FCC Test Report

Bi-Directional Booster

Part 22 and part 24

Product Name: POWERMAX DUAL BAND CELLULAR AMPLIFIER

FCC ID: PZODA4000SBR

Applicant:

DIGITAL ANTENNA
5325 NW 108TH AVENUE
SUNRISE FL 33351

Date Receipt: 5/10/2004

Date Tested: 5/26/2004

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EXHIBITS INCLUDING:

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TUNING PROCEDURE
OPERATIONAL DESCRIPTION
TEST SET UP PHOTOGRAPHS

1 COMPLIANCE STATEMENT:

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. No modifications were made to the equipment during testing in order to demonstrate compliance with these standards.

I attest that the necessary measurements were made, under my supervision, at TIMCO ENGINEERING, INC. located at 849 N.W. State Road 45, Newberry, Florida 32669.

Authorized Signatory Name: Bruno Clavier

Signature: <onfile>

Function: Chief Engineer

Date: 6/10/2004

Test engineer name: Nam Nguyen

Signature: <onfile>

Date: 6/10/2004

2 GENERAL INFORMATION - PART 2.1033 (C)

General information required for type Certification

2.1033(c)(1)(2)	DIGITAL ANTENNA will manufacture the FCCID: PZODA4000SBR TRANSCEIVER in quantity, for use under FCC RULES PART 22 and 24.
2.1033(c)	TECHNICAL DESCRIPTION
2.1033(c)(3)	User Manual. See the exhibits.
2.1033(c)(4)	Type of Emission: F9W (CDMA), GXW (GSM), F1D(AMPS), and DXW for (TDMA/NADC)
2.1033(c)(5)	Frequency Range: 824-849 MHz and 1850-1910MHz
2.1033(c)(6)	Power Range and Controls: There are NO user Power controls.
2.1033(c)(7)	Maximum Output Power rating per rules parts: Part 24.232: Mobile unit max power is 2WEIRP Part 22.913: Mobile unit max power is 7WERP

2.1033(c)(8) DC Voltages and Current into Final Amplifier:

POWER INPUT FINAL AMPLIFIER ONLY
The normal maximum input current is 1 A
DC voltage is 5 Volts

2.1033(c)(9) Tune-up procedure. The tune-up procedure is given in the exhibits.

2.1033(c)(10) Complete Circuit Diagrams: Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description in the instruction manual. The circuit diagram and block diagram are included in the exhibits.

2.1033(c)(11) A photograph or drawing of the equipment identification label is shown in the exhibits.

2.1033(c)(12) Photographs of the equipment of sufficient clarity to reveal equipment construction and layout and label location are shown in the exhibits.

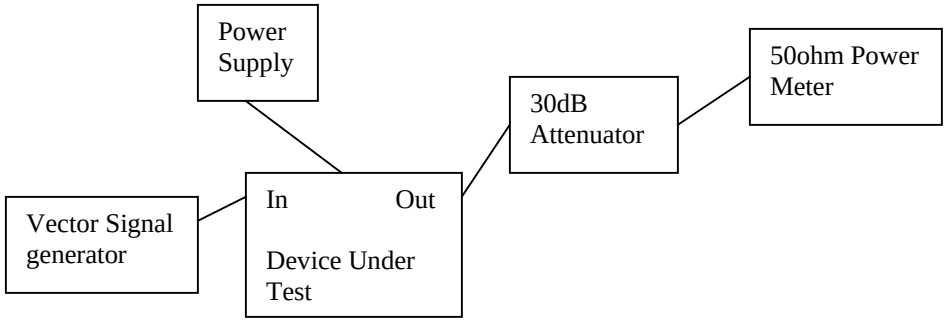
2.1033(c)(13) For equipment employing digital modulation, a detail description of the modulation technique: N/A as this device is an amplifier

2.1033(c)(14) Data required for 2.1046 to 2.1057 See Next Page.

3 PART 2.1046(A) RF POWER OUTPUT:

RF power is measured by connecting a 50 ohm, resistive wattmeter to the RF output connector. With a nominal voltage of 5 VDC using the AC/DC switched mode power supply specified with this device, and the transmitter properly adjusted the RF output measures:

METHOD OF MEASURING RF POWER OUTPUT



CONDUCTED POWER:

Frequency band	Modulation	MAX Input power Uplink (dBm)	MAX Input power Downlink (dBm)	MAX Output power Uplink (dBm)	MAX Output power Downlink (dBm)
AMPS band	GSM	-20	-27	32.5	10
	CDMA	-38.4	-42.4	22.2	10.2
	TDMA	-25.7	-27.7	28.9	9.9
PCS band	GSM	-24	-14.3	28	10
	CDMA	-24	-11.7	28.1	10
	TDMA	-24	-14.7	26.8	10

4 PART 2.1049 GAIN

The following gain is reported for the maximum input drive level to the EUT.

GSM

Uplink PCS	Max input EUT (dBm)	Measured Output (dBm)	Gain (dB)
1850	-37	28	65
1910	-24	23.9	48
Downlink PCS			
1930	-14.3	10	24.3

CDMA

Uplink PCS	Max input EUT (dBm)	Measured Output (dBm)	Gain (dB)
1850	-37	28.1	67.3
1910	-24	25.1	52.3
Downlink PCS			
1930	-18.7	10	28.7
1990	-11.7	10	21.7

TDMA

Uplink PCS	Max input EUT (dBm)	Measured Output (dBm)	Gain (dB)
1850	-37	26.8	63.8
1910	-24	22.5	46.5
Downlink PCS			
1930	-14.7	10	24.7
1990	-18.7	10	28.7

GSM	Uplink AMPS	Max input EUT (dBm)	Measured Output (dBm)	Gain (dB)
	824.2	-29	32.5	61.5
	848.8	-20	30.0	50
	Downlink AMPS			
	869.2	-27	10	37

CDMA	Uplink AMPS	Max input EUT (dBm)	Measured Output (dBm)	Gain (dB)
	824.7	-43.4	22.2	65.6
	848.31	-38.4	20.1	58.5
	Downlink AMPS			
	894.31	-42.4	10.2	52.6

TDMA	Uplink AMPS	Max input EUT (dBm)	Measured Output (dBm)	Gain (dB)
	824.04	-32.7	28.9	61.6
	848.97	-25.7	28.3	54.0
	Downlink AMPS			
	869.04	-27.7	9.9	37.6

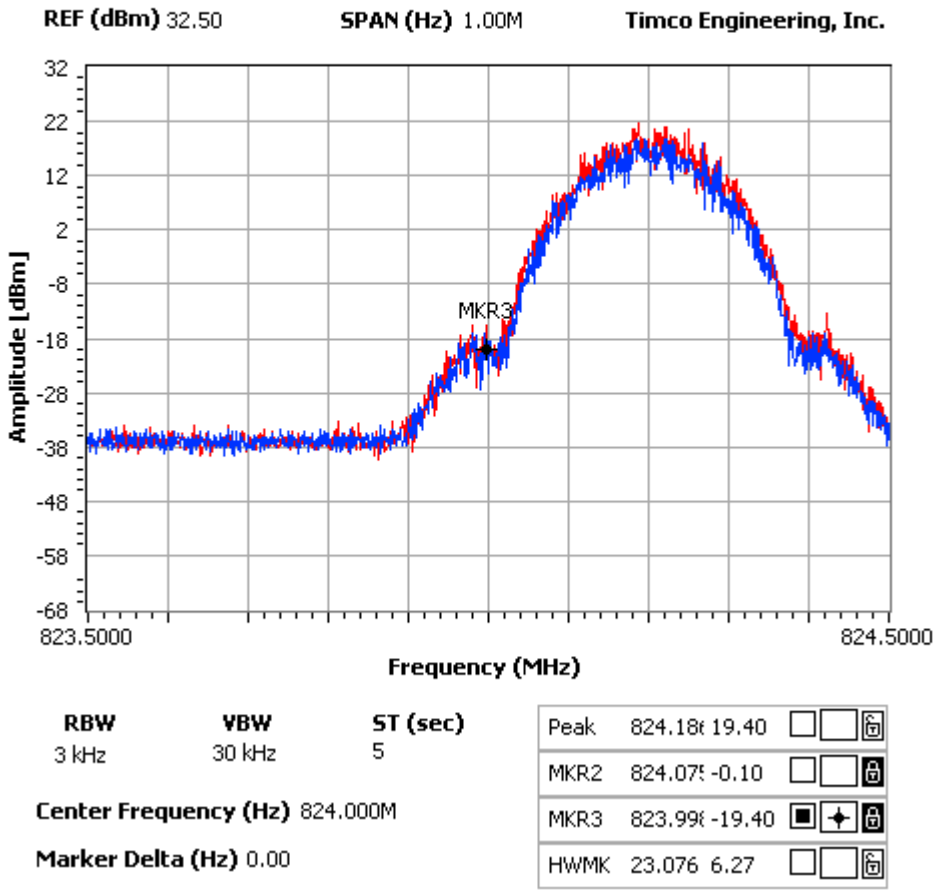
5 PART 2.1049 INPUT/OUTPUT MODULATED AMPLITUDE COMPARISON – AMPS BAND

On the following plot, the Reference level was calibrated using a Resolution Bandwidth wider than the emission bandwidth. First the gain was measured for the maximum output power. Then for each frequency and type of modulation, an attenuation equal to the gain of the amplifier was added on the measurement side of the amplifier, as to overlay the input versus output modulated envelope.

5.1 UPLINK – GSM 824.2MHZ

NOTES:

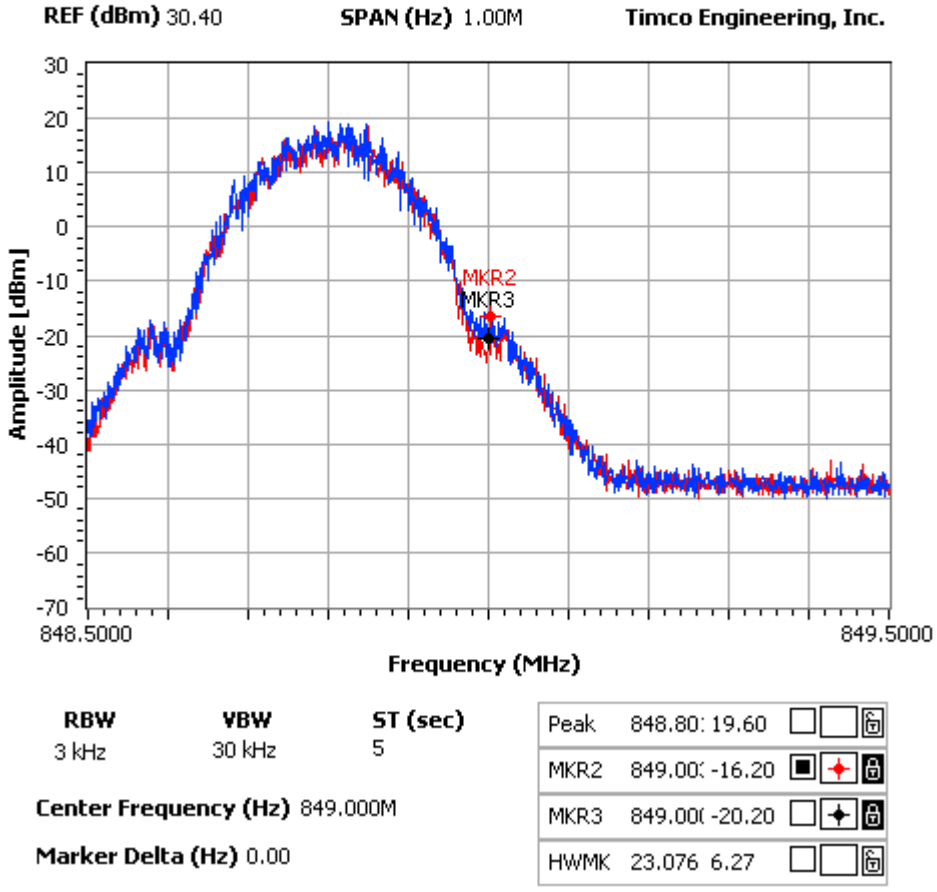
Uplink Max input power is -29dBm / Input vs. Output
GSM real time I/Q baseband



5.2 UPLINK – GSM 848.8MHZ

NOTES:

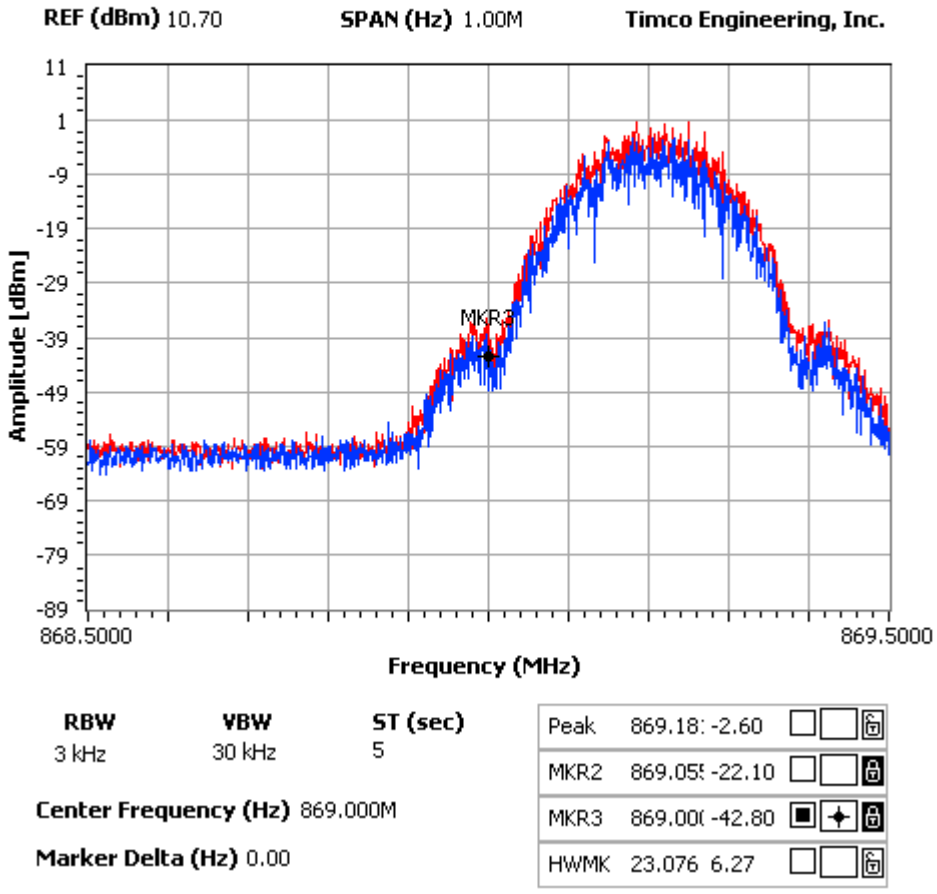
Uplink Max input power is -20 dBm / Input vs. Output
GSM



5.3 DOWNLINK – GSM 869.2MHZ

NOTES:

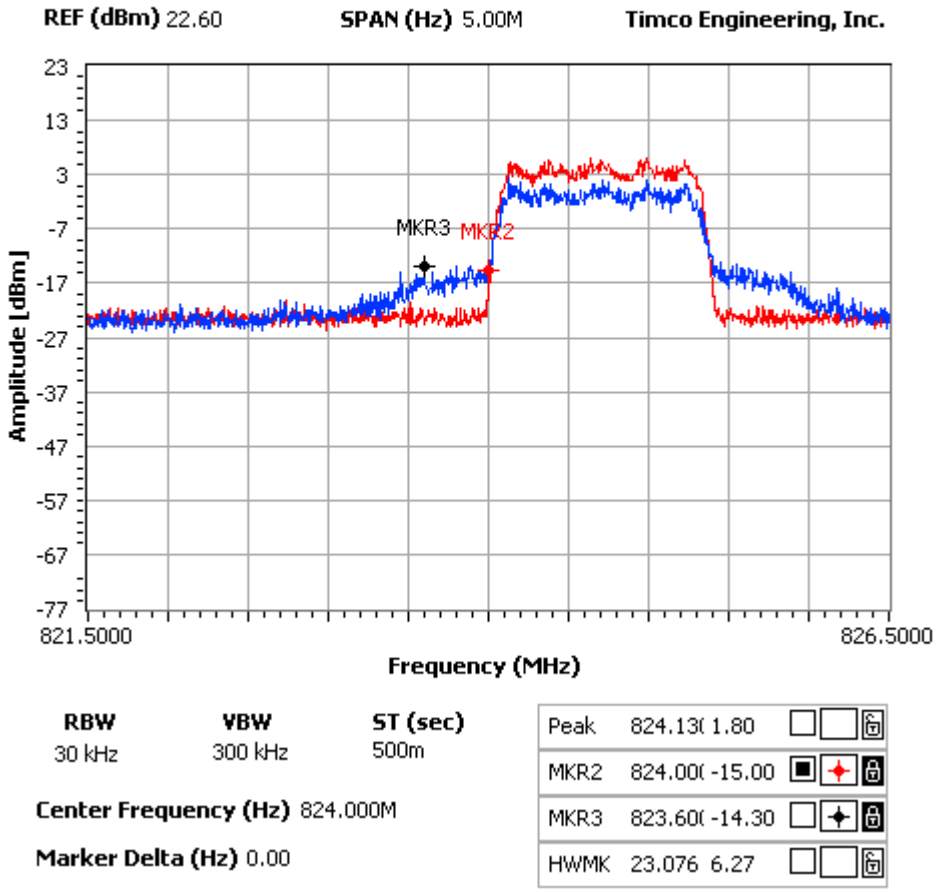
Downlink Max input power is -27 dBm / Input vs. Output
GSM



5.4 UPLINK – CDMA 824.7MHZ

NOTES:

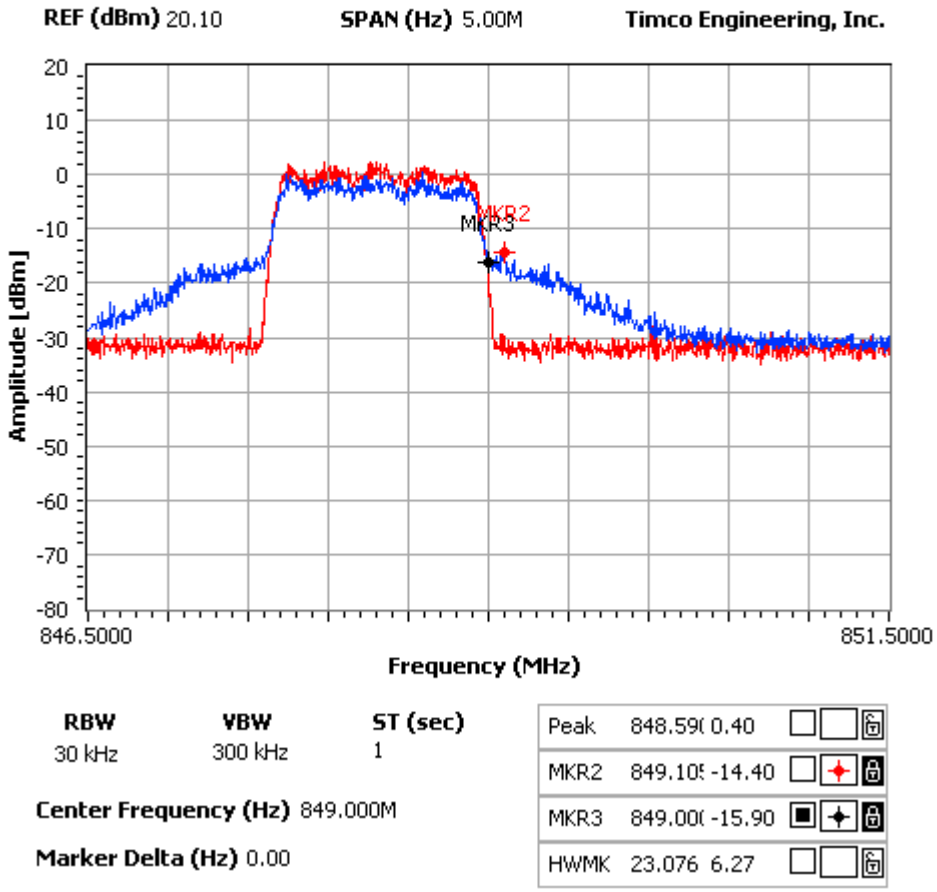
Uplink Max input power is -43.4dBm / input vs. output
CDMA IS-95



5.5 UPLINK – CDMA 848.31MHZ

NOTES:

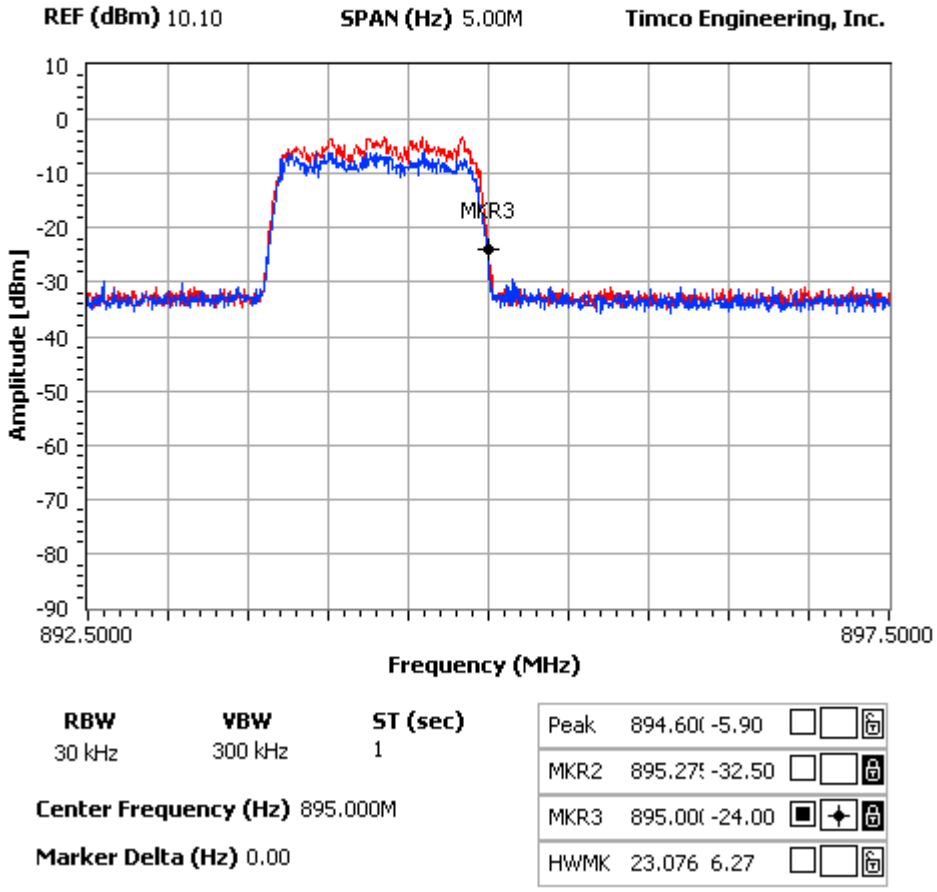
Uplink Max input power is -38.4dBm / Input vs. Output
CDMA IS-95



5.6 DOWNLINK – CDMA 894.31MHZ

NOTES:

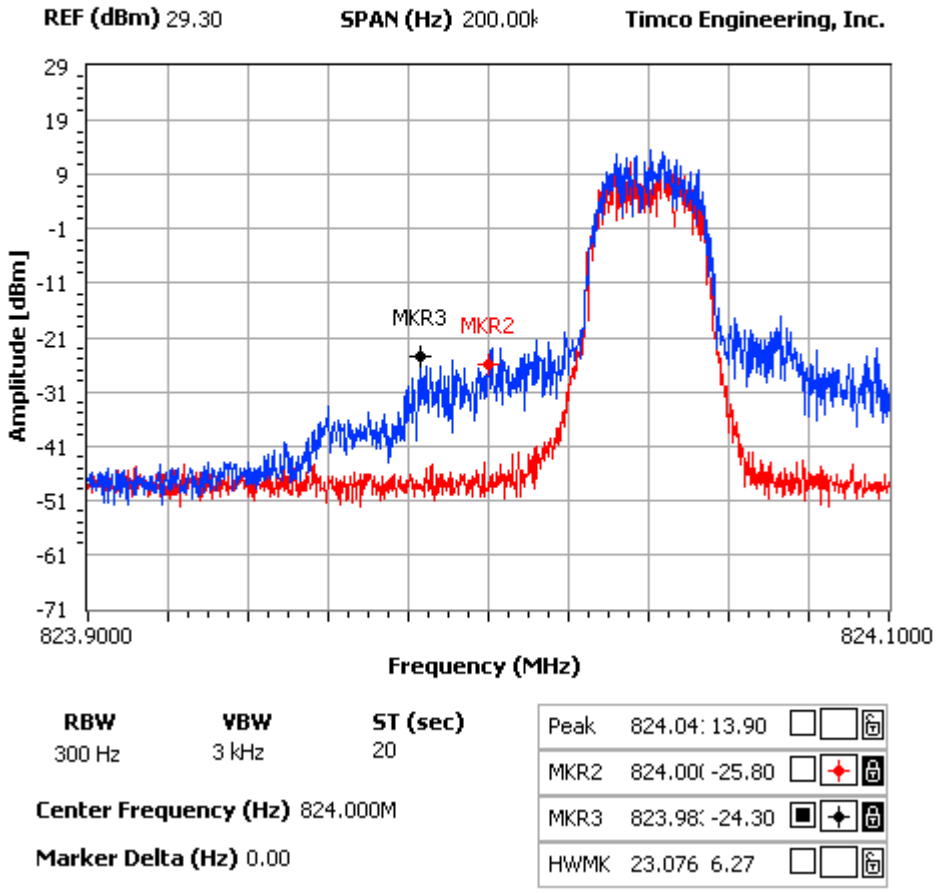
Downlink Max input power is -42.4 dBm / Input vs. Output
CDMA IS-95



5.7 UPLINK – TDMA 824.04MHZ

NOTES:

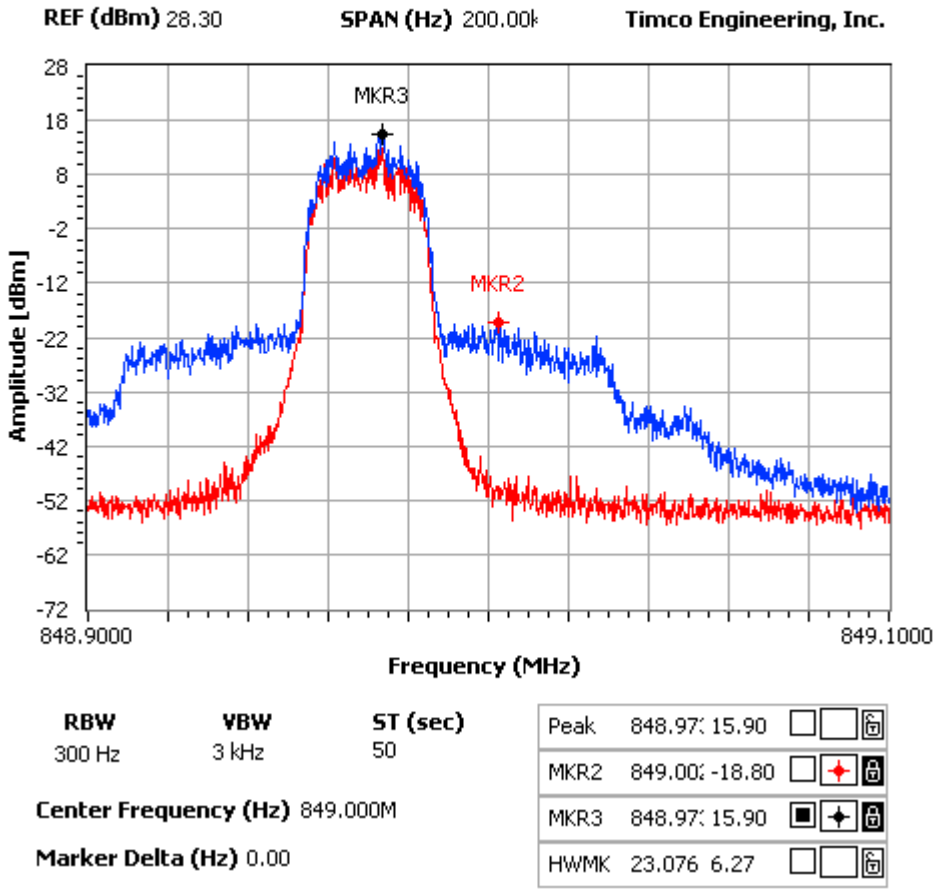
Uplink Max input power is -32.7dBm / Input vs. Output
TDMA pi/4 DQPSK



5.8 UPLINK – TDMA 848.97MHZ

NOTES:

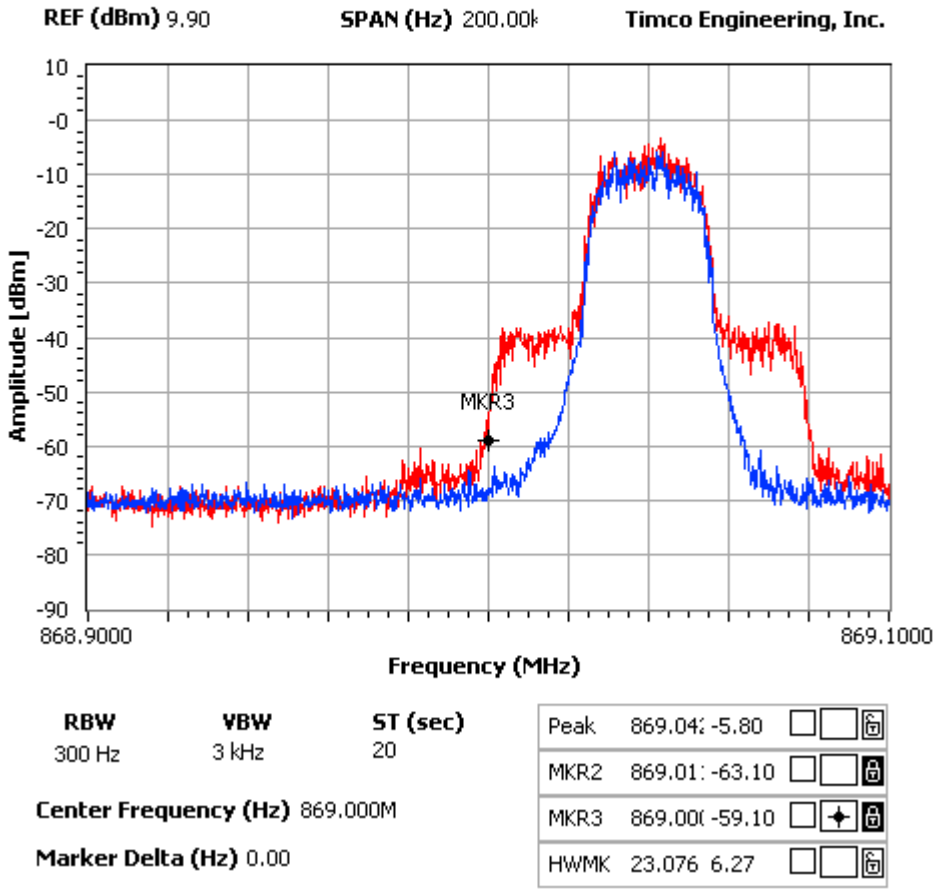
Uplink Max input power is -25.7dBm / Input vs. Output
TDMA pi/4 DQPSK



5.9 DOWNLINK – TDMA 869.04MHZ

NOTES:

Downlink Max input power is -27.7 dBm / Input vs. Output
TDMA Pi/4DQPSK



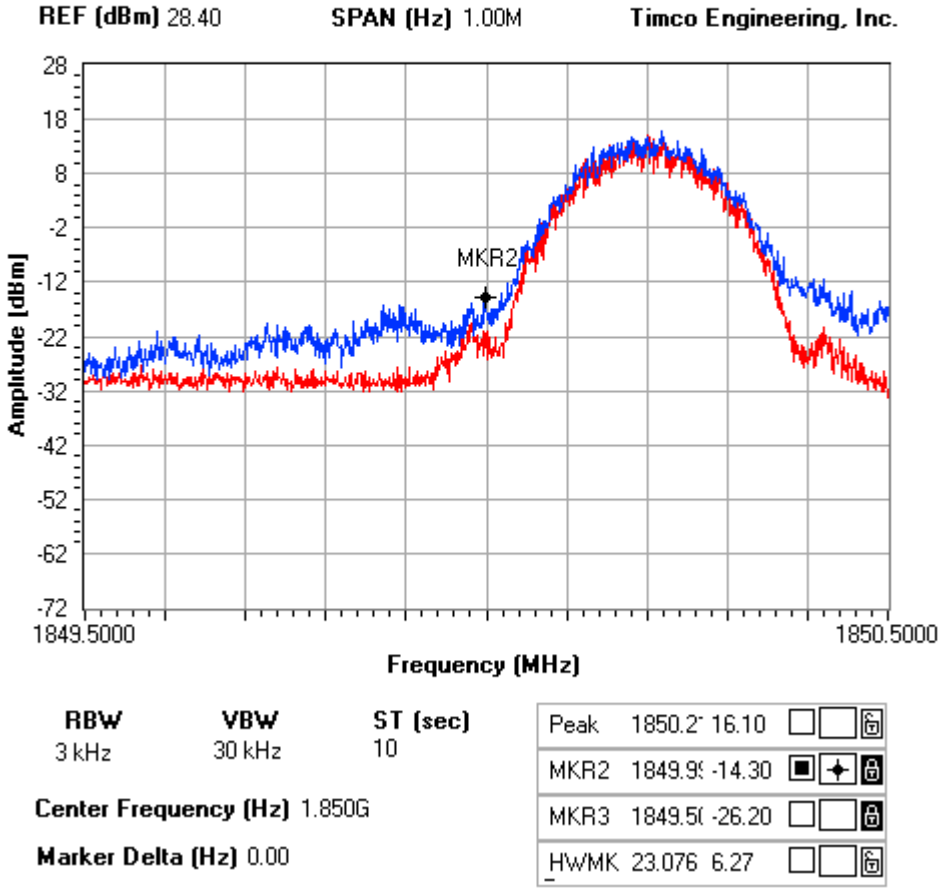
6 PART 2.1049 INPUT/OUTPUT MODULATED AMPLITUDE COMPARISON – PCS BAND

On the following plot, the Reference level was calibrated using a Resolution Bandwidth wider than the emission bandwidth. First the gain was measured for the maximum output power. Then for each frequency and type of modulation, an attenuation equal to the gain of the amplifier was added on the measurement side of the amplifier, as to overlay the input versus output modulated envelope.

6.1 UPLINK – GSM 1850.2MHZ

NOTES:

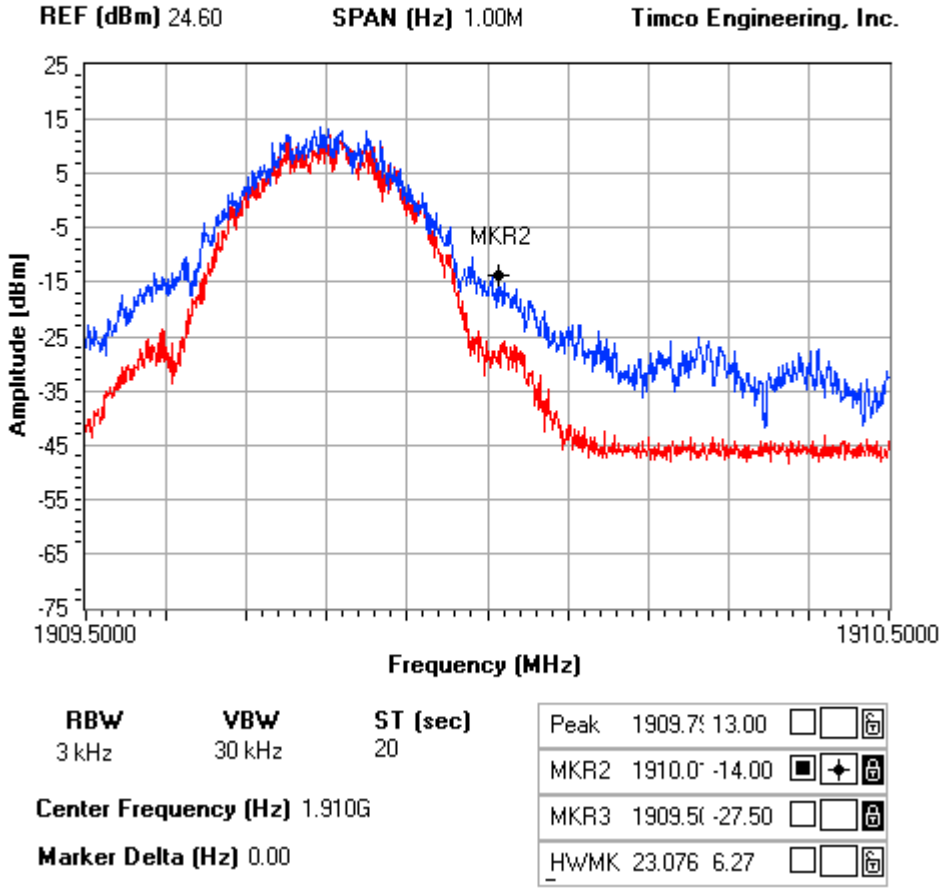
Insided Antenna, Max input power is -37dBm / Input vs. Output
GSM real time I/Q baseband (burst 1 slot)



6.2 UPLINK – GSM 1909.8MHZ

NOTES:

Insided Antenna, Max input power is -24dBm / Input vs. Output at 1910MHz
GSM real time I/Q baseband (burst 1 slot)

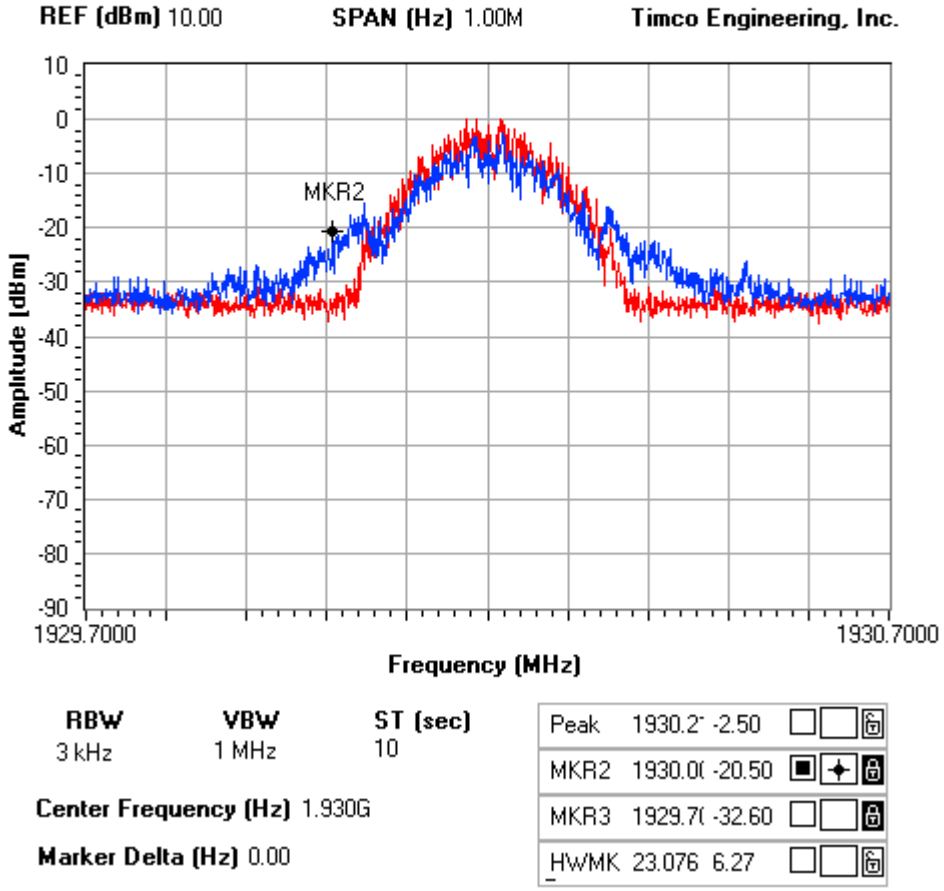


6.3 DOWNLINK – GSM 1930.2MHZ

NOTES:

Outside antenna input power is -14.3dBm / Input vs. Output at 1930.2MHz
CDMA IS-95

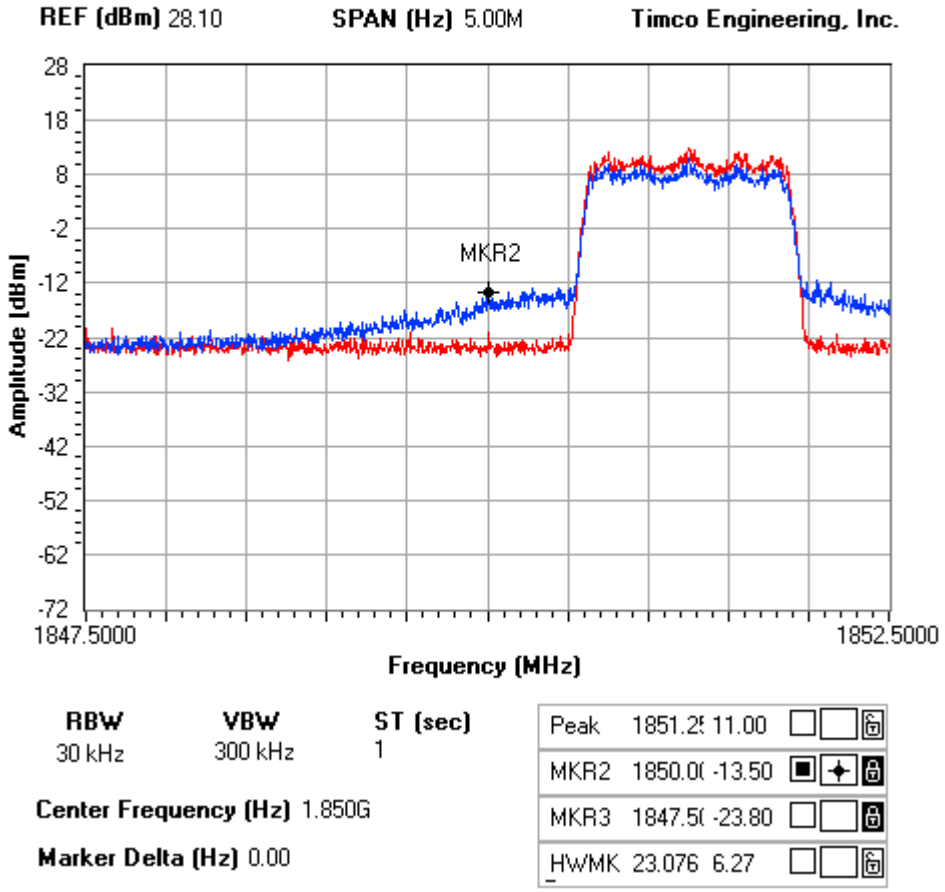
GSM



6.4 UPLINK – CDMA 1851.25MHZ

NOTES:

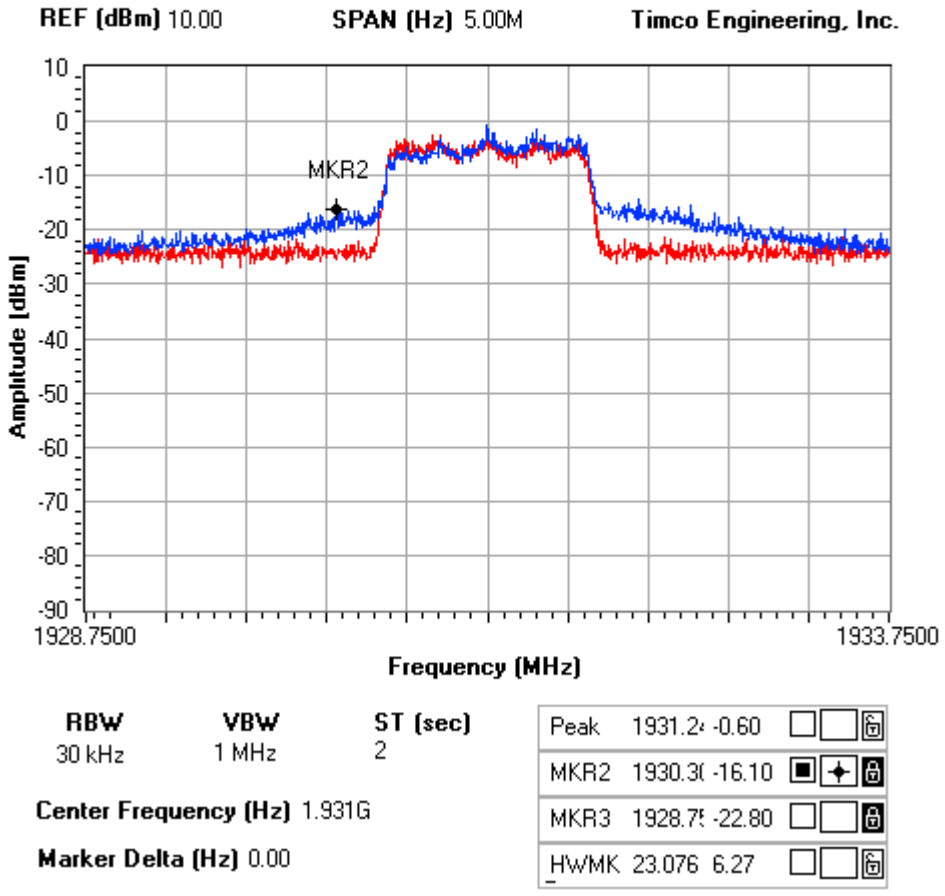
Insided Antenna, Max input power is -37dBm / Input vs. Output at 1850MHz
CDMA IS-95



6.5 DOWNLINK – CDMA 1931.25MHZ

NOTES:

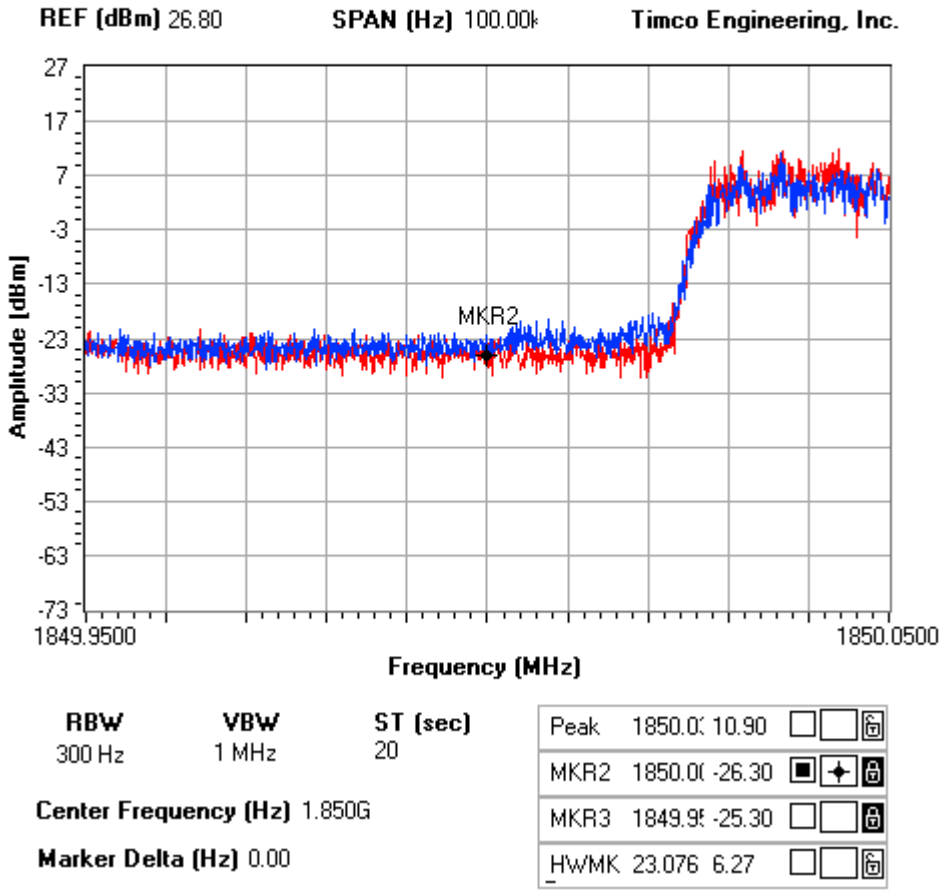
Outside antenna input power is -11.7dBm / Input vs. Output at 1931.25MHz
CDMA IS-95



6.6 UPLINK – TDMA 1850.04MHZ

NOTES:

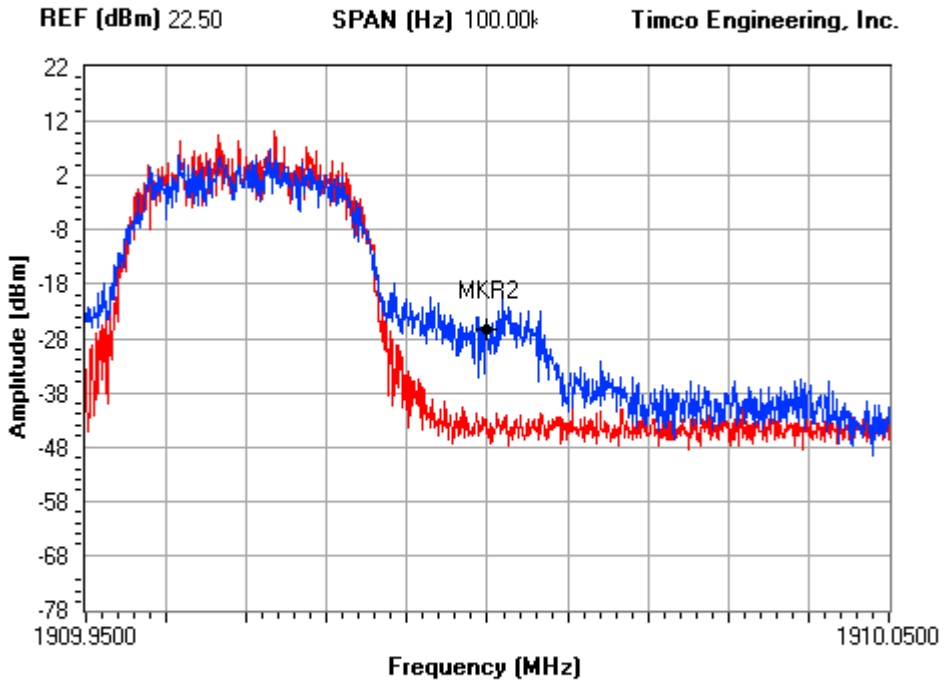
Insided Antenna, Max input power is -37dBm / input vs. output at 1850MHz
TDMA Pi/4 DQPSK



6.7 UPLINK – TDMA 1909.97MHZ

NOTES:

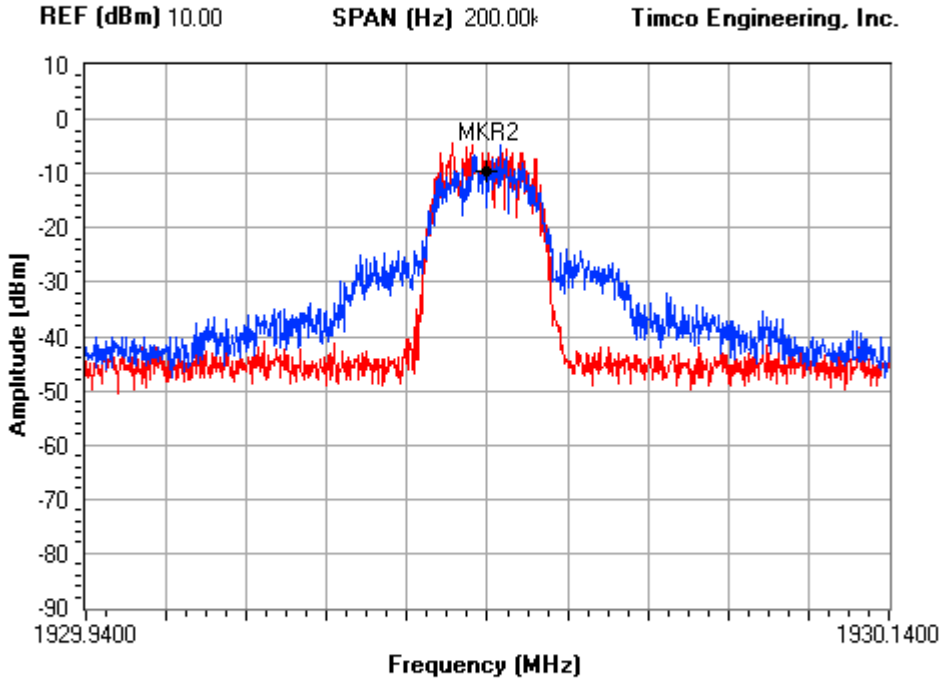
Inside antenna input power is -24dBm / Input vs. Output at 1910MHz
TDMA Pi/4 DQPSK Real time burst



6.8 DOWNLINK – TDMA 1930.04MHZ

NOTES:

Outside antenna input power is -14.7dBm / Input vs. Output at 1930.04MHz
TDMA Pi/4 DQPSK Real time I/Q burst



7 PART 2.1051, 22.917 (F) AND 24.238 OUT OF BAND EMISSIONS/BAND-EDGES:

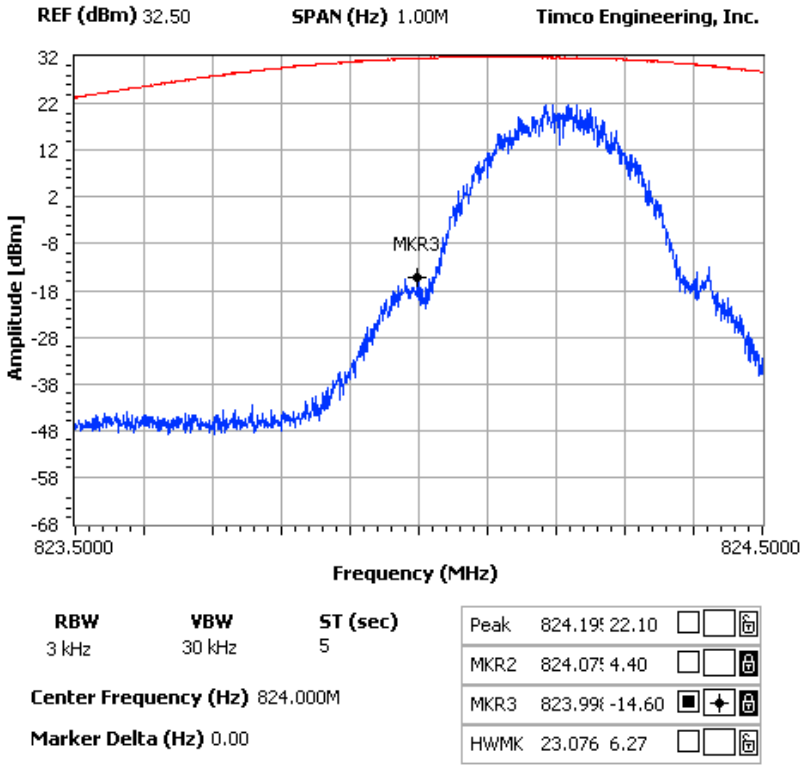
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

Band-edges compliance: Measurement were performed in accordance with Part 22.917 (H) and part 24(E)

On the following plot, the Reference level was calibrated using a Resolution Bandwidth wider than the emission bandwidth.

7.1 UPLINK – GSM 824.2MHZ

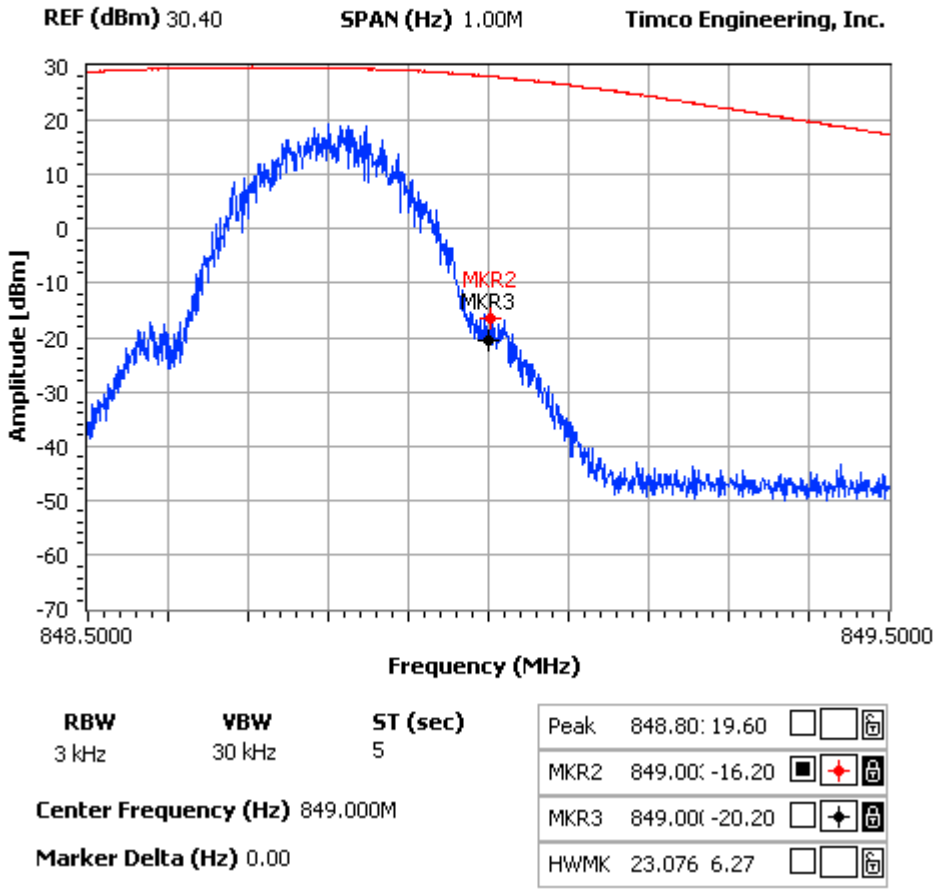
NOTES:
Uplink Max input power is -29dBm / band-edge
GSM real time I/Q baseband



7.2 UPLINK – GSM 848.8MHZ

NOTES:

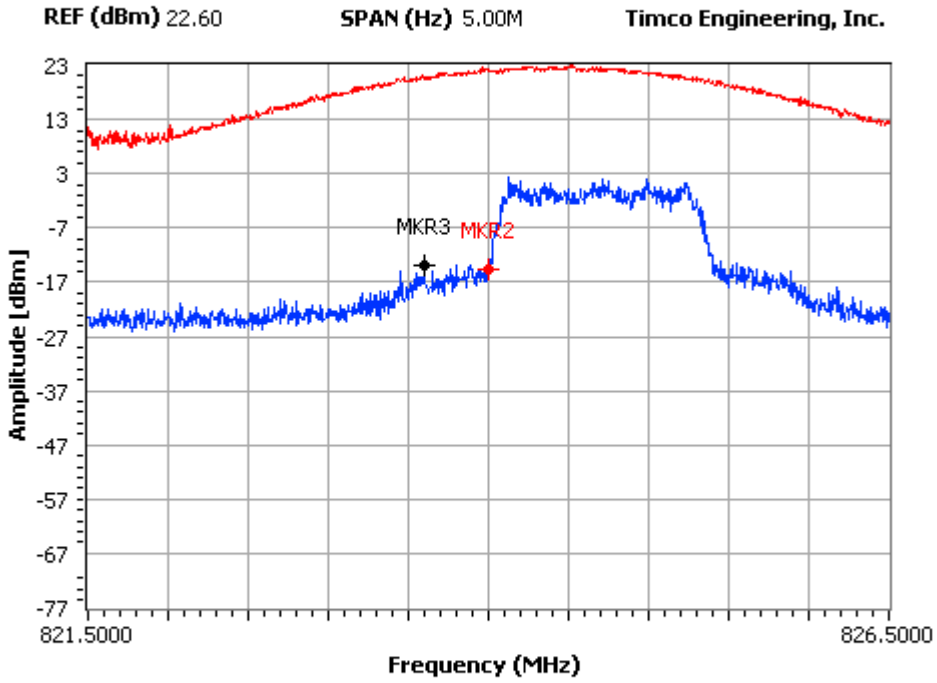
Uplink Max input power is -20 dBm / Band-edge
GSM



7.3 UPLINK – CDMA 824.7MHZ

NOTES:

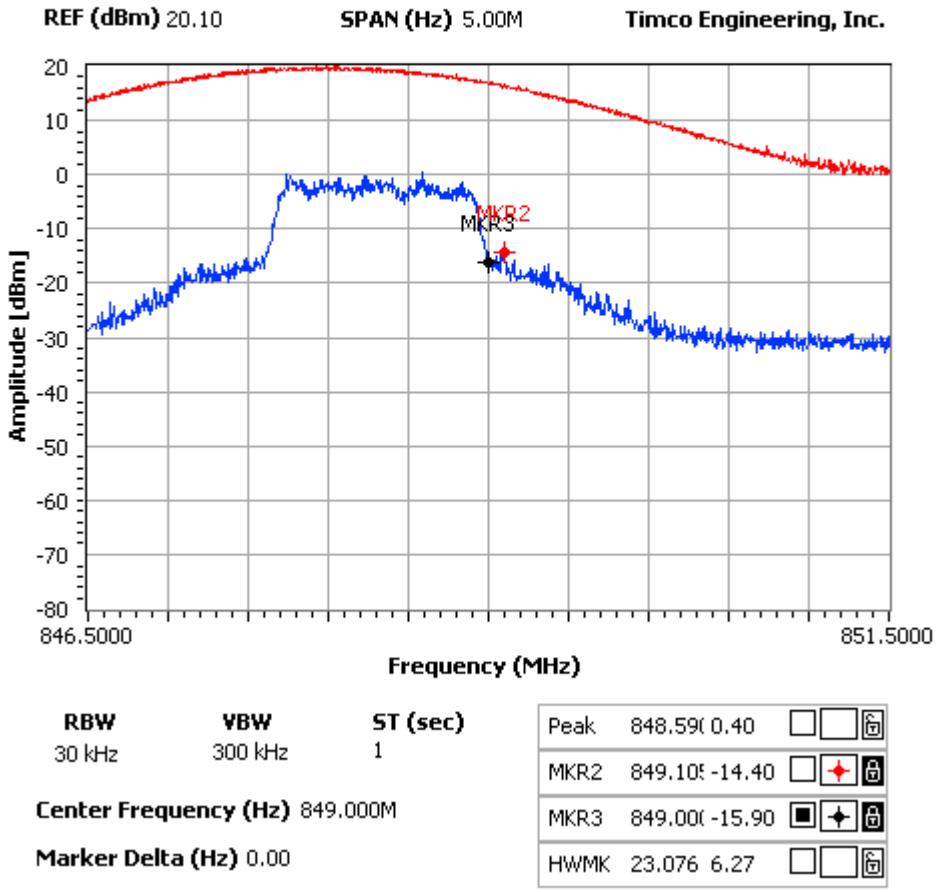
Uplink Max input power is -43.4dBm /band-edge
CDMA IS-95



7.4 UPLINK – CDMA 848.31MHZ

NOTES:

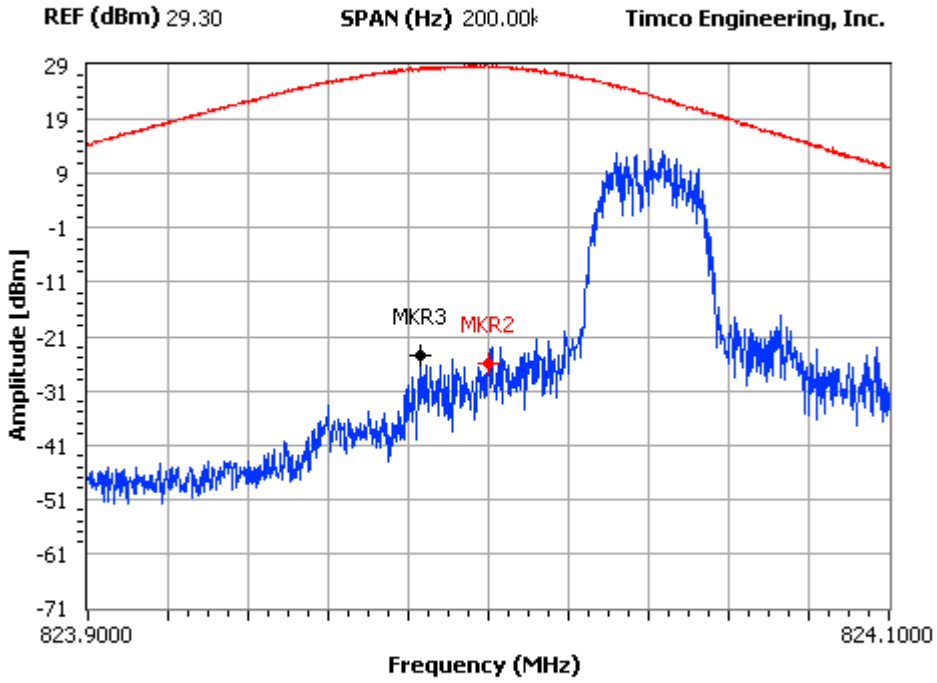
Uplink Max input power is -38.4dBm / Band-edge
CDMA IS-95



7.5 UPLINK – TDMA 824.04MHZ

NOTES:

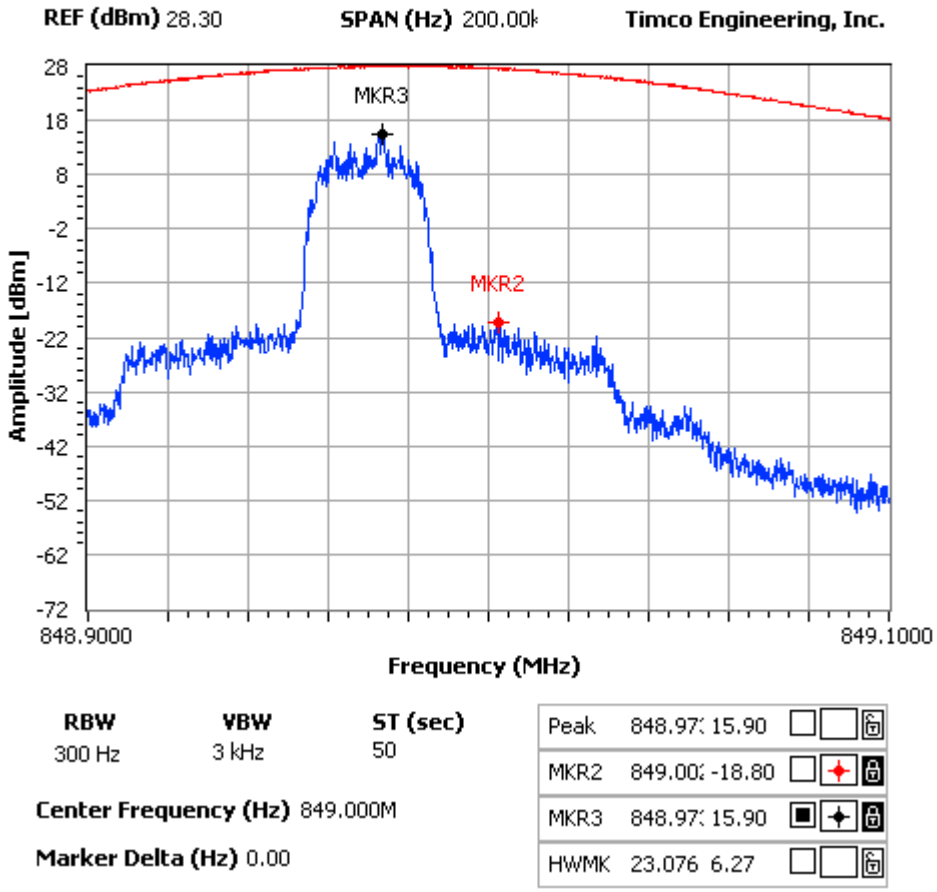
Uplink Max input power is -32.7dBm /band-edge
TDMA pi/4 DQPSK



7.6 UPLINK – TDMA 848.97MHZ

NOTES:

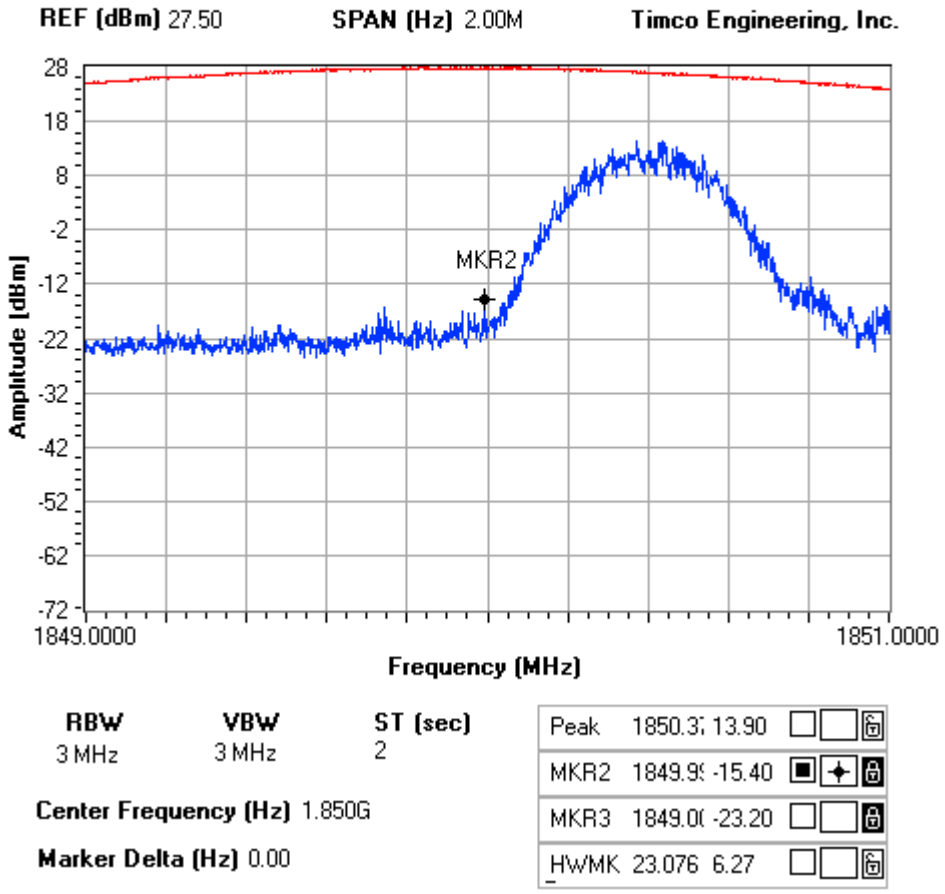
Uplink Max input power is -25.7dBm / band-edge
TDMA pi/4 DQPSK



7.7 UPLINK – GSM 1850.2MHZ

NOTES:

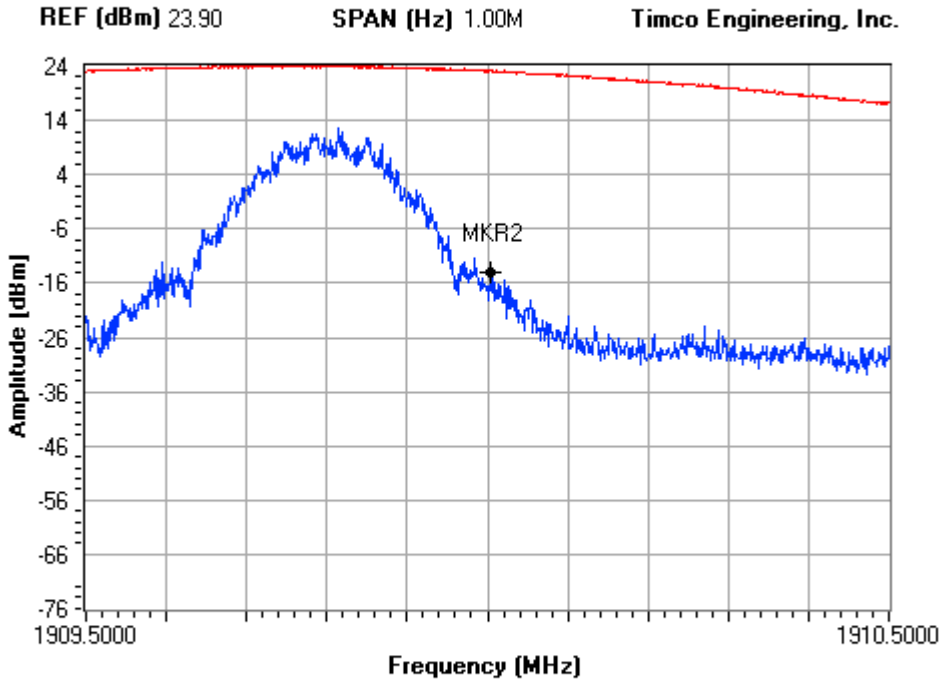
Insided Antenna, Max input power is -37dBm
GSM real time I/Q baseband (burst 1 slot)



7.8 UPLINK – GSM 1909.8MHZ

NOTES:

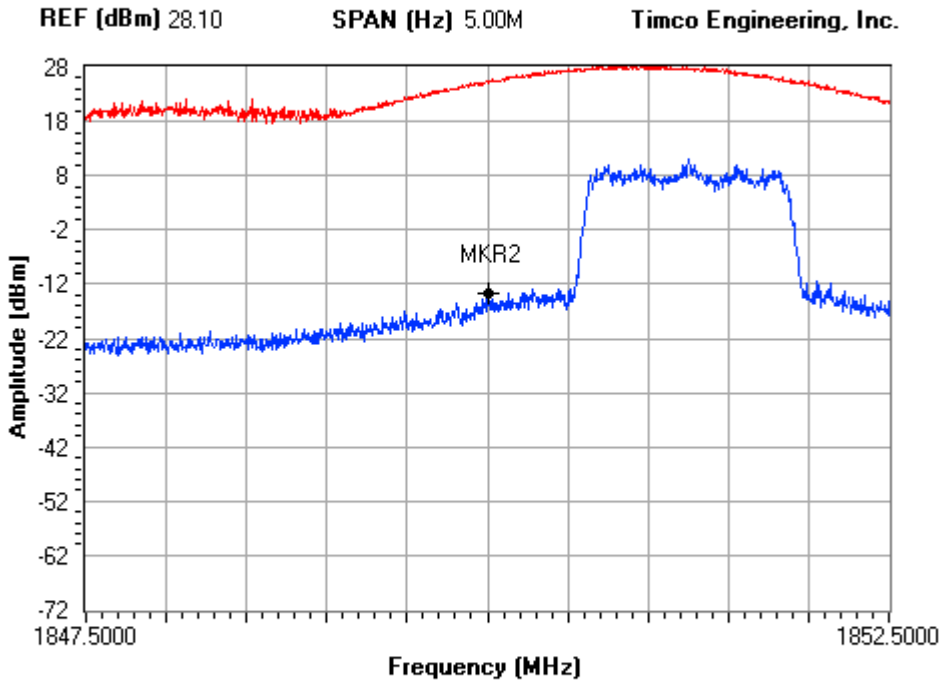
Insided Antenna, Max input power is -24dBm /Bandedge at 1910MHz
GSM real time I/Q baseband (burst 1 slot)



7.9 UPLINK – CDMA 1851.25MHZ

NOTES:

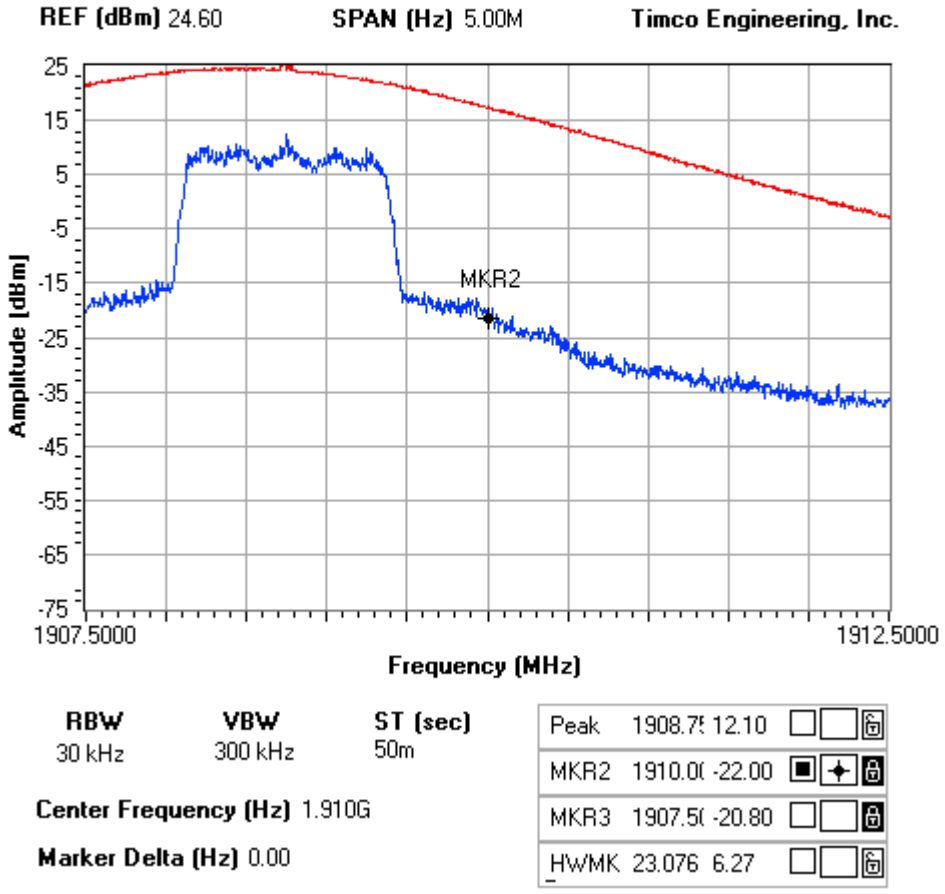
Insided Antenna, Max input power is -37dBm / bandedge at 1850MHz
CDMA IS-95



7.10UPLINK – CDMA 1808.75MHZ

NOTES:

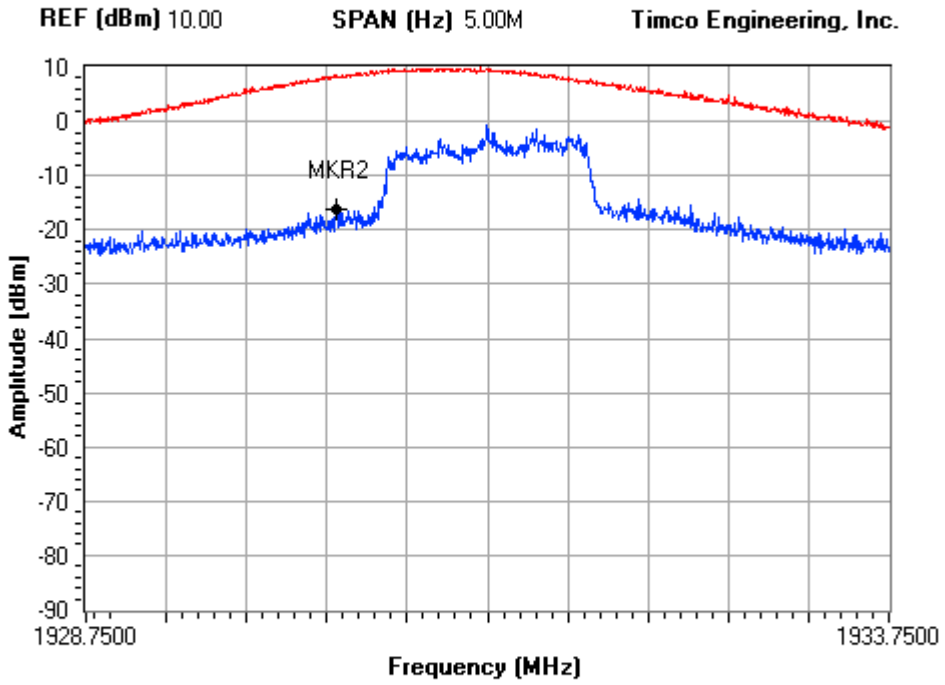
Insided Antenna, Max input power is -24dBm / bandedge at 1910MHz
CDMA IS-95



7.11 DOWNLINK – CDMA 1931.25MHZ

NOTES:

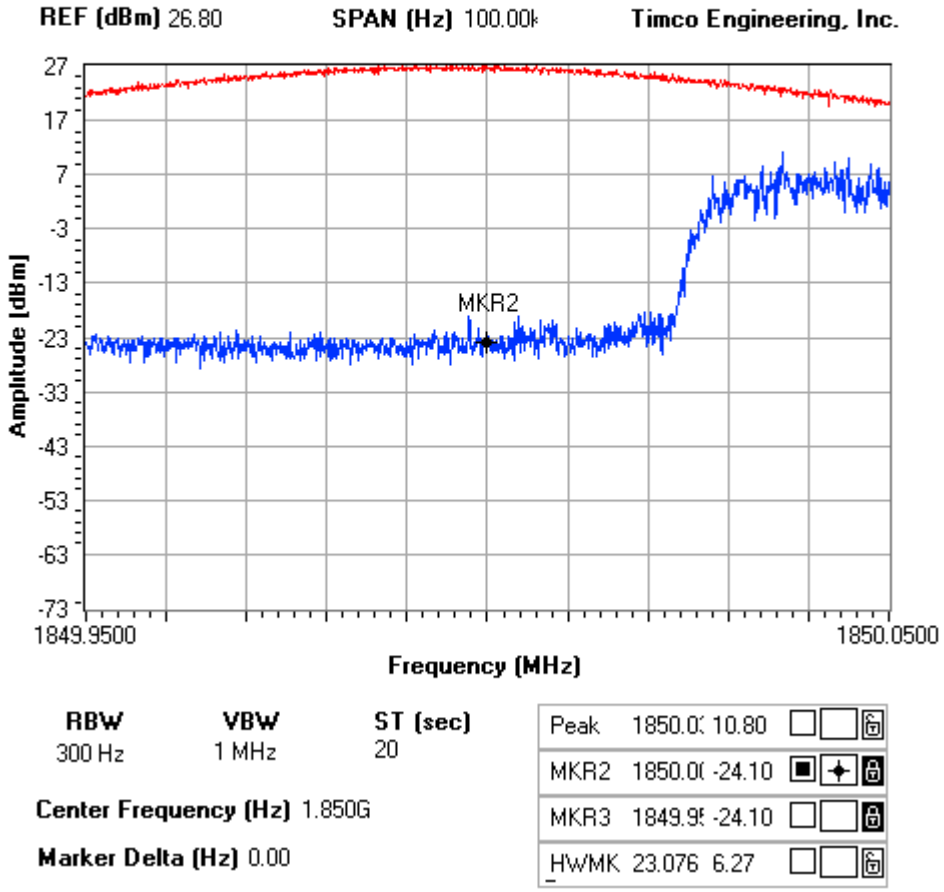
Outside antenna input power is -11.7dBm / Input vs. Output at 1931.25MHz
CDMA IS-95



7.12 UPLINK – TDMA 1850.04MHZ

NOTES:

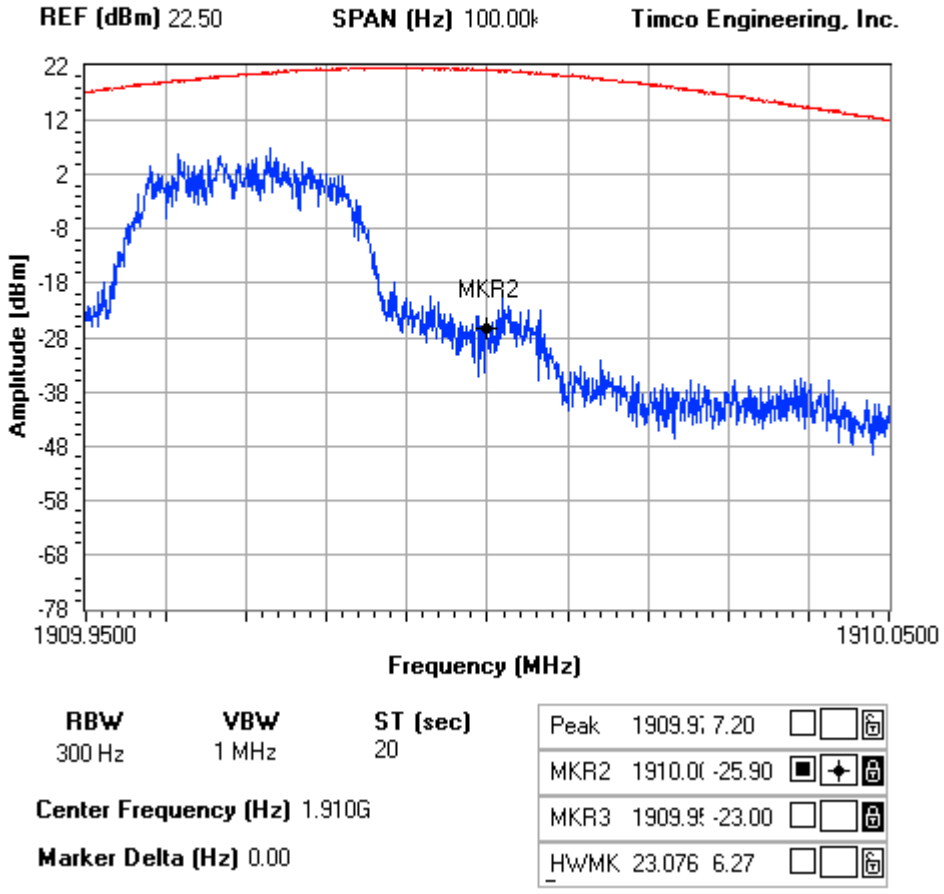
Insided Antenna, Max input power is -37dBm / band edge at 1850MHz
TDMA Pi/4 DQPSK



7.13 UPLINK – TDMA 1909.97MHZ

NOTES:

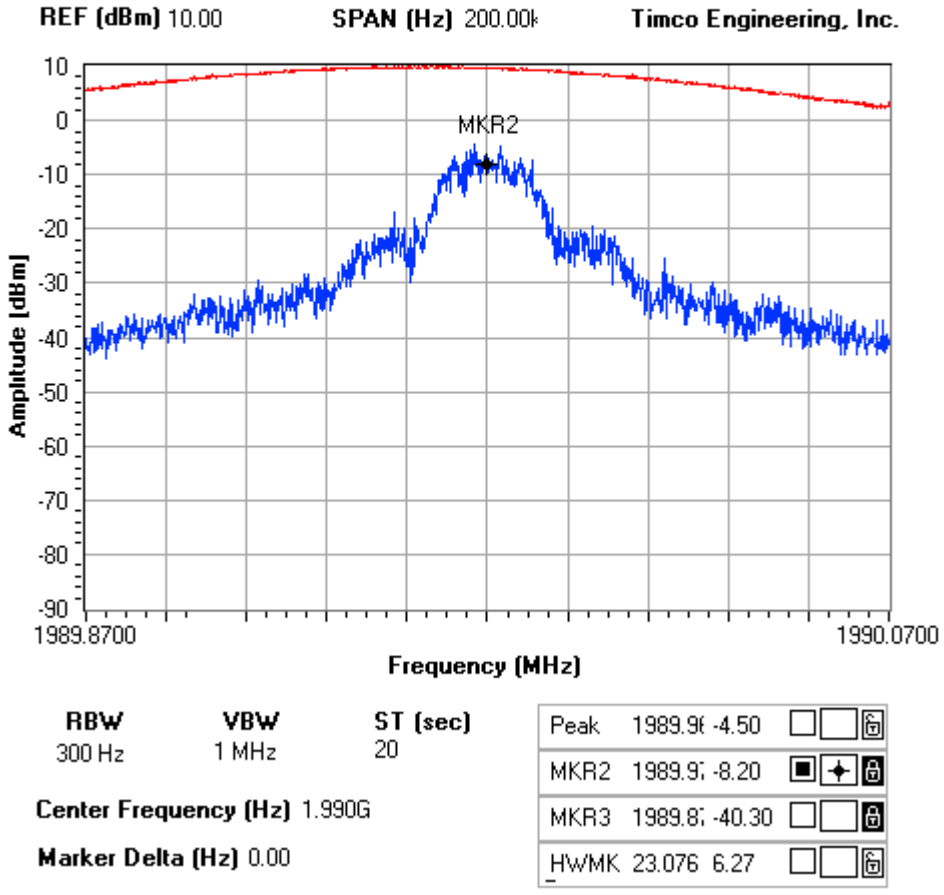
Inside antenna input power is -24dBm / Bandedge at 1910MHz
TDMA Pi/4 DQPSK Real time burst



7.14 DOWNLINK – TDMA 1989.97MHZ

NOTES:

Outside antenna input power is -14.7dBm / Input vs. Output at 1989.97MHz
TDMA Pi/4 DQPSK Real time I/Q burst



8 PART 2.1051 INTERMODULATION PRODUCT

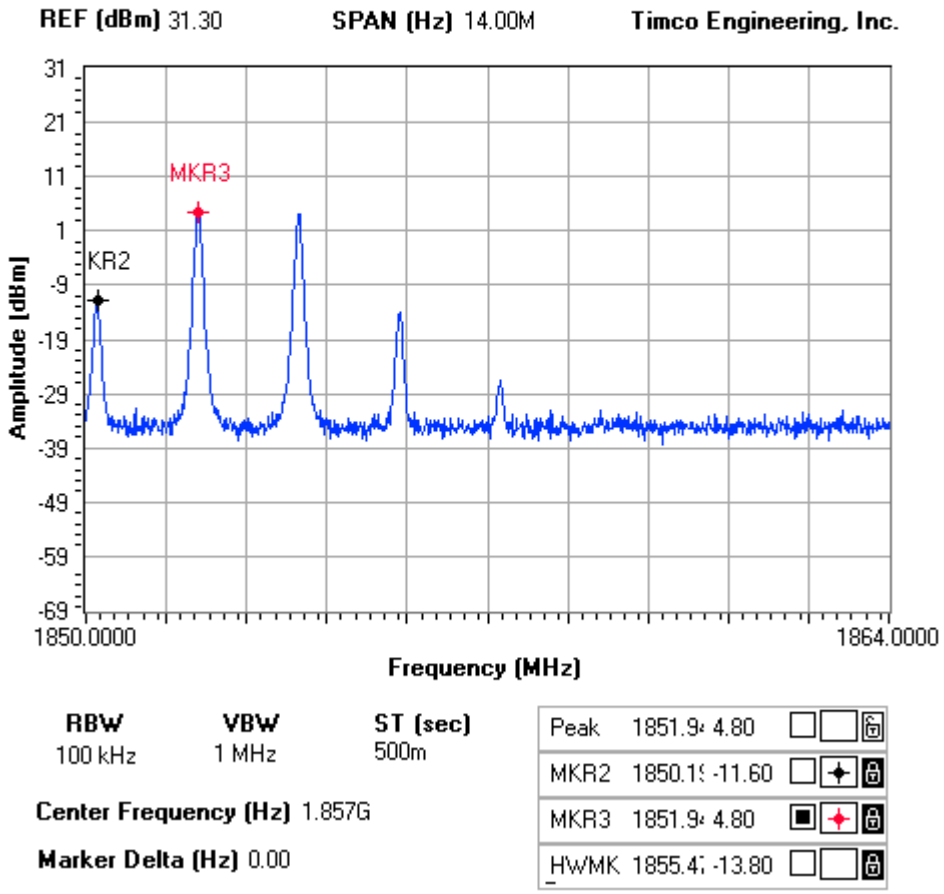
All the modulation type (CDMA, GSM, TDMA, and FM) were tested using the two tones test method. A CW signal was use instead of GSM and F1D modulations. The input power to the amplifier was set at maximum drive level. The two tones were chosen in such a way the third order intermodulation product frequencies are located within the pass band of the EUT.

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter or below the –13dBm:

8.1 UPLINK – PCS BAND/GSM LOW BAND-EDGE

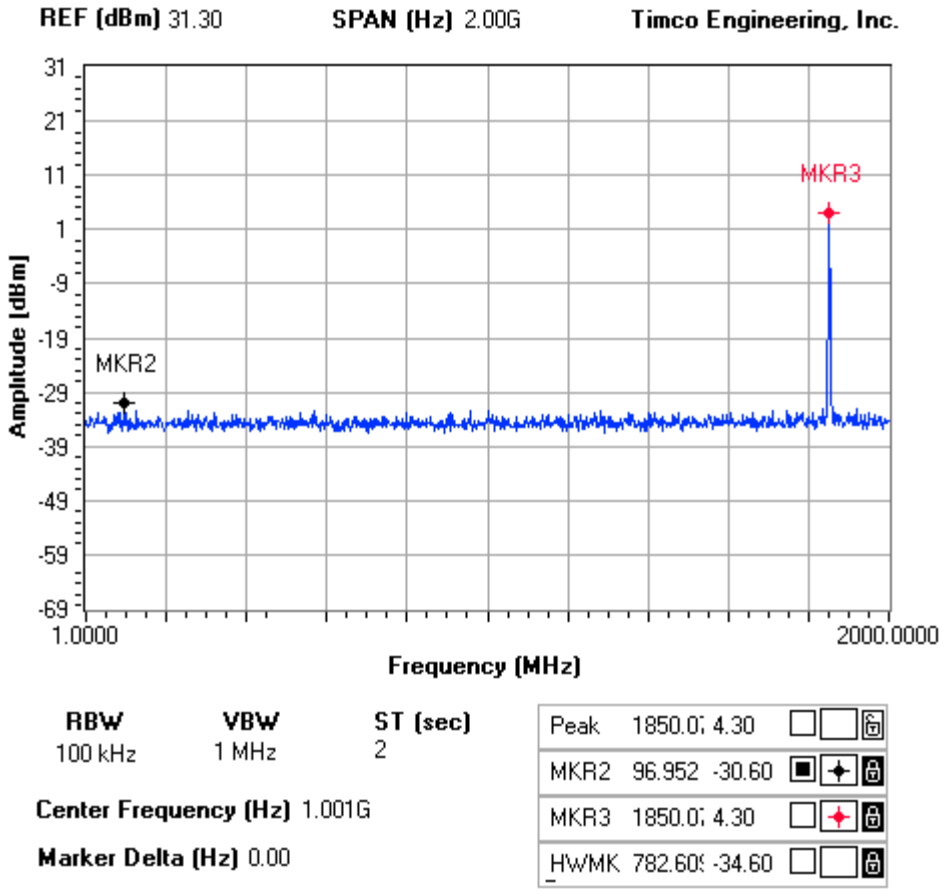
NOTES:

Intermodulation test - CW (covers GSM and F1D) Uplink 1850MHz
The amplitude of F1 and F2 were ajusted to produce F3 and F4 with an amplitude of -13dBm



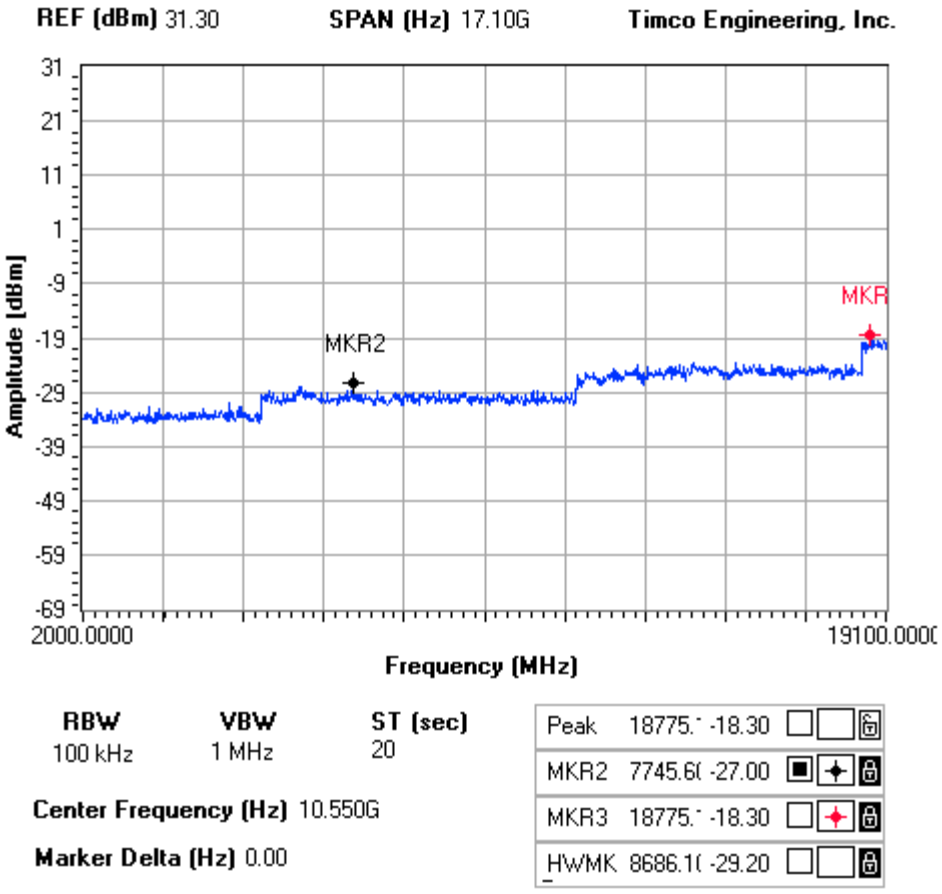
NOTES:

Intermodulation test - CW (covers GSM and F1D) Uplink 1850MHz
The amplitude of F1 and F2 were ajusted to produce F3 and F4 with an amplitude of -13dBm



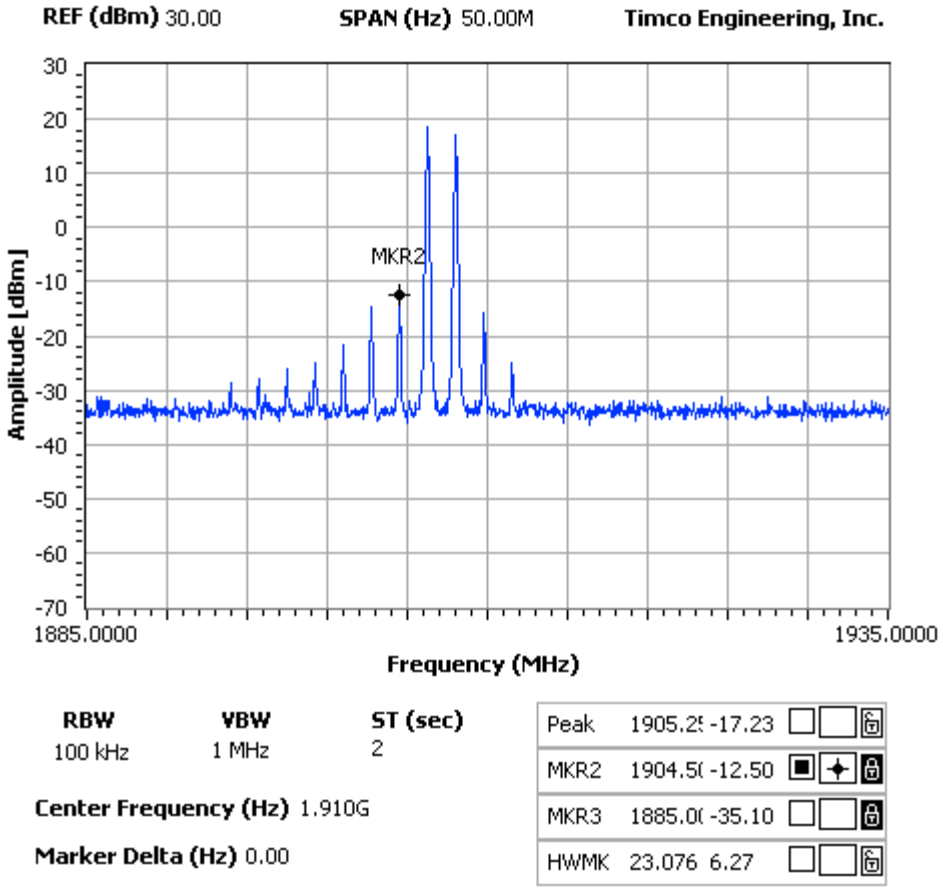
NOTES:

Intermodulation test - CW (covers GSM and F1D) Uplink 1850MHz
The amplitude of F1 and F2 were ajusted to produce F3 and F4 with an amplitude of -13dBm



8.2 UPLINK – PCS BAND/GSM HIGH BAND-EDGE

NOTES:
Intermodulation GSM and F1D covered by CW uplink 1910MHz

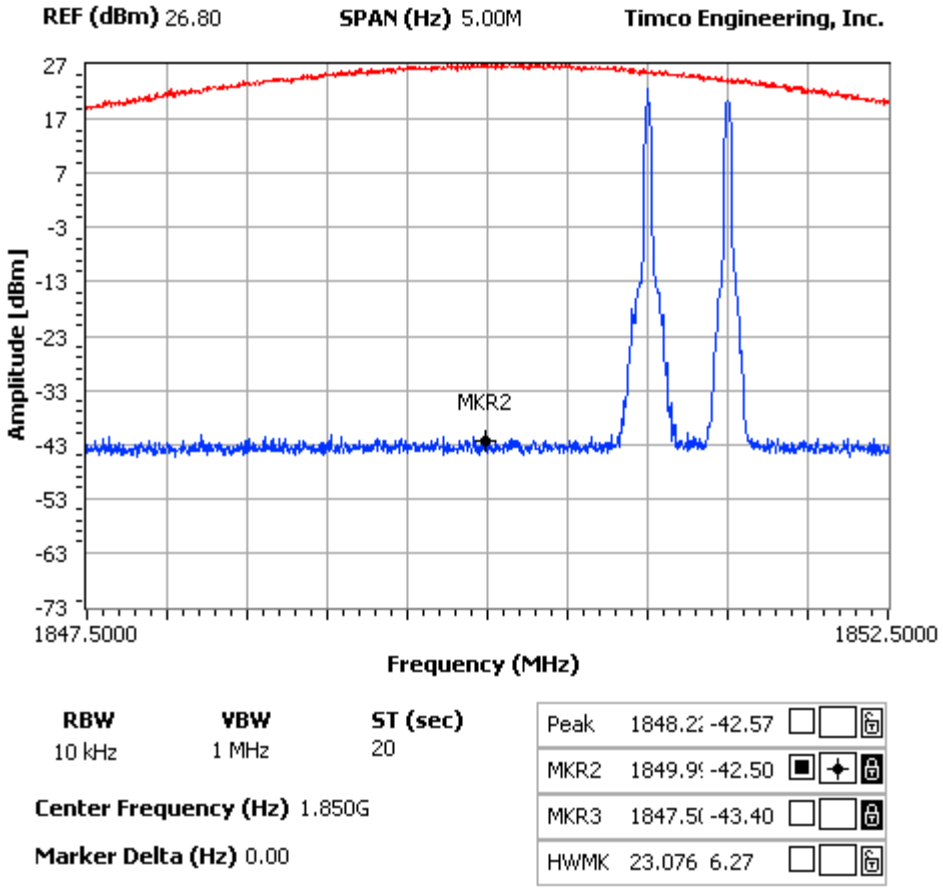


Notes: No emissions were found other than those shown on the above plot(s).

8.3 UPLINK – PCS BAND/TDMA LOW BAND-EDGE

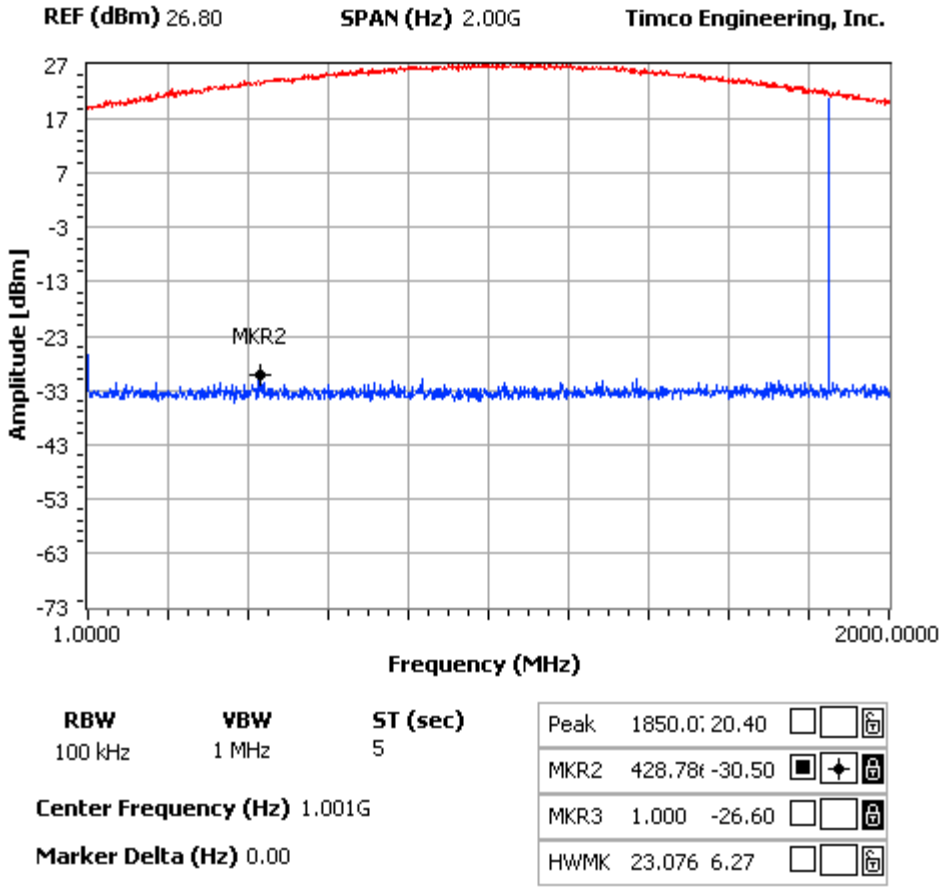
NOTES:

Intermodulation TDMA Pi/4 DQPSK uplink 1850MHz



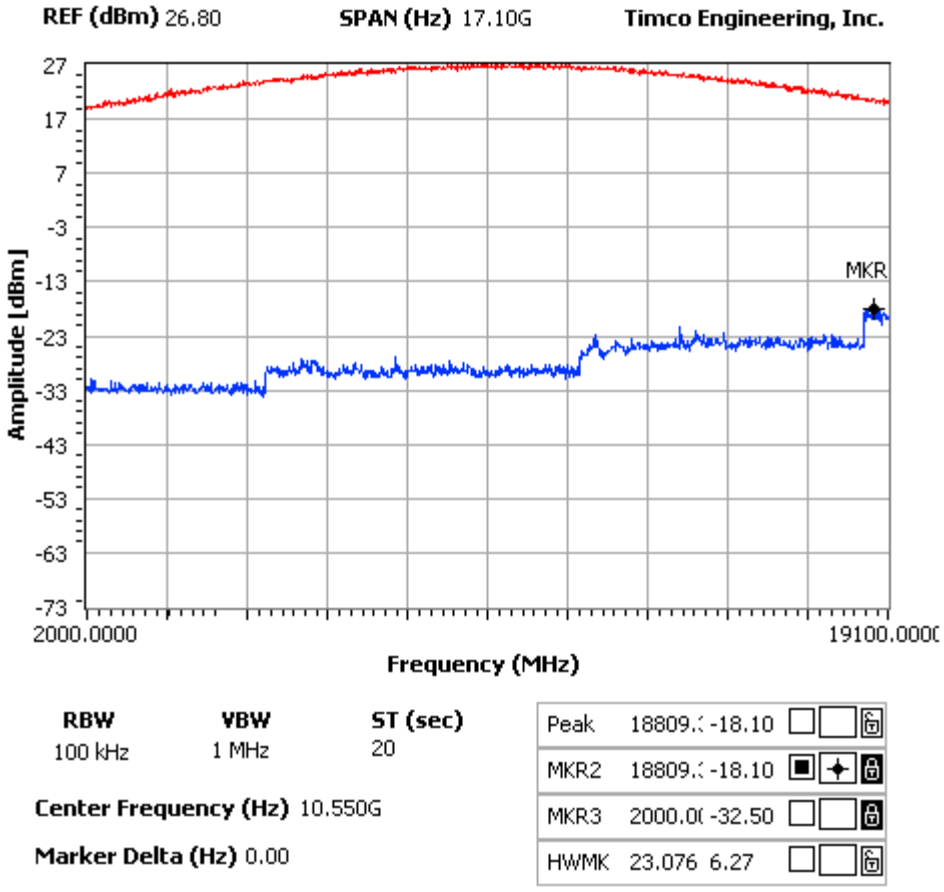
NOTES:

Intermodulation TDMA Pi/4 DQPSK uplink 1850MHz



NOTES:

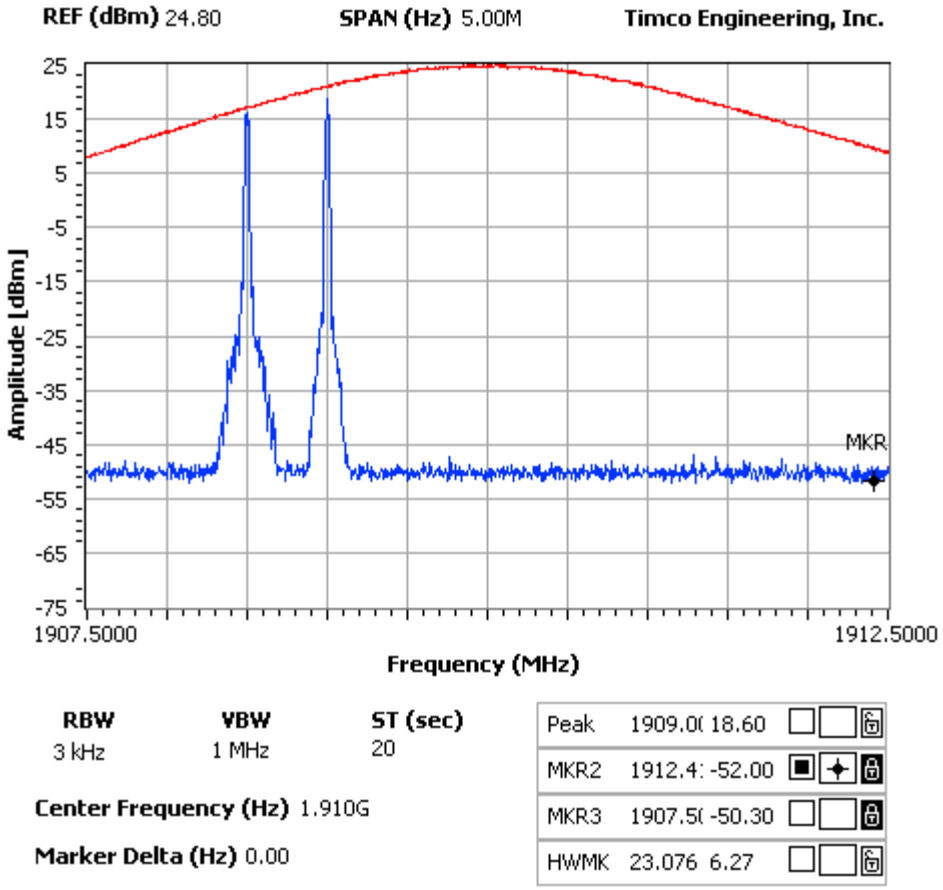
Intermodulation TDMA Pi/4 DQPSK uplink 1850MHz



8.4 UPLINK – PCS BAND/TDMA HIGH BAND-EDGE

NOTES:

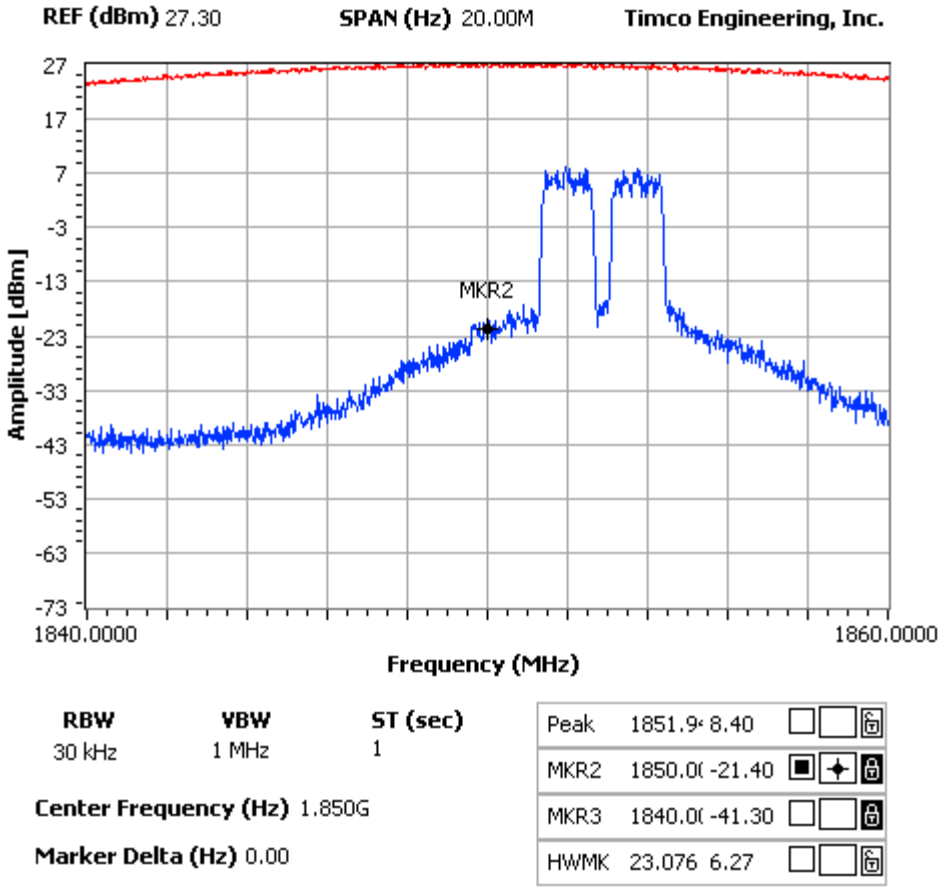
Intermodulation TDMA Pi/4 DQPSK uplink 1910MHz



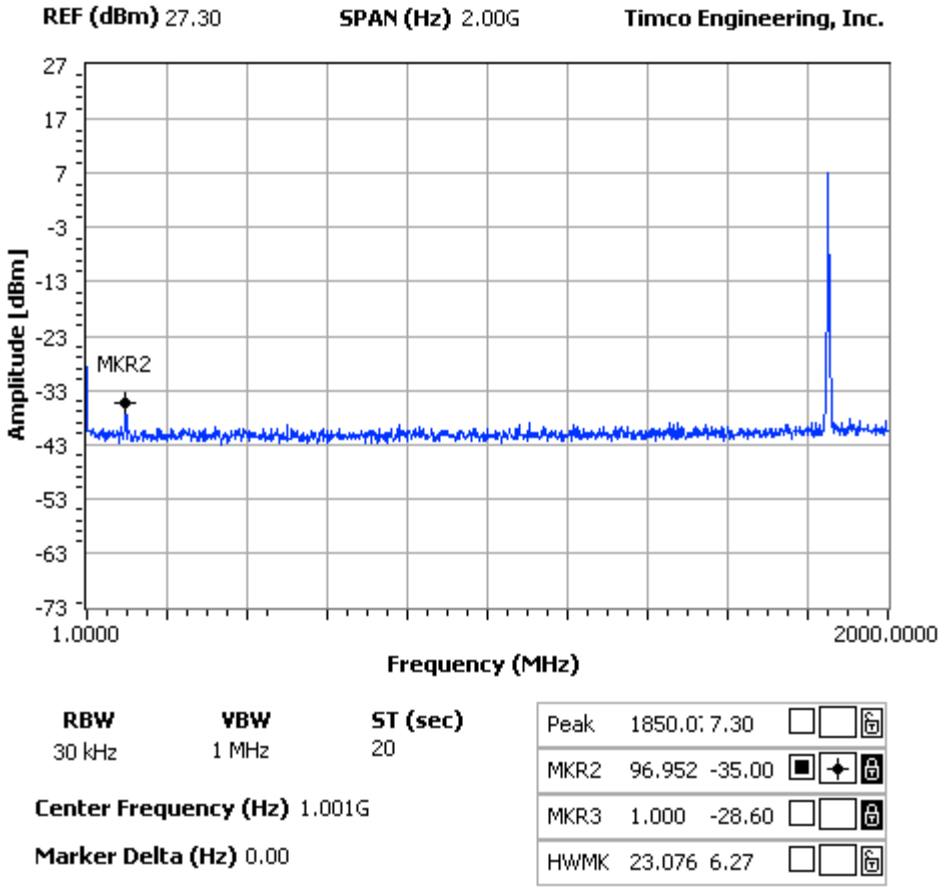
Notes: No emissions were found other than those shown on the above plot(s).

8.5 UPLINK – PCS BAND/CDMA LOW BAND-EDGE

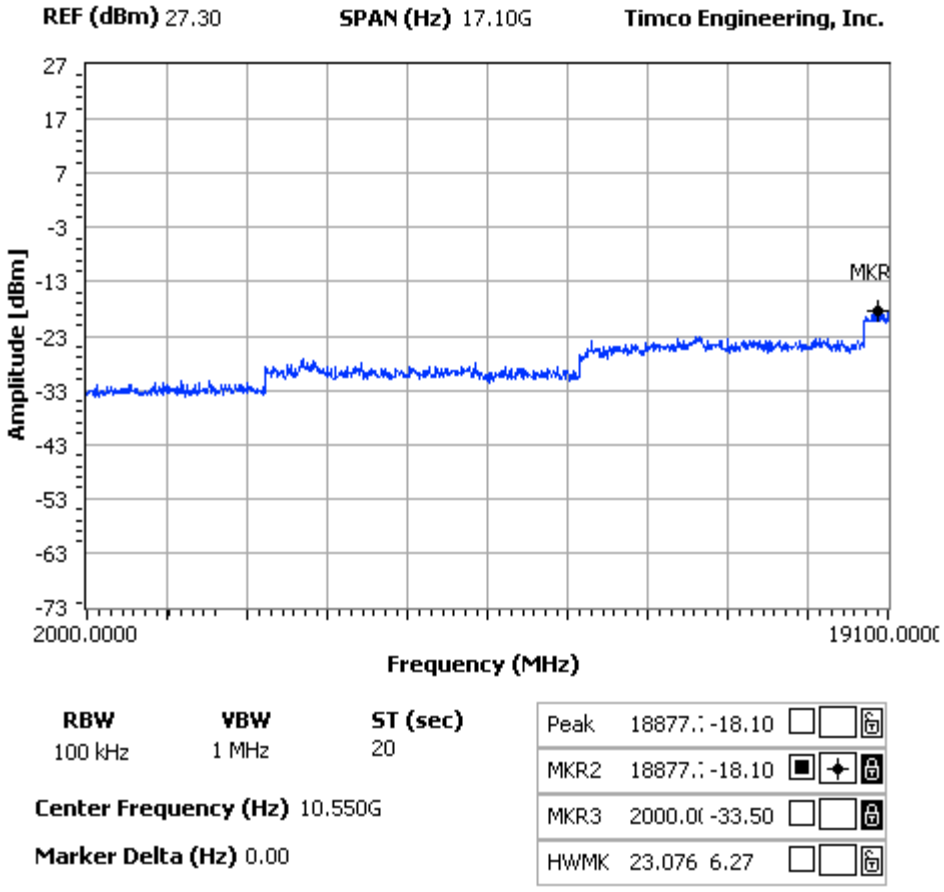
NOTES:
Intermodulation CDMA uplink 1850MHz



NOTES:
Intermodulation CDMA uplink 1850MHz

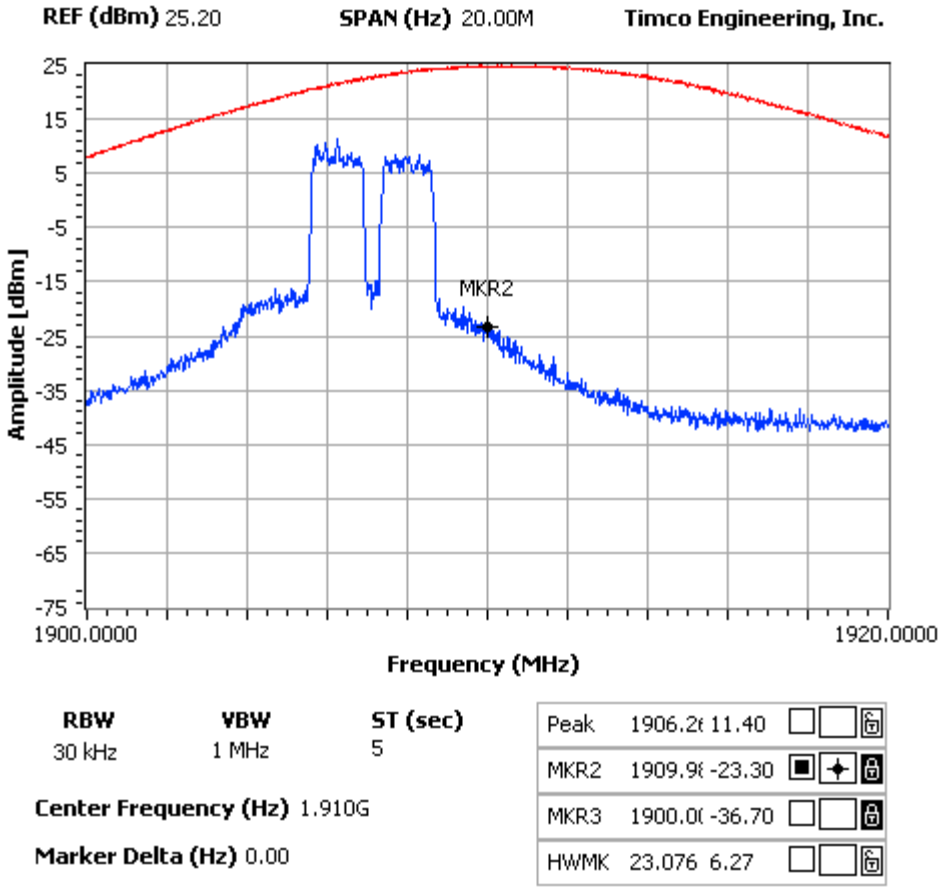


NOTES:
Intermodulation CDMA uplink 1850MHz



8.6 UPLINK – PCS BAND/CDMA HIGH BAND-EDGE

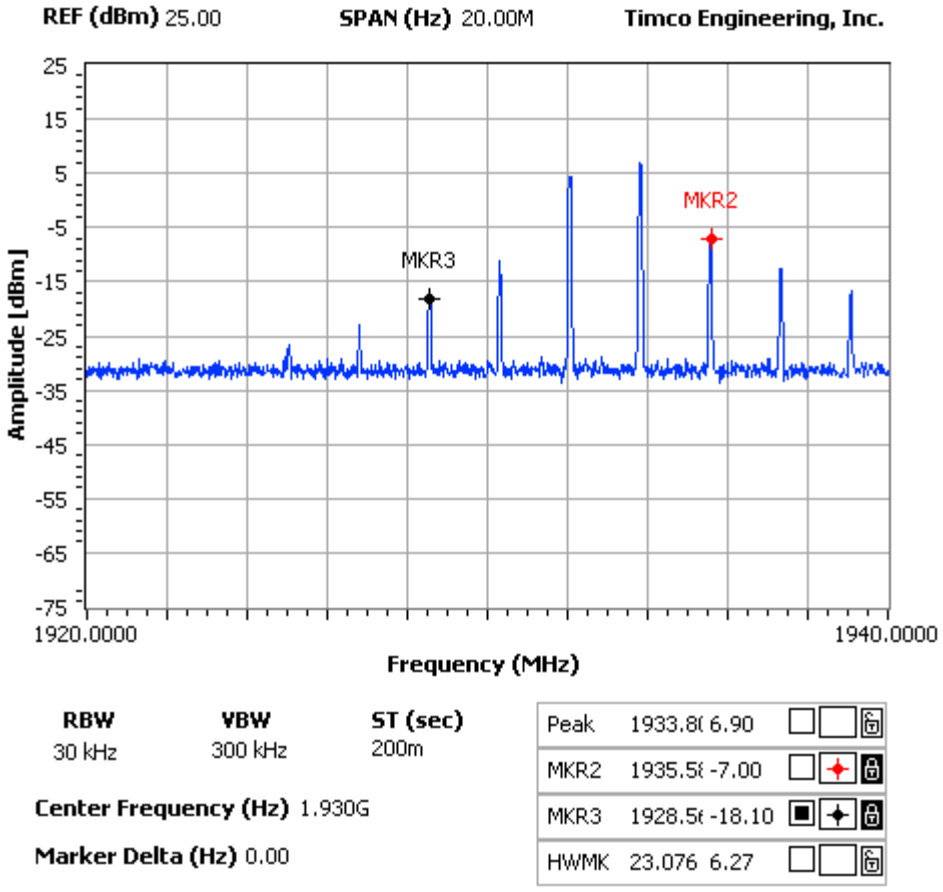
NOTES:
Intermodulation CDMA uplink 1910MHz



Notes: No emissions were found other than those shown on the above plot(s).

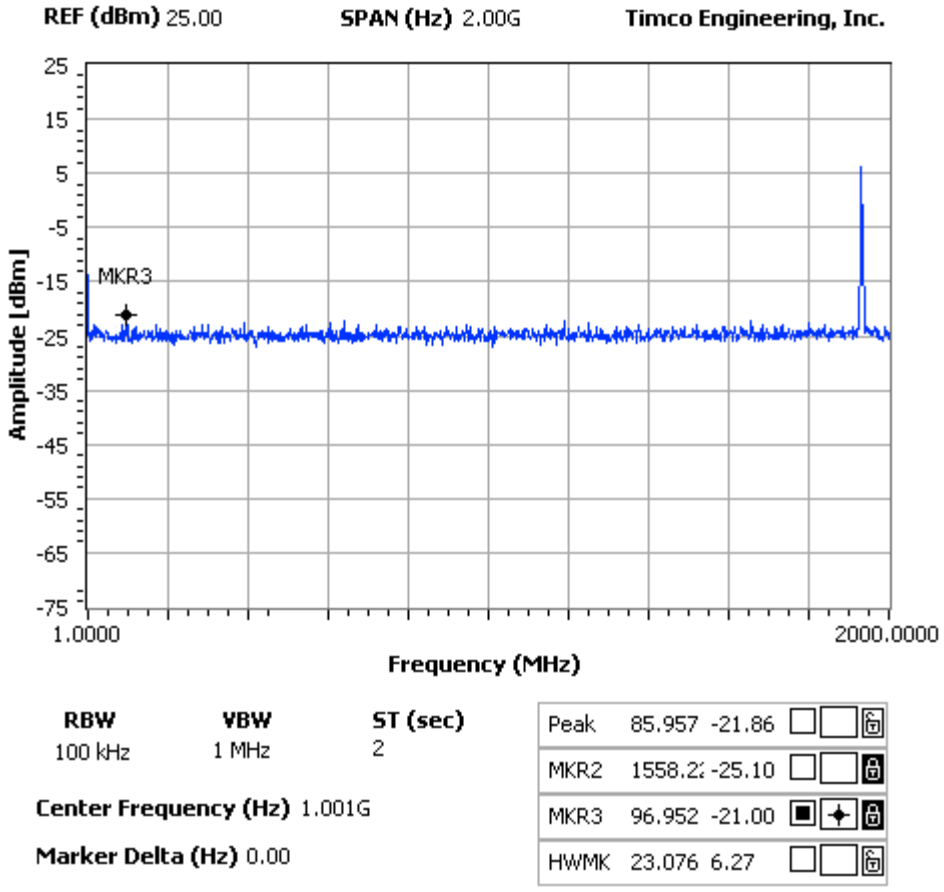
8.7 DOWNLINK – PCS BAND/GSM LOW BAND-EDGE

NOTES:
CW covers GSM and F1D - IM for Downlink 1930MHz

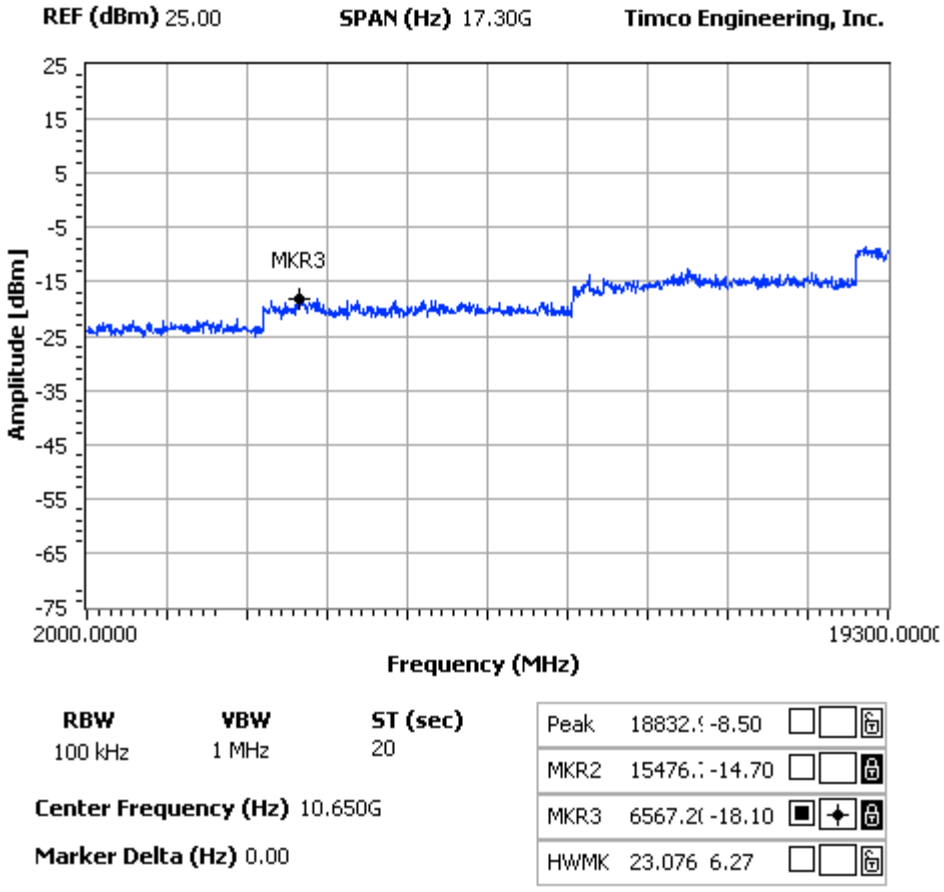


NOTES:

CW covers GSM and F1D - IM for Downlink 1930MHz

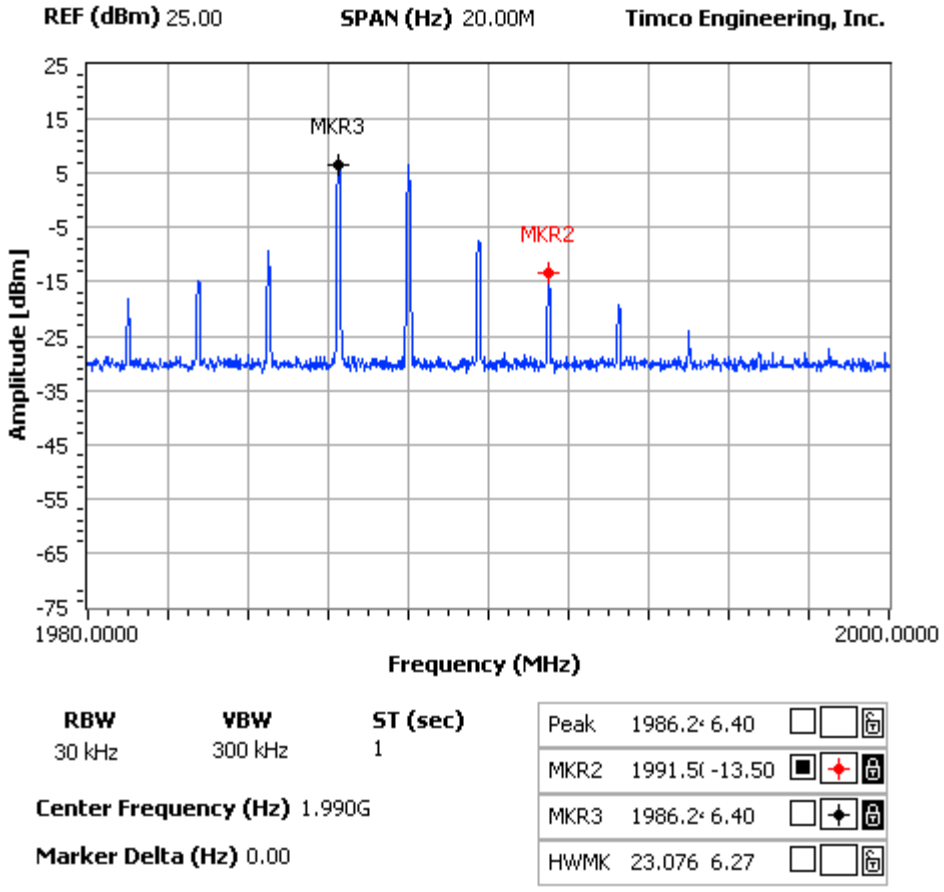


NOTES:
CW covers GSM and F1D - IM for Downlink 1930MHz



8.8 DOWNLINK – PCS BAND/GSM HIGH BAND-EDGE

NOTES:
CW covers GSM and F1D - IM for Downlink 1990MHz



Notes: No emissions were found other than those shown on the above plot(s).

8.9 DOWNLINK – PCS BAND/TDMA LOW BAND-EDGE

Notes: No emissions were found other than the two tones.

8.10 DOWNLINK – PCS BAND/TDMA HIGH BAND-EDGE

Notes: No emissions were found other than the two tones.

8.11 DOWNLINK – PCS BAND/CDMA LOW BAND-EDGE

Notes: No emissions were found other than the two tones.

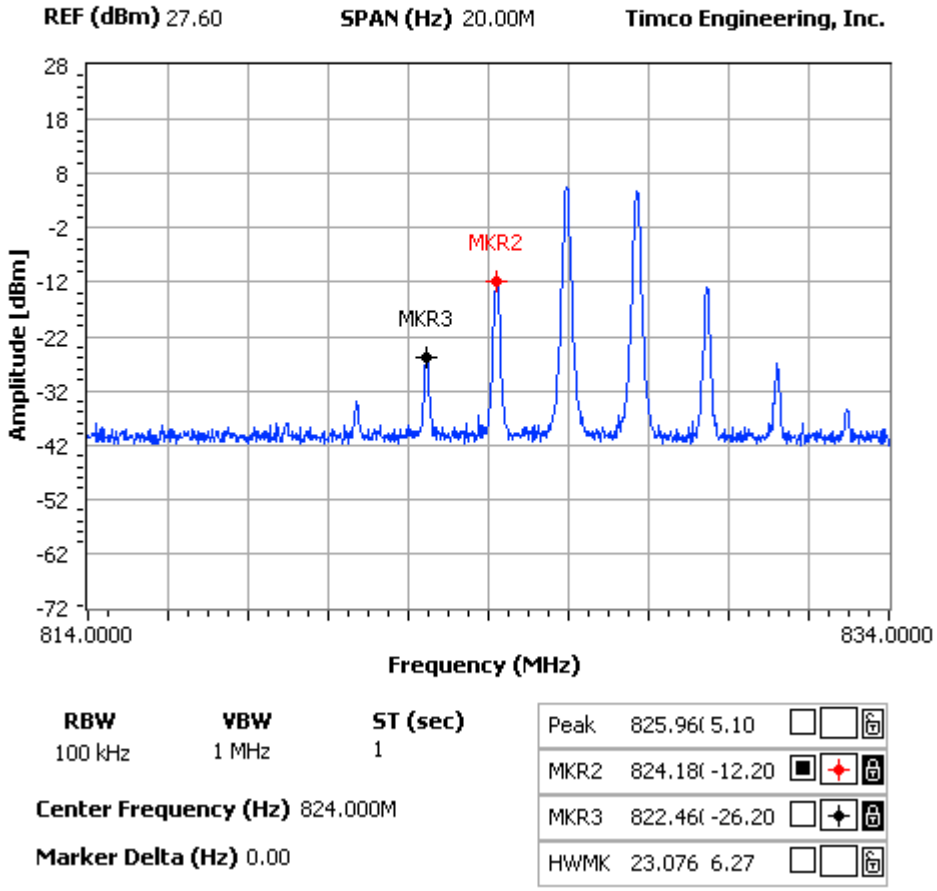
8.12 DOWNLINK – PCS BAND/CDMA HIGH BAND-EDGE

Notes: No emissions were found other than the two tones.

8.13 UPLINK – AMPS BAND/GSM LOW BAND-EDGE

NOTES:

Uplink Max input power is -43.8 dBm / IM spurious emissions
CW for GSM and F1D

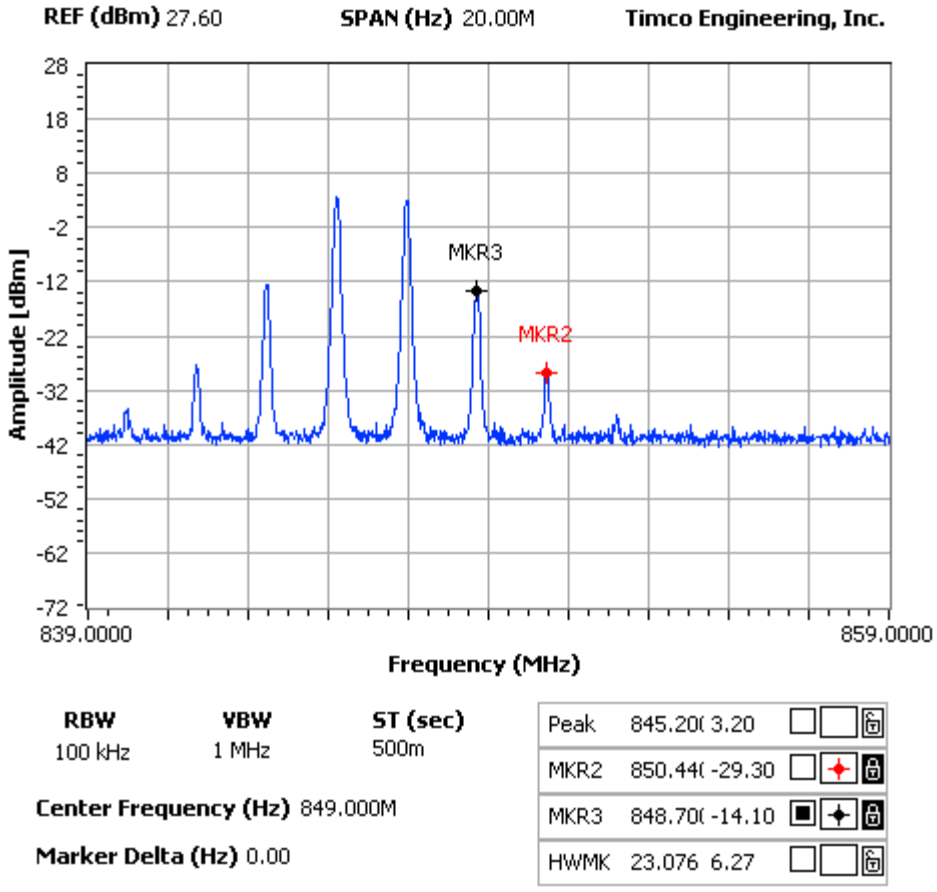


Notes: No emissions were found other than those shown on the above plot(s).

8.14 UPLINK – AMPS BAND/GSM HIGH BAND-EDGE

NOTES:

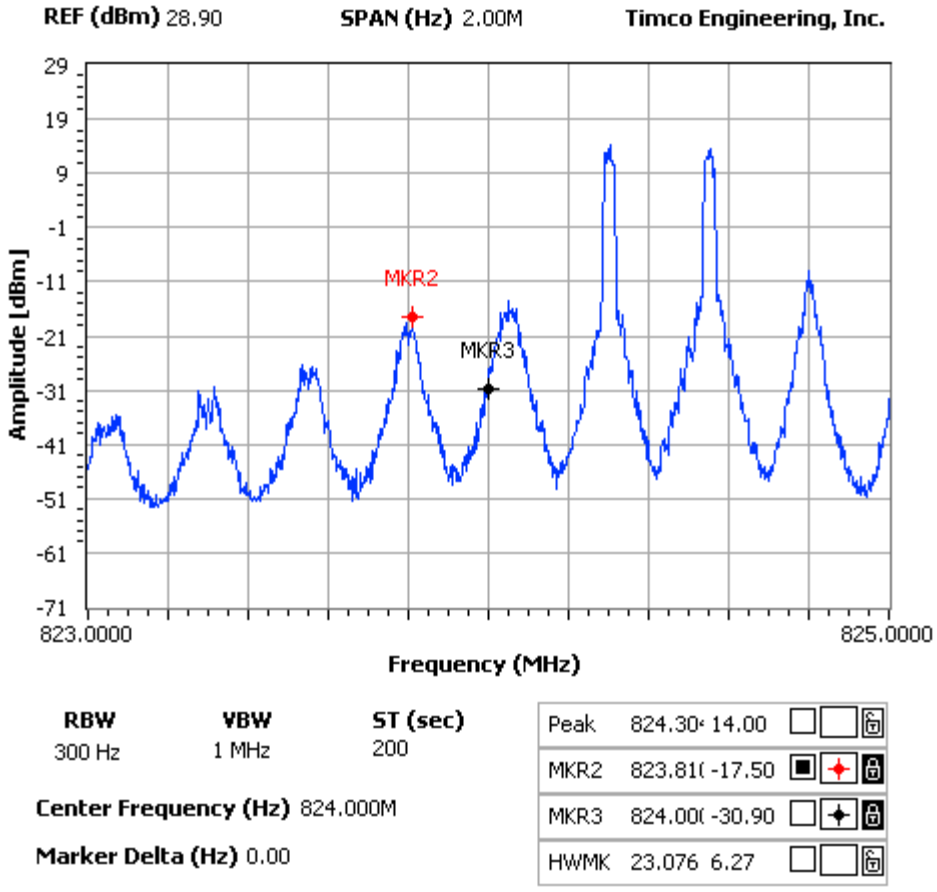
Uplink Max input power is -40.8 dBm / IM spurious emissions
CW for GSM and F1D



Notes: No emissions were found other than those shown on the above plot(s).

8.15UPLINK – AMPS BAND/TDMA LOW BAND-EDGE

NOTES:
Uplink Max input power is -27.8 dBm / IM spurious emissions
TDMA Pi/4 DQPSK

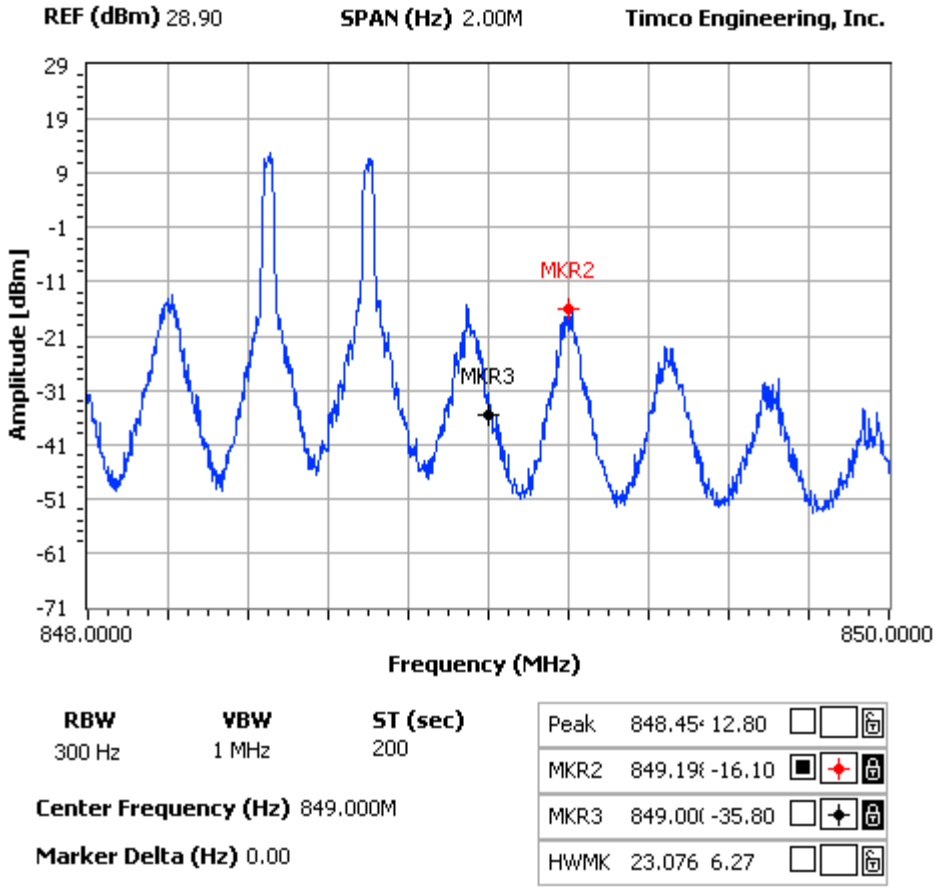


Notes: No emissions were found other than those shown on the above plot(s).

8.16 UPLINK – AMPS BAND/TDMA HIGH BAND-EDGE

NOTES:

Uplink Max input power is -20.8 dBm / IM spurious emissions
TDMA Pi/4 DQPSK

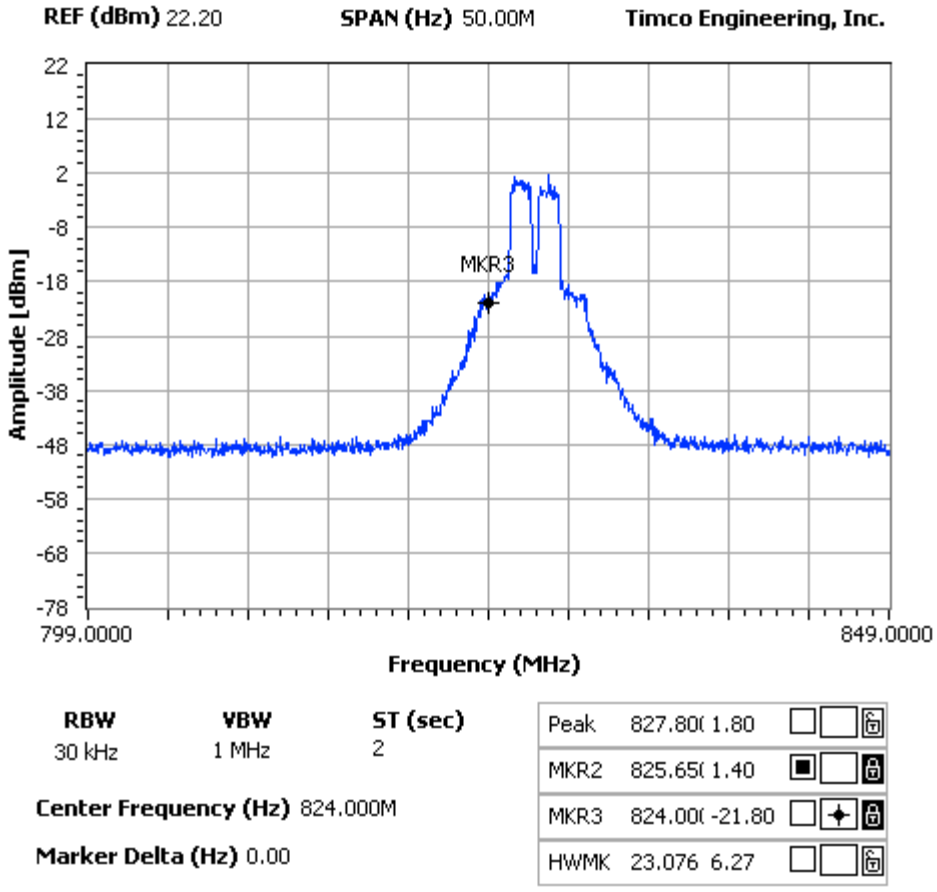


Notes: No emissions were found other than those shown on the above plot(s).

8.17UPLINK – AMPS BAND/CDMA LOW BAND-EDGE

NOTES:

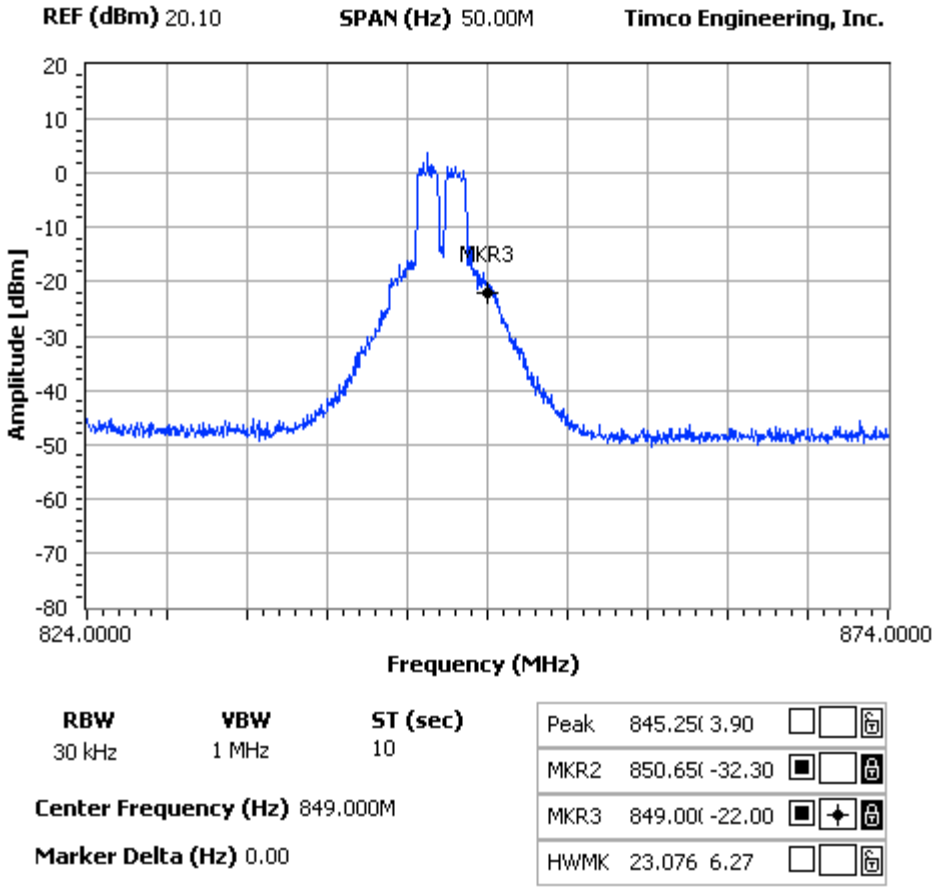
Uplink Max input power is -41.8 dBm / IM spurious emissions
CDMA IS-95



Notes: No emissions were found other than those shown on the above plot(s).

8.18 UPLINK – AMPS BAND/CDMA HIGH BAND-EDGE

NOTES:
Uplink Max input power is -36.8 dBm / IM spurious emissions
CDMA IS-95



Notes: No emissions were found other than those shown on the above plot(s).

8.19 DOWNLINK – AMPS BAND/GSM LOW BAND-EDGE

Notes: No emissions were found other than the two tones.

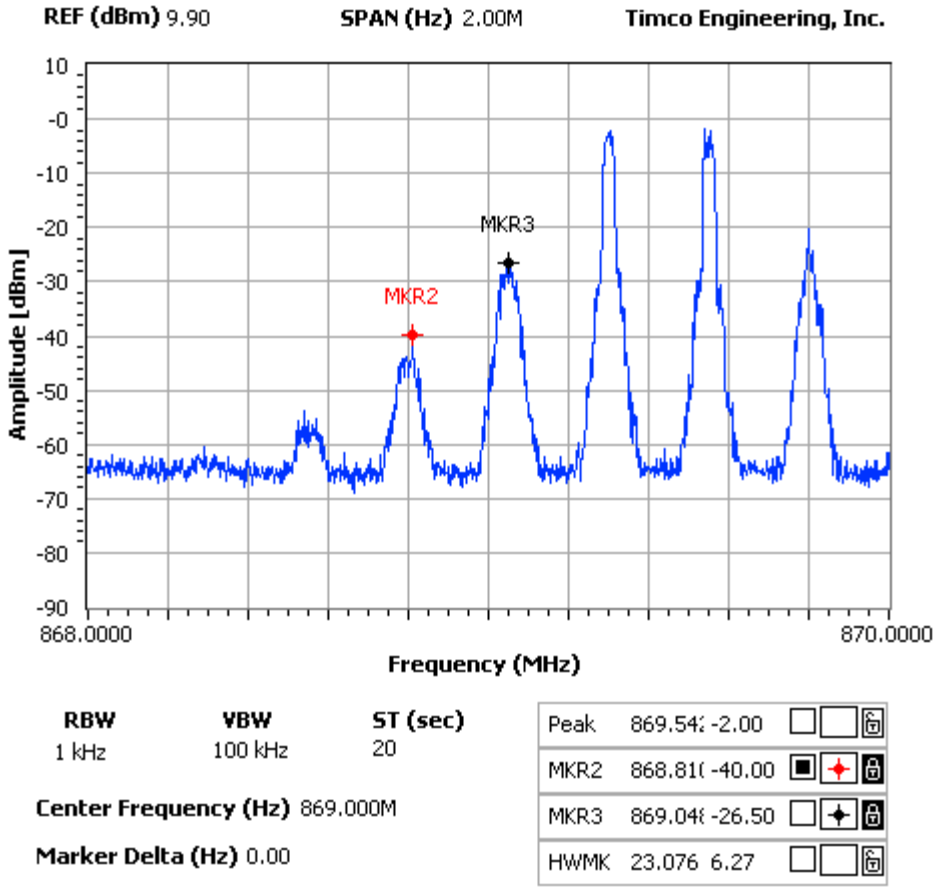
8.20 DOWNLINK – AMPS BAND/GSM HIGH BAND-EDGE

Notes: No emissions were found other than the two tones.

8.21 DOWNLINK – AMPS BAND/TDMA LOW BAND-EDGE

NOTES:

Downlink Max input power is -22.8 dBm / IM spurious emissions
TDMA Pi/4 DQPSK



Notes: No emissions were found other than those shown on the above plot(s).

8.22 DOWNLINK – AMPS BAND/TDMA HIGH BAND-EDGE

Notes: No emissions were found other than the two tones.

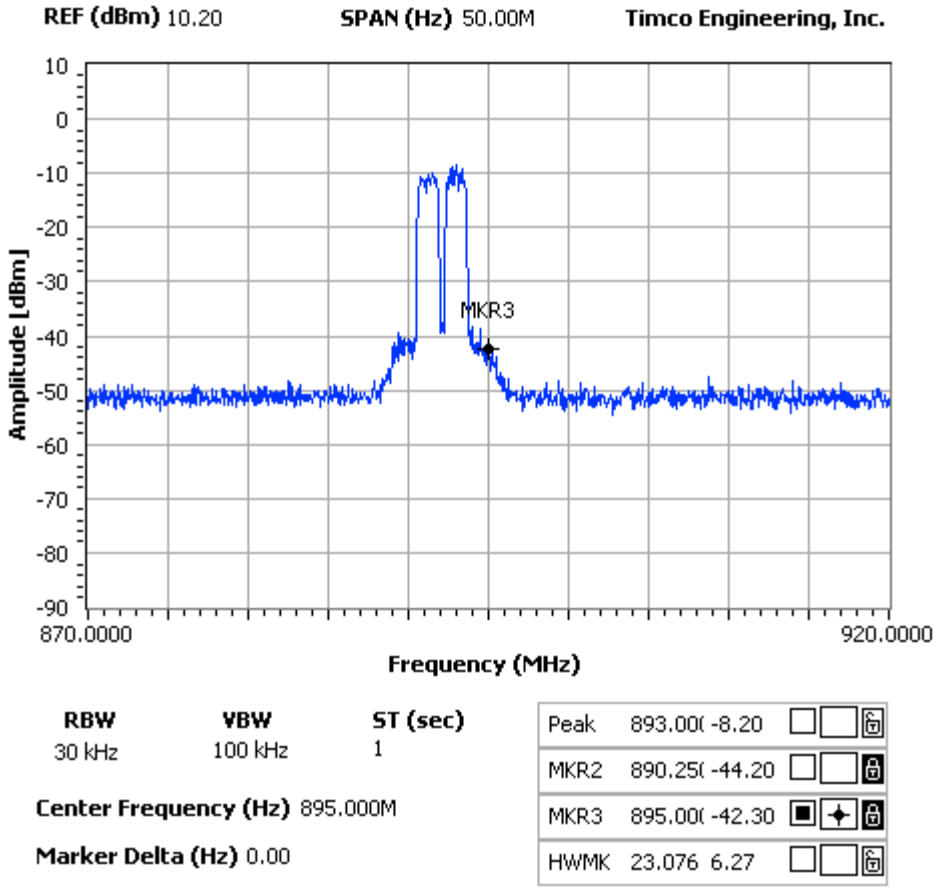
8.23 DOWNLINK – AMPS BAND/CDMA LOW BAND-EDGE

Notes: No emissions were found other than the two tones.

8.24 DOWNLINK – AMPS BAND/CDMA HIGH BAND-EDGE

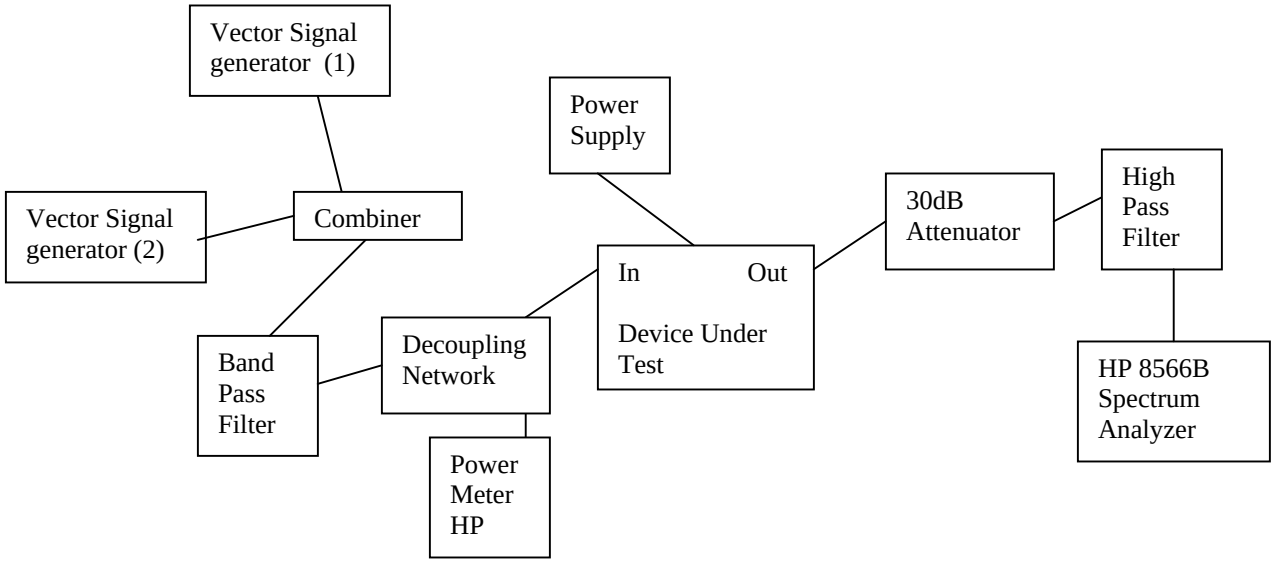
NOTES:

Downlink Max input power is -40.8 dBm / IM spurious emissions
CDMA IS-95



Notes: No emissions were found other than those shown on the above plot(s).

Method of Measuring Conducted Spurious Emissions



The following test equipment was used:

(1) Agilent E4436B: dual-mode baseband generator(arbitrary waveform and real-time I/Q) 250 kHz to 3 GHz

(2) Agilent E4436B: dual-mode baseband generator(arbitrary waveform and real-time I/Q) 250 kHz to 3 GHz

METHOD OF MEASUREMENT: The procedure used was TIA/EIA-603 STANDARD. The spectrum was scanned from 9kHz to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer. The measurements were made using the shielded room located at TIMCO ENGINEERING INC. 849 N.W. State Road 45, Newberry, Florida 32669.

9 PART 2.1051 SPURIOUS EMISSIONS AT ANTENNA TERMINALS:

Data on the following page shows the level of conducted spurious responses. For analog modulation, the carrier was modulated 100% using a 2500 Hz tone. For digital modulation, the carrier is modulated to its maximum extent. The spectrum was scanned from 9kHz to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603. All the modulation type (CDMA, GSM, TDMA, and FM) were tested at a low, mid, and high channel in each band. The maximum input power was set according to 3.

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter:

The maximum conducted power was measured at 1.78 Watt for the AMPS band Uplink.
43+ 10log(1.78) = 45.5 dBc

TEST DATA: **UPLINK – AMPS band**

EMISSION type – GSM, F1D, CDMA, TDMA	dB BELOW CARRIER (dBc)
FREQUENCY MHz	
824.7	0
1649.4	<65.5
2474.1	<65.5
3298.8	<65.5
4123.5	<65.5
4948.2	<65.5
5772.9	<65.5
6597.6	<65.5
7422.3	<65.5
8247	<65.5
835.4	0
1670.8	<65.5
2506.2	<65.5
3341.6	<65.5
4177	<65.5
5012.4	<65.5
5847.8	<65.5
6683.2	<65.5
7518.6	<65.5
8354	<65.5
848.31	0
1696.62	<65.5
2544.93	<65.5
3393.24	<65.5
4241.55	<65.5
5089.86	<65.5
5740	<65.5
6560	<65.5
7380	<65.5
8200	<65.5

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

The maximum conducted power was measured at 645.7 mW for PCS band.
43 + 10log(0.646) = 41.1 dBc

TEST DATA: **UPLINK – PCS band**

EMISSION TDMA, CDMA, GSM, F1D	dB BELOW CARRIER (dBc)
FREQUENCY MHz	
1851.25	0

3702.5	<61.1
5553.75	<61.1
7405	<61.1
9256.25	<61.1
11107.5	<61.1
12958.75	<61.1
14810	<61.1
16661.25	<61.1
18512.5	<61.1
1880	0
3760	<61.1
5640	<61.1
7520	<61.1
9400	<61.1
11280	<61.1
13160	<61.1
15040	<61.1
16920	<61.1
18800	<61.1
1908.75	0
3817.5	<61.1
5726.25	<61.1
7635	<61.1
9543.75	<61.1
11452.5	<61.1
13361.25	<61.1
15270	<61.1
17178.75	<61.1
19087.5	<61.1

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

The maximum conducted power was measured at 10mW for PCS band.
43 + 10log(0.10) = 23 dBc

TEST DATA: **DOWNLINK – PCS band**

EMISSION TDMA, CDMA, GSM, F1D	dB BELOW CARRIER (dBc)
FREQUENCY MHz	
1930.04	0
3860.08	<43.0
5790.12	42.6
7720.16	42.5
9650.2	<43.0
11580.24	<43.0
13510.28	<43.0
15440.32	<43.0
17370.36	<43.0
19300.4	<43.0
1960	0
3920	<43.0
5880	<43.0
7840	<43.0
9800	<43.0
11760	<43.0
13720	<43.0
15680	<43.0
17640	<43.0
19600	<43.0
1989.97	0
3979.94	<43.0
5969.91	41.5
7959.88	<43.0
9949.85	<43.0
11939.82	<43.0
13929.79	<43.0
15919.76	<43.0
17909.73	<43.0
19899.7	<43.0

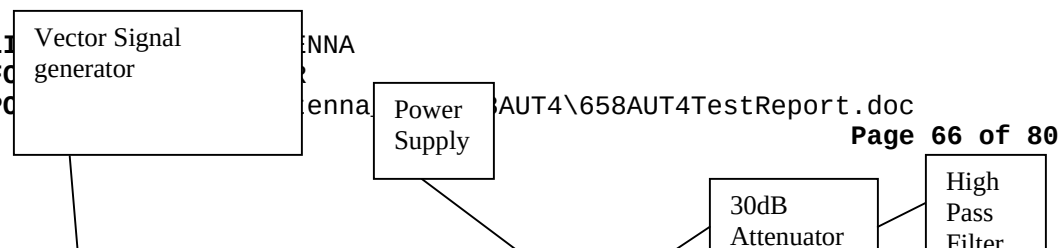
REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

The maximum conducted power was measured at 10mW for PCS band.
43 + 10log(0.10) = 23 dBc

TEST DATA: **DOWNLINK – AMPS band**

EMISSION TDMA, CDMA, GSM, F1D FREQUENCY MHz	dB BELOW CARRIER (dBc)
869.2	0
1738.4	<43.0
2607.6	<43.0
3476.8	<43.0
4346	<43.0
5215.2	<43.0
6084.4	<43.0
6953.6	<43.0
7822.8	<43.0
8692	<43.0
880	0
1760	<43.0
2640	<43.0
3520	<43.0
4400	<43.0
5280	<43.0
6160	<43.0
7040	<43.0
7920	<43.0
8800	<43.0
894.8	0
1789.6	<43.0
2684.4	<43.0
3579.2	<43.0
4474	<43.0
5368.8	<43.0
6263.6	<43.0
7158.4	<43.0
8053.2	<43.0
8948	<43.0

Method of Measuring Conducted Spurious Emissions



The following test equipment was used:

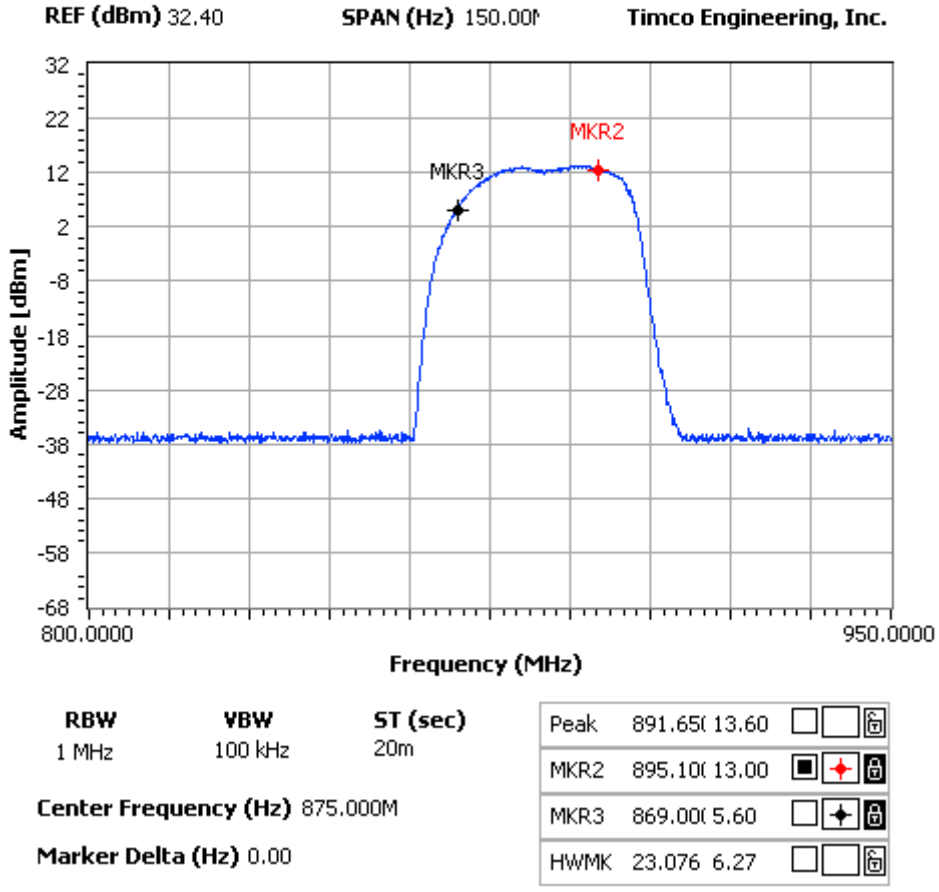
(3) Agilent E4436B: dual-mode baseband generator(arbitrary waveform and real-time I/Q) 250 kHz to 3 GHz

METHOD OF MEASUREMENT: The procedure used was TIA/EIA-603 STANDARD. The spectrum was scanned from 9kHz to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer. The measurements were made using the shielded room located at TIMCO ENGINEERING INC. 849 N.W. State Road 45, Newberry, Florida 32669.

10 OUT OF BAND REJECTION: FILTER FREQUENCY RESPONSE PLOTS

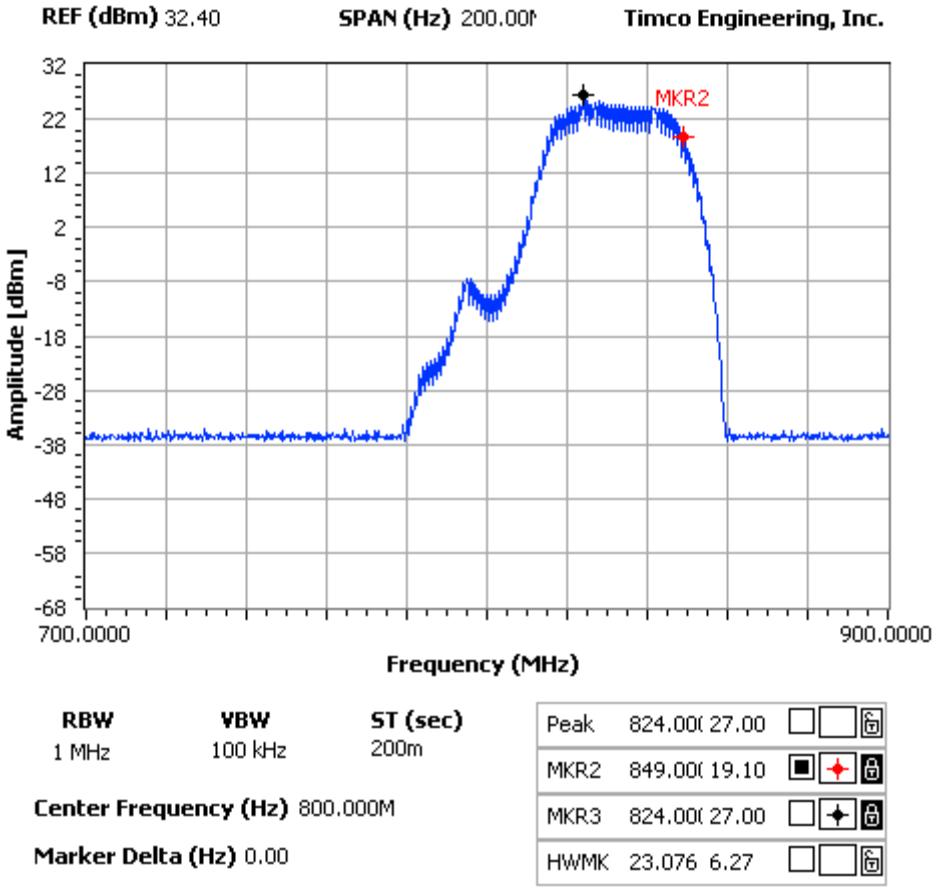
NOTES:

Band rejection filter response - AMPS band Downlink



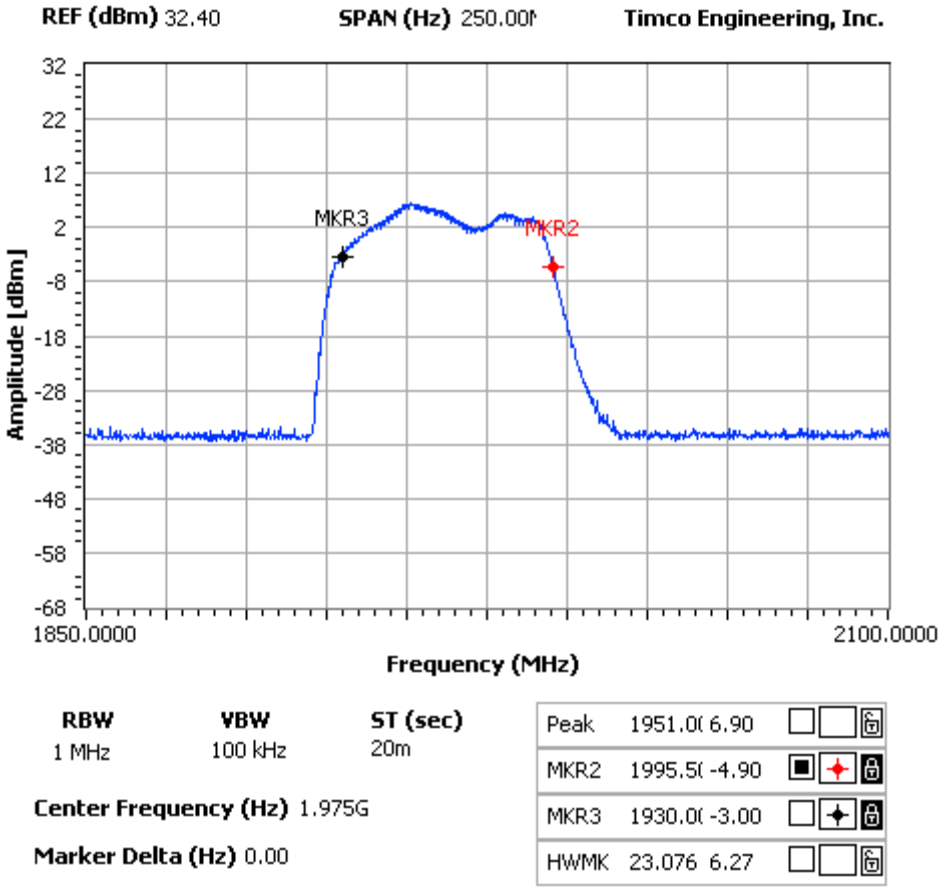
NOTES:

Band rejection filter response - AMPS band



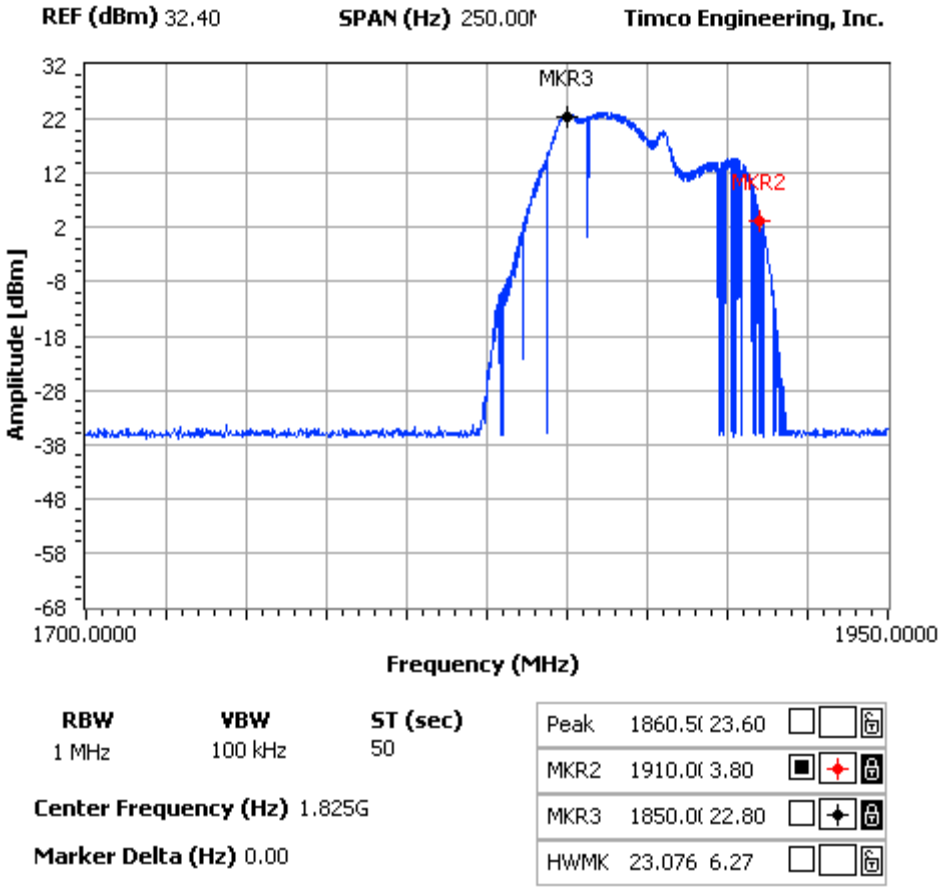
NOTES:

Band rejection filter response - PCS band Downlink



NOTES:

Band rejection filter response - PCS band



11 PART 2.1053 FIELD STRENGTH OF SPURIOUS EMISSIONS:

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter:
The maximum conducted power was measured at 1.78 Watt for the AMPS band Uplink.
43+ 10log(1.78) = 45.5 dBc

TEST DATA: **UPLINK – AMPS band**

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
824.04	H	30.00	0	0	0
1648.08	H	-32.30	1.13	5.04	58.39
2472.12	V	-43.70	1.29	6.67	68.32
3296.16	V	-53.20	1.38	7.39	77.19
4120.20	V	-57.00	1.46	7.79	80.67

Notes: No other emissions were found up to the 10th harmonics

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
836.00	0	30.00	0	0	0
1672.00	H	-33.30	1.13	5.05	59.38
2508.00	V	-46.00	1.3	6.86	70.44
3344.00	V	-56.40	1.38	7.46	80.32
4180.00	V	-56.50	1.47	7.84	80.13

Notes: No other emissions were found up to the 10th harmonics

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
848.97	0	30.00	0	0	0
1697.94	H	-33.00	1.14	5.07	59.07
2546.91	V	-47.80	1.3	6.89	72.21
3395.88	V	-46.70	1.39	7.49	70.6
4244.85	V	-57.90	1.47	7.94	81.43

Notes: No other emissions were found up to the 10th harmonics

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

The maximum conducted power was measured at 645.7 mW for PCS band.
43 + 10log(0.646) = 41.1 dBc

TEST DATA: **UPLINK – PCS band**

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
1850.04	0	30.00	0	0	0
3700.08	V	-43.50	1.42	7.59	67.33
5550.12	V	-52.30	1.72	8.42	75.6
7400.16	V	-49.50	2	8.41	73.09
9250.20	V	-46.90	2.35	9.3	69.95

Notes: No other emissions were found up to the 10th harmonics

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
1880.00	0	30.00	0	0	0
3760.00	V	-48.50	1.43	7.6	72.33
5640.00	V	-50.20	1.76	8.55	73.41
7520.00	V	-50.60	2	8.6	74
9400.00	V	-44.20	2.38	9.57	67.01

Notes: No other emissions were found up to the 10th harmonics

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
1909.97	0	30.00	0	0	0
3819.94	H	-48.60	1.43	7.61	72.42

Notes: No other emissions were found up to the 10th harmonics

REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

The maximum conducted power was measured at 10mW for PCS band.
43 + 10log(0.10) = 23 dBc

TEST DATA: **DOWNLINK – PCS band**

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
1930.00	0	30.00	0	0	0
3860.00	V	-44.10	1.44	7.62	67.92
5790.00	V	-30.70	1.82	8.76	53.76
7720.00	V	-45.20	2.04	8.12	69.12
9650.00	H	-45.20	2.43	9.54	68.09

Notes: No other emissions were found up to the 10th harmonics

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
1960.00	0	30.00	0	0	0
3920.00	V	-41.30	1.44	7.63	65.11
5880.00	H	-37.40	1.85	8.88	60.37
7840.00	V	-44.70	2.07	7.83	68.94

Notes: No other emissions were found up to the 10th harmonics

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
1990.00	0	30.00	0	0	0
3980.00	V	-38.90	1.45	7.65	62.7
5970.00	V	-33.50	1.89	9.01	56.38
7960.00	V	-45.10	2.09	7.55	69.64
9950.00	V	-45.40	2.49	9.12	68.77
11940.00	V	-45.30	2.6	8.87	69.03

Notes: No other emissions were found up to the 10th harmonics

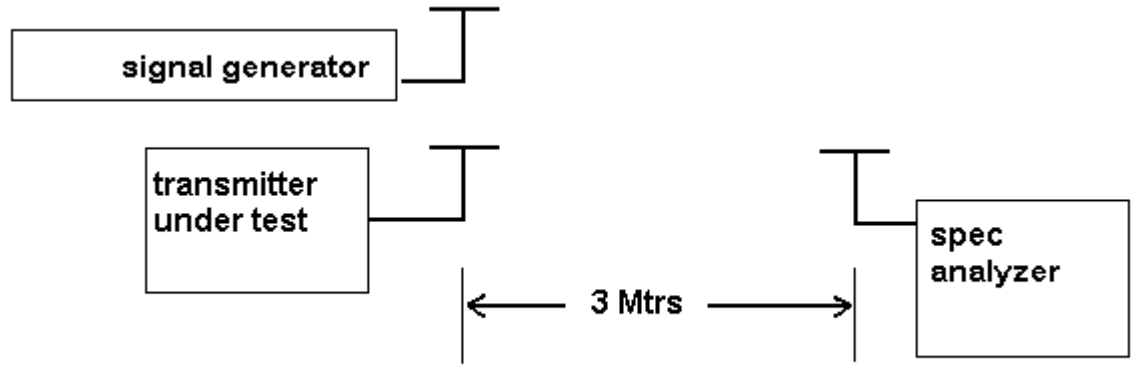
REQUIREMENTS: Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

The maximum conducted power was measured at 10mW for PCS band.
43 + 10log(0.10) = 23 dBc

TEST DATA: **DOWNLINK – AMPS band**

Notes: No emissions were found from the 9kHz up to the 10th harmonics

Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above groundon a rotating table platform.

METHOD OF MEASUREMENTS: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. The CW signal was used to perform this test. This test was conducted per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at the open field test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669. The worst-case spurious emissions data are reported.

12 POWERLINE CONDUCTED INTERFERNCE

RULES PART NO.: 15.107

REQUIREMENTS:	**QUASI-PEAK**	**AVERAGE**
.15 – 0.5 MHz	66-56 dBuV	56-46 dBuV
0.5 – 5.0	56	46
5.0 – 30.	60	50

TEST PROCEDURE: ANSI STANDARD C63.4-2001. The spectrum was scanned from .15 to 30 MHz.

TEST DATA:

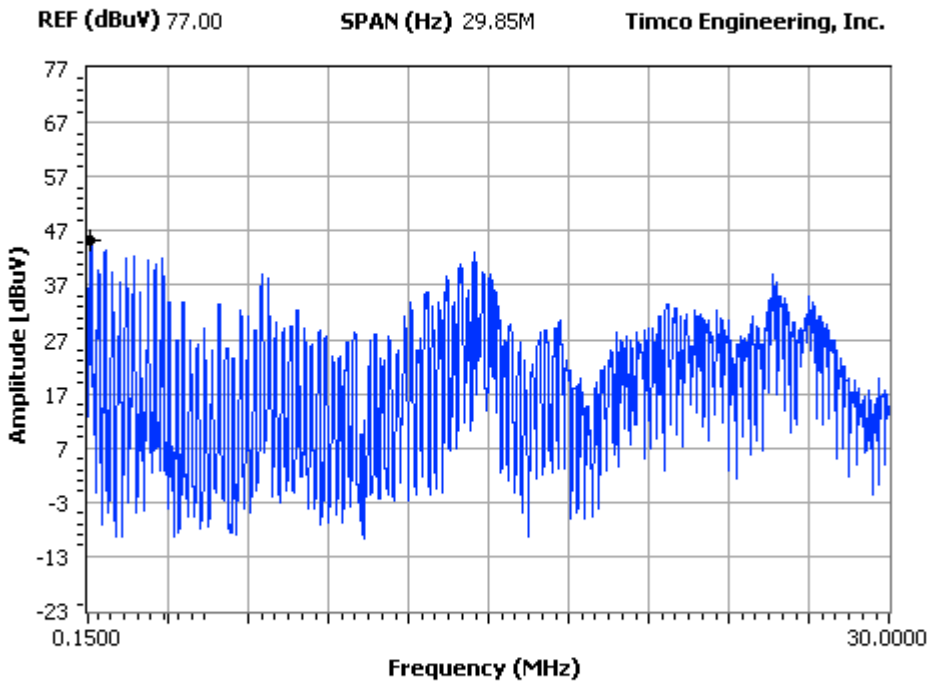
THE GRAPHS ON THE FOLLOWING PAGE REPRESENT THE EMISSIONS TAKEN FOR POWER LINE FOR THIS DEVICE.

TEST RESULTS: Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

POWER LINE CONDUCTED
LINE 1

NOTES:

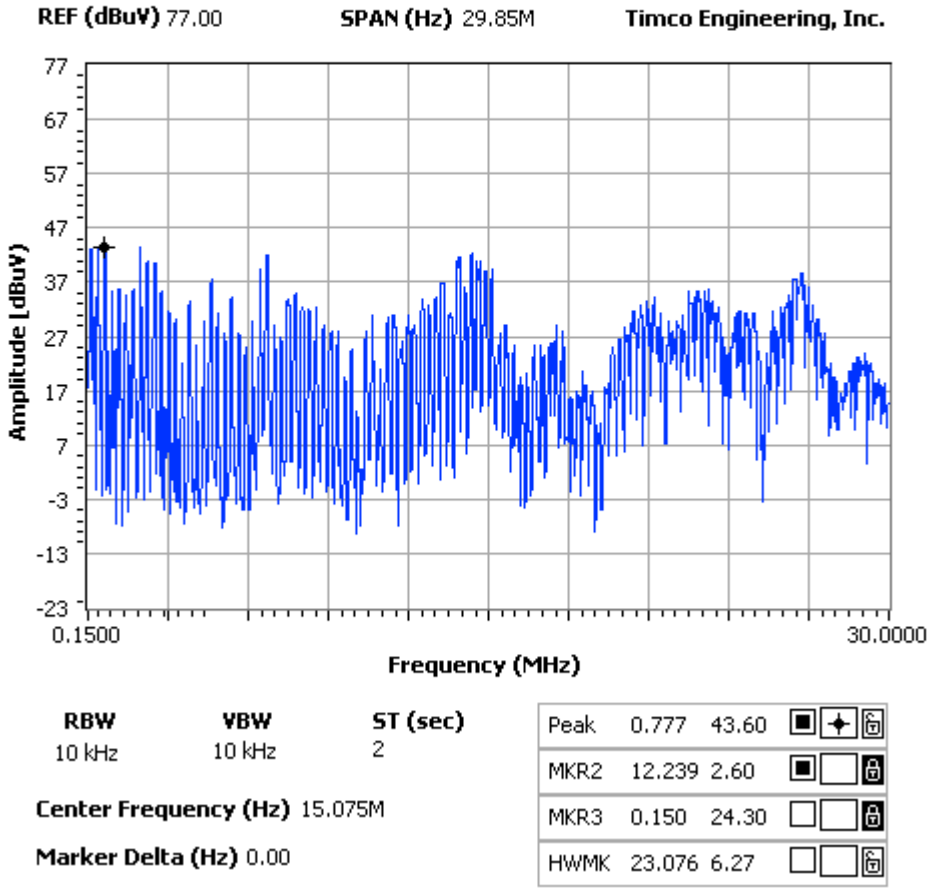
APPLICANT: DIGITAL ANTENNA - FCC ID: PZODA4000SBR
POWER LINE CONDUCTED PLOT- LINE 1



POWER LINE CONDUCTED
LINE 2

NOTES:

APPLICANT: DIGITAL ANTENNA - FCC ID: PZODA4000SBR
POWER LINE CONDUCTED PLOT- LINE 2



13 EQUIPMENT LIST

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
X	3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/13/06
	3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
	Receiver, Beige Tower					
	Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/03
	RF Preselector	HP	85685A	3221A01400	CAL 8/31/01	8/31/03
	Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 8/31/01	8/31/03
X	Receiver, Blue Tower					
X	Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/15/03	4/15/05
X	RF Preselector	HP	85685A	2926A00983	CAL 4/15/03	4/15/05
X	Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/15/03	4/15/05
	Receiver, Silver/Grey Tower					
	Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 10/14/02	10/14/04
	RF Preselector	HP	85685A	2620A00294	CAL 10/14/02	10/14/04
	Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/14/02	10/14/04
	Preamplifier	HP	8449B	3008A01075	CHAR 1/28/02	1/28/04
X	Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
	Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/03
	Biconnical Antenna	Eaton	94455-1	1057	CAL 3/18/03	3/18/05
	BiconiLog Antenna	EMCO	3143	9409-1043		
X	Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
	Log-Periodic Antenna	Electro-Metrics	EM-6950	632	CHAR 10/15/01	10/15/03
	Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CAL 3/4/03	3/4/05
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	152	CAL 3/21/01	3/21/04

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	153	CAL 9/26/02	9/26/05
	Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 2/17/03	2/17/05
	Horn Antenna	Electro-Metrics	EM-6961	6246	CAL 3/31/03	3/31/05
	Horn Antenna	ATM	19-443-6R	None	No Cal Required	
	Passive Loop Antenna	EMC Test Systems	EMCO 6512	9706-1211	CHAR 7/10/01	7/10/03
	Line Impedance Stabilization . . .	Electro-Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/03
	Line Impedance Stabilization . . .	Electro-Metrics	EM-7820	2682	CAL 3/12/03	3/12/05
	Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 5/25/99	5/25/01
	Termaline Wattmeter	Bird Electronic Corporation	6104	1926	CHAR 12/12/01	12/12/03
	Oscilloscope	Tektronix	2230	300572	CHAR 2/1/01	2/1/03
	System One	Audio Precision	System One	SYS1-45868	CHAR 4/25/02	4/25/04
	Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04
	AC Voltmeter	HP	400FL	2213A14499	CAL 10/9/01	10/9/03
	AC Voltmeter	HP	400FL	2213A14261	CHAR 10/15/01	10/15/03
	AC Voltmeter	HP	400FL	2213A14728	CHAR 10/15/01	10/15/03
X	Digital Multimeter	Fluke	77	35053830	CHAR 1/8/02	1/8/04
	Digital Multimeter	Fluke	77	43850817	CHAR 1/8/02	1/8/04
	Digital Multimeter	HP	E2377A	2927J05849	CHAR 1/8/02	1/8/04
	Multimeter	Fluke	FLUKE-77-3	79510405	CHAR 9/26/01	9/26/03
	Peak Power Meter	HP	8900C	2131A00545	CHAR 1/26/01	1/26/03
	Power Meter	HP	432A	1141A07655	CAL 4/15/03	4/15/05
	Power Meter And Sensor	Bird	4421-107 4022	0166 0218	CAL 4/16/03	4/16/05
	Power Sensor	HP	478A	72129	CAL 4/15/03	4/15/05
	Digital Thermometer	Fluke	2166A	42032	CAL 1/16/02	1/16/04

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Thermometer	Traulsen	SK-128		CHAR 1/22/02	1/22/04
	Thermometer	Extech	4028	14871-2	CAL 3/7/03	3/7/05
X	Hygro-Thermometer	Extech	445703	0602	CAL 10/4/02	10/4/04
	Frequency Counter	HP	5352B	2632A00165	CAL 11/28/01	11/28/03
	Frequency Counter	HP	5385A	2730A03025	CAL 3/7/03	3/7/05
	Power Sensor	Agilent Technologies	84811A	2551A02705	CHAR 1/26/01	1/26/03
	Service Monitor	IFR	FM/AM 500A	5182	CAL 11/22/00	11/22/02
	Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	CAL 5/12/02	5/12/04
	Signal Generator	HP	8640B	2308A21464	CAL 2/15/02	2/15/04
	Sweep Generator	Wiltron	6648	101009	CAL 4/15/03	4/15/05
	Sweep Generator	Wiltron	6669M	007005	CAL 3/3/03	3/3/05
	Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
	Modulation Meter	Boonton	8220	10901AB	CAL 4/15/03	4/15/05
	Near Field Probe	HP	HP11940A	2650A02748	CHAR 2/1/01	2/1/03
	BandReject Filter	Lorch Microwave	5BR4-2400/ 60-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	6BR6-2442/ 300-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	5BR4-10525/ 900-S	Z1	CHAR 3/2/01	3/2/03
	High Pass Filter	Microlab	HA-10N		CHAR 10/4/01	10/4/03
	High Pass Filter	Microlab	HA-20N		CHAR 2/7/03	2/7/05
	Audio Oscillator	HP	653A	832-00260	CHAR 3/1/01	3/1/03
	Frequency Counter	HP	5382A	1620A03535	CHAR 3/2/01	3/2/03
	Frequency Counter	HP	5385A	3242A07460	CAL 3/7/03	3/7/05
	Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/03
	Amplifier	HP	11975A	2738A01969	CHAR 3/1/01	3/1/03

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Egg Timer	Unk			CHAR 8/31/01	8/31/03
	Measuring Tape, 20M	Kraftixx	0631-20		CHAR 2/1/02	2/1/04
	Measuring Tape, 7.5M	Kraftixx	7.5M PROFI		2/1/02	2/1/04
	Coaxial Cable #51	Insulated Wire Inc.	NPS 2251-2880	Timco #51	CHAR 1/23/02	1/23/04
	Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 1/24/02	1/24/04
	Coaxial Cable #65	General Cable Co.	E9917 RG233/U	Timco #65	CHAR 1/23/02	1/23/04
	Coaxial Cable #106	Unknown	Unknown	Timco #106	CHAR 1/23/02	1/23/04