



# FCC/IC Radiated Test Report

FOR:

Xirgo Technologies, LLC

Model Name:

XT6075

Product Description:

Reefer Container Monitoring Device

FCC ID: GKM-XT6075

IC ID: 10281A-XT6075

Per:

47 CFR: Part 22, Part 24, Part 27

RSS-132 Issue 3

RSS-133 Issue 6

Report #: EMC-XIRGO-118-17001-FCC-22-24-27-Rev1

Date: August 25, 2017



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## 1 Assessment

The following device as further described in section 3 of this report was evaluated against the applicable criteria specified in the Code of Federal Regulations Title 47 parts 22, 24, 27 and Industry Canada Radio Standard Specifications RSS-132 Issue 3 and RSS-133 Issue 6 pertaining to radiated emissions. No deviations were ascertained during the course of the tests performed.

Company Name	Product Description	Model #
Xirgo Technologies Inc.	Reefer Container Monitoring Device	XT6075

### Responsible for Testing Laboratory:

August 25, 2017	Compliance	Peter Nevermann (Director RC&E)	
Date	Section	Name	Signature

### Responsible for the Report:

August 25, 2017	Compliance	James Donnellan (Sr. EMC Engineer)	
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 EMC Test Report

<b>Company Name:</b>	CETECOM Inc.
<b>Department:</b>	Compliance
<b>Street Address:</b>	411 Dixon Landing Road
<b>City/Zip Code</b>	Milpitas, CA 95035
<b>Country</b>	USA
<b>Telephone:</b>	+1 (408) 586 6200
<b>Fax:</b>	+1 (408) 586 6299
<b>Director RC&amp;E:</b>	Peter Nevermann
<b>Project Engineer:</b>	Ruther Navarro

### 2.2 Identification of the Client

<b>Applicant's Name:</b>	Xirgo Technologies, LLC
<b>Street Address:</b>	188 Camino Ruiz
<b>City/Zip Code</b>	Camarillo, CA 93012
<b>Country</b>	USA

### 2.3 Identification of the Manufacturer

<b>Manufacturer's Name:</b>	Same as Client
<b>Manufacturers Address:</b>	
<b>City/Zip Code</b>	
<b>Country</b>	



### 3 Equipment Under Test (EUT)

#### 3.1 EUT Specifications

<b>Model # &amp; HVIN<sup>1</sup>:</b>	XT6075
<b>Marketing Name &amp; PMN<sup>1</sup>:</b>	XT6075
<b>HW Version:</b>	XT6075-001
<b>SW Version:</b>	XT6075-01
<b>FCC-ID:</b>	GKM-XT6075
<b>IC-ID:</b>	10281A-XT6075
<b>Product Description</b>	Reefer Container Monitoring Device
<b>Module Information:</b>	Module u-Blox TOBY-R200 FCC XPY1EHM44NN ICID 8595A-1EHM44NN
<b>Transceiver Technology / Type(s) of Modulation</b>	WCDMA/UMTS Band II, V / QPSK / HPSK (CDMA2000) LTE 2, 4, 5, 12 / OFDM, OFDMA, SC-FDMA GSM 850, PCS 1900
<b>Operating Frequency Ranges (MHz):</b>	WCDMA/UMTS FDD BAND II: 1852 - 1908 MHz; WCDMA/UMTS FDD BAND V: 824 - 849 MHz; LTE Band 2: 1850 - 1910 MHz; LTE Band 4: 1710 - 1755 MHz; LTE Band 5: 824 - 849 MHz; LTE Band 12: 698 - 716 MHz;
<b>Max Conducted Output Power Per Modular Grant:</b>	33.1 dBm, GSM850
<b>Antenna info:</b>	Taoglas antenna module MA150.A.W.ABC.002.da. with Peak Gain for LTE5 of 3.43 dBi, LTE2 of 5.13 dBi, LTE4 of 4.86 dBi and LTE12 4.07 dBi
<b>Rated Operating Voltage Range:</b>	Input DC: 30 V or 20 – 48 AC No Power supplies sold with the device.
<b>Operating Temperature Range:</b>	Tlow: -30° C/ Tnom: 23° C/ Tmax: 75° C
<b>Other Radios included in the device</b>	GPS Module Name: UBX-M8030 Model number: UBX-M8030-KT-B3000A Zigbee: Module Name: CC2530F256RHAT
<b>Sample Revision</b>	<input type="checkbox"/> Prototype <input checked="" type="checkbox"/> Production <input type="checkbox"/> Pre-Production



### 3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	SN-2	XT6075-001	XT6075-01	Test Sample
2				

### 3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	Antenna	MA150.A.W.ABC.002.da	Taoglas	-

### 3.4 Test Sample Configuration

Set-up #	EUT / AE used for set-up	Comments
1	EUT #1+ AE #1	Radiated

### 3.5 Miscellaneous EUT Information

Testing was done in LTE Band 12 with the zigbee transmitting continuously, whereas for other bands tested zigbee was in transmitting occasional in beacon mode.

#### 4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the EUT against the relevant requirements specified in the Code of Federal Regulations Title 47 parts 22, 24, 27 and Industry Canada Radio Standard Specifications RSS-132 Issue 3 and RSS-133 Issue 6 to support the equipment certification under FCC-ID GKM-XT6075.

Full conducted measurements according to the above standards are filed under the certification of the module FCC-ID: XPY1EHM44NN with a singular grant. Thus this report verifies the radiated performance.

## 5 Measurement

### 5.1 Dates of Testing:

May 4, 2017 – May 25, 2017

### 5.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor  $k=1$ .

#### Radiated measurement

9 kHz to 30MHz	$\pm 2.5$ dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	$\pm 2.0$ dB (Biconilog Antenna)
1 GHz to 40 GHz	$\pm 2.3$ dB (Horn Antenna)

#### Conducted measurement

150 kHz to 30 MHz  $\pm 0.7$  dB (LISN)

RF conducted measurement  $\pm 0.5$  dB

### 5.3 Environmental Conditions during Testing:

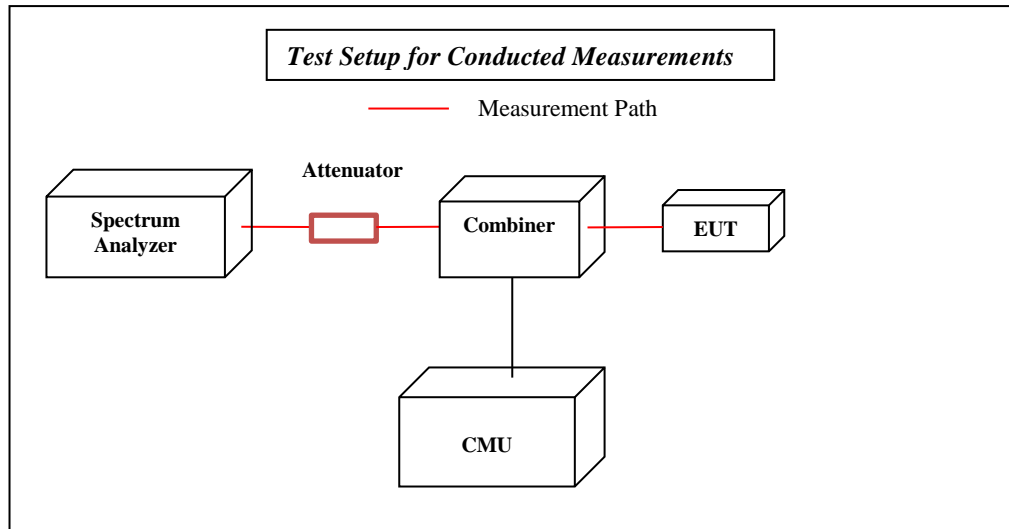
The following environmental conditions were maintained during the course of testing:

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



#### 5.4 Conducted measurements

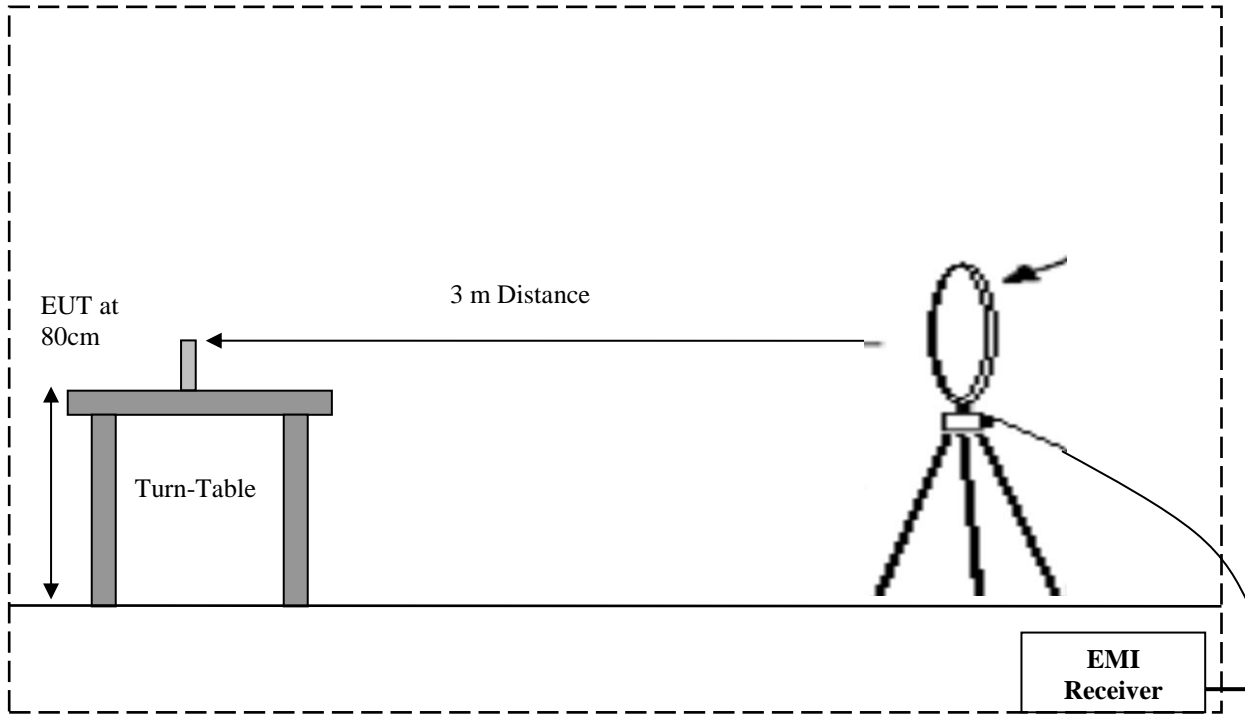
Testing is performed according to the guidelines provided in FCC publication (KDB) 971168 D01 v02r02 – “Measurement Guidance for Certification of Licensed Digital Transmitters” and according to relevant parts of TIA-603C 2004 as detailed below.



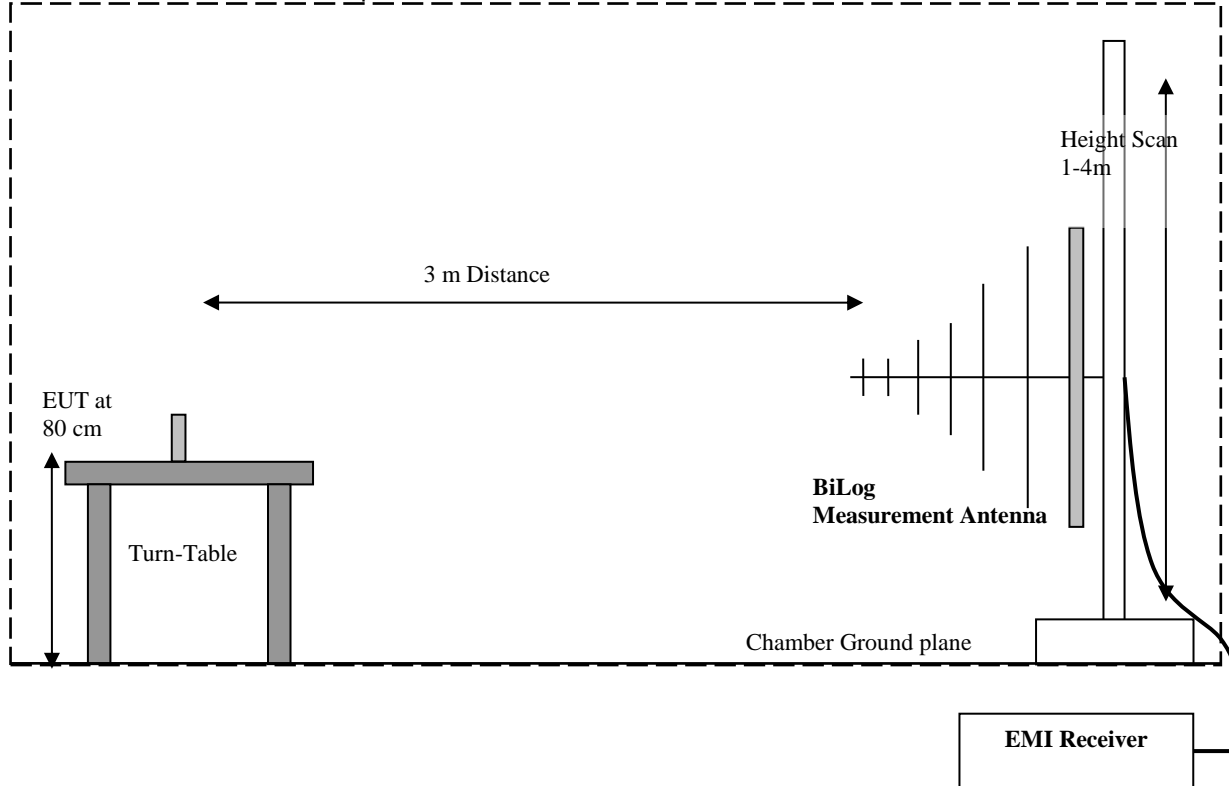
## 5.5 Radiated Measurement

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

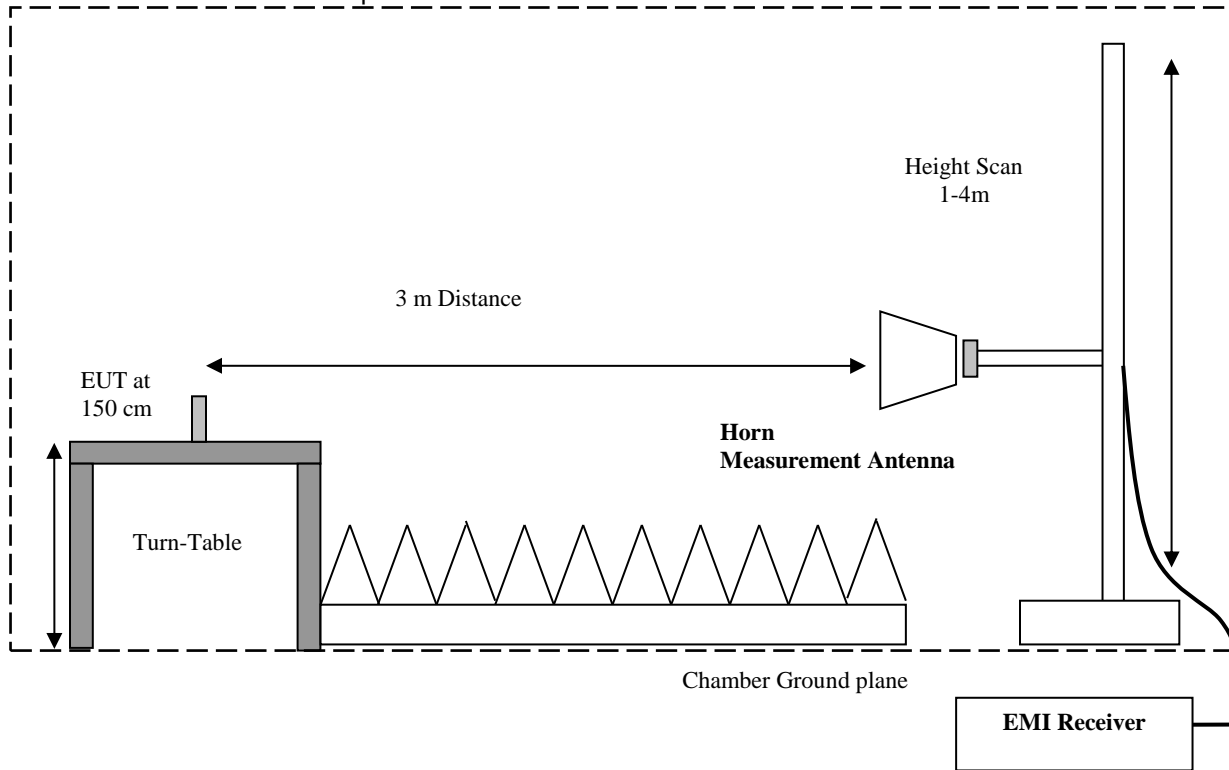
### Radiated Emissions Test Setup below 30MHz Measurements



### Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



5.6 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

- Measured reading in dBµV
- Cable Loss between the receiving antenna and SA in dB and
- Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

$$FS (dB\mu V/m) = \text{Measured Value on SA (dB}\mu V) - \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$$

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0



6 Measurement Results Summary

6.1 FCC 22:

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	GSM/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1055 §22.355 RSS-132 5.3	Frequency Stability	Nominal	GSM/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1049 §22.917(b) RSS-132 5.2	Occupied Bandwidth	Nominal	GSM/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1051 §22.917 RSS-132 5.5	Band Edge Compliance	Nominal	GSM/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1051 §22.917 RSS-132 5.5	Conducted Spurious Emissions	Nominal	GSM/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1053 §22.917 RSS-132 5.5	Radiated Spurious Emissions	Nominal	GSM/UMTS/LTE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Complies

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: Leveraged from module certification.



6.2 FCC 24 & 27:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046; §24.232 (a); §27.50 (d) RSS-133 6.4	RF Output Power	Nominal	PCS/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1055; §24.235; §27.54 RSS-133 6.3	Frequency Stability	Nominal	PCS/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1049; §24.238; §27.53 RSS-133 6.2	Occupied Bandwidth	Nominal	PCS/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1051; §24.238; §27.53 RSS-133 6.5	Band Edge Compliance	Nominal	PCS/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1051; §24.238; §27.53 RSS-133 6.5	Conducted Spurious Emissions	Nominal	PCS/UMTS/LTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note 2
§2.1053; §24.238; §27.53 RSS-133 6.5	Radiated Spurious Emissions	Nominal	PCS/UMTS/LTE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Complies

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: Leveraged from module certification.

## 7 Radiated Spurious Emissions

### 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.

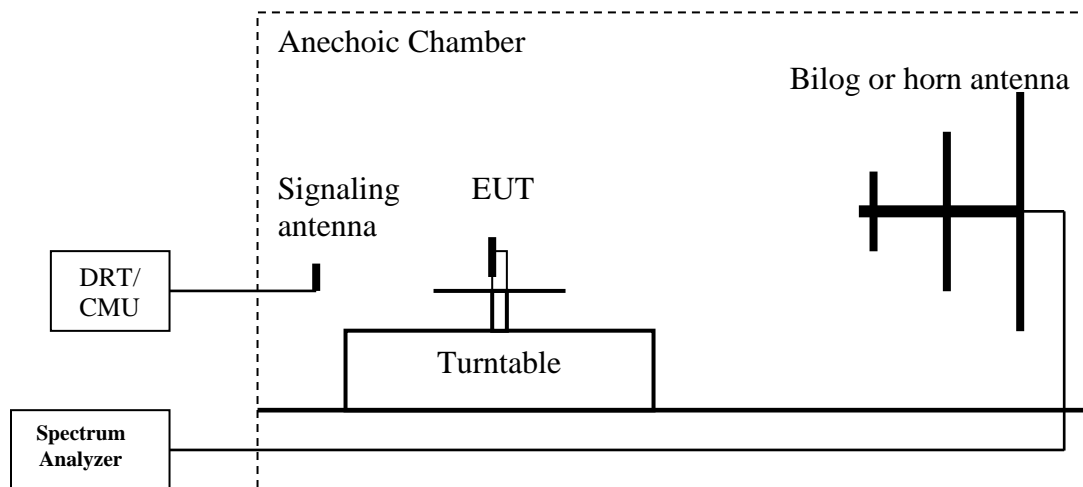
(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of 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
<b>Resolution Bandwidth</b>	100 kHz	1 MHz	1 MHz
<b>Video Bandwidth</b>	100 kHz	1 MHz	1 MHz
<b>Detector</b>	Peak	Peak	Peak
<b>Trace Mode</b>	Max Hold	Max Hold	Max Hold
<b>Sweep Time</b>	Auto	Auto	Auto

#### Settings for FCC 24

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



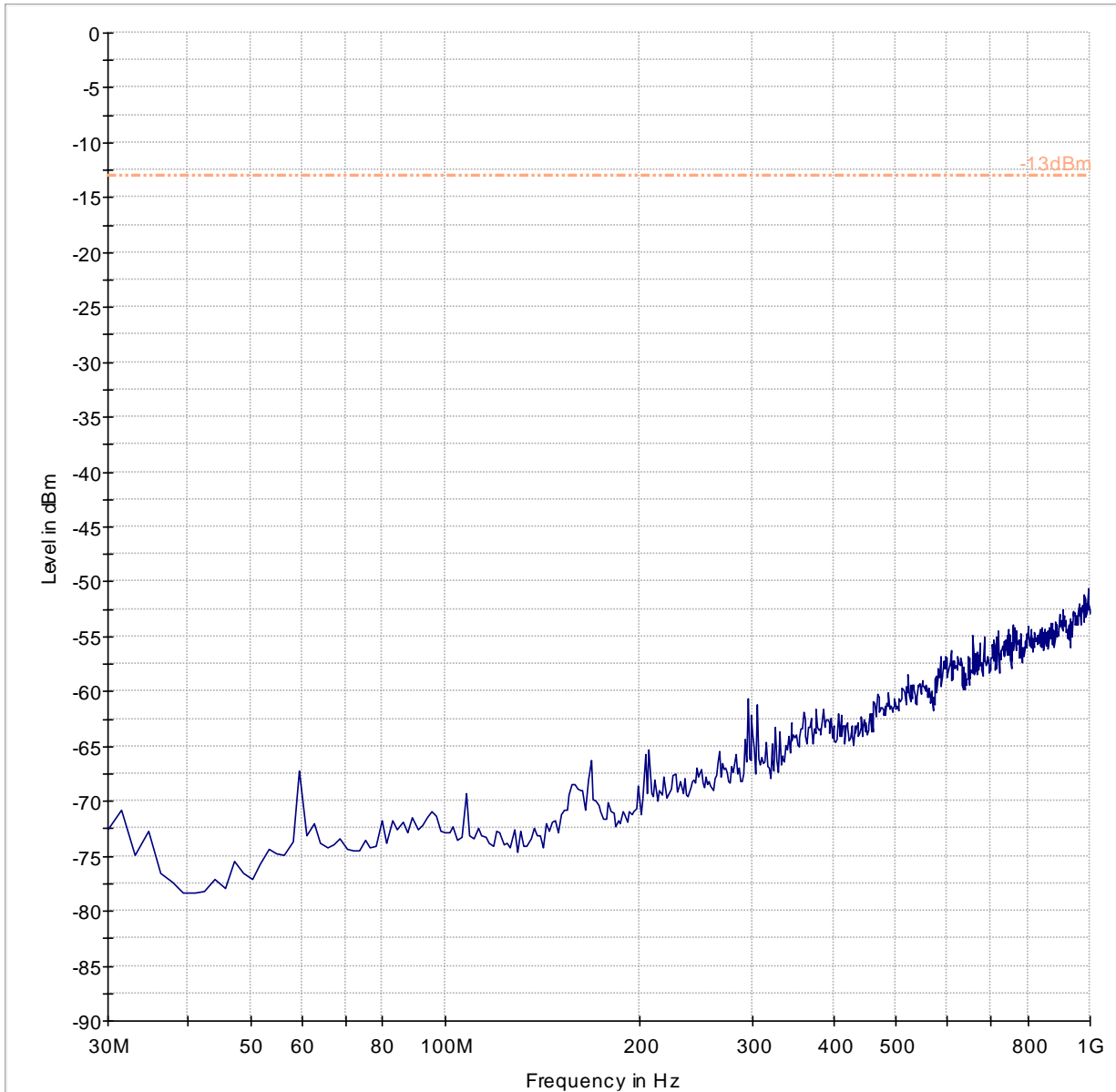
7.4 Summary Measurement Result:

Channel	EUT Operating Mode	Scan Frequency	Limit (dBm)	Result	Spurious Emission Frequency [MHz]	Spurious Emission [dBm]
Low	GSM 1900	30 MHz – 18 GHz	-13	Pass	1849	-22.2
Mid	GSM 1900	9 kHz – 22 GHz	-13	Pass	5640	-44.9
High	GSM 1900	30 MHz – 18 GHz	-13	Pass	1910	-24.46
Low	GSM 850	30 MHz – 9 GHz	-13	Pass	2473	-44.67
Mid	GSM 850	9 kHz – 9 GHz	-13	Pass	1673	-46.7
High	GSM 850	30 MHz – 9 GHz	-13	Pass	-	NF
Low	UMTS FDD II	30 MHz – 18 GHz	-13	Pass	18000	-43.0
Mid	UMTS FDD II	9 kHz – 22 GHz	-13	Pass	25000	-28.0
High	UMTS FDD II	30 MHz – 18 GHz	-13	Pass	-	NF
Low	UMTS FDD V	30 MHz – 9 GHz	-13	Pass	823.8	-30.9
Mid	UMTS FDD V	9 kHz – 9 GHz	-13	Pass	-	NF
High	UMTS FDD V	30 MHz – 9 GHz	-13	Pass	849.1	-33.4
Low	LTE Band 2	30 MHz – 18 GHz	-13	Pass	-	NF
Mid	LTE Band 2	9 kHz – 22 GHz	-13	Pass	25650	-32.0
High	LTE Band 2	30 MHz – 18 GHz	-13	Pass	-	NF
Low	LTE Band 4	30 MHz – 18 GHz	-13	Pass	3420	-48.1
Mid	LTE Band 4	9 kHz – 22 GHz	-13	Pass	3463	-47.6
High	LTE Band 4	30 MHz – 18 GHz	-13	Pass	-	NF
Low	LTE Band 5	30 MHz – 9 GHz	-13	Pass	-	NF
Mid	LTE Band 5	9 kHz – 9 GHz	-13	Pass	877.7	-44.3
High	LTE Band 5	30 MHz – 9 GHz	-13	Pass	-	NF
Low	LTE Band 12	30 MHz – 9 GHz	-13	Pass	-	NF
Mid	LTE Band I2	9 kHz – 9 GHz	-13	Pass	-	NF
High	LTE Band I2	30 MHz – 9 GHz	-13	Pass	760	-45.0



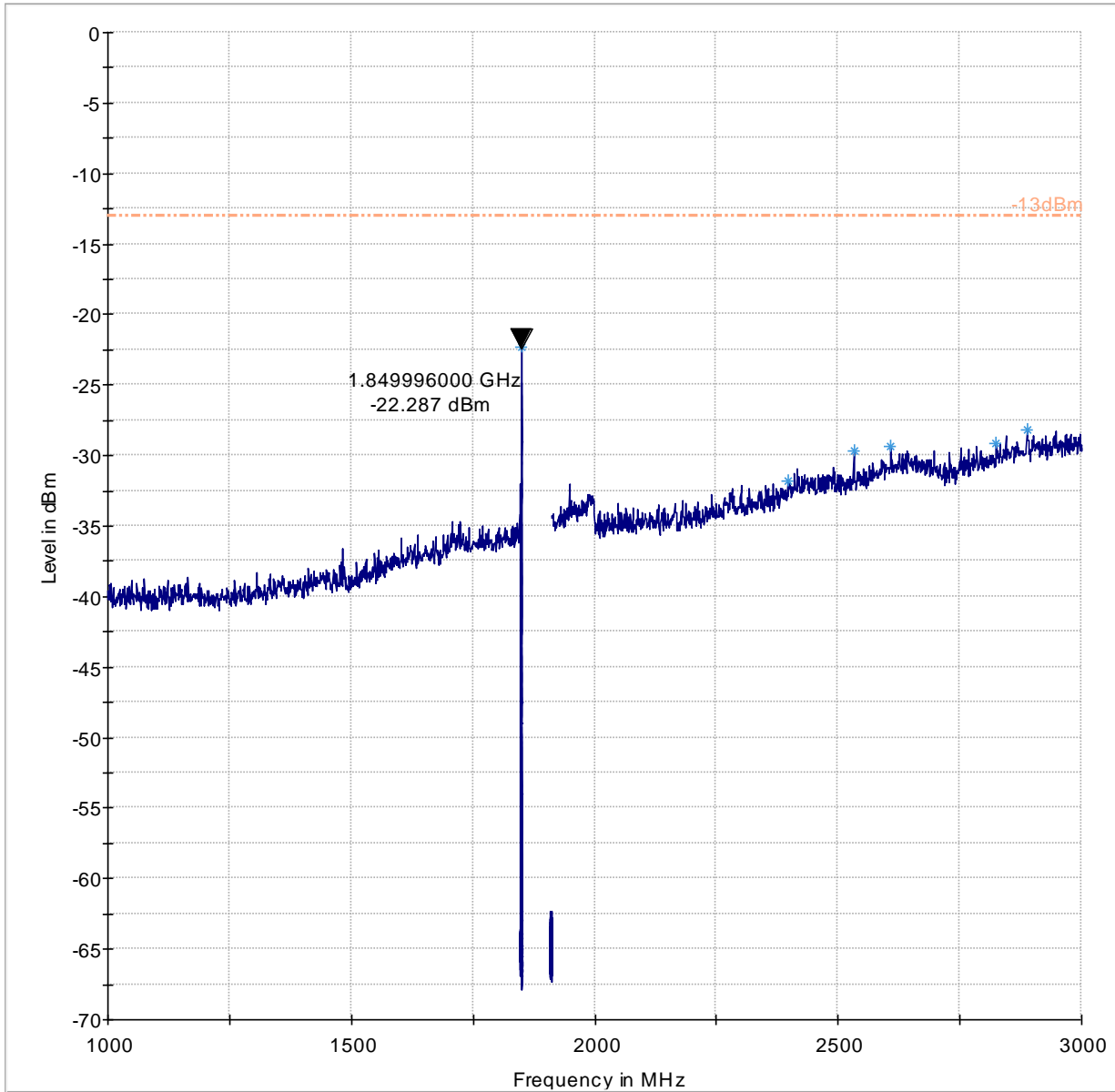
### 7.5 Measurement Plots GSM 1900

#### 7.5.1 30 - 1000 MHz, Ch. Low



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

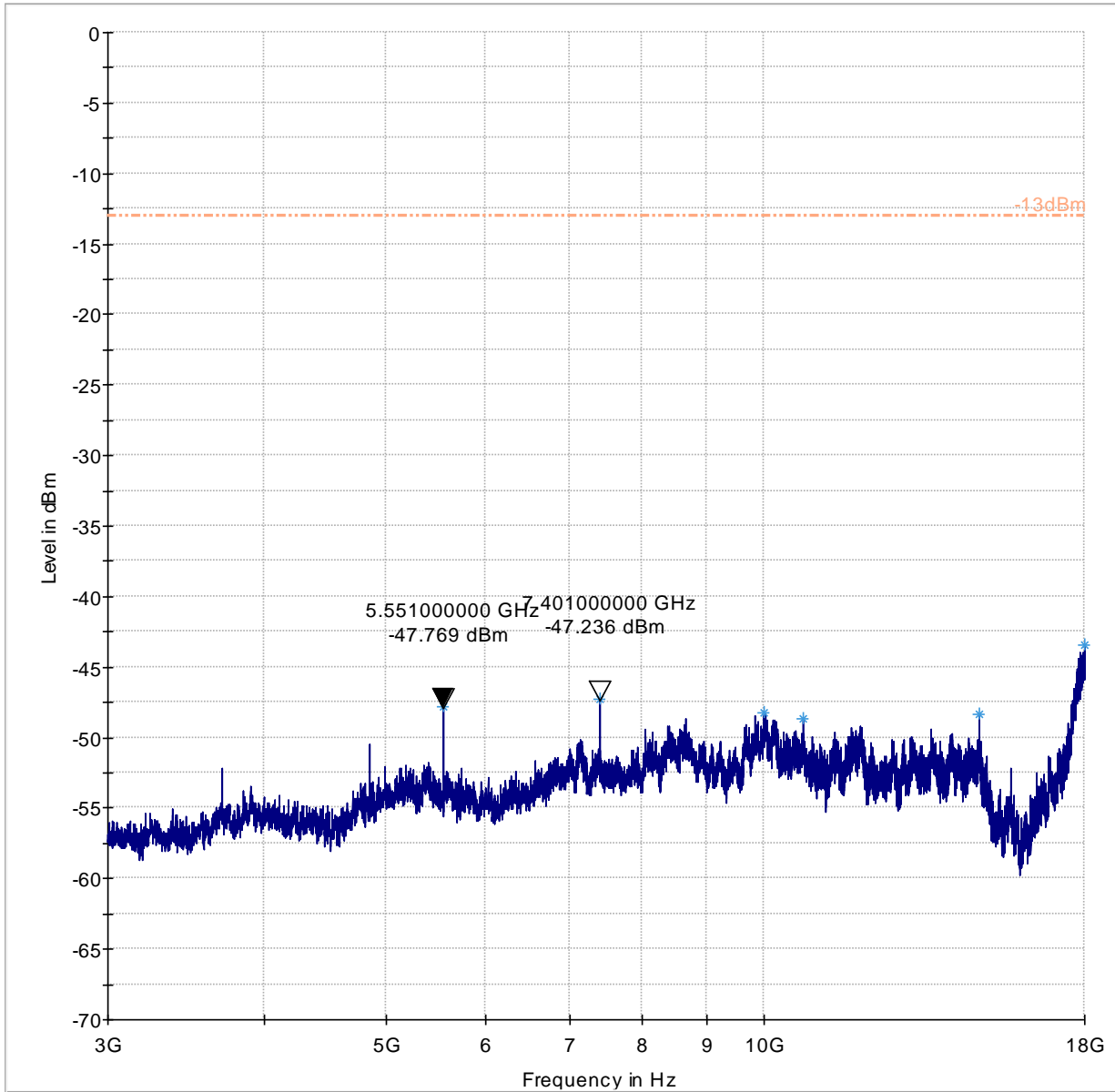
7.5.2 1 - 3 GHz, Ch. Low



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



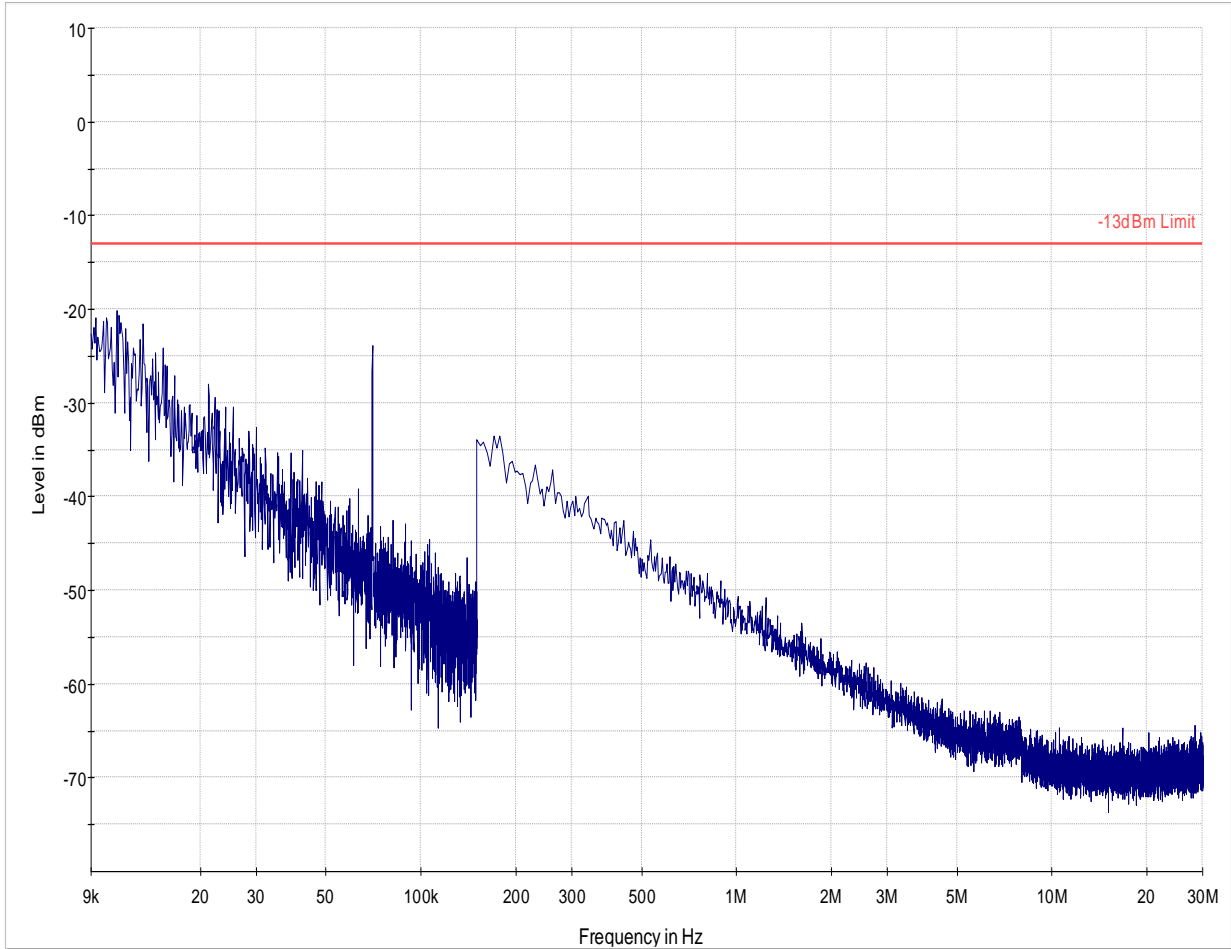
7.5.3 3 - 18 GHz, Ch. Low



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

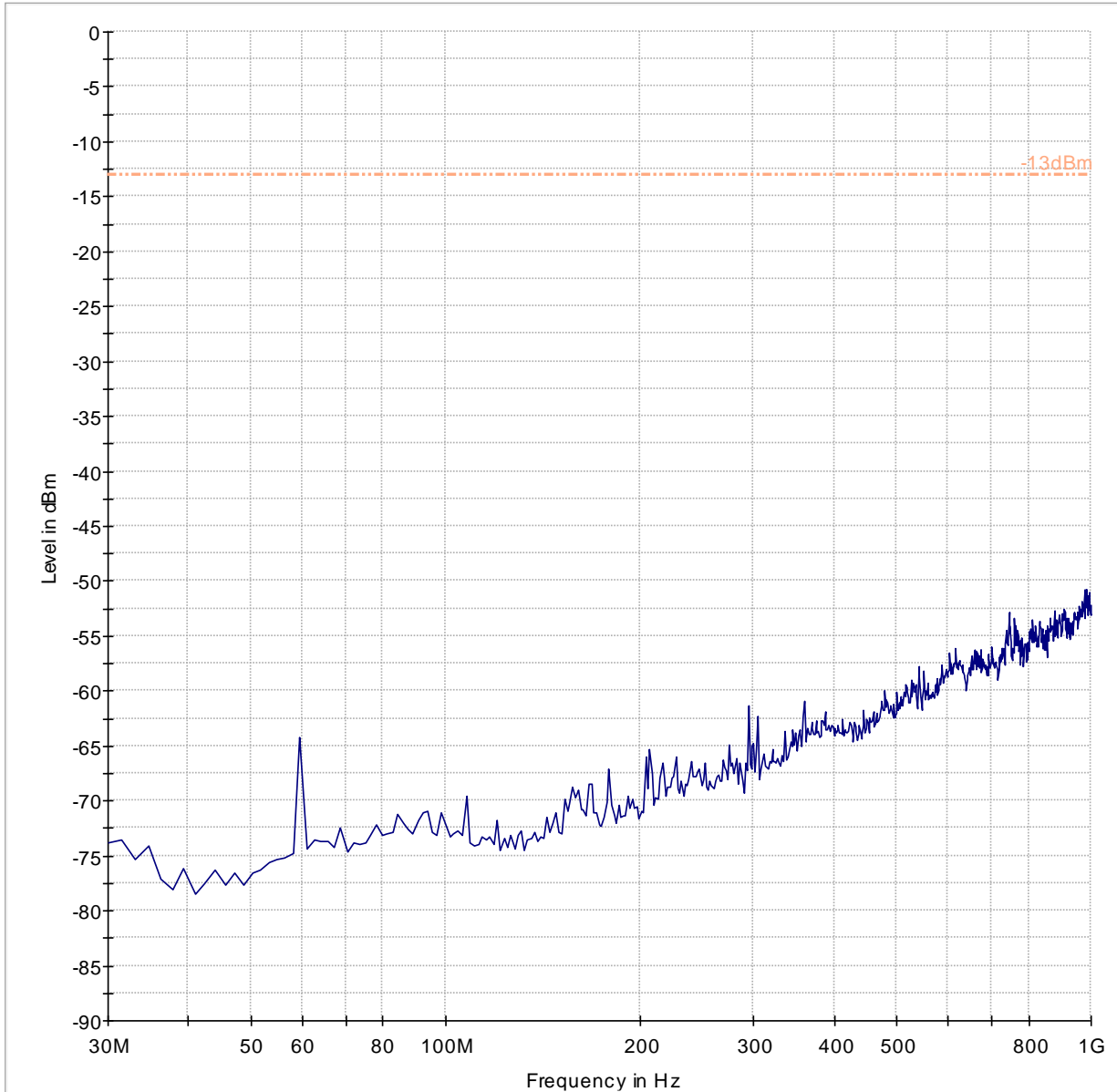


7.5.4 9 KHz - 30 MHz, Ch. Mid



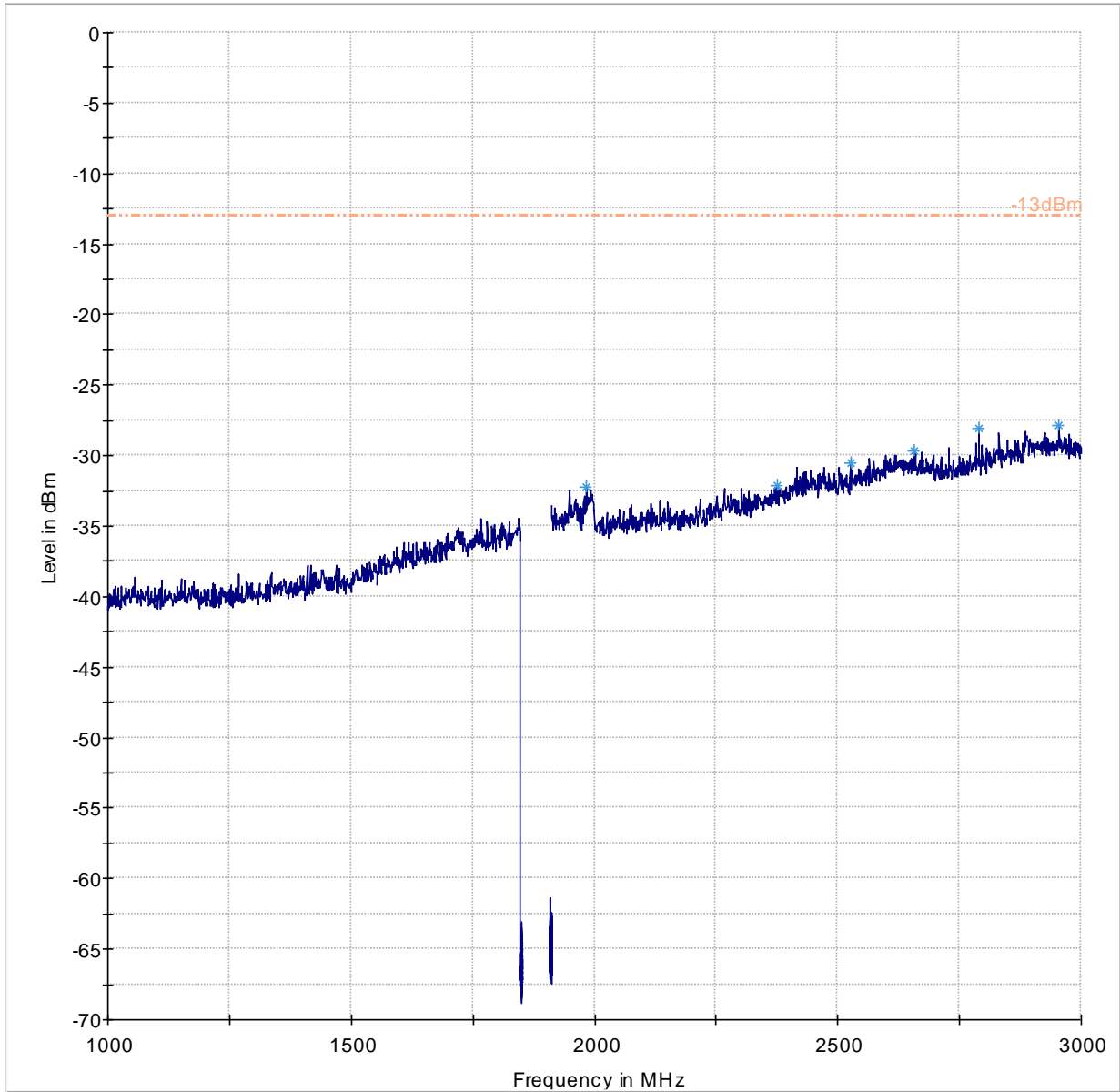
— Preview Result 1-PK+ — -13dBm EIRP Limit converted to near field

7.5.5 30 - 1000 MHz, Ch. Mid



-13dBm.LimitLine      Preview Result 1-PK+

7.5.6 1 - 3 GHz, Ch. Mid

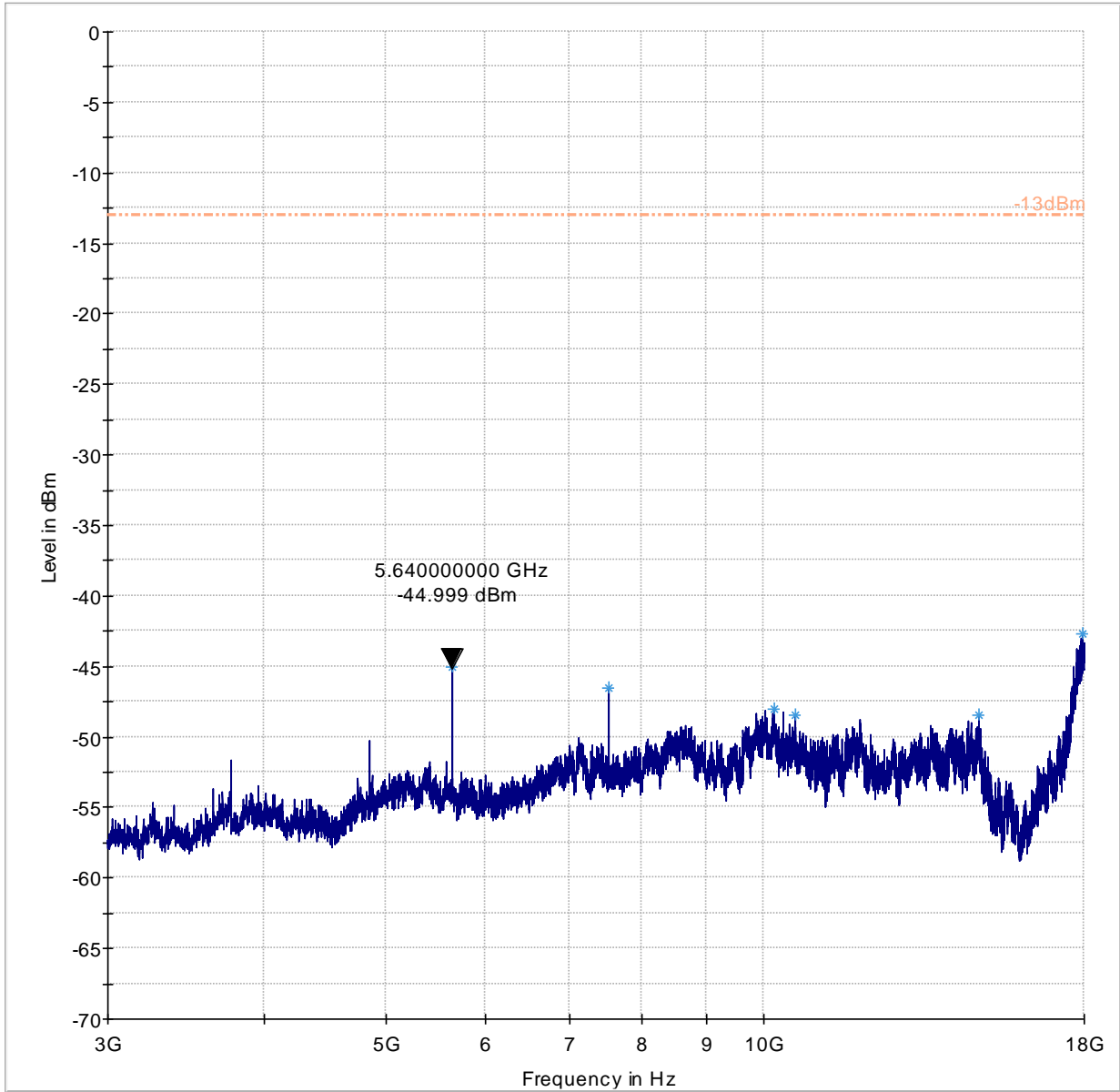


- - - - -13dBm.LimitLine      — Preview Result 1-PK+      \* Data Reduction Result 1 [2]-PK+





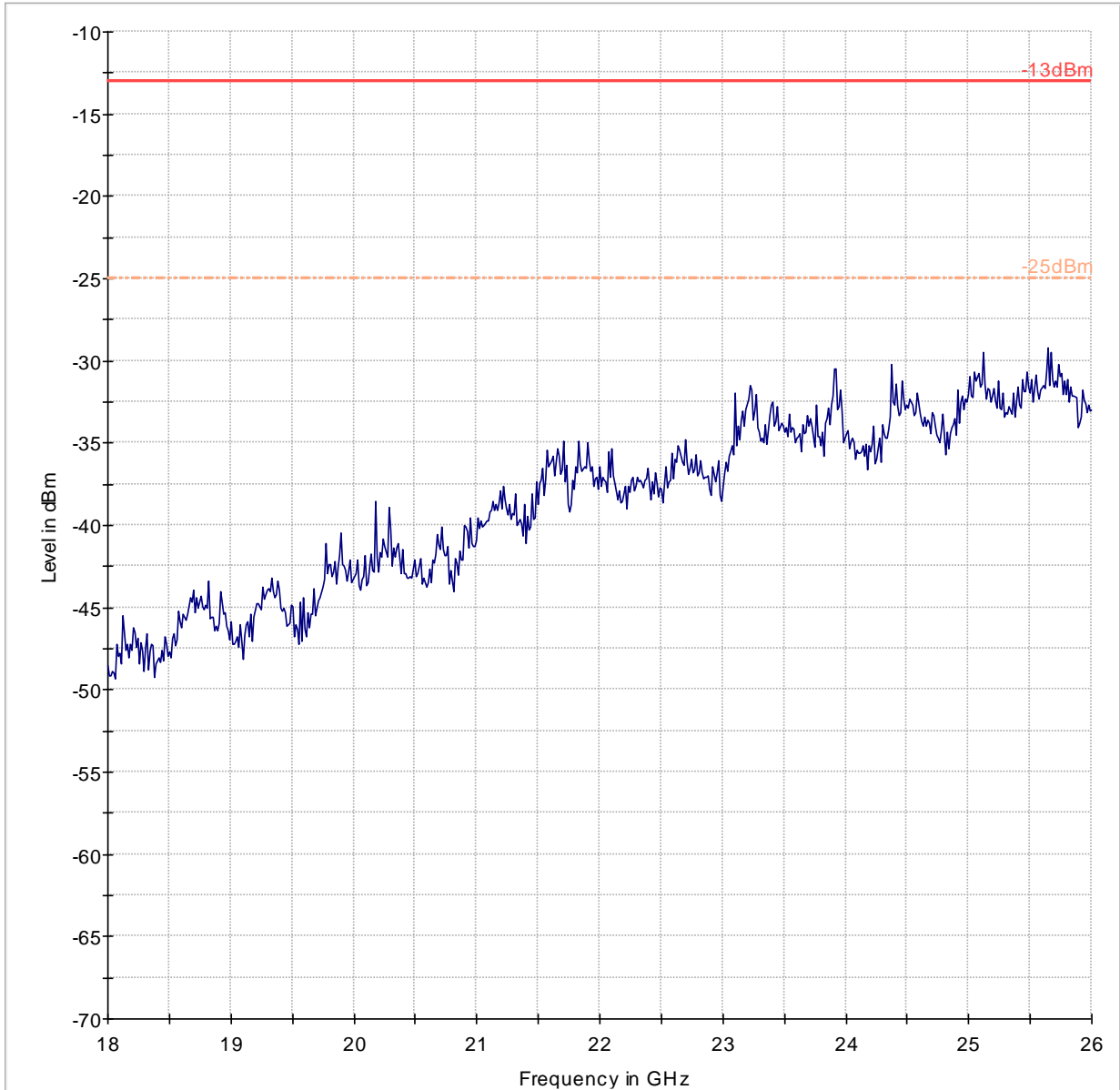
7.5.7 3 GHz - 18 GHz, Ch. Mid



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



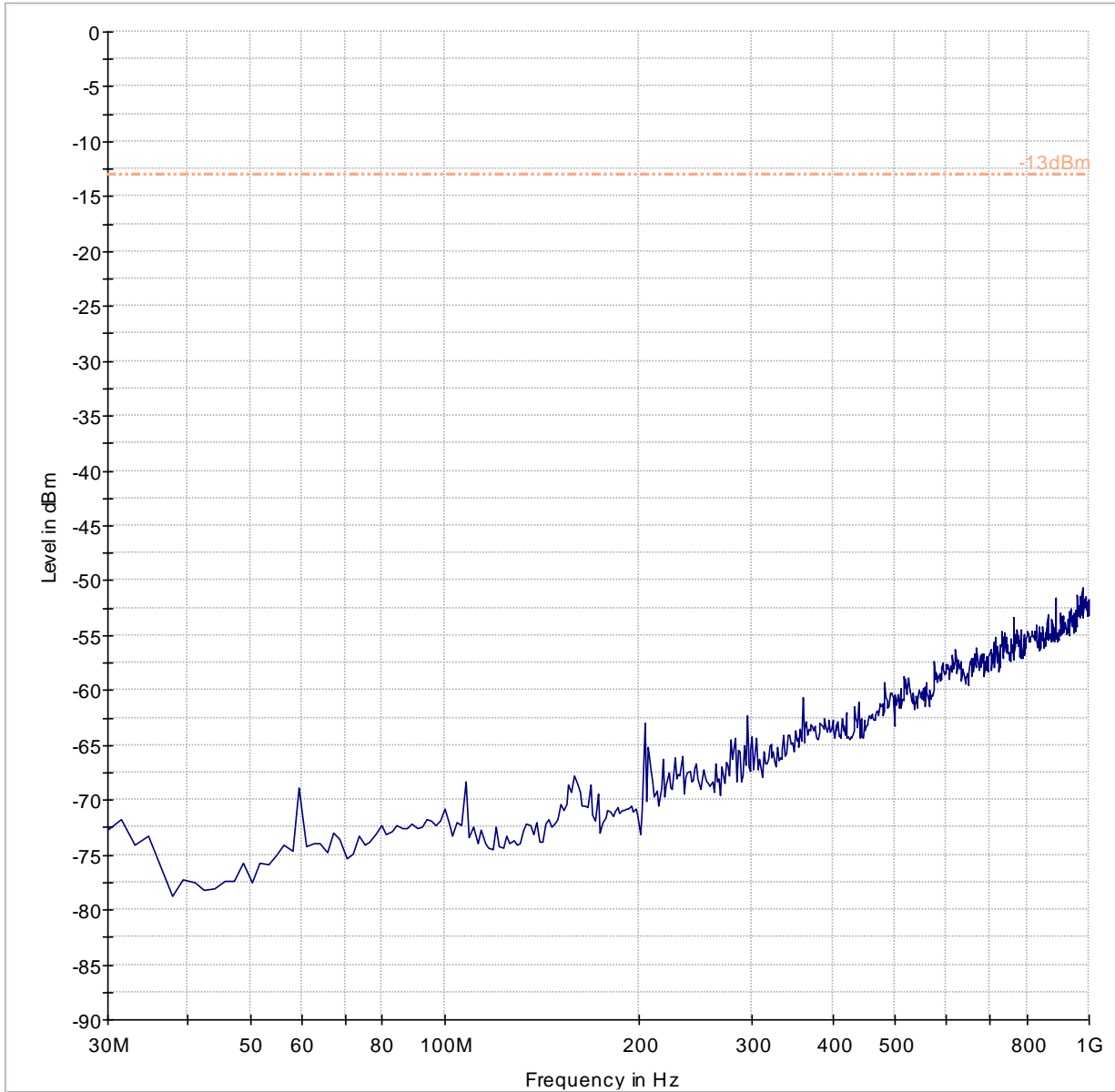
7.5.8 18 - 26 GHz, Ch. Mid



— -13dBm    - - - - -25dBm.LimitLine    — Preview Result 1-PK+



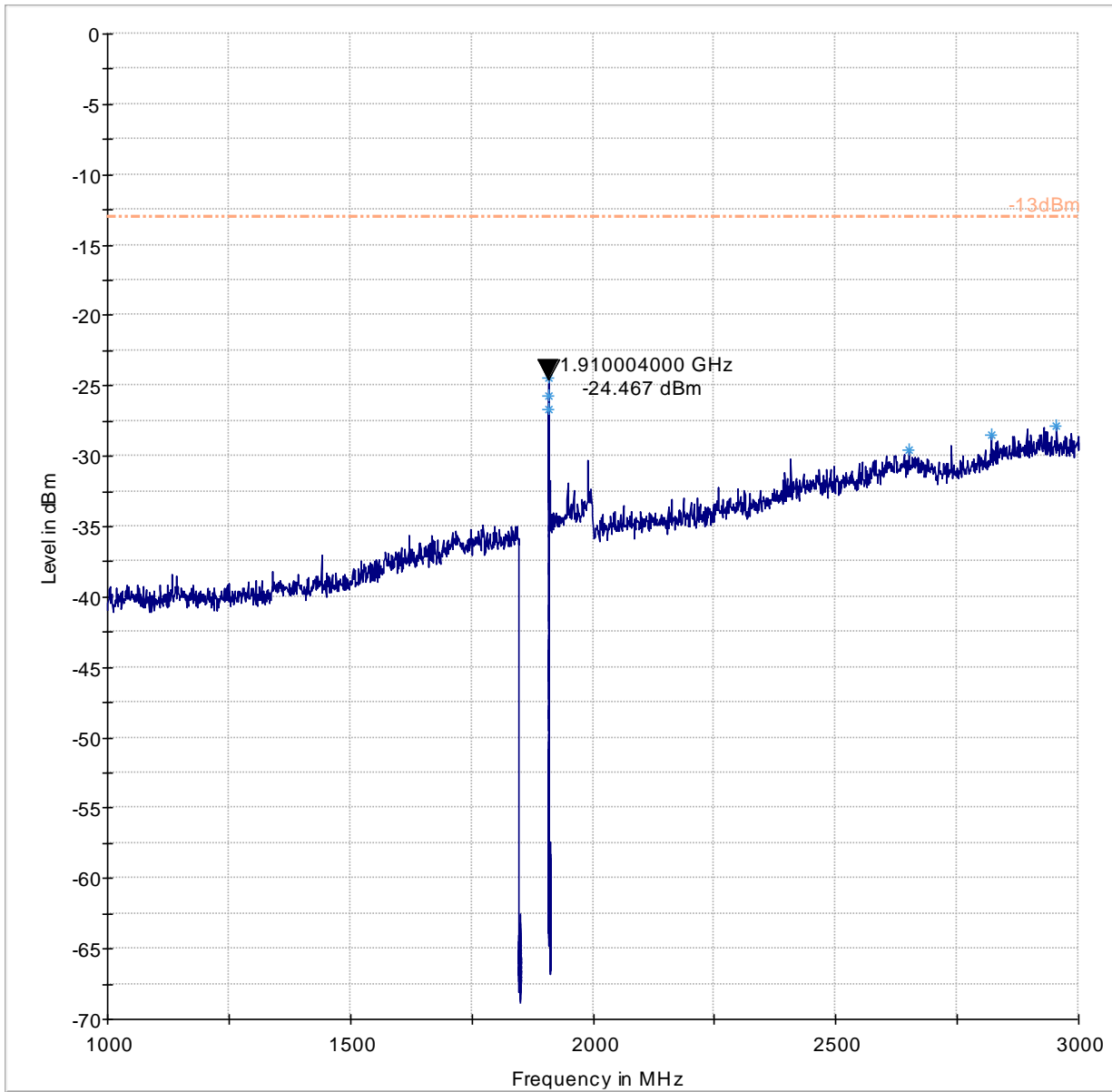
7.5.9 30 - 1000 MHz, Ch. High



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



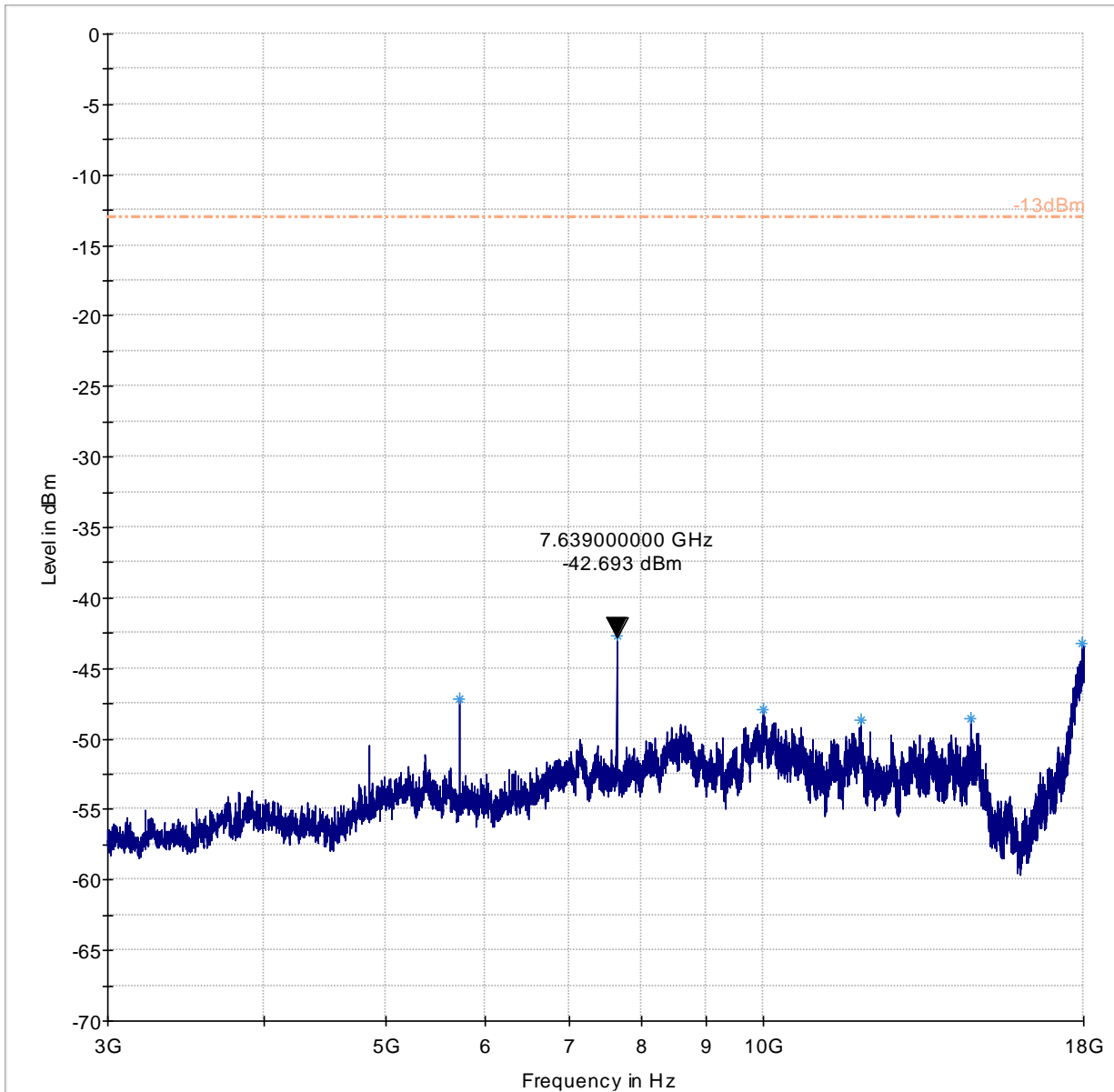
7.5.10 1 - 3 GHz, Ch. High



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



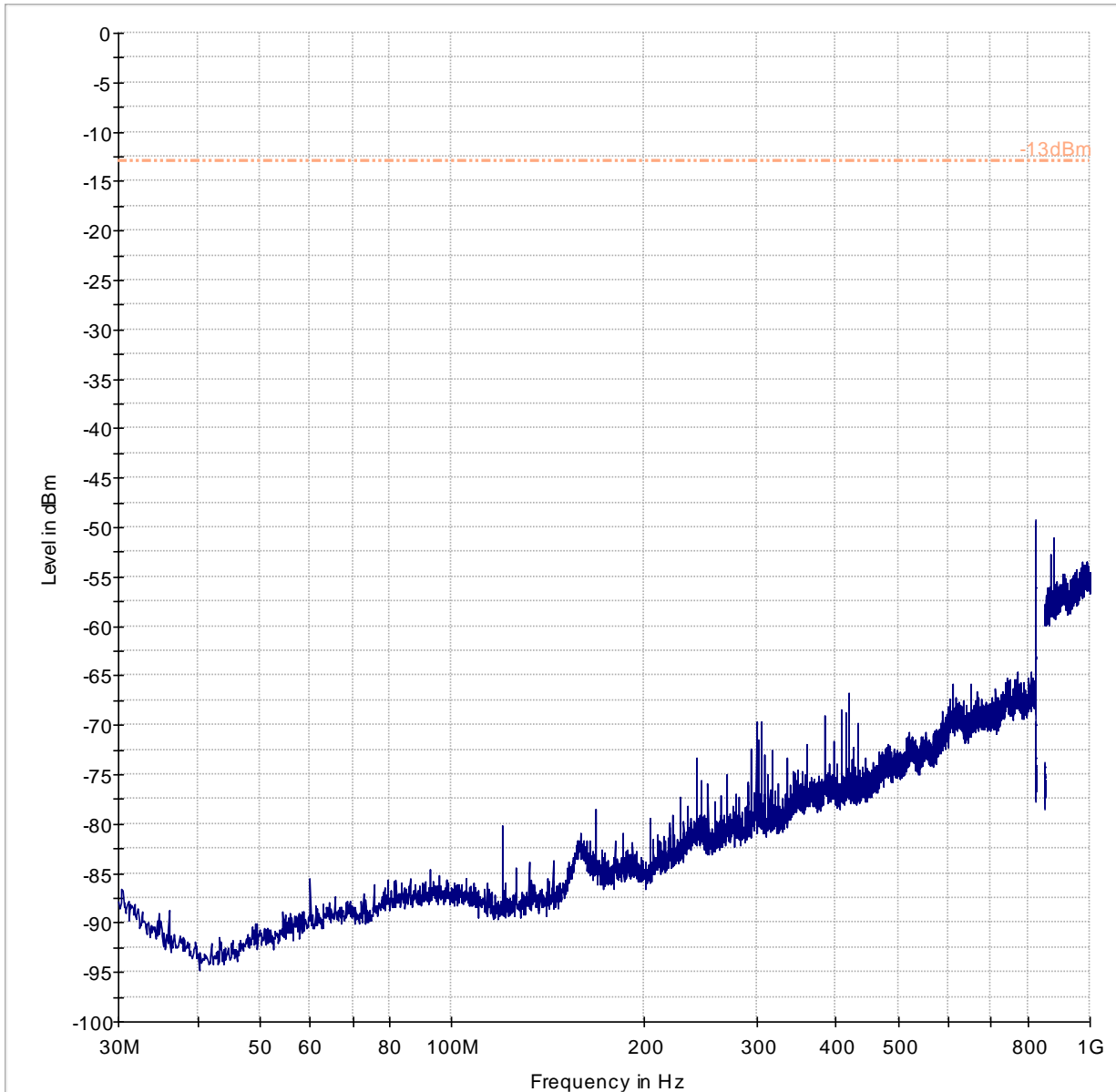
7.5.11 3 - 18 GHz, Ch. High



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

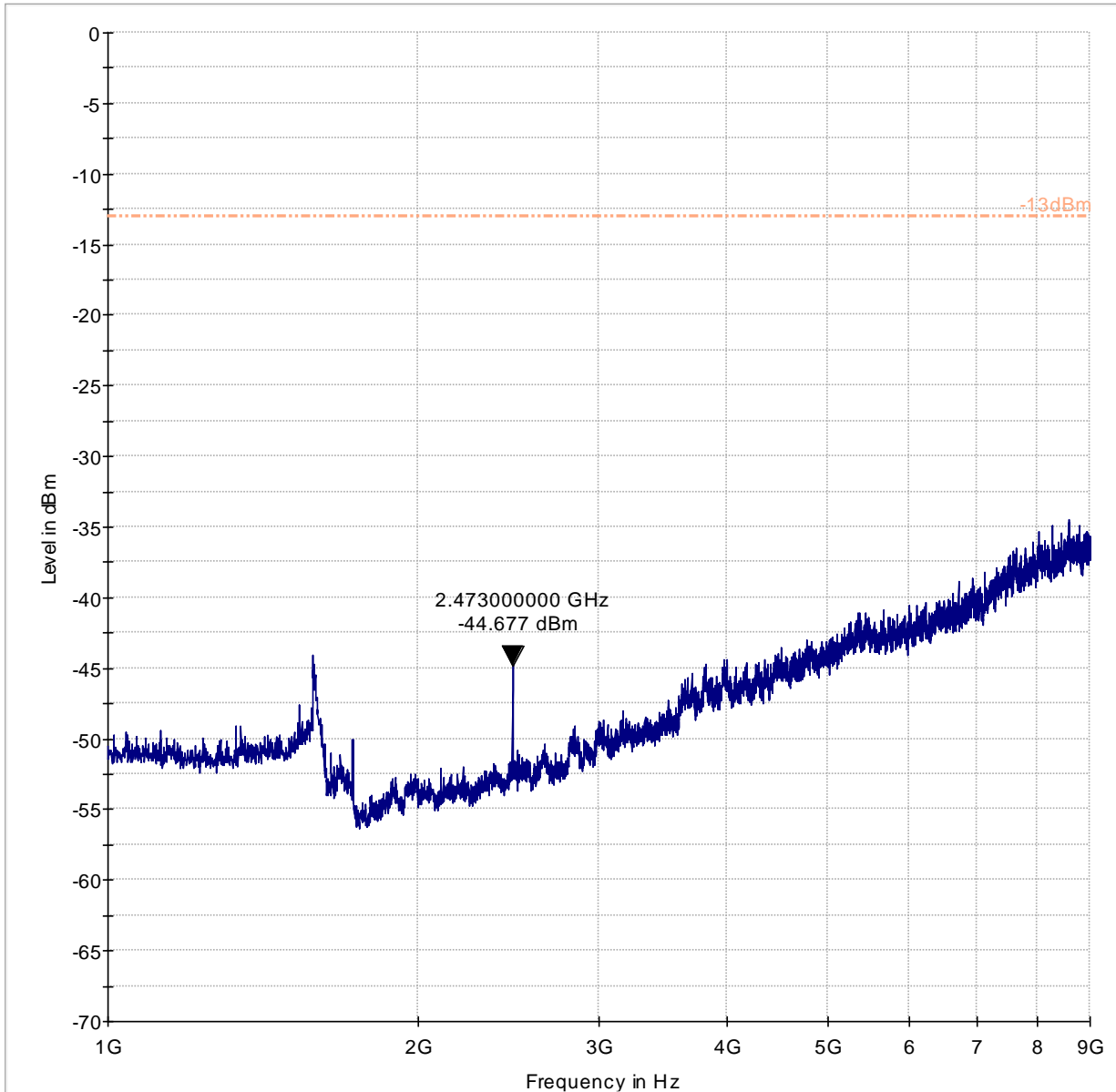
### 7.6 Measurement Plots GSM850

#### 7.6.1 30 – 1000 MHz, Ch. Low



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

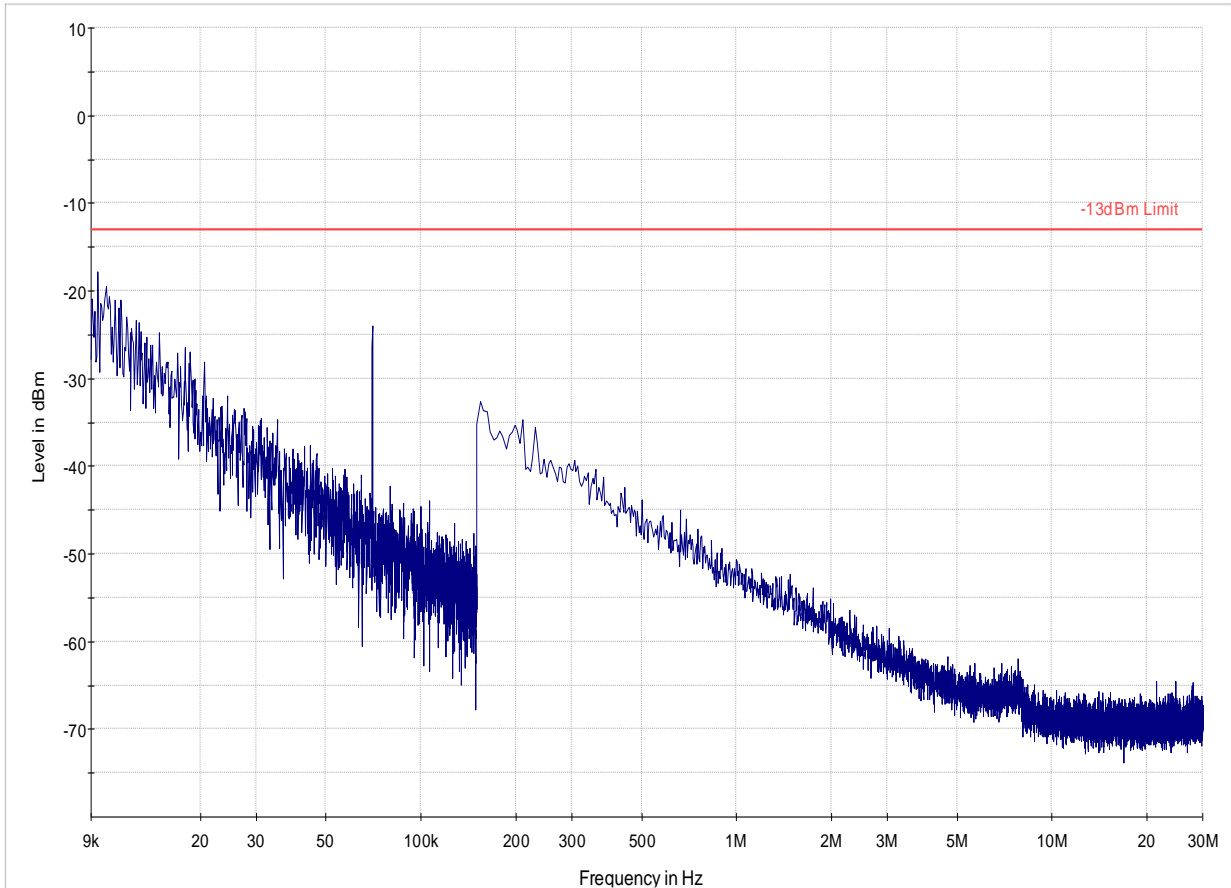
7.6.2 1 GHz – 9 GHz, Ch. Low



-13dBm      Preview Result 1-PK+



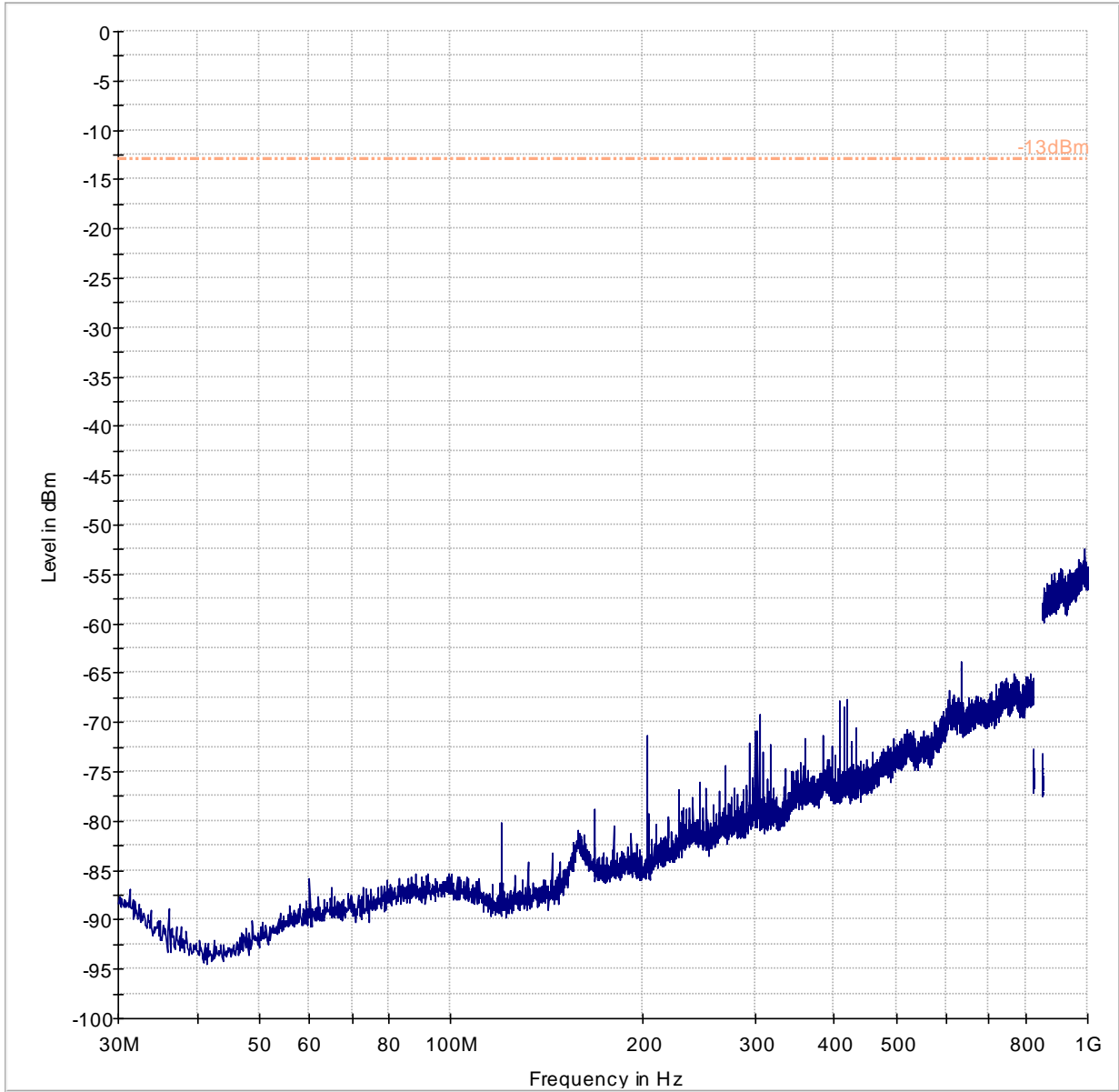
7.6.3 9 KHz – 30 MHz, Ch. Mid



— -13dBm EIRP Limit converted to near field — Preview Result 1-PK+

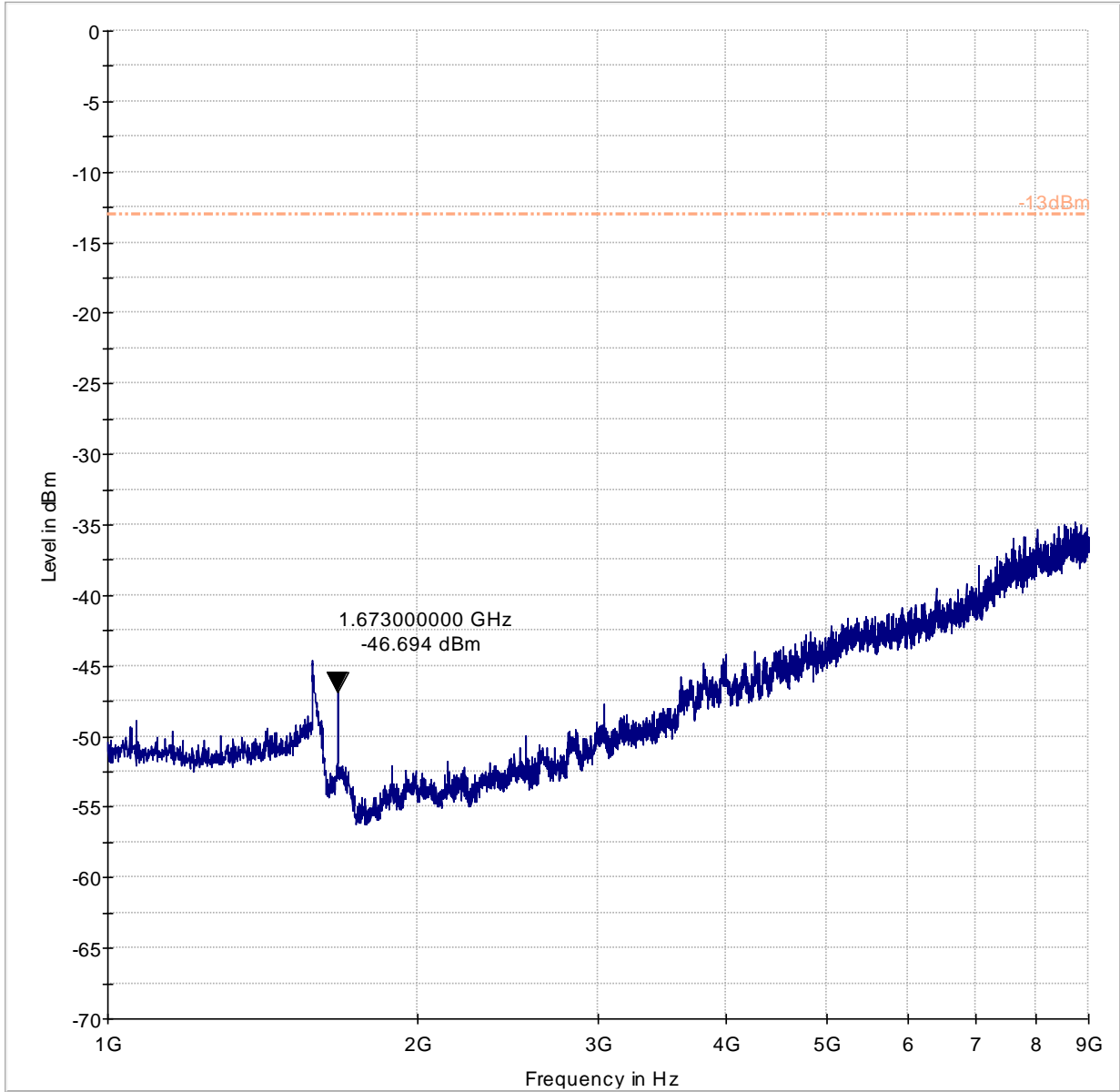


7.6.4 30 – 1000 MHz, Ch. Mid



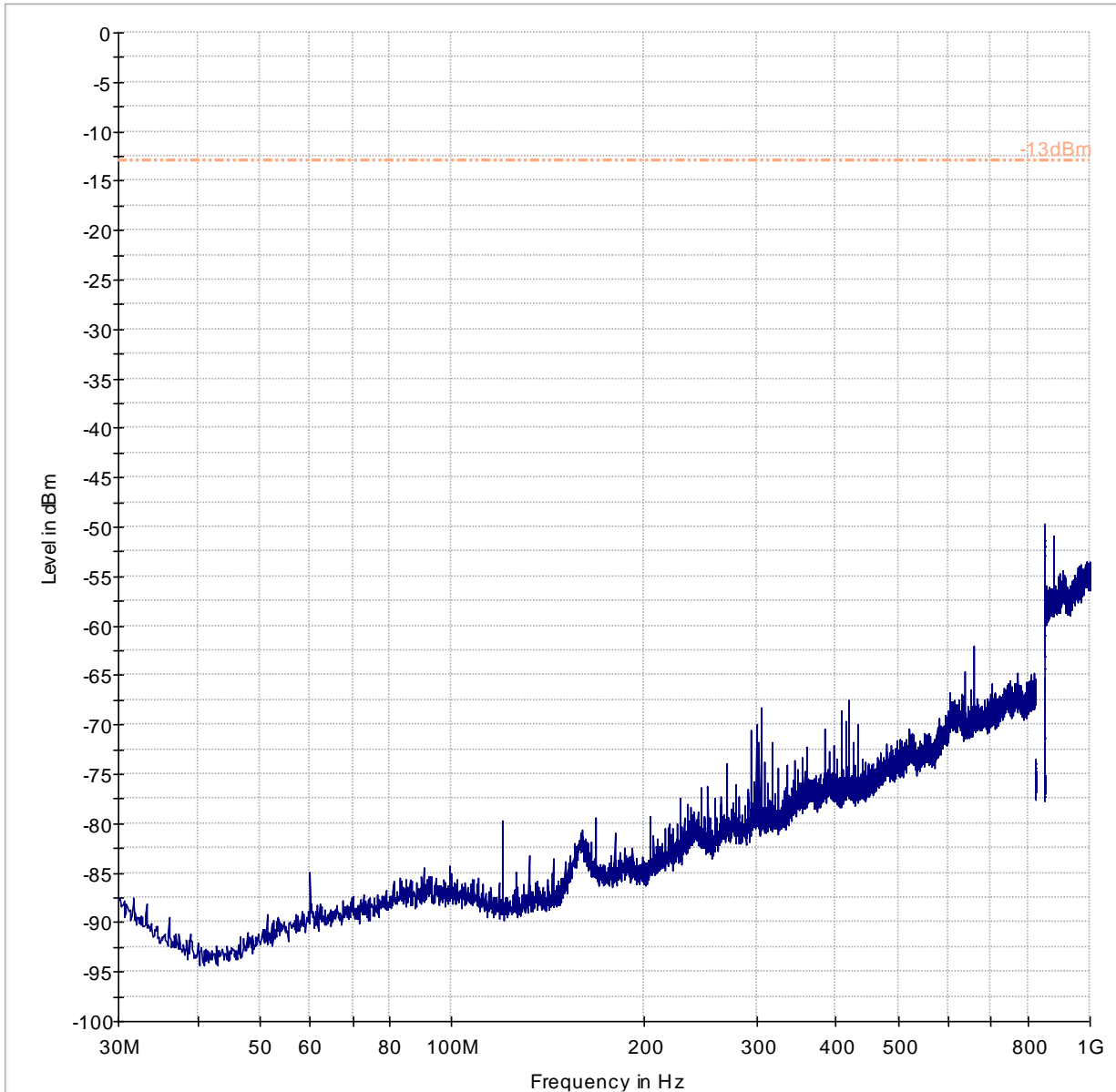
----- -13dBm.LimitLine      ——— Preview Result 1-PK+

1 GHz - 9 GHz, Ch. Mid



-13dBm      Preview Result 1-PK+

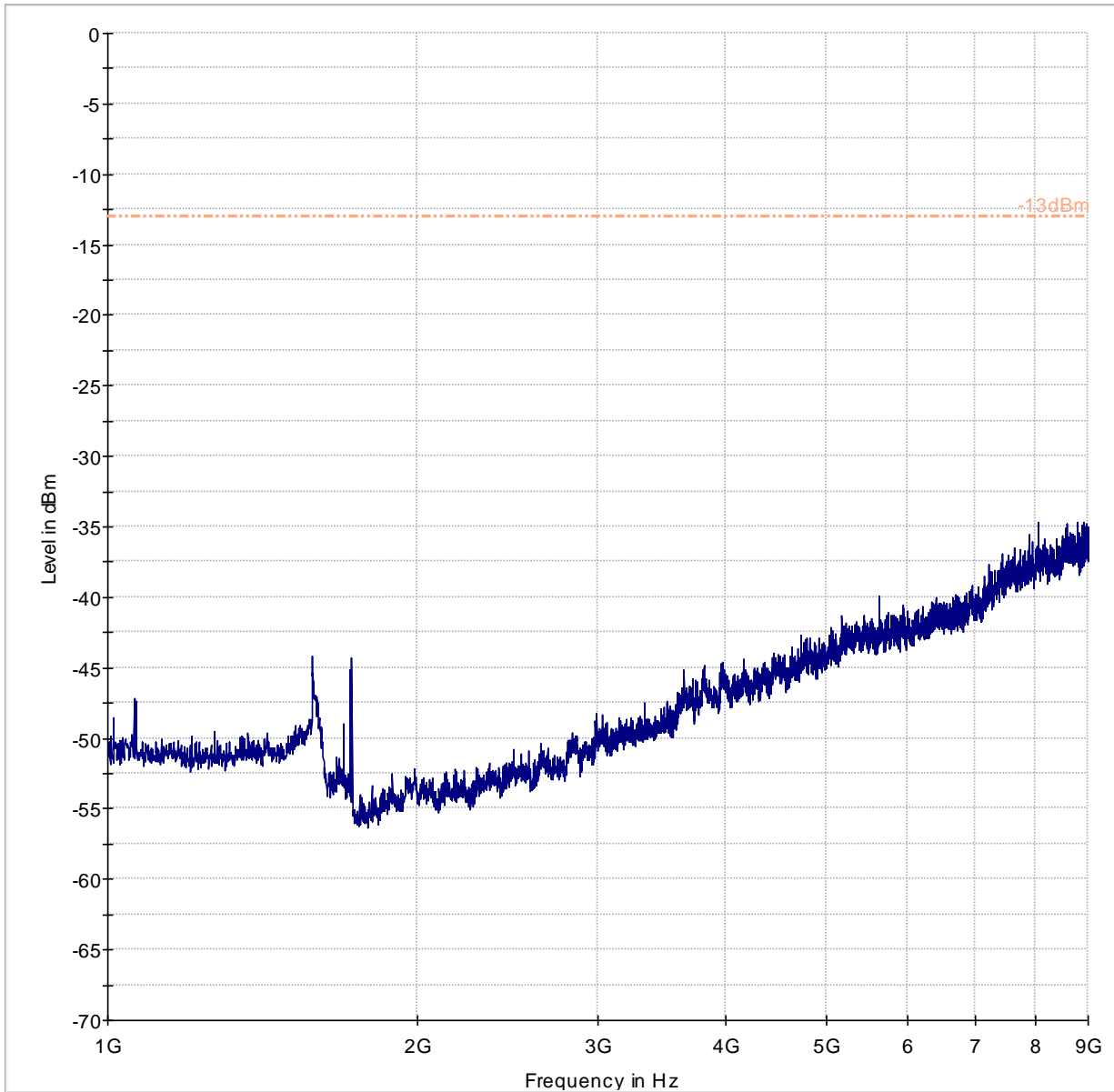
7.6.5 30 – 1000 MHz, Ch. High



-13dBm.LimitLine      Preview Result 1-PK+



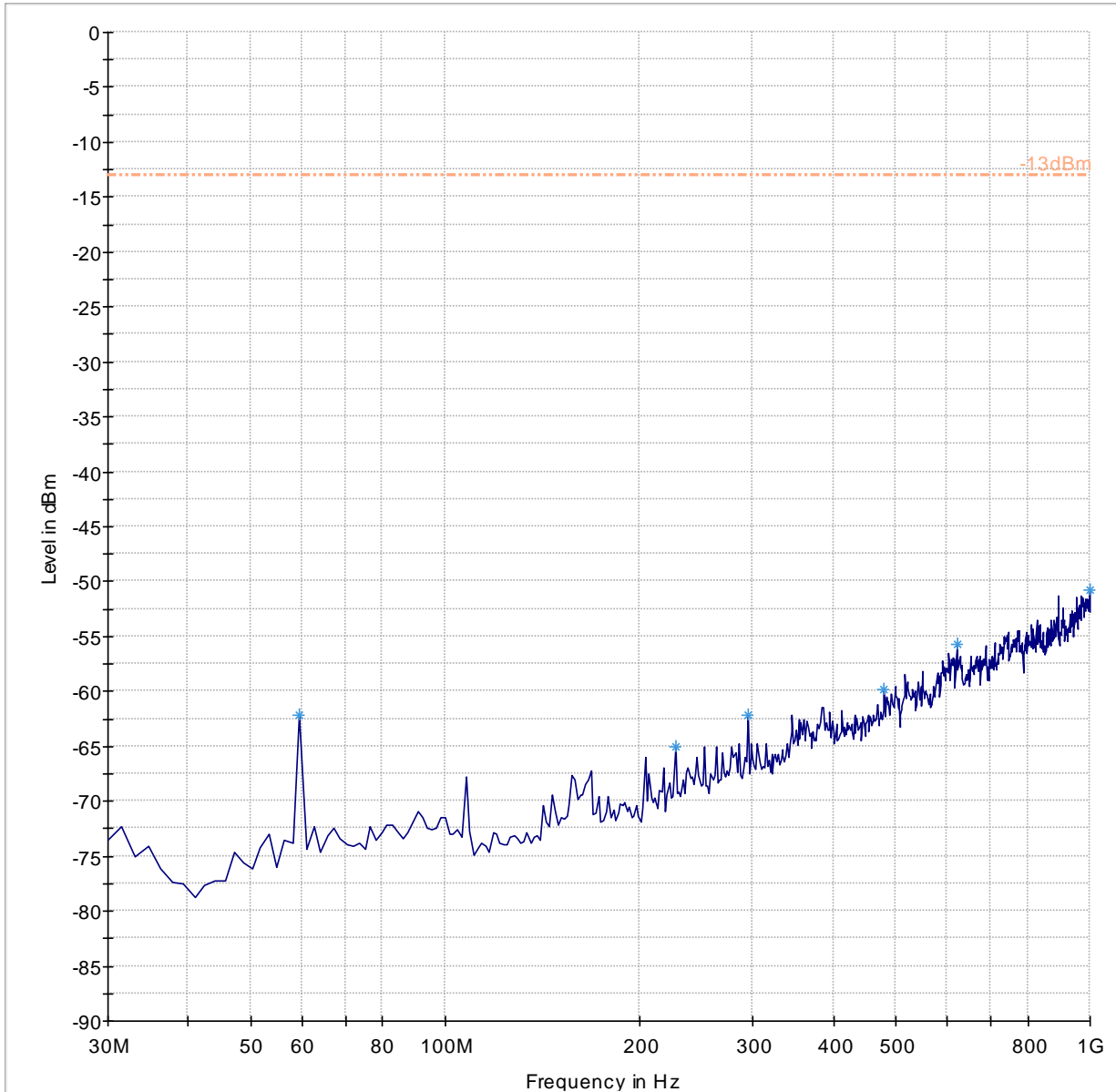
7.6.6 1 GHz – 9 GHz, Ch. High



-13dBm      Preview Result 1-PK+

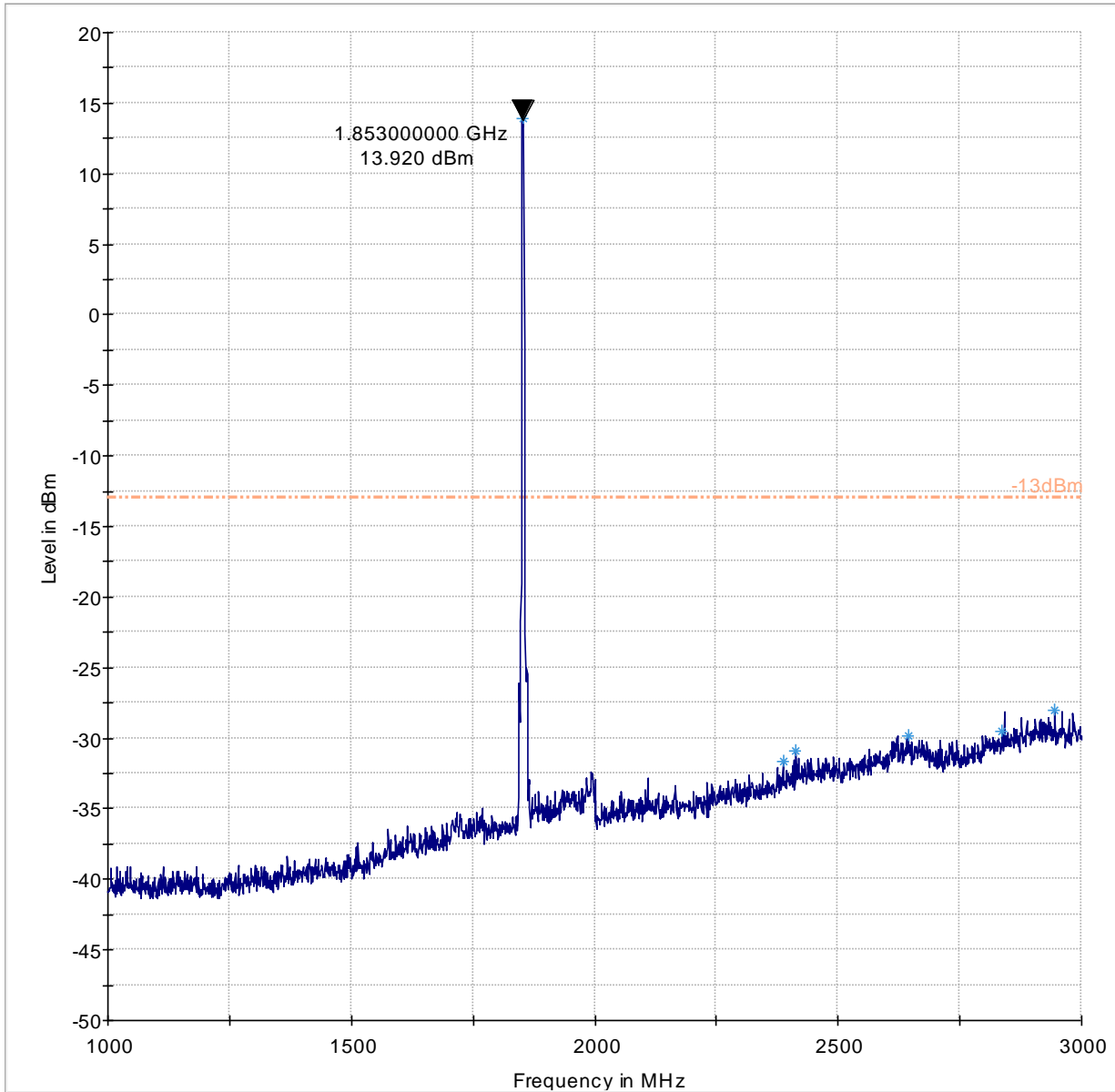
### 7.7 Measurement Plots WCDMA/UMTS FDD II

#### 7.7.1 30 - 1000 MHz, Ch. Low



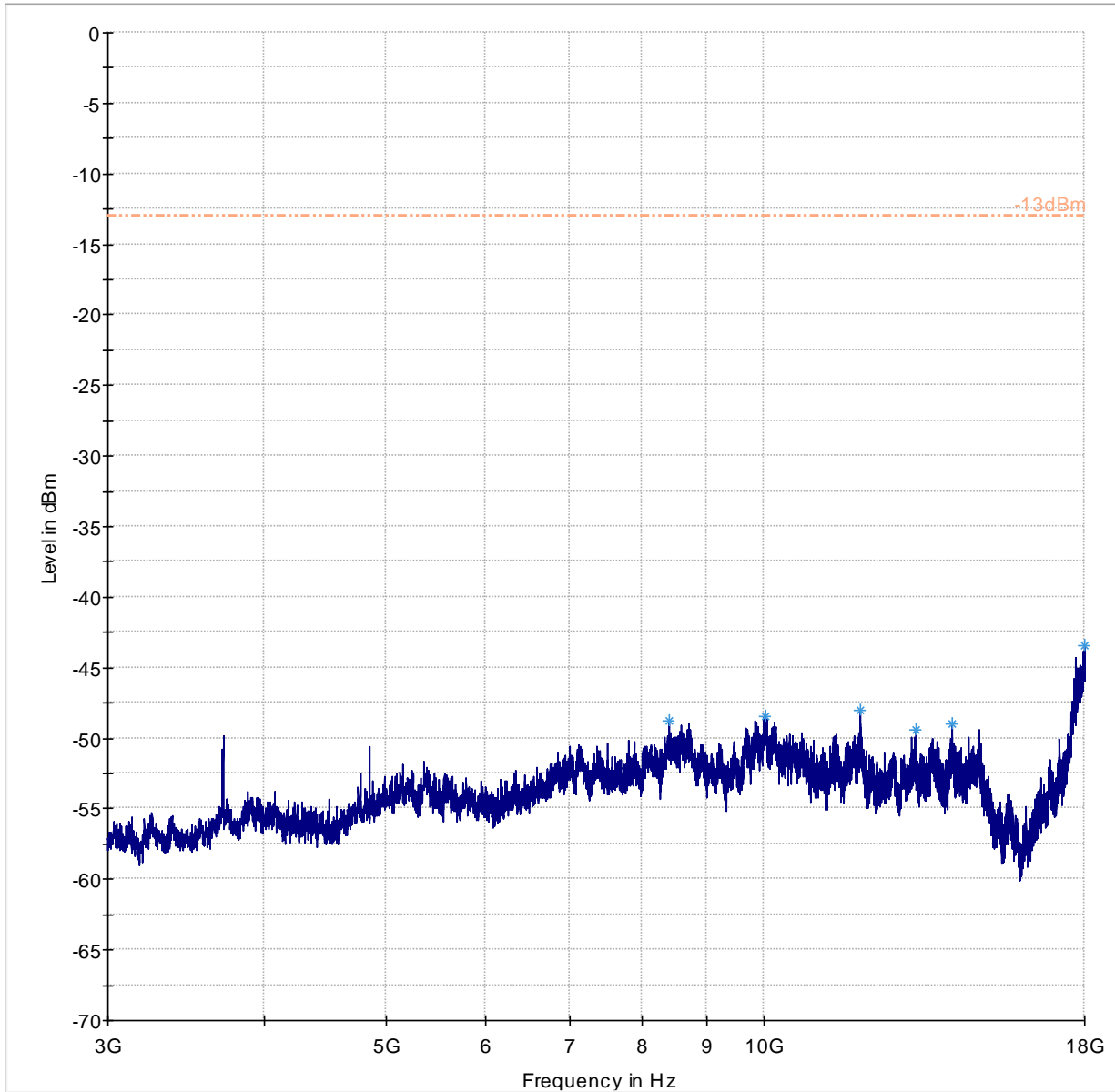
----- -13dBm.LimitLine    ——— Preview Result 1-PK+    \* Data Reduction Result 1 [1]-PK+

7.7.2 1 - 3 GHz, Ch. Low



Note: Emission above the limit is the fundamental

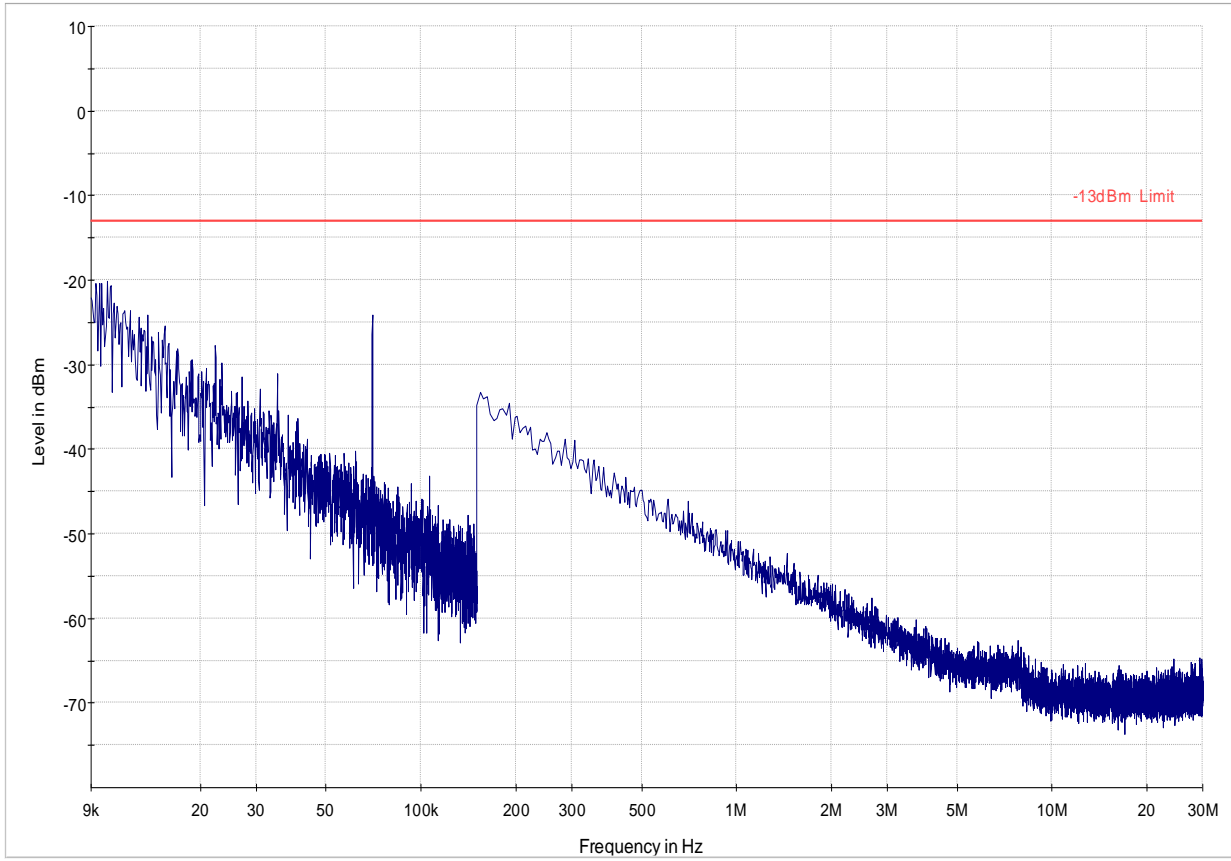
3 - 18 GHz, Ch. Low



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



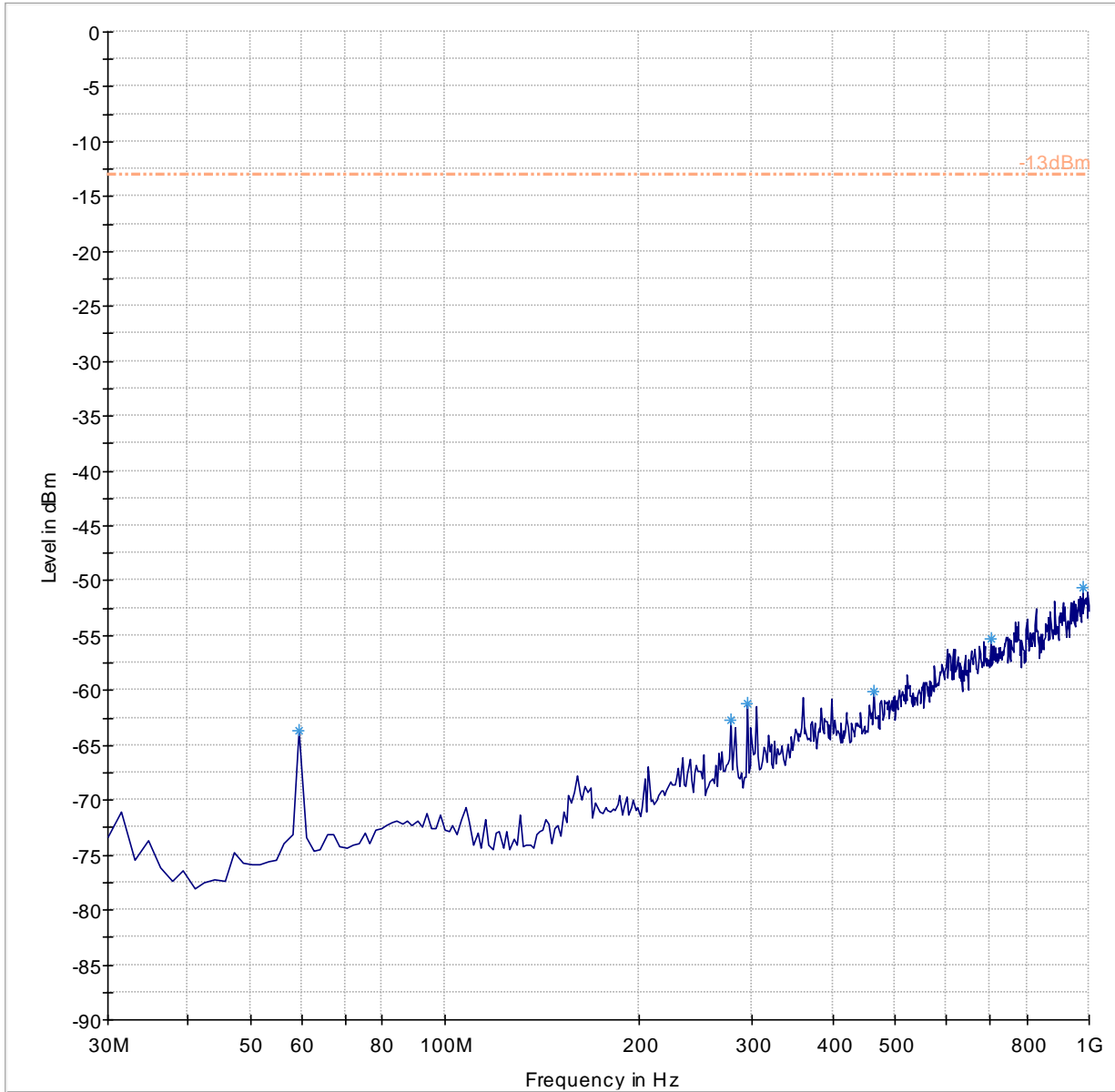
7.7.3 9 KHz - 30 MHz, Ch. Mid



— -13dBm EIRP Limit converted to near field — Preview Result 1-PK+

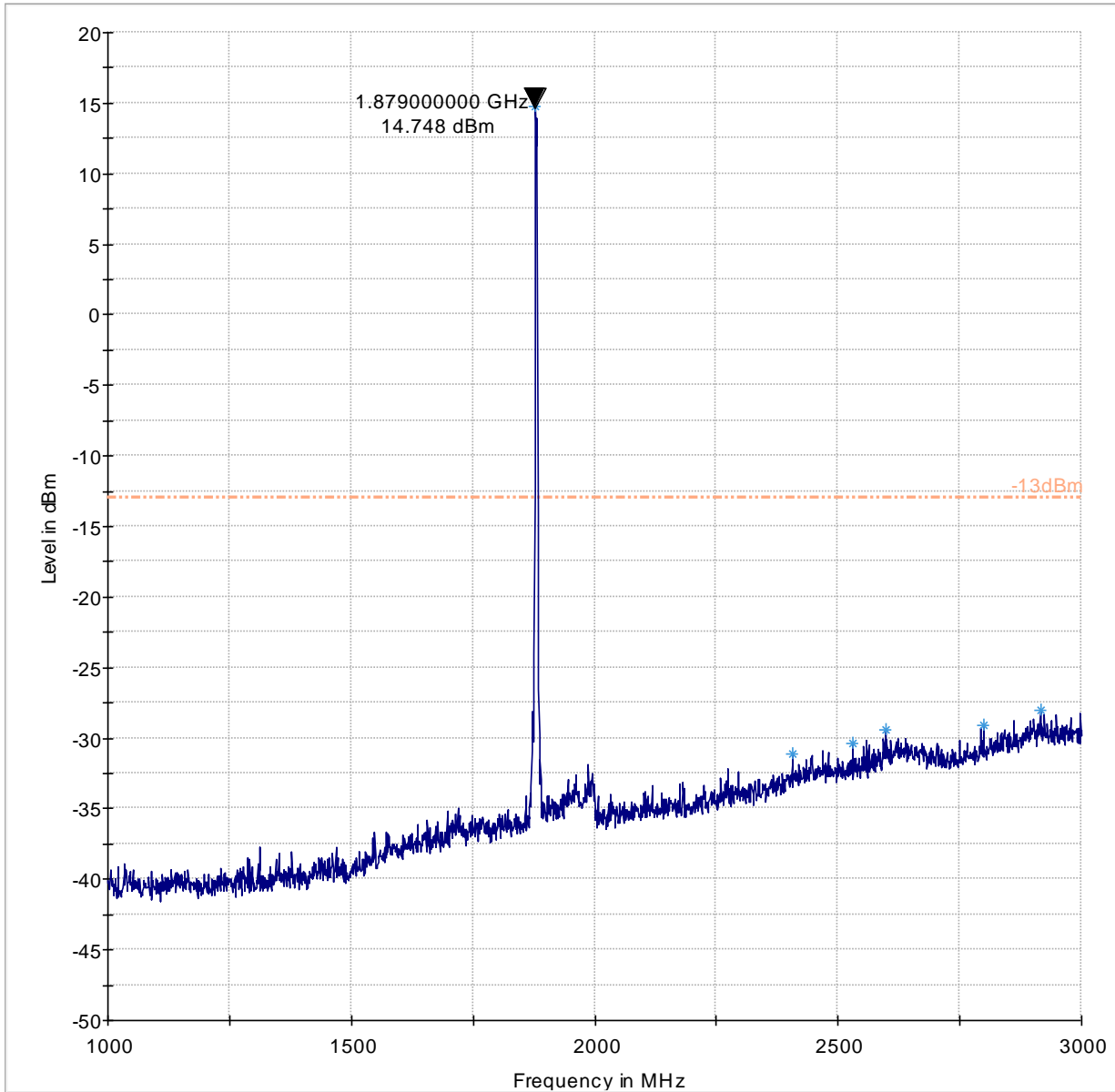


7.7.4 30 - 1000 MHz, Ch. Mid



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

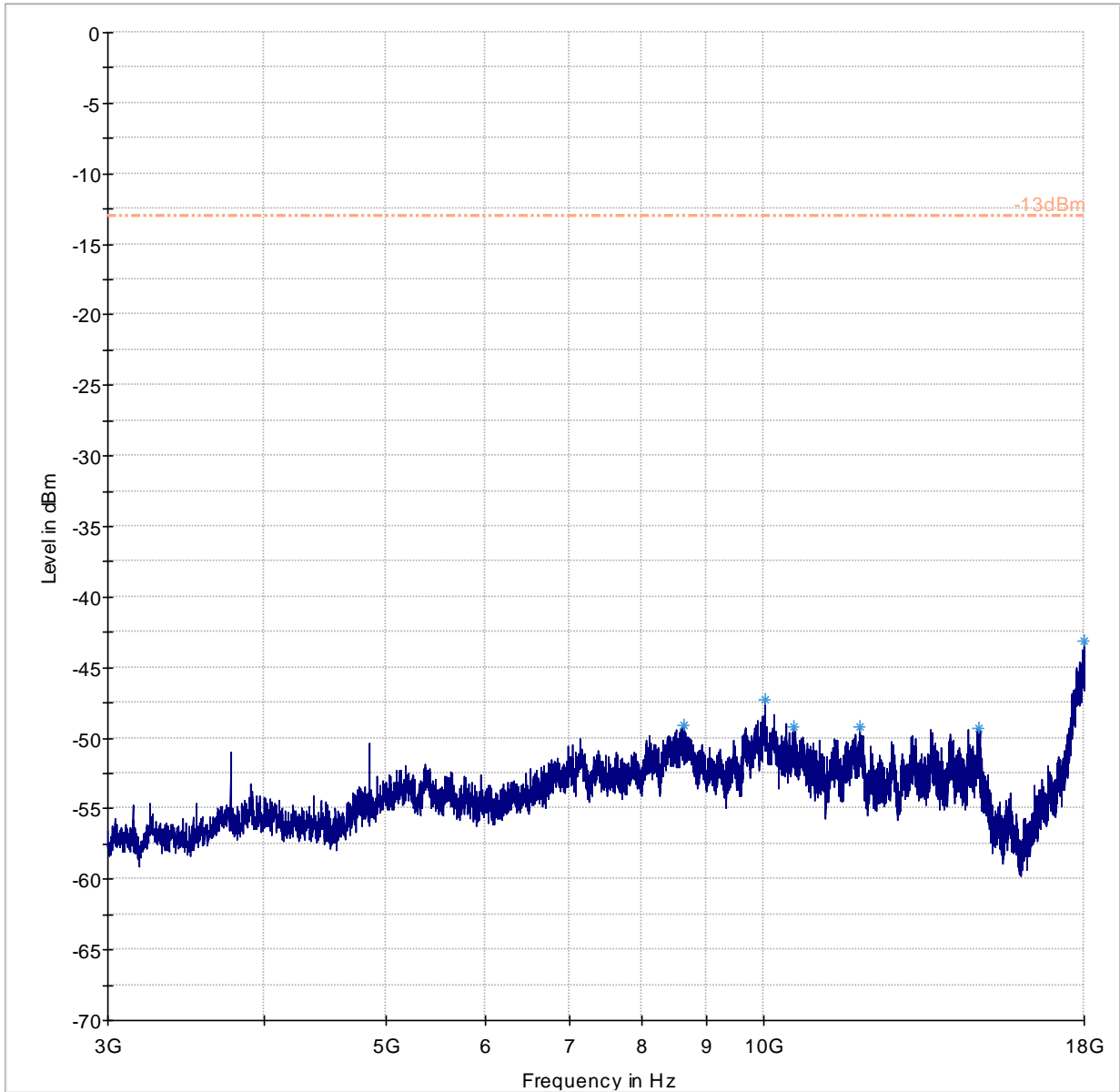
7.7.5 1 - 3 GHz, Ch. Mid



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

Note: Emission above the limit is the fundamental

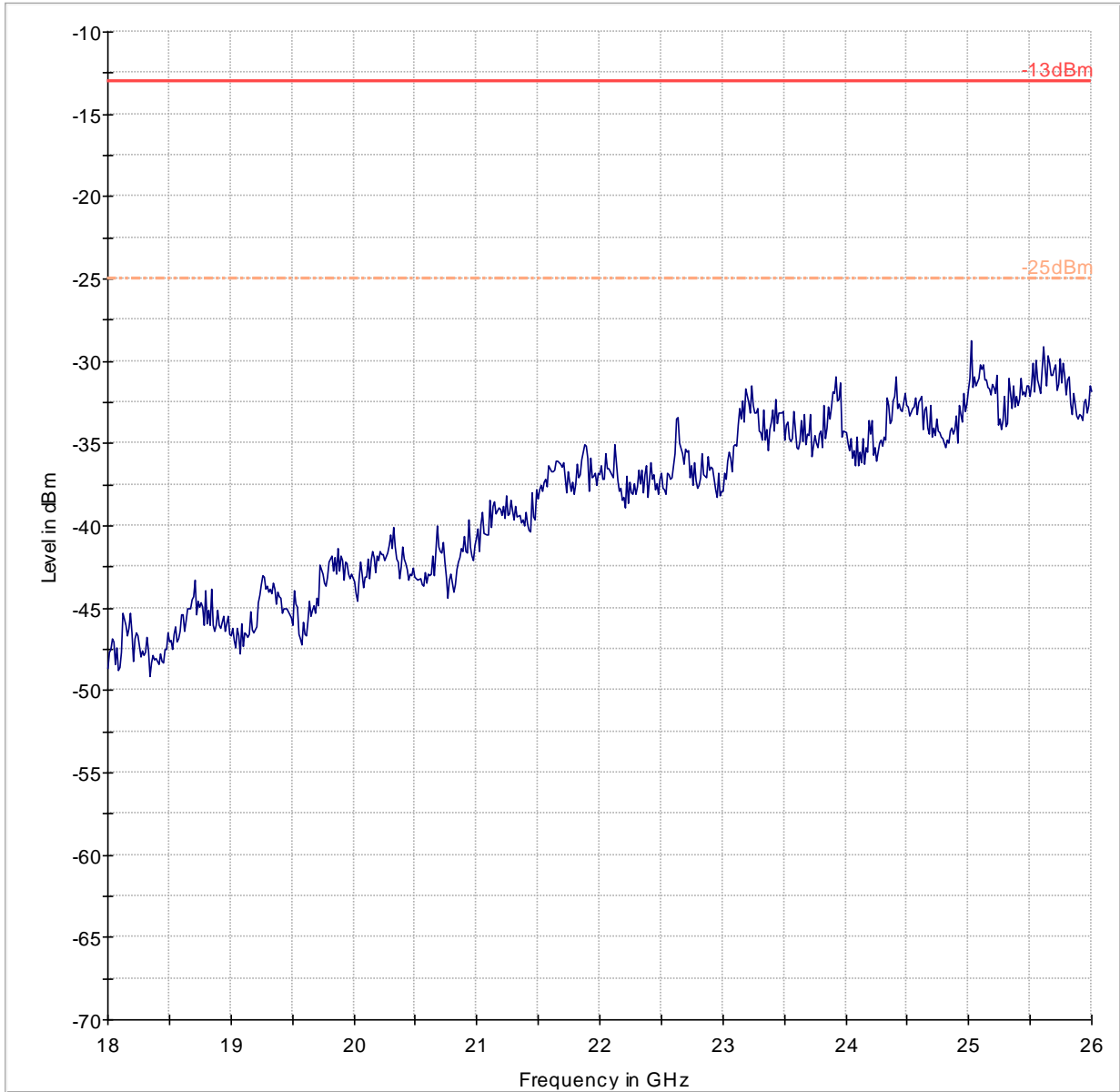
7.7.6 3 GHz - 18 GHz, Ch. Mid



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

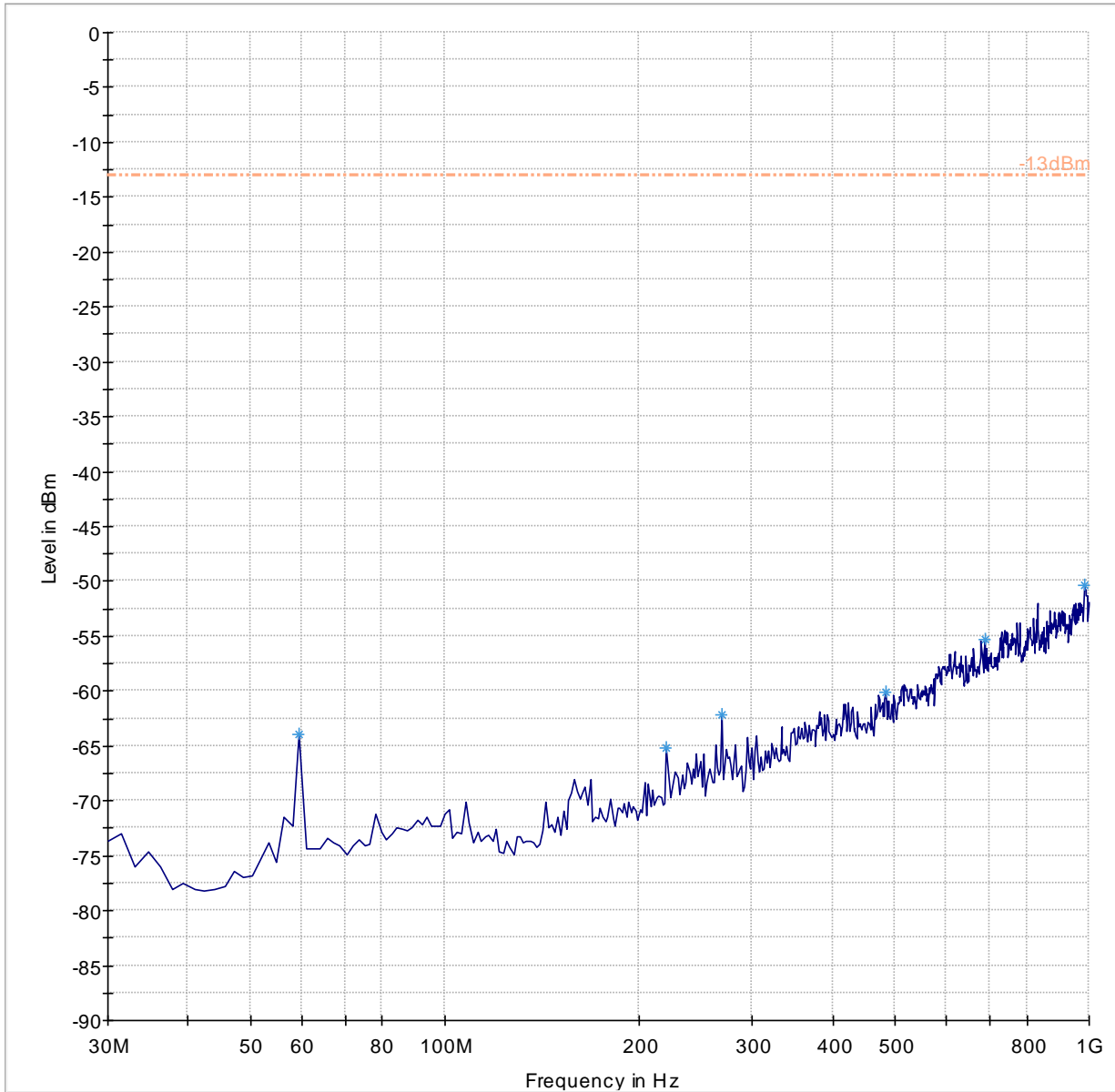


7.7.7 18 - 22 GHz, Ch. Mid



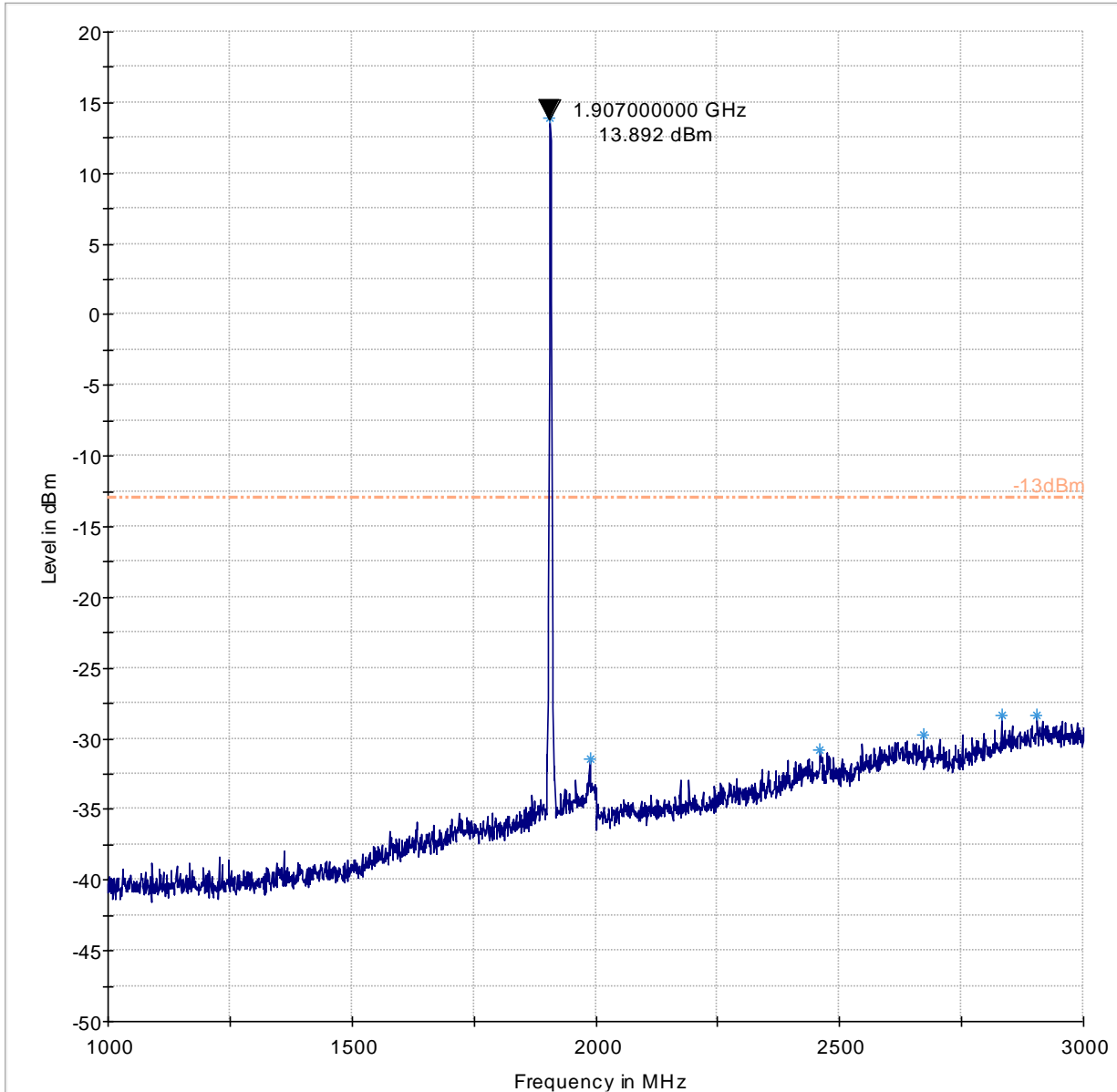
— -13dBm    - - - - -25dBm.LimitLine    — Preview Result 1-PK+

7.7.8 30 - 1000 MHz, Ch. High



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

7.7.9 1 - 3 GHz, Ch. High

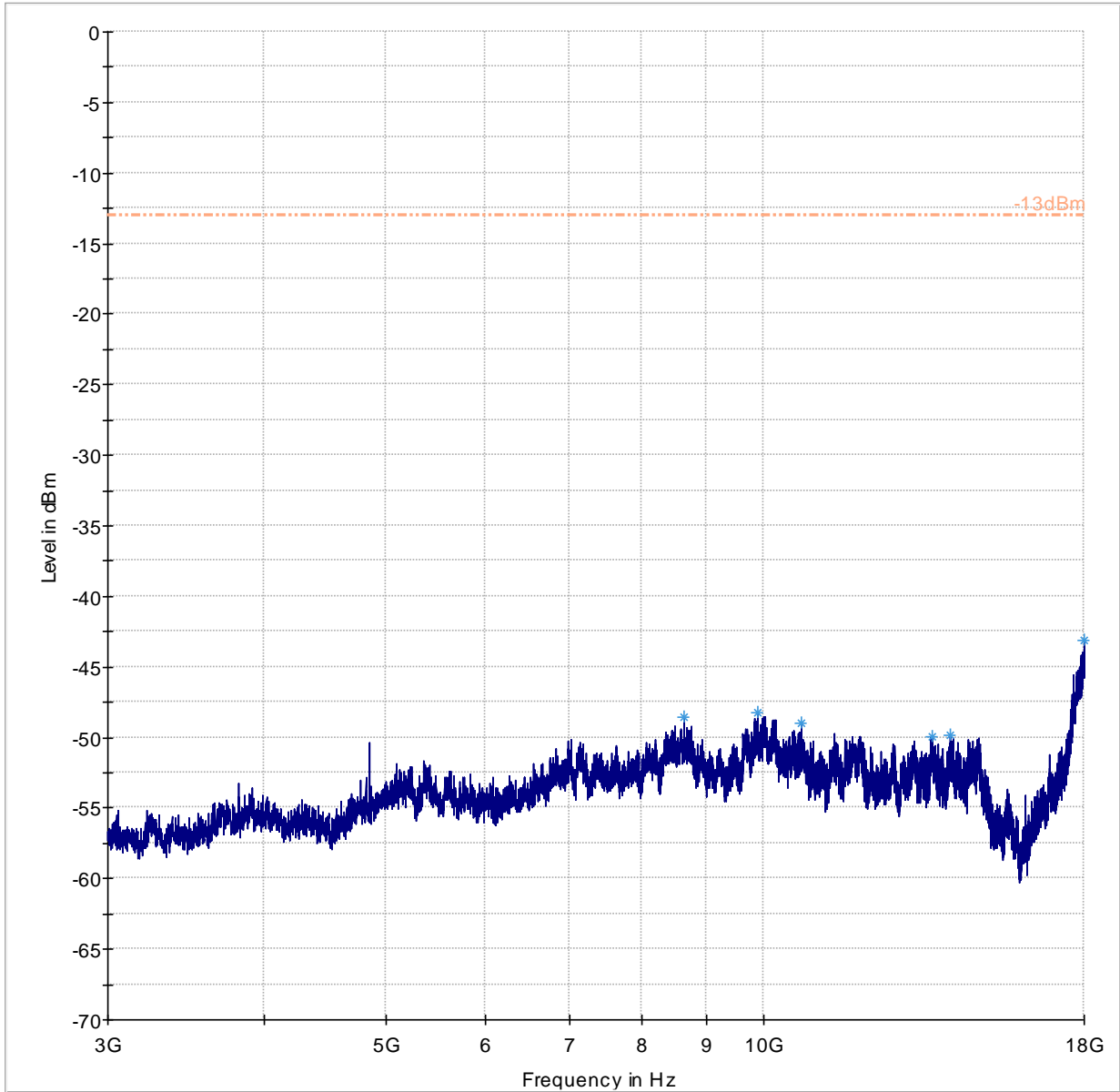


----- -13dBm.LimitLine      ——— Preview Result 1-PK+      \* Data Reduction Result 1 [2]-PK+

Note: Emission above the limit is the fundamental



7.7.10 3 - 18 GHz, Ch. High

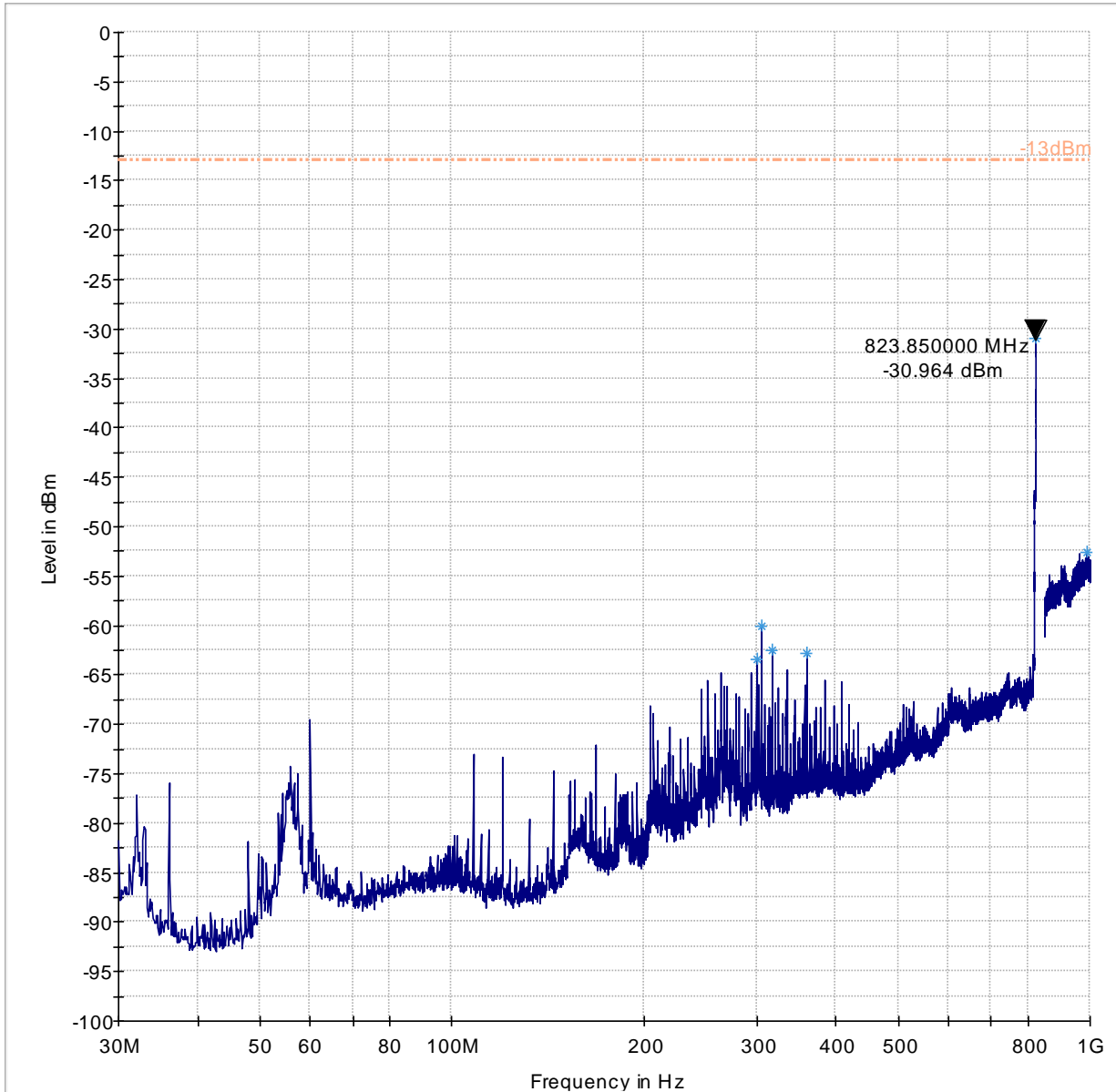


- - - - -13dBm.LimitLine      — Preview Result 1-PK+      \* Data Reduction Result 1 [3]-PK+



7.8 Measurement Plots WCDMA/UMTS FDD V:

7.8.1 30 – 1000 MHz, Ch. Low

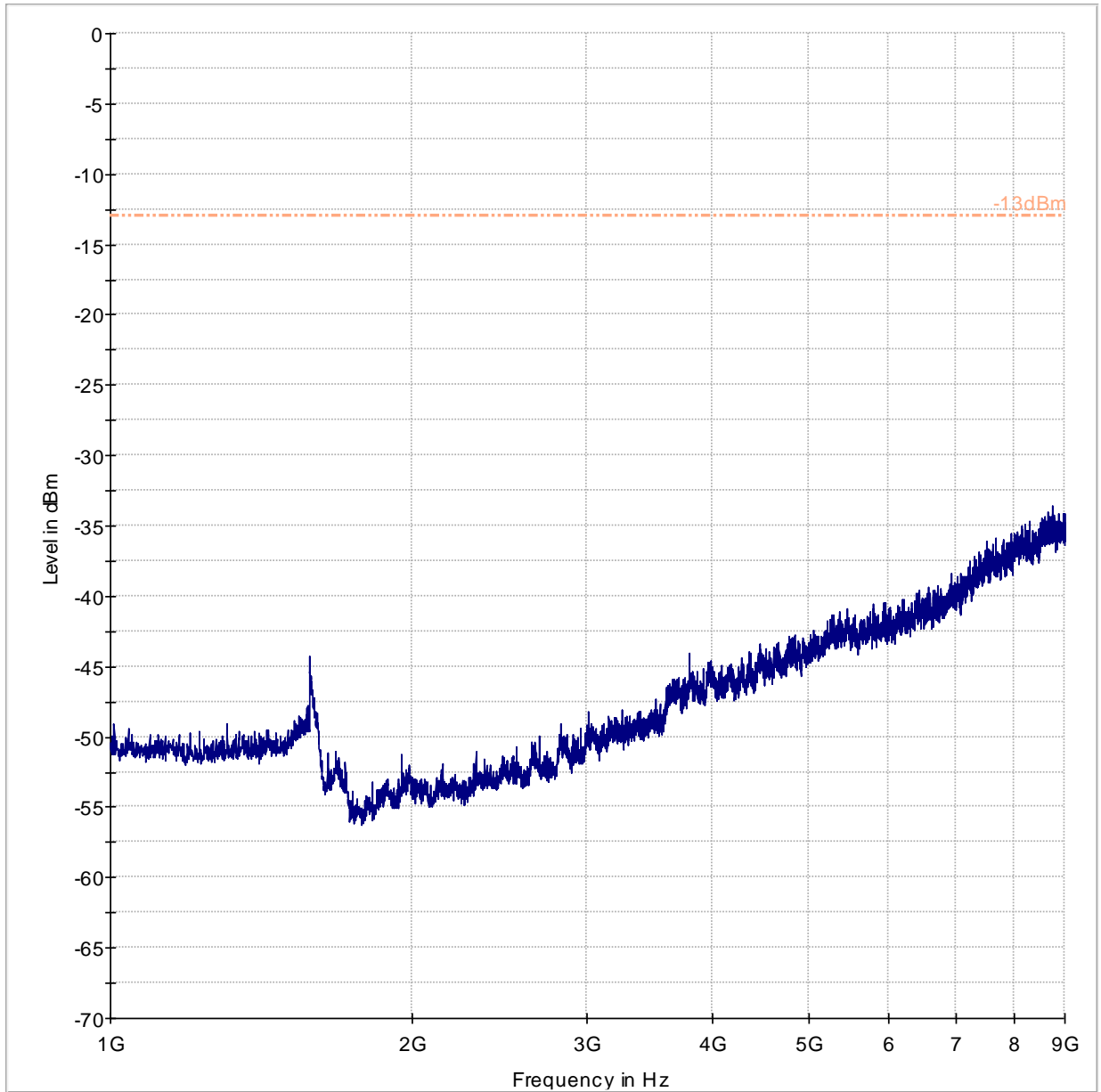


----- -13dBm.LimitLine    ——— Preview Result 1-PK+    \*    Data Reduction Result 1 [1]-PK+





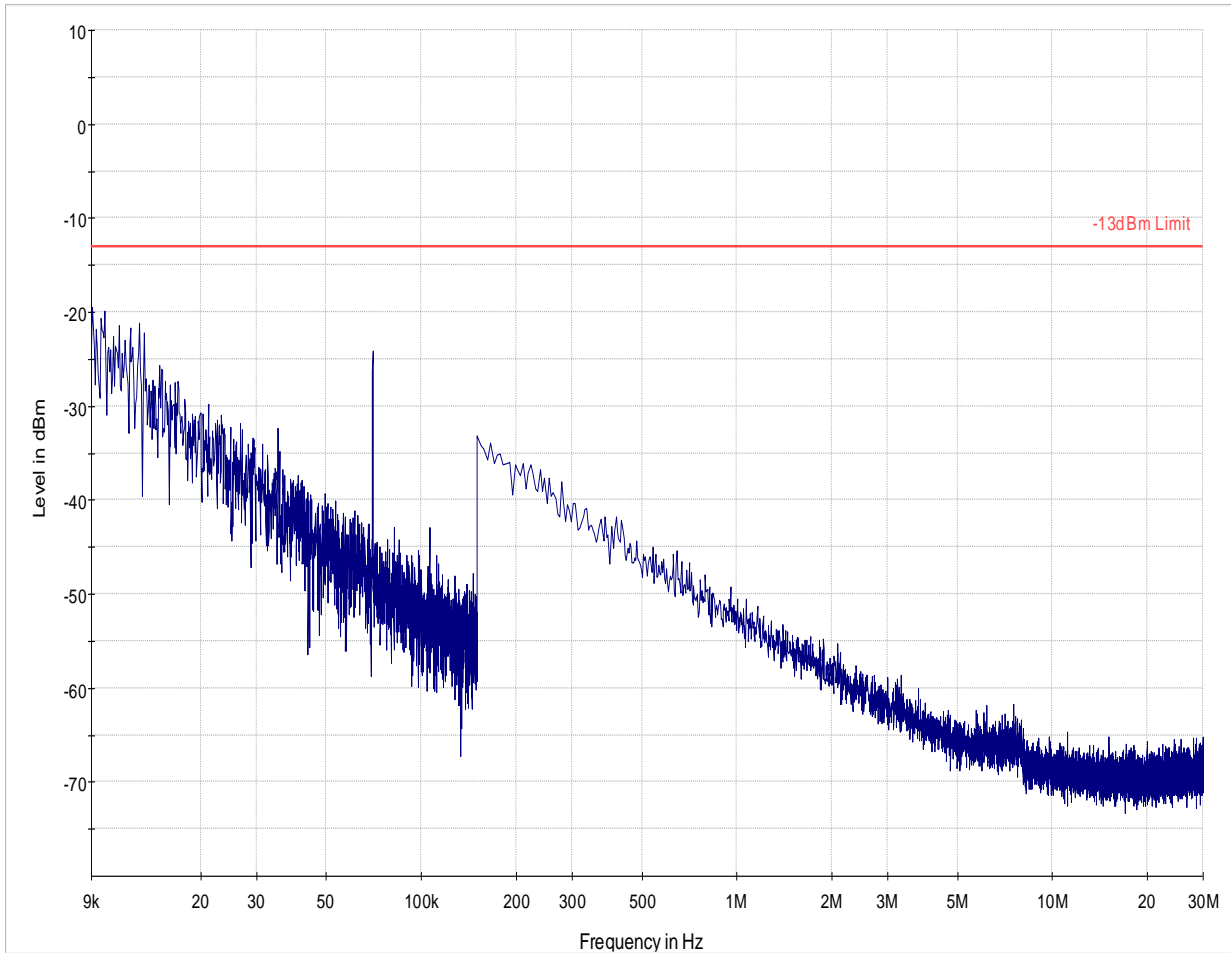
7.8.2 1 – 9 GHz, Ch. Low



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



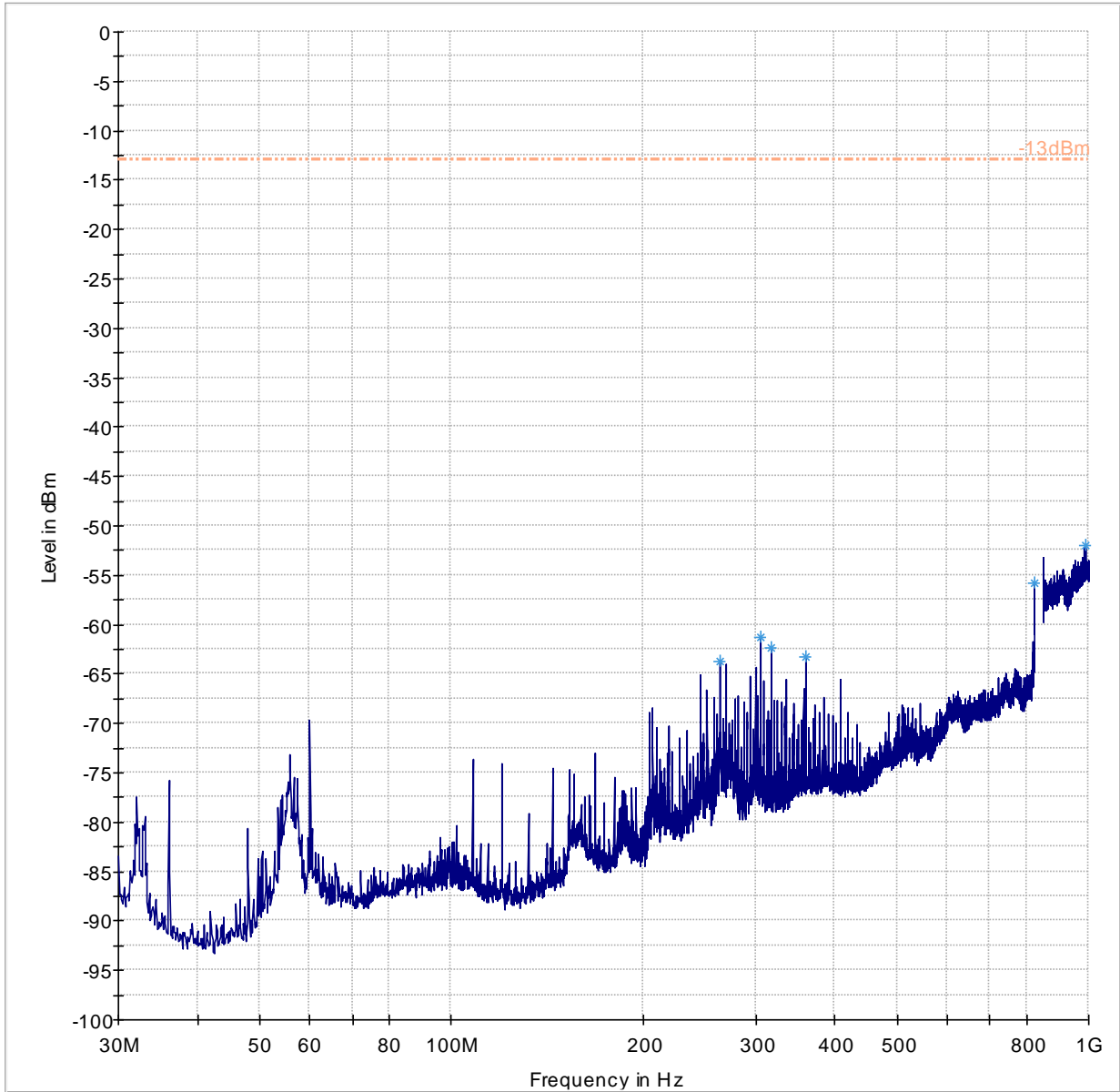
7.8.3 9 KHz – 30 MHz, Ch. Mid



— -13dBm EIRP Limit converted to near field — Preview Result 1-PK+



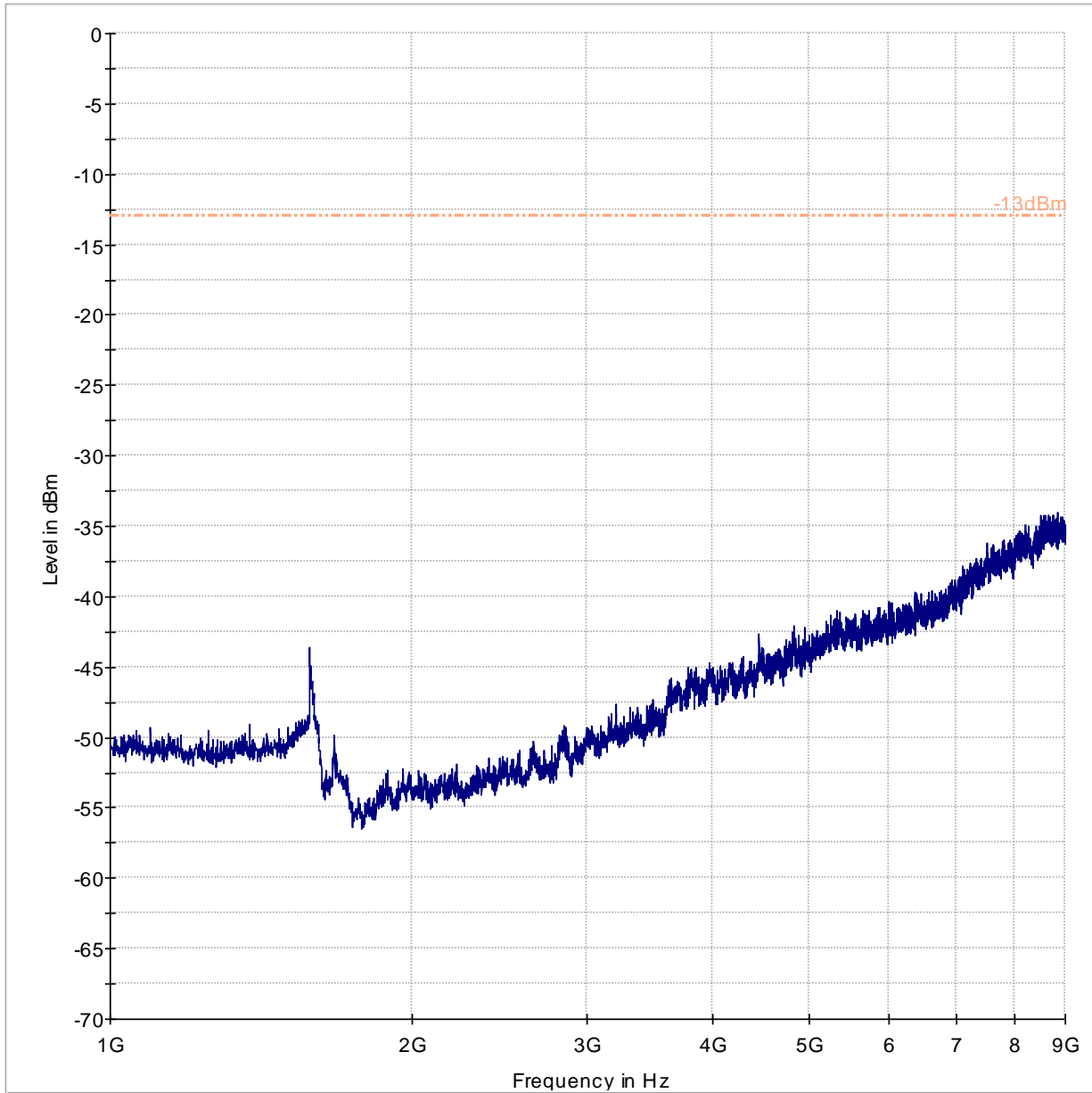
7.8.4 30 – 1000 MHz, Ch. Mid



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



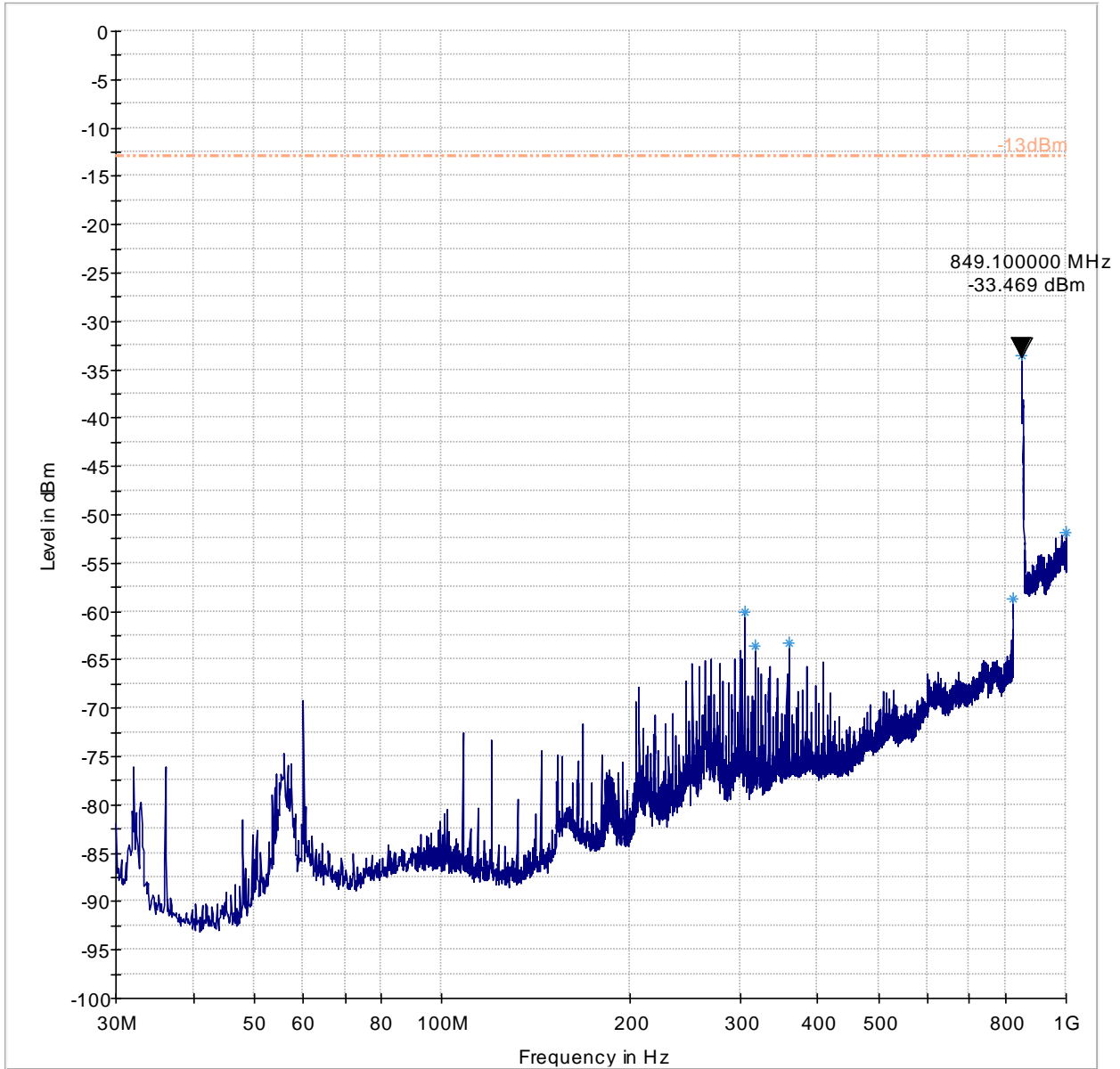
7.8.5 1 GHz – 9 GHz, Ch. Mid



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



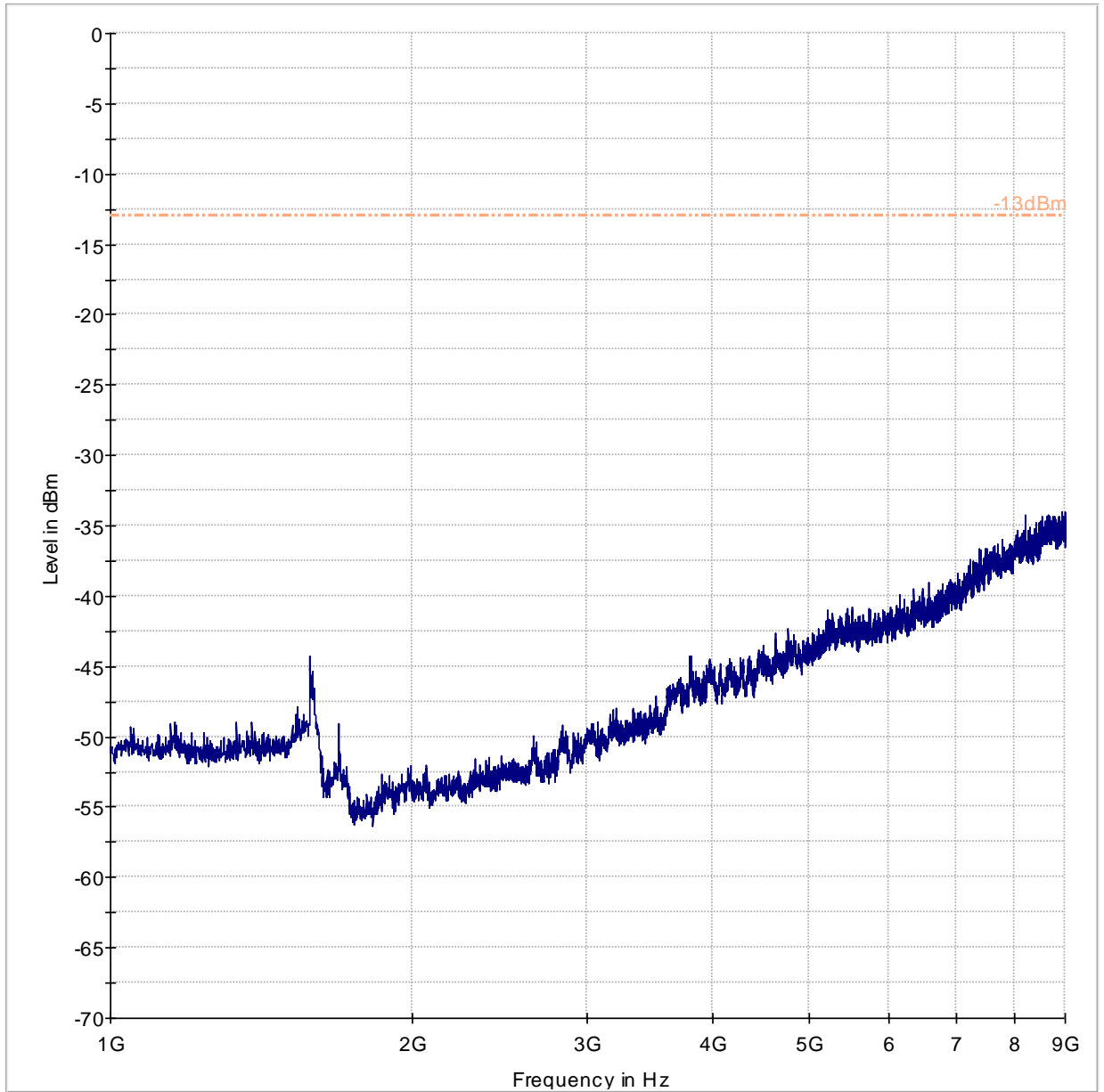
7.8.6 30 – 1000 MHz, Ch. High



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



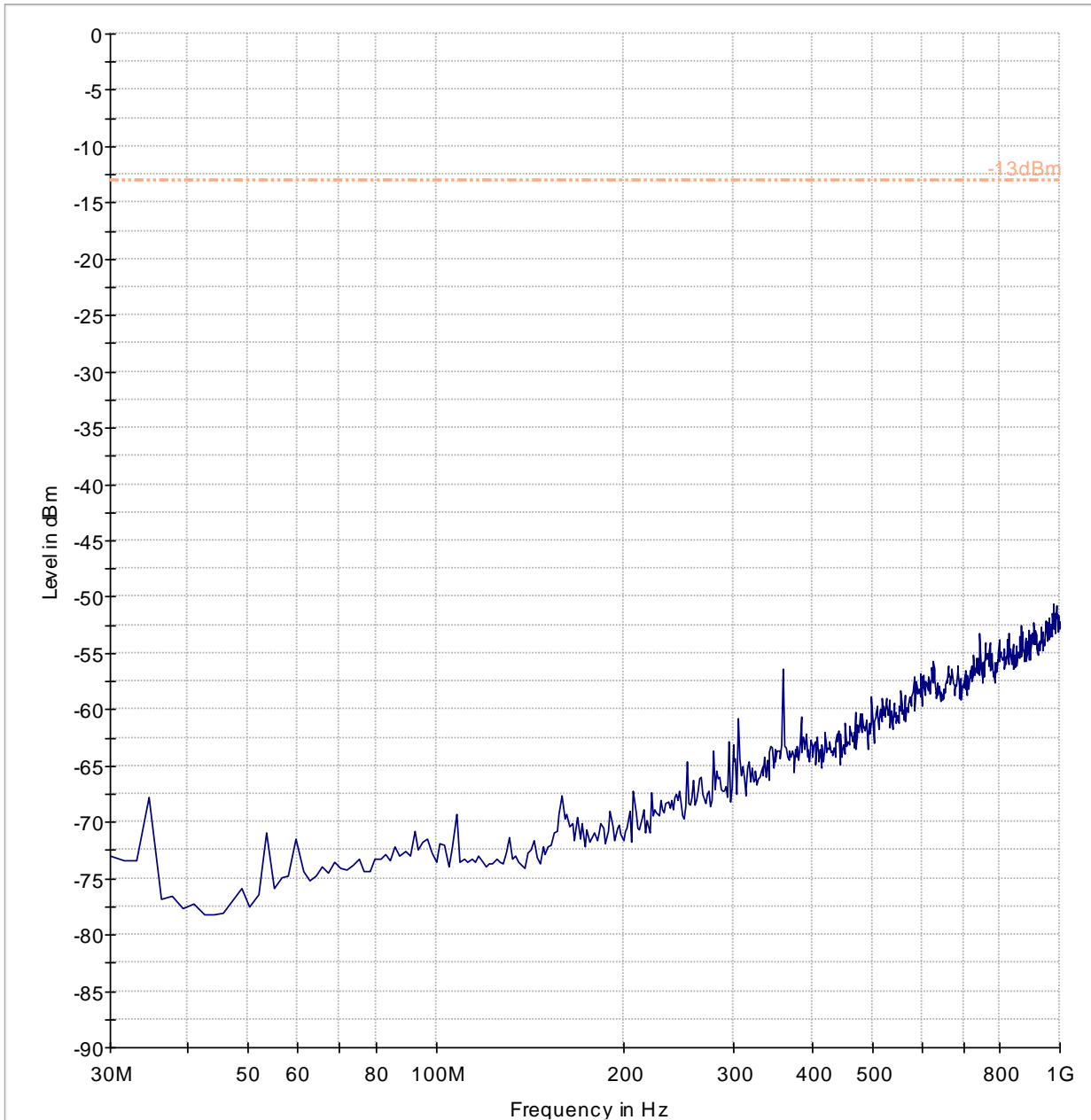
7.8.7 1 - 9 GHz, Ch. High



-13dBm      Preview Result 1-PK+

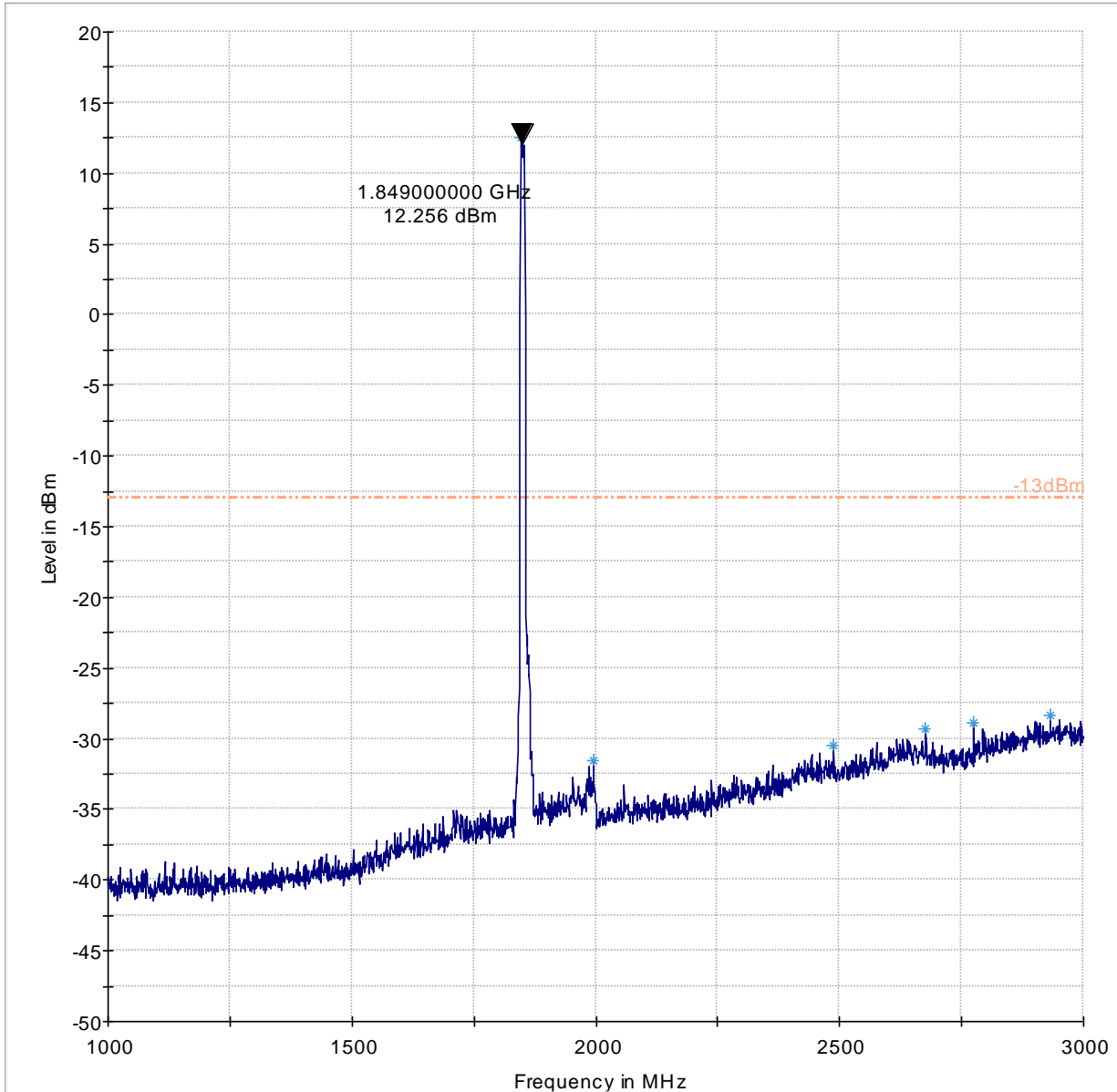
### 7.9 Measurement Plots LTE 2

#### 7.9.1 30 - 1000 MHz, Ch. Low



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

7.9.2 1 GHz - 3 GHz, Ch. Low



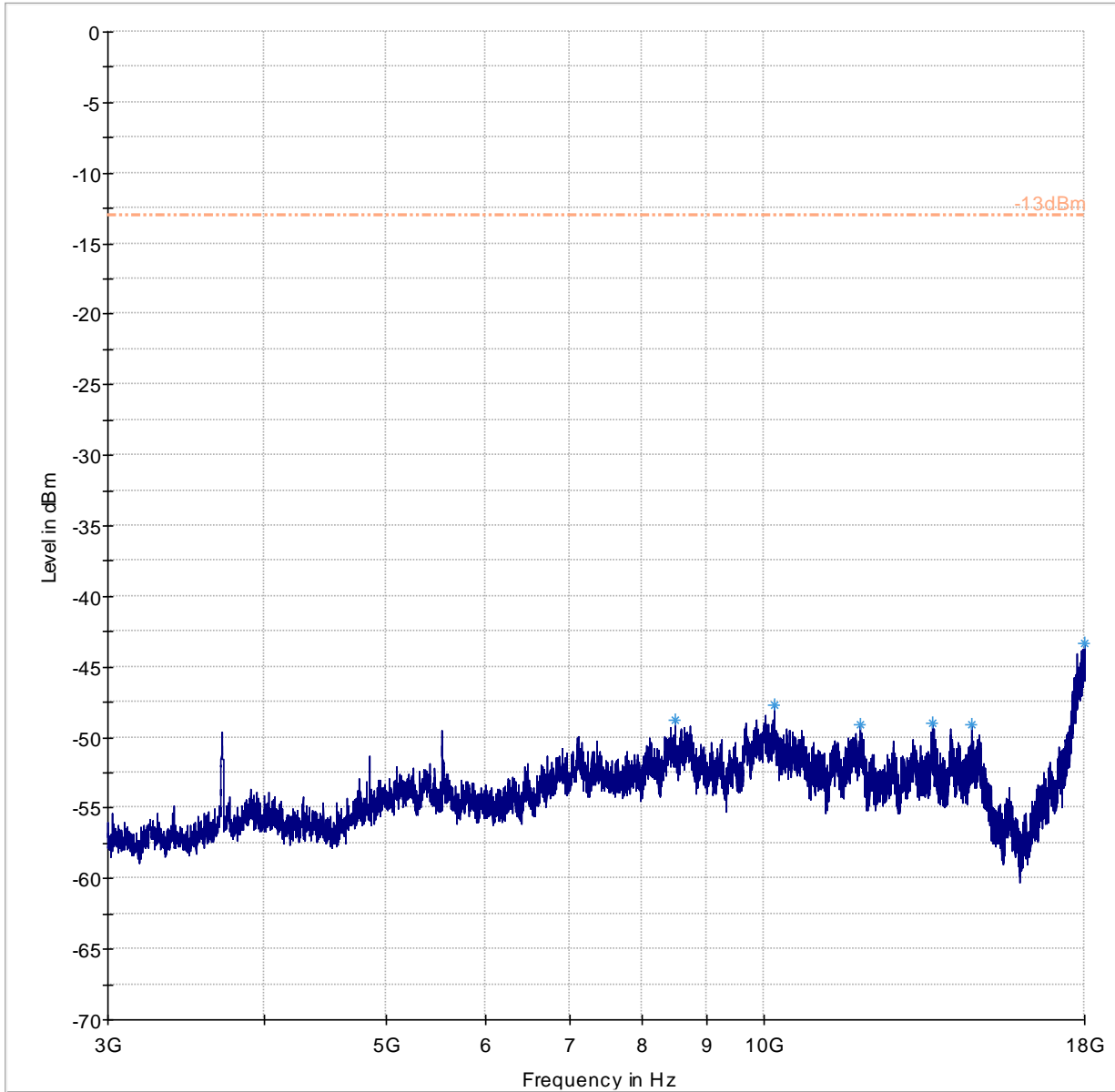
----- -13dBm.LimitLine      ——— Preview Result 1-PK+      \* Data Reduction Result 1 [2]-PK+

Note: Emission above the limit is the fundamental





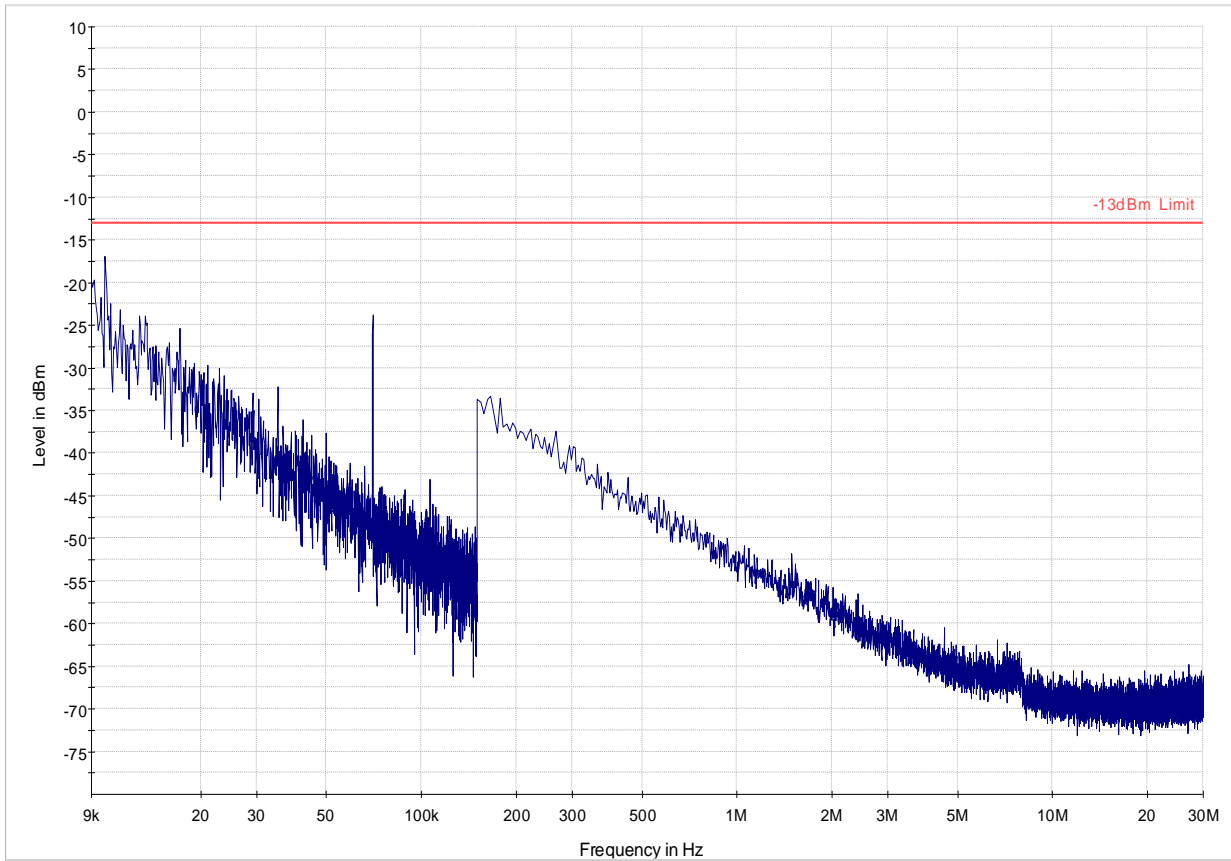
7.9.3 3 - 18 GHz, Ch. Low



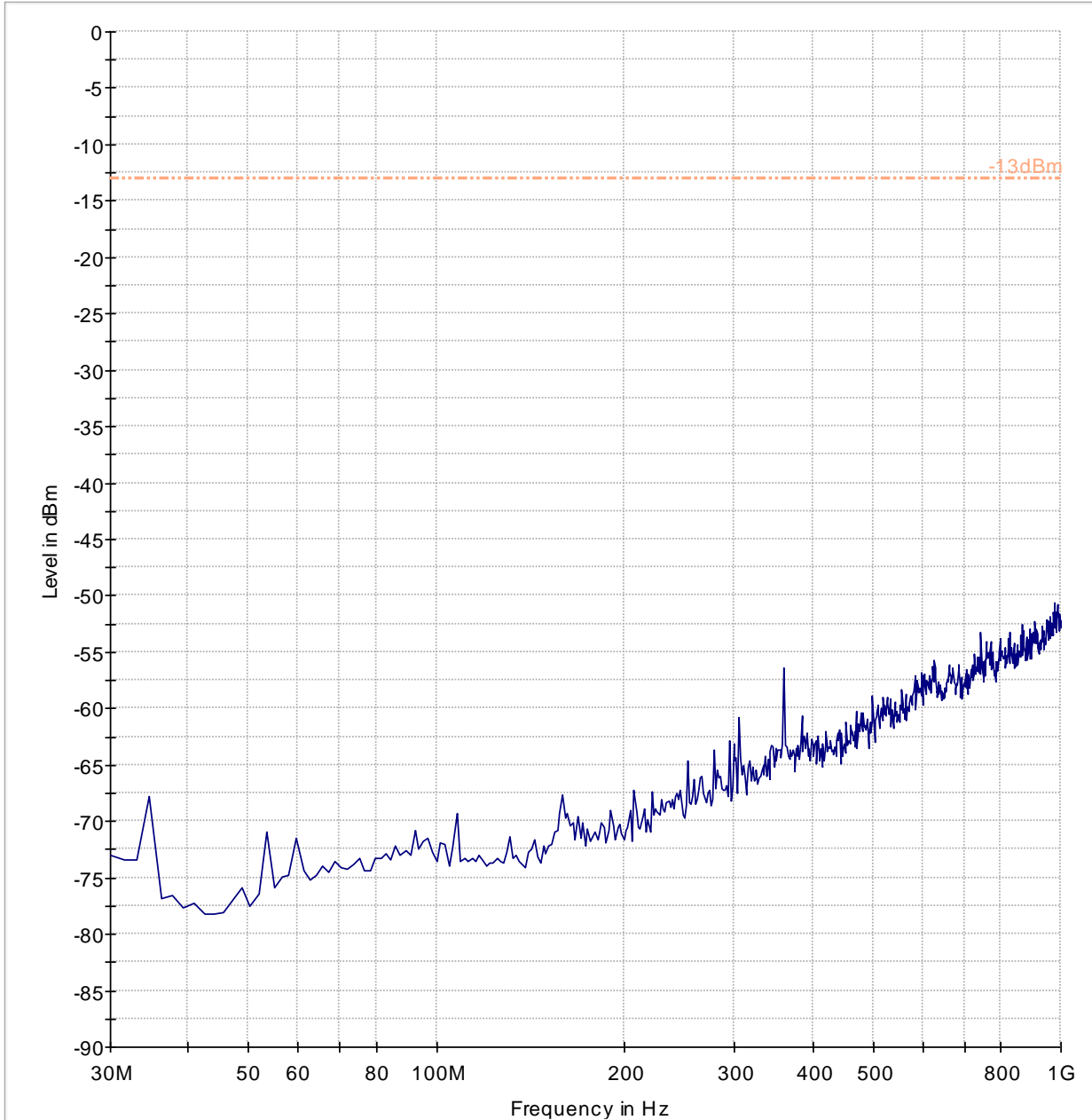
----- -13dBm.LimitLine    ——— Preview Result 1-PK+    \* Data Reduction Result 1 [3]-PK+



7.9.4 9 KHz - 30 MHz, Ch. Mid

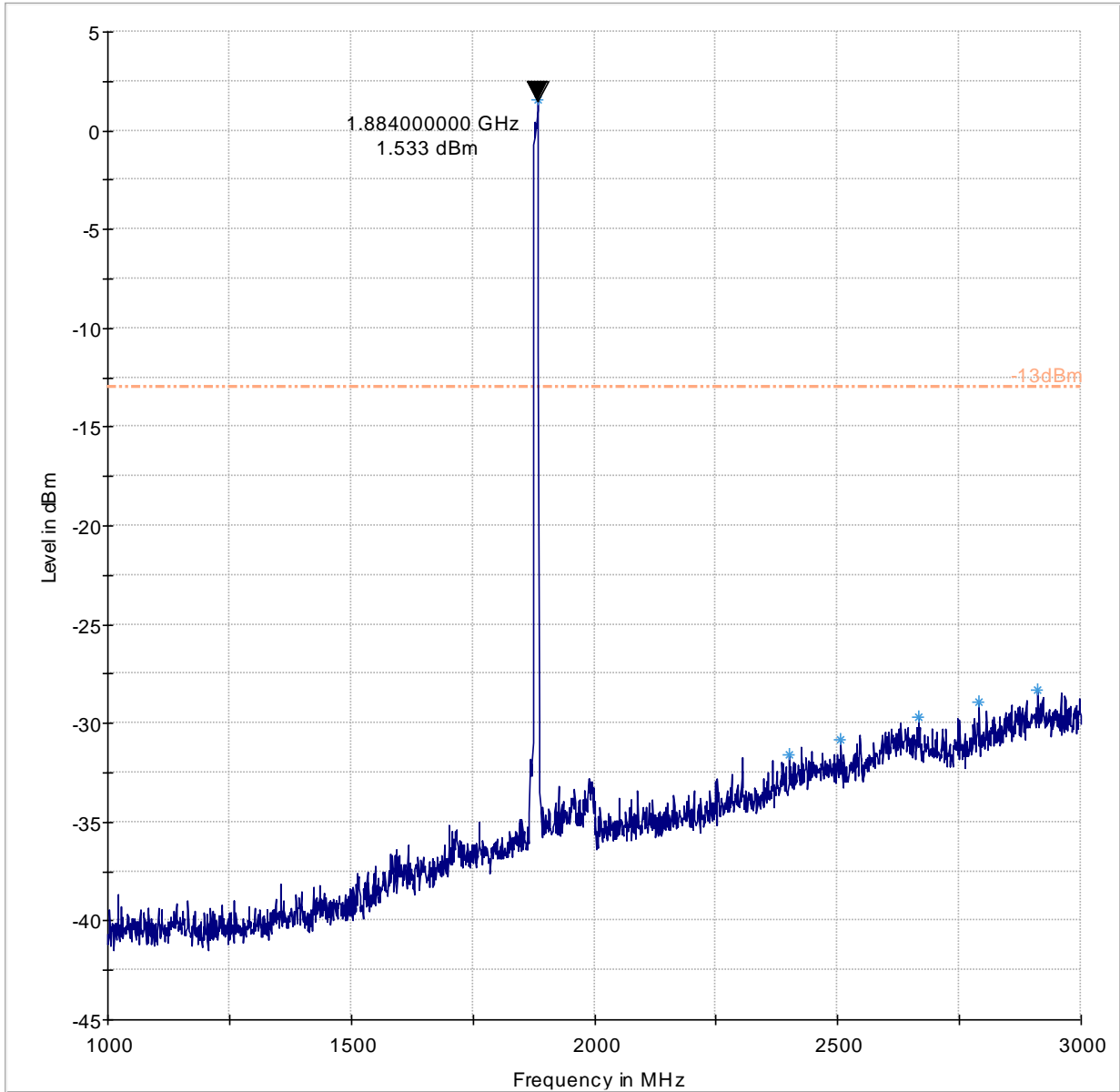


7.9.5 30 - 1000 MHz, Ch. Mid



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

7.9.6 1 GHz - 3 GHz, Ch. Mid

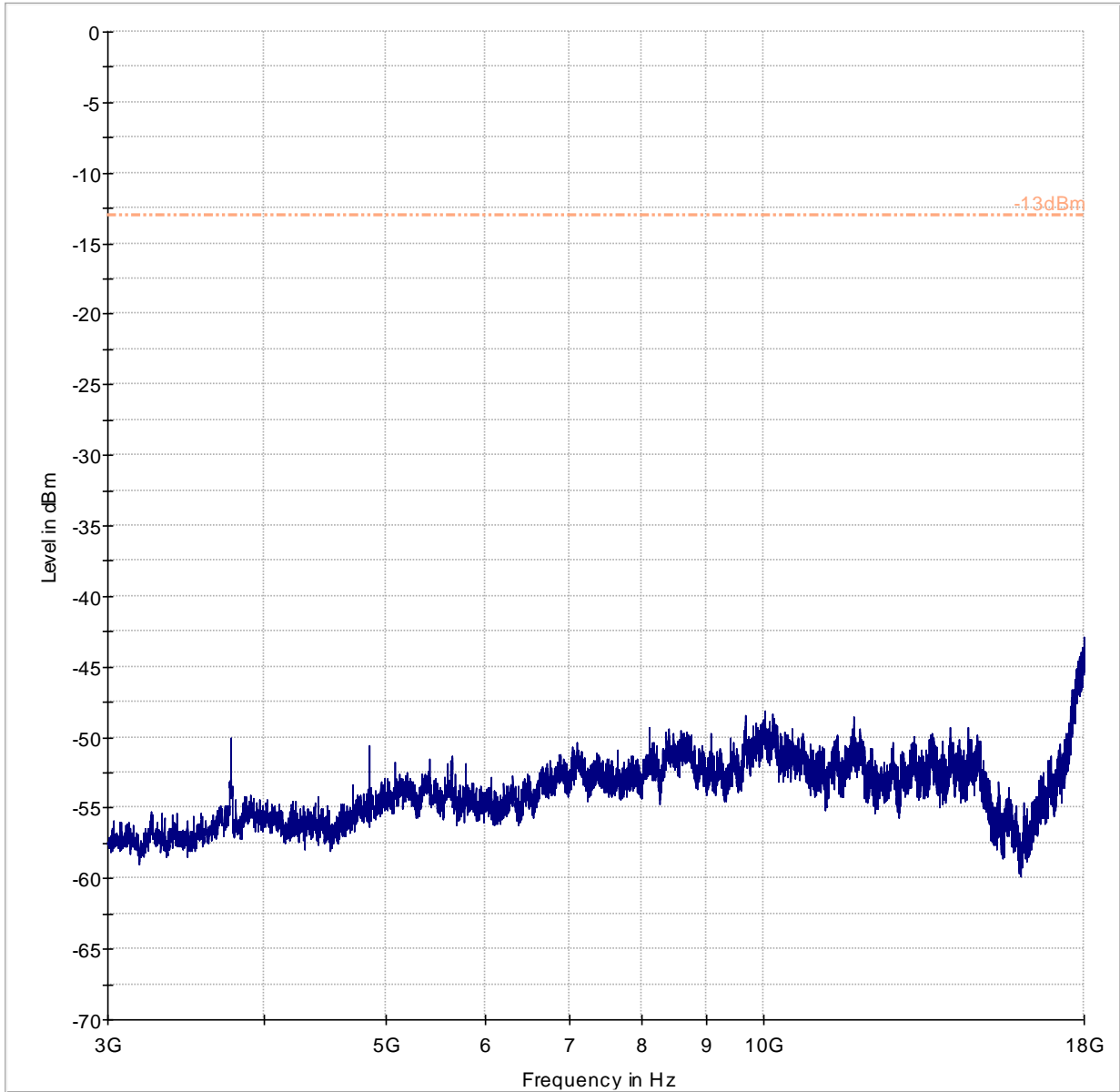


----- -13dBm.LimitLine    ——— Preview Result 1-PK+    \* Data Reduction Result 1 [2]-PK+

Note: Emission above the limit is the fundamental



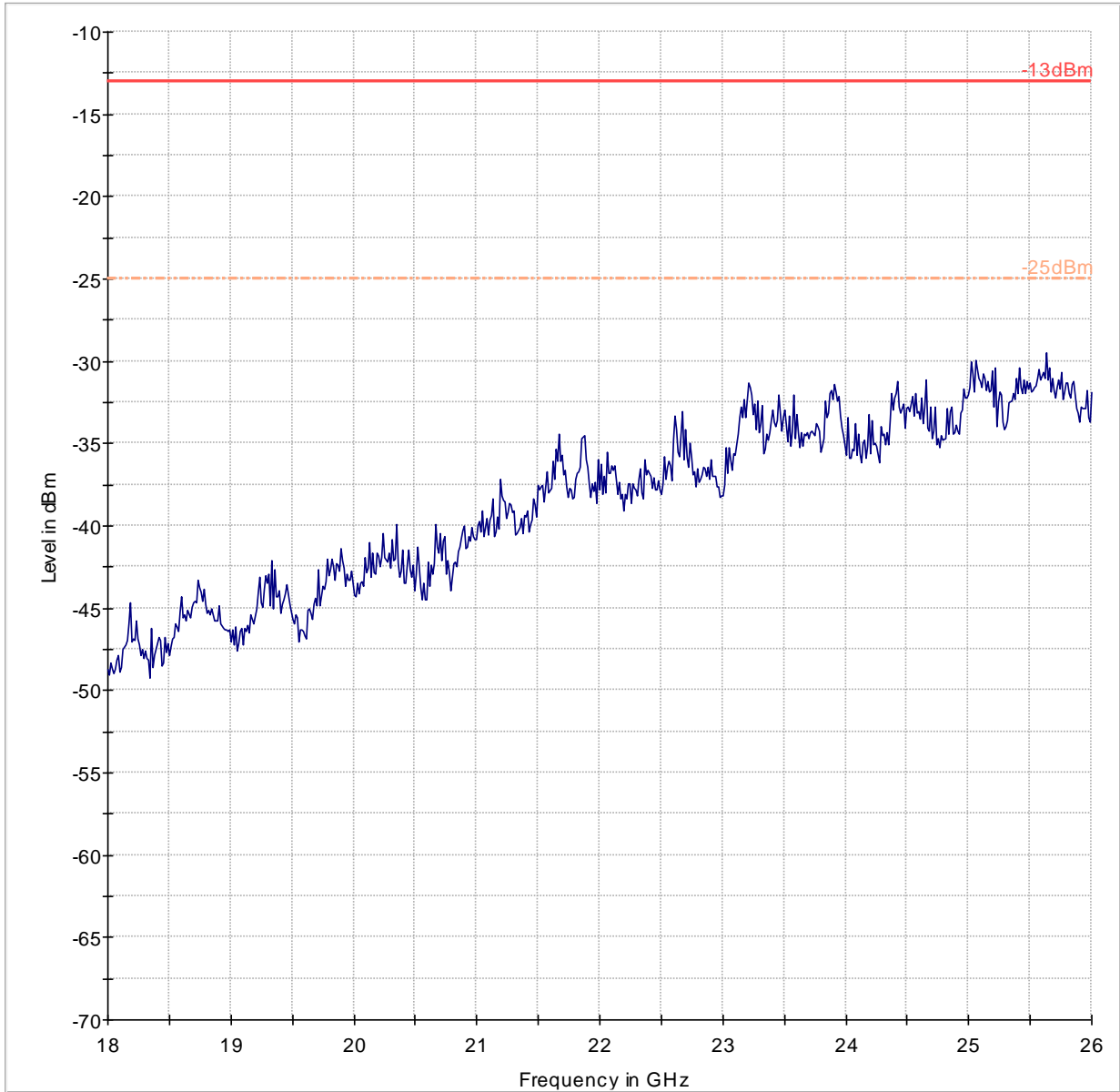
7.9.7 3 GHz - 18 GHz, Ch. Mid



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



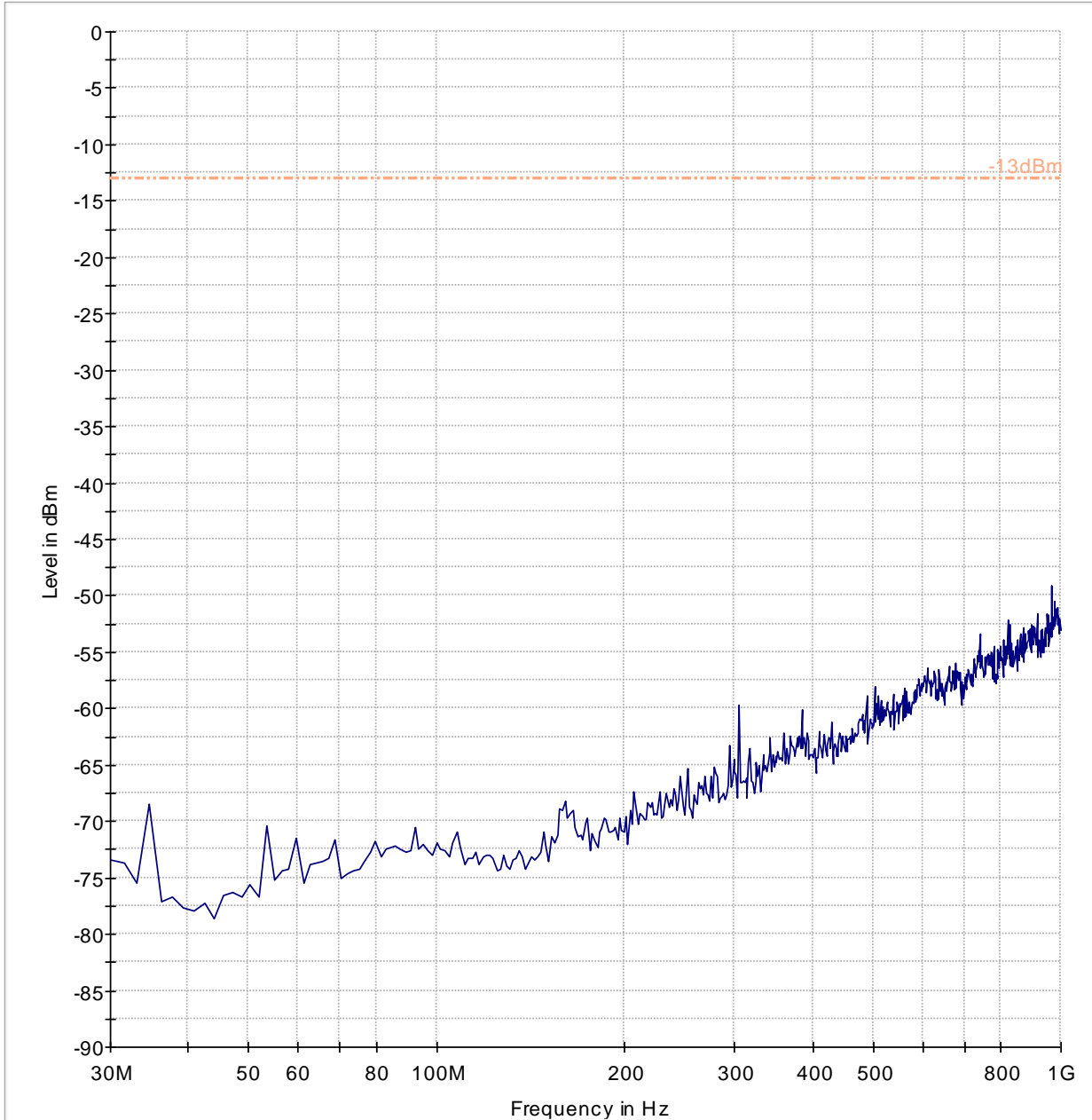
7.9.8 18 - 22 GHz, Ch. Mid



— -13dBm    - - - - -25dBm.LimitLine    — Preview Result 1-PK+

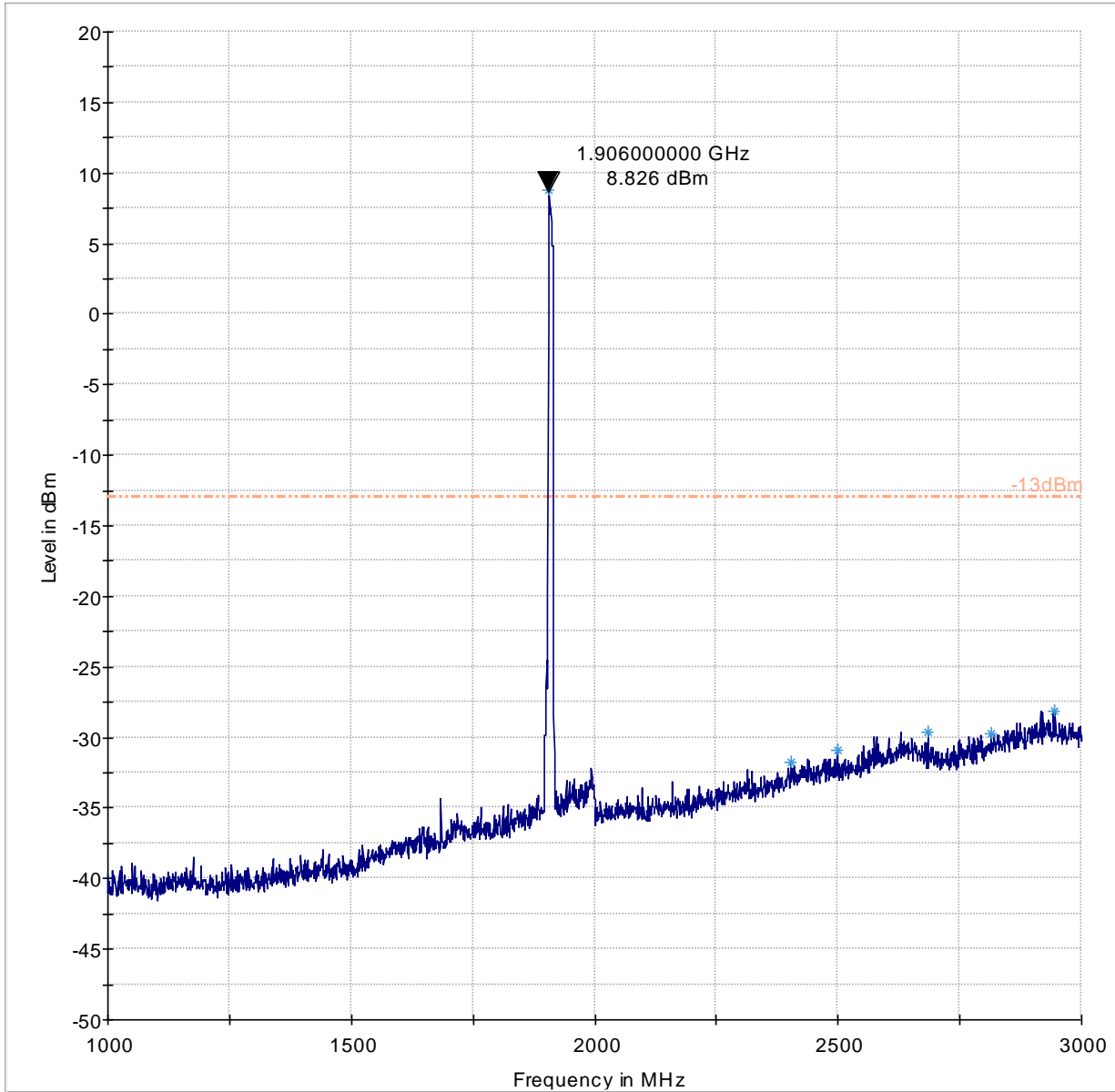


7.9.9 30 - 1000 MHz, Ch. High



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

7.9.10 1 - 3 GHz, Ch. High



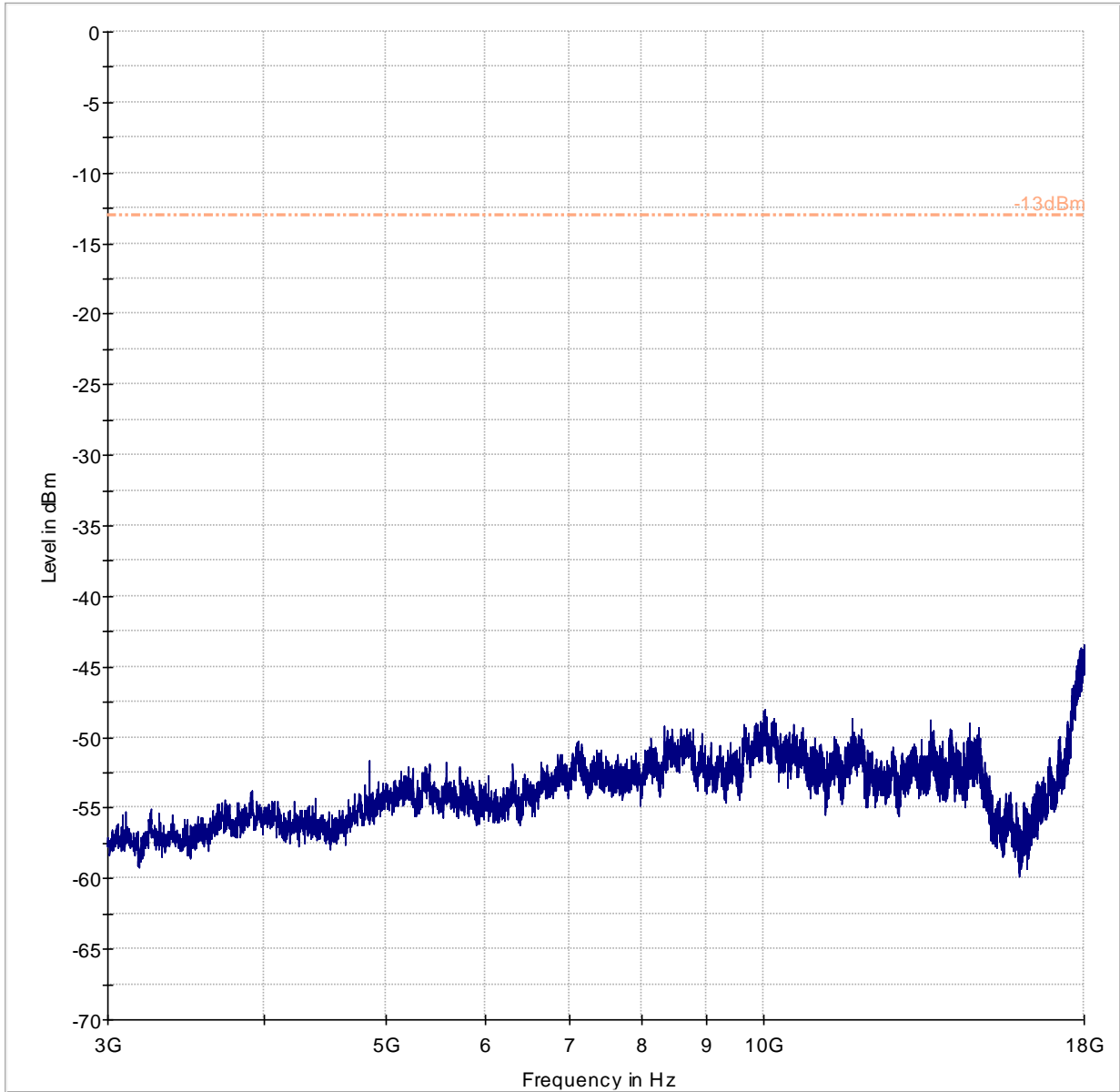
----- -13dBm.LimitLine    ——— Preview Result 1-PK+    \* Data Reduction Result 1 [2]-PK+

Note: Emission above the limit is the fundamental





7.9.11 3 - 18 GHz, Ch. High

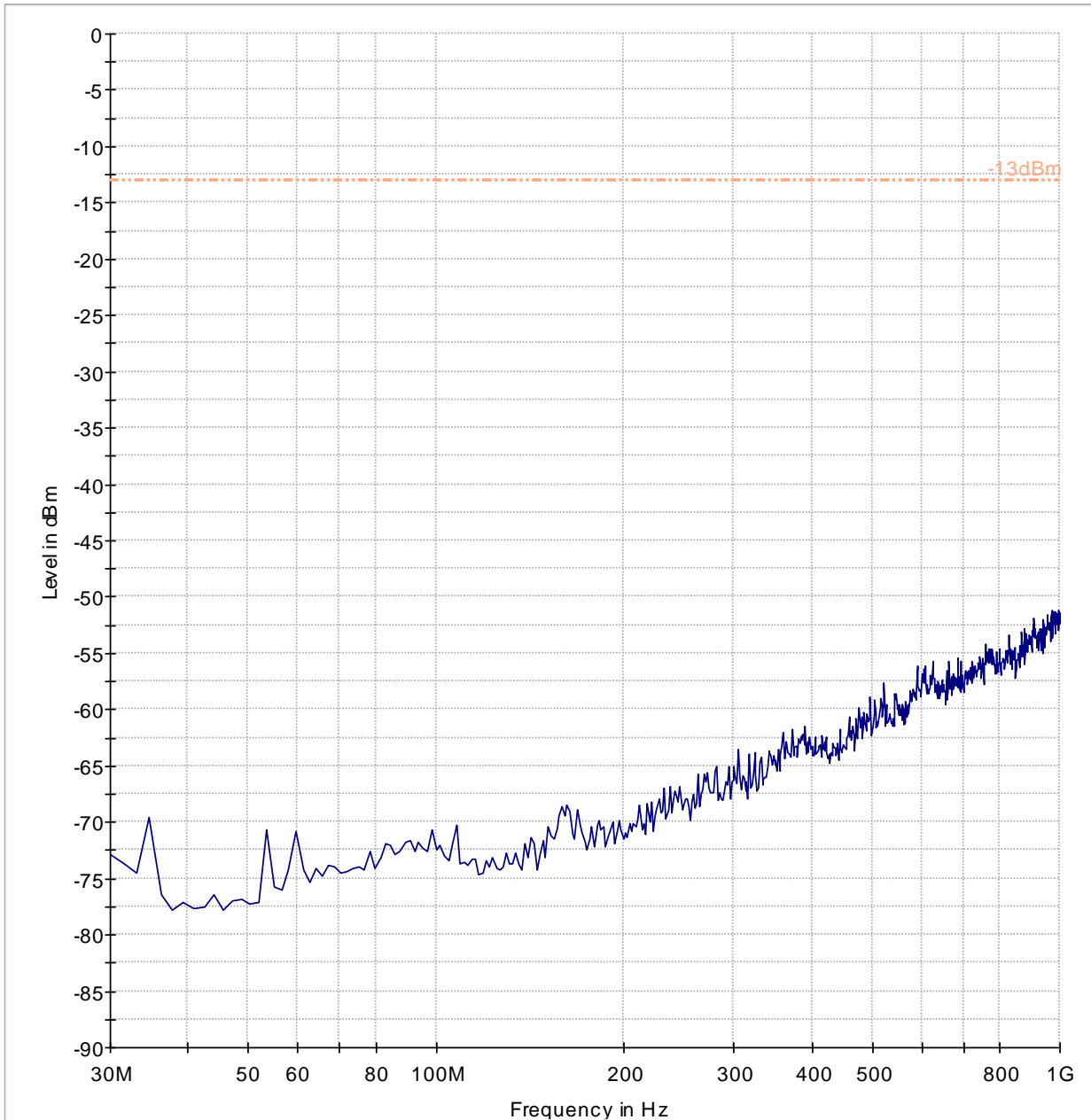


----- -13dBm.LimitLine      ——— Preview Result 1-PK+



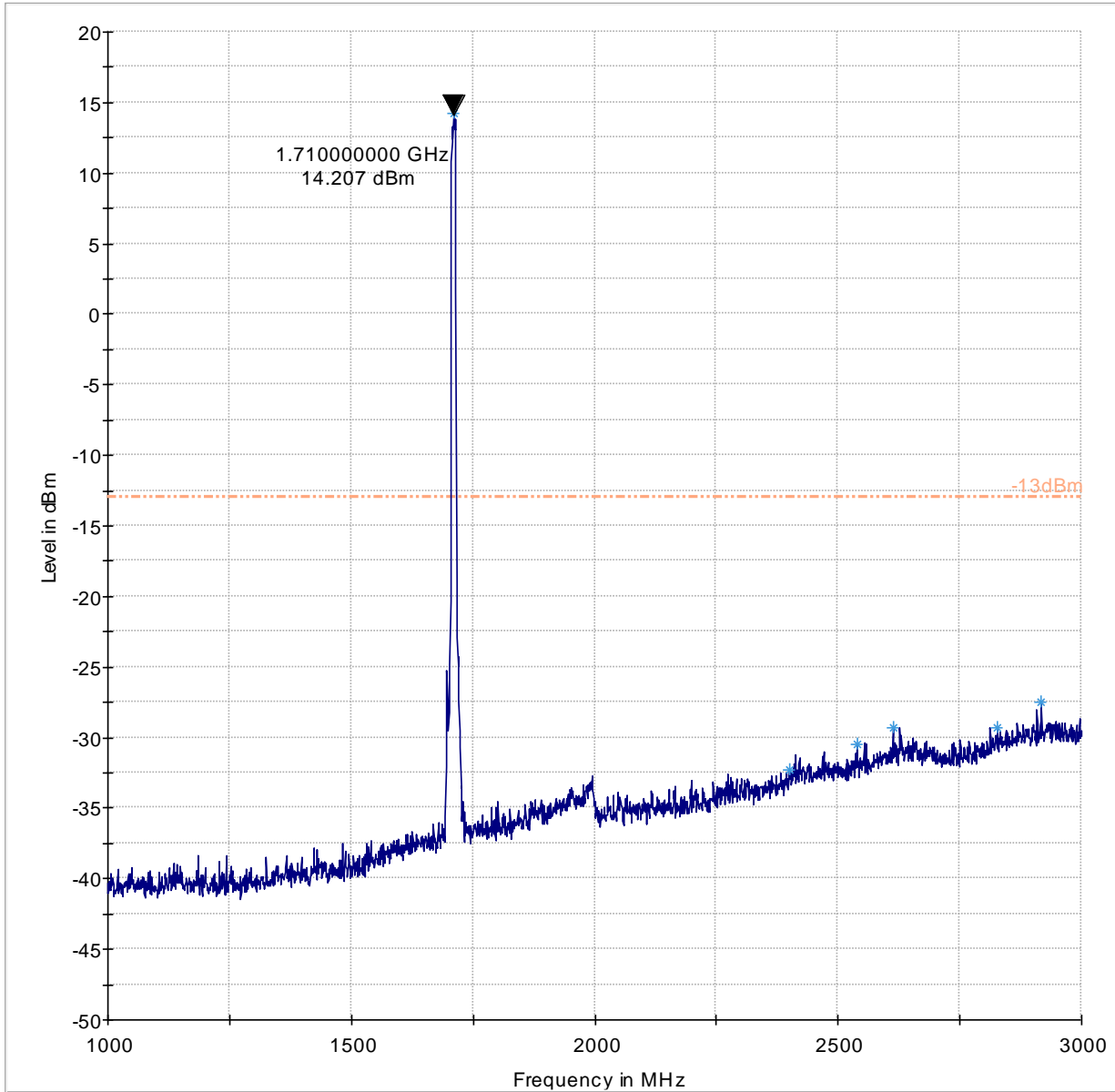
### 7.10 Measurement Plots LTE 4

#### 7.10.1 30 - 1000 MHz, Ch. Low



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

7.10.2 1 - 3 GHz, Ch. Low

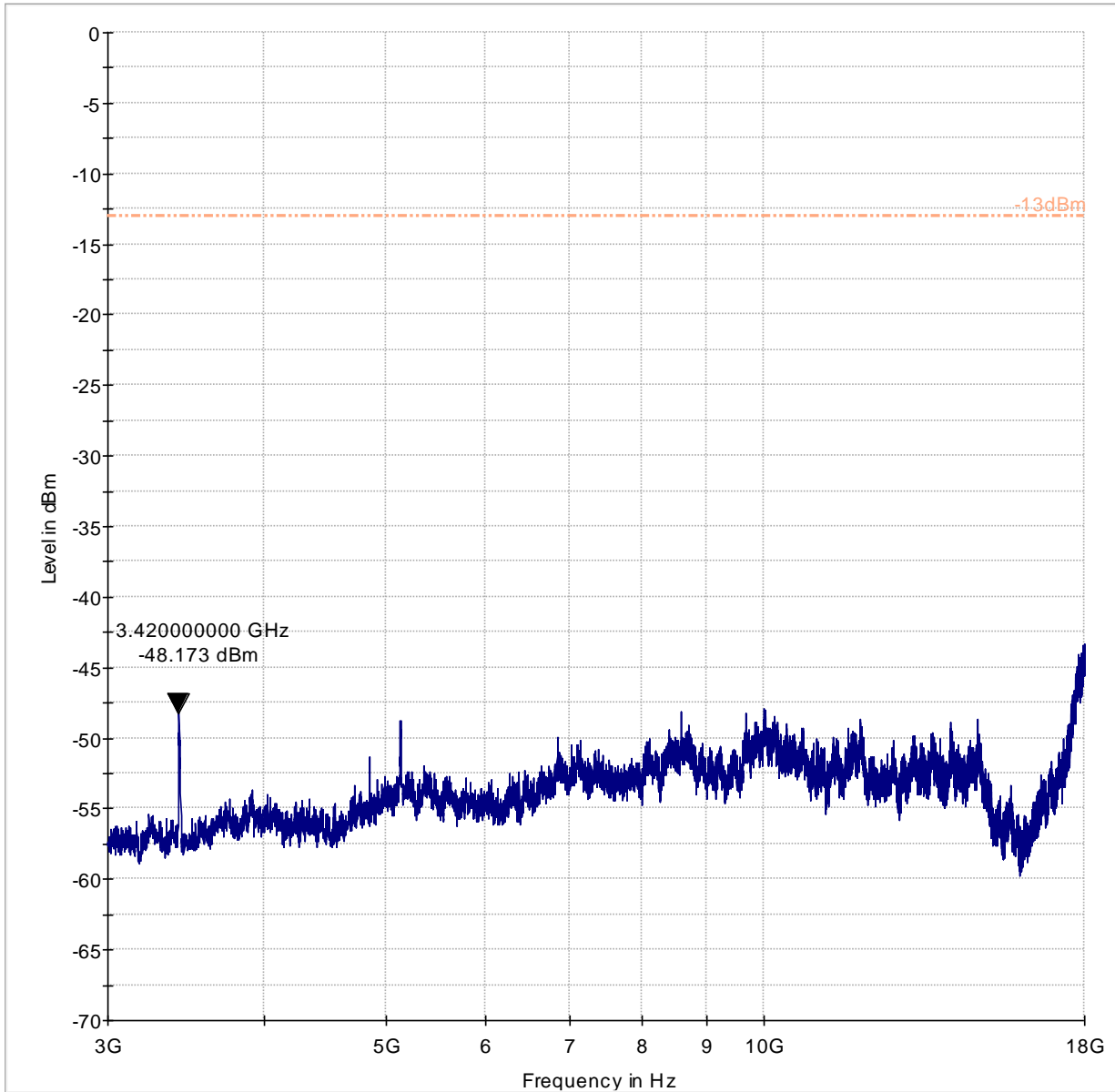


----- -13dBm.LimitLine      ——— Preview Result 1-PK+      \* Data Reduction Result 1 [2]-PK+

Note: Emission above the limit is the fundamental



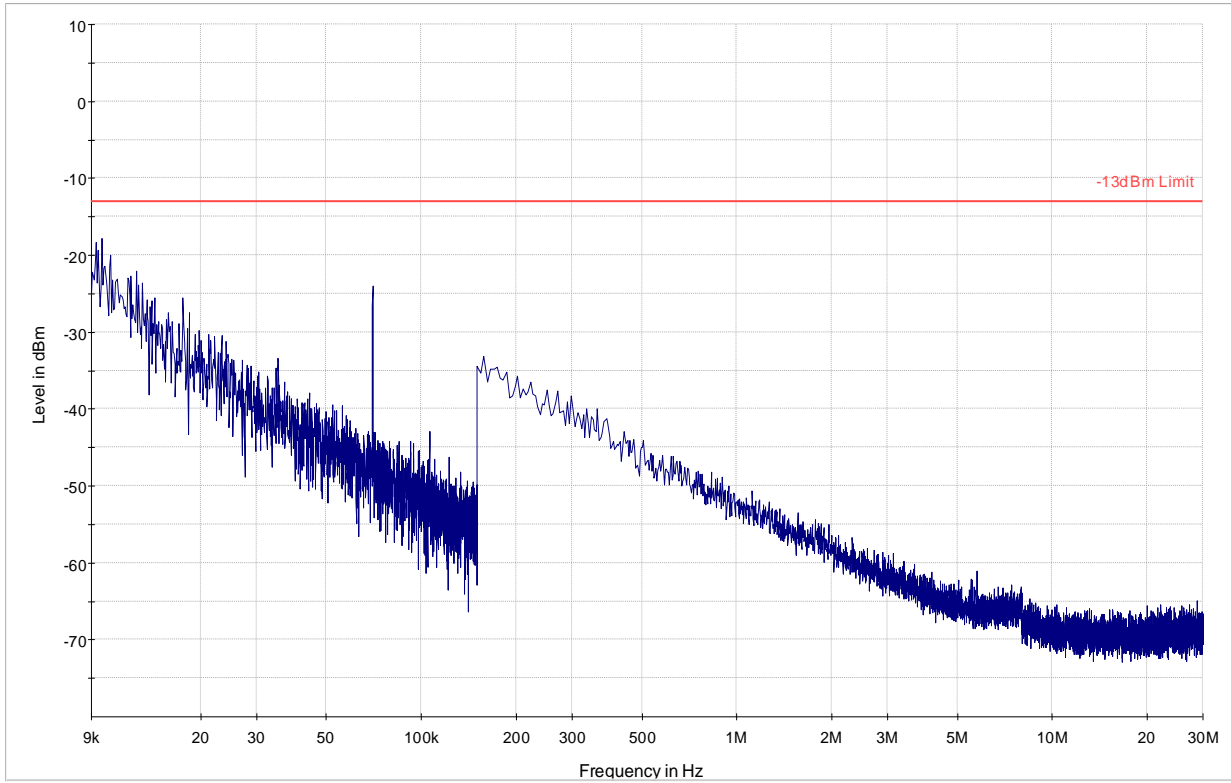
7.10.3 3 - 18 GHz, Ch. Low



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

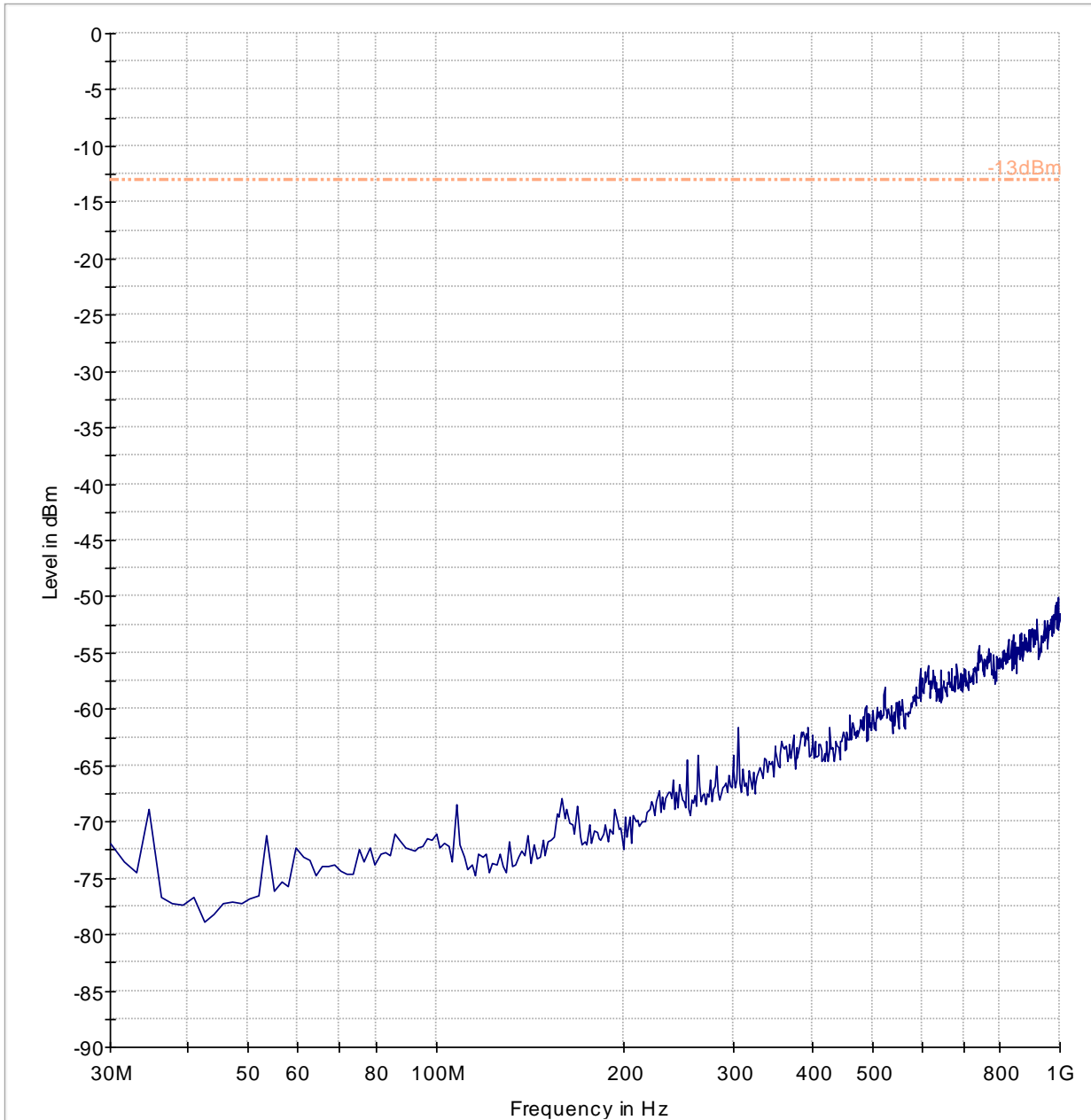


7.10.4 9 KHz - 30 MHz, Ch. Mid



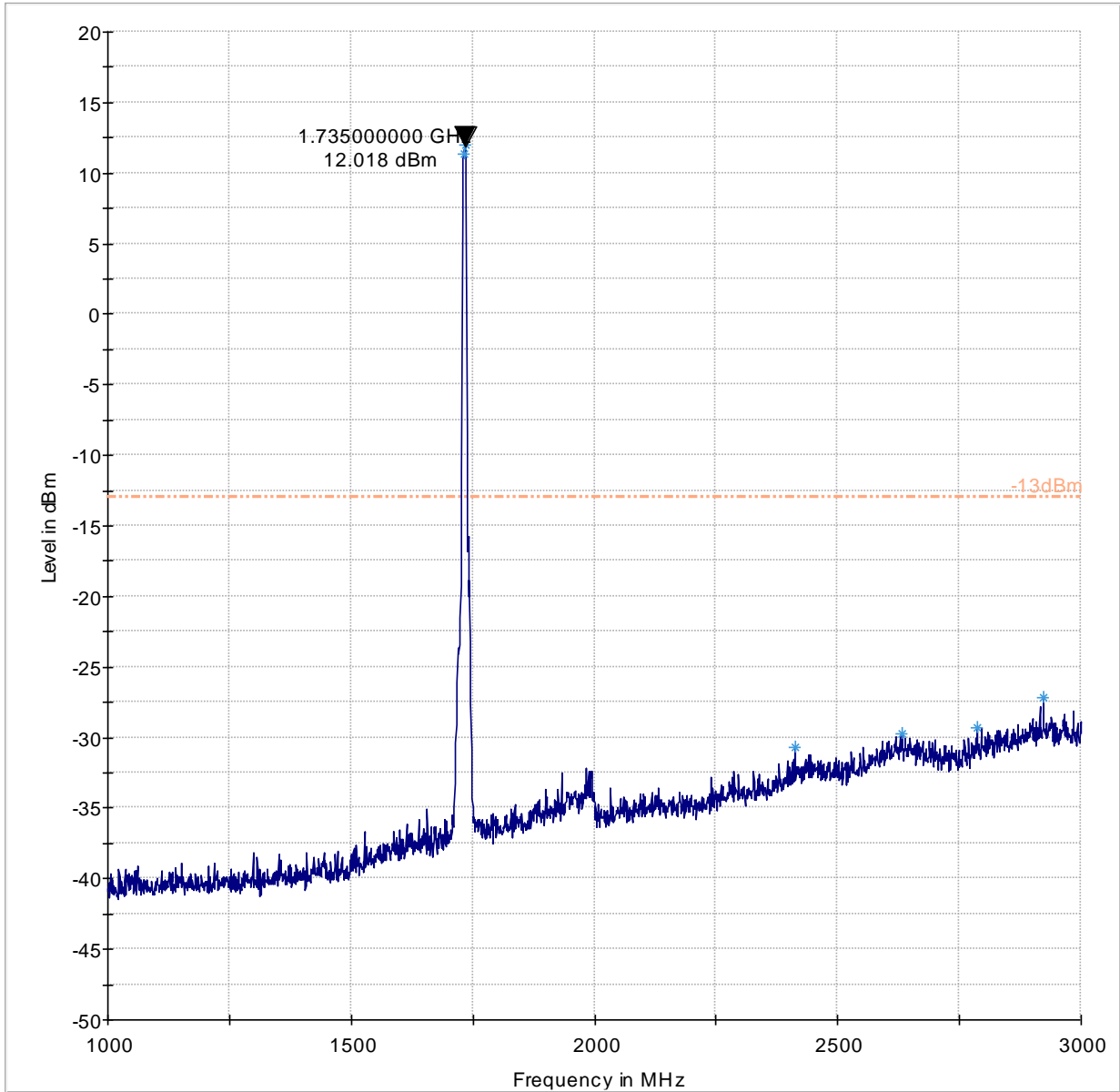
— -13dBm EIRP Limit converted to near field — Preview Result 1-PK+

7.10.5 30 – 1000 MHz, Ch. Mid



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

7.10.6 1 GHz – 3 GHz, Ch. Mid

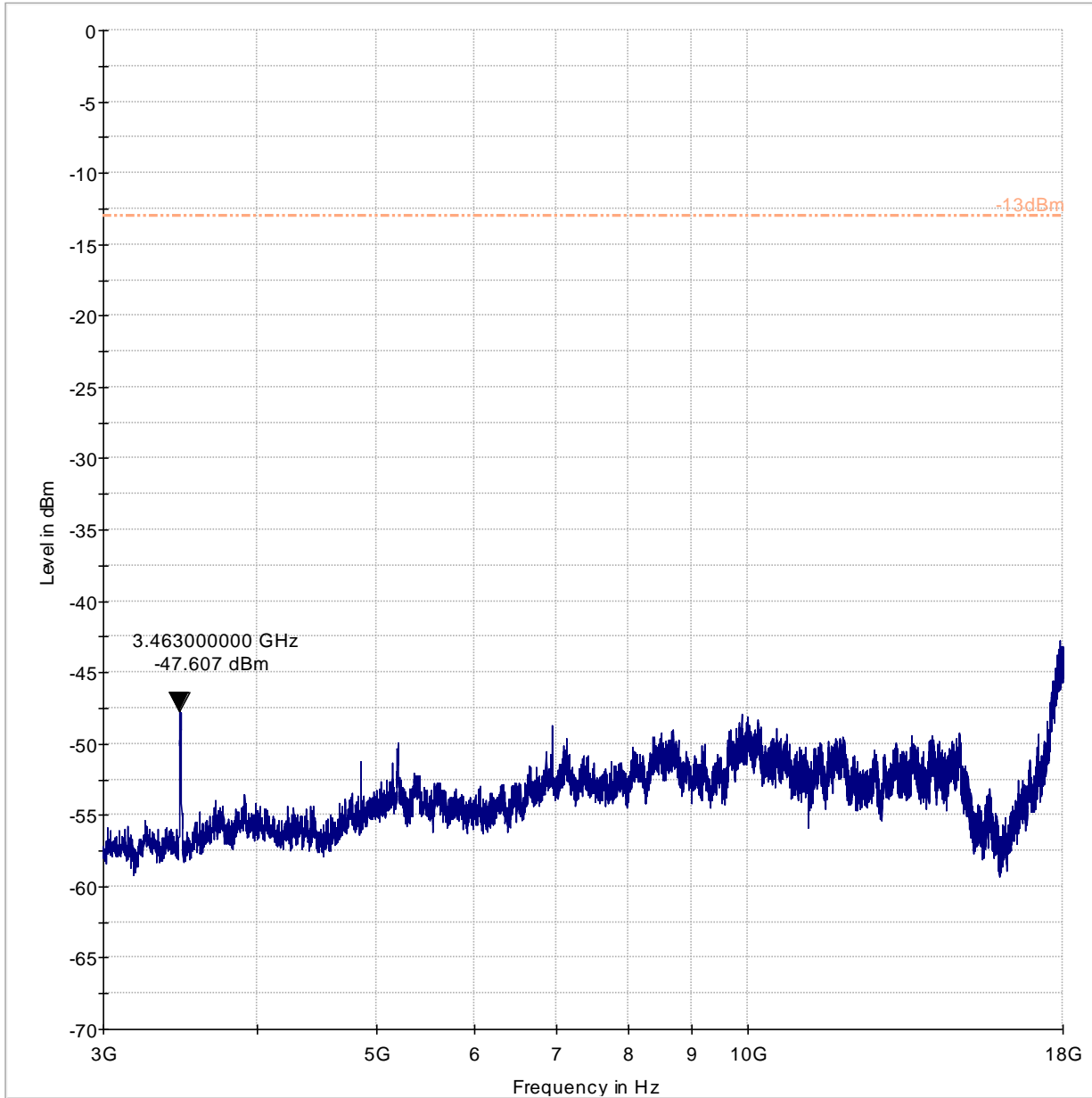


----- -13dBm.LimitLine      ——— Preview Result 1-PK+      \* Data Reduction Result 1 [2]-PK+

Note: Emission above the limit is the fundamental



7.10.7 3 GHz – 18 GHz, Ch. Mid

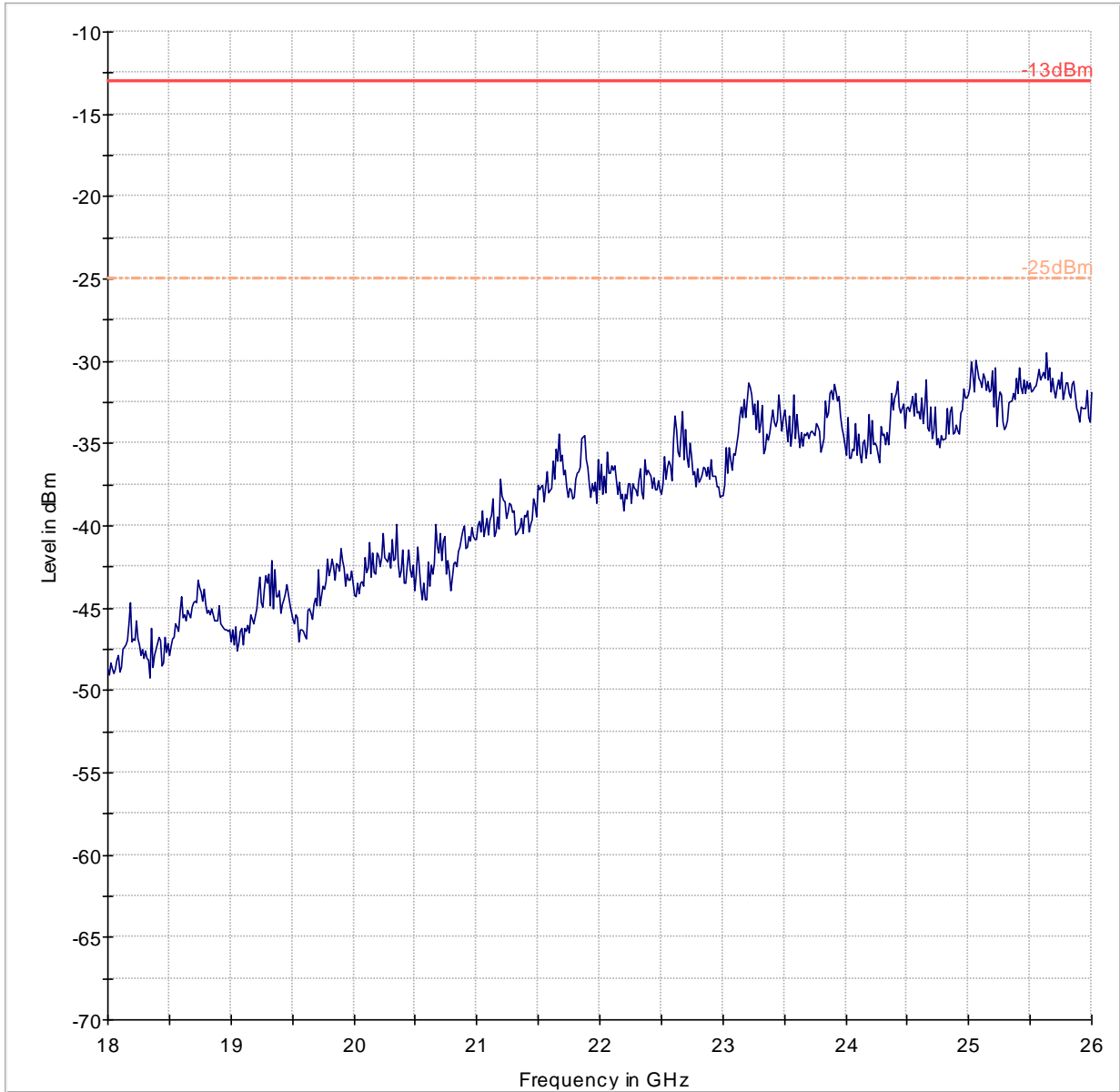


-13dBm.LimitLine      Preview Result 1-PK+



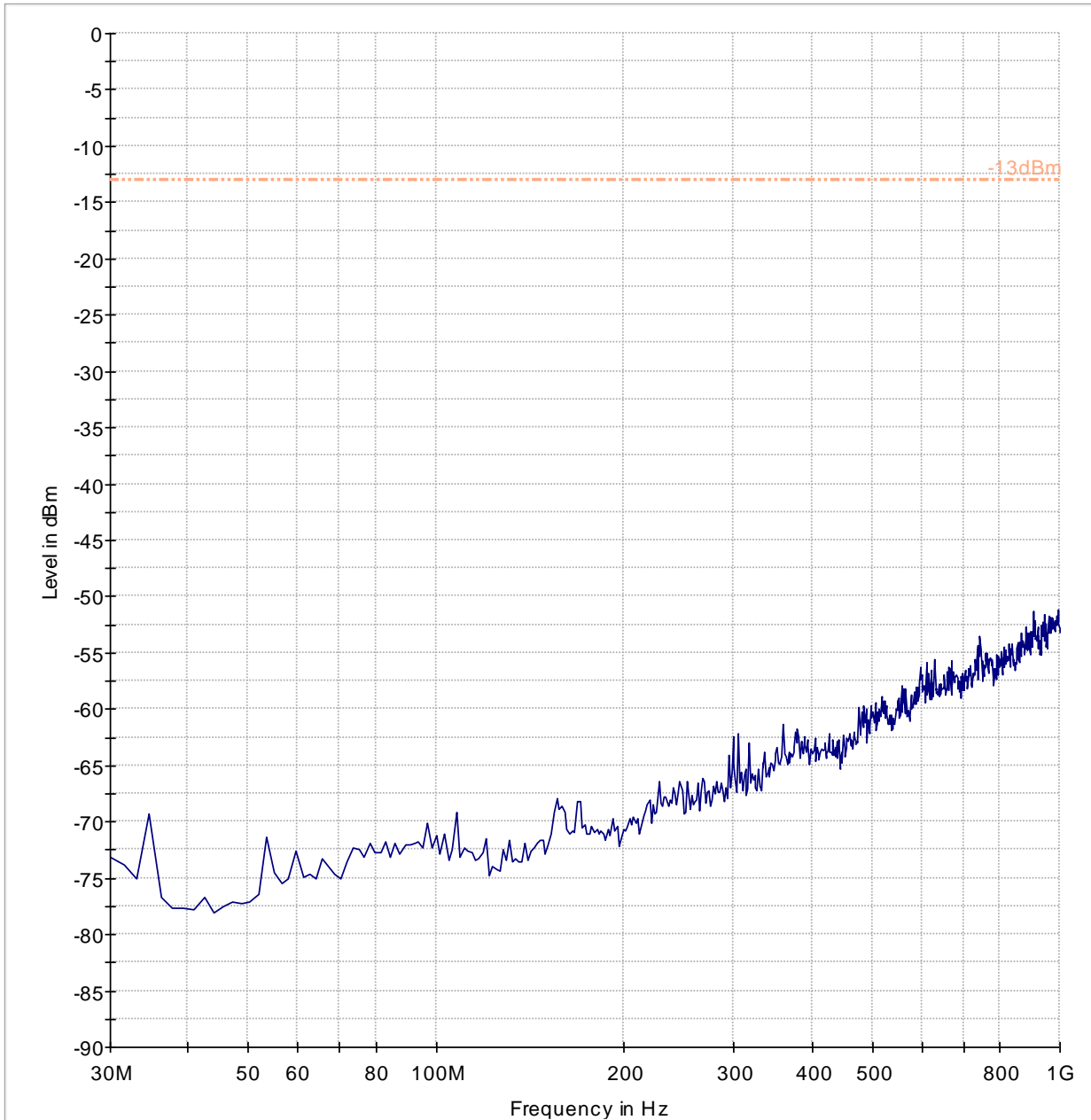


7.10.8 18 GHz - 22 GHz, Ch. Mid



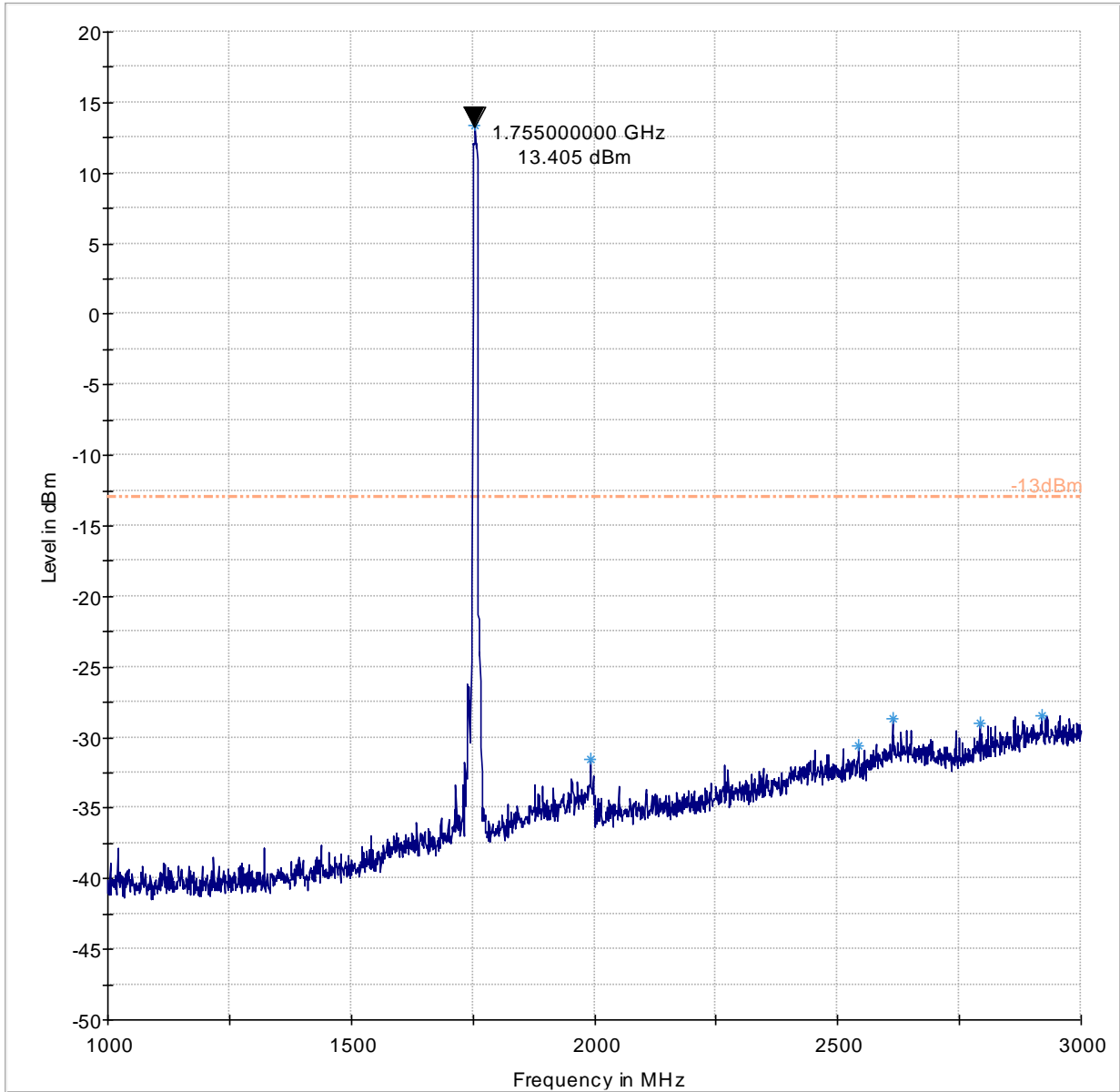
— -13dBm    - - - - -25dBm.LimitLine    — Preview Result 1-PK+

7.10.9 30 - 1000 MHz, Ch. High



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

7.10.10 1 - 3 GHz, Ch. High

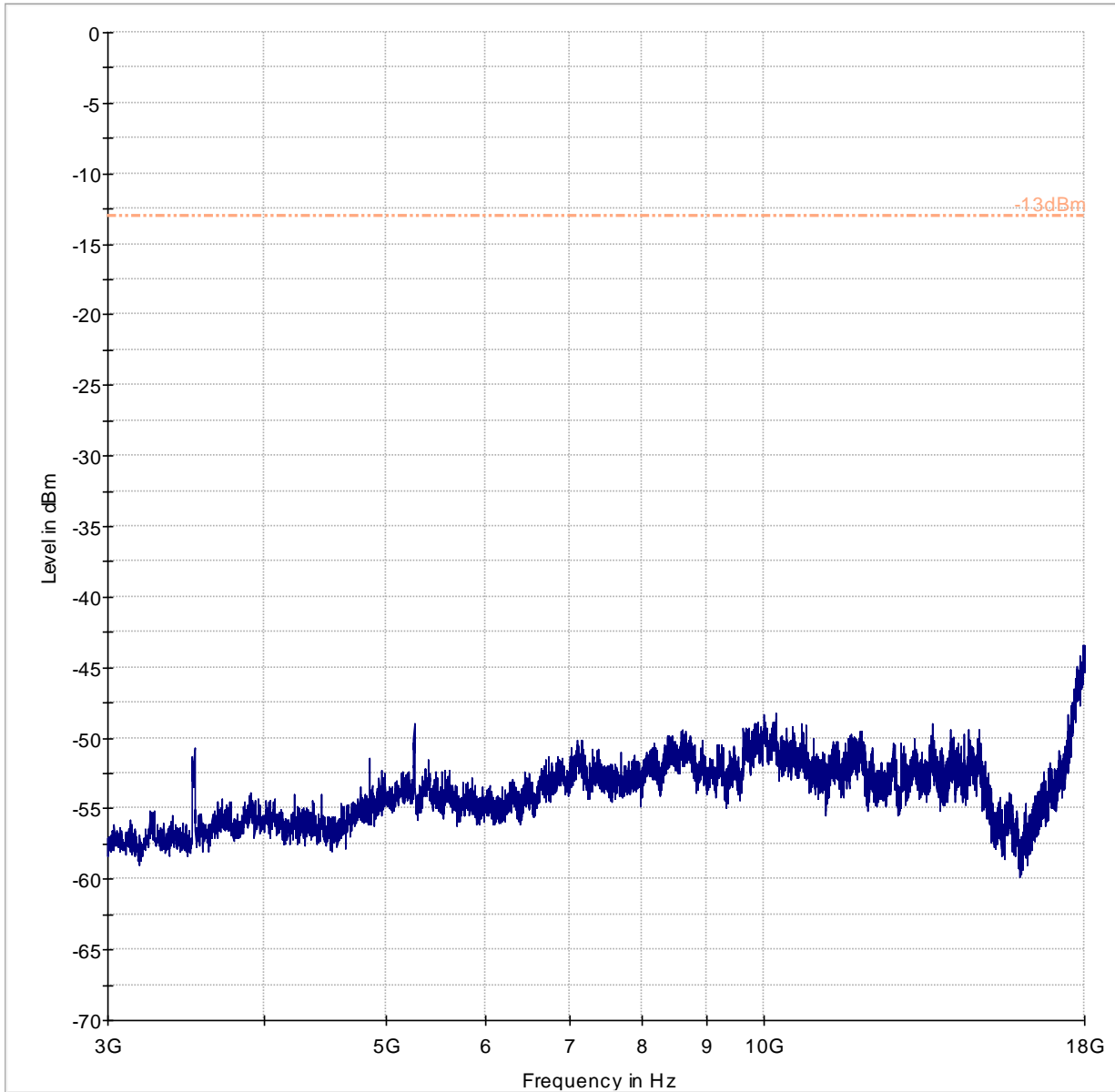


-13dBm.LimitLine    Preview Result 1-PK+    \*    Data Reduction Result 1 [2]-PK+

Note: Emission above the limit is the fundamental



7.10.11 3 – 18 GHz, Ch. High

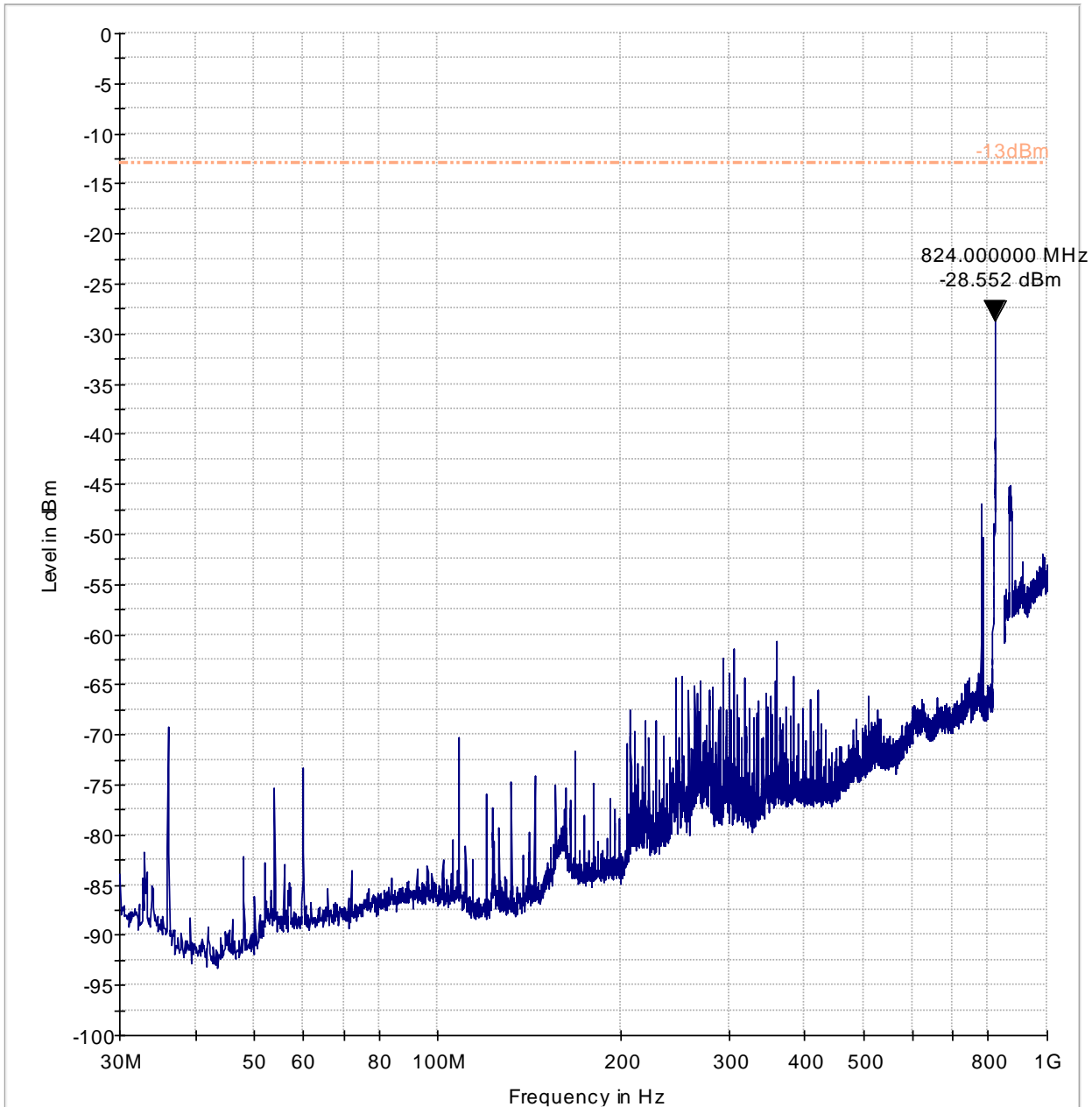


----- -13dBm.LimitLine      ——— Preview Result 1-PK+



7.11 Measurement Plots LTE 5

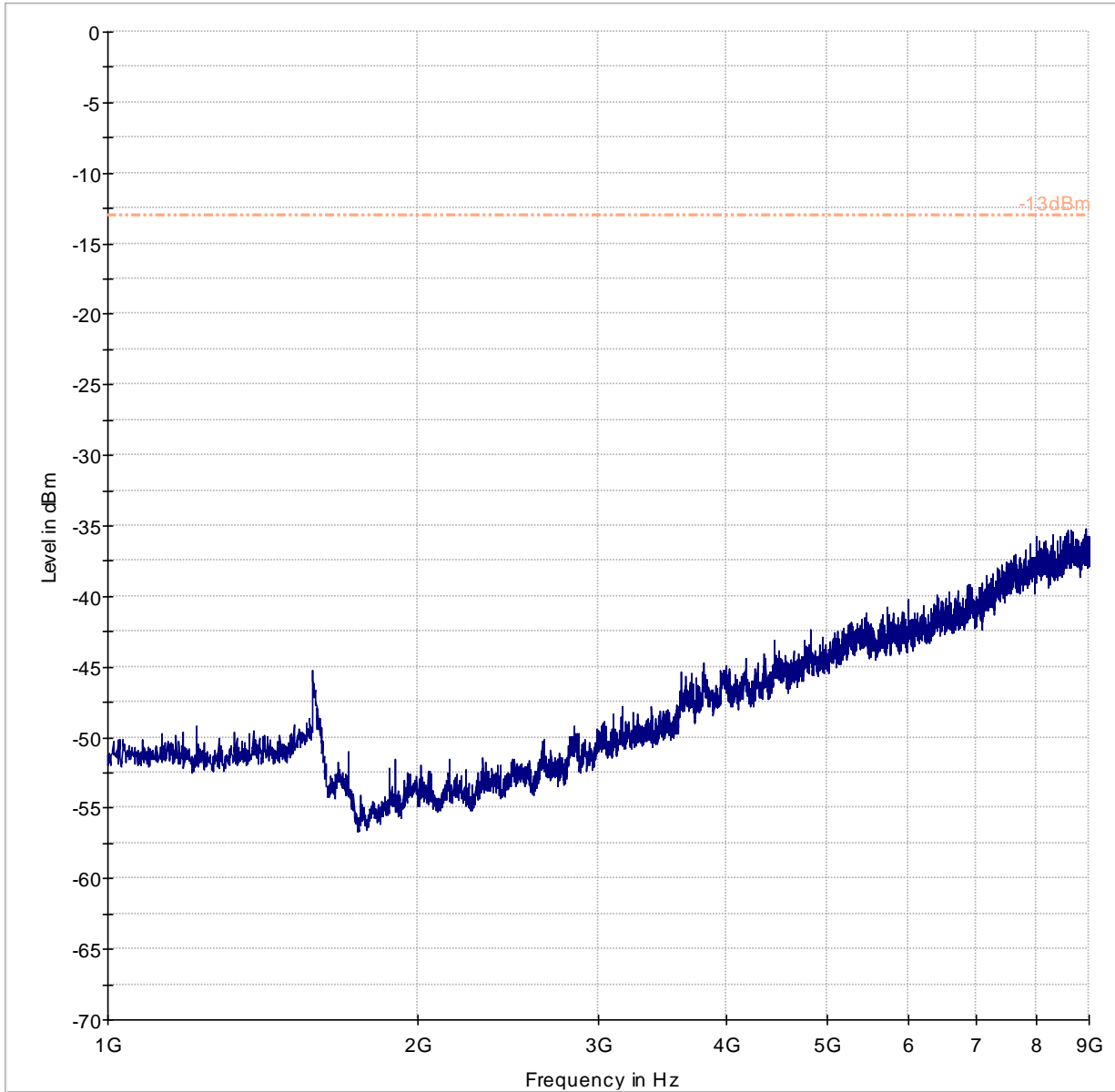
7.11.1 30 – 1000 MHz, Ch. Low



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



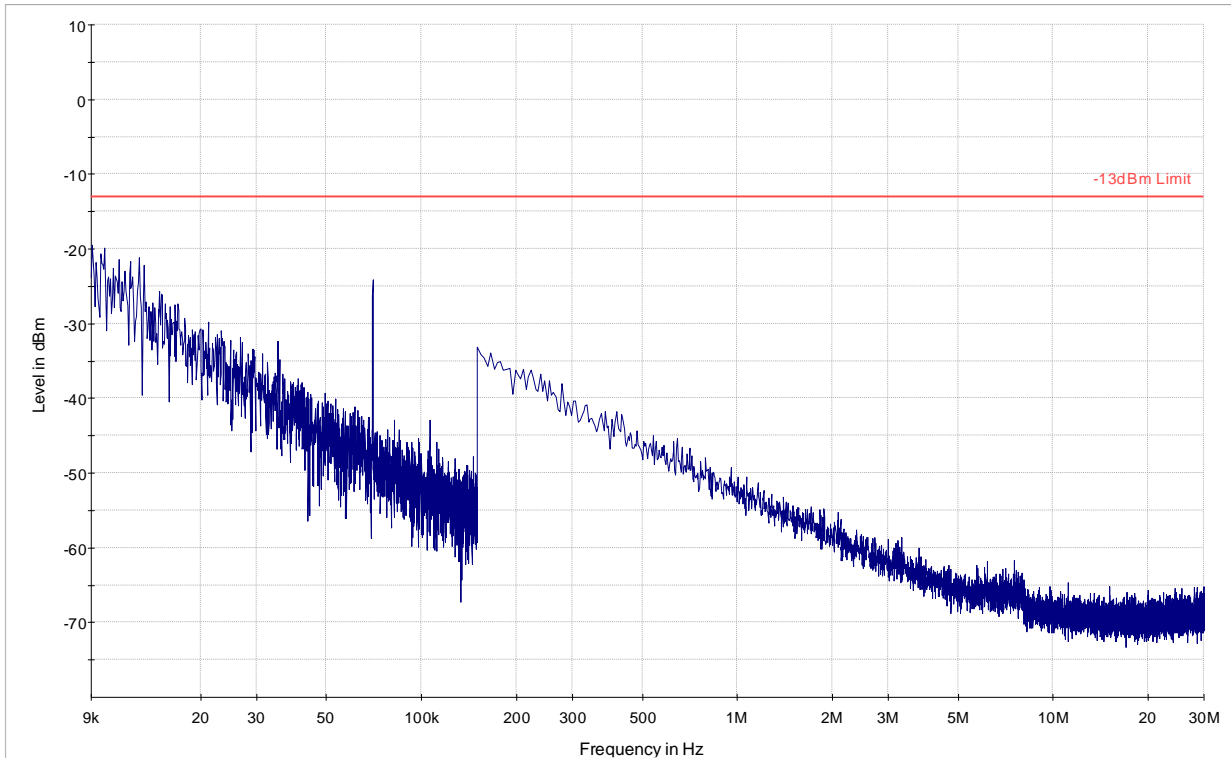
7.11.2 1 – 9 GHz, Ch. Low



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



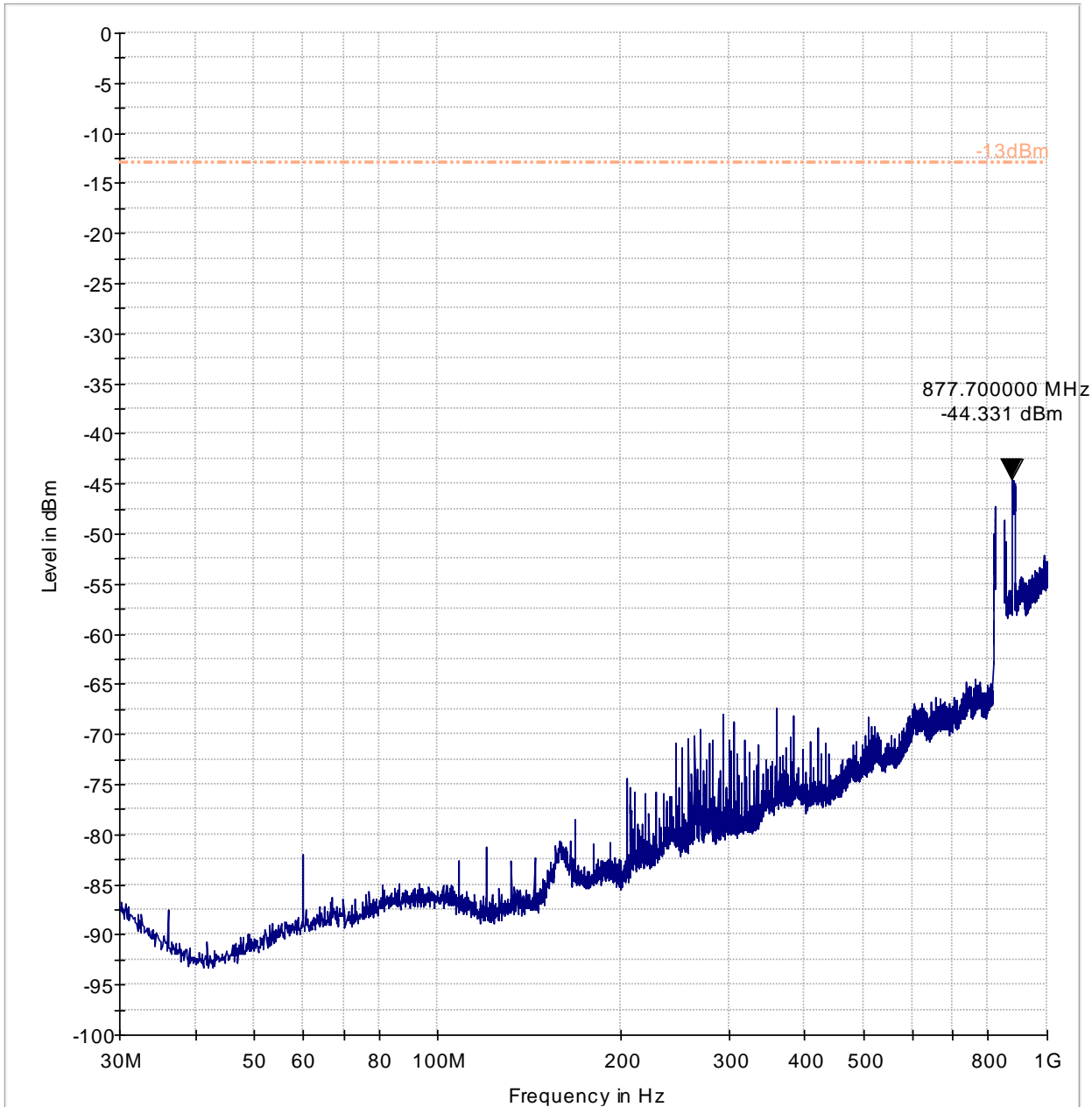
7.11.3 9 KHz – 30 MHz, Ch. Mid



— -13dBm EIRP Limit converted to near field — Preview Result 1-PK+



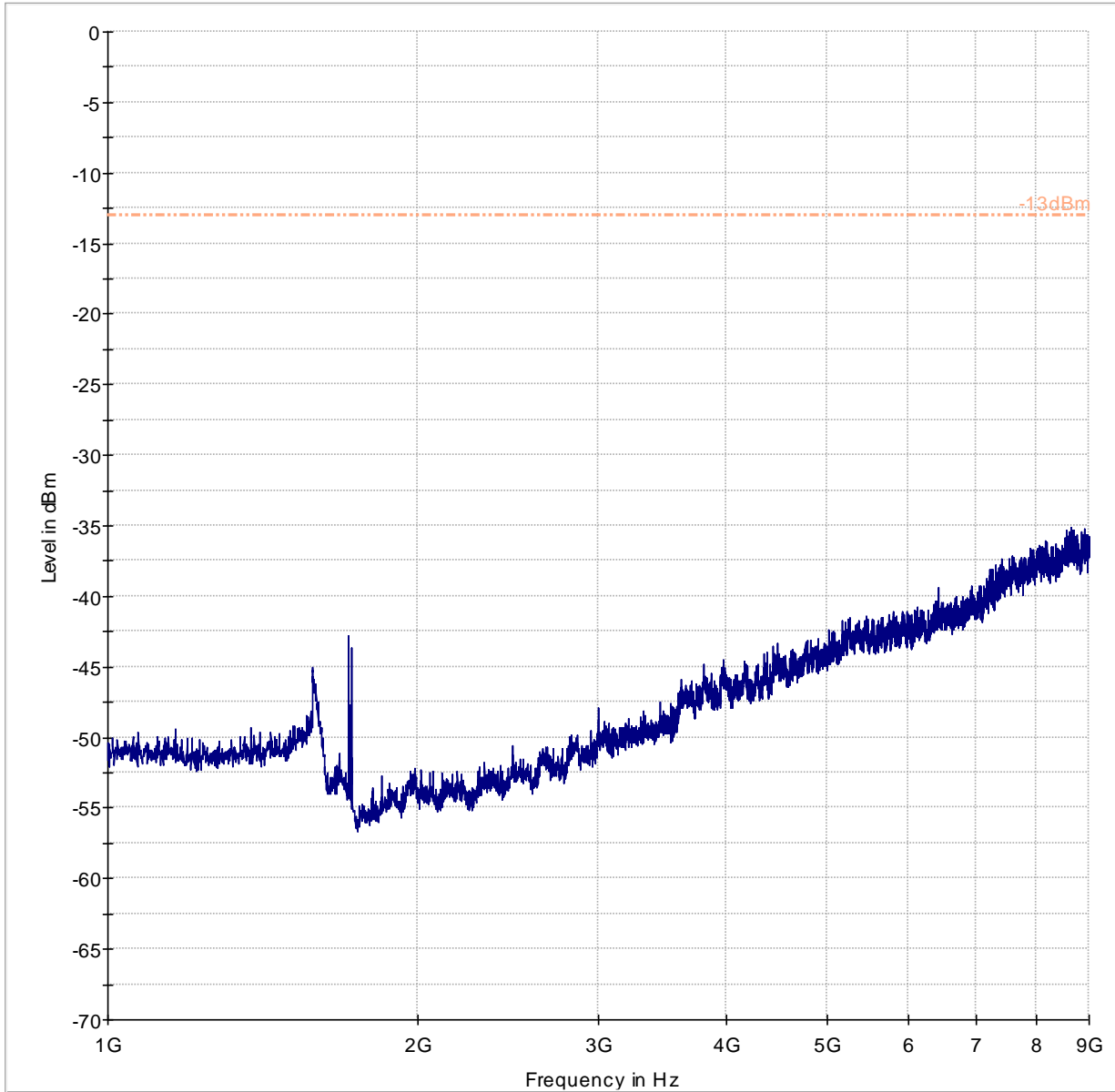
7.11.4 30 – 1000 MHz, Ch. Mid



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



7.11.5 1 GHz – 9 GHz, Ch. Mid

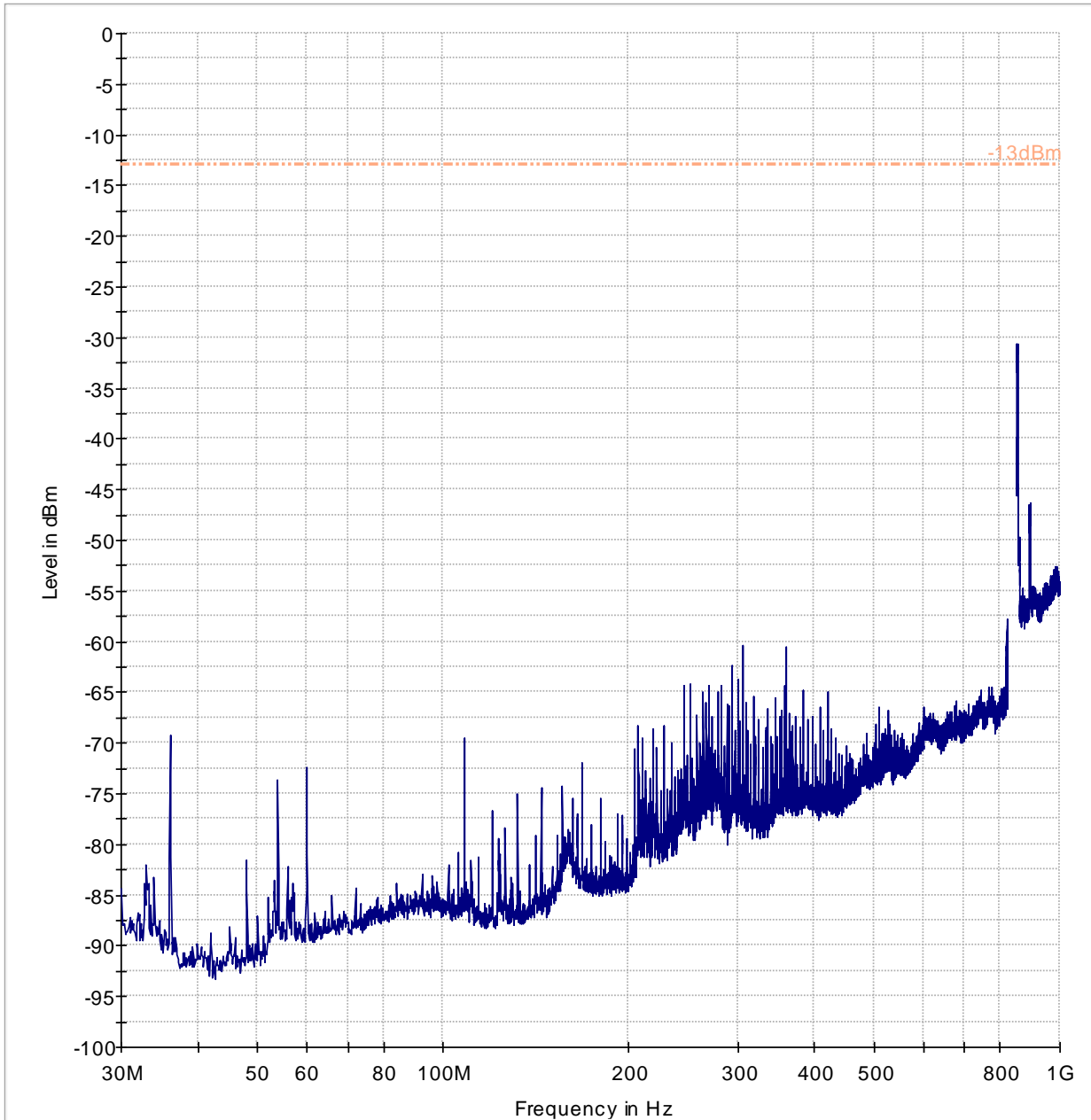


-13dBm    Preview Result 1-PK+    \*

Data Reduction Result 1 [2]-PK+



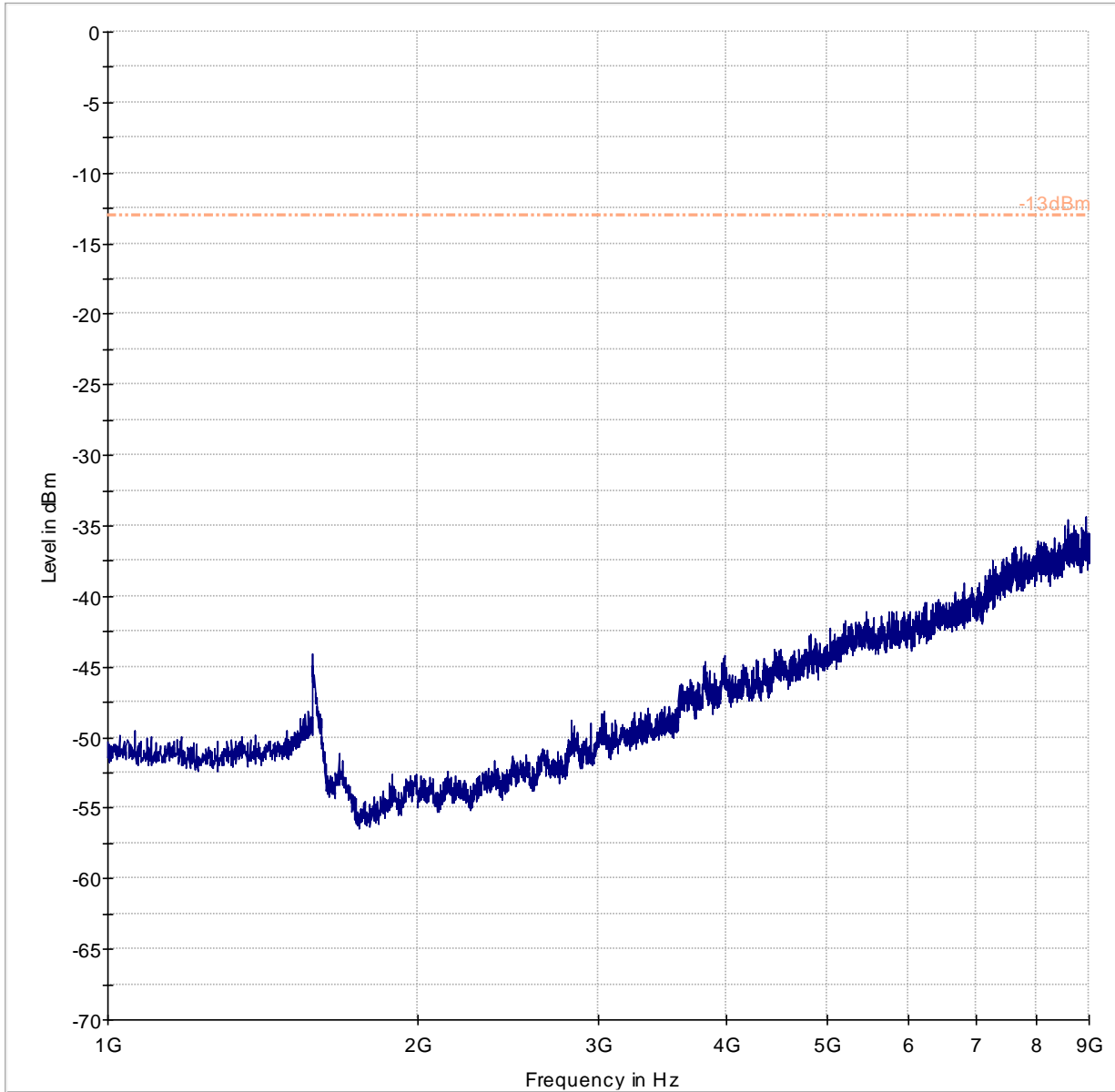
7.11.6 30 – 1000 MHz, Ch. High



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



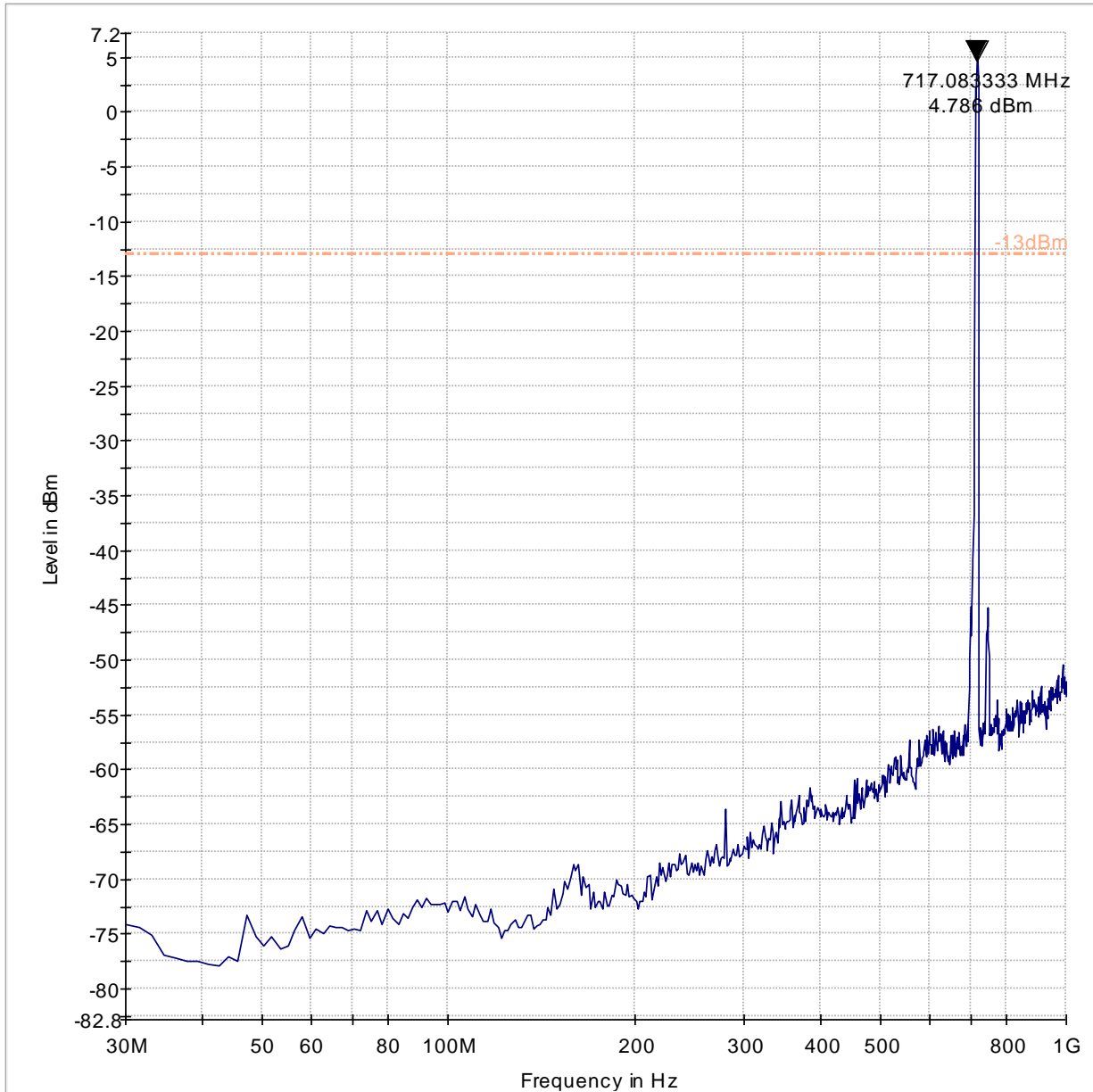
7.11.7 1 - 9 GHz, Ch. High



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

### 7.12 Measurement Plots LTE 12

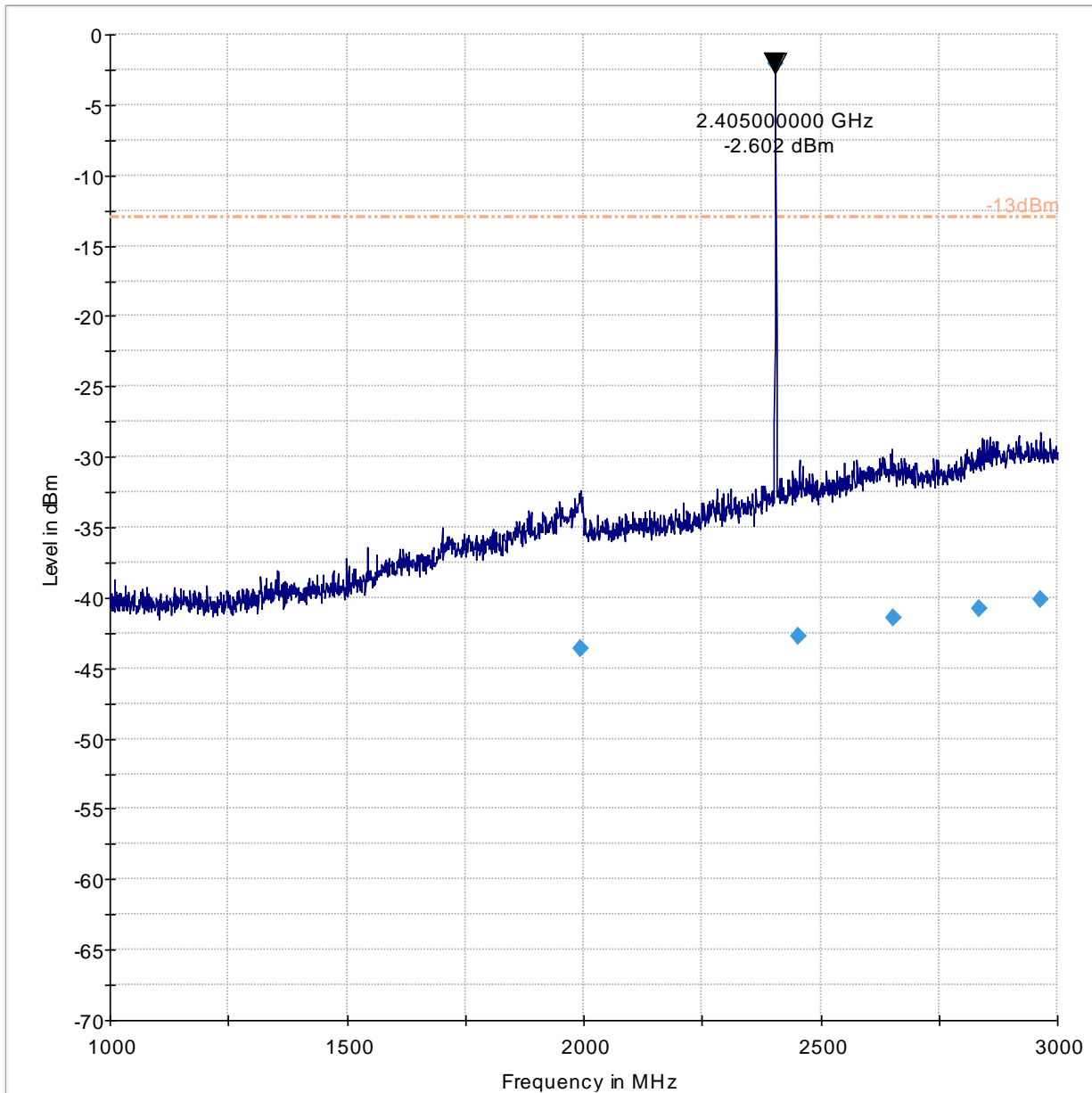
#### 7.12.1 30 - 1000 MHz, Ch. Low



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

Note: Emission above the limit is the fundamental

7.12.2 1 - 3 GHz, Ch. Low

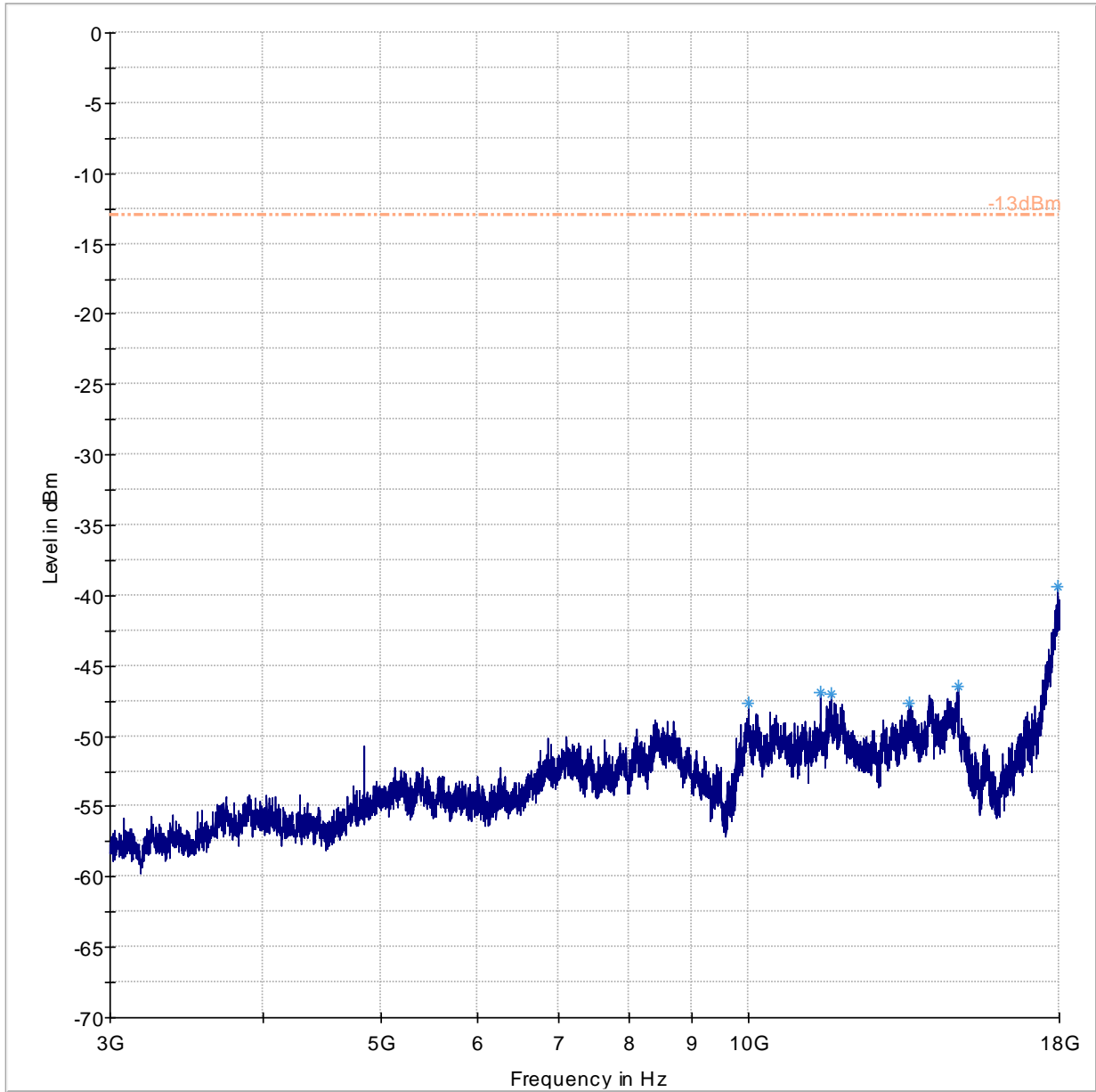


----- -13dBm.LimitLine      ——— Preview Result 1-PK+      ◆ Final Result 1-RMS

Note: Emission above the limit is the zigbee fundamental



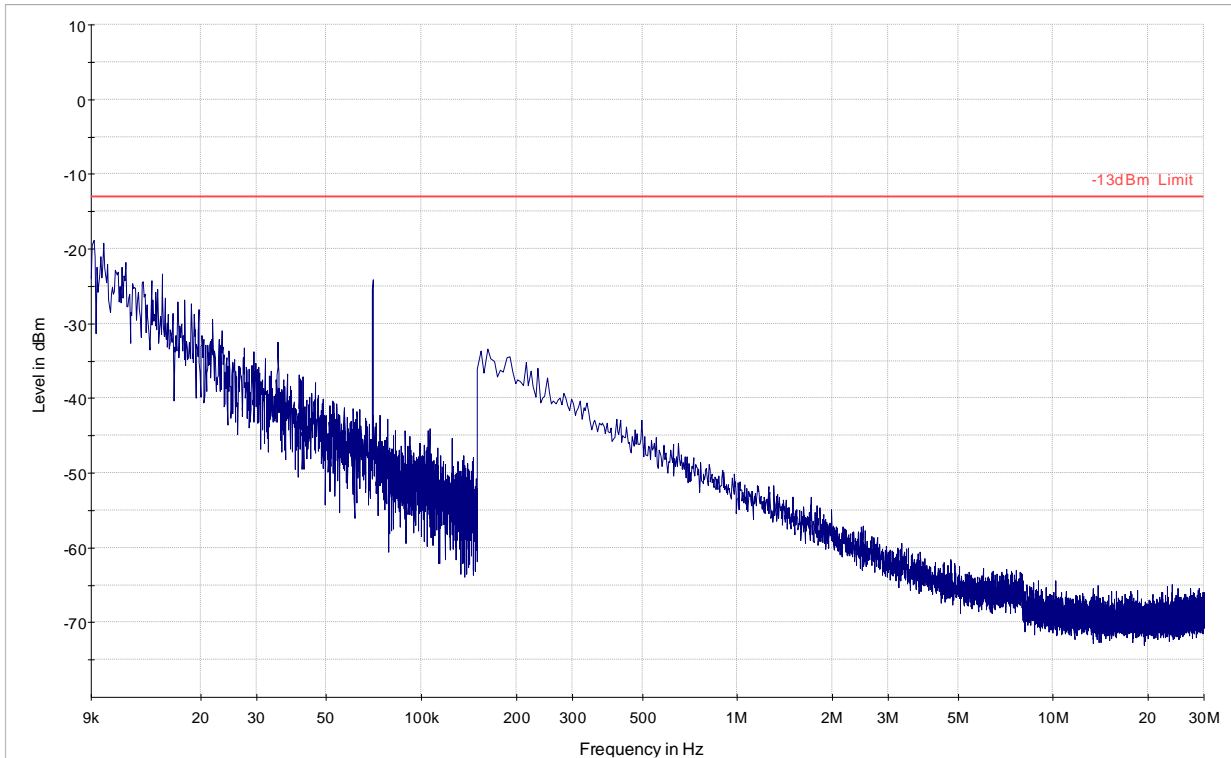
7.12.3 3 – 18 GHz, Ch. Low



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

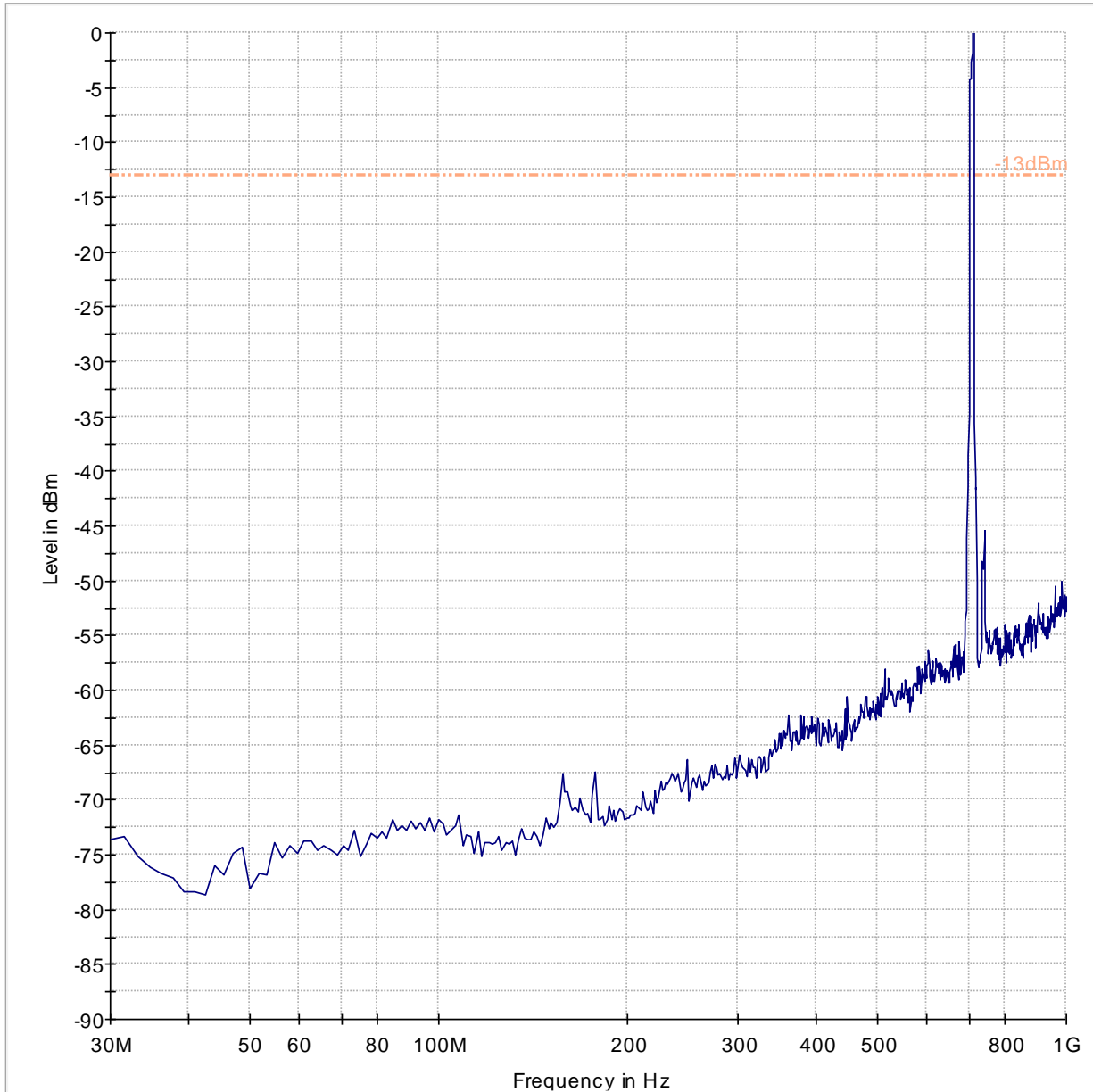


7.12.4 9 KHz - 30 MHz, Ch. Mid



— -13dBm EIRP Limit converted to near field — Preview Result 1-PK+

7.12.5 30 – 1000 MHz, Ch. Mid

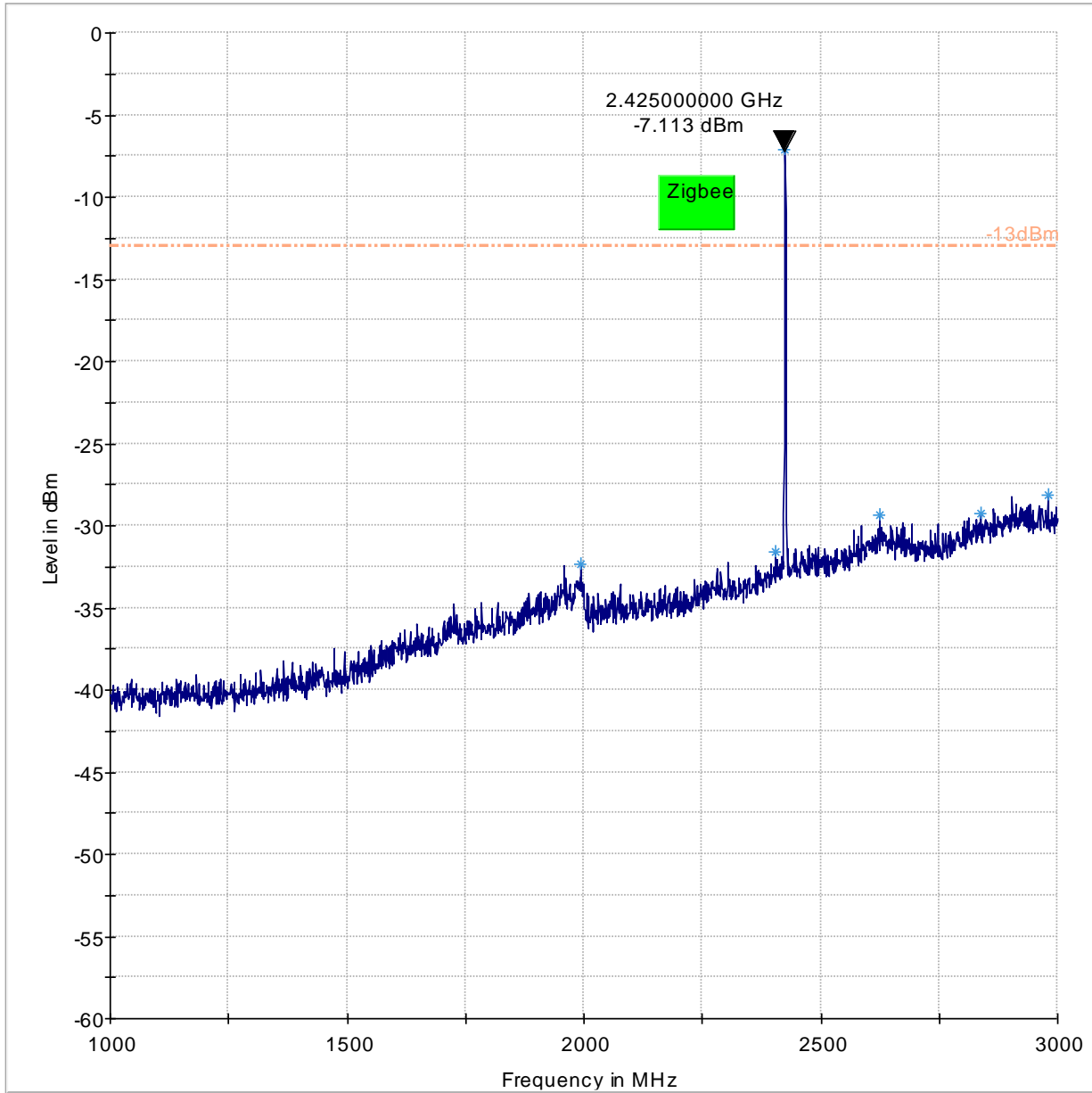


----- -13dBm.LimitLine      ——— Preview Result 1-PK+

Note: Emission above the limit is the fundamental



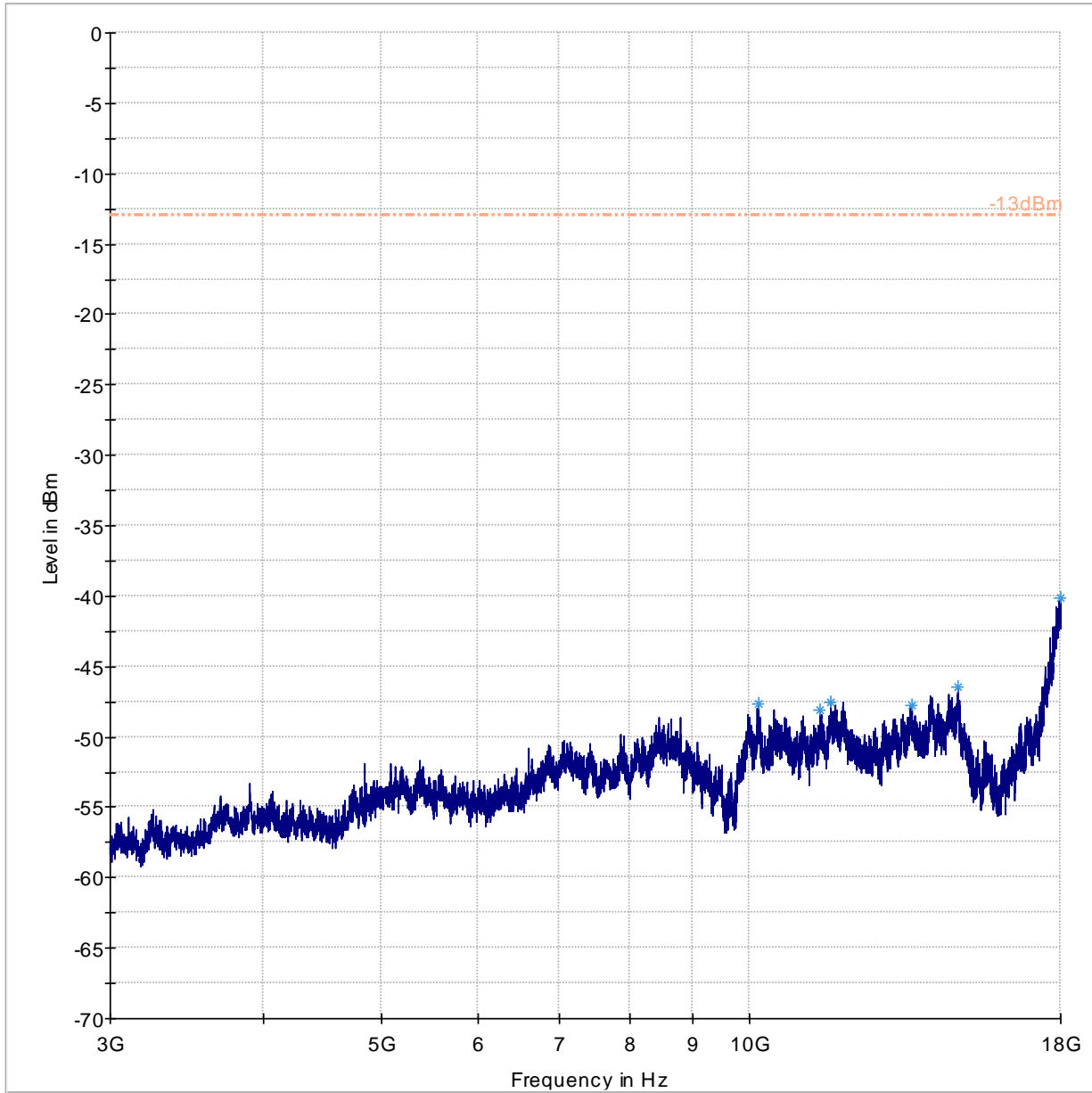
7.12.6 1 – 3 GHz, Ch. Mid



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

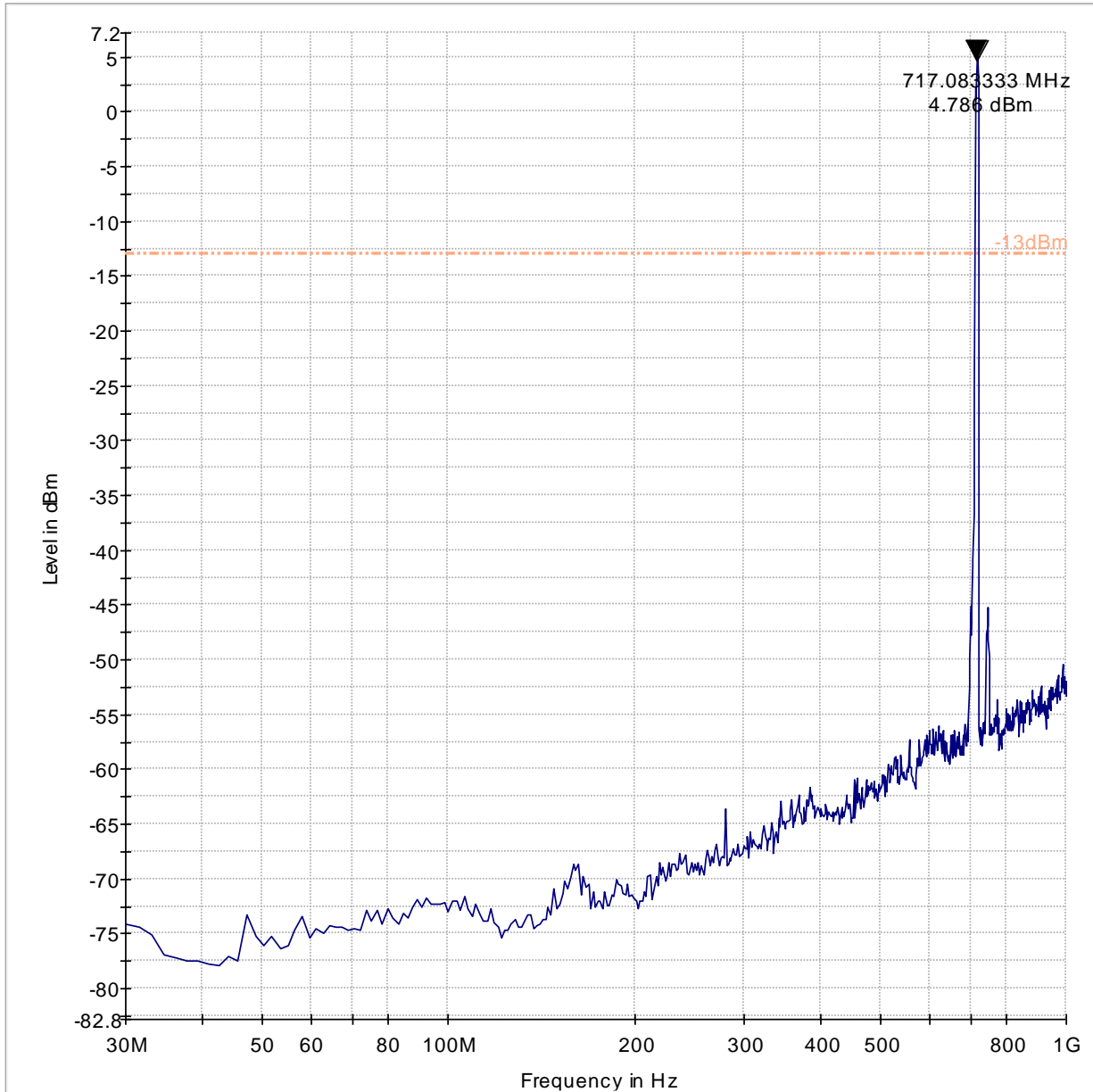
Note: Emission above the limit is the zigbee fundamental

7.12.7 3 – 18 GHz, Ch. Mid



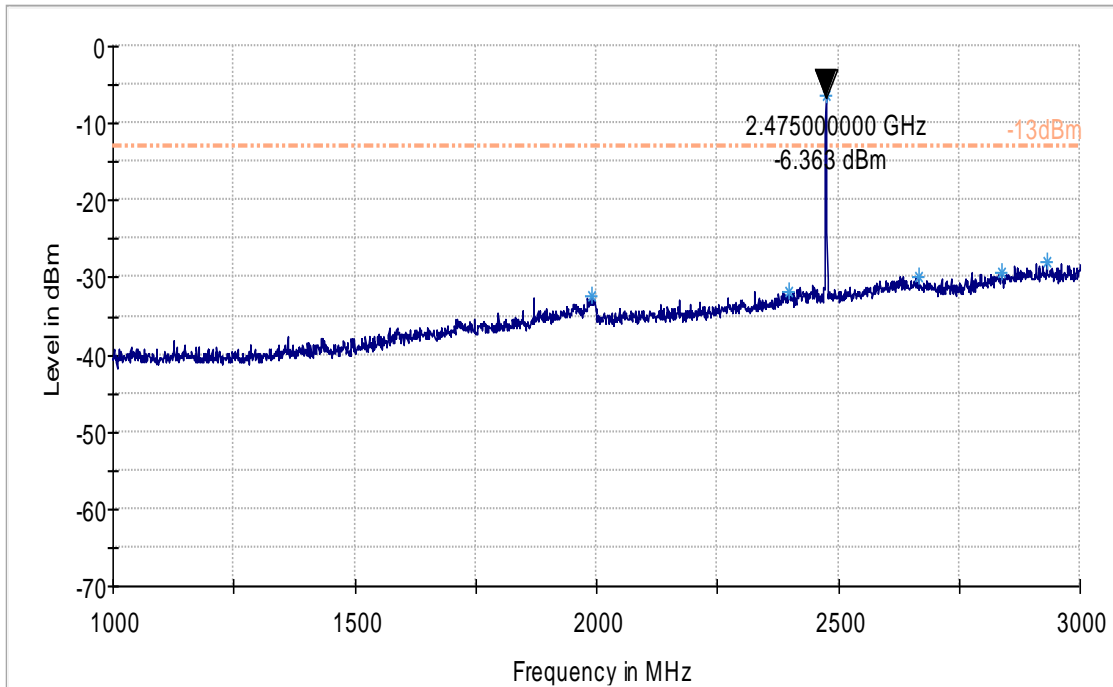
----- -13dBm.LimitLine      ——— Preview Result 1-PK+      \* Data Reduction Result 1 [3]-PK+

7.12.8 30 - 1000 MHz, Ch. High



Note: Emission above the limit is the fundamental

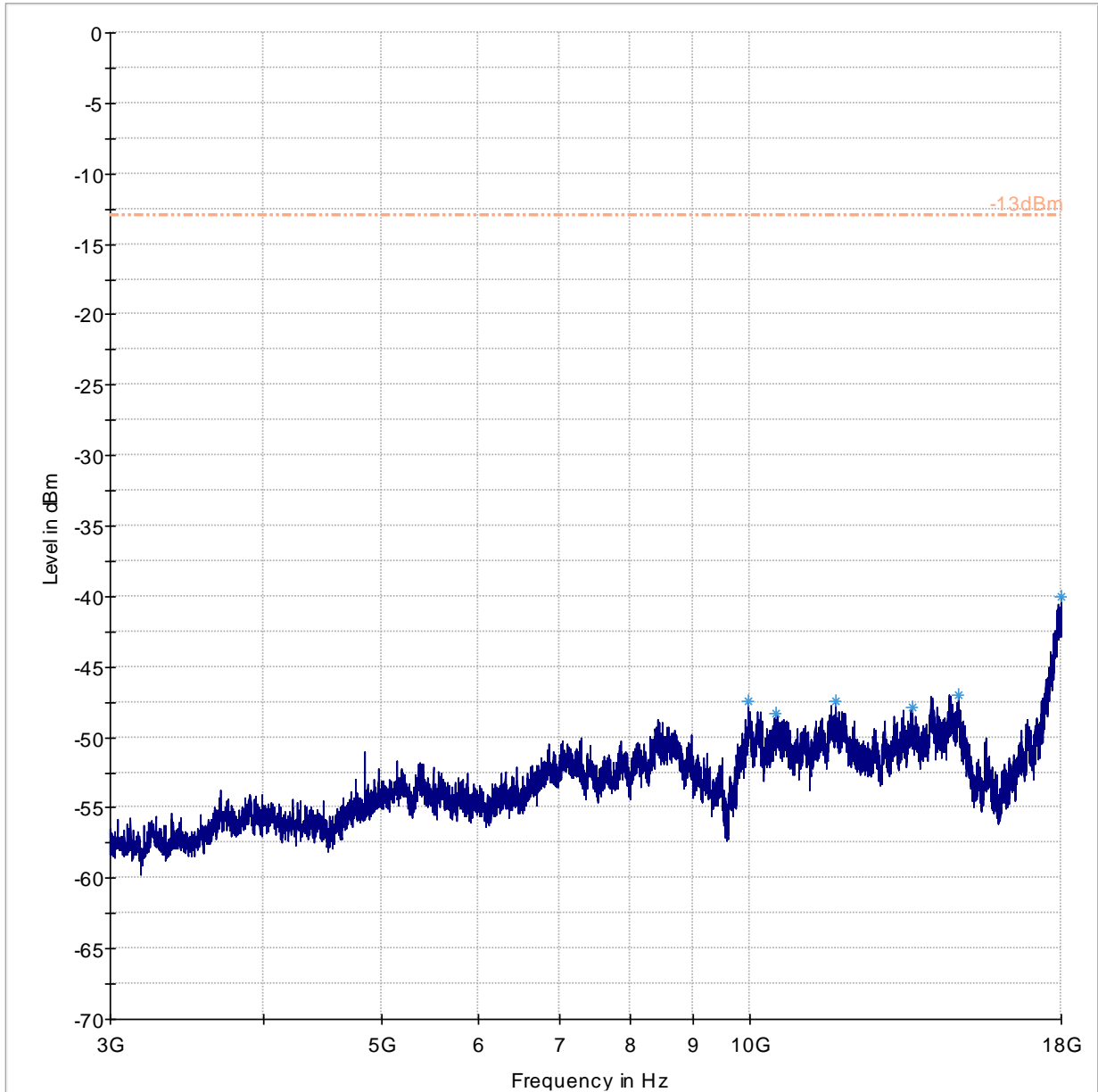
7.12.9 1 – 3 GHz, Ch. High



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

Note: Emission above the limit is the zigbee fundamental

7.12.10 3 - 18 GHz, Ch. High



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

## 8 Test Setup Photos

Setup photos are included in supporting file name: "EMC-XIRGO-118-17001-FCC-22-24-27-TestSetupPhotos.pdf"



9 Test Equipment And Ancillaries Used For Testing

Item Name	Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Antenna Biconilog 3142E	Biconlog Antenna	EMCO	3142E	166067	3 years	6/27/2017
Antenna Loop 6512	Loop Antenna	ETS Lindgren	6512	164698	3 years	6/22/2014
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
Digital Radio Comm. Tester CMU 200 #1	Digital Radio Comm. Tester	R&S	CMU 200 #1	101821	2 Years	7/4/2015
Spectrum Analyzer FSU26 #2	Spectrum Analyzer	R&S	FSU26	200065	3 years	7/4/2015
Thermometer Humidity TM320	Thermometer Humidity	Dickson	TM320	5280063	1 Year	7/29/2016

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.



10 Revision History

Date	Report Name	Changes to report	Prepared by
July 28, 2017	EMC-XIRGO-118-17001-FCC-22-24-27	Initial Release	James Donnellan
Aug. 25, 2017	EMC-XIRGO-118-17001-FCC-22-24-27-Rev1	Updated Revision, Report Dates, Section 3.5, Table 7.4. Updated limit lines on 9K-30MHz plots and Revision History	James Donnellan