

# **Electromagnetic Compatibility Test Report**

**Model: 460  
(Digital STL Transmitter)**

**EMCE Test Report Number: ER050105-3**

**Dated: 2/2/05**

**Prepared for:  
TFT, Inc.  
1330 Concourse Drive  
San Jose, CA 95131**

**Prepared by:  
EMCE Engineering  
44366 South Grimmer Blvd  
Fremont, Ca 94538**

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## **1.0 PURPOSE**

Measurements were performed on the TFT, Inc. Digital STL Transmitter Model 460 (hereinafter referred to as the “EUT”) to determine the electromagnetic emissions as they relate to Part 74 of CFR 47. Measurements were performed at the test facilities of:

EMCE Engineering  
44366 S. Grimmer Blvd  
Fremont, Ca 94538

See appendix D for list of laboratory accreditations.

## **2.0 DESCRIPTION OF TEST SAMPLE**

Testing was conducted to determine the individual EMC characteristics of the Digital STL Transmitter (Model 460, no S/N).

The TFT 460 Digital STL Transmitter transmits on one RF channel between 944.0 MHz and 952.0 MHz per CFR 47, 74.502(b).

## **3.0 DISPOSITION OF TEST SPECIMEN**

Upon completion of the specified EMC tests the EUT was returned to TFT, Inc. in San Jose, CA, by TFT personnel.

## **4.0 NARRATIVE ABSTRACT**

### **4.1 Conclusions**

After completion of all EMC measurements, all measured data was reviewed and compared with the applicable sections from CFR 47, Part 74 (i.e., Applicable sections of 47CFR 74: 74.1 and Subpart E which consists of: 74.501, 74.502, 74.503, 74.531, 74.532, 74.533, 74.534, 74.535, 74.536, 74.537, 74.550, 74.551, 74.561, 74.562, 74.564, and 74.582), and test methods described in CFR 47, Parts 2 and 74. Individual test results will be presented in this section of the report. Table 1 summarizes the test results.

**TABLE 1: SUMMARY OF TEST RESULTS**

CFR Section	Title	Comments	Results
2.1046, 74.534	RF Power Output		PASSED
2.1047, 74.535	Modulation Characteristics		PASSED
2.1049, 74.535	Occupied Bandwidth		PASSED
2.1051	Spurious Emissions		PASSED
2.1055, 74.561	Frequency Stability		PASSED
2.1057	Investigation of Frequency Spectrum		PASSED

## **4.2 EMC Testing Summary**

### **4.2.1 *RF Power Output (CFR 2.1046, 74.534)***

Test results may be found in Appendix A.

### **4.2.2 *Modulation Characteristics (CFR 2.1047, 74.535)***

Test results may be found in Appendix A

### **4.2.3 *Occupied Bandwidth (CFR 2.1049, 74.535)***

Test results may be found in Appendix A.

### **4.2.4 *Spurious Emissions (CFR 2.1051)***

Test results may be found in Appendix A.

### **4.2.5 *Frequency Stability (CFR 2.1055, 74.561)***

Test results may be found in Appendix A

### **4.2.6 *Radiated Spurious Emissions / Investigation of Frequency Spectrum (CFR 2.1053, 2.1057)***

Test results may be found in Appendix A

# **APPENDIX A**

## **Test Data For Digital STL Transmitter M/N: 460**

***RF Power Output (CFR 2.1046, 74.534), Modulation Characteristics (CFR 2.1047, 74.535), Occupied Bandwidth (CFR 2.1049, 74.535)***

Test Location: EMCE Engineering • 44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **TFT, Inc.**Specification: **TFT Mask 950**

Work Order #:

Date: 12/20/2004

Test Type: **Radiated Scan**

Time: 10:24:39 AM

Equipment: **Digital STL Transmitter**

Sequence#: 21

Manufacturer: TFT, Inc.

Tested By: Bob Cole

Model: 460

S/N: N/A

***Test Equipment:***

Function	S/N	Calibration Date	Cal Due Date	Asset #
HP 8593EM	N/A	08/11/2004	08/11/2005	123
Spectrum Analyzer				

***Equipment Under Test (\* = EUT):***

Function	Manufacturer	Model #	S/N
Digital STL Transmitter	TFT, Inc.	460	N/A

***Support Devices:***

Function	Manufacturer	Model #	S/N
Attenuator	WJ	3514-20	N/A

***Test Conditions / Notes:***

2W power out
--------------

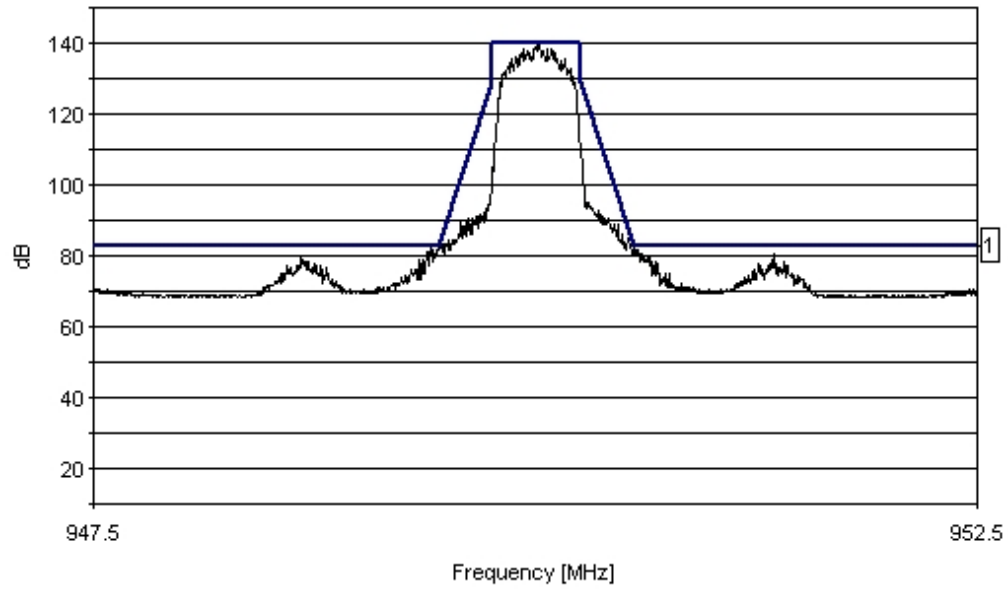
***Transducer Legend:***

T1=20 dB Attenuator	T2=Chamber Receive Cable to 1 GHz
T3=Attenuator TX Cable	

***Measurement Data:*** Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB		Dist Table	Corr dB	Spec dB	Margin dB	Polar Ant
1	950.014M	108.5	+20.0	+5.5	+5.7		+0.0	139.7	140.0	-0.3	None

EMCE Engineering Date: 12/20/2004 Time: 10:24:39 AM TFT, Inc. WFO#:  
TFT Mask 950 Test Distance: None Sequence#: 21



— Sweep Data      — 1 - TFT Mask 950

**Spurious Emissions (CFR 2.1051)**

Test Location: EMCE Engineering • 44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **TFT, Inc.**Specification: **TFT 2W 1-26GHz**

Work Order #:

Date: 12/20/2004

Test Type: **Radiated Scan**

Time: 4:50:14 PM

Equipment: **Digital STL Transmitter**

Sequence#: 2

Manufacturer: **TFT, Inc.**Tested By: **Scott**

Model: 460

S/N: N/A

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
AH Systems DR Horn Antenna	1291	07/28/2004	07/28/2006	389
HP 8593EM Spectrum Analyzer	N/A	08/11/2004	08/11/2005	123

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Digital STL Transmitter*	TFT, Inc.	460	N/A

**Support Devices:**

Function	Manufacturer	Model #	S/N
Attenuator	WJ	3514-20	N/A

**Test Conditions / Notes:**

ANTENNA CONDUCTED SCAN

**Transducer Legend:****Measurement Data:**

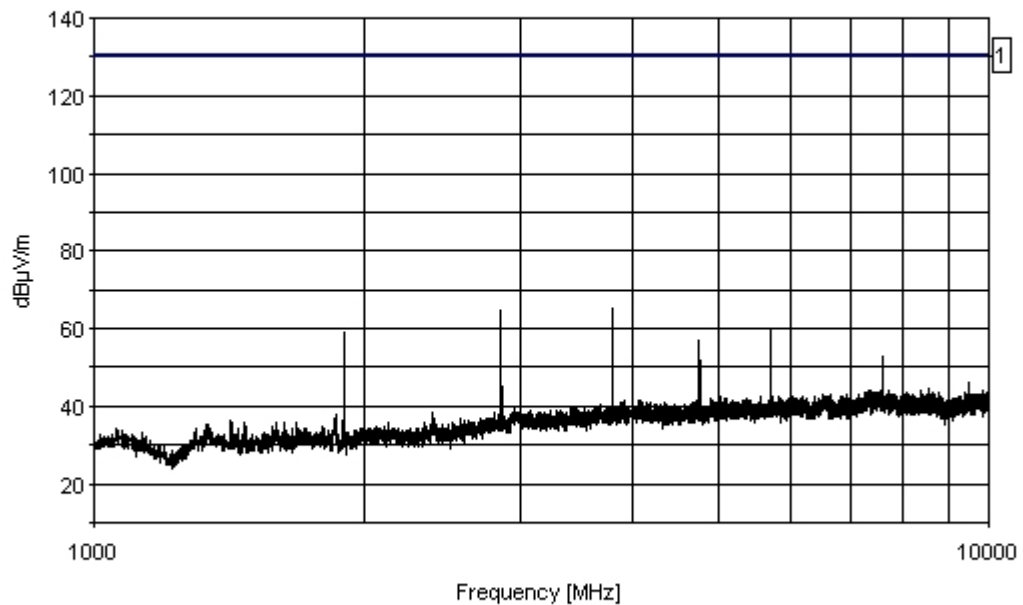
Reading listed by margin.

Test Distance: None

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	3800.985M	65.1					+0.0	65.1	130.0	-64.9	Vert
2	2851.617M	64.5					+0.0	64.5	130.0	-65.5	Vert
3	5701.725M	59.9					+0.0	59.9	130.0	-70.1	Vert
4	1900.245M	59.0					+0.0	59.0	130.0	-71.0	Vert
5	4750.353M	56.7					+0.0	56.7	130.0	-73.3	Vert
6	7600.460M	52.7					+0.0	52.7	130.0	-77.3	Vert
7	9501.200M	46.1					+0.0	46.1	130.0	-83.9	Vert
8	8551.832M	44.5					+0.0	44.5	130.0	-85.5	Vert

9	7347.830M	44.2	+0.0	44.2	130.0	-85.8	Vert
10	7576.400M	44.0	+0.0	44.0	130.0	-86.0	Vert
11	9837.575M	44.0	+0.0	44.0	130.0	-86.0	Vert
12	7736.800M	43.9	+0.0	43.9	130.0	-86.1	Vert
13	8027.525M	43.9	+0.0	43.9	130.0	-86.1	Vert
14	8396.445M	43.9	+0.0	43.9	130.0	-86.1	Vert
15	7397.955M	43.8	+0.0	43.8	130.0	-86.2	Vert
16	8652.082M	43.7	+0.0	43.7	130.0	-86.3	Vert
17	7555.348M	43.6	+0.0	43.6	130.0	-86.4	Vert
18	7506.225M	43.5	+0.0	43.5	130.0	-86.5	Vert
19	7562.365M	43.5	+0.0	43.5	130.0	-86.5	Vert
20	9421.000M	43.5	+0.0	43.5	130.0	-86.5	Vert

EMCE Engineering Date: 12/20/2004 Time: 4:50:14 PM TFT, Inc. WO#:  
TFT 2W 1-26GHz Test Distance: None Sequence#: 2



*Frequency Stability (CFR 2.1055)*

Temperature (Celcius)	Voltage	Frequency (MHz)	PASS/FAIL
50	97	950.01	<b>PASS</b>
50	115	950.014	<b>PASS</b>
50	132	950.014	<b>PASS</b>
40	97	950.008	<b>PASS</b>
40	115	950.014	<b>PASS</b>
40	132	950.005	<b>PASS</b>
30	97	950.005	<b>PASS</b>
30	115	950.003	<b>PASS</b>
30	132	949.997	<b>PASS</b>
20	97	950.005	<b>PASS</b>
20	115	950.022	<b>PASS</b>
20	132	950.016	<b>PASS</b>
10	97	949.944	<b>PASS</b>
10	115	950.018	<b>PASS</b>
10	132	949.999	<b>PASS</b>
0	97	950.016	<b>PASS</b>
0	115	950.014	<b>PASS</b>
0	132	950.016	<b>PASS</b>
-10	97	950.012	<b>PASS</b>
-10	115	950.003	<b>PASS</b>
-10	132	950.53	<b>PASS</b>
-20	97	Non-Operational	<b>N/A</b>
-20	115	Non-Operational	<b>N/A</b>
-20	132	Non-Operational	<b>N/A</b>
-30	97	Non-Operational	<b>N/A</b>
-30	115	Non-Operational	<b>N/A</b>
-30	132	Non-Operational	<b>N/A</b>

***Radiated Spurious Emissions / Investigation of Frequency Spectrum (CFR 2.1053. 2.1057)***

The following Radiated Spurious Emissions readings were determined by first identifying the frequencies using the test methods from ANSI 63.4. The signal amplitudes were then verified using the “substitution method” detailed in TIA 603-2004, section 2.2.12.2, and the results included here.

Test Location: EMCE Engineering • 44366 S. Grimmer Blvd • Fremont, CA 94538 • 510-490-4307

Customer: **TFT, Inc.**

Specification: **TFT 2W 1-26GHz**

Work Order #:

Date: 1/5/2005

Test Type: **Radiated Scan**

Time: 11:50:35 AM

Equipment: **Digital STL Transmitter**

Sequence#: 1

Manufacturer: TFT, Inc.

Tested By: Bob Cole

Model: 460

S/N: N/A

***Test Equipment:***

Function	S/N	Calibration Date	Cal Due Date	Asset #
AH Systems DR Horn Antenna	1291	07/28/2004	07/28/2006	389

***Equipment Under Test (\* = EUT):***

Function	Manufacturer	Model #	S/N
Digital STL Transmitter*	TFT, Inc.	460	N/A

***Support Devices:***

Function	Manufacturer	Model #	S/N
Attenuator	WJ	3514-20	N/A
Tuned Dipole Antenna Set	A. H. Systems	TDS 535-2	4048
Signal Generator	Hewlett Packard	8350A	32095A119

***Test Conditions / Notes:***

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***Transducer Legend:***

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***Measurement Data:*** Reading listed by margin. Test Distance: 1 Meter

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	2851.617M	68.9					+0.0	68.9	130.0	-61.1	Vert
2	1901.248M	61.7					+0.0	61.7	130.0	-68.3	Vert

## **Appendix B**

### **EMCE Laboratory Accreditations**



ISO/IEC 17025:1999  
ISO 9002:1994

## Scope of Accreditation



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### ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

NVLAP LAB CODE 200092-0

#### UNIVERSAL COMPLIANCE LABS DBA EMCE ENGINEERING

44366 South Grimmer Boulevard

Fremont, CA 94538-6385

Mr. Bob Cole

Phone: 510-490-4307 Fax: 510-490-3441

E-Mail: bob@universalcompliance.com

URL: <http://www.universalcompliance.com>

#### NVLAP Code Designation / Description

##### Emissions Test Methods:

12/CIS22	IEC/CISPR 22 (1997) & EN 55022 (1998) + A1(2000): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993) and EN 55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1 (1995) and Amendment 2 (1996)
12/CIS22b	CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
12/FCC15b1	ANSI C63.4 (2003) with FCC Method 47 CFR Part 15, Subpart B: Unintentional Radiators
12/T51	AS/NZS CISPR 22 (2002) and AS/NZS 3548 (1997): Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment

December 31, 2005

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ISO/IEC 17025:1999  
ISO 9002:1994

## Scope of Accreditation



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**ELECTROMAGNETIC COMPATIBILITY  
AND TELECOMMUNICATIONS**

**NVLAP LAB CODE 200092-0**

**UNIVERSAL COMPLIANCE LABS DBA EMCE ENGINEERING**

*NVLAP Code Designation / Description*

**Immunity Test Methods:**

12/I01	IEC 61000-4-2, Ed. 2.1 (2001), A1, A2; EN 61000-4-2: Electrostatic Discharge Immunity Test
12/I03	IEC 61000-4-4(1995), A1(2000), A2(2001); EN 61000-4-4: Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical Fast Transient/Burst Immunity Test
12/I04	IEC 61000-4-5, Ed. 1.1 (2001-04); EN 61000-4-5: Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
12/I05	IEC 61000-4-6, Ed. 2.0 (2003-05); EN 61000-4-6: Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
12/I06	IEC 61000-4-8, Ed. 1.1 (2001); EN 61000-4-8: Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
12/I07	IEC 61000-4-11, Ed. 1.1 (2001-03); EN 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

December 31, 2005

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*For the National Institute of Standards and Technology*

United States Department of Commerce  
National Institute of Standards and Technology



ISO/IEC 17025:1999  
ISO 9002:1994

## Certificate of Accreditation

**UNIVERSAL COMPLIANCE LABS DBA EMCE ENGINEERING**  
FREMONT, CA

is recognized by the National Voluntary Laboratory Accreditation Program  
for satisfactory compliance with criteria set forth in NIST Handbook 150:2001,  
all requirements of ISO/IEC 17025:1999, and relevant requirements of ISO 9002:1994.  
Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:

**ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS**

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