



**FCC CFR47 PART 90  
CLASS II PERMISSIVE CHANGE**

**CERTIFICATION TEST REPORT**

**FOR**

**COMPACT SURVEILLANCE RADAR**

**MODEL NUMBER: M80**

**FCC ID: CO6-M600C**

**REPORT NUMBER: 12U4757-1, REVISION A**

**ISSUE DATE: FEBRUARY 19, 2013**

*Prepared for*  
**SPOTTER RF LLC**  
**709 E. TECHNOLOGY AVE. BLDG E 3100**  
**OREM, UTAH 84097 USA**

*Prepared by*  
**UL CCS**  
**47173 BENICIA STREET**  
**FREMONT, CA 94538, U.S.A.**  
**TEL: (510) 771-1000**  
**FAX: (510) 661-0888**



**NVLAP LAB CODE 200065-0**

Revision History

Rev.	Issue Date	Revisions	Revised By
-	1/26/13	Initial	T. LEE
A	2/19/13	Updated Test method to TIA 603	T. LEE

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>3</b>
<b>2. TEST METHODOLOGY .....</b>	<b>4</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>4</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>4</b>
4.1. MEASURING INSTRUMENT CALIBRATION .....	4
4.2. SAMPLE CALCULATION .....	4
4.3. MEASUREMENT UNCERTAINTY.....	4
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>5</b>
5.1. DESCRIPTION OF EUT .....	5
5.2. MAXIMUM OUTPUT POWER.....	5
5.3. DESCRIPTION OF CLASS II PERMISSIVE CHANGE .....	5
5.4. DESCRIPTION OF AVAILABLE ANTENNAS .....	5
5.5. SOFTWARE AND FIRMWARE.....	5
5.6. WORST-CASE CONFIGURATION AND MODE.....	5
5.7. DESCRIPTION OF TEST SETUP.....	6
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>8</b>
<b>7. RADIATED TEST RESULTS.....</b>	<b>9</b>
7.1. LIMITS AND PROCEDURE .....	9
7.2. TRANSMITTER ABOVE 1 GHz.....	10
7.3. WORST-CASE BELOW 1 GHz.....	11
<b>8. SETUP PHOTOS.....</b>	<b>14</b>

## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SPOTTERRF LLC  
709 E. TECHNOLOGY AVE. BLDG E 3100  
OREM, UTAH 84097 USA

**EUT DESCRIPTION:** COMPACT SURVEILLANCE RADAR

**MODEL:** M80

**SERIAL NUMBER:** PROTO SP0472

**DATE TESTED:** JANUARY 26, 2013

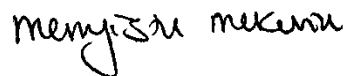
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 90	Pass

UL CCS tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By:

Tested By:



---

TIMOTHY K. LEE  
WiSE PROGRAM MANAGER  
UL CCS

---

MENGISTU MEKURIA  
EMC TECHNICIAN  
UL CCS

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 90, RSS-GEN Issue 3, and TIA 603.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

## **5. EQUIPMENT UNDER TEST**

### **5.1. DESCRIPTION OF EUT**

The EUT is 10 GHz medium range Compact Surveillance Radar (CSR). The unit operates only between channel 3 through 7 (10.125 GHz to 10.325 GHz)

The radio module is manufactured by SpotterRF LLC.

### **5.2. MAXIMUM OUTPUT POWER**

The RF conducted measurement passed within a margin of tolerance of the original output power. Refer to original report number 12U14355-1A for exact output power values and for all antenna port measurements.

### **5.3. DESCRIPTION OF CLASS II PERMISSIVE CHANGE**

Model M80 is identical to the original model M600C except for the following changes. The change filed under this application has the following changes.

- Antenna location has been moved.
- Enclosure size has changed.

### **5.4. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio utilizes a patch antenna, with a maximum gain of 14 dBi.

### **5.5. SOFTWARE AND FIRMWARE**

The EUT driver software installed during testing was Spotter RF C40 SP0003 v3.0.0-alpha.00502 (2012-10-16\_12-19).

### **5.6. WORST-CASE CONFIGURATION AND MODE**

Radiated emission was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

All final radiated testing was performed with the EUT in upright orientation as indicated by the installation instructions.

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Toshiba	PT324U03900R	2C165037H	DoC
AC Adapter	Toshiba	PA3714U-1ACA	T0412032003150A	DoC
Power Over Ethernet Adapter	PHIHONG	POE31U-240	P104205531 A1	--

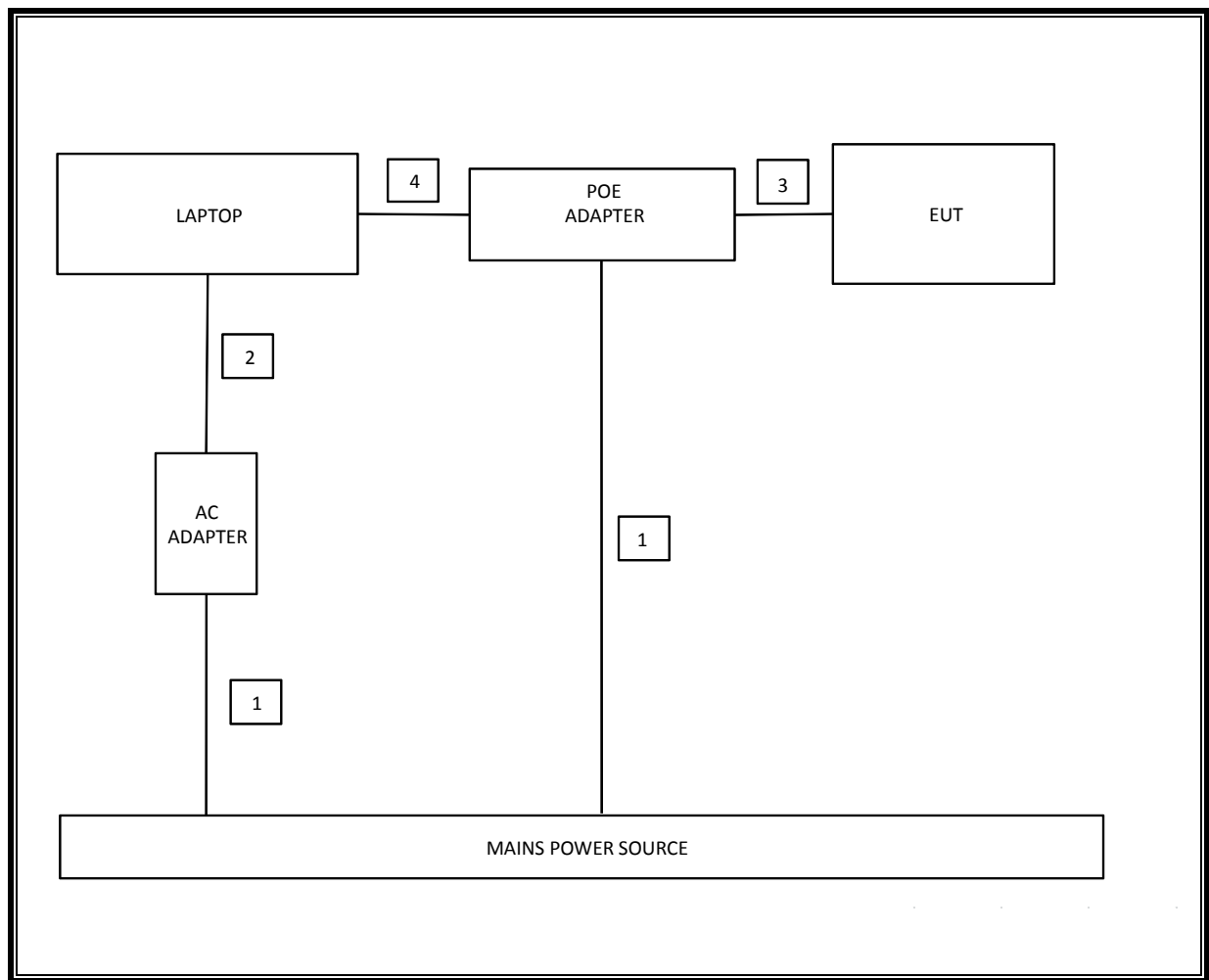
### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	2	AC 2P	Unshielded	1.8m	None
2	DC	1	DC	Shielded	1.8m	Ferrite on Laptop end
3	LAN	1	CAT5	Unshielded	2.0m	None
4	LAN	1	CAT5	Unshielded	3.5m	None

### TEST SETUP

The EUT is powered via the POE adapter. Test software exercised using the Laptop controlled through the Ethernet cables.

**SETUP DIAGRAM FOR TESTS**





## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01012	10/21/2013
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	C01011	3/23/2013
Antenna, Horn, 18 GHz	EMCO	3115	C00945	11/12/2013
Antenna, Horn, 18 GHz	ETS	3117	C01006	12/11/2013
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	C00981	6/14/2013
Harmonic Mixer, 50 GHz	Agilent / HP	11970Q	C00769	5/11/2013
Harmonic Mixer, 75 GHz	Agilent / HP	11970V	C00768	01/31/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	01/16/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/13
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	C00990	8/2/2013

## 7. RADIATED TEST RESULTS

### 7.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §90.210

13dBm (~ 82dBuV/m)

#### TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI/TIA/EIA-603-C-2004. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 55 GHz is investigated with the transmitter set at the worst case channel.

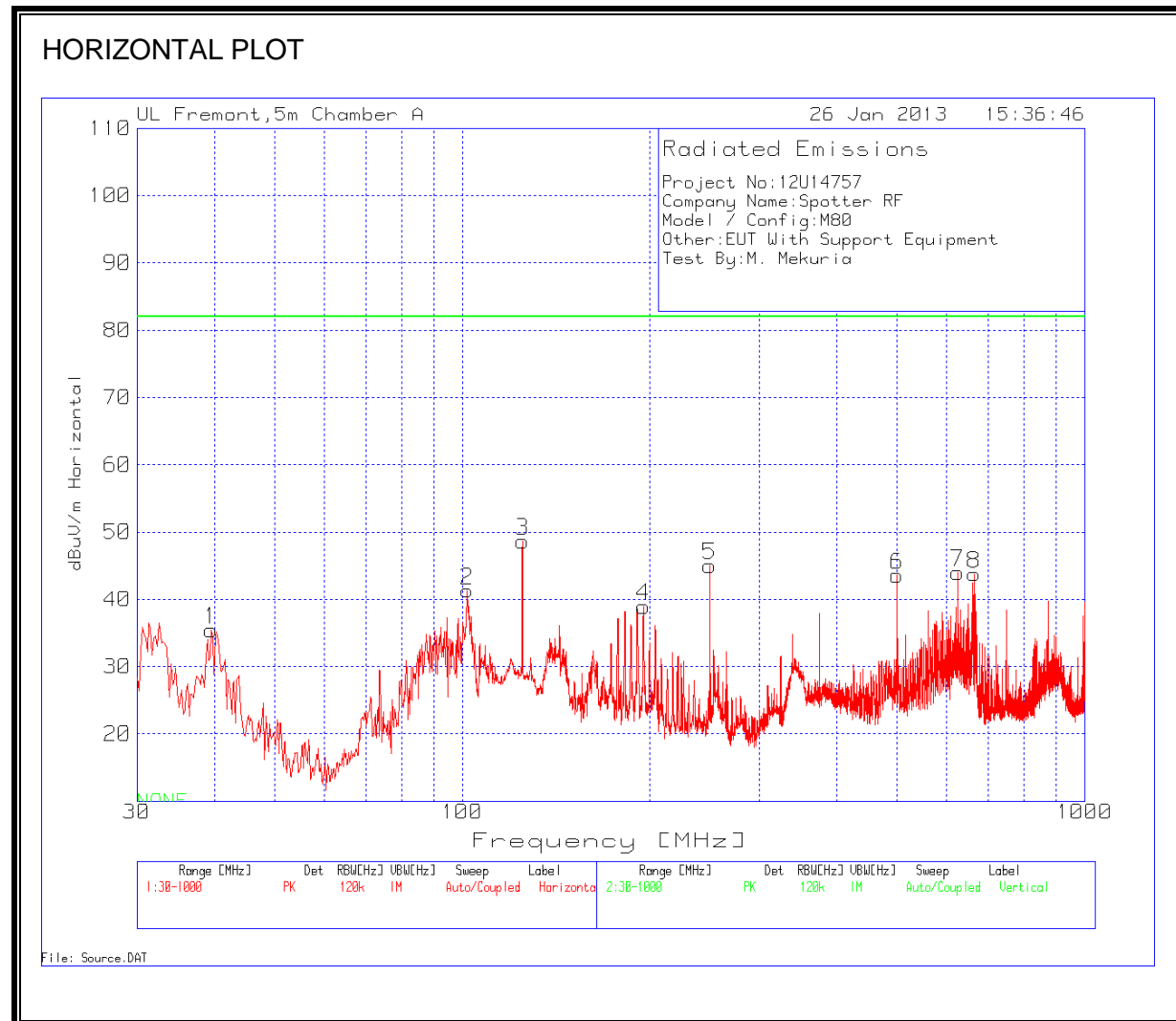
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

## 7.2. TRANSMITTER ABOVE 1 GHz

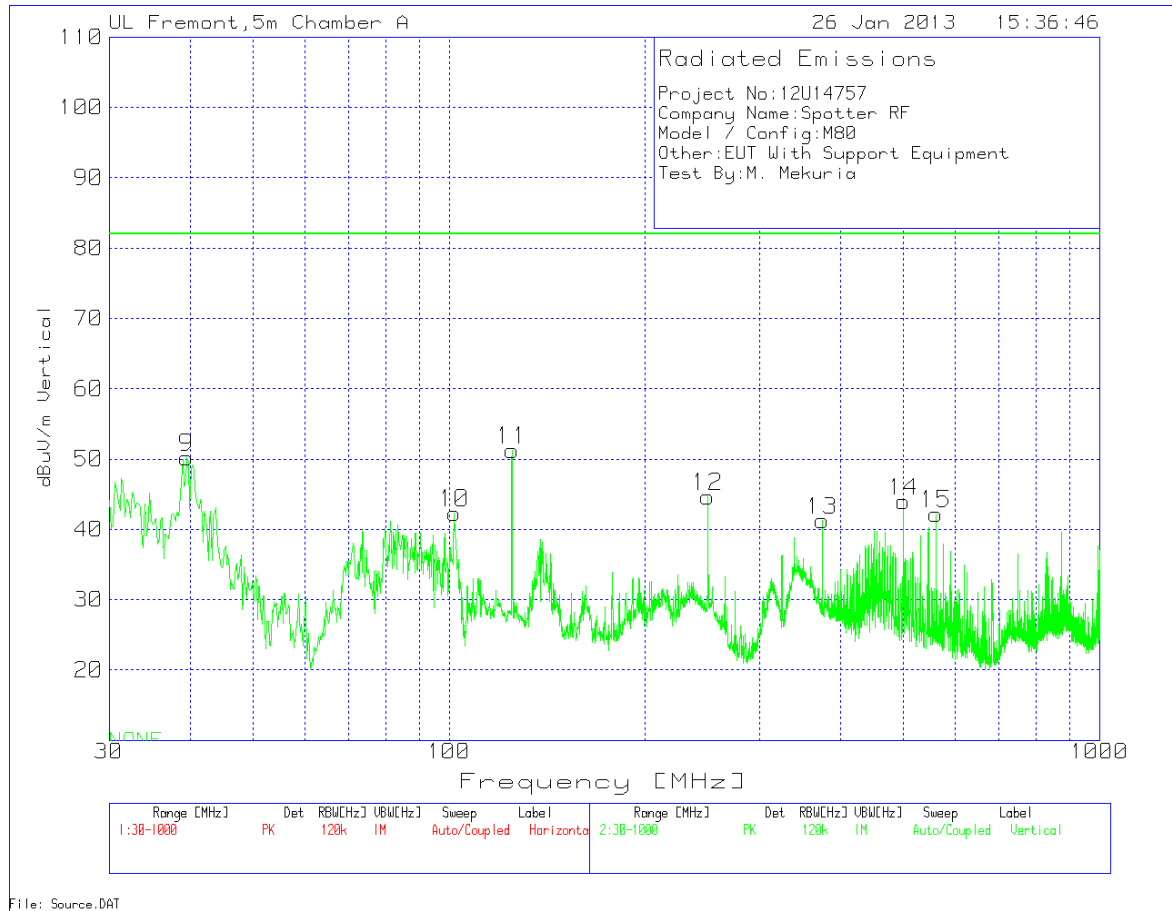
Compliance Certification Services Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		SpotterRF							
<b>Project #:</b>		12U14757							
<b>Date:</b>		01/26/13							
<b>Test Engineer:</b>		MENGISTU MEKURIA							
<b>Configuration:</b>		EUT ALONE (ANTENNA PORT TERMINATED)							
<b>Mode:</b>		TX MODE							
<b>Chamber</b>		<b>Pre-amplifier</b>		<b>Filter</b>		<b>Limit</b>			
5m Chamber A		T144 8449B				Part 90			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Channel (Channel 3)</b>									
1.093	-19.7	V	3.0	39.3		-59.0	-13.0	-46.0	
2.447	-7.3	V	3.0	37.5		-44.7	-13.0	-31.7	
2.528	-4.8	V	3.0	37.5		-42.3	-13.0	-29.3	
4.815	-13.3	V	3.0	36.4		-49.7	-13.0	-36.7	
20.201	3.0	V	3.0	35.5		-32.5	-13.0	-19.5	
30.446	-7.1	V	3.0	36.9		-44.0	-13.0	-31.0	
1.169	-20.4	H	3.0	39.1		-59.5	-13.0	-46.5	
1.330	-19.5	H	3.0	38.8		-58.3	-13.0	-45.3	
1.997	-13.1	H	3.0	37.7		-50.7	-13.0	-37.7	
2.454	-8.1	H	3.0	37.5		-45.6	-13.0	-32.6	
2.538	-2.8	H	3.0	37.5		-40.3	-13.0	-27.3	
4.811	-12.5	H	3.0	36.4		-48.9	-13.0	-35.9	
20.201	12.9	H	3.0	35.5		-22.5	-13.0	-9.5	
30.446	-6.0	H	3.0	36.9		-42.9	-13.0	-29.9	
<b>Mid Channel (Channel 5)</b>									
1.093	-22.1	V	3.0	39.3		-61.4	-13.0	-48.4	
1.504	-20.0	V	3.0	38.4		-58.4	-13.0	-45.4	
1.824	-15.5	V	3.0	37.9		-53.4	-13.0	-40.4	
2.447	-8.2	V	3.0	37.5		-45.7	-13.0	-32.7	
2.552	-9.6	V	3.0	37.5		-47.1	-13.0	-34.1	
4.800	-13.2	V	3.0	36.4		-49.6	-13.0	-36.6	
20.451	3.1	V	3.0	35.4		-32.3	-13.0	-19.3	
30.700	137.0	V	3.0	37.2		99.8	-13.0	112.8	
1.169	-21.8	H	3.0	39.1		-61.0	-13.0	-48.0	
1.330	-19.3	H	3.0	38.8		-58.0	-13.0	-45.0	
1.997	-15.6	H	3.0	37.7		-53.3	-13.0	-40.3	
2.449	-8.2	H	3.0	37.5		-45.7	-13.0	-32.7	
2.552	-5.1	H	3.0	37.5		-42.5	-13.0	-29.5	
4.798	-12.6	H	3.0	36.4		-48.9	-13.0	-35.9	
20.451	7.8	H	3.0	35.4		-27.6	-13.0	-14.6	
30.700	136.5	H	3.0	37.2		99.4	-13.0	112.4	
<b>High Channel (Channel 7)</b>									
1.128	-21.3	V	3.0	39.2		-60.5	-13.0	-47.5	
1.332	-21.2	V	3.0	38.8		-60.0	-13.0	-47.0	
1.504	-18.9	V	3.0	38.4		-57.3	-13.0	-44.3	
2.448	-7.6	V	3.0	37.5		-45.1	-13.0	-32.1	
2.574	-15.8	V	3.0	37.5		-53.2	-13.0	-40.2	
4.896	-14.3	V	3.0	36.3		-50.7	-13.0	-37.7	
20.645	4.7	V	3.0	35.4		-30.7	-13.0	-17.7	
31.000	-2.6	V	3.0	37.5		-40.1	-13.0	-27.1	
1.170	-18.5	H	3.0	39.1		-57.6	-13.0	-44.6	
1.332	-18.2	H	3.0	38.8		-57.0	-13.0	-44.0	
2.004	-13.4	H	3.0	37.7		-51.1	-13.0	-38.1	
2.446	-8.3	H	3.0	37.5		-45.8	-13.0	-32.8	
2.574	-11.6	H	3.0	37.5		-49.0	-13.0	-36.0	
4.777	-15.1	H	3.0	36.4		-51.4	-13.0	-38.4	
20.645	5.7	H	3.0	35.4		-29.7	-13.0	-16.7	
31.000	74.3	H	3.0	37.5		36.8	-13.0	49.8	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

### 7.3. WORST-CASE BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION,)



## VERTICAL PLOT



# HORIZONTAL AND VERTICAL DATA

Project No:12U14757										
Company Name:Spotter RF										
Model / Config:M80										
Other:EUT With Support Equipment										
Test By:M. Mekuria										
Horizontal 30 - 1000MHz										
Marker No.	Test Frequency	Meter Reading	Detector	T243 Sunol Bilog.TXT (dB)	T64 Hp8447D Pre-Amp 25-1000MHz (dB)	dBuV/m	NONE	Margin	Height [cm]	Polarity
1	39.4984	49.4	PK	14.3	-28.2	35.5	82	-46.5	199	Horz
2	101.9165	58.63	PK	10.8	-28.1	41.33	82	-40.67	199	Horz
3	124.984	62.8	PK	13.9	-28.1	48.6	82	-33.4	199	Horz
4	195.6405	55.11	PK	11.8	-28	38.91	82	-43.09	166	Horz
5	250.014	61.53	PK	11.5	-28	45.03	82	-36.97	133	Horz
6	500.0739	53.64	PK	17.5	-27.6	43.54	82	-38.46	133	Horz
7	625.1039	51.96	PK	19	-27	43.96	82	-38.04	100	Horz
8	664.0667	51.19	PK	19.5	-26.9	43.79	82	-38.21	100	Horz
Vertical 30 - 1000MHz										
Marker No.	Test Frequency	Meter Reading	Detector	T243 Sunol Bilog.TXT (dB)	T64 Hp8447D Pre-Amp 25-1000MHz (dB)	dBuV/m	NONE	Margin	Height [cm]	Polarity
9	39.4984	64.07	PK	14.3	-28.2	50.17	82	-31.83	133	Vert
10	101.9165	59.55	PK	10.8	-28.1	42.25	82	-39.75	133	Vert
11	124.984	65.46	PK	13.9	-28.1	51.26	82	-30.74	133	Vert
12	250.014	61.15	PK	11.5	-28	44.65	82	-37.35	166	Vert
13	374.8501	54.01	PK	15.2	-28	41.21	82	-40.79	133	Vert
14	500.0739	54.03	PK	17.5	-27.6	43.93	82	-38.07	199	Vert
15	560.3597	51.03	PK	18.4	-27.3	42.13	82	-39.87	166	Vert