

CE Compliance Test Report

Commercially Available Amateur Radio

Model: FLEX-6300

Type: Base Station Transceiver

For

Flex-Radio Systems
Of Austin, Texas

By

Austin EMC – Austin Texas

Date of Test 26 March 2014

Date of Report 31 March 2014

Tested in Accordance with

ETSI EN 301 489-1 V1.8.1 (2008-04) (harmonized)

ETSI EN 301 489-15 V1.2.1 (2002-08)

(Harmonization candidate)

ETSI EN 301 783-1 V1.2.1 (2009-07) (draft)

ETSI EN 301 783-2 V1.2.1 (2010-07) (harmonized)

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"CE" marked devices meet the essential requirements of Directive 1999/5/EC



The exclamation point warning symbol means that the system is to be operated in a non-harmonized frequency band and/or according to the laws of the telecommunications authority in the country of use.

Please ensure that you have acquired the device for the use and approved operation, and that the respective national frequency allocations are respected. See also the warning on page 3 of this guide.

Waste Disposal

The device may not be disposed of with household waste! This device complies with EU Directive on Electronic and electrical equipment (WEEE regulation) and will therefore not be disposed of with household waste. Dispose of the device at your local collection points for electronic equipment!



CE European Union Declaration of Conformity

FLEX-6300 Amateur Radio Transceiver

According to Radio and Telecommunications Terminal Equipment Directive, (R&TTE) 1999/5/EC - using the Standards:

EN 301 489-1 v1.8.1 (2008-04)
EN 301 489-15 v1.2.1 (2002-08)
EN 301 783-1 v1.2.1 (2009-07)
EN 301 783-2 v1.2.1 (2010-07)
EN 60950-1 : (2011)

Type of Equipment: Base Station
Equipment Class: B

WE THE UNDERSIGNED HEREBY DECLARE THAT THE EQUIPMENT SPECIFIED ABOVE CONFORM TO THE ABOVE STANDARDS.

FlexRadio Systems Date of Testing: March 26, 2014

FlexRadio Systems, 4616 W. Howard Lane, Ste. 1-150, Austin, Texas 78728 U.S.A.

Person Responsible: Gerald Youngblood (Signature on file)

**Notification of the placing on the market of radio equipment using not harmonized
frequency bands
(Article 6.4. of the R&TTE Directive)**

Person placing equipment on the market

Company/name	Bronze Bear Communications, Inc. DBA FlexRadio Systems
Country	USA
Postcode	78728
Town	Austin, TX
Street	4616 W. Howard Lane Building 1,Suite150
Telephone	512-535-4713
Fax	512-233-5143
E-mail	gerald@flex-radio.com

Contact person

Name Klaus Lehmann, FlexRadio Systems Representative for EU
Telephone 04751 - 900501
Fax 04751 - 998569
E-mail Klaus_Lohmann [FlexRadio-EU@t-online.de]

Notified radio equipment

Type number	FLEX-6300
Manufacturer	FlexRadio Systems
Intended use	Amateur Radio Equipment
EU Member States in which operation is planned	All
EU Member States in which placing on the market is planned	All
Standards/test suites applied	EN 301 489-1 and EN 301 489-15

Radio equipment characteristics

Frequency band(s)	All amateur radio bands from 160m through 6m
Operating frequency/ Frequencies	Amateur radio bands from 1.8 MHz through 54 MHz
Channel spacing/ bandwidth	N/A
Transmit power	100W PEP
Type of modulation	CW, SSB, AM, FSK, NBFM
Type of antenna	User supplied
Mode of operation	Simplex
Duty cycle	Full duty cycle

Equipment Under Test (EUT) Information

Brand Name :	FlexRadio
Product Name :	Amateur Transceiver
Model Name or Number :	Flex-6300
Serial Number :	1214-4013-6300-0001 with ATU Option Installed
Type of Equipment :	Amateur Radio Base Station
External Power Supply :	User supplied
Power Input Source :	13.8 Volts DC

EUT Technical Specifications, General

Operating Frequency Range, Receive:	30 kHz – 54 MHz
Performance Frequency Range, Receive:	160m – 6m Bands
RF Input Impedance (Bypass)	50 Ohms, unbalanced
Frequency Stability:	+/- 0.5 ppm
Operating Temperature Range	0 – 50 Deg. C, 32 – 122 Deg. F
Emission Modes:	A1A (CW), A3E (AM), J3E (LSB, USB) F3E (FM), F1B (RTTY)
Frequency Steps:	1 Hz Minimum
Power Consumption:	Rx 1.5A (typ.); Tx (100 W) 23A (max.)
Supply Voltage:	13.8 Volts DC +/- 15% Negative Ground Transmitter output specified at 13.8 VDC

EUT Technical Specifications, Transmitter

Power Output:	1 – 100 watts PEP CW and SSB at 13.8 VDC input voltage 2-25 Watts Continuous Modes
Frequency Range	Ham Bands 160m – 6m
Frequency Transverter Port	100 kHz – 54 MHz
Power Transverter Port	0 – 10 dBm
Emission Modes / Types:	A1A (CWU, CWL), J3E (USB, LSB) A3A (AM), FR3E (FM), Digital
Modulator:	DAC 16 Bits, 122.88 Msps
Harmonic Radiation:	Better than -60 dB (160 – 10m) Better than -70 dB (6m)
SSB Carrier Suppression:	At least 80 dB below peak output
Undesired Sideband Suppression:	At least 80 dB below peak output
Audio Response (Voice Modes):	Default 300-2700 Hz., Var. 50 – 10000 Hz.
Microphone Impedance:	600 Ohms Nominal (200 to 10 K Ohms)
ATU (OPTION) 160- 10m	5 – 500 Ohms Real and Reactance
ATU (OPTION) 6m	16.7 – 150 Ohms Real and Reactive

EUT Technical Specifications, Receiver

Circuit Type:	ADC 16 Bit 122.88 Msps
Intermediate Frequency:	N/A
14 MHz Preamplifier off/on MDS:	-118 dBm/-135 dBm in 500 Hz
Selectivity	(-6 to -60 dB) CW 500Hz 503/505, SF:1.0039
SSB	(-6 to -60 dB) 2.4 kHz 2.403/2.405, SF:1.0008
AM	(-6 to -60 dB) 6.6 kHz 6.603/6.605, SF:1.0003

EUT Technical Specifications, Physical

Dimensions: (WxHxD)	13" x 3" x 11.8" (33 x 7.6 x 30 cm)
Weight: (approx.)	10 lbs. (4.5 kg)
Maximum Interconnect Cable Length	Ethernet – 10 feet (3m)
DC power cable	3 feet (1m)

List of EUT External Ports

Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-Shielded)
13.8 Volt DC Power In	1	PowerPole	Non-Shielded
Ant	2	SO-239	Shielded
Transverter IF	1	BNC	Shielded
USB 2.0	2	USB=AF	Shielded
Ethernet 1 Gb	1	Ethernet-F	Non-Shielded
Audio Line Out Stereo	1	3.5mm-F	Shielded
Accessory	1	DB-15-F	Shielded
Transmit Relay Control	4	RCA-F	Shielded
Microphone In Unbalanced	1	8-Pin Cir	Shielded
Headphones Stereo	1	1/4"	Shielded
CW Key/Paddle Stereo	1	1/4"	Shielded

Ancillary Equipment

Astron Power Supply RS-35M
Bencher CW Paddle
Hand Microphone
Headphones
Dell Laptop Computer
Display
Keyboard
Accessory Cable 1m
Ethernet Cat-5 Cable Non-Shielded 1m
3 RCA Cables 1m ea. Shielded
1 RX BNC Terminators 50 Ohm
2 SO-239 Terminators 50 Ohm
Accessory Cable DB-15 1m
PTT Cable 1m w/Switch

Climate Test Conditions

Temperature: Degrees 70F
Humidity: 50 Percent
Pressure: 29.9" IHG

Operational test conditions and test signals

Operating Power:	25 Watts Carrier in Transmit
Operational Software:	Smart SDR Version 1.1
Special Hardware:	None
Test Frequencies:	1.9, 14.175, 28.85, 52 Mhz.
Antenna Conducted, Receive:	Terminated in Spectrum Analyzer
Antenna Conducted, Transmit:	Terminated in Attenuator, then SA
Radiated Emission, Case,	Terminated Antenna Port
Mains Conducted Emission,	Terminated Antenna Port

Modifications Required for Compliance

No Modifications were required.

EUT Front View FLEX-6300



EUT Rear View FLEX-6300



Summary of EMC Compliance

Standard Test Description	Pass?
EN 55022 B DC power in Conducted Emission, Receive	Yes
EN 55022 B DC power in Conducted Emission, Transmit	Yes
EN 301 783 Radiated Emission, Transmit	Yes
EN 301 783 Radiated Emission, Receive	Yes
EN 301 783 Unwanted Emission, Ant. Conducted, Receive	Yes
EN 301 783 Unwanted Emission, Ant Conducted, Transmit	Yes
EN 301 783 Transmit Harmonics, Conducted, Swept	Yes

Measurement Uncertainty (Expanded 95% Confidence)

AC Mains Conducted Emission .15 – 30 MHz HP8546A	+/- 2.6 dB
Radiated Emission 30 – 1000MHz HP8546	+/- 2.6 dB
Radiated Emission 1-4 GHz HP 8546A	+/- 3.5 dB
Antenna Conducted .15 – 1000 MHz HP8546A	+/- 2.6 dB
Antenna Conducted 1-4 GHz HP 8546A	+/- 3.5 dB

Calculation of Test Limits

Conducted Transmit: (Antenna port)

25 Watt = 44 dBm

As measured thru 44 dB attenuator = 0 dBm

-40 dBc = -40 dBm, -50 dBc = -50 dBm, -60 dBc = -60 dBm

(plots reference 0 dBc = 0 dBm)

Radiated, Receive Mode: (Enclosure Port)

Limit by Substitution: -57 dBm on Dipole = (2 nanowatt X 1.64 (gain of dipole)

Radiated Power is 3.28 nanowatt at 10 meter test distance

SQRT (3.28 x 30) / 10 = 31.369 uV/m or 29.9 dBuV/m (30-1000 MHz)

Add 10 dB above 1 GHz 39.9 dBuV/m

Transmit Mode: (Enclosure Port)

25 watts into a dipole = 25 X 1.64 = 41 watts ERP

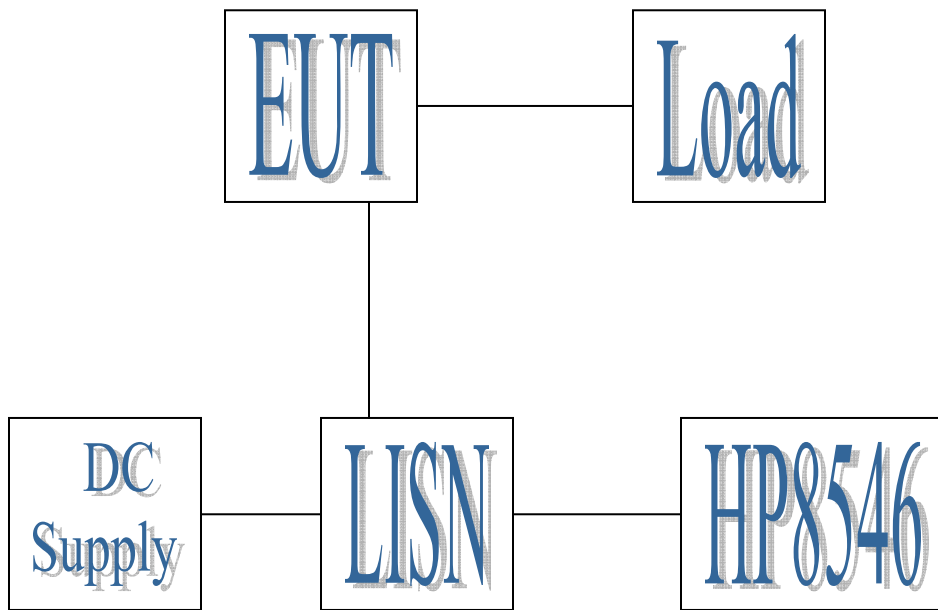
SQRT (41 X 30) / 10 = 3.5 V/m = 130.9 dBuV/m @ 10 m

43+10 Log(25w)=-57 dBc

For <30 Mhz limit is 130.9 -57 = 73.9 dBuV/m

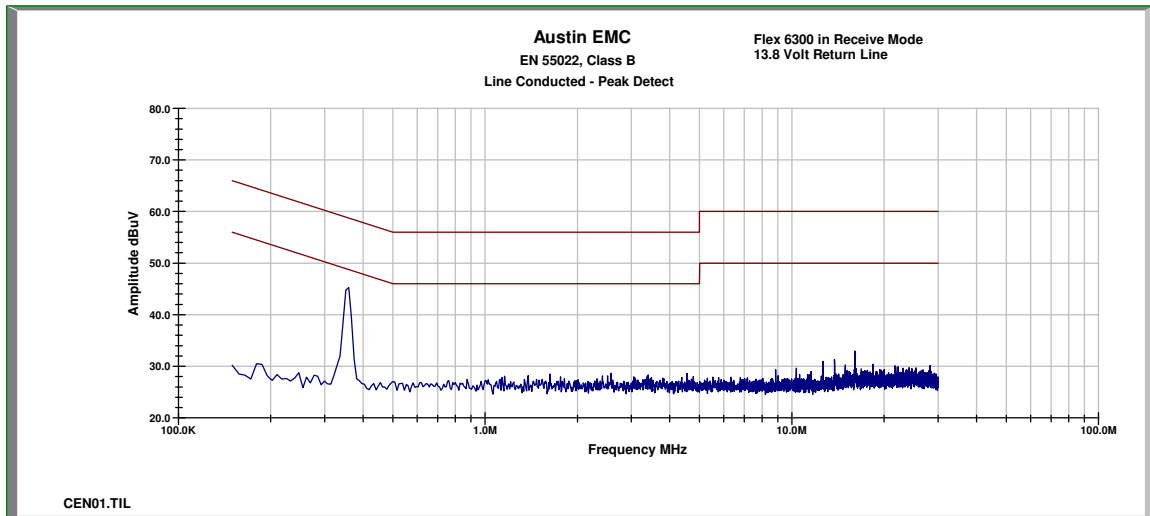
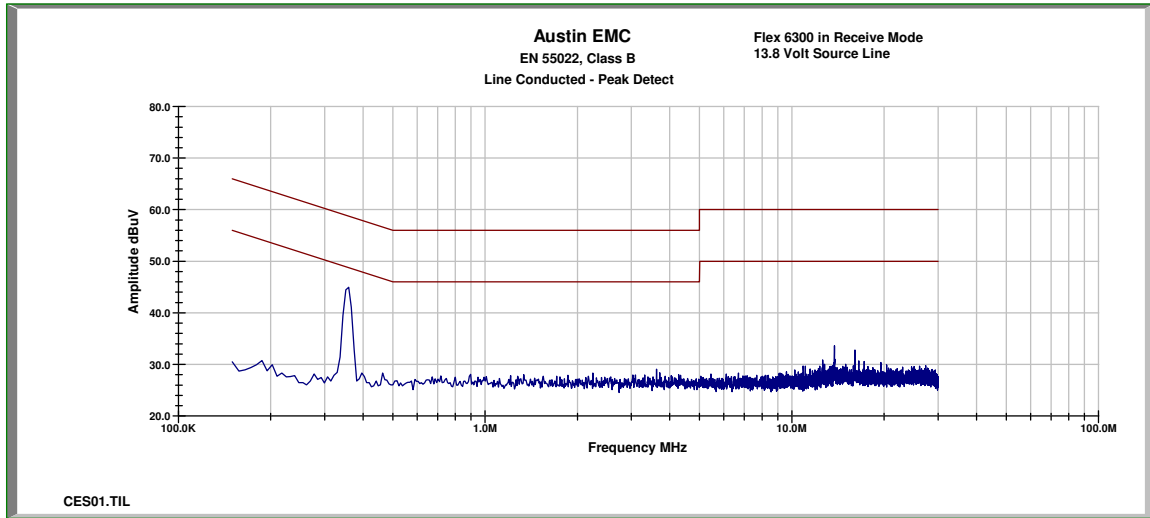
For >30 MHz limit is 130.9 -70 = 60.9 dBuV/m

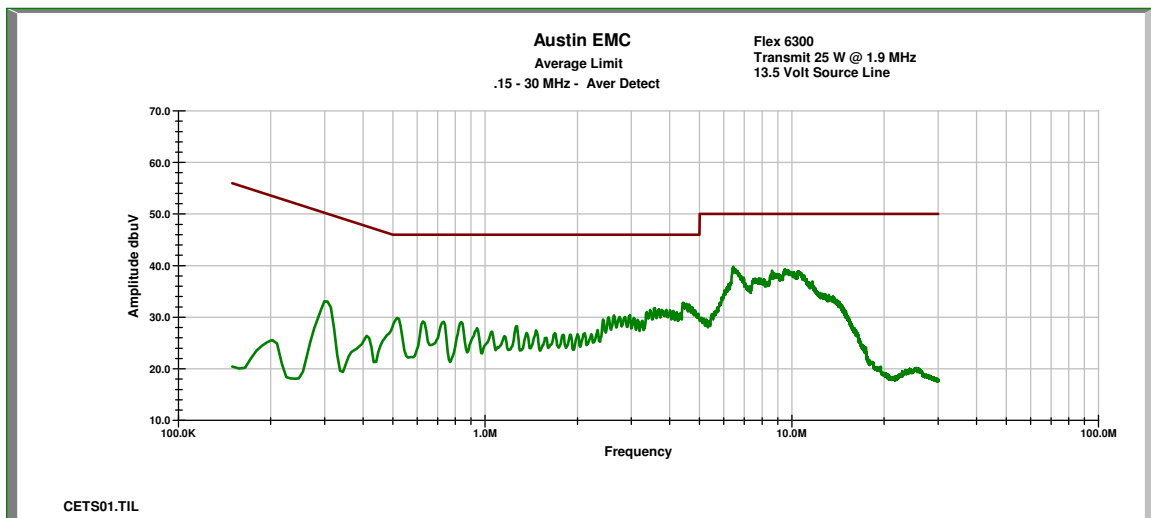
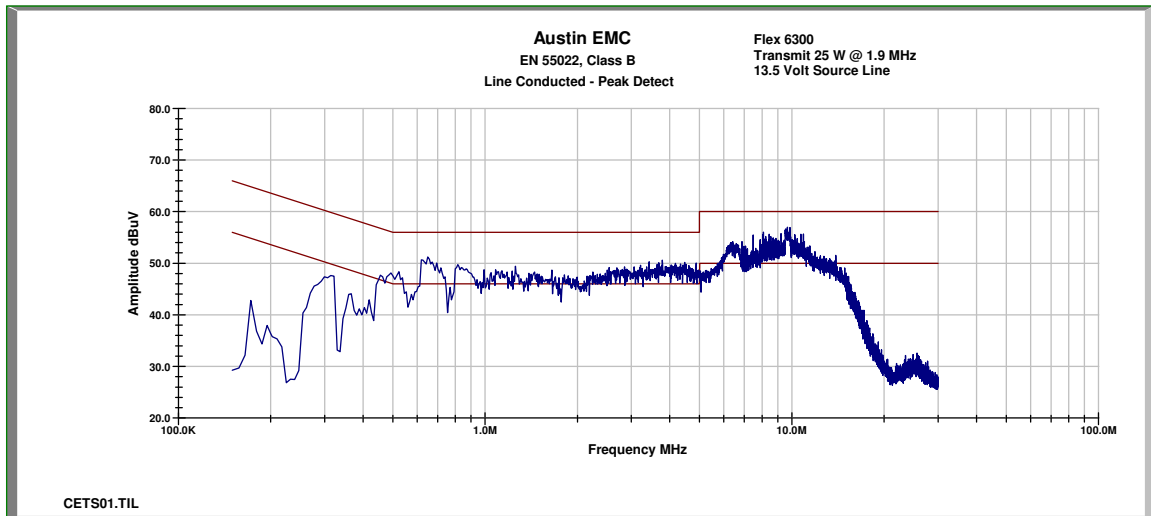
Note: Whichever is higher was translated as whichever is more stringent.

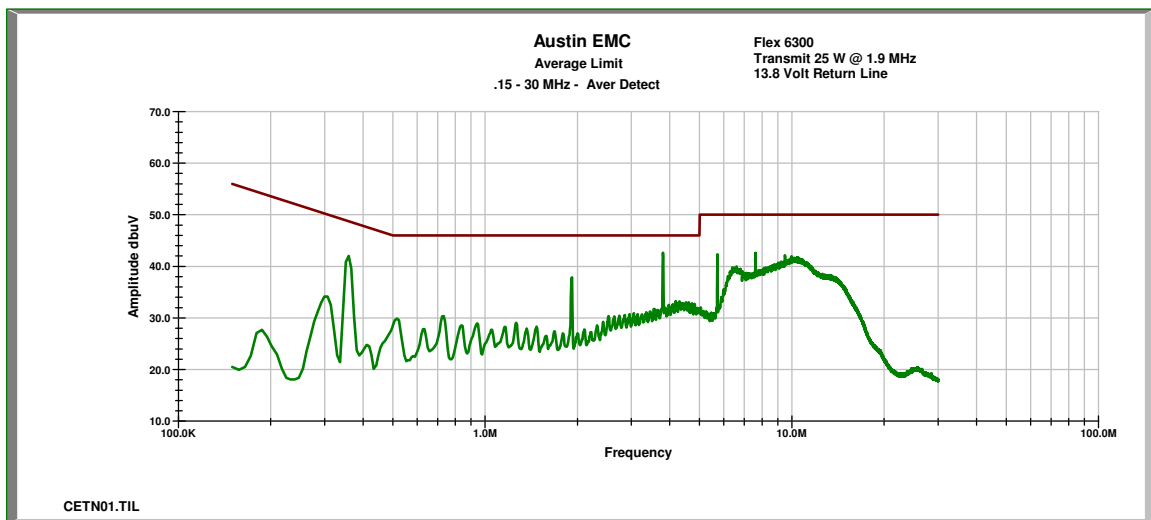
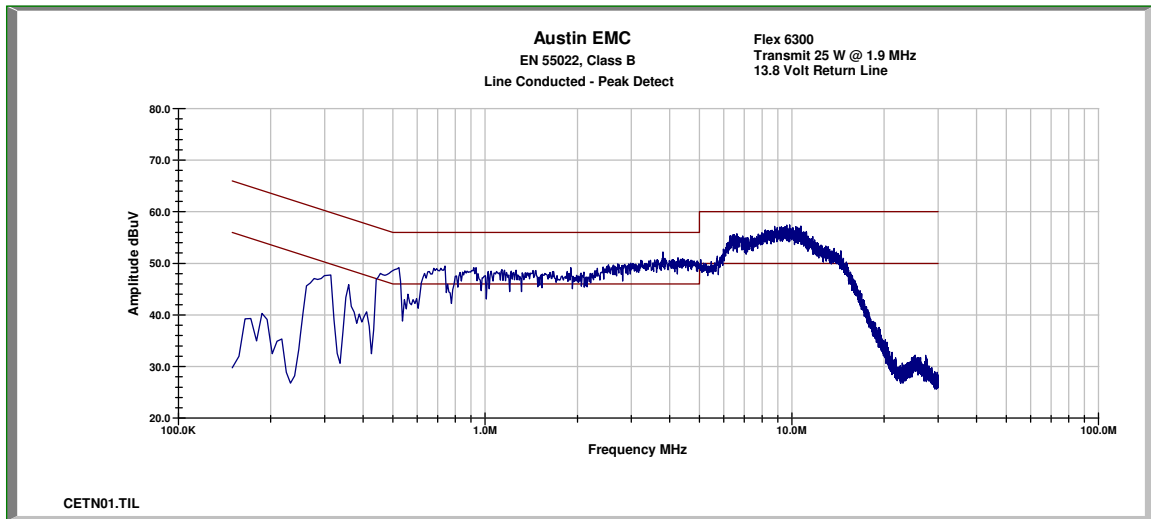


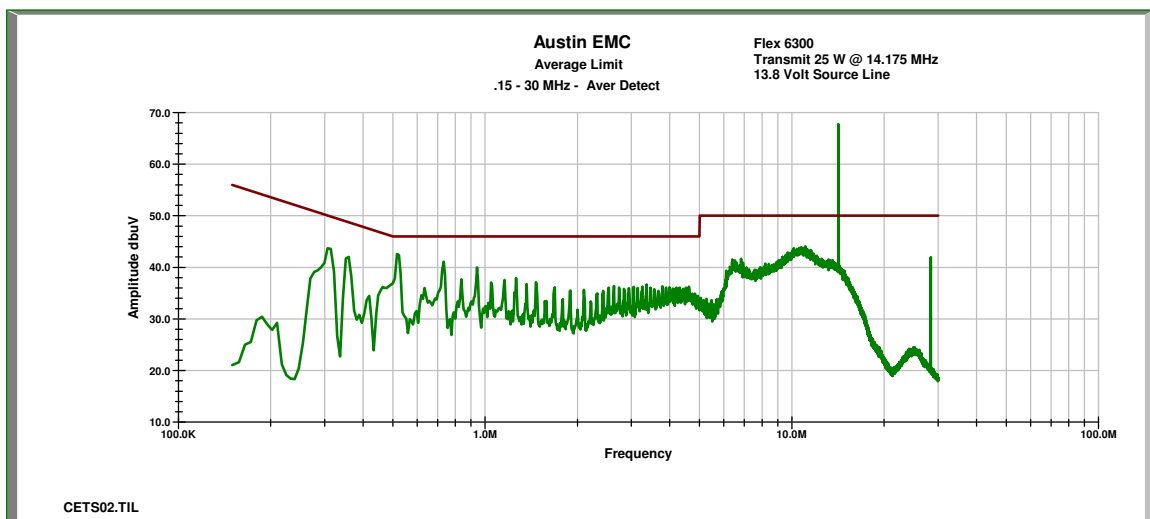
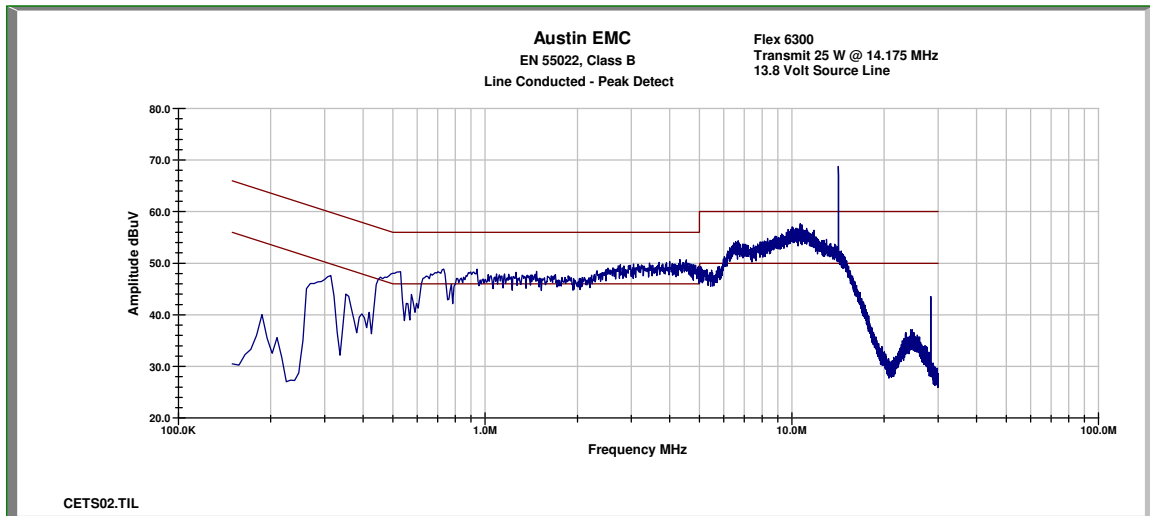
MAINS CONDUCTED TEST SETUP DIAGRAM

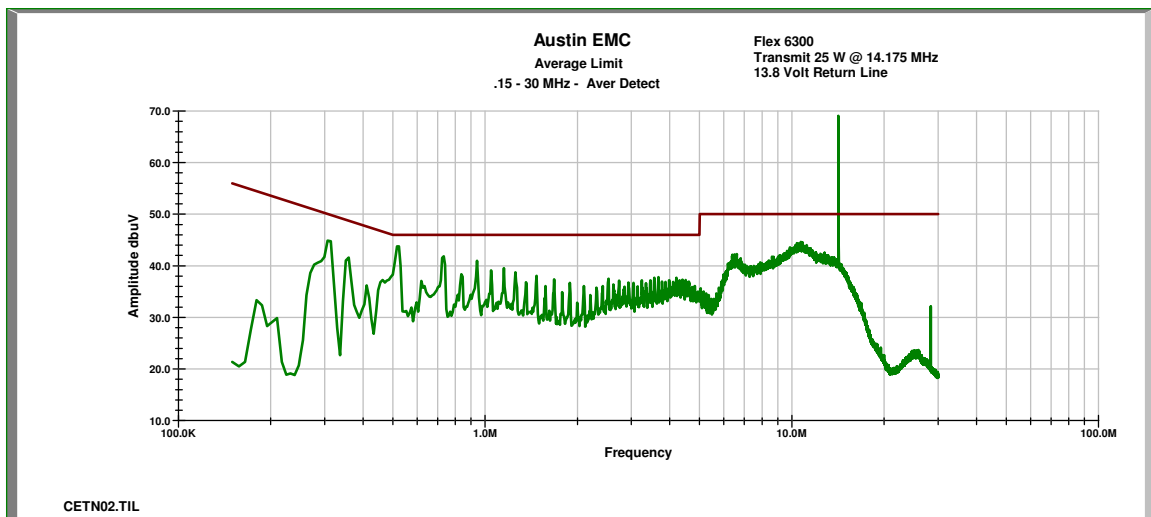
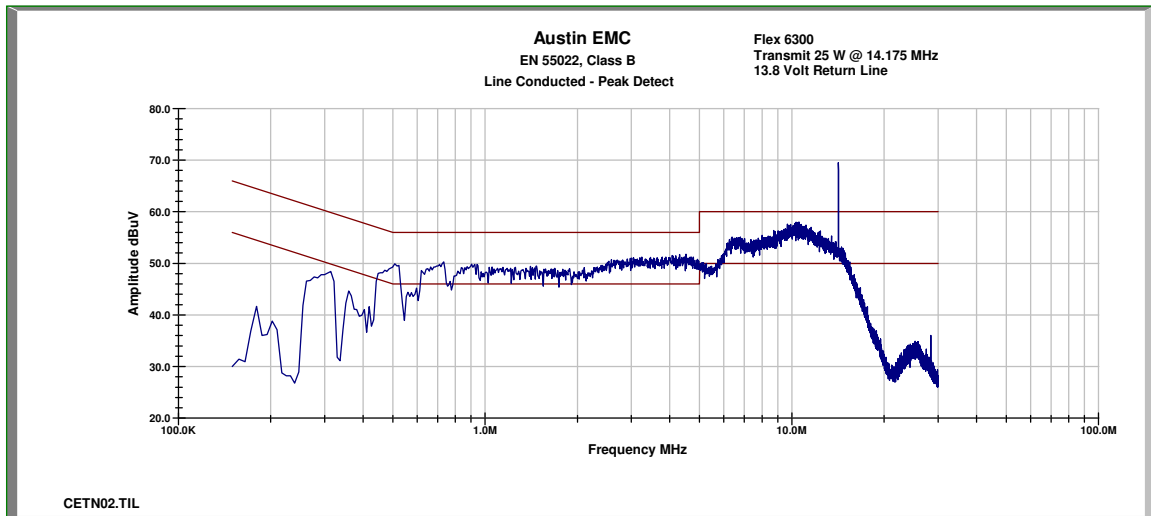
AC Conducted Emission :

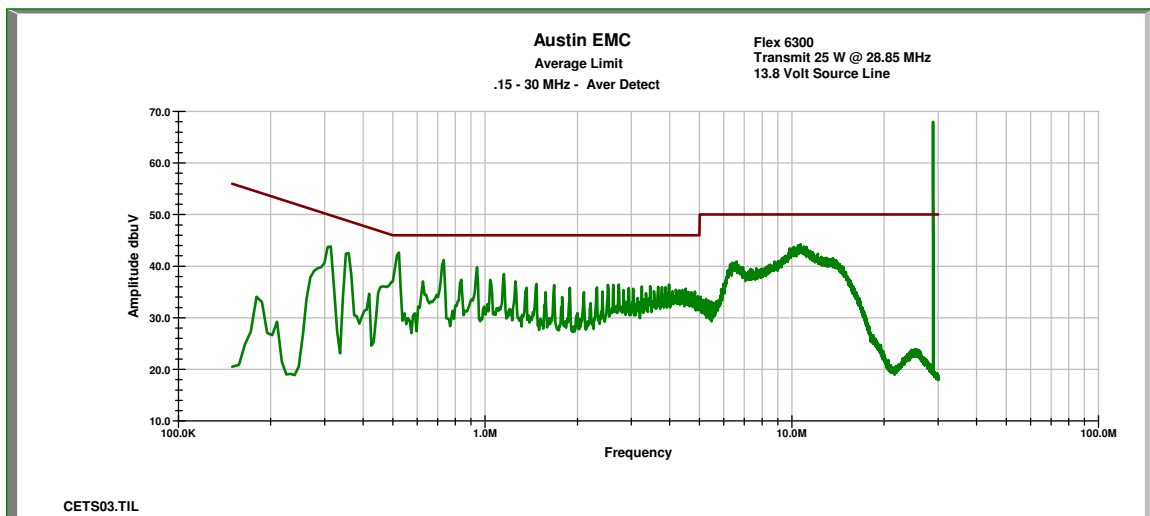
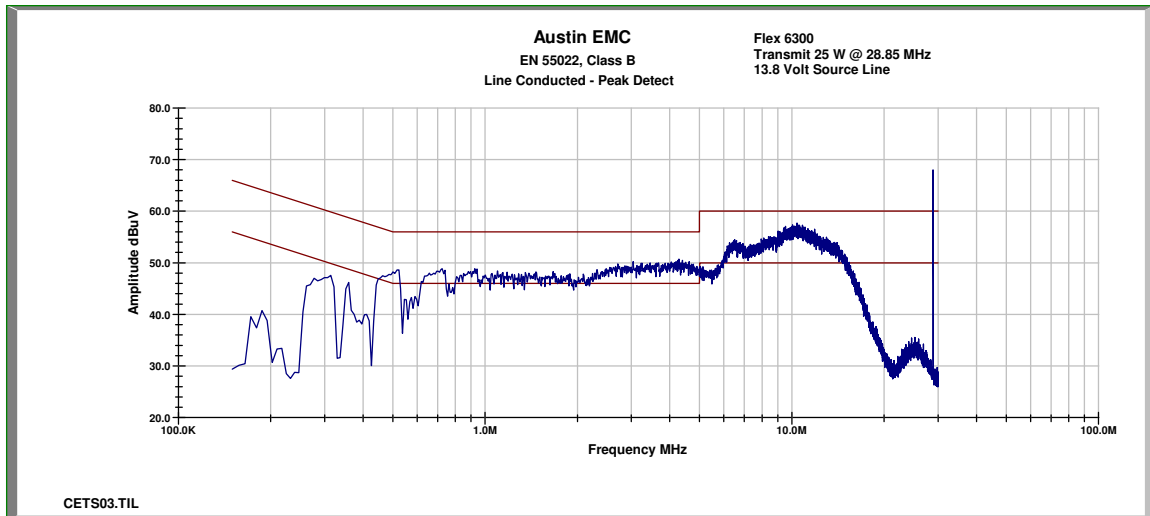


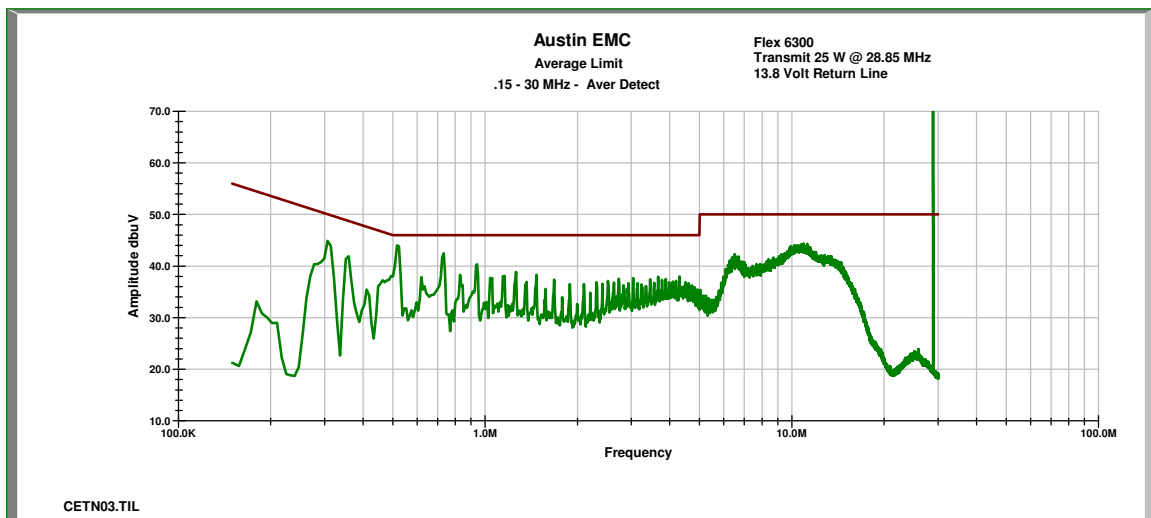
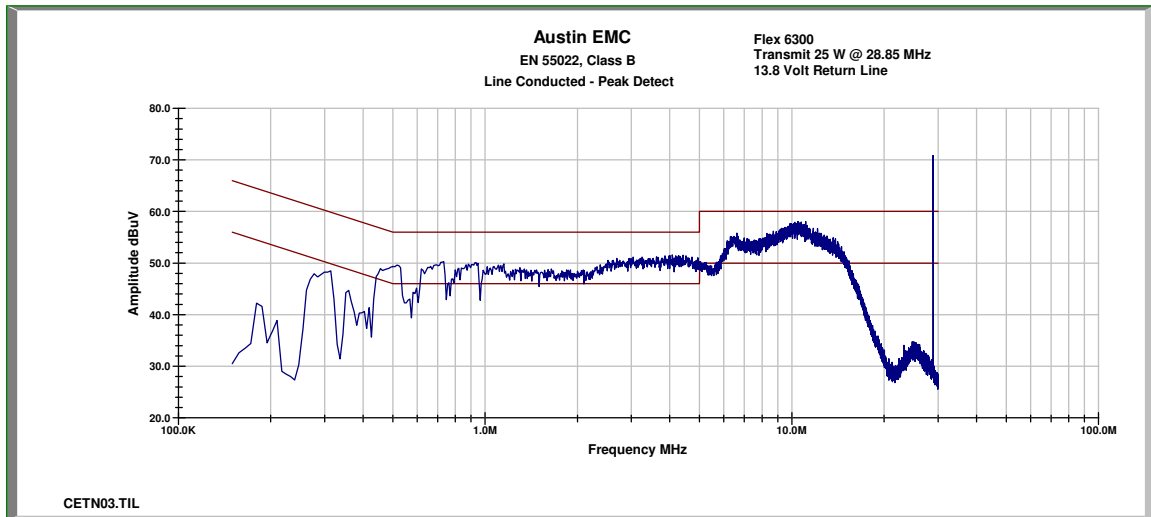


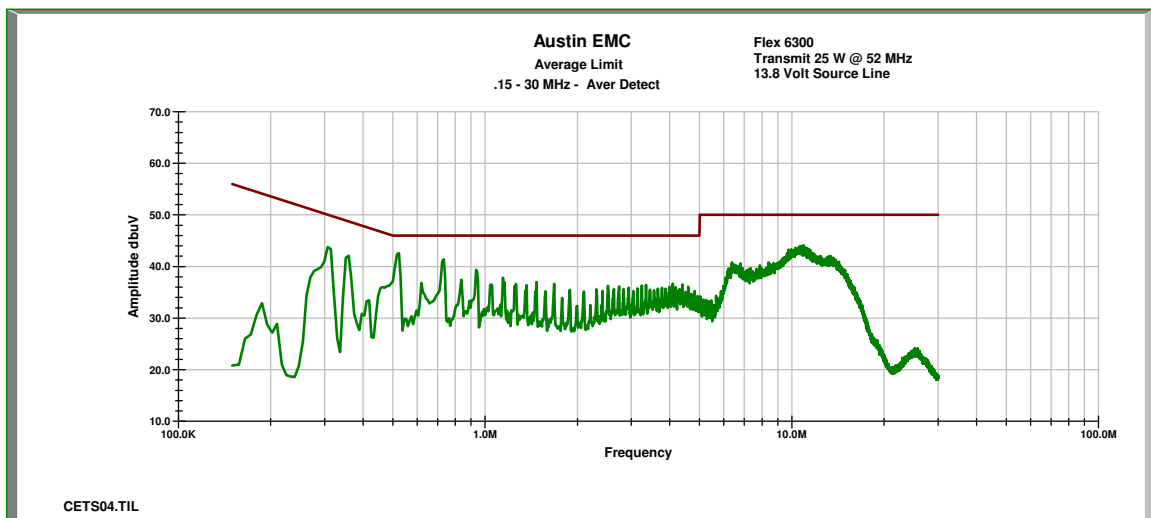
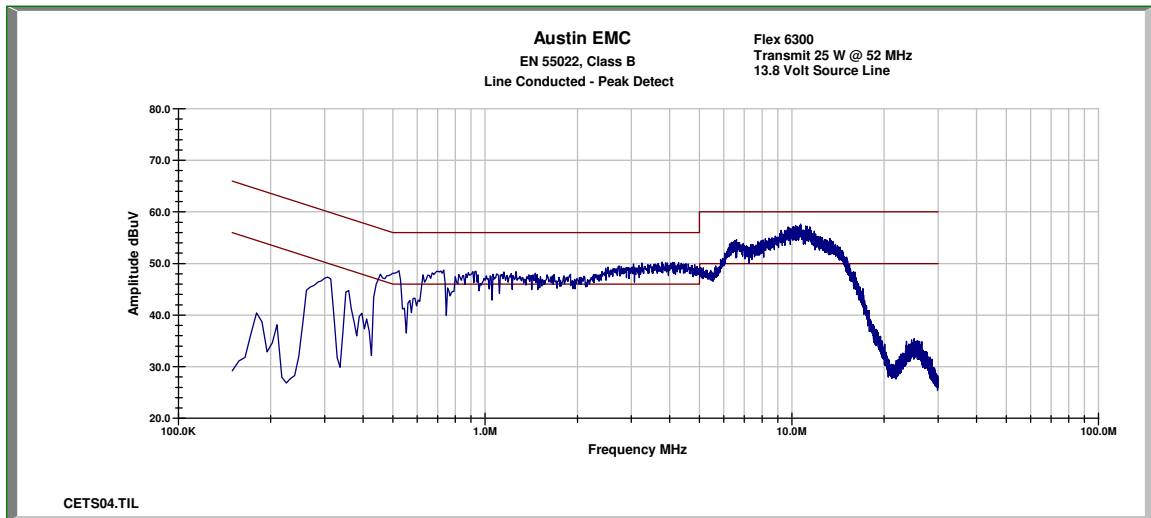


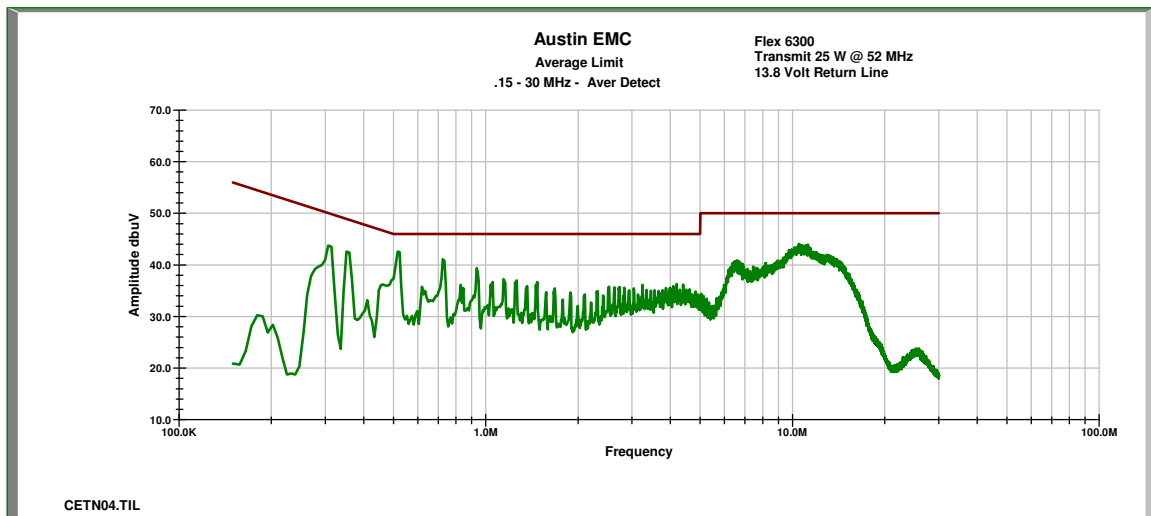
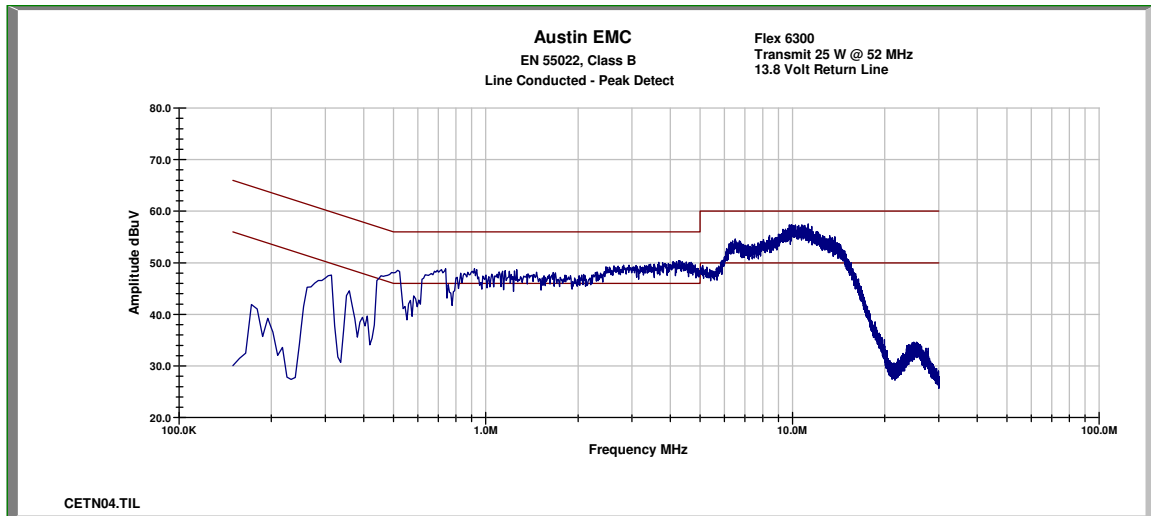














Radiated Test Setup Diagram

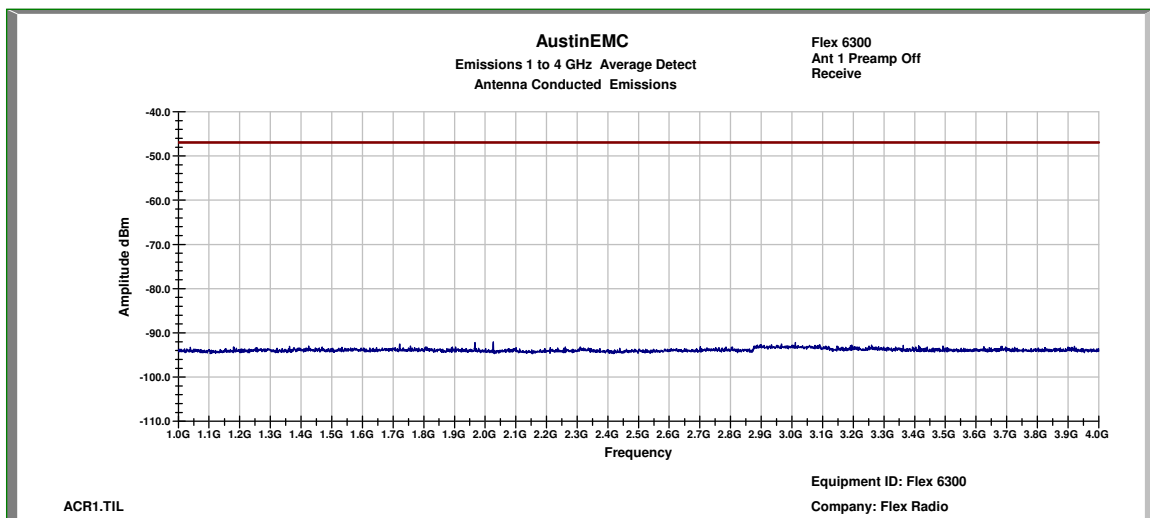
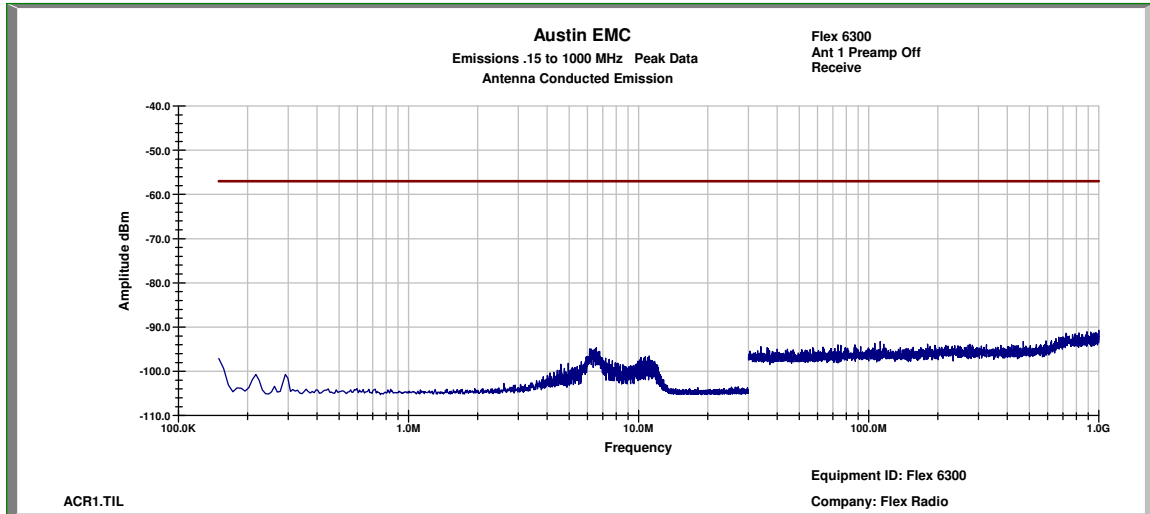


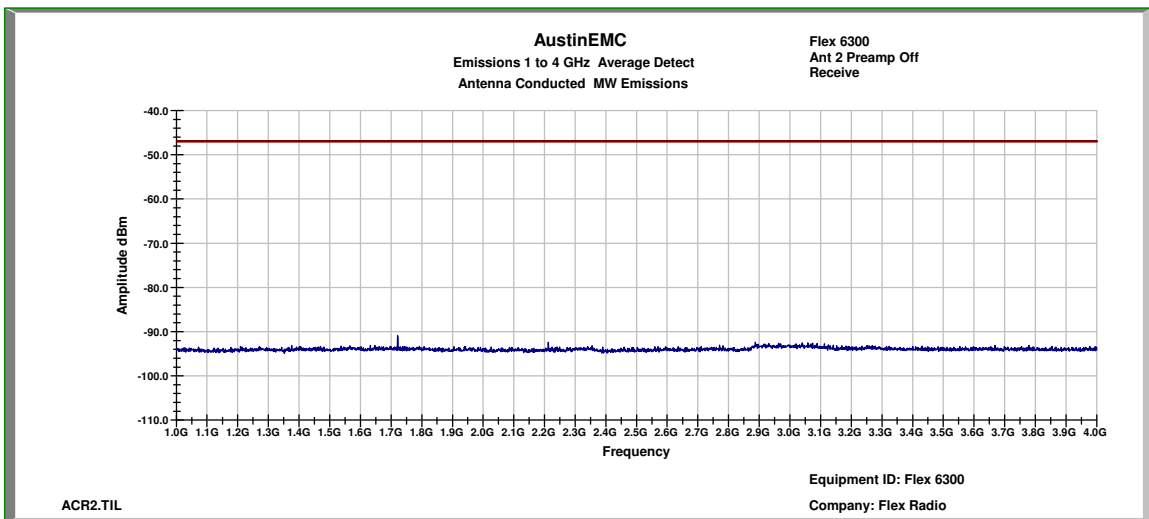
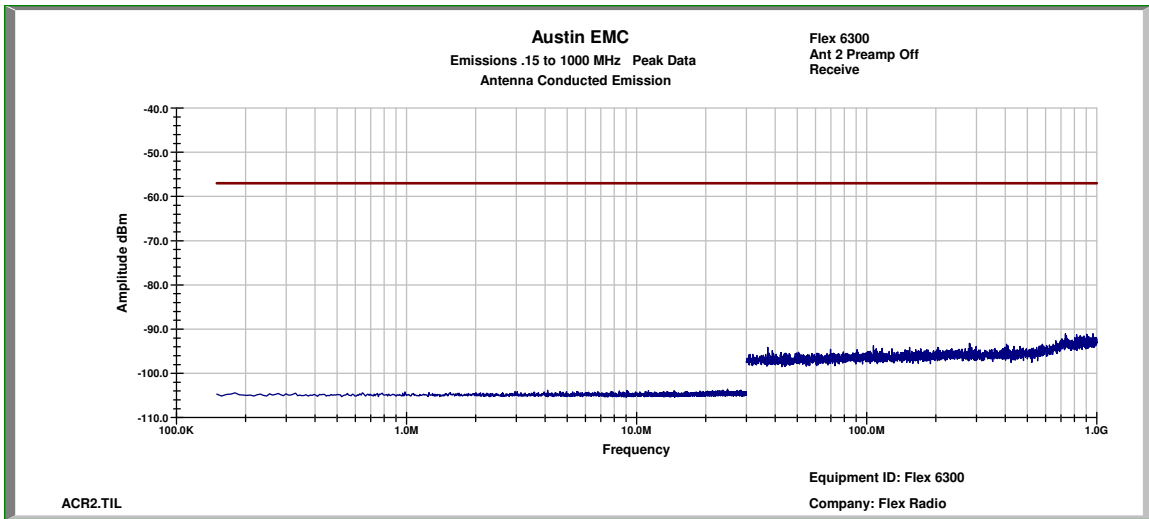
Antenna Conducted Setup Diagram: Receive

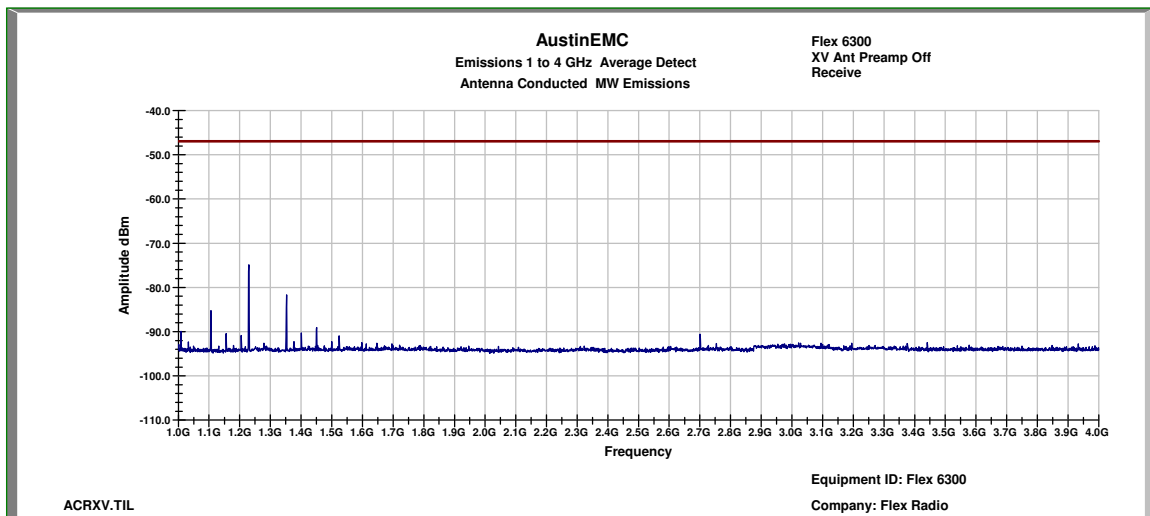
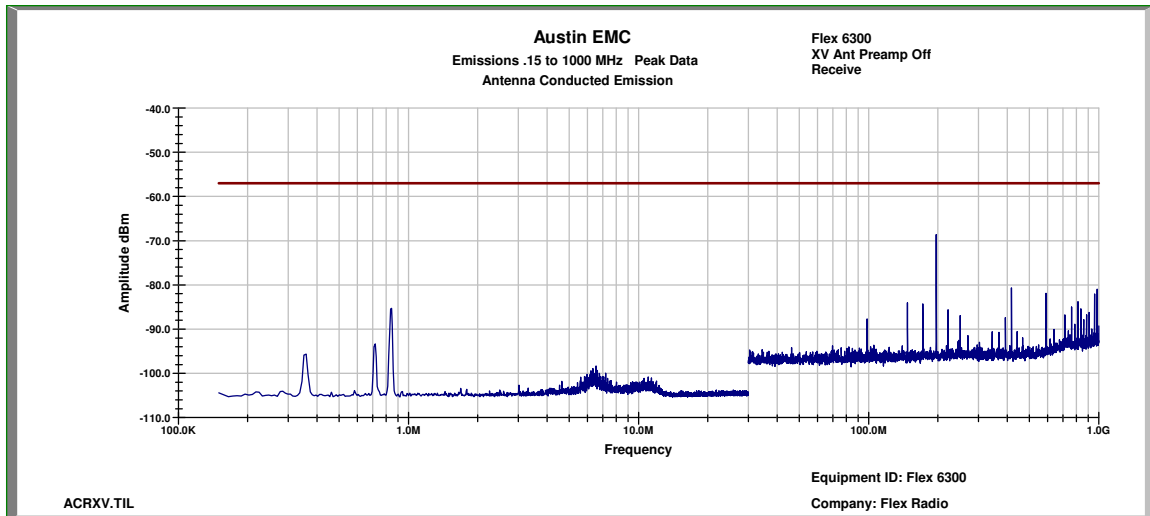


Antenna Conducted Setup Diagram: Transmit

Unwanted Emission, Antenna Conducted, Receive, Plots:

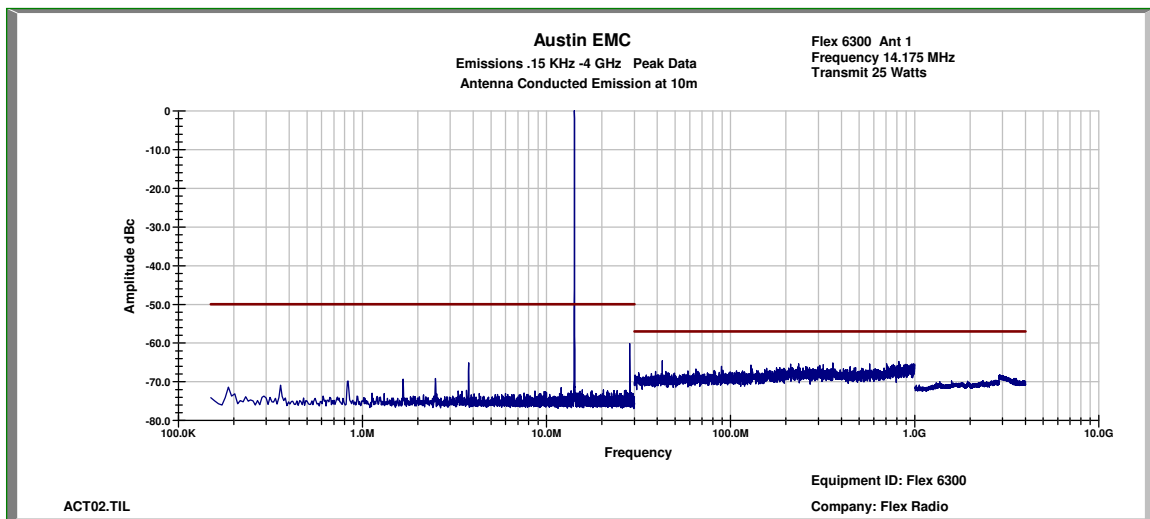
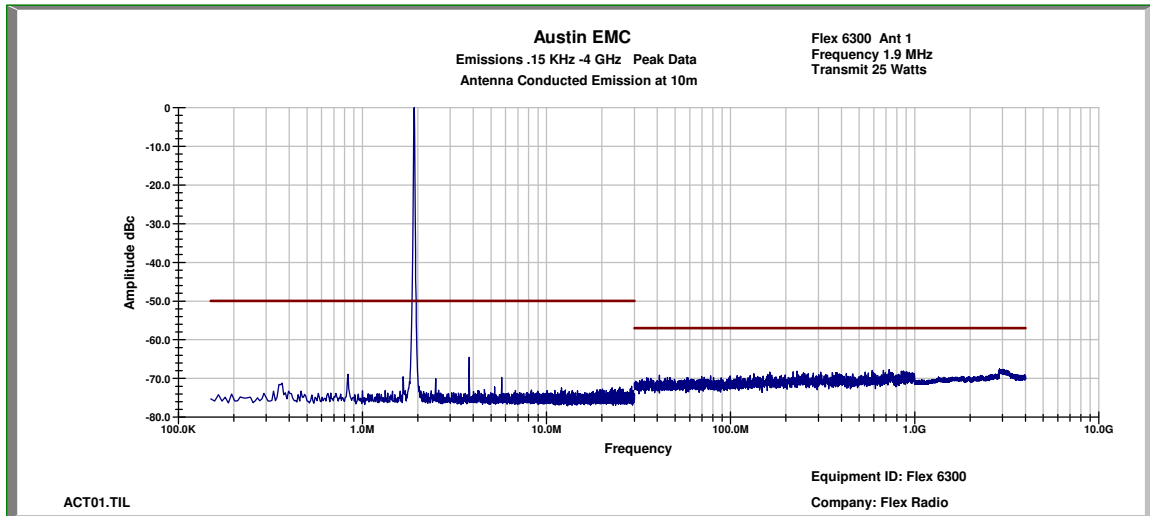


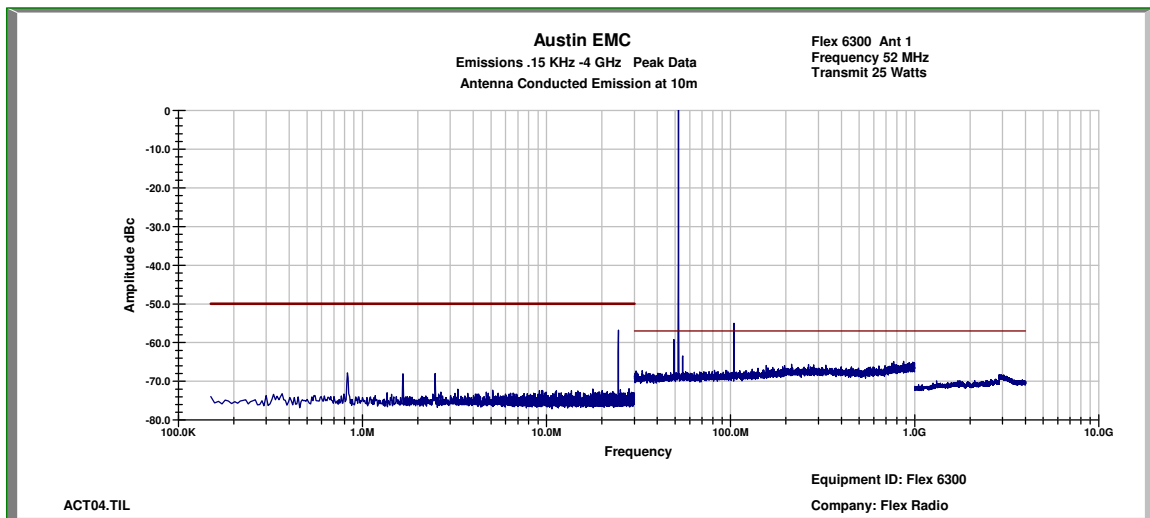
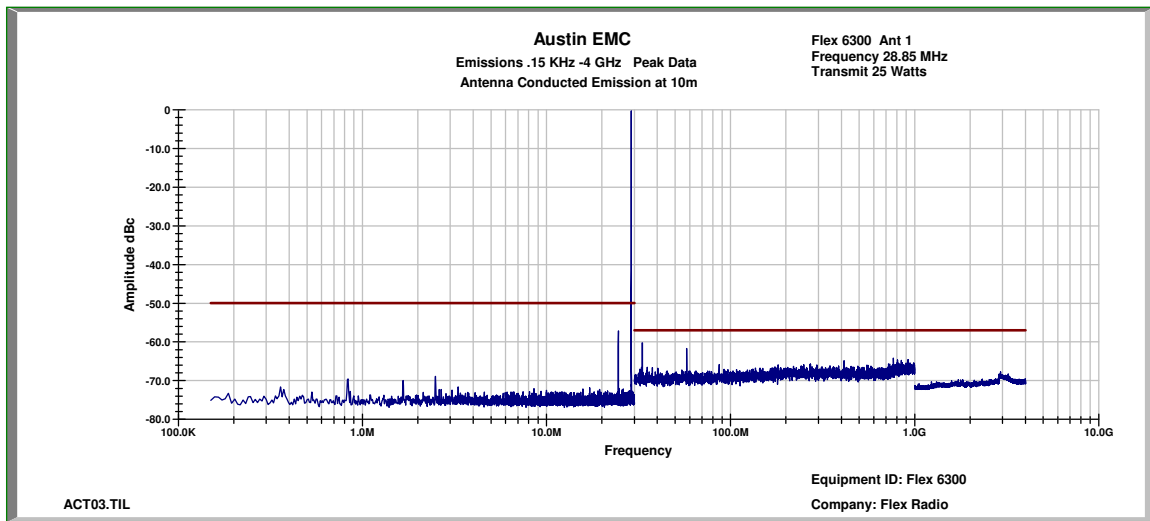




Above plot typical for all antenna ports, relay switched to same internal circuitry

Unwanted Emission, Antenna Conducted, Transmit, Plots:





Note: Fundamental Frequency is excluded from limit

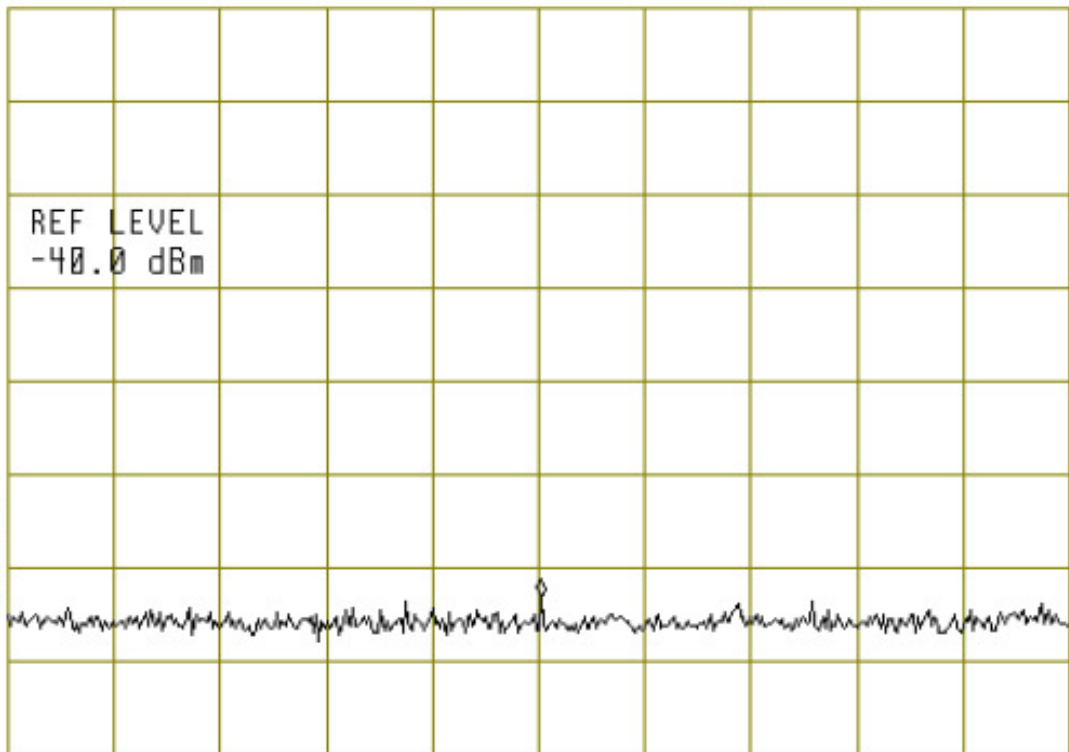
NOTE: See the following Page for higher dynamic range measurement of second and third harmonics using a notch filter at the fundamental frequency.

15:34:15 MAR 26, 2014

MKR 104.03 MHz
-103.13 dBm

REF -40.0 dBm AT 10 dB

PEAK
LOG
10
dB/



CENTER 104.00 MHz

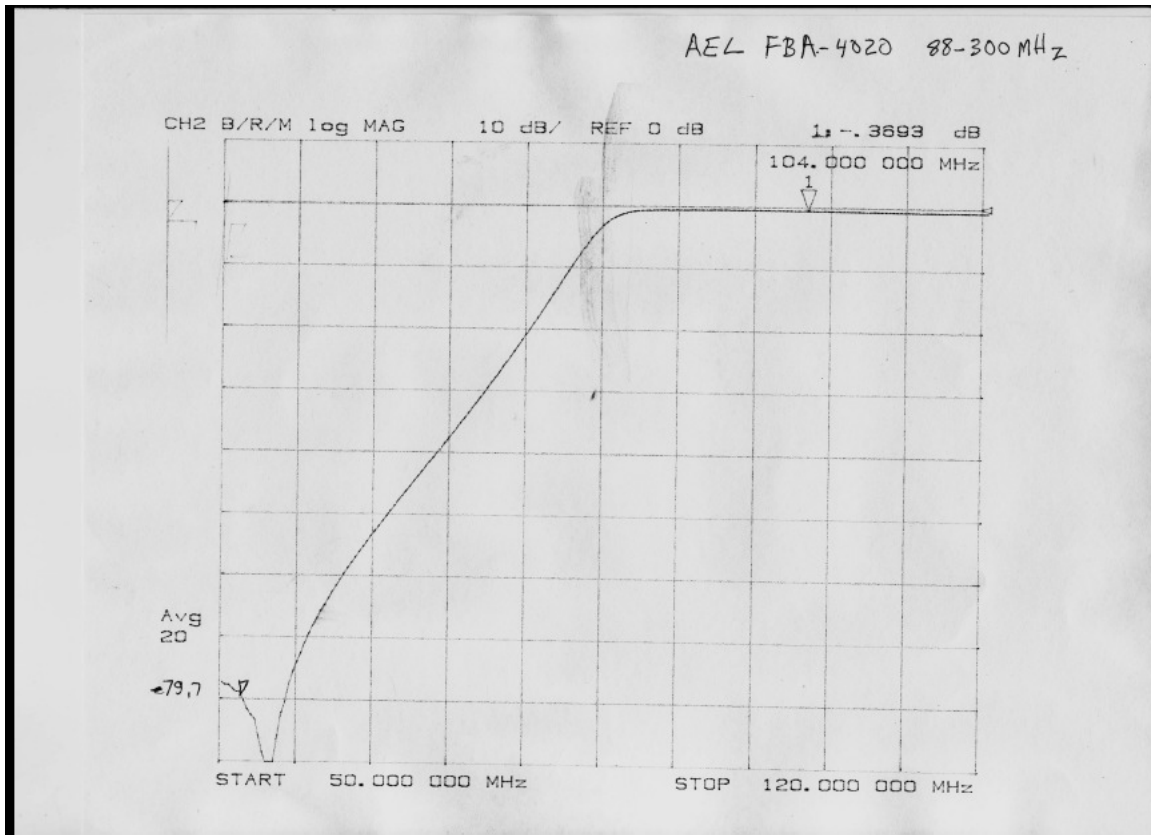
#RES BW 1.0 kHz

VBW 1 kHz

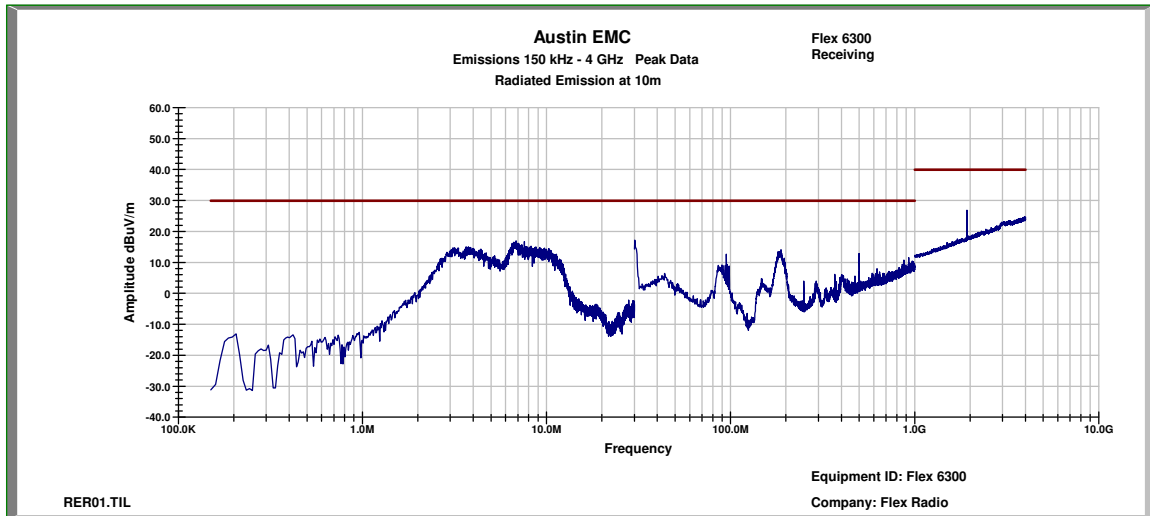
SPAN 10.00 MHz

SWP 30.0 sec

The HP 8546A spectrum analyzer used in the above test does not have sufficient dynamic range to accurately measure the second harmonic at 104 MHz at the specified power levels and swept frequency bandwidth. A 88-300MHz bandpass filter inserted in line to measure the 104MHz second harmonic.

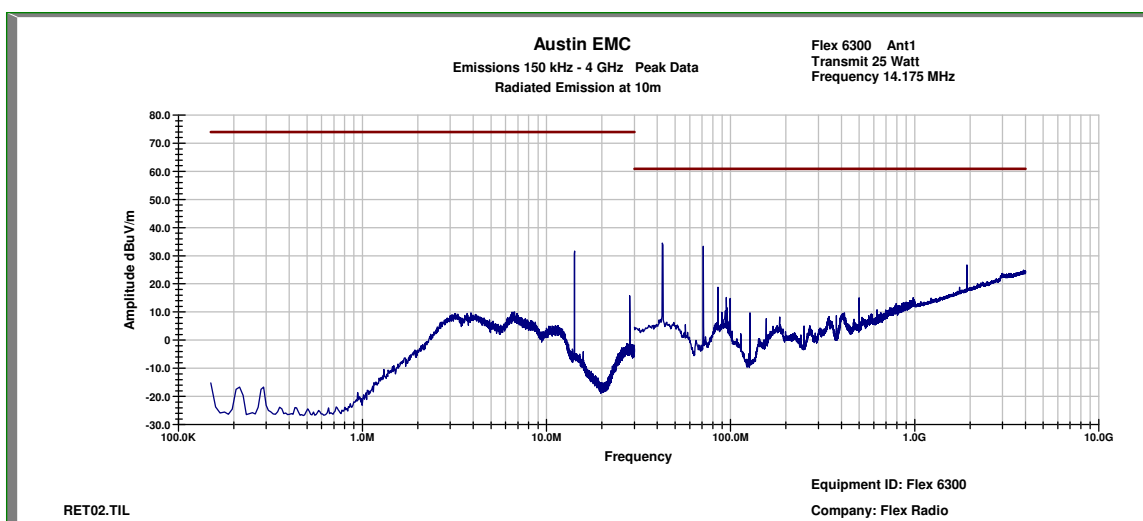
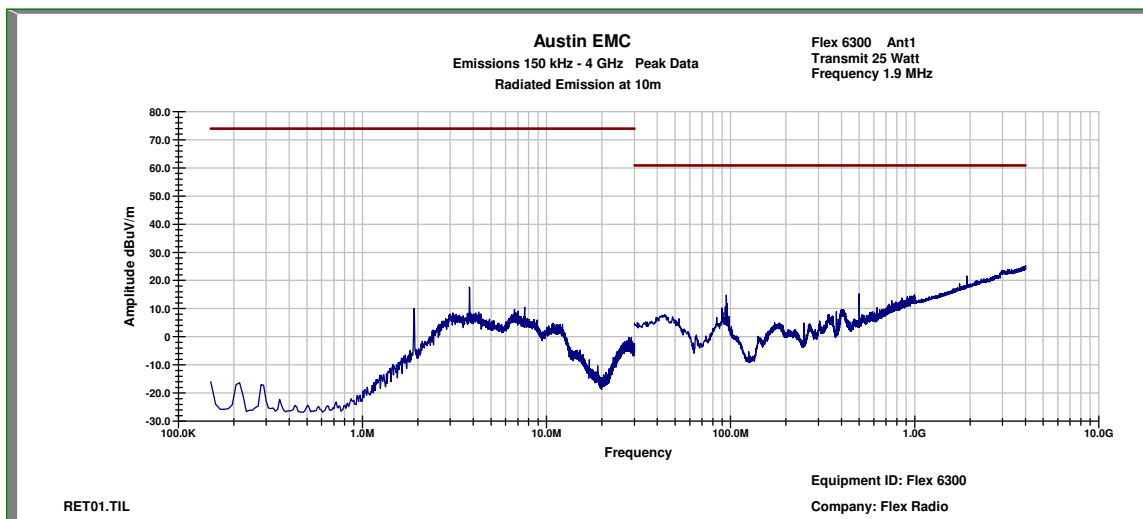


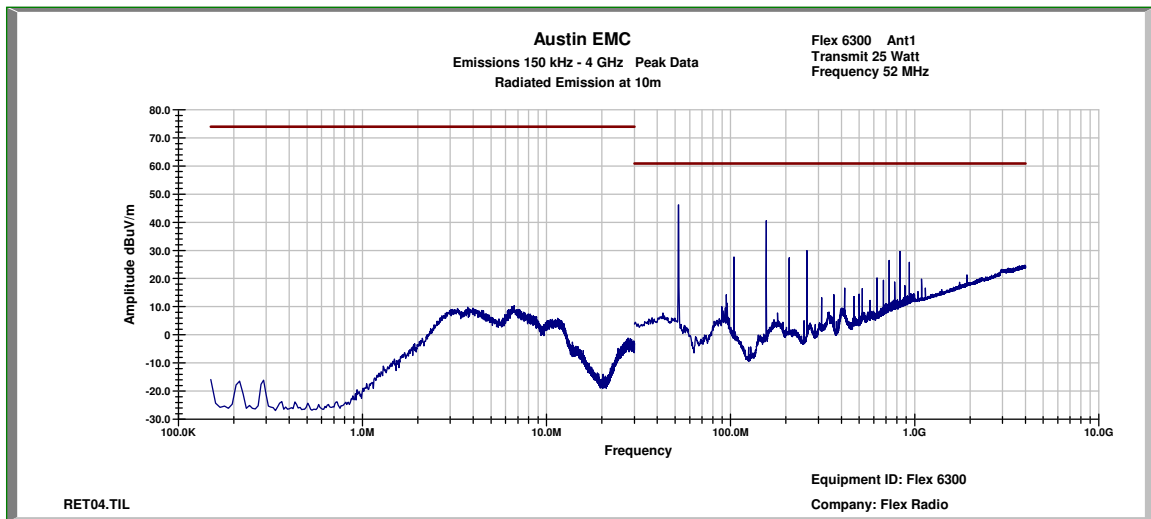
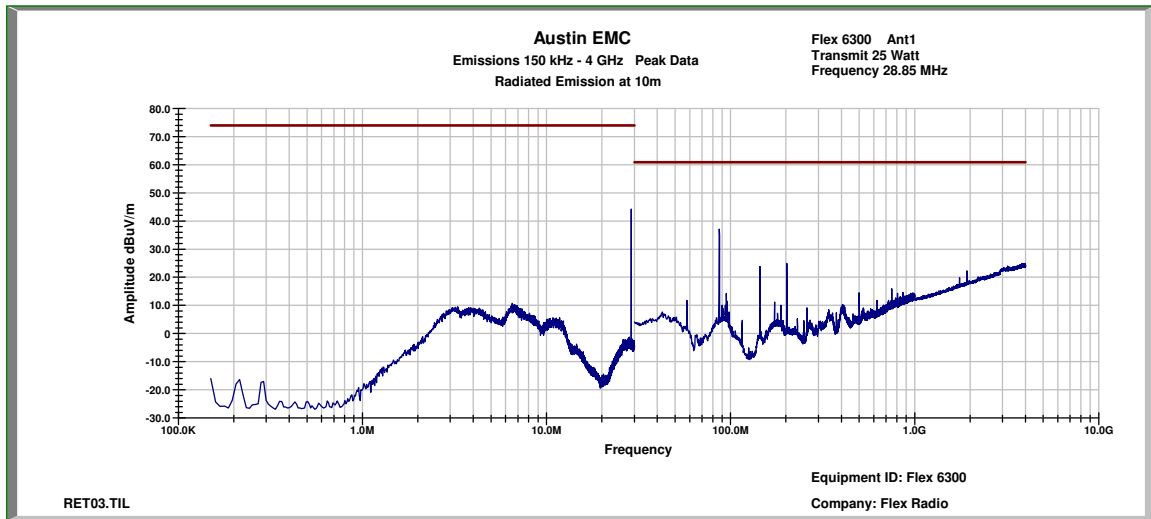
Note: Loss at 104MHz for AEL FBA-4020 filter



Radiated Emission, Receive Peak Plot

Radiated Emission, Transmit Peak Plots





Measurement Equipment Utilized at Austin EMC

Manufacturer Model # Description

HP 8546 A Spectrum Analyzer .009 – 6500 MHz

HP 8753 C Network Analyzer

Solar 801250R24 50 uH LISN (Artificial Mains Network)

Gray Two Meter Cable from LISN

ARL Lim1 Signal Limiter 5.4 dB insertion loss

Bird 100 Watt 50 Ohm Dummy Load

HP HP8491A 3 dB 2 Watt Attenuator

Mitec N/A 40 dB 0.1 - 1100 MHz 1 dB NF Preamp

Brown N/A Cable from Shielded Room

Panashield N/A Double Shielded Room

EMCO 5311 Gigahertz Transverse Electric Mode Chamber

Gore 1.5 Meter Cable from GTEM

Gore 1.5 Meter Cable from Preamp

HP 30dB power attenuator

AEL FBA-4020 88-300MHz Band Pass Filter