TESTING LABORATORY
CERTIFICATE#4323.01

PART 24E

TEST REPORT

For

Rosenberger Technologies Co.,Ltd

No.6 Shenan Road, Dianshanhu Town, Kunshan, Jiangsu, China

FCC ID: 2AW6JIRU091921QF01

Report Type:	**Product Type:**
Original Report	Integrated Remote Unit – Optical

Test Engineer:	Winnie Yang
Report Number:	RKSA200618003-00A
Report Date:	2020-09-09
Reviewed By:	Oscar Ye EMC Manager
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Rosenberger Technologies Co.,Ltd
Tested Model	IRU-O-15-091921-QF-01
Product Type	Integrated Remote Unit – Optical
Power Supply	DC 48V
Operating Band/Frequency:	PCS Band: 1850-1867 MHz(Uplink), 1930-1947 MHz(Downlink)
Antenna Type:	External Antenna
Maximum Antenna Gain:	8.0 dBi

Note: This is an Industrial Cellular Signal Booster.

**All measurement and test data in this report was gathered from production sample serial number: 20200618003. (Assigned by the BACL. The EUT supplied by the applicant was received on 2020-06-18)*

Objective

This type approval report is prepared on behalf of Rosenberger Technologies Co.,Ltd in accordance with Part 2, Part20.21 and Part 24-Subpart E of the Federal Communication Commission's rules.

The objective is to determine the compliance of EUT with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability and band edge.

Related Submittal(s)/Grant(s)

FCC Part 22H24E submissions with FCC ID: 2AW6JIM2U091921NF01

Test Methodology

Test Method: TIA-603-E-2016&ANSI C63.26-2015, FCC KDB 935210 D05 Indus Booster Basic Meas v01r03.

All radiated and conducted emissions measurements were performed at Bay Area Compliant Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6GHz~18GHz	4.92dB
	18GHz~40GHz	5.21dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site used by Bay Area Compliant Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliant Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA-603-E-2016&ANSI C63.26-2015.

The final qualification test was performed with the EUT operating at normal mode.

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

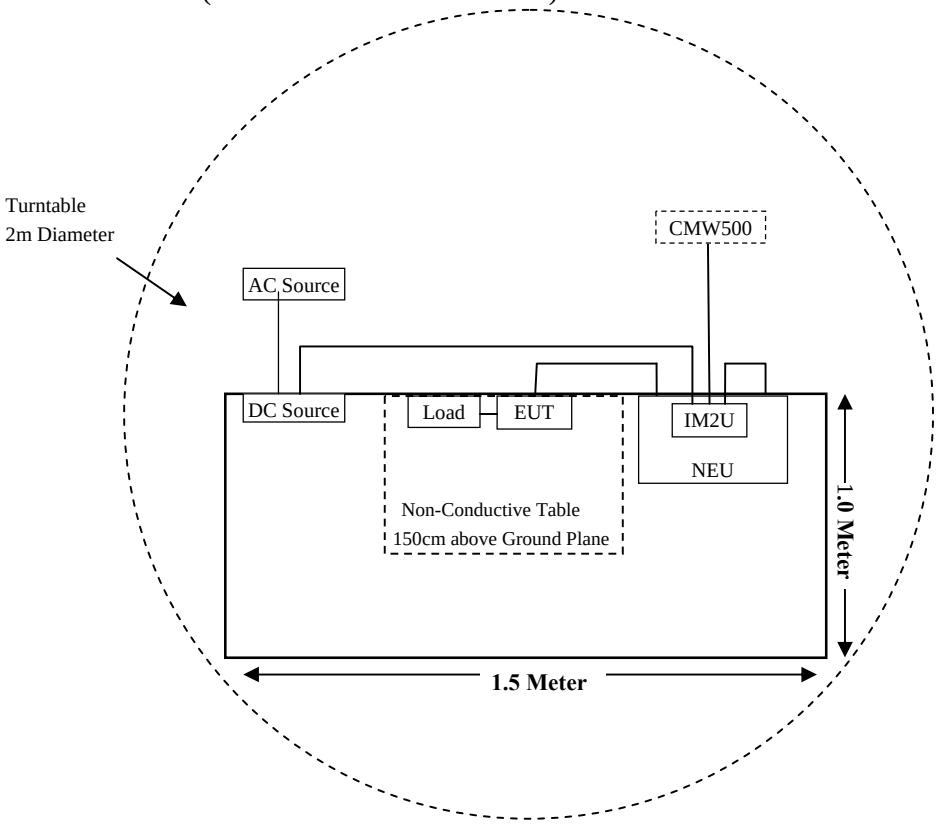
Manufacturer	Description	Model	Serial Number
/	Load	50 Ω	/
Rosenberger	NEU	NEU-1F16F-03	/
Rosenberger	IM2U	IM2U-N10-091921-NF-01	/
R & S	Wideband Radio Communication Tester	CMW500	104478

External I/O Cable

Cable Description	Length (m)	From Port	To
RF Cable	15	CMW500	EUT
RF Cable	0.3	EUT	Load

Block Diagram of Test Setup

For Radiated Emissions (Below 1GHz & Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§ 2.1046; § 24.232	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	Not Applicable (See Note)
§ 2.1049; § 24.238	Occupied Bandwidth	Compliant
§ 2.1051; § 24.238	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; § 24.238	Field Strength of Spurious Radiation	Compliant
§ 2.1053; § 24.238	Band Edge & Inter modulation	Compliant
§ 2.1055; § 24.235	Frequency stability	Not Applicable (See Note)
§ 20.21	Out of Band Rejection	Compliant

Note: This device is an Industrial Signal Booster.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2019-12-14	2020-12-13
HP	Signal Generator	HP 8341B	2624A00116	2019-11-30	2020-11-29
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2017-12-26	2020-12-25
Sunol Sciences	Bilog antenna	JB3	A060217	2020-08-04	2021-08-03
Sonoma Instrunent	Pre-amplifier	310N	171205	2020-08-14	2021-08-13
EMCO	Adjustable Dipole Antenna	3121C	9109-753	/	/
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-8	008	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2020-08-15	2021-08-14
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2020-08-05	2021-08-04
Radiated Emission Test（Chamber 2#）					
HP	Signal Generator	HP 8341B	2624A00116	2019-11-30	2020-11-29
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2020-04-01	2021-03-31
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2020-07-15	2023-07-14
ETS-LINDGREN	Horn Antenna	3115	6229	2020-01-10	2023-01-09
ETS-LINDGREN	Horn Antenna	3116	84159	2019-12-12	2022-12-11
ETS-LINDGREN	Horn Antenna	3116	2516	2020-01-17	2023-01-16
A.H.Systems,inc	Amplifier	PAM-0118P	512	2020-02-20	2021-02-19
EM Electronics Corporation	Amplifier	EM18G40G	060726	2020-03-22	2021-03-21
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-12-12	2020-12-11
MICRO-COAX	Coaxial Cable	Cable-11	011	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-16	016	2020-08-15	2021-08-14
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2020-08-05	2021-08-04

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	EMI Test Receiver	ESIB26	100146	2019-12-14	2020-12-13
Narda	Attenuator	10dB	010	2019-08-15	2020-08-14
Narda	Attenuator	10dB	010	2020-08-15	2021-08-14
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2019-08-05	2020-08-04
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2020-08-05	2021-08-04
Mini-Ciruits	Power splitter	ZFRSC-14-S+	SF019411452	2019-11-10	2020-11-09
Agilent	Power Meter	N1912A	MY5000492	2019-11-18	2020-11-17
Agilent	Power Sensor	N1921A	MY54210024	2019-11-18	2020-11-17
keysight	Vector signal source	N5182B	MY53051592	2019-12-14	2020-12-13
BACL	Temperature & Humidity Chamber	BTH-150	30023	2019-12-20	2020-12-19
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	2019-10-10	2020-10-09
Rosenberger	RF Cable	Rosenberger C01	C01	Each Time	/

*** Statement of Traceability:** Bay Area Compliant Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d) and Part 24E, there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC §2.1046; § 24.232 (c) - RF OUTPUT POWER and AMPLIFER GAIN

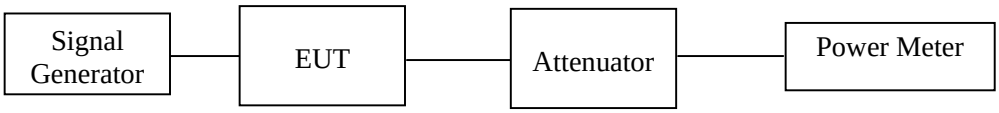
Applicable Standards

According to FCC §2.1046 and §24.232 (a)(1) Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.
(2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.
(3) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; *see* Tables 1 and 2 of this section.

Test Procedure

Conducted method:

According to KDB 935210 D05 Indus Booster Basic Meas v01r03 clause 3.5



Test Data

Environmental Conditions

Temperature:	25.3 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Winnie Yang on 2020-08-17.

PCS Band

Modes	Frequency (MHz)	Signal Type	AGC threshold level (dBm)	Signal Level	Input power (dBm)	Output Power (dBm)	Gain (dB)	EIRP(dBm)
Uplink	1860.1	AWGN	-39.1	Pre-AGC	-39.50	-8.47	31.03	-0.47
				3dB above AGC	-36.50	-7.89	28.61	0.11
		GSM	-38.9	Pre-AGC	-39.01	-8.32	30.69	-0.32
				3dB above AGC	-36.01	-8.04	27.97	-0.04
Downlink	1941.9	AWGN	-17.3	Pre-AGC	-17.35	14.39	31.74	22.39
				3dB above AGC	-14.35	14.96	29.31	22.96
		GSM	-16.1	Pre-AGC	-16.48	15.09	31.57	23.09
				3dB above AGC	-13.48	15.75	29.23	23.75

Note: ERP=Conducted Output Power (dBm) +Antenna Gain (dBi)-2.15 dB
EIRP=Conducted Output Power (dBm) +Antenna Gain (dBi)
The Maximum indoor and outdoor Gain for all Bands is 8 dBi
The frequency was selected to test, which according to the peak of the frequency point from out-of band rejection test.

FCC §2.1049, §24.238 - BANDWIDTH

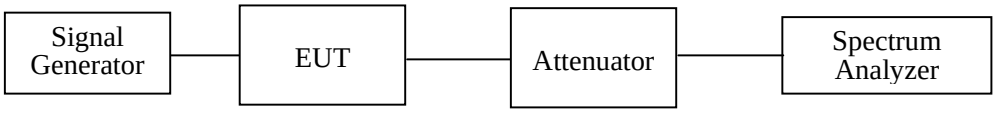
Applicable Standards

FCC 47 §2.1049 and & §24.238.

Test Procedure

According to KDB 935210 D05 Indus Booster Basic Meas v01r03 clause 3.4

A 26 dB bandwidth measurement shall be performed on the input signal and the output signal (alternatively, the 99% OBW can be measured and used) to demonstrate compliance to the technical requirements specified in §90.219(e)(4)(i) and (ii). See KDB Publication 971168 for more information regarding measuring the OBW.



Test Data

Environmental Conditions

Temperature:	24.8~25.0 ℃
Relative Humidity:	49~51 %
ATM Pressure:	101.2~101.7 kPa

The testing was performed by Winnie Yang from 2020-07-30 to 2020-07-31.

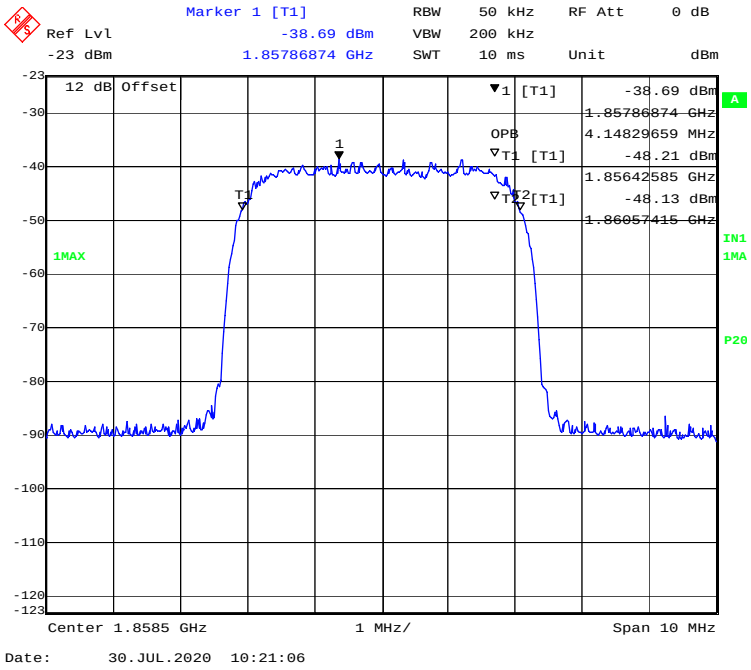
EUT operation mode: Transmitting

Test Result: Compliant.

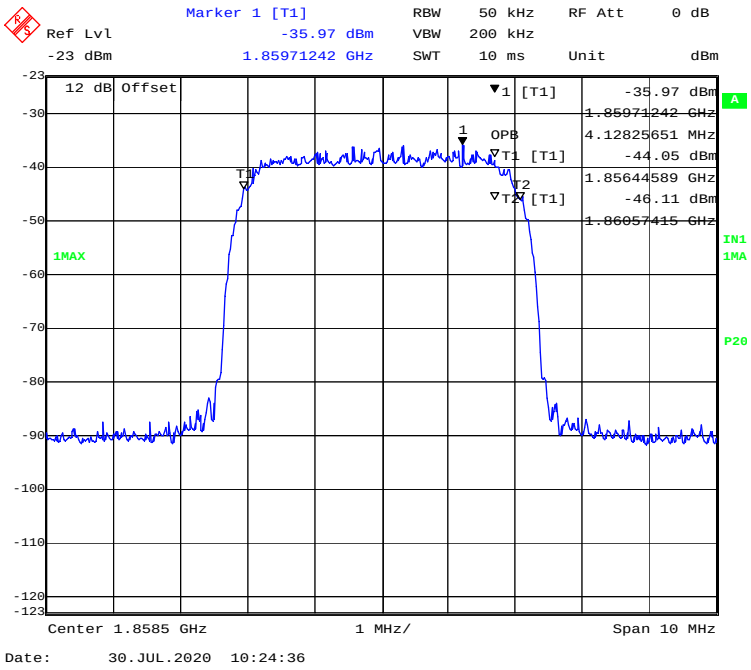
PCS Band

Modes	Signal Type	Signal Level	Frequency (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)	
				Input	Output	Input	Output
Uplink	AWGN	Pre-AGC	1858.5	4.148	4.168	4.649	4.649
		3dB above AGC	1858.5	4.128	4.128	4.649	4.649
	GSM	Pre-AGC	1858.5	0.242	0.244	0.311	0.317
		3dB above AGC	1858.5	0.244	0.244	0.313	0.313
Downlink	AWGN	Pre-AGC	1938.5	4.128	4.168	4.649	4.649
		3dB above AGC	1938.5	4.148	4.148	4.649	4.629
	GSM	Pre-AGC	1938.5	0.244	0.246	0.317	0.313
		3dB above AGC	1938.5	0.244	0.246	0.313	0.317

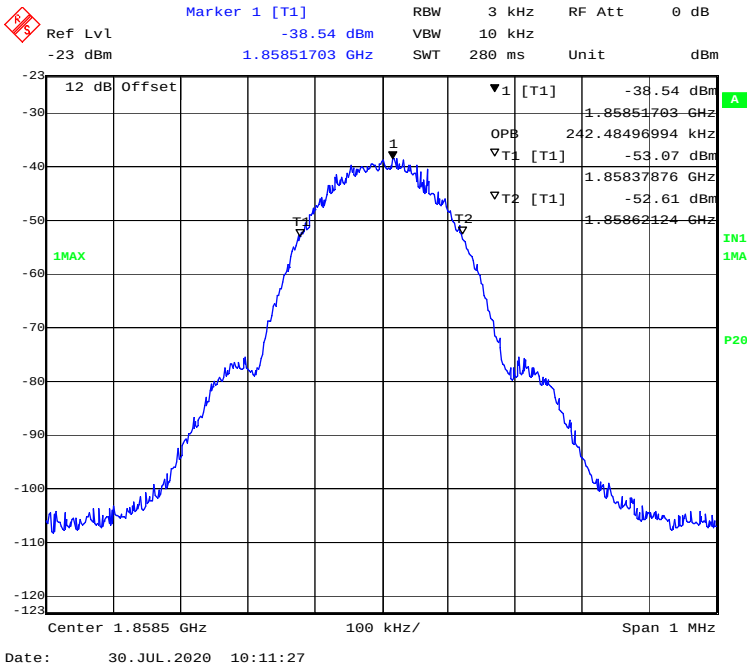
99% Bandwidth-UL-AWGN-Pre AGC-Input



99% Bandwidth-UL- AWGN-3dB above AGC-Input



99% Bandwidth-UL-GSM-Pre AGC-Input



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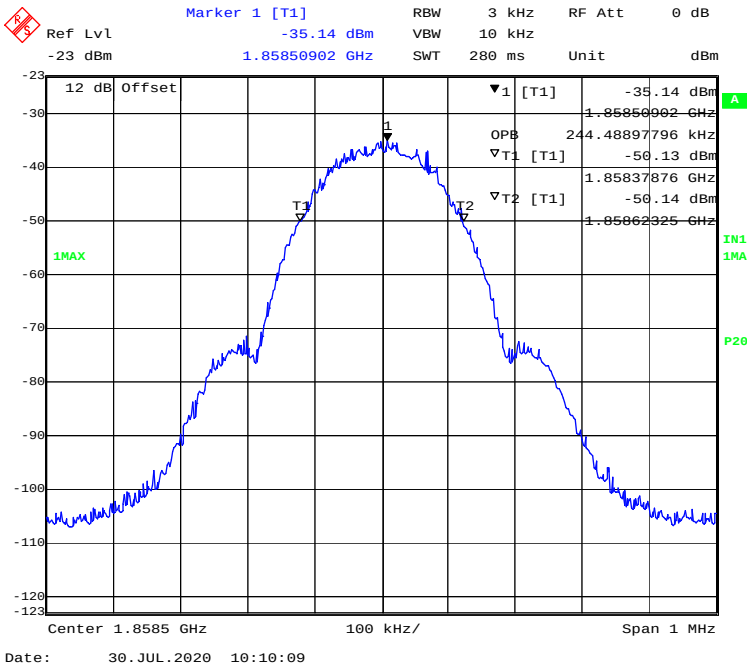

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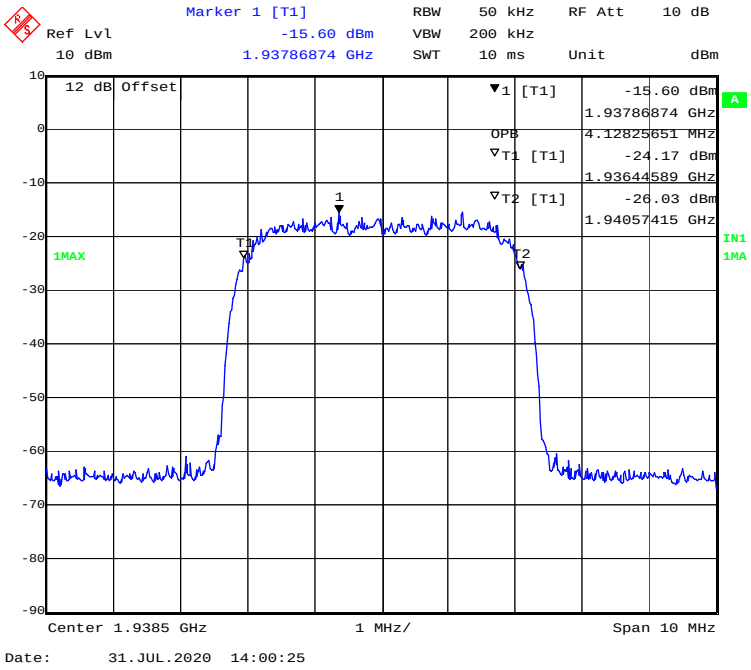
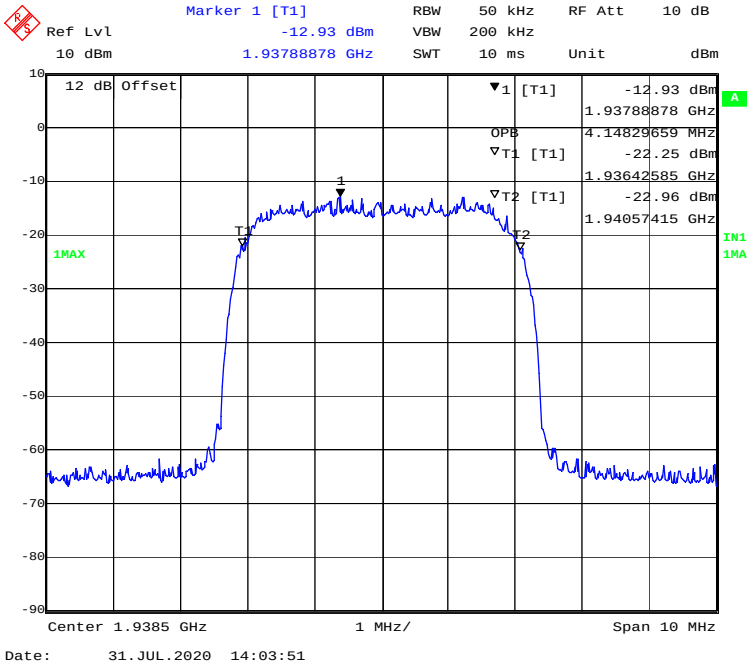
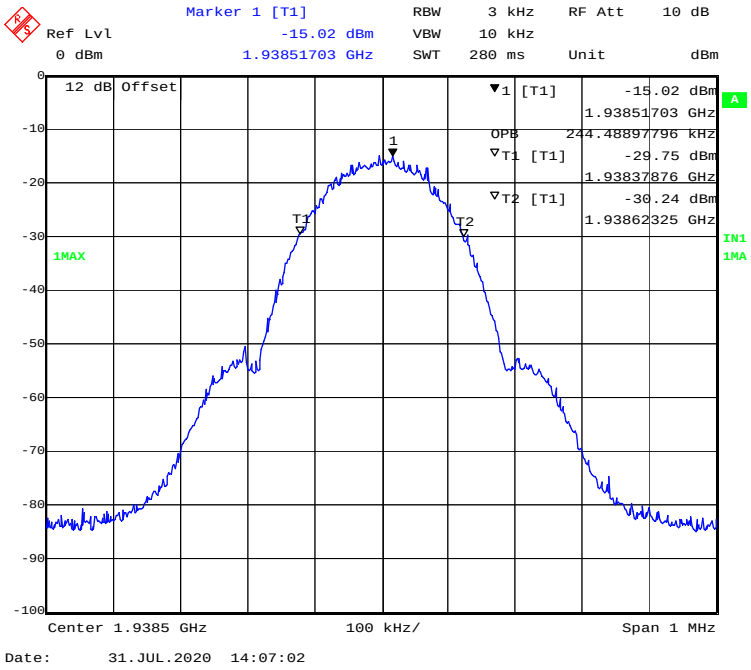


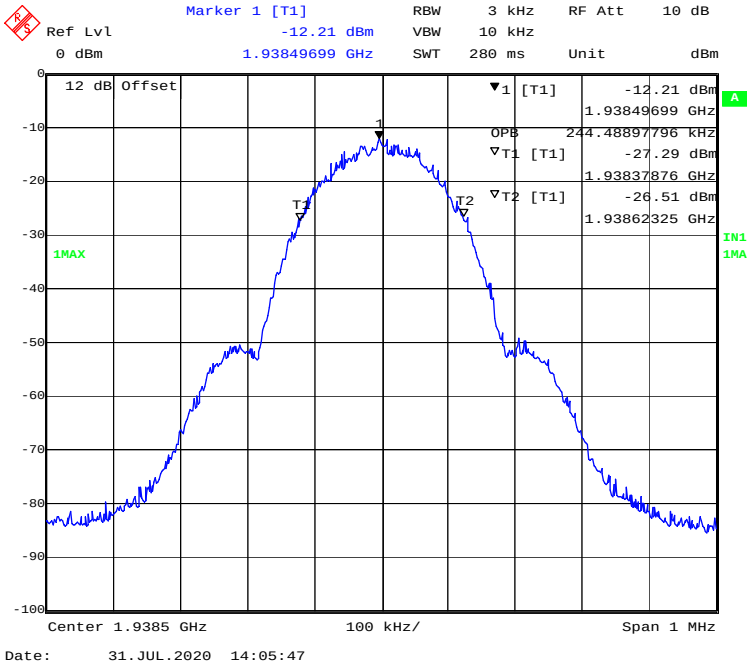
99% Bandwidth-DL- AWGN-3dB above AGC-Input



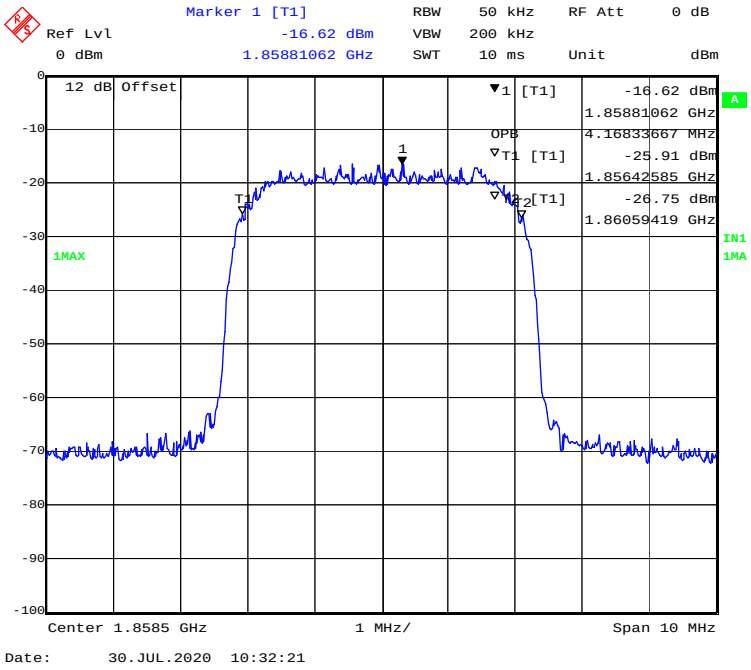
99% Bandwidth-DL-GSM-Pre AGC-Input



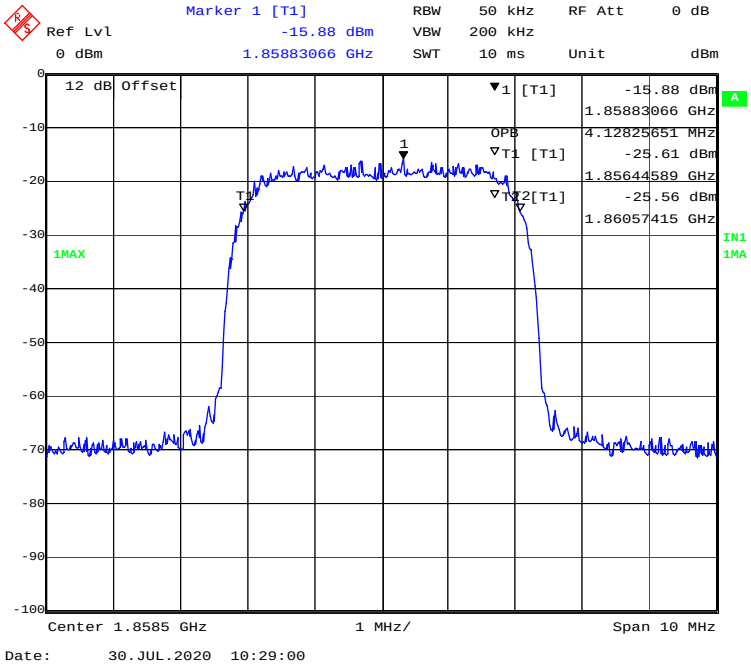
99% Bandwidth-DL- GSM-3dB above AGC-Input



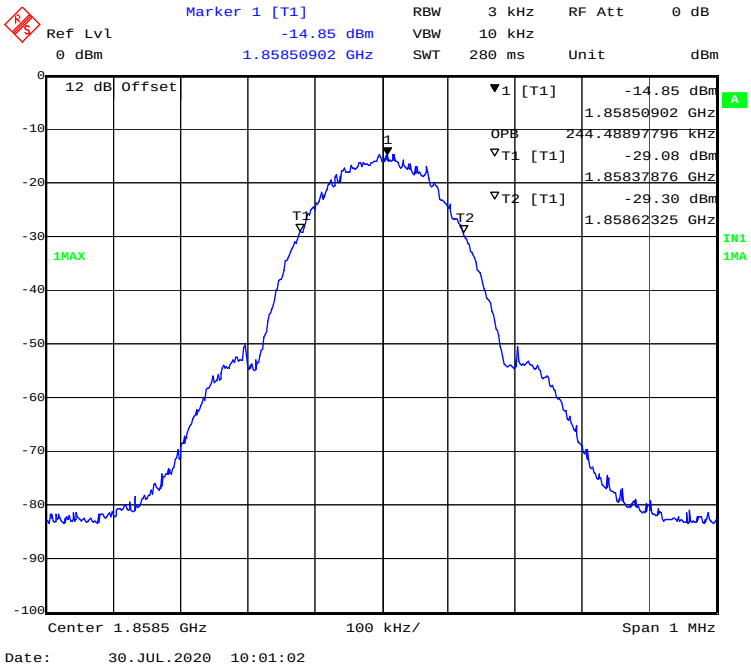
99% Bandwidth-UL-AWGN-Pre AGC- Output



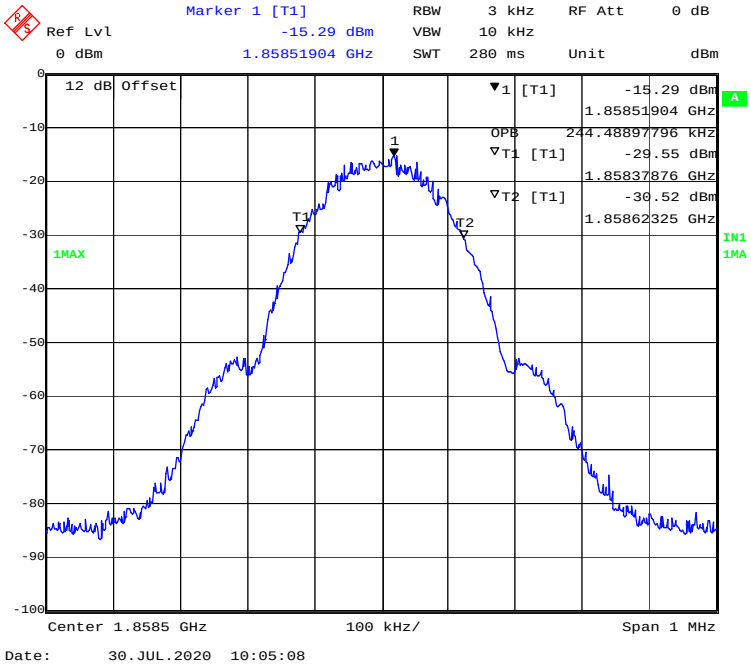
99% Bandwidth-UL- AWGN-3dB above AGC- Output



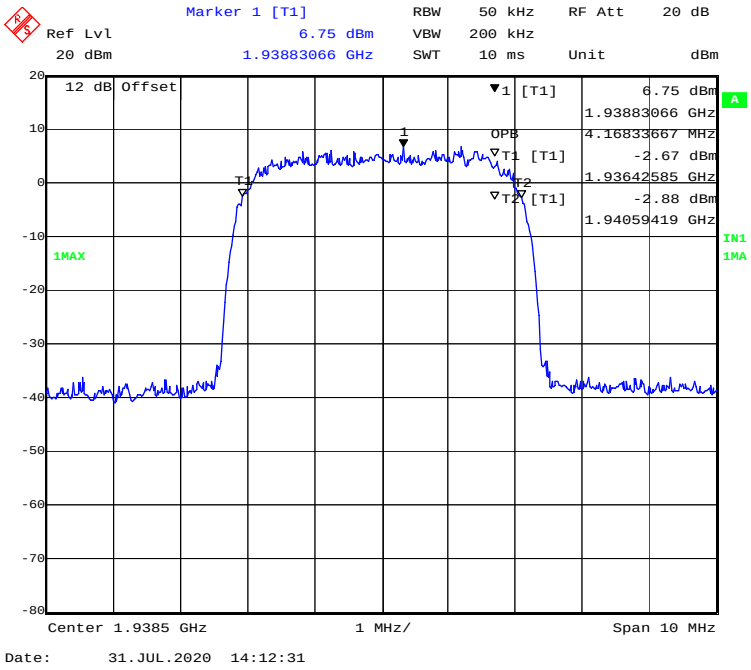
99% Bandwidth-UL-GSM-Pre AGC- Output



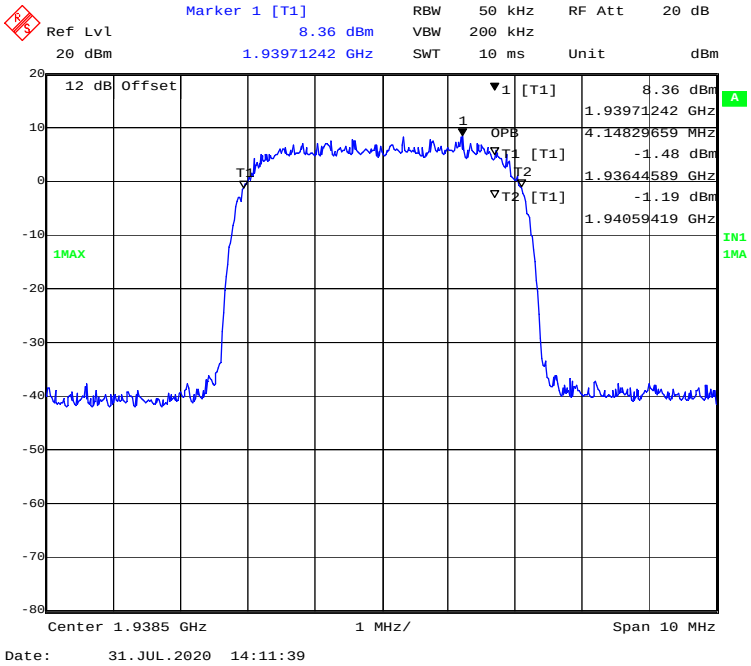
99% Bandwidth-UL- GSM-3dB above AGC- Output



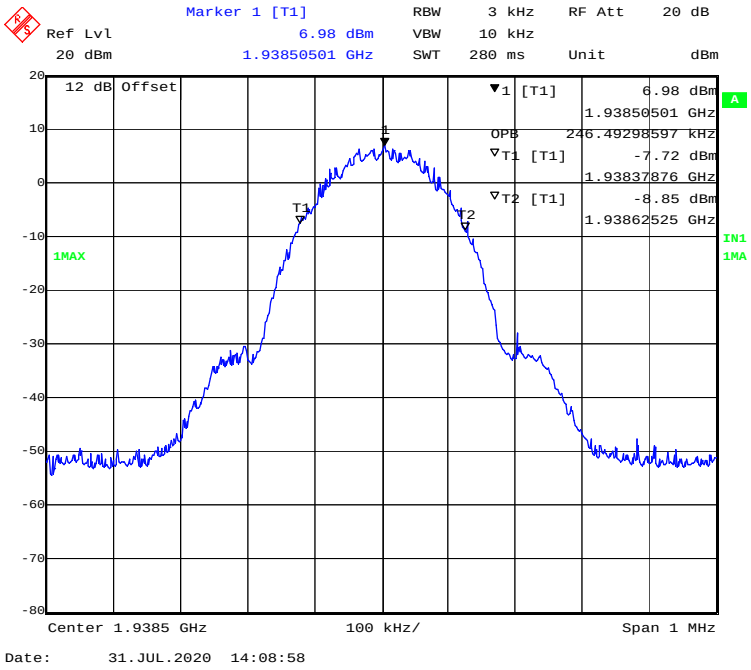
99% Bandwidth-DL-AWGN-Pre AGC- Output



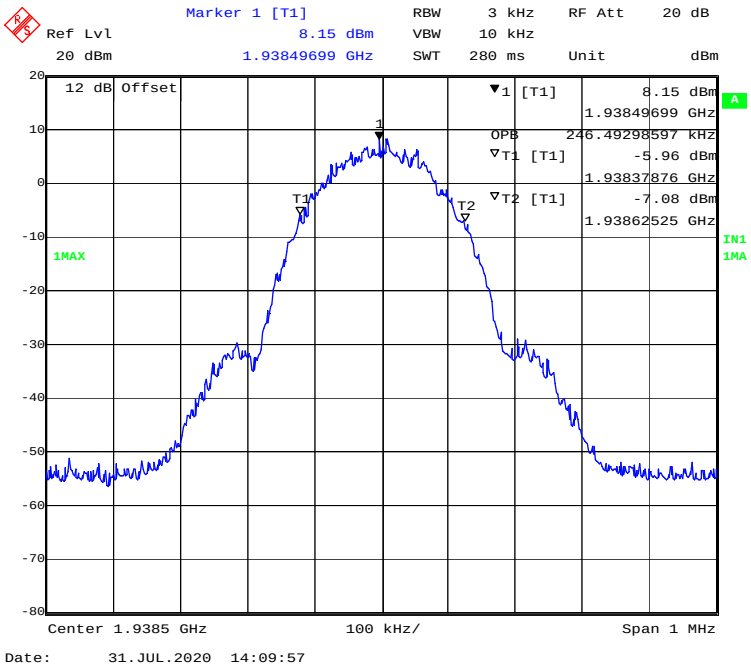
99% Bandwidth-DL- AWGN-3dB above AGC- Output



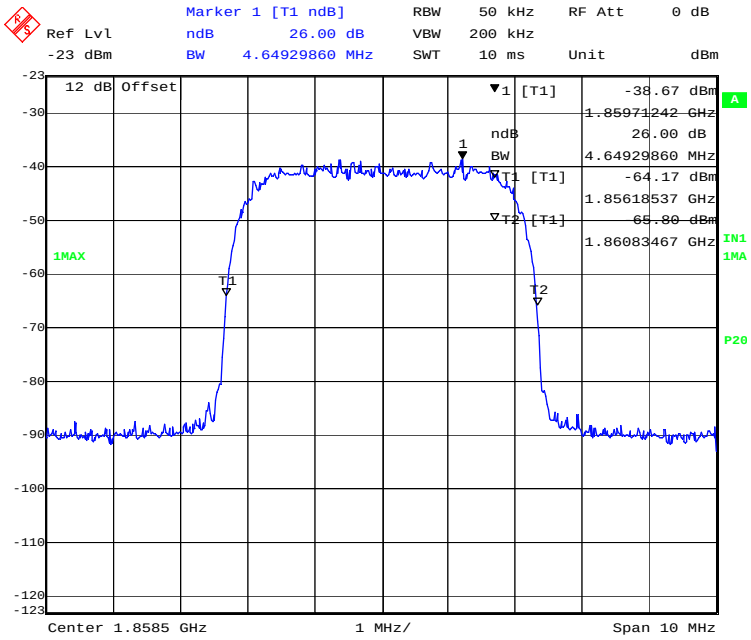
99% Bandwidth-DL-GSM-Pre AGC-Output



99% Bandwidth-DL- GSM-3dB above AGC-Output



26dB Bandwidth-UL-AWGN-Pre AGC-Input



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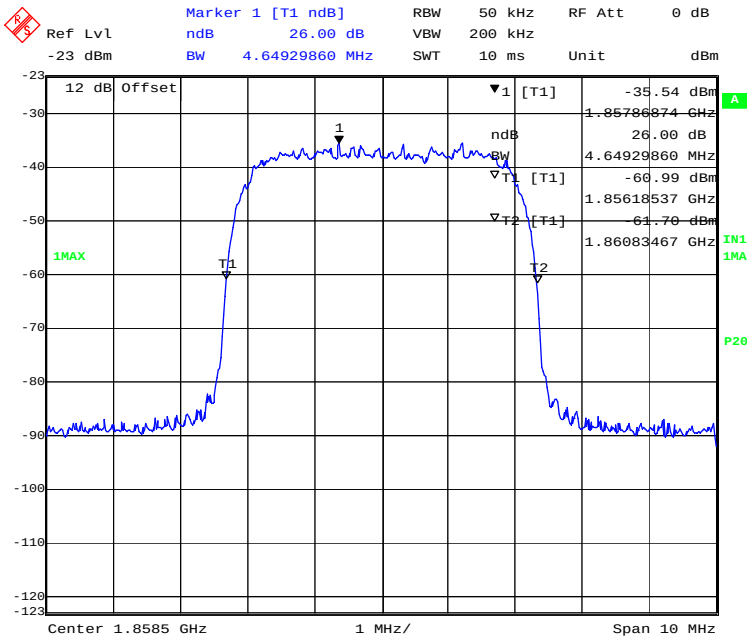
26dB Bandwidth-UL- AWGN-3dB above AGC-Input



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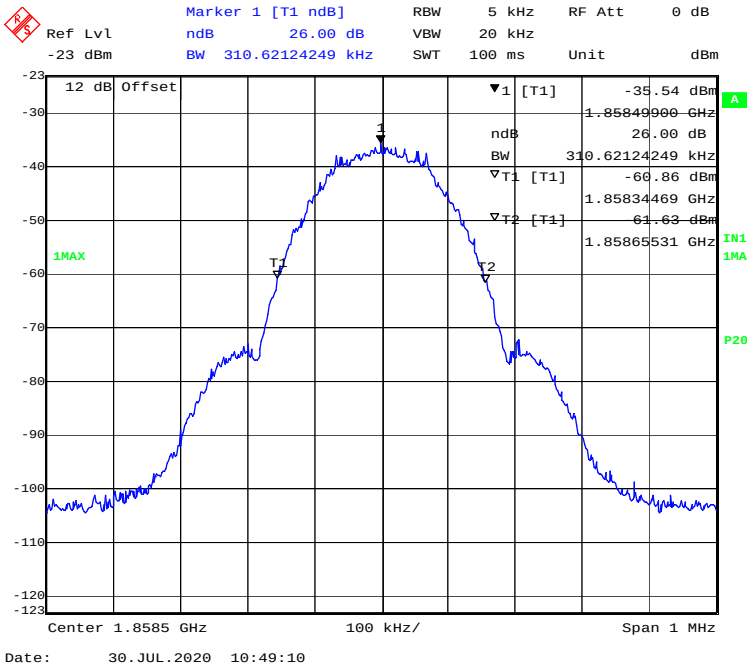
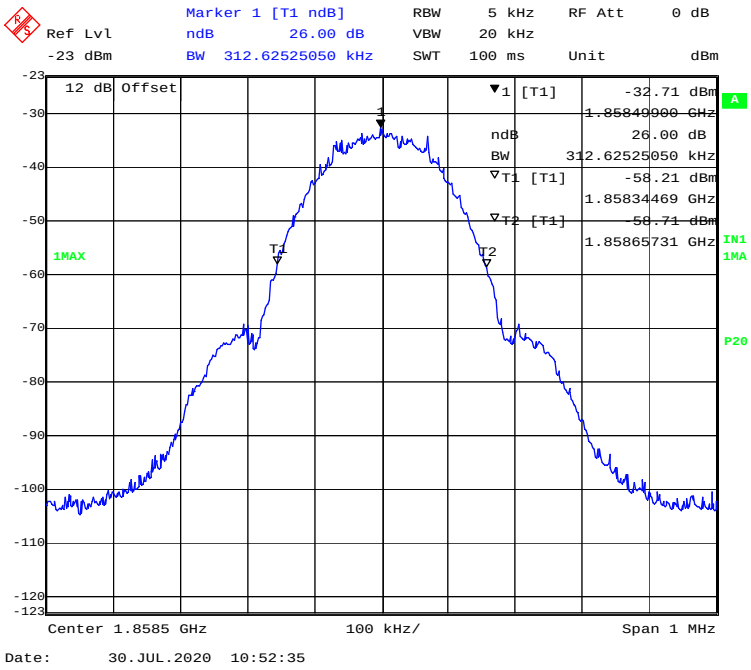
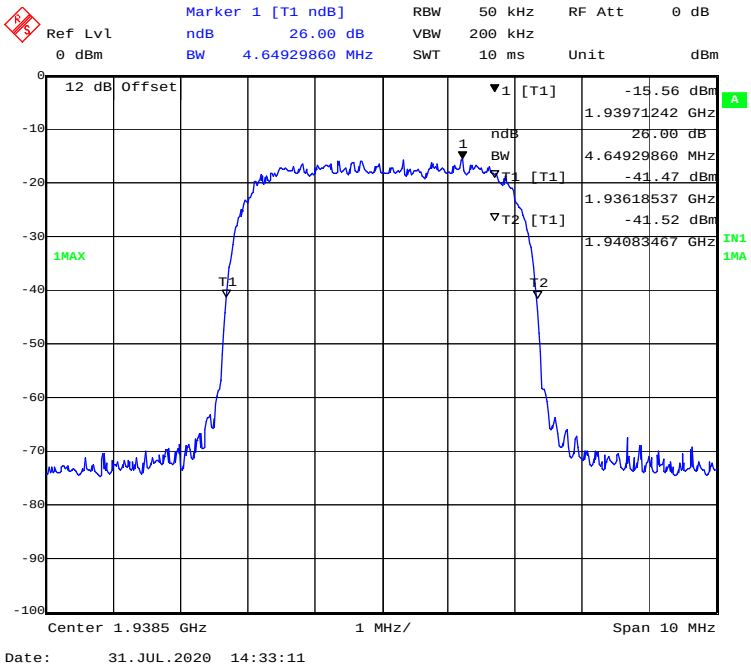
26dB Bandwidth-UL-GSM-Pre AGC-Input



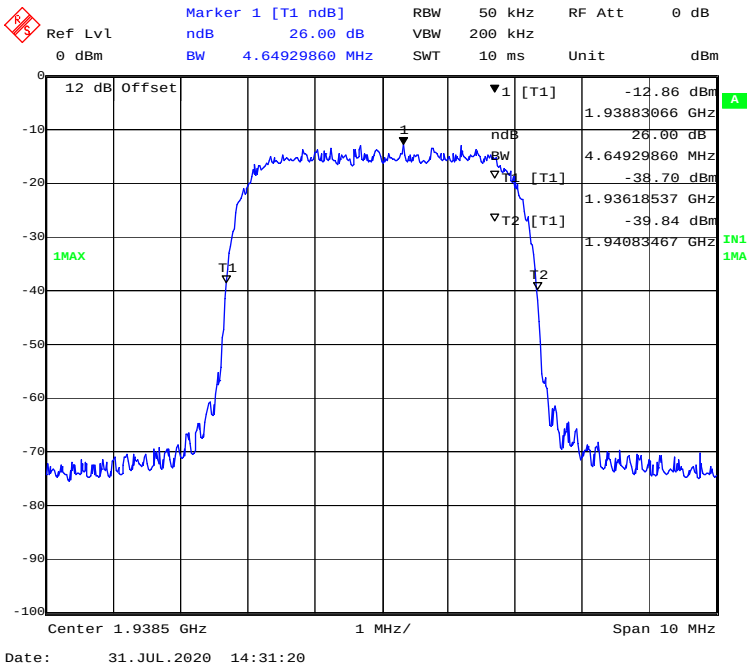
26dB Bandwidth-UL- GSM-3dB above AGC-Input



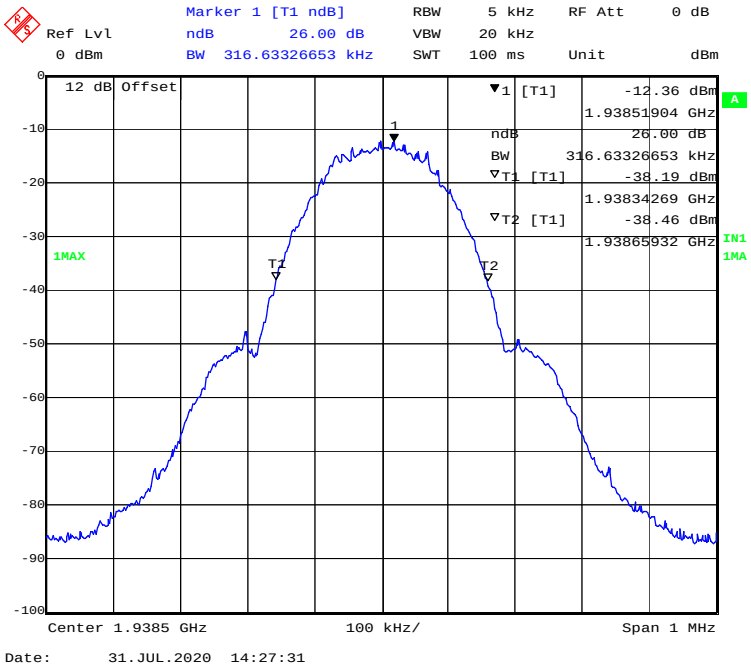
26dB Bandwidth-DL-AWGN-Pre AGC-Input



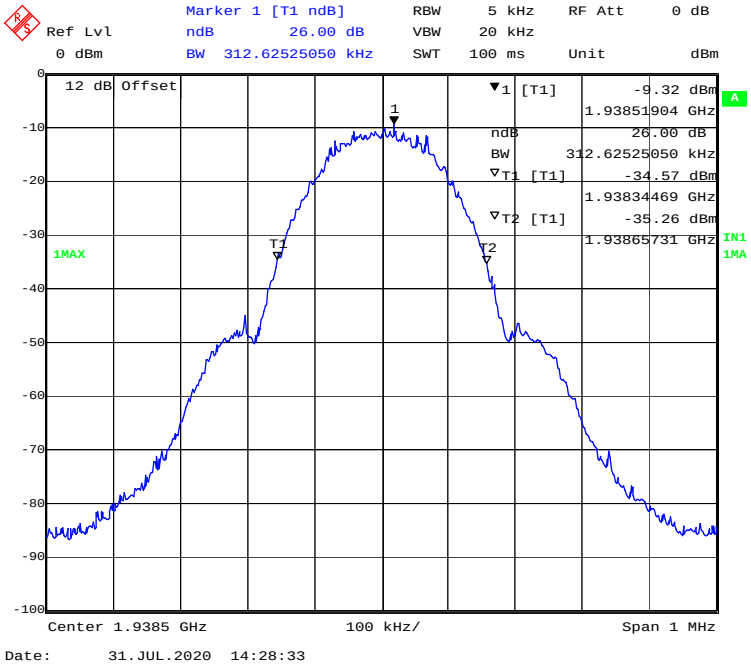
26dB Bandwidth-DL- AWGN-3dB above AGC-Input



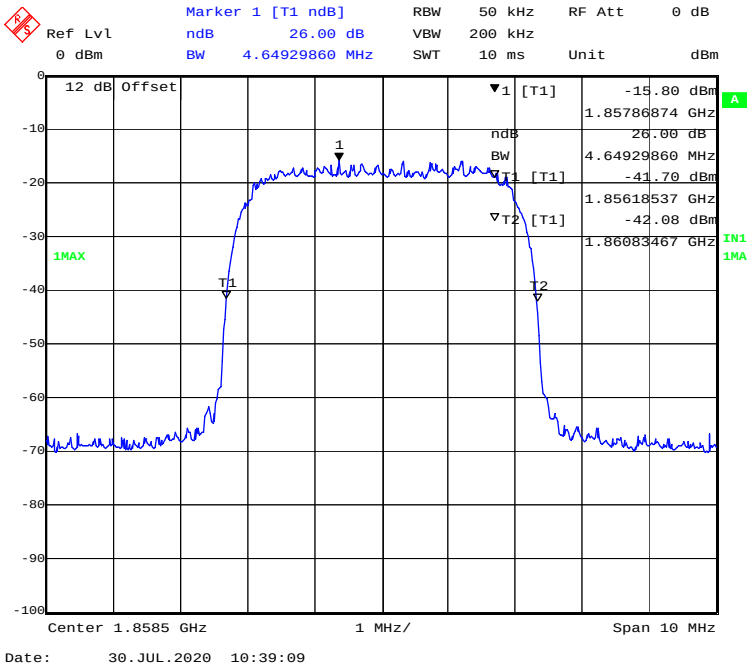
26dB Bandwidth-DL-GSM-Pre AGC-Input



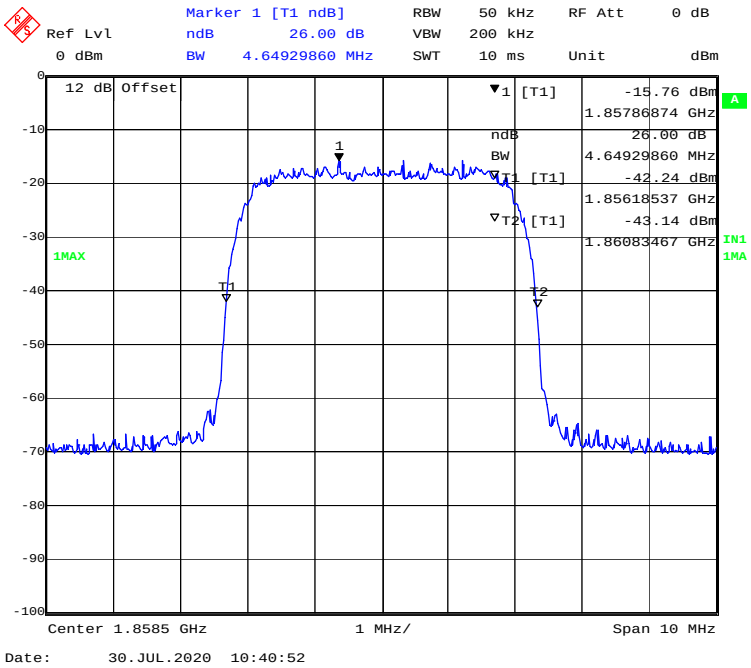
26dB Bandwidth-DL- GSM-3dB above AGC-Input



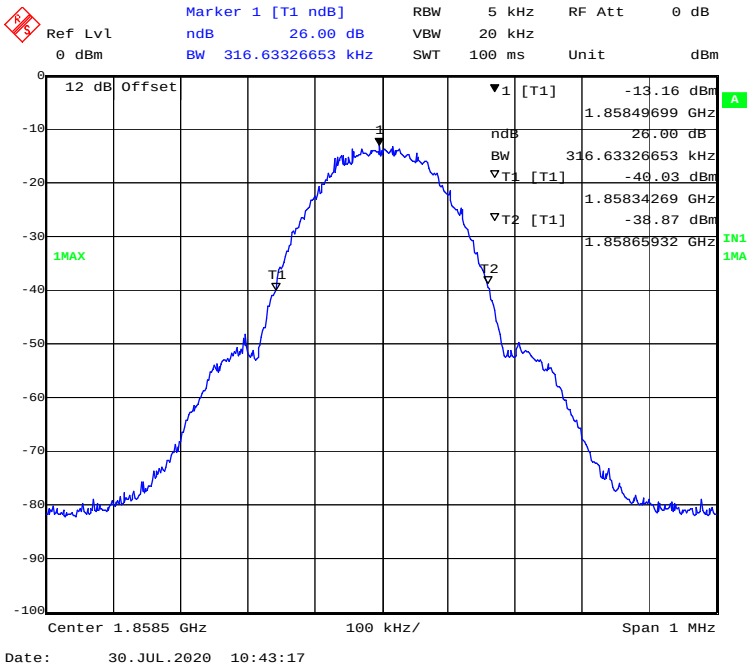
26dB Bandwidth-UL-AWGN-Pre AGC- Output



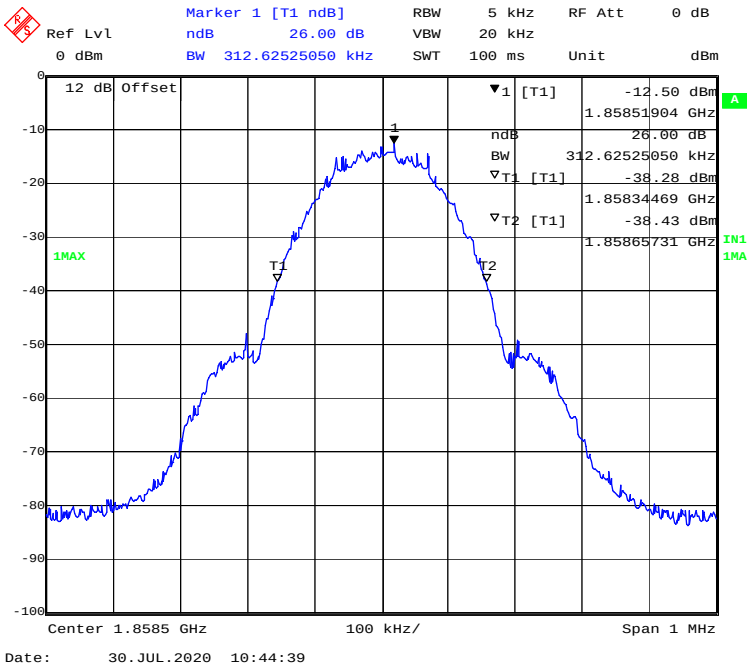
26dB Bandwidth-UL- AWGN-3dB above AGC- Output



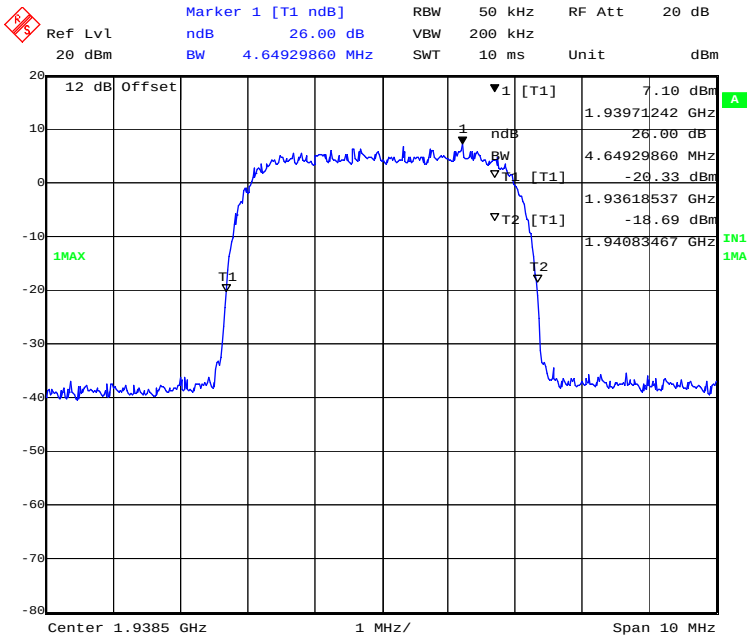
26dB Bandwidth-UL-GSM-Pre AGC- Output



26dB Bandwidth-UL- GSM-3dB above AGC- Output

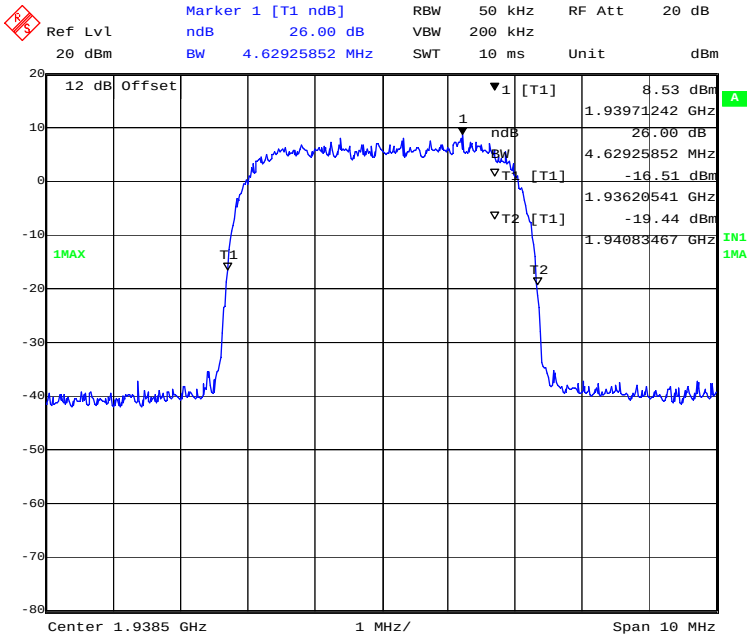


26dB Bandwidth-DL-AWGN-Pre AGC- Output



Date: 31.JUL.2020 14:15:35

26dB Bandwidth-DL- AWGN-3dB above AGC- Output



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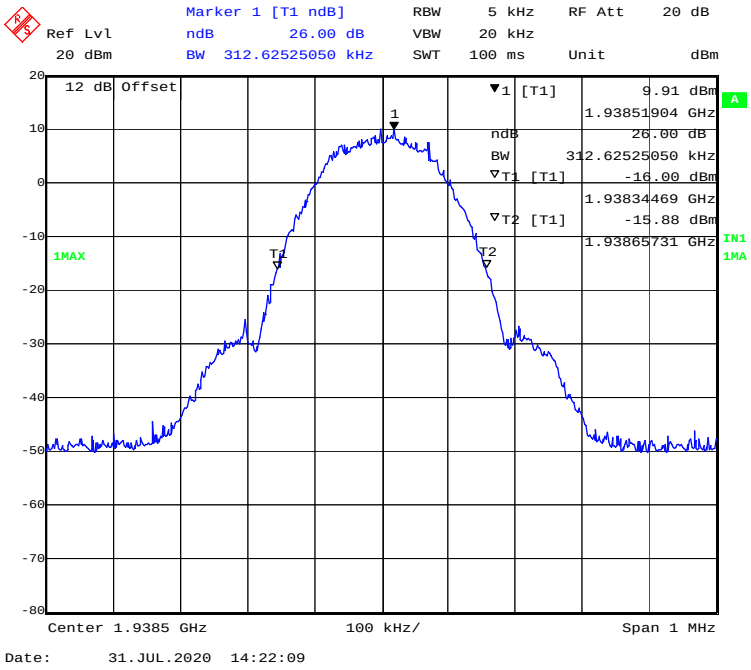
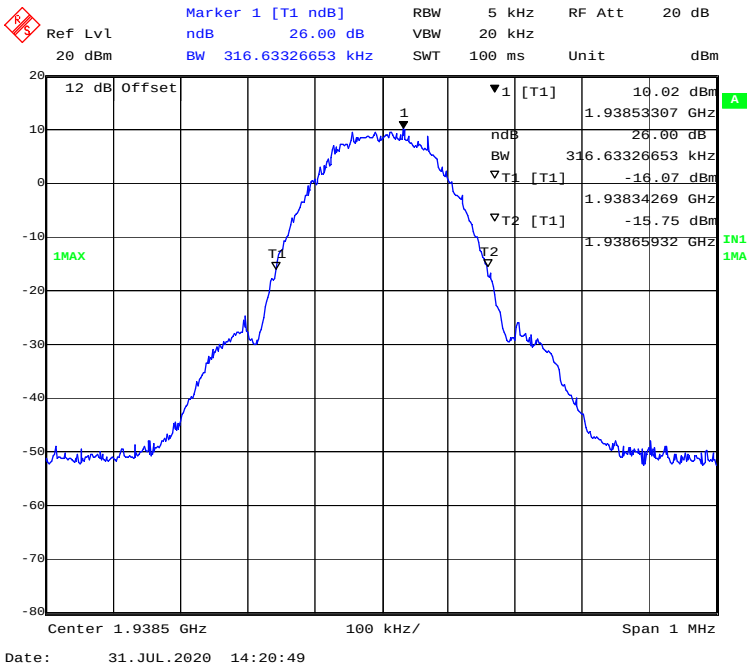
26dB Bandwidth-DL-GSM-Pre AGC-Output



26dB Bandwidth-DL- GSM-3dB above AGC-Output



FCC § 2.1051; § 24.238 (a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standards

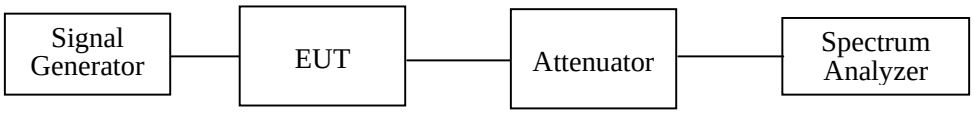
FCC §2.1051 and §24.238.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

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 $\log_{10}$(P) dB.

Test Procedure

Please refer to KDB 935210 D05 Indus Booster Basic Meas v01r03 clause 3.6.3



Test Data

Environmental Conditions

Temperature:	24.2-24.8 ℃
Relative Humidity:	47-51 %
ATM Pressure:	101.2-101.7 kPa

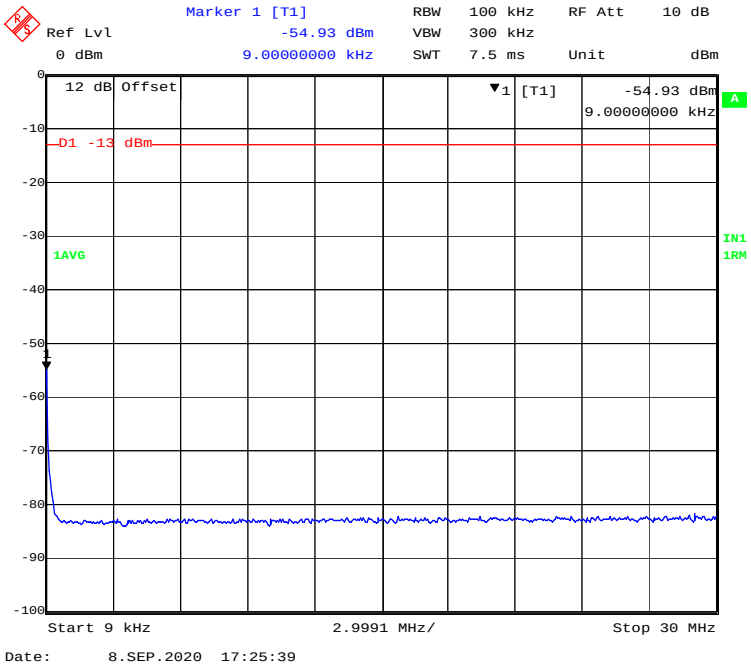
The testing was performed by Winnie Yang from 2020-08-26 to 2020-09-08.

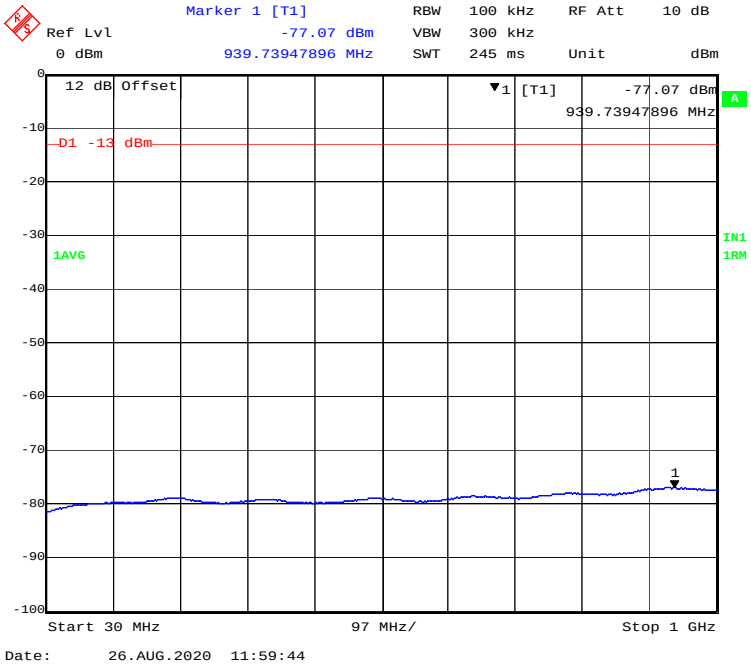
EUT operation mode: Transmitting

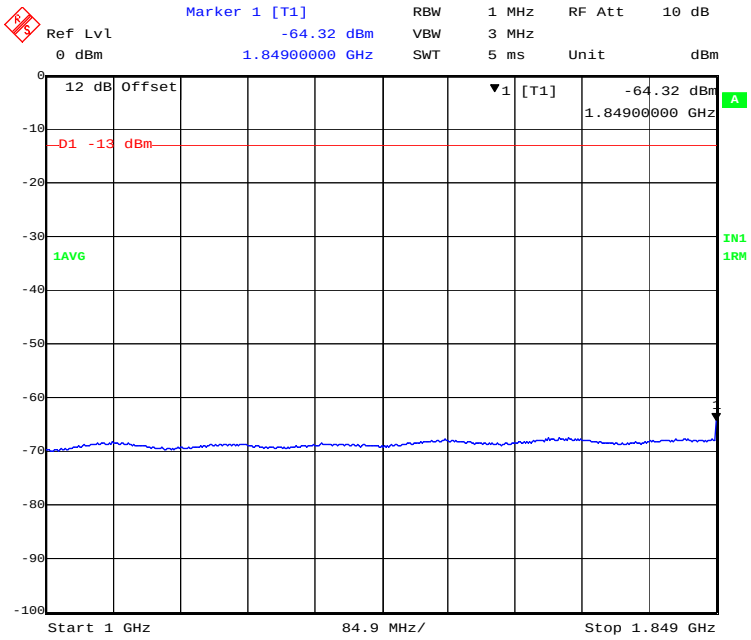
Test Result: Compliant.

Uplink:

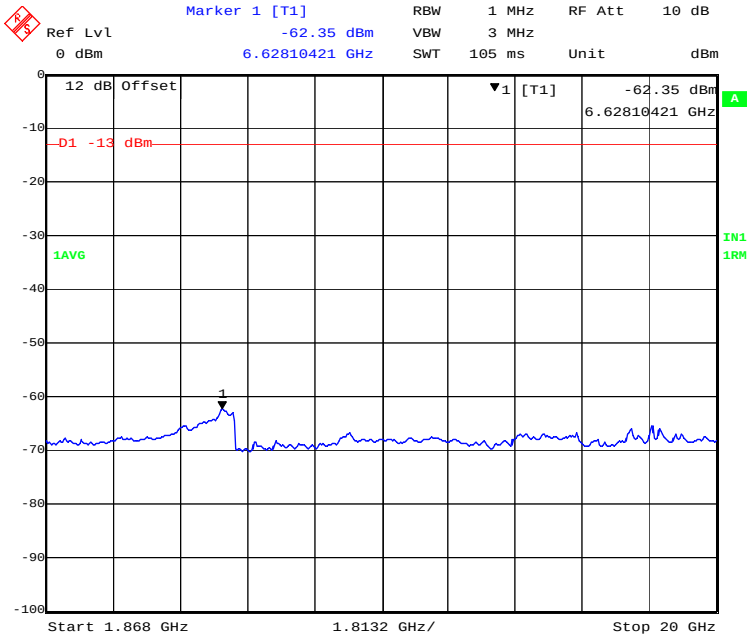
PCS- AWGN-Pre AGC-Low Channel





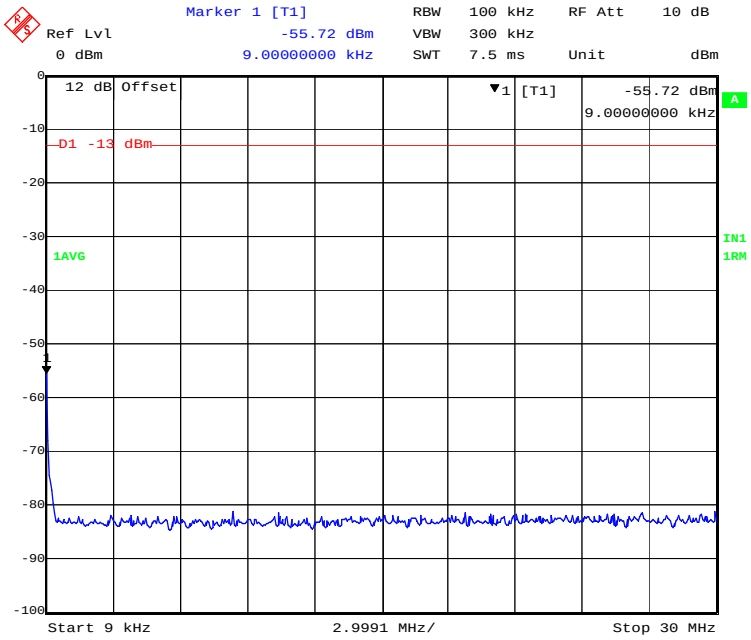


Date: 26.AUG.2020 11:58:16

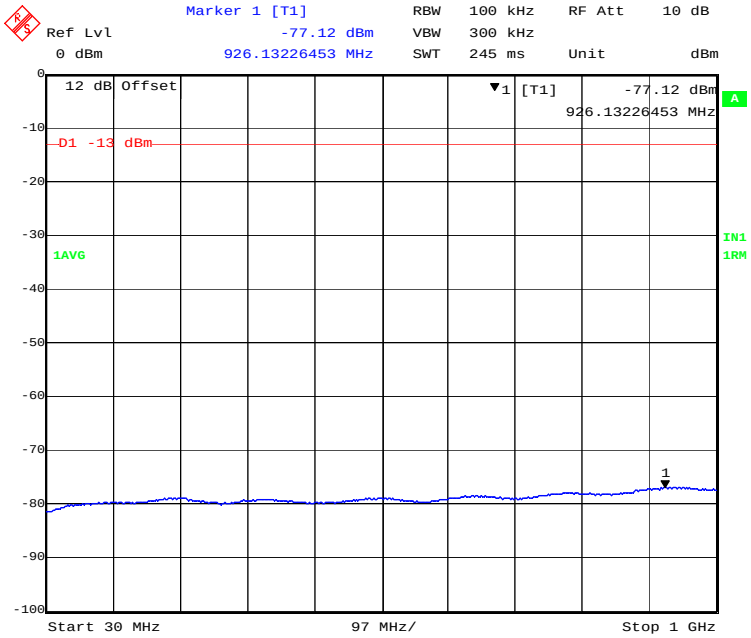


Date: 26.AUG.2020 11:53:03

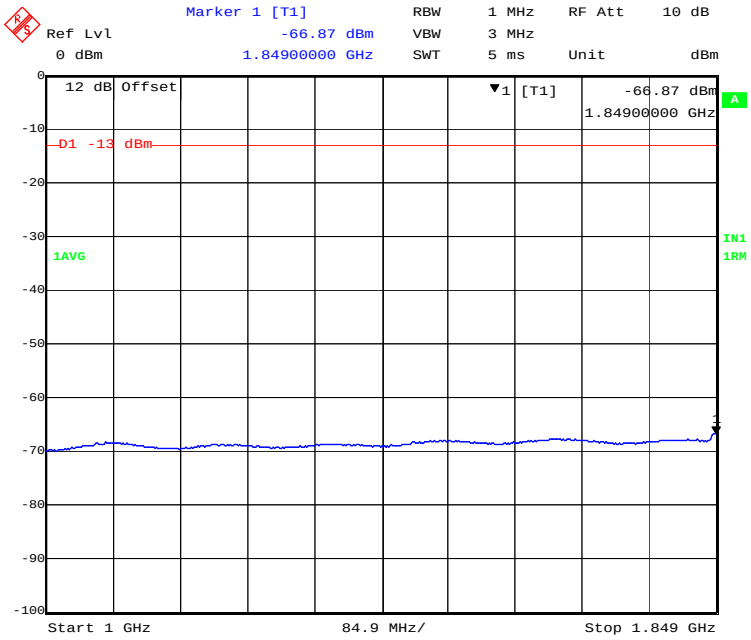
PCS - AWGN-Pre AGC-Middle Channel



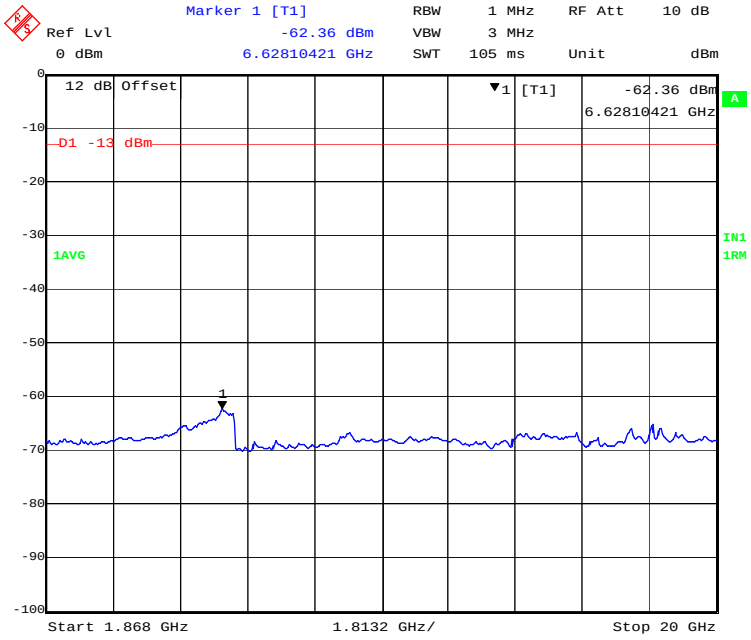
Date: 8.SEP.2020 17:28:47



Date: 26.AUG.2020 11:43:56

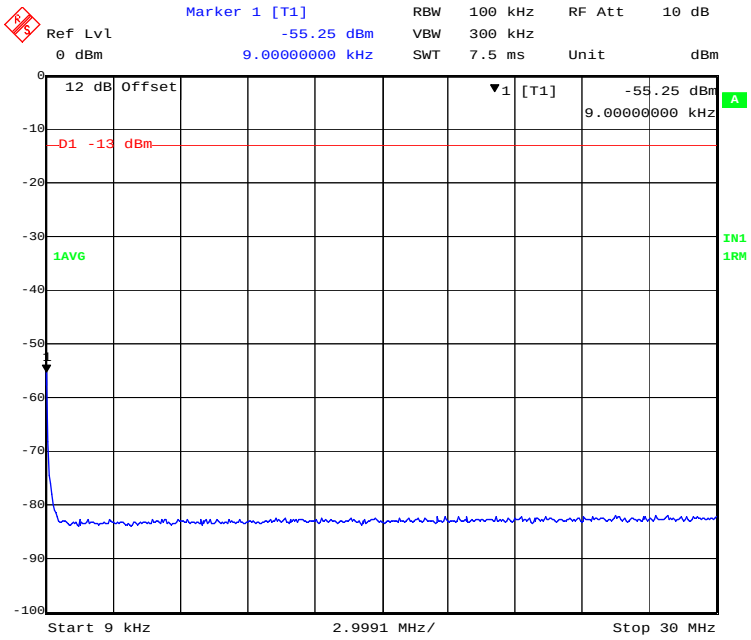


Date: 26.AUG.2020 11:44:53

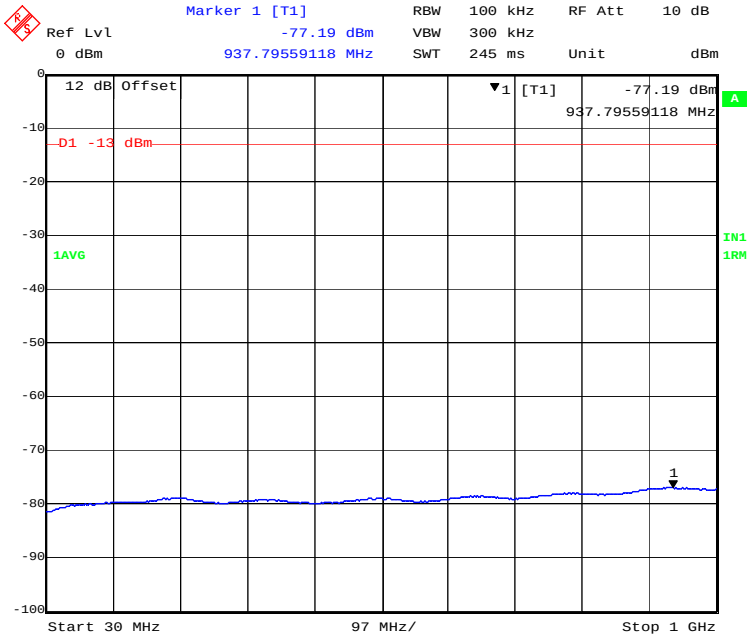


Date: 26.AUG.2020 11:47:46

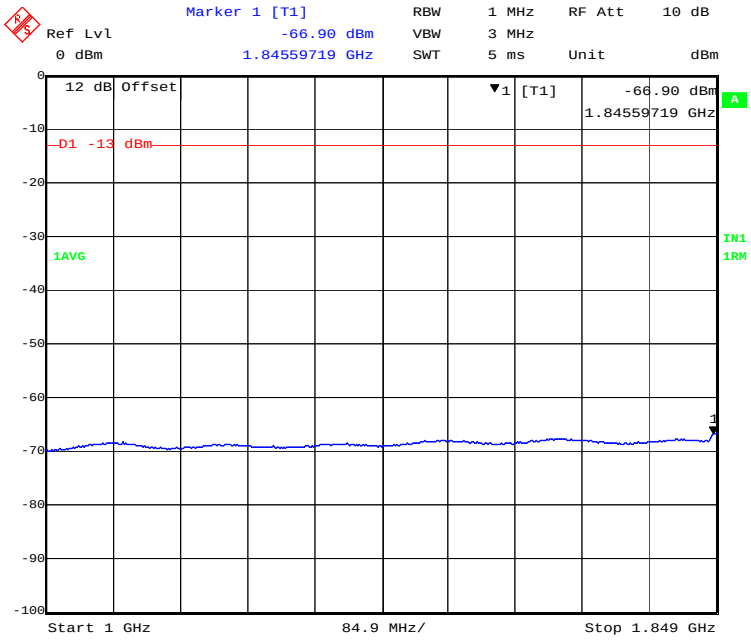
PCS - AWGN-Pre AGC-High Channel



Date: 8.SEP.2020 17:29:38



Date: 26.AUG.2020 11:31:47



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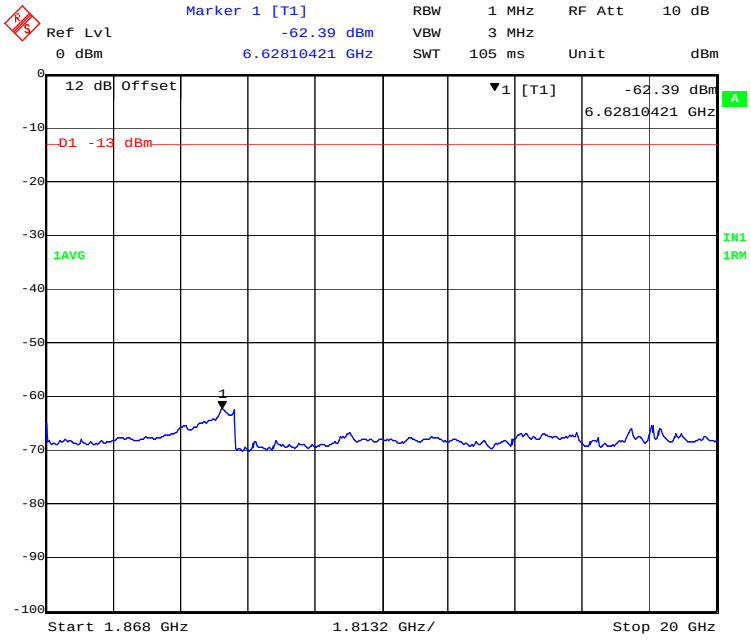
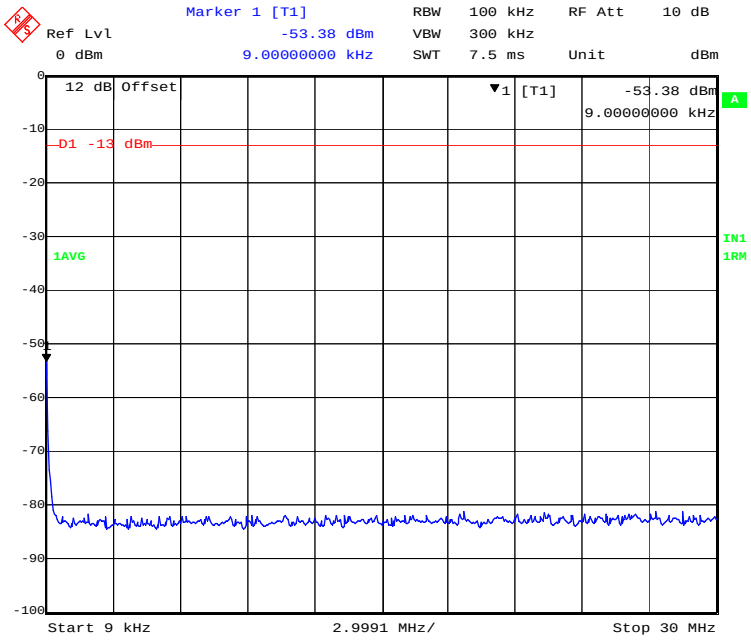


Date: 26.AUG.2020 11:41:00

PCS - GSM-Pre AGC-Low Channel



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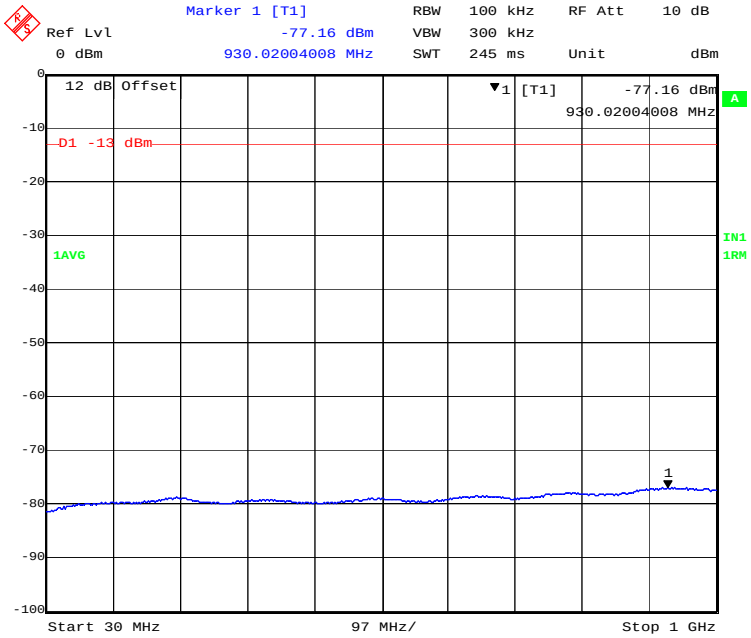
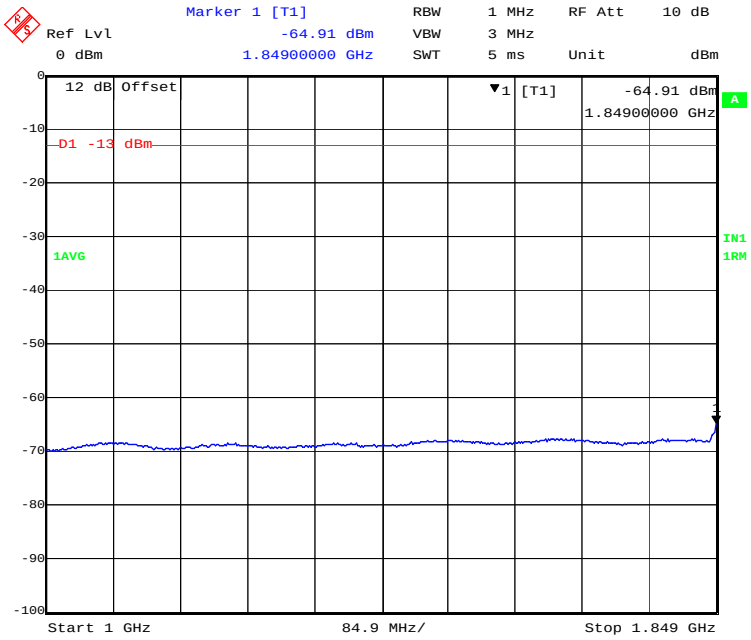
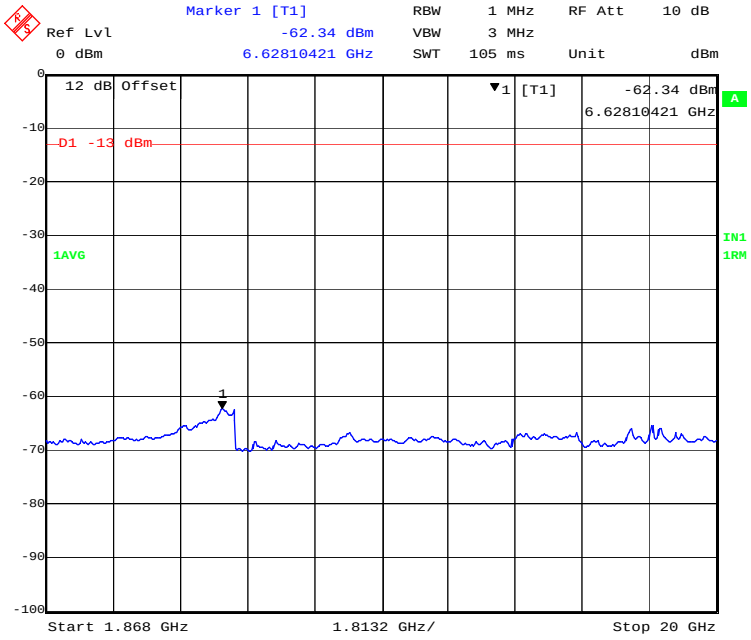


Date: 26.AUG.2020 10:54:04

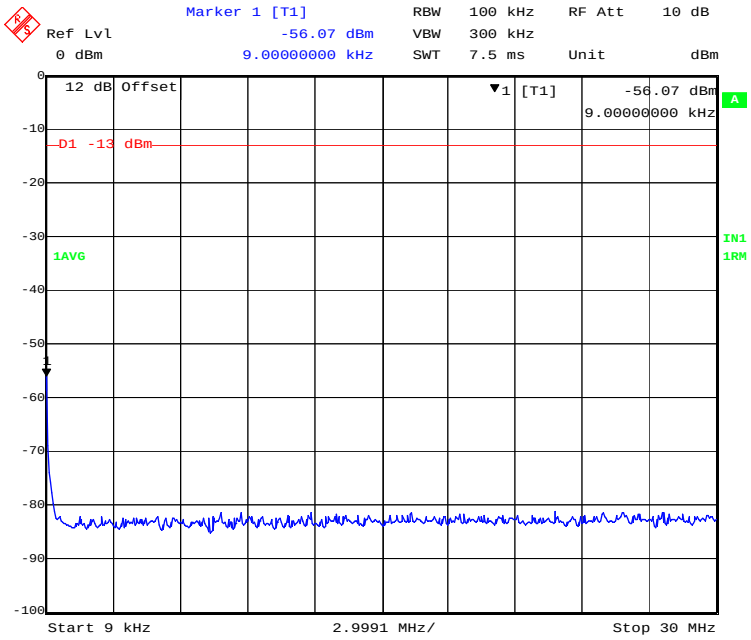


Date: 26.AUG.2020 10:57:09

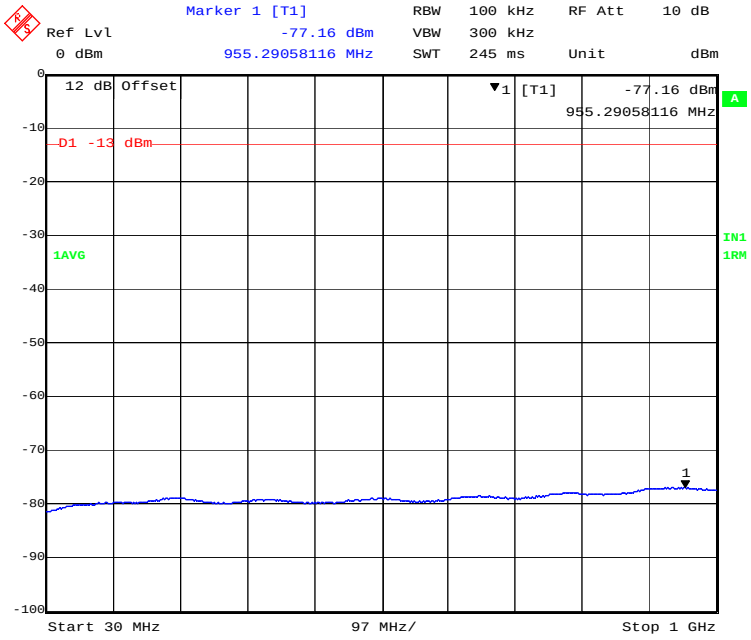


Date: 26.AUG.2020 11:01:39

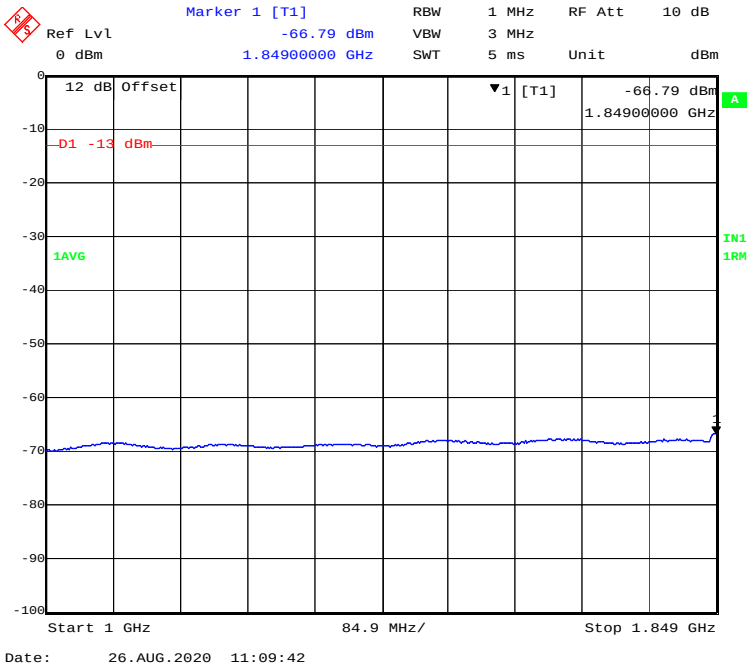
PCS - GSM-Pre AGC-Middle Channel

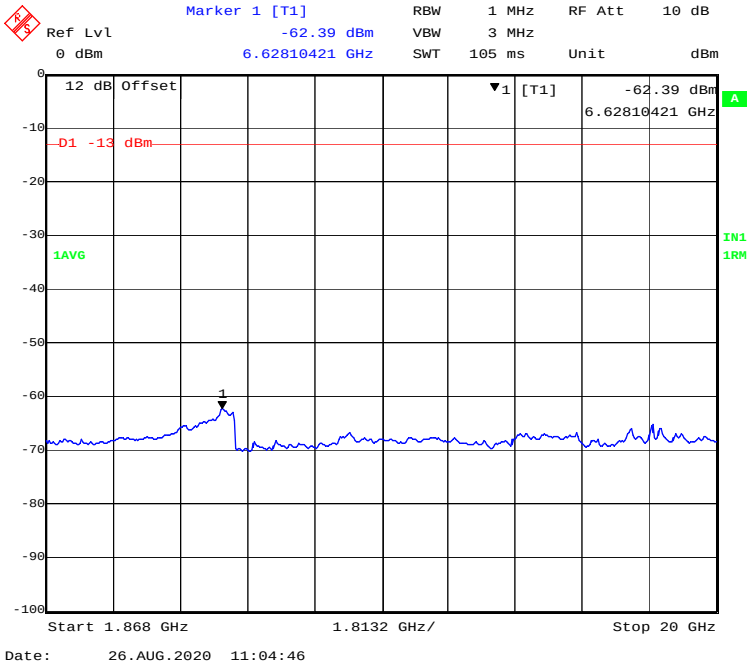


Date: 8.SEP.2020 17:33:10

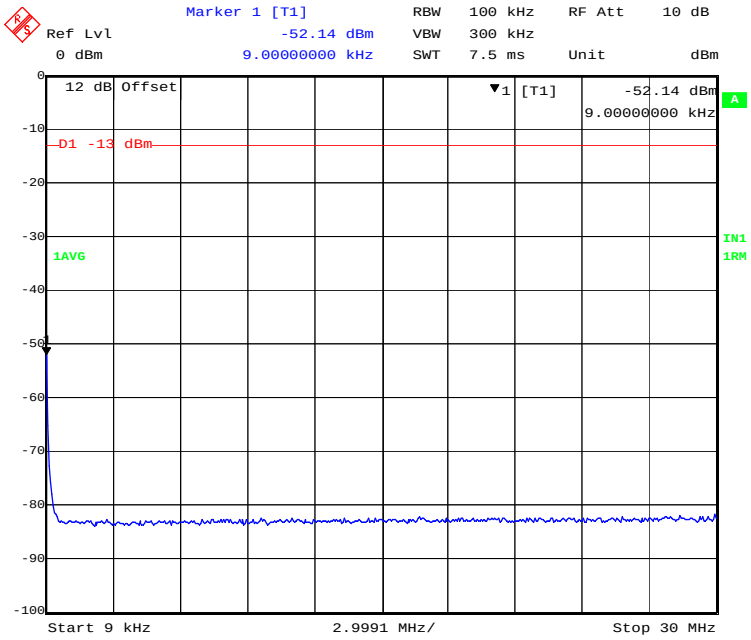


Date: 26.AUG.2020 11:10:57

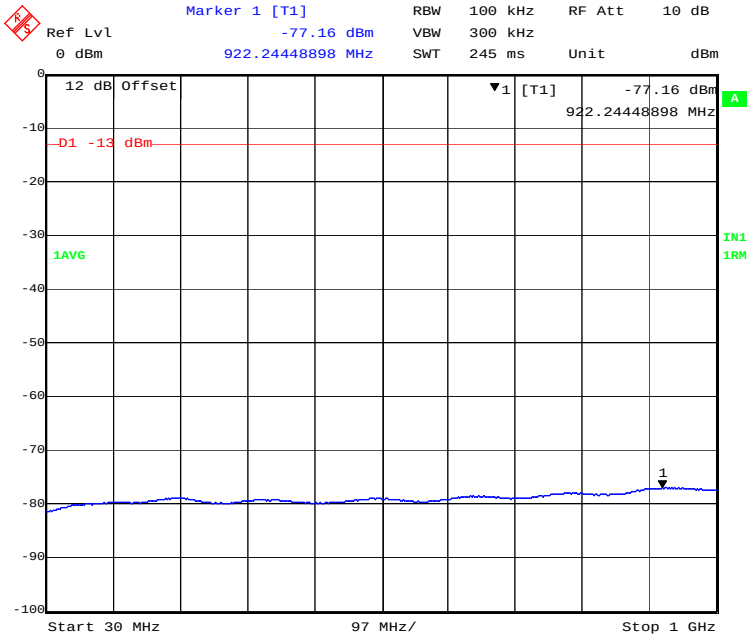

Marker 1 [T1]
Ref Lvl
0 dBm
-66.79 dBm
1.84900000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -66.79 dBm
1.84900000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1 GHz
84.9 MHz/
Stop 1.849 GHz
Date: 26.AUG.2020 11:09:42


Marker 1 [T1]
Ref Lvl
0 dBm
-62.39 dBm
6.62810421 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -62.39 dBm
6.62810421 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1.868 GHz
1.8132 GHz/
Stop 20 GHz
Date: 26.AUG.2020 11:04:46

PCS - GSM-Pre AGC-High Channel



Date: 8.SEP.2020 17:36:08



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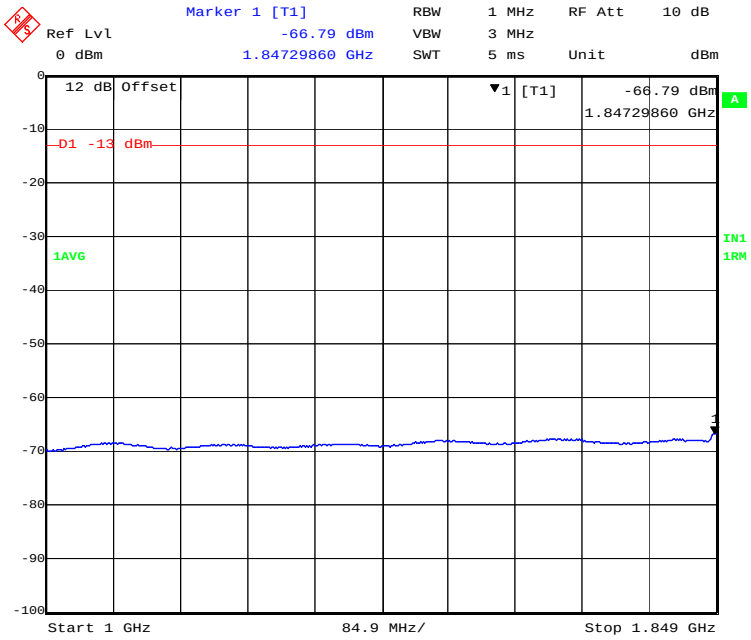

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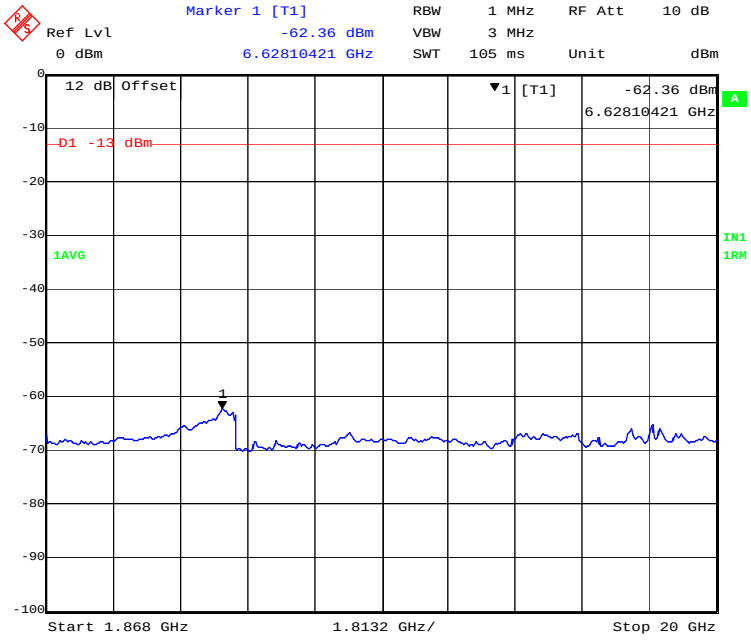
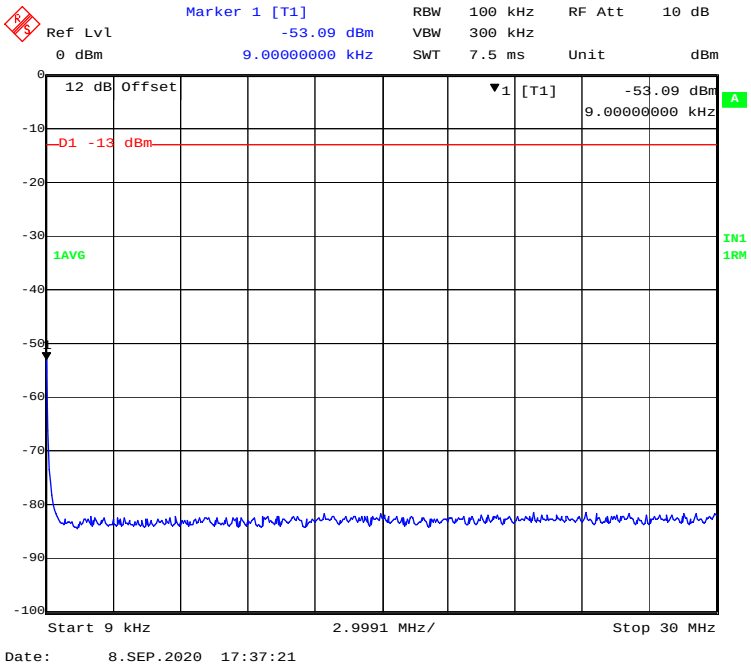
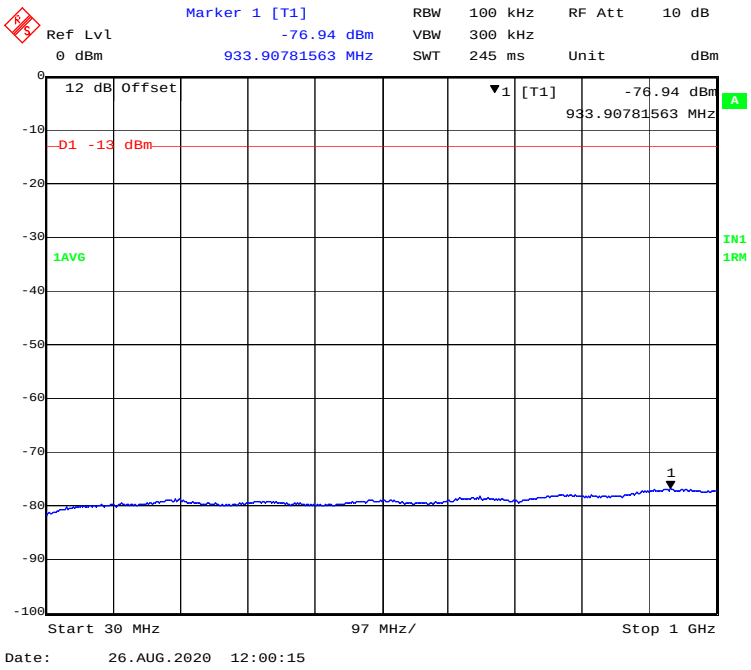
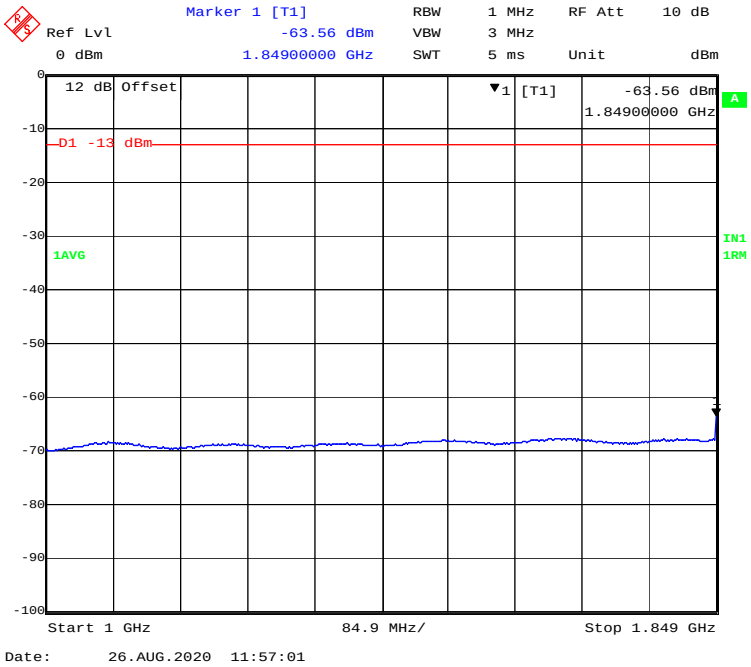


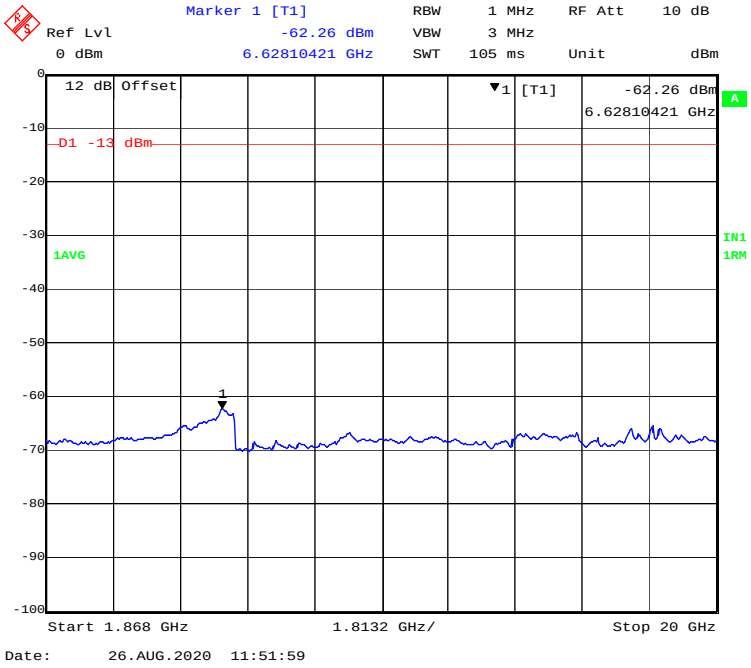
Date: 26.AUG.2020 11:23:01

PCS - AWGN-3dB above AGC-Low Channel

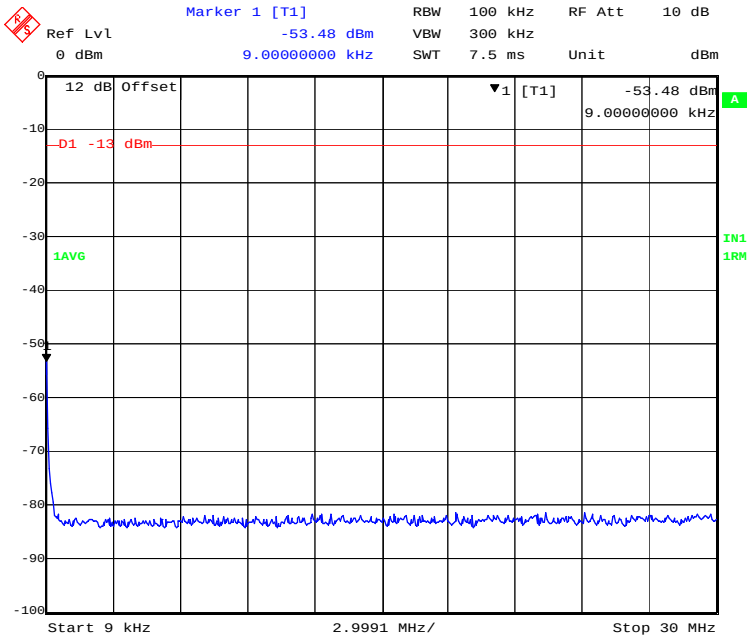




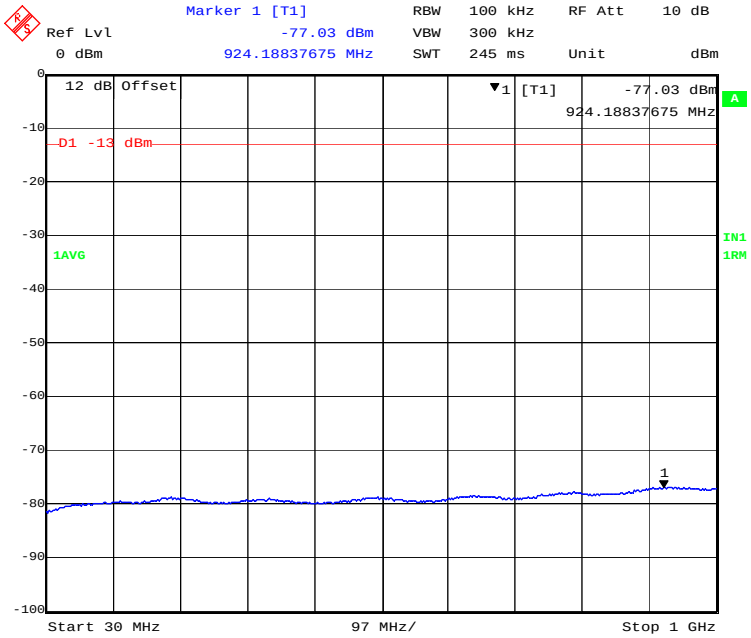

Marker 1 [T1]
-63.56 dBm
1.84900000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
Ref Lvl
0 dBm
12 dB Offset
1 [T1] -63.56 dBm
1.84900000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1 GHz
84.9 MHz/
Stop 1.849 GHz
Date: 26.AUG.2020 11:57:01


Marker 1 [T1]
-62.26 dBm
6.62810421 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
Ref Lvl
0 dBm
12 dB Offset
1 [T1] -62.26 dBm
6.62810421 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1.868 GHz
1.8132 GHz/
Stop 20 GHz
Date: 26.AUG.2020 11:51:59

PCS - AWGN-3dB above AGC-Middle Channel



Date: 8.SEP.2020 17:39:26



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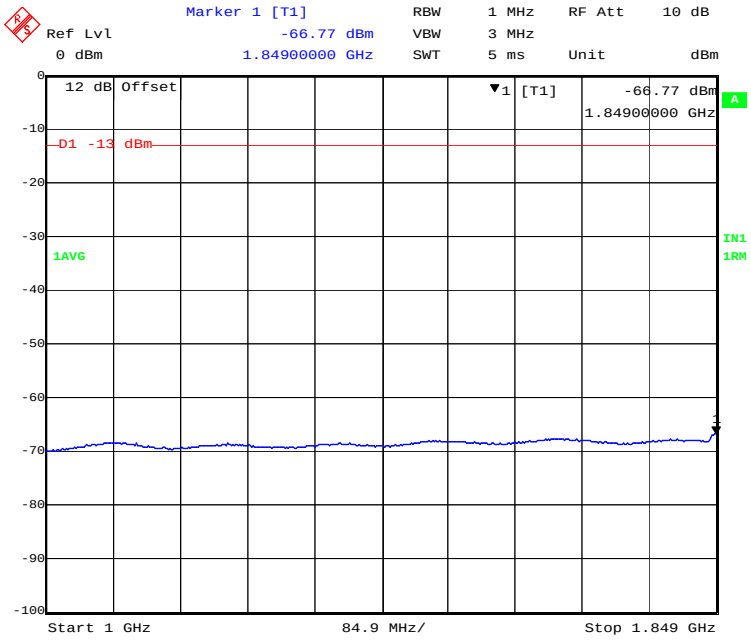
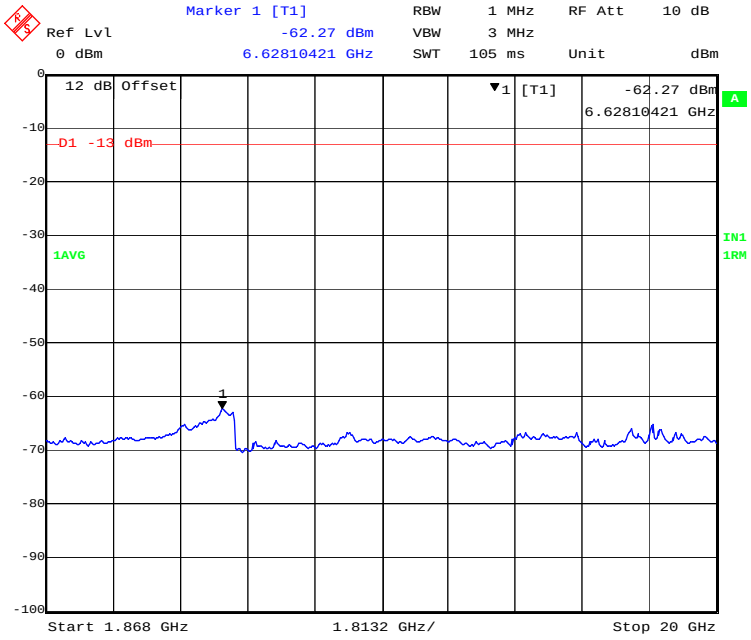
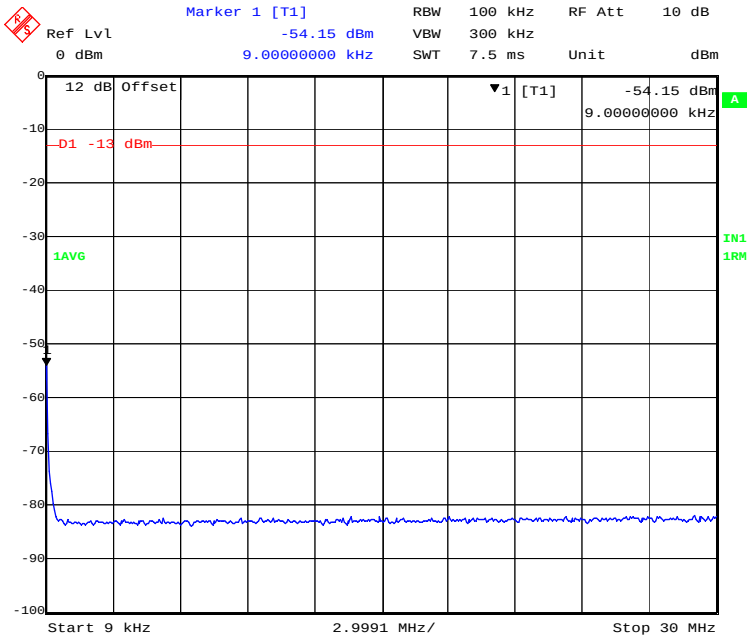


Date: 26.AUG.2020 11:45:39

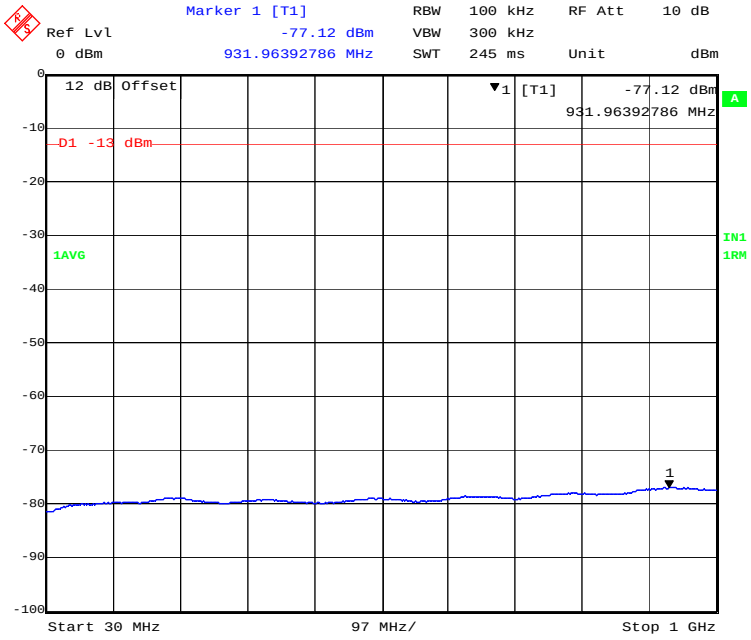


Date: 26.AUG.2020 11:50:10

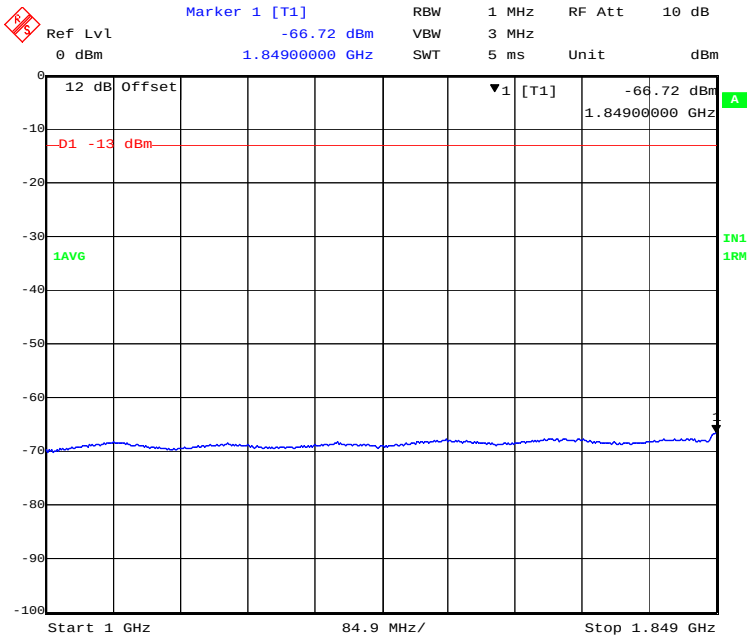
PCS - AWGN-3dB above AGC-High Channel



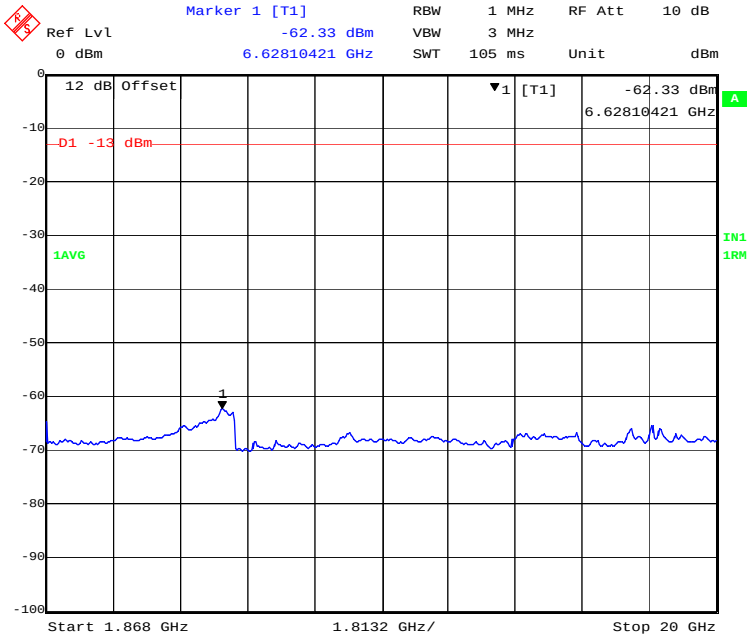
Date: 8.SEP.2020 17:40:36



Date: 26.AUG.2020 11:29:36

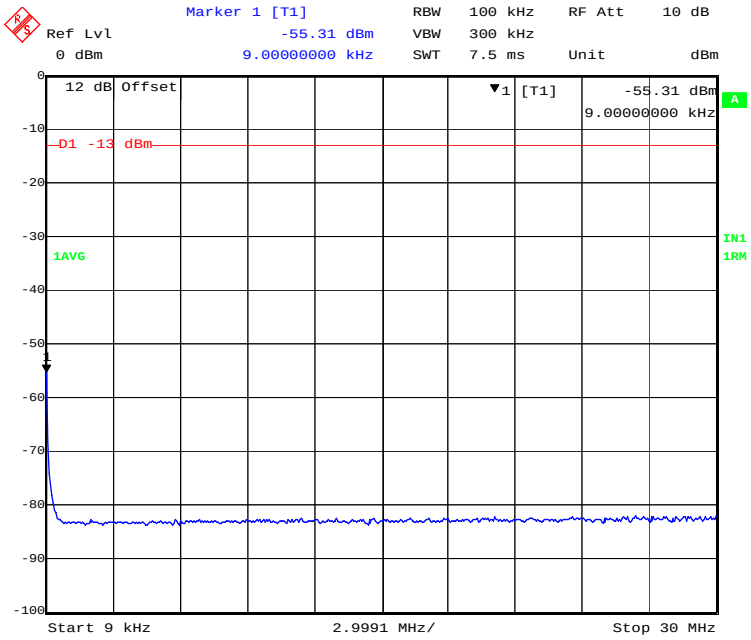


Date: 26.AUG.2020 11:32:36

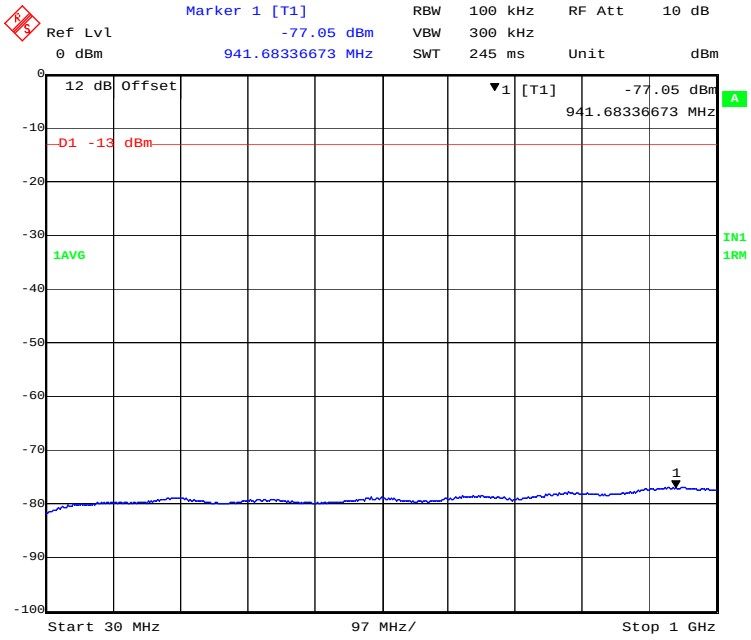


Date: 26.AUG.2020 11:37:50

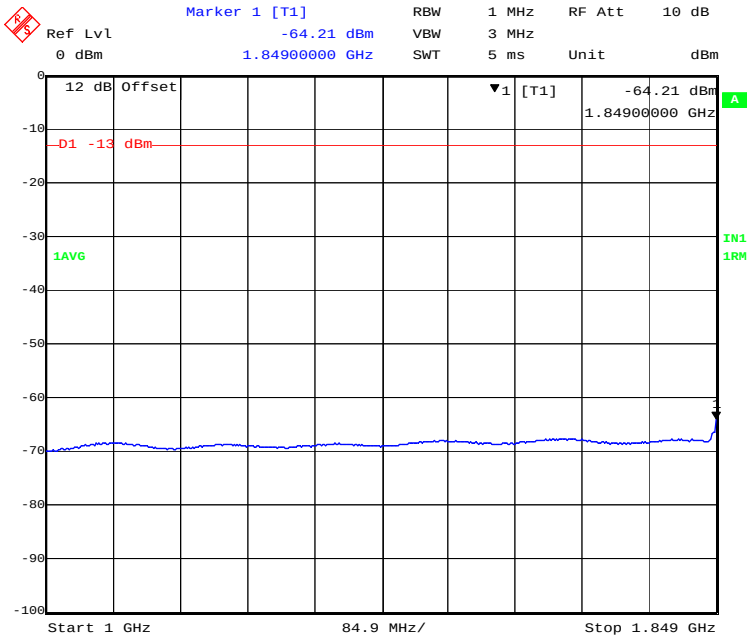
PCS - GSM-3dB above AGC-Low Channel



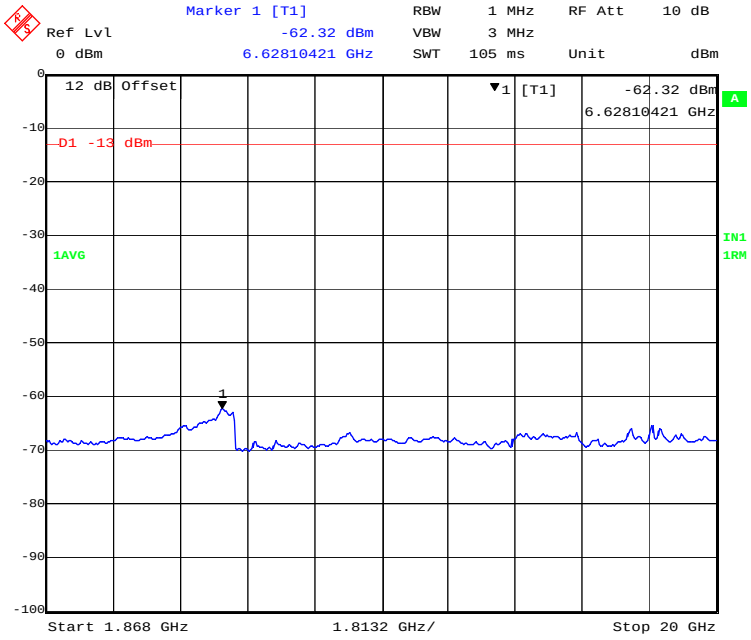
Date: 8.SEP.2020 17:42:48



Date: 26.AUG.2020 10:51:54

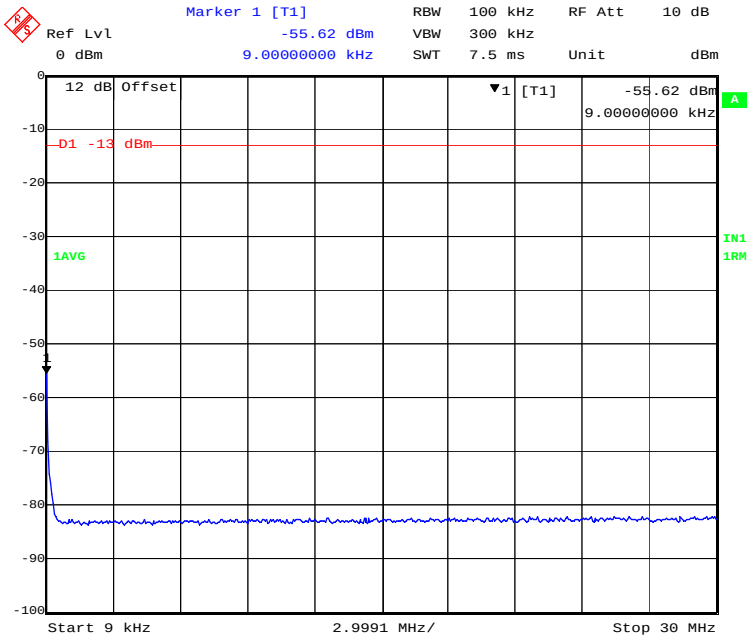


Date: 26.AUG.2020 10:58:32

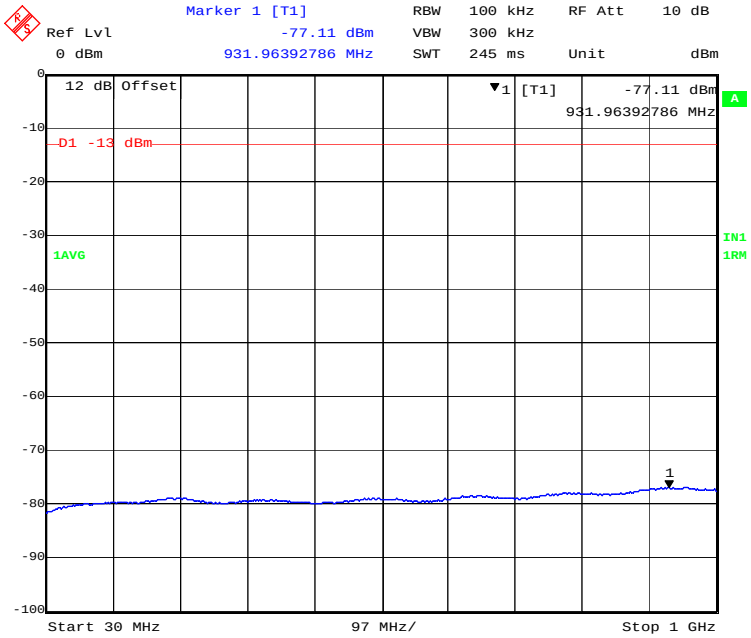


Date: 26.AUG.2020 11:03:45

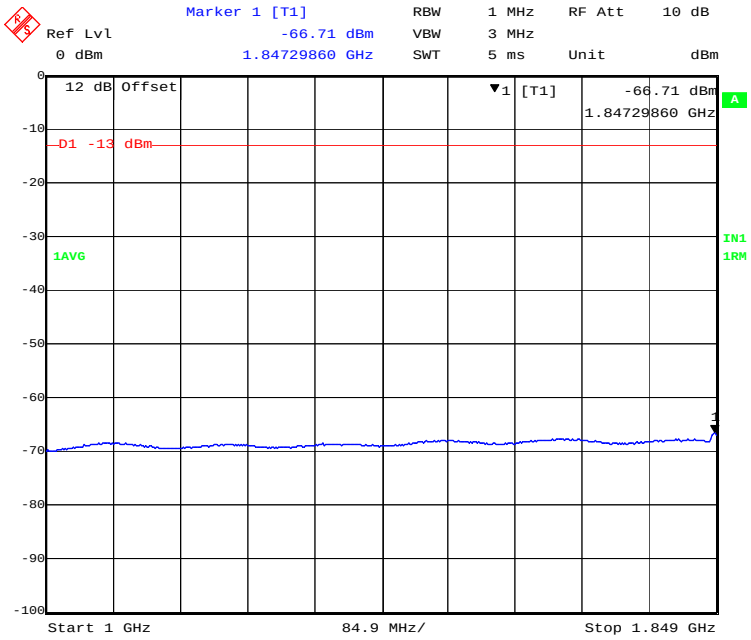
PCS - GSM-3dB above AGC-Middle Channel



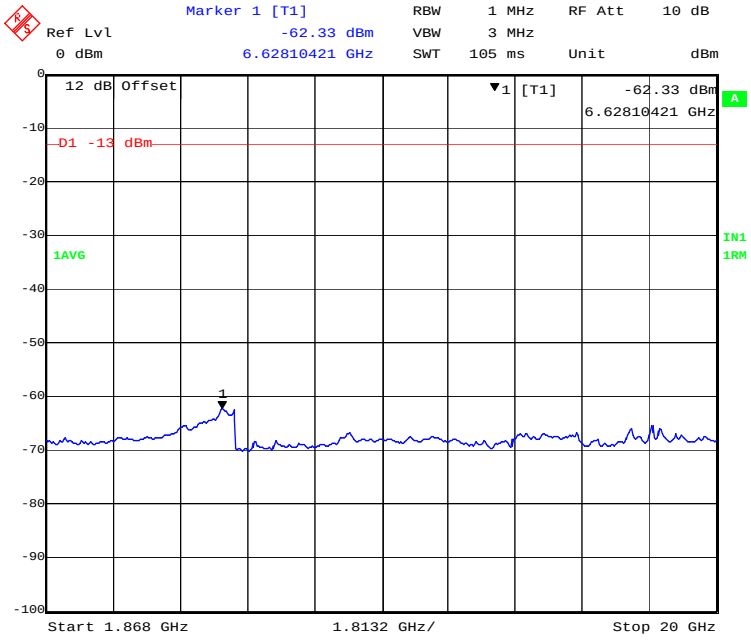
Date: 8.SEP.2020 17:43:40



Date: 26.AUG.2020 11:12:42

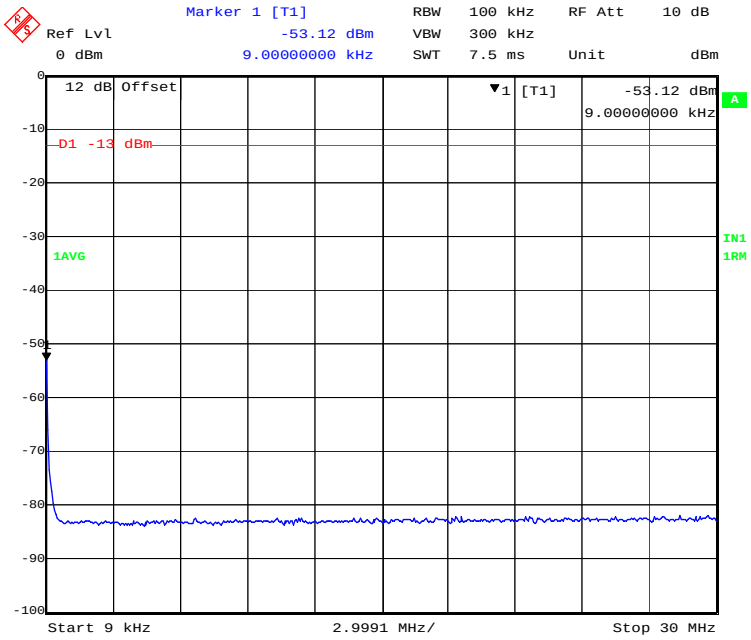


Date: 26.AUG.2020 11:08:22

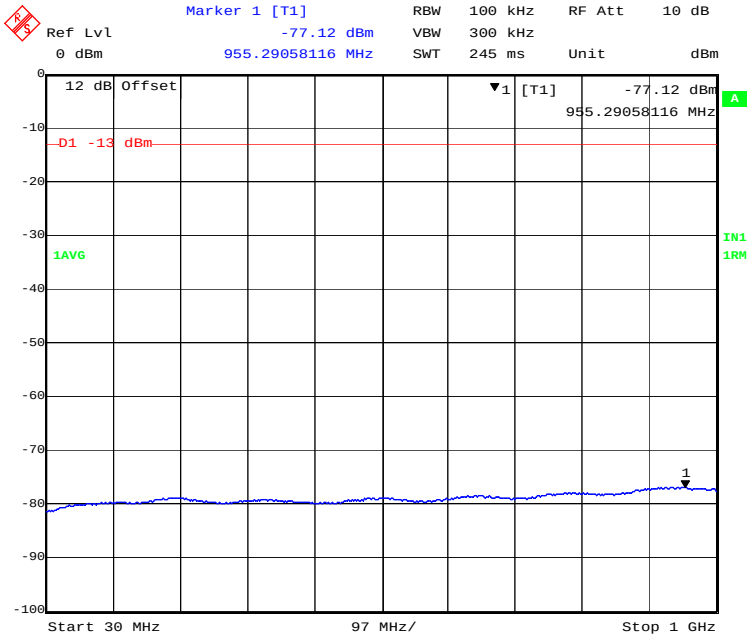


Date: 26.AUG.2020 11:06:14

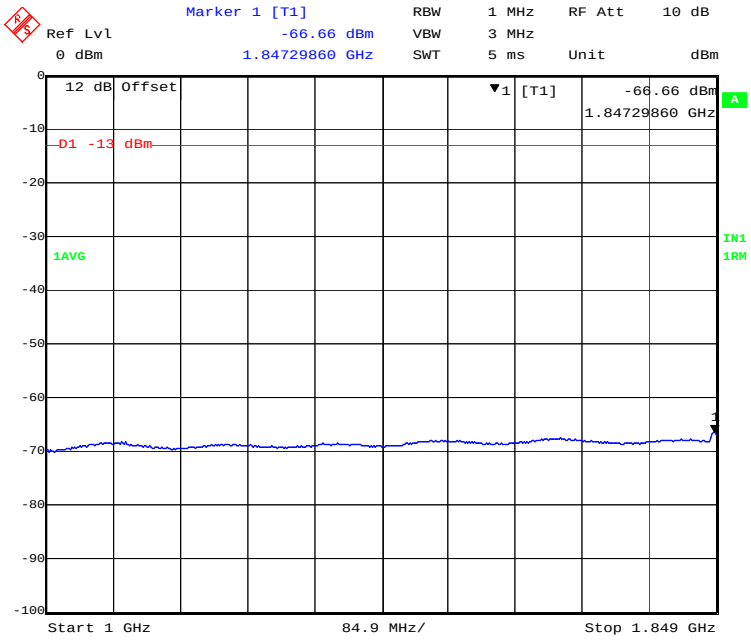
PCS - GSM-3dB above AGC-High Channel



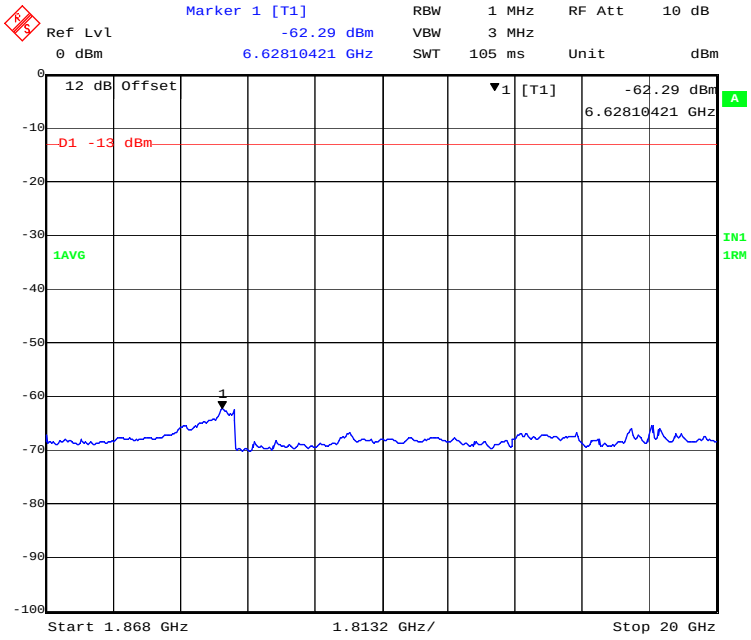
Date: 8.SEP.2020 17:44:36



Date: 26.AUG.2020 11:17:14



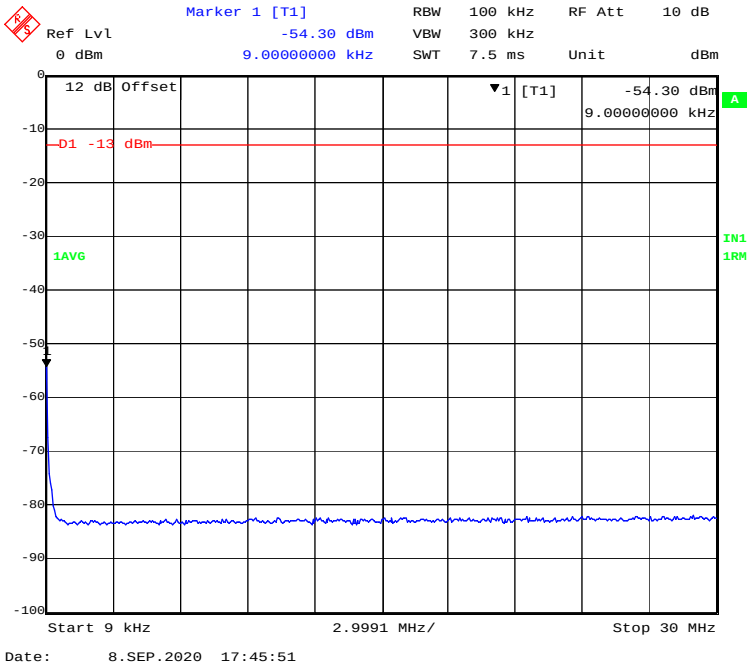
Date: 26.AUG.2020 11:19:30

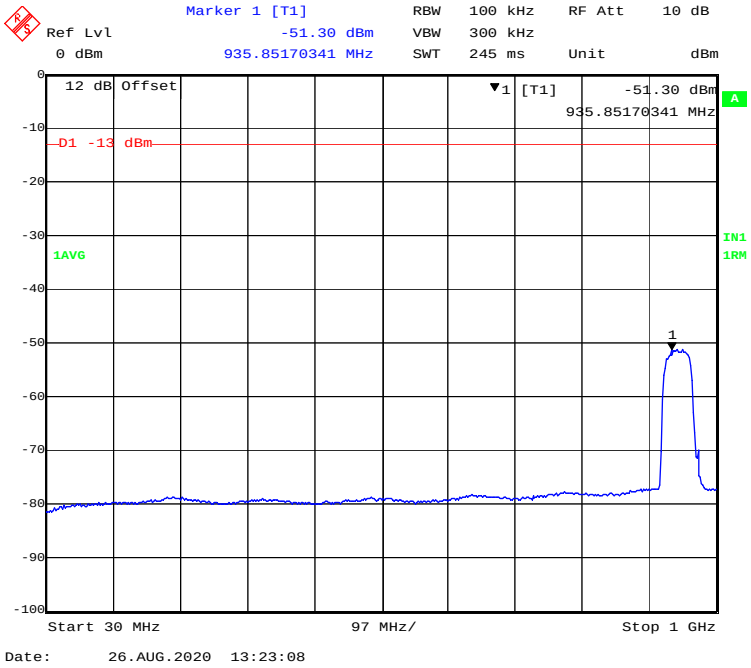


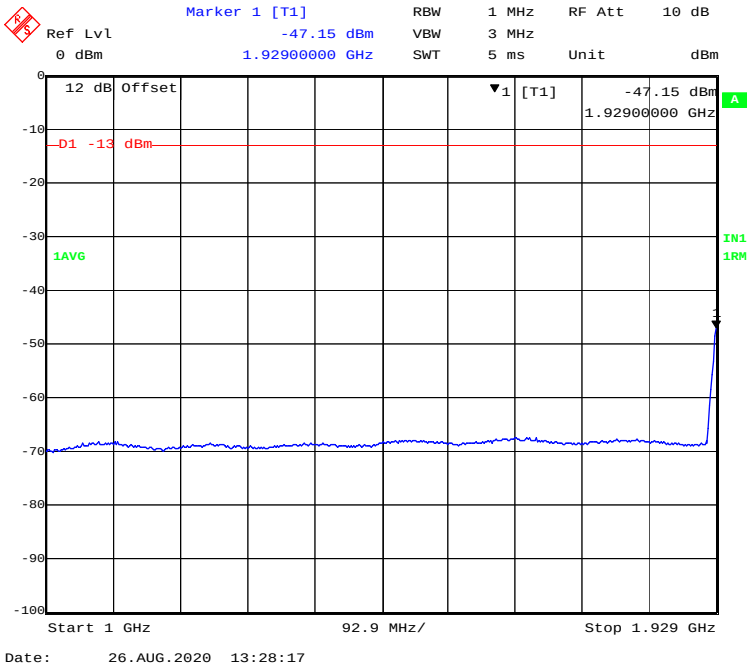
Date: 26.AUG.2020 11:24:38

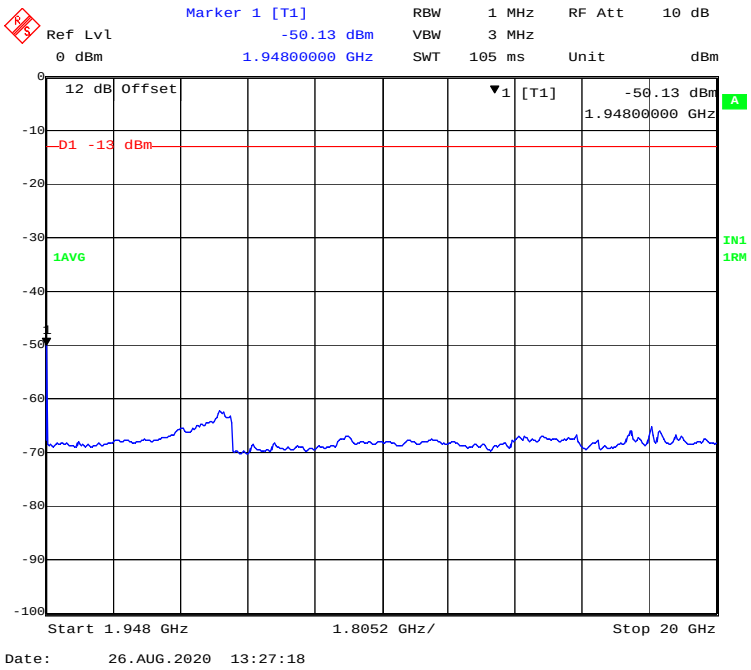
Downlink:

PCS - AWGN-Pre AGC-Low Channel

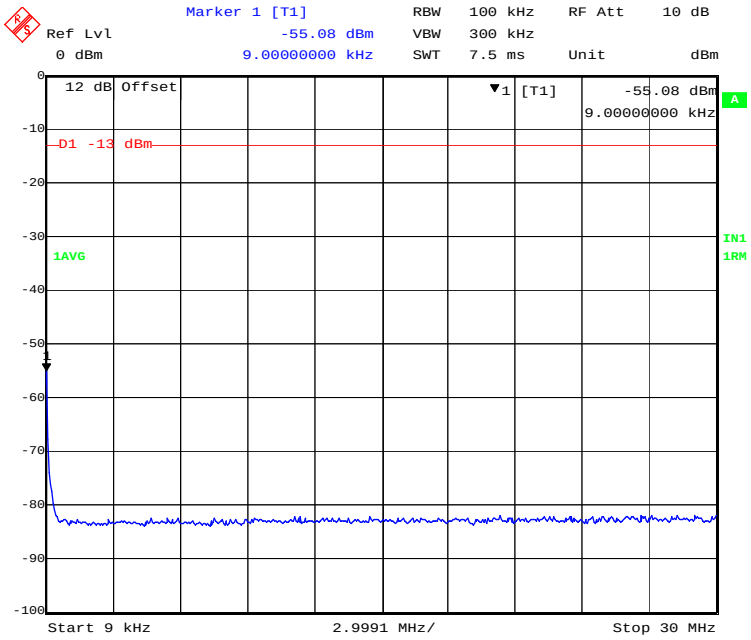




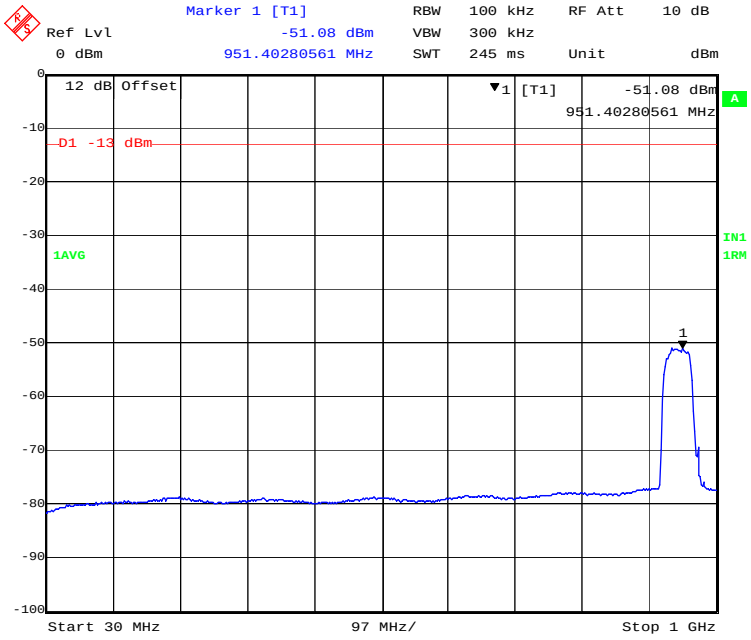

Marker 1 [T1]
-47.15 dBm
1.92900000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
Ref Lvl
0 dBm
12 dB Offset
1 [T1] -47.15 dBm
1.92900000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1 GHz
92.9 MHz/
Stop 1.929 GHz
Date: 26.AUG.2020 13:28:17


Marker 1 [T1]
-50.13 dBm
1.94800000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
Ref Lvl
0 dBm
12 dB Offset
1 [T1] -50.13 dBm
1.94800000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1.948 GHz
1.8052 GHz/
Stop 20 GHz
Date: 26.AUG.2020 13:27:18

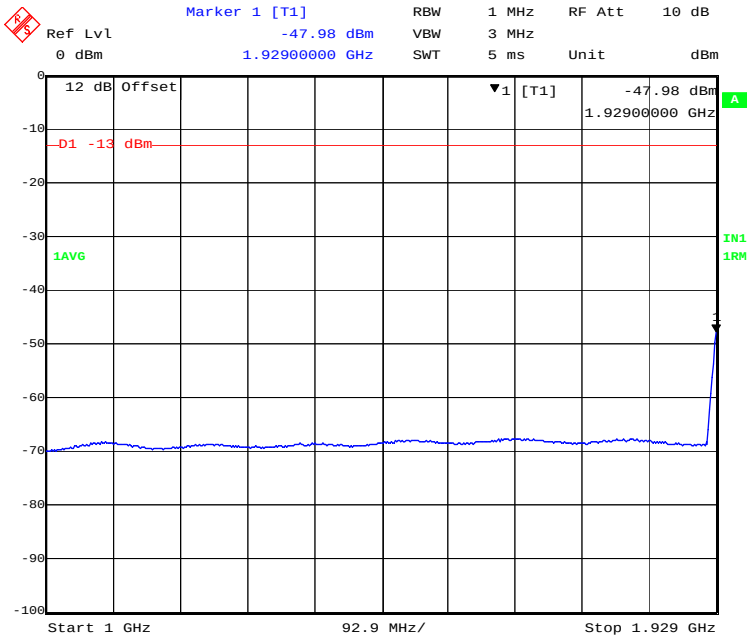
PCS - AWGN-Pre AGC-Middle Channel



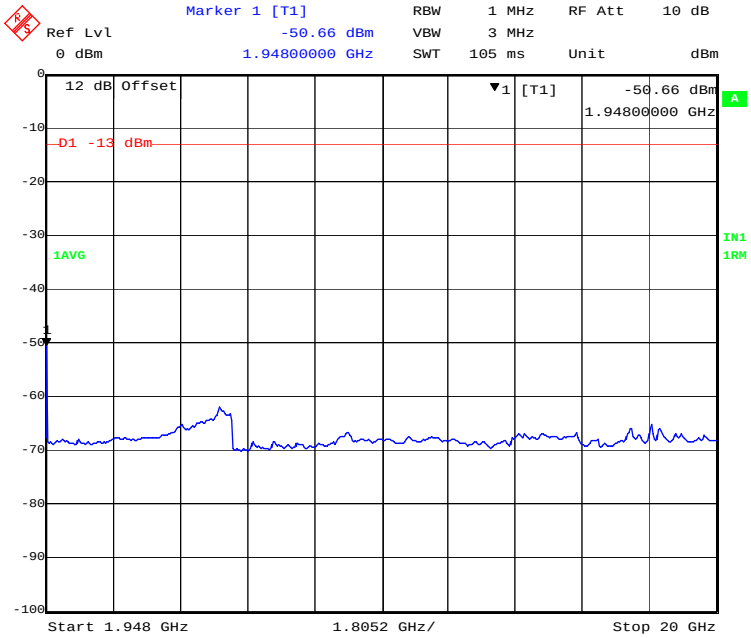
Date: 8.SEP.2020 17:46:40



Date: 26.AUG.2020 13:33:06

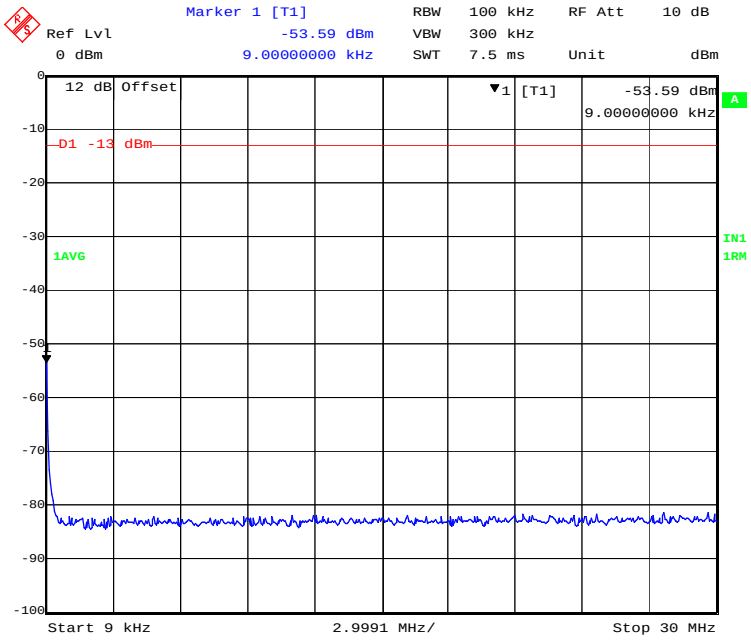


Date: 26.AUG.2020 13:34:47

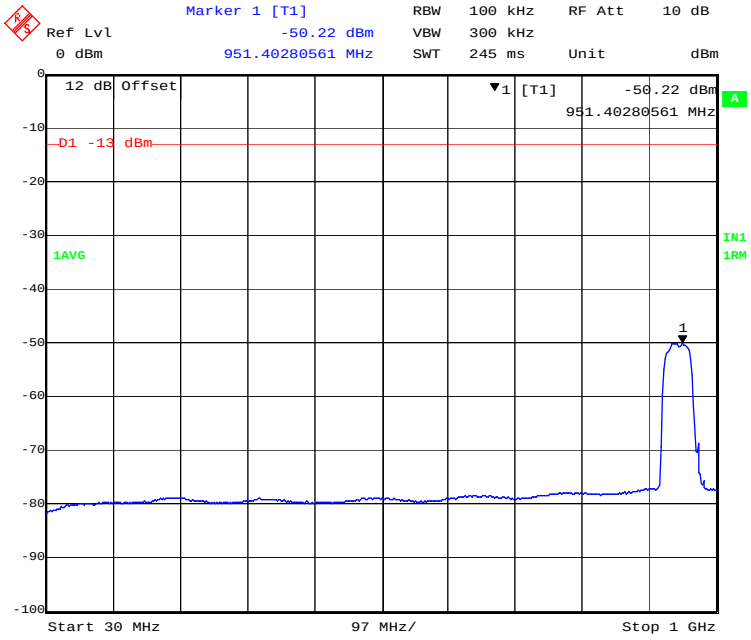


Date: 26.AUG.2020 13:36:24

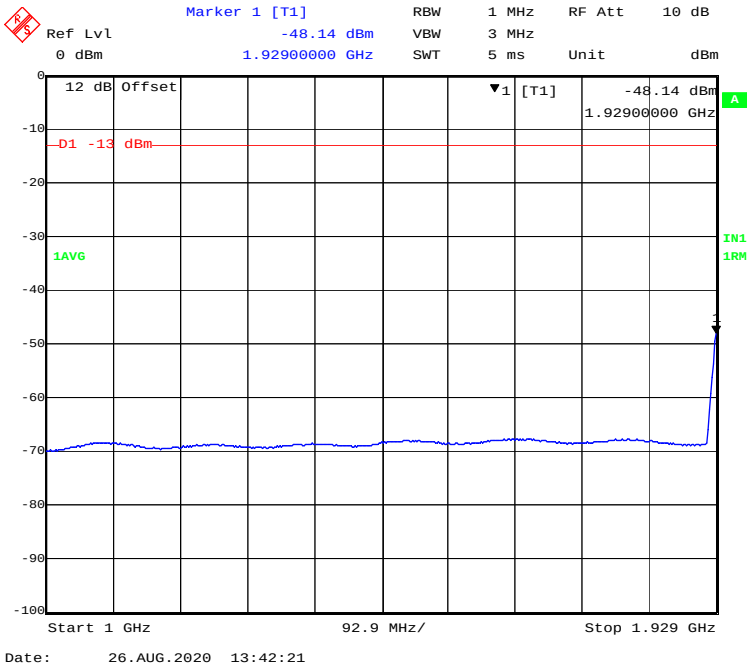
PCS - AWGN-Pre AGC-High Channel

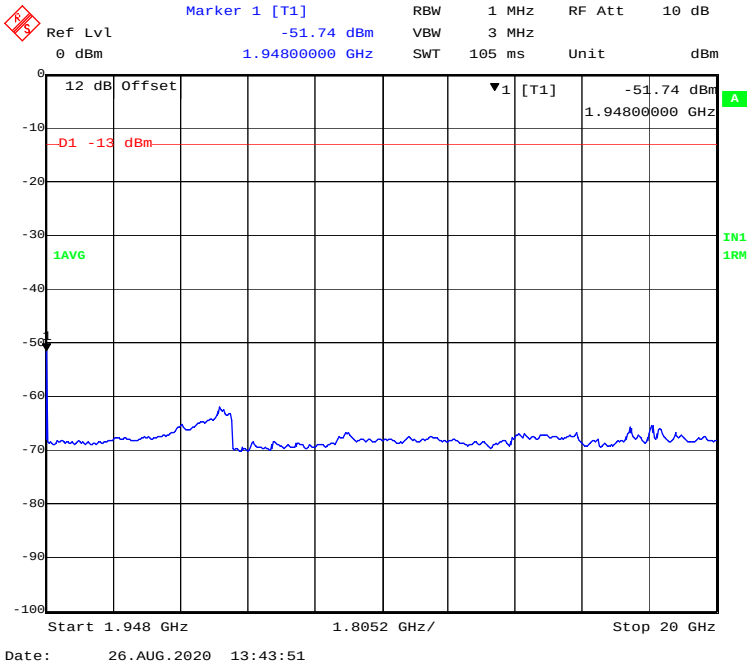


Date: 8.SEP.2020 17:48:13



Date: 26.AUG.2020 13:40:43


Marker 1 [T1]
Ref Lvl
0 dBm
-48.14 dBm
1.92900000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -48.14 dBm
1.92900000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1 GHz
92.9 MHz/
Stop 1.929 GHz
Date: 26.AUG.2020 13:42:21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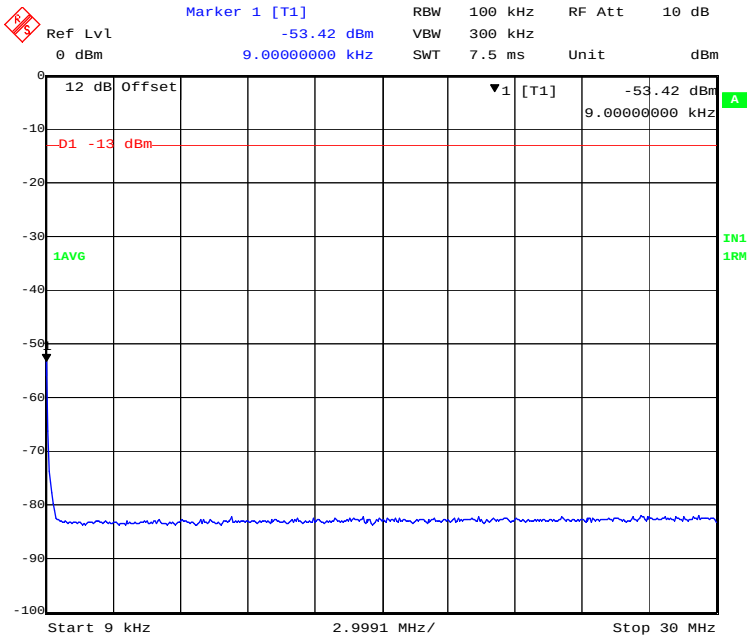
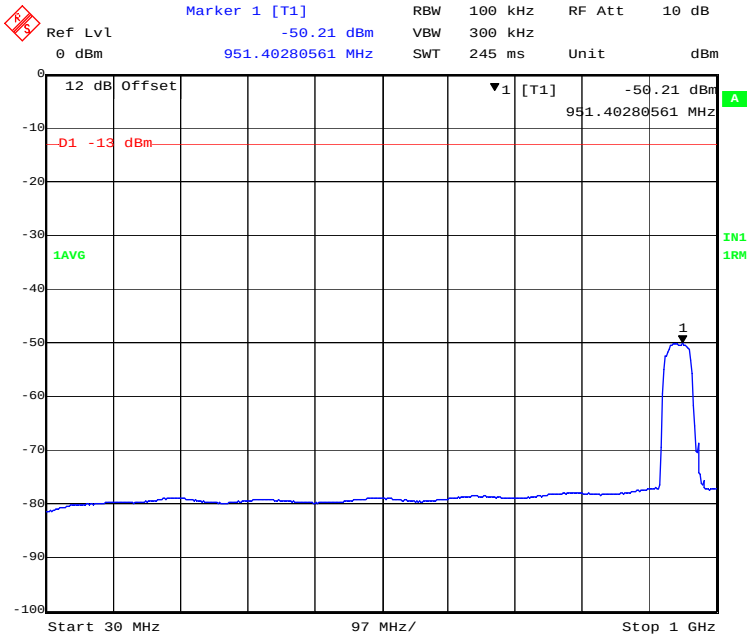
0 dBm
-51.74 dBm
1.94800000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -51.74 dBm
1.94800000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1.948 GHz
1.8052 GHz/
Stop 20 GHz
Date: 26.AUG.2020 13:43:51

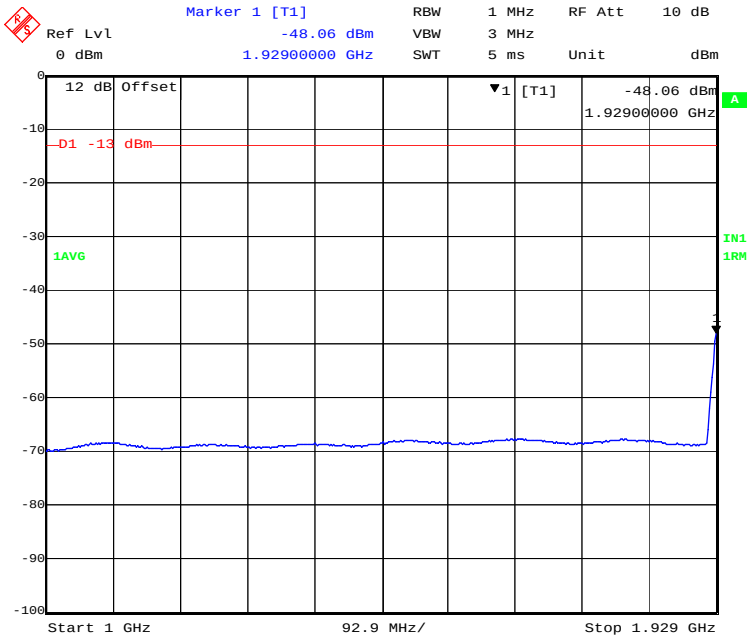
PCS - GSM-Pre AGC-Low Channel



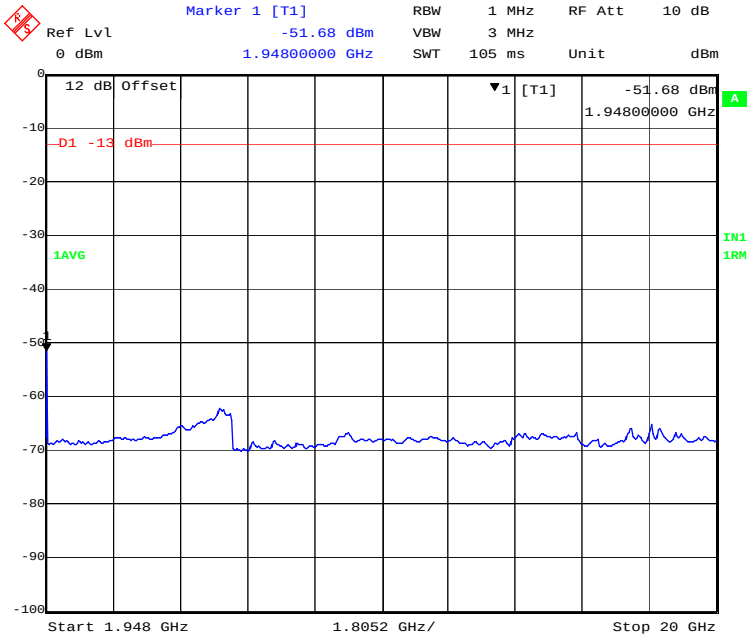
Date: 8.SEP.2020 17:49:57



Date: 26.AUG.2020 13:50:01

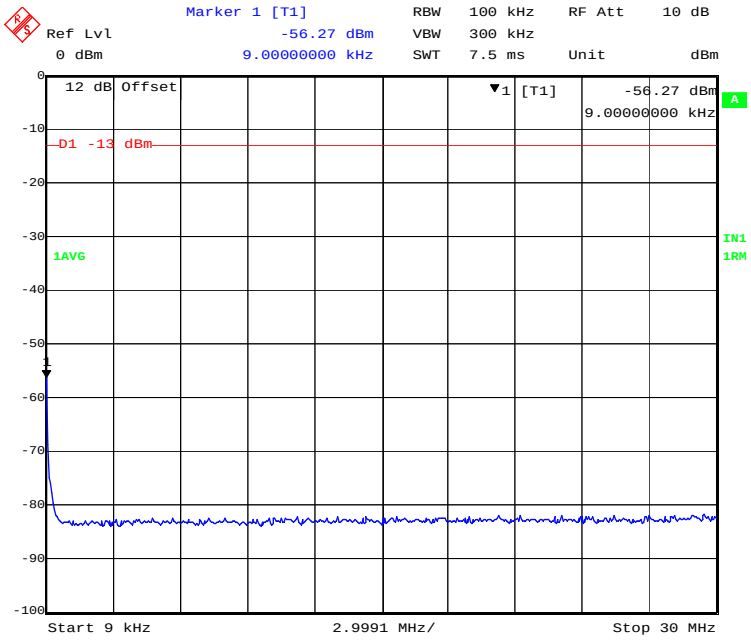


Date: 26.AUG.2020 13:52:45

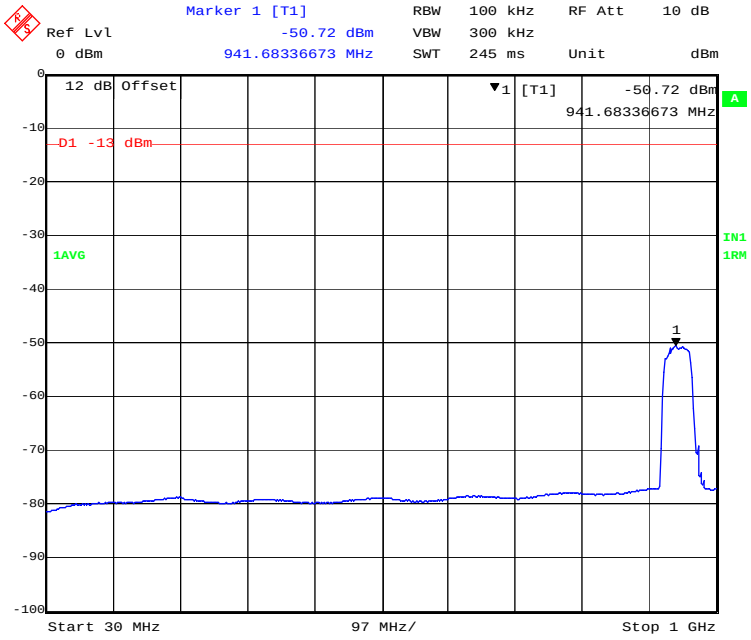


Date: 26.AUG.2020 13:56:16

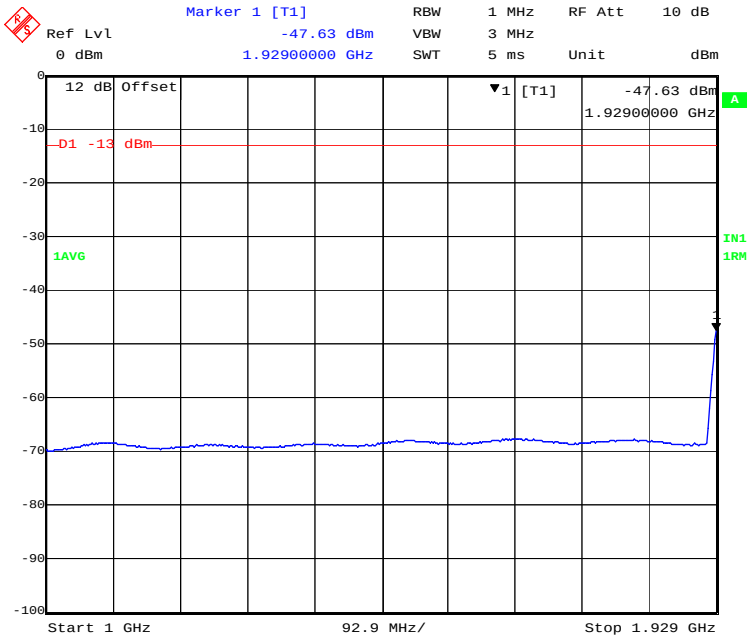
PCS - GSM-Pre AGC-Middle Channel



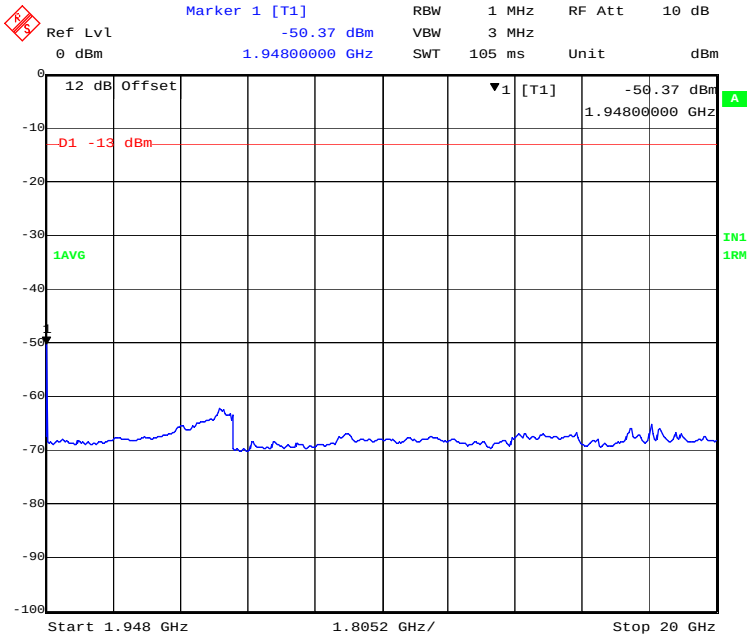
Date: 8.SEP.2020 17:50:59



Date: 26.AUG.2020 13:59:11

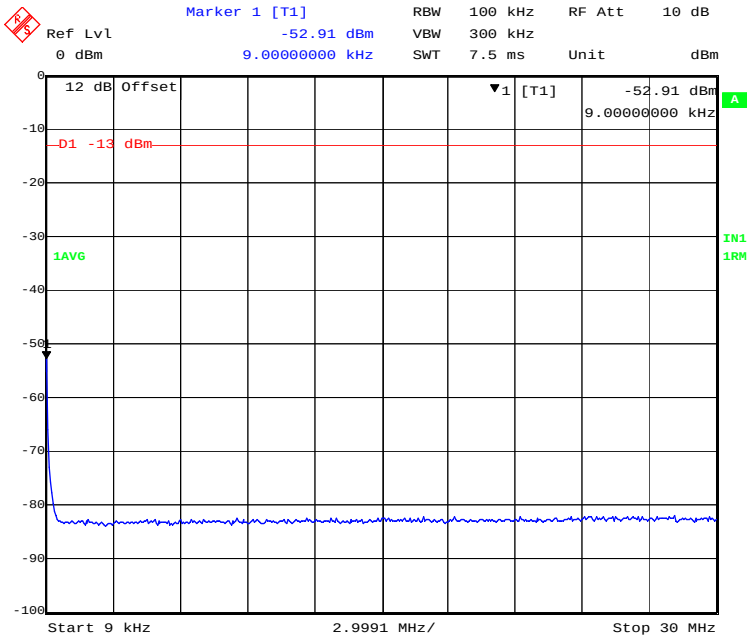


Date: 26.AUG.2020 14:00:48

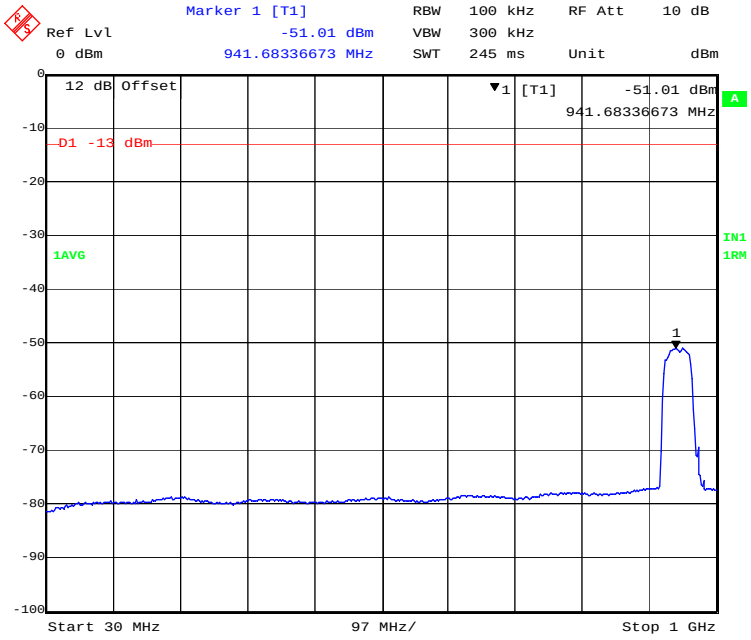


Date: 26.AUG.2020 14:01:52

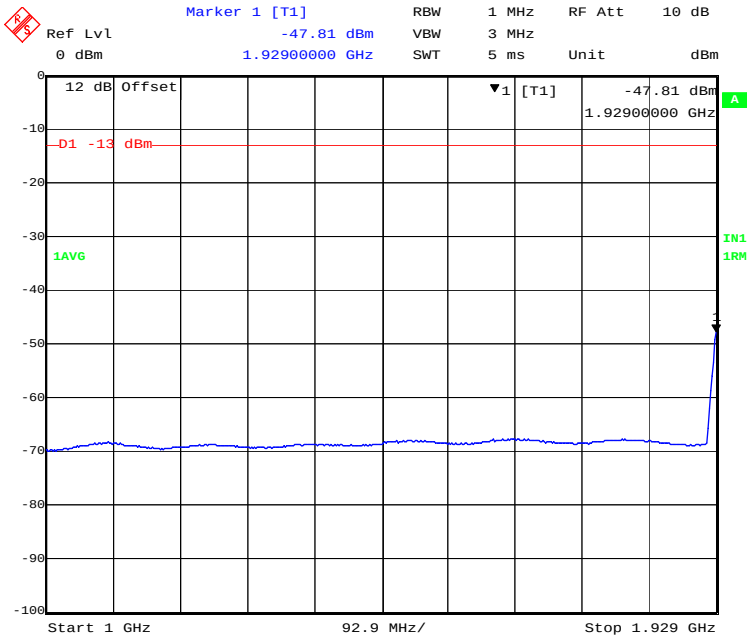
PCS - GSM-Pre AGC-High Channel



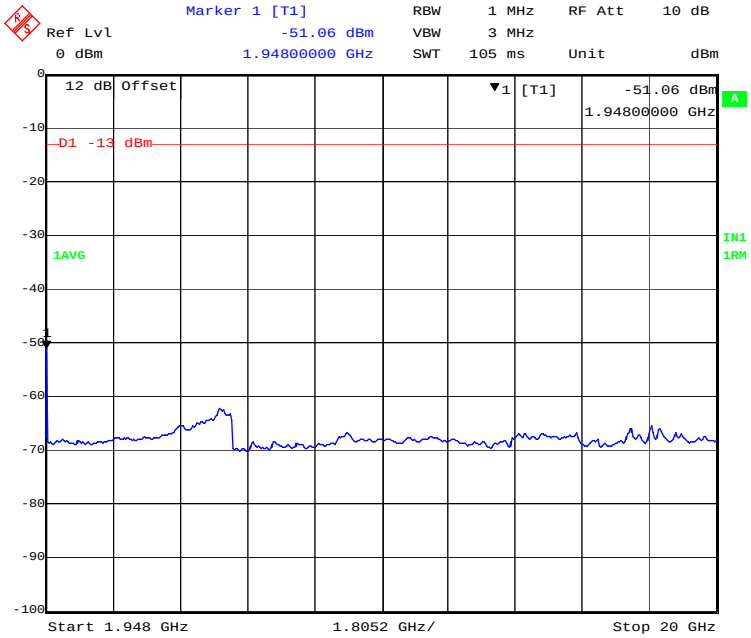
Date: 8.SEP.2020 17:51:50



Date: 26.AUG.2020 14:03:31

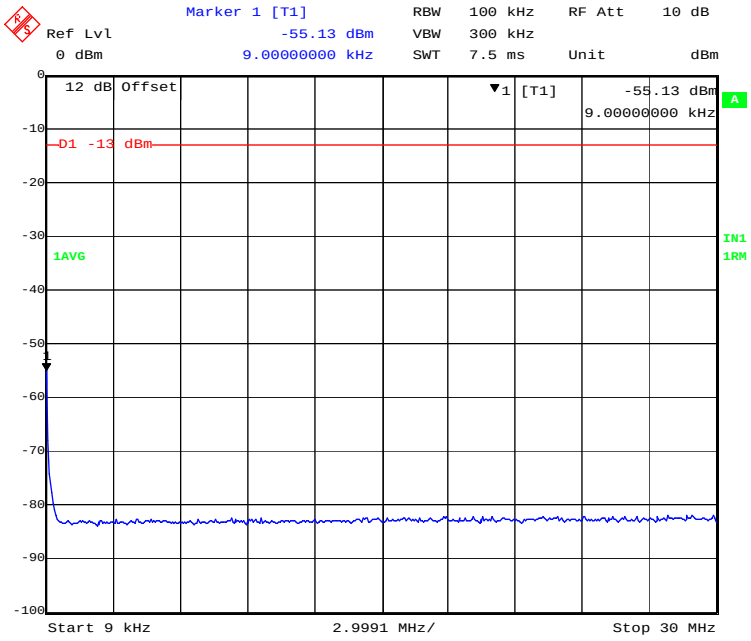


Date: 26.AUG.2020 14:05:42

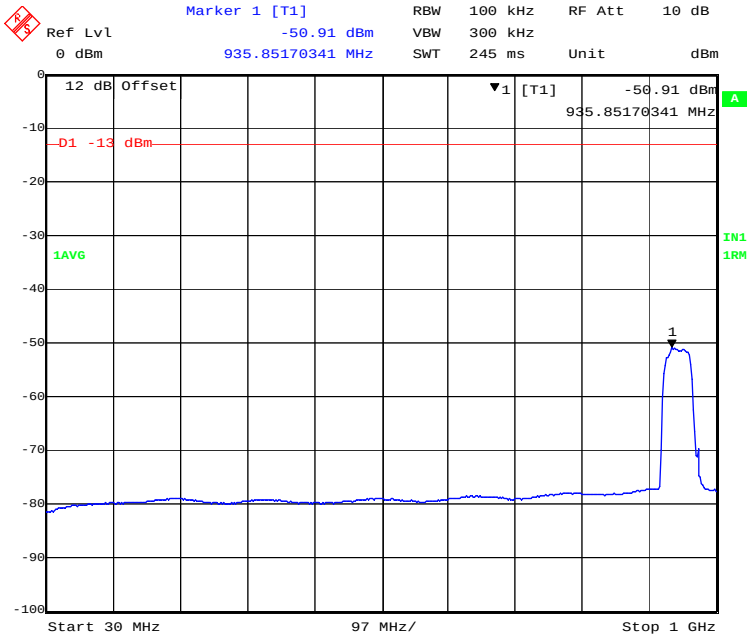


Date: 26.AUG.2020 14:07:26

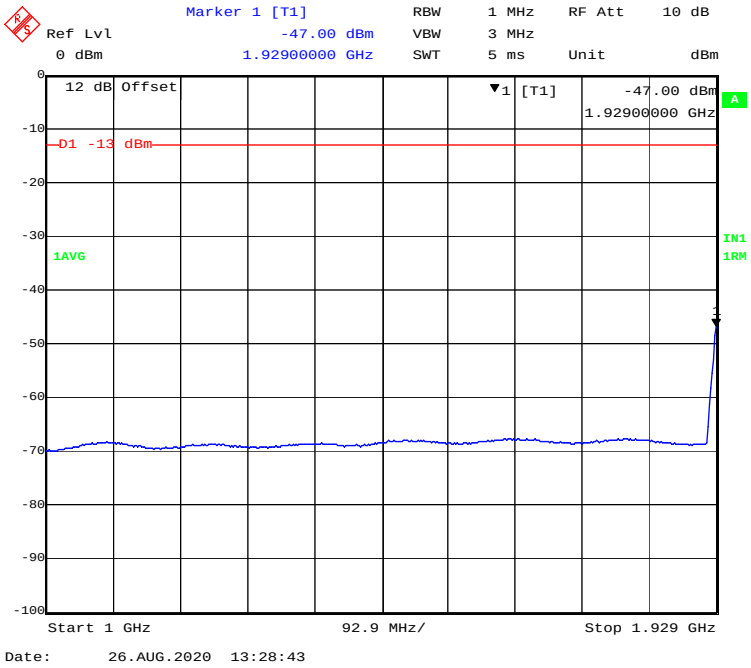
PCS - AWGN-3dB above AGC-Low Channel

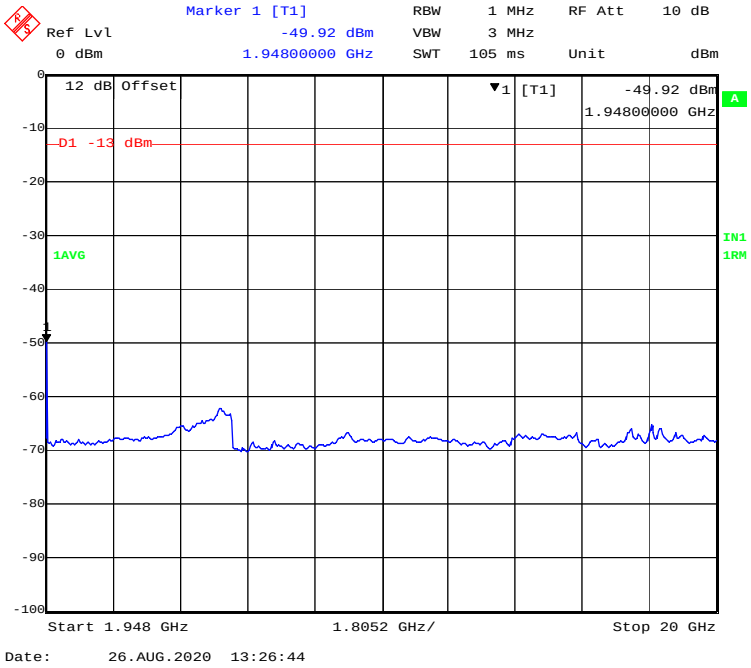


Date: 8.SEP.2020 17:52:44

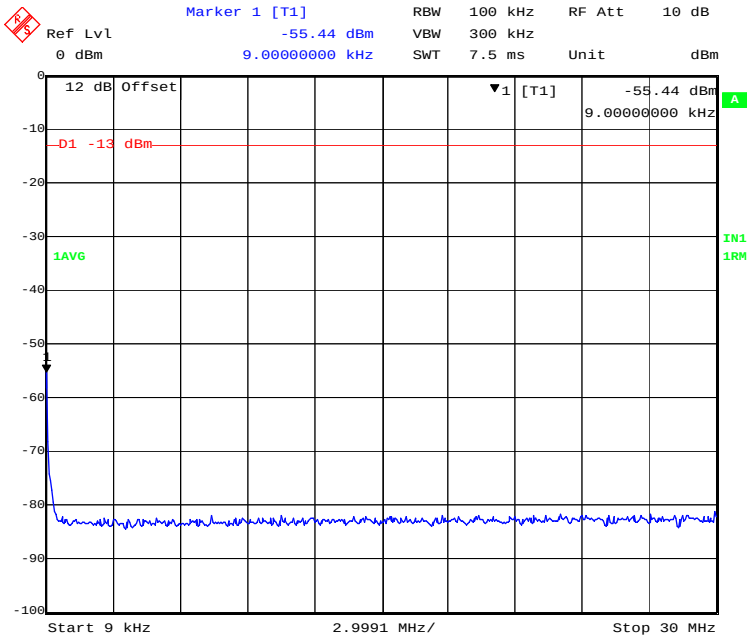


Date: 26.AUG.2020 13:20:38

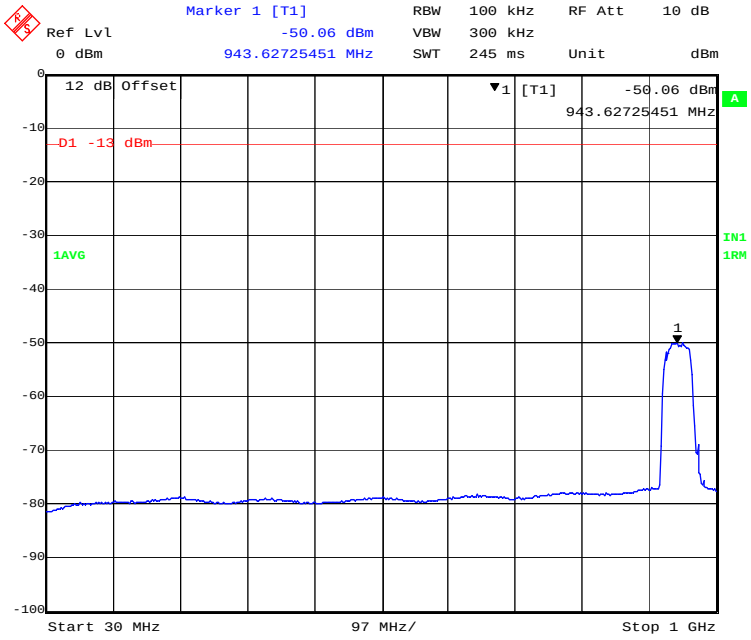

Marker 1 [T1]
Ref Lvl
0 dBm
-47.00 dBm
1.92900000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
12 dB Offset
▼1 [T1] -47.00 dBm
1.92900000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1 GHz
92.9 MHz/
Stop 1.929 GHz
Date: 26.AUG.2020 13:28:43


Marker 1 [T1]
Ref Lvl
0 dBm
-49.92 dBm
1.94800000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
12 dB Offset
▼1 [T1] -49.92 dBm
1.94800000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1.948 GHz
1.8052 GHz/
Stop 20 GHz
Date: 26.AUG.2020 13:26:44

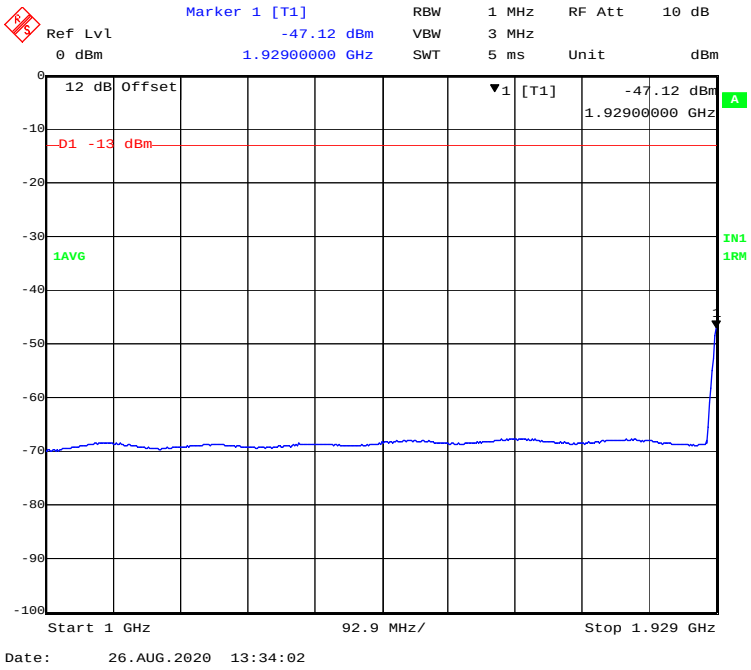
PCS - AWGN-3dB above AGC-Middle Channel

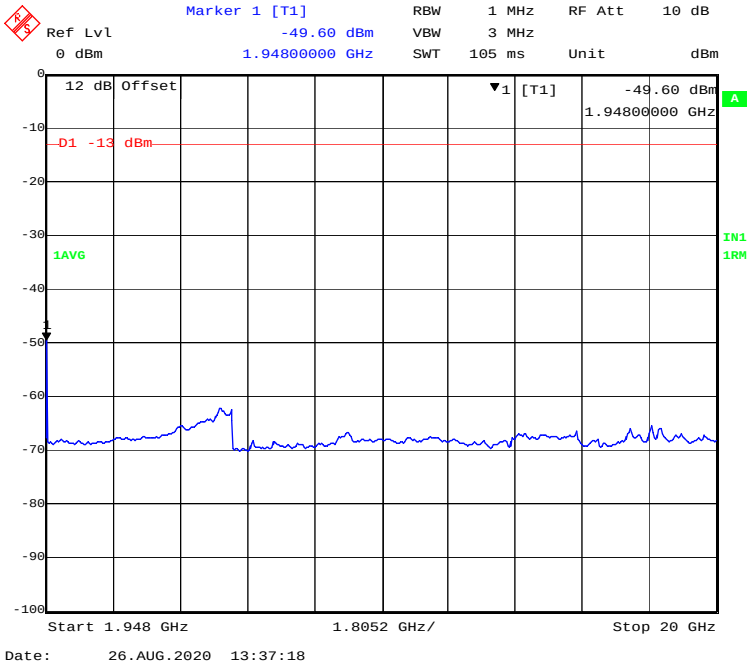


Date: 8.SEP.2020 17:53:40

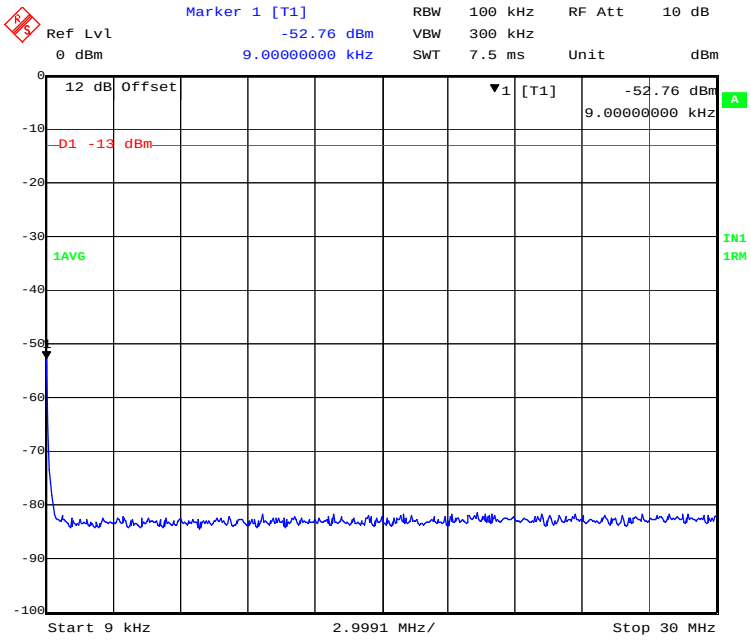


Date: 26.AUG.2020 13:32:19

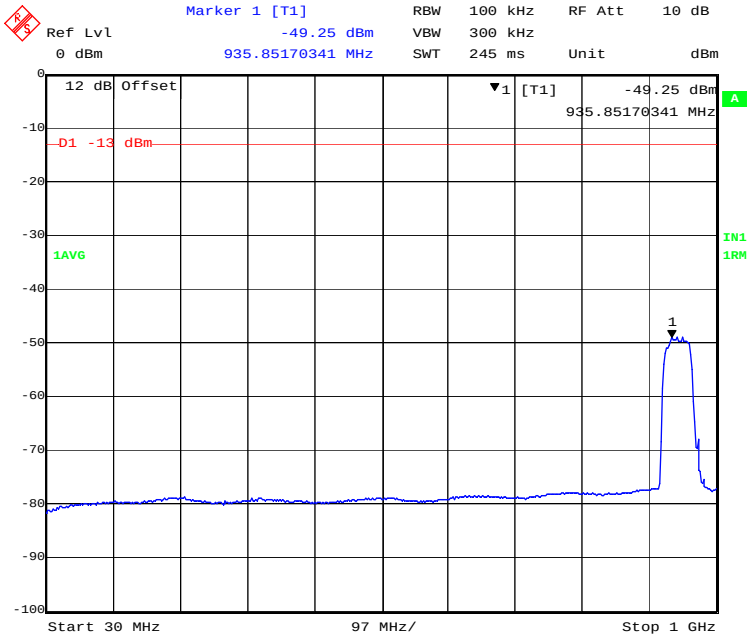

Marker 1 [T1]
Ref Lvl
0 dBm
-47.12 dBm
1.92900000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -47.12 dBm
1.92900000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1 GHz
92.9 MHz/
Stop 1.929 GHz
Date: 26.AUG.2020 13:34:02


Marker 1 [T1]
Ref Lvl
0 dBm
-49.60 dBm
1.94800000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -49.60 dBm
1.94800000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1.948 GHz
1.8052 GHz/
Stop 20 GHz
Date: 26.AUG.2020 13:37:18

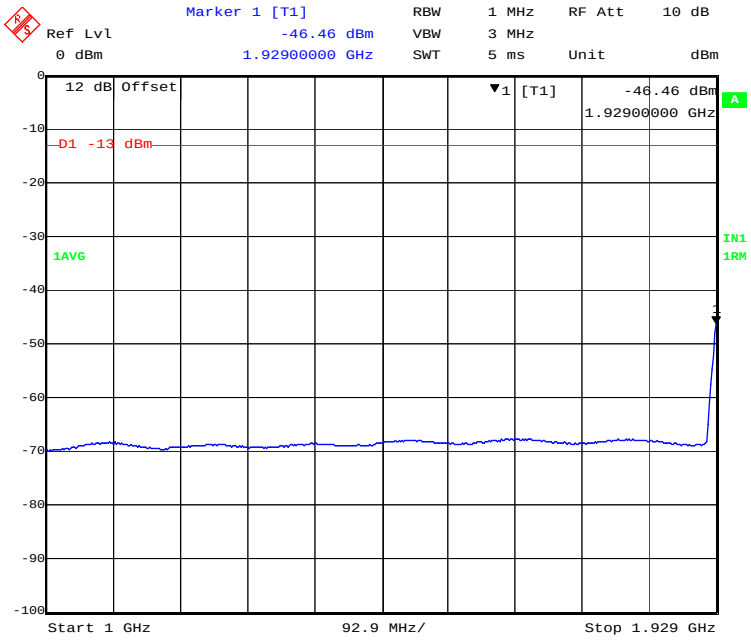
PCS - AWGN-3dB above AGC-High Channel



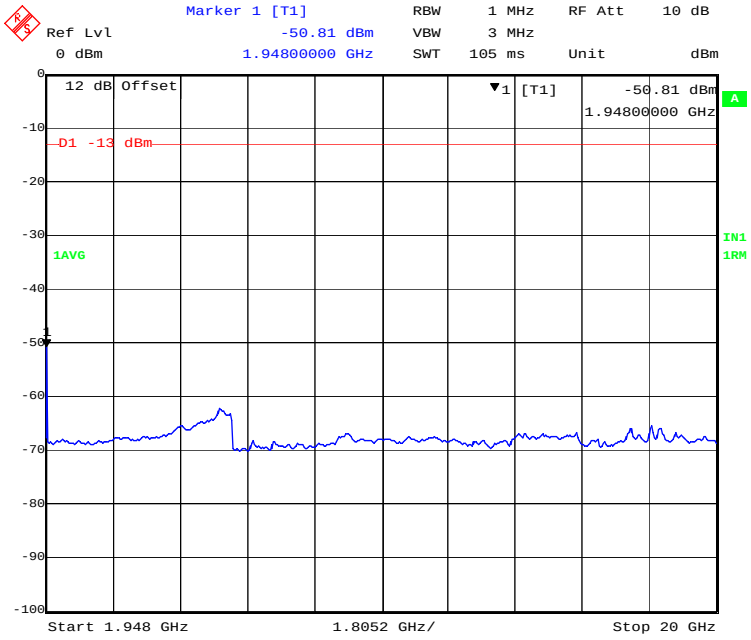
Date: 8.SEP.2020 17:55:37



Date: 26.AUG.2020 13:39:53

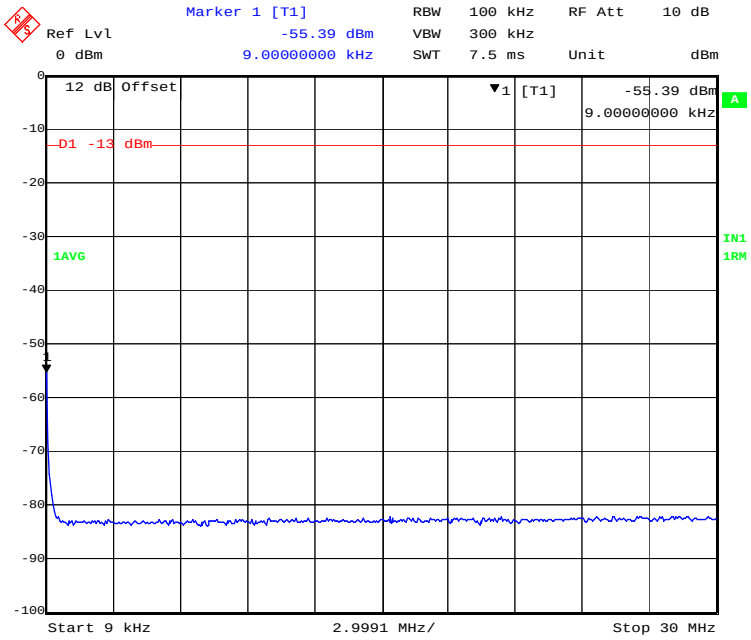


Date: 26.AUG.2020 13:41:41

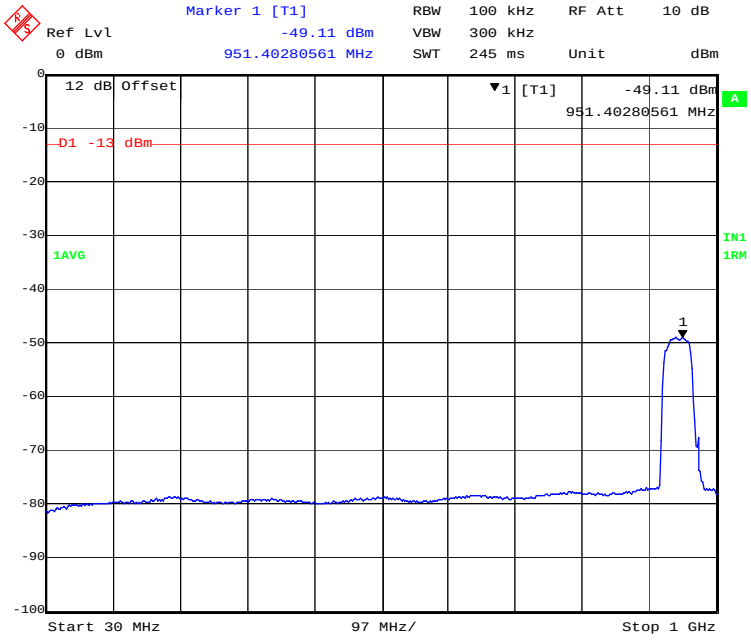


Date: 26.AUG.2020 13:44:39

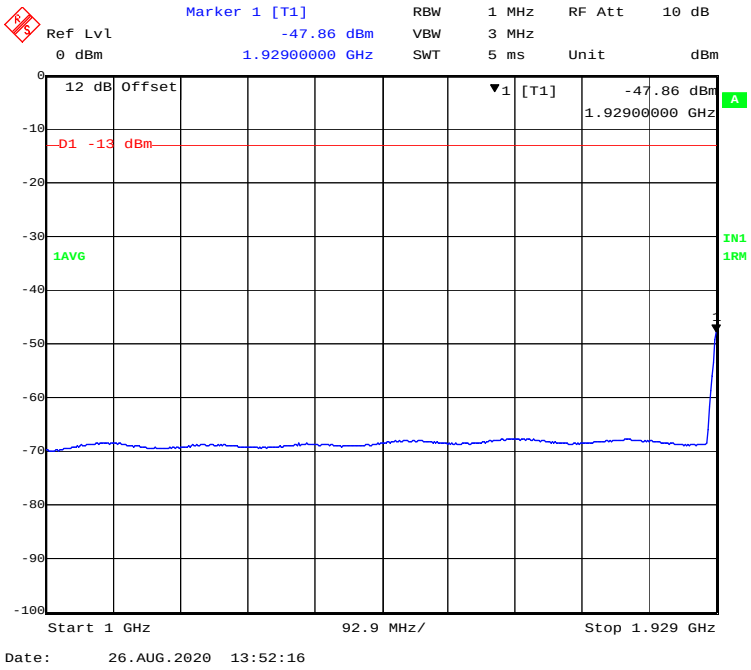
PCS - GSM-3dB above AGC-Low Channel

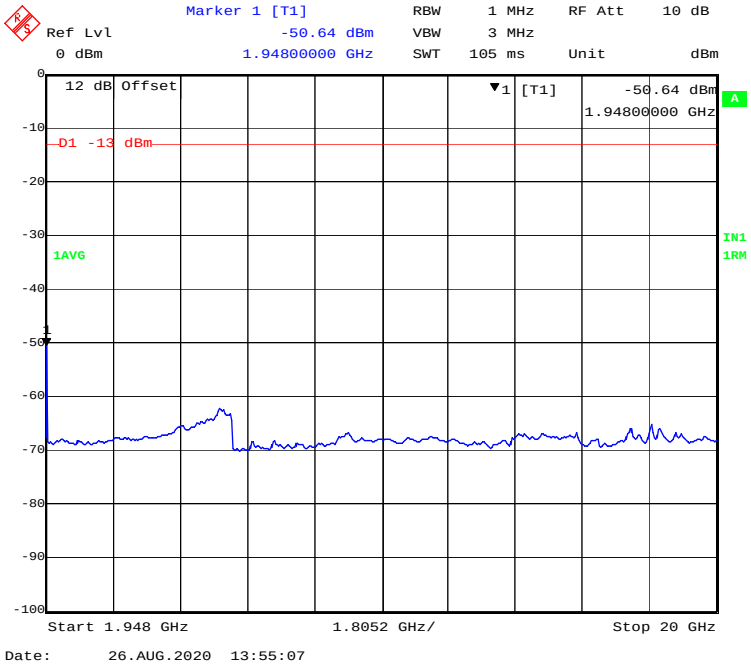


Date: 8.SEP.2020 17:56:56

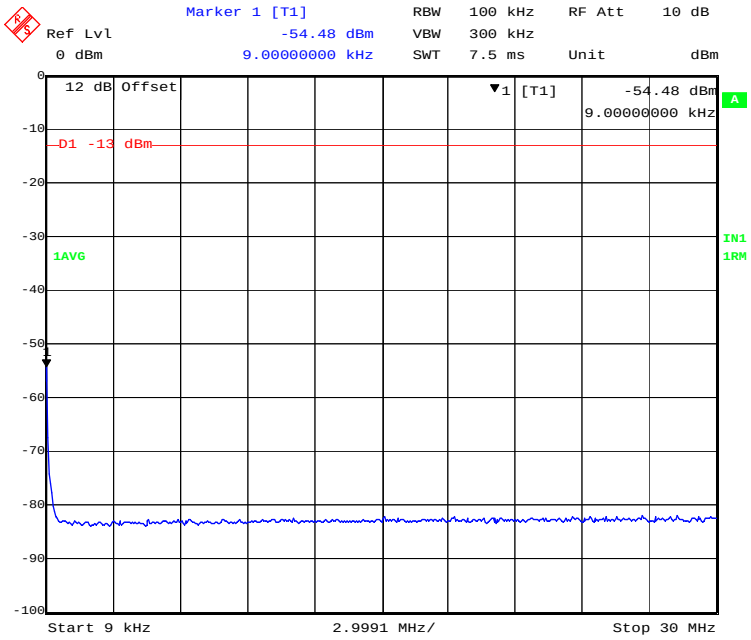


Date: 26.AUG.2020 13:50:55

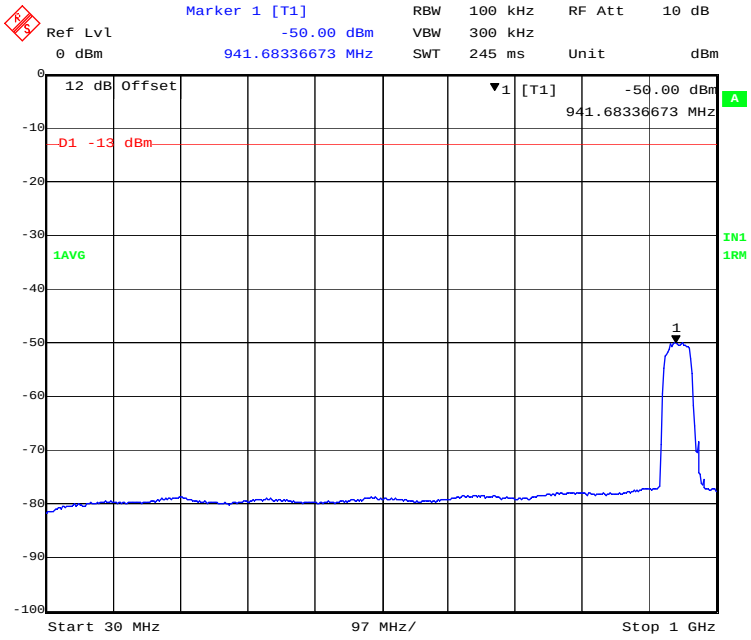

Marker 1 [T1]
Ref Lvl
0 dBm
-47.86 dBm
1.92900000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -47.86 dBm
1.92900000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1 GHz
92.9 MHz/
Stop 1.929 GHz
Date: 26.AUG.2020 13:52:16


Marker 1 [T1]
Ref Lvl
0 dBm
-50.64 dBm
1.94800000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -50.64 dBm
1.94800000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1.948 GHz
1.8052 GHz/
Stop 20 GHz
Date: 26.AUG.2020 13:55:07

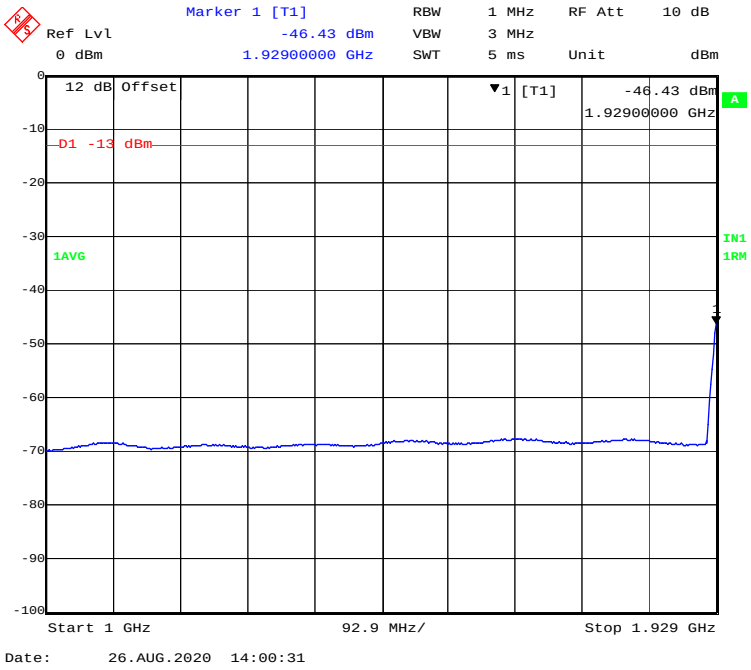
PCS - GSM-3dB above AGC-Middle Channel

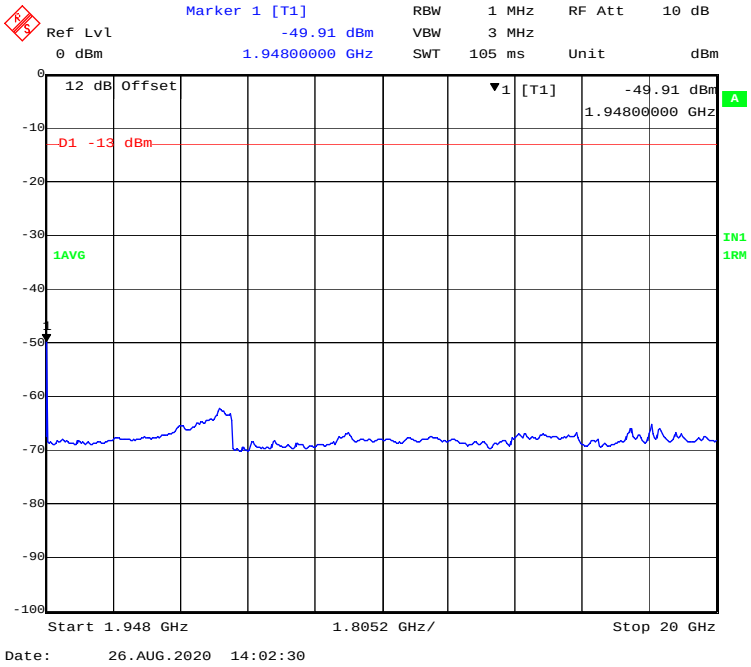


Date: 8.SEP.2020 17:57:46

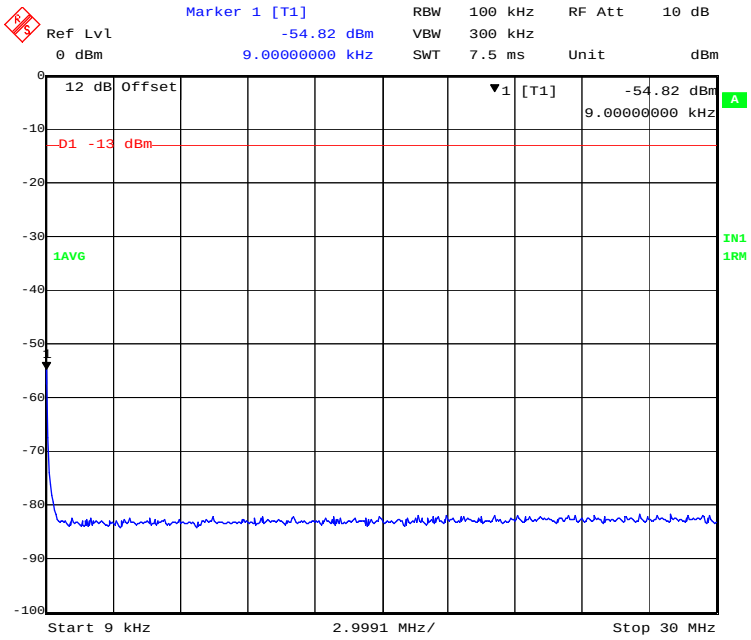


Date: 26.AUG.2020 13:58:07

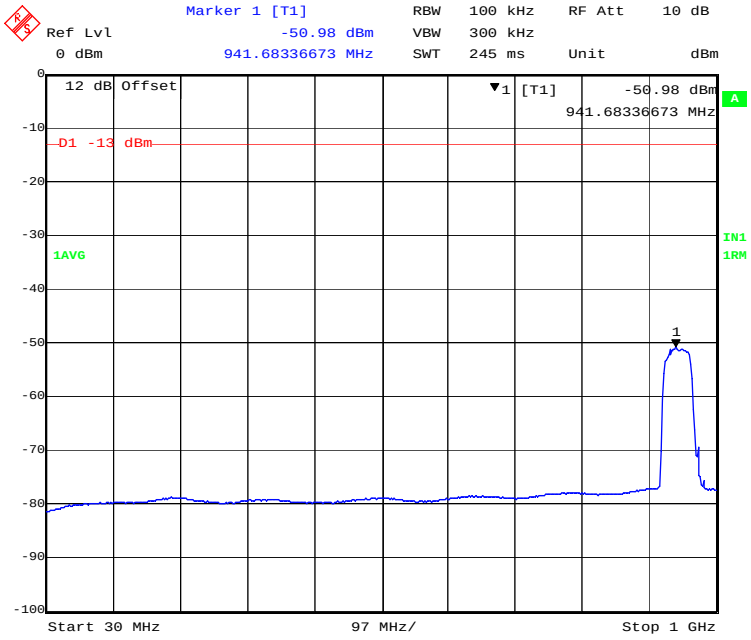

Marker 1 [T1]
Ref Lvl
0 dBm
-46.43 dBm
1.92900000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -46.43 dBm
1.92900000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1 GHz
92.9 MHz/
Stop 1.929 GHz
Date: 26.AUG.2020 14:00:31


Marker 1 [T1]
Ref Lvl
0 dBm
-49.91 dBm
1.94800000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 10 dB
Unit dBm
12 dB Offset
1 [T1] -49.91 dBm
1.94800000 GHz
D1 -13 dBm
1AVG
IN1
1RM
Start 1.948 GHz
1.8052 GHz/
Stop 20 GHz
Date: 26.AUG.2020 14:02:30

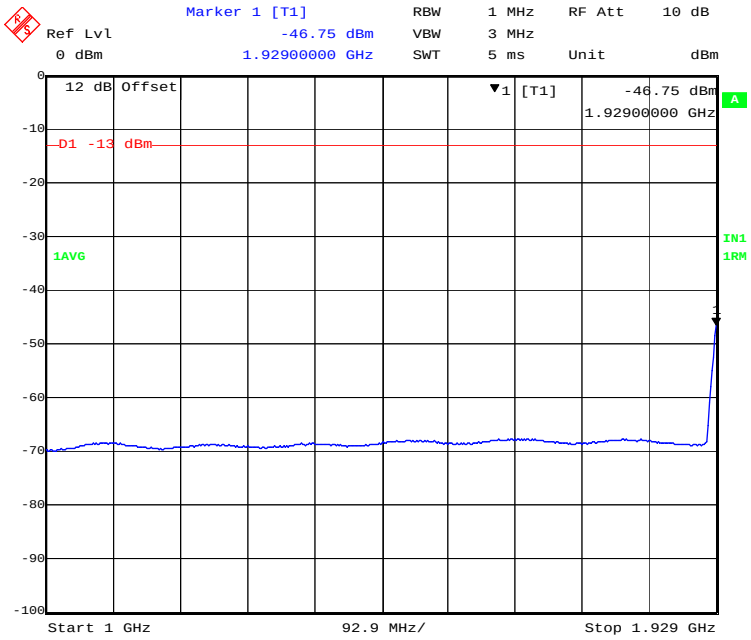
PCS - GSM-3dB above AGC-High Channel



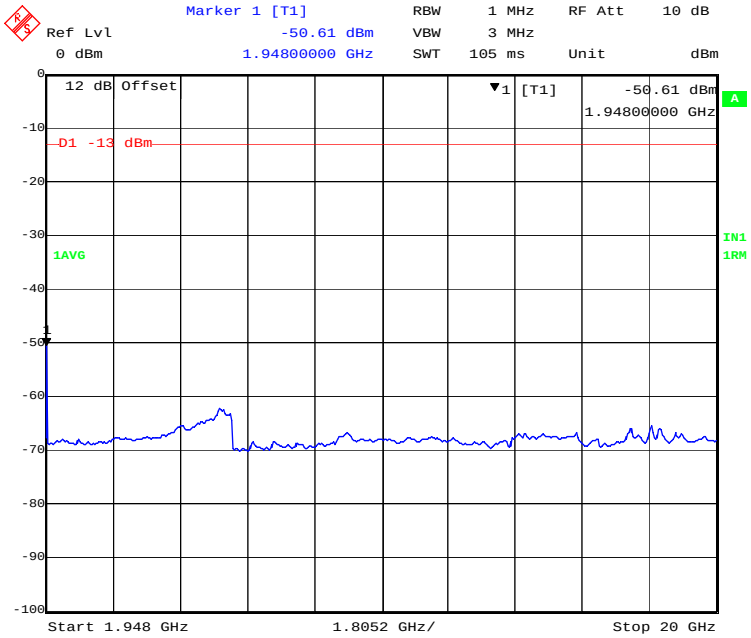
Date: 8.SEP.2020 17:58:45



Date: 26.AUG.2020 14:04:11



Date: 26.AUG.2020 14:05:21



Date: 26.AUG.2020 14:06:42

FCC § 2.1053, § 24.238 - SPURIOUS RADIATED EMISSIONS

Applicable Standards

FCC § 2.1053 and § 24.238.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the receiving antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Data

Environmental Conditions

Temperature:	25.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Winnie Yang on 2020-08-17.

Test mode: Transmitting (Pre-scan with low, middle and high channels, and the worse case data as below)

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 24E	
			Height (cm)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)		Limit (dBm)	Margin (dB)
PCS Band										
Uplink										
Test frequency range: 30MHz - 20 GHz										
61.53	46.66	198	200	H	-55.52	0.27	-10.56	-66.35	-13	53.35
61.53	43.28	227	200	V	-62.06	0.27	-10.56	-72.89	-13	59.89
3717.00	61.97	22	200	H	-44.94	0.95	9.77	-36.12	-13	23.12
3717.00	65.87	344	200	V	-41.04	0.95	9.77	-32.22	-13	19.22
Downlink										
Test frequency range: 30MHz -20 GHz										
297.96	59.08	55	100	H	-47.91	0.46	-2.15	-50.52	-13	37.52
297.96	54.72	15	100	V	-51.46	0.46	-2.15	-54.07	-13	41.07
3877.00	45.97	61	100	H	-60.44	0.96	9.67	-51.73	-13	38.73
3877.00	41.24	60	100	V	-65.17	0.96	9.67	-56.46	-13	43.46

Note:
1) Absolute Level = SG Level - Cable loss + Antenna Gain
2) Margin = Limit- Absolute Level

FCC § 24.238 - BAND EDGES & INTERMODULATION

Applicable Standards

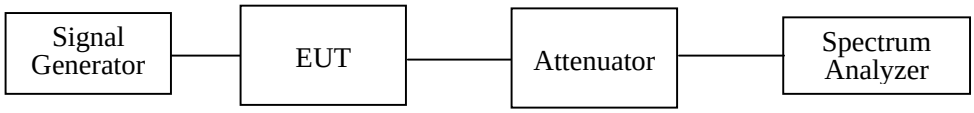
FCC §2.1053, §24.238.

The power of any emissions 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.

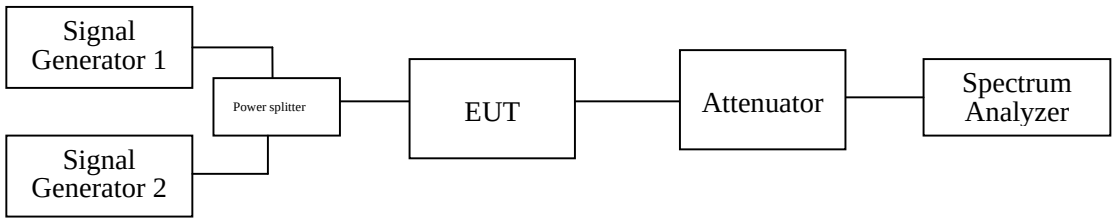
Test Procedure

Please refer to KDB 935210 D05 Indus Booster Basic Meas v01r03 clause 3.6.2

For band edges test:



For intermodulation test:



Test Data

Environmental Conditions

Temperature:	24.8~25.2 ℃
Relative Humidity:	49~51 %
ATM Pressure:	101.2~101.7 kPa

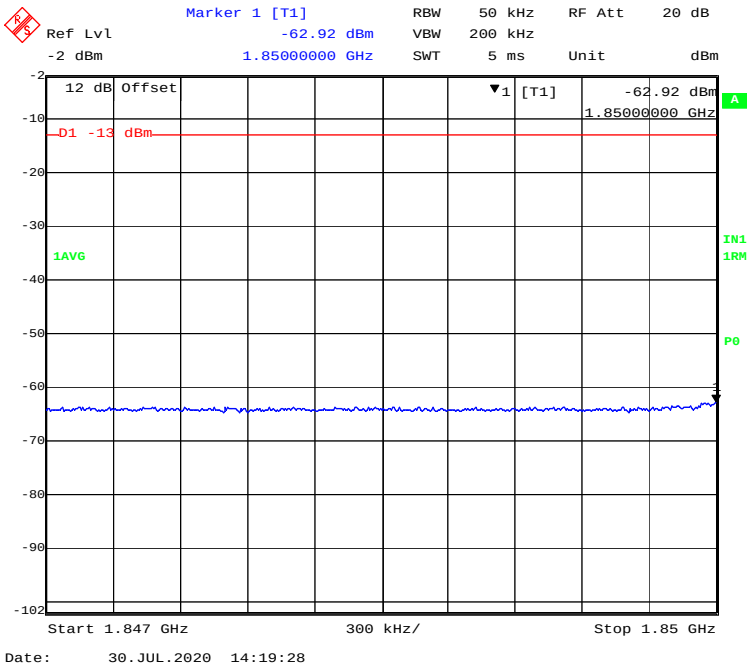
The testing was performed by Winnie Yang from 2020-07-30 to 2020-08-21

EUT operation mode: Transmitting

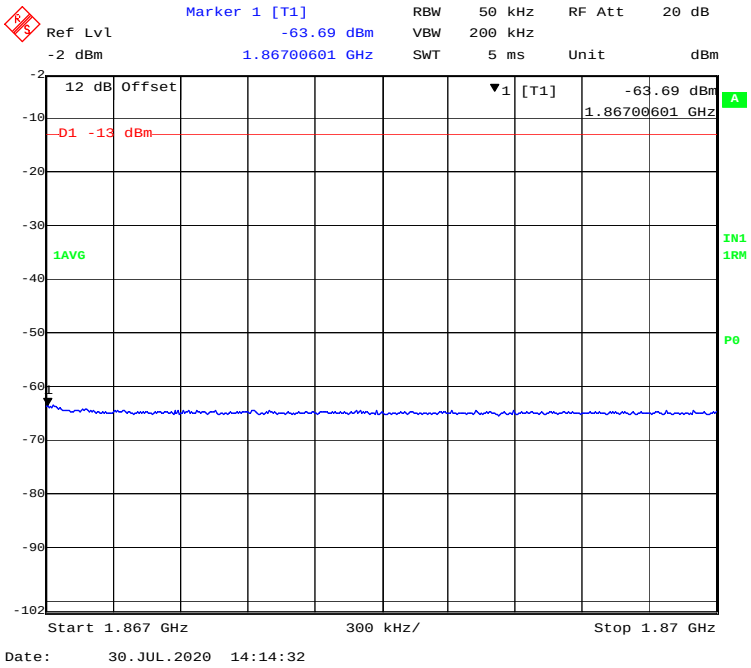
Test Result: Compliant.

For Band Edge:
Uplink:

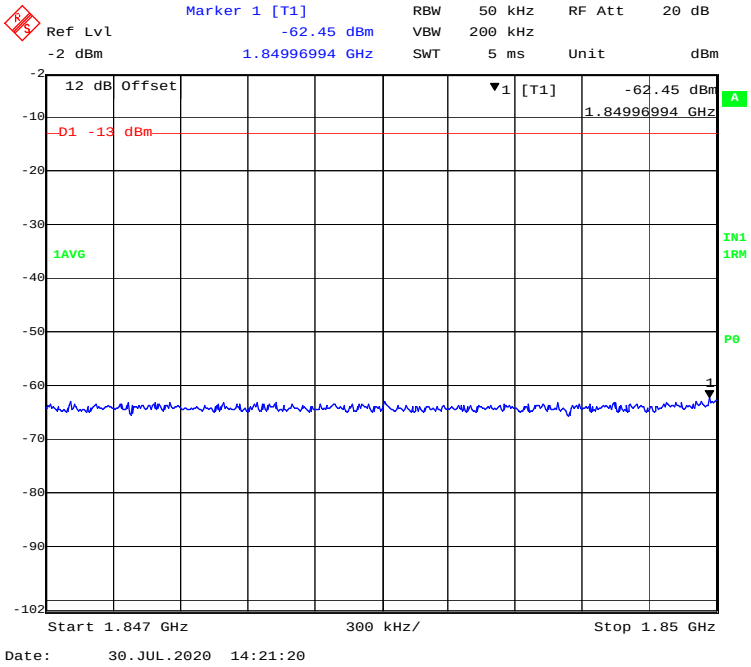
PCS Band, Left Band Edge for AWGN-Pre AGC



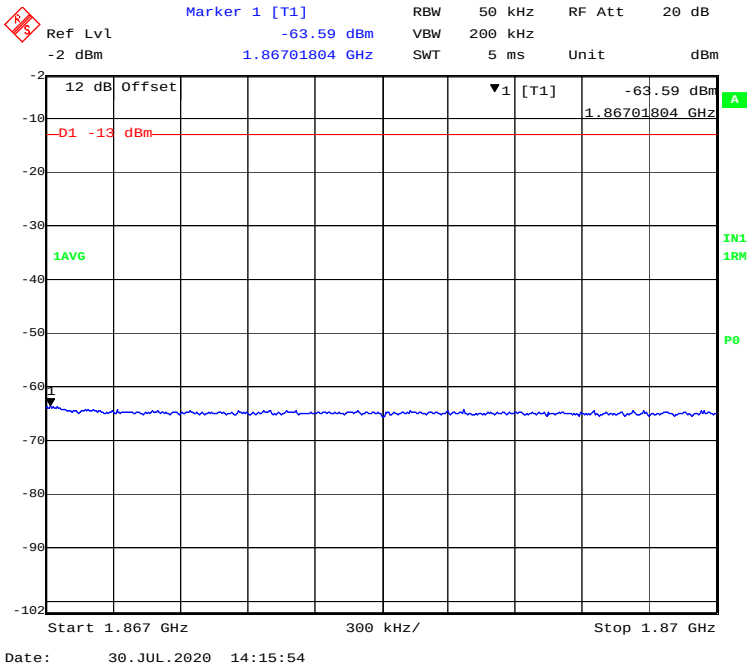
PCS Band, Right Band Edge for AWGN-Pre AGC



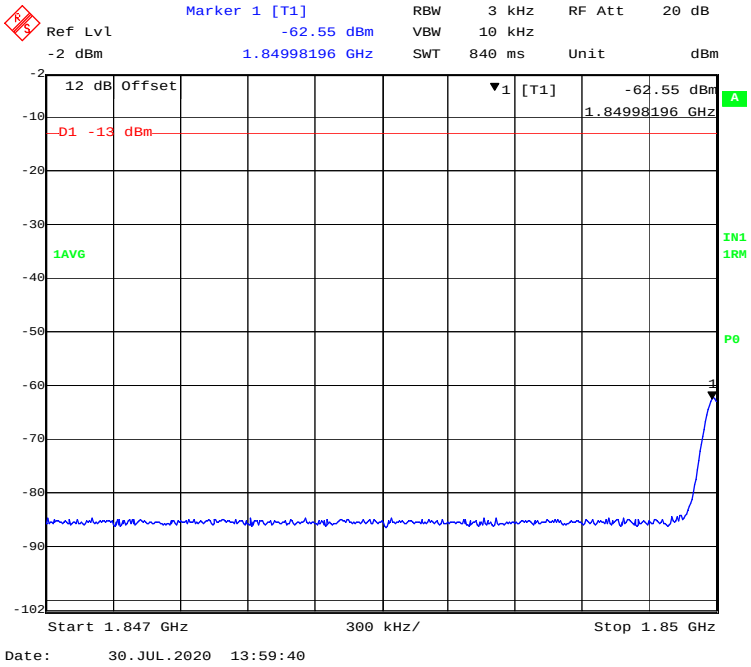
PCS Band, Left Band Edge for AWGN-3dB Above AGC



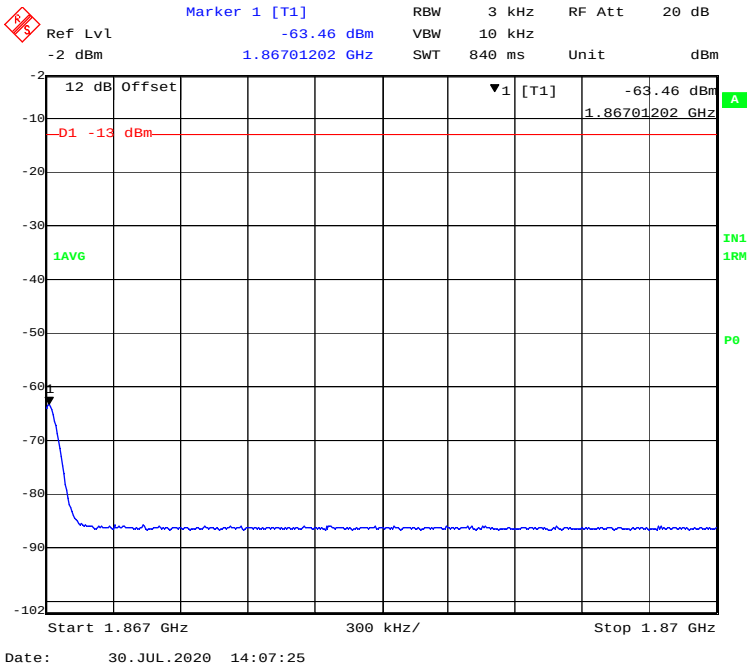
PCS Band, Right Band Edge for AWGN-3dB Above AGC



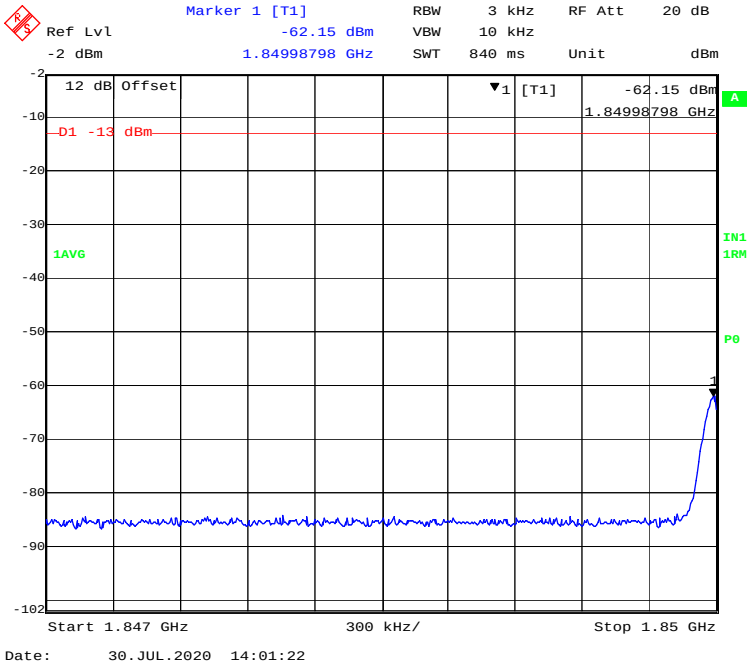
PCS Band, Left Band Edge for GSM-Pre AGC



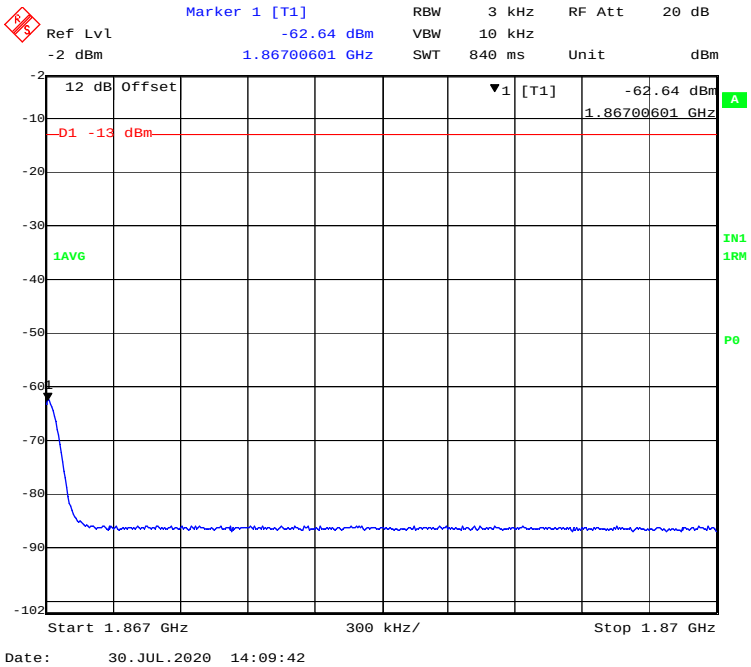
PCS Band, Right Band Edge for GSM-Pre AGC



PCS Band, Left Band Edge for GSM-3dB Above AGC

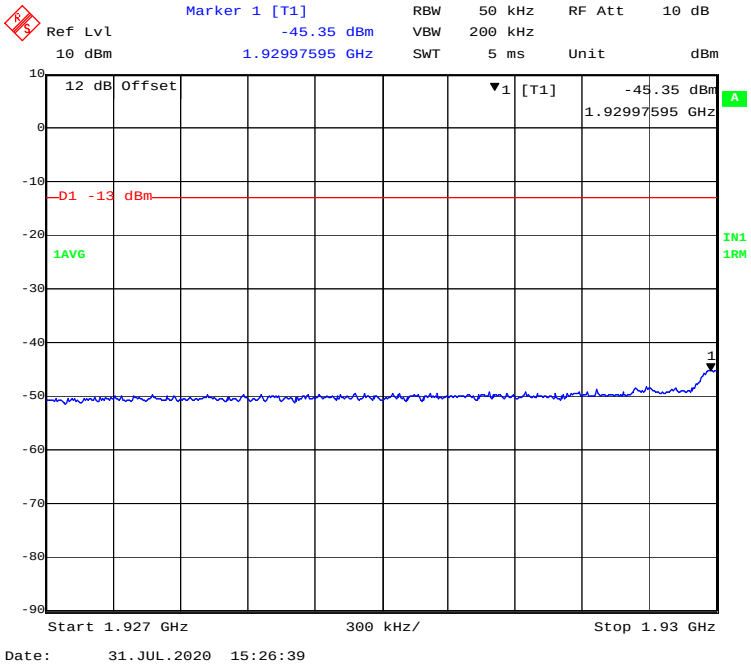


PCS Band, Right Band Edge for GSM-3dB Above AGC

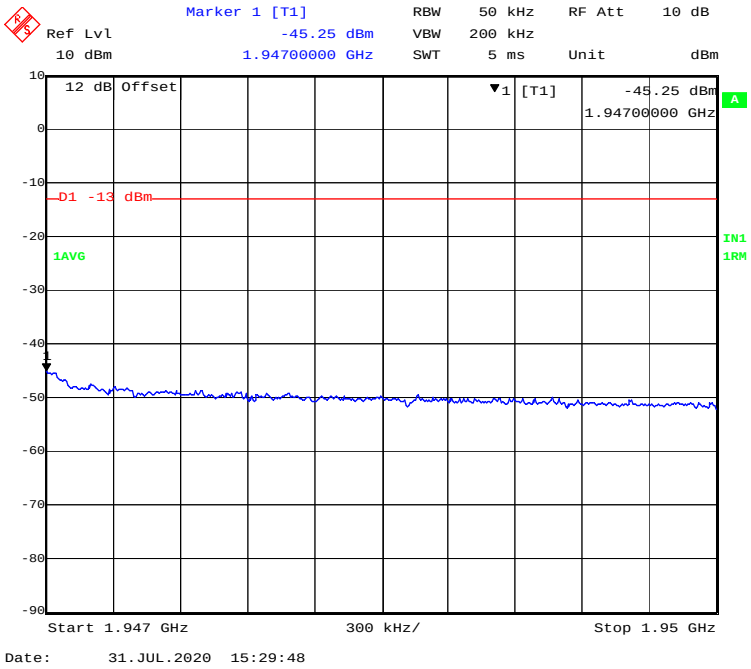


Downlink:

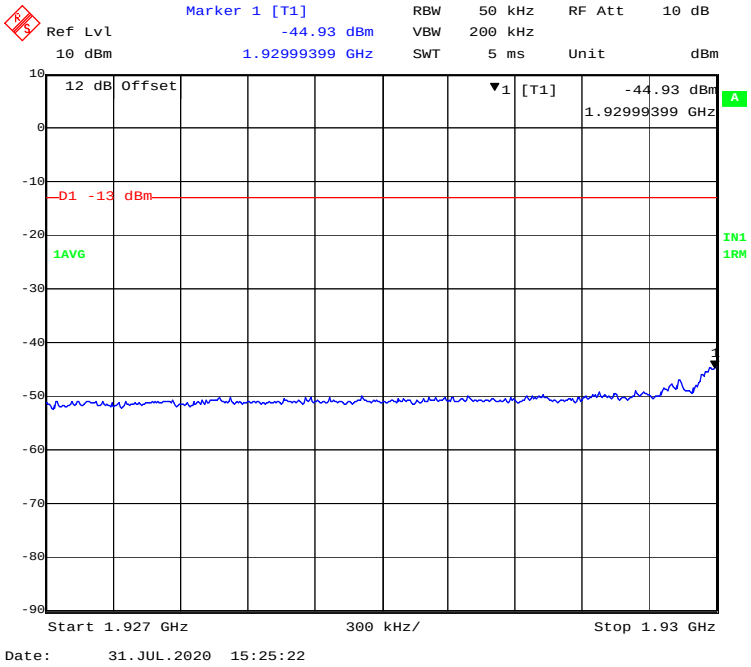
PCS Band, Left Band Edge for AWGN-Pre AGC



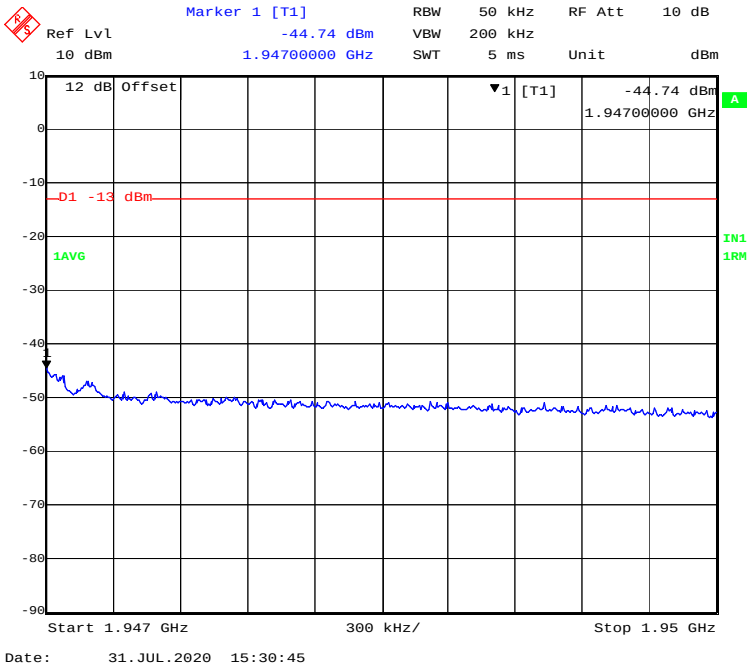
PCS Band, Right Band Edge for AWGN-Pre AGC



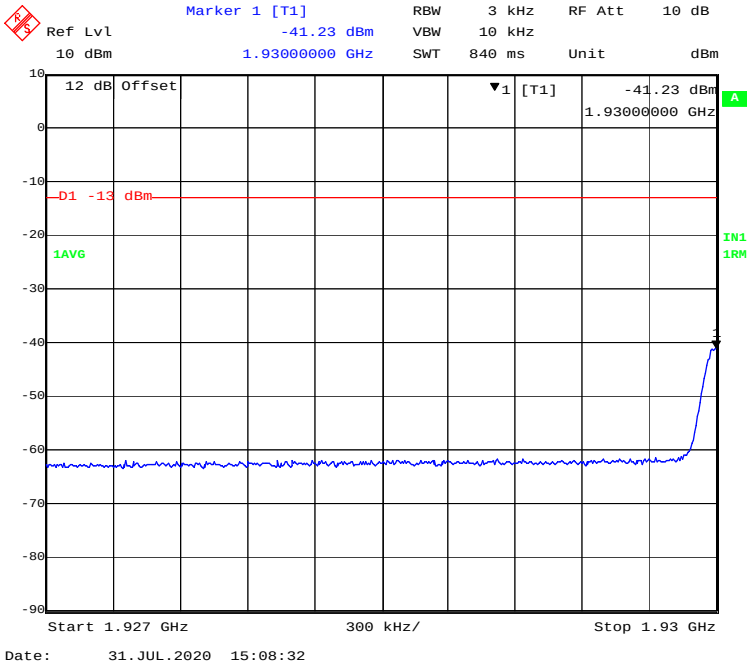
PCS Band, Left Band Edge for AWGN-3dB Above AGC



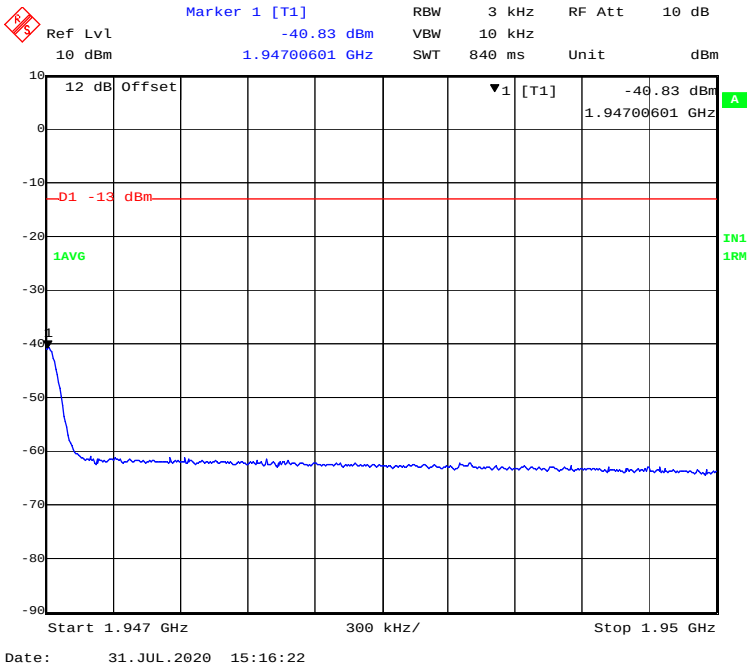
PCS Band, Right Band Edge for AWGN-3dB Above AGC



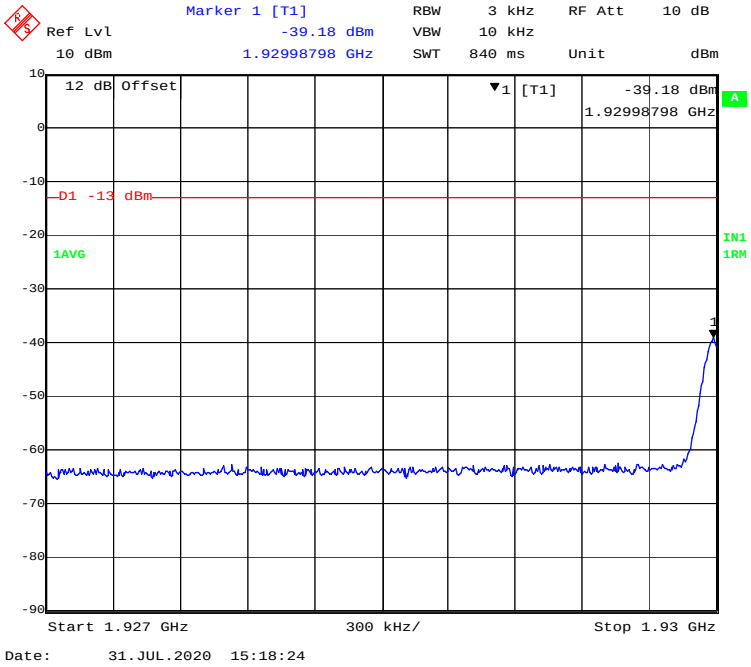
PCS Band, Left Band Edge for GSM-Pre AGC



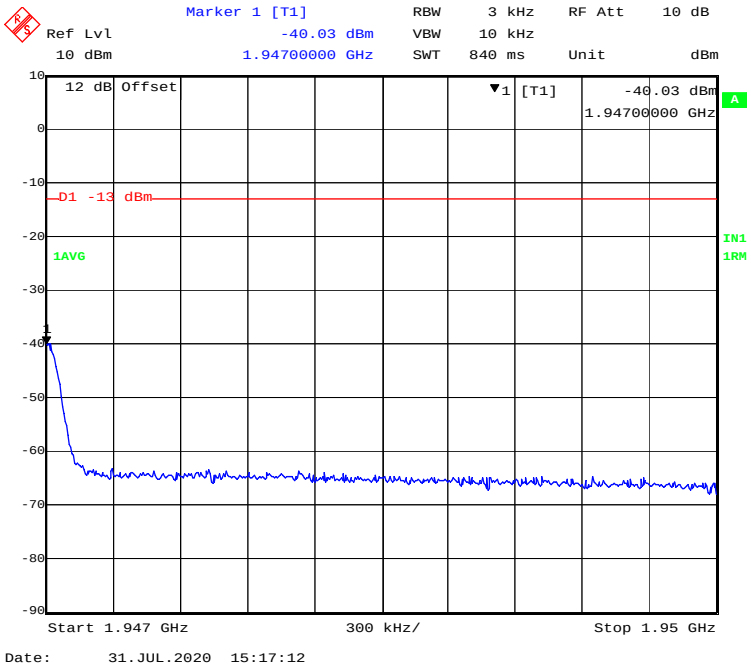
PCS Band, Right Band Edge for GSM-Pre AGC



PCS Band, Left Band Edge for GSM-3dB Above AGC

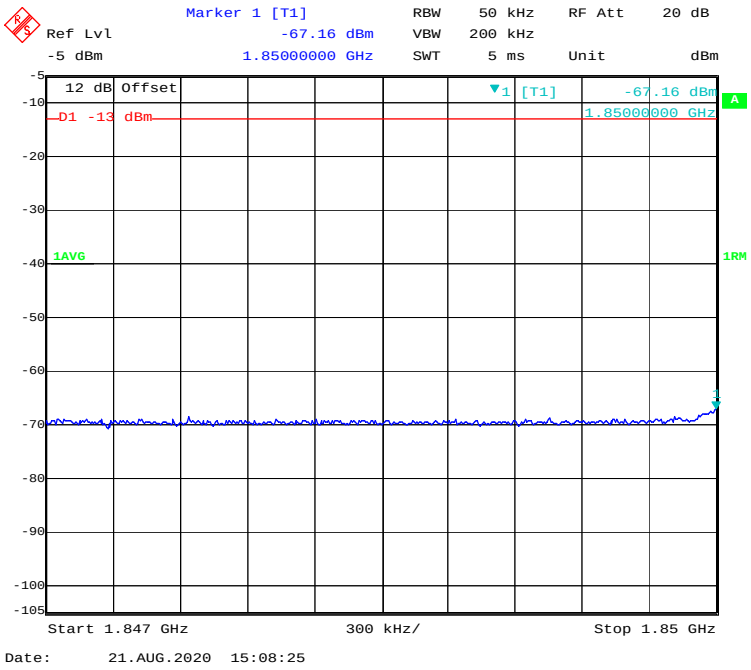


PCS Band, Right Band Edge for GSM-3dB Above AGC

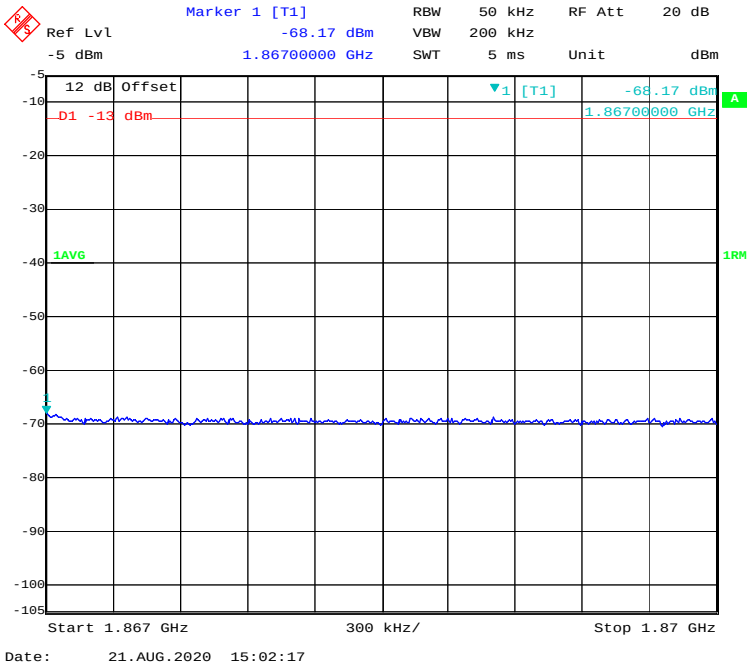


Inter-Modulation
Uplink:

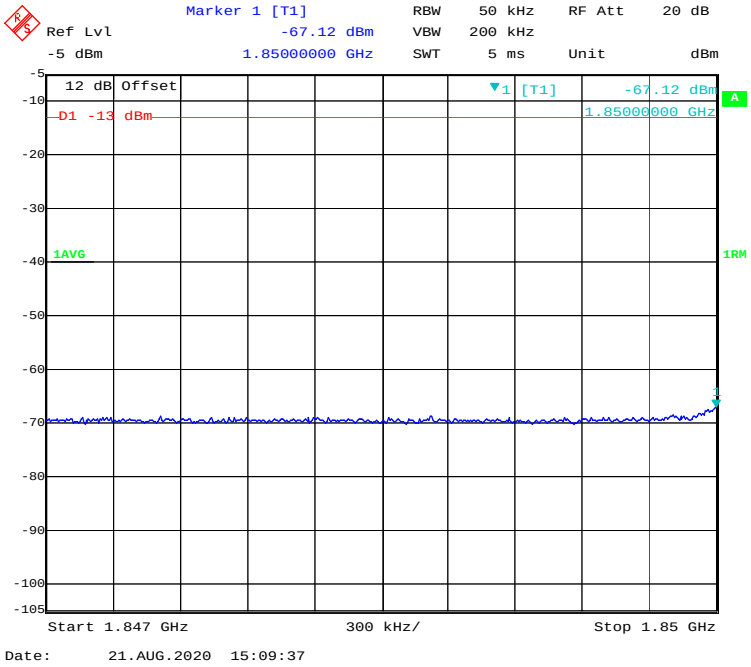
PCS Band, Left Band Edge for AWGN-Pre AGC



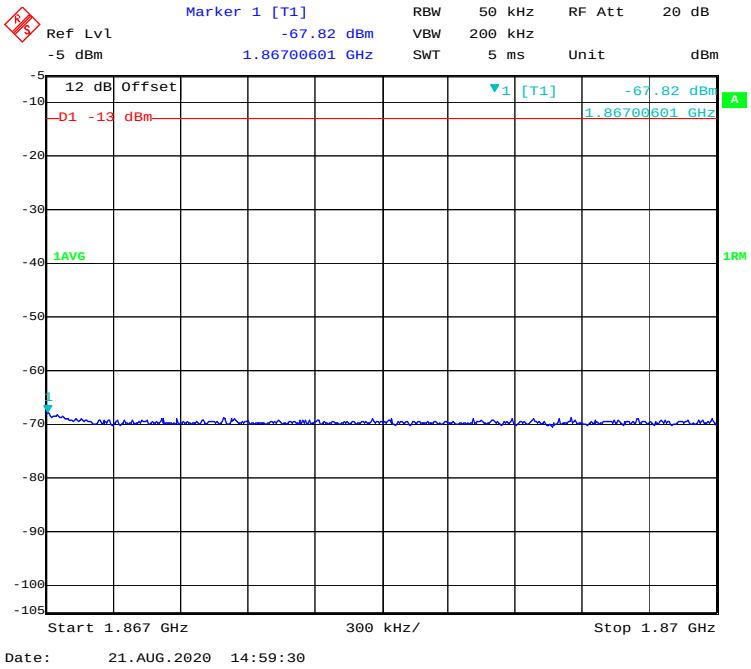
PCS Band, Right Band Edge for AWGN-Pre AGC



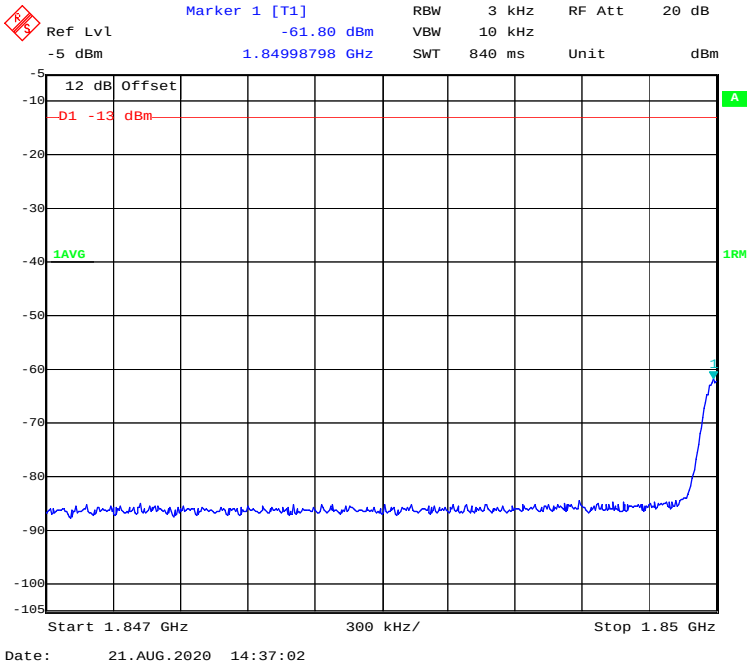
PCS Band, Left Band Edge for AWGN-3dB Above AGC



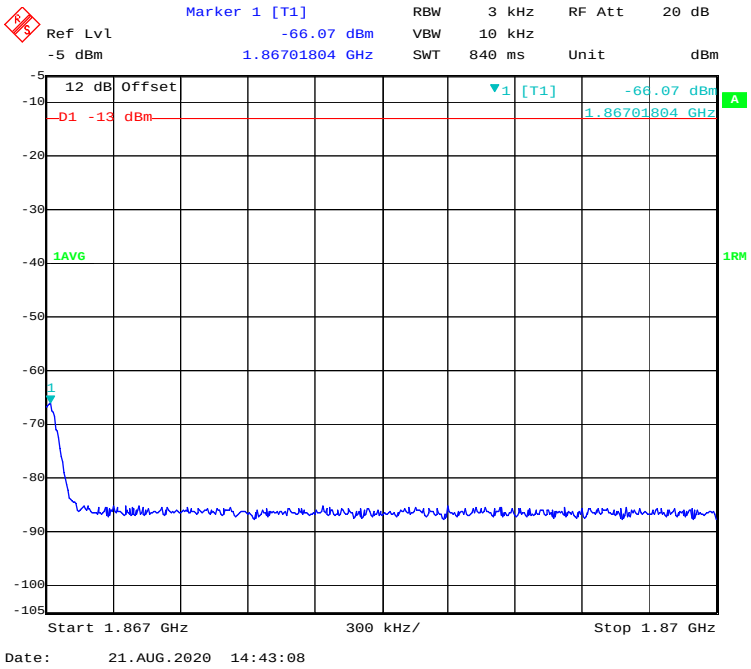
PCS Band, Right Band Edge for AWGN-3dB Above AGC



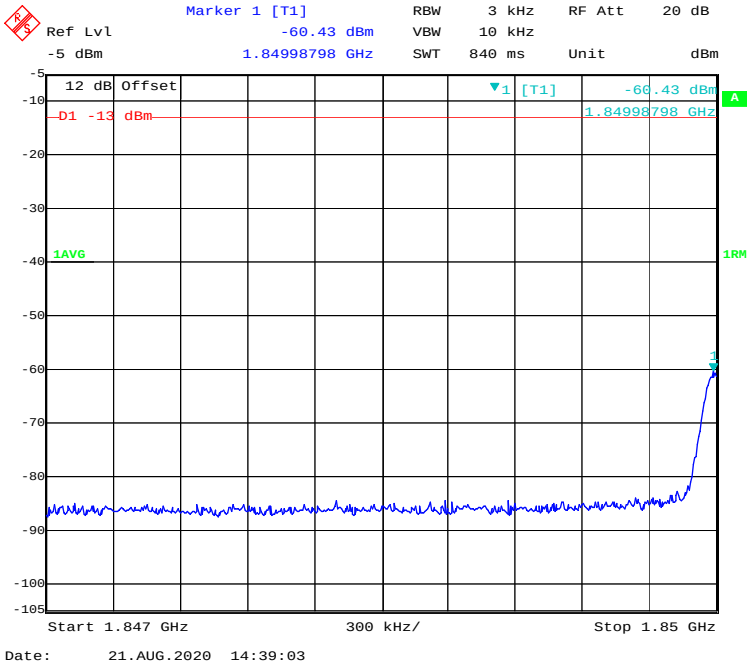
PCS Band, Left Band Edge for GSM-Pre AGC



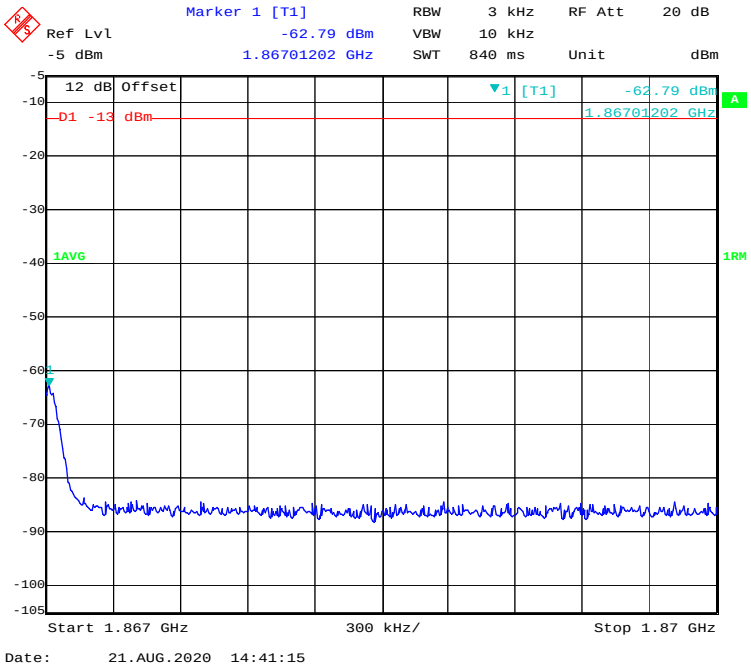
PCS Band, Right Band Edge for GSM-Pre AGC



PCS Band, Left Band Edge for GSM-3dB Above AGC

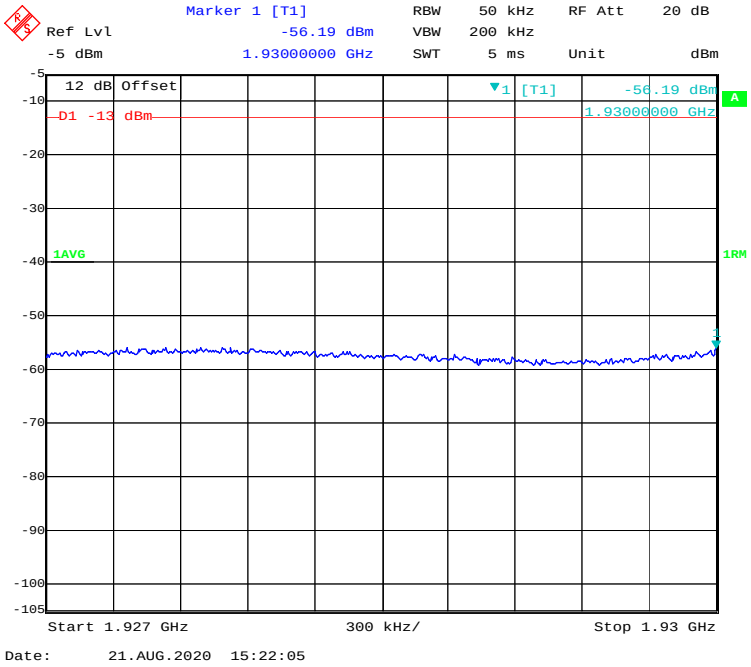


PCS Band, Right Band Edge for GSM-3dB Above AGC

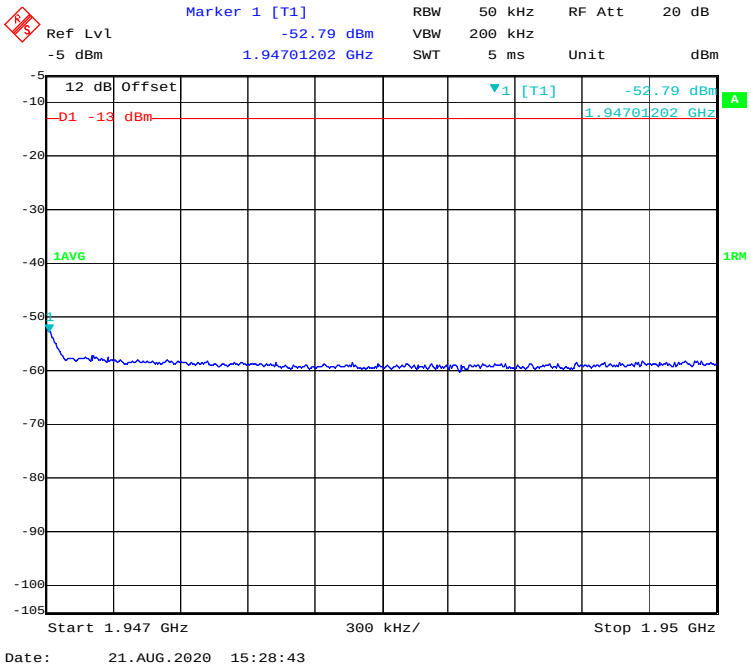


Downlink:

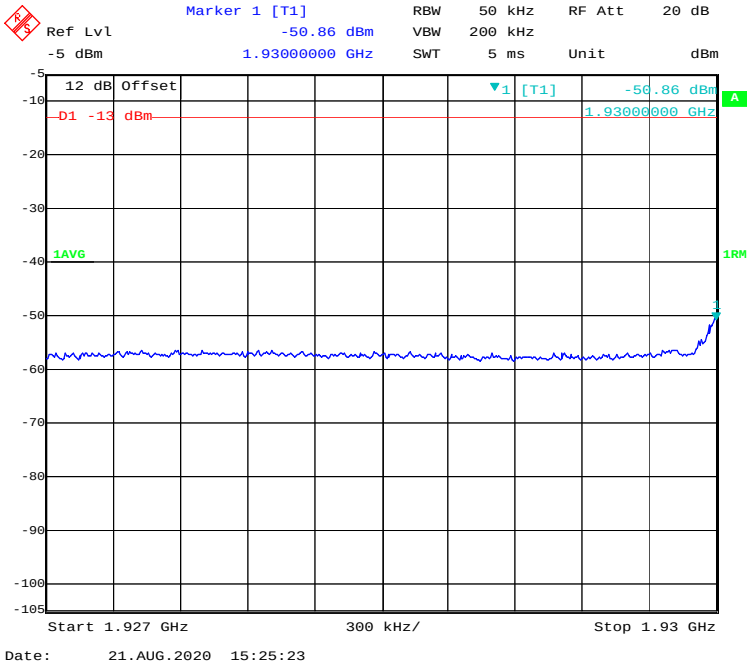
PCS Band, Left Band Edge for AWGN-Pre AGC



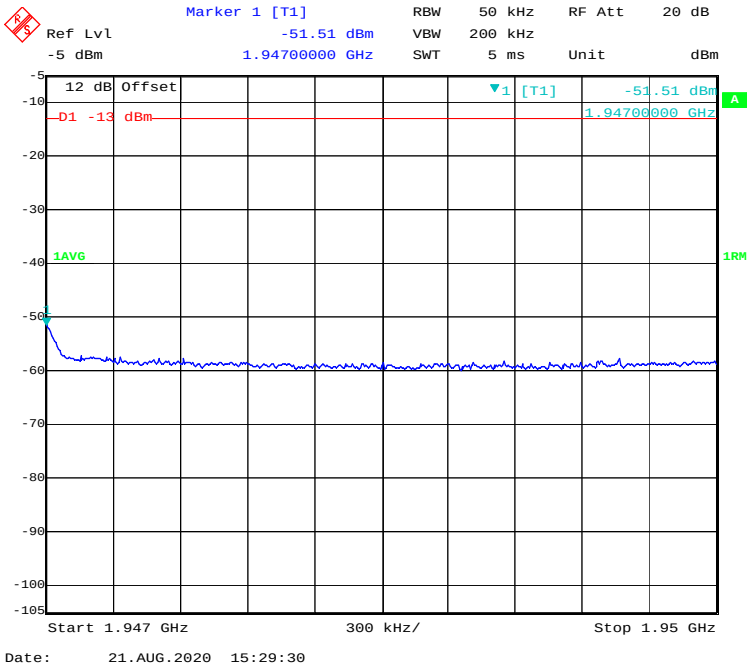
PCS Band, Right Band Edge for AWGN-Pre AGC



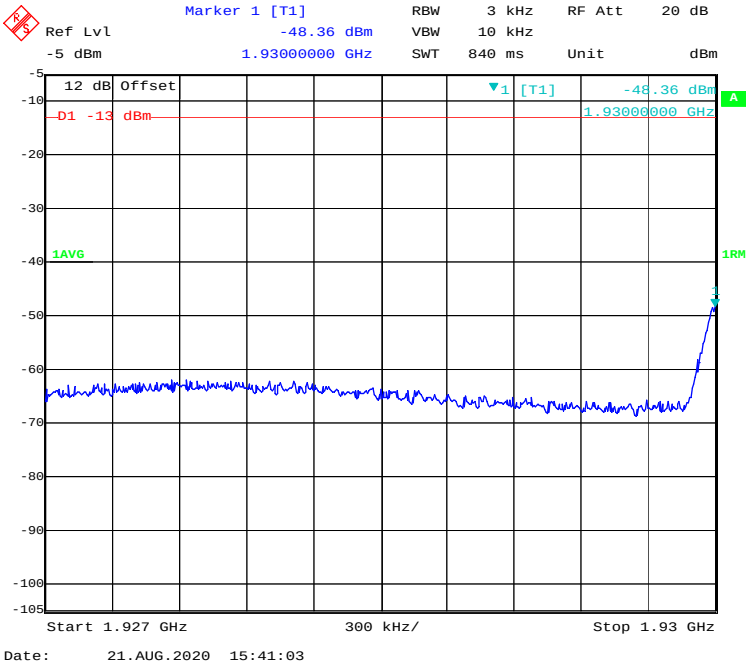
PCS Band, Left Band Edge for AWGN-3dB Above AGC



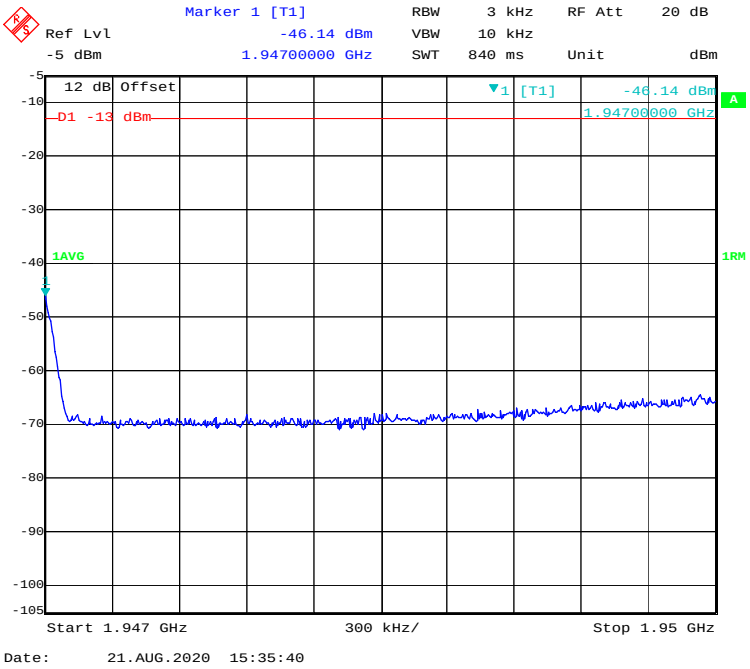
PCS Band, Right Band Edge for AWGN-3dB Above AGC



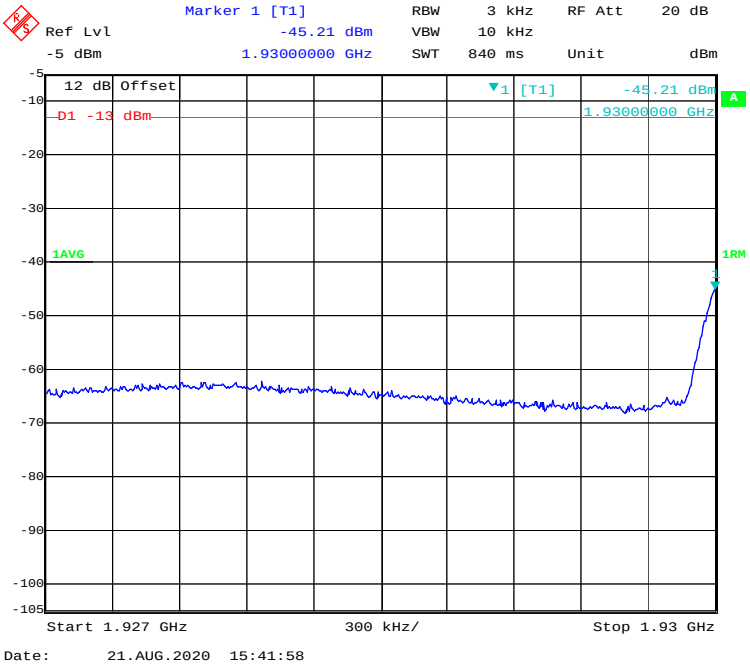
PCS Band, Left Band Edge for GSM-Pre AGC



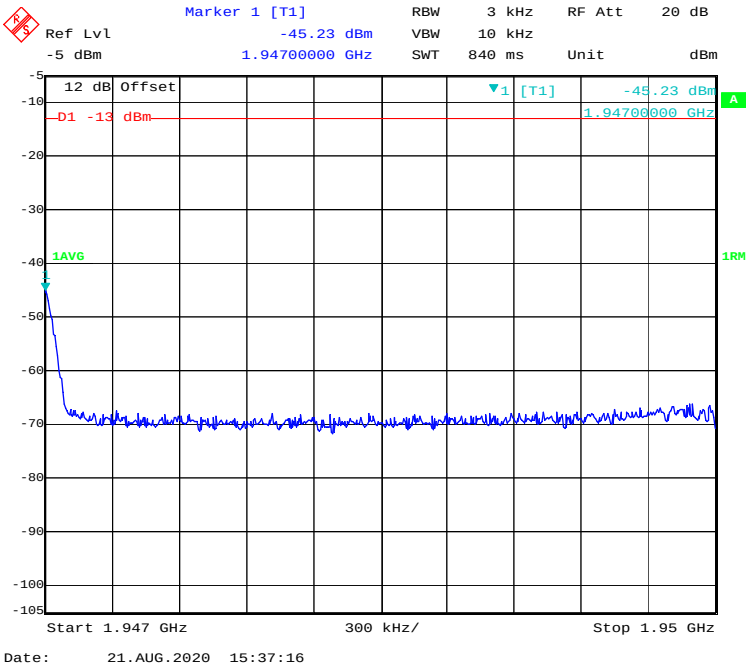
PCS Band, Right Band Edge for GSM-Pre AGC



PCS Band, Left Band Edge for GSM-3dB Above AGC



PCS Band, Right Band Edge for GSM-3dB Above AGC



FCC § 20.21 - OUT OF BAND REJECTION

Applicable Standards

According to FCC Part § 20.21, a booster shall have -20dB at the band edge referenced to the gain in the center of the pass band of the booster, where band edge is the end of the licensee's allocated spectrum.

Test Procedure

FCC KDB 935210 D05 Indus Booster Basic Meas v01r03, Section 3.3.

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. The span of the spectrum analyzer was set to be wide enough in order to capture the spectrum of entire operating band.

Test Data

Environmental Conditions

Temperature:	24.8~25.0 ℃
Relative Humidity:	49~51 %
ATM Pressure:	101.2~101.7 kPa

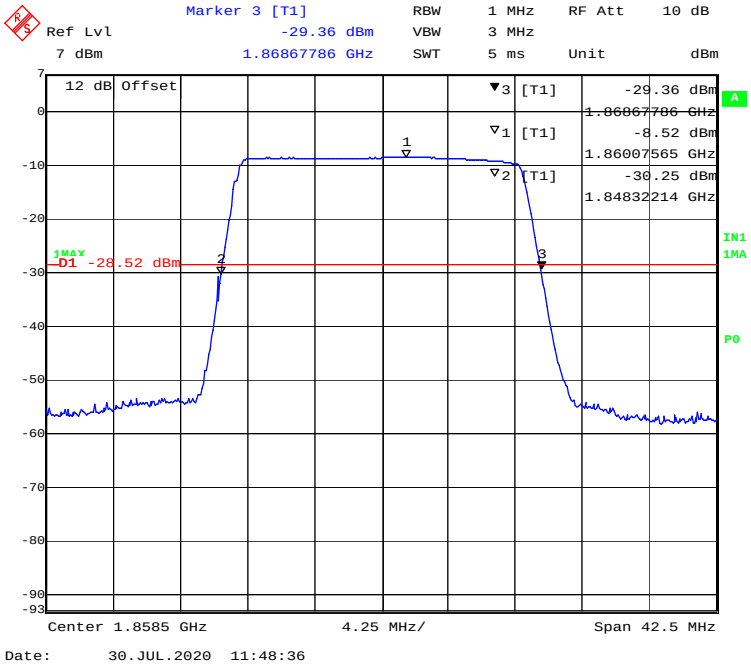
The testing was performed by Winnie Yang from 2020-07-30 to 2020-07-31.

EUT operation mode: Transmitting

Test Result: Compliant.

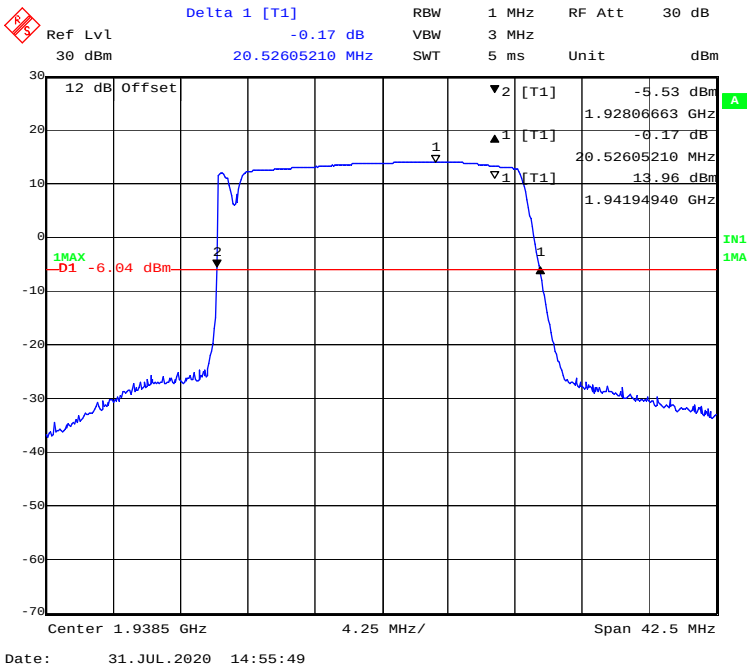
Uplink:

PCS Band



Downlink:

PCS Band



Declarations

1: BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

5: This report cannot be reproduced except in full, without prior written approval of the Company.

6: This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

******* END OF REPORT *******