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FCC Class II Permissive Change Test Report
(FCC Part 25)
For the
Comtech Mobile Datacom Corporation
STM3 TRANSMITTER MODULE
FCC ID: UQR-CMDCSTM3

WLL REPORT# **12723-01 Rev 2**

November 16, 2012
Re-issued January 14, 2013

Prepared for:

Comtech Mobile Datacom Corporation
20430 Century Blvd.
Germantown, MD 20874

Prepared By:

Washington Laboratories, Ltd.
7560 Lindbergh Drive
Gaithersburg, Maryland 20879

ACCREDITED TESTING
Testing Certificate AT-1448

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Prepared by:

Steven Dovell
Compliance Engineer

Reviewed by:

Steven D. Koster
Vice President

Abstract

This report has been prepared on behalf of Comtech Mobile Datacom Corporation STM3 Transmitter Module to support Application for a Class II Permissive Change to existing certified equipment under Part 25 of the FCC Rules. This Class II Permissive Change (Part 25) Test Report documents the test configuration and test results for a Comtech Mobile Datacom Corporation STM3 Transmitter module.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. At the initial issuance of this report Washington Laboratories, Ltd. was accepted by the FCC and approved by the American Association for Laboratory Accreditation (A2LA) under Certificate 2675.01 as an independent FCC. As of April 1st 2010, Washington Laboratories, Ltd is accredited by ACLASS under Testing Certificate AT-1448.

The Comtech Mobile Datacom Corporation STM3 Transmitter module complies with the limits for a Satellite Earth Station device under FCC Part 25.

Revision History	Reason	Date
Rev 0	Initial Release	November 16, 2012
Rev 1	Insert Paragraph from FCC part 25.216(g) into section 4.3 on page 29	December 3, 2012 JR
Rev 2	Carrier off plot inserted on page 41 for GPS band	January 14, 2013 JR

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1 Introduction

1.1 Reason for Class II Permissive Change

Changes were made in the RF path to reduce spurious emissions in the GPS Frequency Band of 1559MHz – 1610MHz.

1.2 Description of Change

R20 on the module was changed from 1.37k to 2.7k. This raises the gain of the 4-pole Bessel Active Pre-modulation filter, in order to be able to reduce the relative PLL reference clock feed through.

1.3 Compliance Statement

The Comtech Mobile Datacom Corporation STM3 Transmitter Module remains in compliance with the limits for a Satellite Earth Station device under FCC Part 25.

1.4 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.5 Contract Information

Customer:	Comtech Mobile Datacom Corporation 20430 Century Blvd Germantown, MD 20874

1.6 Test Dates

Testing was performed on the following date(s):	10/23/12 – 11/8/12

1.7 Test and Support Personnel

Washington Laboratories, LTD	Steven Dovell
Client Representative	Sathish Nash

1.8 Abbreviations

A	**A**mpere
ac	**a**lternating **c**urrent
AM	Amplitude Modulation
Amps	**Amp**ere**s**
b/s	**b**its per **s**econd
BW	**B**and**W**idth
CE	**C**onducted **E**mission
cm	**C**enti**m**eter
CW	**C**ontinuous **W**ave
dB	**Decibel**
dc	**d**irect **c**urrent
EMI	**E**lectro**m**agnetic **I**nterference
EUT	**E**quipment **U**nder **T**est
FM	**F**requency **M**odulation
G	**g**iga - prefix for 10^9 multiplier
Hz	**H**ertz
IF	**I**ntermediate **F**requency
k	**k**ilo - prefix for 10^3 multiplier
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
M	**M**ega - prefix for 10^6 multiplier
m	**M**eter
µ	**m**icro - prefix for 10^{-6} multiplier
NB	**N**arrow**b**and
QP	**Q**uasi-**P**eak
RE	**R**adiated **E**missions
RF	**R**adio **F**requency
rms	**r**oot-**m**ean-**s**quare
SN	**S**erial **N**umber
S/A	**S**pectrum **A**nalyzer
V	**V**olt

2 Equipment Under Test

2.1 EUT Identification & Description

The STM3 module is a satellite transmitter unit (STU) designed to be mounted onto a user's circuit board, where it will receive and respond to various configuration instructions and queries, as well as transmit message packets through the Simplex Telemetry network (The module is designed for low-power systems). In most target systems the module will only be powered when needed. The STM3 firmware is designed to respond to commands and immediately go back to a "sleep" state, in which it consumes only a few microAmps of current. A low-power timer in the STM3 microprocessor runs during sleep mode using an external 32kHz crystal on the support PCB, and ensures that message retries occur on schedule.

Table 1: Device Summary

ITEM	DESCRIPTION
Manufacturer:	Comtech Mobile Datacom Corporation
Model:	STM3 Transmitter module
FCC ID:	UQR-CMDCSTM3
FCC Rule Parts:	§25
Frequency Range:	1611.25-1618.75MHz
Maximum Peak Output Power (Conducted):	0.0966W (19.85dBm)
Maximum Peak RMS Output Power (Conducted):	17.82dBm
Maximum EIRP (in a 4 kHz BW) Conducted (with 5dB antenna)	-22.57dBW (7.43dBm)
Modulation:	BPSK (DSSS)
Occupied Bandwidth (20dB):	2.161MHz
Authorized Bandwidth	2.5MHz
Emission Designator	2M50G1D
Keying:	Automatic
Type of Information:	Data
Power Output Level	Fixed
Antenna Connector	Integral
Antenna	Spectrum Control PA25-1615-025SA 5dB Patch
Power Source & Voltage:	Regulated 3.3VDC +/-5% from host unit

2.2 Test Configuration

The STM3 transmitter module was soldered to a host test fixture circuit board. This test fixture board had a 3.3VDC regulator, SMA antenna port, VDC input port, 5 pin header for test mode/transmit on switches, and a programming port that provided the required interface to the module.

The SMA antenna port was connected to a spectrum analyzer through suitable attenuators for the measurements required for this testing.

2.3 Testing Algorithm

The STM3 Transmitter module was configured with a laptop computer connected through the RS232 data port. An external power supply provided DC power to the unit. A Client test program (stxcom.exe) program on the support laptop was used to program the EUT to operate on the test frequencies in a carrier on and carrier off mode. The EUT has the capability of transmitting on 4 channels.

- Channel A:1611.25MHz –limited testing (Power, Bandwidth, GPS Band [pt25.216])
- Channel B: 1613.75 MHz- full testing
- Channel C: 1616.25MHz- limited testing (Power, Bandwidth, GPS Band [pt25.216])
- Channel D: 1618.75 MHZ- limited testing (Power, Bandwidth, GPS Band [pt25.216])

Worst case emission levels are provided in the test results data.

2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. The Industry Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ACLASS under Certificate AT-1448 as an independent FCC test laboratory.

2.5 Measurements

2.5.1 References

TIA-603-B Land Mobile FM or PM Communications Equipment Measurement and Performance Standard

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 with a type B evaluation of the standard uncertainty. Elements contributing to the standard uncertainty are combined using the method described in Equation 1 to arrive at the total standard uncertainty. The standard uncertainty is multiplied by the coverage factor to determine the expanded uncertainty which is generally accepted for use in commercial, industrial, and regulatory applications and when health and safety are concerned (see Equation 2). A coverage factor was selected to yield a 95% confidence in the uncertainty estimation.

Equation 1: Standard Uncertainty

$$u_c = \pm\sqrt{\frac{a^2}{div_a{}^2} + \frac{b^2}{div_b{}^2} + \frac{c^2}{div_c{}^2} + ...}$$

Where u_c = standard uncertainty

a, b, c,.. = individual uncertainty elements

$Div_{a,\ b,\ c}$ = the individual uncertainty element divisor based on the probability distribution

Divisor = 1.732 for rectangular distribution

Divisor = 2 for normal distribution

Divisor = 1.414 for trapezoid distribution

Equation 2: Expanded Uncertainty

$$U = ku_c$$

Where U = expanded uncertainty

k = coverage factor

$k \leq 2$ for 95% coverage (ANSI/NCSL Z540-2 Annex G)

u_c = standard uncertainty

The measurement uncertainty complies with the maximum allowed uncertainty from CISPR 16-4-2. Measurement uncertainty is not used to adjust the measurements to determine compliance. The expanded uncertainty values for the various scopes in the WLL accreditation are provided in Table 2 below.

Table 2: Expanded Uncertainty List

Scope	Standard(s)	Expanded Uncertainty
Radiated Emissions	CISPR11, CISPR22, CISPR14, FCC	4.55 dB

3 Test Equipment

Table 3 shows a list of the test equipment used for measurements along with the calibration information.

Table 3: Test Equipment List

Asset #	Manufacturer/Model	Description	Cal. Due
68	HP - 85650A	ADAPTER QP	7/1/2013
72	HP - 8568B	ANALYZER SPECTRUM	7/1/2013
70	HP - 85685A	PRESELECTOR RF W/OPT 8ZE	7/1/2013
7	ARA - LPB-2520	ANTENNA BICONILOG ANTENNA	10/10/2014
382	SUNOL SCIENCES CORPORATION - JB1	ANTENNA BICONLOG	12/27/2012
4	ARA - DRG-118/A	ANTENNA DRG 1-18GHZ	2/15/2013
626	ARA - DRG-118/A	ANTENNA HORN	6/16/2013
522	HP - 8449B	PRE-AMPLIFIER 1-26.5GHZ	10/10/2013
528	AGILENT - E4446A	ANALYZER SPECTRUM	8/30/2013
803	R&S - SMR 40	SIGNAL GENERATOR 1 - 40GHZ	5/24/2014
478	RHODE SCHWARZ - SMT 06	SIGNAL GENERATOR	5/15/2013

4 Test Results

Note: The 'Chopin Transmitter Module' designation is the Comtech Mobile in-house development name for the STM3. All references in the test results plots to the Chopin are considered to be references to the STM3 Transmitter Module.

4.1 RF Power Output (FCC 25.204)

FCC 25.204 specifies the limits for Satellite Earth Stations as +40dBW (+70dBm) in any 4 kHz band at 0 degrees azimuth.

4.1.1 Maximum Peak Power in any 4 kHz bandwidth

The power was measured conducted into a spectrum analyzer. The RBW was set to 3.9 kHz (a correction of 10Log (4kHz/3.9kHz) =0.1 dB was added). 5dB was added for the Spectrum Control PA25-1615-025SA 5DB Patch Antenna. The results are in the following table and figures.

Table 4: RF Peak Power Output per 4 kHz Bandwidth

Channel	Frequency	Peak power/4kHz (dBm)	Peak power/4kHz (dBW)	Limit (dBW)	Pass/Fail
A	1611.25MHz	7.19	-22.81	40	Pass
B	1613.75MHz	6.95	-23.05	40	Pass
C	1616.25MHz	7.06	-22.94	40	Pass
D	1618.75MHz	7.43	-22.57	40	Pass

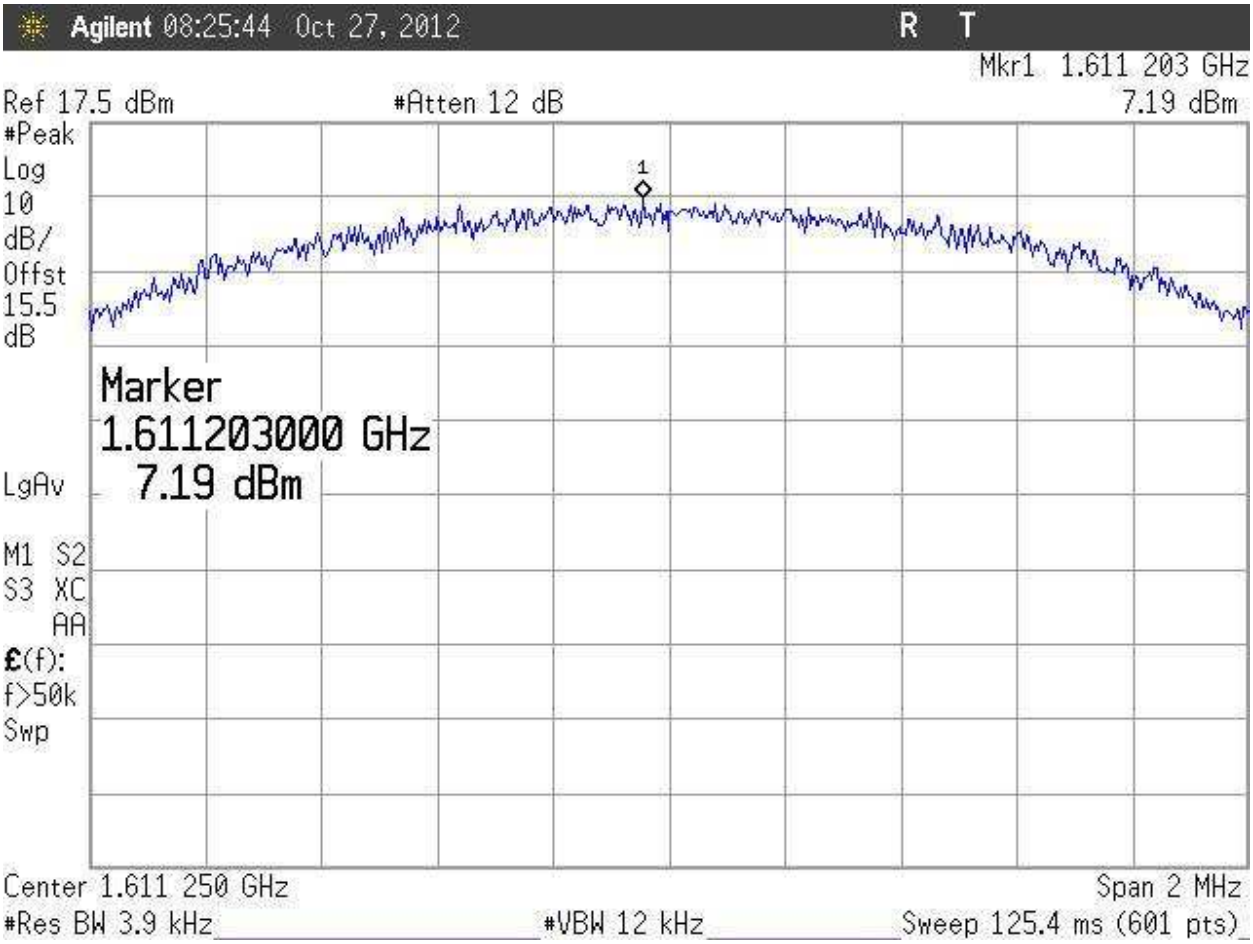


Figure 1: Peak Power in any 4 kHz: Channel A @ 1611.25MHz

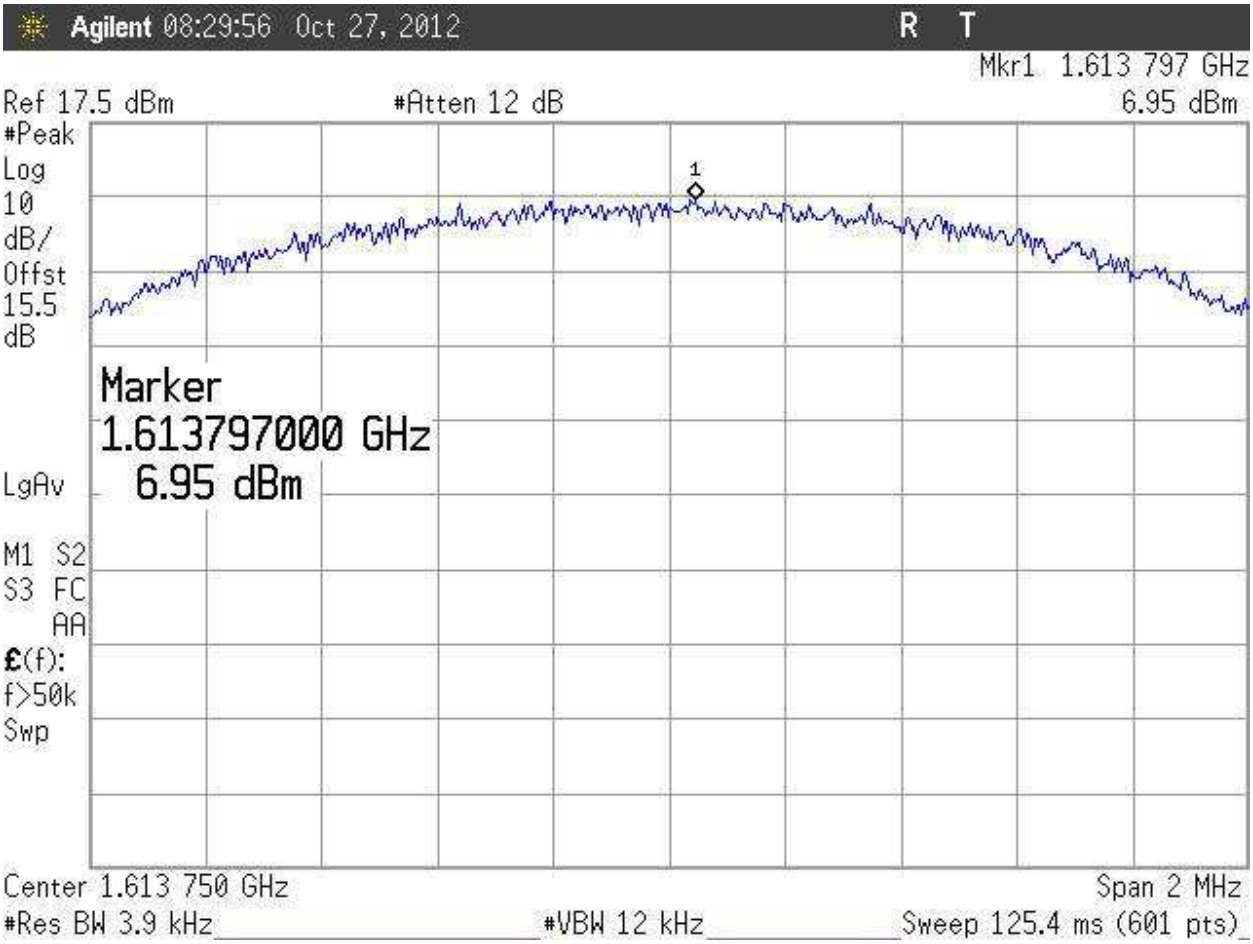


Figure 2: Peak Power in any 4 kHz: Channel B @ 1613.75MHz

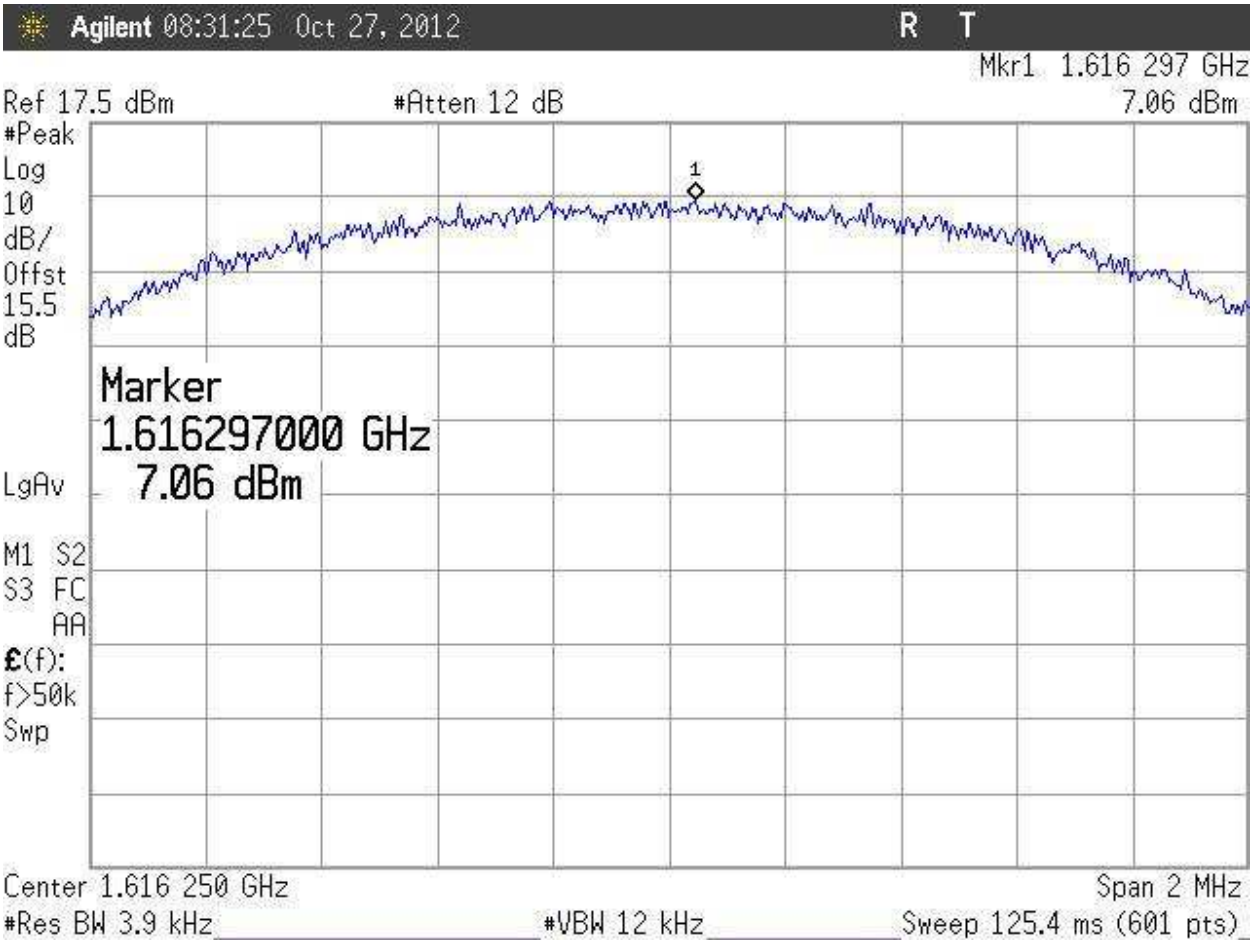


Figure 3: Peak Power in any 4 kHz: Channel C @ 1616.25MHz

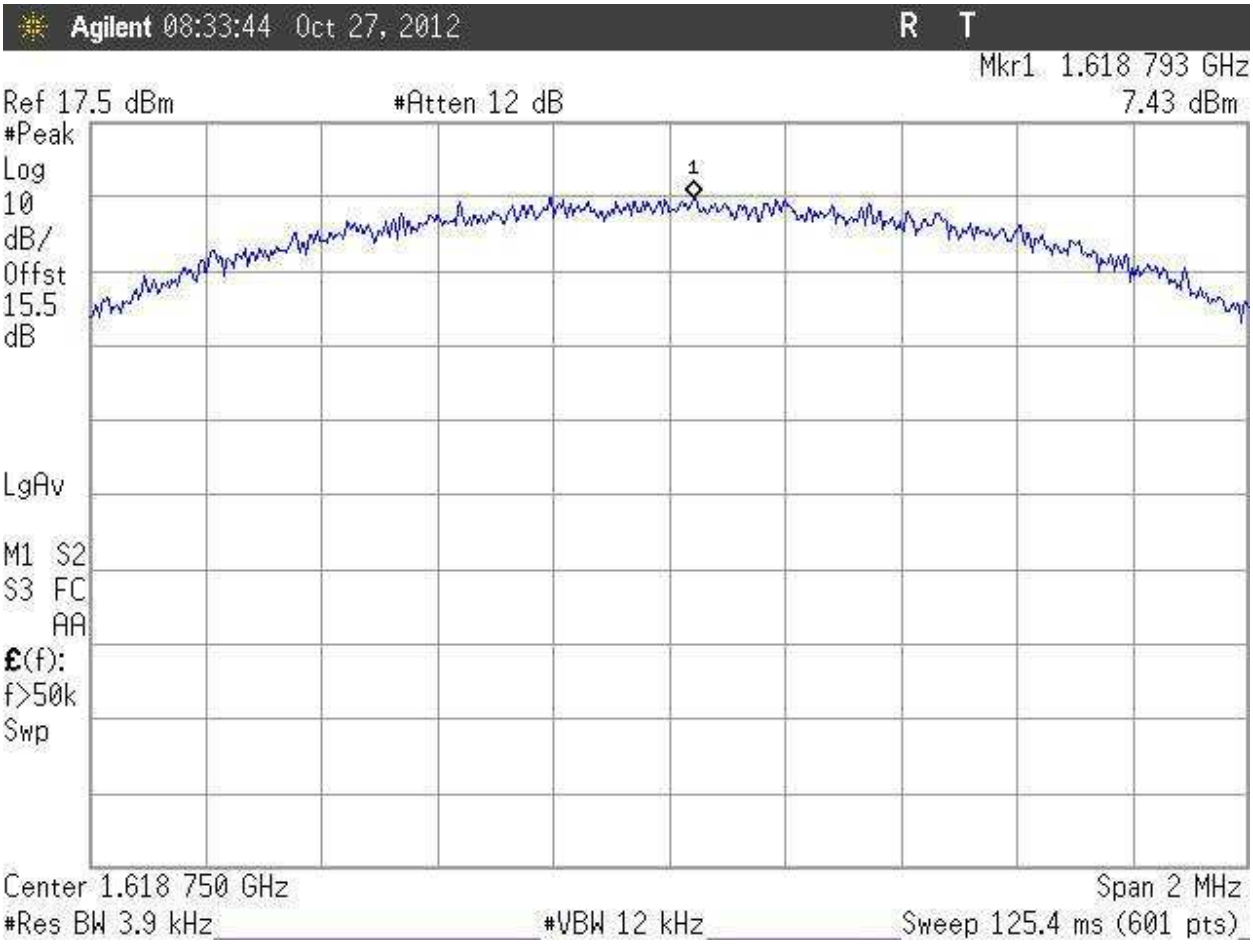


Figure 4: Peak Power in any 4 kHz: Channel D @ 1618.75MHz

4.1.2 Power measurement (3MHz bandwidth)

The Peak power was measured at the antenna port using a spectrum analyzer. The RBW was set to 3MHz and the VBW set to 8MHz. The results are in the following table and figures (antenna gain not included).

Table 5: RF Power Output - Peak

Channel	Frequency	Power Output (dBm)	Power Output (W)	Power Output (dBm)/(W) Previously Measured
A	1611.25MHz	19.36	0.0863	20.62/0.115
B	1613.75MHz	19.76	0.0946	20.78/0.119
C	1616.25MHz	19.85	0.0966	20.90/0.123
D	1618.75MHz	19.83	0.0962	20.99/0.125

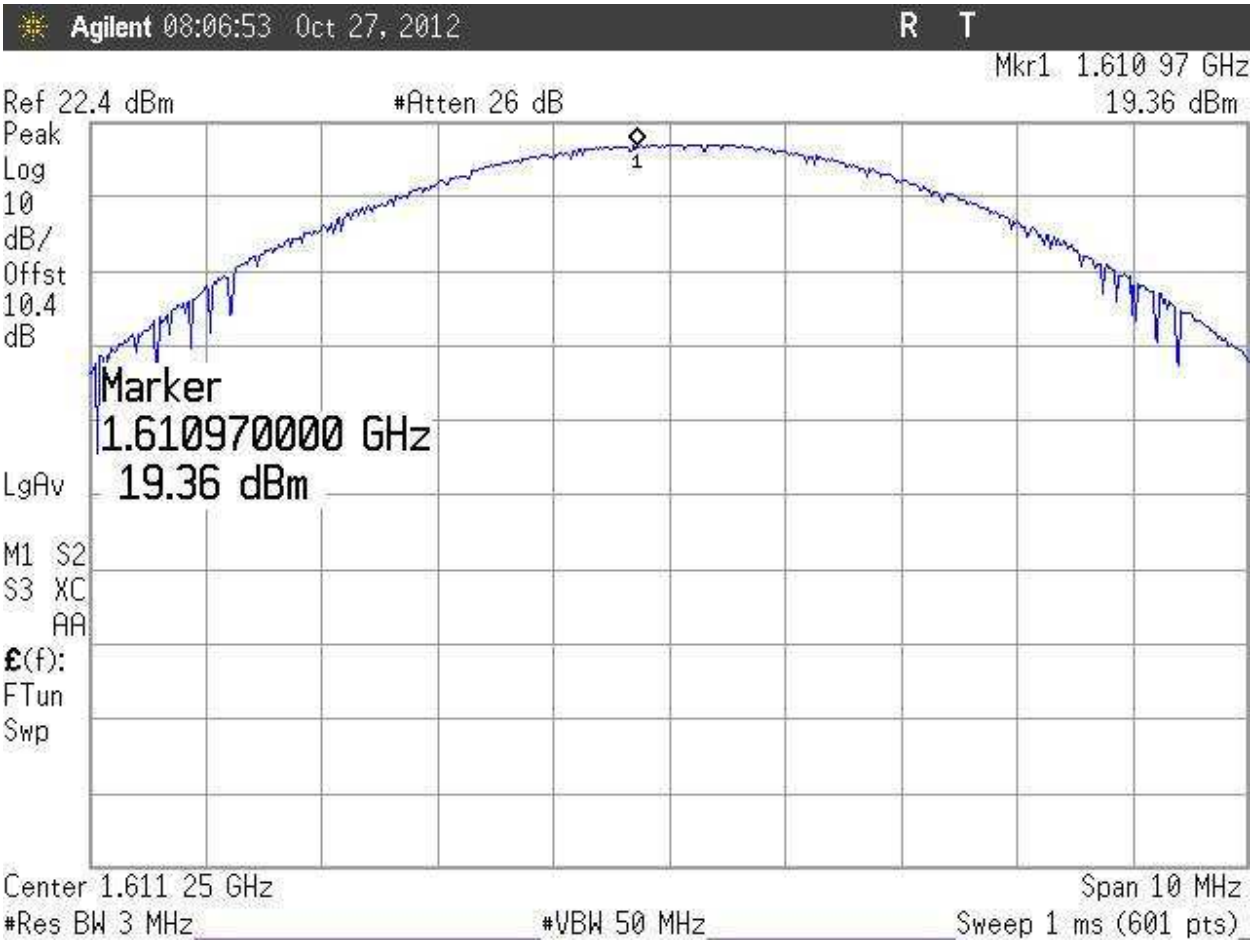


Figure 5: RF Peak Power, Channel A @ 1611.25MHz

Figure 6: RF Peak Power, Channel B @ 1613.75MHz

Figure 7: RF Peak Power, Channel C @ 1616.25MHz

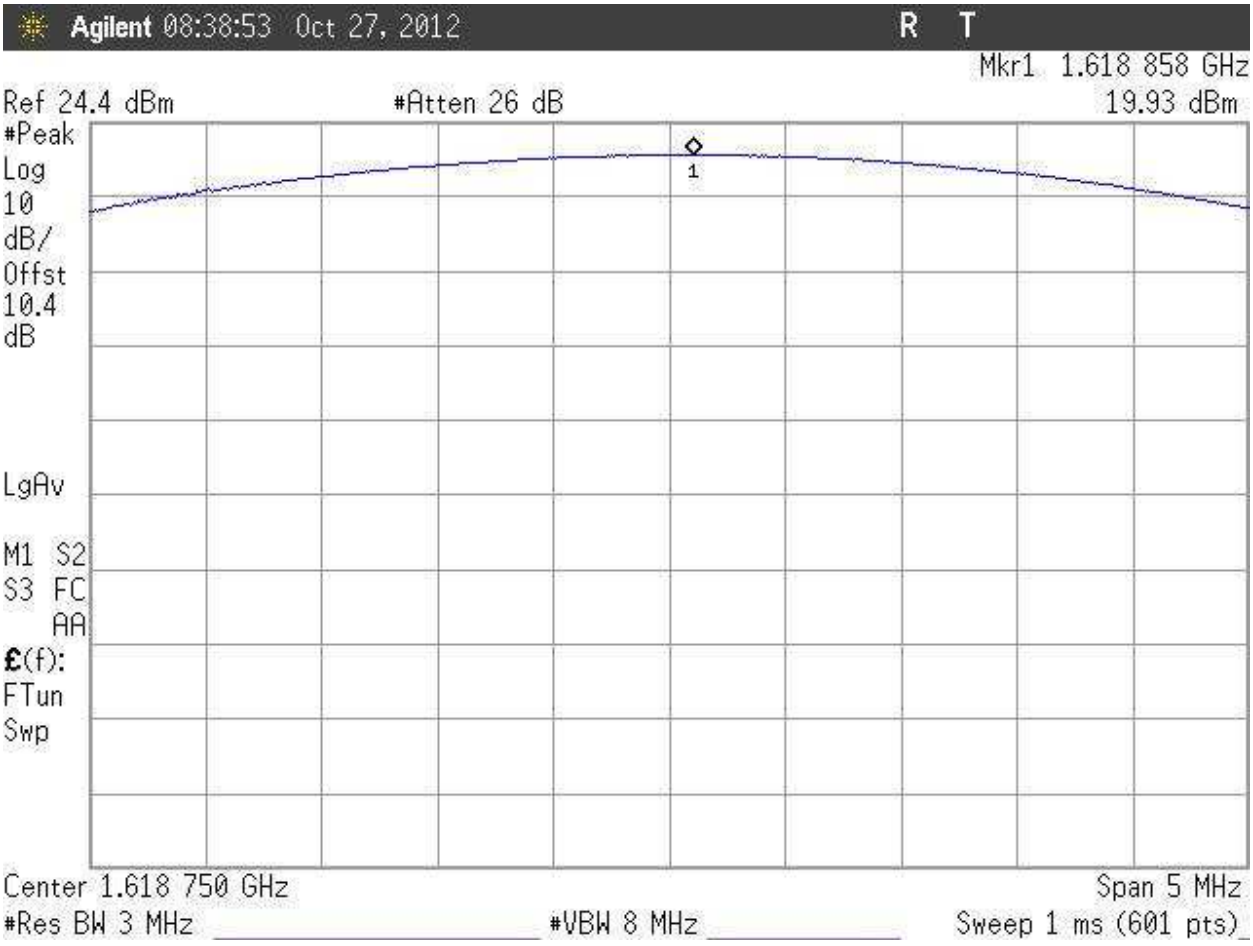


Figure 8: RF Peak Power, Channel D @ 1618.75MHz

4.1.3 Conducted Peak RMS Power at Antenna Port

The Peak RMS power was measured at the antenna port using a spectrum analyzer. The RBW was set to 3MHz and the VBW set to 8MHz. An RMS detector setting was used with a 1 second sweep time. The results are in the following table and figures (antenna gain not included).

Table 6: RF Power Output - RMS

Channel	Frequency	Peak RMS Power Output (dBm)	Peak RMS Power Output (dBm) Previously Measured
A	1611.25MHz	17.48	17.90
B	1613.75MHz	17.54	18.04
C	1616.25MHz	17.69	18.31
D	1618.75MHz	17.82	18.31

Figure 9: Peak RMS Power, Channel A @ 1611.25 MHz

Figure 10: Peak RMS Power, Channel B @ 1613.75 MHz

Figure 11: Peak RMS Power, Channel C @ 1616.25 MHz

Figure 12: Peak RMS Power, Channel D @ 1618.75 MHz

4.2 Radiated Spurious Emissions: EIRP Data (FCC §25.202(f))

Case radiated spurious emissions must comply with the requirements of §25.202 (f) of FCC. The limits for the spurious emissions are as follows:

FCC Part 25.202(f):

Radiated spurious emissions must comply with the requirements of §25.202(f). The limits for the spurious emissions are as follows:

The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

Based on the power measured, the limit for emissions removed from the center frequency by more than 250% of the authorized bandwidth will be:

Limit (dBm) = 20.99(dBm) – (43 + 10Log (.125W)) = -13dBm

This section covers emissions detected at more than 250% removed from the authorized bandwidth.

4.2.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

Where emissions were detected, the EIRP levels were determined using the method of signal substitution. The unit was verified in 3 orthogonals with the worst case displayed.

4.2.2 Test Results

The frequency range of 30 MHz to 16.5 GHz was measured and the data presented below. The EUT complied with this limit.

Table 7: Radiated Emissions

Frequency (MHz)	Polarity	Azimuth	Ant. Height (m)	Spurious Level (dBuV)	Sub. Sig. Gen. Level (dBm)	Sub. Power Level (dBm)	Sub. Ant. Factor (dB)	Sub. Ant. Gain (dB)	EIRP Level (dBm)	Limit (dBm)	Margin (dB)
46.18	V	0.0	1.0	19.3	-59.6	-61.6	15.1	-11.6	-73.2	-13	-60.2
60.32	V	0.0	1.0	11.8	-74.0	-76.0	10.1	-4.3	-80.3	-13	-67.3
111.51	V	90.0	1.0	6.6	-73.3	-75.4	10.7	0.5	-74.9	-13	-61.9
180.83	V	125.0	1.0	8.4	-67.8	-69.9	10.2	5.2	-64.7	-13	-51.7
208.30	V	90.0	1.0	11.0	-69.6	-71.7	11.7	4.9	-66.8	-13	-53.8
257.90	V	90.0	1.0	4.7	-80.2	-82.3	13.8	4.7	-77.6	-13	-64.6
450.02	V	45.0	1.5	3.9	-79.9	-82.0	16.0	7.3	-74.7	-13	-61.7
1080.25	V	45.0	3.0	49.1	-60.0	-62.2	24.5	6.4	-55.9	-13	-42.9
1613.75	V	350.0	1.8	53.8	-20.0	-22.7	25.2	9.2	-13.6	N/A	Fundamental
2118.20	V	180.0	1.5	42.2	-27.0	-30.1	28.6	8.2	-21.9	-13	-8.9
2656.30	V	15.0	1.6	39.9	-36.9	-40.0	28.6	10.1	-29.9	-13	-16.9
46.16	H	0.0	4.0	7.1	-61.9	-63.9	15.1	-11.6	-75.5	-13	-62.5
60.34	H	145.0	4.0	11.5	-65.2	-67.2	10.1	-4.3	-71.5	-13	-58.5
75.34	H	180.0	2.4	20.5	-60.3	-62.3	6.6	1.2	-61.2	-13	-48.2
113.13	H	145.0	2.6	2.8	-78.8	-80.9	10.9	0.4	-80.5	-13	-67.5
128.73	H	200.0	2.5	8.5	-74.7	-76.8	10.9	1.5	-75.3	-13	-62.3
140.21	H	200.0	2.1	12.8	-71.8	-73.9	9.1	4.0	-69.8	-13	-56.8
159.09	H	185.0	2.1	10.9	-75.4	-77.5	10.2	4.1	-73.4	-13	-60.4
172.07	H	180.0	2.2	14.8	-74.6	-76.7	10.6	4.3	-72.3	-13	-59.3
222.07	H	90.0	2.2	10.3	-76.7	-78.8	12.9	4.2	-74.6	-13	-61.6
432.01	H	95.0	2.2	8.6	-71.7	-73.8	16.4	6.5	-67.3	-13	-54.3
508.63	H	80.0	2.2	7.7	-74.0	-76.1	17.1	7.3	-68.9	-13	-55.9
1080.25	H	350.0	3.1	45.7	-39.1	-41.3	24.5	6.4	-35.0	-13	-22.0
1613.75	H	300.0	2.5	62.6	-23.0	-25.7	25.2	9.2	-16.6	N/A	Fundamental
2118.20	H	180.0	2.3	49.3	-32.3	-35.0	25.2	11.5	-23.5	-13	-10.5
2660.00	H	190.0	2.2	53.9	-30.0	-33.1	28.6	8.2	-24.9	-13	-11.9

4.3 Spurious Emissions per FCC §25.216

FCC Part 25 limits the emissions from mobile earth stations for the protection of aeronautical radio navigation-satellite service. The EIRP density of spurious emissions which fall within the frequency range of 1559M to 1610MHz were measured in accordance with §25.216.

In accordance with §25.216(c) the EIRP density of emissions from mobile earth stations operating between 1610MHz and 1660.5MHz shall not exceed -70dBW/MHz, averaged over any 2ms active transmission interval, in the band 1559M – 1605MHz. The EIRP of discrete emissions of less than 700Hz bandwidth from such stations shall not exceed -80 dBW, averaged over any 2ms active transmission interval, in the 1559M – 1605MHz band.

In accordance with §25.216(f) Mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies in the 1610–1660.5 MHz band shall suppress the power density of emissions in the 1605–1610 MHz band to an extent determined by linear interpolation from -70 dBW/MHz at 1605 MHz to -10 dBW/MHz at 1610 MHz

In accordance with §25.216 (g) Mobile earth stations manufactured more than six months after Federal Register publication of the rule changes adopted in FCC 03-283 with assigned uplink frequencies in the 1610-1626.5 MHz band shall suppress the power density of emissions in the 1605-1610 MHz band-segment to an extent determined by linear interpolation from −70 dBW/MHz at 1605 MHz to −10 dBW/MHz at 1610 MHz averaged over any 2 millisecond active transmission interval. The e.i.r.p of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed a level determined by linear interpolation from −80 dBW at 1605 MHz to −20 dBW at 1610 MHz, averaged over any 2 millisecond active transmission interval.

In accordance with §25.216(i) the peak e.i.r.p density of carrier-off state emissions from mobile earth stations manufactured more than six months after Federal Register publication of the rule changes adopted in FCC 03–283 with assigned uplink frequencies between 1 and 3 GHz shall not exceed -80 dBW/MHz in the 1559– 1610 MHz band averaged over any 2 millisecond active transmission interval.

4.3.1 Test Procedure

The output of the EUT was connected to the input of measurement receiver with a RMS detector and the capability of performing the measurements as specified in §25.216. The following was used to calculate the limit and the corrected emissions levels for obtaining the plots shown in Figure 13 through Figure 21.

For emissions from 1559M – 1605MHz: Limit = -70dBW/MHz = -40dBm/MHz

For discrete emissions with bandwidths less than 700Hz from 1559M – 1605MHz: Limit = -80dBW = -50dBm

For emissions from 1605M – 1610MHz: Limit = -70dBW/MHz (-40dBm/MHz) to -10dBW/MHz (20dBm/MHz)

For discrete emissions with bandwidths less than 700Hz from 1605M – 1610MHz: Limit = -80dBW/MHz (-50dBm/MHz) to -20dBW/MHz (10dBm/MHz)

For emissions in the Carrier –Off State from 1559M – 1610MHz: Limit = -80dBW/MHz (-50dBm/MHz)
The receiver emissions levels were adjusted for correction factors as follows:

Emission Level = RXL + ATT+CBL+ANT
Where: RXL = Raw received level
ATT = Attenuator = 5.0dB
CBL = Cable loss = 0.1
ANT= Spectrum Control PA25-1615-025SA 5dB Patch Antenna

These correction factors were entered into the receiver as an offset; he plots display corrected data for comparison to the limit.

4.3.2 Test Results

The following plots show the maximum emissions detected with the band of 1559M – 1610MHz in both a Carrier on and Carrier off mode.

Where spurious signals approached or exceeded the discrete signal limit, the signals were examined using the following method:

In order to show compliance with the discrete signal limit, plots of the signals were taken with the spectrum analyzer resolution bandwidth reduced to 1kHz and a RMS Detector averaged over a maximum of 2ms transmission interval was utilized. These plots were compared to the discrete limit. The EUT complied with this standard.

Figure 13: GPS Band Emissions Channel A @1611.25MHz, 1559 – 1610MHz

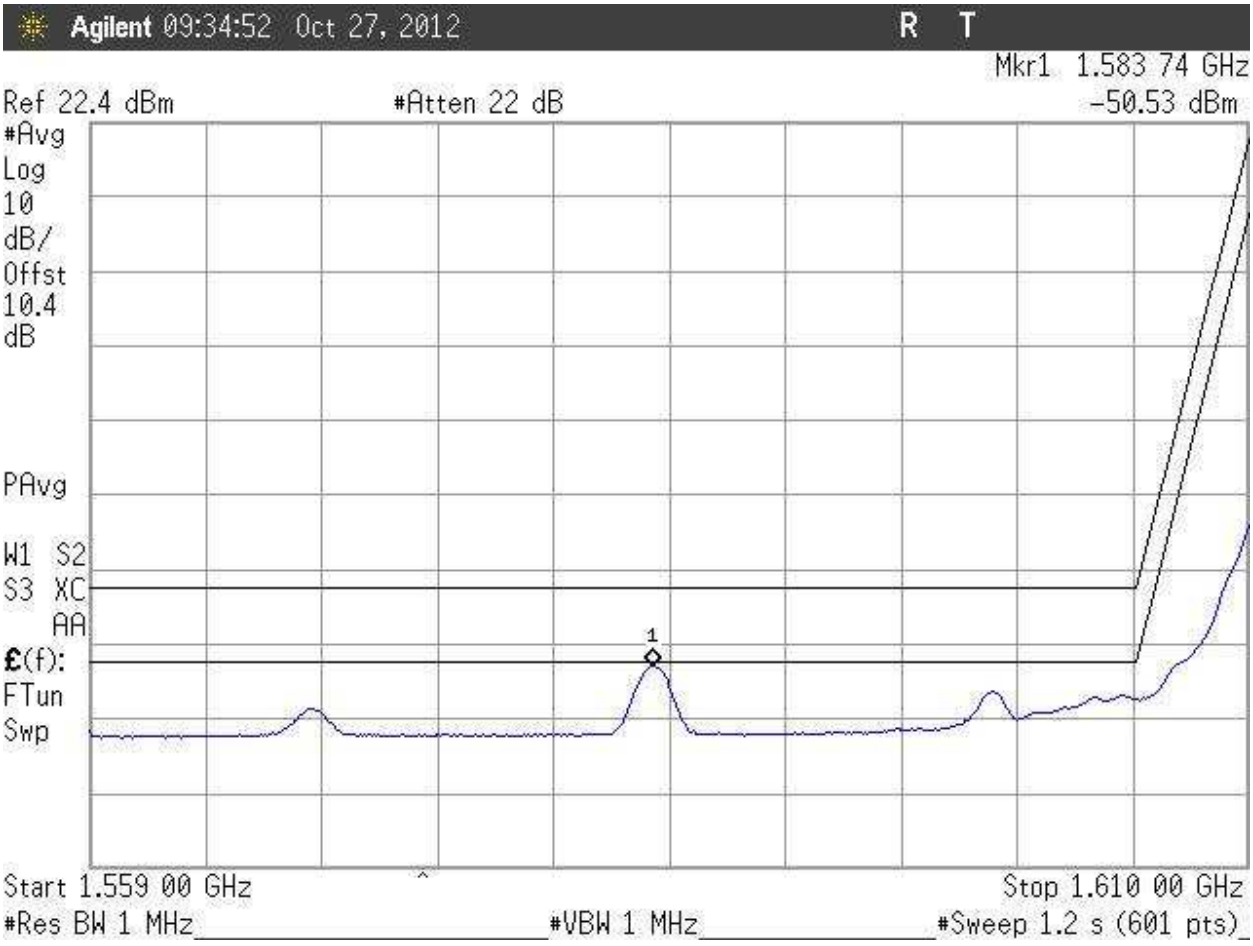


Figure 14: GPS Band Emissions, Channel B @1613.75, 1559 – 1610MHz

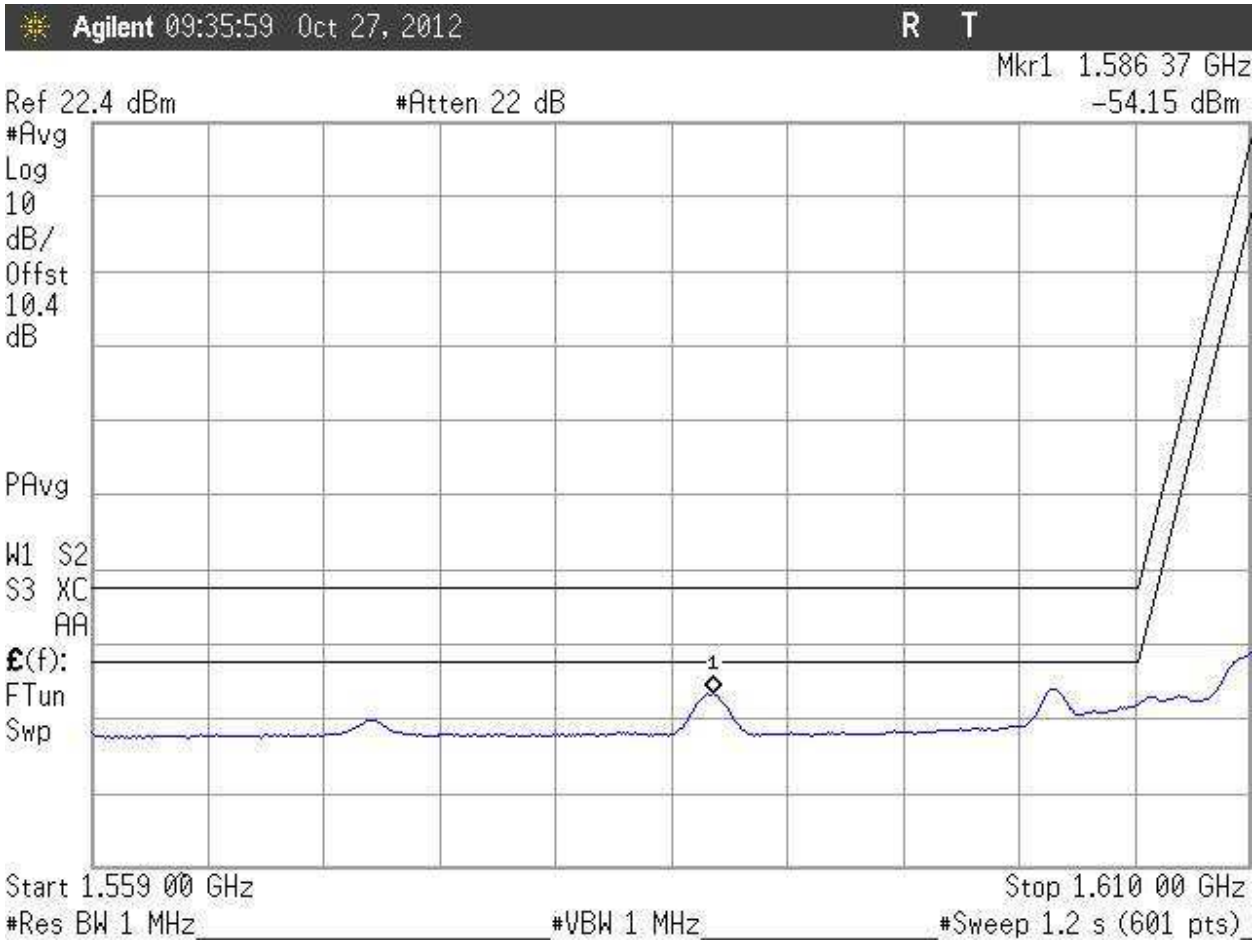


Figure 15: GPS Band Emissions, Channel C @ 1616.25MHz, 1559 – 1610MHz

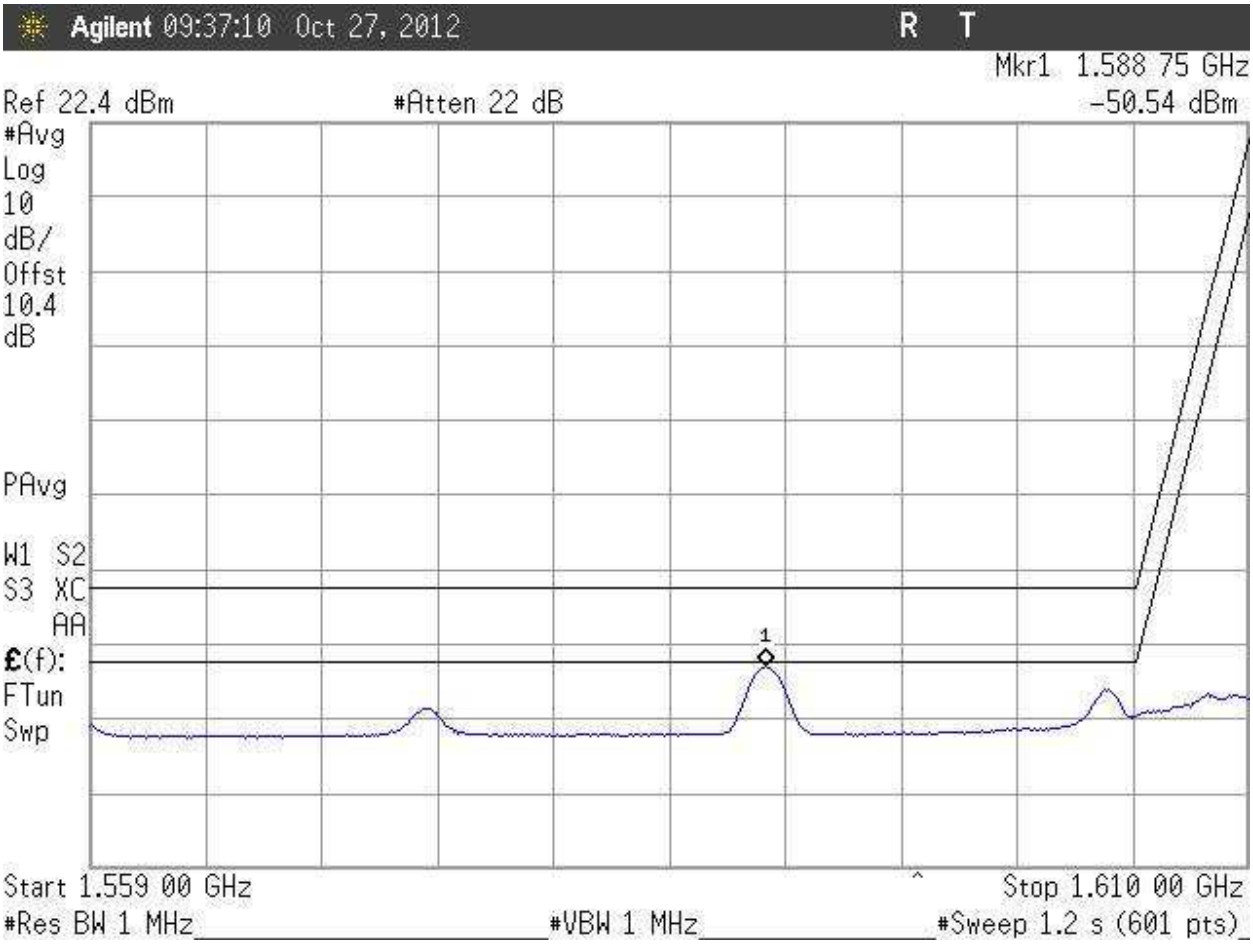


Figure 16: GPS Band Emissions, Channel D @ 1618.75MHz, 1559 – 1610MHz

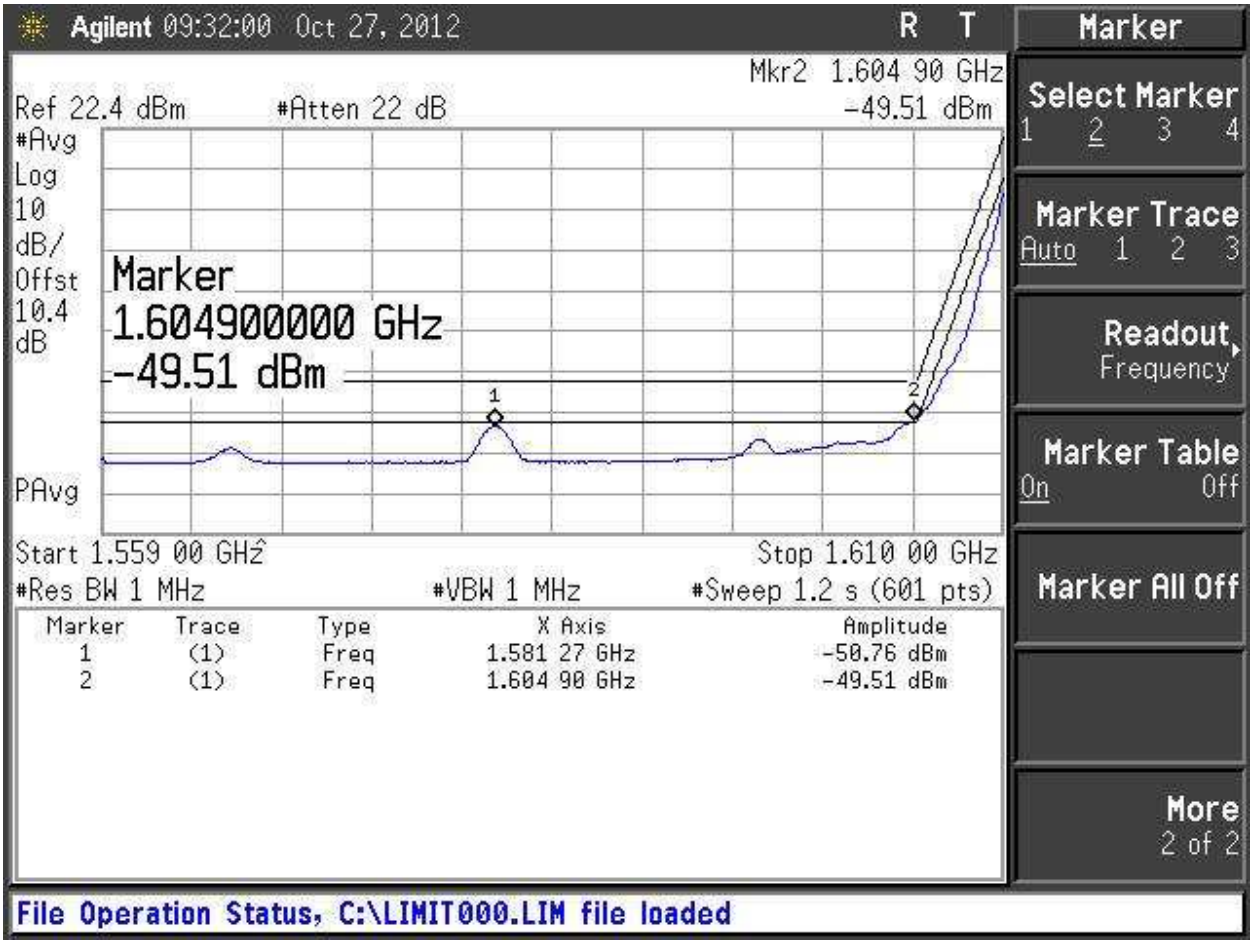


Figure 17: GPS Band, Channel A, Markers indicate emissions to examine

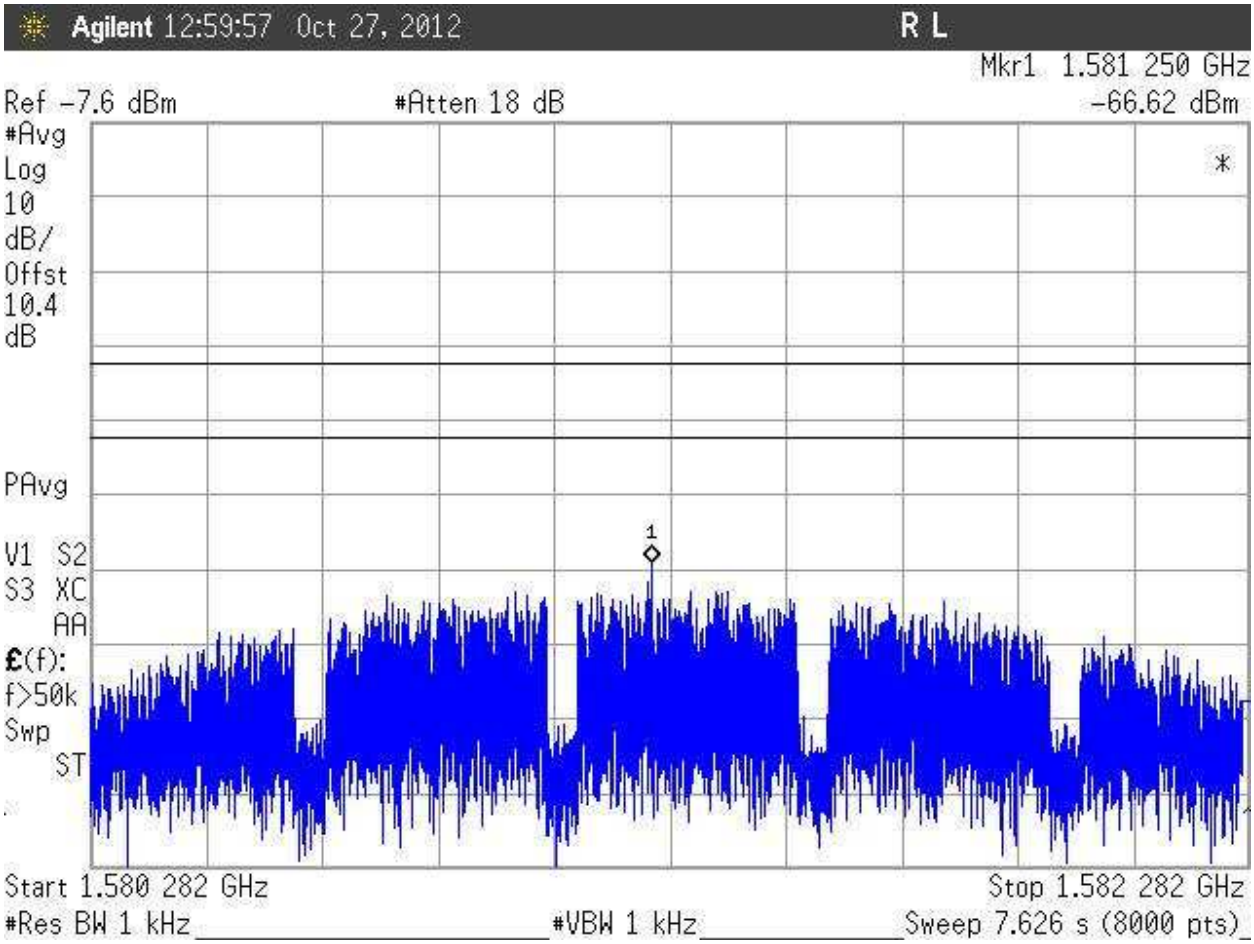


Figure 18: GPS Band, Channel A, 1566.3MHz reduced bandwidth showing compliance with discrete limits

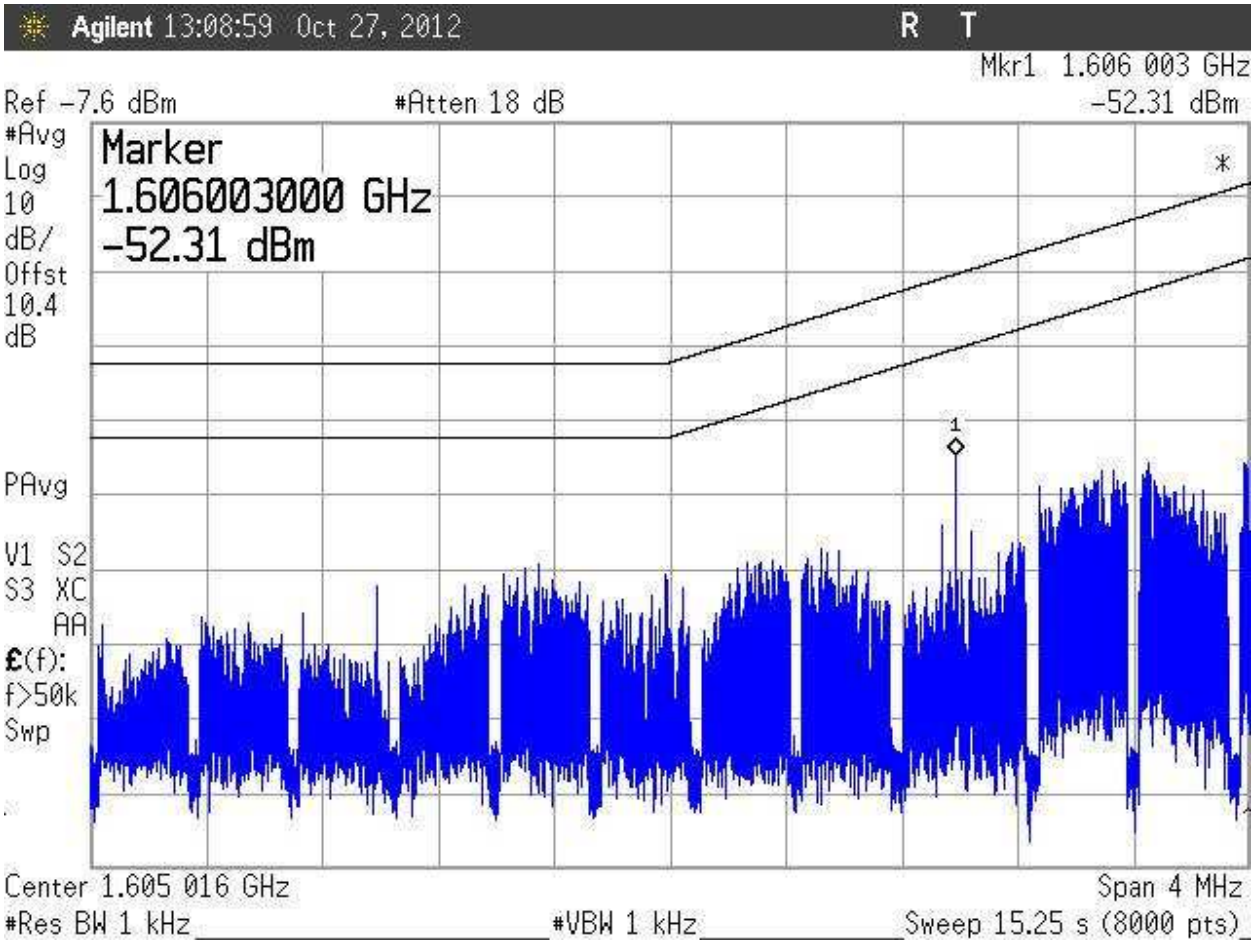


Figure 19: GPS Band, Channel A, 1606.1MHz reduced bandwidth showing compliance with discrete limits

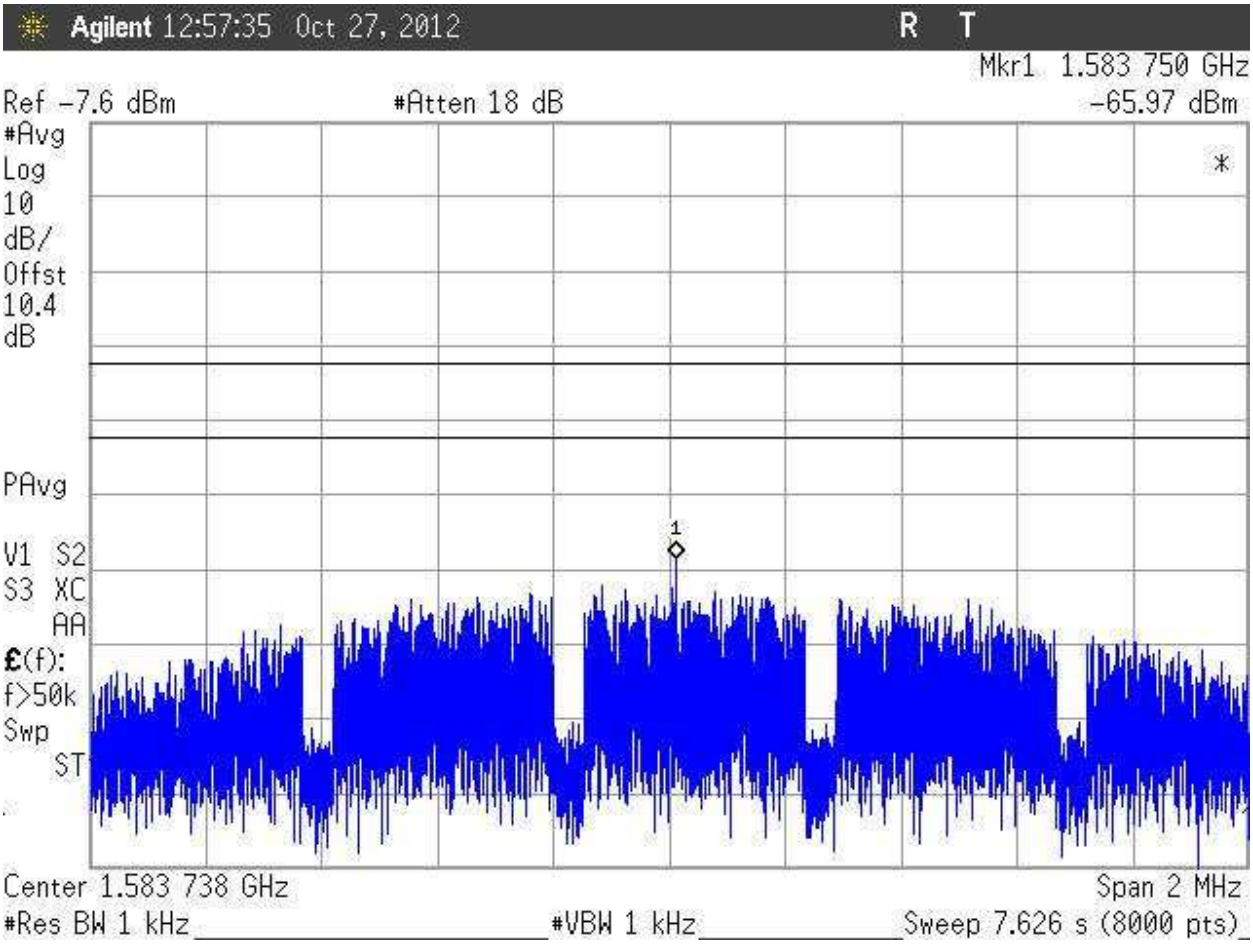


Figure 20: GPS Band, Channel B, 1583.75 MHz reduced bandwidth showing compliance with discrete limits

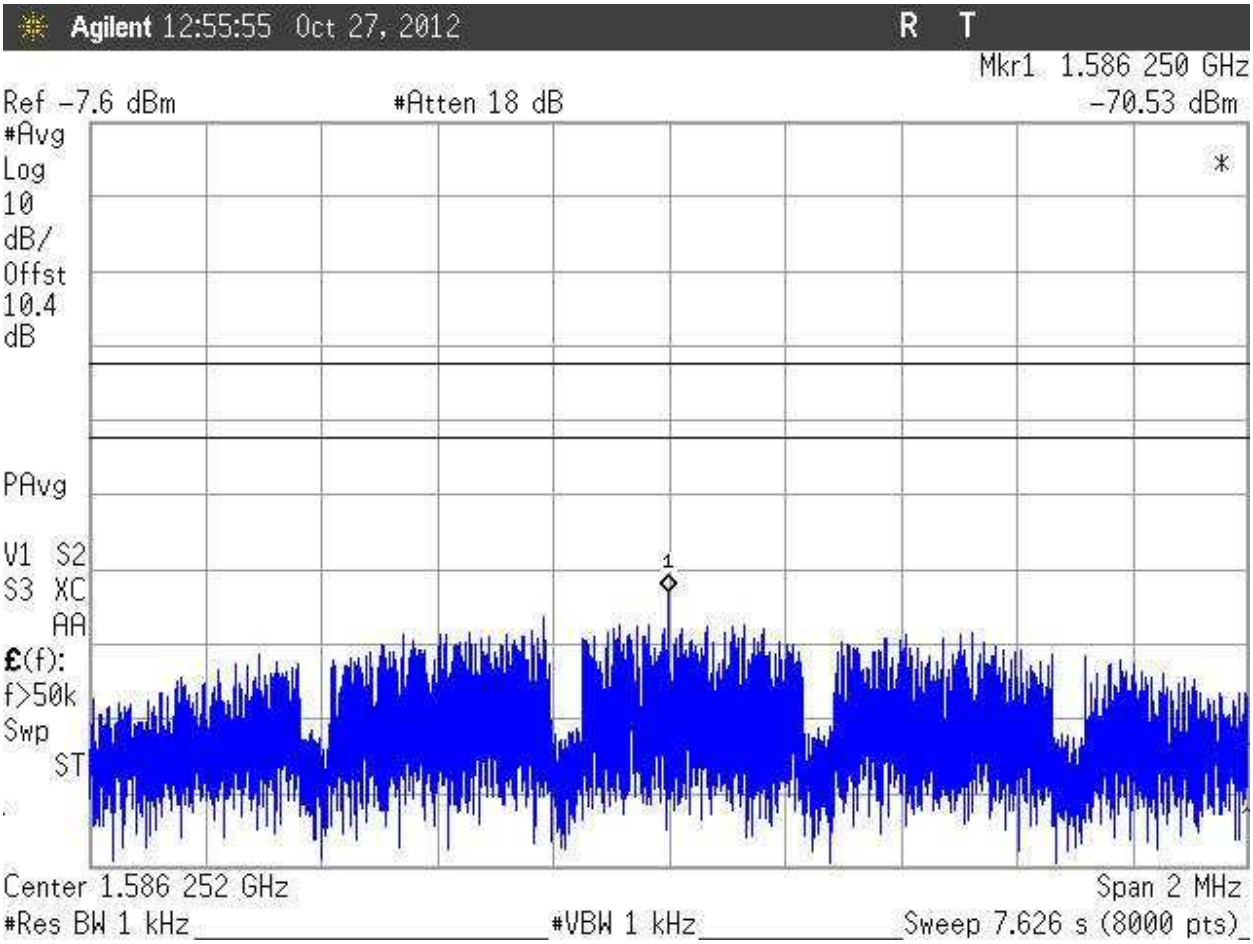


Figure 21: GPS Band, Channel C, 1586.25MHz reduced bandwidth showing compliance with discrete limits

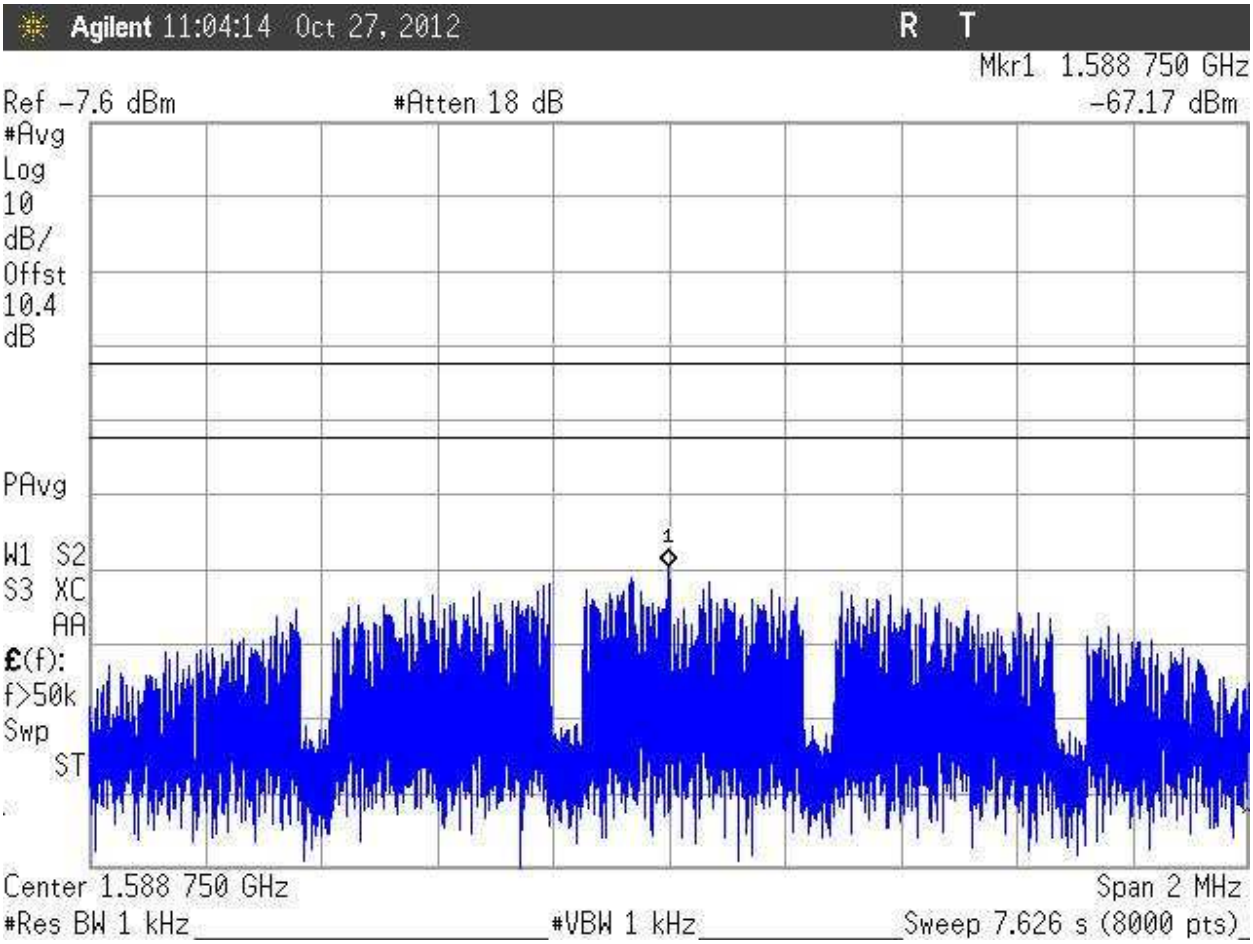
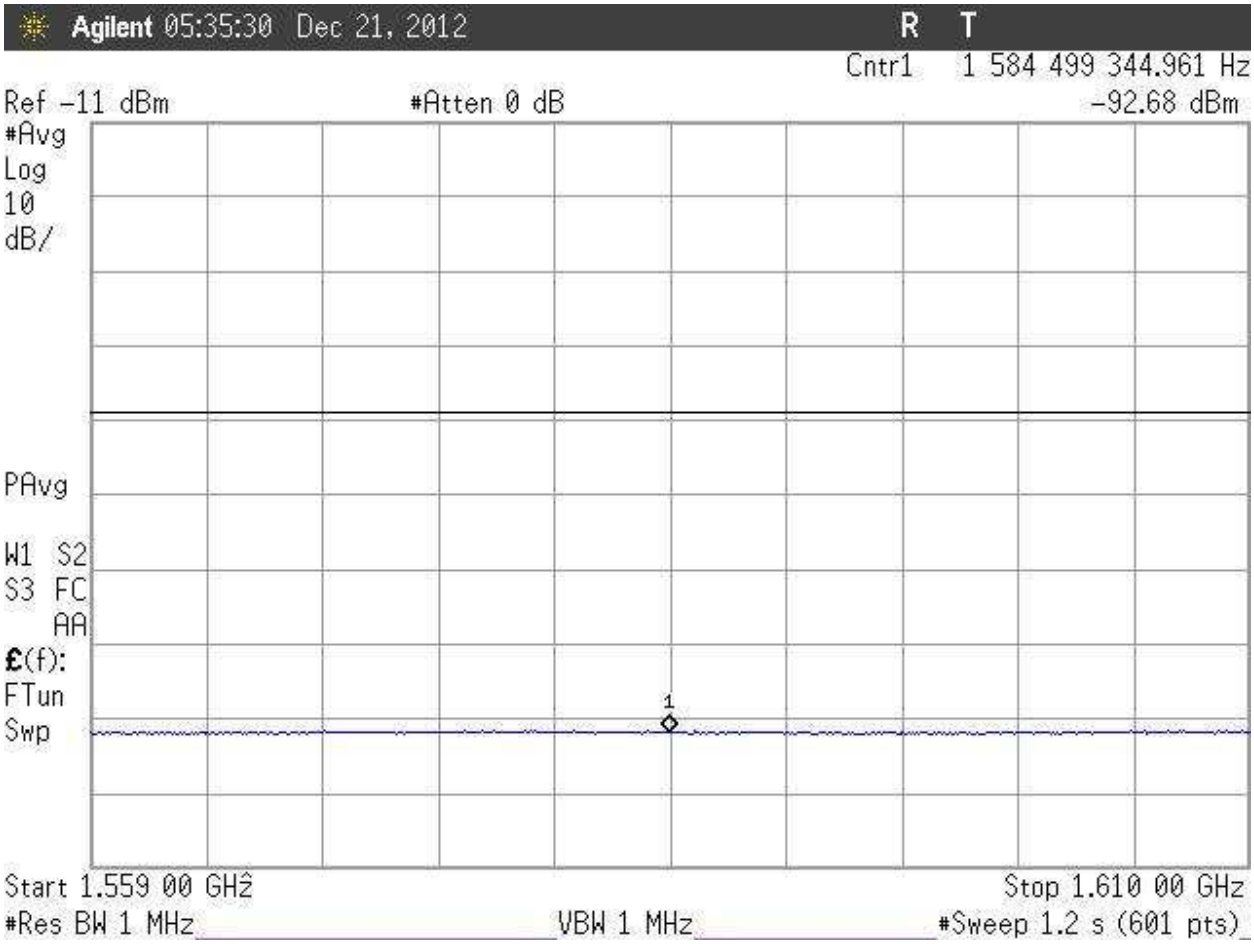


Figure 22: GPS Band, Channel D, 1588.75MHz reduced bandwidth showing compliance with discrete limits



(Limit = -50dBm [-80dBW/MHz])

Figure 23: GPS Band Carrier Off

