FCC / IC Test Report

FOR:

3SI Security Systems
Model Name: AT140317US

Product Description:
Asset Tracking and Alert Device.

FCC ID: Q6KAT140317A
IC Certification Number: 5043A-AT140317A

47 CFR Part 22, 24, 27
RSS-132 Issue 3
RSS-133 Issue 2
RSS-139 Issue 2

TEST REPORT #: EMC_ ETHEO-018-14001_FCC_22_24_27
DATE: 2014-05-29

ACCREDITED
TESTING LABORATORY
Certificate #2135.01

CTIA Authorized Test Lab
LAB CODE 20020328-00

FCC:
Accredited

IC recognized #
3462B-1

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecomusa.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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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 27 & Industry Canada Radio Standard Specifications RSS-GEN Issue 3, RSS-132 Issue 3, RSS-133 Issue 2 and RSS-139 Issue 2. No deviations were ascertained during the course of the tests performed.

Company	Description	Model #
3SI Security Systems	Asset tracking and alert devices.	AT140317US

Report reviewed by:

Digitally signed by Franz Engert
DN: cn=Franz Engert, c=US, o=CETECOM, ou=Complience, email=franz.engert@cetecom.com
Date: 2014.07.03 16:57:45 -07'00'

Date	Section	Name	Signature
2014-05-01	Compliance	Franz Engert (Compliance Manager)	

Responsible for the Report:

James Donnellan

Digitally signed by James Donnellan
DN: cn=James Donnellan, c=US, o=Cetecom Inc., ou=Compliance, email=james.donnellan@cetecom.com
Date: 2014.07.02 16:37:34 -07'00'

Date	Section	Name	Signature
2014-05-01	Compliance	James Donnellan (EMC Engineer)	

The test results of this test report relate exclusively to the test item specified in Section3.
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
Fax:	+1 (408) 586 6299
Compliance Manager:	Franz Engert
Responsible Project Leader	James Donnellan

2.2 Identification of the Client

Applicant's Name:	3SI Security Systems
Street Address:	486 Thomas Jones Way Exton,
City/Zip Code	PA 19341
Country	USA
Contact Person:	Brandon Cromer
Phone No.	610-280-2043
Fax:	
e-mail:	

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as client.
Manufacturers Address:	
City/Zip Code	
Country	

2.4 Dates of Testing:

2014-05-5 to 2014-5-25

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

Marketing Name:	Asset Recovery Device
Model Number:	AT140217US
FCC-ID :	Q6KAT140317A
IC Cert Number:	5043A-AT140317A
Product Description:	Asset tracking and alert device.
Technology / Type(s) of Modulation:	GSM, WCDMA and GPS
Integrated Module Info:	Telit HE910-D: GSM Quad-Band with a FCC ID: RI7HE910 IC: 5131A-HE910
Operating Frequency Ranges (MHz) / Channels:	Cellular: Pre certified module TELIT HE910-D (FCC ID: RI7HE910 IC: 5131A-HE910) GSM 850/1900MHz WCDMA 850/1700/1900/MHz Beacon: 216.475MHz / 219.6MHz GPS: 1575.42 MHz
Antenna info:	GSM: PCB trace antenna, -2dBi gain. GPS: Internal GPS module.
Rated Operating Voltage Range:	Vmin: 3.3V - Vmax: 4.2V
Rated Operating Temperature Range:	Tmin: -20°C/ Tmax: 60°C
Test Sample Status:	Prototype

3.2 Identification of the Equipment under Test (EUT)

EUT #	Serial Number	Sample	HW/SW Version
1	IMEI: 351579051431698	Radiated	P2 18 / 12.0.14945
2			

3.3 Identification of Accessory equipment

AE #	Type	Manufacturer	Model	Serial Number / PN
1	Battery	3SI	3.7V Li-Po 650mAh	52010555
2				

4 Summary of Measurement Results

GSM / FDDV 850MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §22.913 (a) RSS132 5.4	RF Output Power	Nominal	CDMA 850	■	☐	☐	☐	Complies
§2.1055 §22.355 RSS132 5.3	Frequency Stability	Nominal	CDMA 850	☐	☐	☐	■	Note 1
§2.1049 §22.917(b) RSS132 5.2	Occupied Bandwidth	Nominal	CDMA 850	☐	☐	☐	■	Note 1
§2.1051 §22.917 RSS132 5.5	Band Edge Compliance	Nominal	CDMA 850	☐	☐	☐	■	Note 1
§2.1051 §22.917 RSS132 5.5	Conducted Spurious Emissions	Nominal	CDMA 850	☐	☐	☐	■	Note 1
§2.1053 §22.917 RSS132 5.5	Radiated Spurious Emissions	Nominal	CDMA 850	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed.
Note 1: Leveraged from module certification. See Section 5.4

GSM / FDD II 1900 MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §24.232 (a) RSS133 6.4	RF Output Power	Nominal	CDMA 1900	■	□	□	□	Complies
§2.1055 §24.235 RSS133 6.3	Frequency Stability	Nominal	CDMA 1900	□	□	□	■	Note 1
§2.1049 §24.238(b) RSS133 6.2	Occupied Bandwidth	Nominal	CDMA 1900	□	□	□	■	Note 1
§2.1051 §24.238 RSS133 6.5	Band Edge Compliance	Nominal	CDMA 1900	□	□	□	■	Note 1
§2.1051 §24.238 RSS133 6.5	Conducted Spurious Emissions	Nominal	CDMA 1900	□	□	□	■	Note 1
§2.1053 §24.238 RSS133 6.5	Radiated Spurious Emissions	Nominal	CDMA 1900	■	□	□	□	Complies

Note: NA= Not Applicable; NP= Not Performed.
Note 1: Leveraged from module certification.

FDD IV 1710 MHz Band:

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §24.232 (a) RSS133 6.4	RF Output Power	Nominal	WCDMA	■	□	□	□	Complies
§2.1055 §24.235 RSS133 6.3	Frequency Stability	Nominal	WCDMA	□	□	□	■	Note 1
§2.1049 §24.238(b) RSS133 6.2	Occupied Bandwidth	Nominal	WCDMA	□	□	□	■	Note 1
§2.1051 §24.238 RSS133 6.5	Band Edge Compliance	Nominal	WCDMA	□	□	□	■	Note 1
§2.1051 §24.238 RSS133 6.5	Conducted Spurious Emissions	Nominal	WCDMA	□	□	□	■	Note 1
§2.1053 §24.238 RSS133 6.5	Radiated Spurious Emissions	Nominal	WCDMA	■	□	□	□	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 Test Conditions

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

5.3 Default Test Temperature and Voltage

- 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 a pre-certified module the Telit HE910 D

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/27L and RSS-132/133/139.

5.5 Other Testing Notes:

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 Measurement Method:

Testing is performed according to the guidelines provided in *FCC publication (KDB) 971168 D01 Power Meas License Digital Systems v02r01: Measurement Guidance for Certification of Licensed Digital Transmitters7, June 2013* and according to relevant parts of TIA-603C 2004 as detailed below.

5.7 RF Power Output

5.7.1 References

FCC: CFR Part 2.1046, CFR Part 22.913, CFR Part 24.232, CFR Part 27.50
IC: RSS-Gen Section 4.8; RSS-132 Section 5.4; RSS-133 Section 6.4, RSS-139 Section 6.4

5.7.2 Limits:

5.7.2.1 FCC 22.913 (a) Effective radiated power limits.

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

5.7.2.2 FCC 24.232 (b)(c) Power limits.

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

(5) Equipment employed must be authorized in accordance with the provisions of §24.51. 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 (d)(6) of this section. 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.

(6) 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.

5.7.2.3 FCC 27.50 (c)(d) Power Limits

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

5.7.2.4 RSS-132, Issue 3, cl. 5.4

The transmitter output power shall be measured in terms of average power. The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts.
In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

5.7.2.5 RSS-133, Issue 6, cl. 4.1 and 6.4

The transmitter power shall be measured in terms of average power.
The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed 2 watts maximum e.i.r.p. In addition, the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

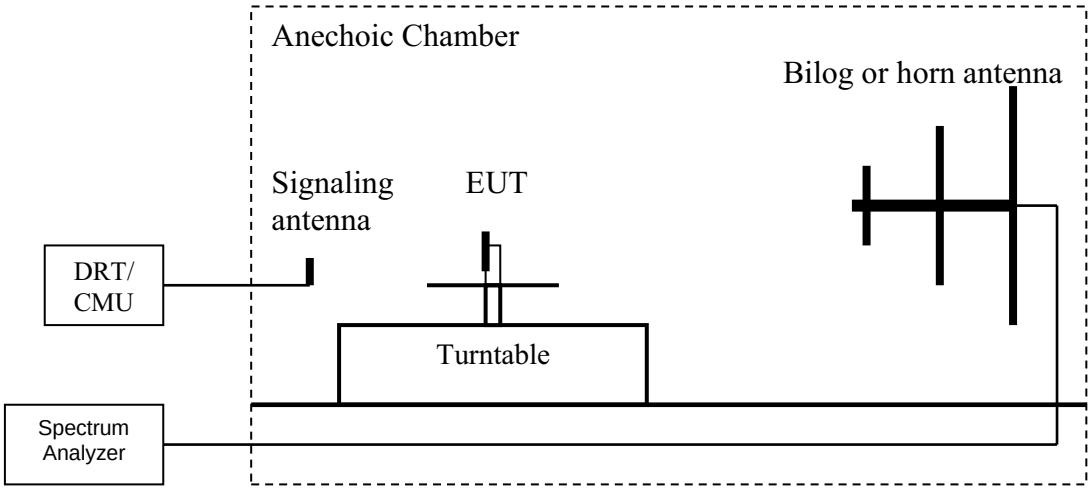
5.7.2.6 RSS-139, Issue 2, cl 6.

The average equivalent isotropically radiated power (e.i.r.p.) for fixed, mobile and portable transmitters in the 1710-1755 MHz shall not exceed 1 watt. Consult SRSP-513 for e.i.r.p. limits on fixed and base stations operating in the 2110-2155 MHz band. In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

5.7.3 RF Power Output

5.7.3.1 Radiated Output Power Measurement Procedure

Ref: TIA-603C 2004 -2.2.17.2 Effective Radiated Power (ERP) or Effective Isotropic Radiated Power (EIRP)



1. Connect the equipment as shown in the above diagram with the EUT's antenna in center of the turn table.
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 the channel frequency and to required settings: peak detector, max hold trace, RBW>OBW, VBW>3xRBW, sweeptime auto couple, span > 2x RBW.
4. Rotate the EUT 360°. Record the peak level in dBm (**LVL**).
5. Replace the EUT with a vertically 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 ERP using the following equation: **ERP** (dBm) = **LVL** (dBm) + **LOSS** (dB)
8. Determine the EIRP using the following equation: **EIRP** (dBm) = **ERP** (dBm) + 2.14 (dB)
9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.
10. Radiated emission measurements were made in GMSK and UMTS and modes.

Note: Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4, 7 and 8 above are performed with test software.

5.7.3.2 Spectrum Analyzer Settings:

	ERP	EIRP
Resolution Bandwidth	5 MHz	5 MHz
Video Bandwidth	5 MHz	5 MHz
Detector	Peak	Peak
Trace Mode	Max Hold	Max Hold
Sweep Time	Auto	Auto

5.7.4 Test Results

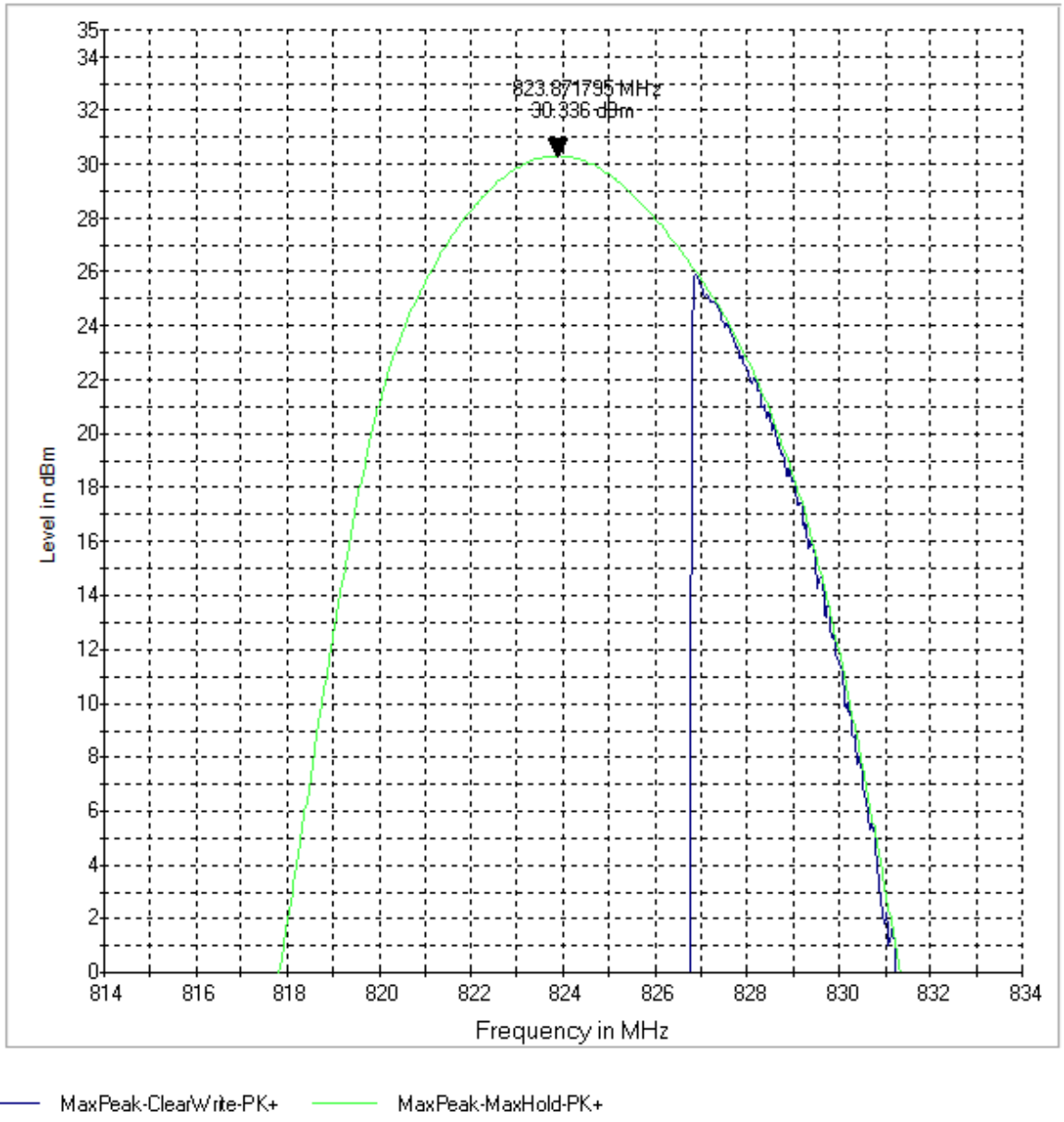
Frequency (MHz)	Measured Peak Output Power from module's test report	Directivity Gain	Peak ERP / EIRP
850 (GSM)		**GRPS/EGRPS**	**ERP GRPS/EGRPS**
823.87	32.7	2.542 / 2.5697	30.336 /27.259
836.52	32.6	2.5033 / 2.5124	30.435 / 27.557
848.09	32.6	2.5148 / 2.5694	31.097 / 28.353
1900 (GSM)		**GRPS/EGRPS**	**EIRP GRPS/EGRPS**
1849.96	29.7	4.1133 / 4.0107	30.124 / 29.131
1879.64	29.6	4.1777 / 4.2606	30.968 / 29.907
1909.54	29.3	4.238 / 4.1741	29.71 / 28.811
UMTS FDD II			**EIRP GRPS**
1852.46	26.39	-	25.462
1879.45	25.93	-	25.792
1907.09	25.59	-	25.133
UMTS FDD V			**ERP GRPS**
827.39	26.39	-	23.427
835.87	25.93	-	22.844
845.98	25.59	-	23.934
UMTS FDD IV			**EIRP WCDMA**
1712.67	26.40	-	26.018
1730.71	26.30	-	24.235
1754.11	26.32	-	26.1

5.7.4.1 Verification Result

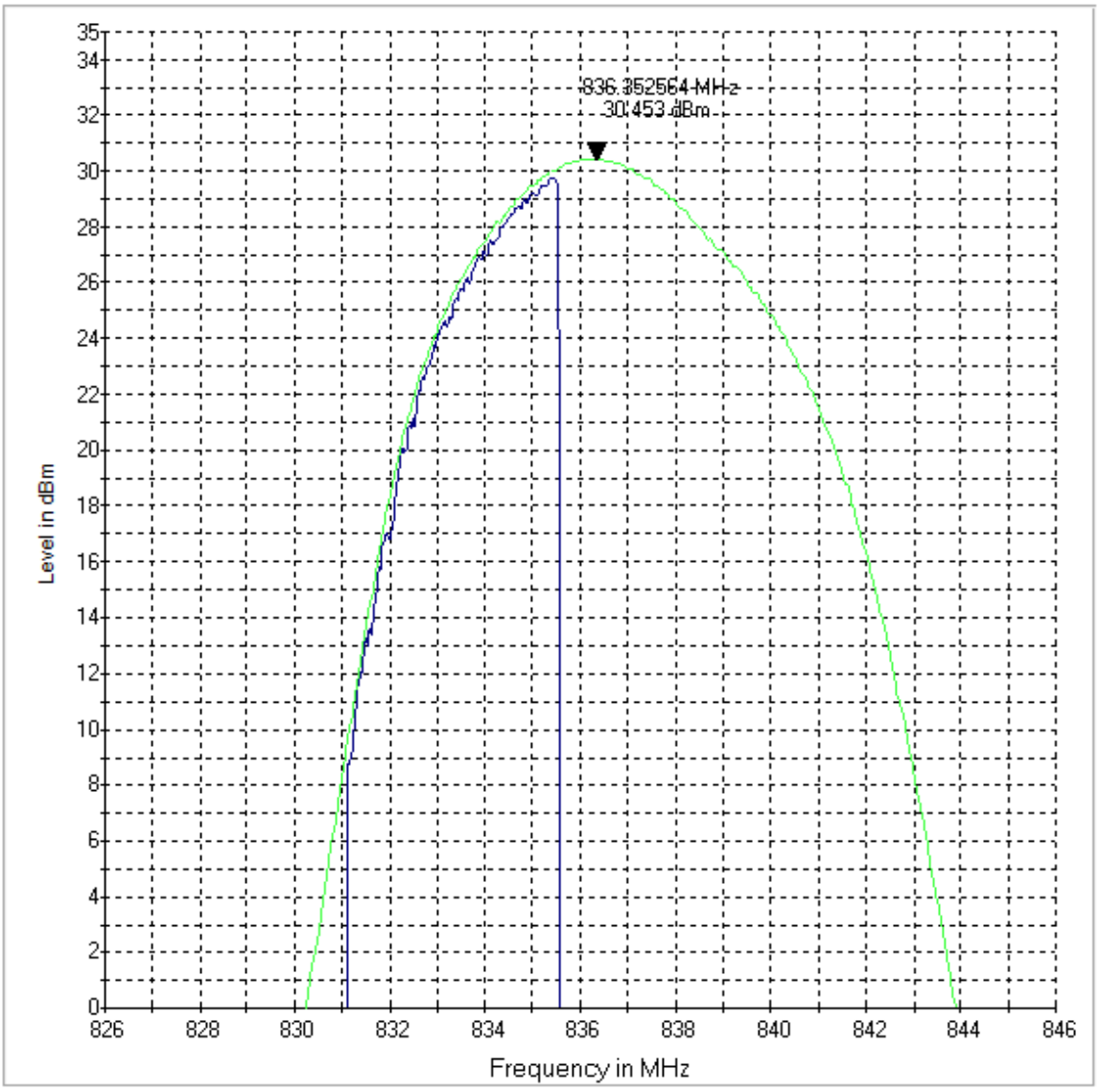
All measured results are in-line with the manufacturing tolerances as taken from the module manufacturer's specification.

5.7.5 ERP /EIRP Plots:

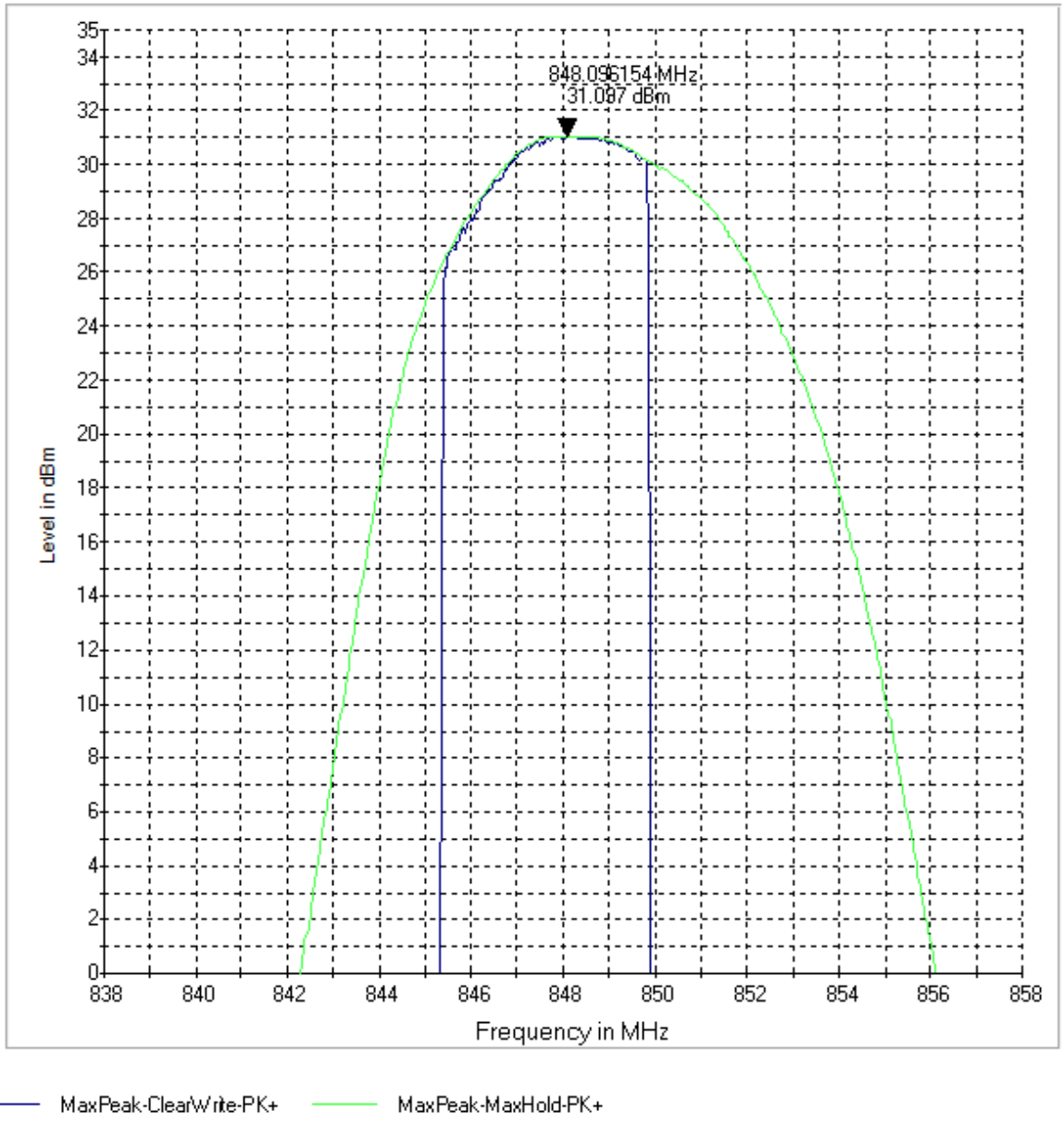
ERP LOW CHANNEL 128 GSM



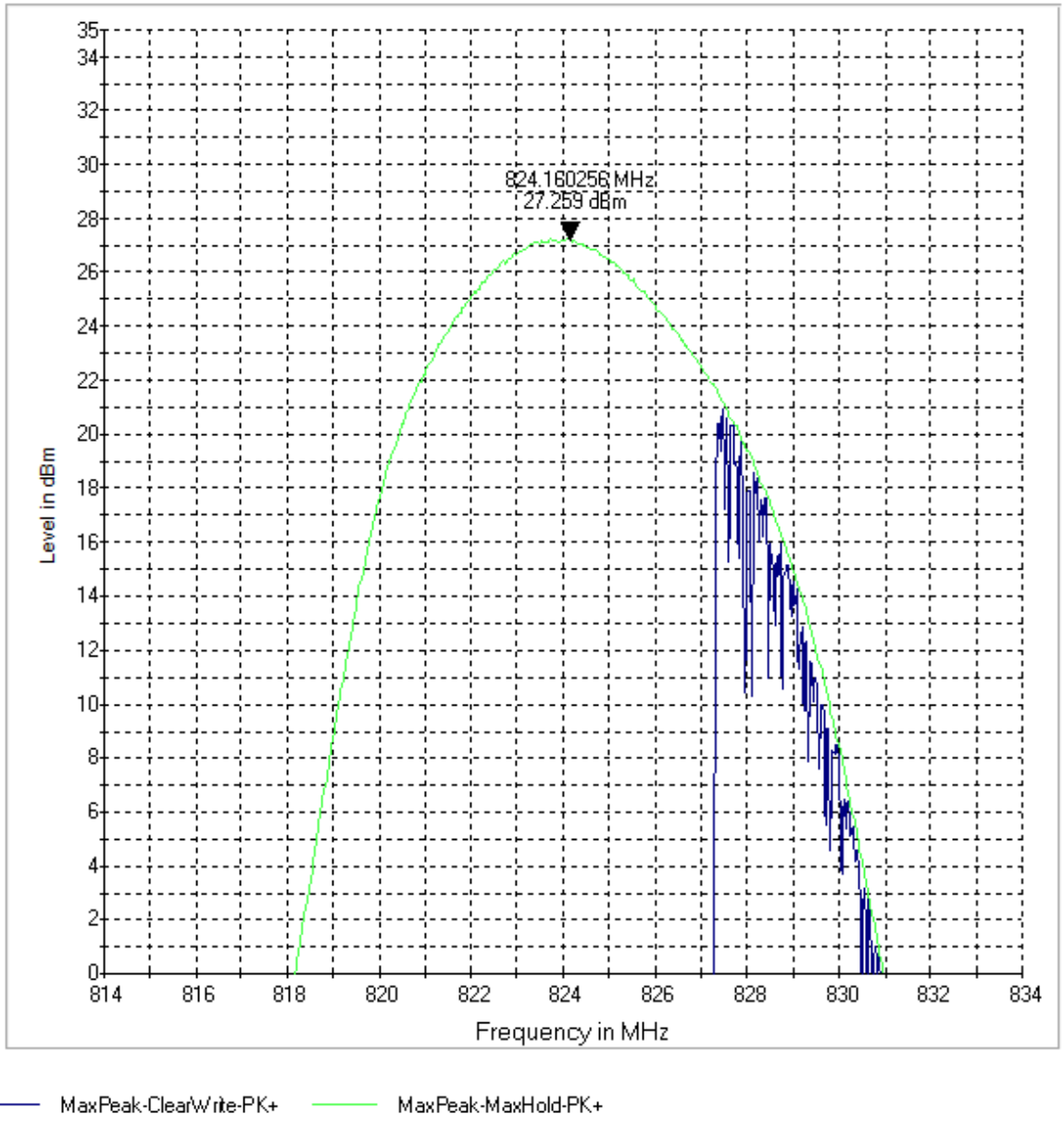
ERP Mid CHANNEL 190 GSM



ERP High Channel 251 GSM



ERP Low Channel 128 EGRPS



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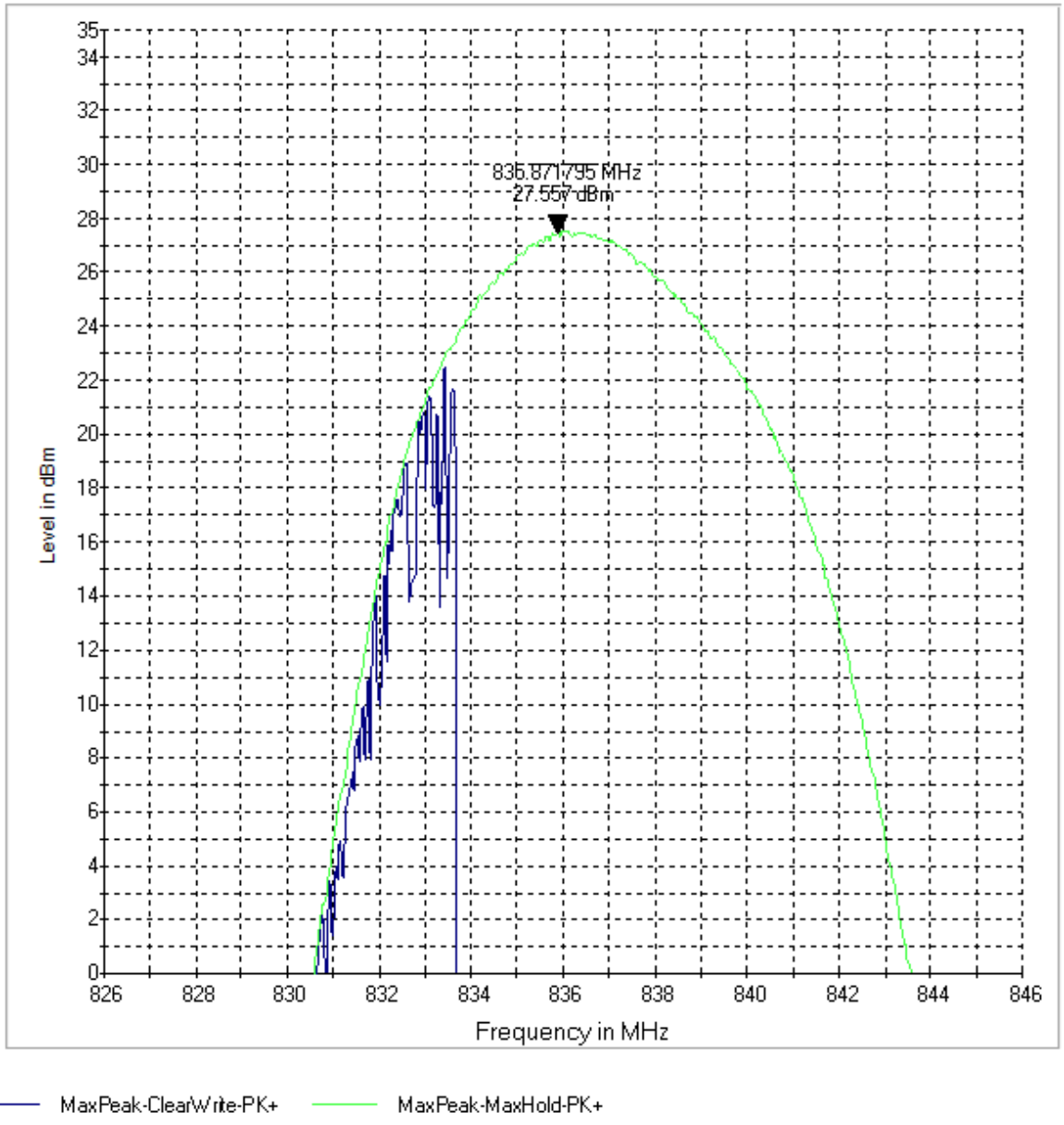
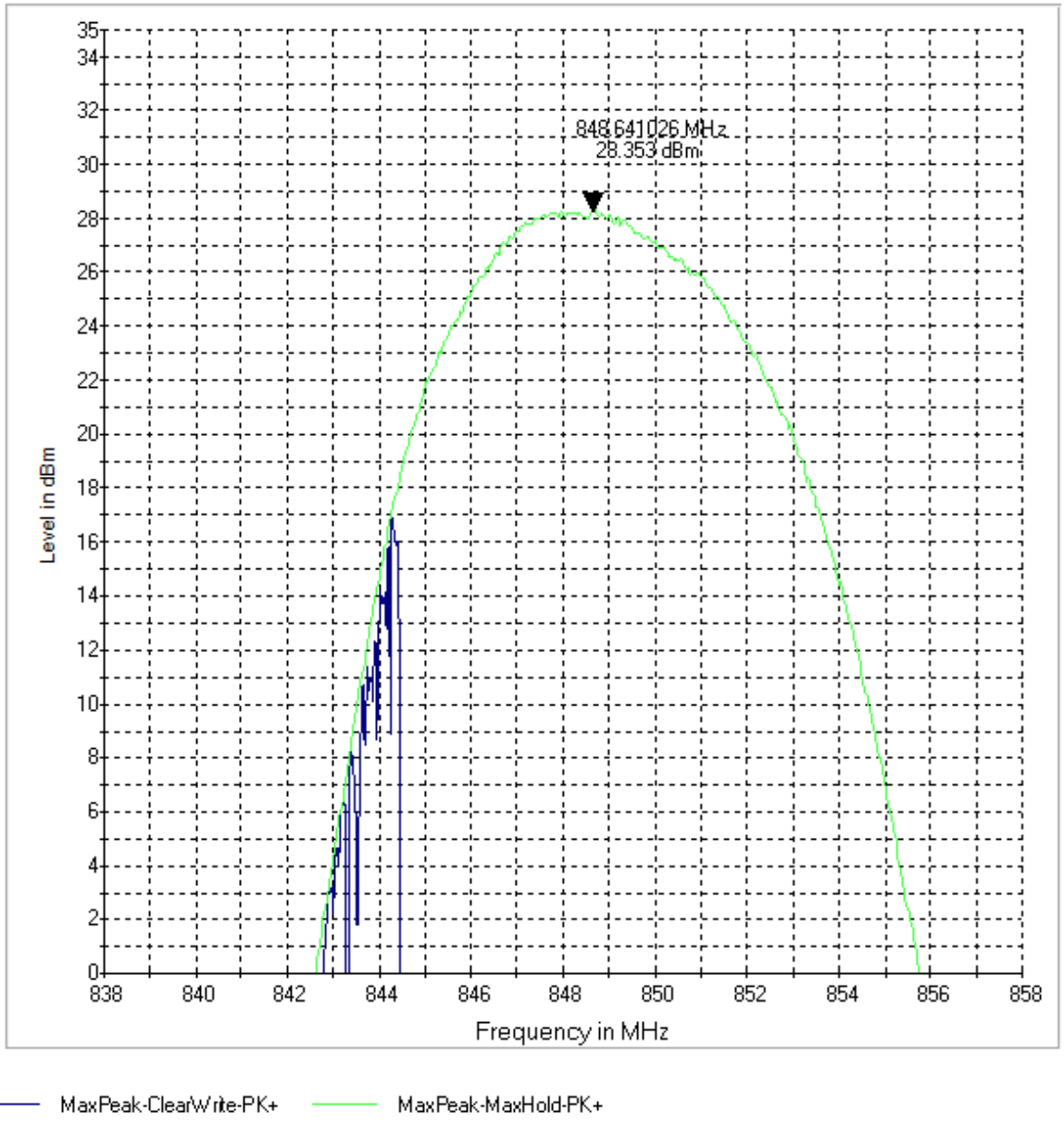
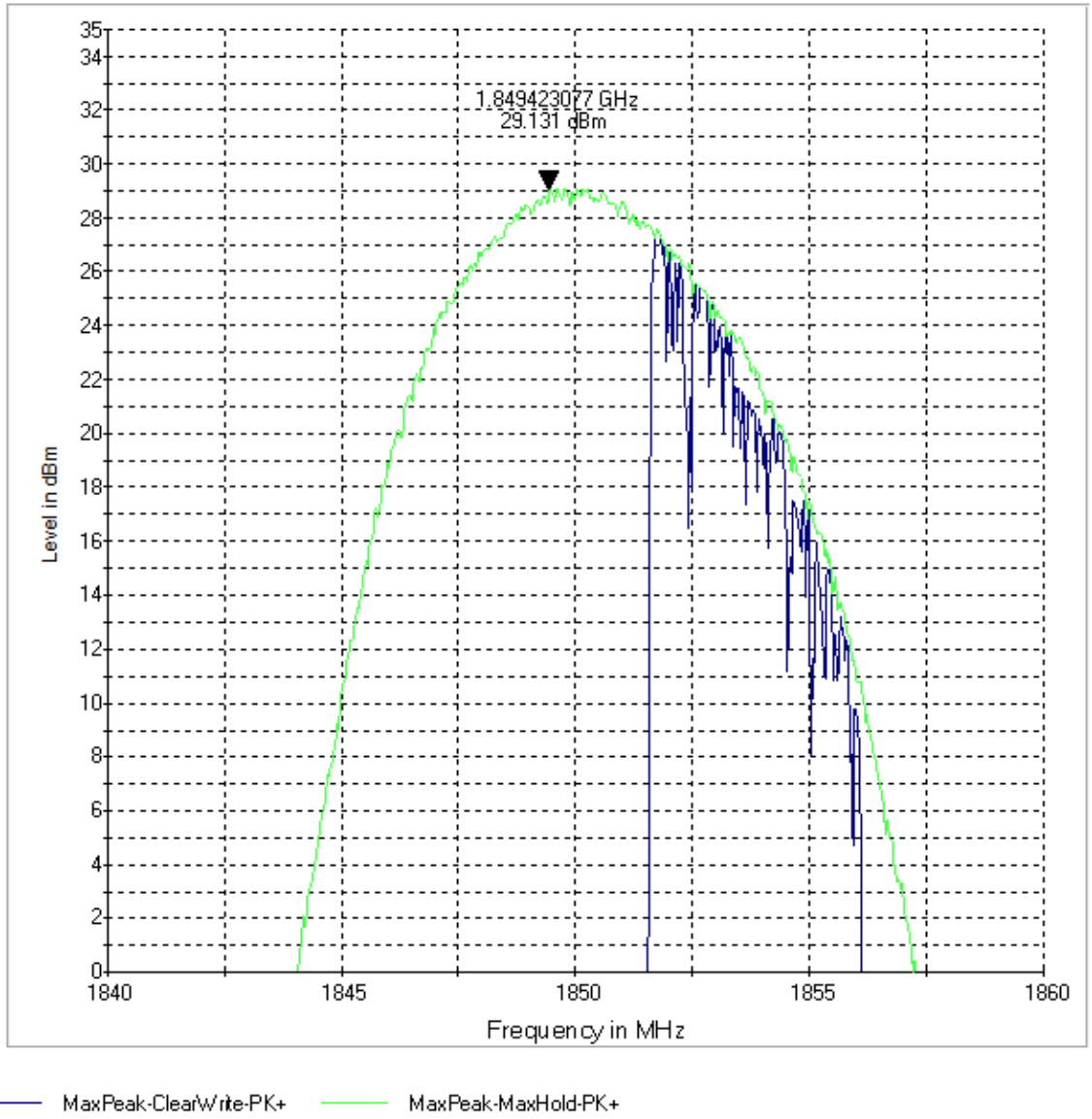


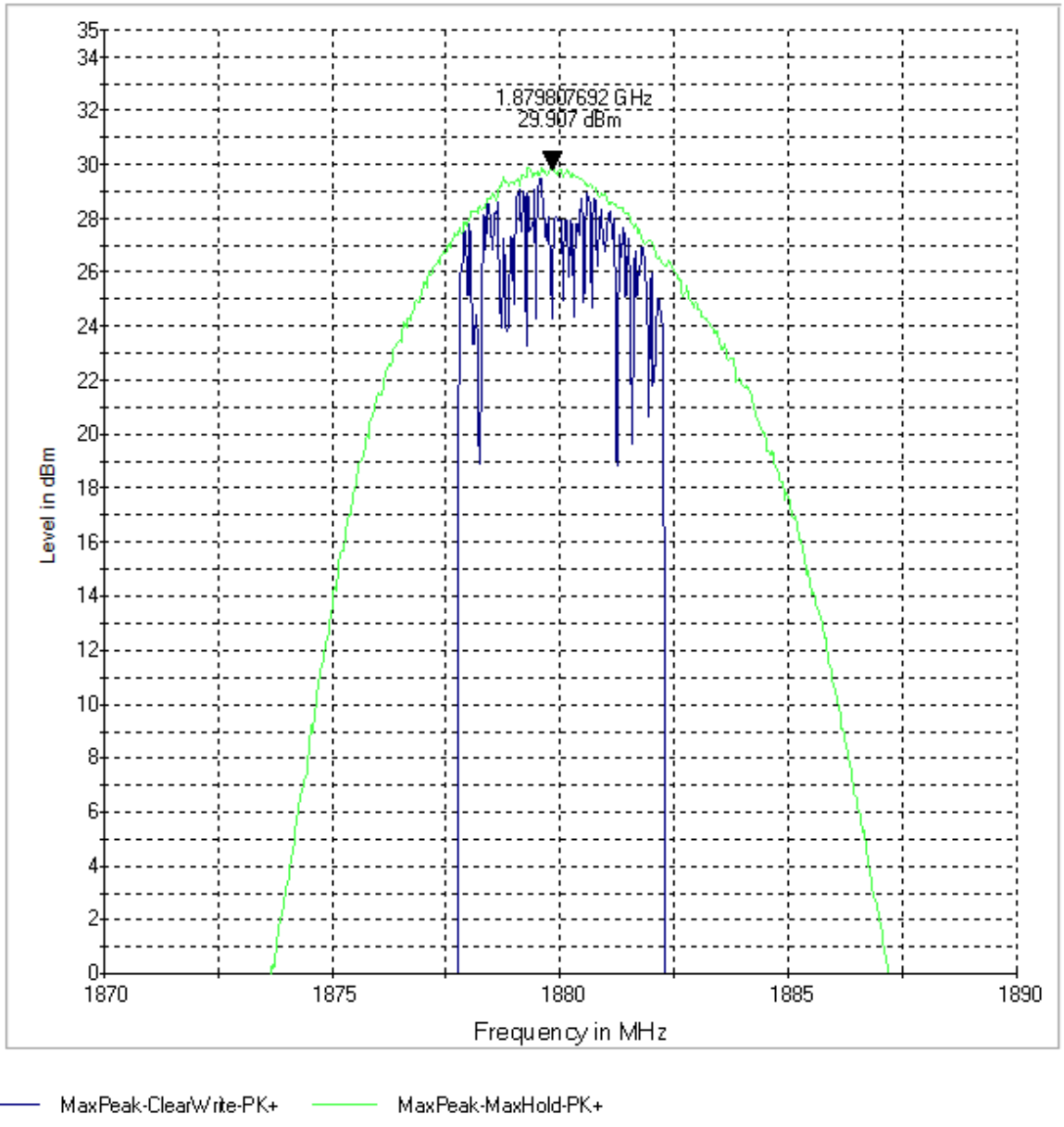
ERP High Channel 251 EGRPS



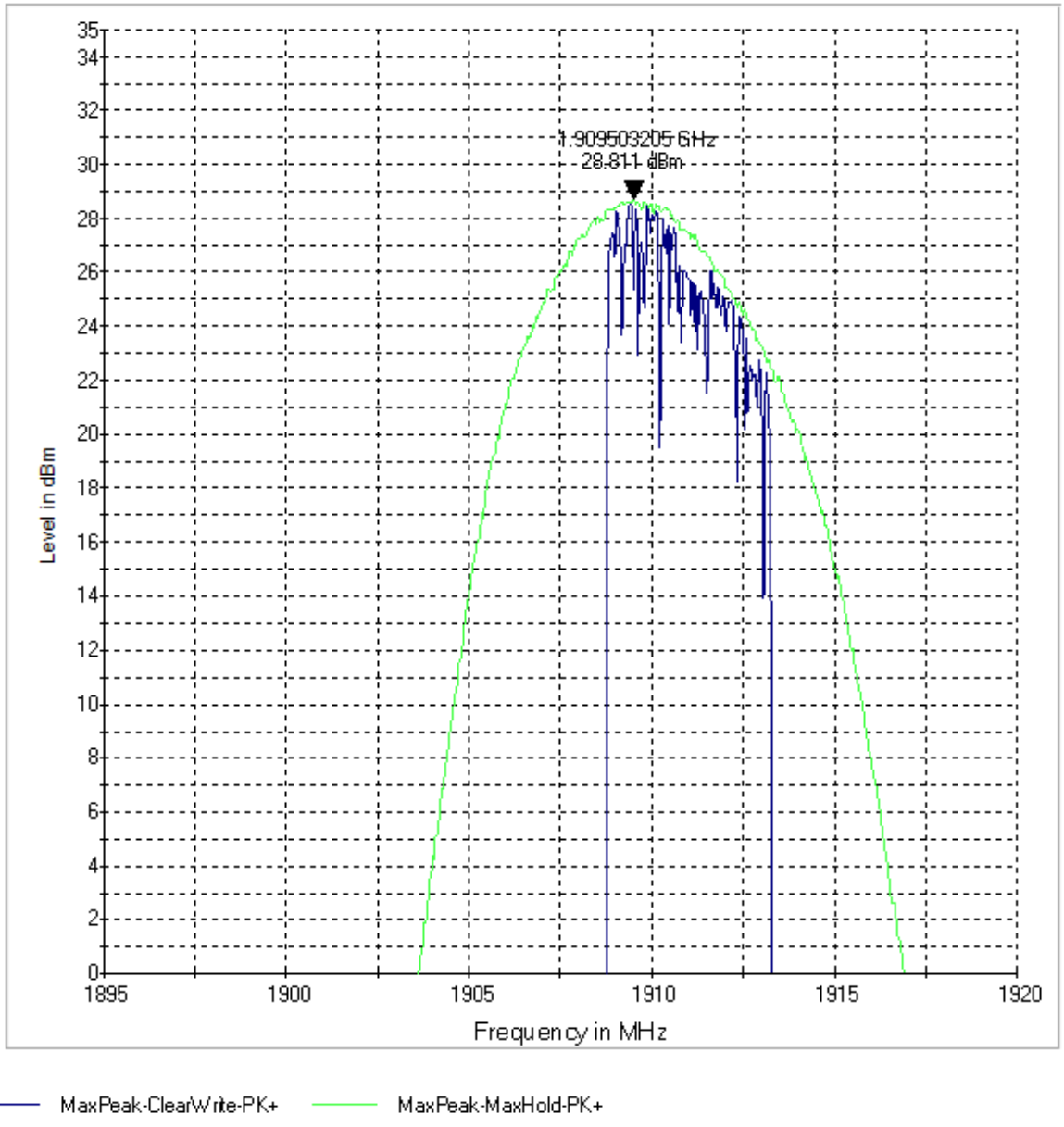
EIRP Low Channel 512 EGRPS



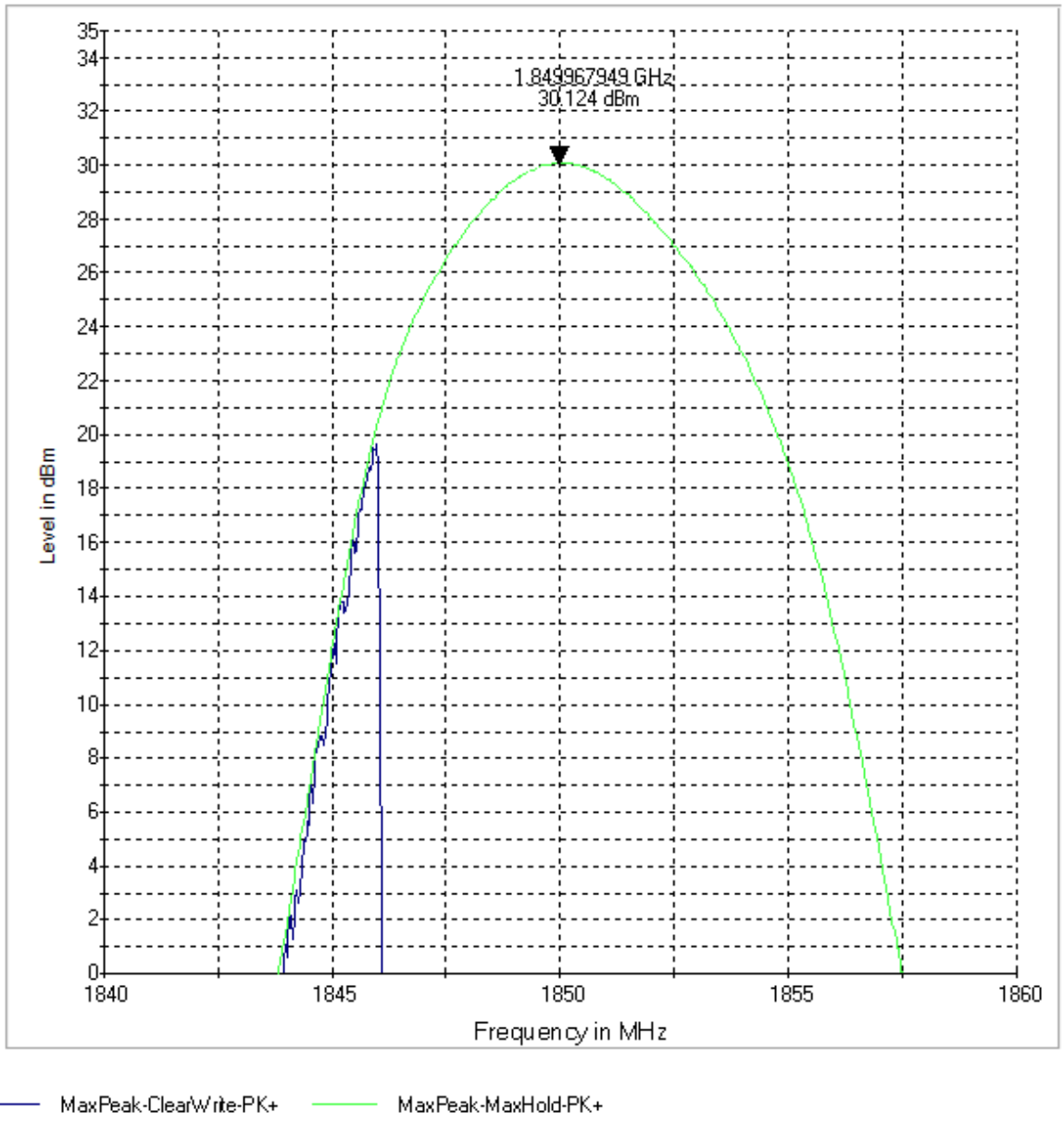
EIRP Mid Channel 661 EGRPS



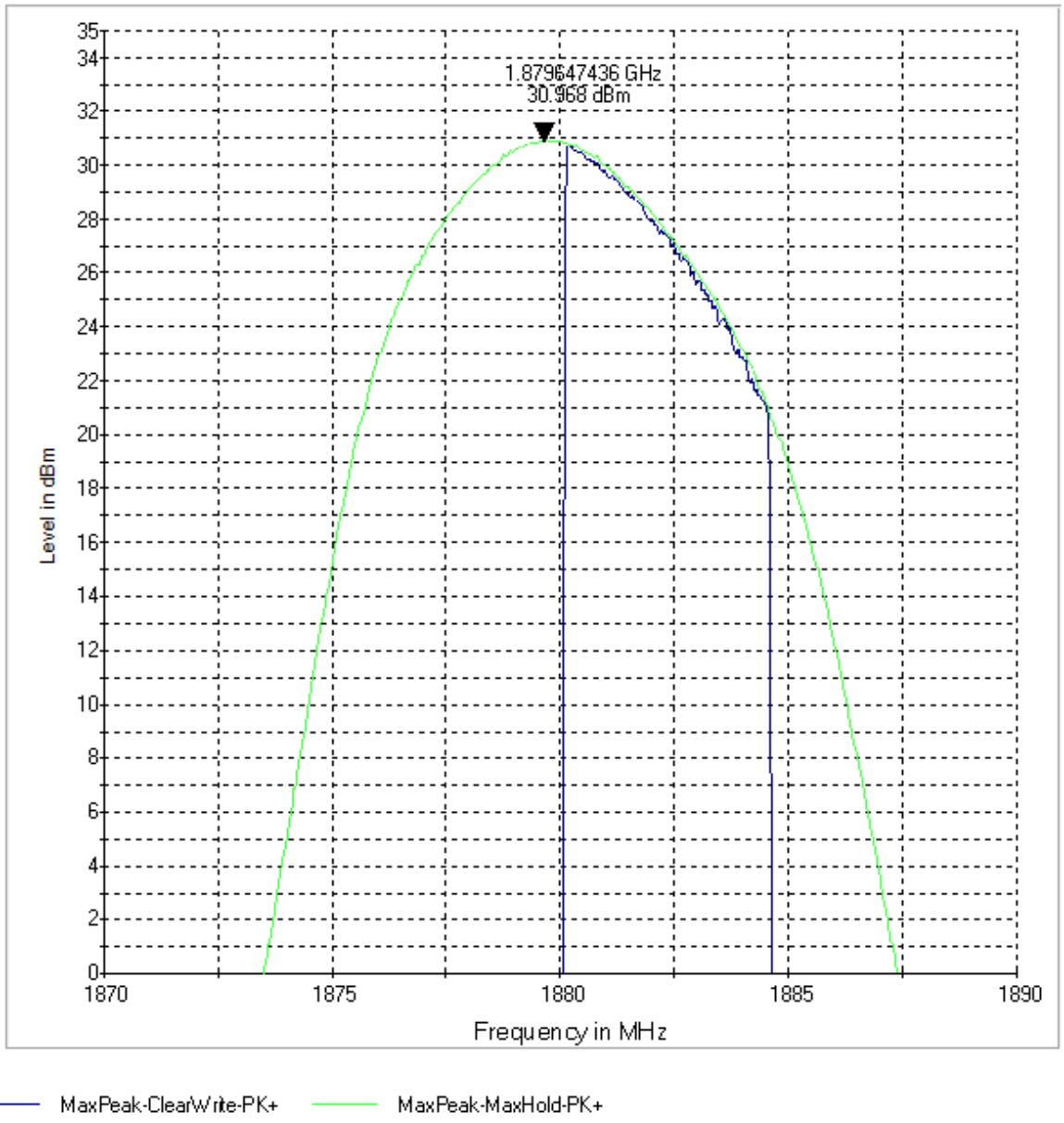
EIRP High Channel 810 EGRPS



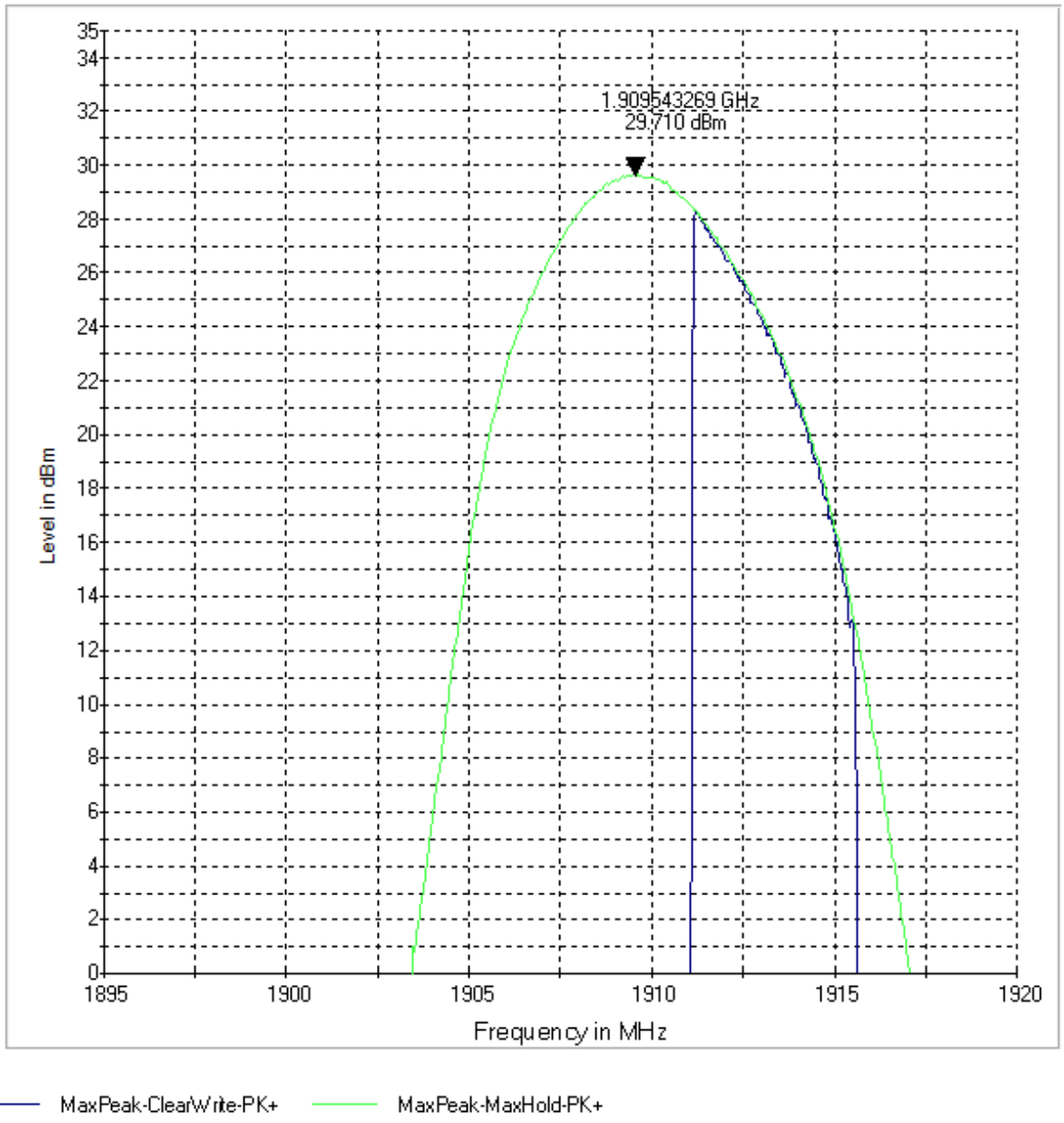
EIRP Low Channel 512 GSM



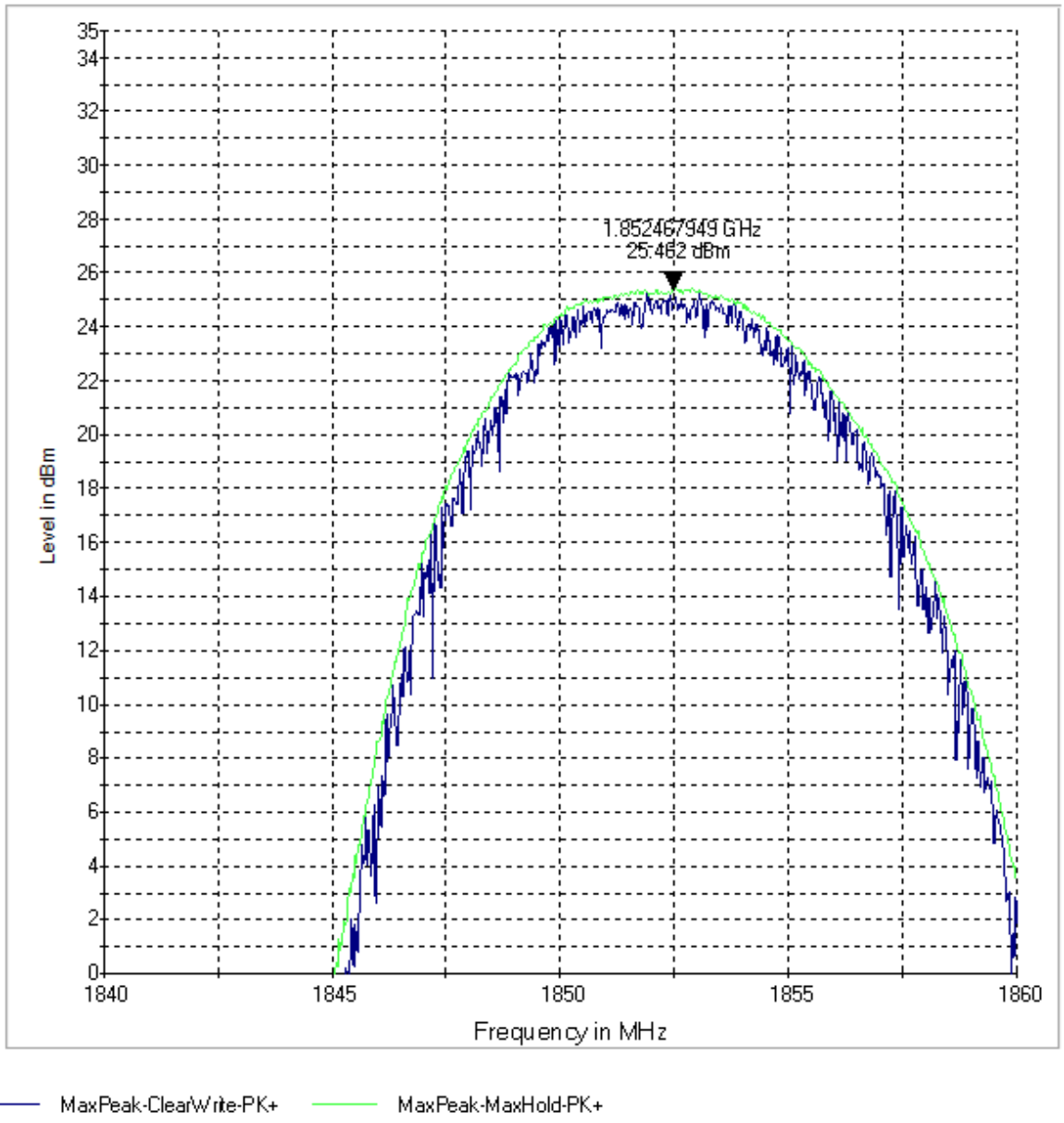
EIRP Mid Channel 661 GSM



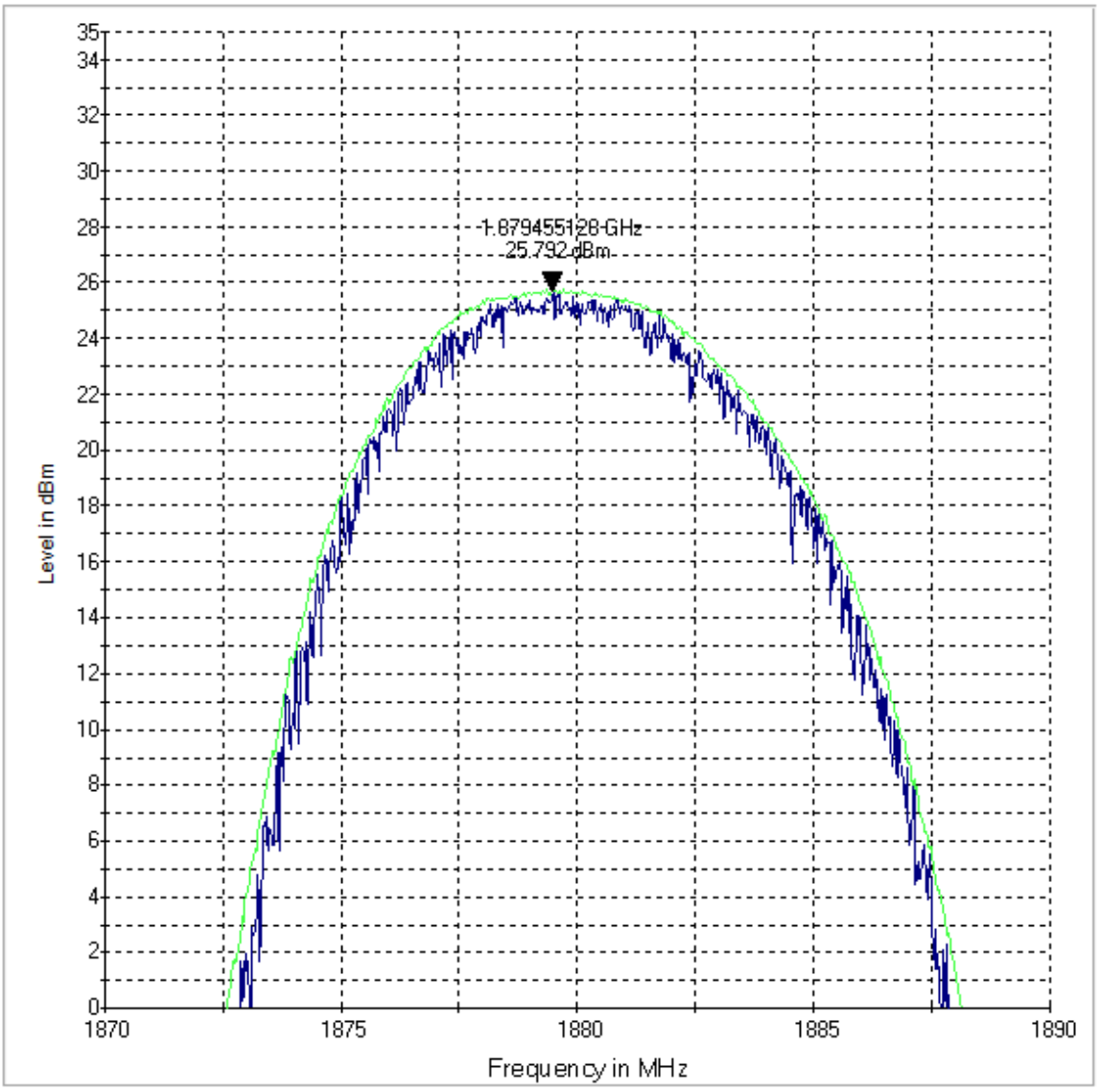
EIRP High Channel 810 GSM



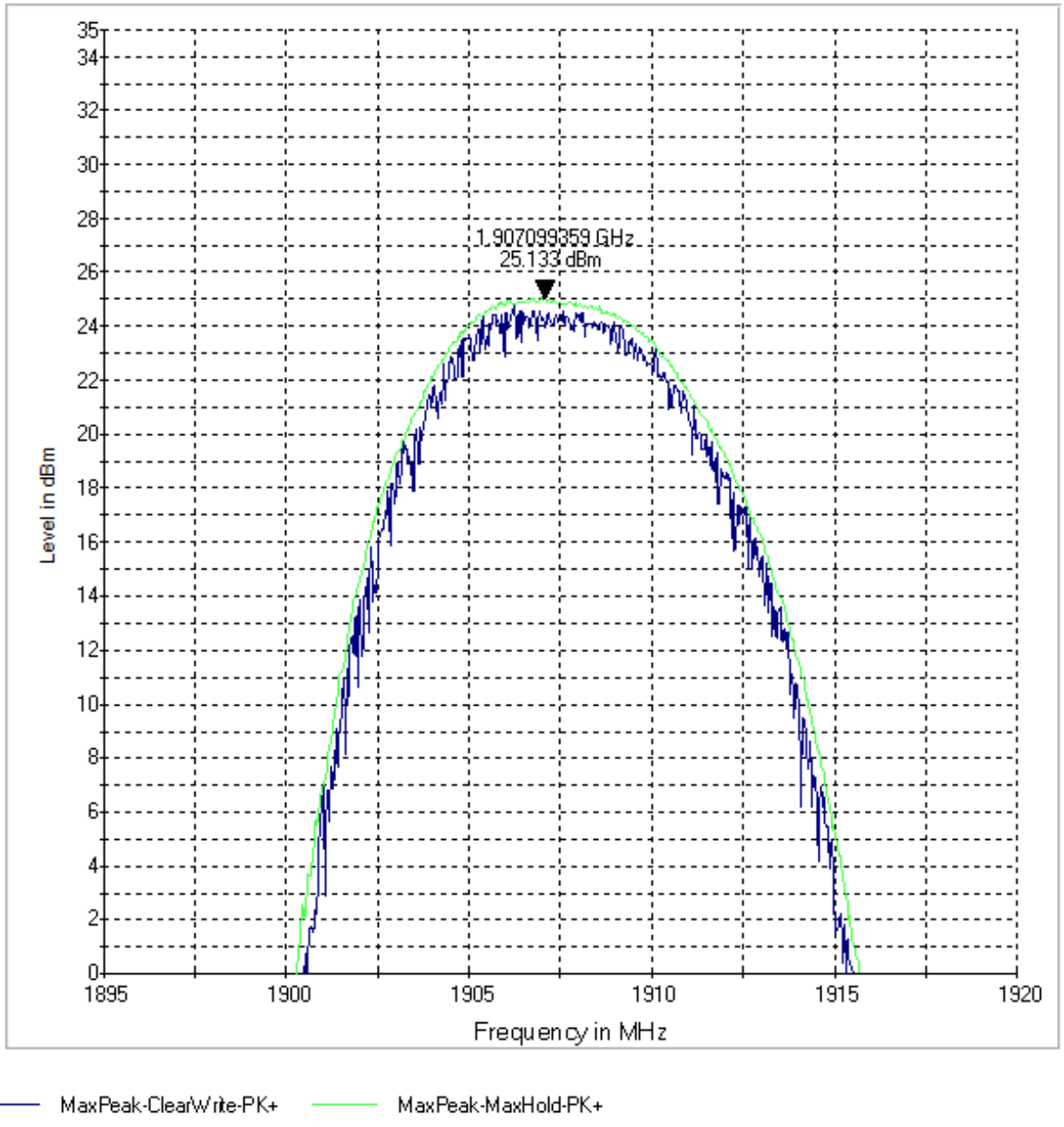
EIRP FDDII Low Channel 9262



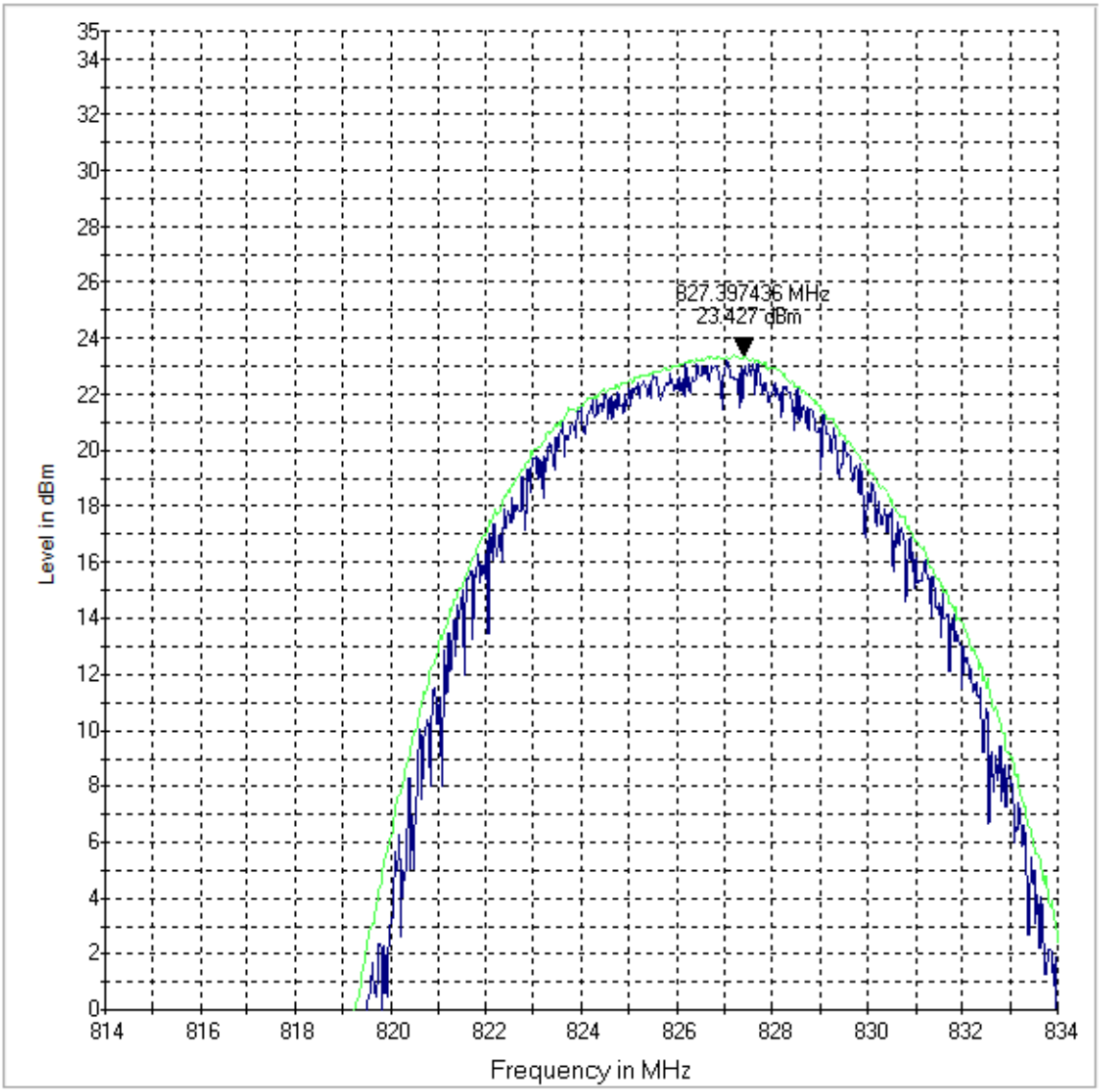
EIRP FDDII Mid Channel 9400



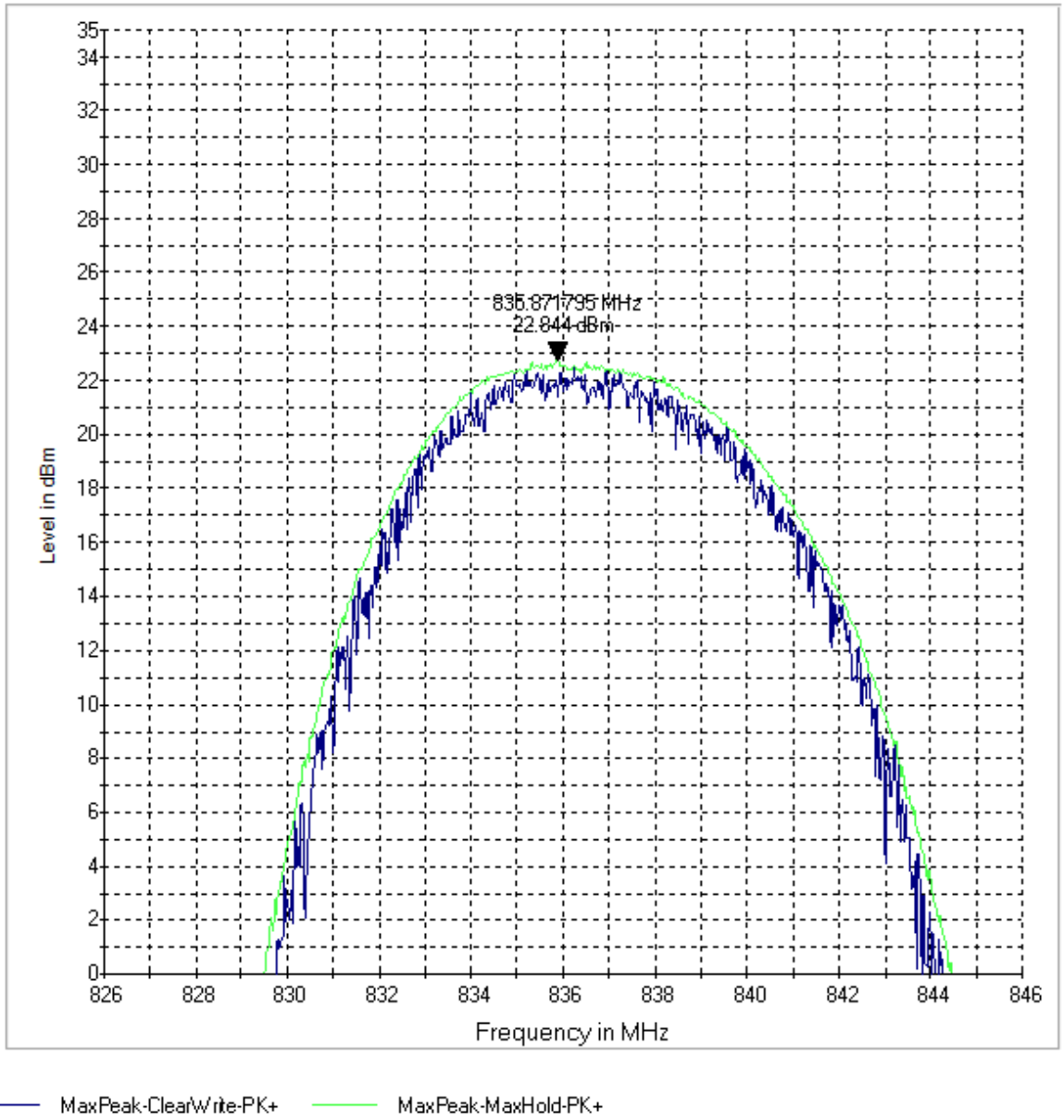
EIRP FDDII High Channel 9538



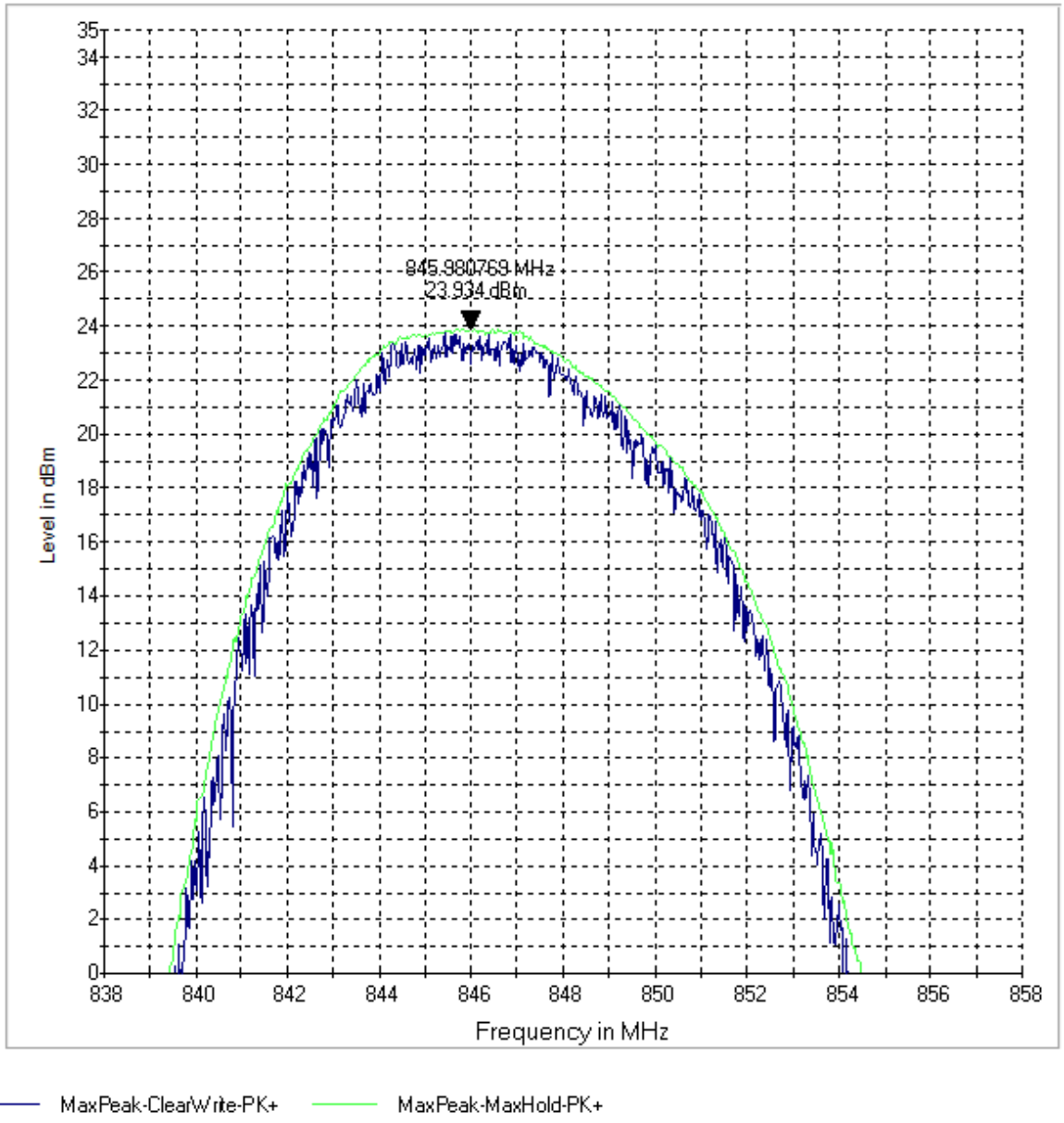
ERP FDDV Low Channel 4132



ERP FDDV Mid Channel 4183



ERP FDDV High Channel 4233



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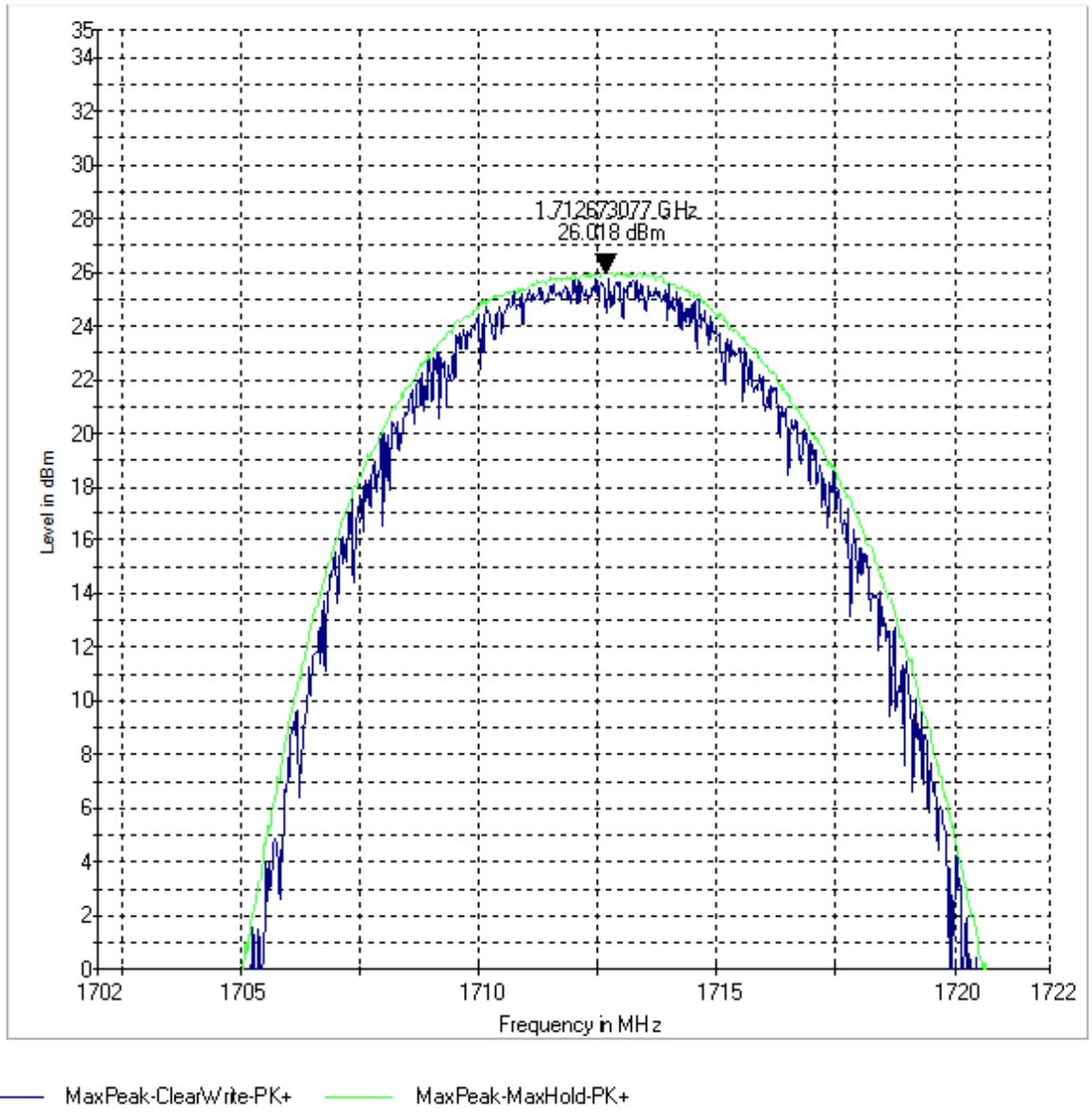
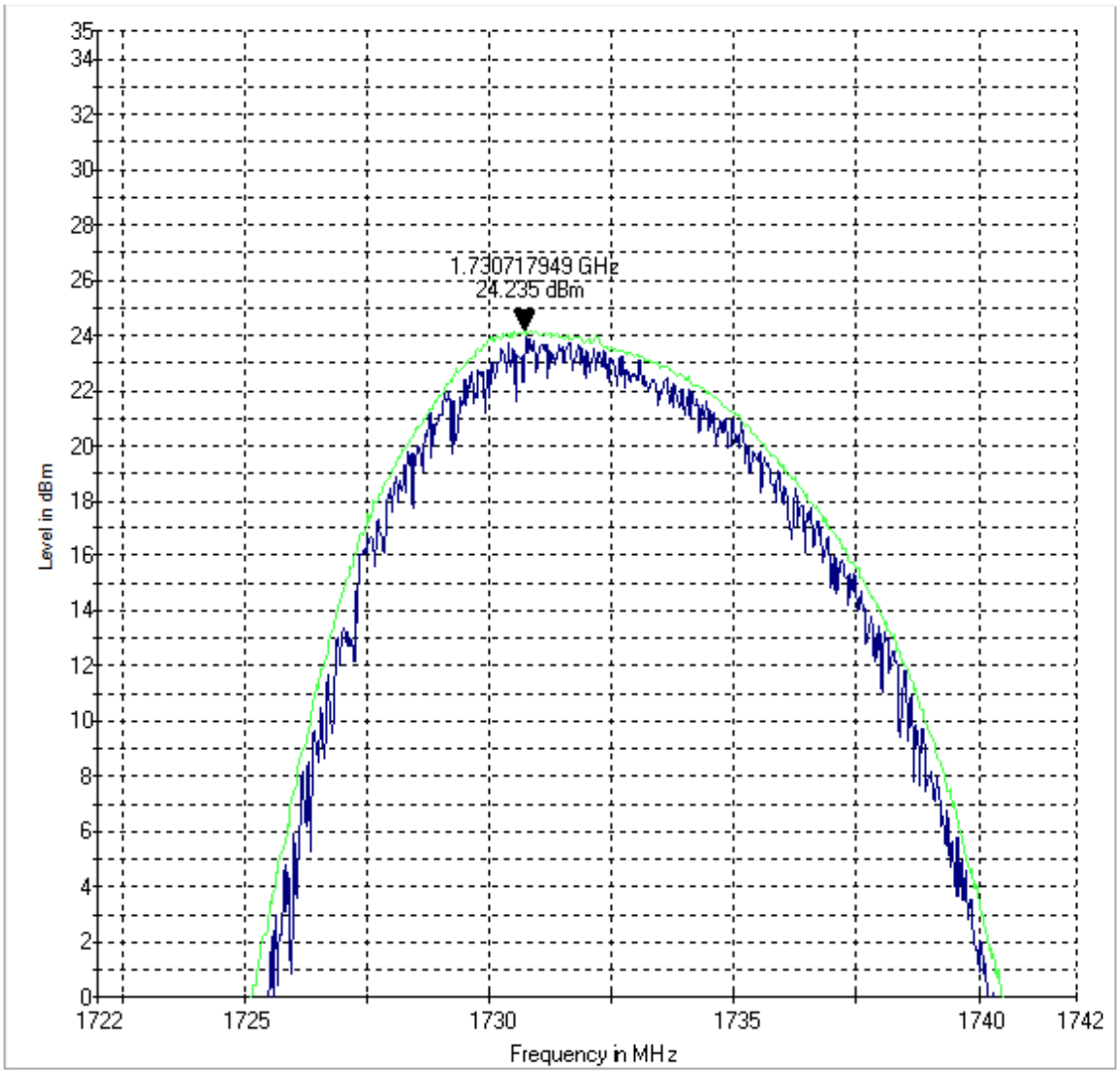
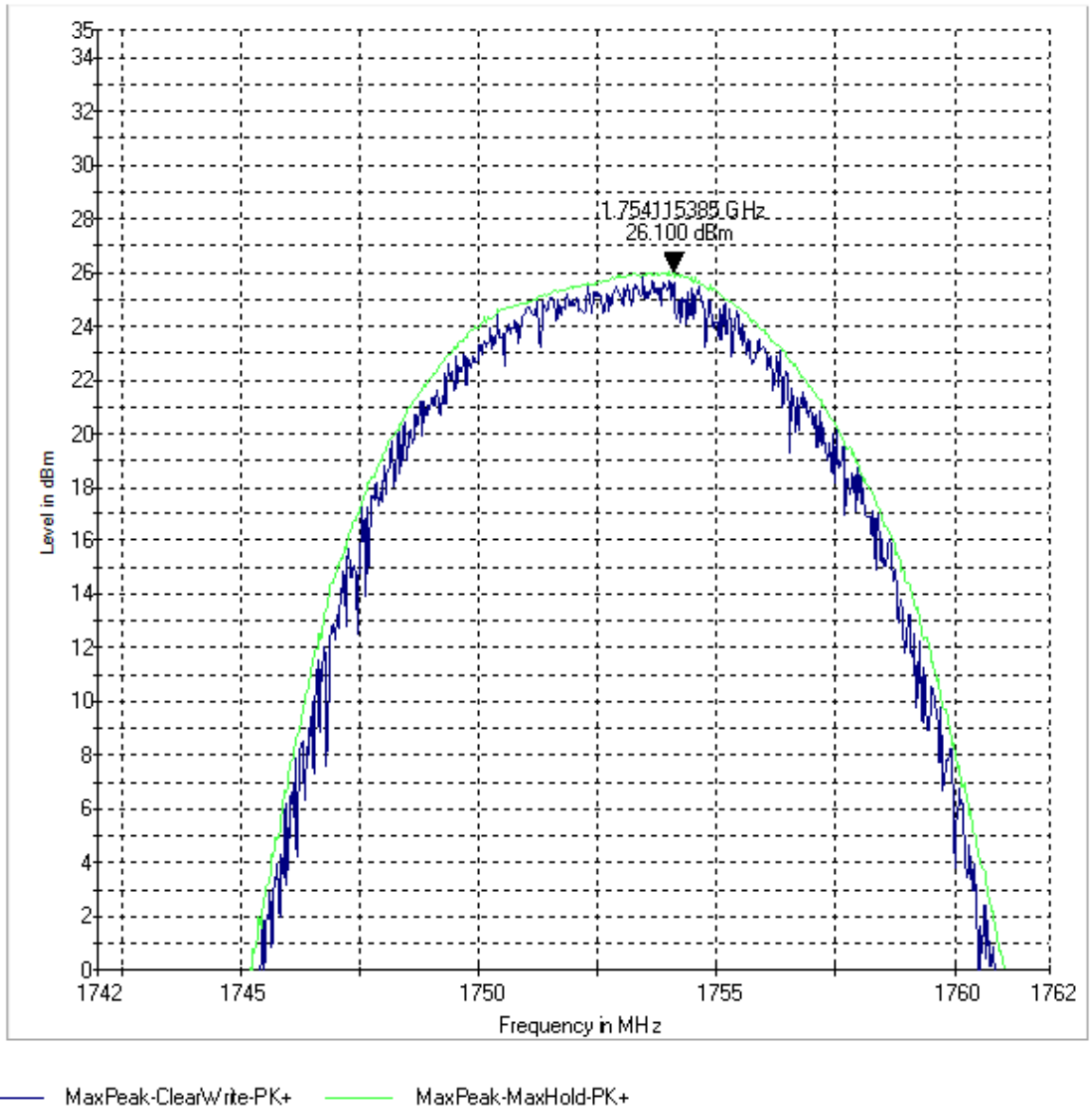


EIRP FDDIV Med Channel 1413



EIRP FDDIV High Channel 1513



5.8 Spurious Emissions Radiated

5.8.1 References

FCC: CFR Part 2.1053, CFR Part 22.917, CFR Part 24.238, CFR Part 27.53
IC: RSS-Gen Section 4.9; RSS 132 Section 5.5; RSS 133 Section 6.5

5.8.2 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.

5.8.2.1 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.

5.8.2.2 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.

FCC 27.53 Emission limits.

(g) AWS emission limits—(1) General protection levels. Except as otherwise specified below, for operations in the 1710-1755 MHz, 2110-2155 MHz, 2000-2020 MHz, 2180-2200 MHz, 1915-1920 MHz, and 1995-2000 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.

5.8.2.4 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.

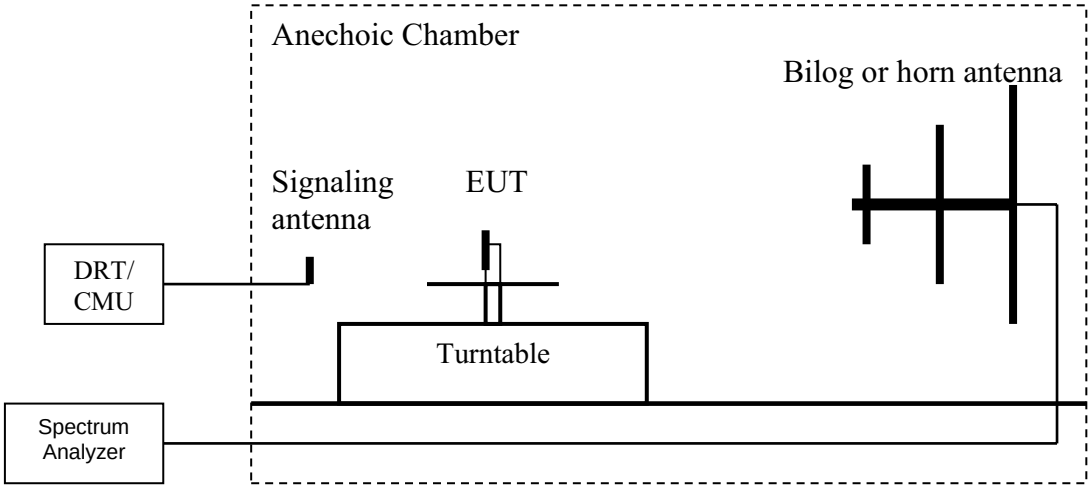
5.8.2.5 RSS-139 Section 6.5

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

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

5.8.3 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.
    (N**ote:** 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.)

5.8.4 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

5.8.5 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

Settings for FCC 27

	30MHz – 1 GHz	1 – 2.7 GHz	2.7 – 18 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

5.8.6 Test Results

5.8.6.1 Transmitter Spurious Emission GSM 850 / FDD 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	**1687.8**	-53.5	**1663.27**	-48.553	**1687**	-54.22	-13
3	**2471.8**	-43.05	**2507.5**	-46.71	**2543.17**	-48.157	
4	**3375.6**	NF	**3326.54**	NF	**3374**	NF	
5	**4219.5**	NF	**4158.175**	NF	**4217.5**	NF	
6	**5063.4**	NF	**4989.81**	NF	**5061**	NF	
7	**5907.3**	NF	**5821.445**	NF	**5904.5**	NF	
8	**6751.2**	NF	**6653.08**	NF	**6748**	NF	
9	**7595.1**	NF	**7484.715**	NF	**7591.5**	NF	
10	**8439**	NF	**8316.35**	NF	**8435**	NF	
NF = Noise Floor Measurement Uncertainty: ±3dB							

5.8.6.2 Test Results Transmitter Spurious Emission GSM -1900 / FDD 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**	-53	**3918.74**	-53.5	**3837.76**	-54.22	-13
3	**5550**	NF	**2507.5**	NF	**2543.17**	NF	
4	**7400**	NF	**7837.48**	NF	**7675.52**	NF	
5	**9250**	NF	**9796.85**	NF	**9594.4**	NF	
6	**11100**	NF	**11756.22**	NF	**11513.28**	NF	
7	**12950**	NF	**13715.59**	NF	**13432.16**	NF	
8	**14800**	NF	**15674.96**	NF	**15351.04**	NF	
9	**16650**	NF	**17634.33**	NF	**17269.92**	NF	
10	**18500**	NF	**19593.7**	NF	**19188.8**	NF	
NF = Noise Floor Measurement Uncertainty: ±3dB							

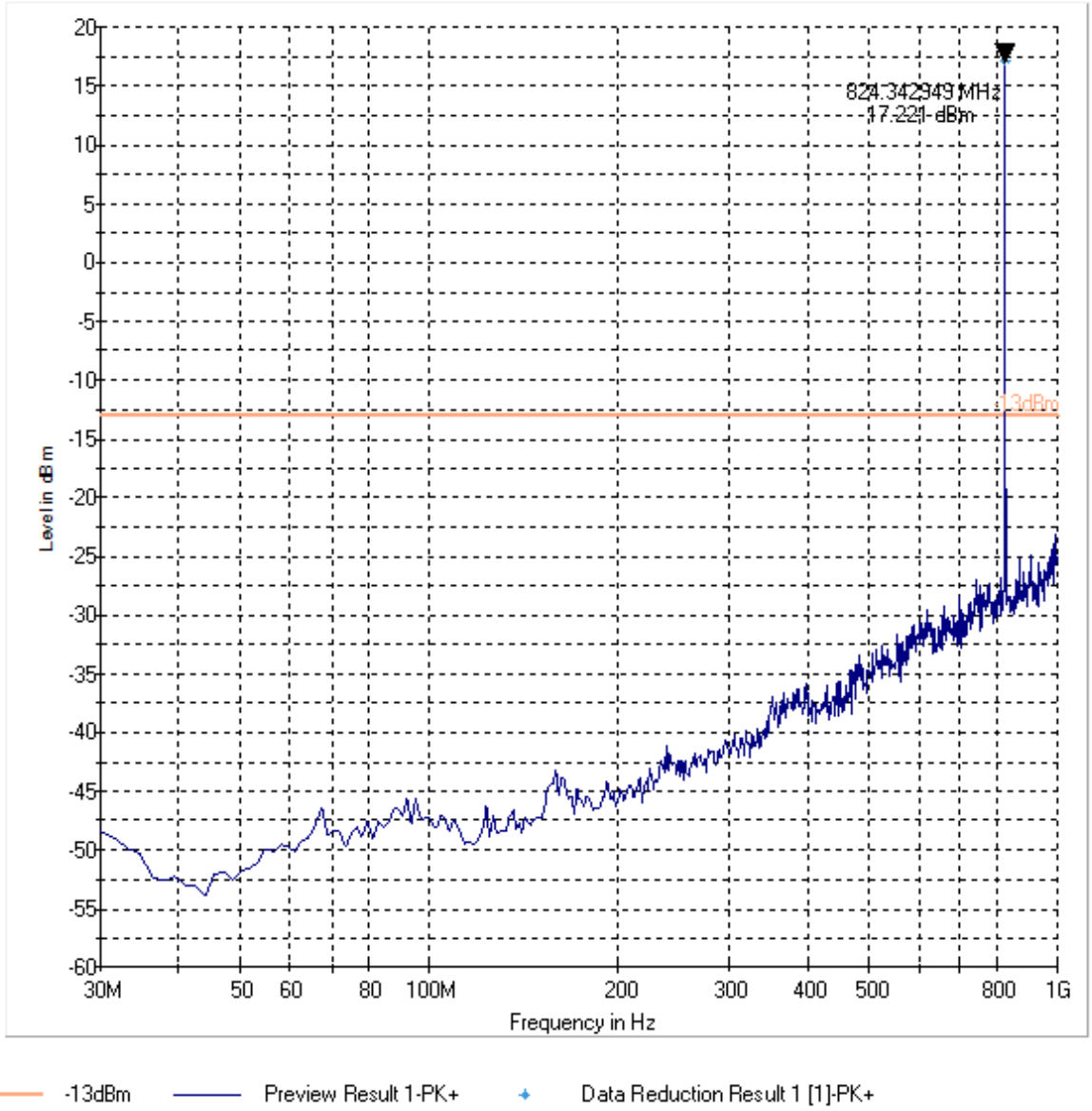
5.8.6.3 Test Results Transmitter Spurious Emission FDD IV WCDMA :

Harmonic	Tx ch-1312 Freq. (MHz)	Level (dBm)	Tx ch-1413 Freq. (MHz)	Level (dBm)	Tx ch-1513 Freq. (MHz)	Level (dBm)	Limit FCC and IC (dBm)
2	**3408.65**	-45.27	**3456.73**	-47.38	**3504.8**	-47.4	-13
3	**5112.975**	NF	**2507.5**	NF	**2543.17**	NF	
4	**6817.3**	NF	**6913.46**	NF	**7009.6**	NF	
5	**8521.625**	NF	**8641.825**	NF	**8762**	NF	
6	**10225.95**	NF	**10370.19**	NF	**10514.4**	NF	
7	**11930.28**	NF	**12098.56**	NF	**12266.8**	NF	
8	**13634.6**	NF	**13826.92**	NF	**14019.2**	NF	
9	**15338.93**	NF	**15555.29**	NF	**15771.6**	NF	
10	**17043.25**	NF	**17283.65**	NF	**17524**	NF	
NF = Noise Floor Measurement Uncertainty: ±3dB							

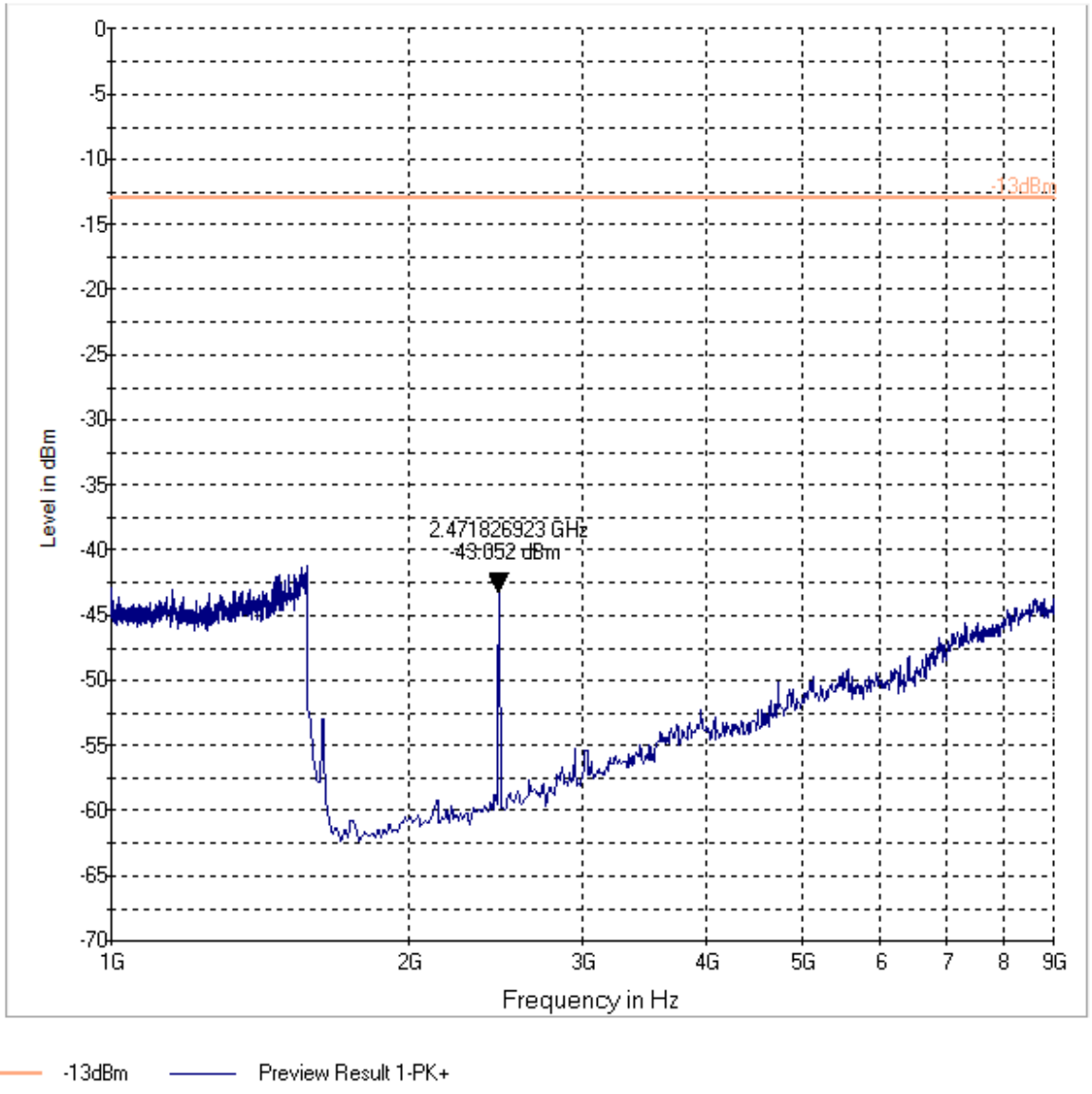
5.8.7 Radiates Emission Plots:

Radiated Spurious Emissions (GSM-850) Tx: Low Channel

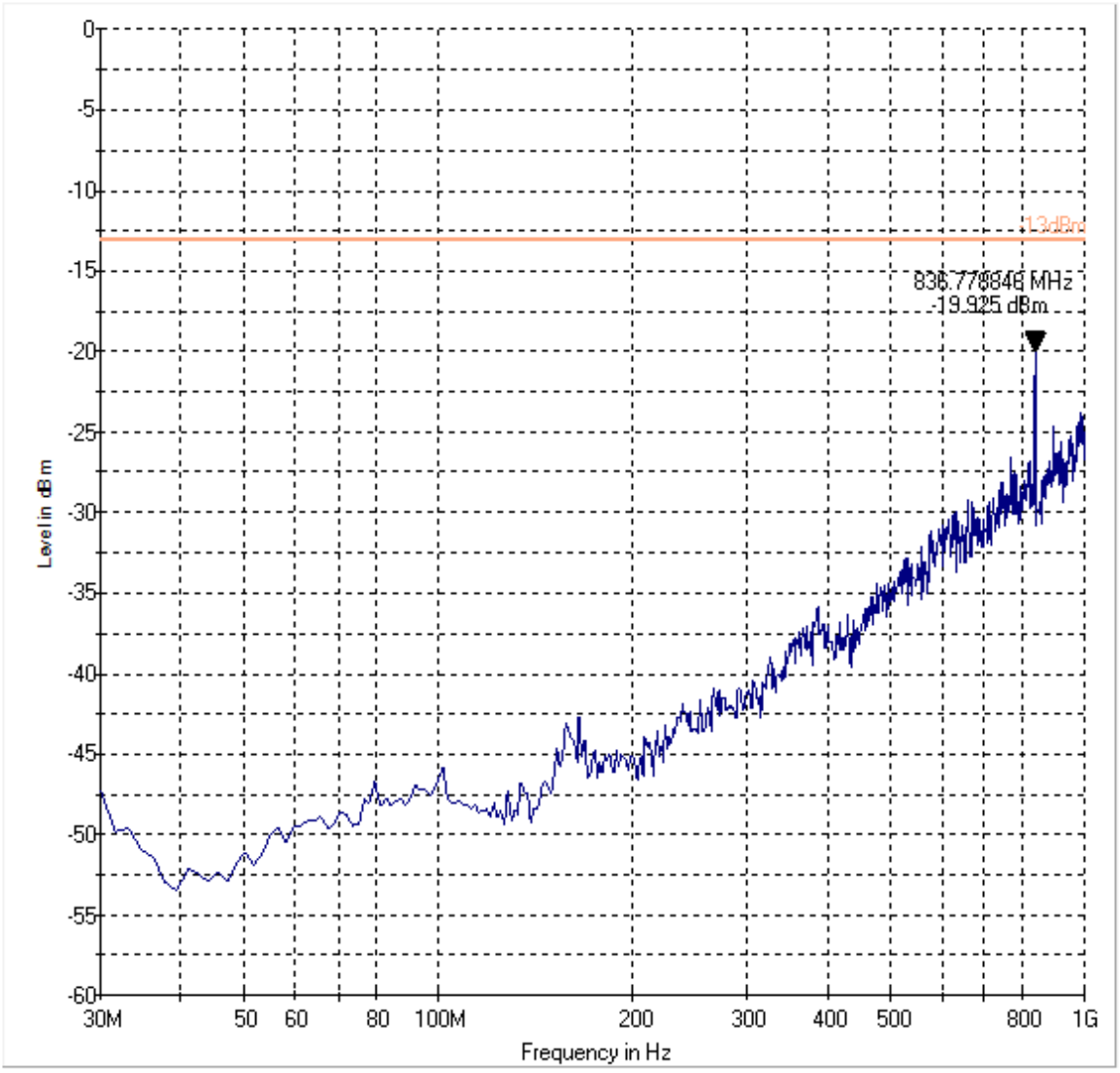
Test results 30MHz-1GHz



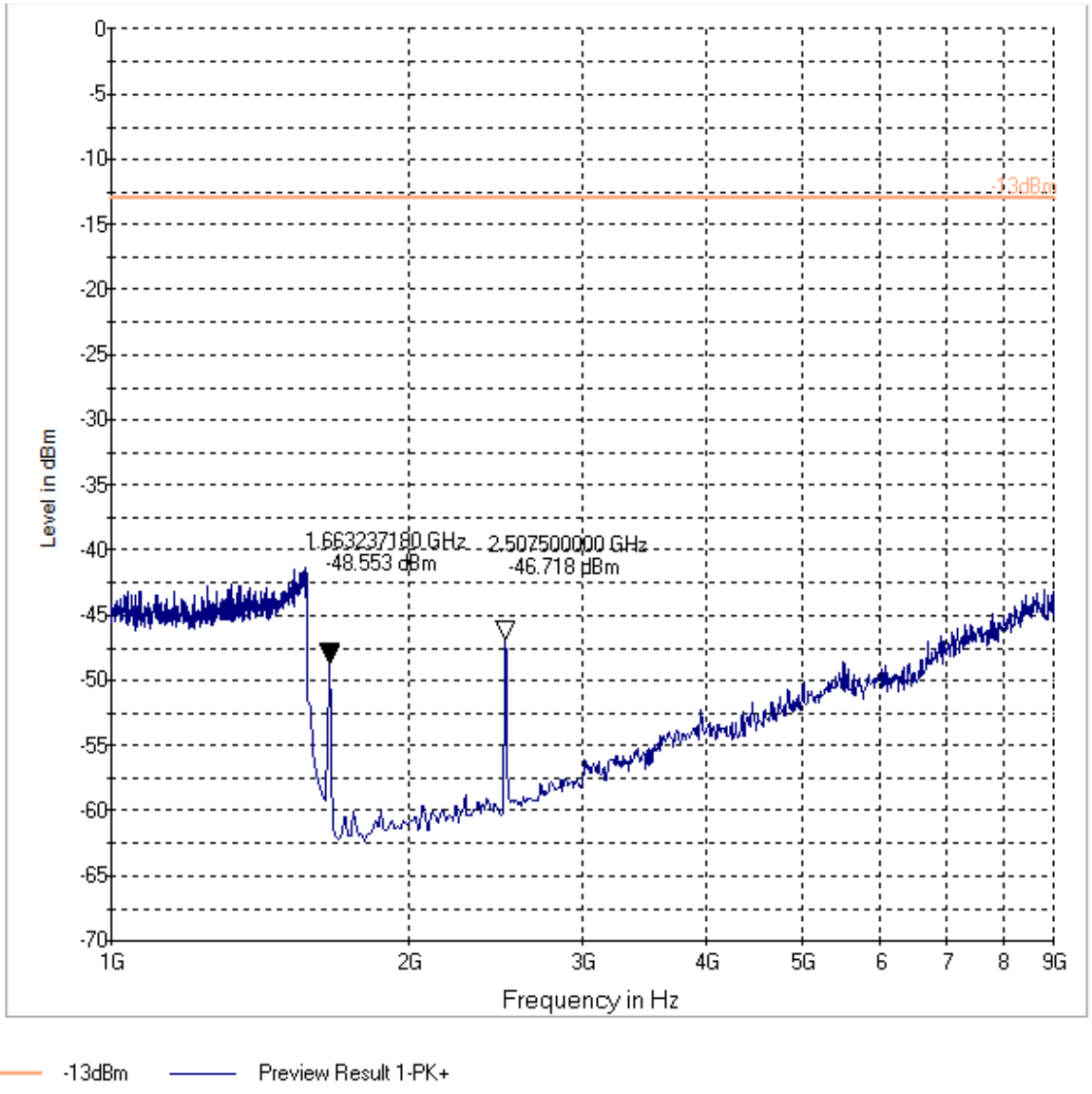
Test results 1GHz-9GHz



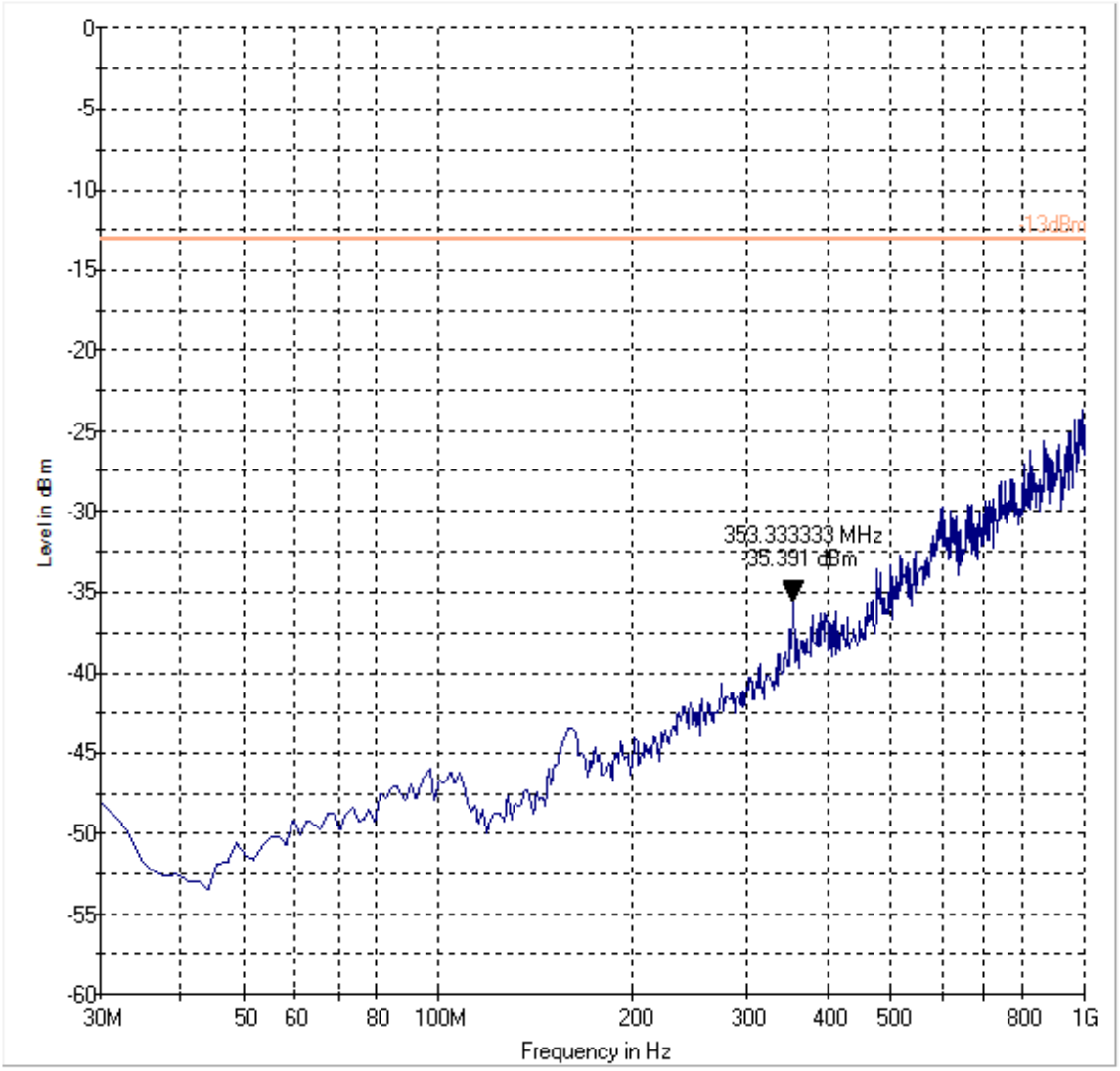
Radiated Spurious Emissions (GSM-850) Tx: Mid Channel
Test results 30MHz-1GHz



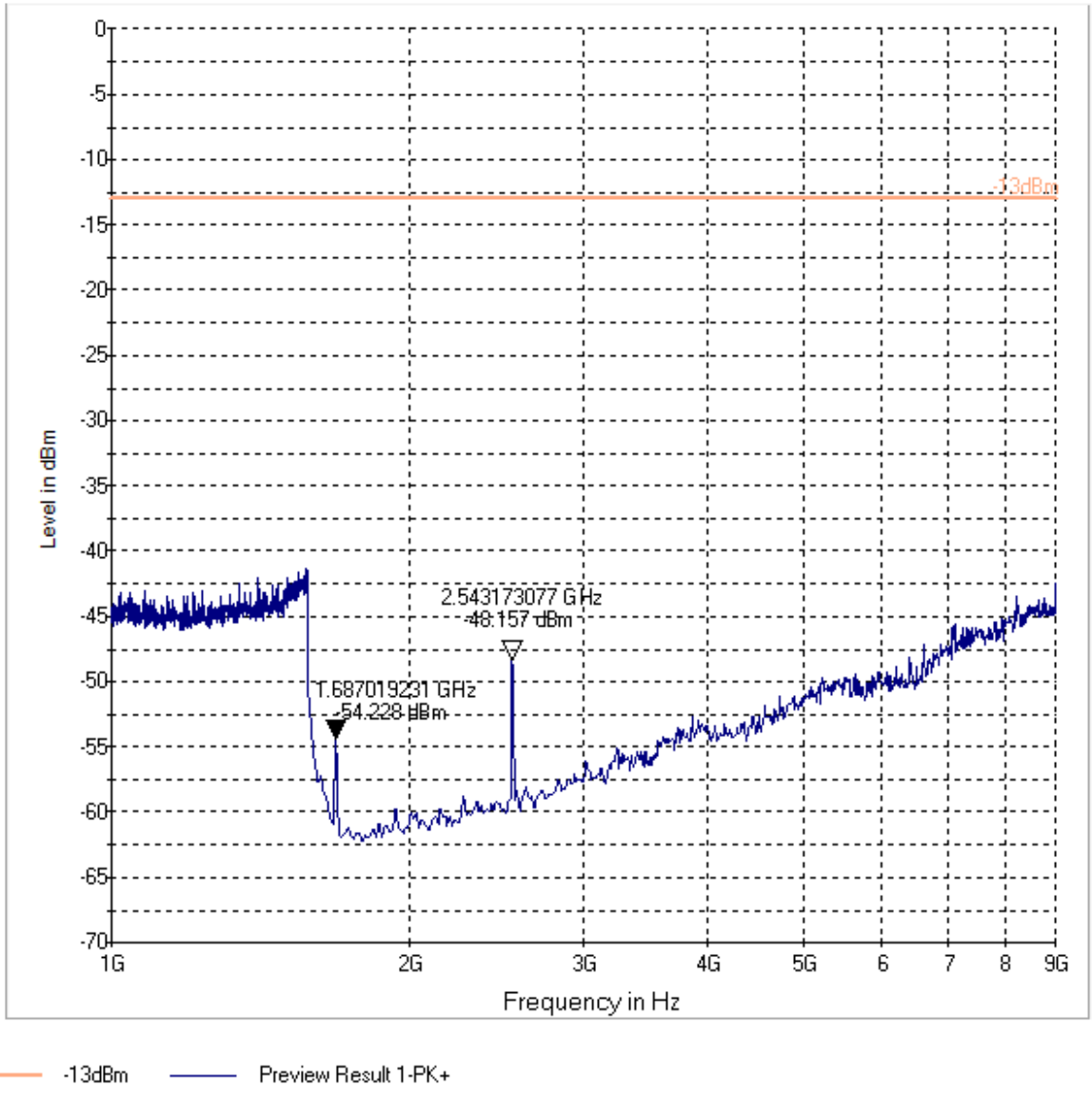
Test results 1GHz-9GHz



Radiated Spurious Emissions (GSM-850) Tx: High Channel
Test results 30MHz-1GHz

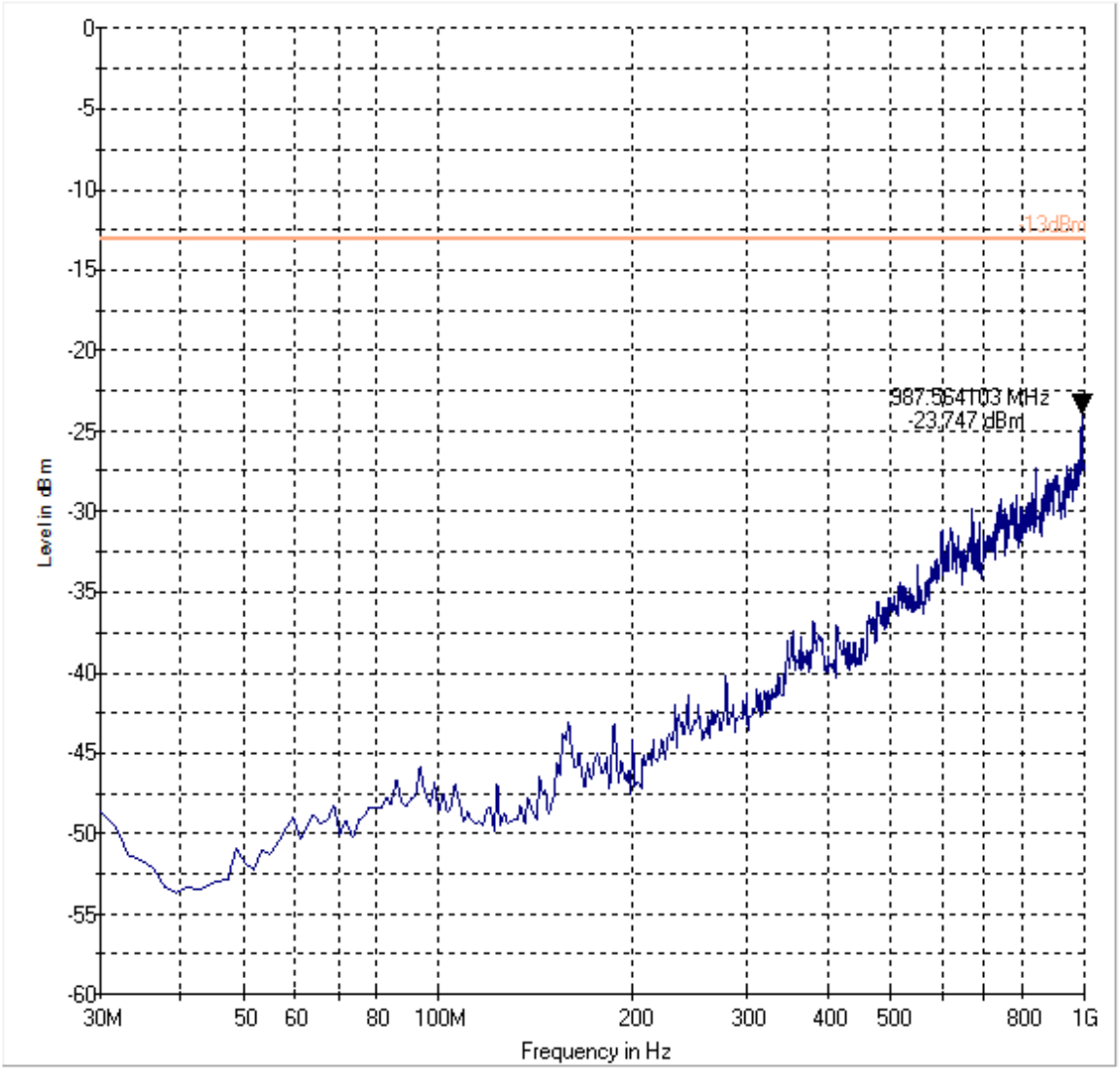


Test results 1GHz-9GHz

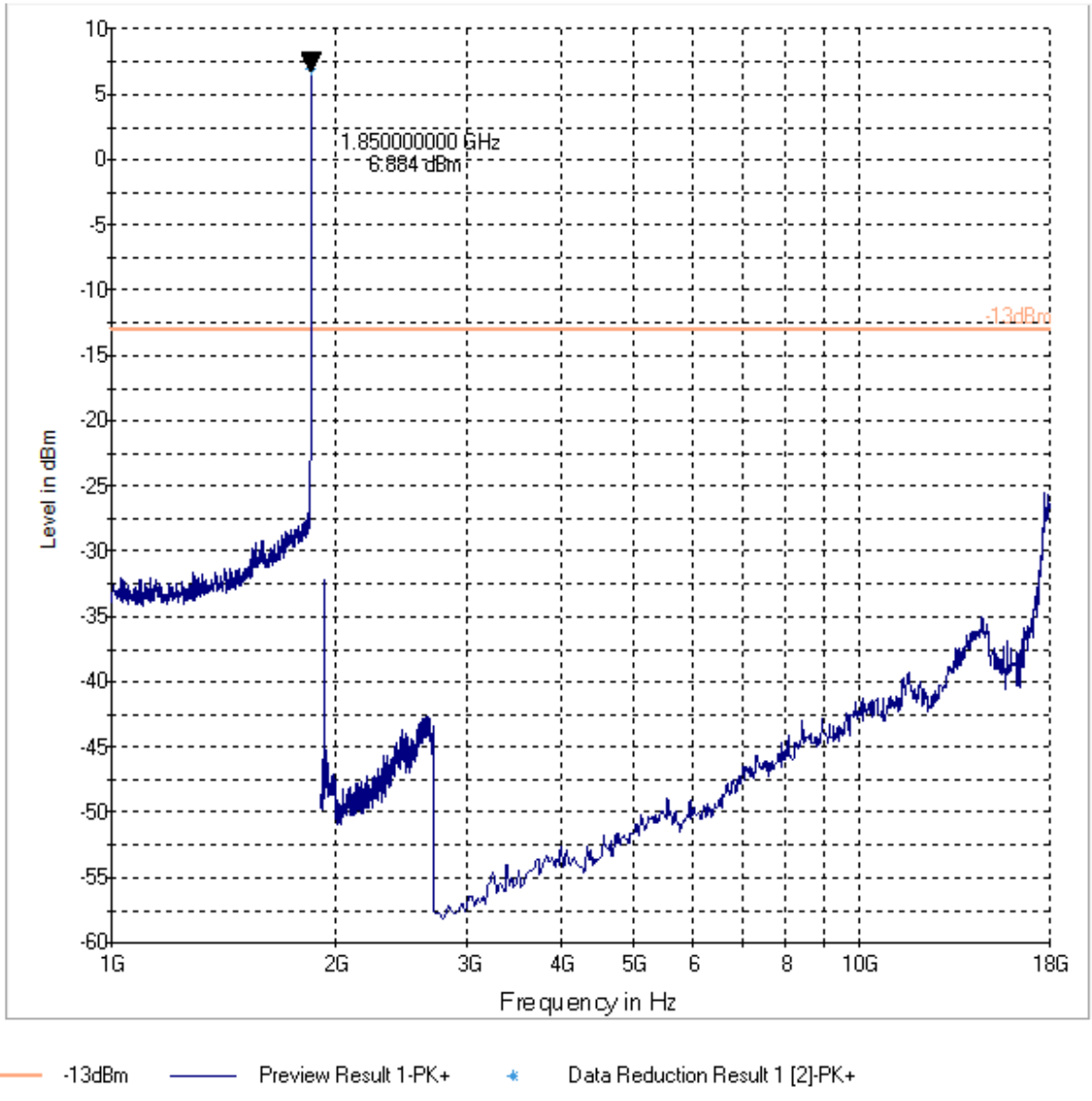


Radiated Spurious Emissions (GSM-1900) Tx: Low Channel

Test results 30MHz-1GHz

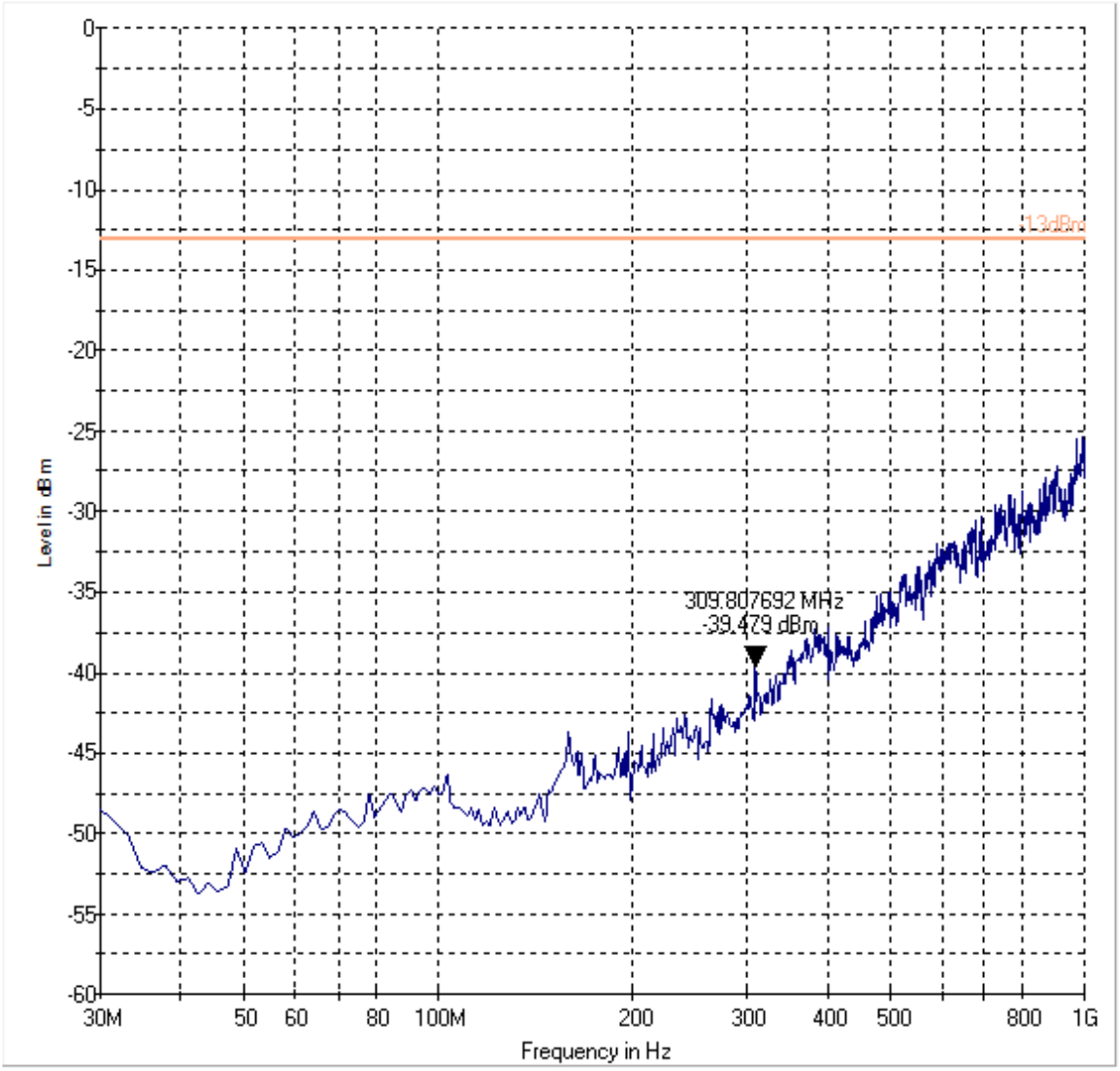


Test results 1GHz-18GHz

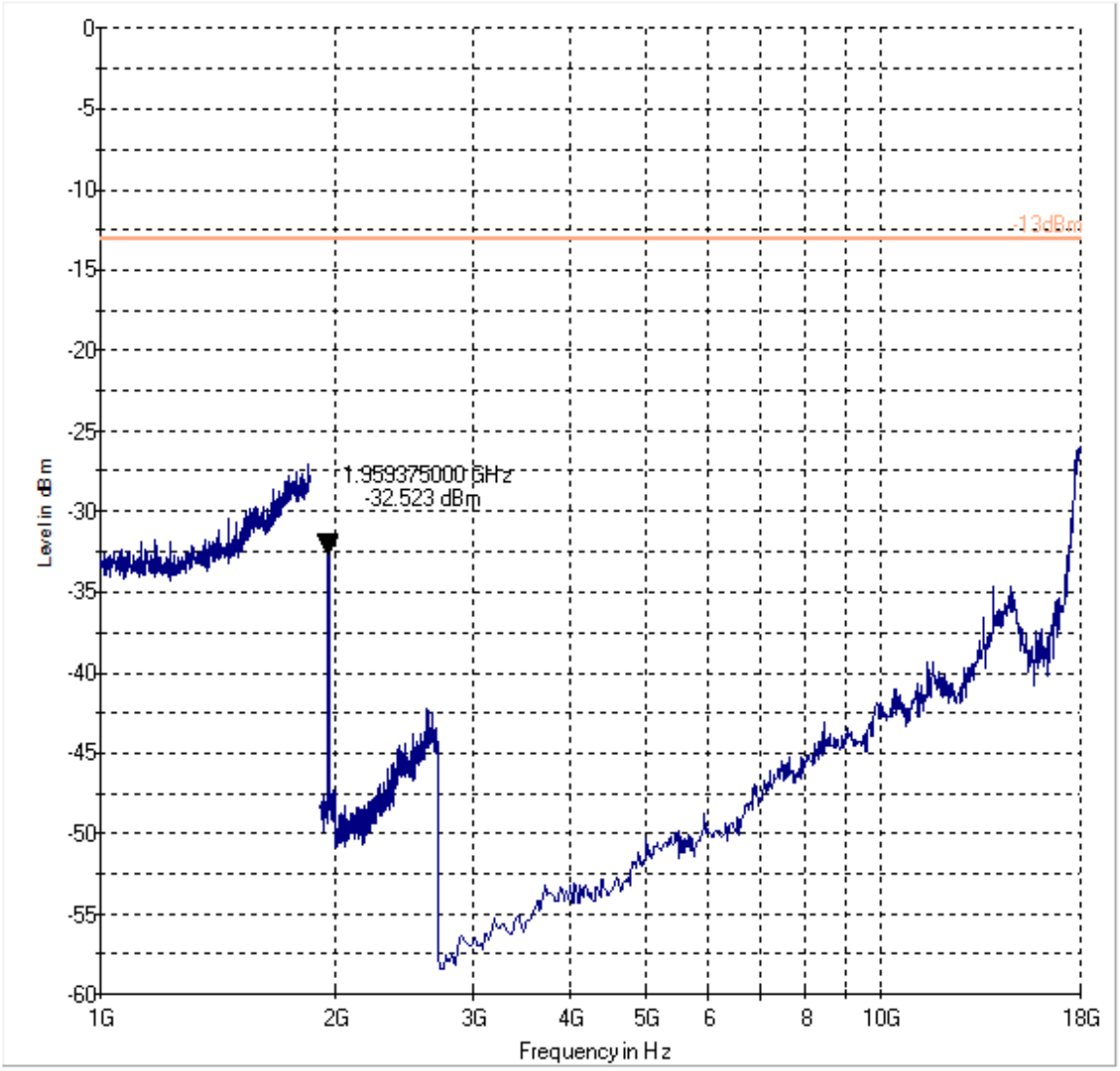


Radiated Spurious Emissions (GSM-1900) Tx Mid Channel

Test results 30MHz-1GHz

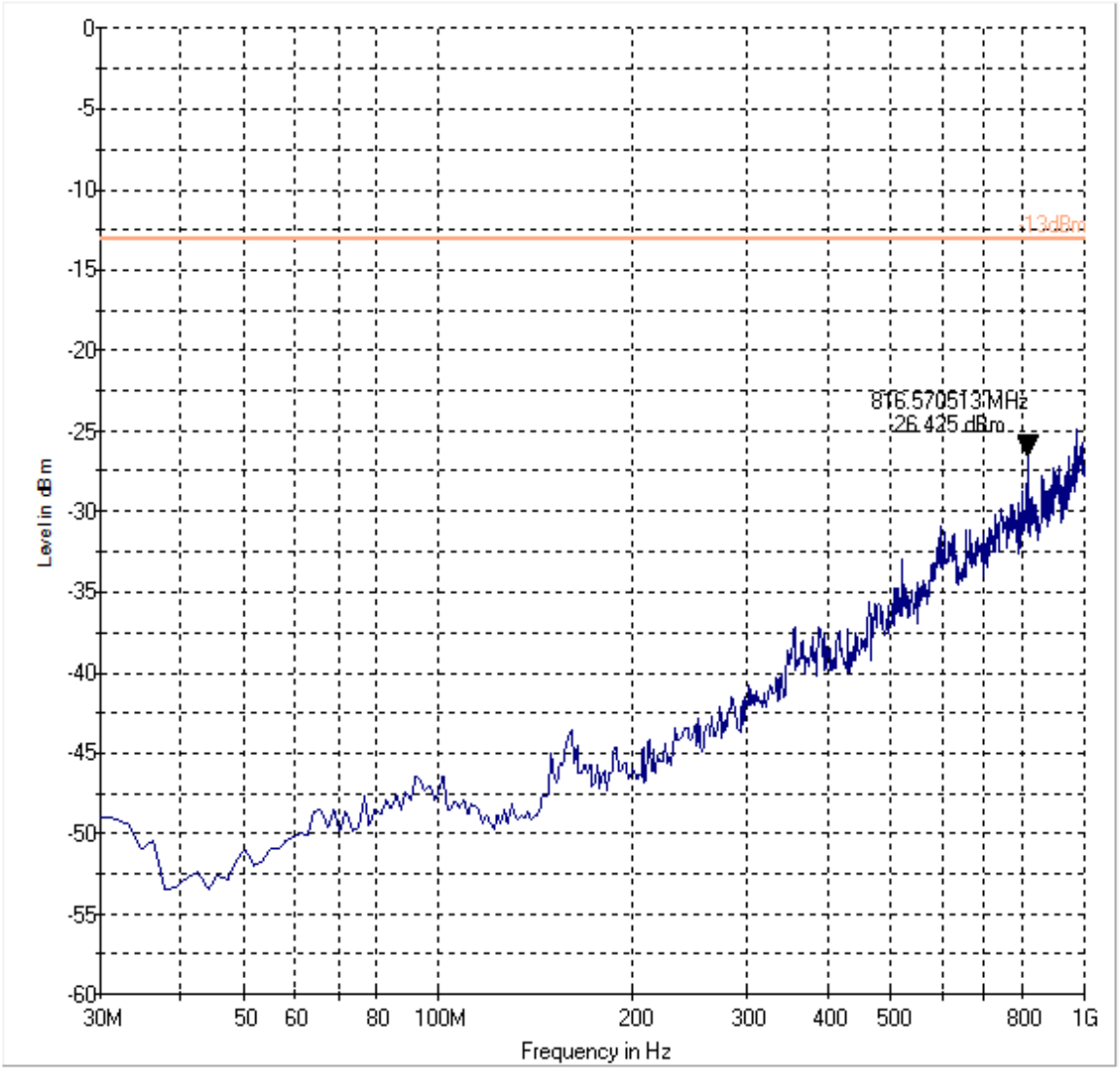


Test results 1GHz-18GHz

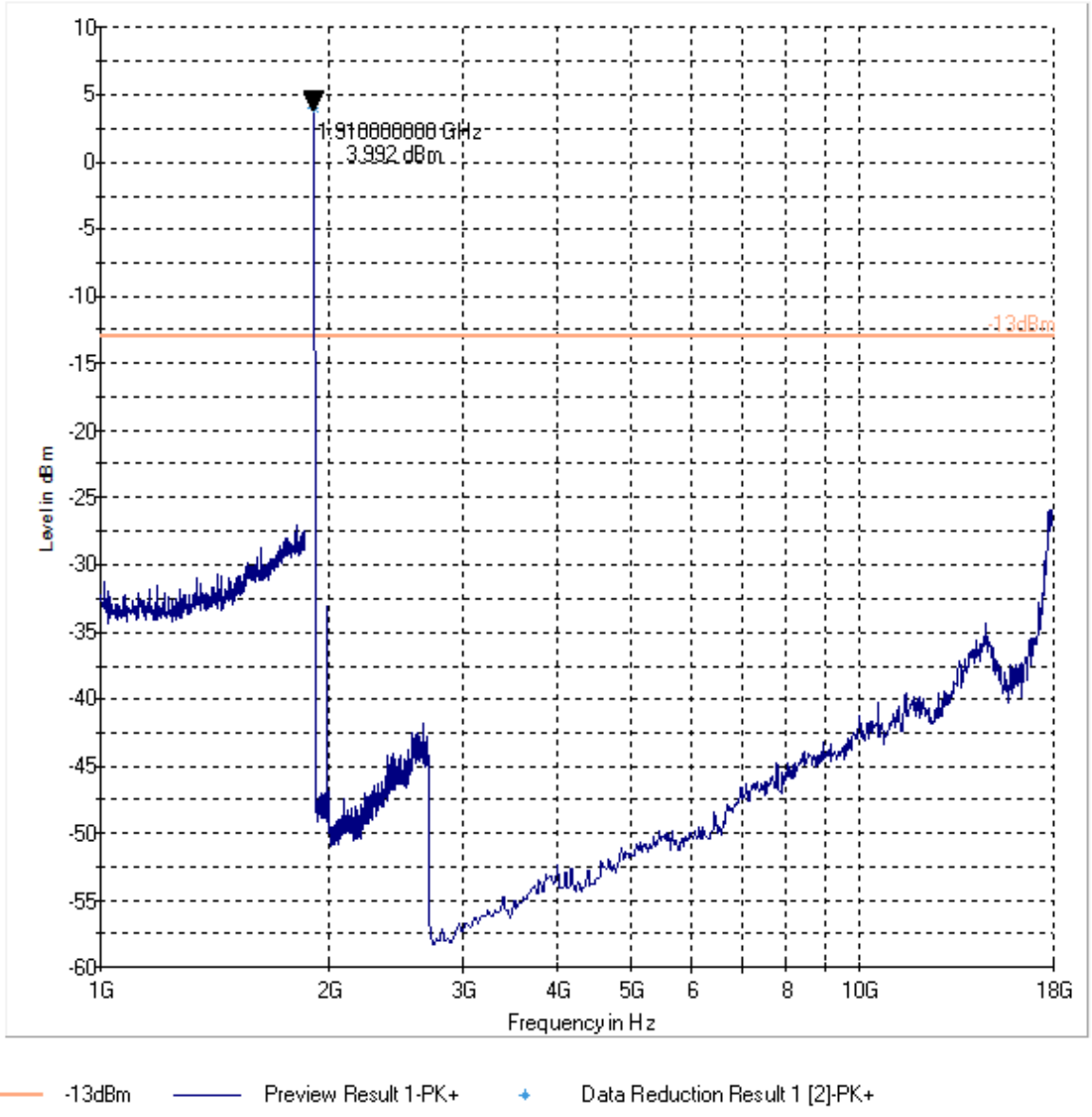


Radiated Spurious Emissions (GSM-1900) Tx: High Channel

Test results 30MHz-1GHz

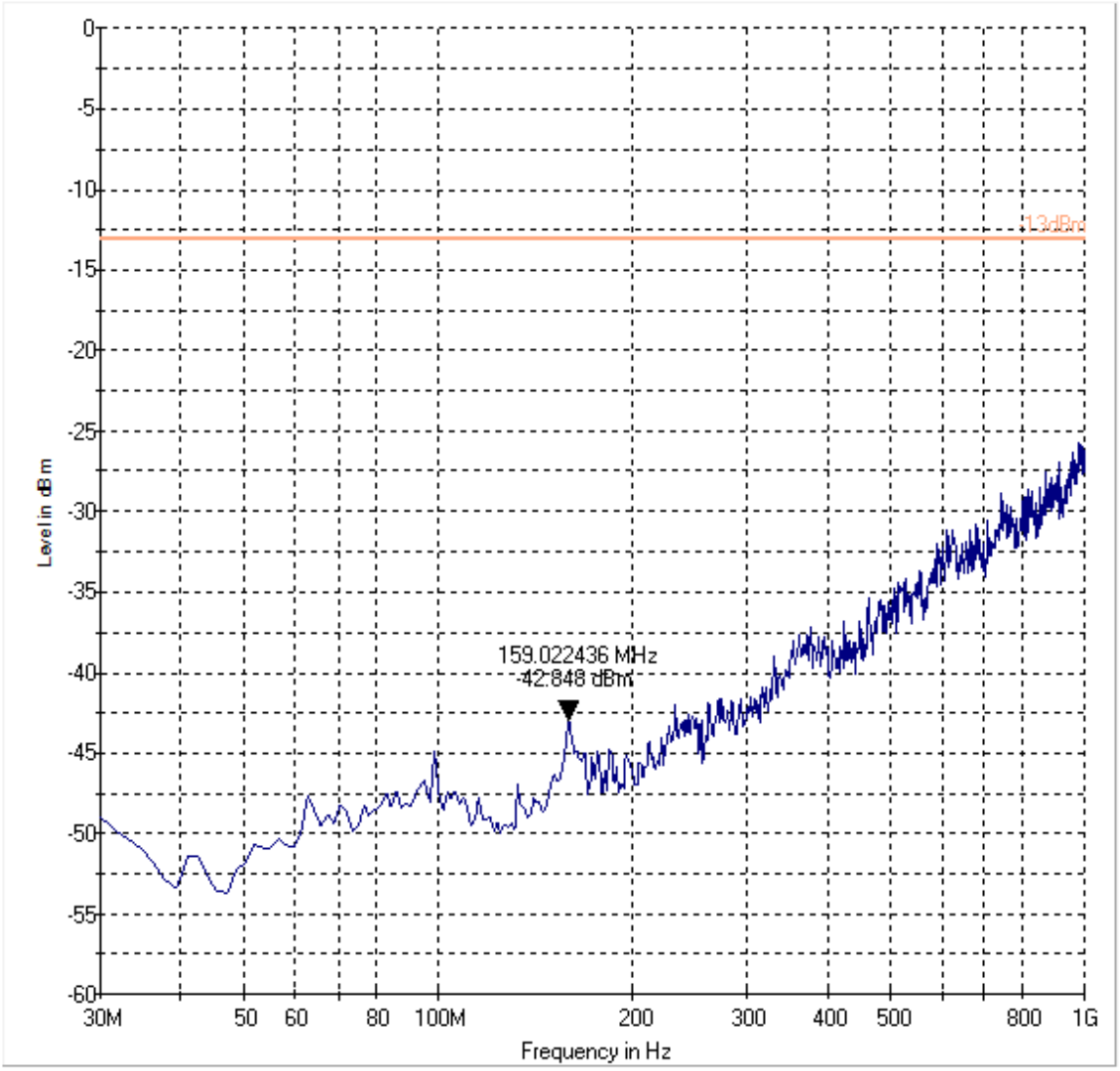


Test results 1GHz-9GHz

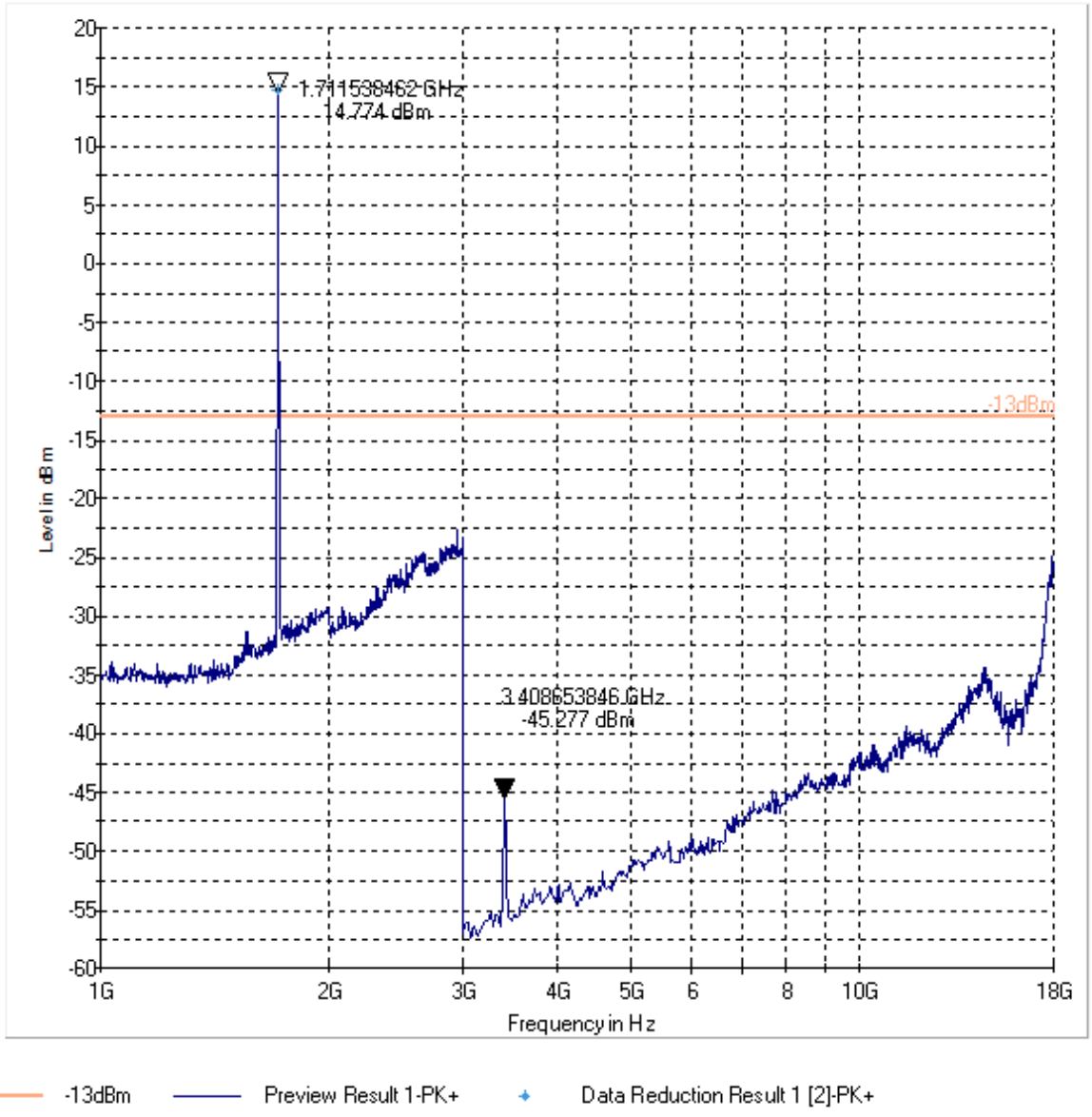


Radiated Spurious Emissions (UMTS FDD IV) Tx Low Channel

Test results 30MHz-1GHz

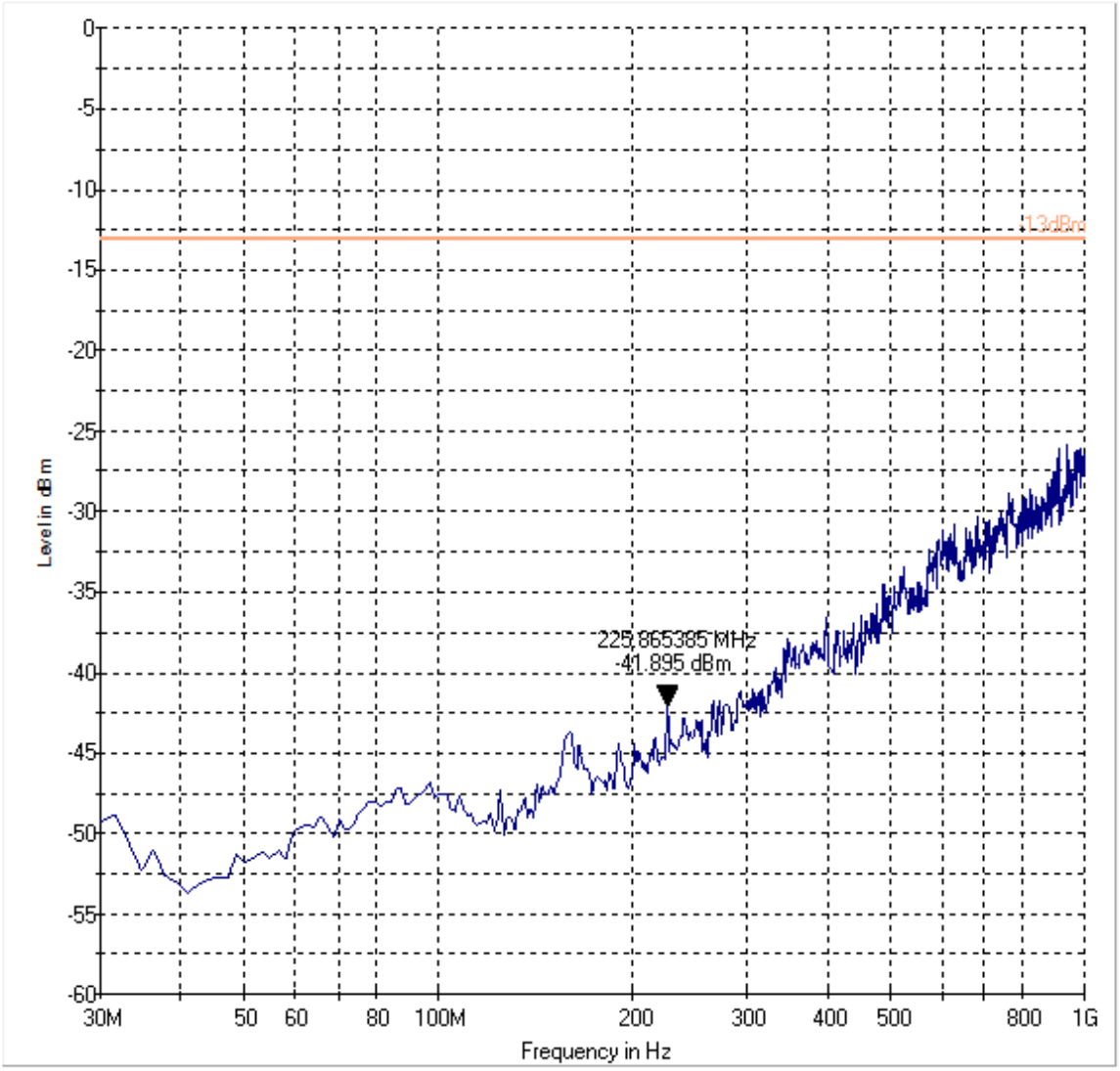


Test results 1GHz - 18GHz

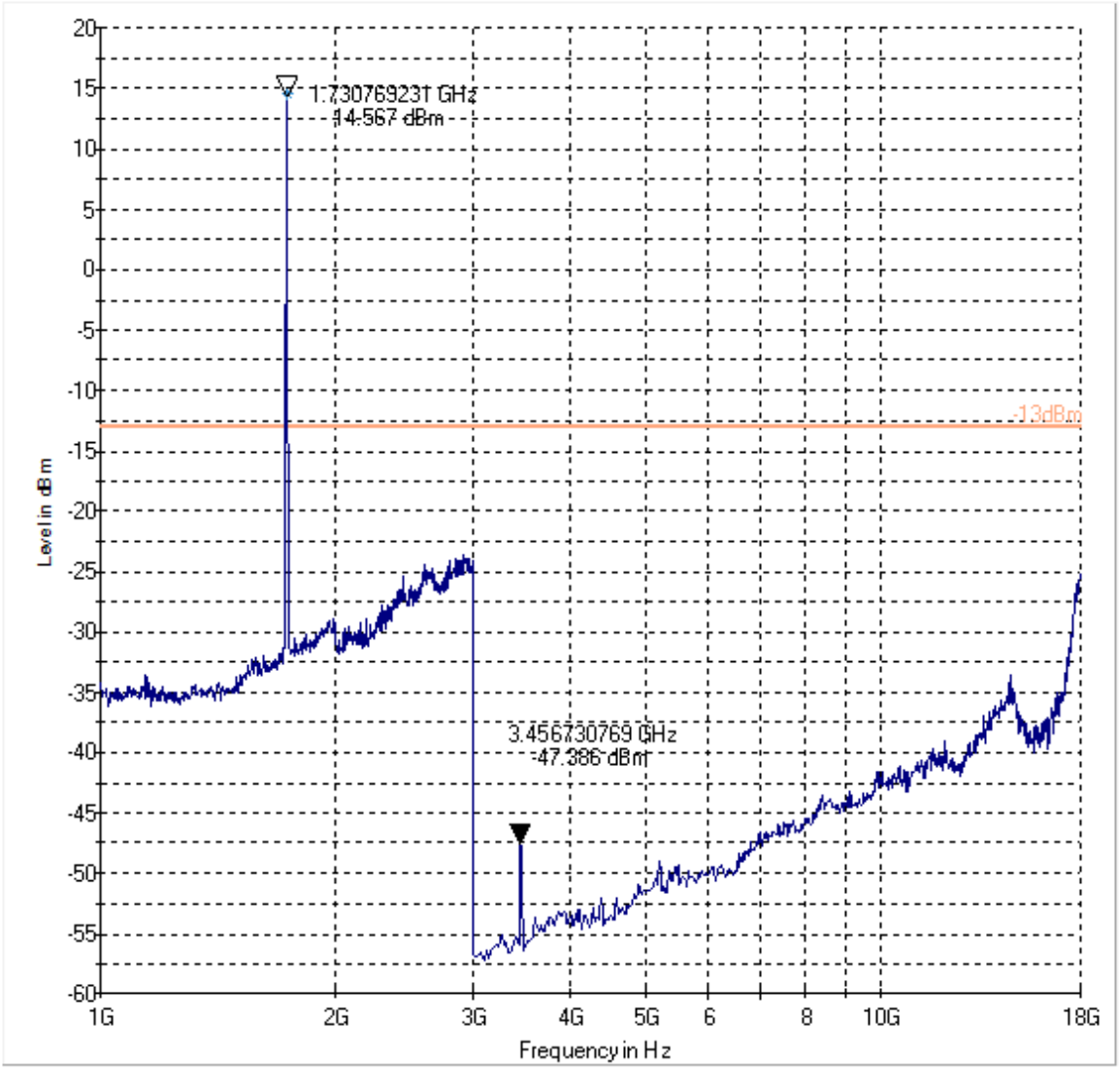


Radiated Spurious Emissions (UMTS FDD IV) Mid Channel

Test results 30MHz-1GHz

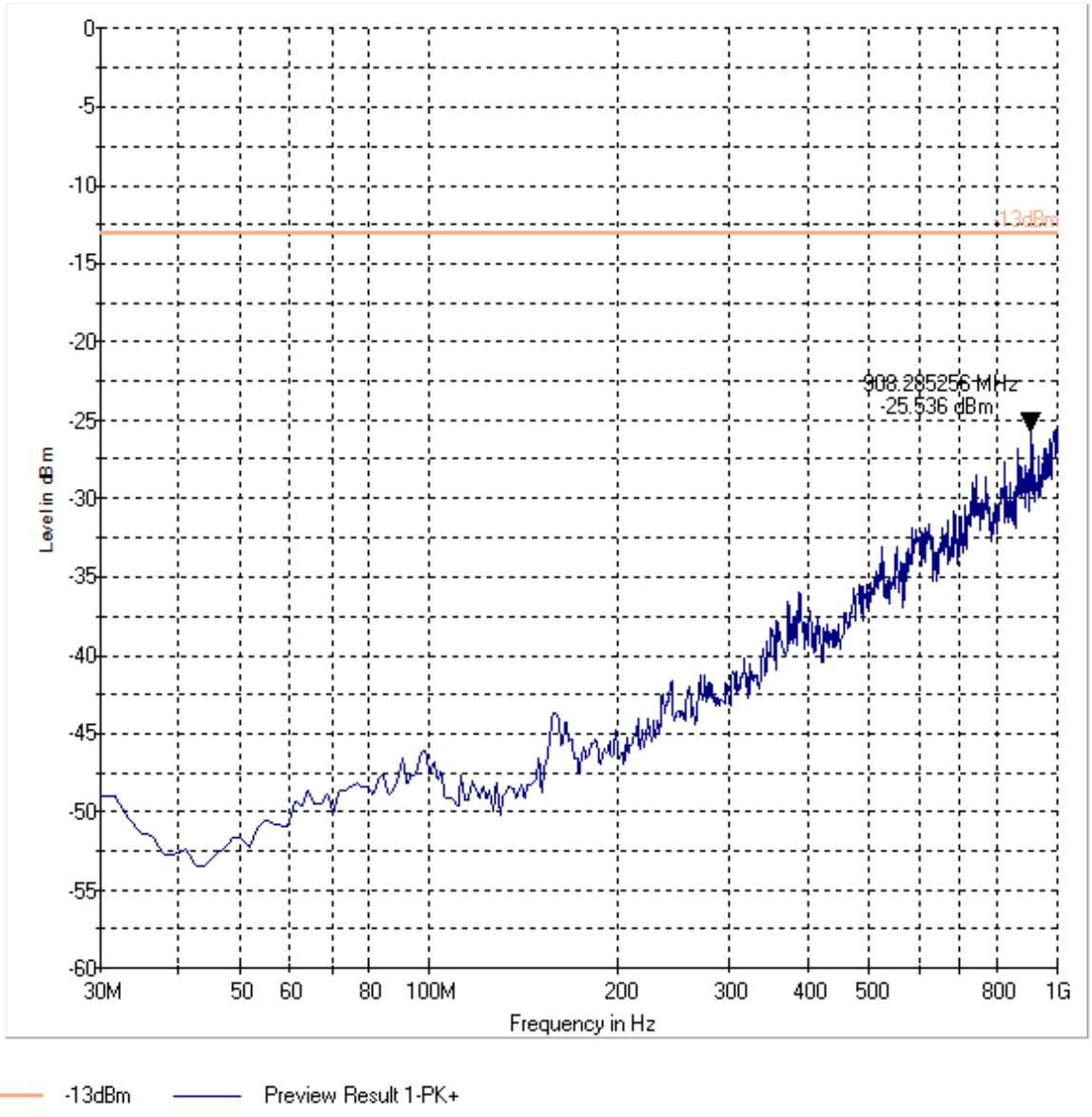


Test results 1GHz - 18GHz

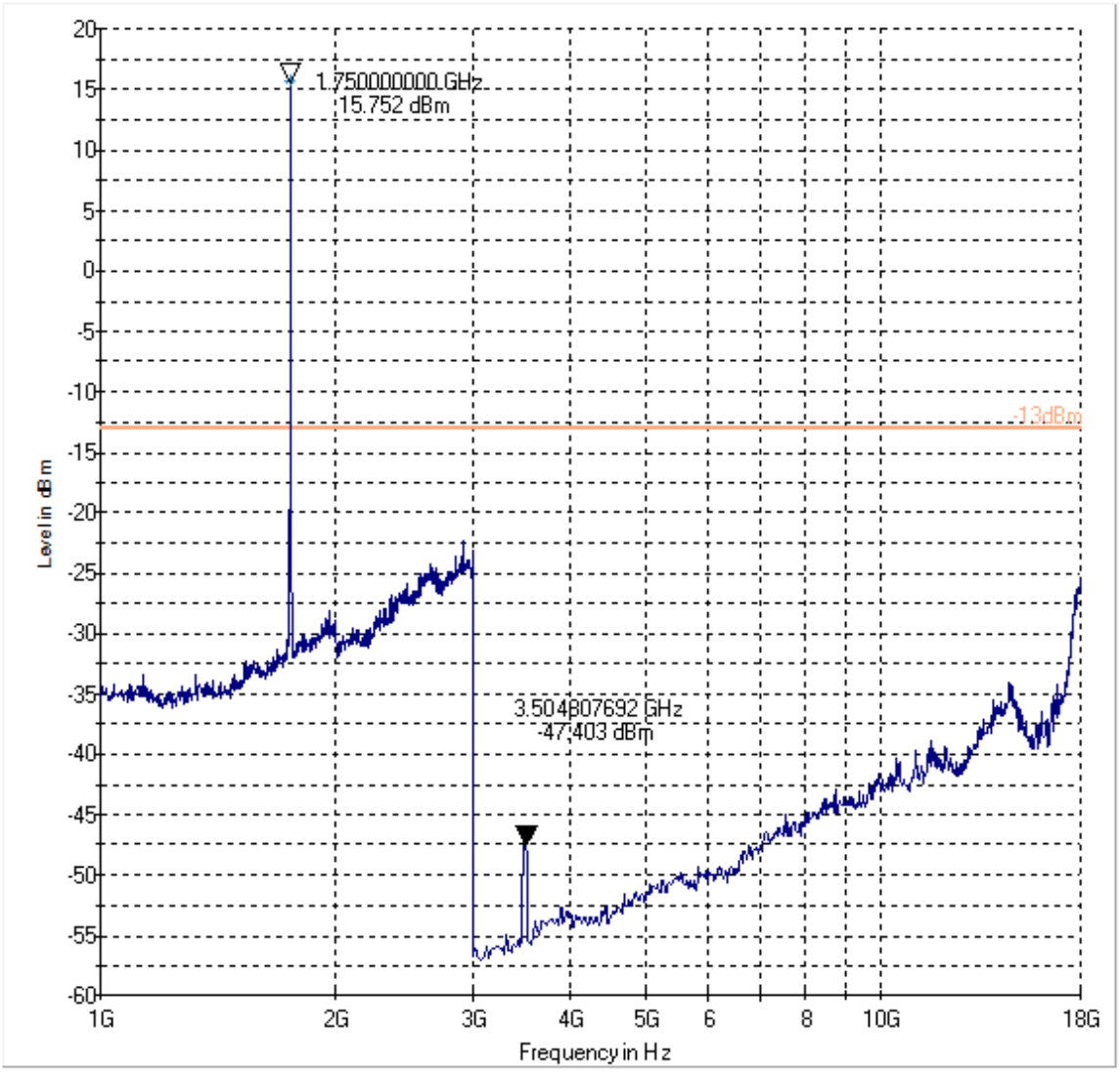


Radiated Spurious Emissions (UMTS FDD IV) High Channel

Test results 30MHz-1GHz



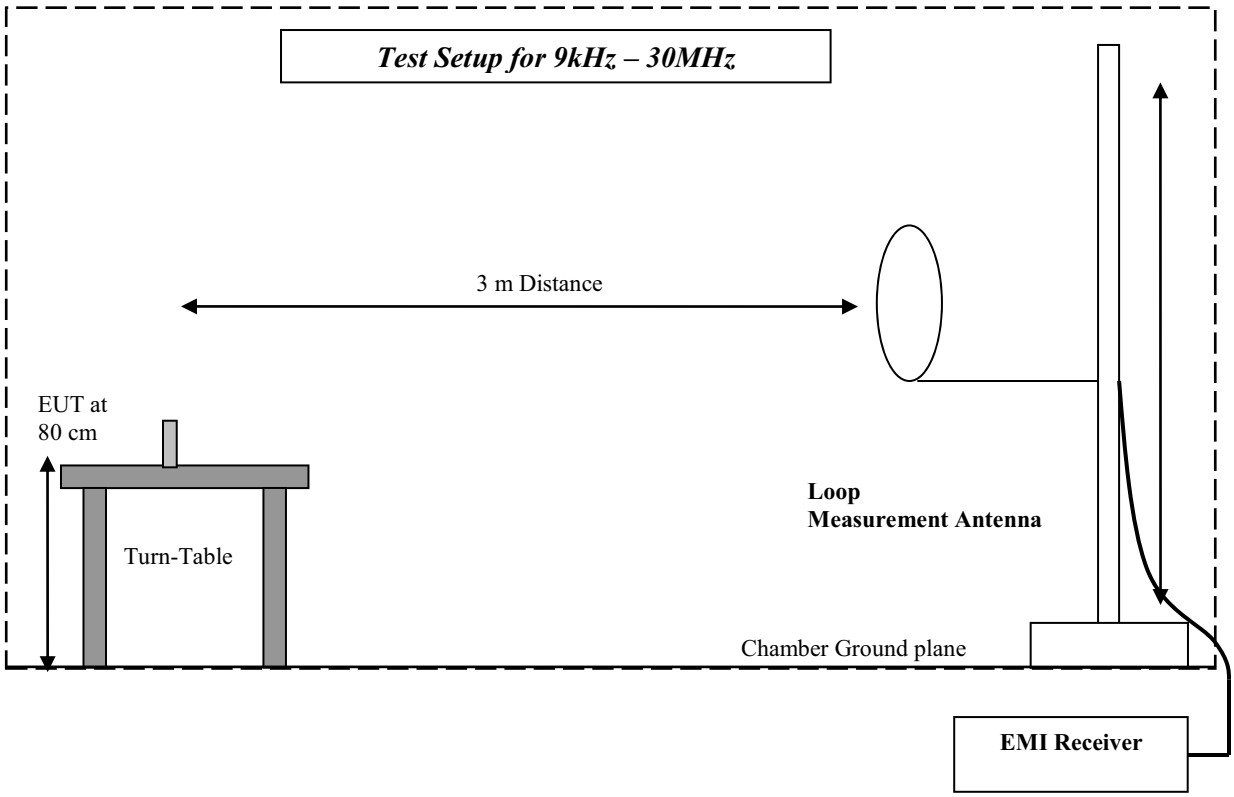
Test results 1GHz - 18GHz

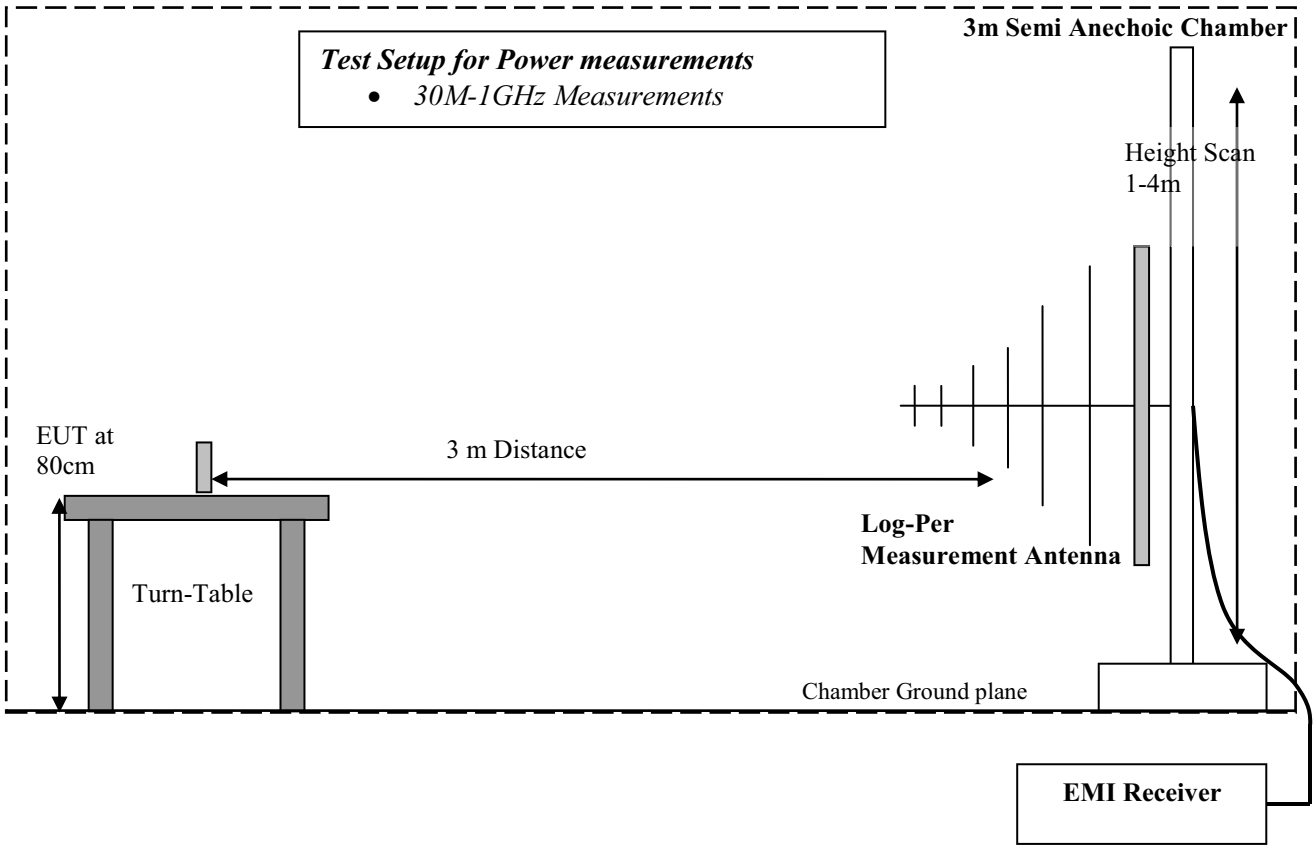


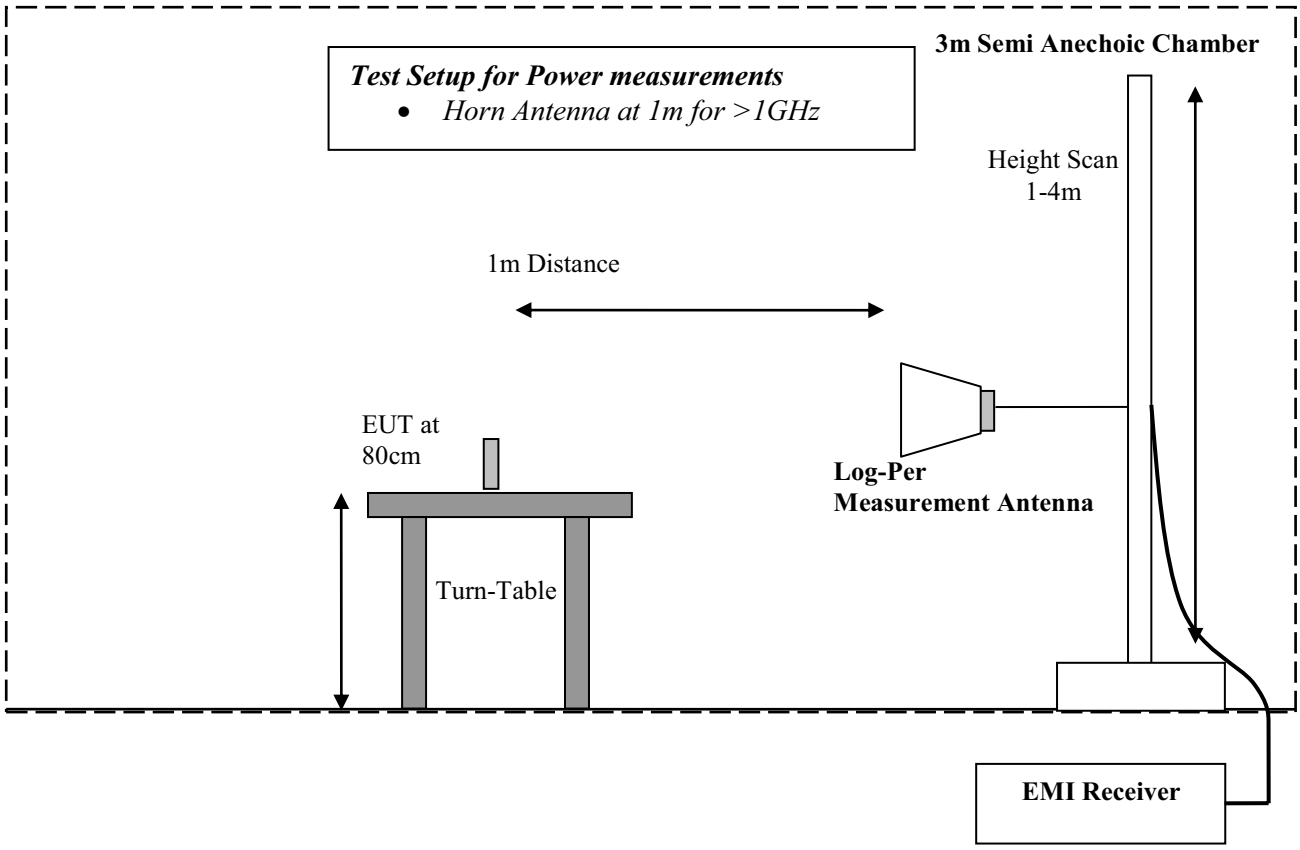
6 Test Equipment and ancillaries used for tests.

No.	Equipment Name	Manufacturer	Type/model	Serial No.	Cal Date	Cal Interval
3m Semi- Anechoic Chamber:						
	Digital Radio Comm. Tester	Rohde&Schwarz	CMU 200	101821	Jun 2013	2 Years
	EMC32 Measurement Software	Rohde&Schwarz	8.52.0	N/A	N/A	N/A
	Turn table	EMCO	2075	N/A	N/A	N/A
	MAPS Position Controller	ETS Lindgren	2092	0004-1510	N/A	N/A
	Antenna Mast	EMCO	2075	N/A	N/A	N/A
	Relay Switch Unit	Rohde&Schwarz	RSU	338964/001	N/A	N/A
	EMI Receiver/Analyzer	Rohde&Schwarz	ESU 40	100251	Sep 2013	1 Year
	1500MHz HP Filter	Filtek	HP12/1700	14c48	N/A	N/A
	2800 MHz HP Filter	Filtek	HP12/2800	14C47	N/A	N/A
	Pre-Amplifier	Miteq	JS40010260	340125	N/A	N/A
	Binconilog Antenna	EMCO	3141	0005-1186	Apr 2012	3 Years
	Horn Antenna	EMCO	3115	35114	Mar 2012	3 Years
	Horn Antenna	ETS Lindgren	3116	70497	Mar 2012	3 Years
	Spectrum Analyzer	Rohde&Schwarz	FSU	100189	Jun 2013	2 Years
	Loop Antenna 6512	ETS Lindgren	6512	49838	Mar 2014	3 Years
Ancillary equipment						
	Humidity Temperature Logger	Dickson	TM320	03280063	Apr 2013	2 Year
	Communication Antenna	IBP5-900/1940	Kathrein	N/A	N/A	N/A

7 Block Diagrams






3m Semi Anechoic Chamber
Test Setup for Power measurements
Horn Antenna at 1m for >1GHz
Height Scan
1-4m
1m Distance
EUT at
80cm
Log-Per
Measurement Antenna
Turn-Table
EMI Receiver

8 Revision History

Date	Report Name	Changes to report	Report prepared by
2014-6-18	EMC_ ETHEO-018-14001_FCC_22_24_27	1st Offical Version	jdonnellan