



FCC / IC Test Report

FOR:

Zipcar

Model Name:

Z001

Product Description:

Automotive access and telematics system

FCC ID: 2AHNP-Z00102

IC ID: 21726-Z00102

Per:

47 CFR Part 22, 24

RSS-132 Issue 3

RSS-133 Issue 6

REPORT #: EMC_ZIPCA-006-16001_FCC_22_24_rev1

DATE: September 23, 2016



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1 Assessment

The following equipment as further described in section 3 of this test report was evaluated against the applicable criteria specified in FCC CFR47 Parts 22, 24 and Industry Canada Radio Standard Specifications RSS-132 Issue 3 and RSS-133 Issue 6. No deviations were ascertained during the course of the tests performed.

Company	Description	Model #
Zipcar	Automotive access and telematics system	Z001

Report reviewed by: TCB Evaluator

September 23, 2016	Compliance	James Donnellan (Senior EMC Engineer)	James Donnellan	Digitally signed by James Donnellan DN: cn=James Donnellan, c=US, o=Cetecom Inc., ou=Compliance, email=james.donnellan@cetecom.com Date: 2016.10.05 17:39:15 -0700
Date	Section	Name	Signature	

Responsible for the Report:

September 23, 2016	Compliance	Kris Lazarov (EMC Engineer)	Kris Lazarov	Digitally signed by Kris Lazarov DN: cn=Kris Lazarov, o, ou, email=kris.lazarov@cetecom.com , c=US
Date	Section	Name	Signature	

The test results of this test report relate exclusively to the test item specified in Section 3.
CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Address:	CETECOM Inc. 411 Dixon Landing Rd Milpitas, CA 95035
Telephone:	+1 (408) 586 6200
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Compliance Manager:	Franz Engert
Responsible Project Leader	Yu-Chien Ho

2.2 Identification of the Client

Client Firm/Name:	Zipcar
Street Address:	15 N Ellsworth Ave Ste 100
City/Zip Code	San Mateo, CA 94401
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Applicant
Manufacturers Address:	-----
City/Zip Code	-----
Country	-----

2.4 Dates of Testing:

April 10, 2016 – April 24, 2016

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Model #:	Z001
HW Version :	2
SW Version :	22.9
FCC-ID :	2AHNP-Z00102
IC-ID:	21726-Z00102
HVIN:	Z001
PMN:	Z001
FVIN:	N/A
Product Description:	Automotive access and telematics system
Module Information:	Manufacturer: SIMCOM Module: SIM5320A; FCC-ID: UDV-1103022011008 ; IC: 8460A-20110302008;
Technology / Type(s) of Modulation:	GSM/GPRS/EGPRS 850/900/1800/1900MHz, multislots class 12; UMTS/HSPA FDD BAND II, V
Operating Frequency Ranges (MHz) / Channels:	GSM 850: 824 MHz – 849 MHz GSM 1900: 1850 MHz - 1910 MHz UMTS FDD BAND V: 824 MHz – 849 MHz UMTS FDD BAND II: 1850 MHz – 1910 MHz
Max. Measured Radiated Output Power	30.58 dBm, GSM 850
Antenna info:	cellular radio: YNX-GSM-SMA-003 sticker mounting antenna., peak gain: 3 dBi@850, 3dBi@1850
Rated Operating Voltage Range:	Vehicle 12VDC
Rated Operating Temperature Range:	Tlow: -40° C/ Tnom: 30° C/ Tmax: 85° C
Other Radios included in the Device:	GPS RFID/NFC Bluetooth 4.1
Sample Revision:	☐ Prototype; ☒ Production; ☐ Pre-Production

3.2 Identification of the Equipment under Test (EUT)

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	320009	2	22.9	

3.3 Identification of Accessory equipment

AE #	Type	Model	Manufacturer	Serial Number
1	N/A			

4 Summary of Measurement Results

GSM 850, 850 MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §22.913 (a) RSS-132 5.4	RF Output Power	Nominal	GMSK ₂	■	□	□	□	Complies
§2.1055 §22.355 RSS-132 5.3	Frequency Stability	Nominal	GMSK ₂	□	□	□	■	Note 1
§2.1049 §22.917(b) RSS-132 5.2	Occupied Bandwidth	Nominal	GMSK ₂	□	□	□	■	Note 1
§2.1051 §22.917 RSS-132 5.5	Band Edge Compliance	Nominal	GMSK ₂	□	□	□	■	Note 1
§2.1051 §22.917 RSS-132 5.5	Conducted Spurious Emissions	Nominal	GMSK ₂	□	□	□	■	Note 1
§2.1053 §22.917 RSS-132 5.5	Radiated Spurious Emissions	Nominal	GMSK ₂	■	□	□	□	Complies

Note: NA= Not Applicable; NP= Not Performed.

Note 1: Leveraged from module certification. See Section 5.4

Note 2: It has been confirmed that GMSK modulation delivers highest channel power as well as highest power density. Thus GMSK has been chosen to represent worst case for all measurements in this report.

UMTS FDD V, 850MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §22.913 (a) RSS-132 5.4	RF Output Power	Nominal	UMTS FDD	■	□	□	□	Complies
§2.1055 §22.355 RSS-132 5.3	Frequency Stability	Nominal	UMTS FDD	□	□	□	■	Note 1
§2.1049 §22.917(b) RSS-132 5.2	Occupied Bandwidth	Nominal	UMTS FDD	□	□	□	■	Note 1
§2.1051 §22.917 RSS-132 5.5	Band Edge Compliance	Nominal	UMTS FDD	□	□	□	■	Note 1
§2.1051 §22.917 RSS-132 5.5	Conducted Spurious Emissions	Nominal	UMTS FDD	□	□	□	■	Note 1
§2.1053 §22.917 RSS-132 5.5	Radiated Spurious Emissions	Nominal	UMTS FDD	■	□	□	□	Complies

Note: NA= Not Applicable; NP= Not Performed.

Note 1: Leveraged from module certification. See Section 5.4

GSM 1900, 1900 MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §24.232 (a) RSS-133 6.4	RF Output Power	Nominal	GMSK ₂	■	□	□	□	Complies
§2.1055 §24.235 RSS-133 6.3	Frequency Stability	Nominal	GMSK ₂	□	□	□	■	Note 1
§2.1049 §24.238(b) RSS-133 6.2	Occupied Bandwidth	Nominal	GMSK ₂	□	□	□	■	Note 1
§2.1051 §24.238 RSS-133 6.5	Band Edge Compliance	Nominal	GMSK ₂	□	□	□	■	Note 1
§2.1051 §24.238 RSS-133 6.5	Conducted Spurious Emissions	Nominal	GMSK ₂	□	□	□	■	Note 1
§2.1053 §24.238 RSS-133 6.5	Radiated Spurious Emissions	Nominal	GMSK ₂	■	□	□	□	Complies

Note: NA= Not Applicable; NP= Not Performed.

Note 1: Leveraged from module certification.

Note 2: It has been confirmed that GMSK modulation delivers highest channel power as well as highest power density. Thus GMSK has been chosen to represent worst case for all measurements in this report.

UMTS FDD Band II, 1900 MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §24.232 (a) RSS-133 6.4	RF Output Power	Nominal	UMTS FDD	■	□	□	□	Complies
§2.1055 §24.235 RSS-133 6.3	Frequency Stability	Nominal	UMTS FDD	□	□	□	■	Note 1
§2.1049 §24.238(b) RSS-133 6.2	Occupied Bandwidth	Nominal	UMTS FDD	□	□	□	■	Note 1
§2.1051 §24.238 RSS-133 6.5	Band Edge Compliance	Nominal	UMTS FDD	□	□	□	■	Note 1
§2.1051 §24.238 RSS-133 6.5	Conducted Spurious Emissions	Nominal	UMTS FDD	□	□	□	■	Note 1
§2.1053 §24.238 RSS-133 6.5	Radiated Spurious Emissions	Nominal	UMTS FDD	■	□	□	□	Complies

Note: NA= Not Applicable; NP= Not Performed.

Note 1: Leveraged from module certification.

5 Measurements

5.1 Measurement Uncertainty

	Uncertainty in dB radiated <30MHz	Uncertainty in in dB radiated 30MHz - 1GHz	Uncertainty in dB radiated > 1GHz	Uncertainty in dB Conducted measurement
standard deviation k=1	2.48	1.94	2.16	0.64
95% confidence interval in dB	4.86	3.79	4.24	1.25
95% confidence interval in dB in delta to Result	+/-2.5 dB	+/-2.0 dB	+/- 2.3dB	+/-0.7dB

5.2 Nominal Environmental Conditions

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

5.3 Nominal Environmental Test Conditions

- Test Temperature: 20°C (nominal);
- Test Voltage: 3.7 VDC(nominal);

Deviating test conditions are indicated at individual test description where applicable.

5.4 Inheriting Test Results from Incorporated Module Certification:

The EUT integrates the certified module UBlox Lisa U201 (details see EUT spec in section 3.1)

Taking into account guidance from FCC KDB 996369 (modular approval) and where relevant test procedures did not change conducted test results are leveraged.

This test report contains full radiated testing as per FCC 22H/24E and RSS-132 issue 3 / RSS-133 issue 6

5.5 Nominal Cellular Test Conditions

1. The different cellular operation modes of the EUT as required for testing are controlled through the link with the Digital Radio Communication Tester (R&S CMU200).
2. The EUT is tested on the low, mid and high channel of each of the supported cellular operation modes.

5.6 Additional Test Information.

Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v02r02, *Measurement Guidance for Certification of Licensed Digital Transmitters* and according to relevant parts of TIA-603C 2004 as detailed below.

6 RF Output Power verification

6.1 Reference:

FCC: CFR Part 2.1046, CFR Part 22.913, CFR Part 24.232

6.2 Limits:

6.2.1 FCC Part 22.913 (a)

(a) The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts (38.45dBm).

6.2.2 FCC Part 24.232 (c),(d),(e)

(c) Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

(d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

6.2.3 FCC Part 27.50 (d) (4)

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

6.3 Measurement Result:

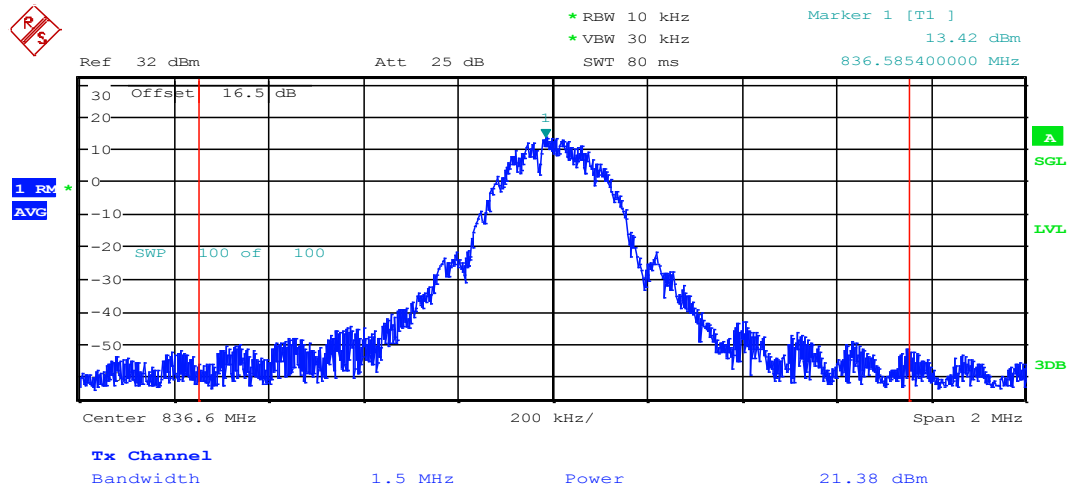
Band	Frequency (MHz)	Measured AVG Conducted Output Power (dBm)	Duty Cycle Correction (dB)	Measured AVG Conducted Output Power during Burst (dBm)	Maximum AVG Conducted Output Power from Module Report (dBm) ¹	Delta (dB)
GSM 850	836.6	21.38	9.2	30.58	31.55	-0.97
GSM 1900	1880	15.79	9.2	24.98	25.02	-0.04
UMTS FDD II	1880	18.71	0	18.71	23.6	-4.89
UMTS FDD V	836.6	21.25	0	21.25	23.1	-1.85

Note 1: Values taken from full scope modular reports. Report #: 112S009R-HP-US-P07V01. Suzhou EMC Laboratory. No.99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., Suzhou, China.

Note 2: AVG conducted output power was measured using KDB 558074 D01 DTS Meas Guidance v03r05 9.2.2.2 Method AVGSA-1 (trace averaging with the EUT transmitting at full power throughout each sweep)

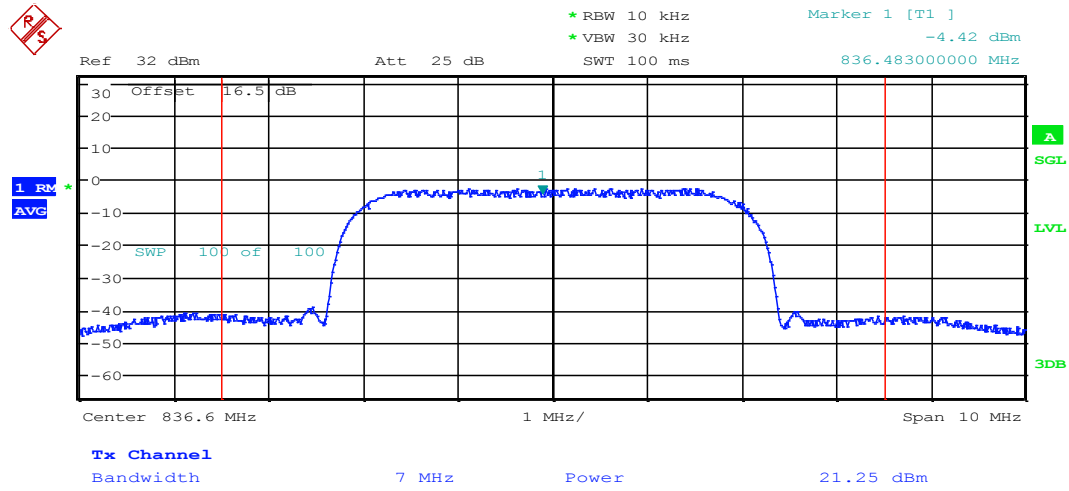
6.4 Measurement Plots:

6.4.1 GSM 850, Tx: Ch. Mid



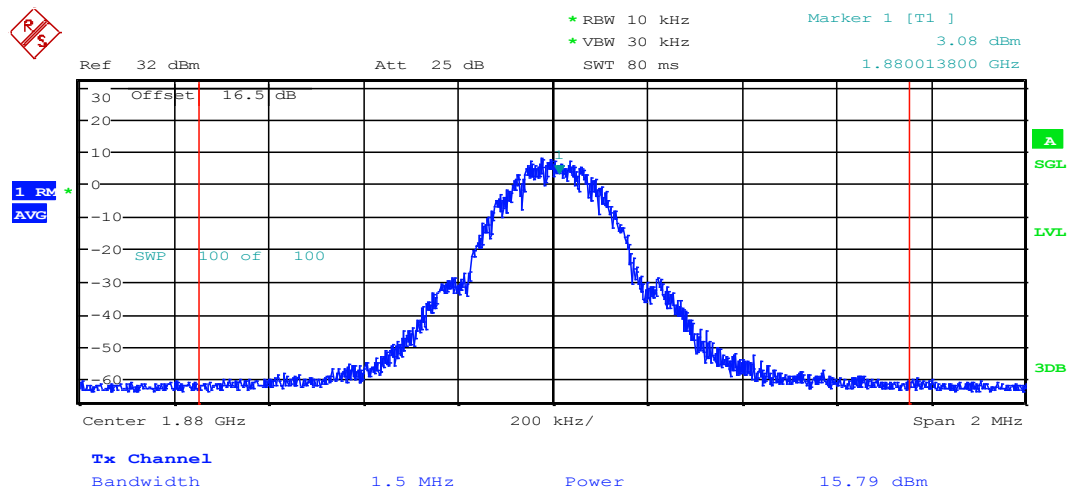
Date: 2.JUN.2016 08:51:10

6.4.2 UMTS FDD V, Tx: Ch. Mid



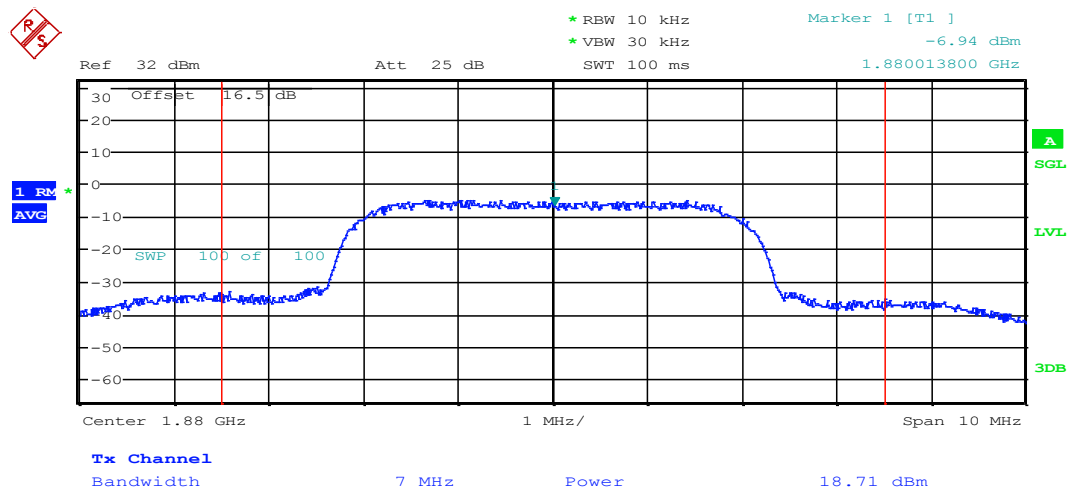
Date: 2.JUN.2016 09:49:15

6.4.3 GSM 1900, Tx: Ch. Mid



Date: 2.JUN.2016 09:13:57

6.4.4 UMTS FDD II, Tx: Ch. High



Date: 2.JUN.2016 09:20:26

7 Spurious Emissions Radiated

7.1 References:

FCC: CFR Part 2.1053, CFR Part 22.917, CFR Part 24.238,
IC: RSS-Gen issue 4, section 6.13; RSS-132 issue 3, section 5.5; RSS-133 issue 6, section 6.5

7.2 Limits:

(a) *Out of band emissions.* 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. For all power levels +30dBm to 0dBm, this becomes a constant specification of -13dBm.

7.2.1 FCC 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

7.2.2 FCC 24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

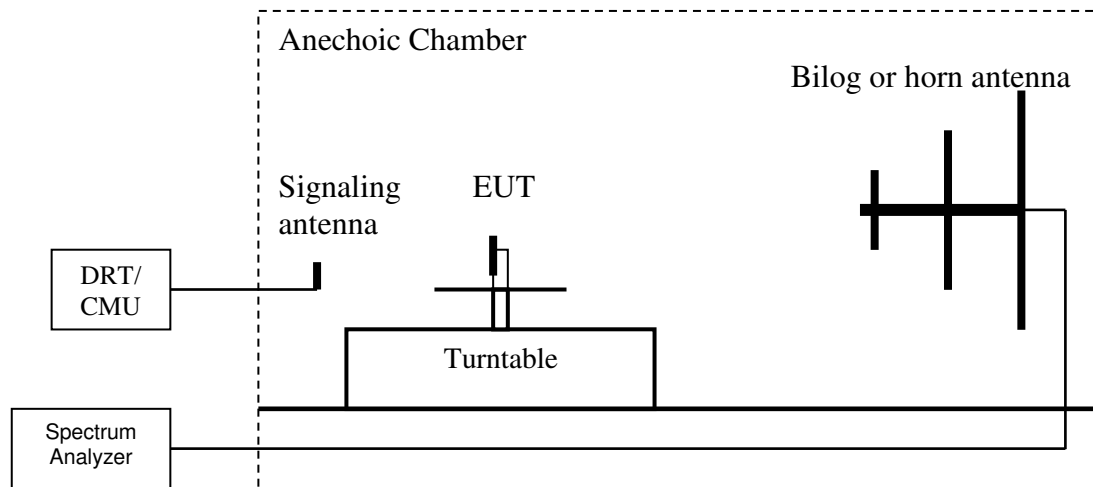
7.2.3 RSS-132 Section 5.5.1.1 and RSS-133 Section 6.5.1

In the first 1.0 MHz band immediately outside and adjacent to the licensee's frequency block, the power of emissions per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log_{10}(P)$, dB. After the first 1.0 MHz, the power of emissions shall be attenuated below the transmitter output power by at least $43 + 10 \log_{10}(P)$, dB, in any 100 kHz bandwidth.

After the first 1.5 MHz, the power of emissions shall be attenuated below the transmitter output power by at least $43 + 10 \log_{10}(P)$, dB, in any MHz of bandwidth.

7.3 Radiated out of band measurement procedure:

Ref: TIA-603C 2004- 2.2.12 Unwanted emissions: Radiated Spurious



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to measure peak hold with the required settings.
4. Place the measurement antenna in a horizontal orientation. Rotate the EUT 360°. Raise the measurement antenna up to 4 meters in 0.5 meters increments and rotate the EUT 360° at each height to maximize all emissions. Measure and record all spurious emissions (LVL) up to the tenth harmonic of the carrier frequency.
5. Replace the EUT with a horizontally polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS**). **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the level of spurious emissions using the following equation:
Spurious (dBm) = **LVL** (dBm) + **LOSS** (dB):
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation:
Spurious (dBm) = **LVL** (dBm) + **LOSS** (dB):
10. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.
(Note: Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4 and 7 above are performed with test software.)

7.3.1 Sample Calculations for Radiated Measurements: Power Measurements using Substitution Procedure:

The measurement on the Spectrum Analyzer is used as a basis for the Substitution procedure. The EUT is replaced with a Signal Generator and an antenna. The setting on the Signal Generator is varied until the Spectrum Analyzer displays the original reading. EIRP is calculated as-

EIRP (dBm)= Signal Generator setting (dBm)- Cable Loss (dB)+ Antenna Gain (dBi). Example below.

Frequency (MHz)	Measured SA (dBμV)	Signal Generator setting (dBm)	Antenna Gain (dBi)	Dipole Gain (dBd)	Cable Loss (dB)	EIRP (dBm)
1000	95.5	24.5	6.5	0	3.5	27.5

7.3.2 Spectrum Analyzer Settings

Settings for FCC 22

	30MHz – 1 GHz	1 – 1.58 GHz	1.58 – 9 GHz
Resolution Bandwidth	100 kHz	1 MHz	1 MHz
Video Bandwidth	100 kHz	1 MHz	1 MHz
Detector	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto

Settings for FCC 24

	30MHz – 1 GHz	1 – 2.7 GHz	2.7 – 18 GHz	18 – 19.1 GHz
Resolution Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Video Bandwidth	100 kHz	1 MHz	1 MHz	1 MHz
Detector	Peak	Peak	Peak	Peak
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold
Sweep Time	Auto	Auto	Auto	Auto

7.4 Test Results

7.4.1 GSM 850

Harmonic	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)	Limit FCC and IC (dBm)
2	1648.4	-41.23	1673.2	NF	1697.6	NF	-13
3	2472.6	NF	2509.8	-41.3	2546.4	-45.3	
4	3296.8	NF	3346.4	NF	3395.2	NF	
5	4121	NF	4183	NF	4244	NF	
6	4945.2	NF	5019.6	NF	5092.8	NF	
7	5769.4	NF	5856.2	NF	5941.6	NF	
8	6593.6	NF	6692.8	NF	6790.4	NF	
9	7417.8	NF	7529.4	NF	7639.2	NF	
10	8242	NF	8366	NF	8488	NF	
NF = Noise Floor Measurement Uncertainty: ±3dB							

7.4.2 UMTS FDD BAND V

Harmonic	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)	Limit FCC and IC (dBm)
2	1648.4	NF	1673.2	NF	1697.6	NF	-13
3	2472.6	NF	2509.8	NF	2546.4	NF	
4	3296.8	NF	3346.4	NF	3395.2	NF	
5	4121	NF	4183	NF	4244	NF	
6	4945.2	NF	5019.6	NF	5092.8	NF	
7	5769.4	NF	5856.2	NF	5941.6	NF	
8	6593.6	NF	6692.8	NF	6790.4	NF	
9	7417.8	NF	7529.4	NF	7639.2	NF	
10	8242	NF	8366	NF	8488	NF	
NF = Noise Floor Measurement Uncertainty: ±3dB							

7.4.3 GSM 1900

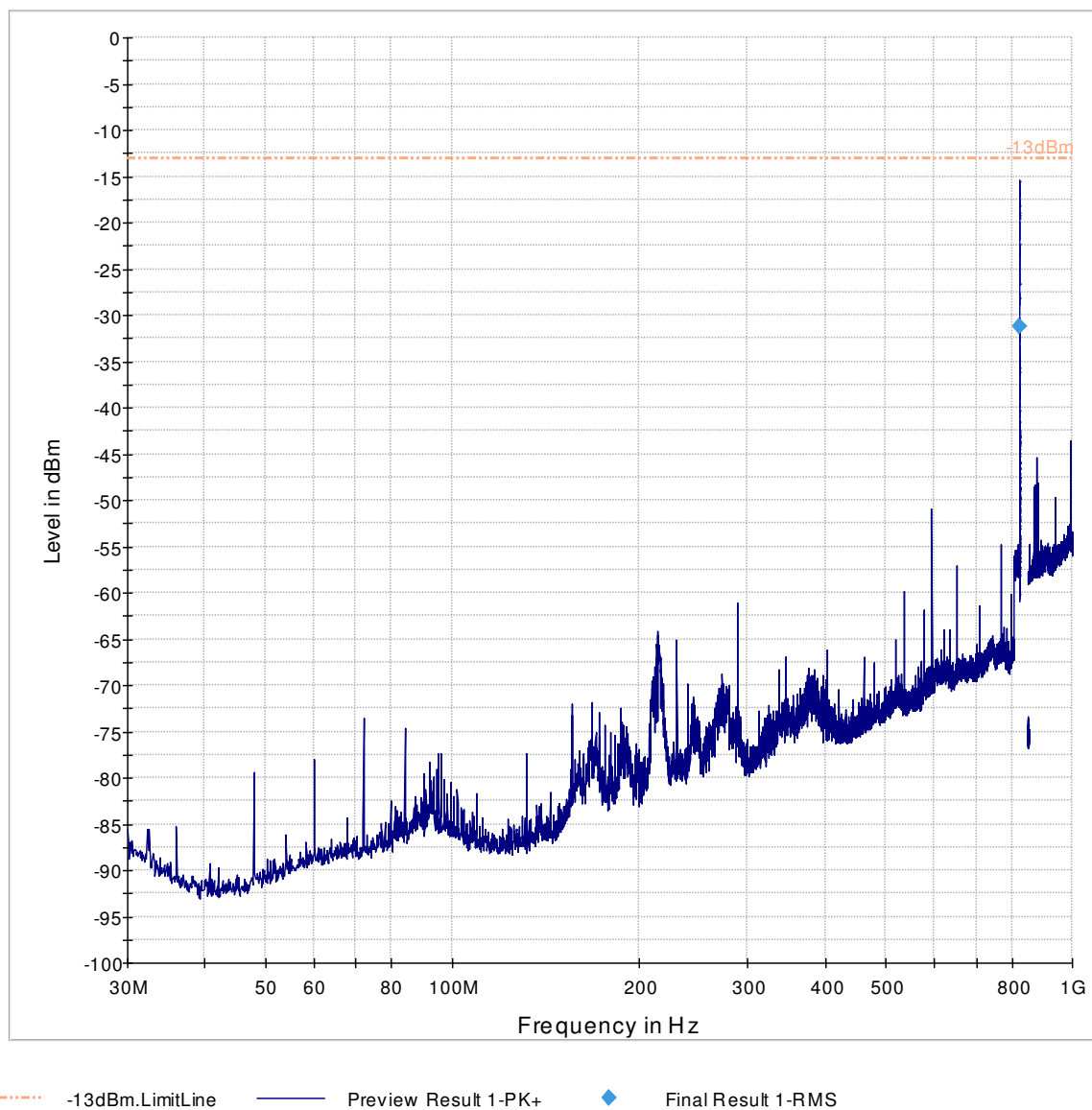
Harmonic	Tx ch-512 Freq. (MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)	Limit FCC and IC (dBm)
2	3700.4	NF	3760	NF	3819.6	NF	-13
3	5550.6	NF	5640	NF	5729.4	NF	
4	7400.8	NF	7520	NF	7639.2	NF	
5	9251	NF	9400	NF	9549	NF	
6	11101.2	NF	11280	NF	11458.8	NF	
7	12951.4	NF	13160	NF	13368.6	NF	
8	14801.6	NF	15040	NF	15278.4	NF	
9	16651.8	NF	16920	NF	17188.2	NF	
10	18502	NF	18800	NF	19098	NF	
NF = Noise Floor Measurement Uncertainty: ±3dB							

7.4.4 UMTS FDD BAND II

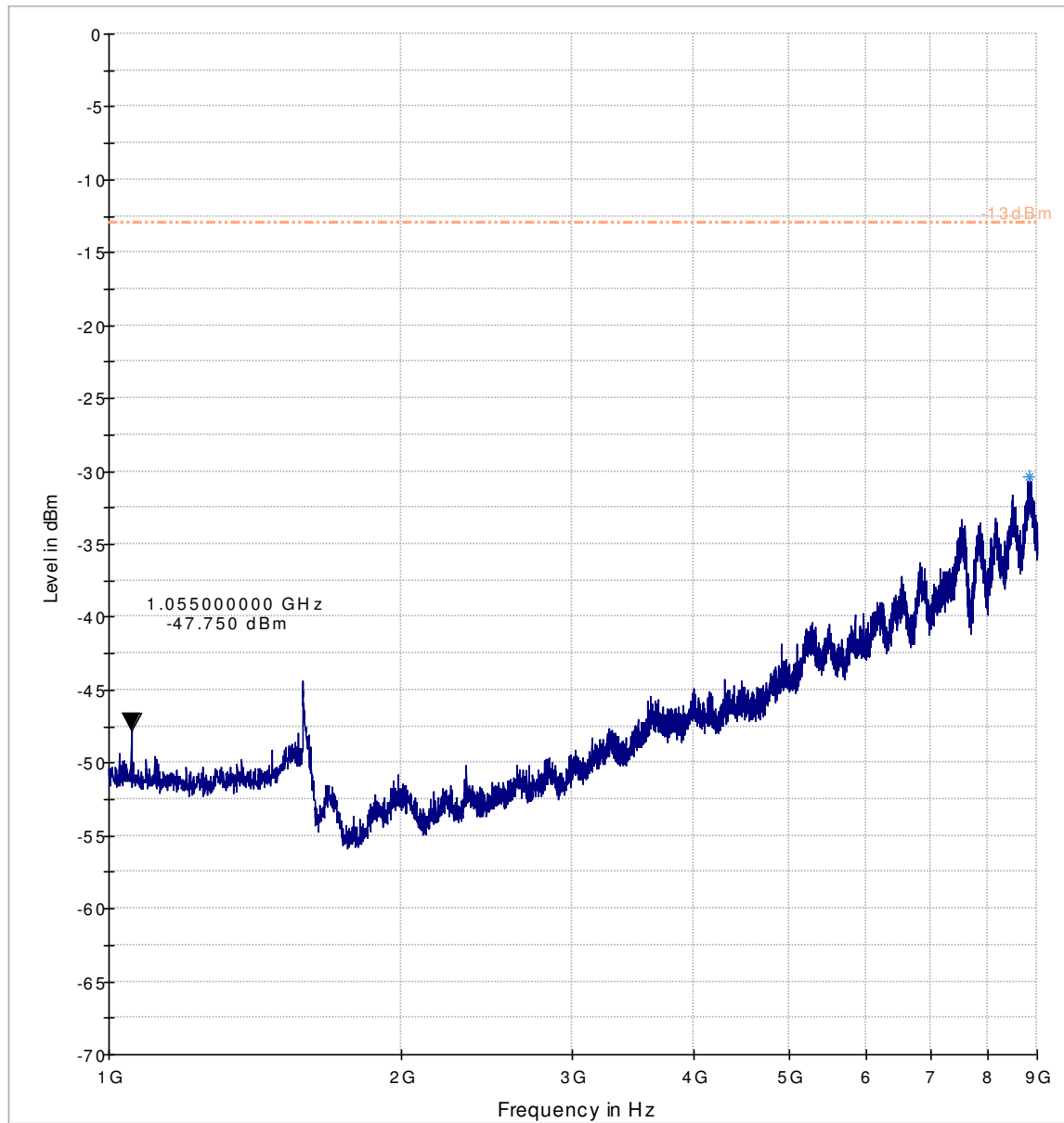
Harmonic	Tx ch-512 Freq. (MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)	Limit FCC and IC (dBm)
2	3700.4	NF	3760	NF	3819.6	NF	-13
3	5550.6	NF	5640	NF	5729.4	NF	
4	7400.8	NF	7520	NF	7639.2	NF	
5	9251	NF	9400	NF	9549	NF	
6	11101.2	NF	11280	NF	11458.8	NF	
7	12951.4	NF	13160	NF	13368.6	NF	
8	14801.6	NF	15040	NF	15278.4	NF	
9	16651.8	NF	16920	NF	17188.2	NF	
10	18502	NF	18800	NF	19098	NF	
NF = Noise Floor Measurement Uncertainty: ±3dB							

Measurement Plots:

7.4.5 GSM 850, Tx: Ch. Low, 30 MHz – 1 GHz

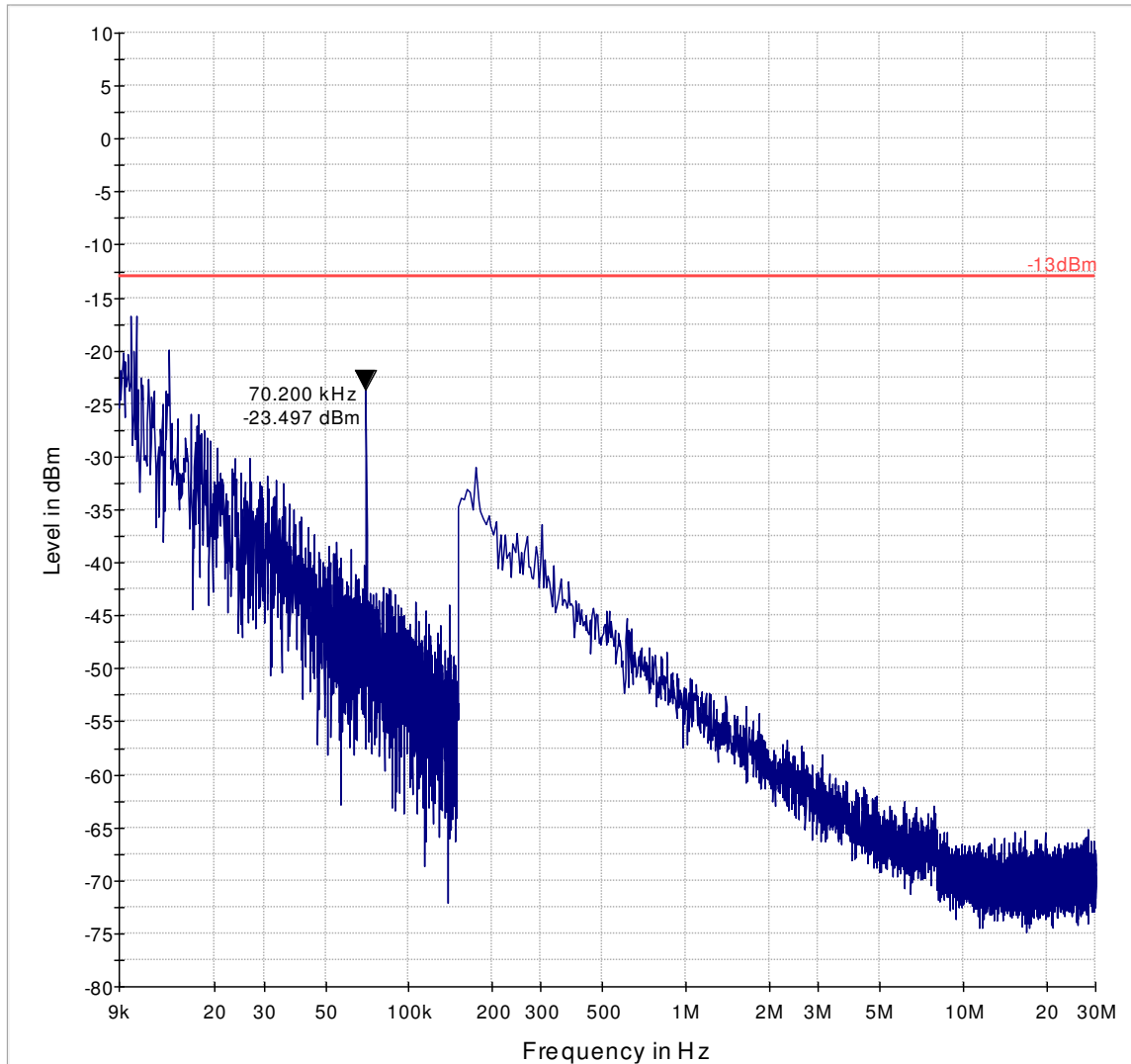


7.4.6 GSM 850, Tx: Ch. Low, 1 GHz – 9 GHz



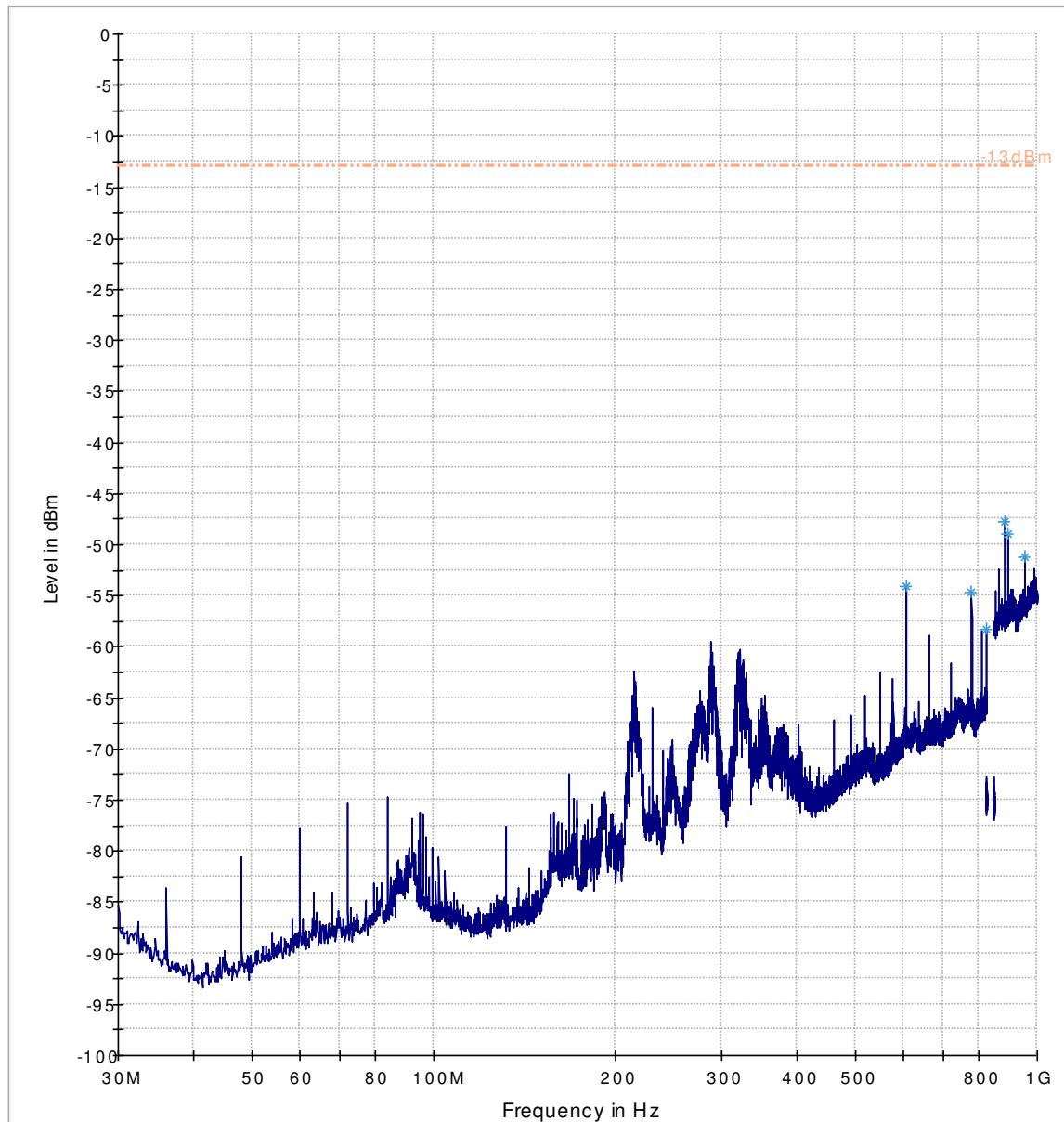
----- -13dBm ——— Preview Result 1-PK+ * Data Reduction Result 1 [2]-PK+

7.4.7 GSM 850, Tx: Ch. Mid, 9 KHz – 30 MHz



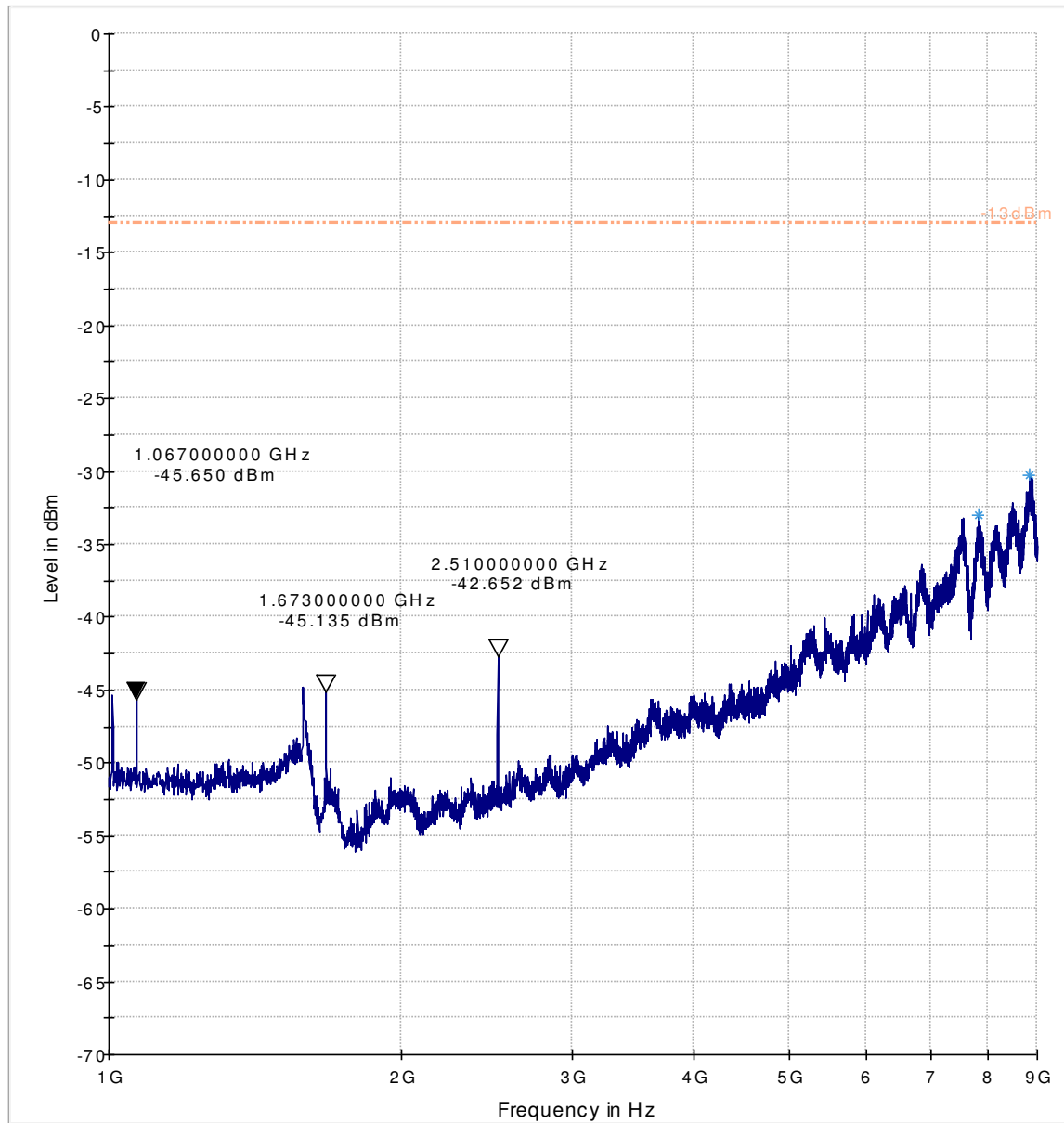
— -13dBm — Preview Result 1-PK+

7.4.8 GSM 850, Tx: Ch. Mid, 30 MHz – 1 GHz



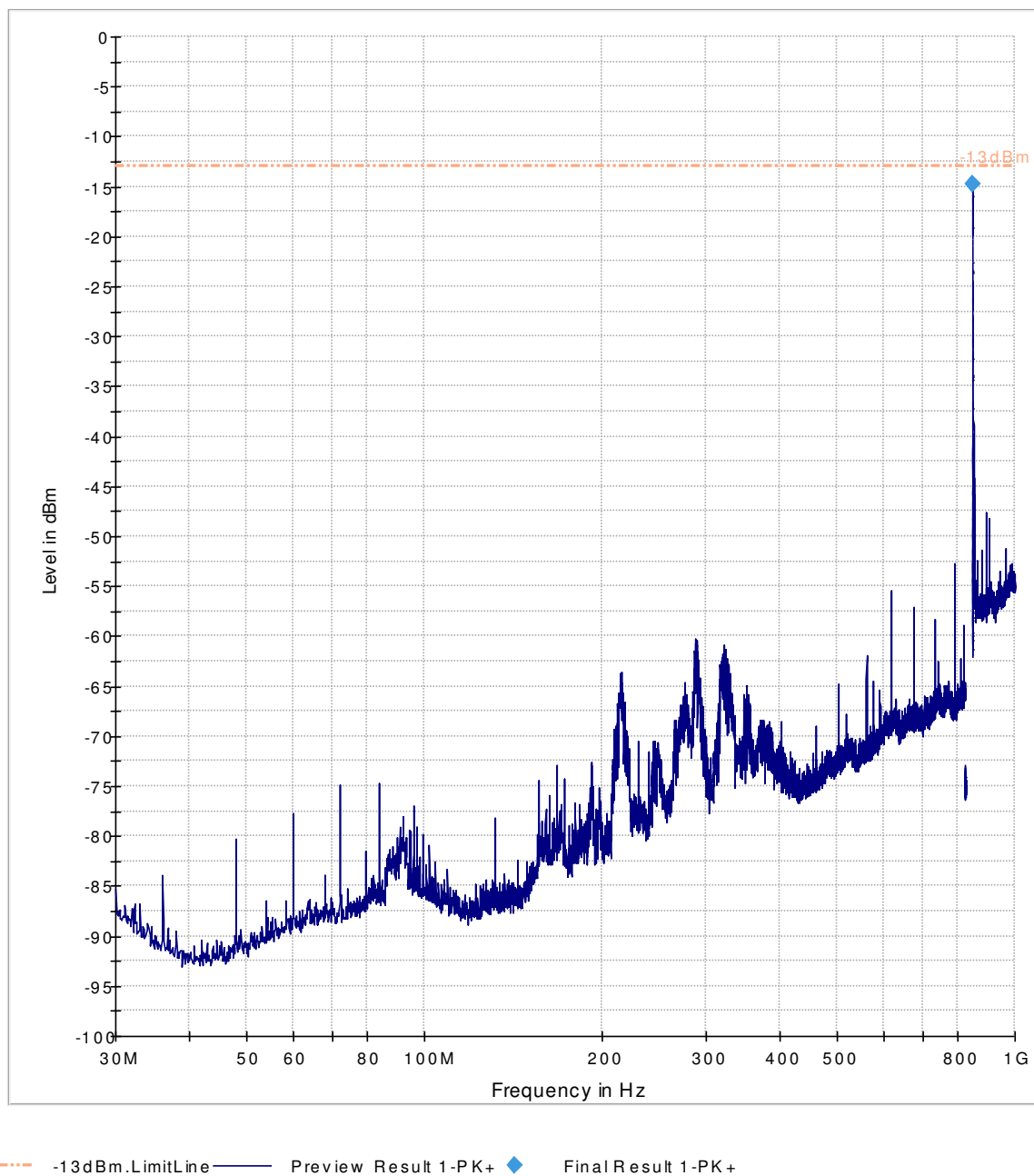
----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

7.4.9 GSM 850, Tx: Ch. Mid, 1 GHz – 9 GHz

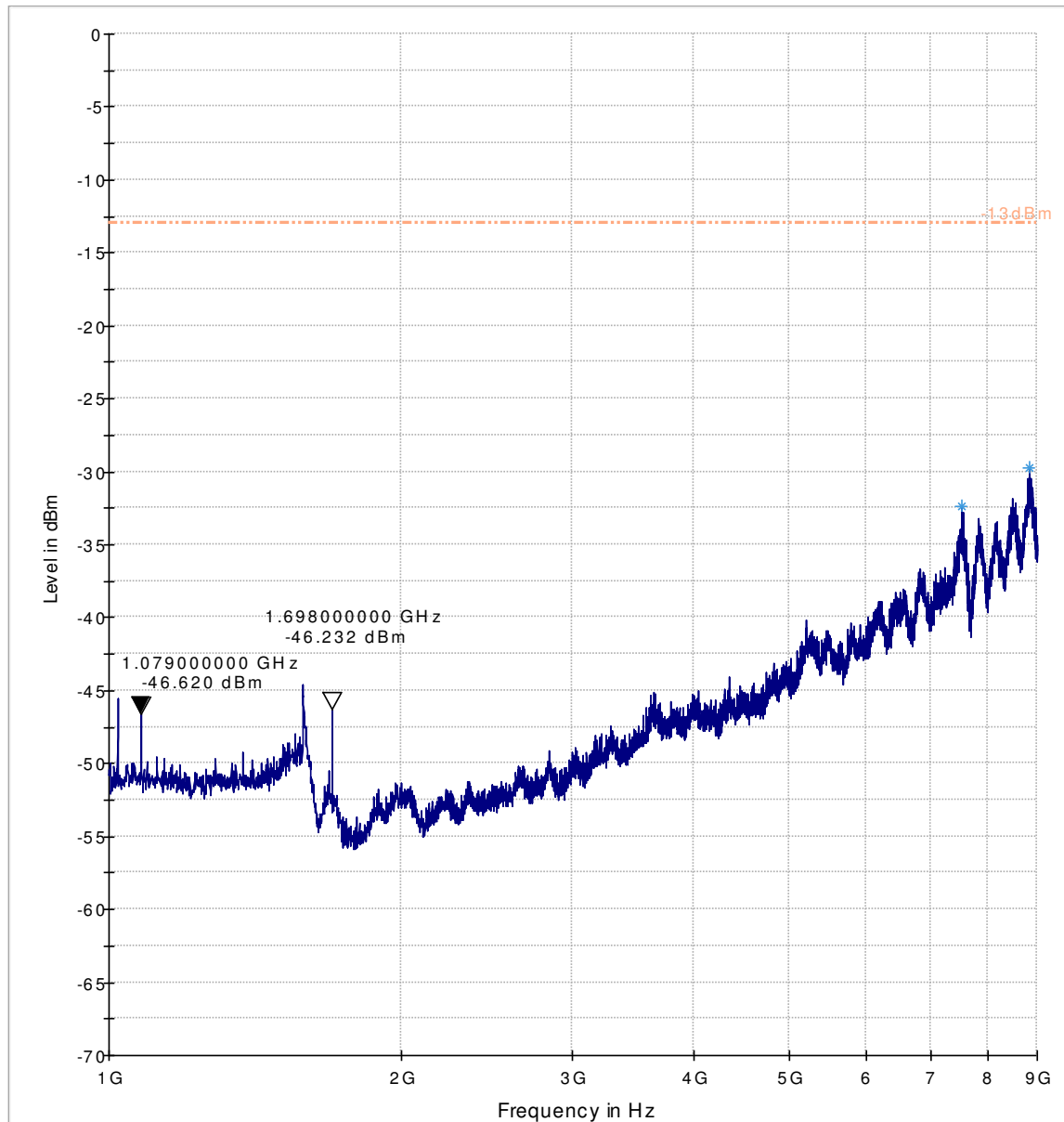


----- -13dBm — Preview Result 1-PK+ * Data Reduction Result 1 [2]-PK+

7.4.10 GSM 850, Tx: Ch. High, 30 MHz – 1 GHz

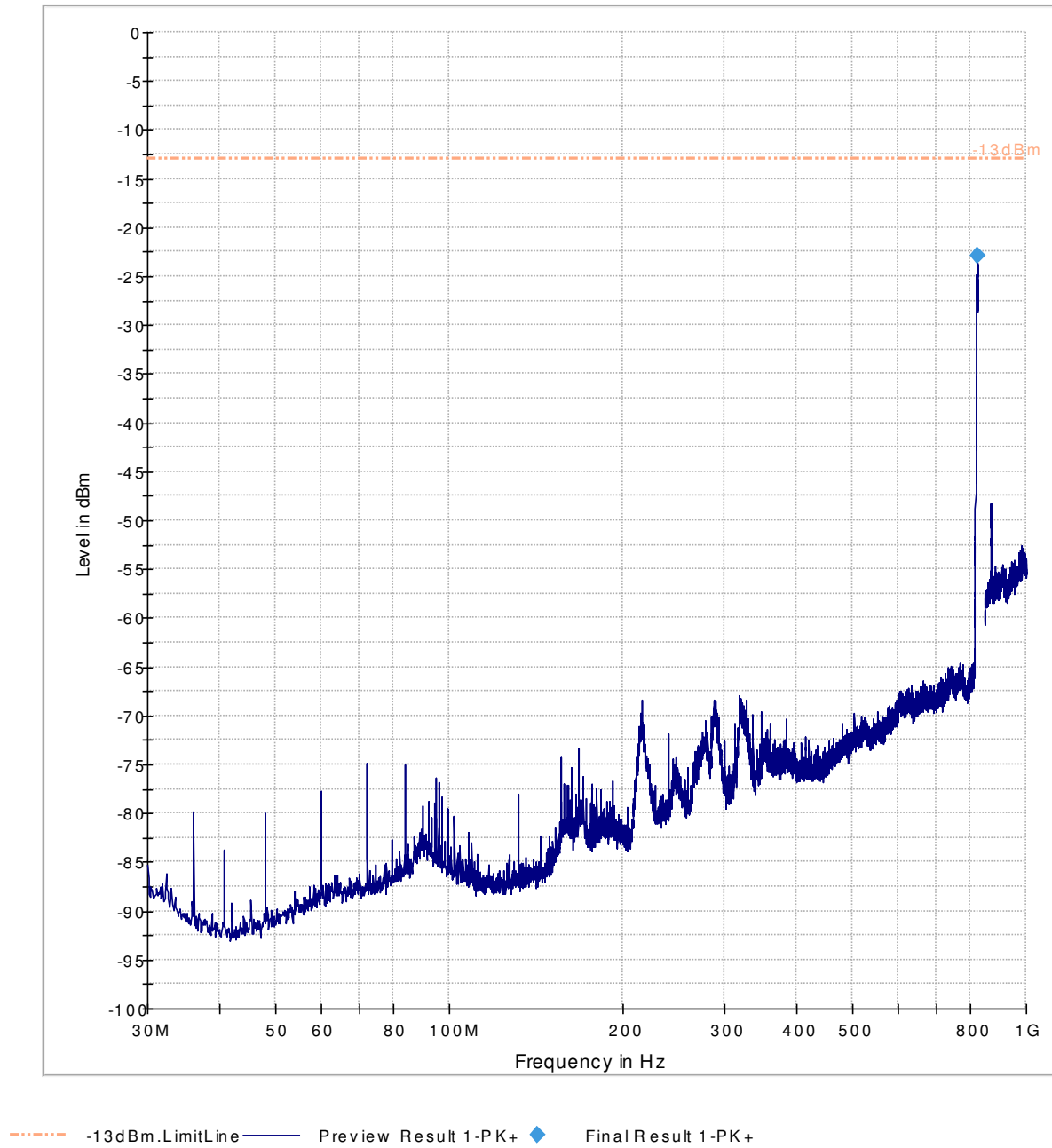


7.4.11 GSM 850, Tx: Ch. High, 1 GHz – 9 GHz

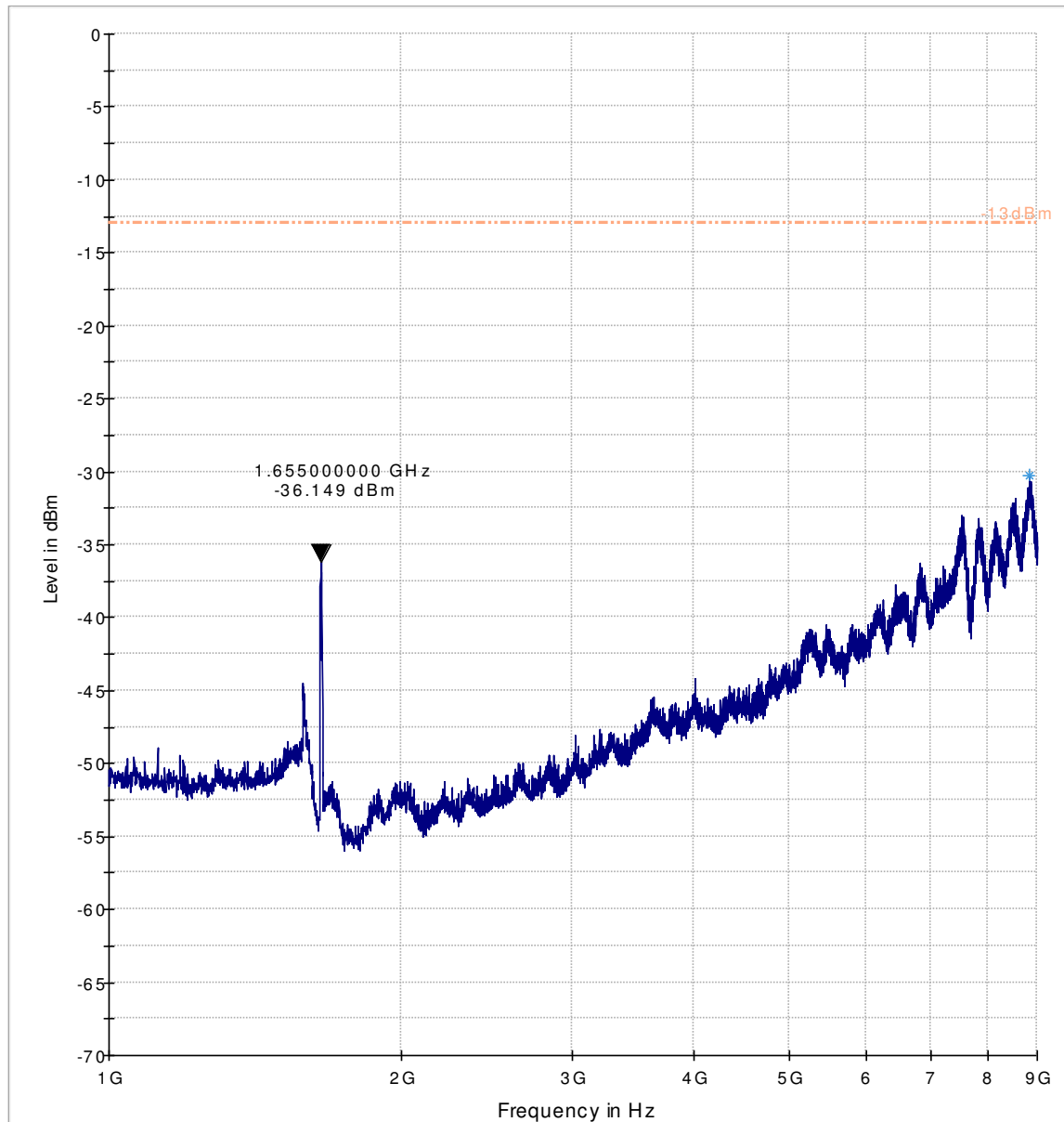


----- -13dBm ——— Preview Result 1-PK+ * Data Reduction Result 1 [2]-PK+

7.4.12 UMTS FDD Band V, Tx: Ch. Low, 30 MHz – 1 GHz

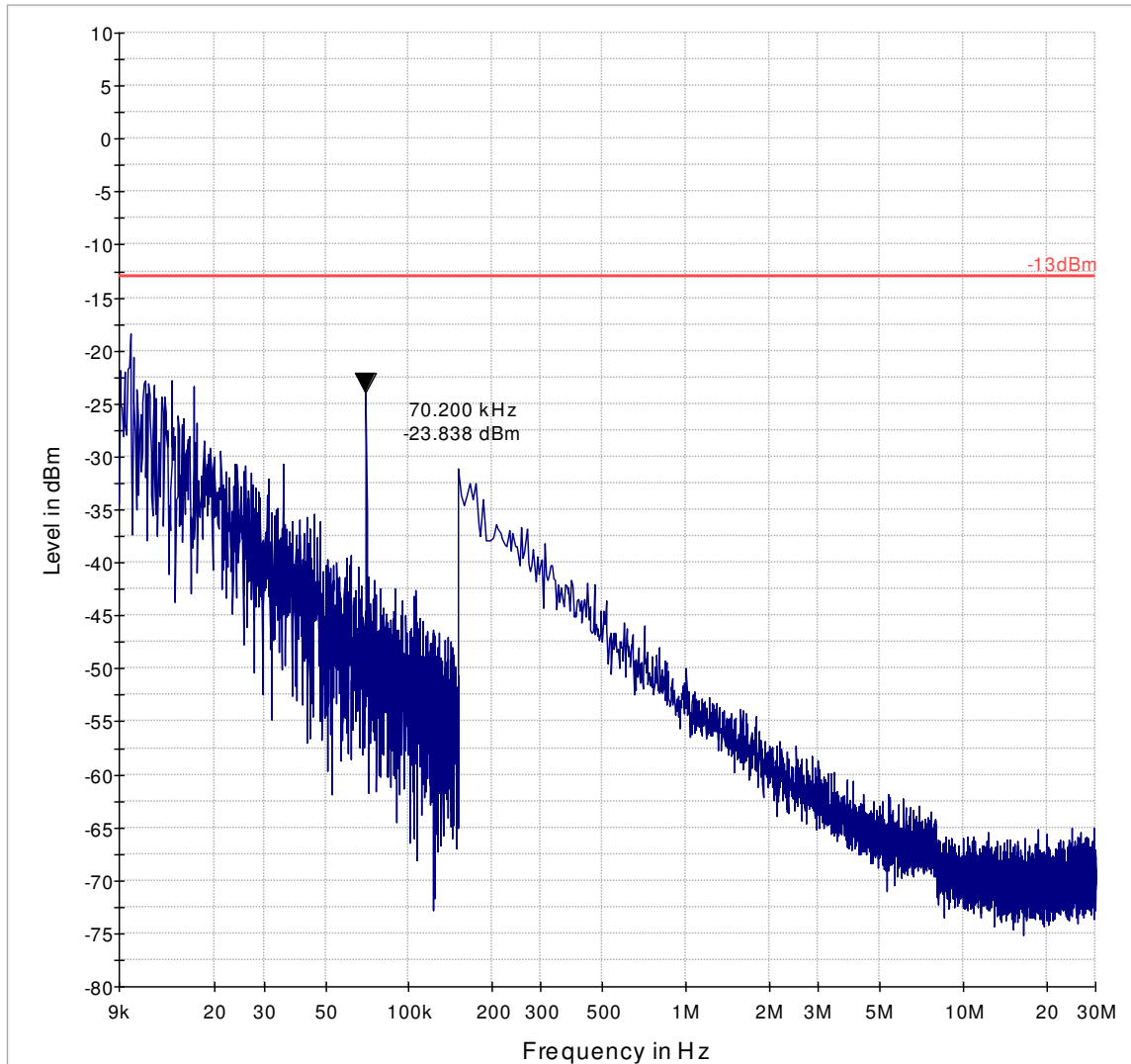


7.4.13 UMTS FDD Band V, Tx: Ch. Low, 1 GHz – 9 GHz



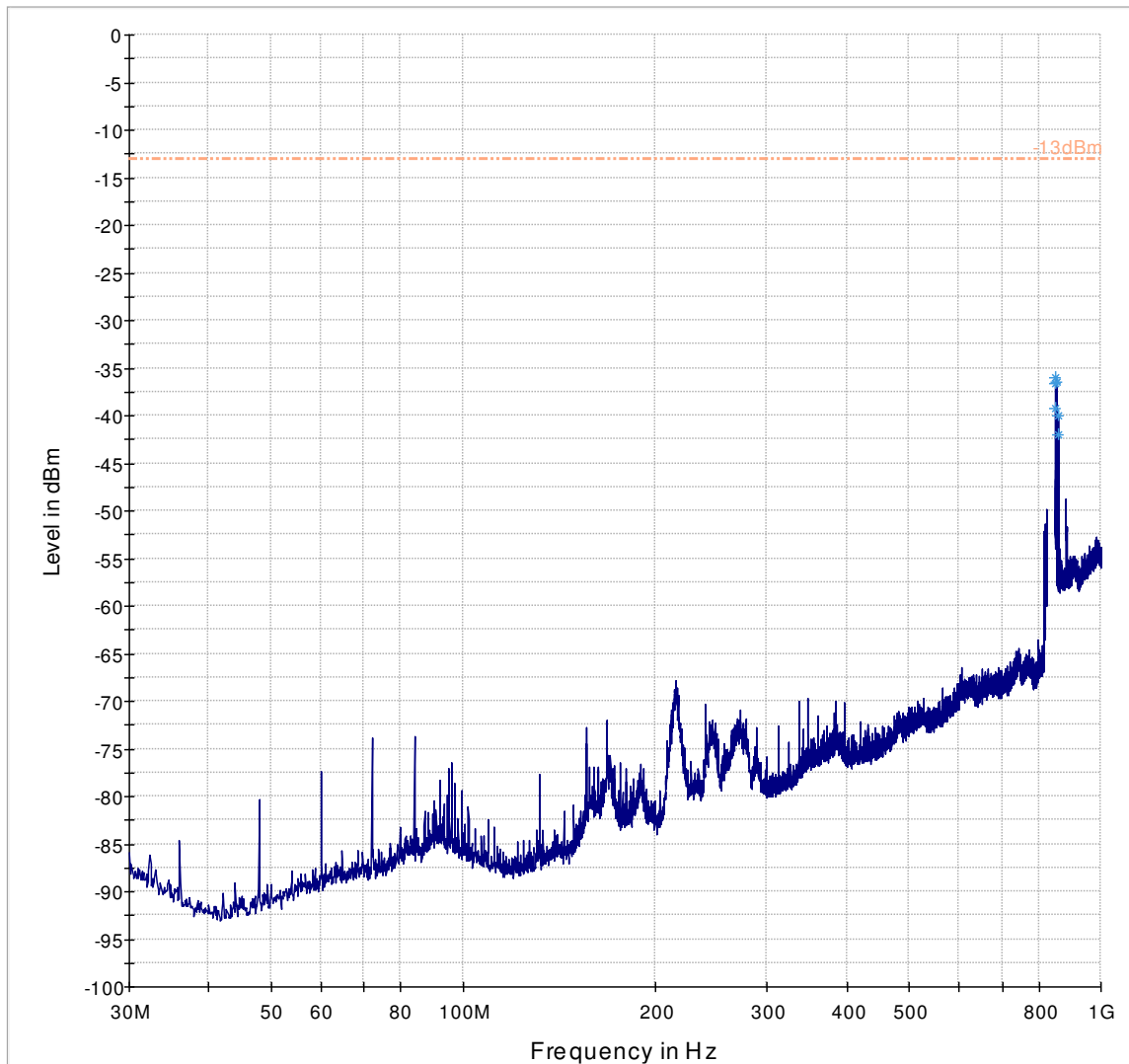
----- -13dBm ——— Preview Result 1 -PK+ * Data Reduction Result 1 [2]-PK+

7.4.14 UMTS FDD Band V, Tx: Ch. Mid, 9 KHz – 30 MHz



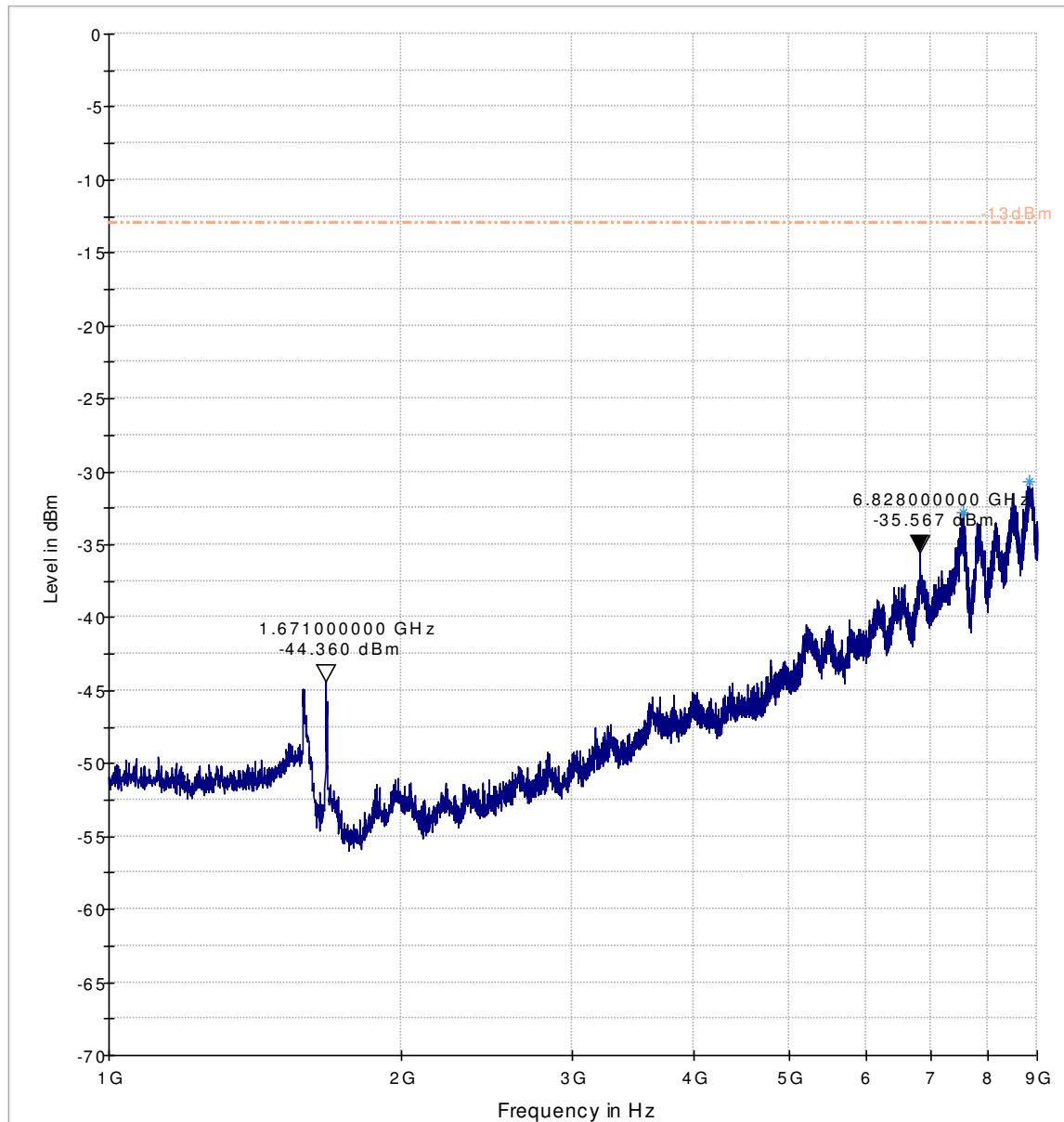
— -13dBm — Preview Result 1-PK+

7.4.15 UMTS FDD Band V, Tx: Ch. Mid, 30 MHz – 1 GHz



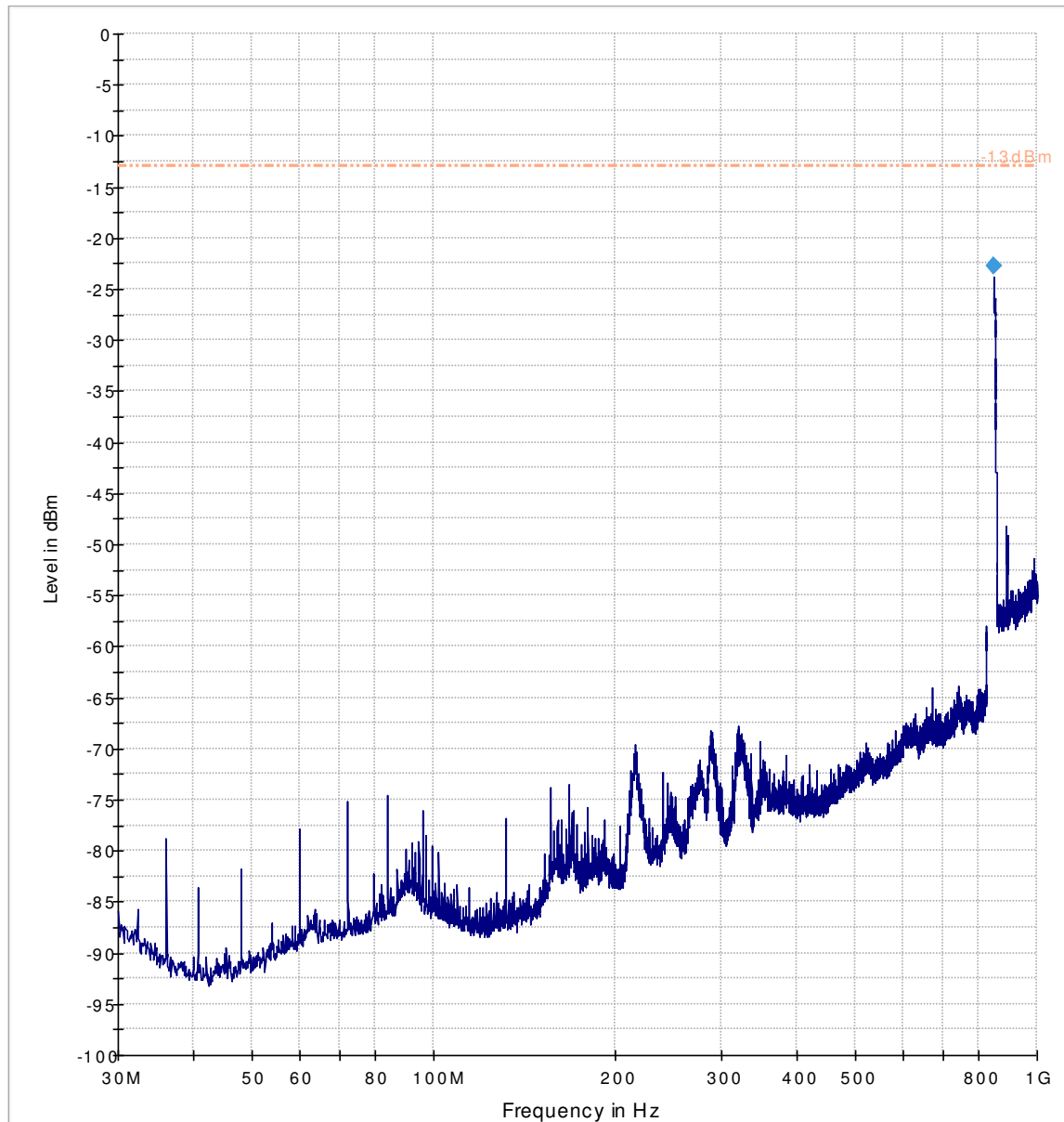
----- -13dBm.LimitLine ——— Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

7.4.16 UMTS FDD Band V, Tx: Ch. Mid, 1 GHz – 9 GHz



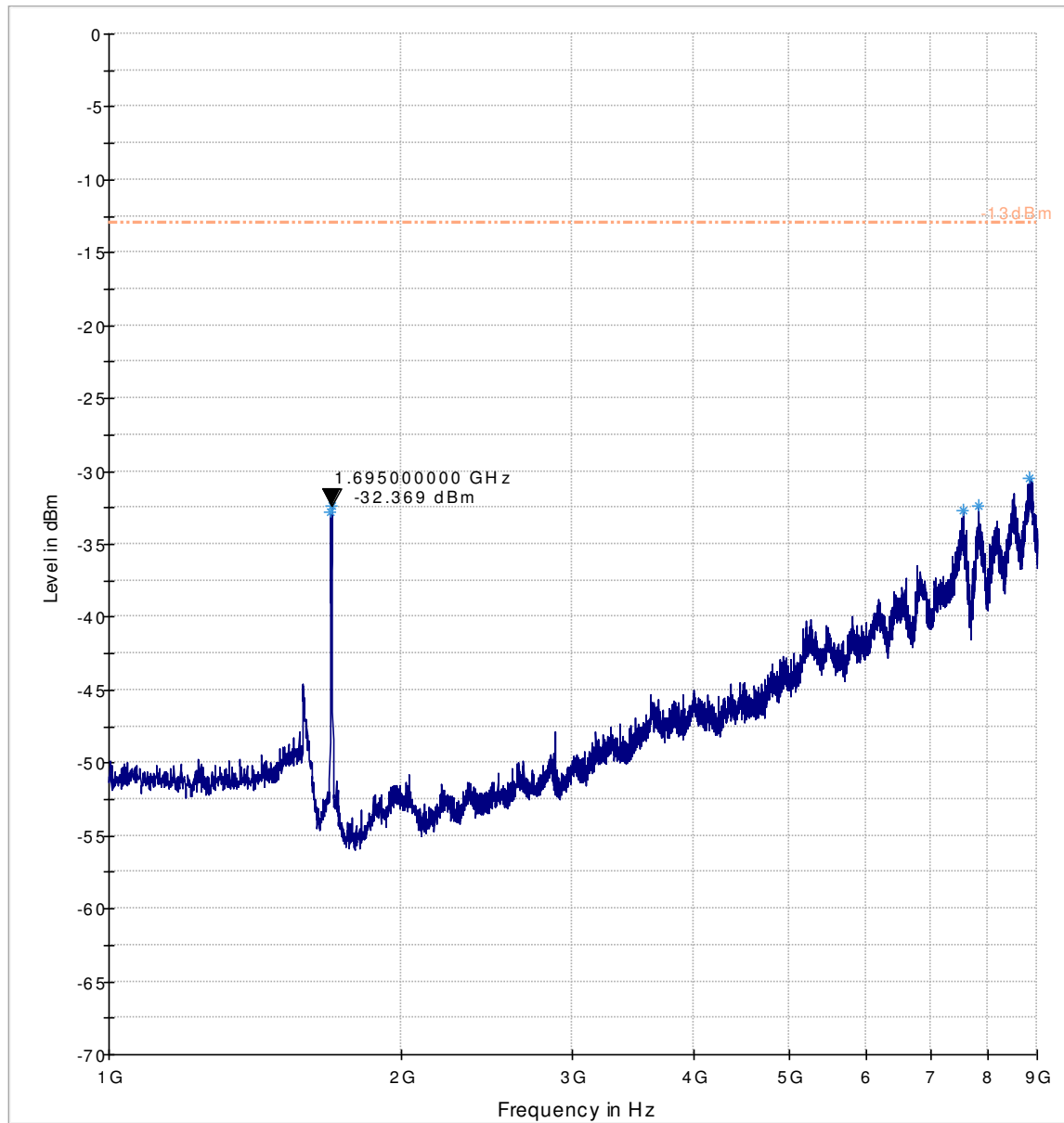
----- -13dBm ——— Preview Result 1-PK+ * Data Reduction Result 1 [2]-PK+

7.4.17 UMTS FDD Band V, Tx: Ch. High, 30 MHz – 1 GHz



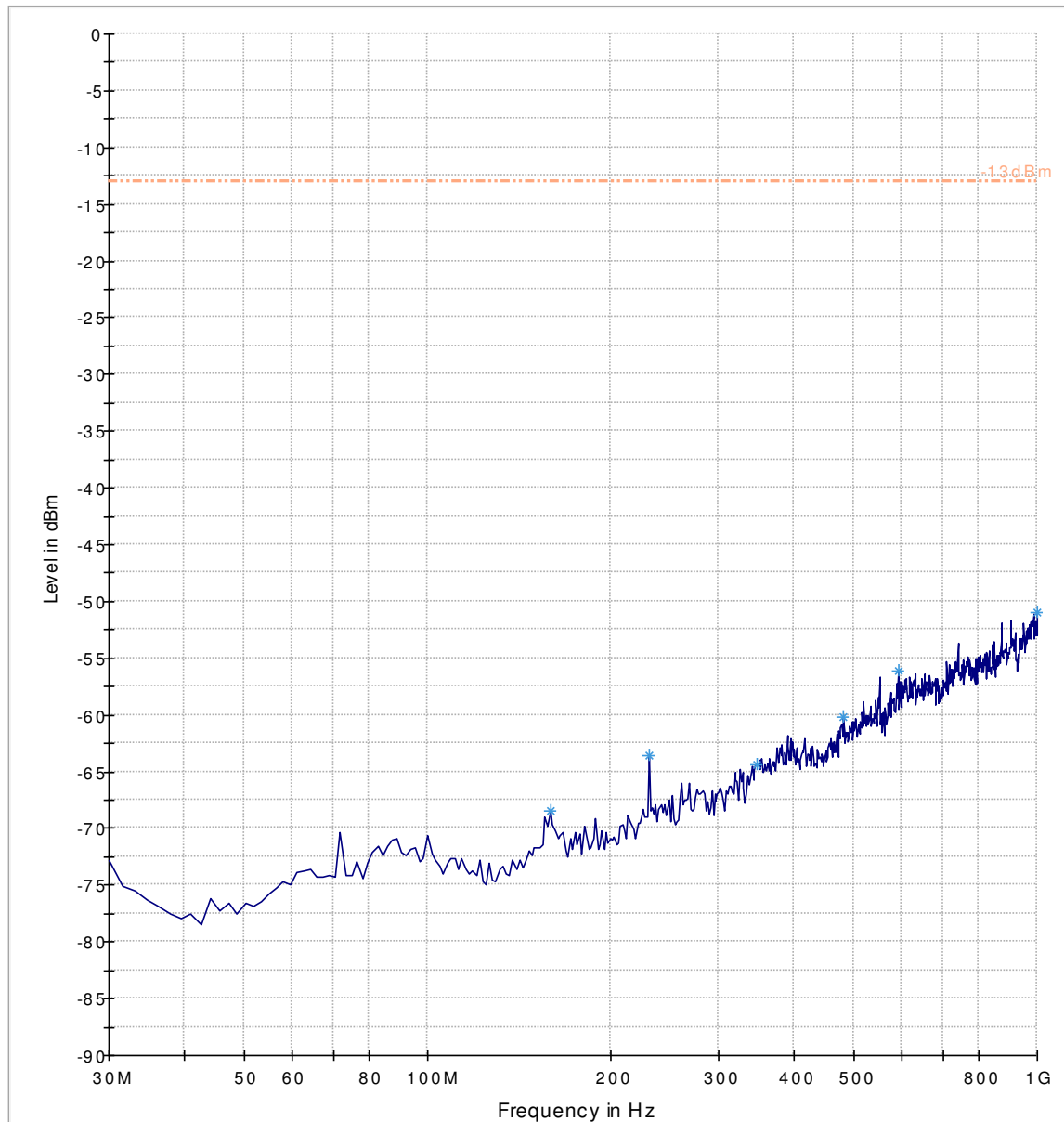
----- -13dBm.LimitLine — Preview Result 1-PK+ ◆ Final Result 1-PK+

7.4.18 UMTS FDD Band V, Tx: Ch. High, 1 GHz – 9 GHz



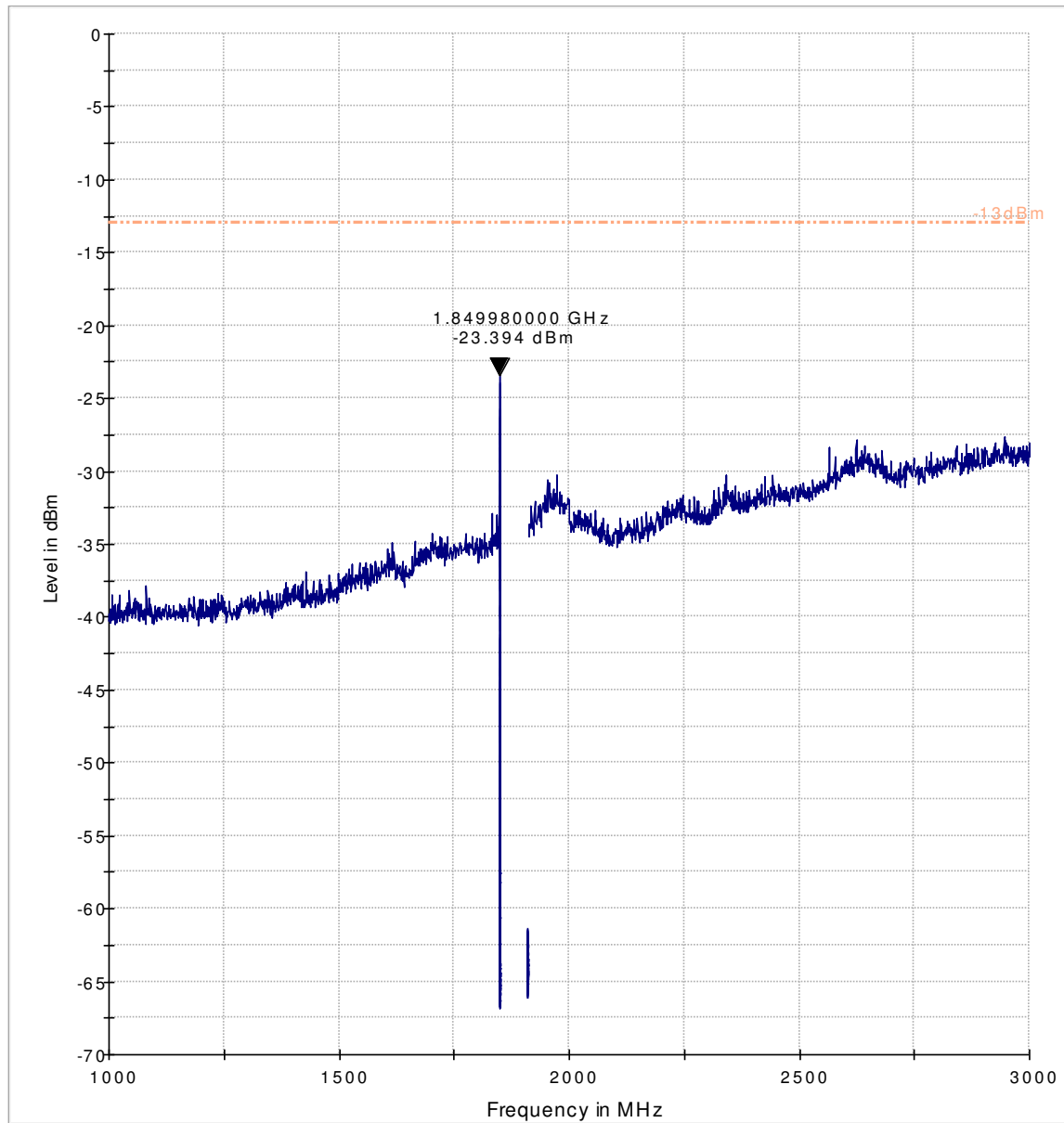
----- -13dBm ——— Preview Result 1-PK+ * Data Reduction Result 1 [2]-PK+

7.4.19 GSM 1900, Tx: Ch. Low, 30 MHz – 1 GHz



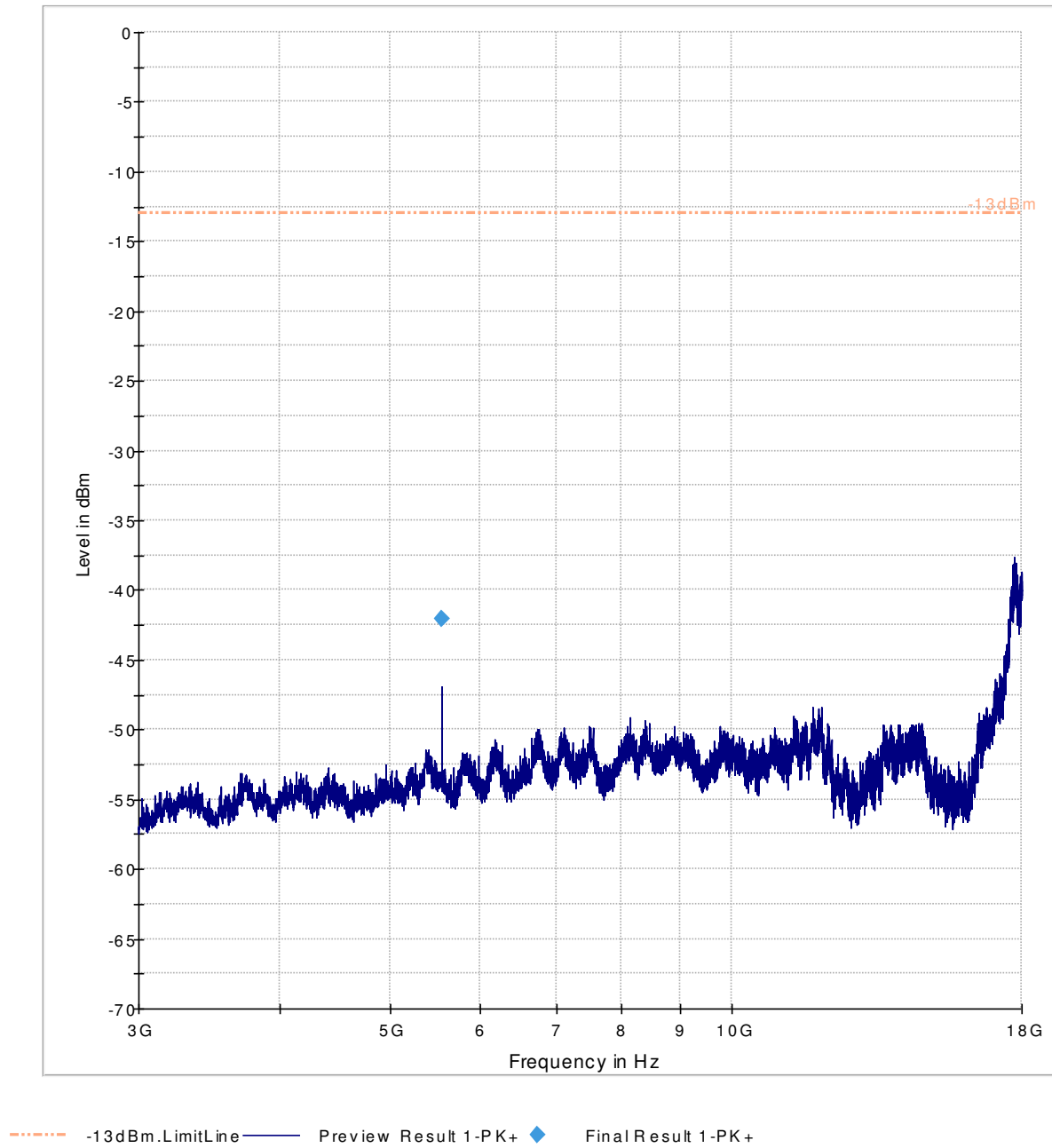
----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

7.4.20 GSM 1900, Tx: Ch. Low, 1 GHz – 3 GHz

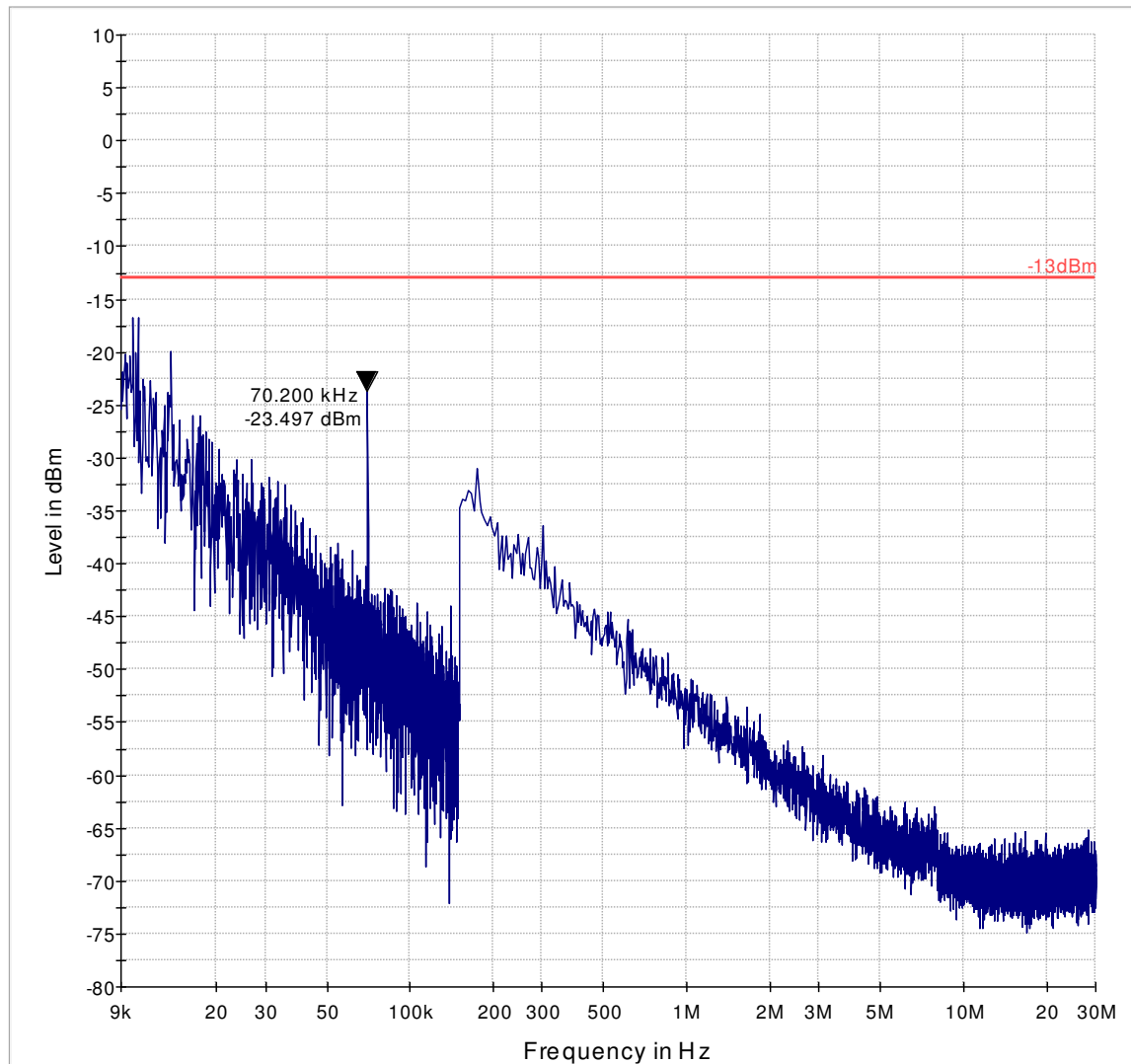


----- -13dBm.LimitLine — Preview Result 1-PK+ ◆ Final Result 1-RMS

7.4.21 GSM 1900, Tx: Ch. Low, 3 GHz – 18 GHz

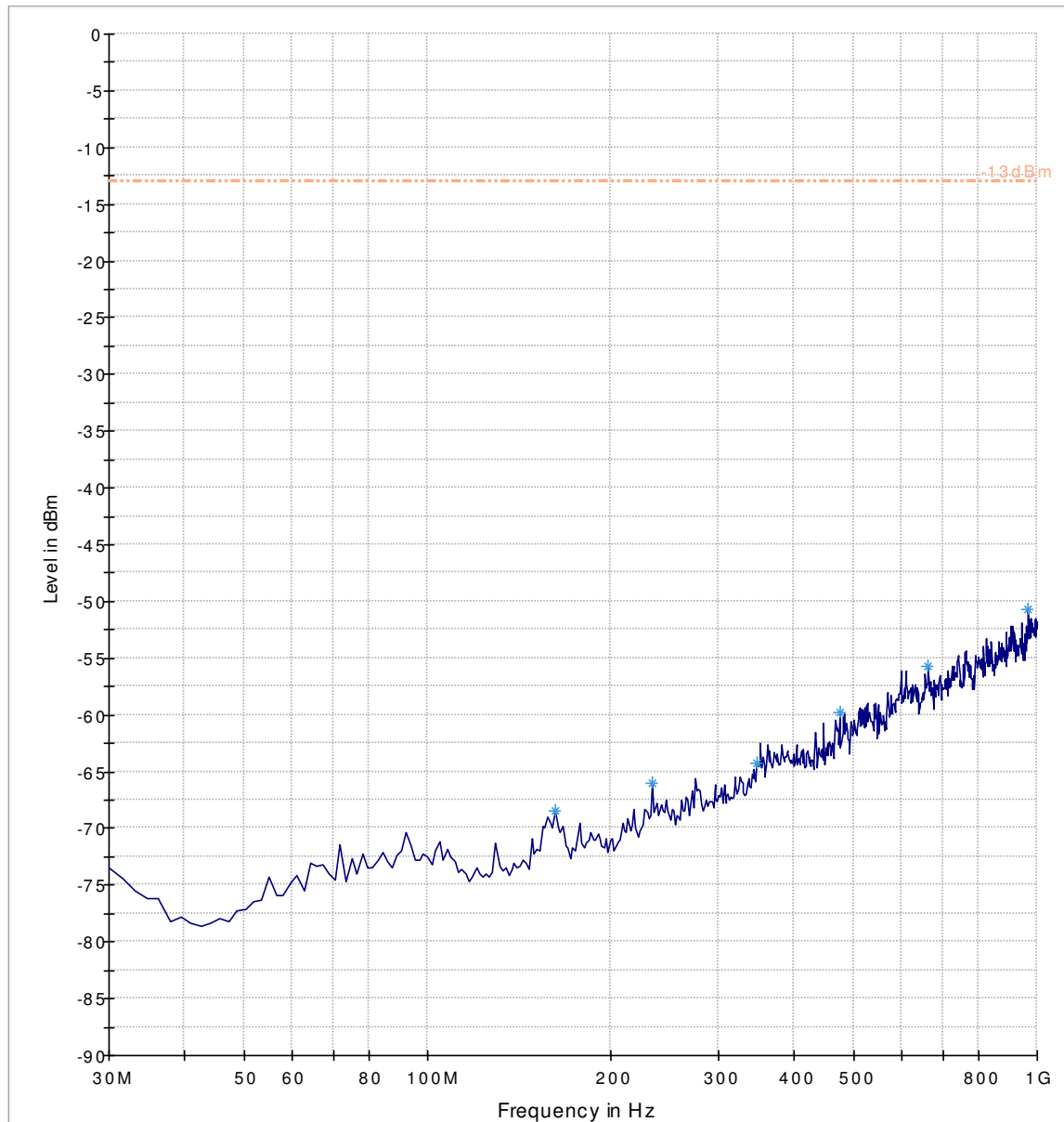


7.4.22 GSM 1900, Tx: Ch. Mid, 9 KHz – 30 MHz



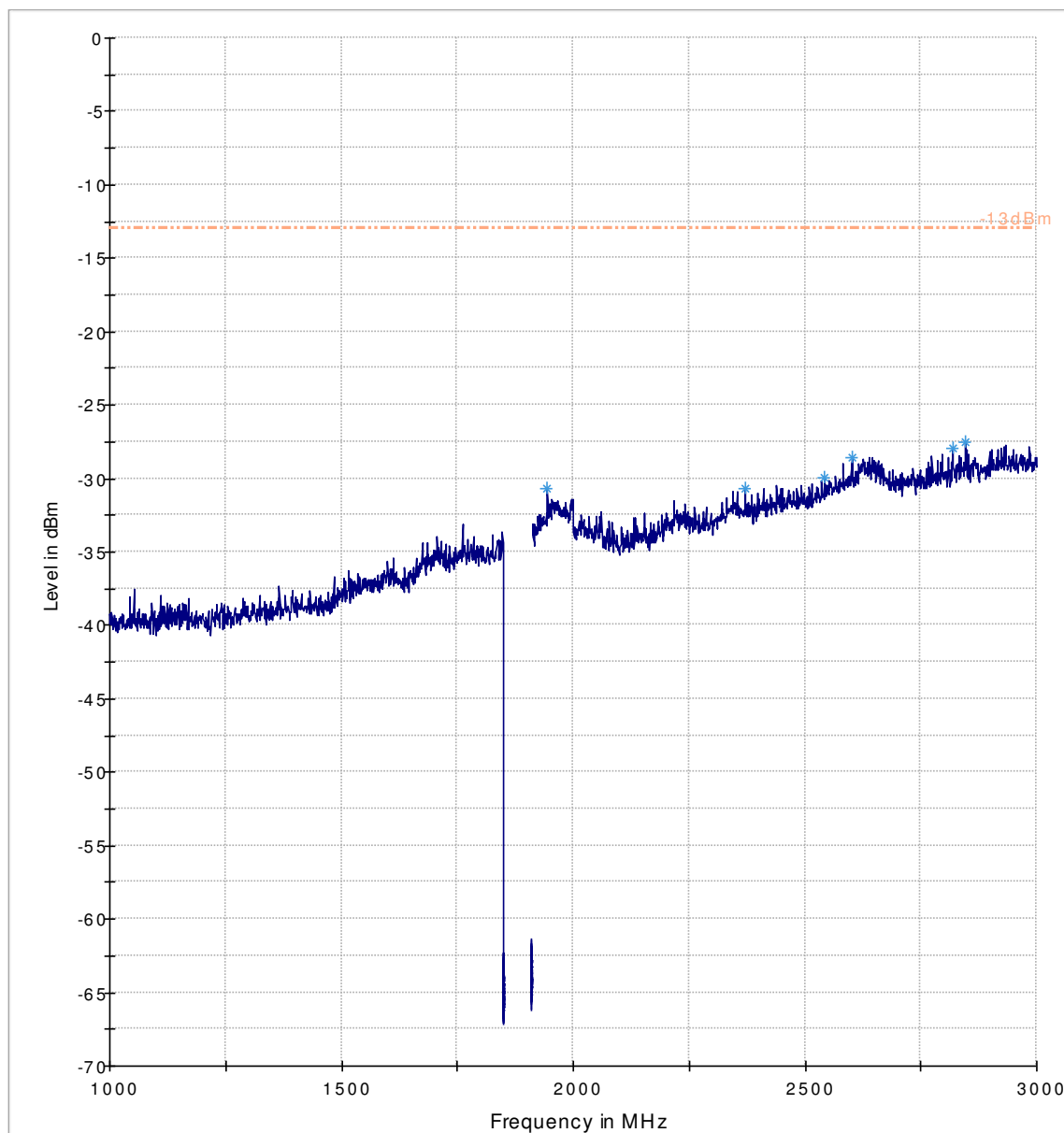
— -13dBm — Preview Result 1-PK+

7.4.23 GSM 1900, Tx: Ch. Mid, 30 MHz – 1 GHz



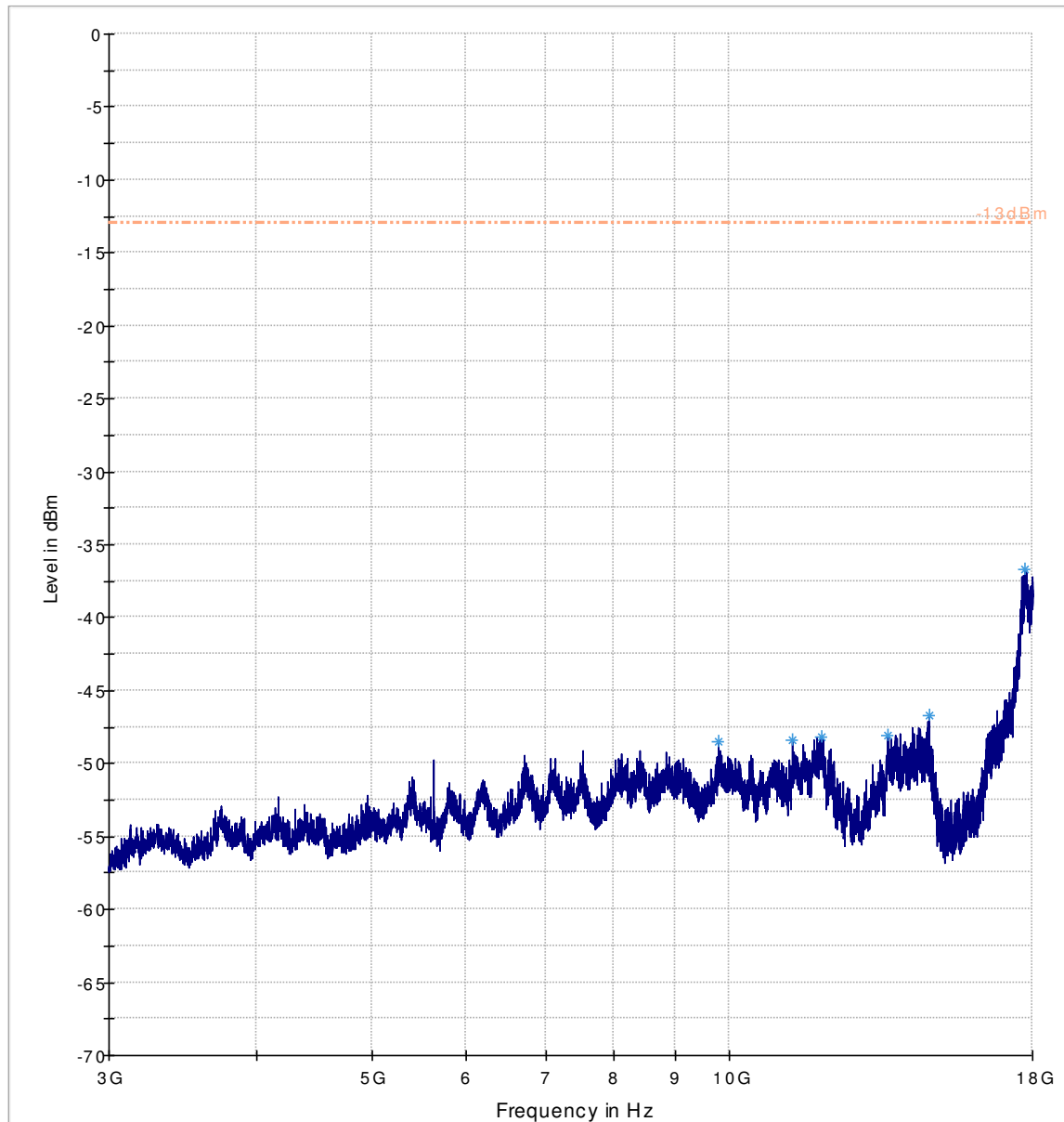
----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

7.4.24 GSM 1900, Tx: Ch. Mid, 1 GHz – 3 GHz



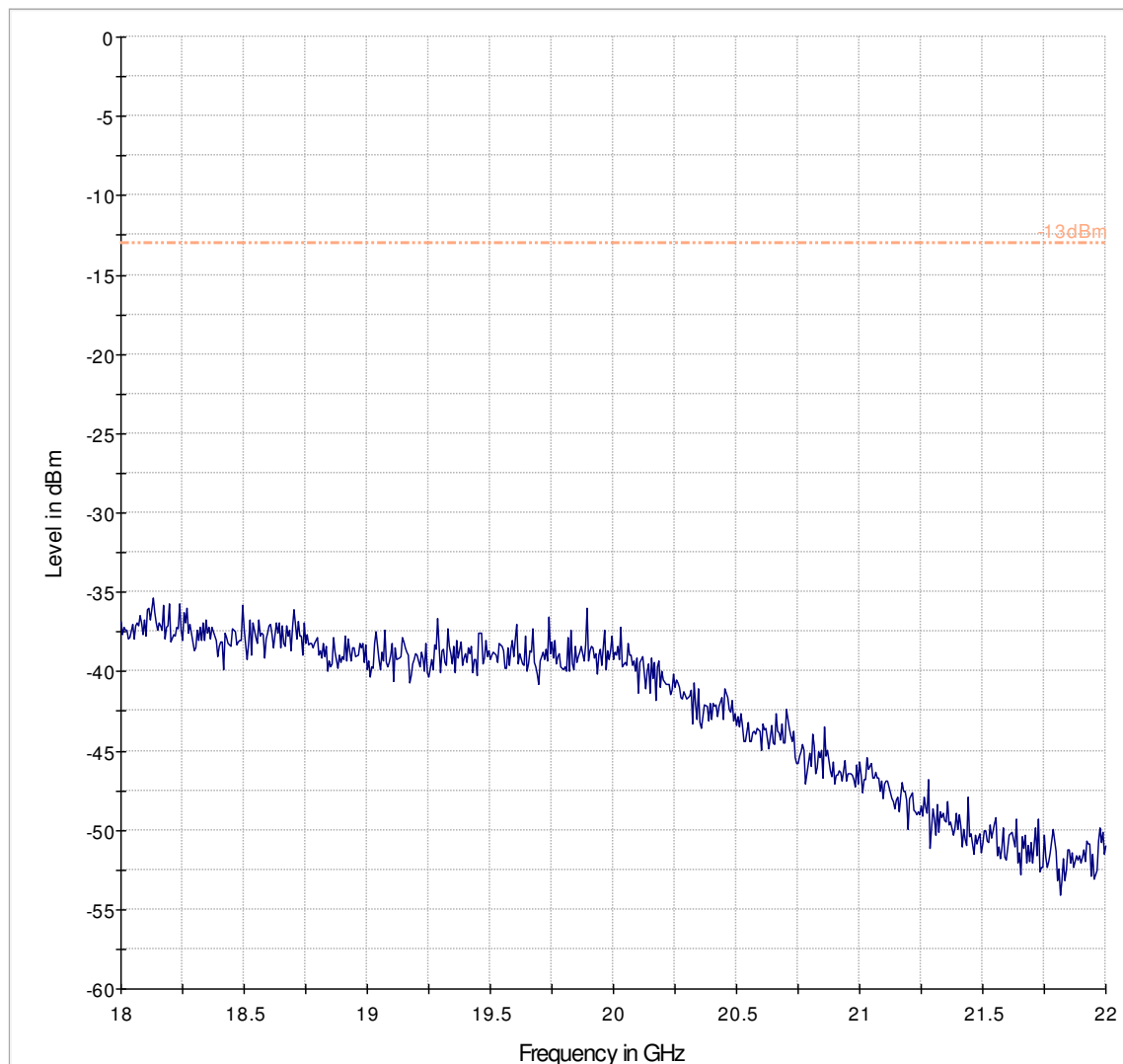
----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [2]-PK+

7.4.25 GSM 1900, Tx: Ch. Mid, 3 GHz – 18 GHz



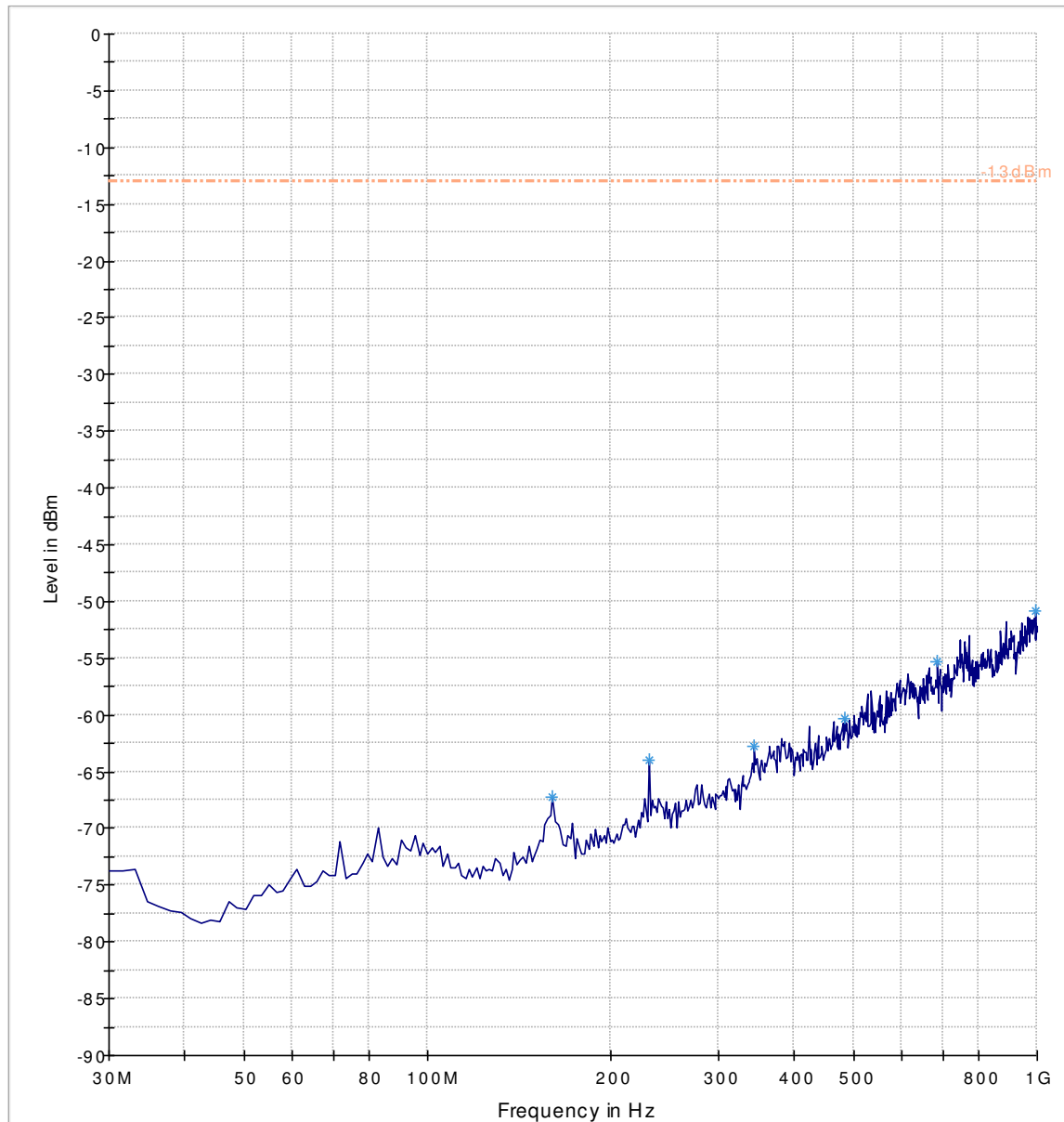
----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [3]-PK+

7.4.26 GSM 1900, Tx: Ch. Mid, 18 GHz – 22 GHz



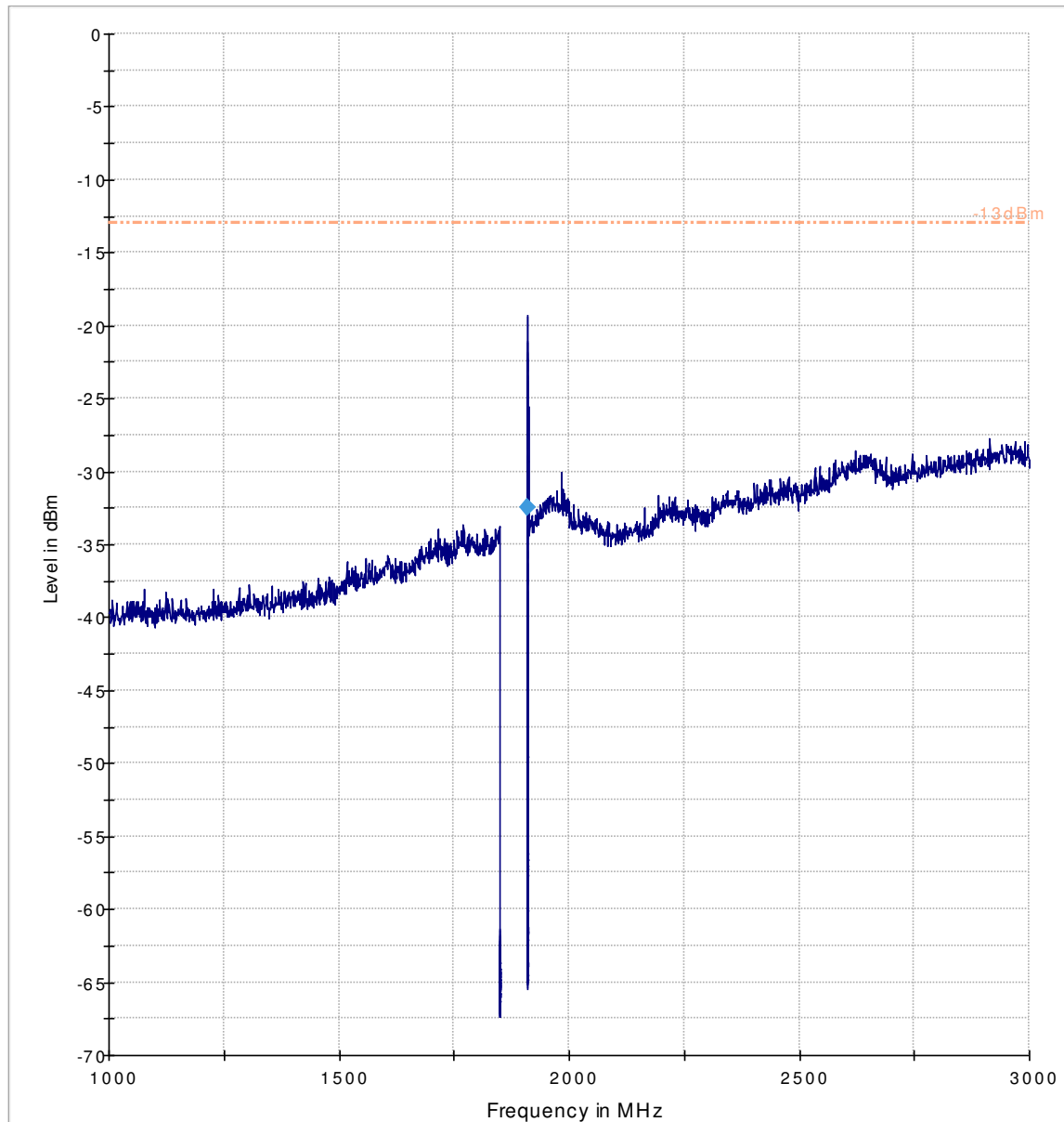
----- -13dBm — Preview Result 1-PK+

7.4.27 GSM 1900, Tx: Ch. High, 30 MHz – 1 GHz



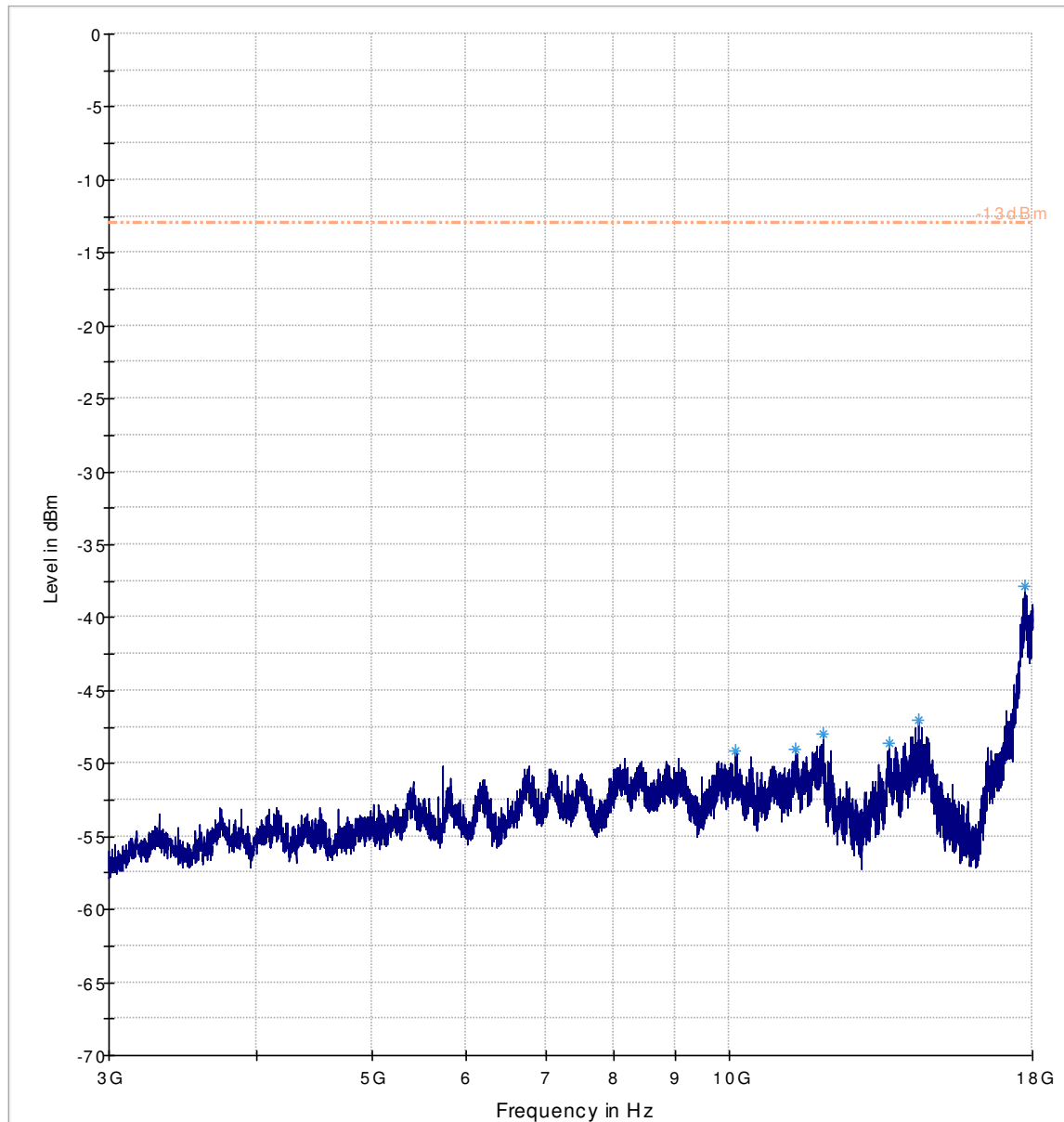
----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

7.4.28 GSM 1900, Tx: Ch. High, 1 GHz – 3 GHz



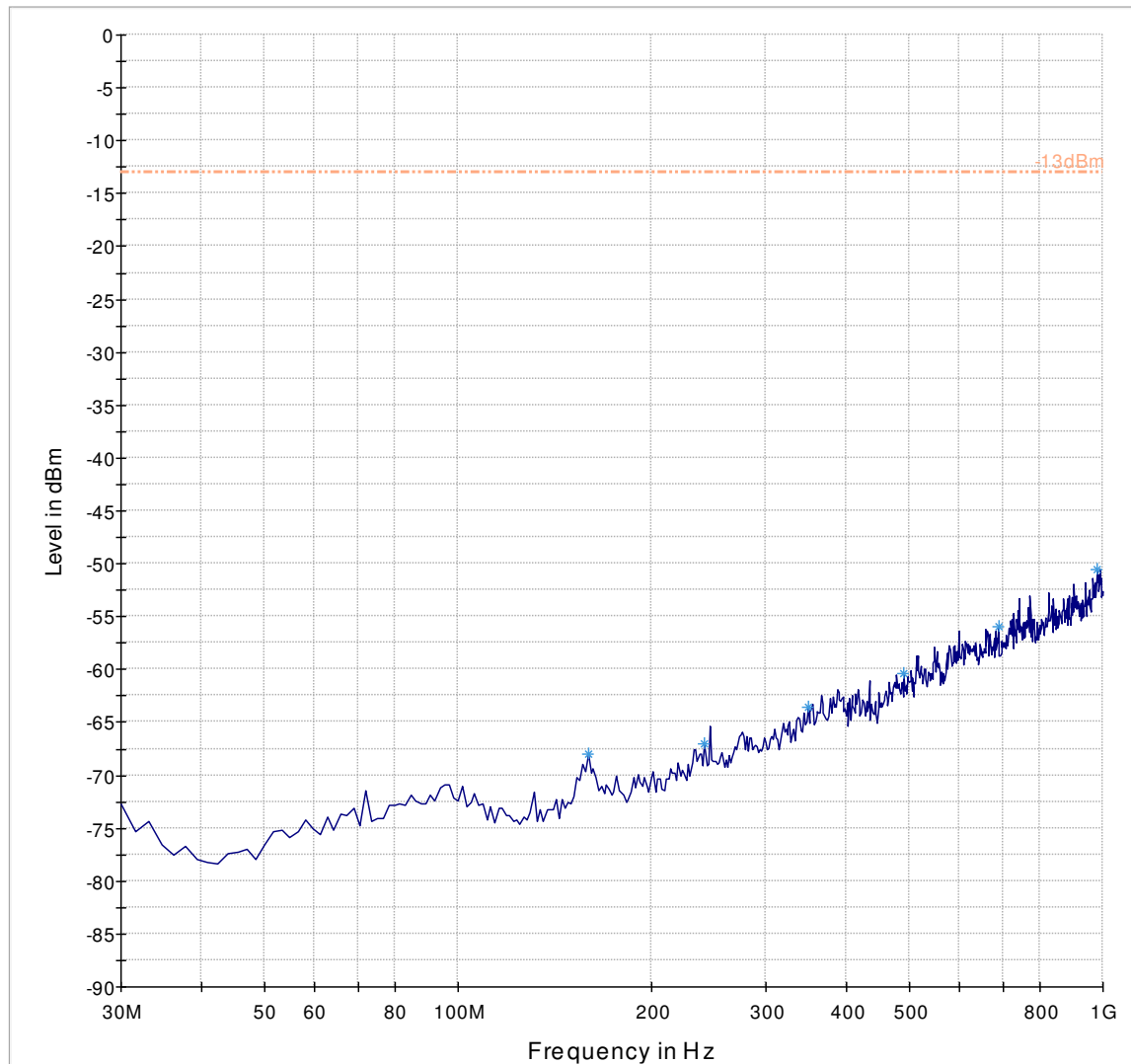
----- -13dBm.LimitLine ——— Preview Result 1-PK+ ◆ Final Result 1-RMS

7.4.29 GSM 1900, Tx: Ch. High, 3 GHz – 18 GHz

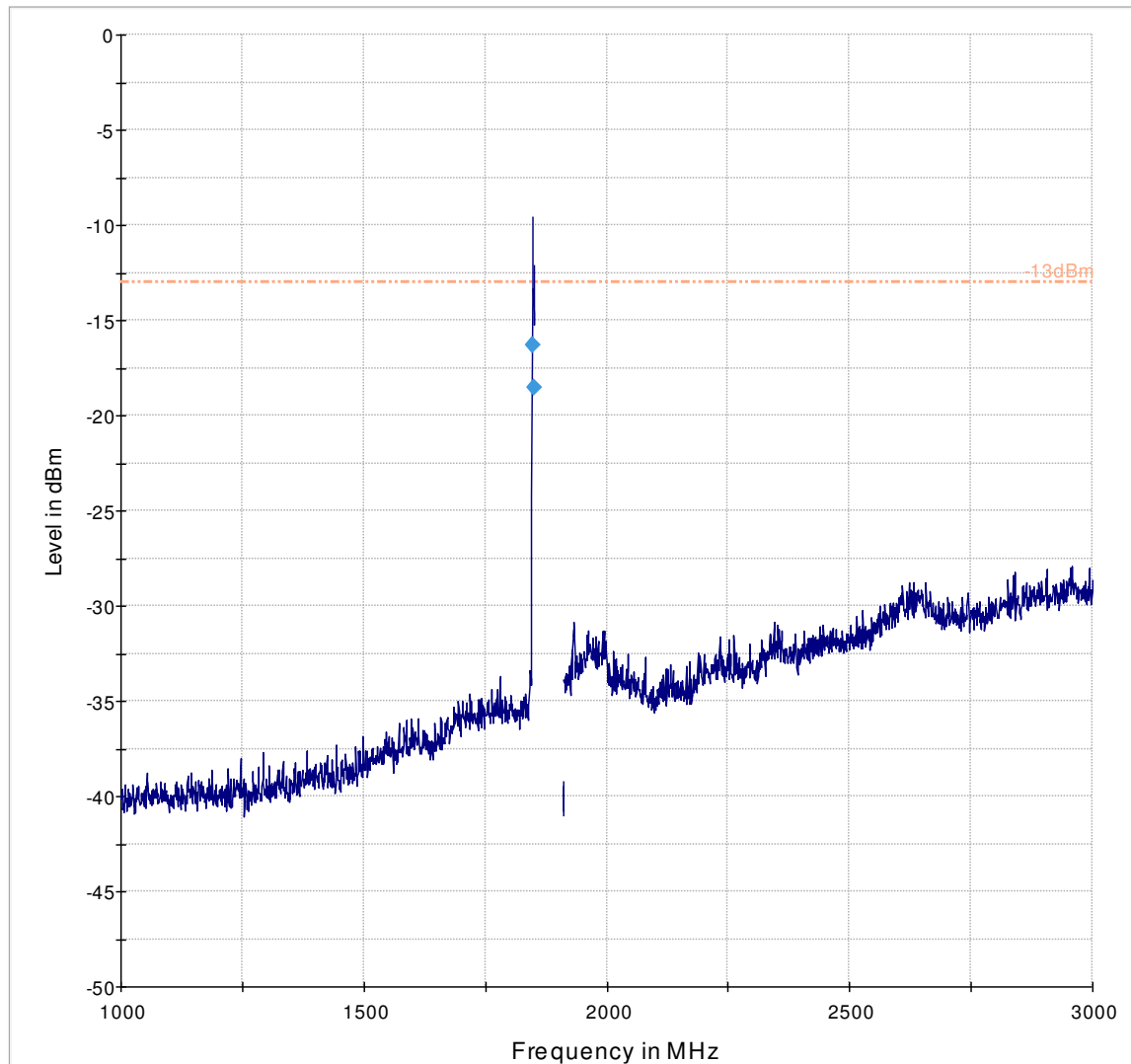


----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [3]-PK+

7.4.30 UMTS FDD Band II, Tx: Ch. Low, 30 MHz – 1 GHz

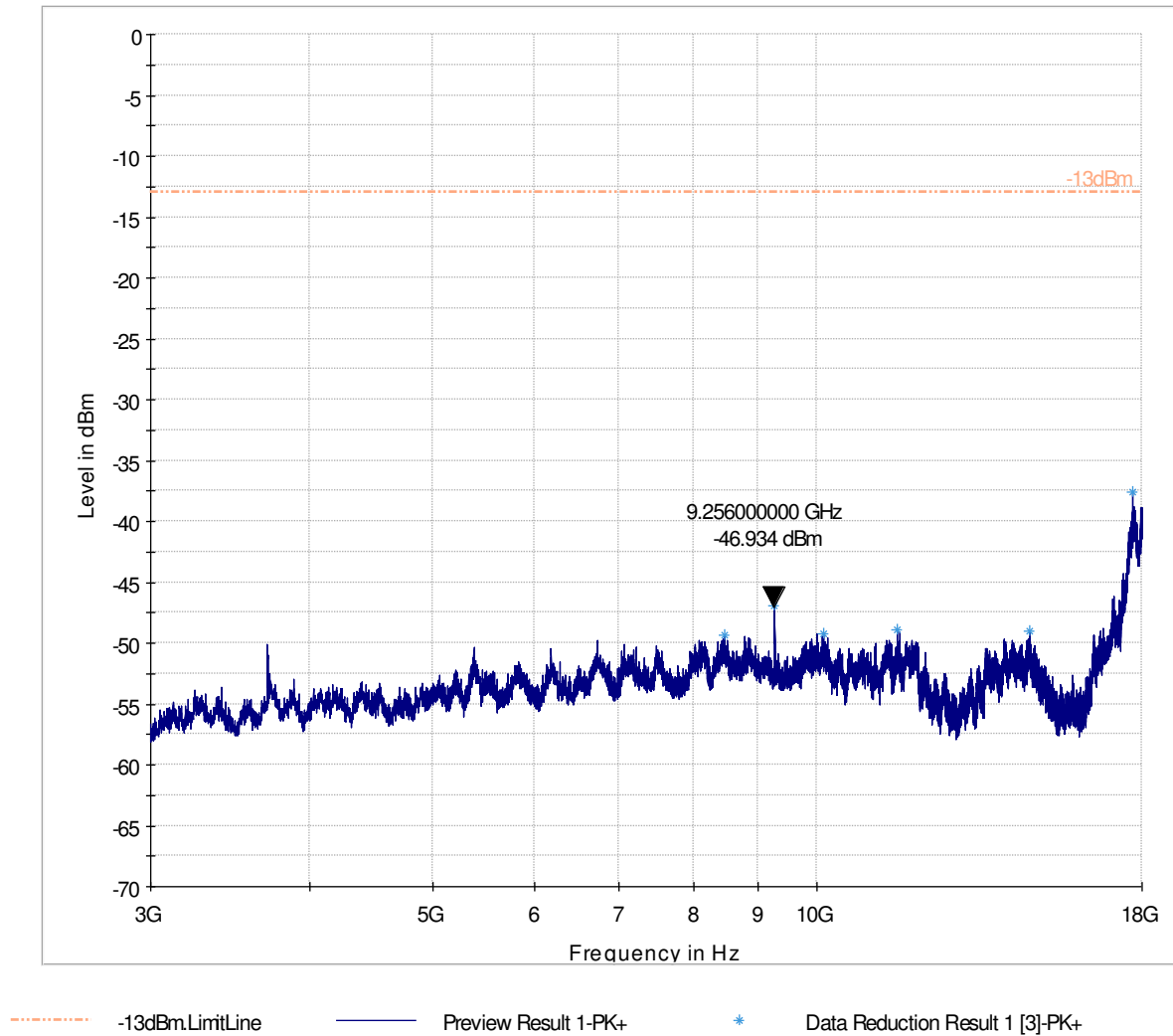


7.4.31 UMTS FDD Band II, Tx: Ch. Low, 1 GHz – 3 GHz

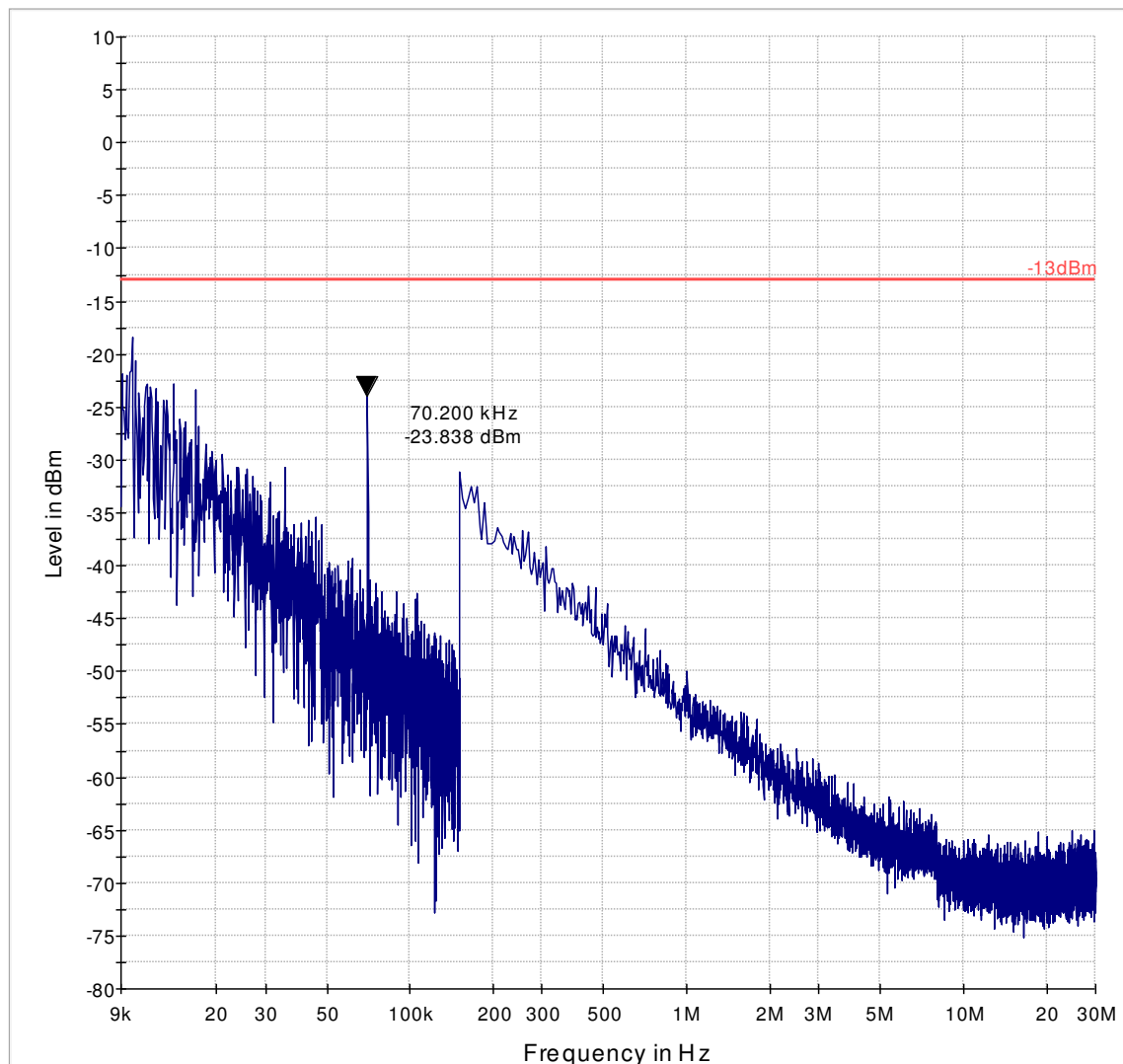


----- -13dBm.LimitLine ——— Preview Result 1-PK+ ◆ Final Result 1-RMS

7.4.32 UMTS FDD Band II, Tx: Ch. Low, 3 GHz – 18 GHz

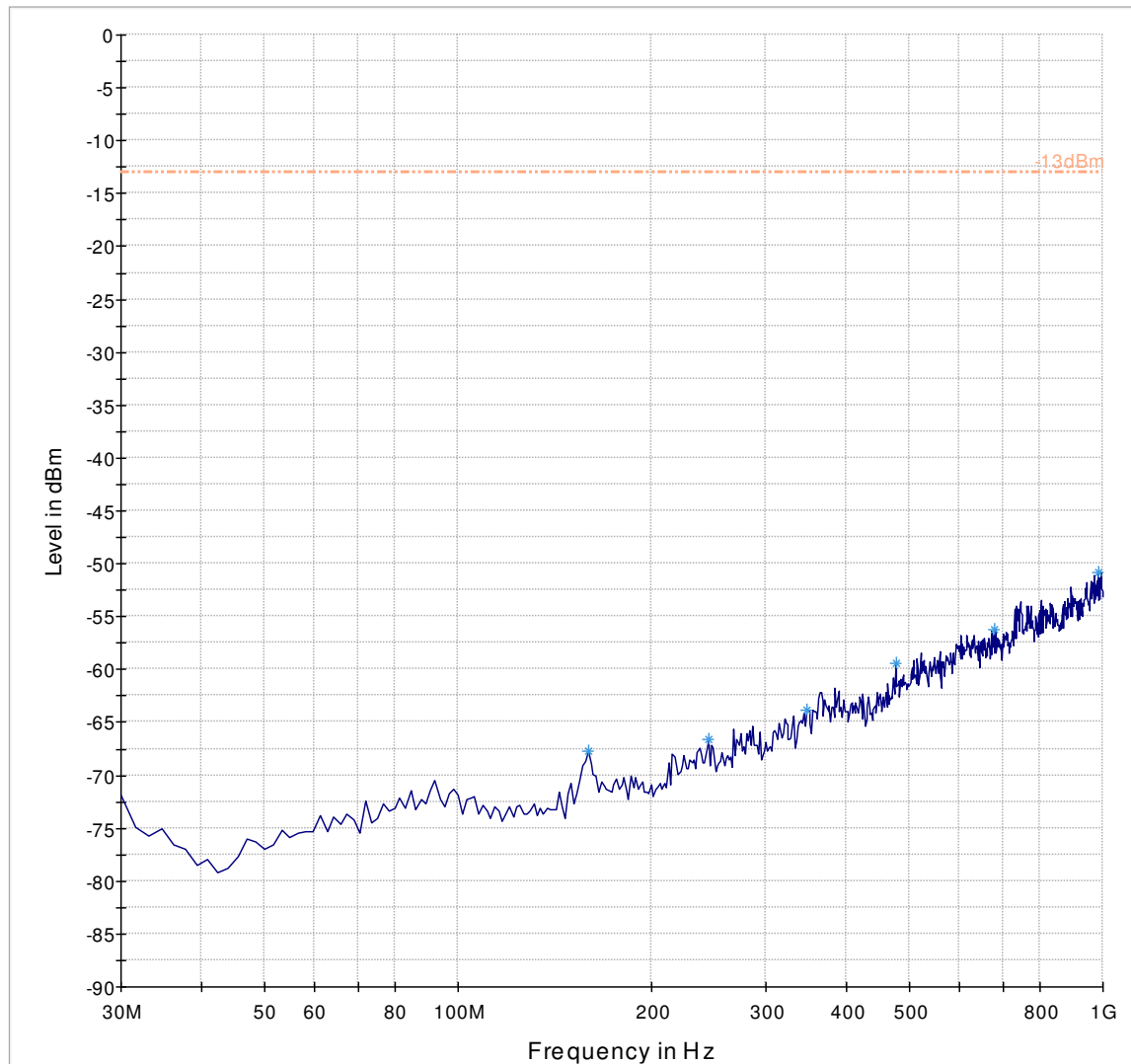


7.4.33 UMTS FDD Band II, Tx: Ch. Mid, 9 KHz – 30 MHz



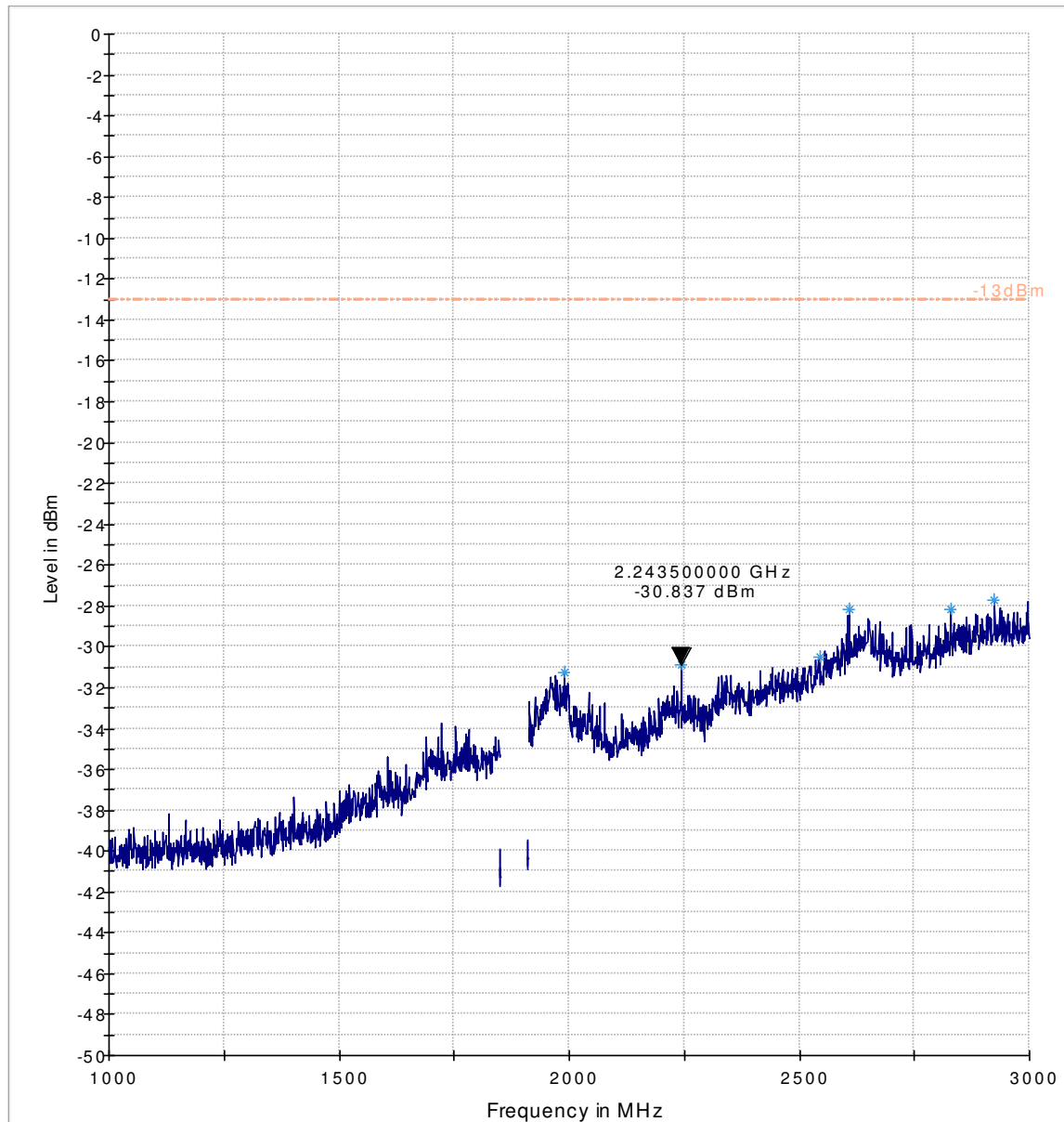
— -13dBm — Preview Result 1-PK+

7.4.34 UMTS FDD Band II, Tx: Ch. Mid, 30 MHz – 1 GHz



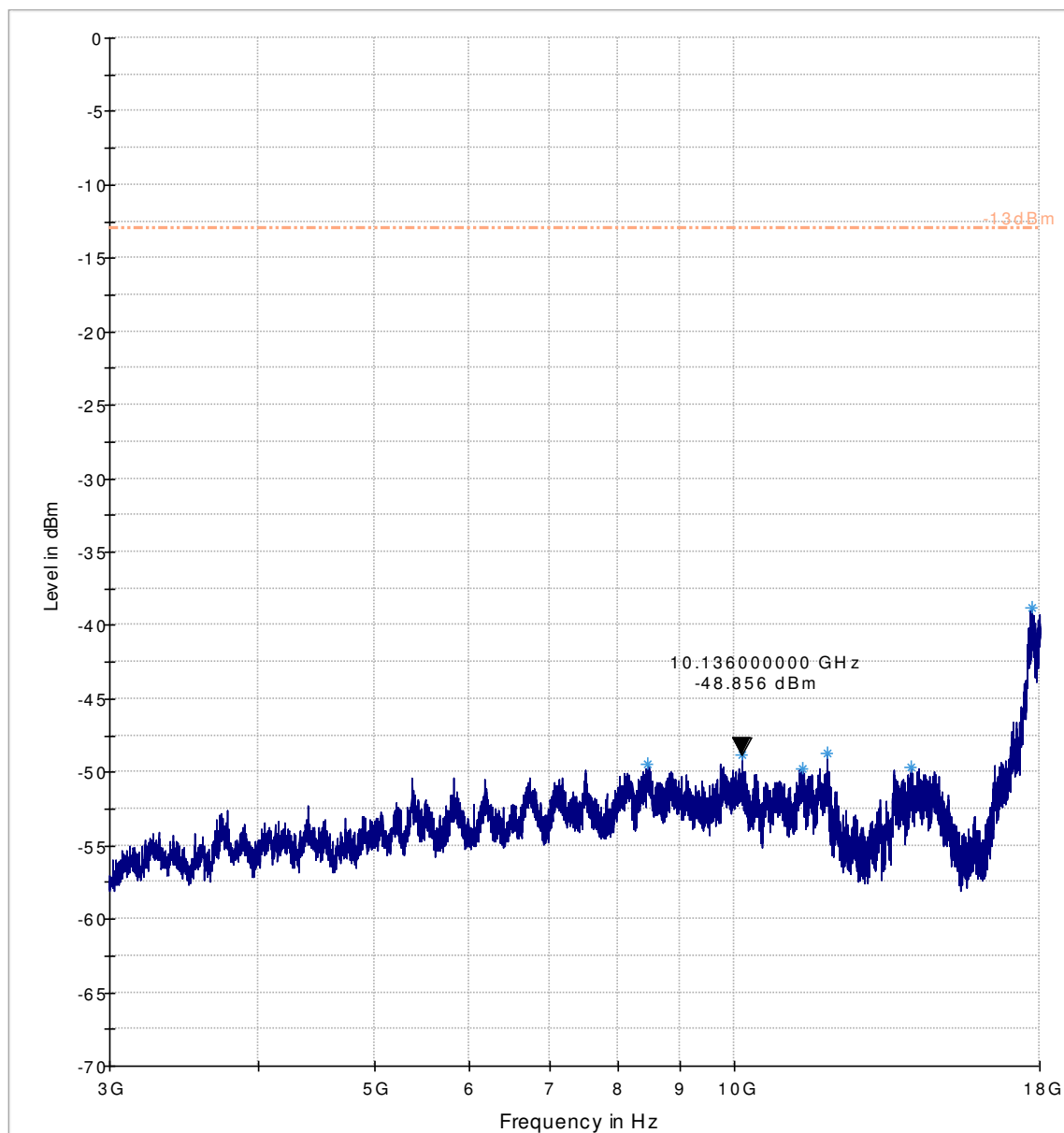
----- -13dBm.LimitLine Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

7.4.35 UMTS FDD Band II, Tx: Ch. Mid, 1 GHz – 3 GHz



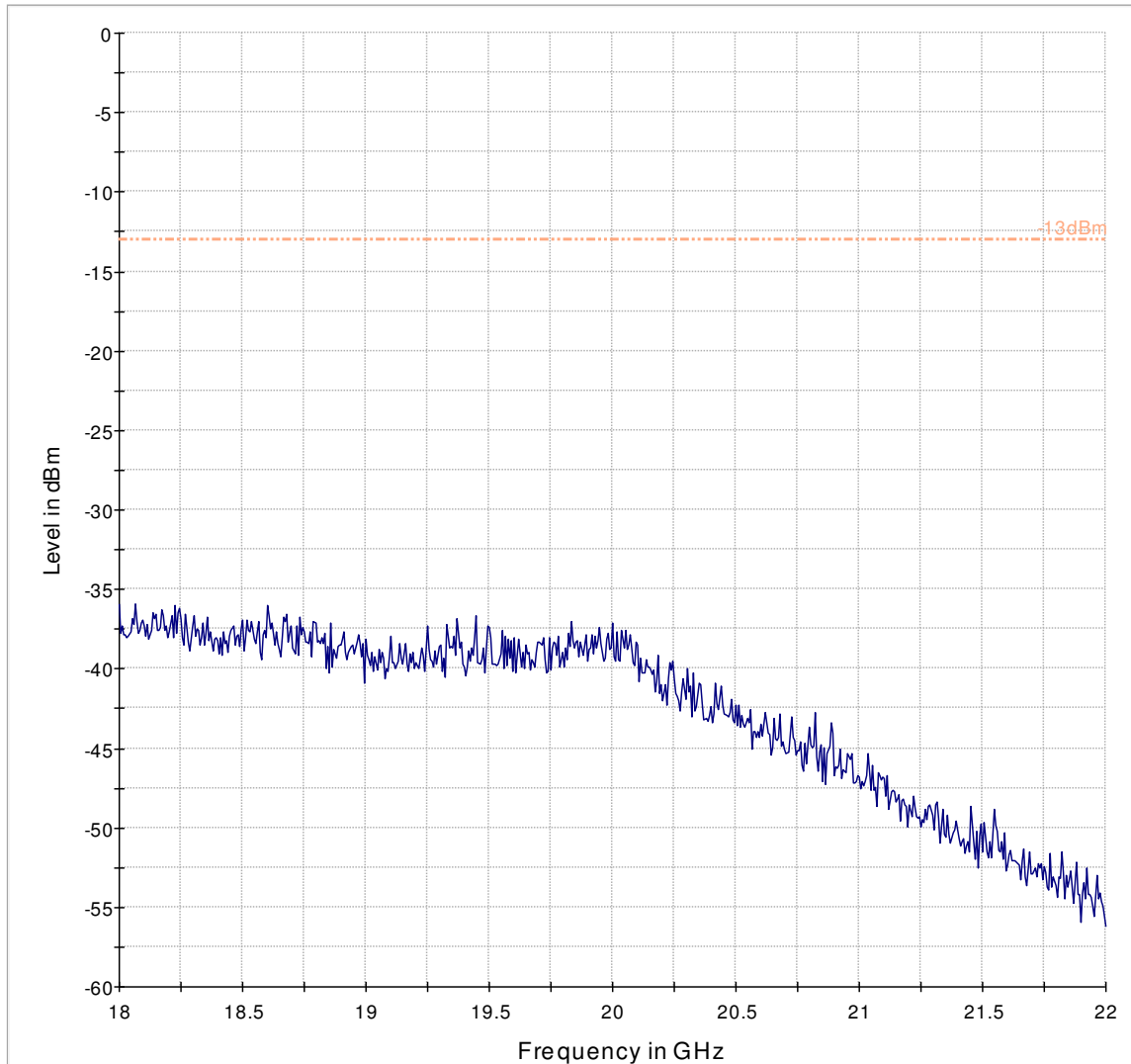
----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [2]-PK+

7.4.36 UMTS FDD Band II, Tx: Ch. Mid, 3 GHz – 18 GHz



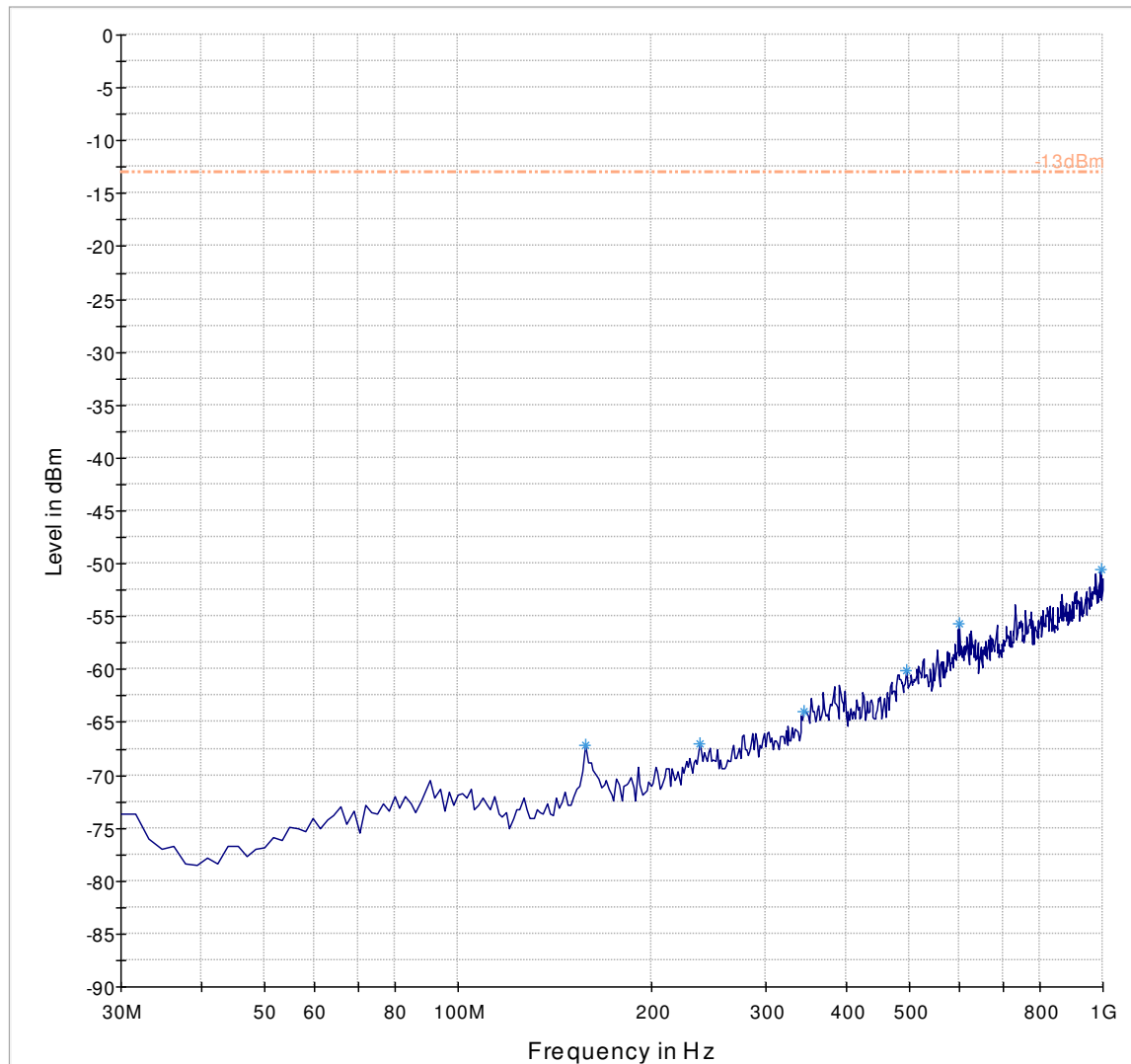
----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [3]-PK+

7.4.37 UMTS FDD Band II, Tx: Ch. Mid, 18 GHz – 22 GHz



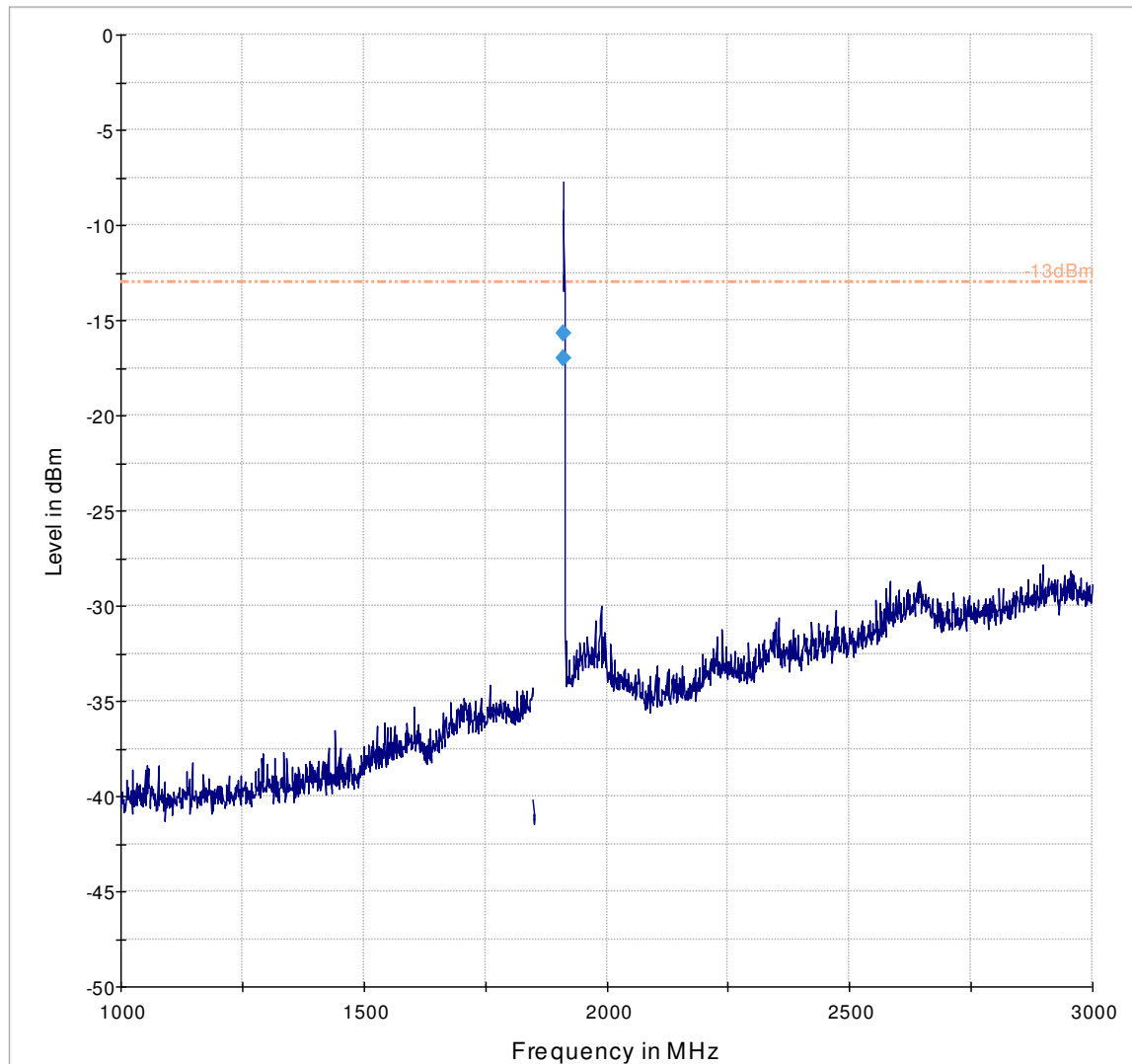
----- -13dBm ——— Preview Result 1-PK+

7.4.38 UMTS FDD Band II, Tx: Ch. High, 30 MHz – 1 GHz



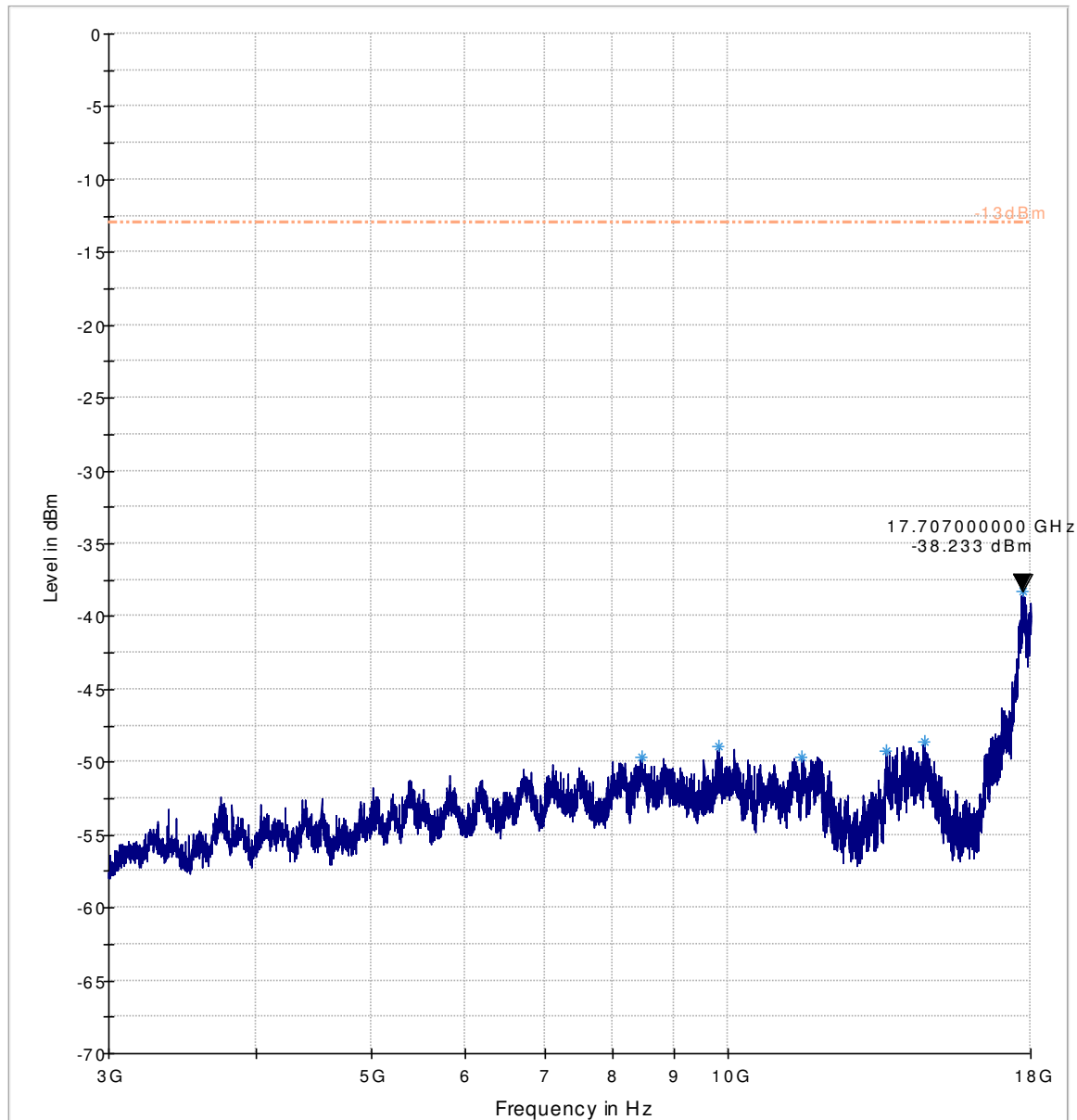
----- -13dBm.LimitLine Preview Result 1-PK+ * Data Reduction Result 1 [1]-PK+

7.4.39 UMTS FDD Band II, Tx: Ch. High, 1 GHz – 3 GHz



----- -13dBm.LimitLine Preview Result 1-PK+ Final Result 1-RMS

7.4.40 UMTS FDD Band II, Tx: Ch. High, 3 GHz – 18 GHz



----- -13dBm.LimitLine — Preview Result 1-PK+ * Data Reduction Result 1 [3]-PK+

8 Test Equipment and Ancillaries used for tests.

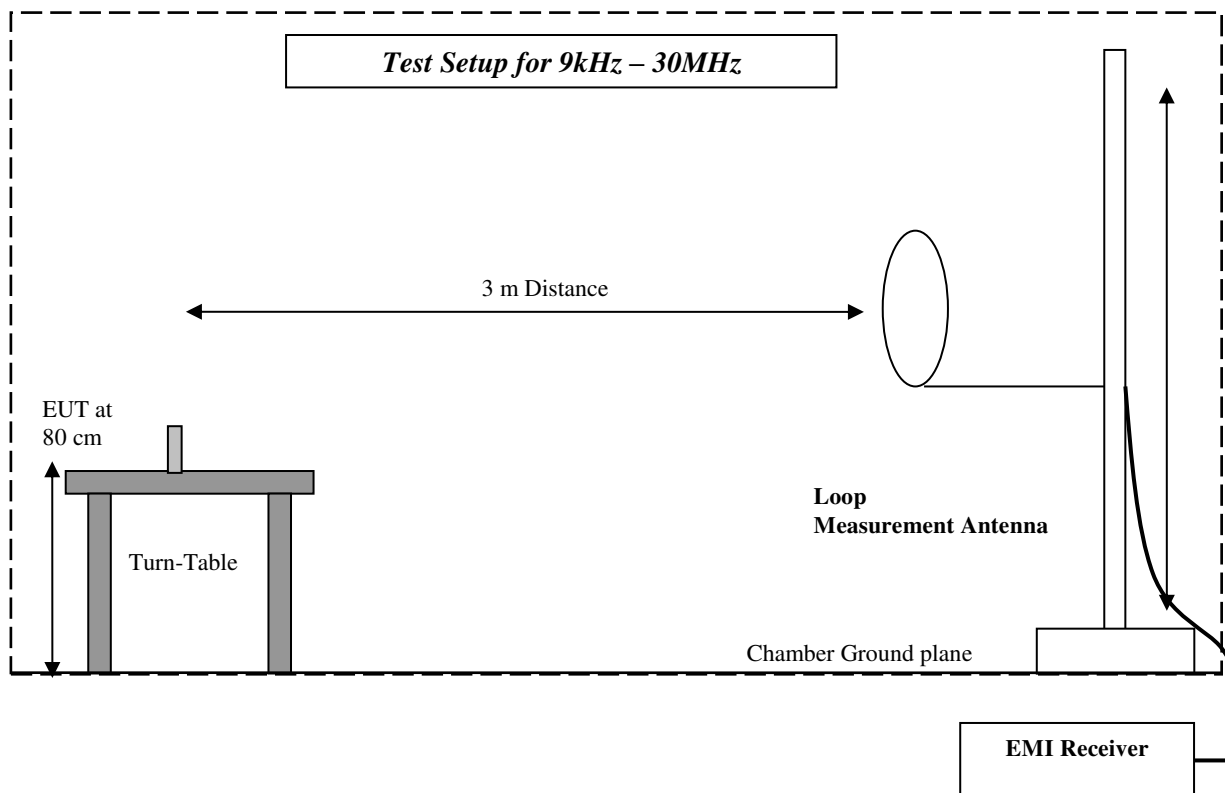
Item Name	Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Antenna Biconilog 3142E	Biconlog Antenna	EMCO	3142E	166067	3 years	6/14/2014
Antenna Horn 3115 SN 35111	Horn Antenna	EMCO	3115	35111	3 years	7/24/2015
Antenna Horn 3116	Horn Antenna	ETS Lindgren	3116	70497	3 years	7/22/2015
Antenna Loop 6512	Loop Antenna	ETS Lindgren	6512	49838	3 years	3/13/2014
Digital Barometer	Compact Digital Barometer	Control Company	35519-055	91119547	2 Years	4/7/2015
Receiver ESU40	EMI Receiver	R&S	ESU40	100251	3 years	6/29/2015
Spectrum Analyzer FSU26 #2	Spectrum Analyzer	R&S	FSU26	200065	3 years	7/4/2015

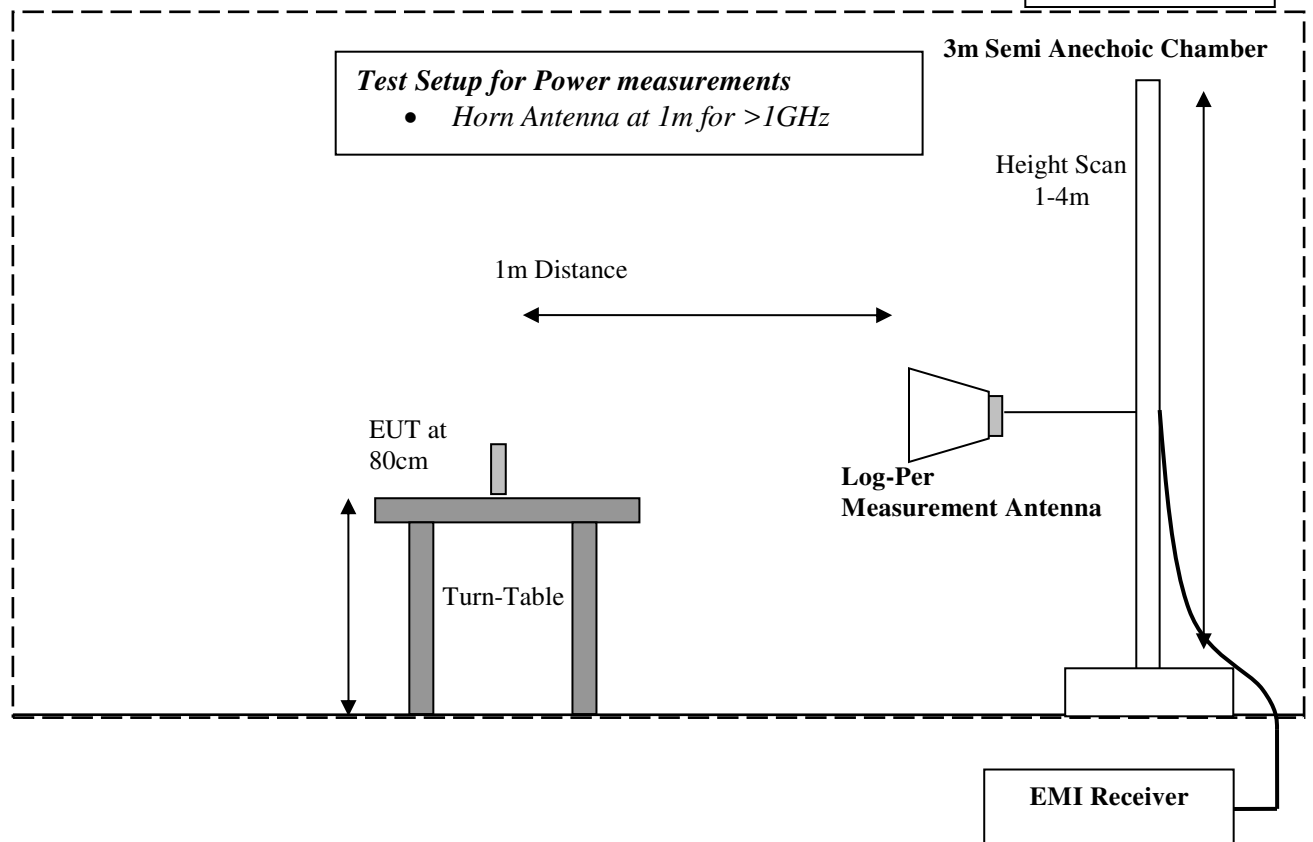
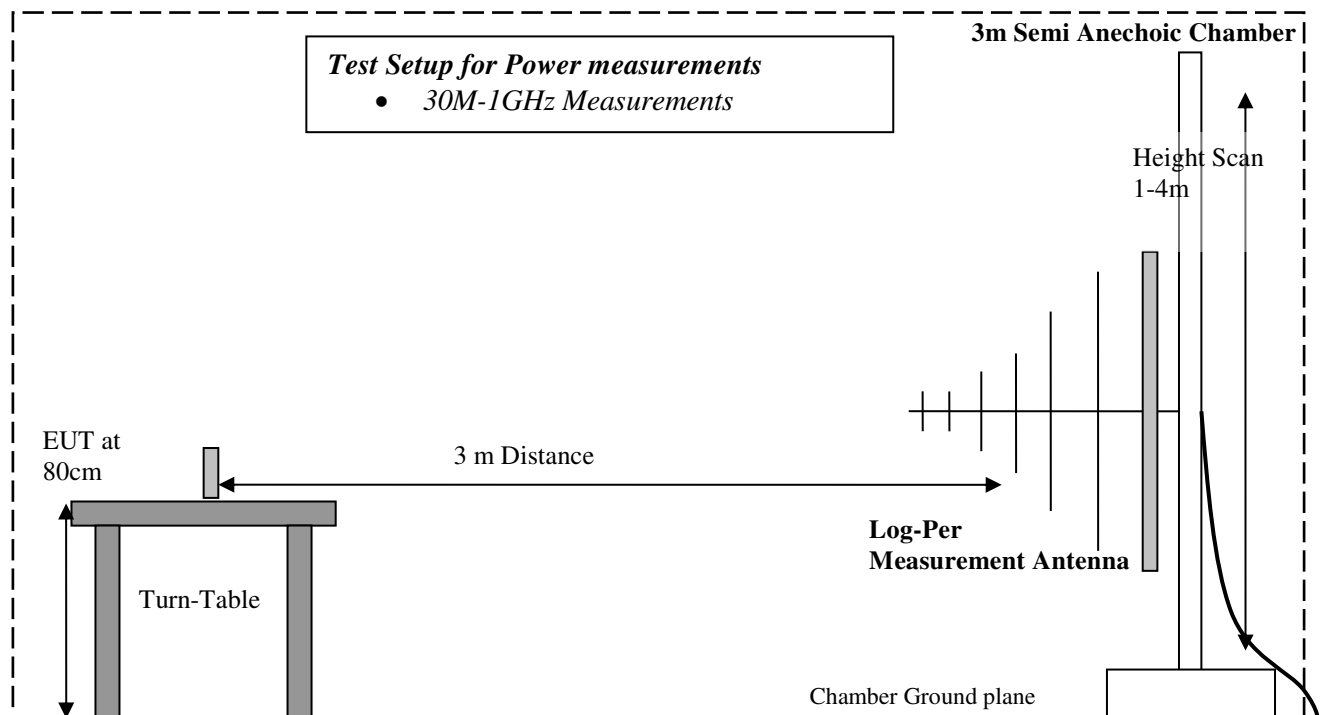
Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month.

Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

9 Block Diagrams





10 Revision History

Date	Report Name	Changes to Report	Report prepared by
June 2, 2016	EMC_ZIPCA-006-16001_FCC_22_24	Initial Version	Yu-Chien Ho
September 23, 2016	EMC_ZIPCA-006-16001_FCC_22_24_rev1	Added output power measurement method	Yu-Chien Ho