	20	-9.33	-0.011152	±2.5	PASS
Band5	4183	NV	30	-5.11	-0.006108	±2.5	PASS
Band5	4183	NV	40	-11.36	-0.013579	±2.5	PASS
Band5	4233	NV	-10	-8.43	-0.009957	±2.5	PASS
Band5	4233	NV	0	-9.34	-0.011032	±2.5	PASS
Band5	4233	NV	10	-11.89	-0.014044	±2.5	PASS
Band5	4233	NV	20	-11.37	-0.013430	±2.5	PASS
Band5	4233	NV	30	-12.09	-0.014281	±2.5	PASS
Band5	4233	NV	40	-11.96	-0.014127	±2.5	PASS

\*\*\*\*\*THE END\*\*\*\*\*

CTC Laboratories, Inc.

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