FCC/IC Test Report

FOR

Sony Mobile Communication AB

Type Number: PM-0745-BV

Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/IV/V/VIII; LTE FDD1/2/3/4/5/7/8; WLAN b/g/n/a/ac; BT 4.0; RFID; ANT+; A-GPS

FCC ID: PY7PM-0745
IC ID:

47 CFR Part 2, 22, 24, 27

RSS-GEN Issue 3, RSS-132 Issue 3, RSS-133 Issue 6, RSS-139 Issue 2, RSS-199 Issue 1

TEST REPORT #: EMC_CETEC_063_13001_WWAN
DATE: 2014-01-21

FCC:
A2LA Accredited

IC recognized #
3462B-1

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1 Assessment

The following device was tested against the applicable criteria specified in FCC rules parts 2, 22, 24 and 27 of Title 47 of the Code of Federal Regulations and Industry Canada Standards RSS-GEN Issue 3, RSS-132 Issue 3, RSS-133 Issue 6 and RSS-139 Issue 2, RSS-199 Issue 1.
No deviations were ascertained during the course of the tests performed.

Company	Description	Type #
Sony Mobile Communication AB	Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/IV/V/VIII; LTE FDD1/2/3/4/5/7/8; WLAN b/g/n/a/ac; BT 4.0; RFID; ANT+; A-GPS	PM-0745-BV

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2014-01-21	Compliance	Franz Engert (Manager Compliance)	Digitally signed by Franz Engert DN: cn=Franz Engert, c=US, o=CETECOM, ou=Complience, email=franz.engert@cetecom.com Date: 2014.01.23 13:17:22 -08'00'

Responsible for the Report:

Date	Section	Name	Signature
2014-01-21	Compliance	Josie Sabado (Test Lab Manager)	

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:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Test Lab Manager:	Franz Engert
Responsible Project Leader:	Kenneth Reyes

2.2 Identification of the Client

Applicant's Name:	Sony Mobile Communication AB
Address:	Nya Vattentornet 22188 Lund/SWEDEN
Contact Person:	Mikael Nilsson
Phone No.	+46 7 03 22 75 03
E-mail:	Micke.nilsson@sonymobile.com

2.3 Identification of the Manufacturer

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

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Assessment

Product Description:	Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/II/IV/V/VIII; LTE FDD1/2/3/4/5/7/8; WLAN b/g/n/a/ac; BT 4.0; RFID; ANT+; A-GPS
Type Number:	PM-0745-BV
FCC-ID:	PY7PM-0745
IC ID:	
Technology / Type(s) of Modulation:	GMSK; 8-PSK, QPSK, 16-QAM
Integrated Module Info:	1. Cellular Radio Module • GSM/EGPRS 850 / 900 / 1800 / 1900 • UMTS HSPA FDD II/IV/V • LTE FDD 2/4/5/7
Operating Frequency Ranges (MHz) / Channels:	GSM 850: 824.2 MHz -848.8 MHz; PCS 1900: 1850.2 MHz -1909.8 MHz; FDD II: 826.4 MHz - 846.6 MHz; FDD V: 1852.4 MHz -1907.6 MHz; FDD IV: 1712.4 MHz -1752.5 MHz; LTE 2: 1850.7 MHz -1909.3 MHz; LTE 4: 1710.7 MHz-1754.3 MHz; LTE 5: 824.7 MHz-848.3 MHz; LTE 7: 2502.5 MHz-2567.5 MHz;
Antenna info:	Integrated antenna
Rated Operating Voltage Range:	Vmin: 3.3V/ Vnom: 3.7V/ Vmax: 4.2V Li-polymer Battery
Rated Operating Temperature Range:	–30°C ~ +60°C
Other Radios included:	1. WLAN 802.11 b/g/n/a/ac 2.4 and 5.0 GHz bands of operation 2. Bluetooth 2.1+ EDR 3. Bluetooth 4.0 (LE) 4. ANT+ 5. GPS 1575.42 MHz 6. NFC (13.56 MHz)

3.2 Identification of the Equipment under Test (EUT)

EUT #	IMEI	Type	HW/SW Version	Sample
1	004402451808277	40YD36JI180V58B1	AP1.1 / 17.0.A.0.276	Radiated

3.3 Accessories of the EUT

AC #	Type	Manufacturer	Type	S/N
1	AC/DC Adapter	Sony Ericsson	CAA-0002016-JP B	11 11W 27 408396 SEM0205

3.4 Environmental conditions during Test:

The following environmental conditions were maintained during the course of testing:
Ambient Temperature: 20-25°C
Relative Humidity: 40-60%

3.5 Dates of Testing:

12/23/2013 – 12/27/2013

3.6 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/CMW500).
2. The EUT is tested on the low, mid and high channel of each of the supported cellular operation modes.
3. This test report only contains **radiated data result** as applicable to the specified rule parts.

4 Subject of Investigation

The objective of the measurements applied by CETECOM Inc. was to establish compliance of the EUT as described under Ch. 3 of this Test Report, with the applicable criteria specified in

- 47 CFR Part 2: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission Frequency allocations and radio treaty matters; general rules and regulations.
- 47 CFR Part 22: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 22- Public mobile services
- 47 CFR Part 24: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 24- Personal communication services
- 47 CFR Part 27: Title 47 of the Code of Federal Regulations: Chapter I-Federal Communications Commission subchapter B- common carrier services; Part 27- Miscellaneous wireless communication services
- RSS-GEN- Issue 3: General Requirements and Information for the Certification of Radio Apparatus
- RSS-132- Issue 3: Spectrum management and telecommunication policy- Radio Standards Specifications Cellular telephones employing new technologies operating in the bands 824-849MHz and 869-894MHz
- RSS-133- Issue 6: Spectrum management and telecommunication policy- Radio Standards Specifications- 2GHz personal communication services
- RSS-139- Issue 2: Spectrum management and telecommunication policy- Radio Standards Specifications- Advance wireless services equipment operating in the bands 1710-1755MHz and 2110-2155MHz
- RSS-199 Issue 1: Broadband Radio Service (BRS) equipment operating in the band 2500-2690MHz.

This test report is to support requests for new FCC and IC equipment authorizations under:

FCC ID: PY7PM-0745
IC ID:
Type Number: PM-0745-BV

5 Summary of Measurement Results

GSM 850
UMTS Band V
LTE Band 5

Specifications	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §22.913 (a) RSS-GEN, 4.8 RSS-132, 5.4	RF Output Power	Nominal	GSM 850	☐	☐	☐	■	Note 1
			UMTS Band V	☐	☐	☐	■	Note 1
			LTE Band 5	☐	☐	☐	■	Note 1
RSS-132 6.4	Peak-to-Average Ratio	Nominal	GSM 850	☐	☐	☐	■	Note 1
			UMTS Band V	☐	☐	☐	■	Note 1
			LTE Band 5	☐	☐	☐	■	Note 1
§2.1055 §22.355 RSS-GEN, 4.7 RSS-132 5.3	Frequency Stability	Nominal	GSM 850	☐	☐	☐	■	Note 1
			UMTS Band V	☐	☐	☐	■	Note 1
			LTE Band 5	☐	☐	☐	■	Note 1
§2.1049 §22.917(b) RSS-GEN, 4.6	Occupied Bandwidth	Nominal	GSM 850	☐	☐	☐	■	Note 1
			UMTS Band V	☐	☐	☐	■	Note 1
			LTE Band 5	☐	☐	☐	■	Note 1
§2.1051 §22.917 RSS-GEN, 4.9 RSS-132, 5.5	Band Edge Compliance	Nominal	GSM 850	■	☐	☐	☐	Complies
			UMTS Band V	■	☐	☐	☐	Complies
			LTE Band 5	■	☐	☐	☐	Complies
§2.1051 §22.917 RSS-GEN, 4.9 RSS-132, 5.5	Conducted Spurious Emissions	Nominal	GSM 850	☐	☐	☐	■	Note 1
			UMTS Band V	☐	☐	☐	■	Note 1
			LTE Band 5	☐	☐	☐	■	Note 1
§2.1053 §22.917 RSS-GEN, 4.9 RSS-132, 5.5	Radiated Spurious Emissions	Nominal	GSM 850	■	☐	☐	☐	Complies
			UMTS Band V	■	☐	☐	☐	Complies
			LTE Band 5	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed.
Note 1: Testing not performed by CETECOM Inc.

GSM 1900
UMTS Band II
LTE Band 2

Specifications	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §24.232 (a) RSS-GEN, 4.8 RSS-133, 6.4	RF Output Power	Nominal	GSM 1900	☐	☐	☐	■	Note 1
			UMTS Band II	☐	☐	☐	■	Note 1
			LTE Band 2	☐	☐	☐	■	Note 1
§24.232 (d) RSS-133 6.4	Peak-to-Average Ratio	Nominal	GSM 1900	☐	☐	☐	■	Note 1
			UMTS Band II	☐	☐	☐	■	Note 1
			LTE Band 2	☐	☐	☐	■	Note 1
§2.1055 §24.235 RSS-GEN, 4.7 RSS-133, 6.3	Frequency Stability	Nominal	GSM 1900	☐	☐	☐	■	Note 1
			UMTS Band II	☐	☐	☐	■	Note 1
			LTE Band 2	☐	☐	☐	■	Note 1
§2.1049 RSS-GEN, 4.6	Occupied Bandwidth	Nominal	GSM 1900	☐	☐	☐	■	Note 1
			UMTS Band II	☐	☐	☐	■	Note 1
			LTE Band 2	☐	☐	☐	■	Note 1
§2.1051 §24.238 RSS-GEN, 4.9 RSS-133, 6.5	Band Edge Compliance	Nominal	GSM 1900	■	☐	☐	☐	Complies
			UMTS Band II	■	☐	☐	☐	Complies
			LTE Band 2	■	☐	☐	☐	Complies
§2.1051 §24.238 RSS-GEN, 4.9 RSS-133, 6.5	Conducted Spurious Emissions	Nominal	GSM 1900	☐	☐	☐	■	Note 1
			UMTS Band II	☐	☐	☐	■	Note 1
			LTE Band 2	☐	☐	☐	■	Note 1
§2.1053 §24.238 RSS-GEN, 4.9 RSS-133, 6.5	Radiated Spurious Emissions	Nominal	GSM 1900	■	☐	☐	☐	Complies
			UMTS Band II	■	☐	☐	☐	Complies
			LTE Band 2	■	☐	☐	☐	Complies

Note: NA= Not Applicable; NP= Not Performed.
Note 1: Testing not performed by CETECOM Inc.

UMTS Band IV
LTE Band 4
LTE Band 7

Specifications	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
§2.1046 §27.50(d)(4) RSS-GEN, 4.8 RSS-139(6.4)	RF Output Power	Nominal	UMTS Band IV	☐	☐	☐	■	See Note1
			LTE Band 4/7	☐	☐	☐	■	See Note1
§27.50(d)(5) RSS-GEN, 4.8 RSS-139(6.4)	Peak-to-average Ratio	Nominal	UMTS Band IV	☐	☐	☐	■	See Note1
			LTE Band 4/7	☐	☐	☐	■	See Note1
§2.1055 §27.54 RSS-GEN, 4.7 RSS-139(6.3)	Frequency Stability	Nominal	UMTS Band IV	☐	☐	☐	■	See Note1
			LTE Band 4/7	☐	☐	☐	■	See Note1
§2.1049 §27.53(h) RSS-Gen, 4.6	Occupied Bandwidth	Nominal	UMTS Band IV	☐	☐	☐	■	See Note1
			LTE Band 4/7	☐	☐	☐	■	See Note1
§2.1051 §27.53(h) RSS-GEN, 4.9 RSS-139 6.5.1	Band Edge Compliance	Nominal	UMTS Band IV	■	☐	☐	☐	Complies
			LTE Band 4/7	■	☐	☐	☐	Complies
§2.1051 §27.53(h) RSS-GEN, 4.9 RSS-139 6.5	Conducted Spurious Emissions	Nominal	UMTS Band IV	☐	☐	☐	■	See Note1
			LTE Band 4/7	☐	☐	☐	■	See Note1
§2.1053 §27.53(h) RSS-GEN, 4.9 RSS-139 6.5	Radiated Spurious Emissions	Nominal	UMTS Band IV	■	☐	☐	☐	Complies
			LTE Band 4/7	■	☐	☐	☐	Complies

Note: NA= Not Applicable;
Note 1: Testing not performed by CETECOM Inc.

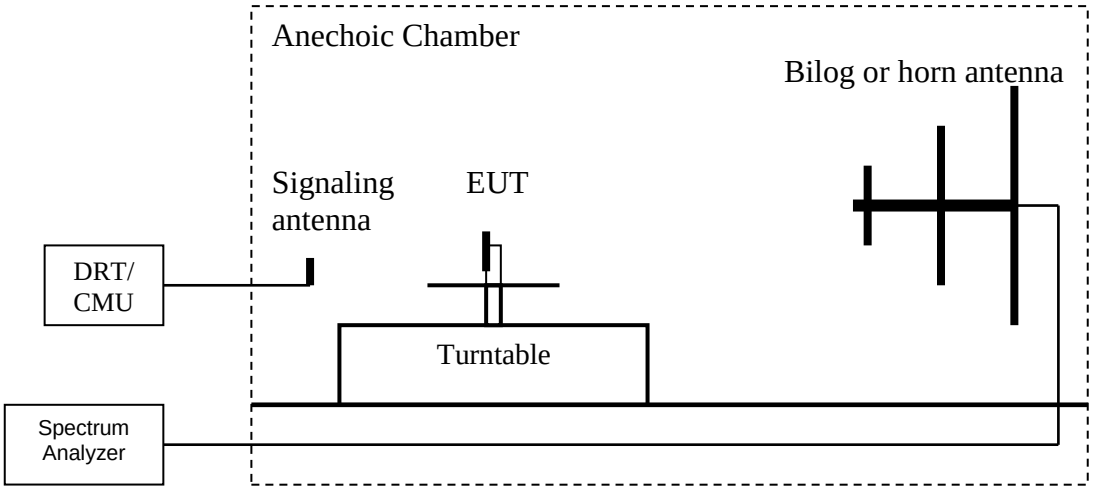
6 Measurements

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 Transmitters June 2013* and according to relevant parts of TIA-603C 2004 as detailed below.

6.1 Radiated Output Power Measurement

6.1.1 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. Set the analyzer to measure peak hold with the required settings.
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 (1 uplink slot) and UMTS RMC 12.2k

11. For LTE, EIRP measurement were made on 10MHz bandwidth with Resource Block #1 and Resource Block Start 0 as this was determined to be the worst case settings.

6.1.2 Measurement Uncertainty

+/- 3 dB

6.1.3 Test Conditions:

Tnom: 20°C; Vnom: 3.7 V

6.1.4 Test Results

6.1.4.1 RF Power Output 850MHz band

Limits:
FCC: Peak Output Power <= 38.45 dBm (7W), ERP
IC: Average EIRP <= 40.60 dBm (11.5W)

GSM 850: GMSK Mode	
Frequency (MHz)	**Radiated Power**
	ERP (dBm) peak
824.2	26.28
836.6	26.14
848.8	25.44

EGPRS 850: 8PSK Mode	
Frequency (MHz)	**Radiated Power**
	ERP (dBm) peak
824.2	23.53
836.6	23.50
848.8	22.52

FDD V: UMTS Mode	
Frequency (MHz)	**Radiated Power**
	ERP (dBm) peak
826.4	18.50
836.6	18.86
846.6	19.41

FDD 5: LTE Mode							
RB Configuration: #RB = 1 / Start RB = 0 (worst case)							
Bandwidth (MHz)	Frequency (MHz)	Radiated Power QPSK			Radiated Power 16-QAM		
		ERP (dBm) peak measured	Peak to average ratio	ERP (dBm) average	ERP (dBm) measured	Peak to average ratio	ERP (dBm) average
1.4	824.7	20.24	4.68	15.56	20.26	5.32	14.94
	836.5	20.33	5.67	14.66	20.74	4.74	16
	848.3	20.75	4.49	16.26	20.87	5.68	15.19
3	825.5	19.54	5.35	14.19	19.35	4.72	14.63
	836.5	20.00	4.71	15.29	20.07	5.64	14.43
	847.5	20.97	5.73	15.24	21.00	4.77	16.23
5	826.5	19.50	4.71	14.79	19.41	5.50	13.91
	836.5	19.50	5.02	14.48	19.65	4.77	14.88
	846.5	21.37	4.87	16.5	21.24	5.88	15.36
10	829.0	19.21	5.20	14.01	19.10	4.53	14.57
	836.5	19.22	4.50	14.72	19.23	5.06	14.17
	844.0	20.28	5.69	14.59	20.41	4.66	15.75

6.1.4.1.1 Test Verdict

Pass.

6.1.4.2 RF Power Output 1900MHz band

Limits:
FCC: Peak Output Power <= 33 dBm (2W), EIRP
IC: Average EIRP <= 30 dBm (2W)

GSM 1900: GMSK Mode	
Frequency (MHz)	**Radiated Power**
	EIRP (dBm) peak
1850.2	27.81
1880	28.53
1909.8	28.59

EGPRS 1900: 8PSK Mode	
Frequency (MHz)	**Radiated Power**
	EIRP (dBm) peak
1850.2	23.32
1880	24.31
1909.8	24.76

FDD II: UMTS Mode	
Frequency (MHz)	**Radiated Power**
	EIRP (dBm) peak
1852.4	22.48
1880	24.11
1907.6	22.63

FDD 2: LTE Mode							
RB Configuration: #RB = 1 / Start RB = 0 (worst case)							
Bandwidth (MHz)	Frequency (MHz)	Radiated Power QPSK			Radiated Power 16-QAM		
		ERP (dBm) peak measured	Peak to average ratio	EIRP (dBm) average	ERP (dBm) peak measured	Peak to average ratio	EIRP (dBm) average
1.4	1850.7	24	4.3	21.85	24.01	5.12	21.04
	1880	26.12	5.6	22.67	26.2	4.74	23.61
	1909.3	23.81	4.47	21.49	23.4	5.48	20.07
3	1851.5	23.95	5.09	21.01	23.77	4.17	21.75
	1880	26	4.51	23.64	25.91	5.25	22.81
	1908.5	23.35	5.77	19.73	23.66	4.56	21.25
5	1852.5	23.33	4.19	21.29	23.94	5.72	20.37
	1880	25.25	4.26	23.14	25.7	4.73	23.12
	1907.5	23.2	4.69	20.66	23.11	5.61	19.65
10	1855	23.37	5.20	20.32	23.38	4.28	21.25
	1880	25.05	4.55	22.65	25.15	5.49	21.81
	1905	23.49	5.44	20.2	23.6	4.52	21.23
15	1857.5	23.26	4.38	21.03	23.81	5.22	20.74
	1880	25.5	5.43	22.22	25.66	4.78	23.03
	1902.5	21.82	4.80	19.17	21.85	5.83	18.17
20	1860	23.72	5.40	20.47	23.78	4.55	21.38
	1880	25.64	5.02	22.77	23.93	5.66	20.42
	1900	23.29	5.30	20.14	23.32	4.93	20.54

6.1.4.2.1 Test Verdict:
Pass

6.1.4.3 RF Power Output 1700MHz band

Limits:
FCC: Peak Output Power < 30 dBm (1W), EIRP
IC: Average EIRP <= 30 dBm (1W)

FDD IV: UMTS Mode	
Frequency (MHz)	**Radiated Power**
	EIRP (dBm)
1712.4	21.99
1732.6	22.15
1752.6	21.74

FDD 4: LTE Mode							
RB Configuration: #RB = 1 / Start RB = 0 (worst case)							
Bandwidth (MHz)	**Frequency (MHz)**	**Radiated Power QPSK**			**Radiated Power 16-QAM**		
		ERP (dBm) peak measured	**Peak to average ratio**	**EIRP (dBm) average**	**ERP (dBm) peak measured**	**Peak to average ratio**	**EIRP (dBm) average**
1.4	**1710.7**	24.27	4.86	21.56	24.25	5.54	20.86
	1732.5	21.57	4.87	18.85	21.57	3.64	20.08
	1754.3	21.68	4.55	19.28	21.70	5.54	18.31
3	**1711.5**	24.25	5.55	20.85	24.37	4.80	21.72
	1732.5	21.42	3.59	19.98	22.03	4.78	19.4
	1753.5	21.71	5.97	17.89	21.75	4.89	19.01
5	**1712.5**	24.23	4.85	21.53	24.55	5.68	21.02
	1732.5	21.85	4.27	19.73	21.33	3.7	19.78
	1752.5	21.22	4.98	18.39	21.03	5.98	17.2
10	**1715**	24.74	5.56	21.33	24.63	4.93	21.85
	1732.5	22.02	3.91	20.26	22.08	5.13	19.1
	1750	21.35	5.96	17.54	21.26	4.88	18.53
15	**1717.5**	24.59	4.99	21.75	24.20	5.62	20.73
	1732.5	22.59	4.88	19.86	23.21	4.17	21.19

	1747.5	21.56	4.53	19.18	21.68	5.71	18.12
20	**1720**	24.48	5.76	20.87	24.01	4.91	21.25
	1732.5	22.53	4.55	20.13	23.29	5.32	20.12
	1745	20.41	4.75	17.81	20.54	3.99	18.7

Test Verdict

Pass.

6.1.4.4 RF Power Output 2600MHz band

Limits:
FCC: Peak Output Power < 30 dBm (1W), EIRP
IC: Average EIRP <= 30 dBm (1W)

FDD 7: LTE Mode							
RB Configuration: #RB = 1 / Start RB = 0 (worst case)							
Bandwidth (MHz)	Frequency (MHz)	Radiated Power QPSK			Radiated Power 16-QAM		
		EIRP (dBm) peak measured	Peak to average ratio	EIRP (dBm) average	EIRP (dBm) peak measured	Peak to average ratio	EIRP (dBm) average
5	2502.5	26.05	4.5	21.55	27.74	5.4	22.34
	2535	26.87	4.4	22.47	27.00	4.0	23
	2567.5	25.58	4.7	20.88	26.14	4.7	21.44
10	2505	26.50	5.4	21.1	27.88	4.7	23.18
	2535	26.89	4.1	22.79	27.36	5.2	22.16
	2565	24.84	4.9	19.94	26.60	4.7	21.9
15	2507.5	26.00	4.6	21.4	27.72	5.4	22.32
	2535	26.88	4.7	22.18	27.29	4.1	23.19
	2562.5	24.61	4.7	19.91	26.59	4.7	21.89
20	2510	25.74	5.4	20.34	27.38	4.5	22.88
	2535	26.44	3.9	22.54	26.62	4.7	21.92
	2560	26.19	4.3	21.89	26.62	4.7	21.92

Test Verdict
Pass.

6.2 Spurious Emissions Radiated

6.2.1 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, RSS-139 Section 6.5, RSS-199 Section 4.5.

6.2.2 Measurement requirements:

6.2.2.1 FCC 2.1053: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

6.2.2.2 RSS-Gen 4.9: Transmitter unwanted spurious emissions

The same parameter, peak power or average power, used for the transmitter output power measurement shall be used for unwanted emission measurements.
The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lower, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

6.2.3 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.

6.2.3.1 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.

6.2.3.2 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.

6.2.3.3 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.

6.2.3.4 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), dD.

6.2.3.5 RSS-199 Section 4.5

The unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth in the 1 MHz band immediately outside and adjacent to the channel edge of the equipment. Beyond the 1 MHz band immediately outside the channel edge of the equipment, a resolution bandwidth of 1 MHz shall be employed. A narrower resolution bandwidth is allowed to be used provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz or 1% of the occupied bandwidth as applicable.

The power of any unwanted emissions measured from the channel edge of the equipment shall be attenuated below the transmitter power, P (dBW), as follows:

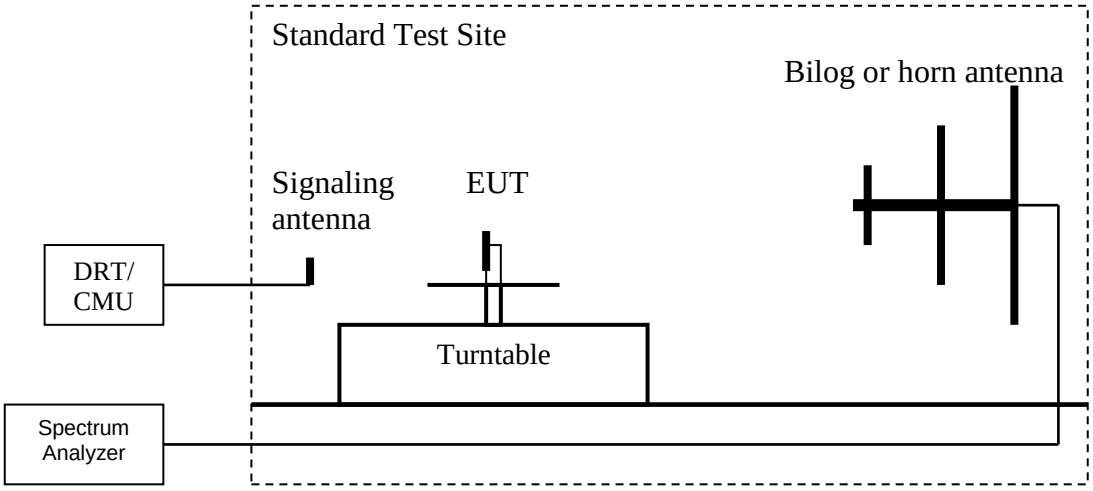
a. for base station and subscriber equipment, other than mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log_{10} (p), dB; and

b. for mobile subscriber equipment, the attenuation shall not be less than 43 + 10 Log_{10} (p), dB at the channel edges and 55 + 10 Log_{10} (p) at 5.5 MHz away and beyond the channel edges

where p in (a) and (b) is the transmitter power measured in watts.

6.2.4 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.)

6.2.5 Sample Calculations for Radiated Measurements

6.2.5.1 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:

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

6.2.6 Measurement Survey:

The site is constructed in accordance with ANSI C63.4 requirements and is recognized by the FCC to be in compliance for a 3m site. The spectrum is scanned from 9kHz to the 10th harmonic of the highest frequency generated by the EUT.
Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the 850 MHz and 1900 MHz bands of operation.
It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the GSM-850 MHz and the PCS-1900 MHz band into any of the other blocks respectively. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

Radiated emission measurements were made in GMSK (1 uplink slot) and UMTS RMC 12.2k. Additional spot checks in mid channel of operation for all modes were performed with the slimmer battery option of the device.

For radiated measurements, all data in this report shows the worst case emissions data between H/V antenna polarizations and for all 3 orthogonal orientations of the EUT.

Unless mentioned otherwise, the emission signals above the limit line in the plots are from the carrier.

6.2.7 Test Conditions:

Tnom: 20°C; Vnom: 3.6 V

6.2.8 Test Results:

6.2.8.1 Test Results Transmitter Spurious Emission GSM850

Harmonic	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
2	1648.4	NF	1673.2	NF	1697.6	NF
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						

6.2.8.2 Test Results Transmitter Spurious Emission UMTS FDD V

Harmonic	Tx ch-4132 Freq. (MHz)	Level (dBm)	Tx ch-4183 Freq. (MHz)	Level (dBm)	Tx ch-4233 Freq. (MHz)	Level (dBm)
2	**1652.8**	NF	**1673.2**	NF	**1693.2**	NF
3	**2479.2**	NF	**2509.8**	NF	**2539.8**	NF
4	**3305.6**	NF	**3346.4**	NF	**3386.4**	NF
5	**4132**	NF	**4183**	NF	**4233**	NF
6	**4958.4**	NF	**5019.6**	NF	**5079.6**	NF
7	**5784.8**	NF	**5856.2**	NF	**5926.2**	NF
8	**6611.2**	NF	**6692.8**	NF	**6772.8**	NF
9	**7437.6**	NF	**7529.4**	NF	**7619.4**	NF
10	**8264**	NF	**8366**	NF	**8466**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.2.8.3 Test Results Transmitter Spurious Emission LTE FDD 5 QPSK; 10MHz BW

Harmonic	Tx ch-20450 Freq. (MHz)	Level (dBm)	Tx ch-20525 Freq. (MHz)	Level (dBm)	Tx ch-20600 Freq. (MHz)	Level (dBm)
2	**1658.0**	NF	**1673.0**	NF	**1688.0**	NF
3	**2487.0**	NF	**2509.5**	NF	**2532.0**	NF
4	**3316.0**	NF	**3346.0**	NF	**3376.0**	NF
5	**4145.0**	NF	**4182.5**	NF	**4220.0**	NF
6	**4974.0**	NF	**5019.0**	NF	**5064.0**	NF
7	**5803.0**	NF	**5855.5**	NF	**5908.0**	NF
8	**6632.0**	NF	**6692.0**	NF	**6752.0**	NF
9	**7461.0**	NF	**7528.5**	NF	**7596.0**	NF
10	**8290.0**	NF	**8365.0**	NF	**8440.0**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.2.8.4 Test Results Transmitter Spurious Emission LTE FDD 5 16-QAM; 10MHz BW

Harmonic	Tx ch-20450 Freq. (MHz)	Level (dBm)	Tx ch-20525 Freq. (MHz)	Level (dBm)	Tx ch-20600 Freq. (MHz)	Level (dBm)
2	**1658.0**	NF	**1673.0**	NF	**1688.0**	NF
3	**2487.0**	NF	**2509.5**	NF	**2532.0**	NF
4	**3316.0**	NF	**3346.0**	NF	**3376.0**	NF
5	**4145.0**	NF	**4182.5**	NF	**4220.0**	NF
6	**4974.0**	NF	**5019.0**	NF	**5064.0**	NF
7	**5803.0**	NF	**5855.5**	NF	**5908.0**	NF
8	**6632.0**	NF	**6692.0**	NF	**6752.0**	NF
9	**7461.0**	NF	**7528.5**	NF	**7596.0**	NF
10	**8290.0**	NF	**8365.0**	NF	**8440.0**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.2.8.5 Test Results Transmitter Spurious Emission PCS-1900

Harmonic	Tx ch-512 Freq.(MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	**3700.4**	NF	**3760**	NF	**3819.6**	NF
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						

6.2.8.6 Test Results Transmitter Spurious Emission UMTS FDD II

Harmonic	Tx ch-9262 Freq. (MHz)	Level (dBm)	Tx ch-9400 Freq. (MHz)	Level (dBm)	Tx ch-9538 Freq. (MHz)	Level (dBm)
2	**3704.8**	NF	**3760**	NF	**3815.2**	NF
3	**5557.2**	NF	**5640**	NF	**5722.8**	NF
4	**7409.6**	NF	**7520**	NF	**7630.4**	NF
5	**9262**	NF	**9400**	NF	**9538**	NF
6	**11114.4**	NF	**11280**	NF	**11445.6**	NF
7	**12966.8**	NF	**13160**	NF	**13353.2**	NF
8	**14819.2**	NF	**15040**	NF	**15260.8**	NF
9	**16671.6**	NF	**16920**	NF	**17168.4**	NF
10	**18524**	NF	**18800**	NF	**19076**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.2.8.7 Test Results Transmitter Spurious Emission LTE FDD 2 QPSK; 10MHz BW

Harmonic	Tx ch-18650 Freq. (MHz)	Level (dBm)	Tx ch-18900 Freq. (MHz)	Level (dBm)	Tx ch-19150 Freq. (MHz)	Level (dBm)
2	**5565.0**	NF	**5640.0**	NF	**5715.0**	NF
3	**7420.0**	NF	**7520.0**	NF	**7620.0**	NF
4	**9275.0**	NF	**9400.0**	NF	**9525.0**	NF
5	**11130.0**	NF	**11280.0**	NF	**11430.0**	NF
6	**12985.0**	NF	**13160.0**	NF	**13335.0**	NF
7	**14840.0**	NF	**15040.0**	NF	**15240.0**	NF
8	**16695.0**	NF	**16920.0**	NF	**17145.0**	NF
9	**18550.0**	NF	**18800.0**	NF	**19050.0**	NF
10	**3710.0**	NF	**3760.0**	NF	**3810.0**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.2.8.8 Test Results Transmitter Spurious Emission LTE FDD 2 16-QAM; 10MHz BW

Harmonic	Tx ch-18650 Freq. (MHz)	Level (dBm)	Tx ch-18900 Freq. (MHz)	Level (dBm)	Tx ch-19150 Freq. (MHz)	Level (dBm)
2	**5565.0**	NF	**5640.0**	NF	**5715.0**	NF
3	**7420.0**	NF	**7520.0**	NF	**7620.0**	NF
4	**9275.0**	NF	**9400.0**	NF	**9525.0**	NF
5	**11130.0**	NF	**11280.0**	NF	**11430.0**	NF
6	**12985.0**	NF	**13160.0**	NF	**13335.0**	NF
7	**14840.0**	NF	**15040.0**	NF	**15240.0**	NF
8	**16695.0**	NF	**16920.0**	NF	**17145.0**	NF
9	**18550.0**	NF	**18800.0**	NF	**19050.0**	NF
10	**3710.0**	NF	**3760.0**	NF	**3810.0**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.2.8.9 Test Results Transmitter Spurious Emission UMTS FDD IV

Harmonic	Tx ch-1312 Freq. (MHz)	Level (dBm)	Tx ch-1413 Freq. (MHz)	Level (dBm)	Tx ch-1513 Freq. (MHz)	Level (dBm)
2	3424.8	NF	3465.2	NF	3505.2	NF
3	5137.2	NF	5197.8	NF	5257.8	NF
4	6849.6	NF	6930.4	NF	7010.4	NF
5	8562	NF	8663	NF	8763	NF
6	10274.4	NF	10395.6	NF	10515.6	NF
7	11986.8	NF	12128.2	NF	12268.2	NF
8	13699.2	NF	13860.8	NF	14020.8	NF
9	15411.6	NF	15593.4	NF	15773.4	NF
10	17124	NF	17326	NF	17526	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.2.8.10 Test Results Transmitter Spurious Emission LTE FDD 4 QPSK 10MHz BW

Harmonic	Tx ch-20000 Freq. (MHz)	Level (dBm)	Tx ch-20175 Freq. (MHz)	Level (dBm)	Tx ch-20350 Freq. (MHz)	Level (dBm)
2	**3430**	NF	**3465**	NF	**3500**	NF
3	**5145**	NF	**5197.5**	NF	**5250**	NF
4	**6860**	NF	**6930**	NF	**7000**	NF
5	**8575**	NF	**8662.5**	NF	**8750**	NF
6	**10290**	NF	**10395**	NF	**10500**	NF
7	**12005**	NF	**12127.5**	NF	**12250**	NF
8	**13720**	NF	**13860**	NF	**14000**	NF
9	**15435**	NF	**15592.5**	NF	**15750**	NF
10	**17150**	NF	**17325**	NF	**17500**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.2.8.11 Test Results Transmitter Spurious Emission LTE FDD 4 16-QAM 10MHz BW

Harmonic	Tx ch-20000 Freq. (MHz)	Level (dBm)	Tx ch-20175 Freq. (MHz)	Level (dBm)	Tx ch-20350 Freq. (MHz)	Level (dBm)
2	**3430**	NF	**3465**	NF	**3500**	NF
3	**5145**	NF	**5197.5**	NF	**5250**	NF
4	**6860**	NF	**6930**	NF	**7000**	NF
5	**8575**	NF	**8662.5**	NF	**8750**	NF
6	**10290**	NF	**10395**	NF	**10500**	NF
7	**12005**	NF	**12127.5**	NF	**12250**	NF
8	**13720**	NF	**13860**	NF	**14000**	NF
9	**15435**	NF	**15592.5**	NF	**15750**	NF
10	**17150**	NF	**17325**	NF	**17500**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

6.2.8.12 Test Results Transmitter Spurious Emission LTE FDD 7 QPSK 10MHz BW

Harmonic	Tx ch-20800 Freq. (MHz)	Level (dBm)	Tx ch-21100 Freq. (MHz)	Level (dBm)	Tx ch-21400 Freq. (MHz)	Level (dBm)
2	**5010**	NF	**5070**	NF	**5130**	NF
3	**7515**	NF	**7605**	NF	**7695**	NF
4	**10020**	NF	**10140**	NF	**10260**	NF
5	**12525**	NF	**12675**	NF	**12825**	NF
6	**15030**	NF	**15210**	NF	**15390**	NF
7	**17535**	NF	**17745**	NF	**17955**	NF
8	**20040**	NF	**20280**	NF	**20520**	NF
9	**22545**	NF	**22815**	NF	**23085**	NF
10	**25050**	NF	**25350**	NF	**25650**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

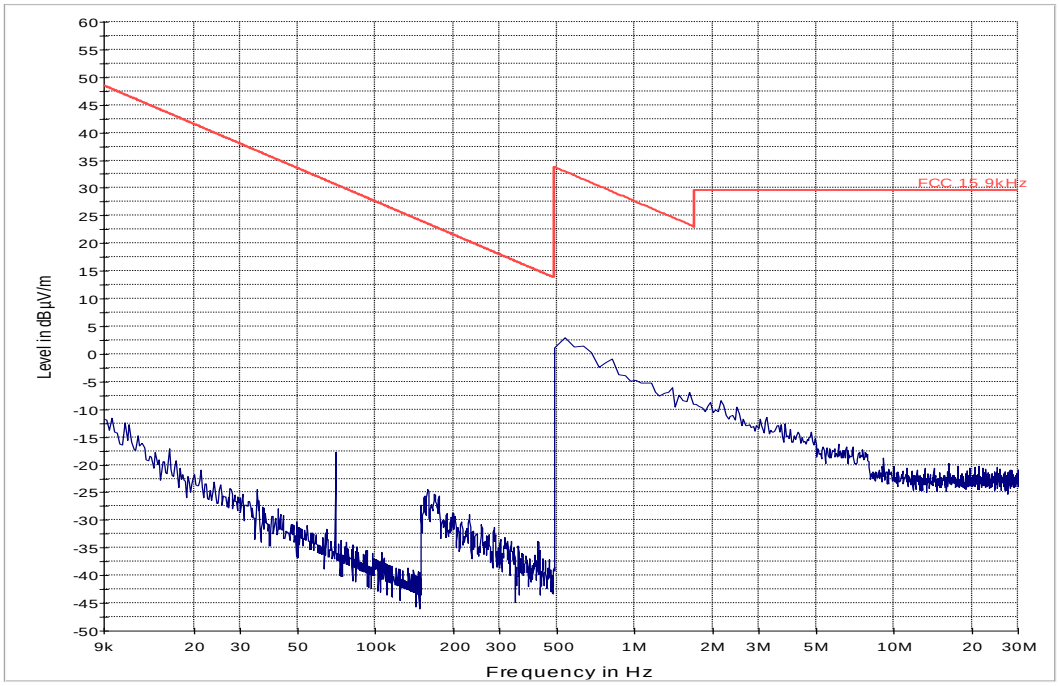
6.2.8.13 Test Results Transmitter Spurious Emission LTE FDD 7 16-QAM 10MHz BW

Harmonic	Tx ch-20800 Freq. (MHz)	Level (dBm)	Tx ch-21100 Freq. (MHz)	Level (dBm)	Tx ch-21400 Freq. (MHz)	Level (dBm)
2	**5010**	NF	**5070**	NF	**5130**	NF
3	**7515**	NF	**7605**	NF	**7695**	NF
4	**10020**	NF	**10140**	NF	**10260**	NF
5	**12525**	NF	**12675**	NF	**12825**	NF
6	**15030**	NF	**15210**	NF	**15390**	NF
7	**17535**	NF	**17745**	NF	**17955**	NF
8	**20040**	NF	**20280**	NF	**20520**	NF
9	**22545**	NF	**22815**	NF	**23085**	NF
10	**25050**	NF	**25350**	NF	**25650**	NF
NF= Noise Floor Measurement Uncertainty: ±3dB						

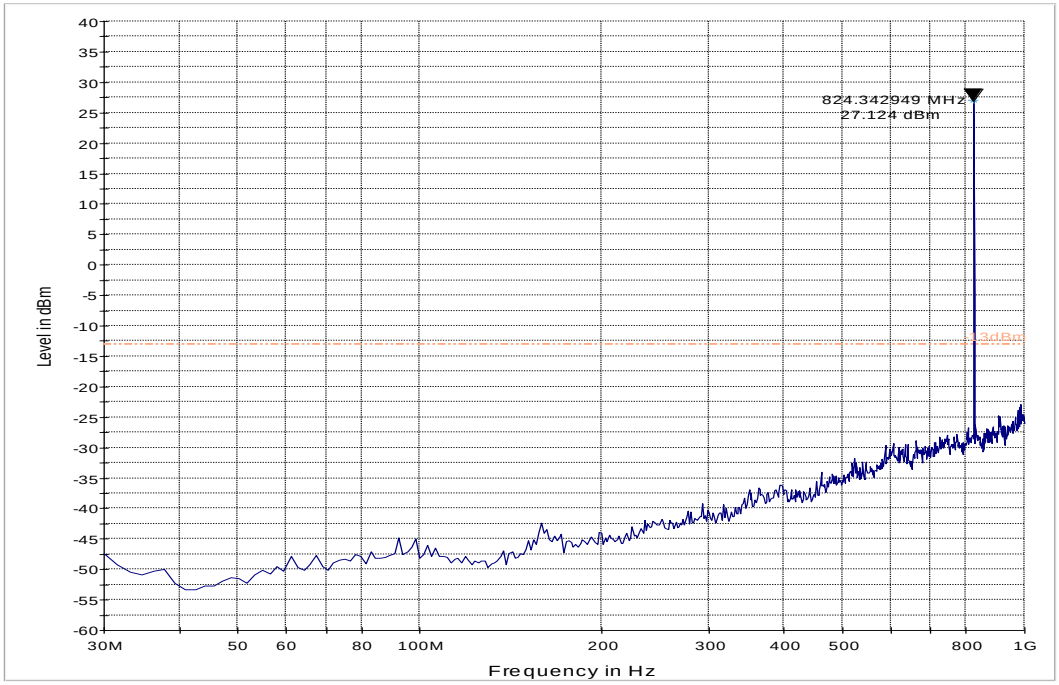
6.2.8.14 Plots:

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

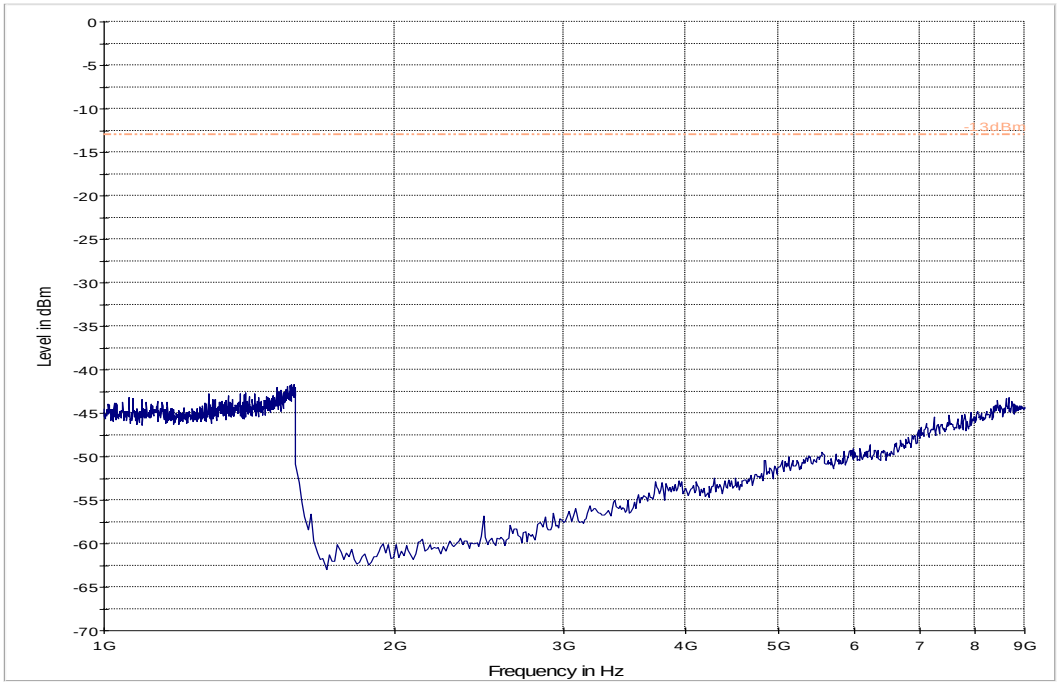
Test results 9kHz-30MHz



Test results 30MHz-1GHz



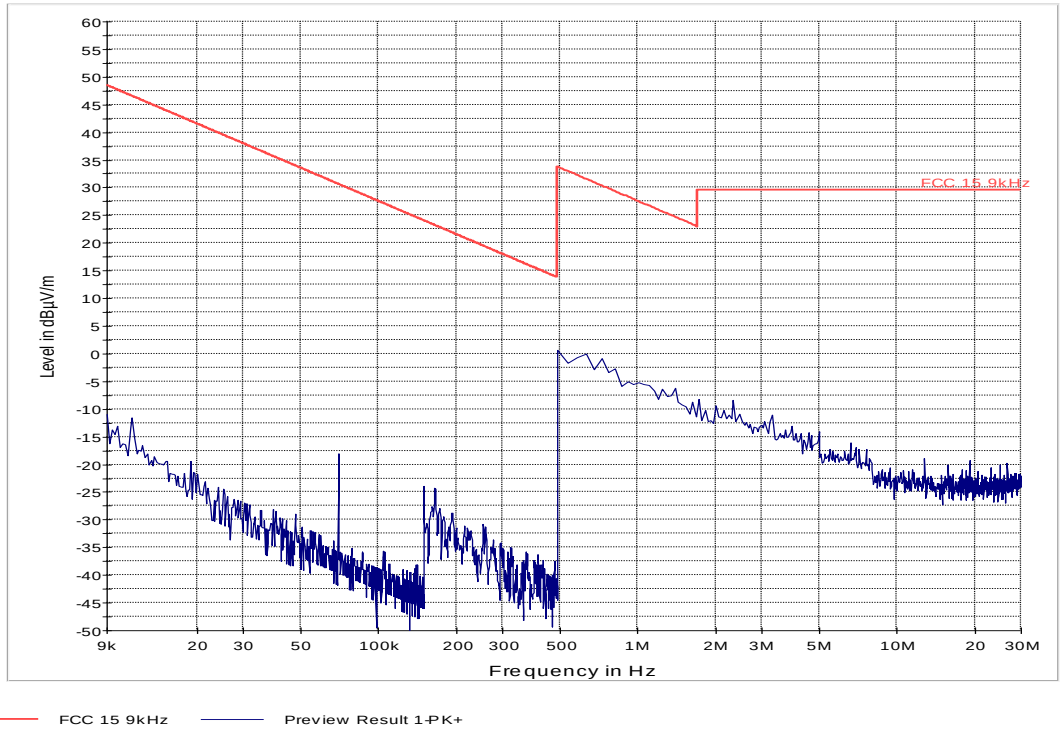
Test results 1GHz-9GHz



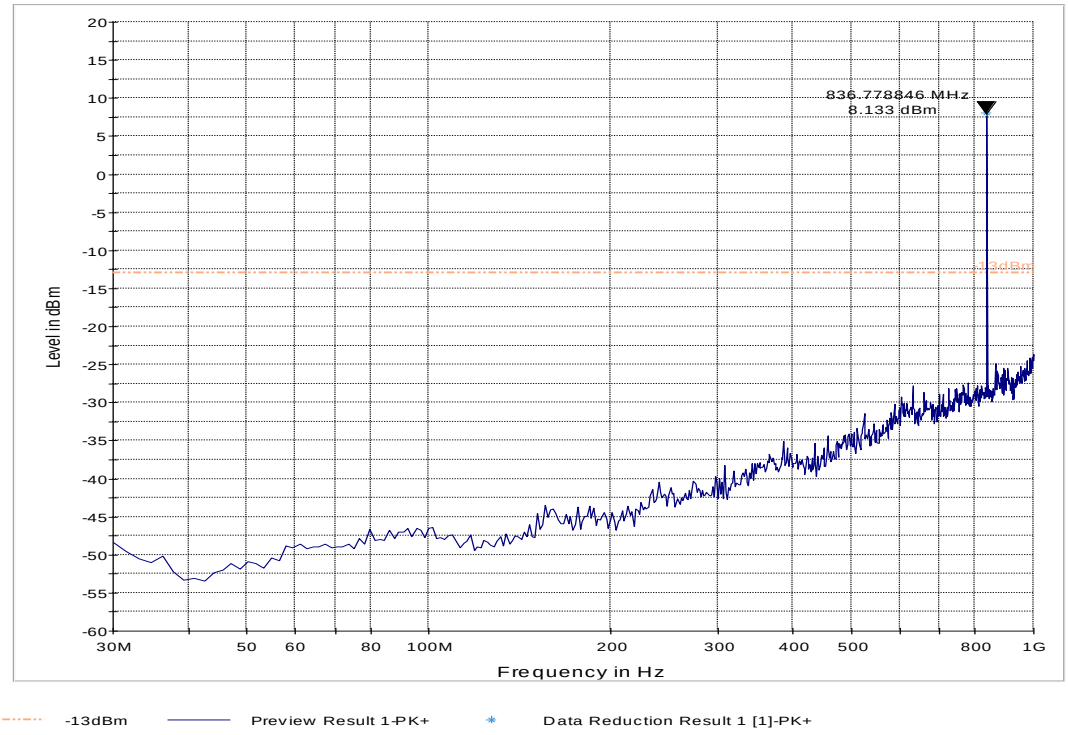
-13dBm Preview Result 1-PK+

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

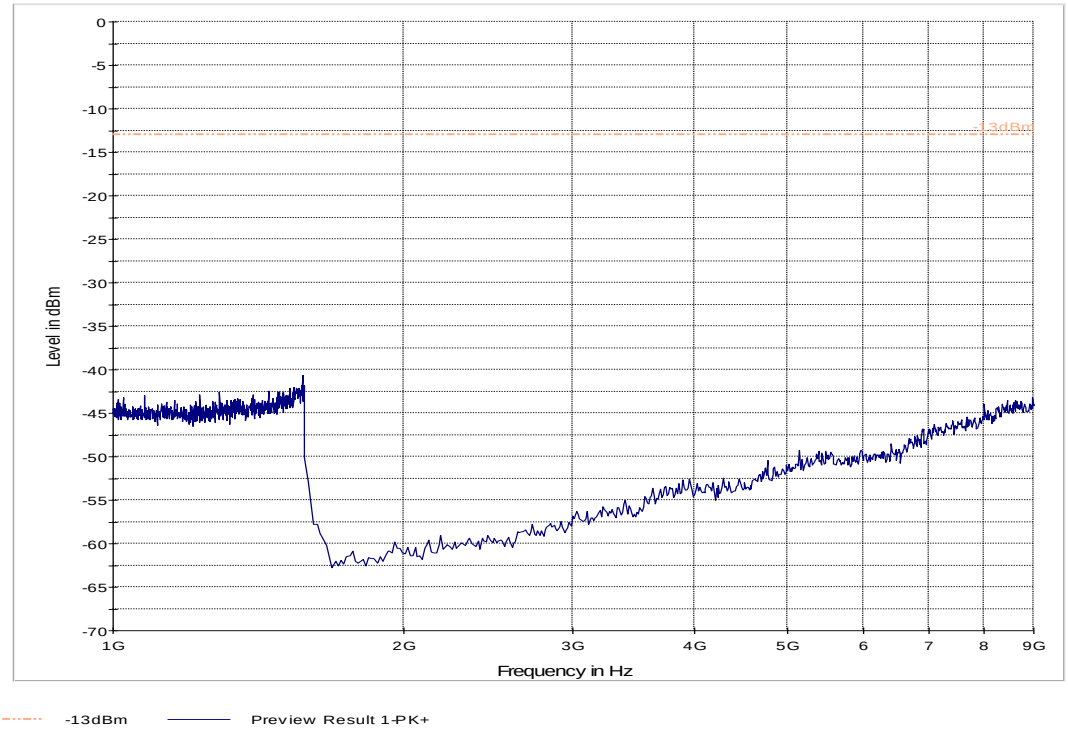
Test results 9kHz-30MHz



Test results 30MHz-1GHz

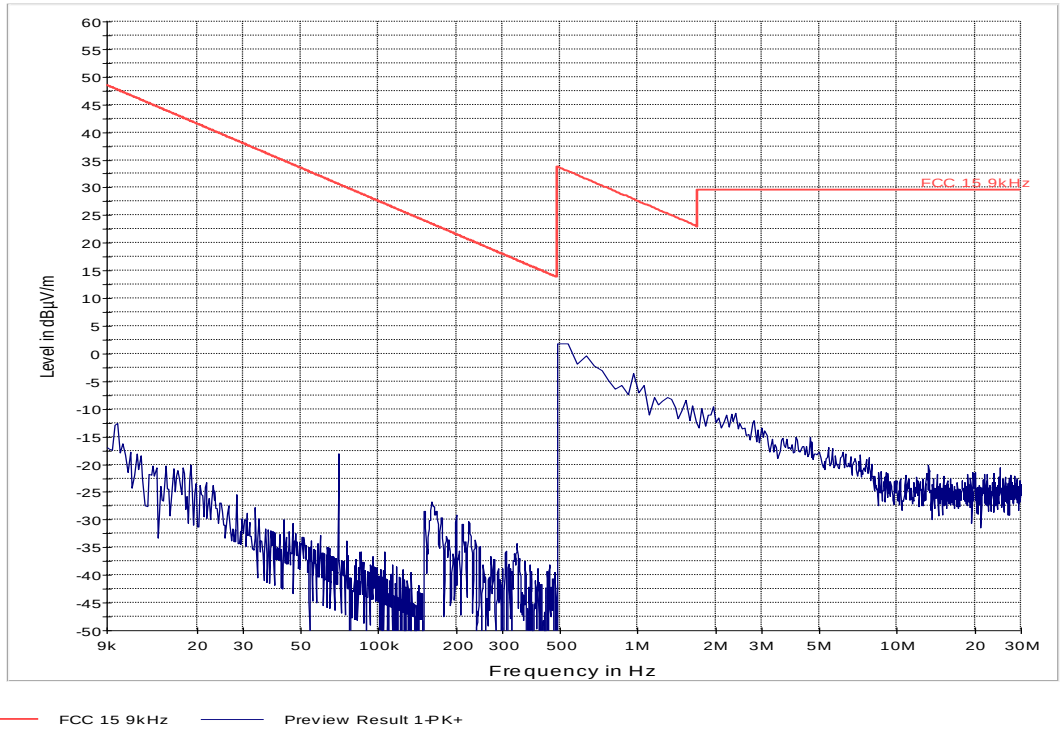


Test results 1GHz-9GHz

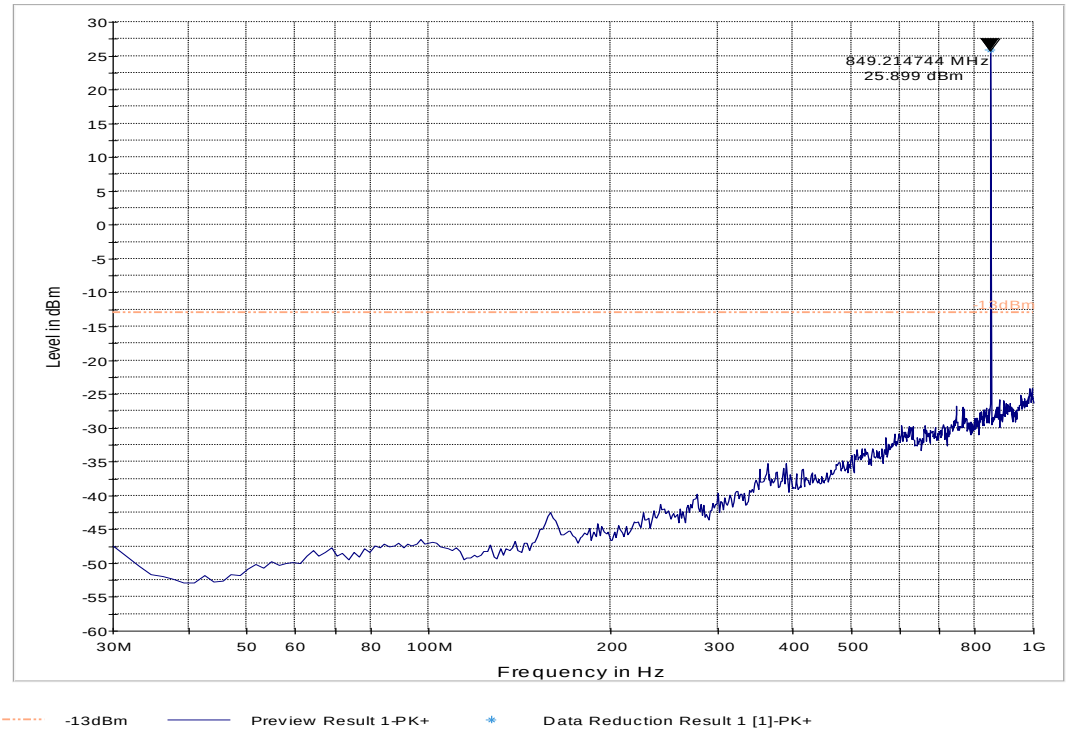


Radiated Spurious Emissions (GSM-850) Tx: High Channel

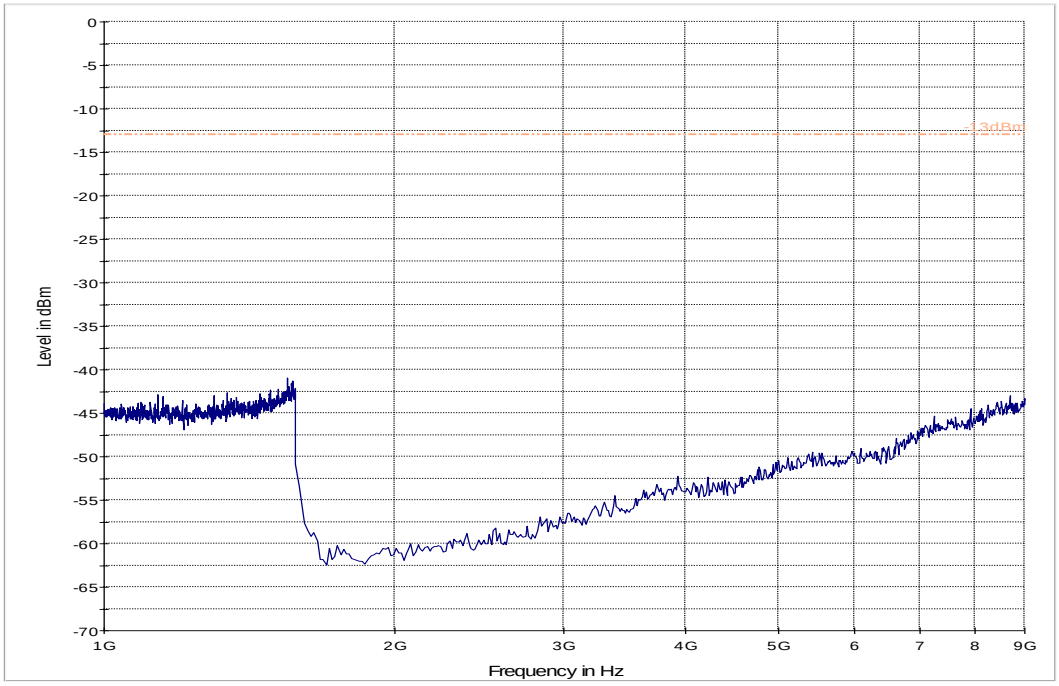
Test results 9kHz-30MHz



Test results 30MHz-1GHz



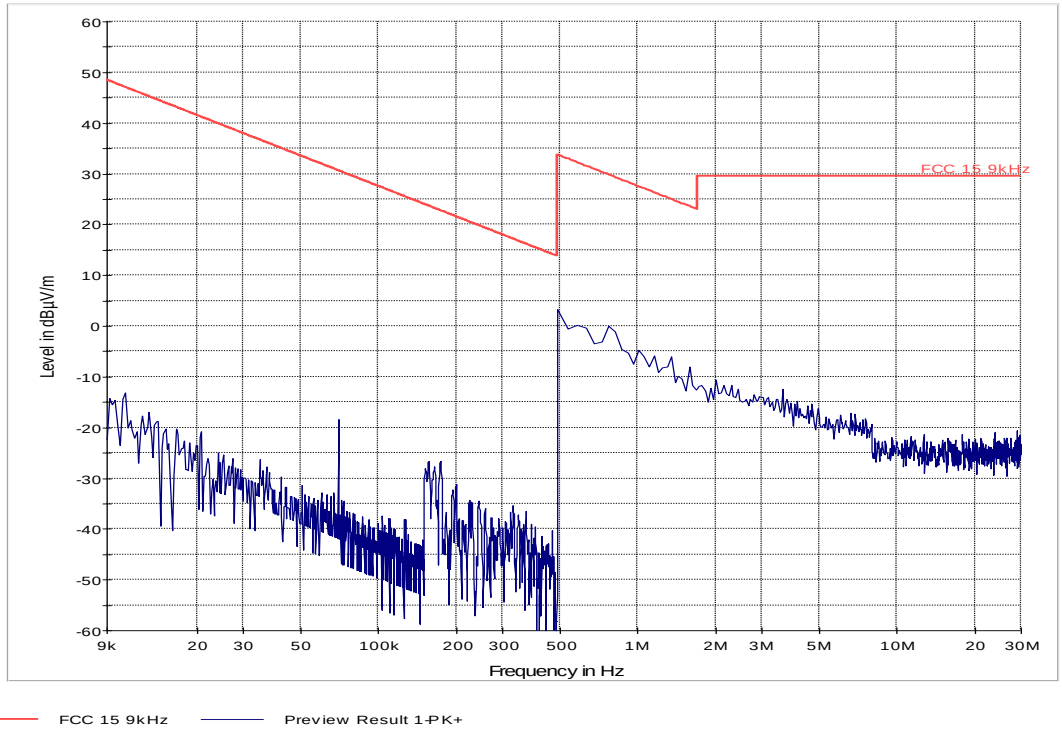
Test results 1GHz-9GHz



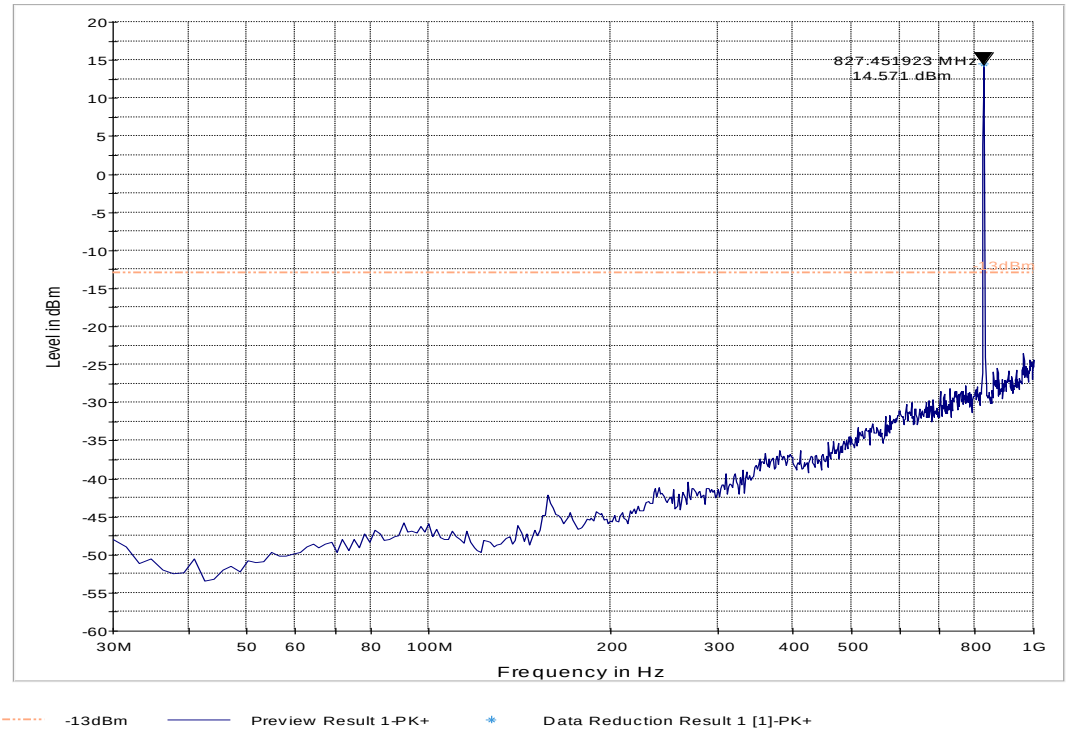
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band V) Tx: Low Channel

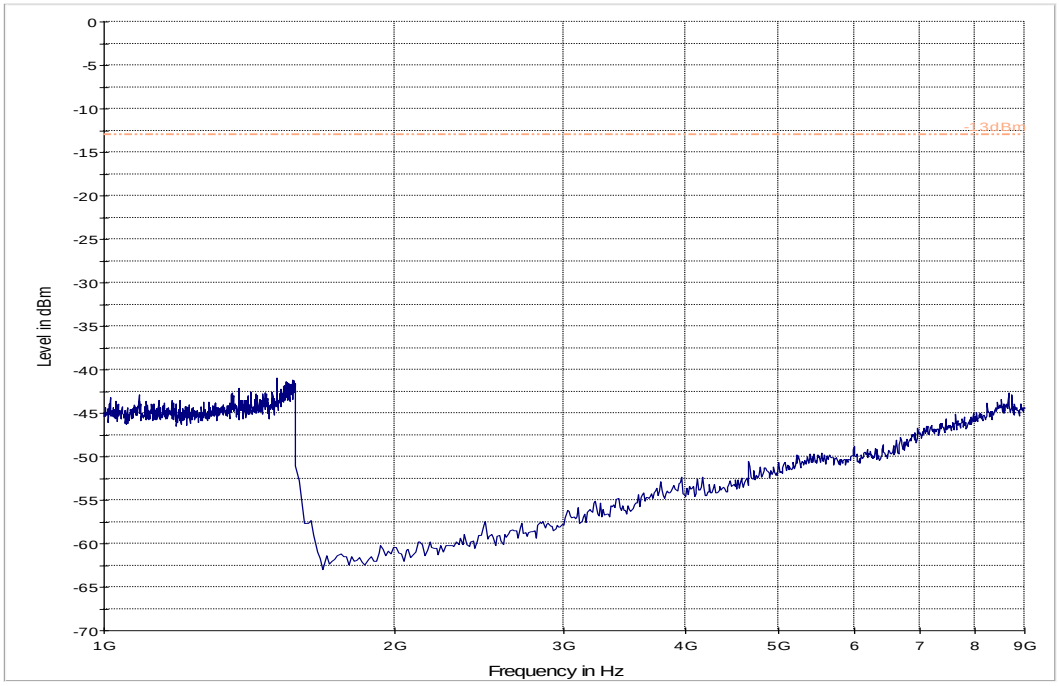
Test results 9kHz-30MHz



Test results 30MHz-1GHz



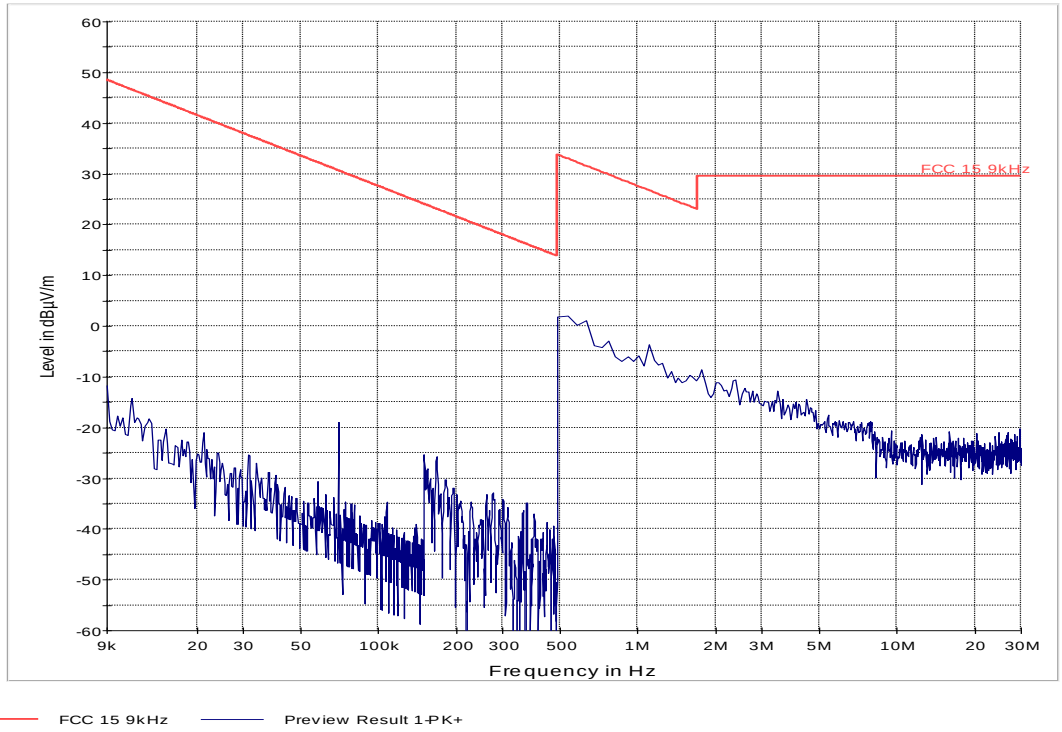
Test results 1GHz-9GHz



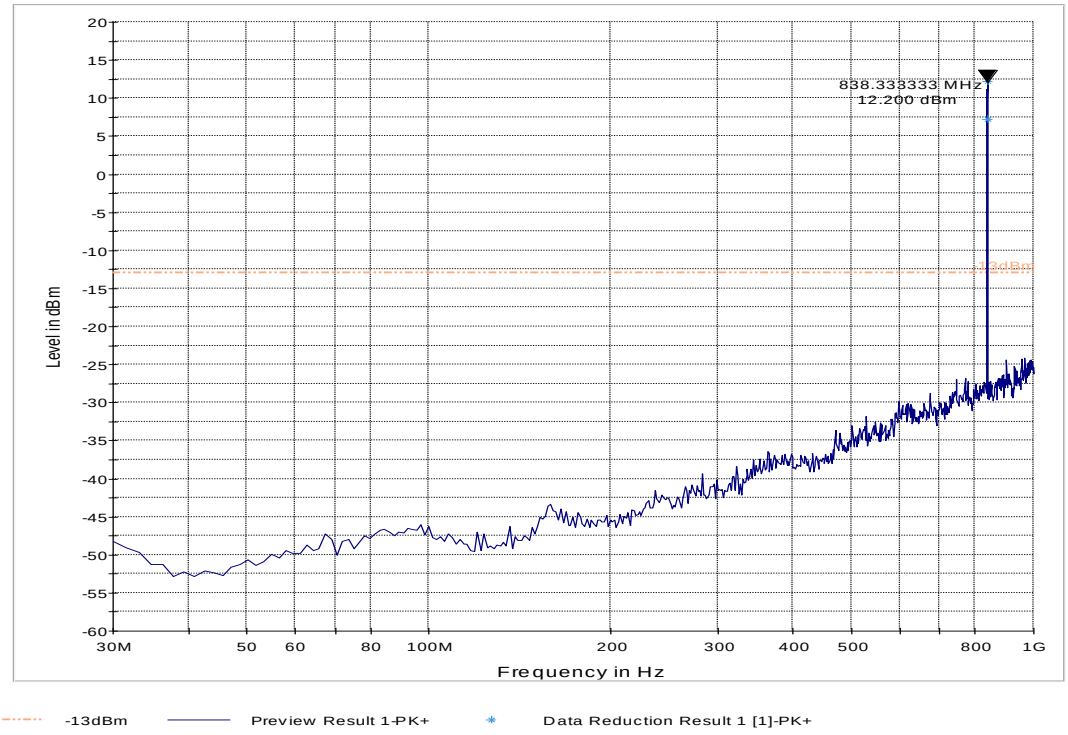
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band V) Tx: Mid Channel

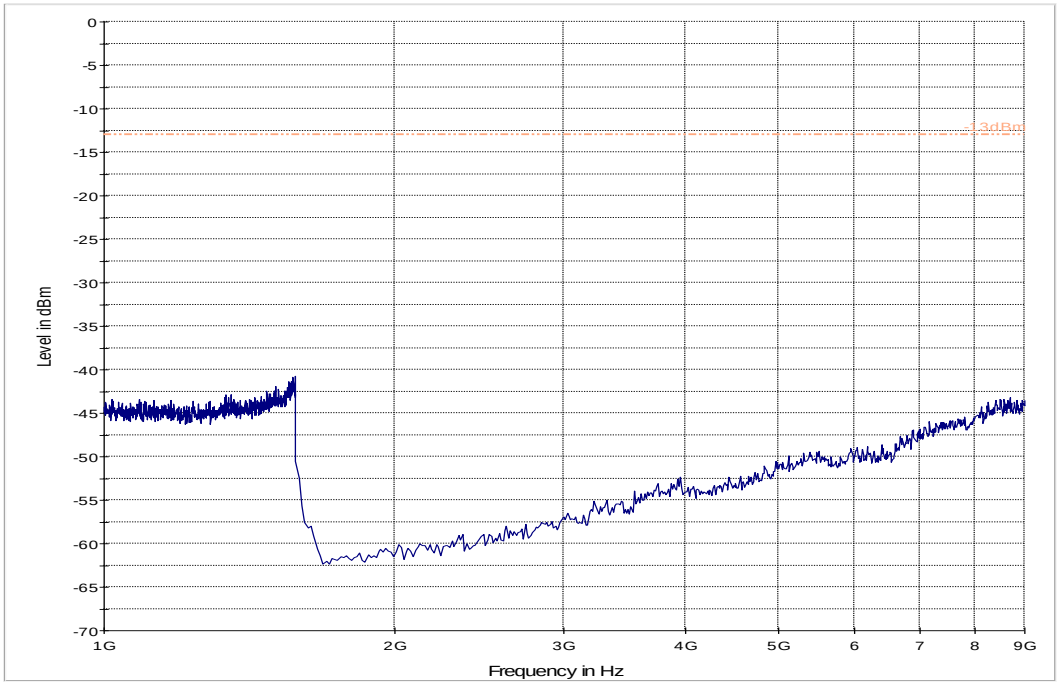
Test results 9kHz-30MHz



Test results 30MHz-1GHz



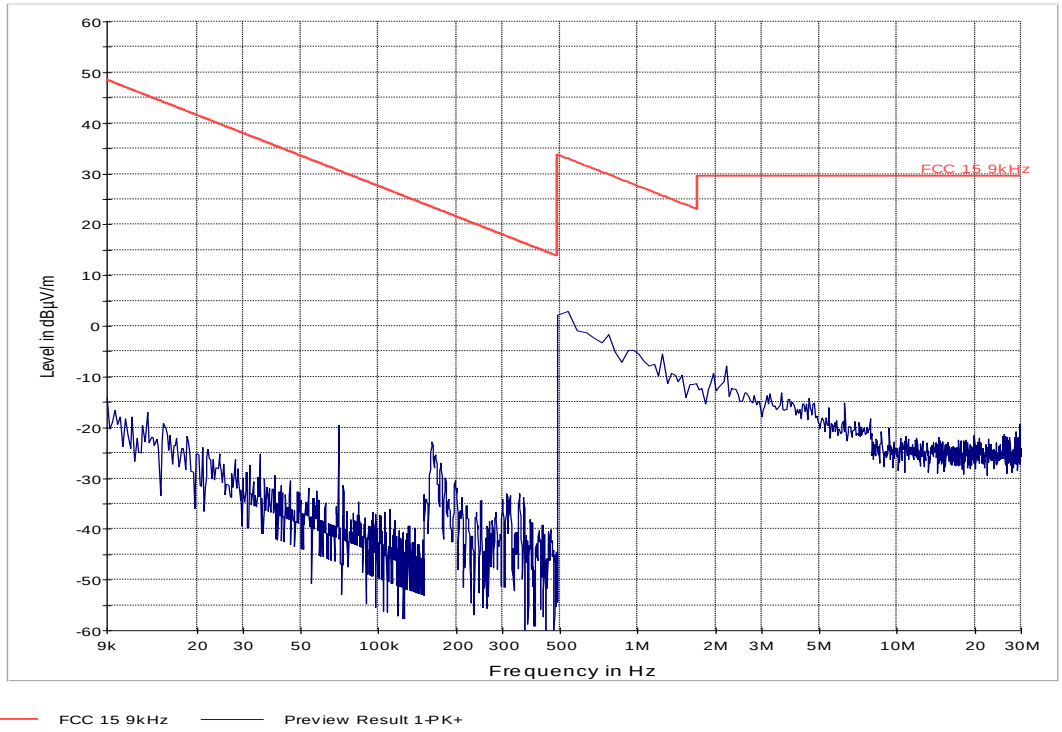
Test results 1GHz-9GHz



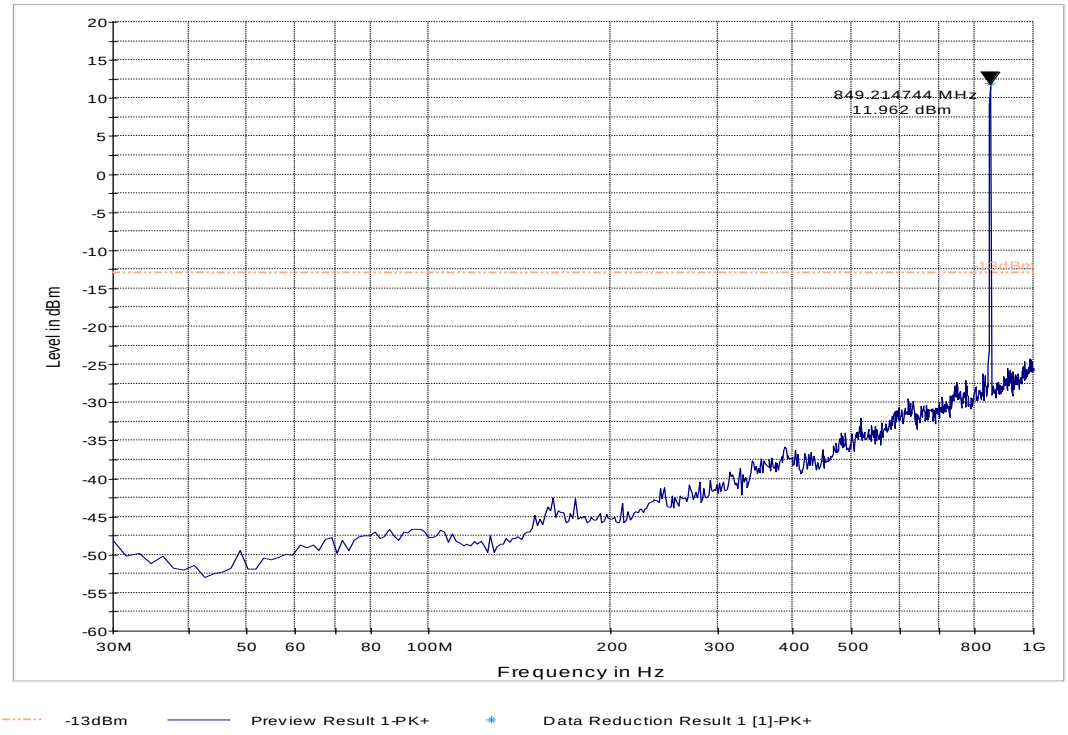
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band V) Tx: High Channel

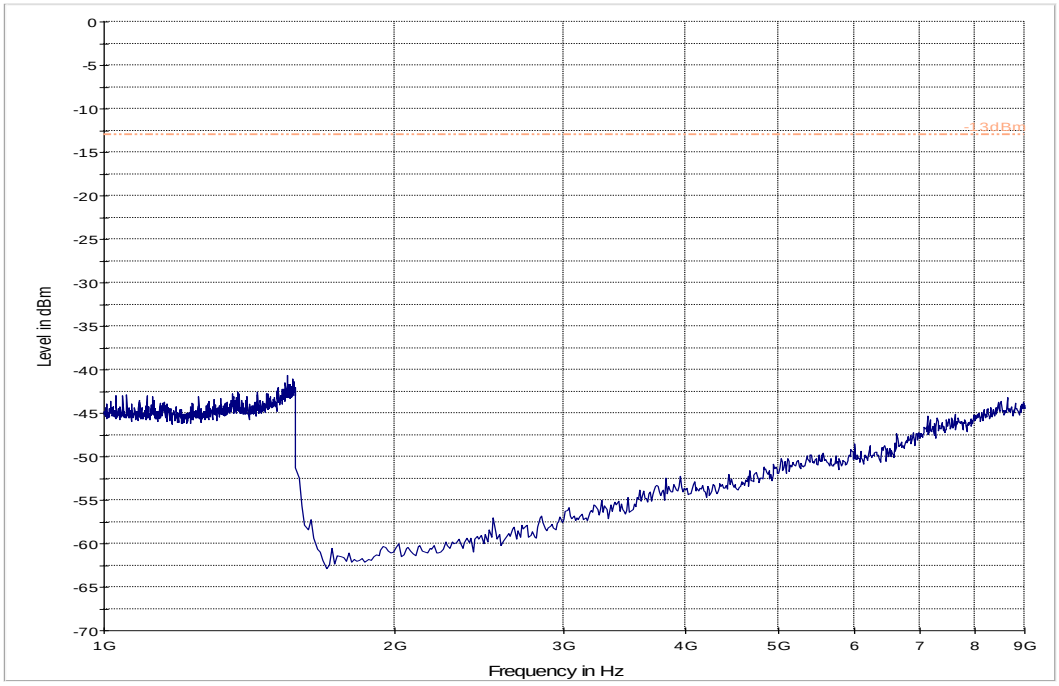
Test results 9kHz-30MHz



Test results 30MHz-1GHz



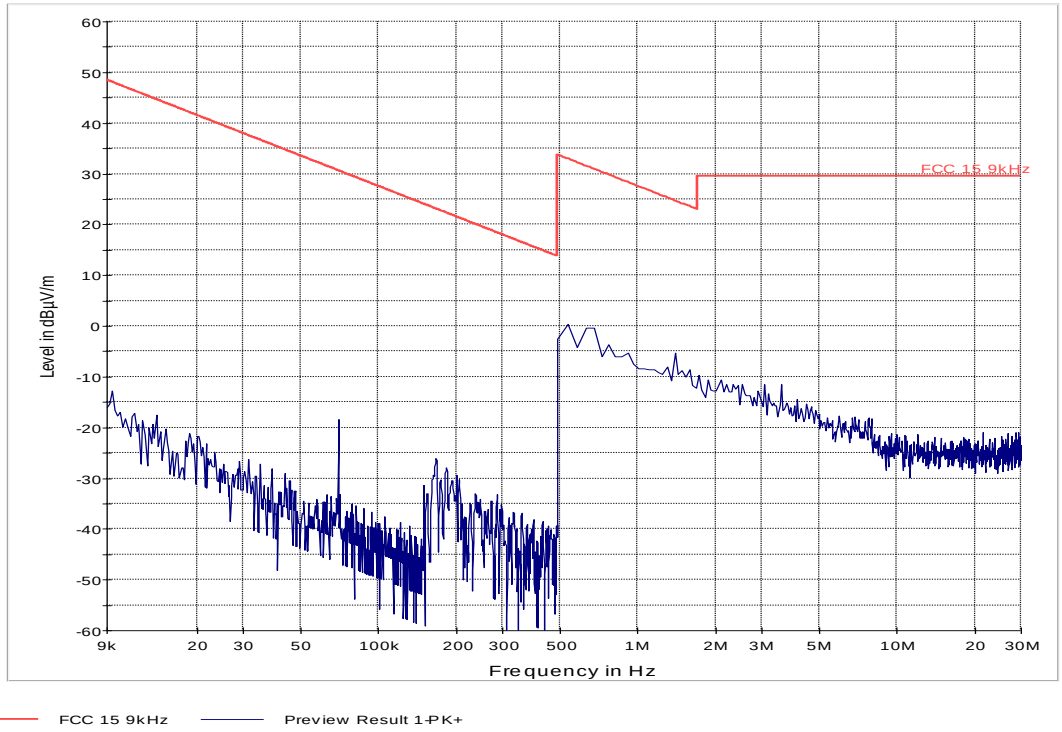
Test results 1GHz-9GHz



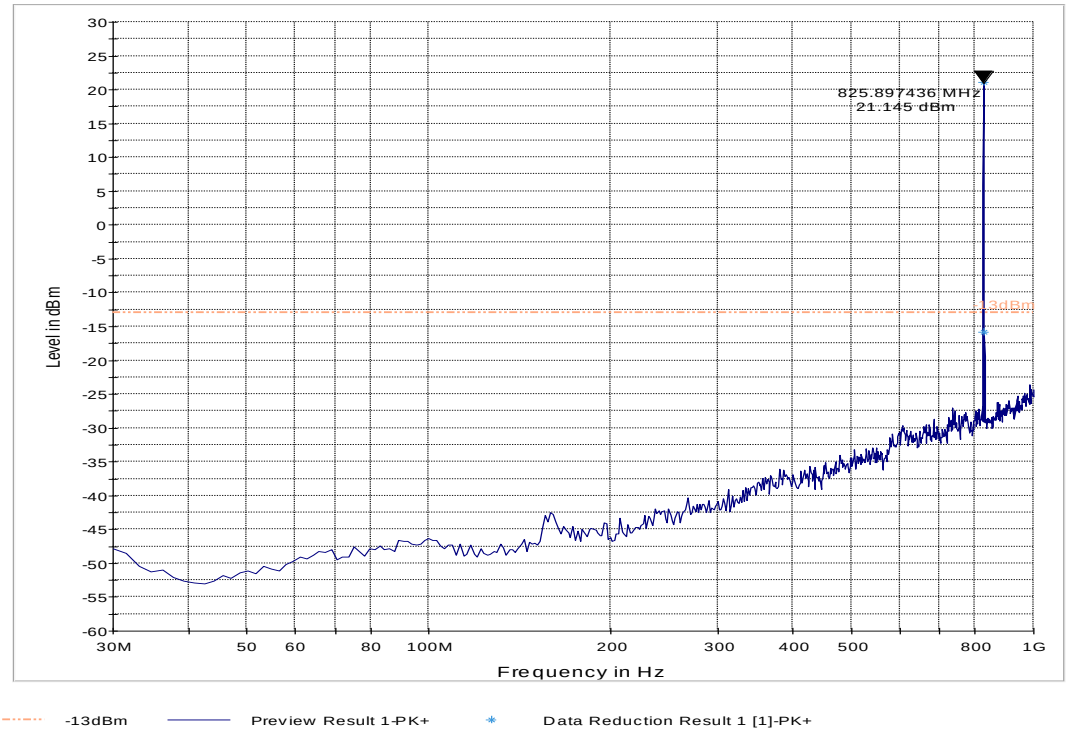
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 5) Tx: QPSK; 10MHz BW: Low Channel

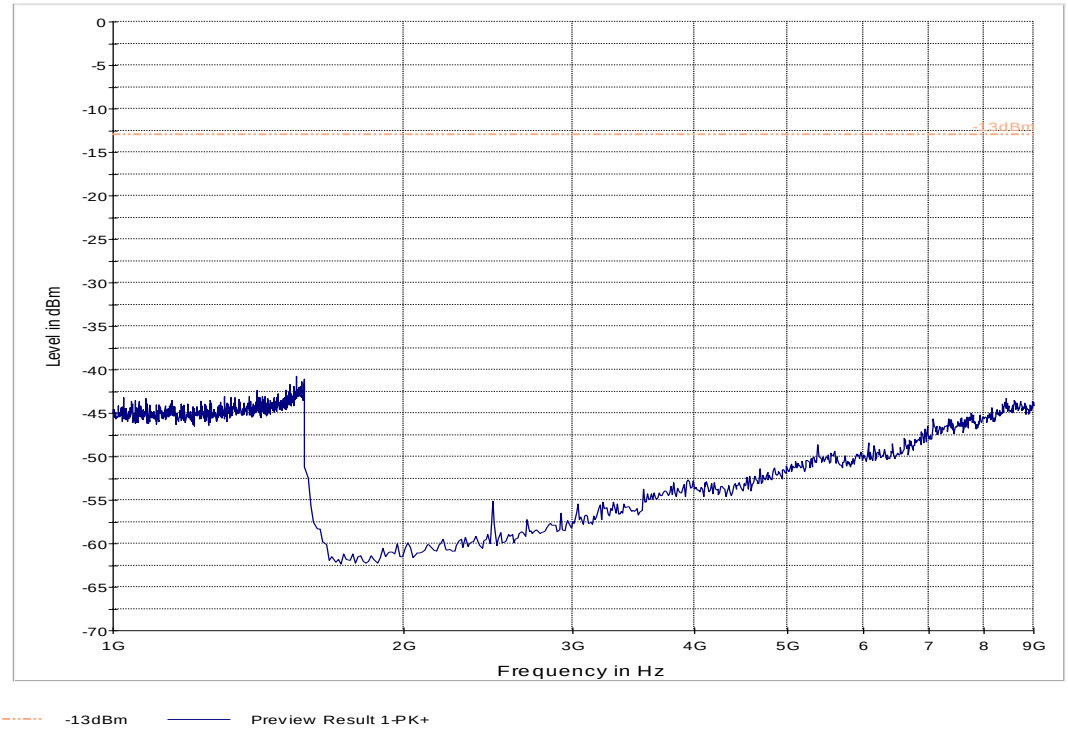
Test results 9kHz-30MHz



Test results 30MHz-1GHz

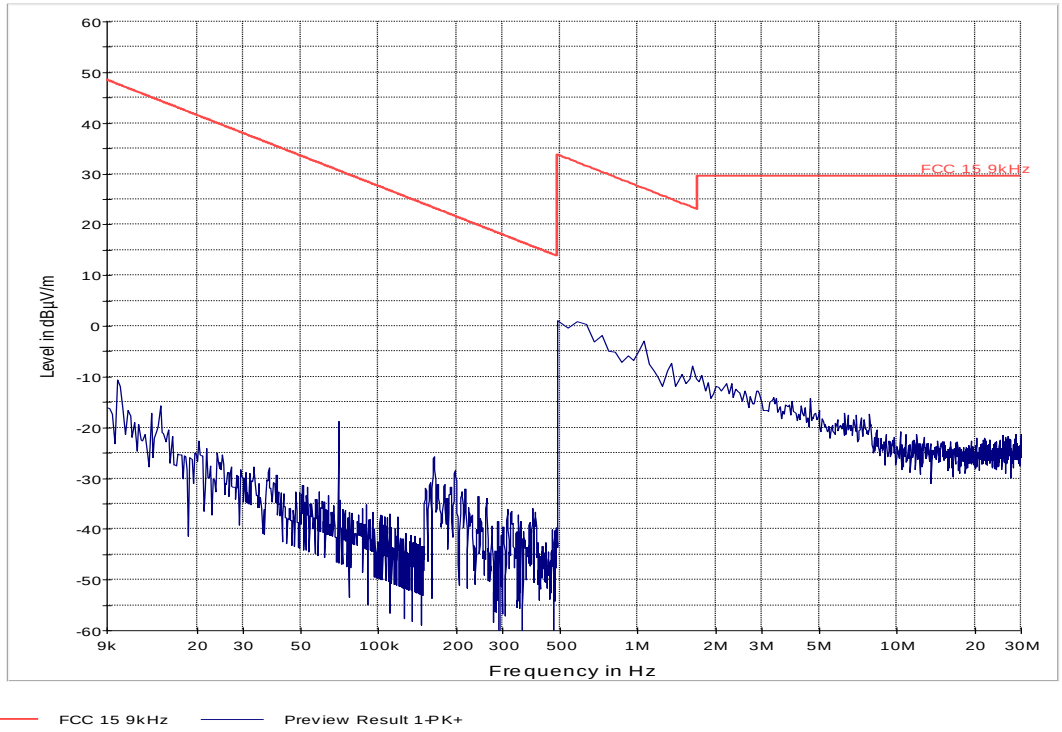


Test results 1GHz-9GHz

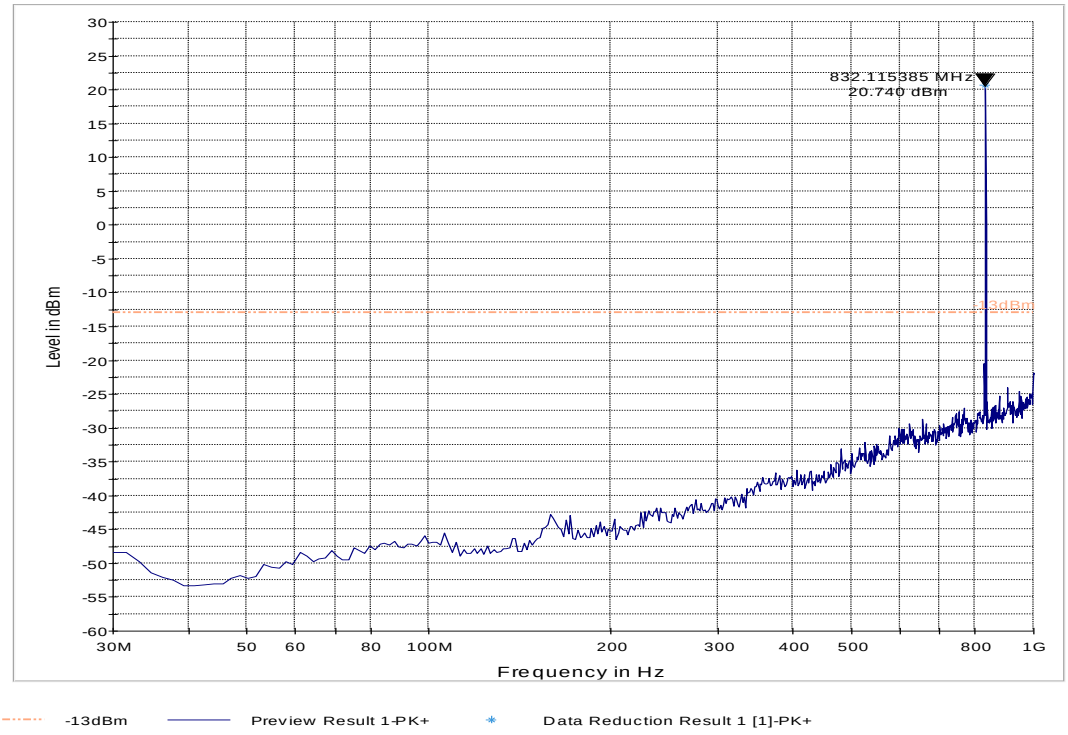


Radiated Spurious Emissions (LTE Band 5) Tx: QPSK; 10MHz BW: Mid Channel

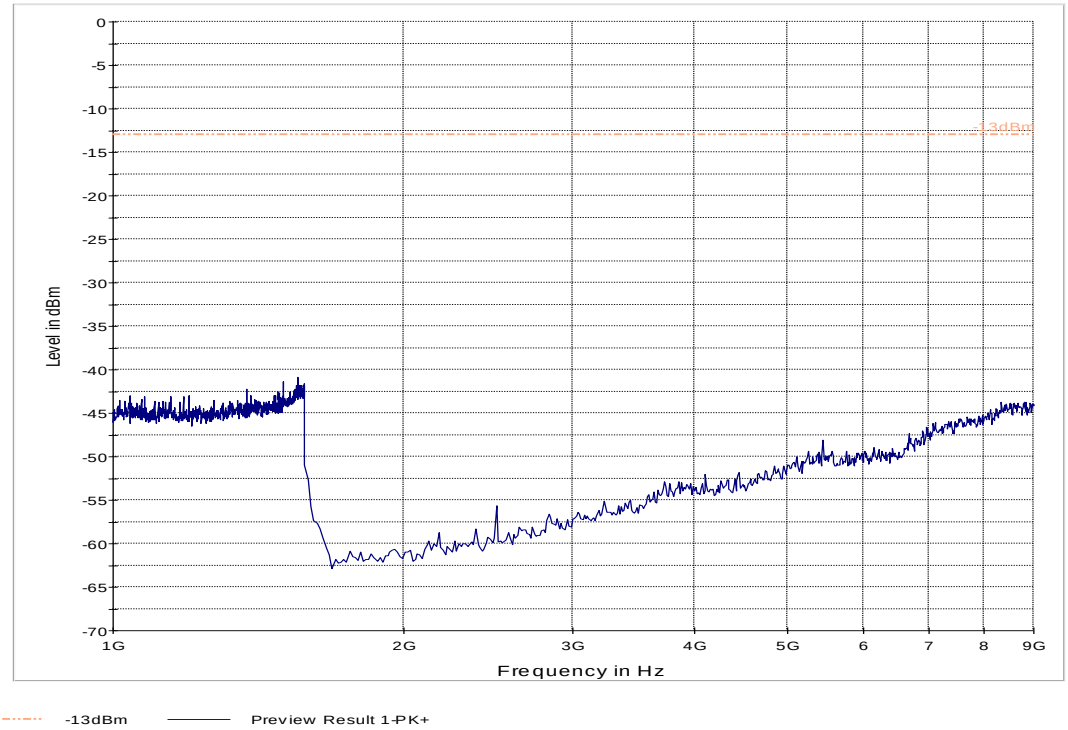
Test results 9kHz-30MHz



Test results 30MHz-1GHz

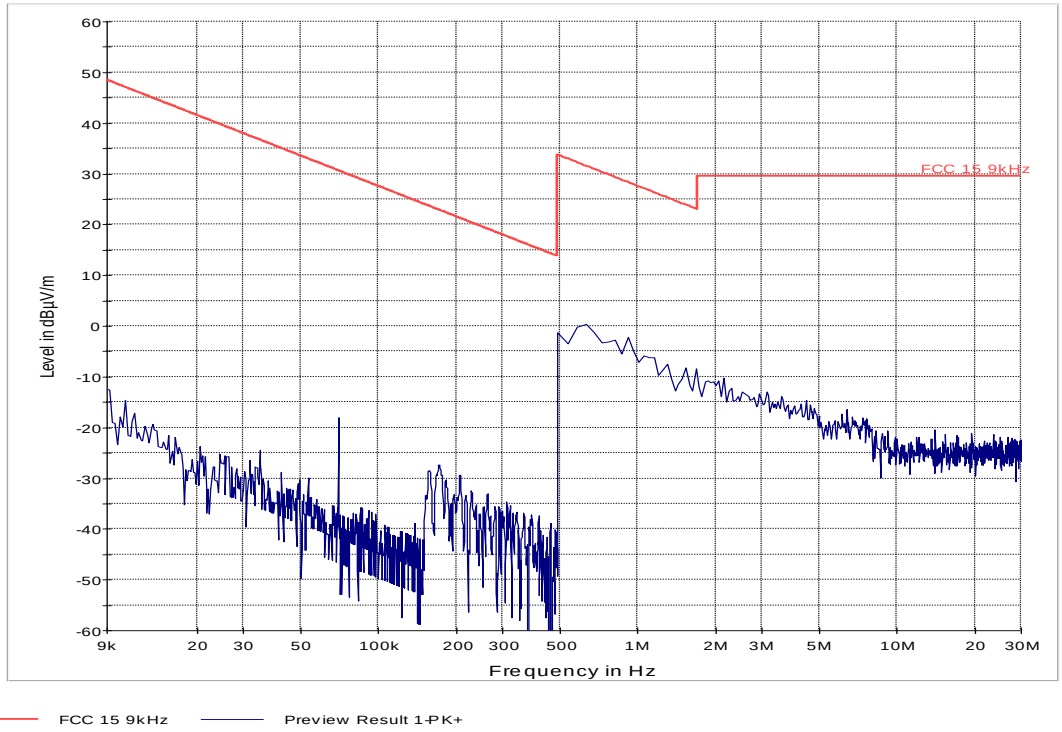


Test results 1GHz-9GHz

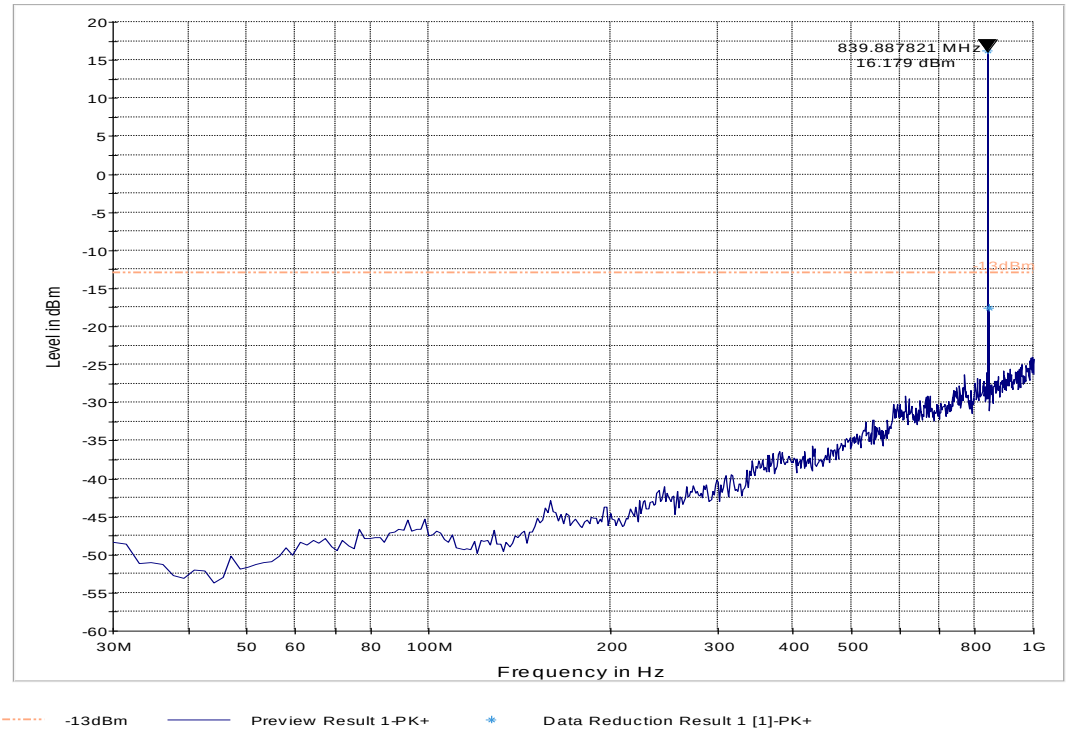


Radiated Spurious Emissions (LTE Band 5) Tx: QPSK; 10MHz BW: High Channel

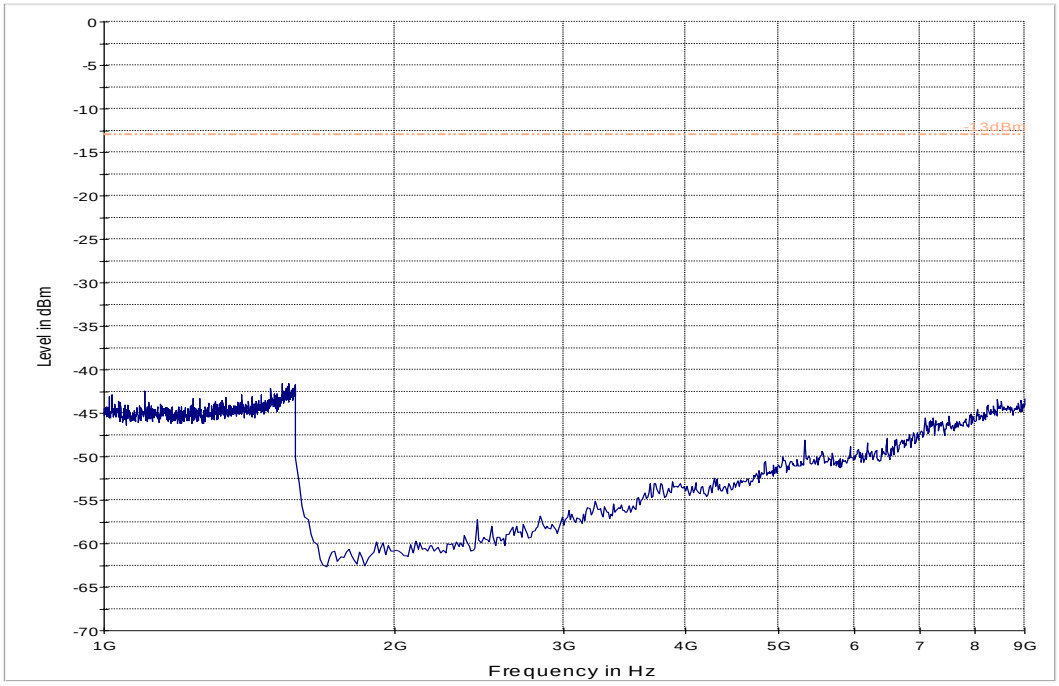
Test results 9kHz-30MHz



Test results 30MHz-1GHz



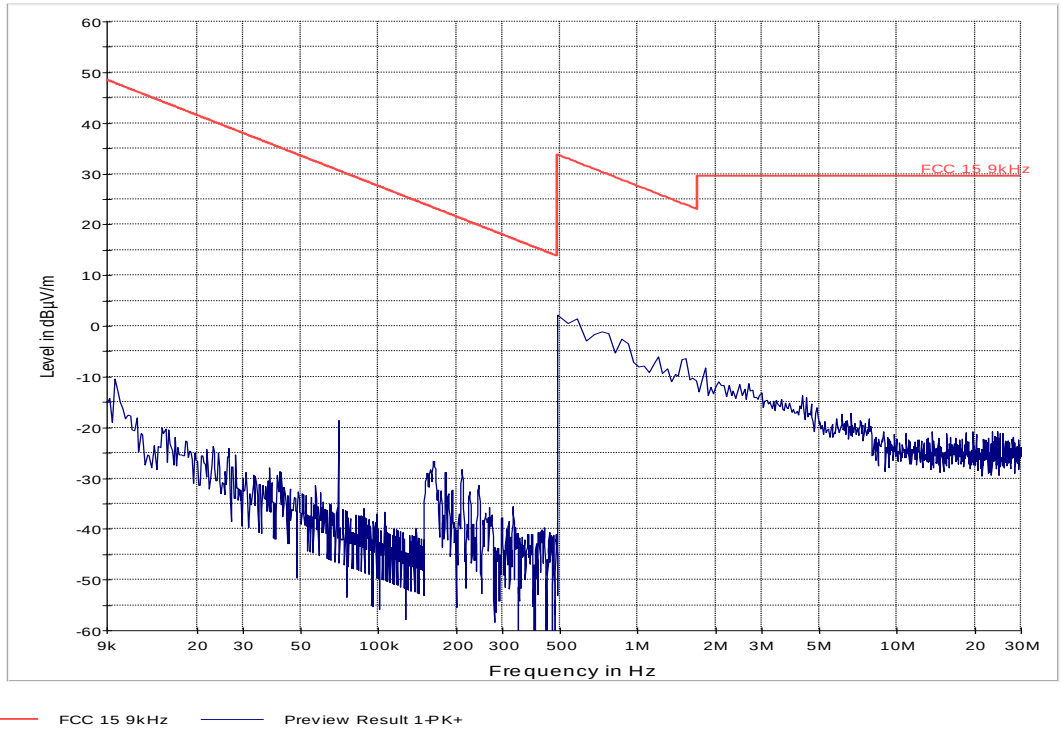
Test results 1GHz-9GHz



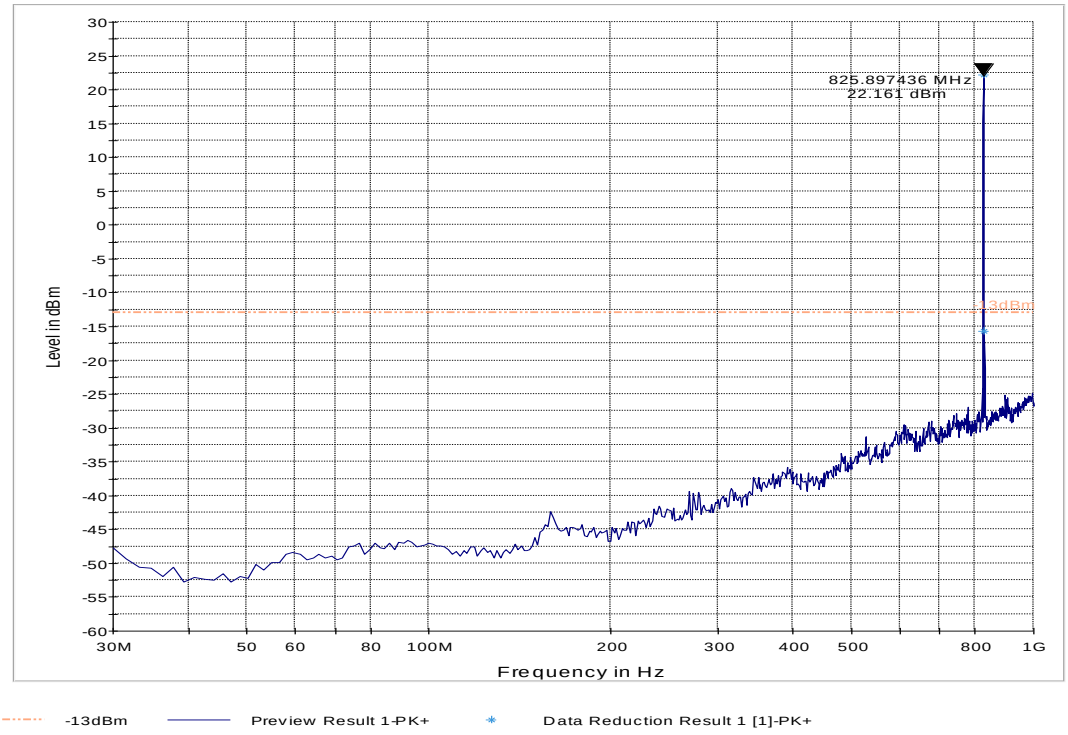
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 5) Tx: 16-QAM; 10MHz BW: Low Channel

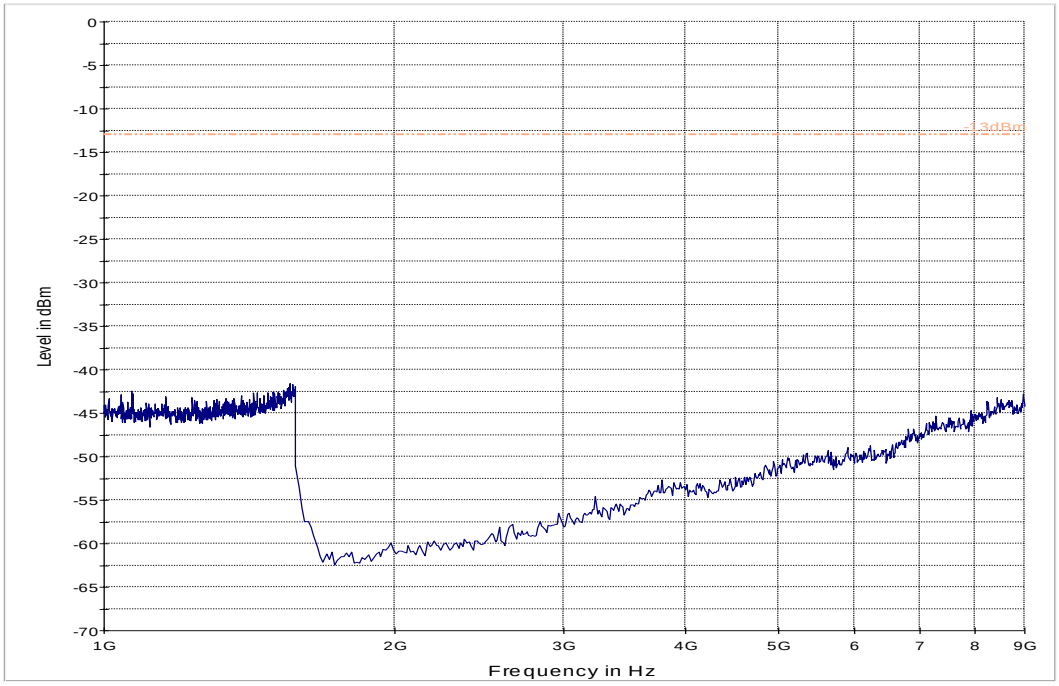
Test results 9kHz-30MHz



Test results 30MHz-1GHz



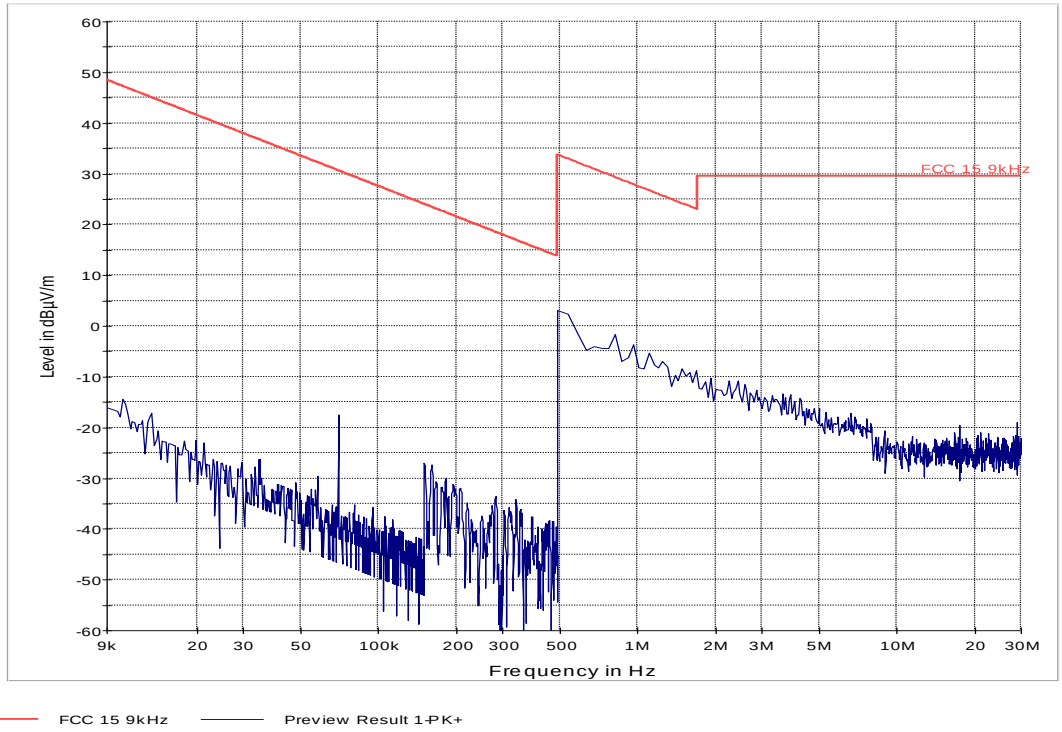
Test results 1GHz-9GHz



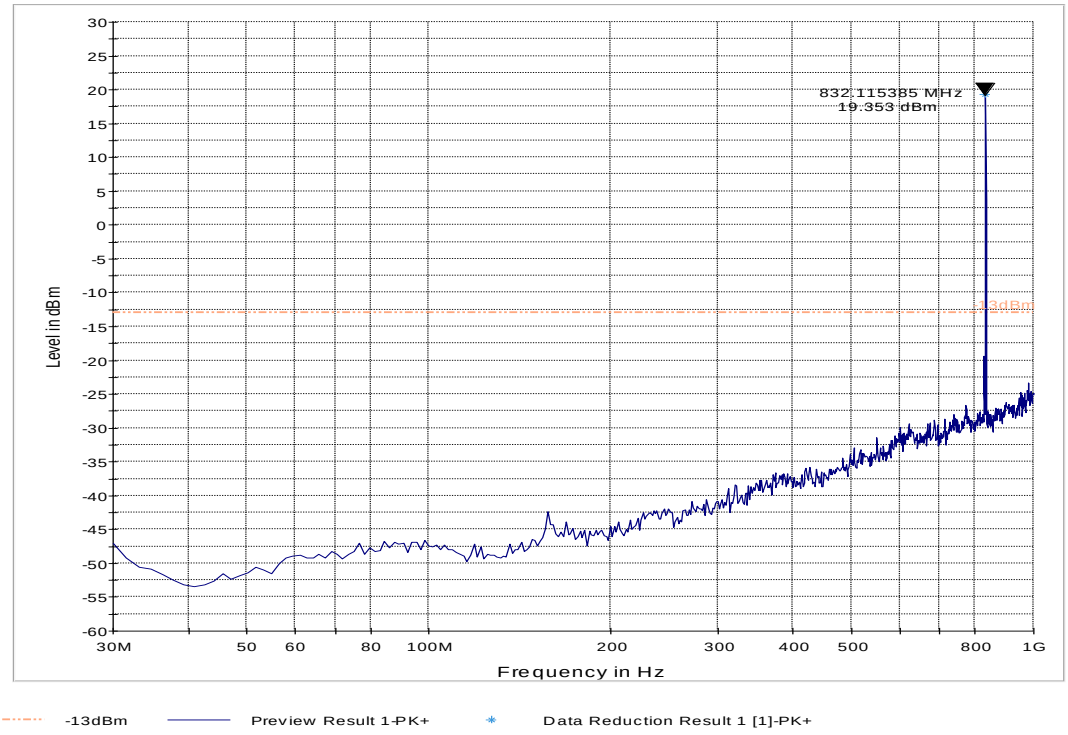
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 5) Tx: 16-QAM; 10MHz BW: Mid Channel

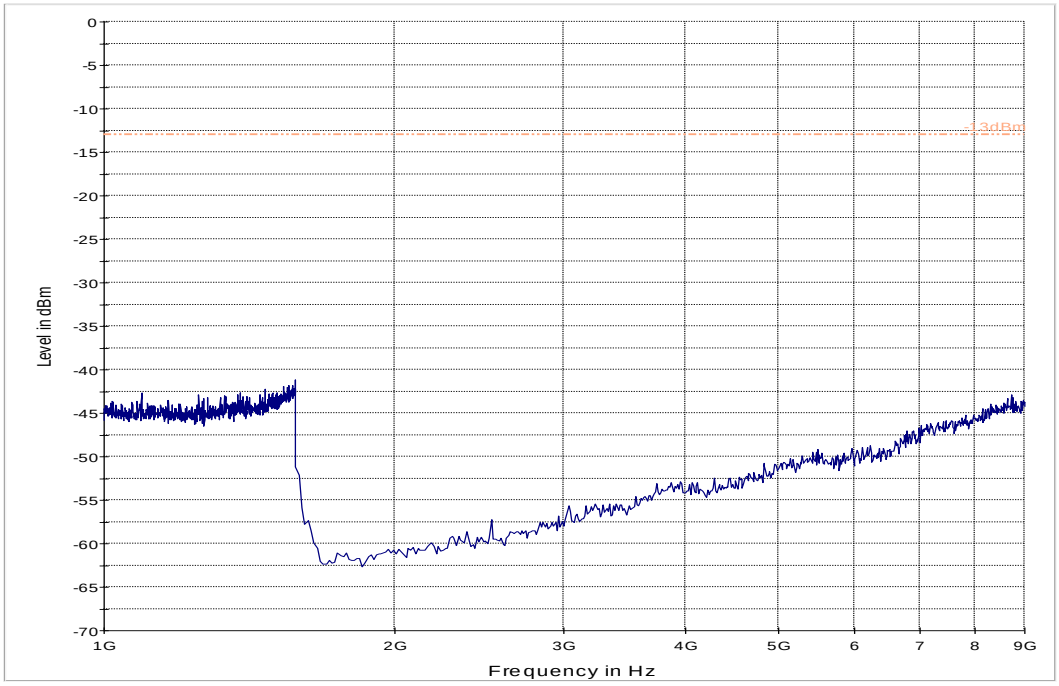
Test results 9kHz-30MHz



Test results 30MHz-1GHz



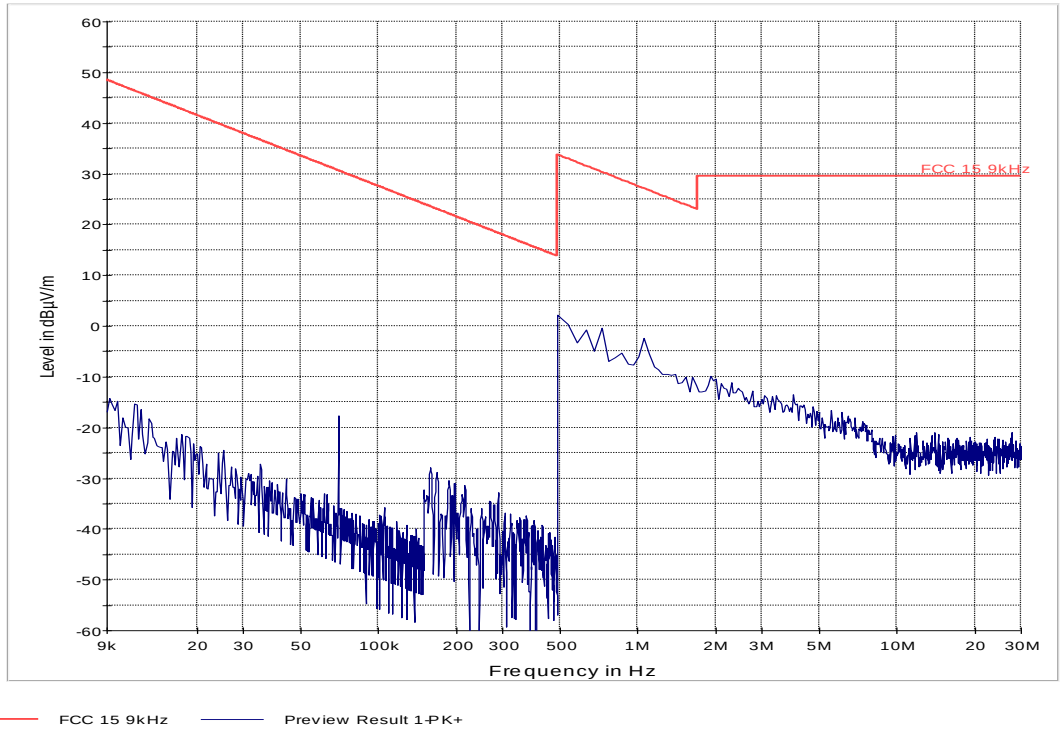
Test results 1GHz-9GHz



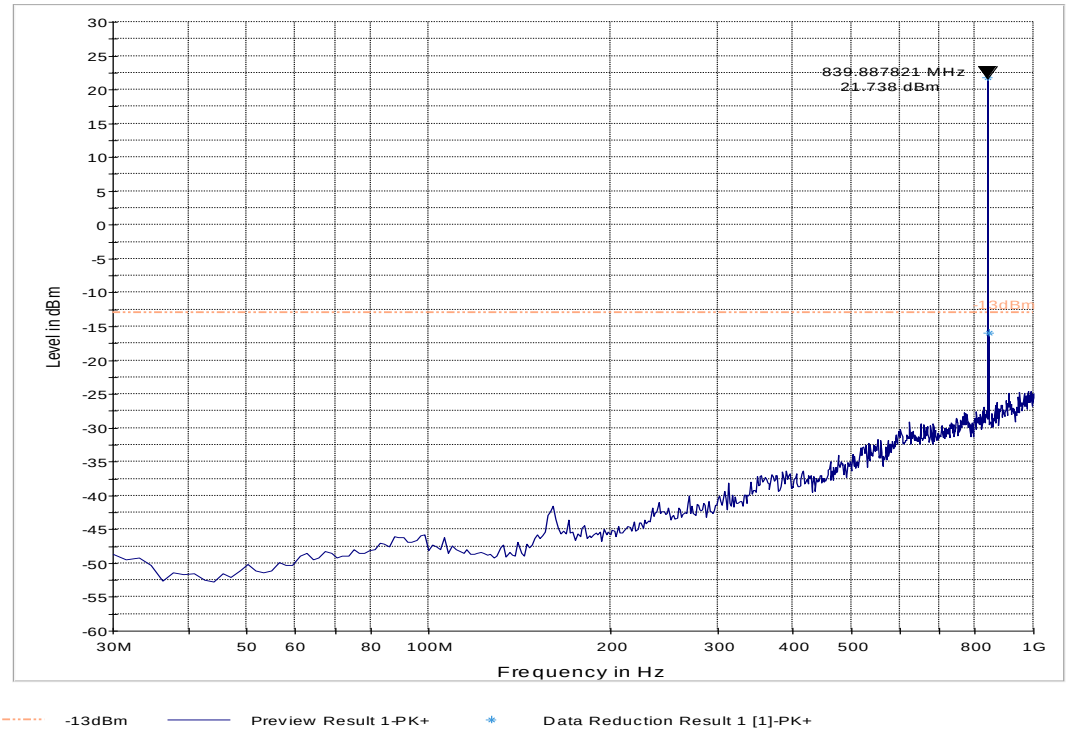
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 5) Tx: 16-QAM; 10MHz BW: High Channel

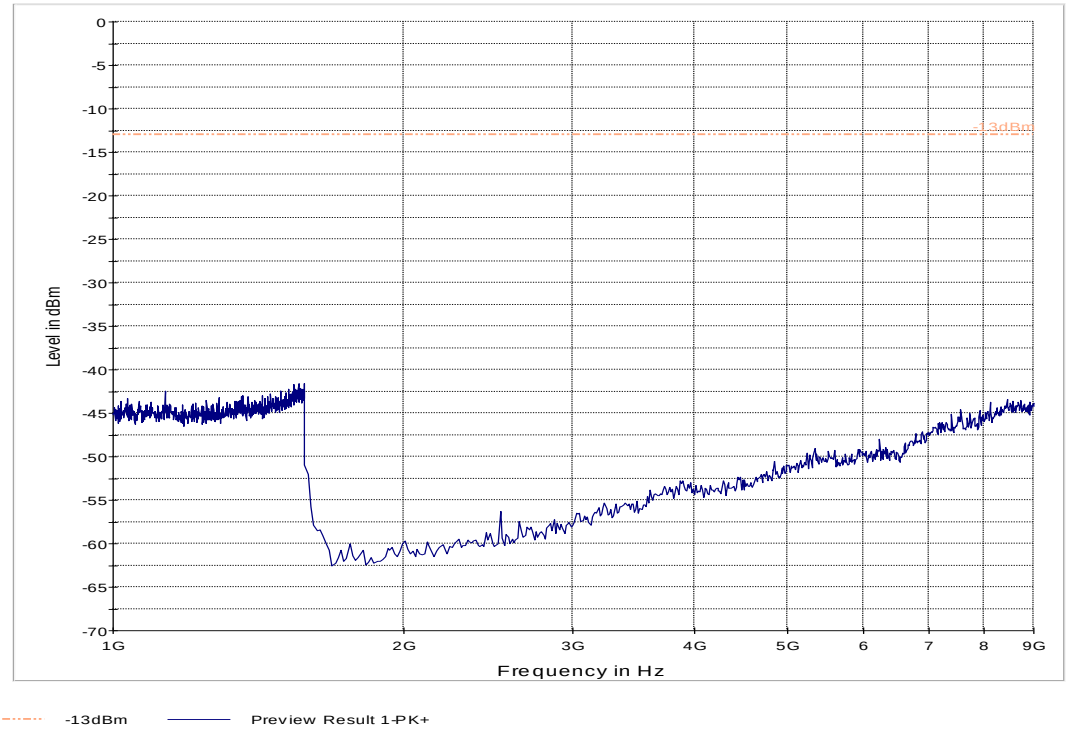
Test results 9kHz-30MHz



Test results 30MHz-1GHz

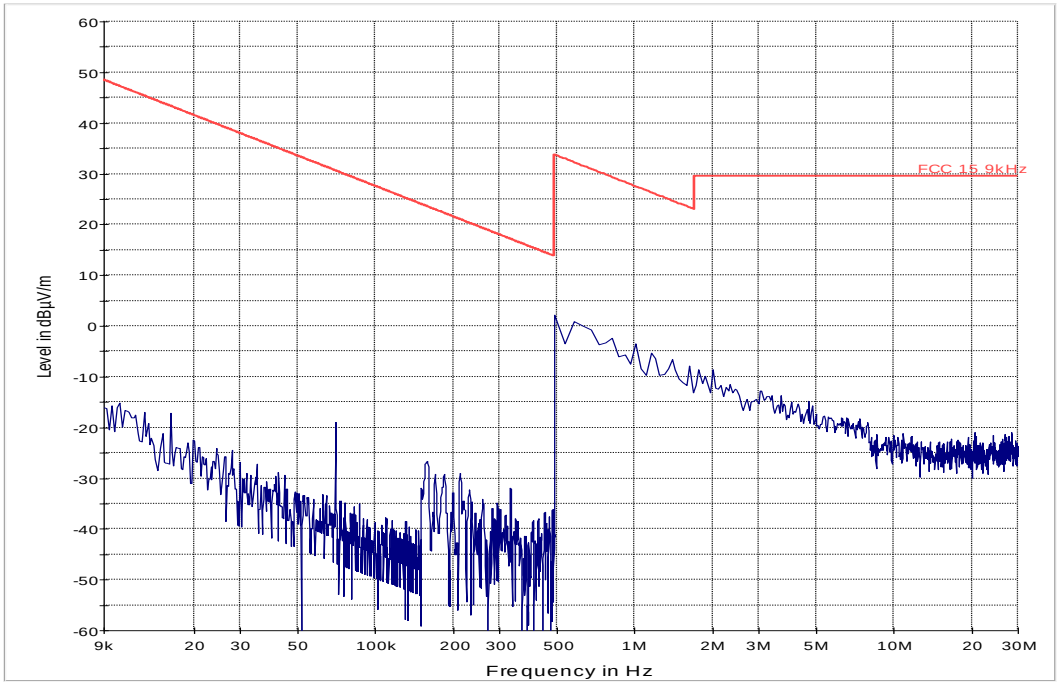


Test results 1GHz-9GHz



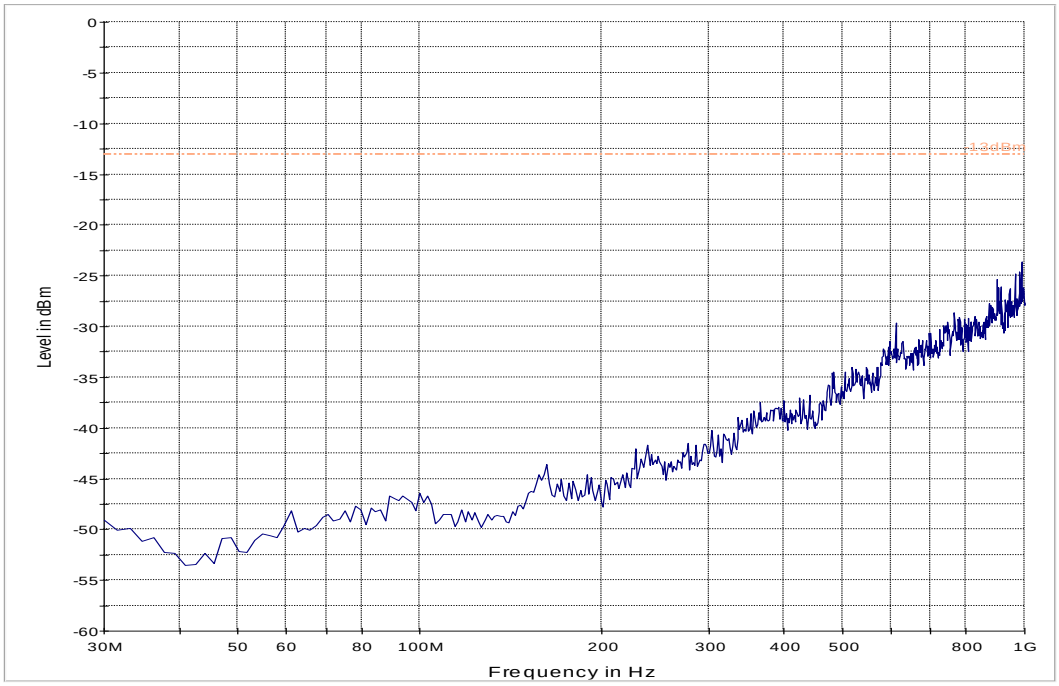
Radiated Spurious Emissions (GSM-1900) Tx: Low Channel

Test results 9kHz-30MHz



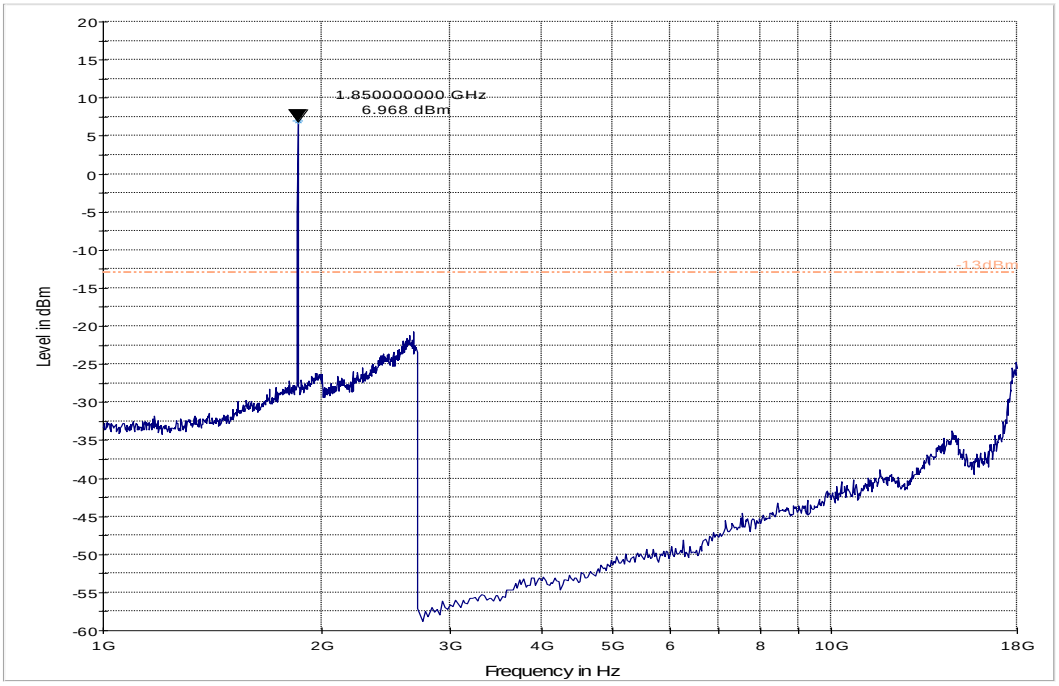
FCC 15 9kHz Preview Result 1-PK+

Test results 30MHz-1GHz



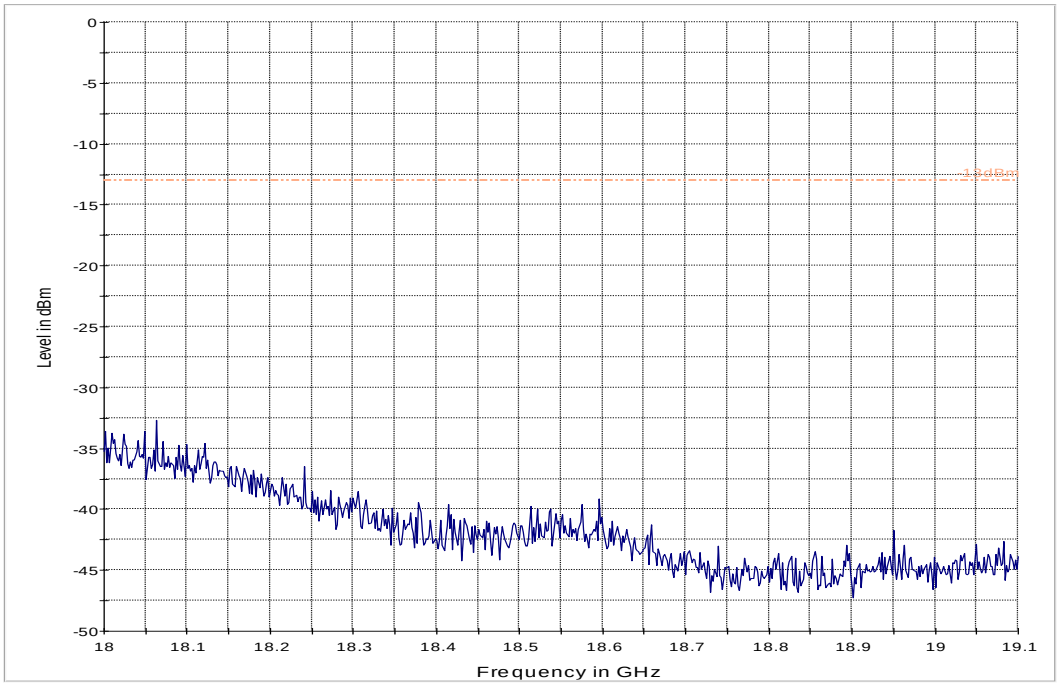
-13dBm Preview Result 1-PK+

Test results 1GHz-18GHz



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

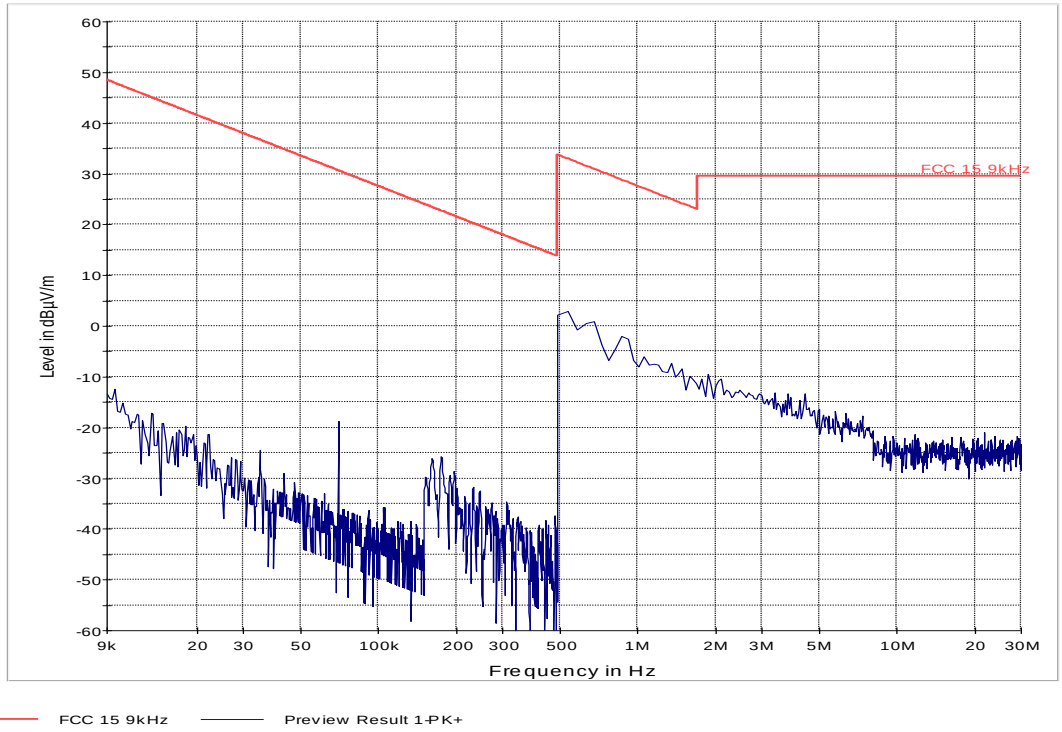
Test results 18GHz-19.1GHz



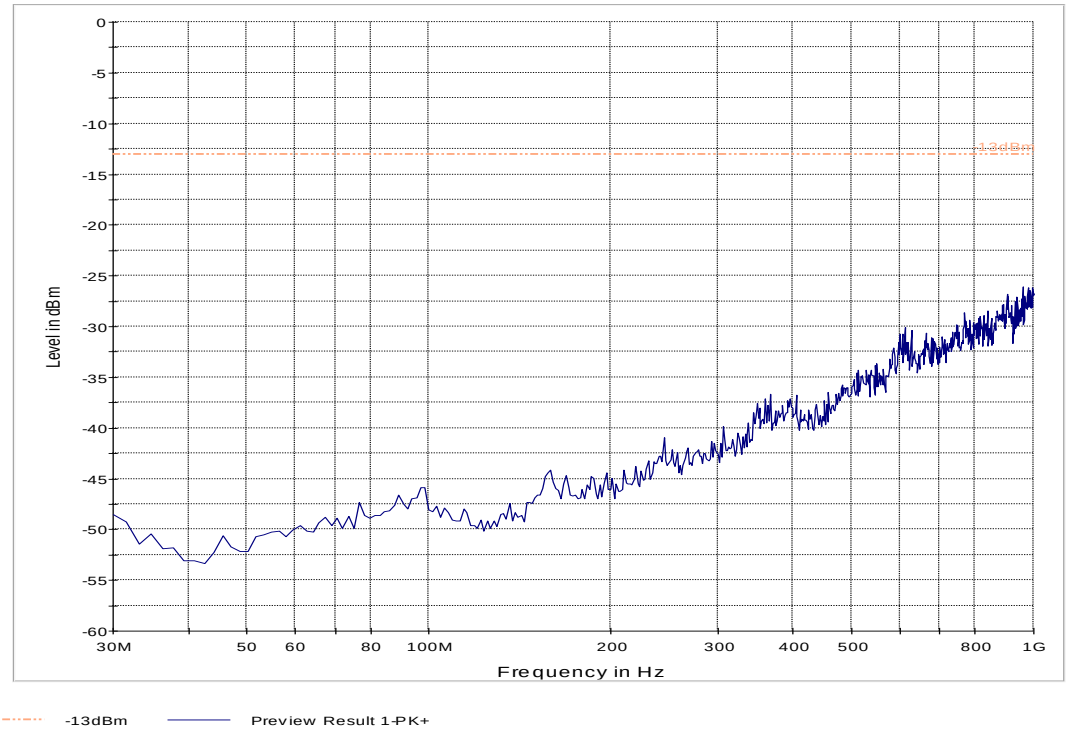
-13dBm Preview Result 1-PK+

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

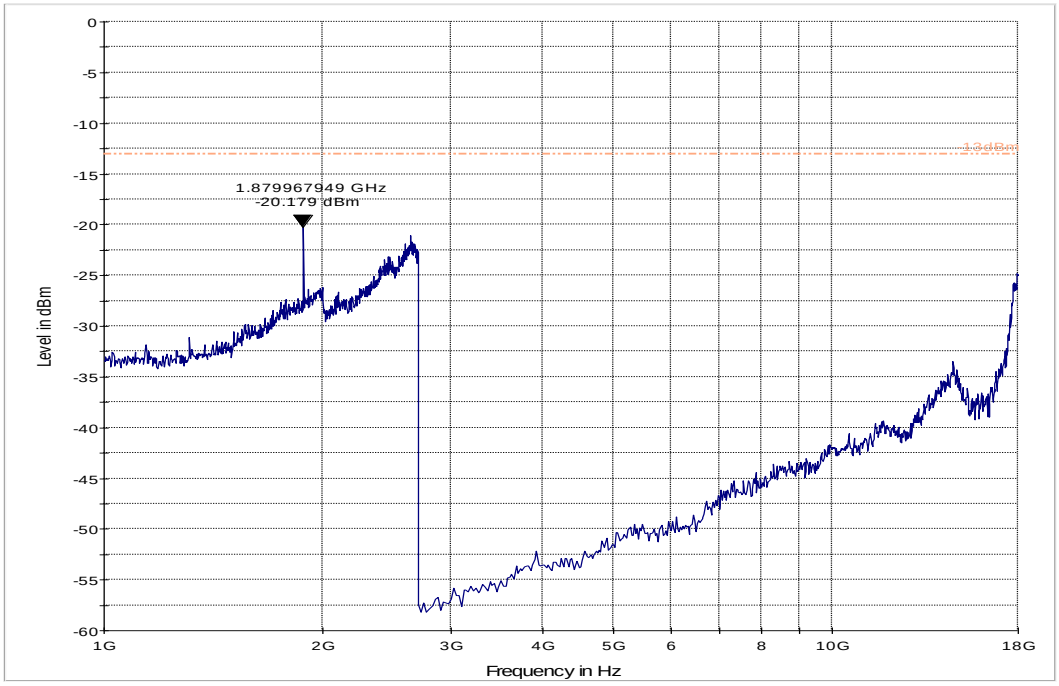
Test results 9kHz-30MHz



Test results 30MHz-1GHz

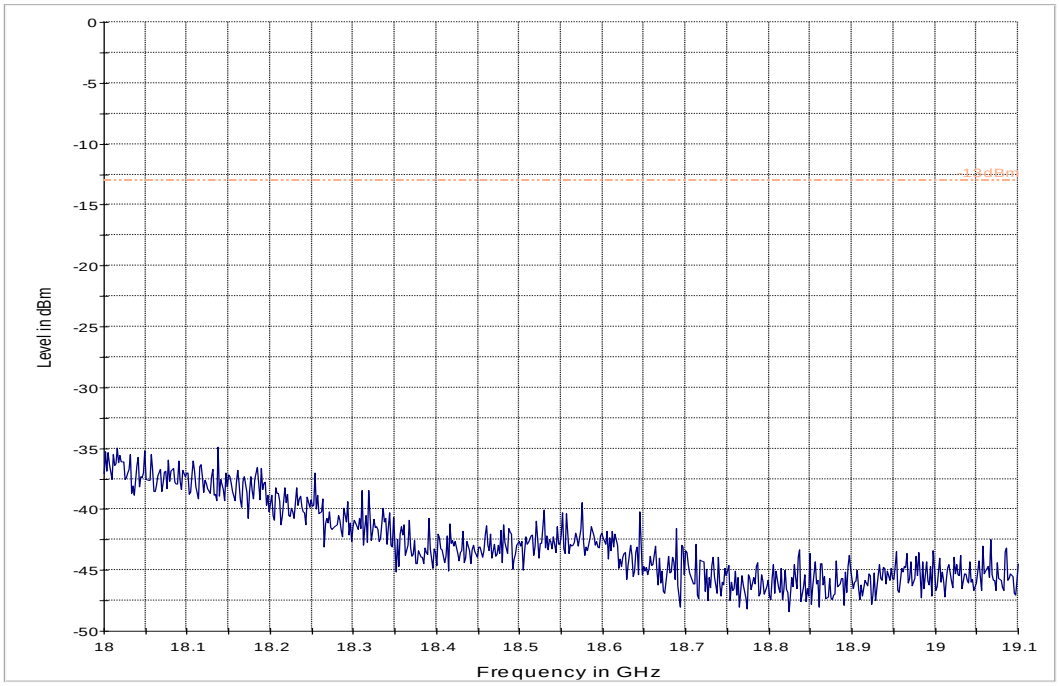


Test results 1GHz-18GHz



-13dBm Preview Result 1-PK+

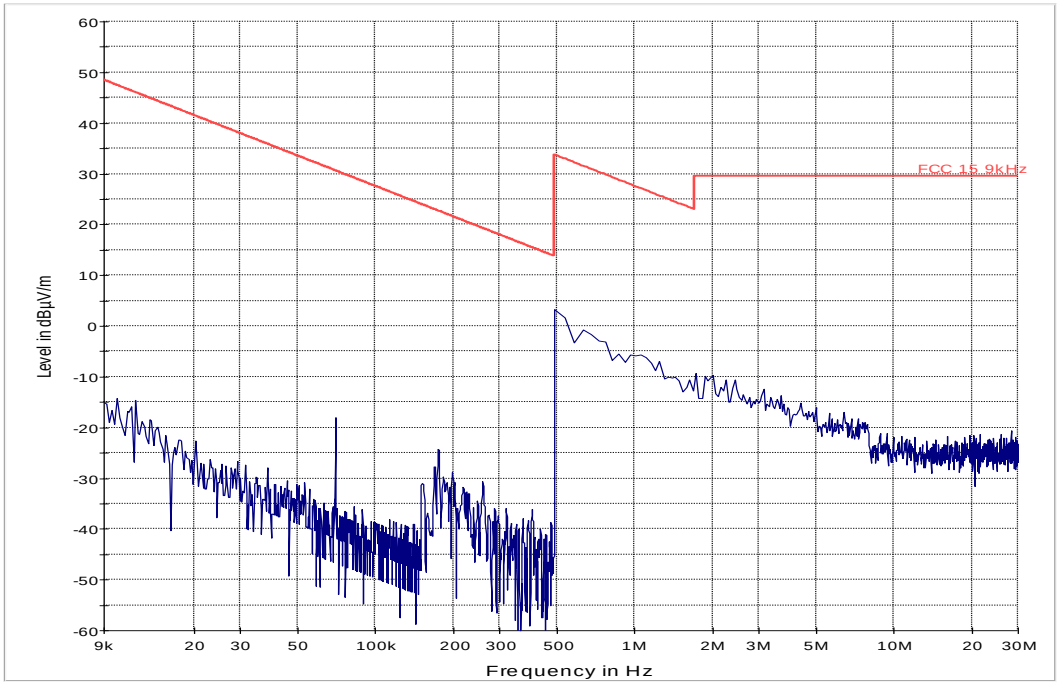
Test results 18GHz-19.1GHz



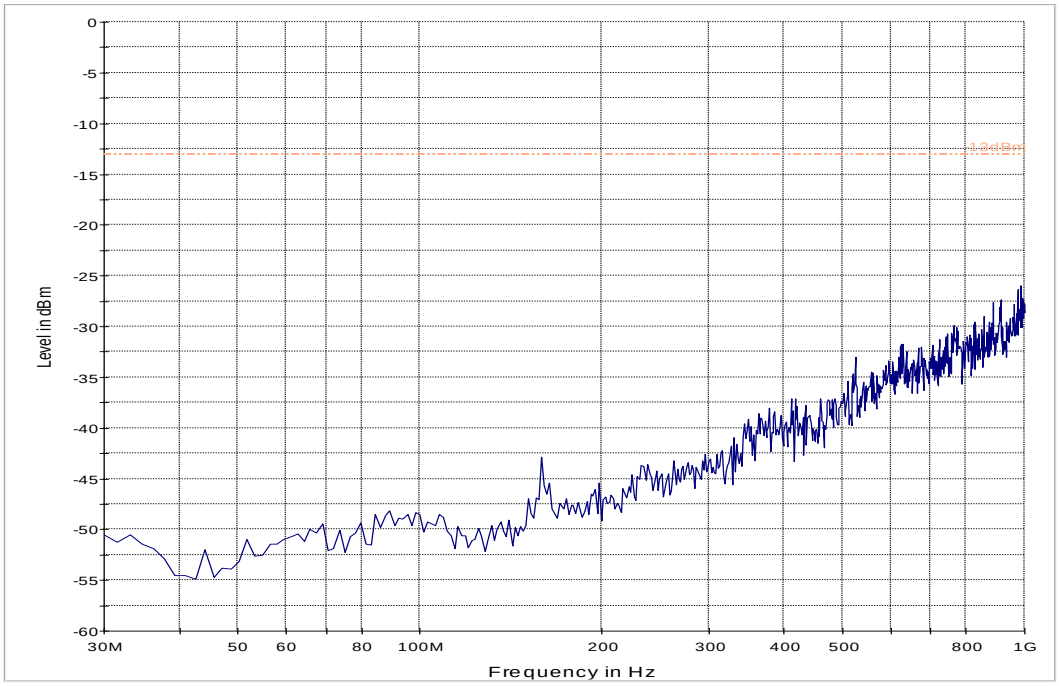
-13dBm Preview Result 1-PK+

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

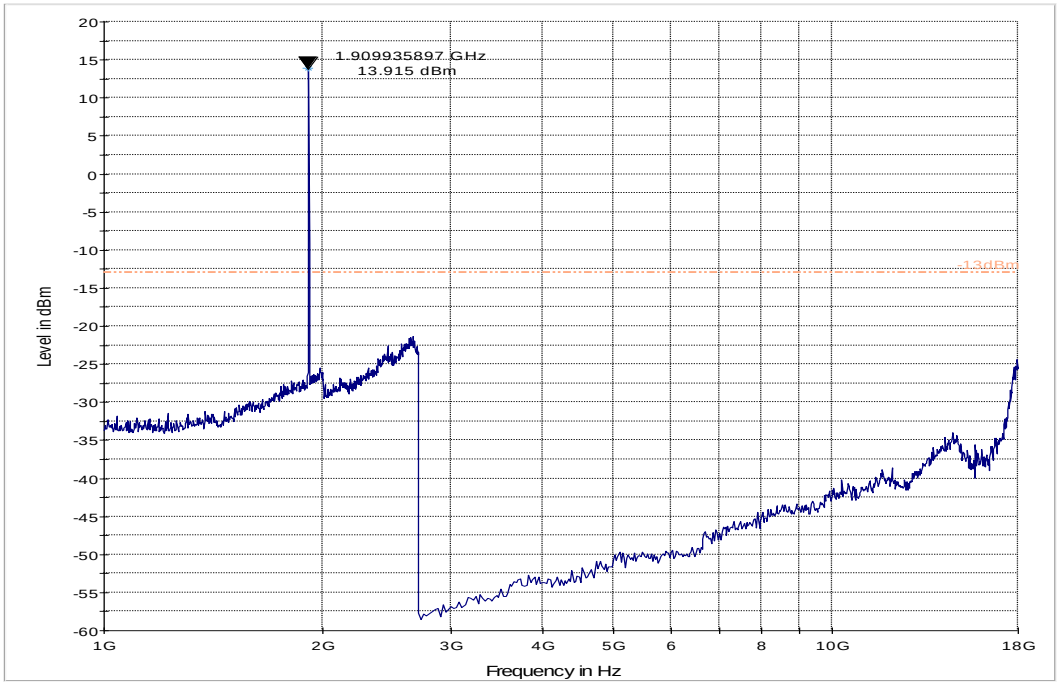
Test results 9kHz-30MHz



Test results 30MHz-1GHz

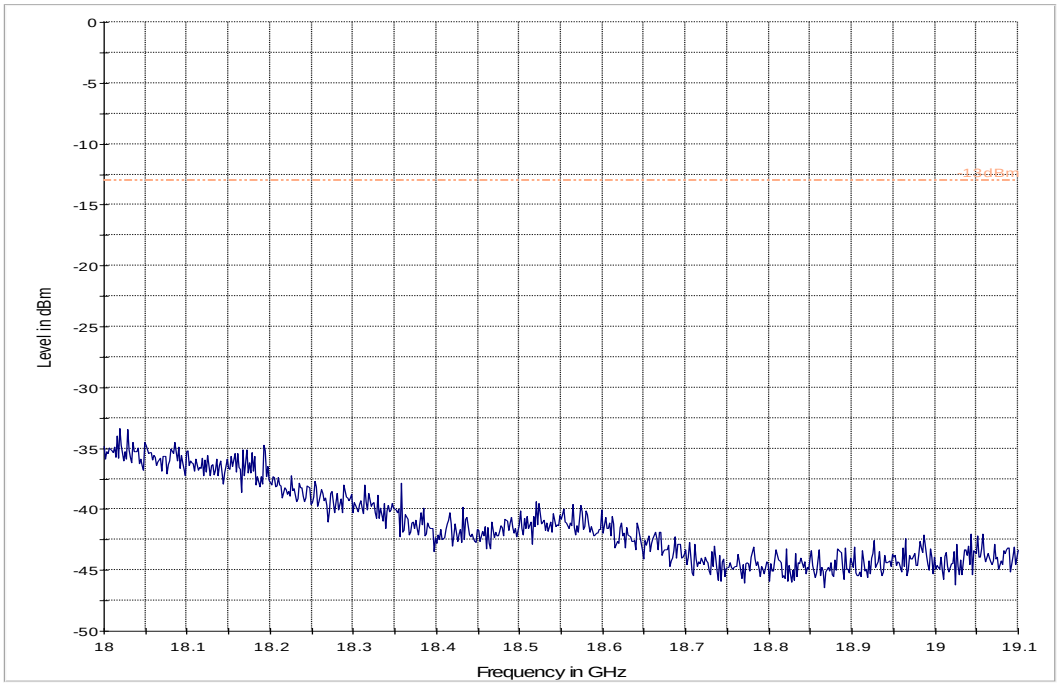


Test results 1GHz-18GHz



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

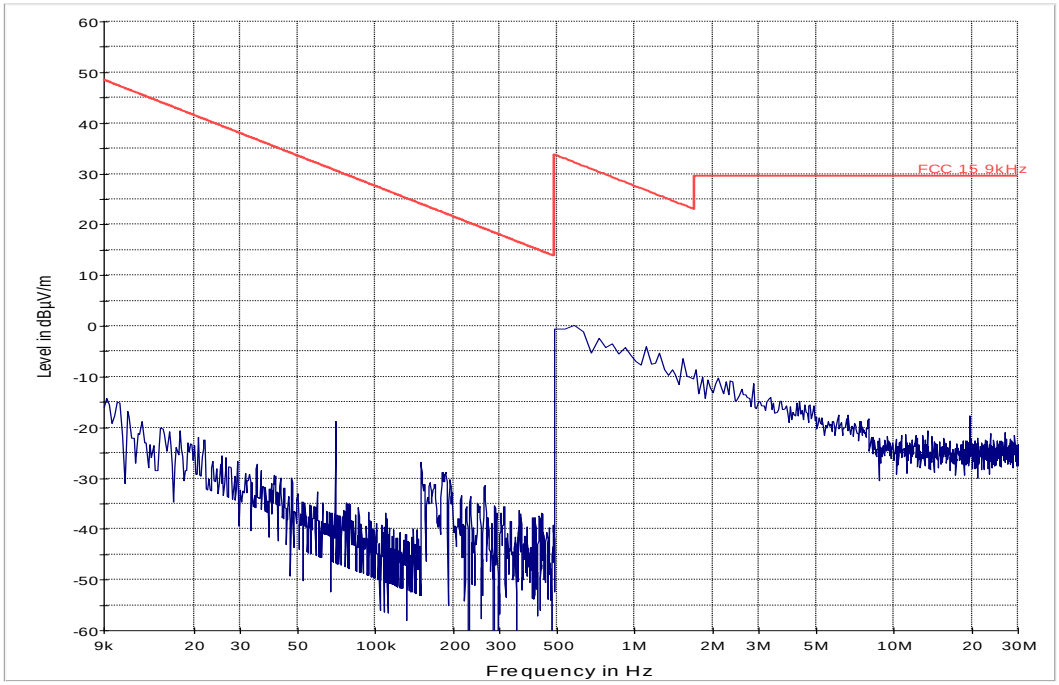
Test results 18GHz-19.1GHz



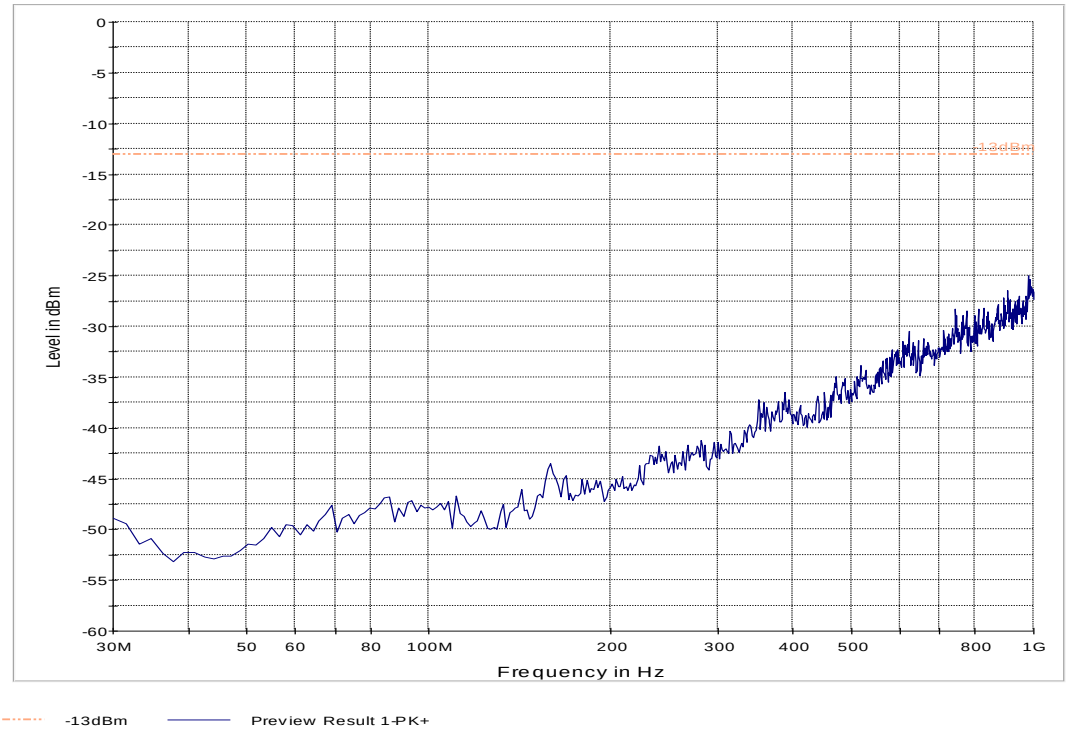
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band II) Tx: Low Channel

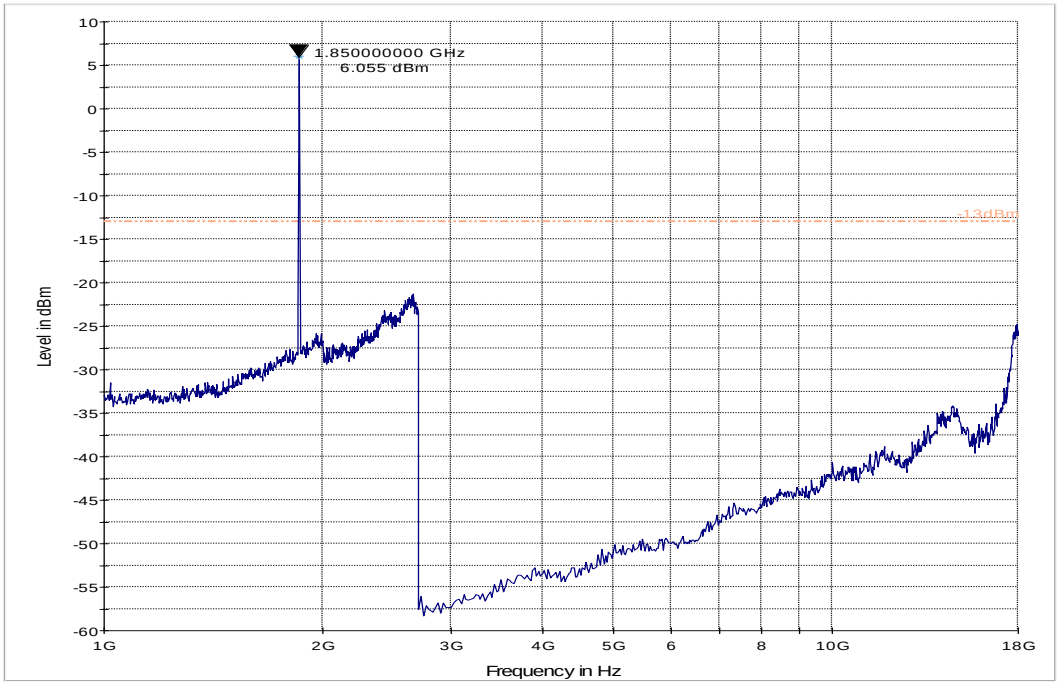
Test results 9kHz-30MHz



Test results 30MHz-1GHz

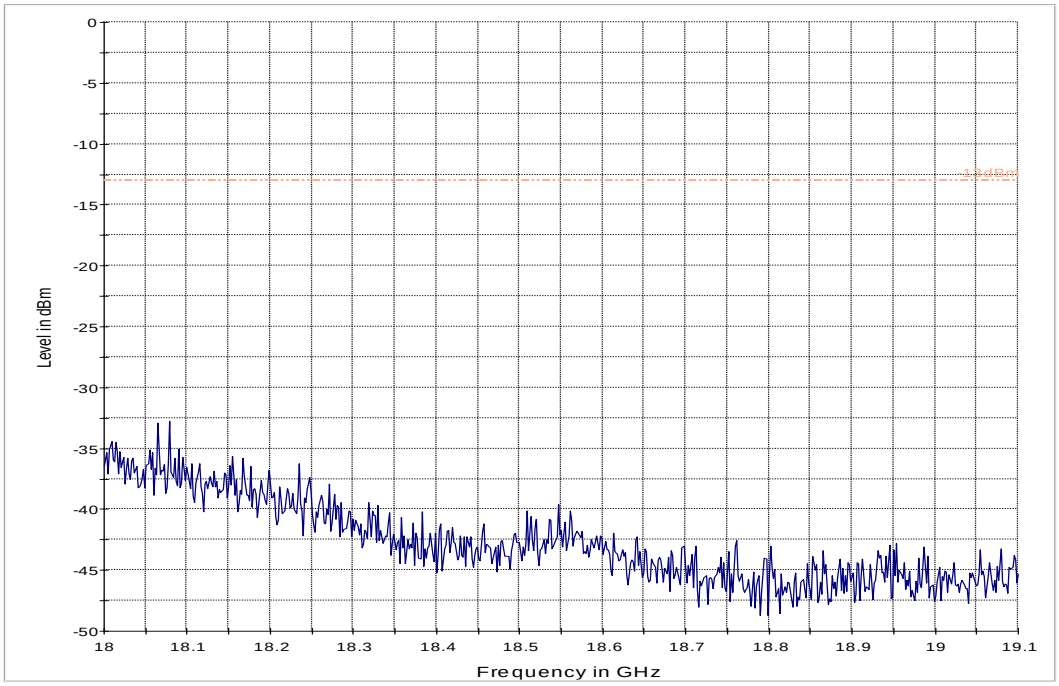


Test results 1GHz-18GHz



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

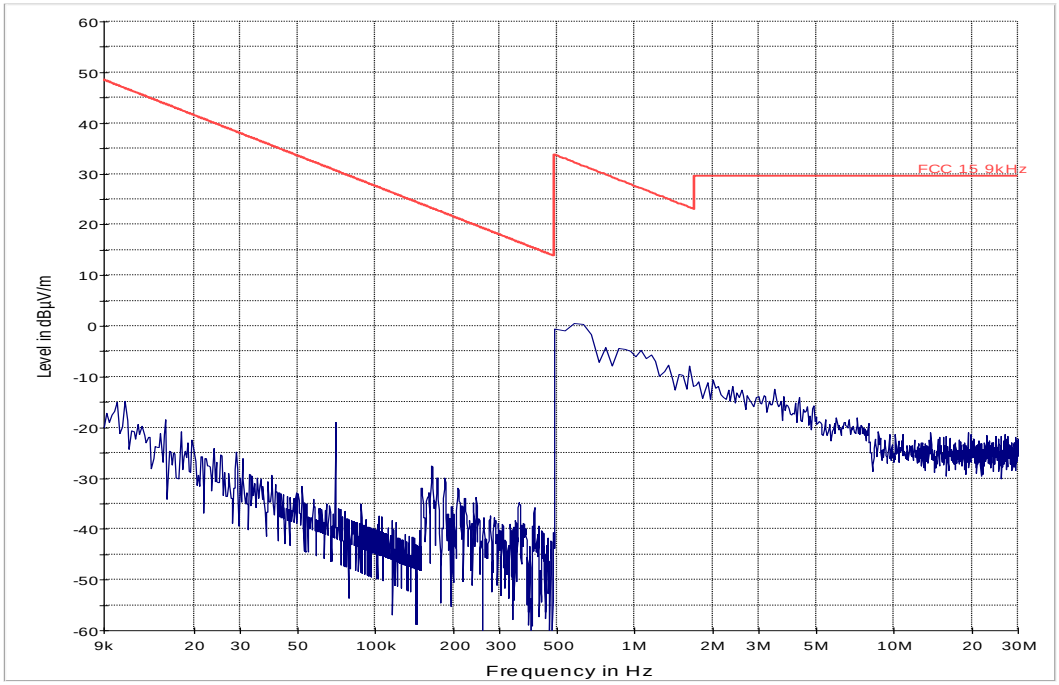
Test results 18GHz-19.1GHz



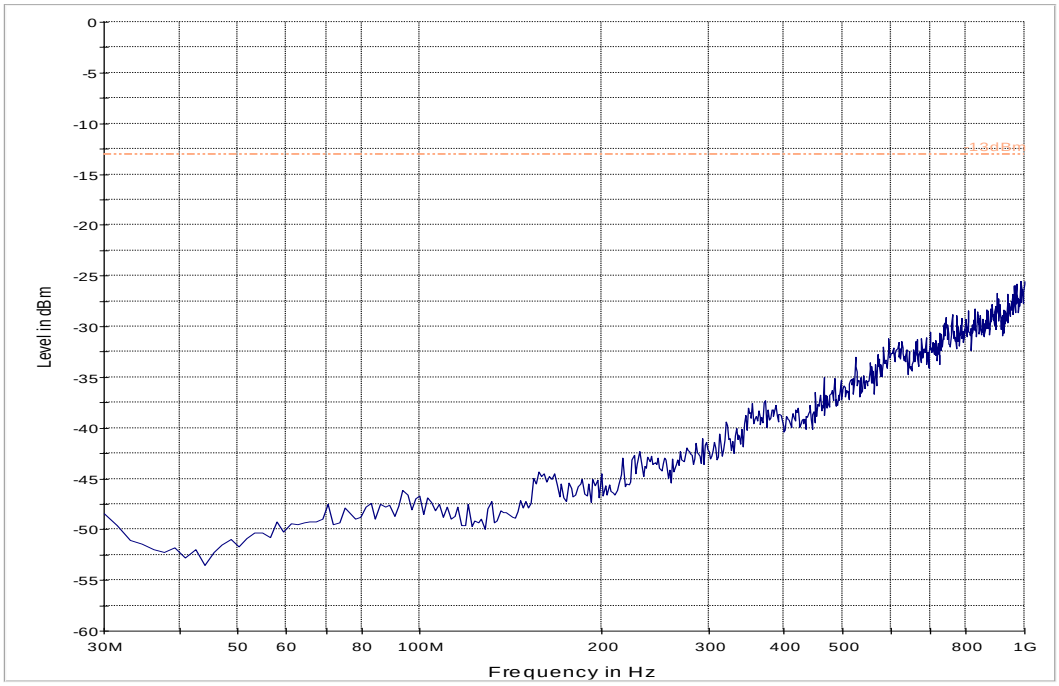
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band II) Tx: Mid Channel

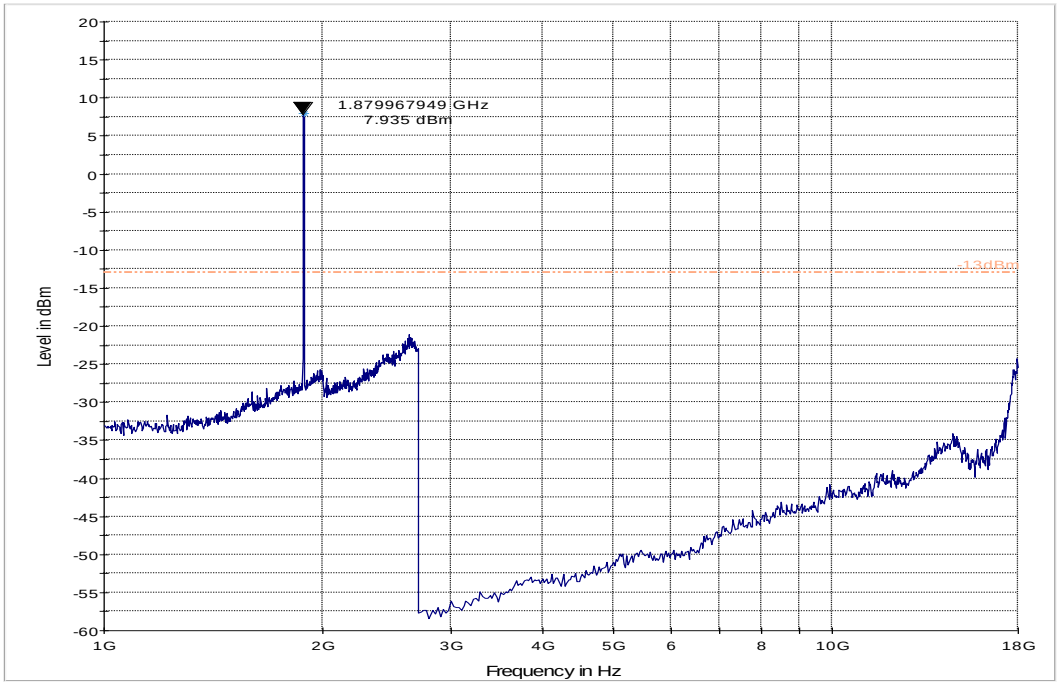
Test results 9kHz-30MHz



Test results 30MHz-1GHz

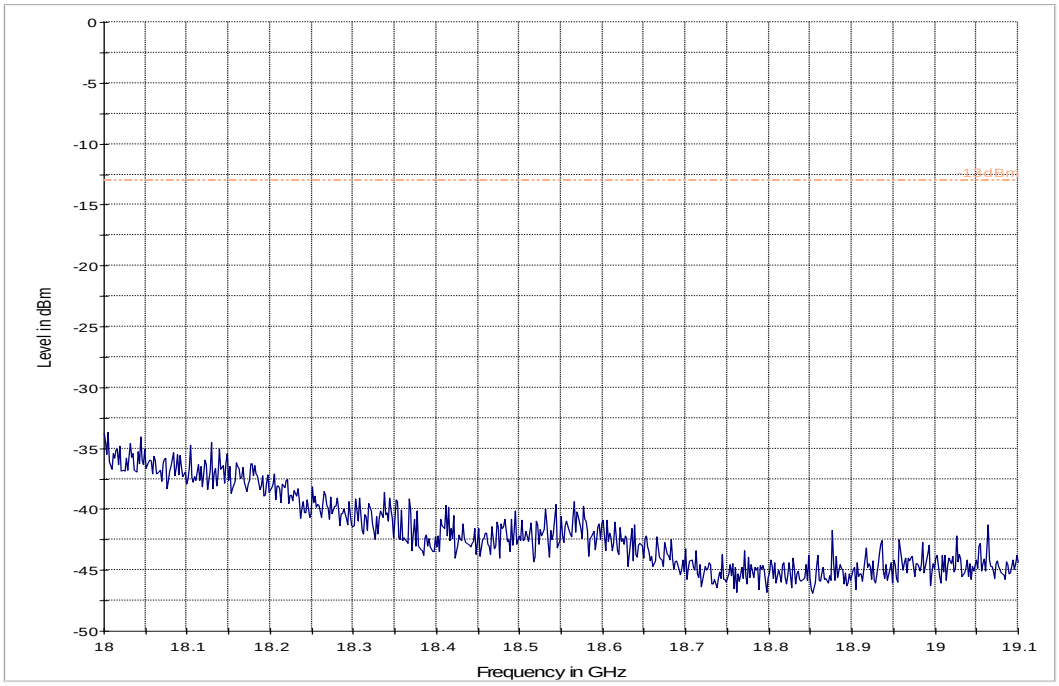


Test results 1GHz-18GHz



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

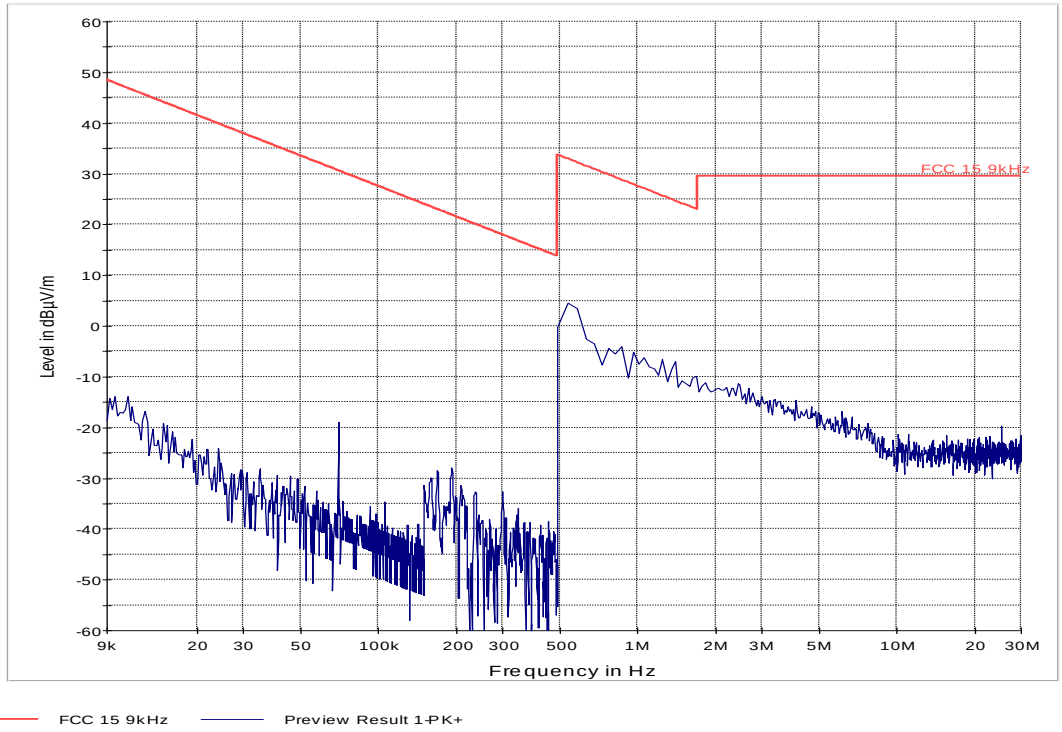
Test results 18GHz-19.1GHz



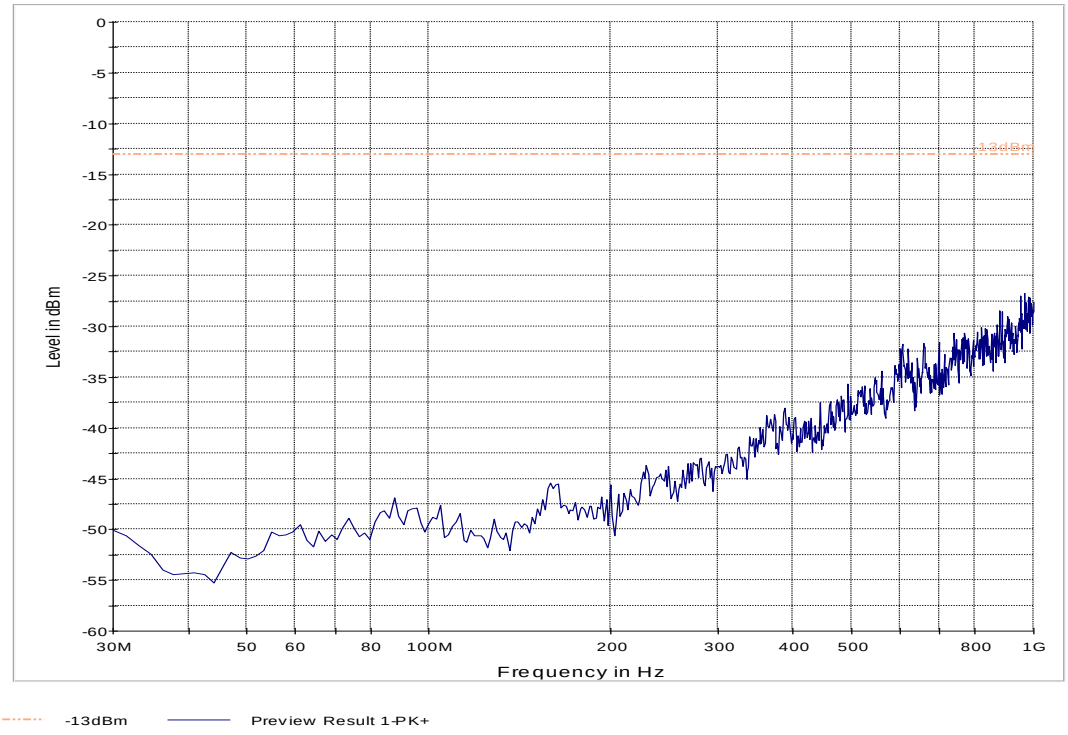
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band II) Tx: High Channel

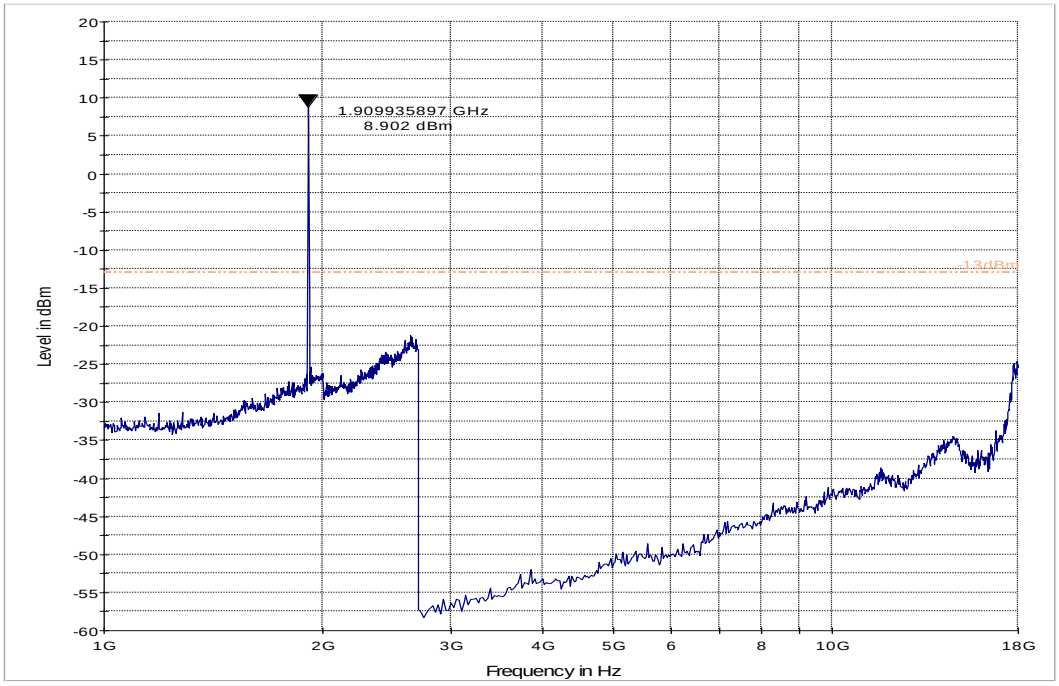
Test results 9kHz-30MHz



Test results 30MHz-1GHz

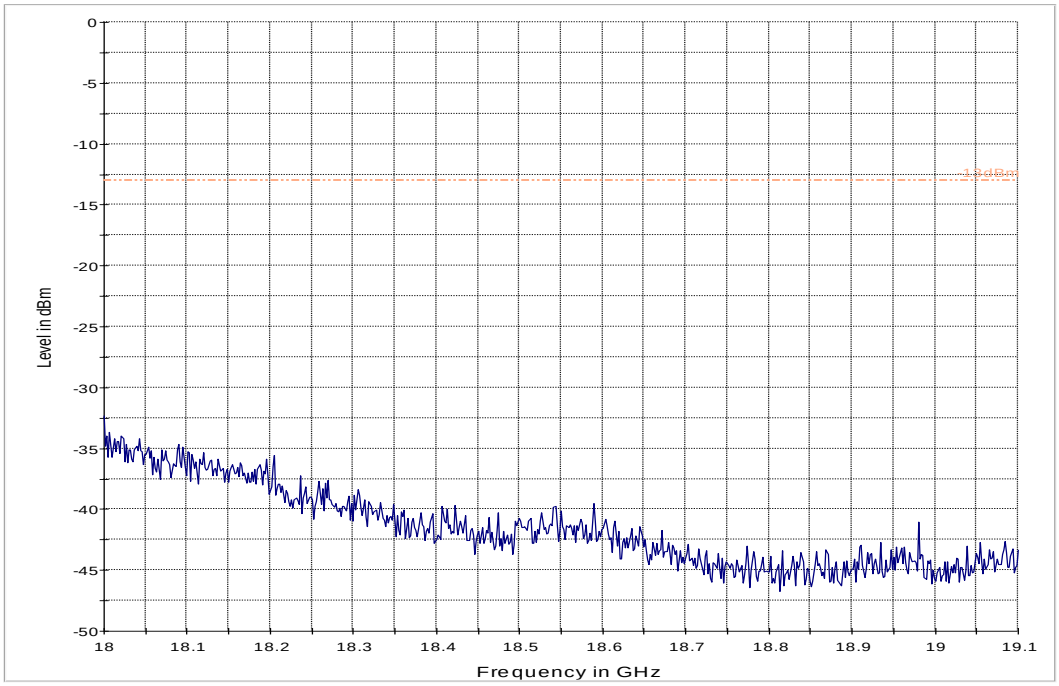


Test results 1GHz-18GHz



-13dBm Preview Result 1-PK+

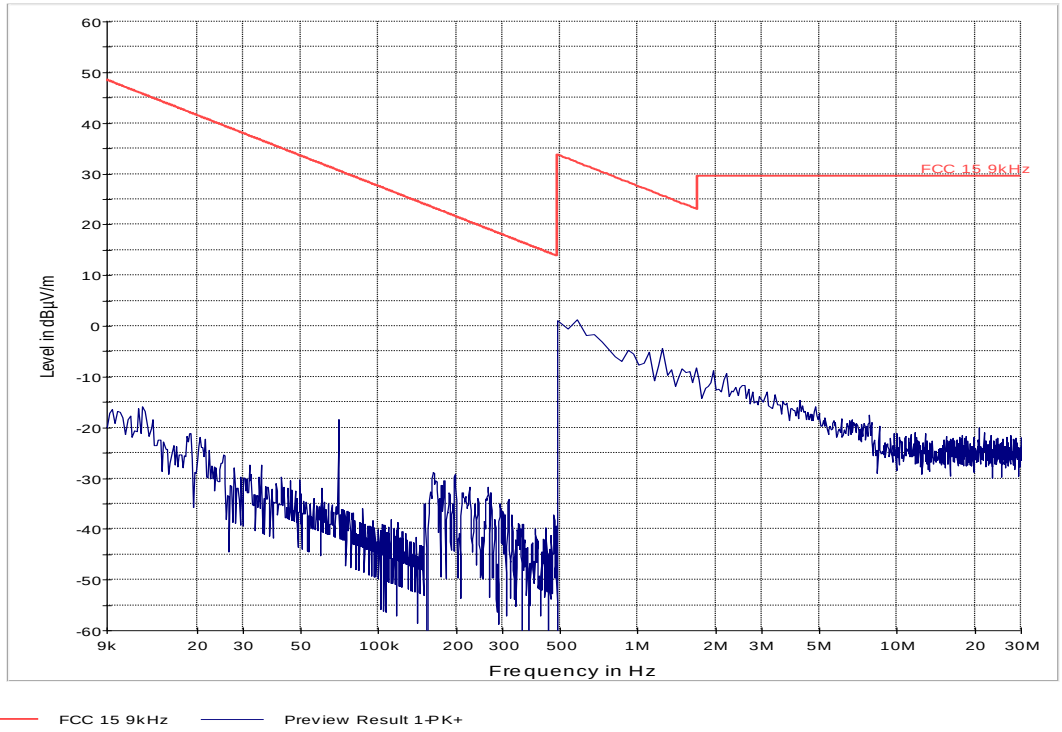
Test results 18GHz-19.1GHz



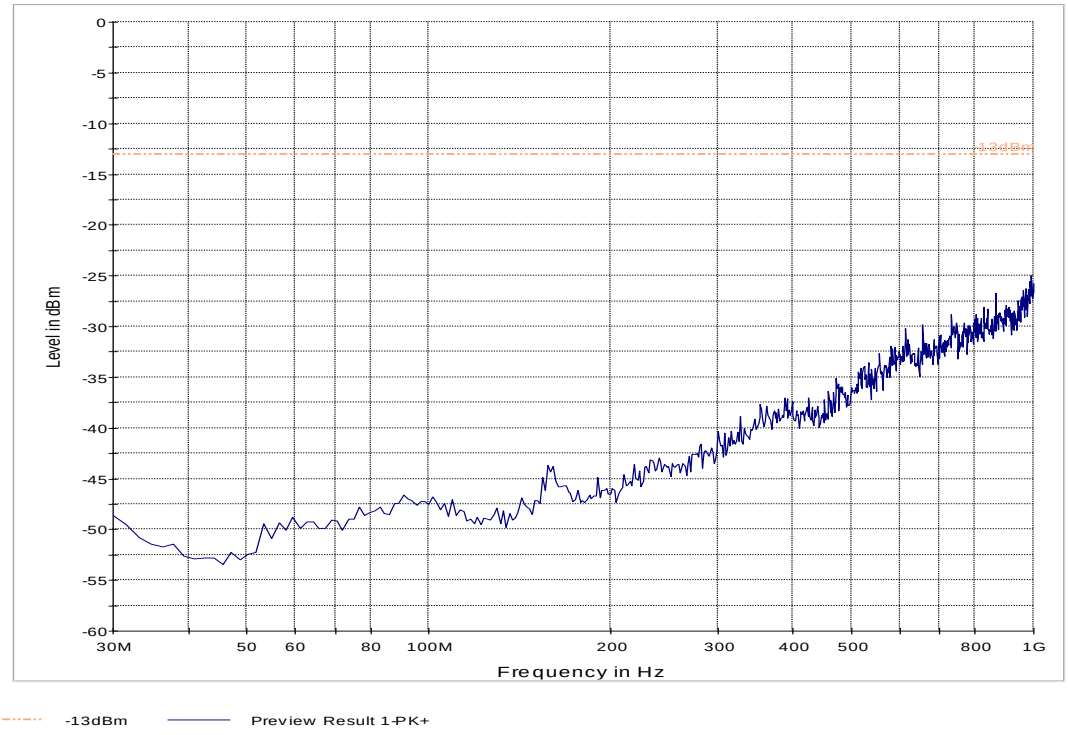
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 2) Tx: QPSK; 10MHz BW: Low Channel

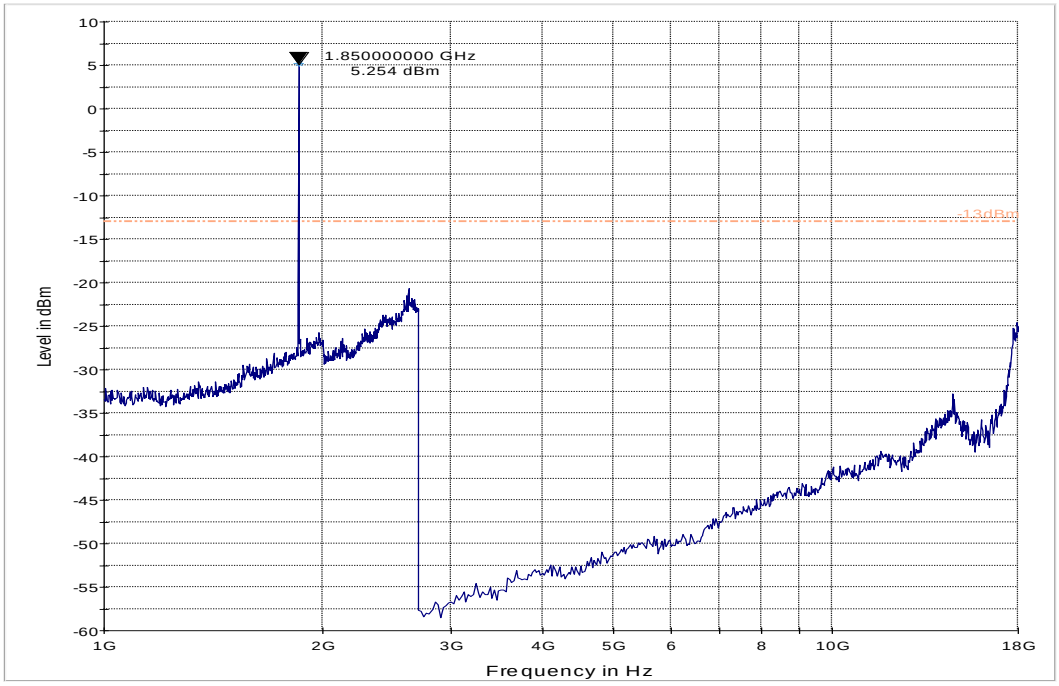
Test results 9kHz-30MHz



Test results 30MHz-1GHz

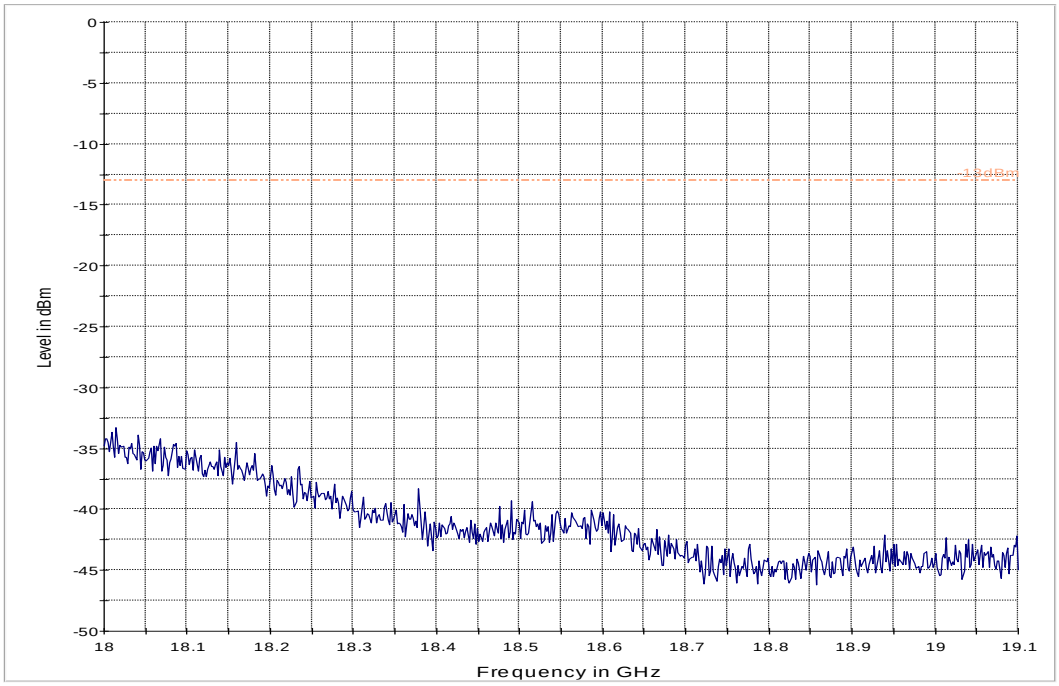


Test results 1GHz-18GHz



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

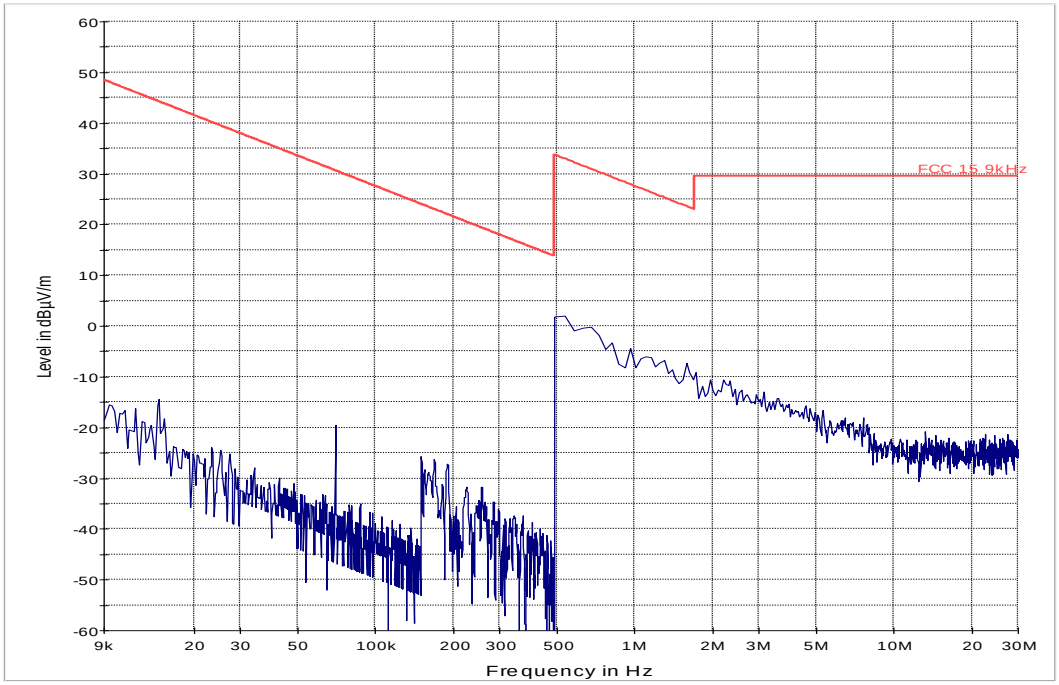
Test results 18GHz-19.1GHz



-13dBm Preview Result 1-PK+

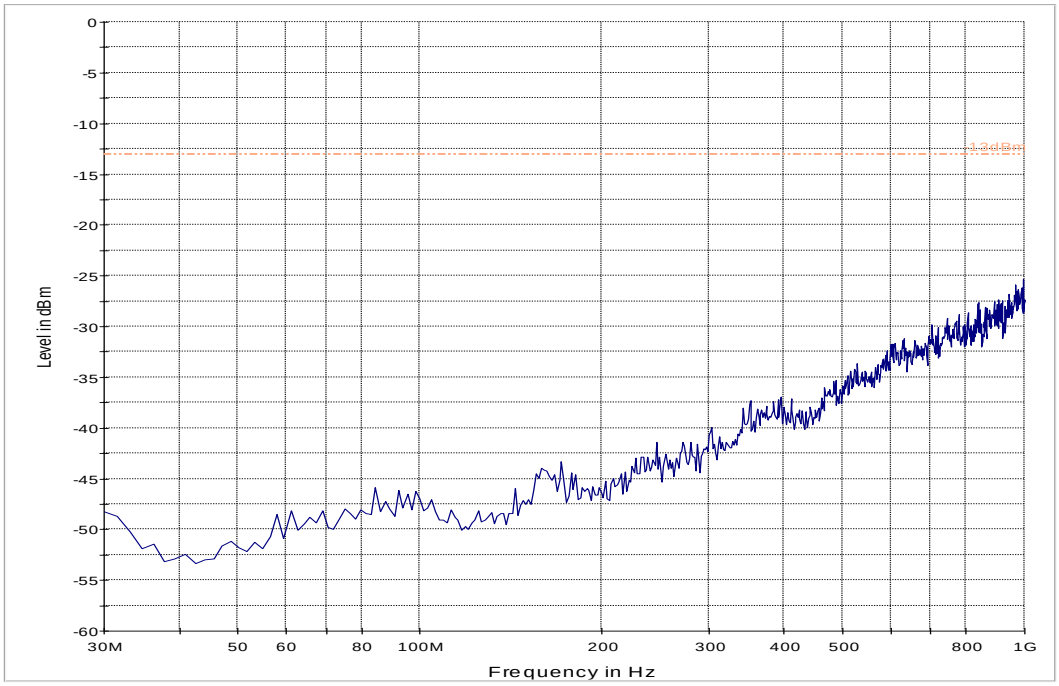
Radiated Spurious Emissions (LTE Band 2) Tx: QPSK; 10MHz BW: Mid Channel

Test results 9kHz-30MHz



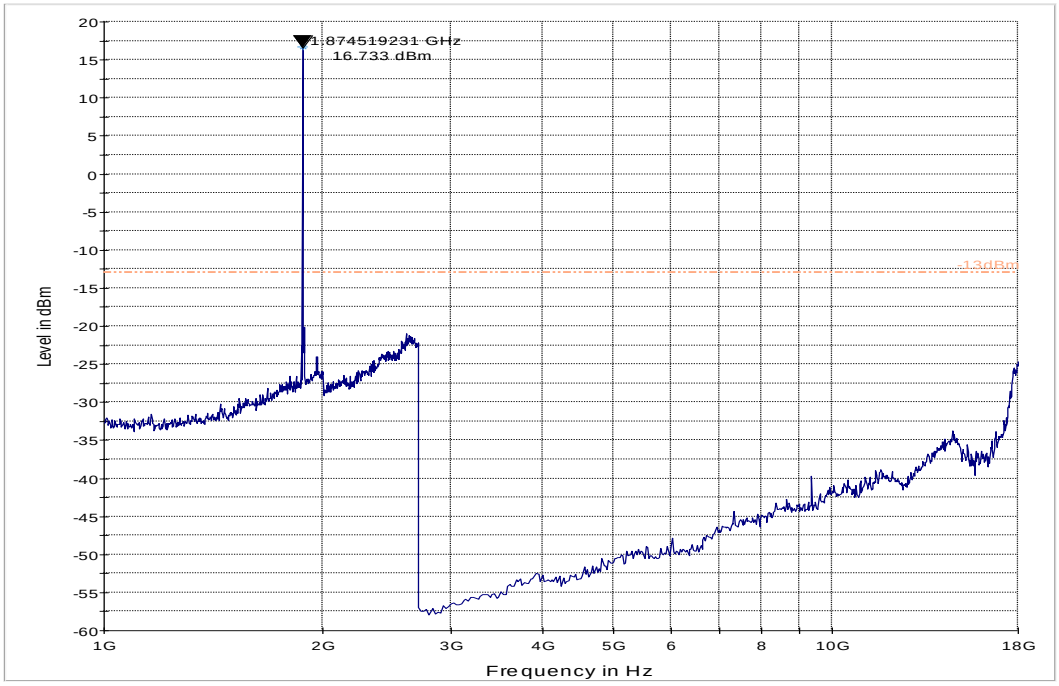
FCC 15 9kHz Preview Result 1-PK+

Test results 30MHz-1GHz



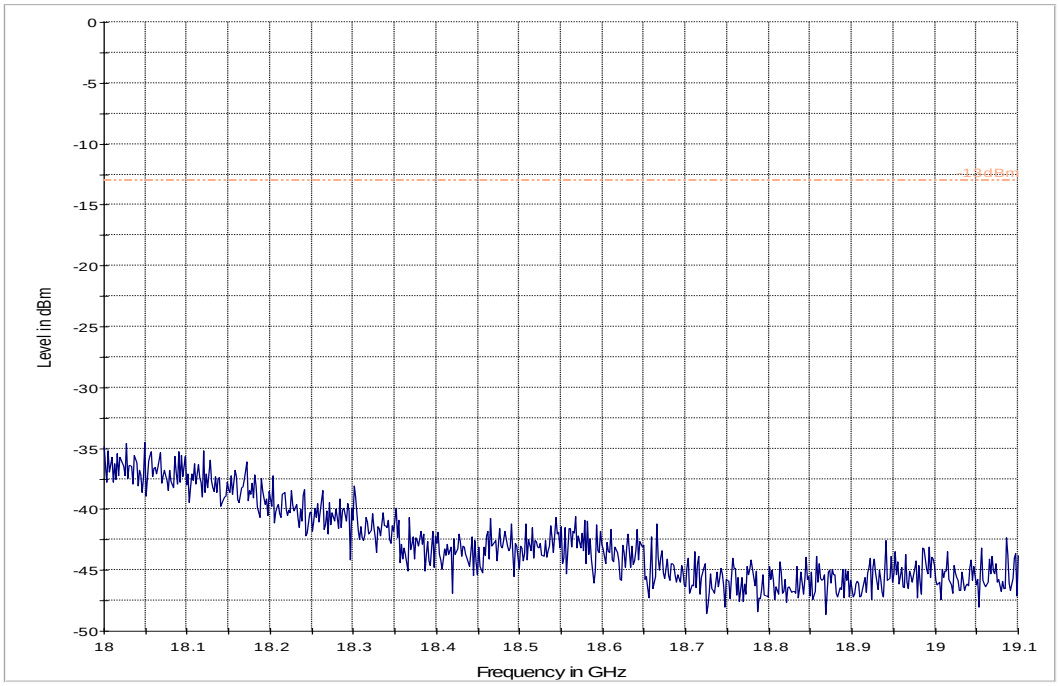
-13dBm Preview Result 1-PK+

Test results 1GHz-18GHz



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

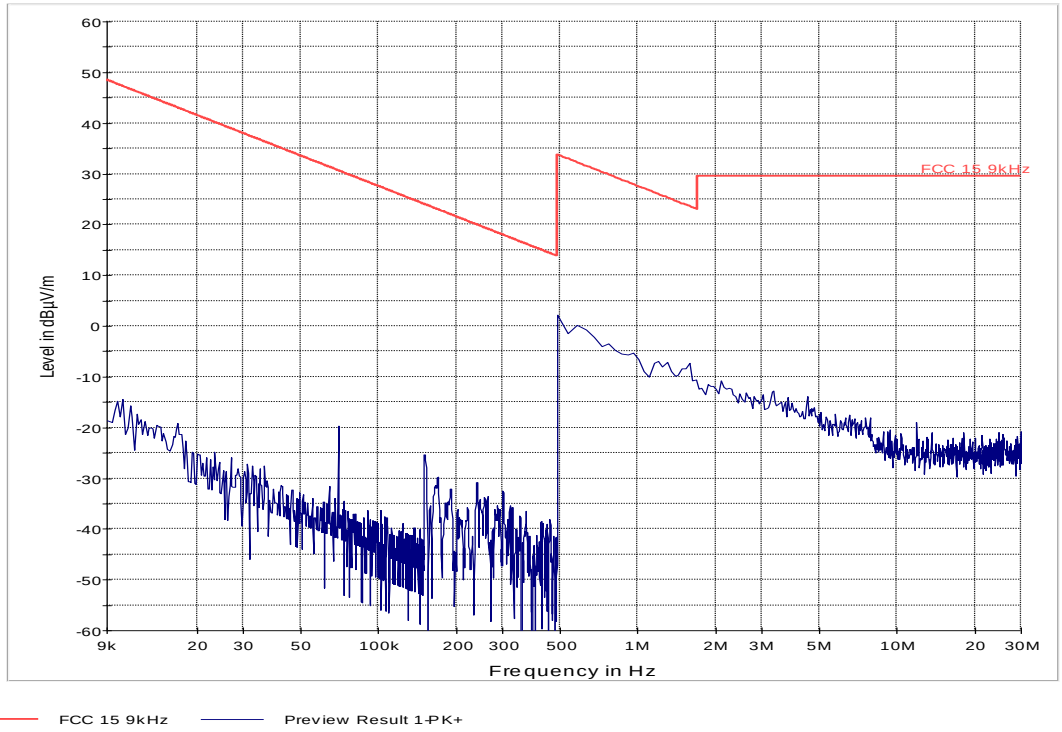
Test results 18GHz-19.1GHz



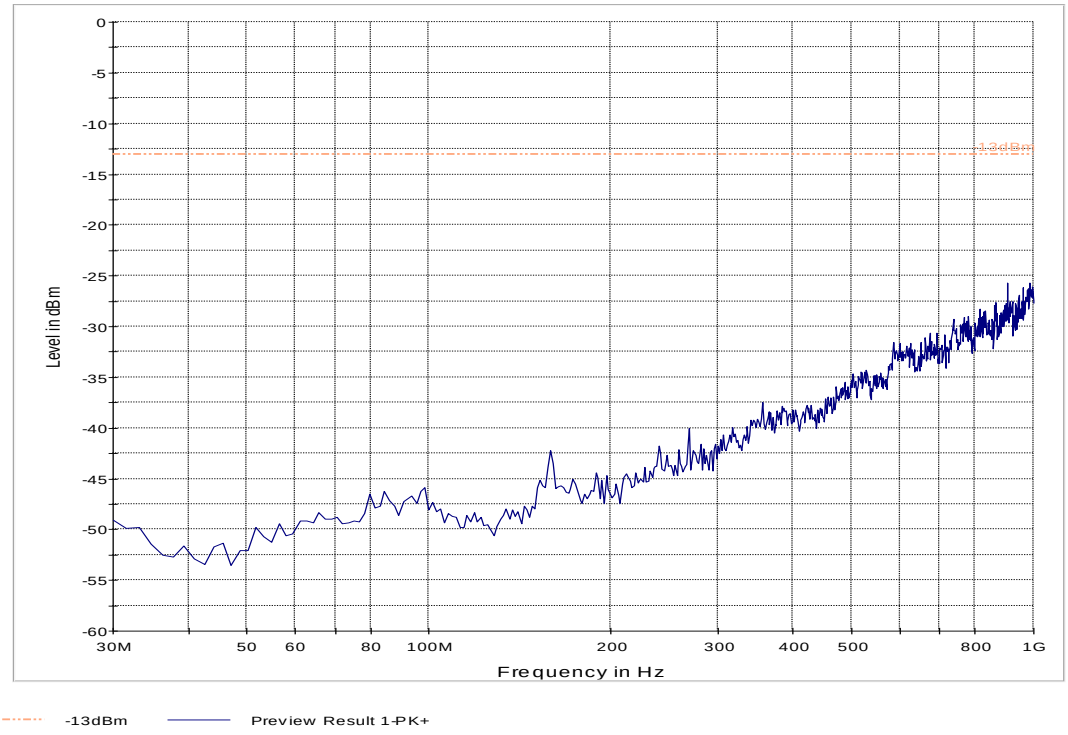
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 2) Tx: QPSK; 10MHz BW: High Channel

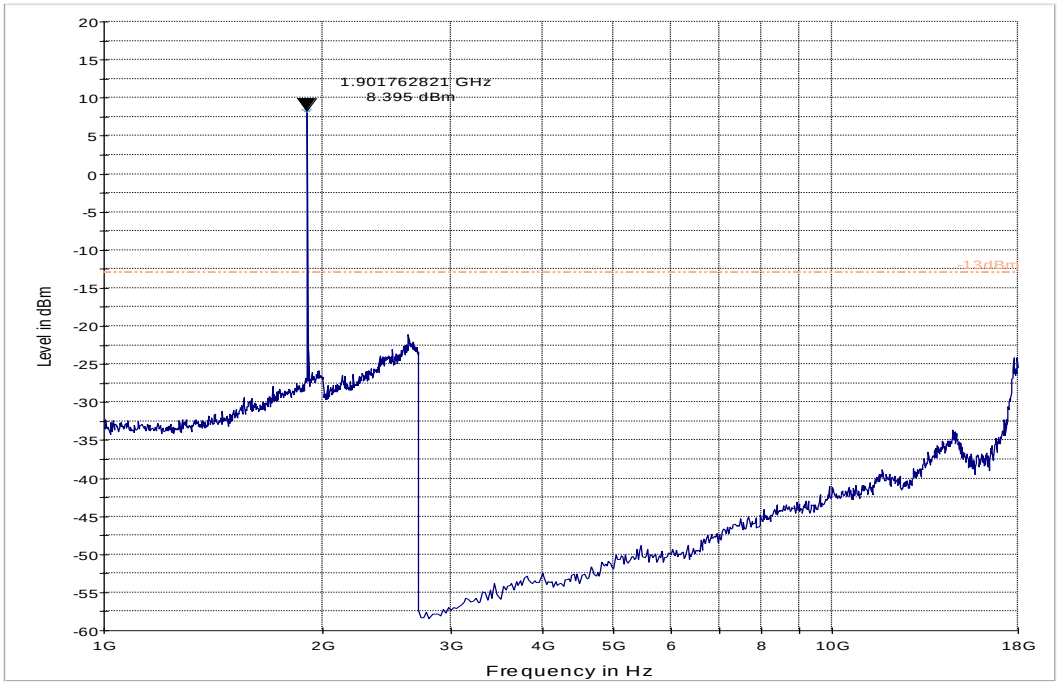
Test results 9kHz-30MHz



Test results 30MHz-1GHz

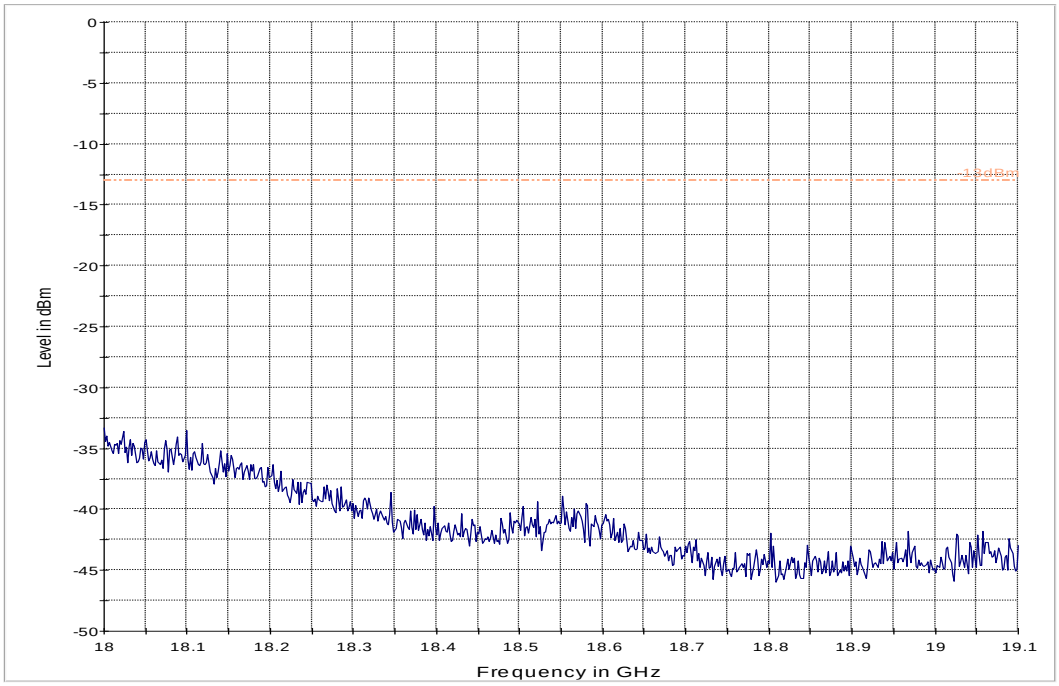


Test results 1GHz-18GHz



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

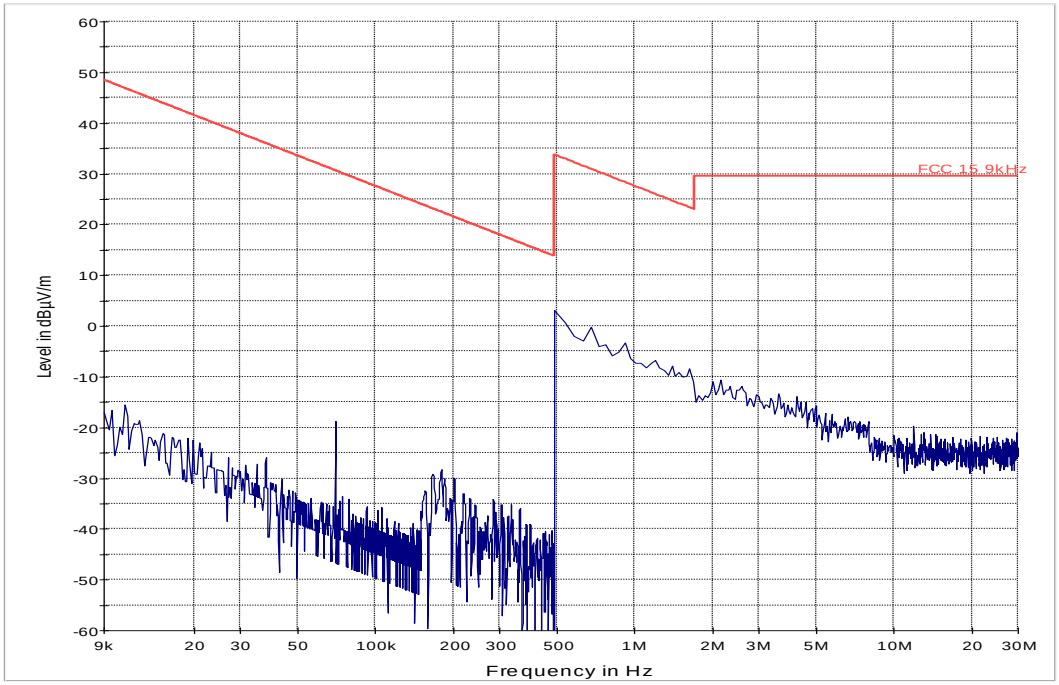
Test results 18GHz-19.1GHz



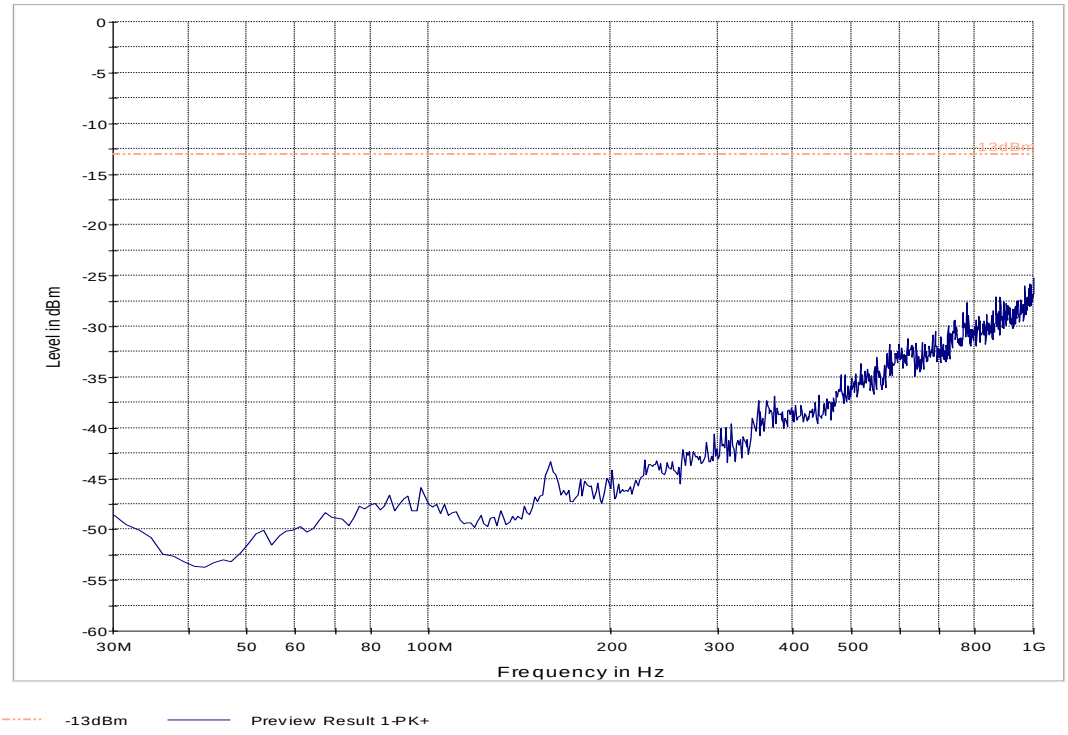
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 2) Tx: 16-QAM; 10MHz BW: Low Channel

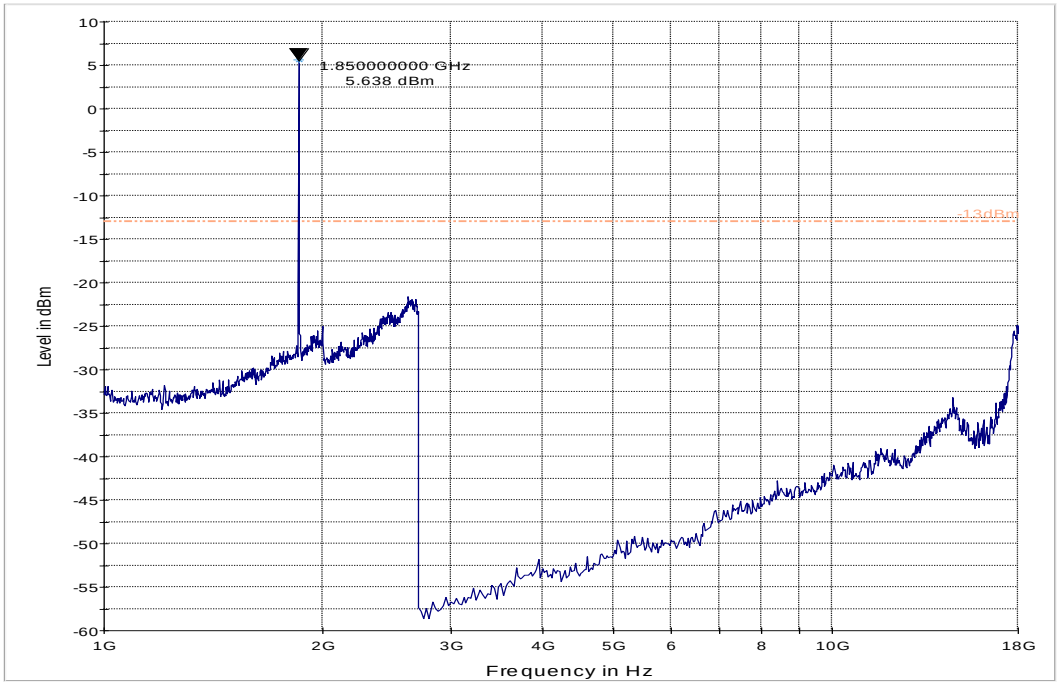
Test results 9kHz-30MHz



Test results 30MHz-1GHz

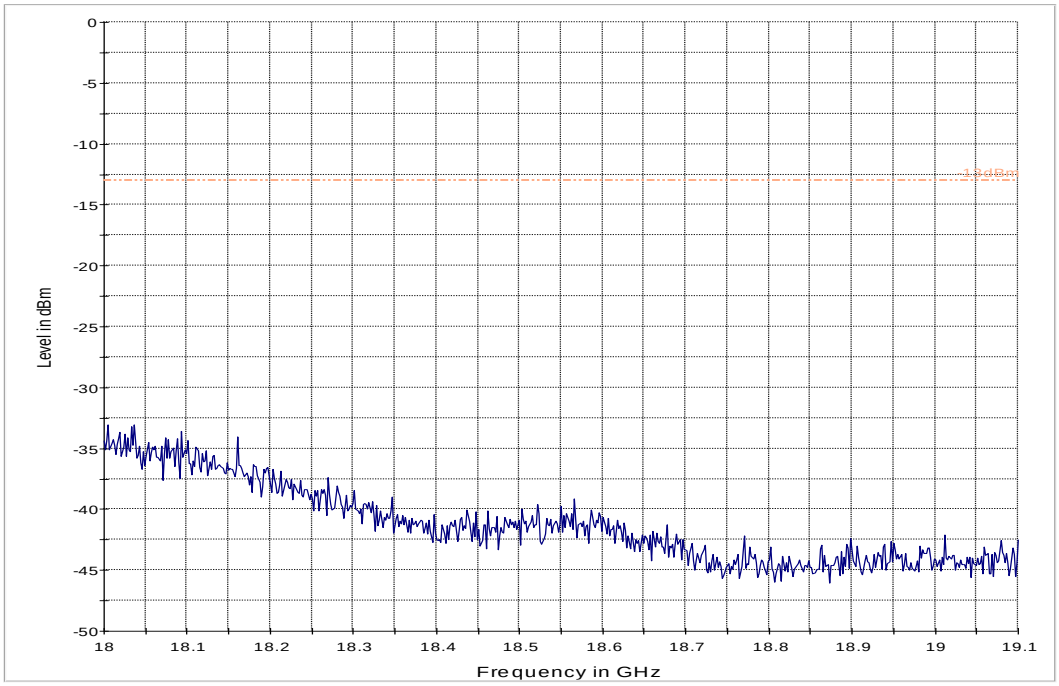


Test results 1GHz-18GHz



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

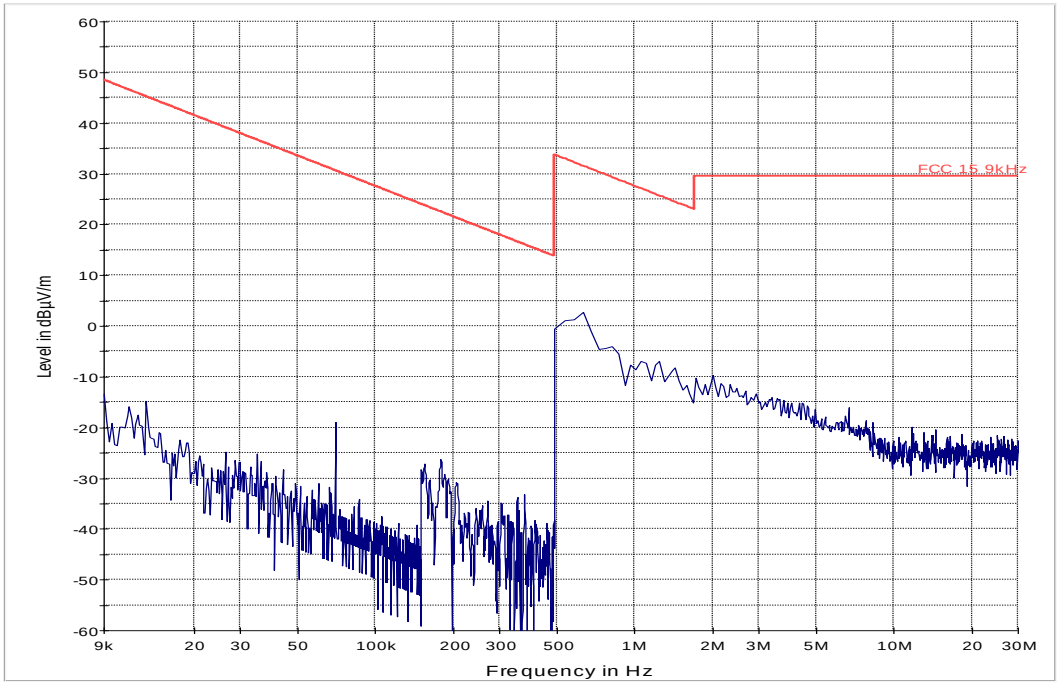
Test results 18GHz-19.1GHz



-13dBm Preview Result 1-PK+

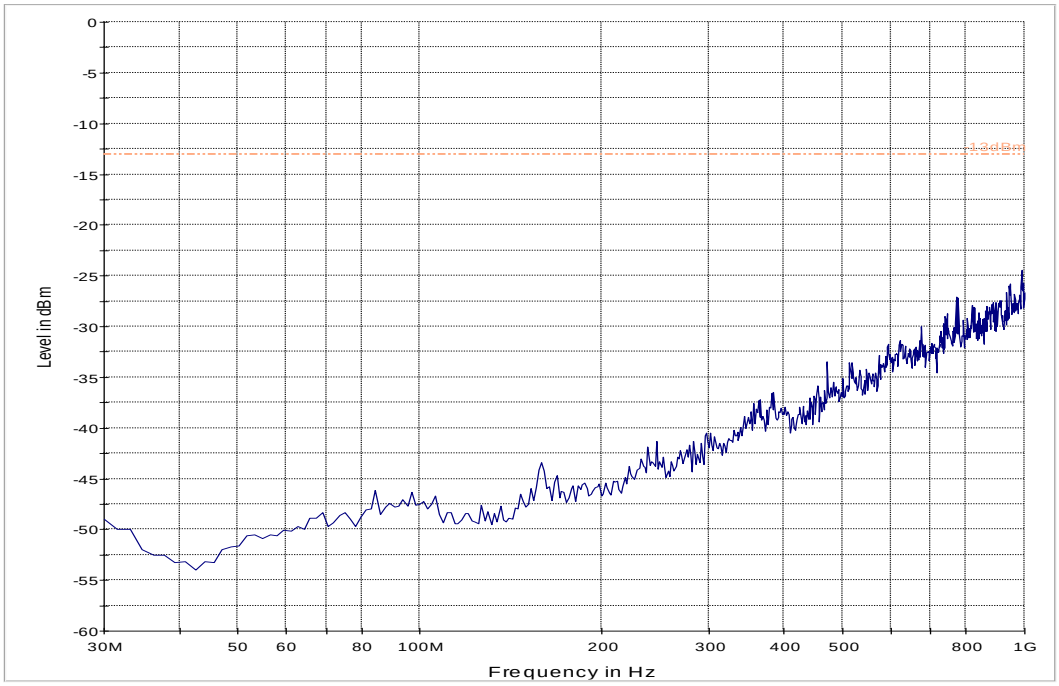
Radiated Spurious Emissions (LTE Band 2) Tx: 16-QAM; 10MHz BW: Mid Channel

Test results 9kHz-30MHz



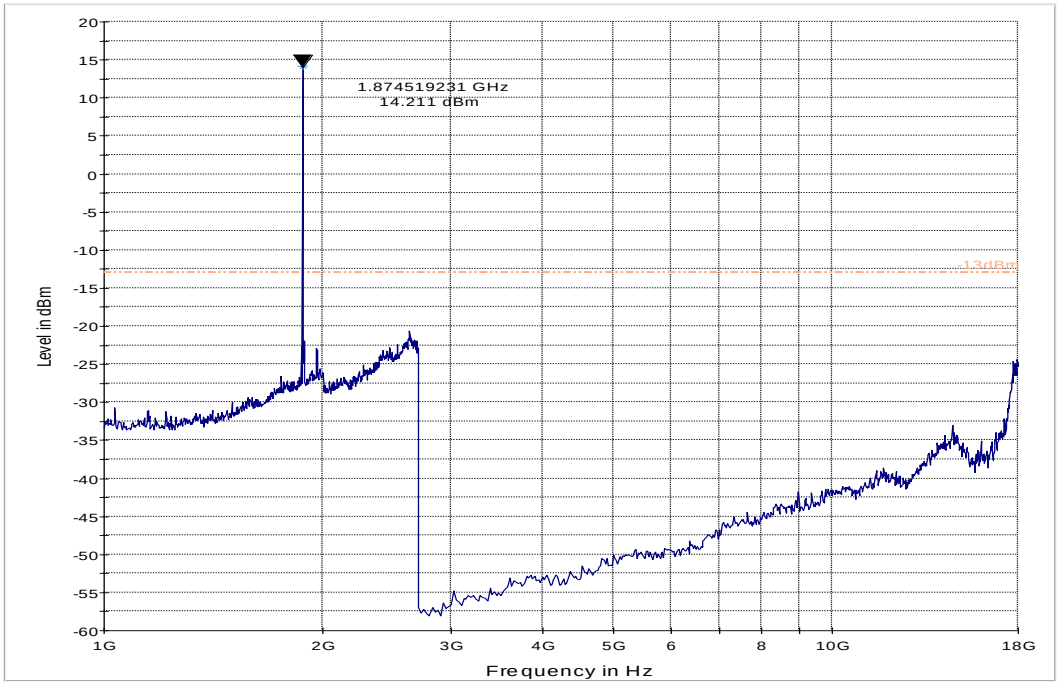
FCC 15 9kHz Preview Result 1-PK+

Test results 30MHz-1GHz



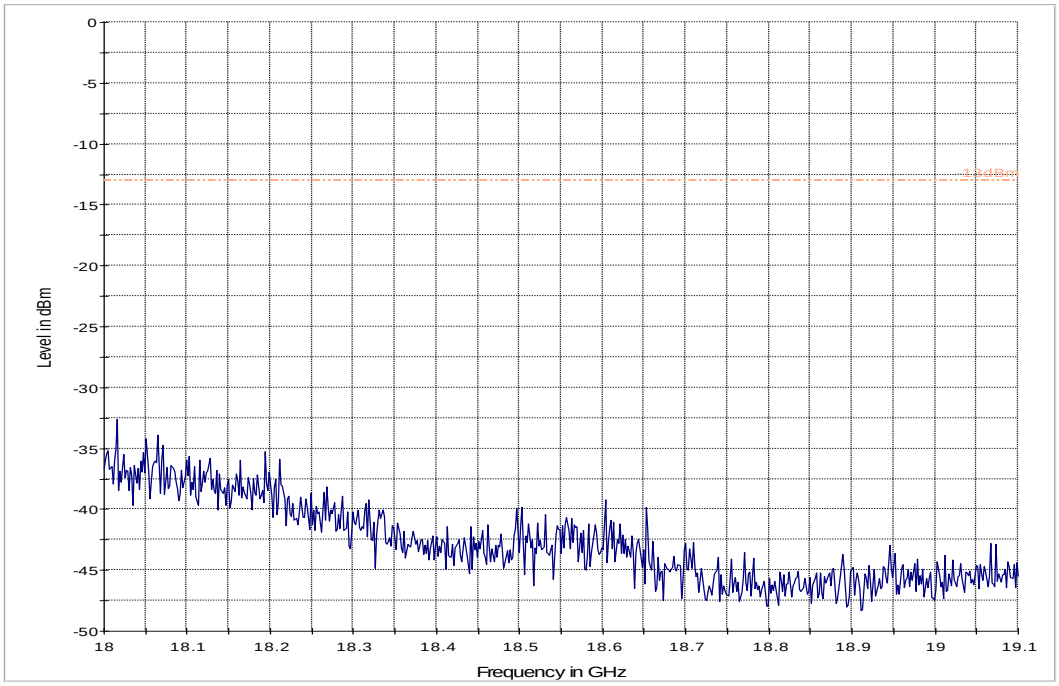
-13dBm Preview Result 1-PK+

Test results 1GHz-18GHz



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

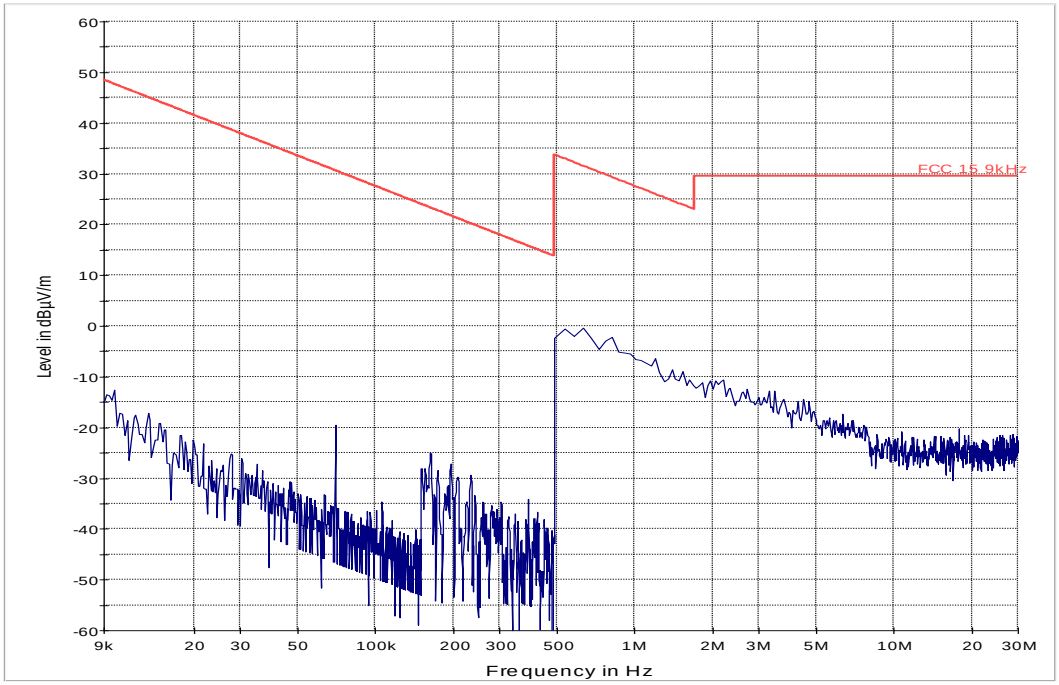
Test results 18GHz-19.1GHz



-13dBm Preview Result 1-PK+

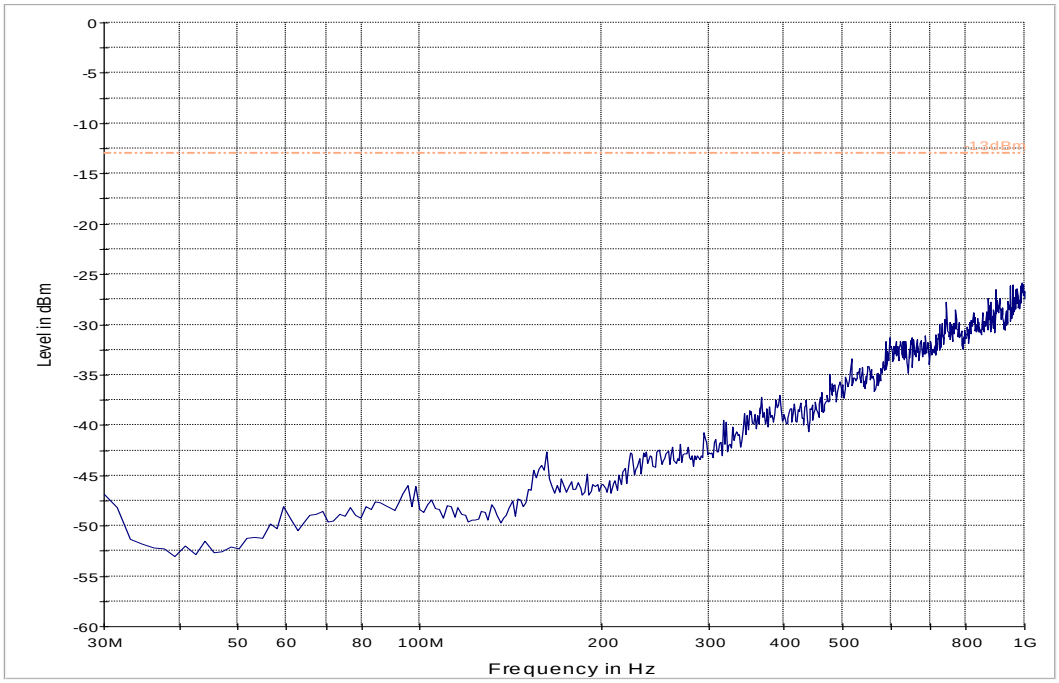
Radiated Spurious Emissions (LTE Band 2) Tx: 16-QAM; 10MHz BW: High Channel

Test results 9kHz-30MHz



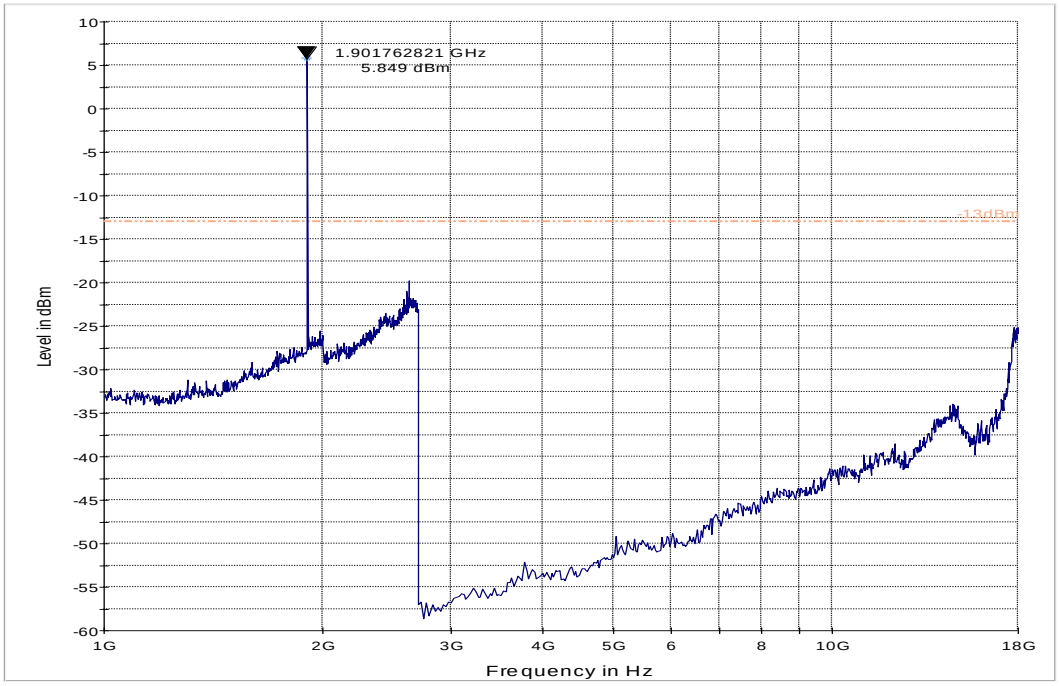
FCC 15 9kHz Preview Result 1-PK+

Test results 30MHz-1GHz



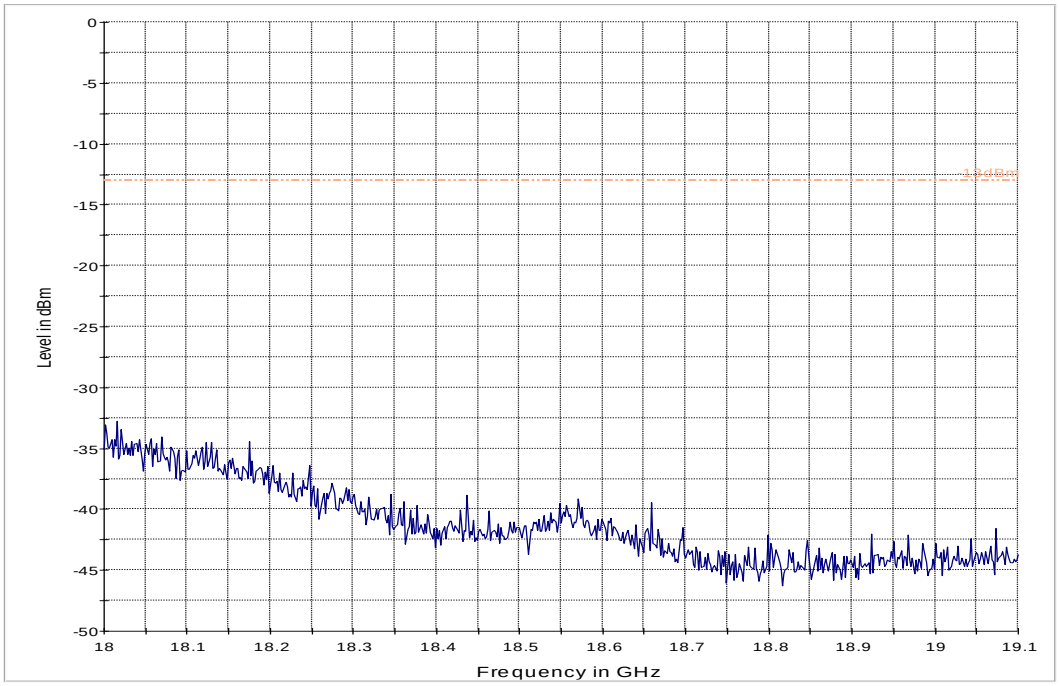
-13dBm Preview Result 1-PK+

Test results 1GHz-18GHz



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

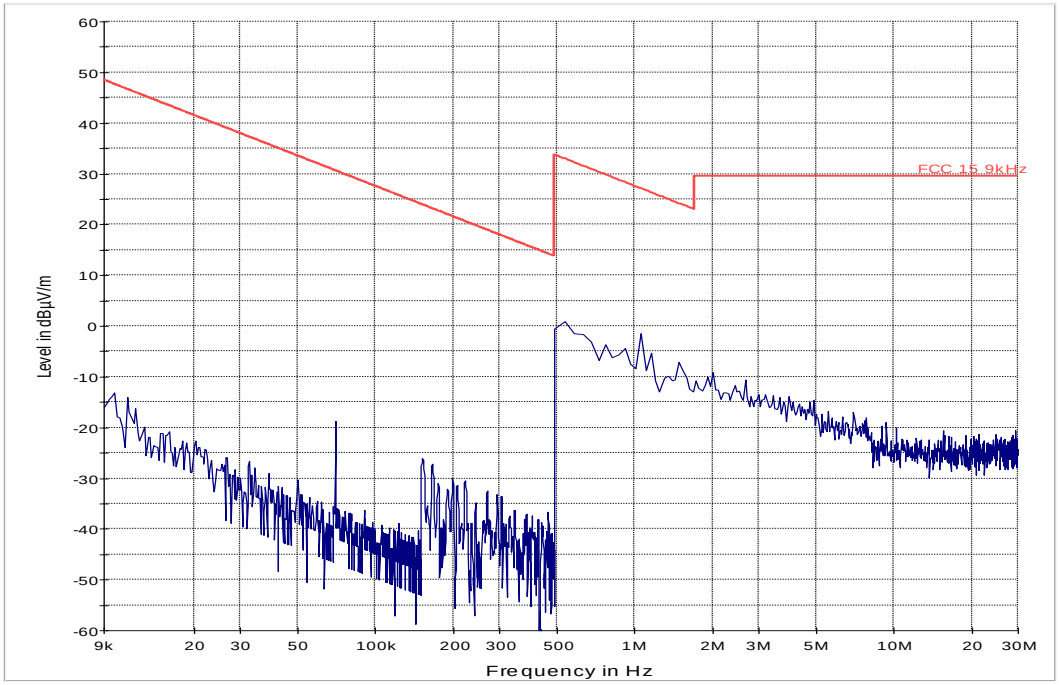
Test results 18GHz-19.1GHz



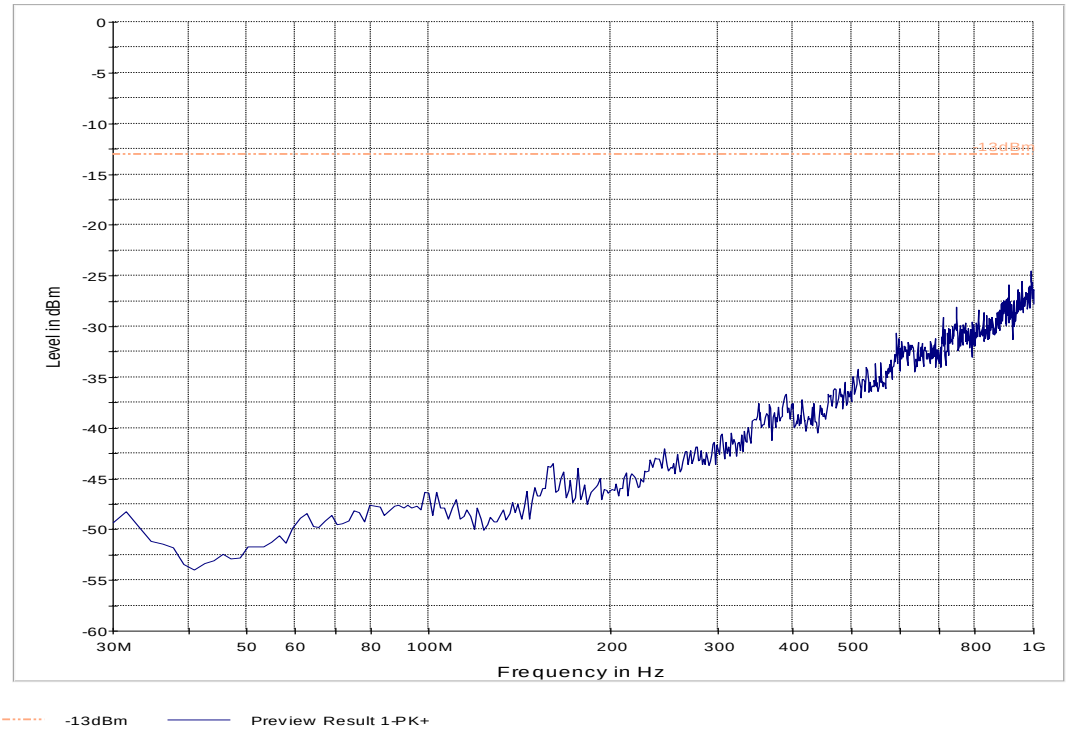
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band IV) Tx: Low Channel

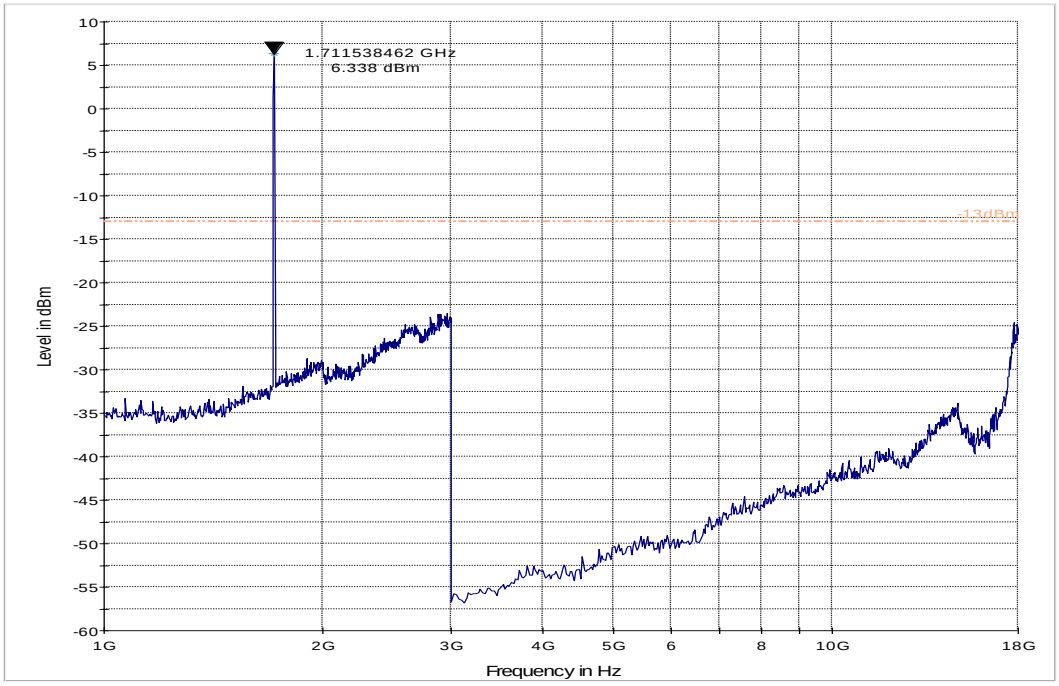
Test results 9kHz-30MHz



Test results 30MHz-1GHz

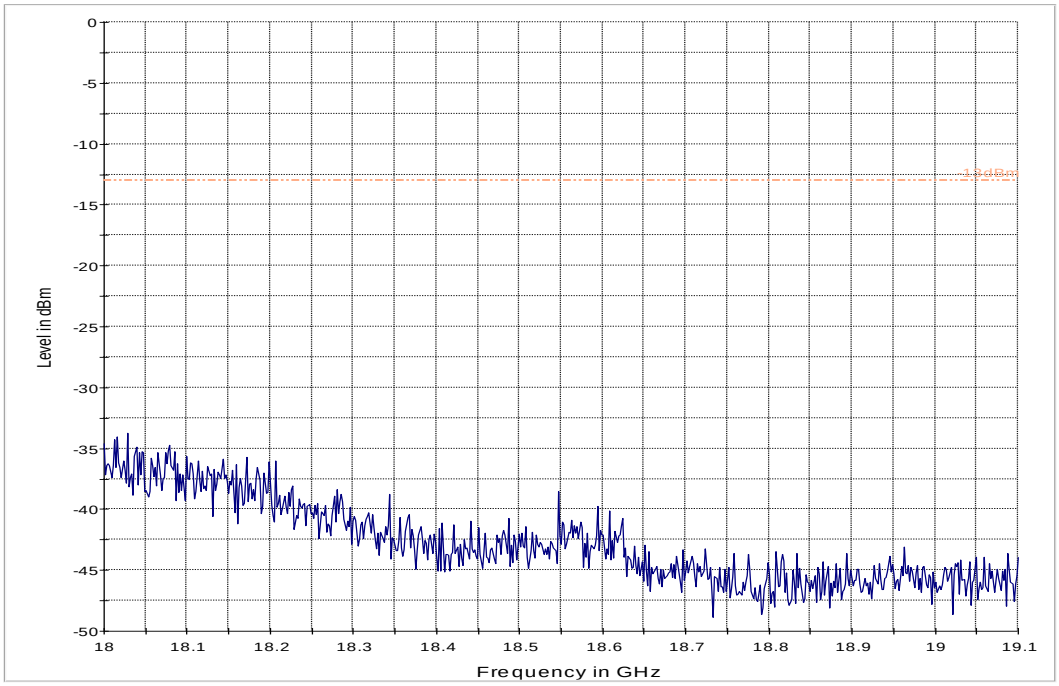


Test results 1GHz-18GHz



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

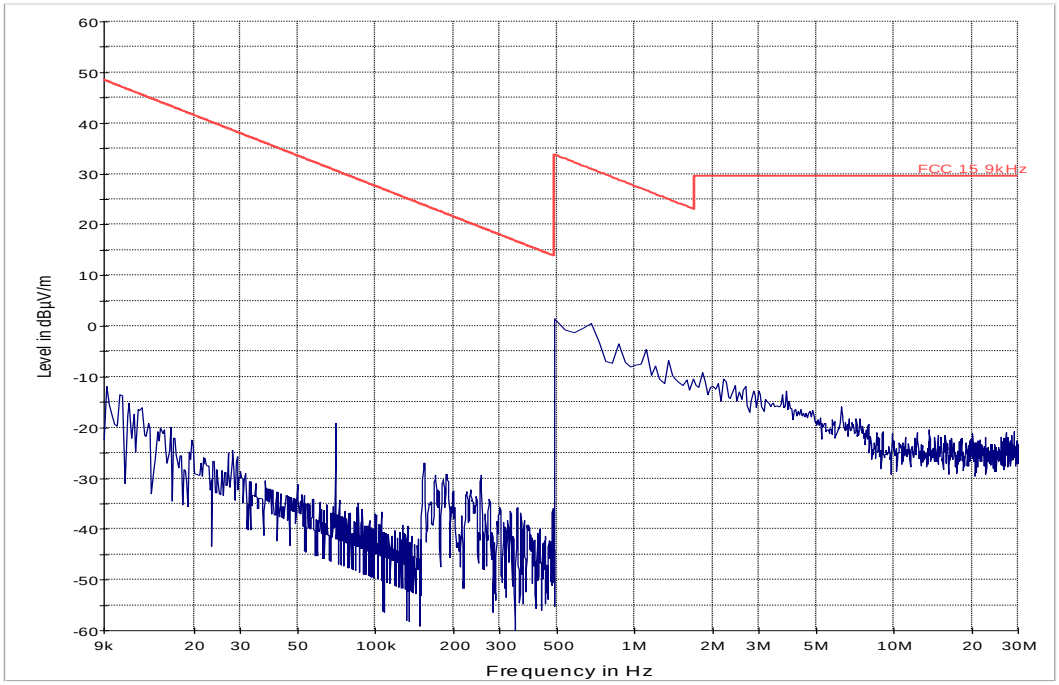
Test results 18GHz-19.1GHz



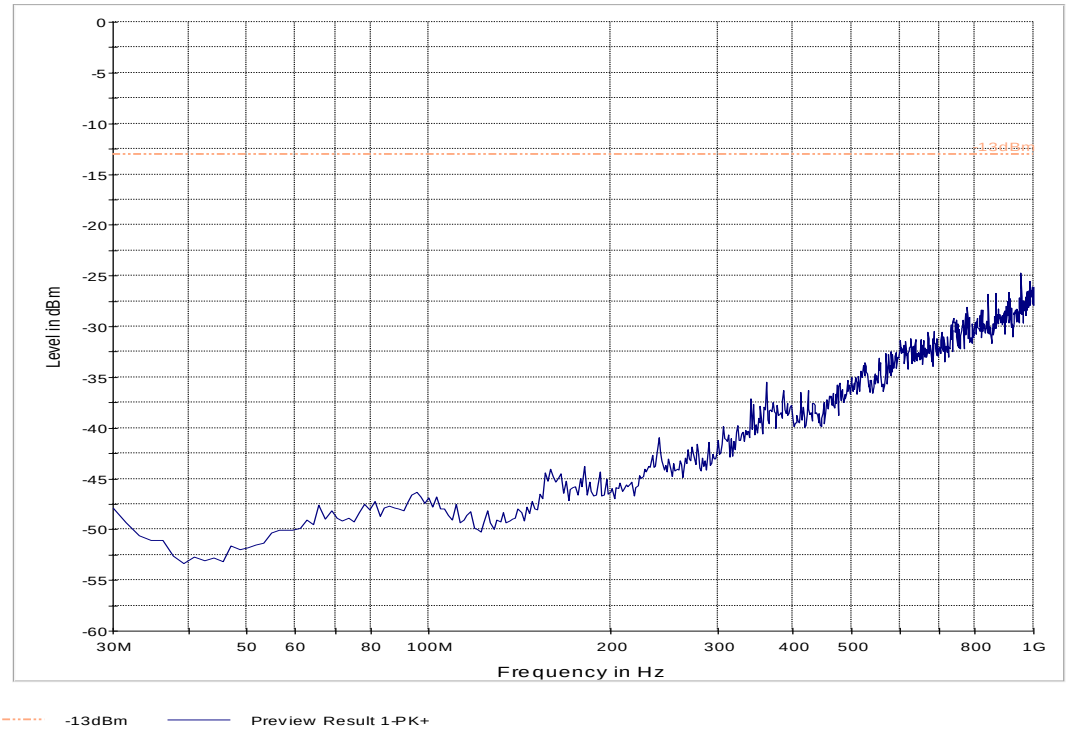
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band IV) Tx: Mid Channel

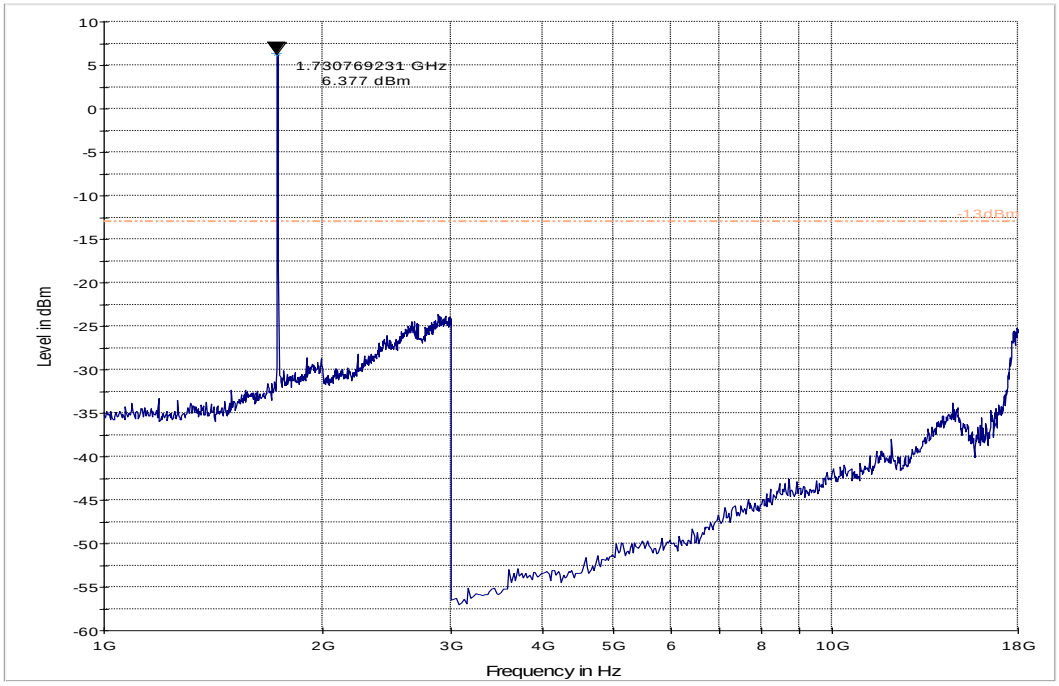
Test results 9kHz-30MHz



Test results 30MHz-1GHz

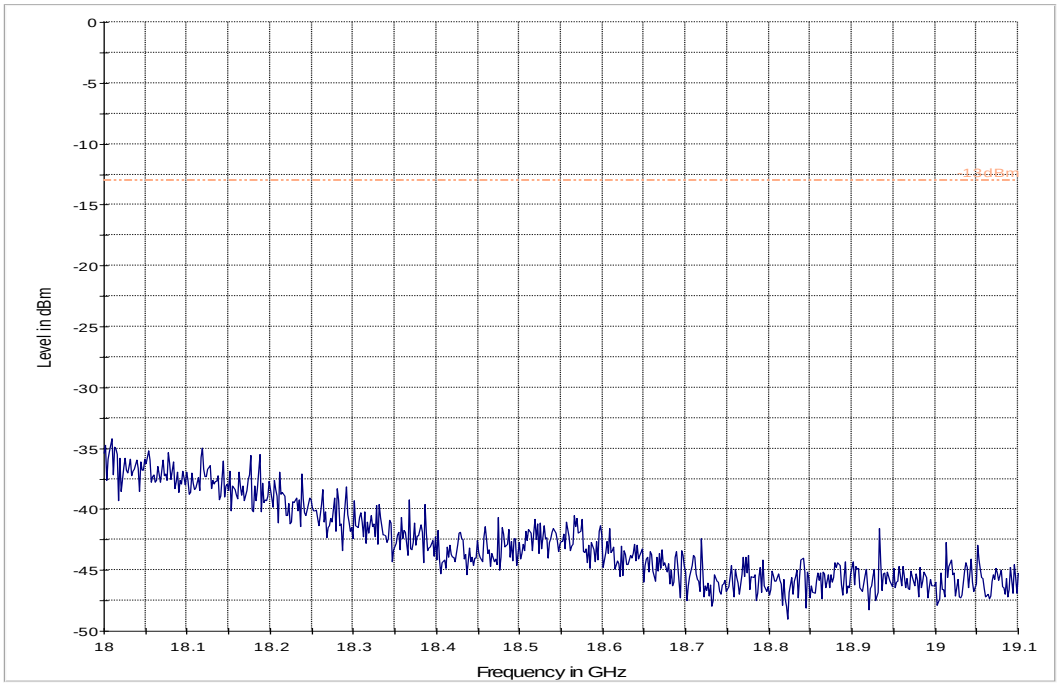


Test results 1GHz-18GHz



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

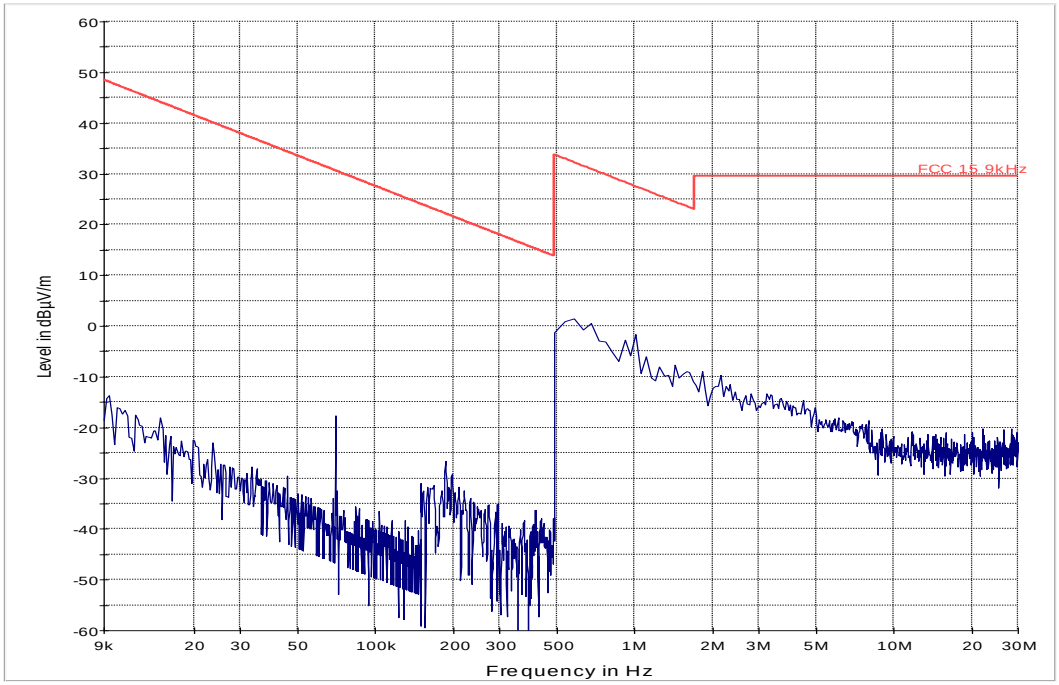
Test results 18GHz-19.1GHz



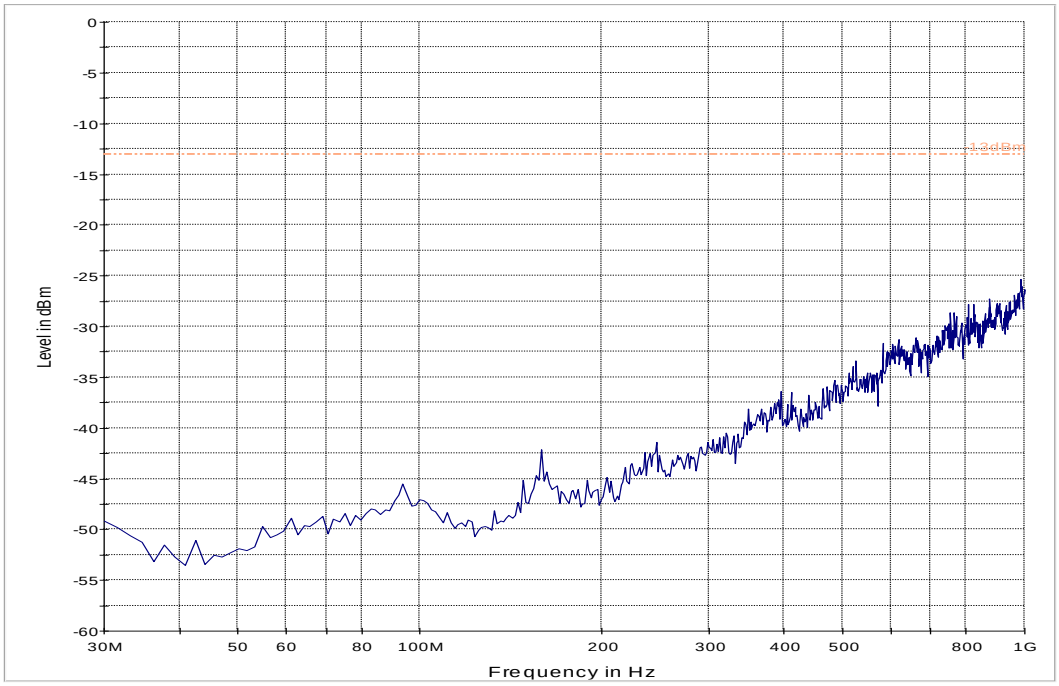
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (UMTS Band IV) Tx: High Channel

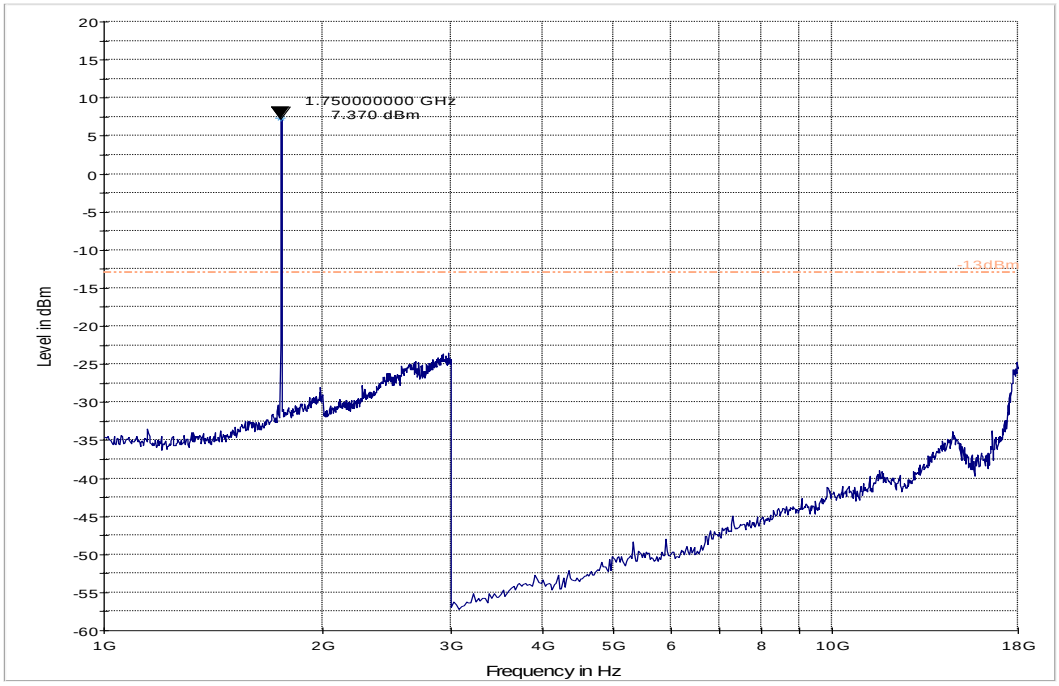
Test results 9kHz-30MHz



Test results 30MHz-1GHz

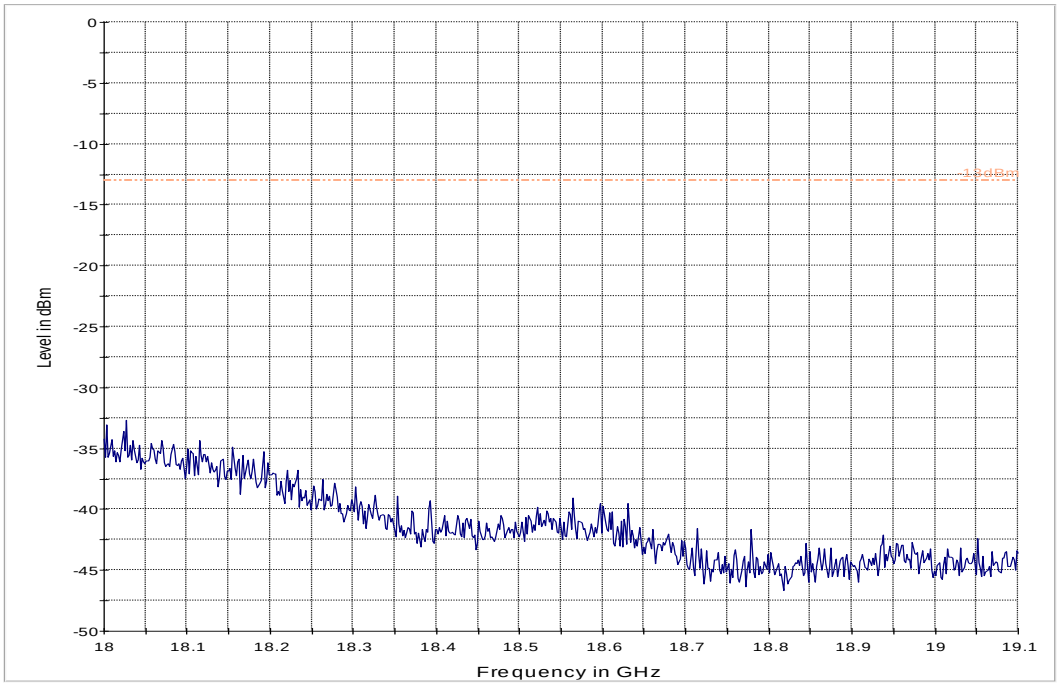


Test results 1GHz-18GHz



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

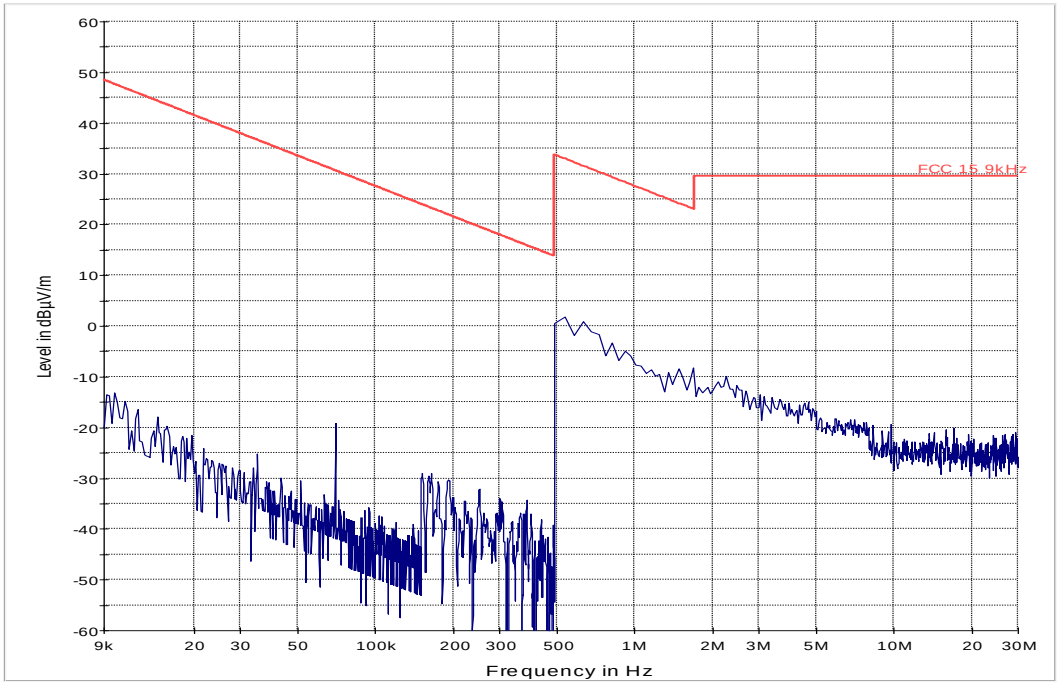
Test results 18GHz-19.1GHz



-13dBm Preview Result 1-PK+

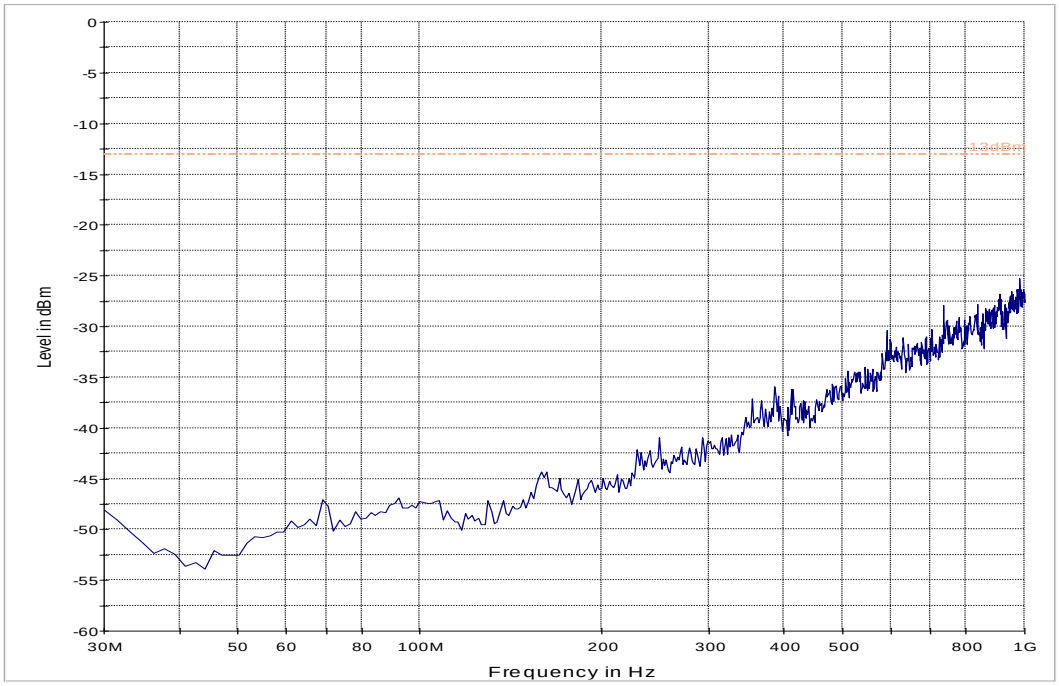
Radiated Spurious Emissions (LTE Band 4) Tx: QPSK; 10MHz BW: Low Channel

Test results 9kHz-30MHz



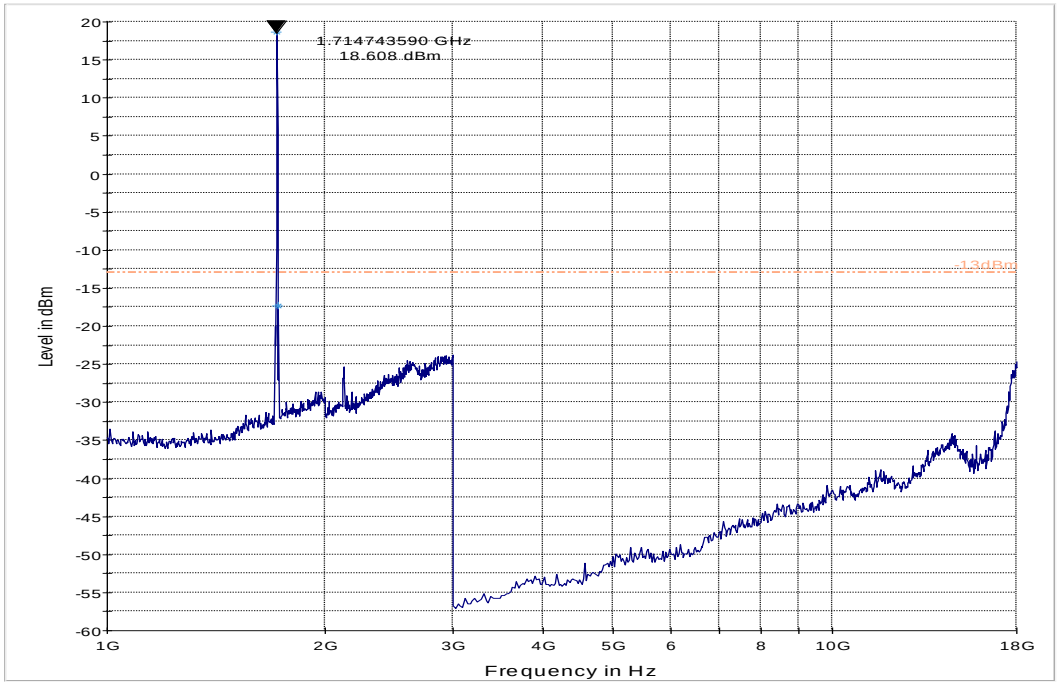
FCC 15 9kHz Preview Result 1-PK+

Test results 30MHz-1GHz



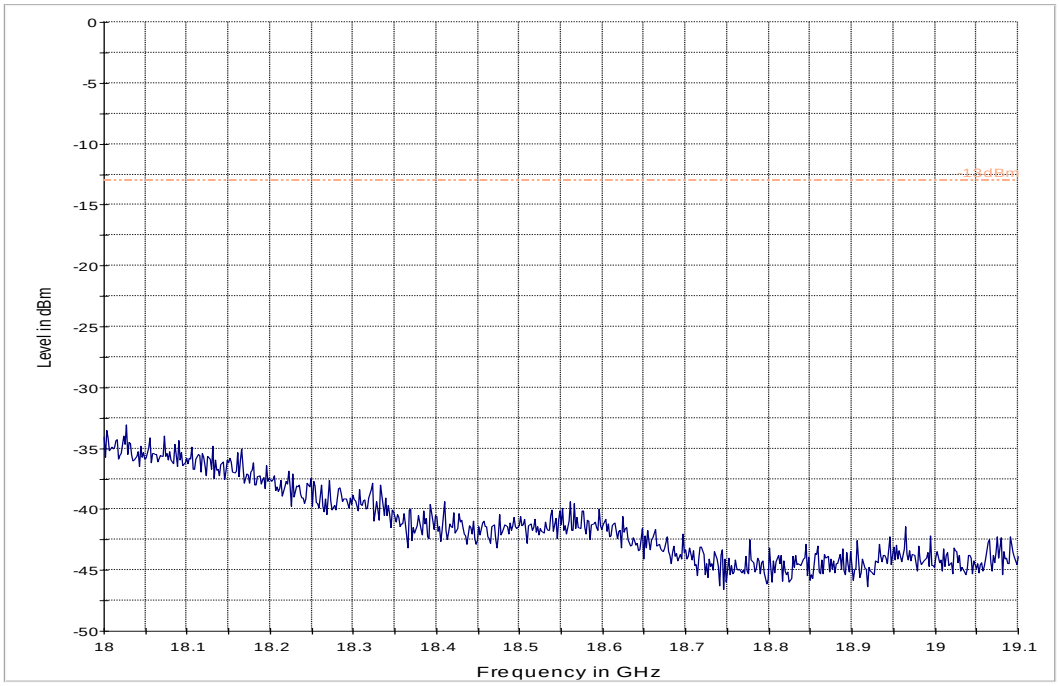
-13dBm Preview Result 1-PK+

Test results 1GHz-18GHz



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

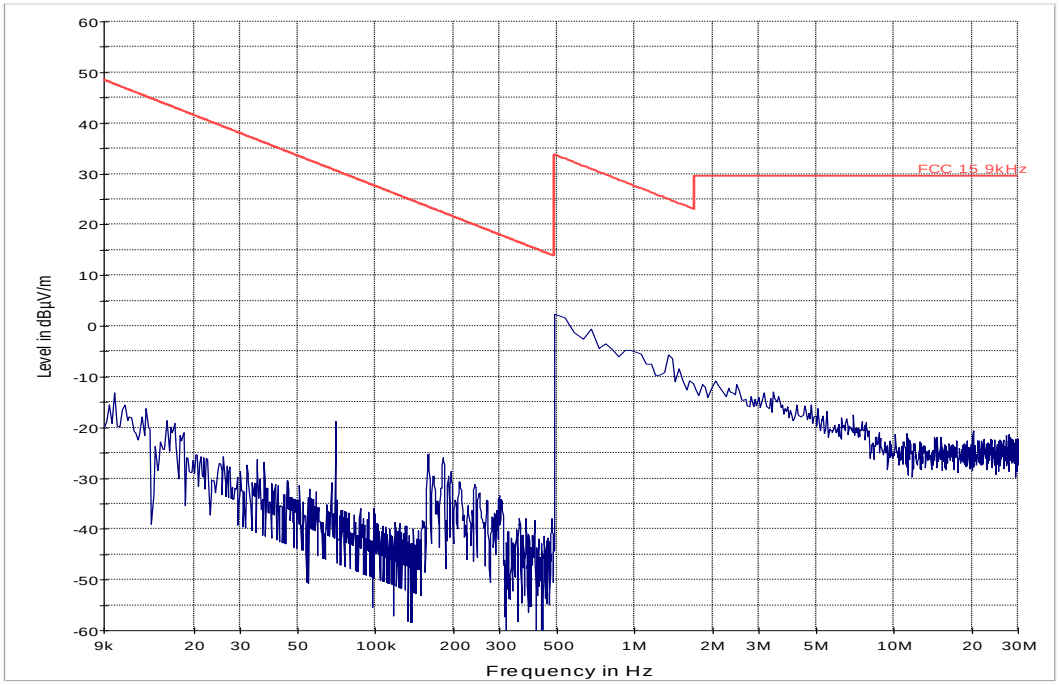
Test results 18GHz-19.1GHz



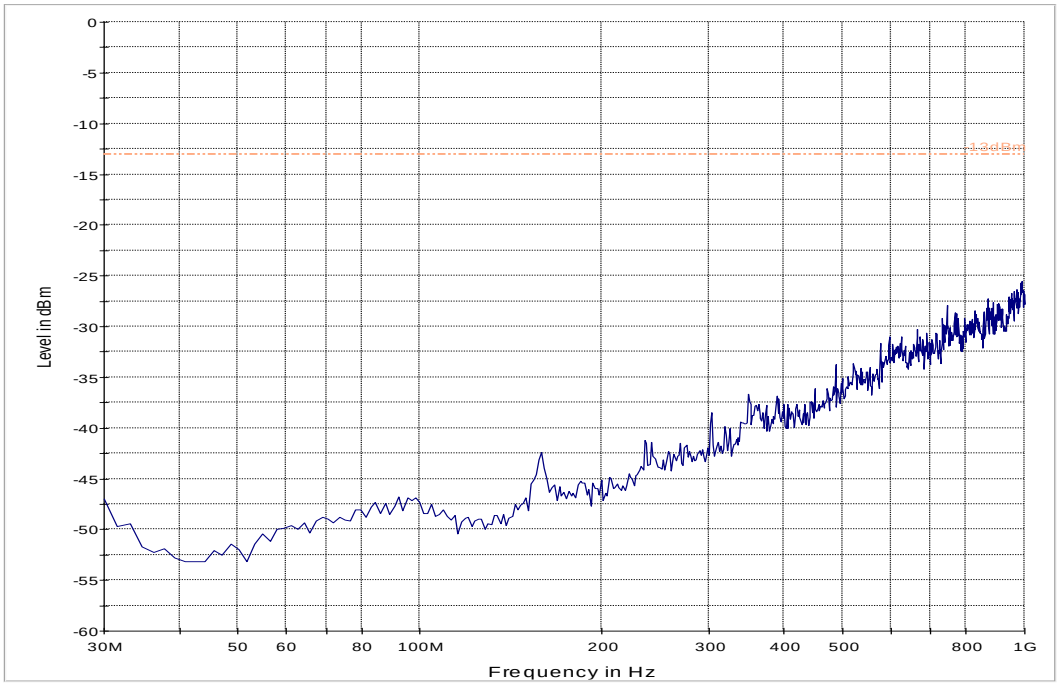
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 4) Tx: QPSK; 10MHz BW: Mid Channel

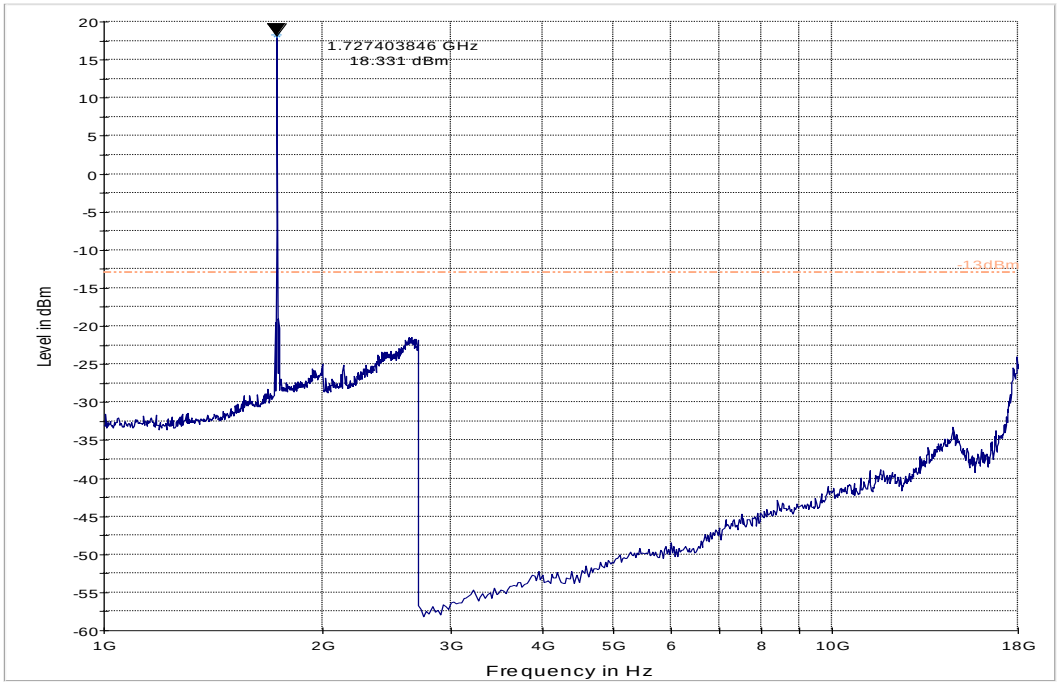
Test results 9kHz-30MHz



Test results 30MHz-1GHz

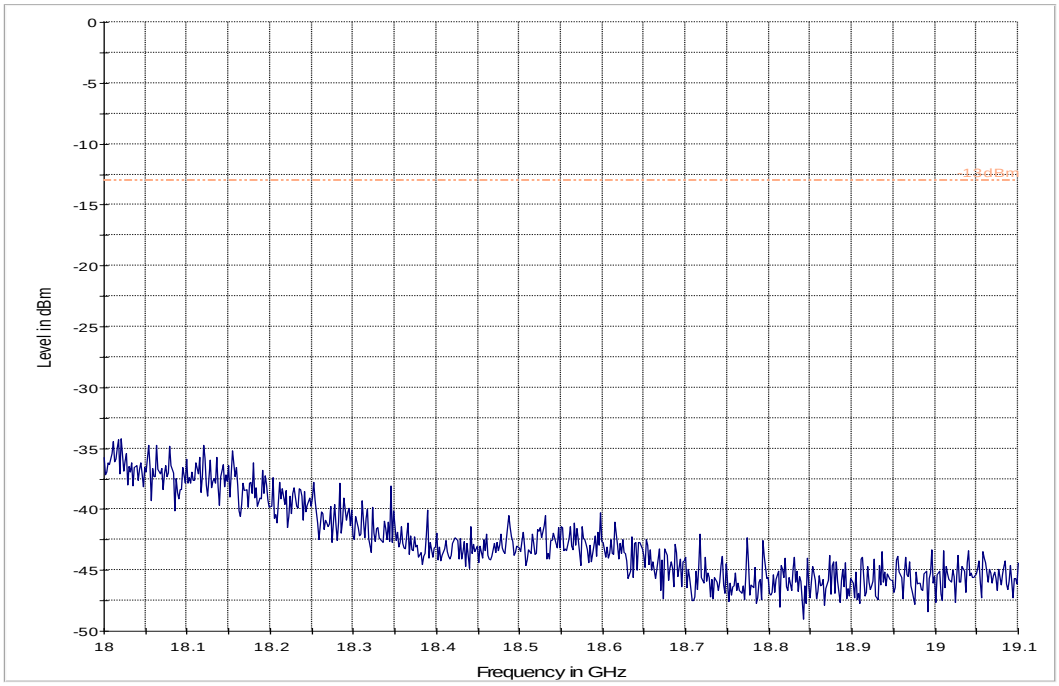


Test results 1GHz-18GHz



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

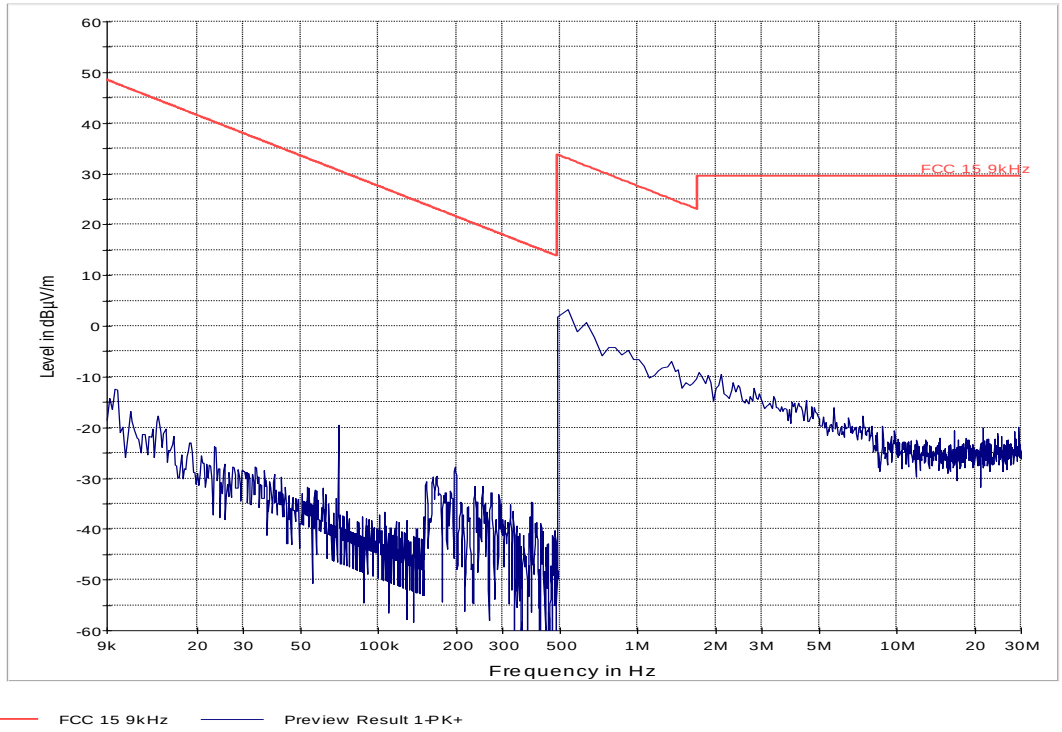
Test results 18GHz-19.1GHz



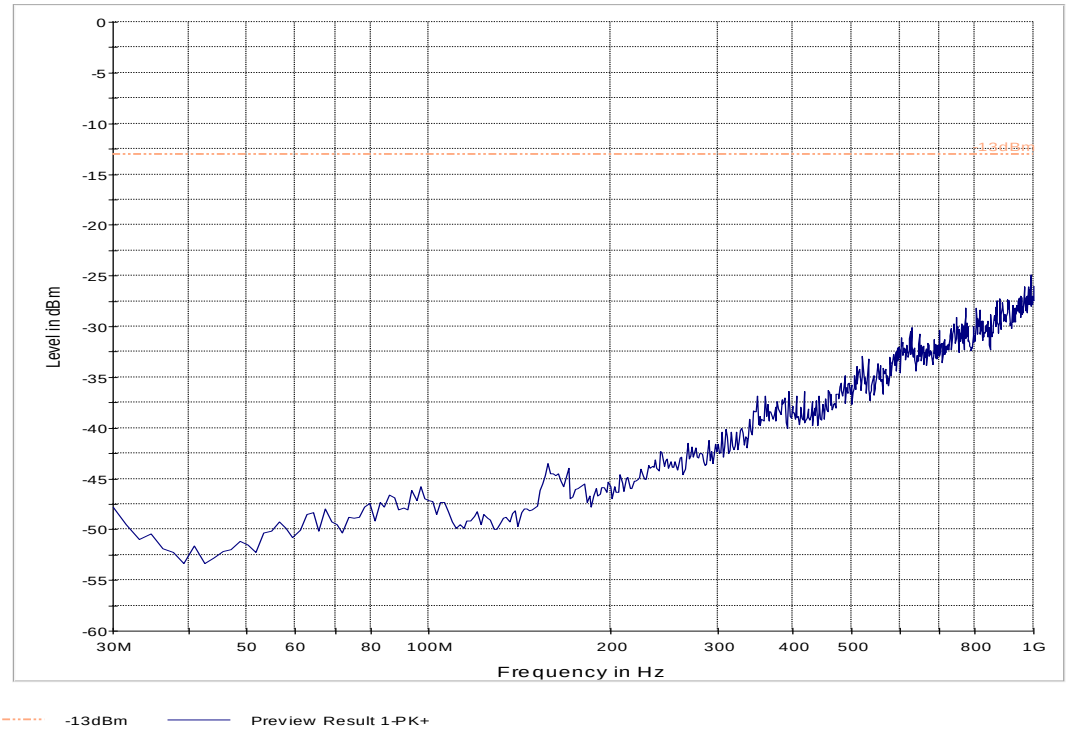
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 4) Tx: QPSK; 10MHz BW: High Channel

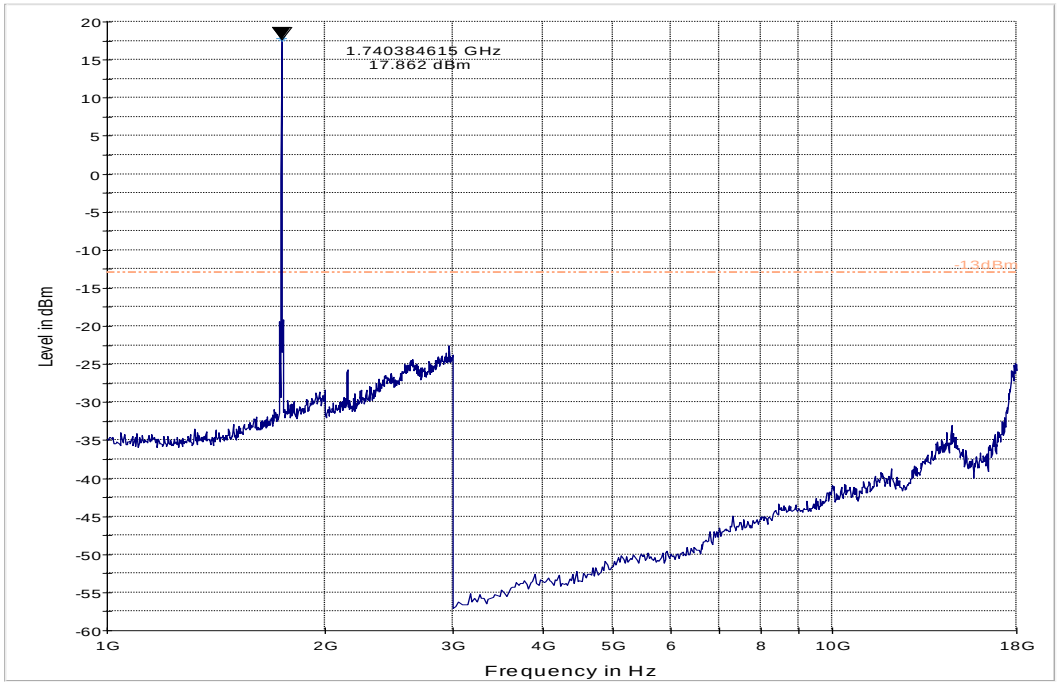
Test results 9kHz-30MHz



Test results 30MHz-1GHz

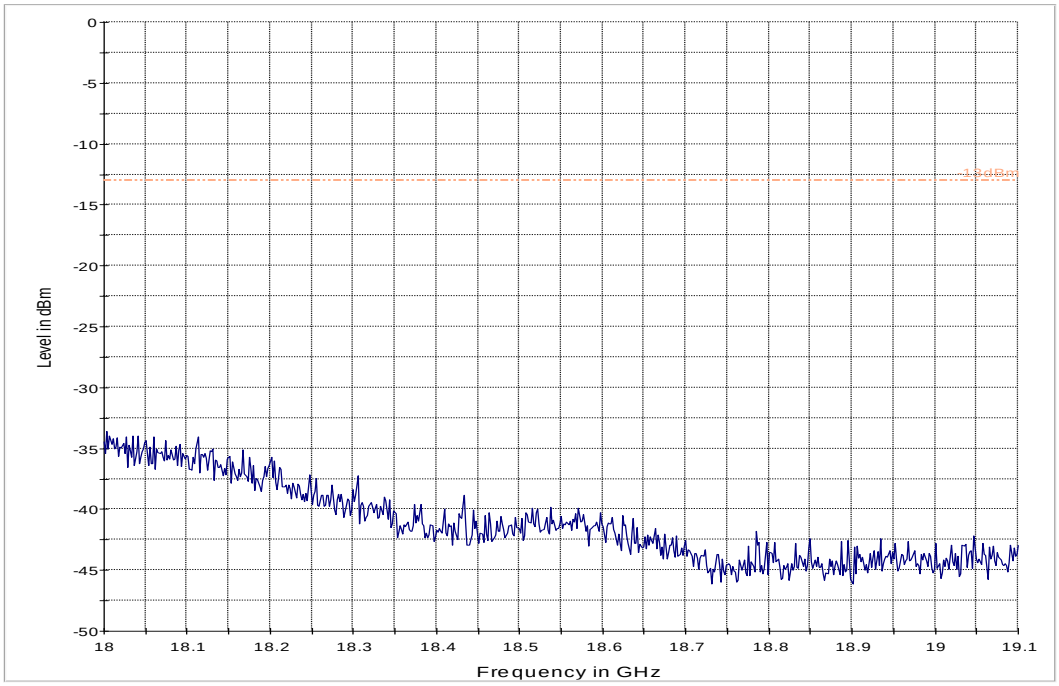


Test results 1GHz-18GHz



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

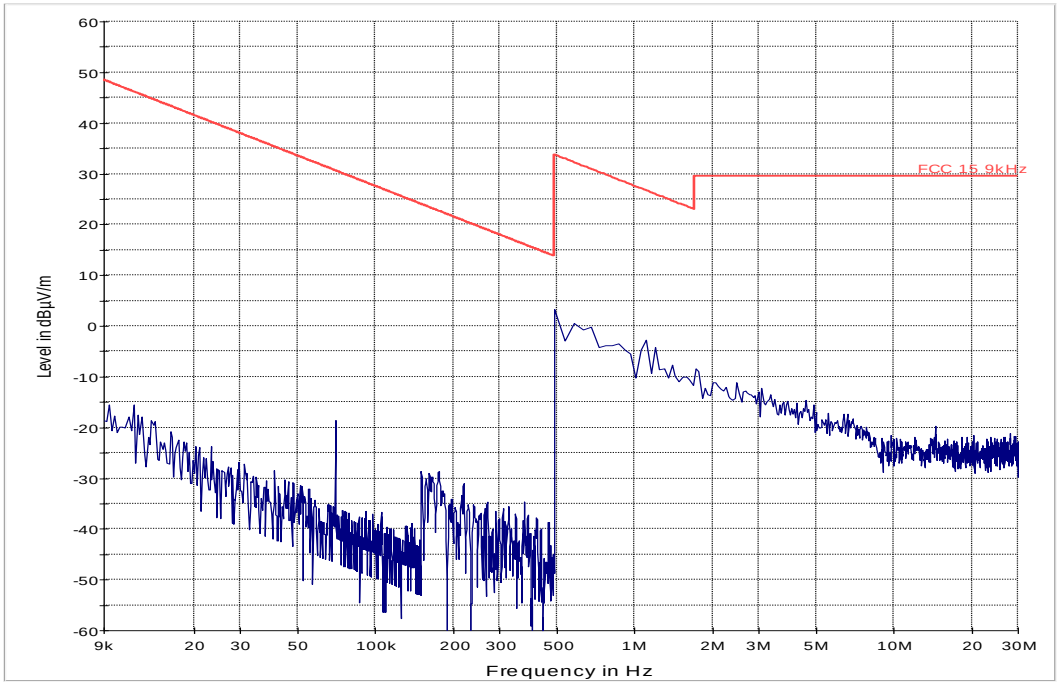
Test results 18GHz-19.1GHz



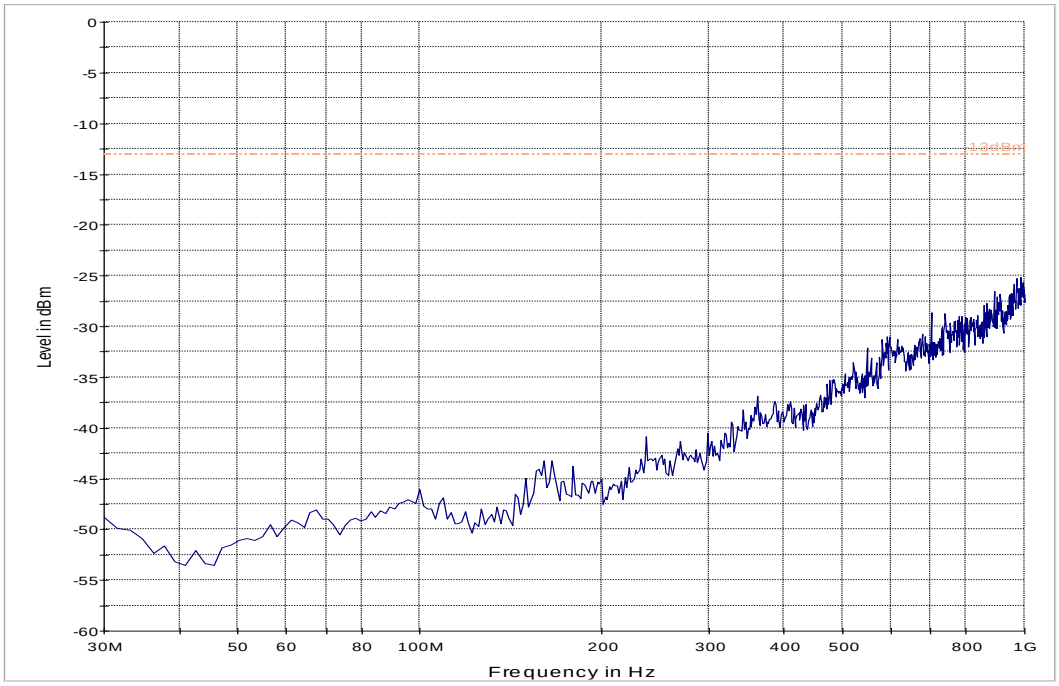
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 4) Tx: 16-QAM; 10MHz BW: Low Channel

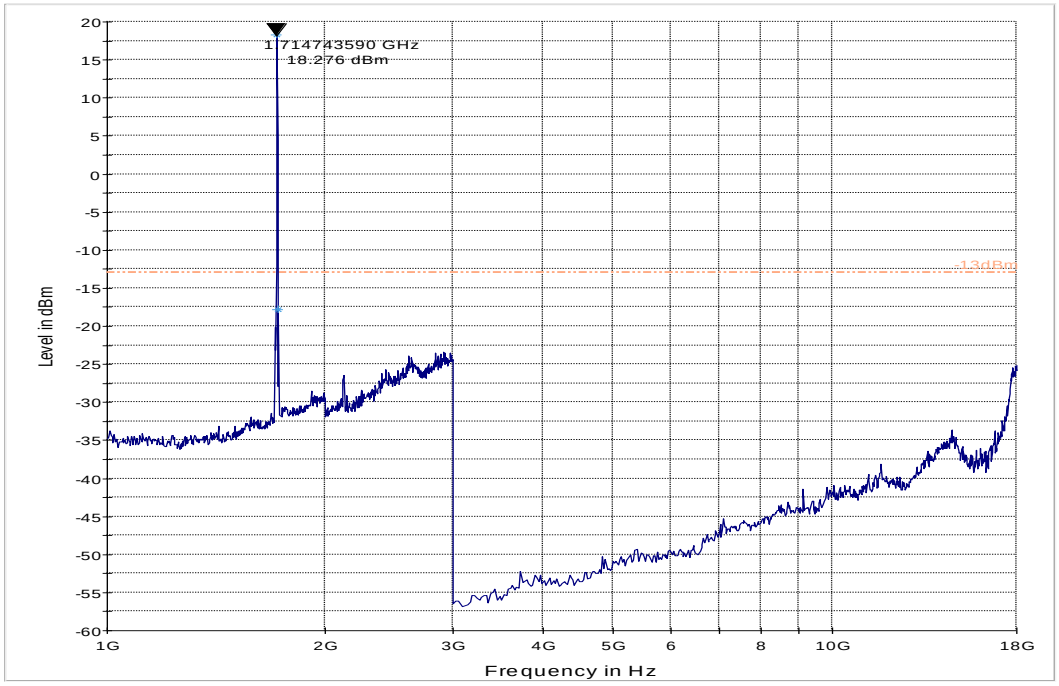
Test results 9kHz-30MHz



Test results 30MHz-1GHz

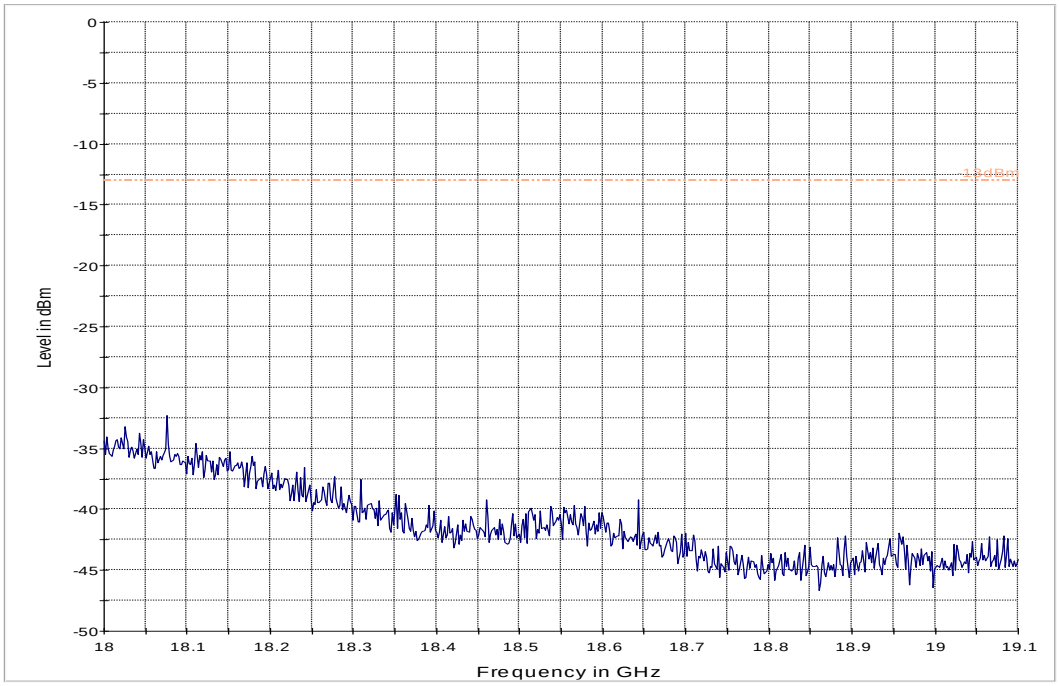


Test results 1GHz-18GHz



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

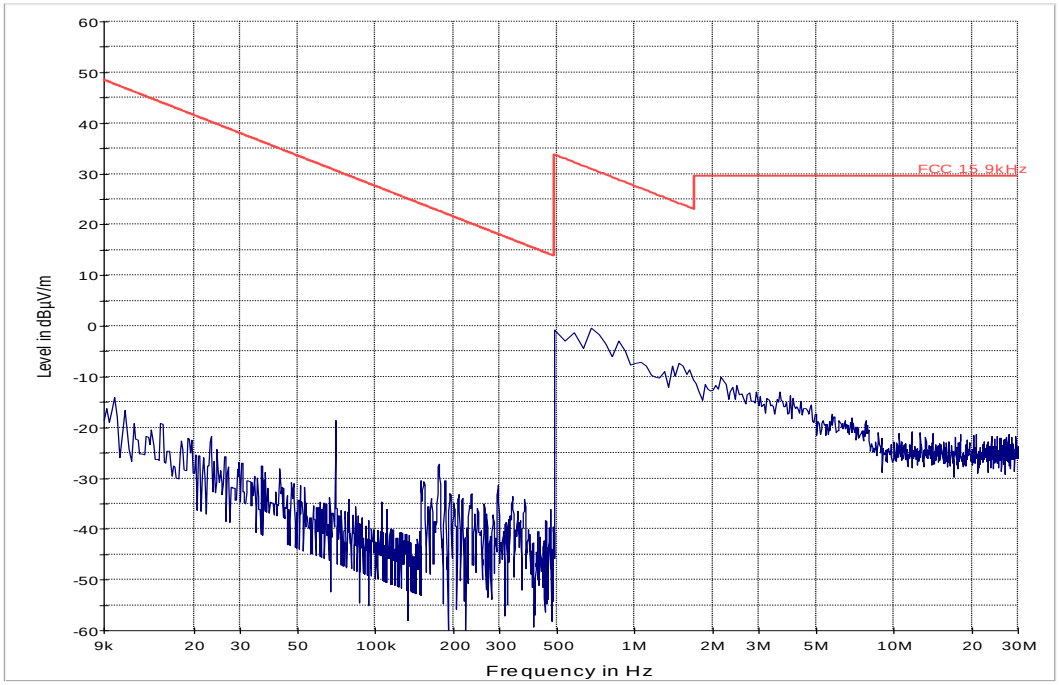
Test results 18GHz-19.1GHz



-13dBm Preview Result 1-PK+

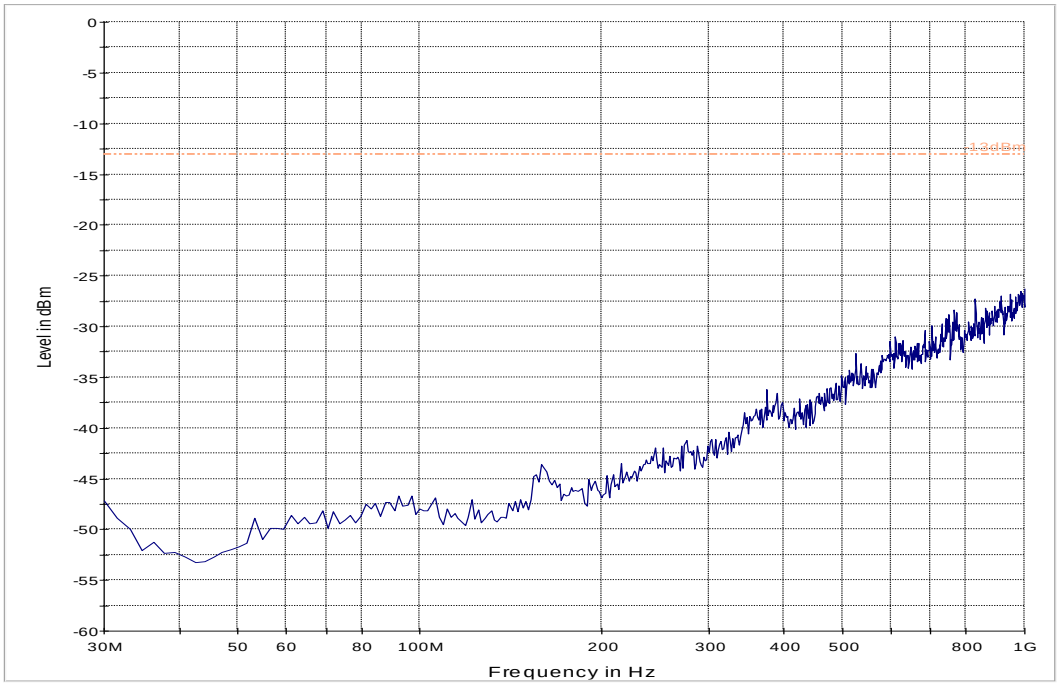
Radiated Spurious Emissions (LTE Band 4) Tx: 16-QAM; 10MHz BW: Mid Channel

Test results 9kHz-30MHz



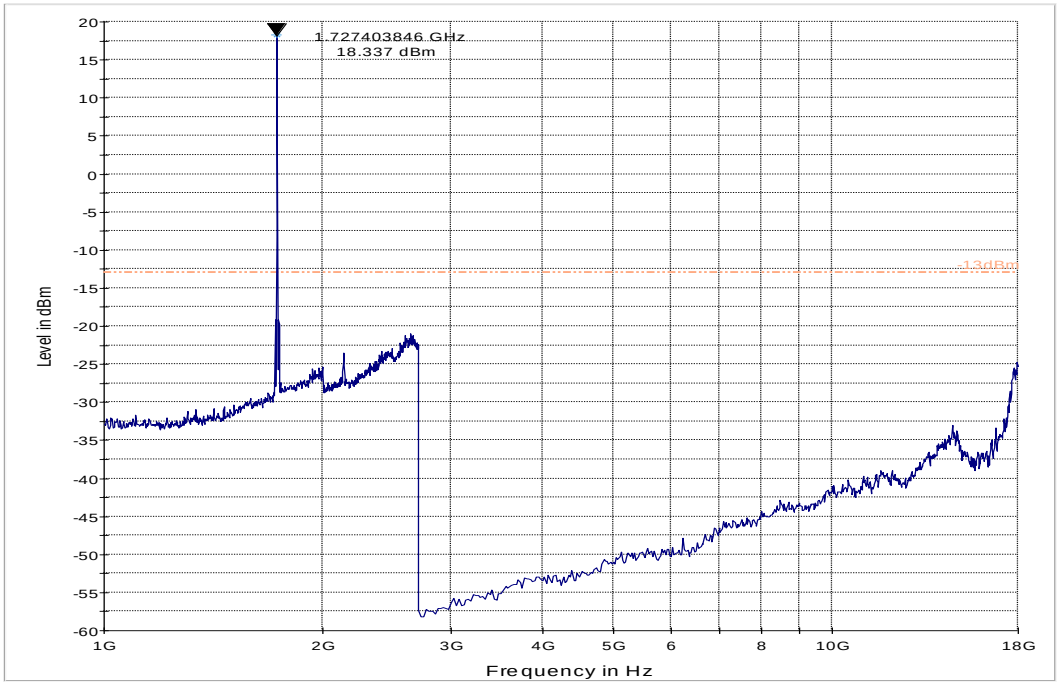
FCC 15 9kHz Preview Result 1-PK+

Test results 30MHz-1GHz



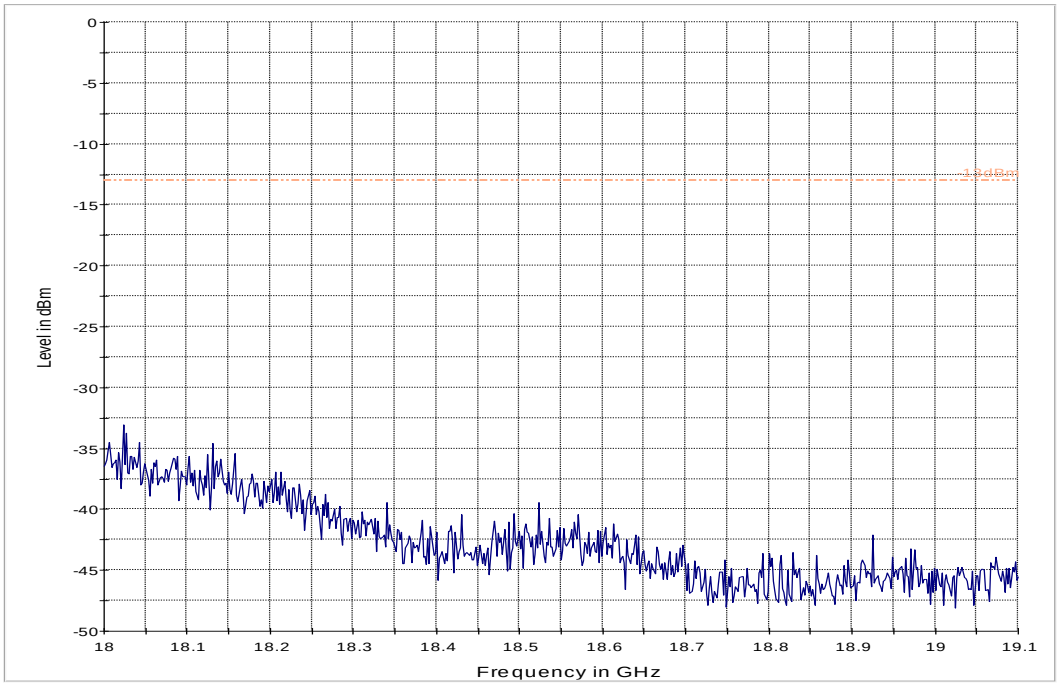
-13dBm Preview Result 1-PK+

Test results 1GHz-18GHz



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

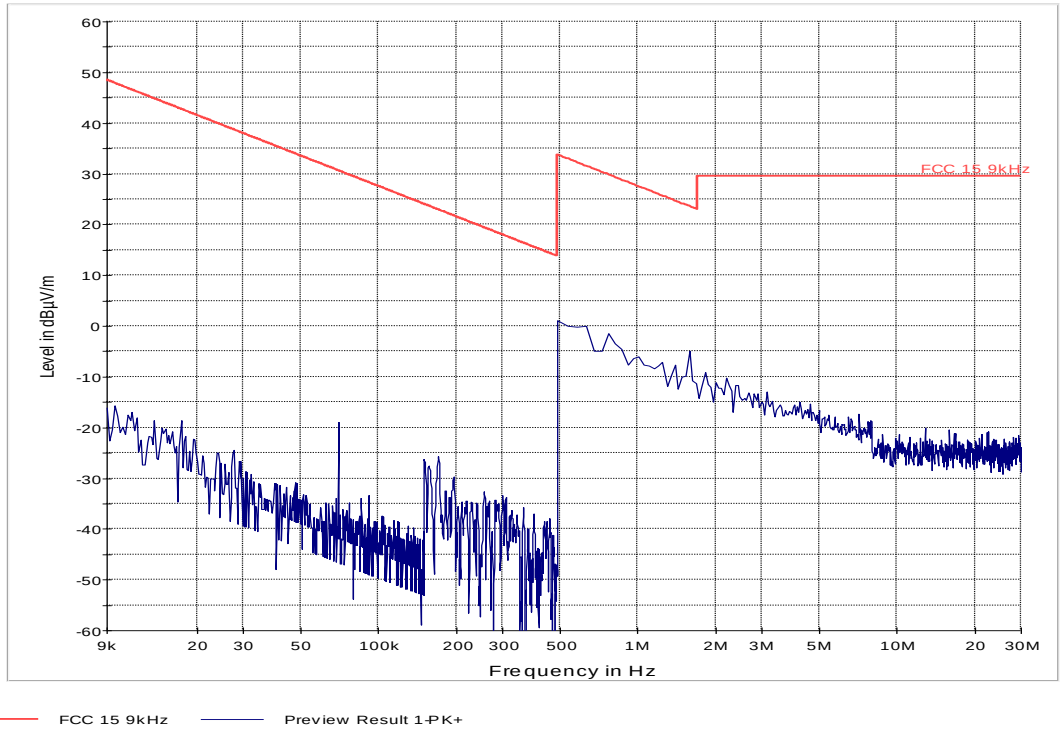
Test results 18GHz-19.1GHz



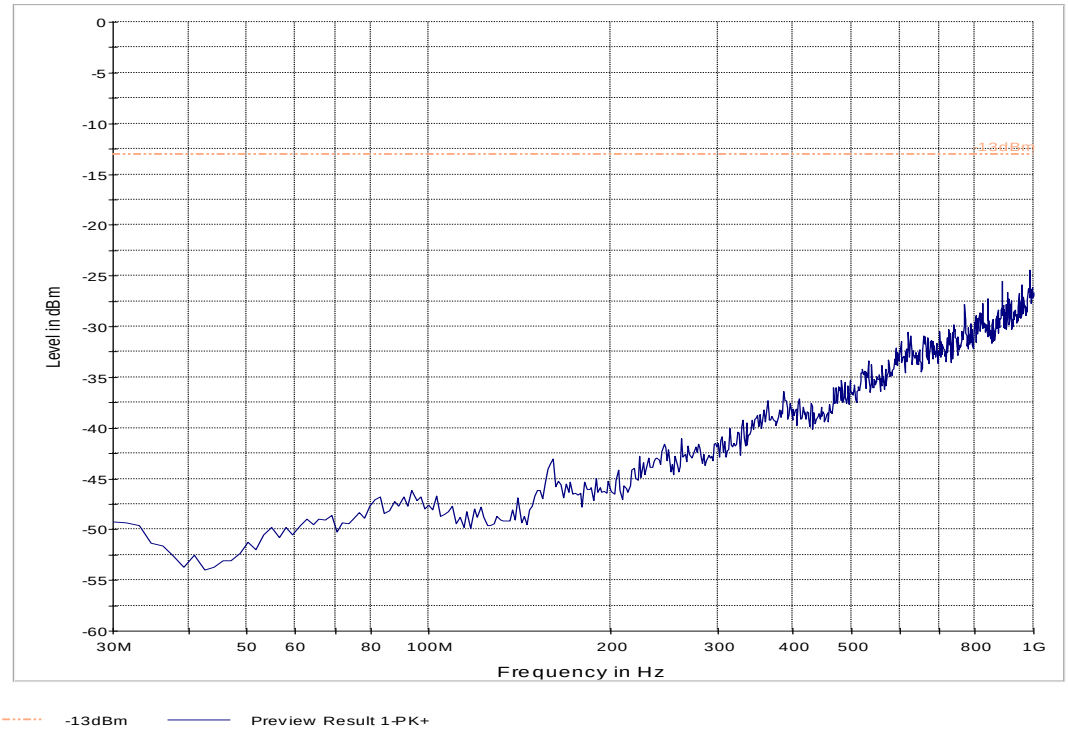
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 4) Tx: 16-QAM; 10MHz BW: High Channel

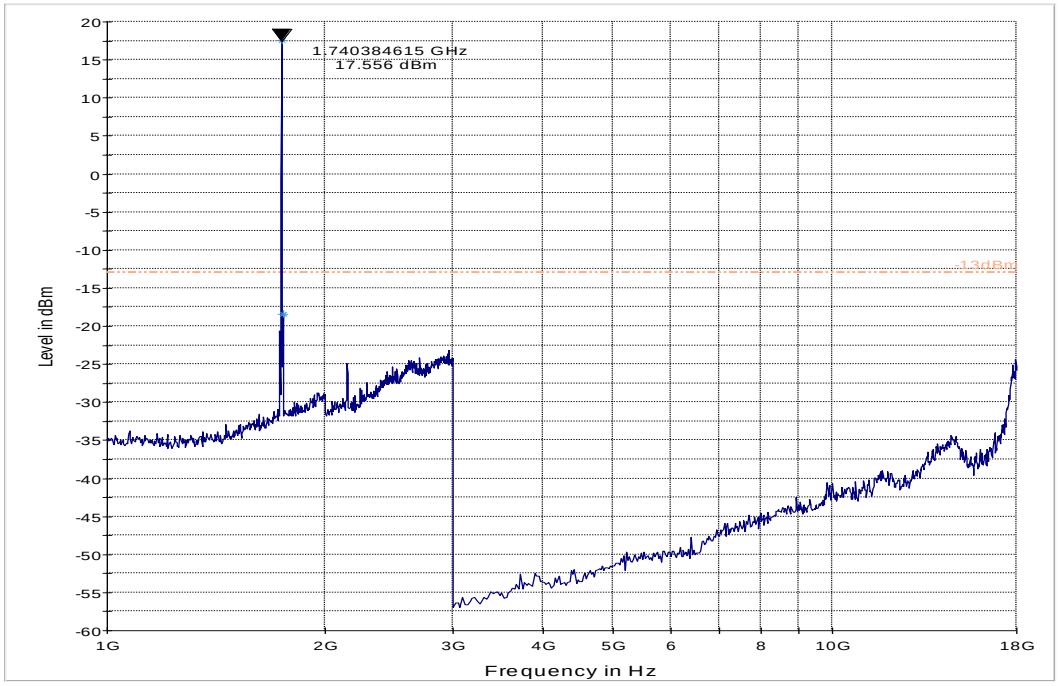
Test results 9kHz-30MHz



Test results 30MHz-1GHz

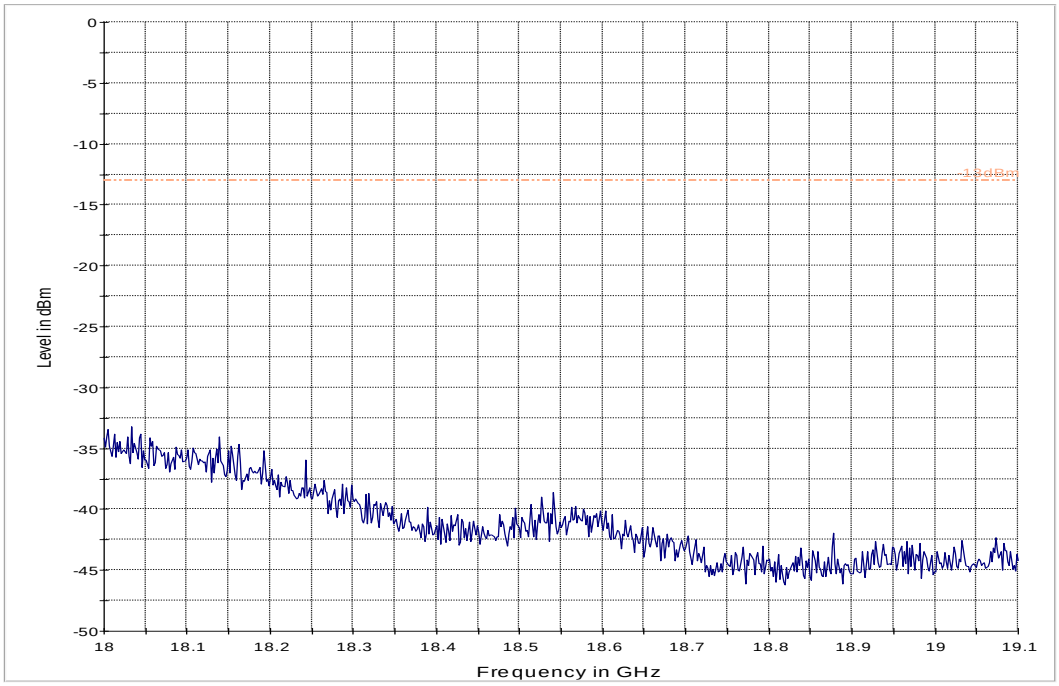


Test results 1GHz-18GHz



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

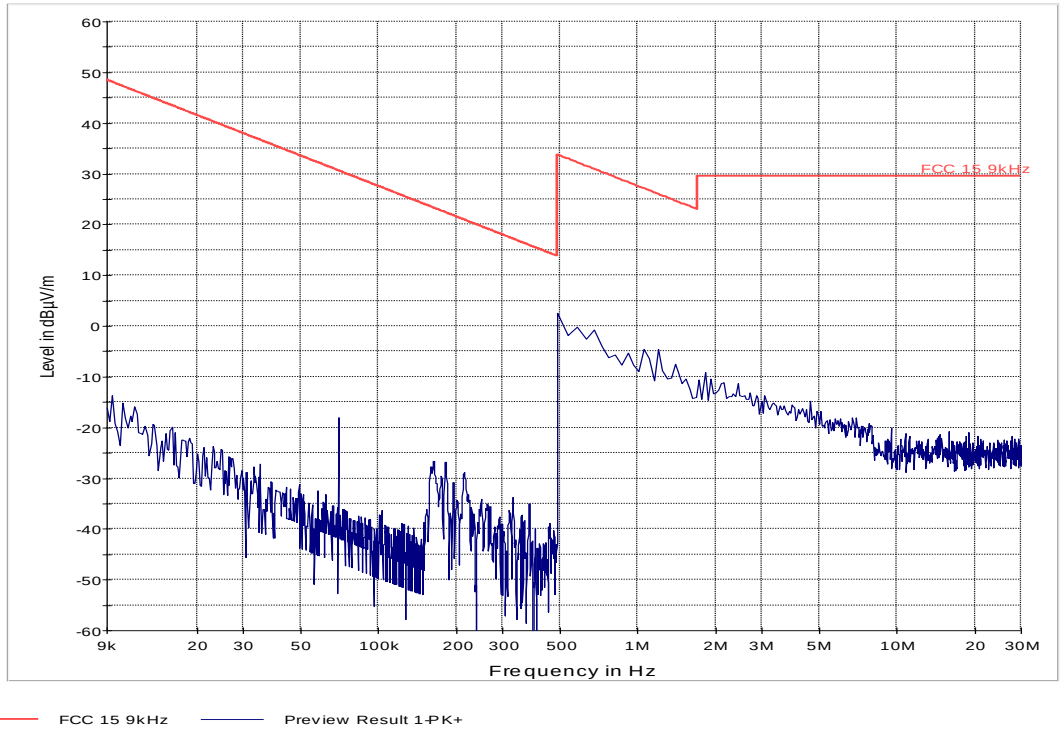
Test results 18GHz-19.1GHz



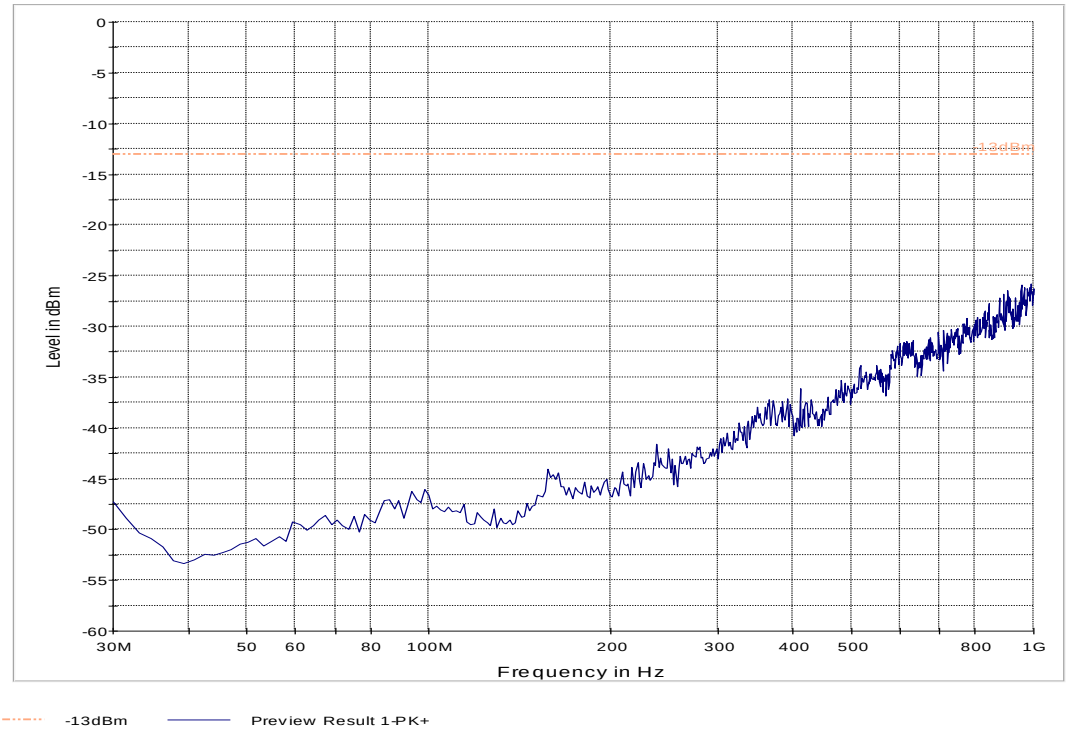
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 7) Tx: QPSK; 10MHz BW: Low Channel

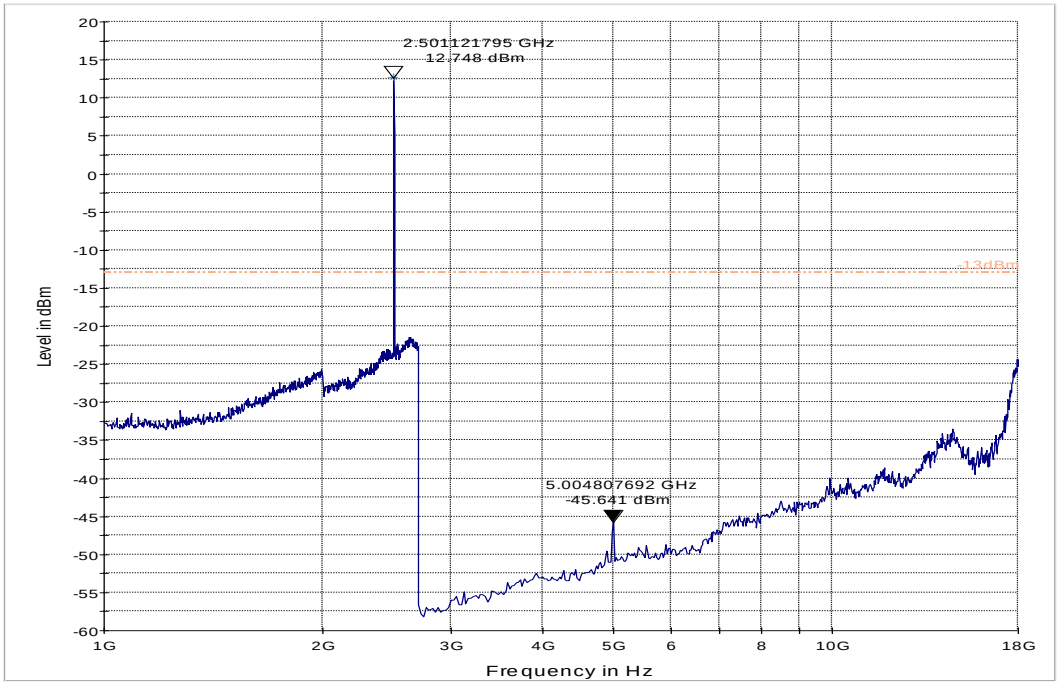
Test results 9kHz-30MHz



Test results 30MHz-1GHz

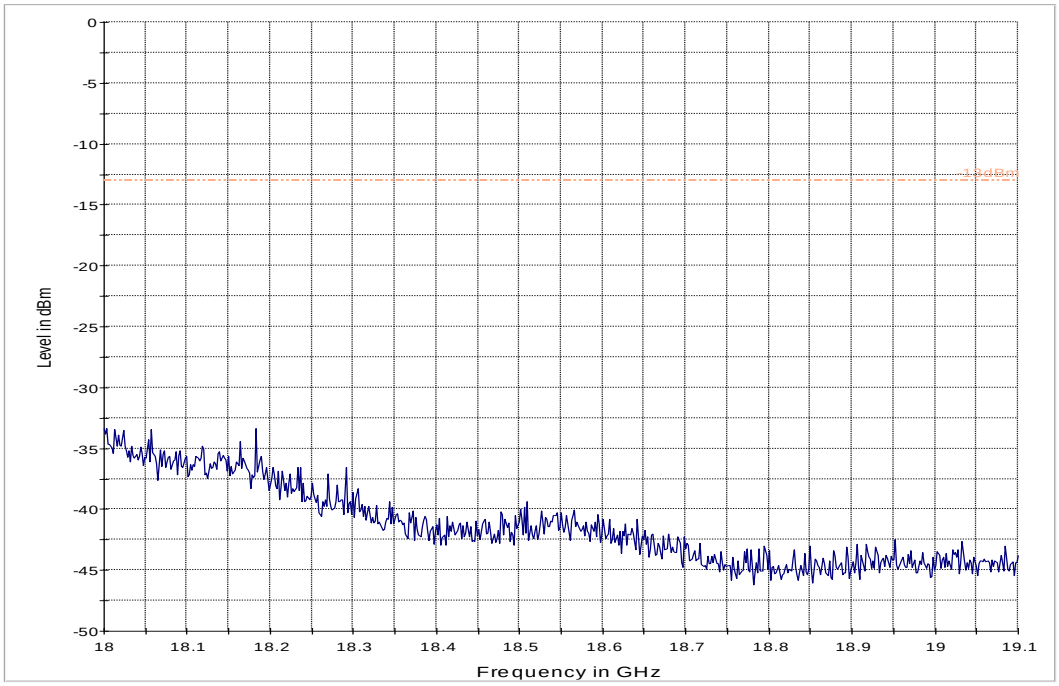


Test results 1GHz-18GHz



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

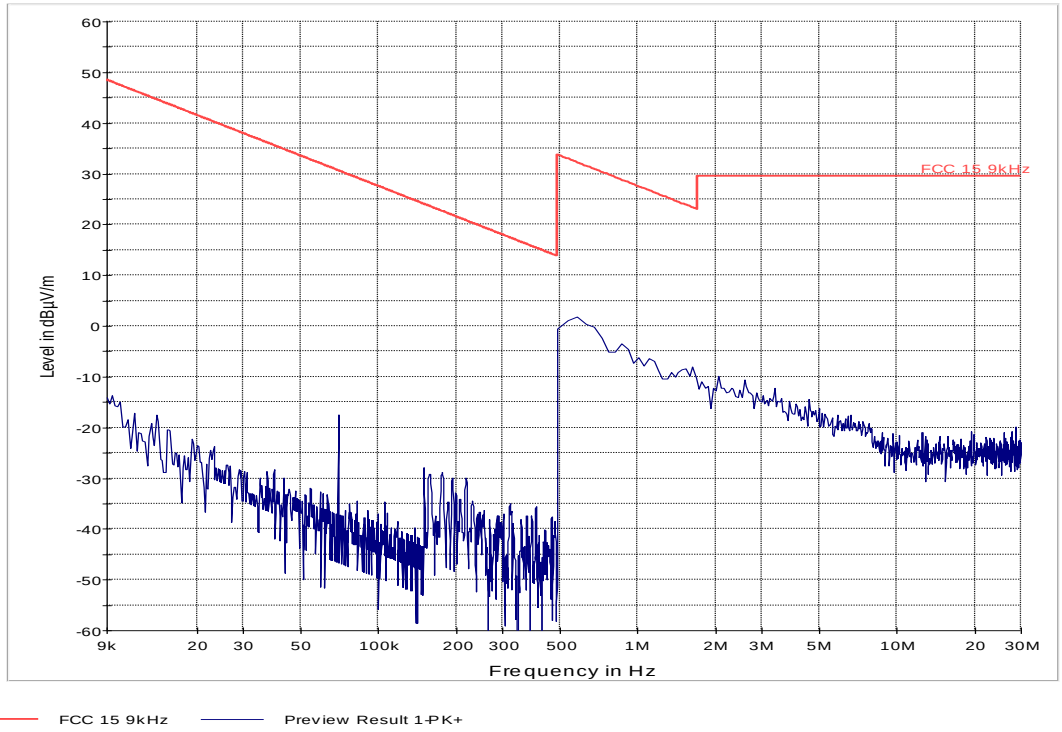
Test results 18GHz-19.1GHz



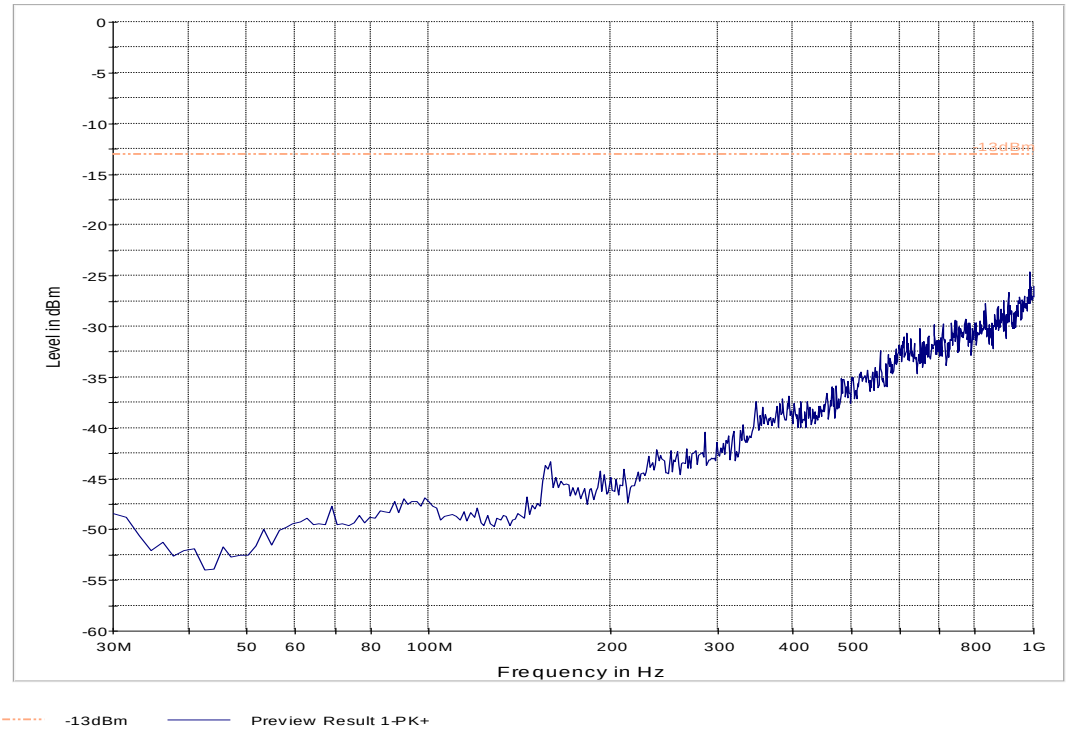
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 7) Tx: QPSK; 10MHz BW: Mid Channel

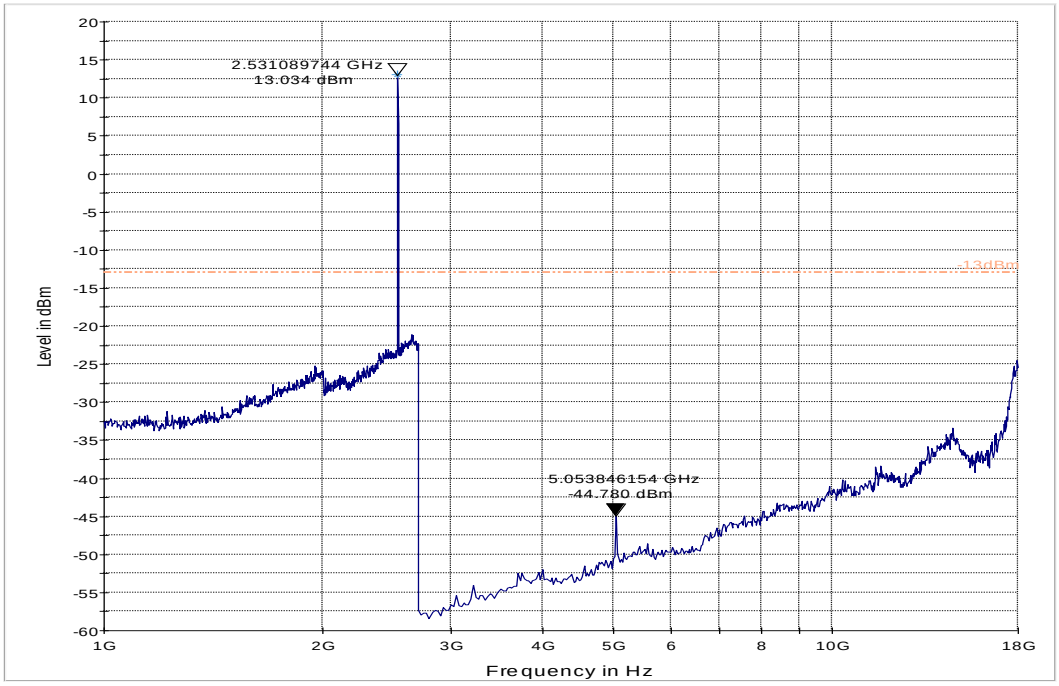
Test results 9kHz-30MHz



Test results 30MHz-1GHz

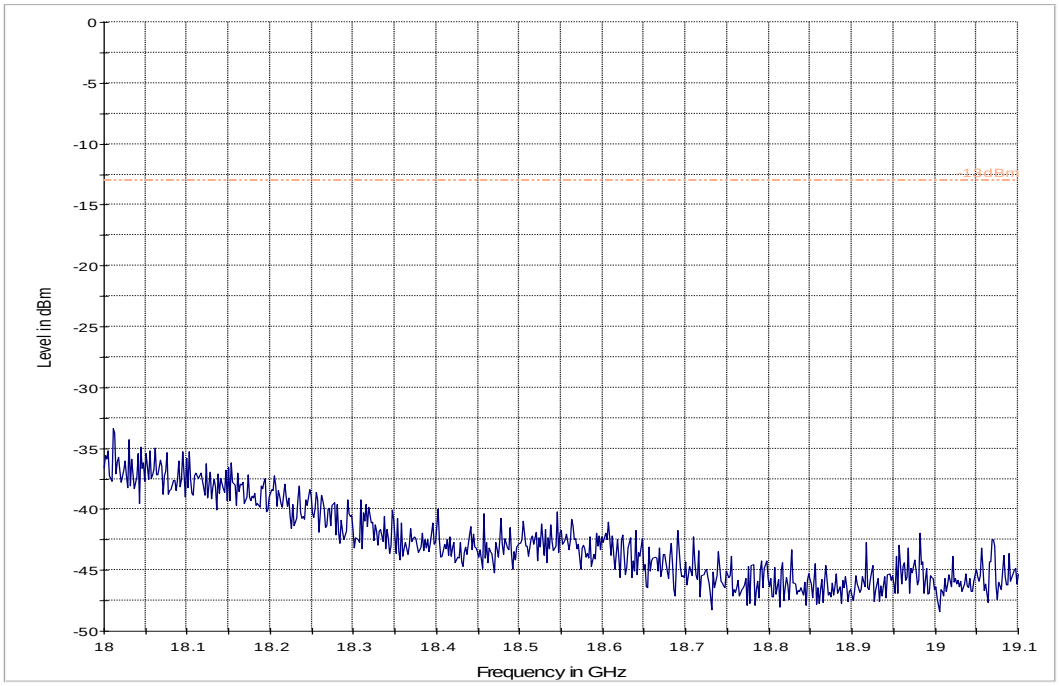


Test results 1GHz-18GHz



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

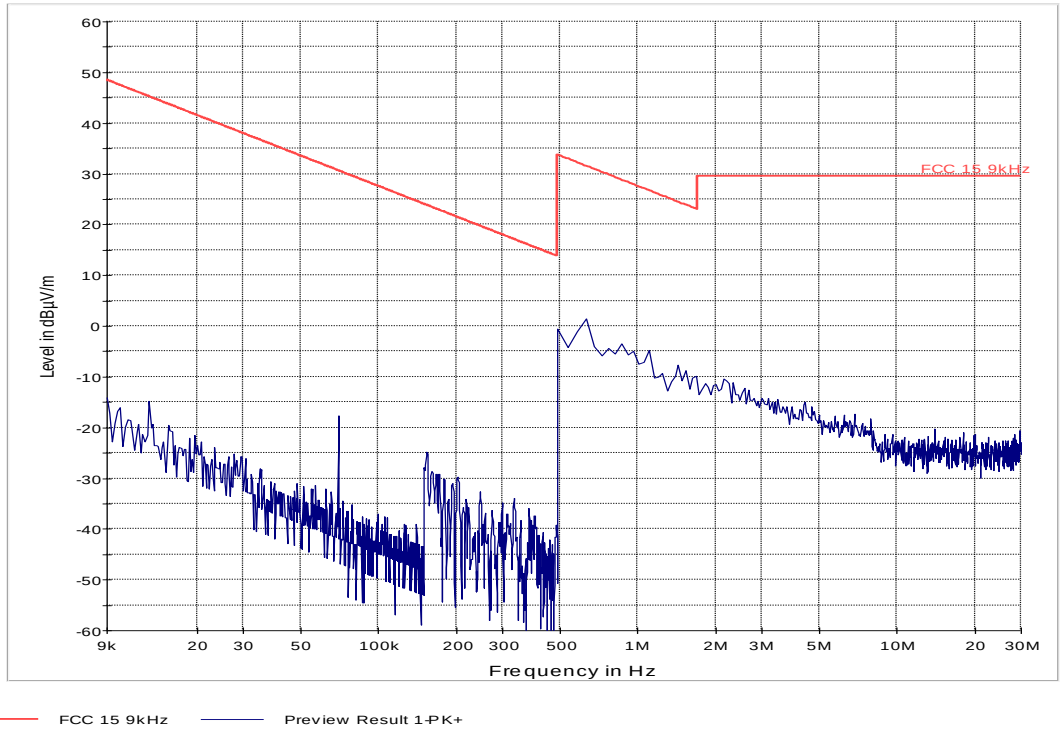
Test results 18GHz-19.1GHz



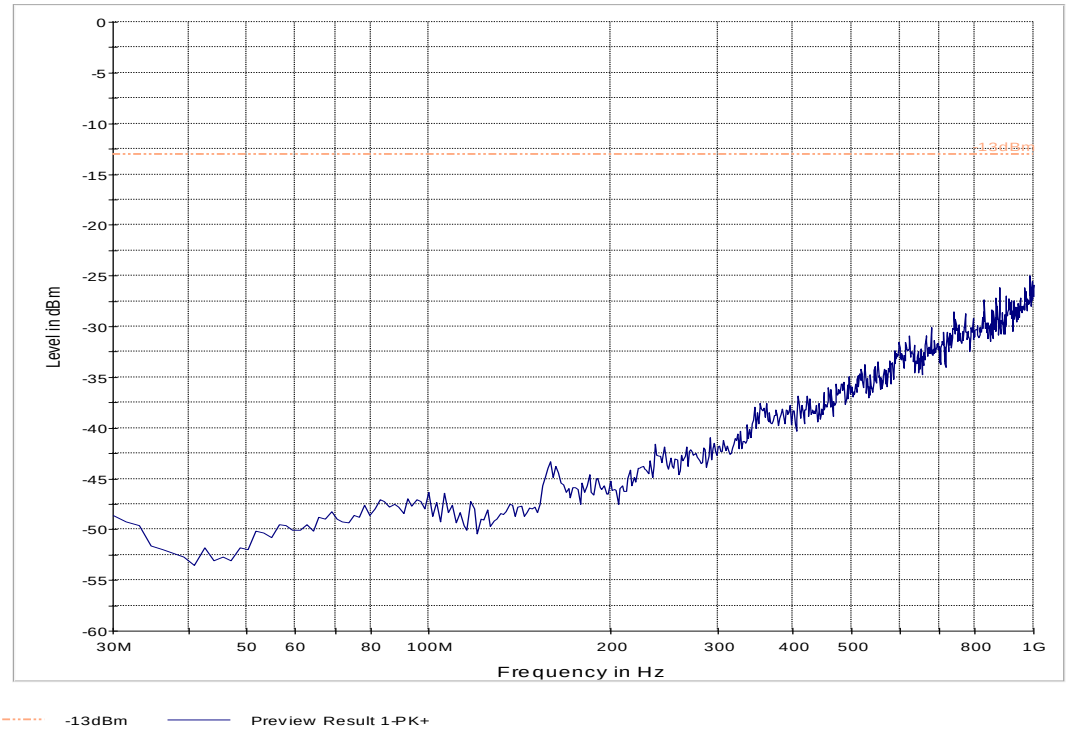
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 7) Tx: QPSK; 10MHz BW: High Channel

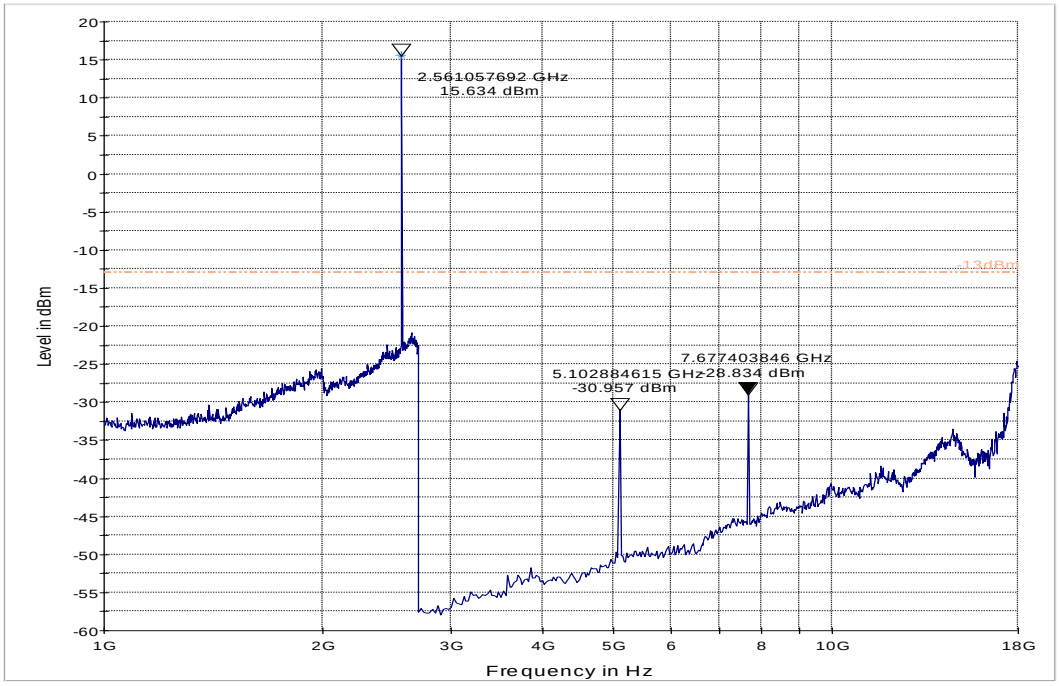
Test results 9kHz-30MHz



Test results 30MHz-1GHz

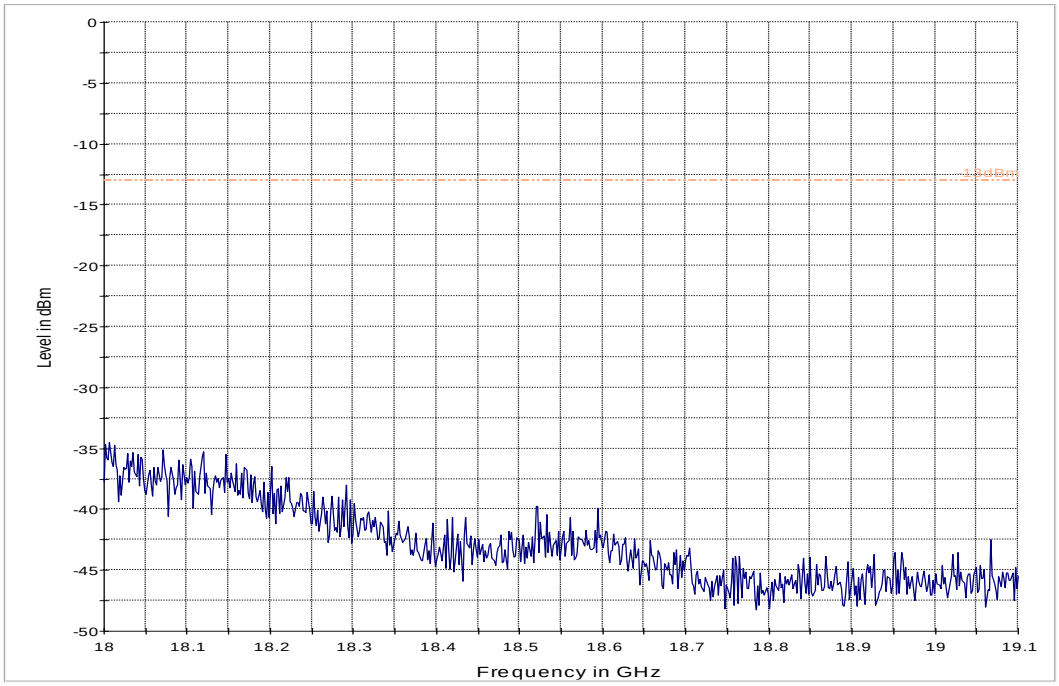


Test results 1GHz-18GHz



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

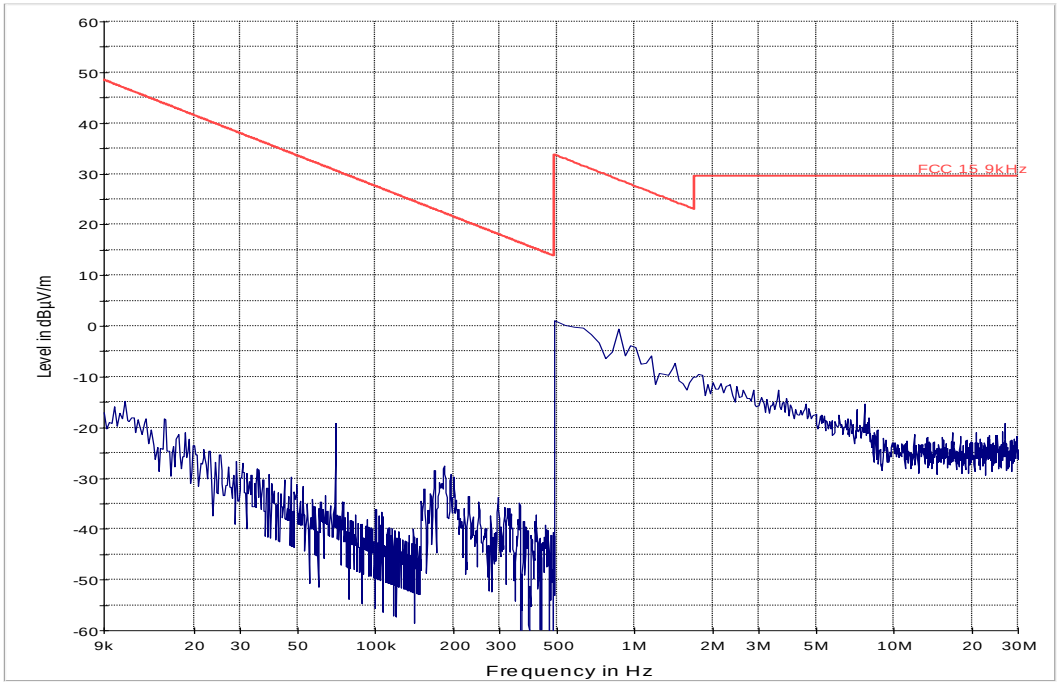
Test results 18GHz-19.1GHz



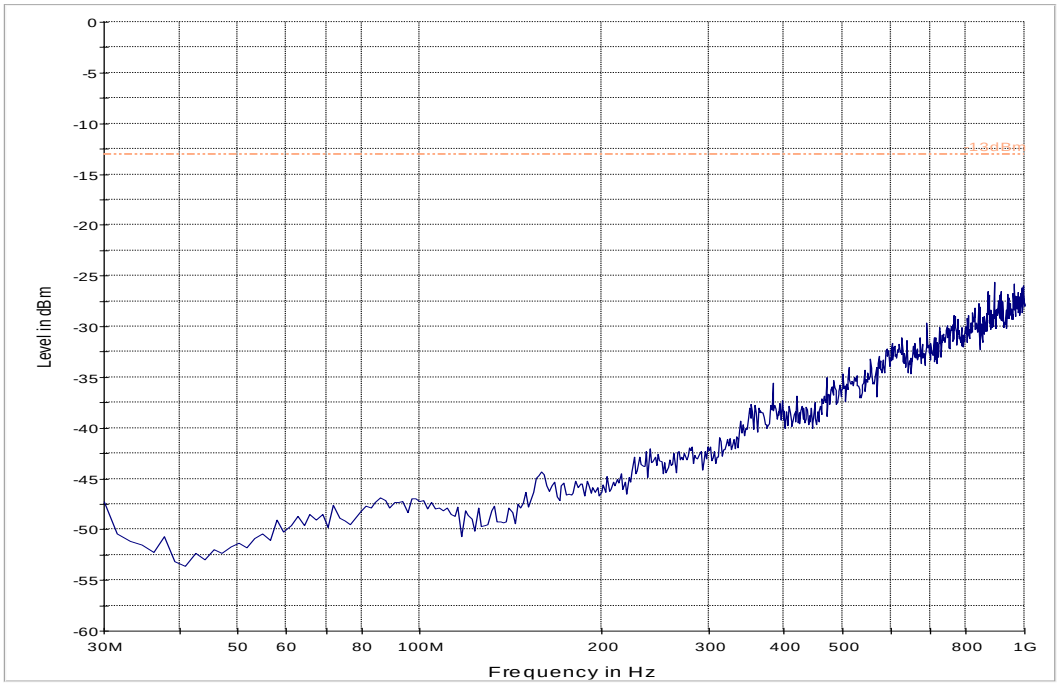
-13dBm Preview Result 1-PK+

Radiated Spurious Emissions (LTE Band 7) Tx: 16-QAM; 10MHz BW: Low Channel

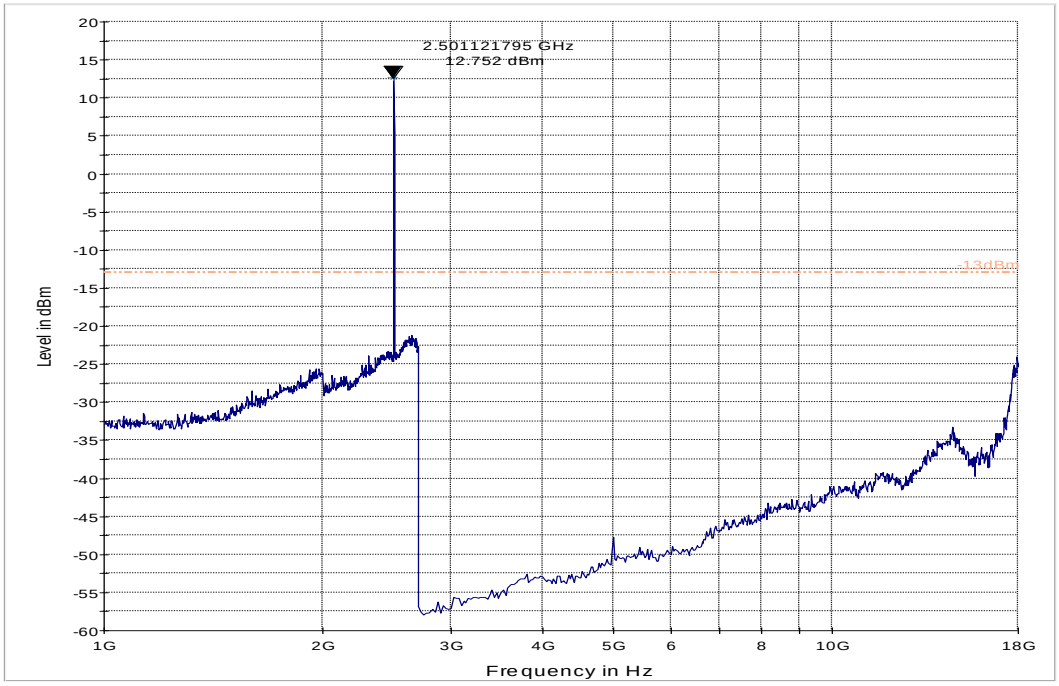
Test results 9kHz-30MHz



Test results 30MHz-1GHz

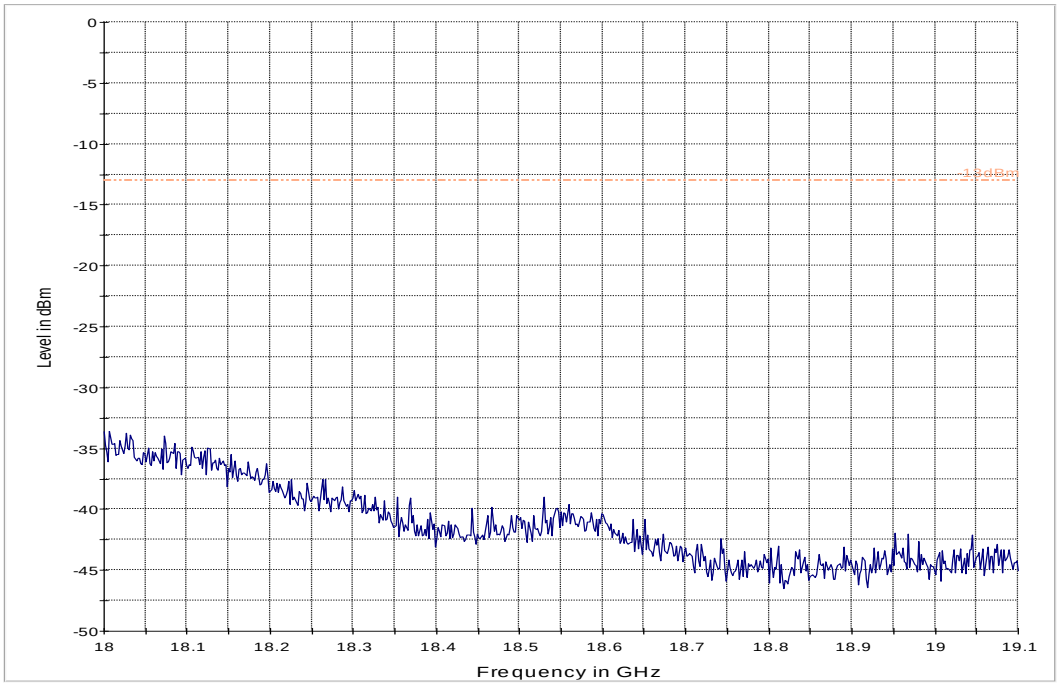


Test results 1GHz-18GHz



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

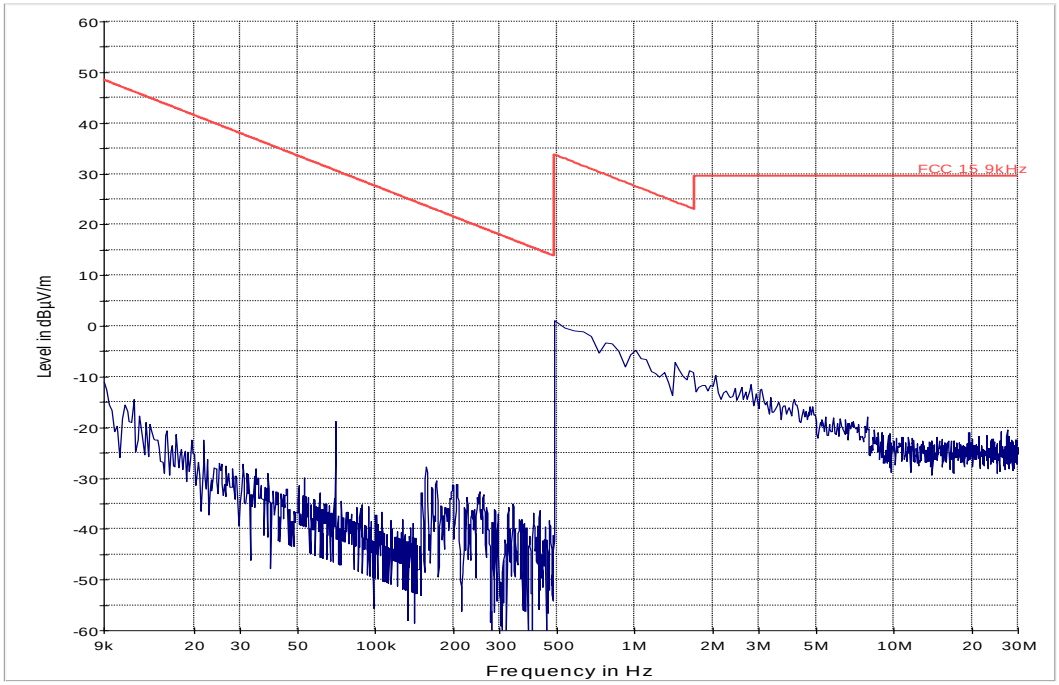
Test results 18GHz-19.1GHz



-13dBm Preview Result 1-PK+

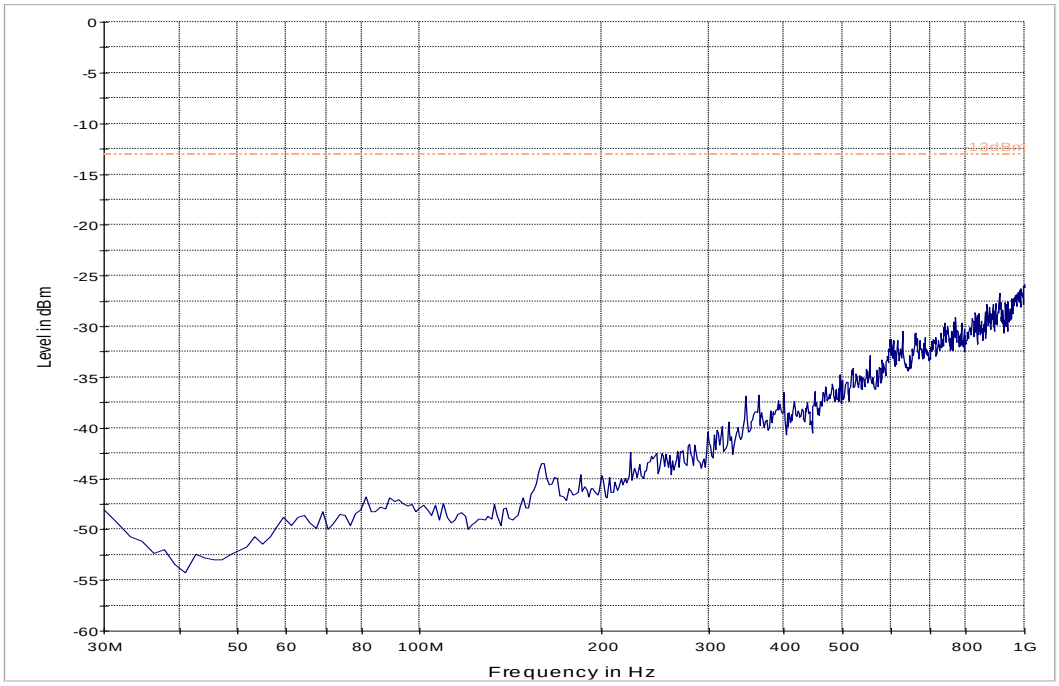
Radiated Spurious Emissions (LTE Band 7) Tx: 16-QAM; 10MHz BW: Mid Channel

Test results 9kHz-30MHz



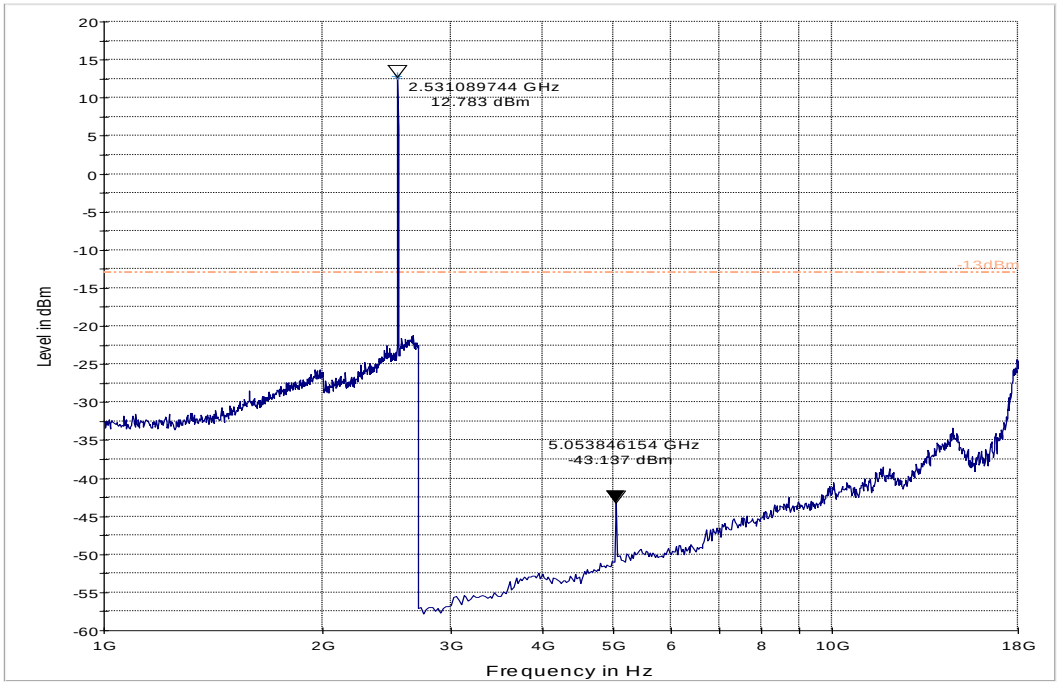
FCC 15 9kHz Preview Result 1-PK+

Test results 30MHz-1GHz



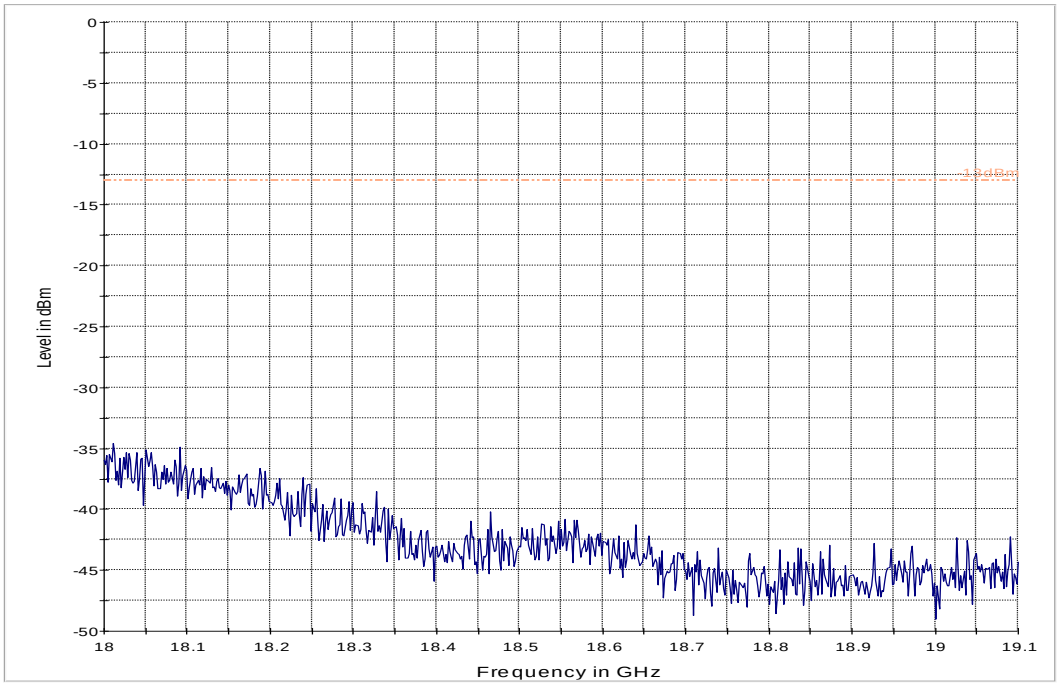
-13dBm Preview Result 1-PK+

Test results 1GHz-18GHz



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

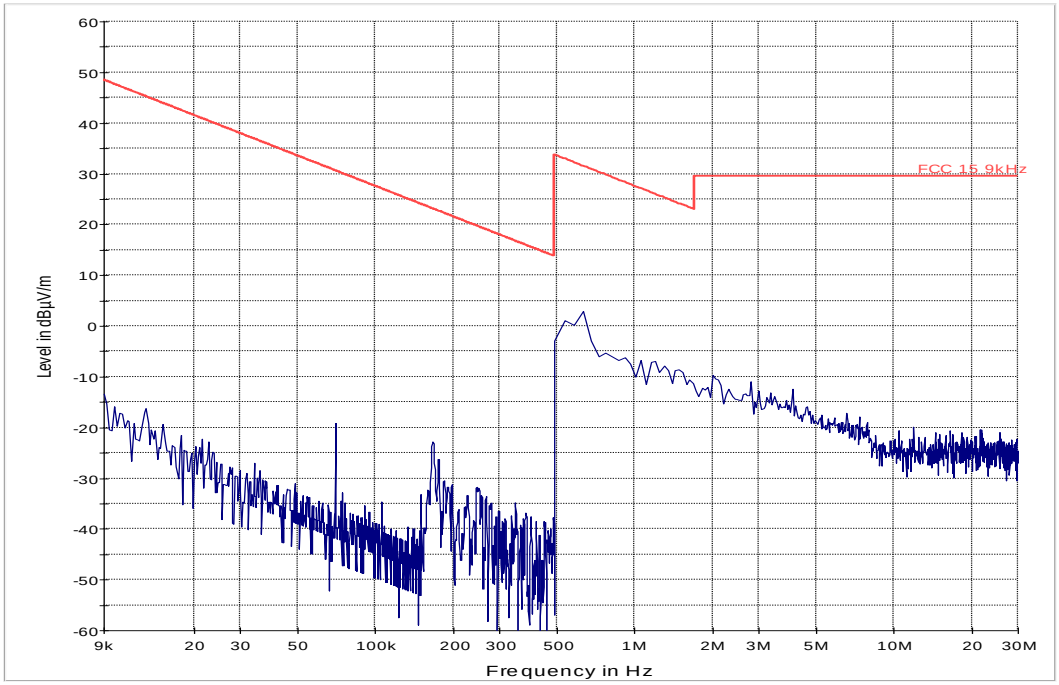
Test results 18GHz-19.1GHz



-13dBm Preview Result 1-PK+

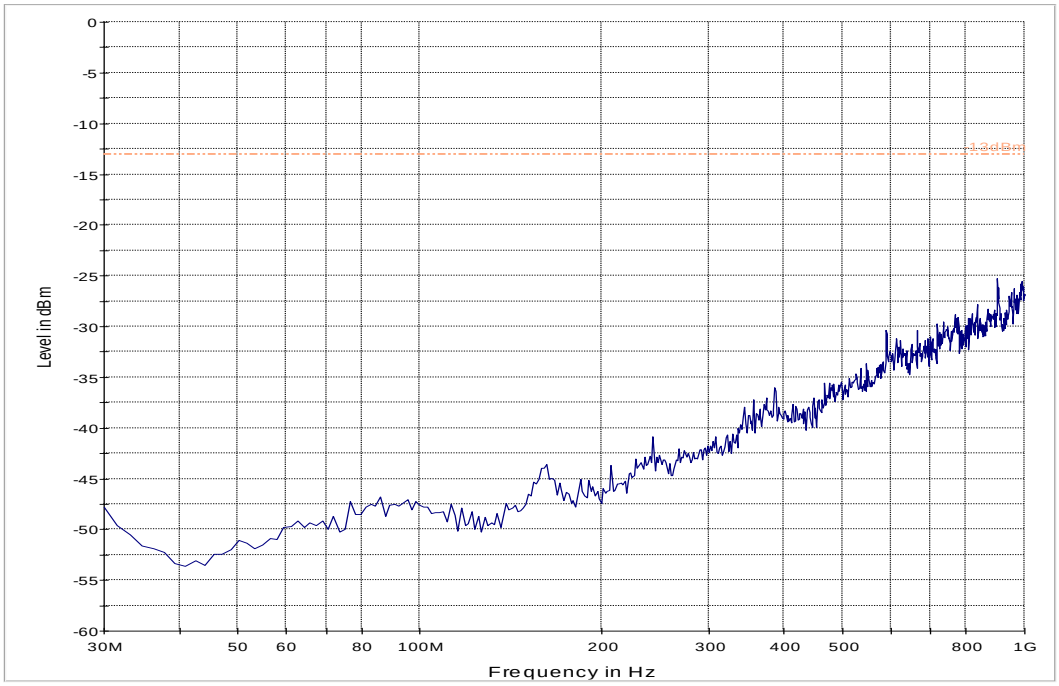
Radiated Spurious Emissions (LTE Band 7) Tx: 16-QAM; 10MHz BW: High Channel

Test results 9kHz-30MHz



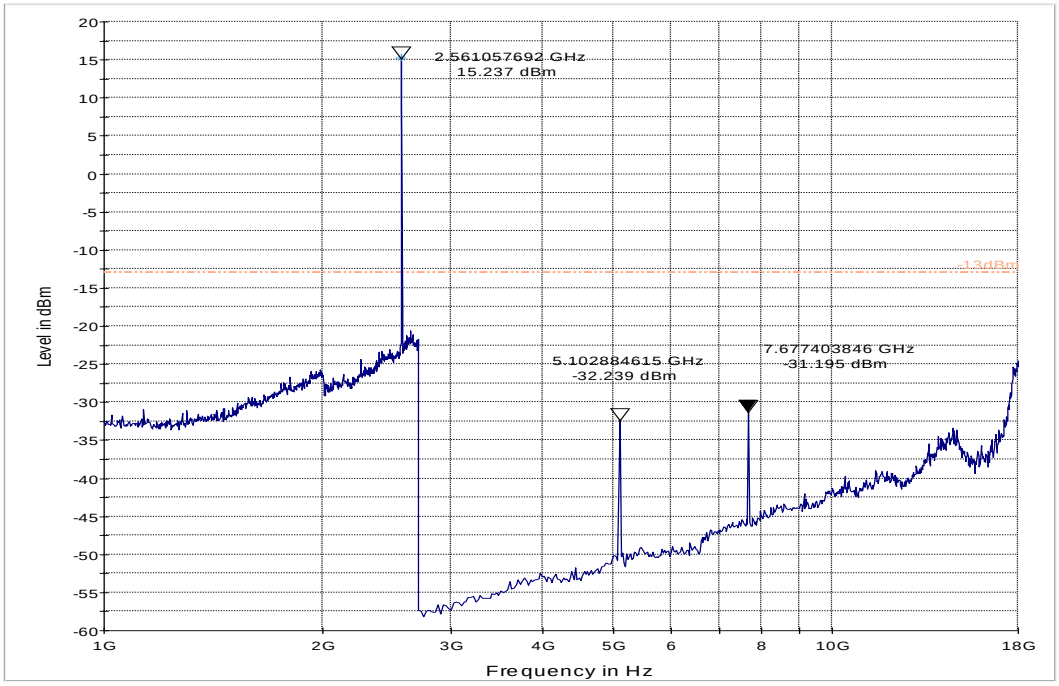
FCC 15 9kHz Preview Result 1-PK+

Test results 30MHz-1GHz



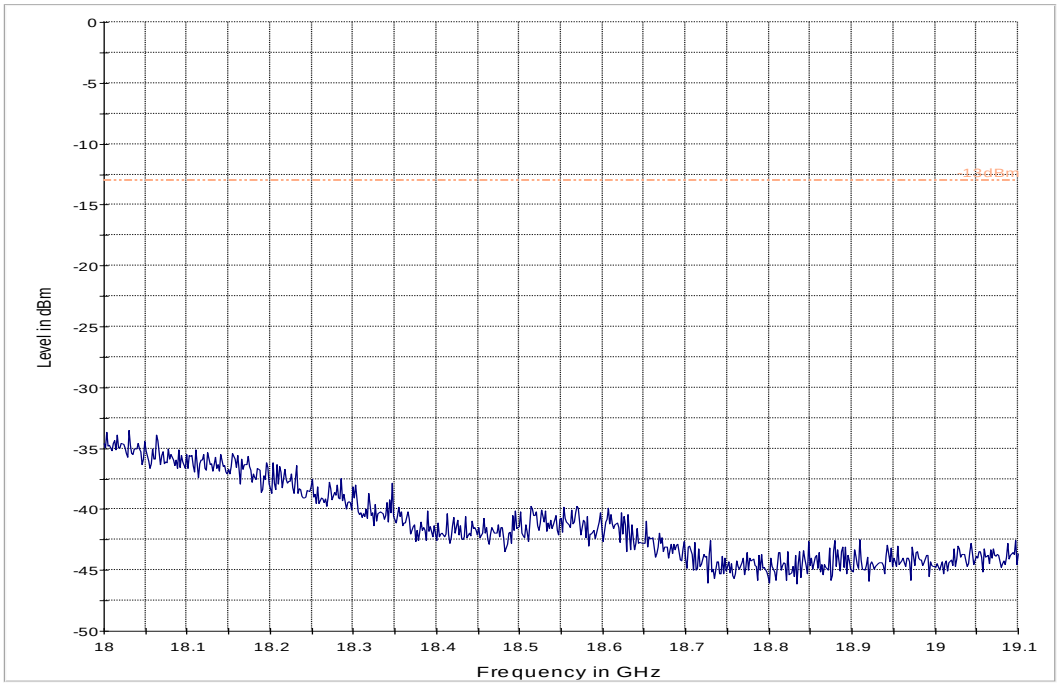
-13dBm Preview Result 1-PK+

Test results 1GHz-18GHz



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

Test results 18GHz-19.1GHz

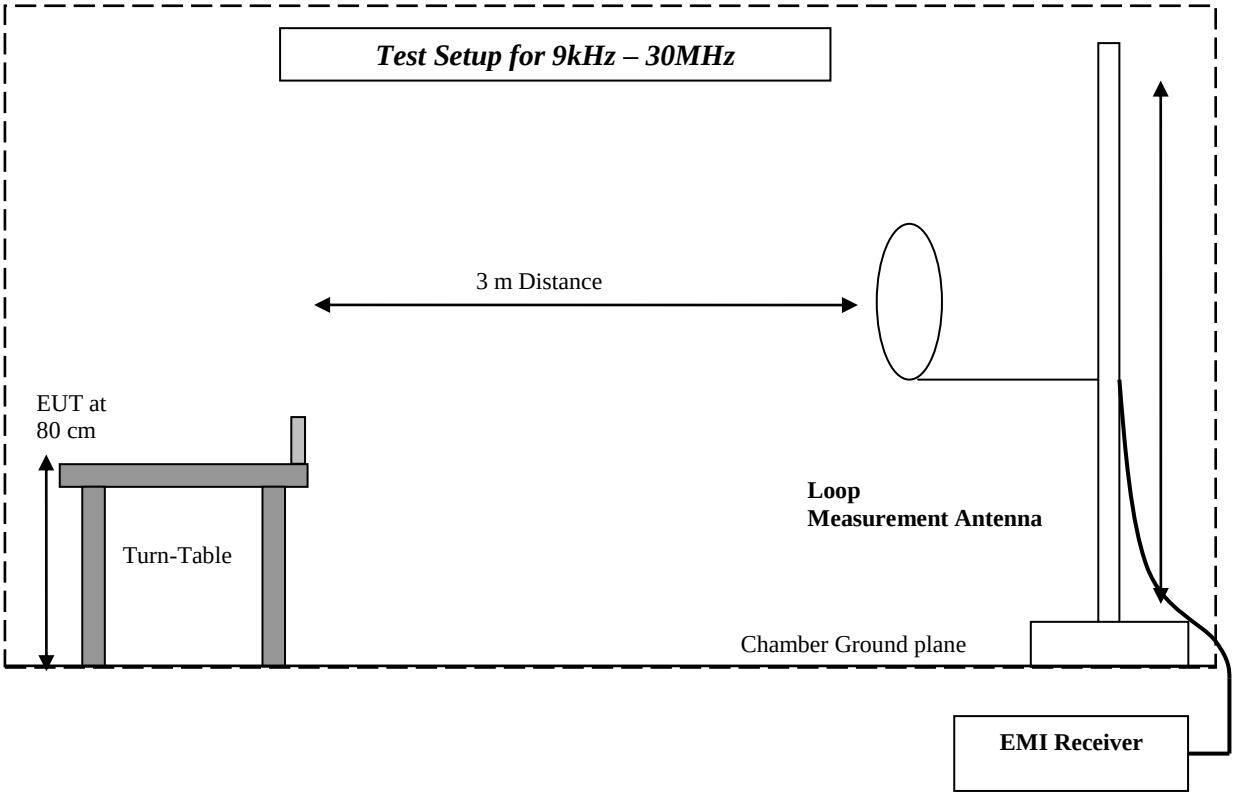


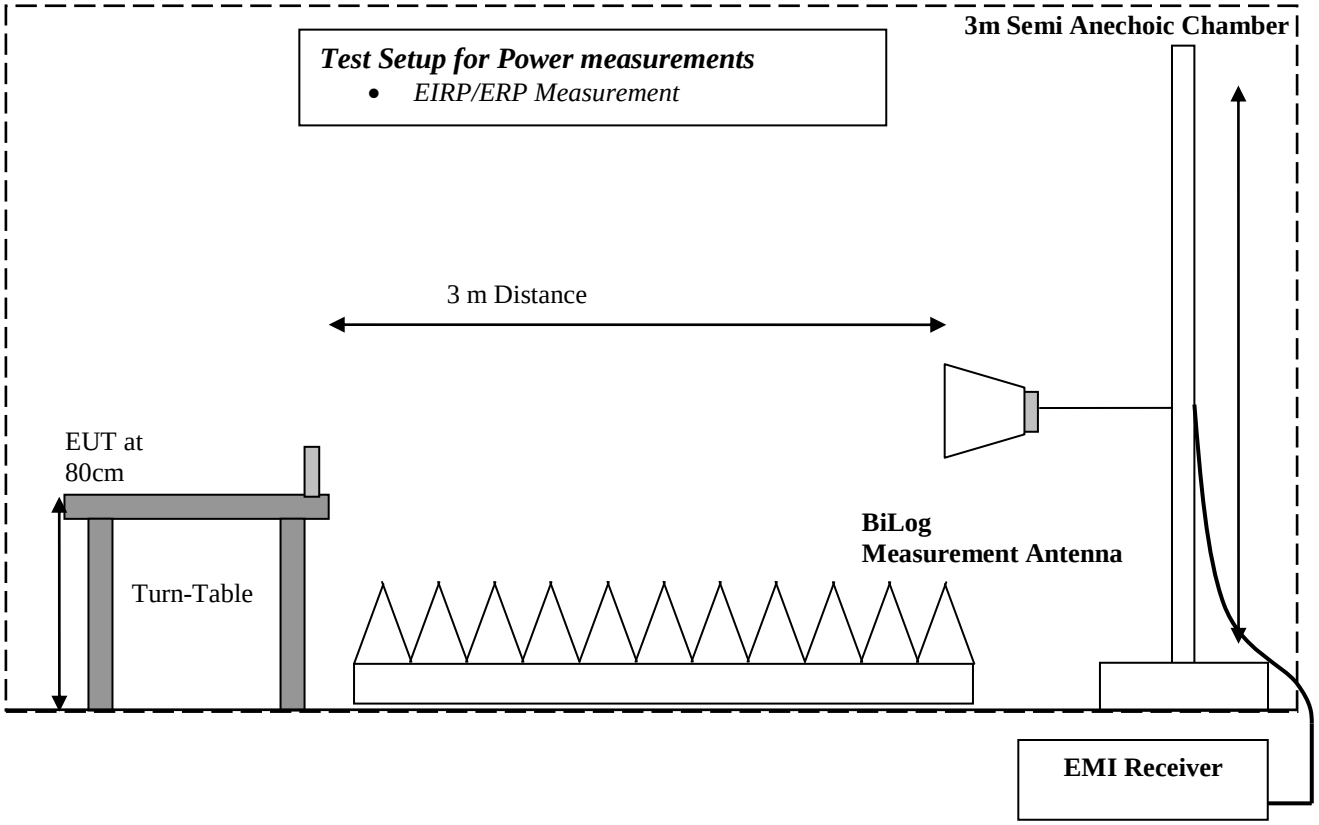
-13dBm Preview Result 1-PK+

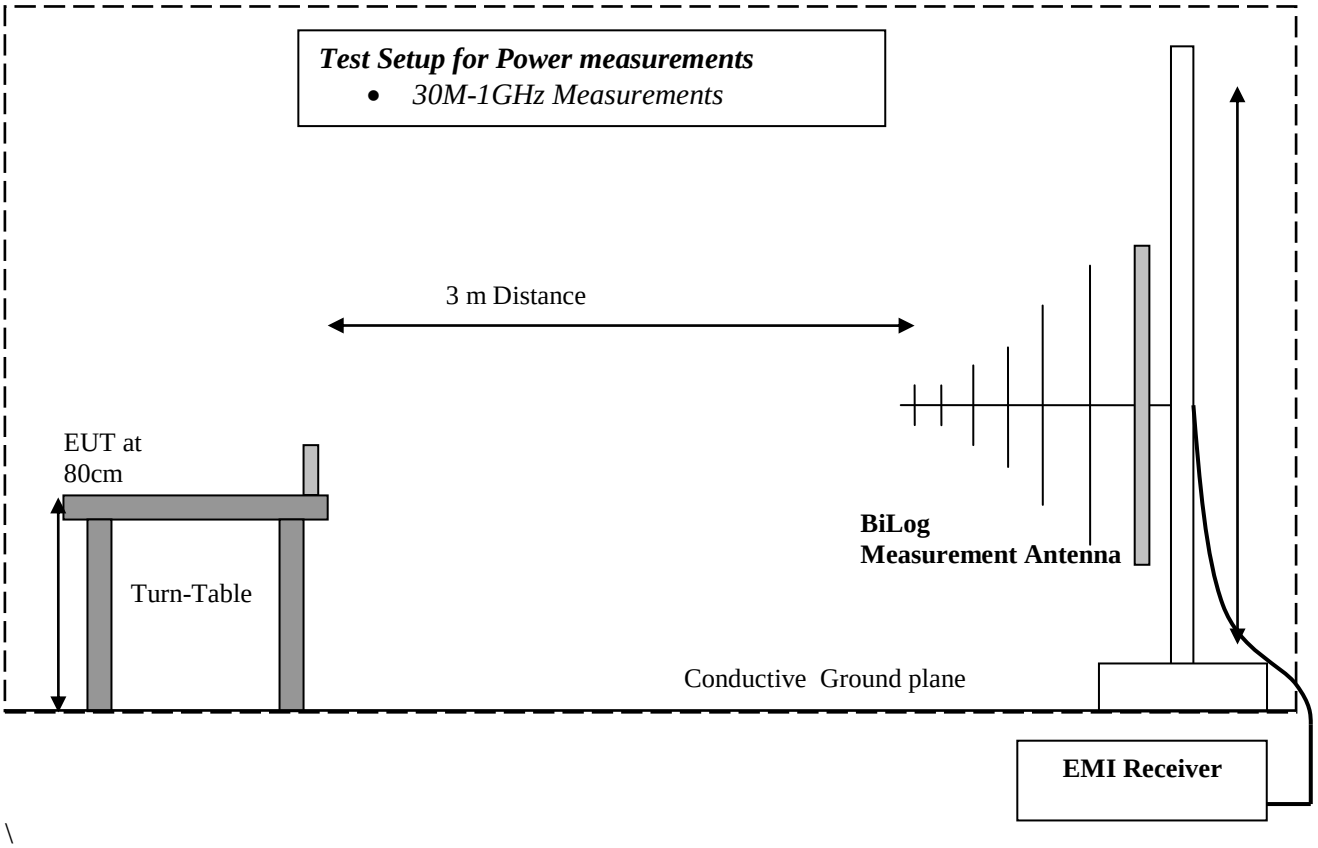
7 Test Equipment and Ancillaries used for tests

Instrument/Ancillary	Model	Manufacturer	Serial No.	Cal Date	Cal Interval
Radio Communication Tester	CMU 200	Rohde & Schwarz	110759	June 2013	2 Years
EMI Receiver/Analyzer	ESU 40	Rohde & Schwarz	100251	Sept 2013	2 Years
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	June 2013	2 Years
Loop Antenna	6512	EMCO	00049838	Apr 2012	3 years
Biconilog Antenna	3141	EMCO	0005-1186	Mar 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035111	Mar 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035114	Apr 2012	3 years
Horn Antenna (18-40GHz)	3116	ETS	00070497	Aug 2011	3 years
Communication Antenna	IBP5-900/1940	Kathrein	n/a	n/a	n/a
High Pass Filter	5HC2700	Trilithic Inc.	9926013	Part of system calibration	
High Pass Filter	4HC1600	Trilithic Inc.	9922307	Part of system calibration	
6GHz High Pass Filter	HPM50106	Microtronics	001	Part of system calibration	
Pre-Amplifier	JS4-00102600	Miteq	00616	Part of system calibration	
LISN	50-25-2-08	FCC	08014	Jan 2013	1 year
DC Power Supply	6655A	Hewlett Packard	3403A-00487	n/a	n/a
Multimeter	MM200	Klein	N/A	Apr 2011	2 Years
Temp Hum Logger	TM320	Dickson	03280063	Apr 2013	1 Year
Temp Hum Logger	TM325	Dickson	5285354	Apr 2013	1 Year

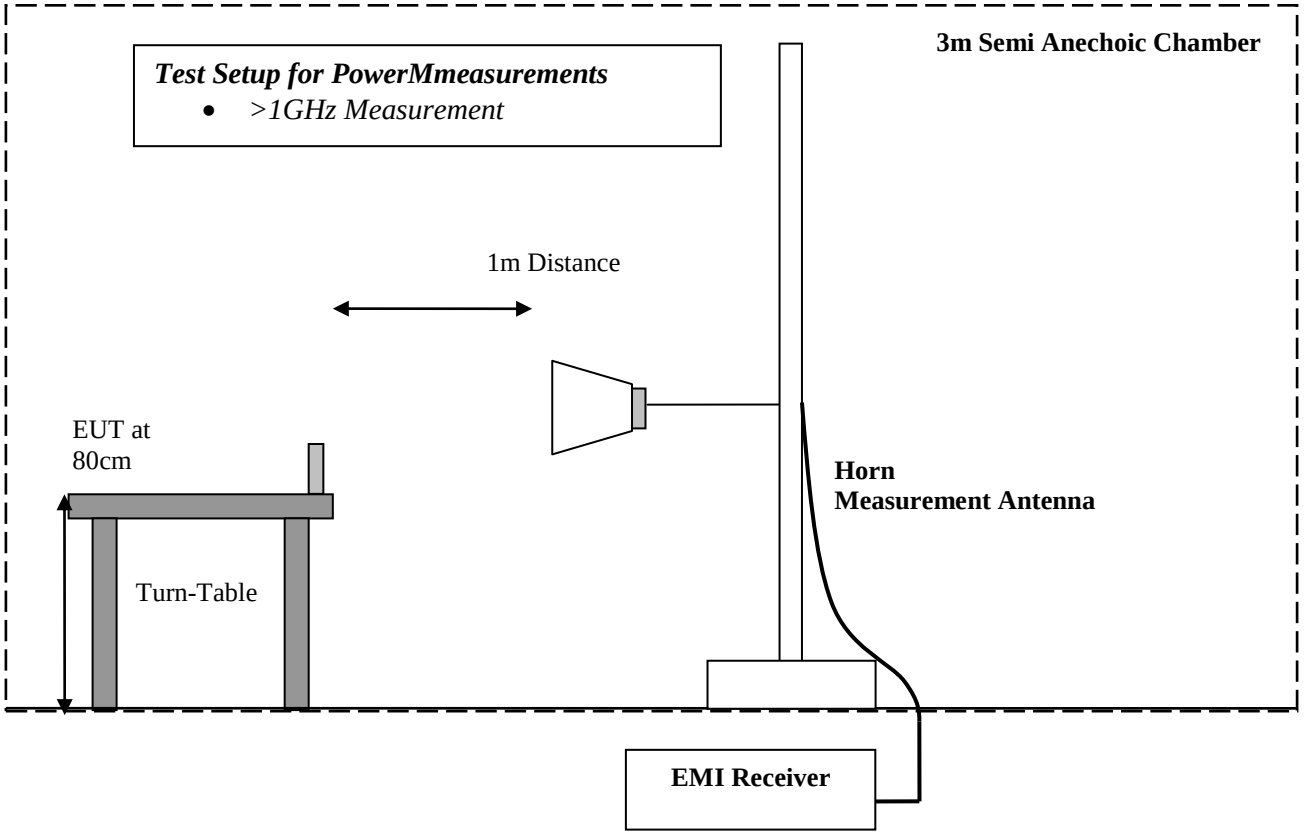
8 Test Setup Diagrams






Test Setup for Power measurements
• 30M-1GHz Measurements
3 m Distance
EUT at
80cm
Turn-Table
BiLog
Measurement Antenna
Conductive Ground plane
EMI Receiver

\


3m Semi Anechoic Chamber
Test Setup for PowerMmeasurements
• >1GHz Measurement
1m Distance
EUT at
80cm
Turn-Table
Horn
Measurement Antenna
EMI Receiver

9 Revision History

Date	Report Name	Changes to report	Report prepared by
2014-01-21	EMC_CETEC_063_13001_WWAN	Initial Version	Franz Engert