MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: **BALOGH T. A. G. Corporation**

MODEL: **TCF-100**

FCC ID: **G8630100FC**

DATE: **June 30, 2008**

This report concerns (check one): Original grant X
Class II change_____

Equipment type: Transceiver

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No X

If yes, defer until:_____
date

N.A. agrees to notify the Commission by N.A.
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech
3505 Francis Circle
Alpharetta, GA 30004

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1. General Information

The information contained in this report is presented for the FCC Equipment Authorization of Certification for the EUT.

1.1 Product Description

The Equipment under Test (EUT) is the BALOGH T.A.G. Corporation, Model TCF-100. The EUT is a Low Power RFID Transceiver operating at 13.56 MHz.

1.2 Related Submittal(s)/Grant(s)

The EUT will be used with part of a system to send/receive data. The transmitter presented in this report will be used with another transceiver which has been submitted under FCC ID:

1.3 The EUT is subject to the following authorizations:

a) Certification of the transmitter part of a transceiver
b) Verification as a Digital Device.

2 Tests and Measurements

2.1 Configuration of Tested System

The Test sample was tested per ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2003). Conducted and radiated emissions data were taken with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for fundamental and harmonic emissions are shown in Figure 2.

The sample used for testing was received by US Tech on March 3, 2008 in good condition.

2.2 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA. This site has been fully described and registered with the FCC, under designation number US5117. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 2982A-1.

2.3 Test Equipment

Table 2 describes test equipment used to evaluate this product.

2.4 Modifications

The line filtering inside the control module attached to the EUT needed to be modified by Balogh in order to bring the EUT into compliance with the FCC Part 15.207 conducted emissions limits for an intentional radiator.

2.5 Test Procedure

The EUT was configured as shown in the following block diagram(s) and photograph(s). The sample was tested per ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (1992) following US Tech's procedures paragraph 7 for conducted and paragraph 8 for radiated. Conducted and radiated emissions data were taken with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter on the spectrum analyzer was OFF throughout the evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions.

Figure 1. Test Configuration

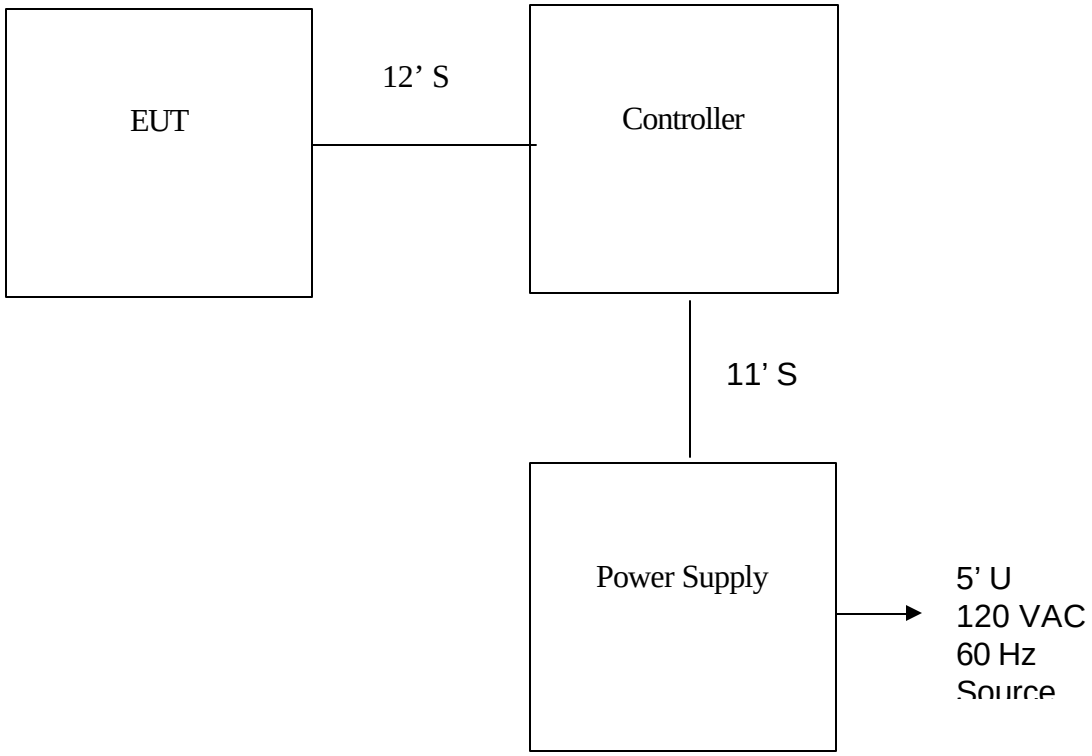


Figure 2.

Photograph of Test Setup for Spurious and Fundamental Emissions Measurement, (Front View)

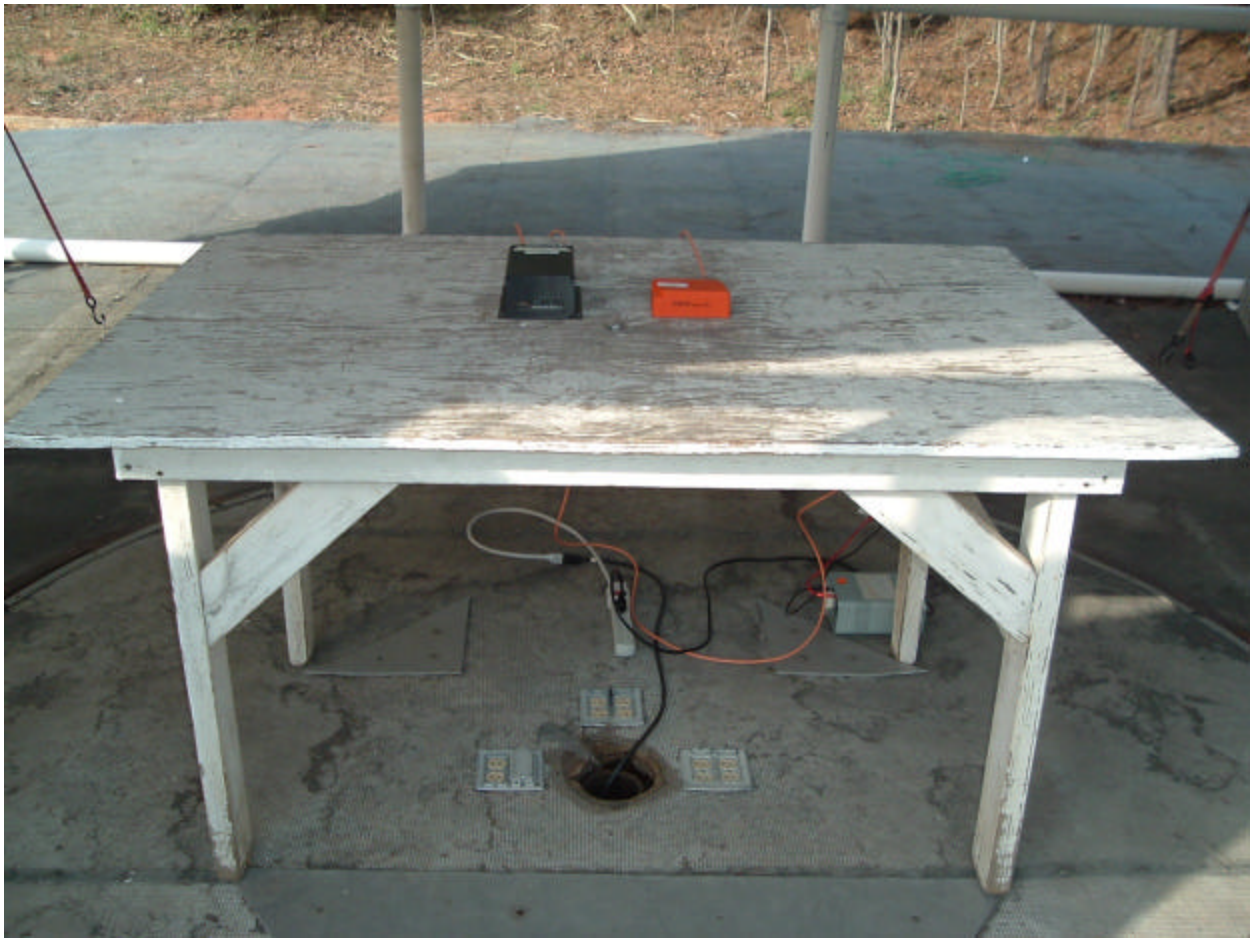


Figure 3.

Photograph of Test Setup for Spurious and Fundamental Emissions Measurement, (Rear View)

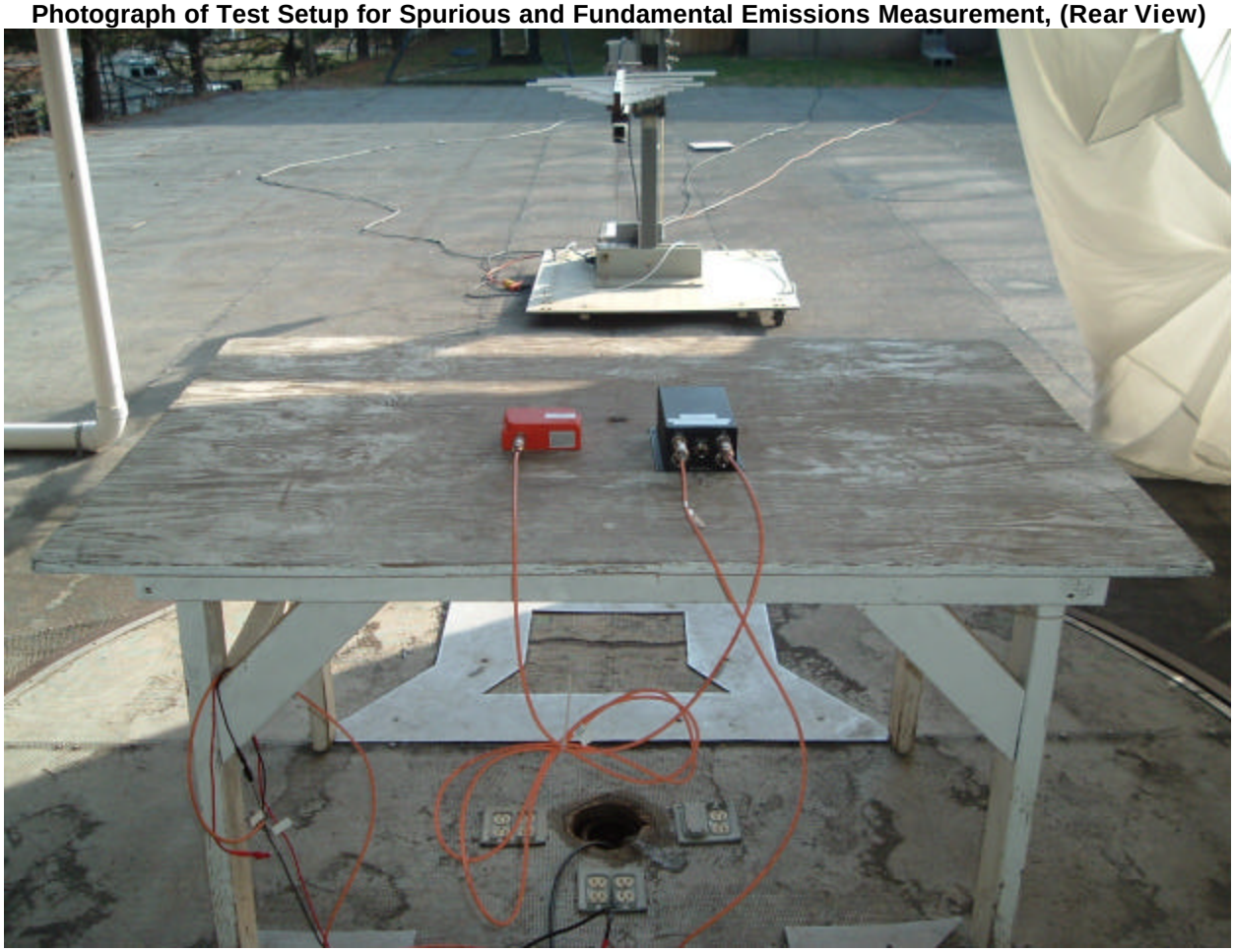


Figure 4.

Photograph of Conducted Emissions, Transmitter and Digital Device

Table 1.

EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Transceiver BALOGH T.A.G. Corporation (EUT)	TCF-100	None	G8630`00FC (Pending)	12' S
Controller BALOGH T.A.G. Corporation	BIET / FCF	None	None	11' S
Power Supply BALOGH T.A.G. Corporation	24 VDC	None	None	5' U

P = Power D = data S = Shielded U = Unshielded

Table 2.

Test Instruments

TYPE	MANUFACTURER	MODEL	SN.	Cal Date.
SPECTRUM ANALYZER	HEWLETT-PACKARD	8593E	3205A00124	1/15/08
RF PREAMP 10 to 1000 MHz	HEWLETT-PACKARD	8447D	1937A03355	6/14/07
Active Loop Antenna 10 kHz to 30 MHz MHz	A. H. Systems	SAS-200/562	142	Due 10/16/08
BICONICAL ANTENNA 25 MHz to 200 MHz	EMCO	3110	9307-1431	11/15/07
LOG PERIODIC ANTENNA 100MHz to 1000 MHz	EMCO	3146	9110-3600	8/24/07
LISN	SOLAR ELE.	8028	910495 & 910494	5/10/07

2.6 EUT Antenna Description (FCC Sec. 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The Model BALOGH T.A.G. Corporation TFC-100 incorporates an integral antenna only.

Manufacturer: Balogh T.A.G. Corporation
7699 Kensington Court
Brighton, Michigan 48116-8561

Type: Fixed air coil, non-adjustable

Model Number: --

Gain: --

Connector: Integral

BALOGH T.A.G. Corporation will sell the TCF-100 with one of the following antennas.

Table 3. Antenna description for Model TCF-100 Transceiver

MANUFACTURER	MODEL	GAIN dBi
Balogh T.A.G. Corporation	--	--

2.7 Field Strength of Fundamental (47 CFR 15.225(a))

The results of the measurements for peak fundamental emissions are given in Table 3 and Figure 6. The EUT emissions were measured by setting up the Active Loop Antenna in the vertical orientation at a distance of 3 meters from the EUT and at a height of 1.0 meters above the ground. The EUT major axis was set to face the measuring antenna so that it intercepted the plane formed by the loop at right angles. When a signal was detected, the loop was slowly rotated about its axis in an attempt to maximize the emission. The antenna was left in the orientation where the emission was maximized and the signal was measured and recorded.

2.8 Operation in the Band 13.110MHz to 14.010 MHz (CFR15.225 (b), (c))

This frequency band is subdivided into four sub ranges as follows:

Frequency (MHz)	Limit (linear)	Limit (logarithmic)
13.110 to 13.410	106 uV/m	40.5 dBuV/m
13.410 to 13.553	334 uV/m	50.5 dBuV/m
13.567 to 13.710	334 uV/m	50.5 dBuV/m
13.710 to 14.010	106 uV/m	40.5 dBuV/m

There are no signals to measure in the frequency band of 13.110 MHz to 13.410 MHz and 13.710 MHz to 14.010 MHz. See Figure 5. In the frequency band of 13.410 MHz to 13.553 MHz, part of the Fundamental occupies this band, but at levels less than the limit of 334 uV/m. Also in the band 13.567 MHz to 14.010 MHz the fundamental can be found but at levels less than the limit for this range. In fact for the entire frequency range of 13.110 MHz to 14.010 MHz, the EUT (13.558 MHz @ 39 dBuV/m) is the only signal visible and it is less than the lowest limit for the above bands.

Table 4.
Field Strength of Fundamental Emission Peak

Peak Radiated Emissions of Fundamental									
Test By:	**Test:** FCC Part 15.225					**Client:** BALOGH T.A.G. Corporation			
DA	**Project:** 08-0028		15.225 Limits			**Model:** TCF-100			
Frequency (MHz)	**Measured Test Data @ 3m (dBm)**	**Test Data @ 3 m dBuV**	**Transducer Table**	**AF+CL-PA + DF (dB)**	**Results @ 30 m (uV/m)**	**Limits @ 30 m (uV/m)**	**Tested Distance**	**Margin (dB)**	**Detector Type**
13.553	-57.65	49.35	Loop	8.3+.7-40	8.3	334	3m	32	**PK**
13.560	- 44.0	63.0	Loop	8.3+.7-40	38.86	15848.0	3m	52.3	**PK**
13.567	-62.6	44.37	Loop	8.3+.7-40	4.7	334	3m	37	**PK**

NOTE: Preamp (PA) not used. Distance Factor (DF) = - 40 dB. Cable Loss (CL) = 0.7 dB
Antenna Factor (AF) = 8.3 dB. Distance Factor = 40 Log_{10}(3m/30m) = - 40 dB

SAMPLE CALCULATIONS:

RESULTS @ 13.56 MHz = Antilog ((- 44 - 40 + 8.79 + 107)/20) = 38.86 uV/m @ 30 m
Conversion from dBm to dBuV = 107 dB

Test Results
Reviewed By: Daniel Aparaschivei **Name: Daniel Aparaschivei**

Figure 5.
Frequency Band 13.110 MHz to 14.010 MHz

For illustrative purposes, the graph was offset by +40 dB for distance and - 8.7 dB for antenna factor and cable loss. At the band edges, the EUT signal is the largest signal found and per the values in Table 5 above, it has a minimum margin of 32 dB on either side of the 13.553MHz to 13.567MHz band. The two signals seen with the EUT signal are ambients.

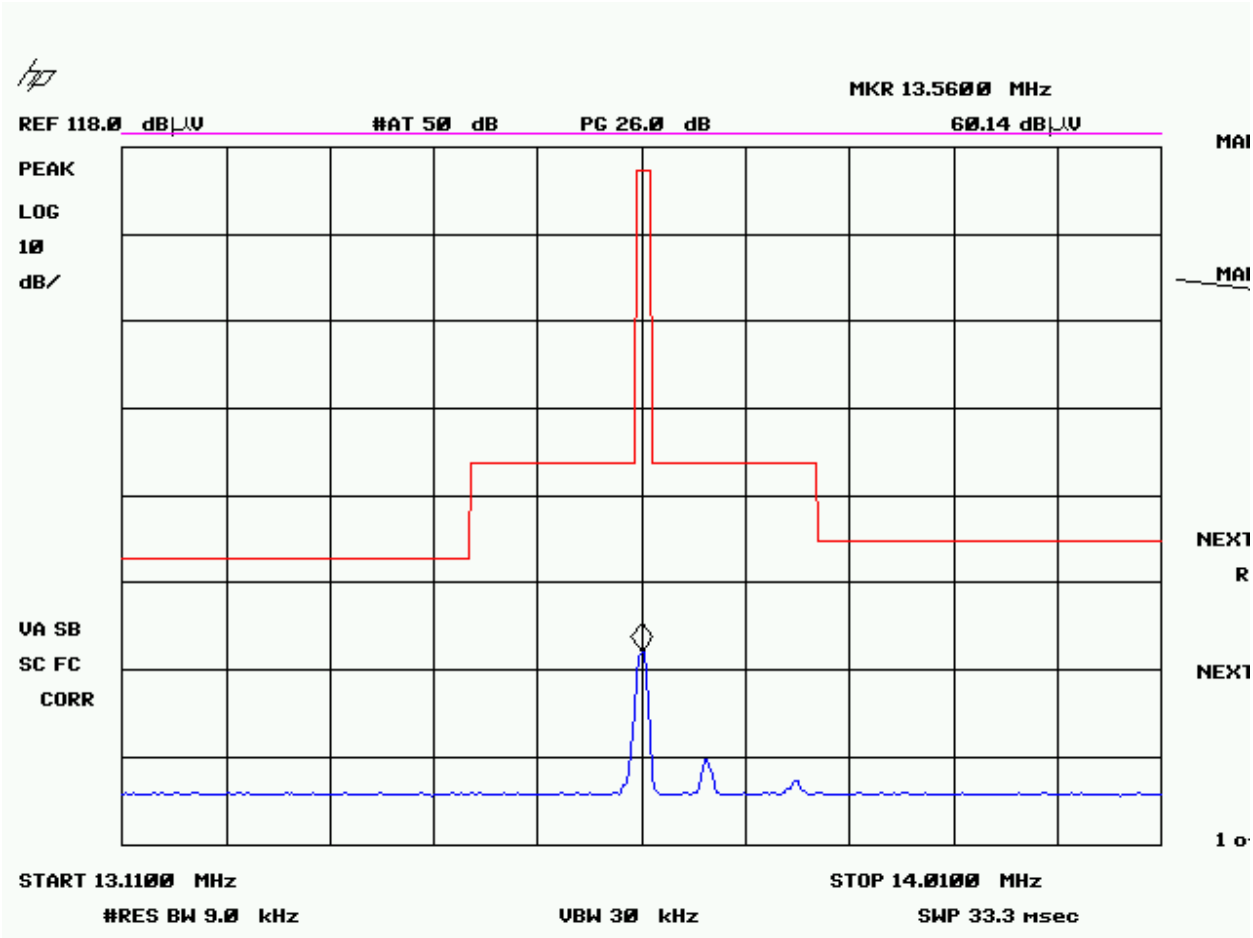
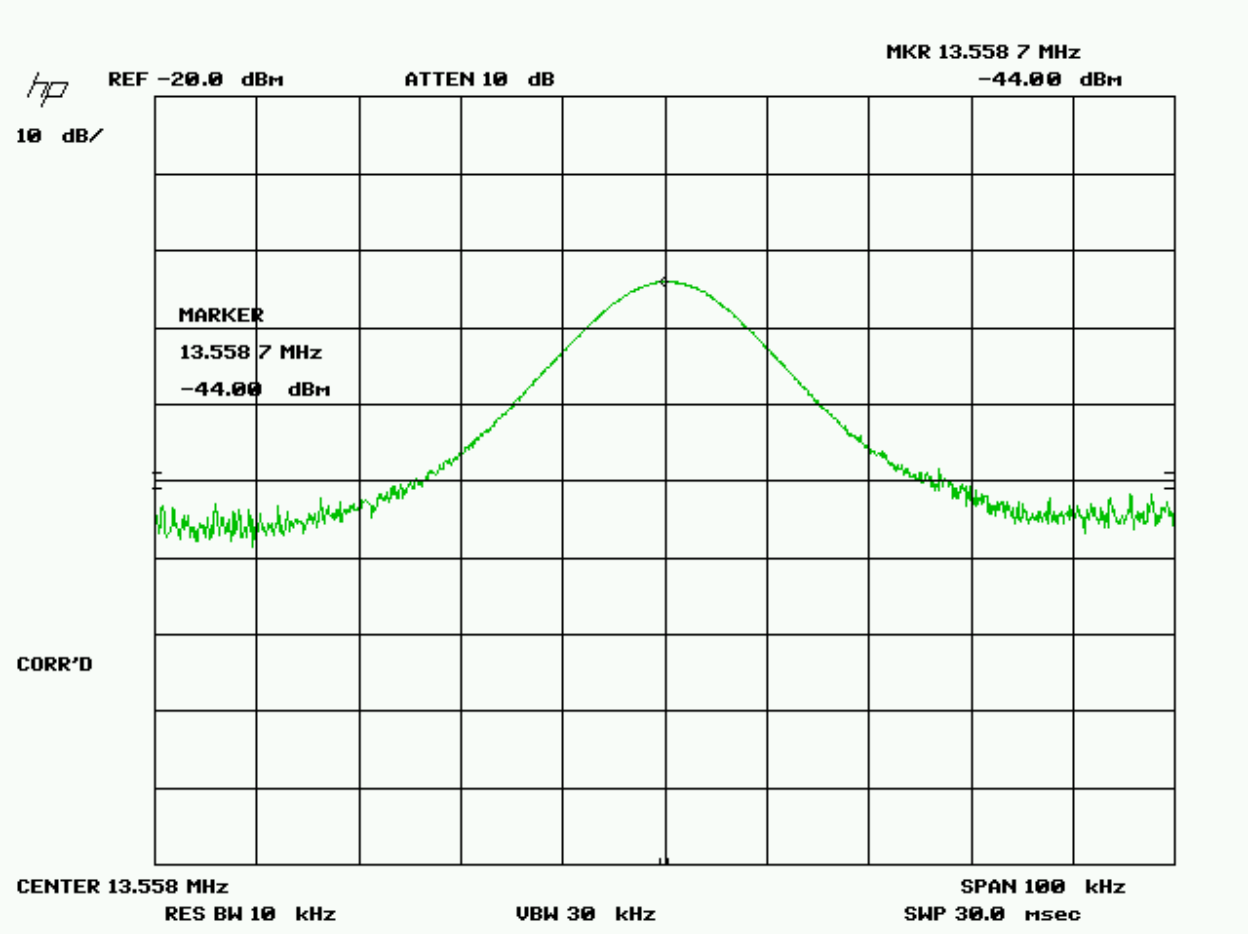


Figure 6.
Field Strength of Fundamental Emissions 15.225 (a)



2.9 Peak Radiated Spurious Emissions in the Frequency Range 14.01 MHz -1,000 MHz (FCC Section 15.205, 15.209 and 15.225)

A preliminary scan was performed on the EUT to determine spurious frequencies that were caused by the transmitter portion of the product. Significant emissions that fell within restricted bands were then measured on an OATS site. Radiated measurements below 1 GHz were tested with a RBW = 120 kHz. The results of all peak radiated spurious emissions including those falling in the restricted bands are given in Table 5 and in Figure 7.

Table 5. Peak Radiated Spurious Emissions

Test By:	**Test:** FCC Part 15.109, 15.209, 15.225							**Client:** BALOGH T.A.G. Corporation	
DA	**Project:** 08-0028		**Class:** A					**Model:** TCF-100	
Frequency (MHz)	**Test Data (Pk Det) (dBm)**	**Test Data (dBuV)**	**Distance Factor (DF)**	**AF+CL -PA (dB)**	**Results (dBuV/m)**	**Results (uV/m)**	**Limits (uV/m)**	**Margin (dB)**	
*27.117	-81.3	25.7	-40	12.46+0.74	-1.1	0.88	30	**30.65**	
*40.68	-91.2	15.8	0	10.58+1.12	27.5	23.7	100	**12.5**	
**250.05	-69.0	38.0	-10.45	13.0+2.96	43.41	148.08	210	**3.03**	
366.10	-72.2	34.8	-10.45	15.1+3.53	42.98	140.92	210	**3.46**	
379.66	-71	36.0	-10.45	15.4+3.60	44.55	168.84	210	**1.89**	
393.23	-73.3	33.7	-10.45	15.9+3.73	42.88	139.31	210	**3.56**	
**406.77	-74.2	32.8	-10.45	16.1+3.75	42.2	128.82	210	**4.24**	
420.33	-74.0	33.0	-10.45	16.3+3.90	42.75	137.25	210	**3.69**	
**250	-73.4	33.6	-10.45	13.0+2.96	39.11	90.26	210	**7.33**	
379.65	-74.0	33.0	-10.45	15.4+3.60	41.55	119.54	210	**4.89**	
**406.76	-76.1	30.9	-10.45	16.1+3.75	40.30	103.51	210	**6.14**	
420.33	-74.2	32.8	-10.45	16.3+3.90	42.55	134.12	210	**3.89**	

Note: Preamp (PA) not used. AF = Antenna Factor (1st column); CL = Cable Loss (2nd column), DF = Extrapolation of test distance used to test distance required.
CONVERSION FROM dBm to dBuV: dBuV = dBm +107 dB
Measured with Peak detector as worst case.

Tested from 13.55 MHz to 1000 MHz.

SAMPLE CALCULATIONS:

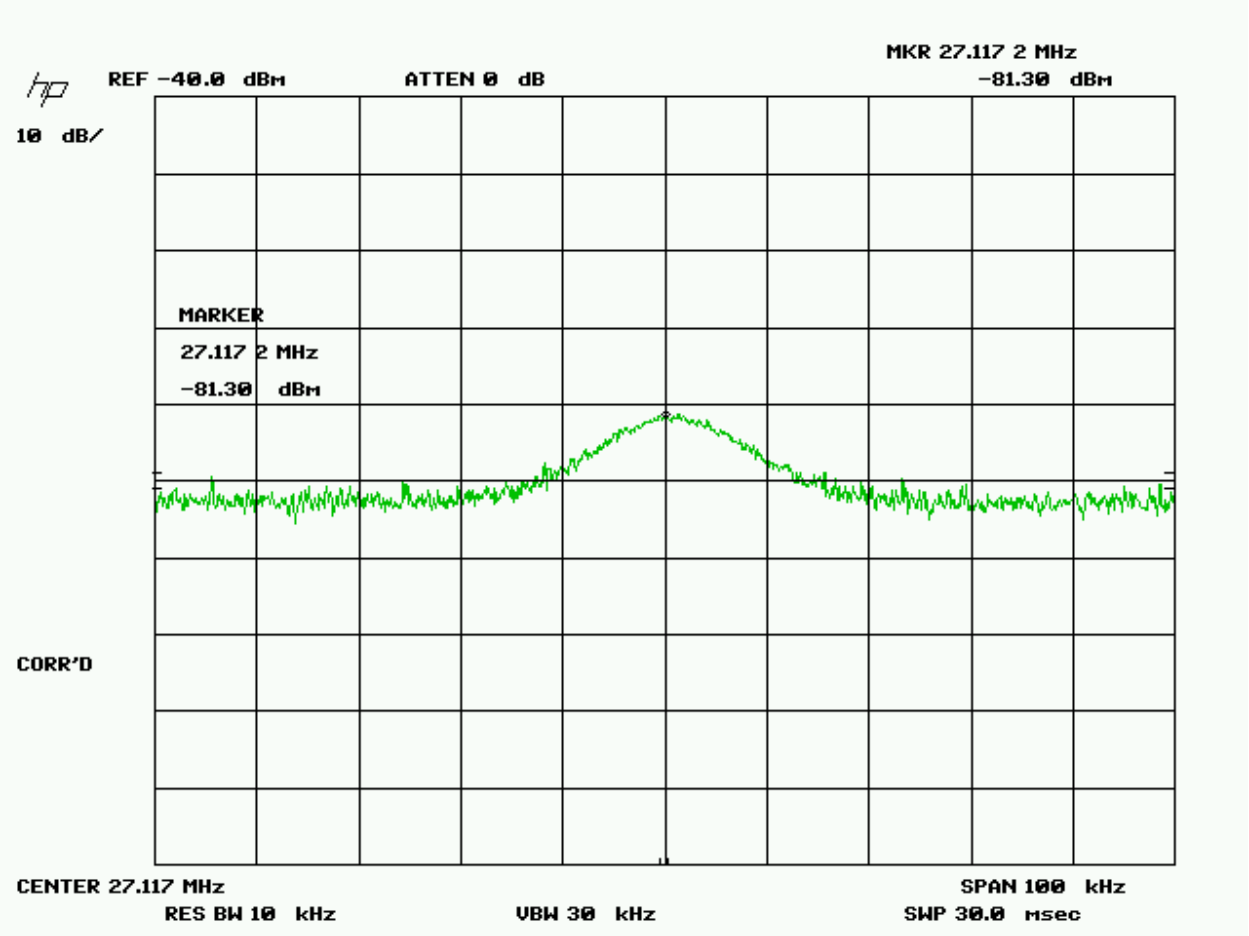
RESULTS: At 27.117 MHz = Antilog ((-81.3-40+ 13.2 + 107)/20) = 0.881 uV/m @ 30 m

* - Harmonically related to fundamental. All other signals are from Receiver/Digital parts of EUT.
** - Falls within Restricted Band, signal not from intentional radiator, therefore requirements of 15.209 (f) and 15.35 (a) apply.

Test Results Reviewed By: Daniel Aparaschivei **Name: Daniel Aparaschivei**

Figure 7.

Peak Radiated Spurious Emission 15.247(c) Representative Plot



2.10 Frequency Tolerance

The EUT temperature stability was measured over the temperature range of -20º C to 50º C as well as supply voltage variations of 85% to 115% at the temperature of 20º C. The results of this measurement are recorded in Table 6 below.

Table 6. Frequency Variation with Temperature and Supply Voltage.

Voltage - Volts	Temperature ºC		
	-20	**20**	**50**
Frequency @ 20.4	NR	13.55900 MHz	NR
Frequency @ 24.0	13.55925 MHz	13.55913 MHz	13.55900 MHz
Frequency @ 27.6	NR	13.55900 MHz	NR
85 % of 24 VDC = 20.4 VDC			
115 % of 24 VDC= 27.6 VDC			

NR = Not Required

For the frequency 13.55913 MHz, 0.01% = 0.0001x 1355913 MHz = .001355913 MHz

An increase of .01% yields 13.560485913 MHz

A decrease of 0.01% yields 13.557774087 MHz.

All of the measured values lie between the upper and lower 0.01% bounds.

Test Date: March 5, 2008

Tested by Signature: Daniel Aparaschivei **Name: Daniel Aparaschivei**

Figure 8. Data Plot 24.0 VDC, +20ºC.

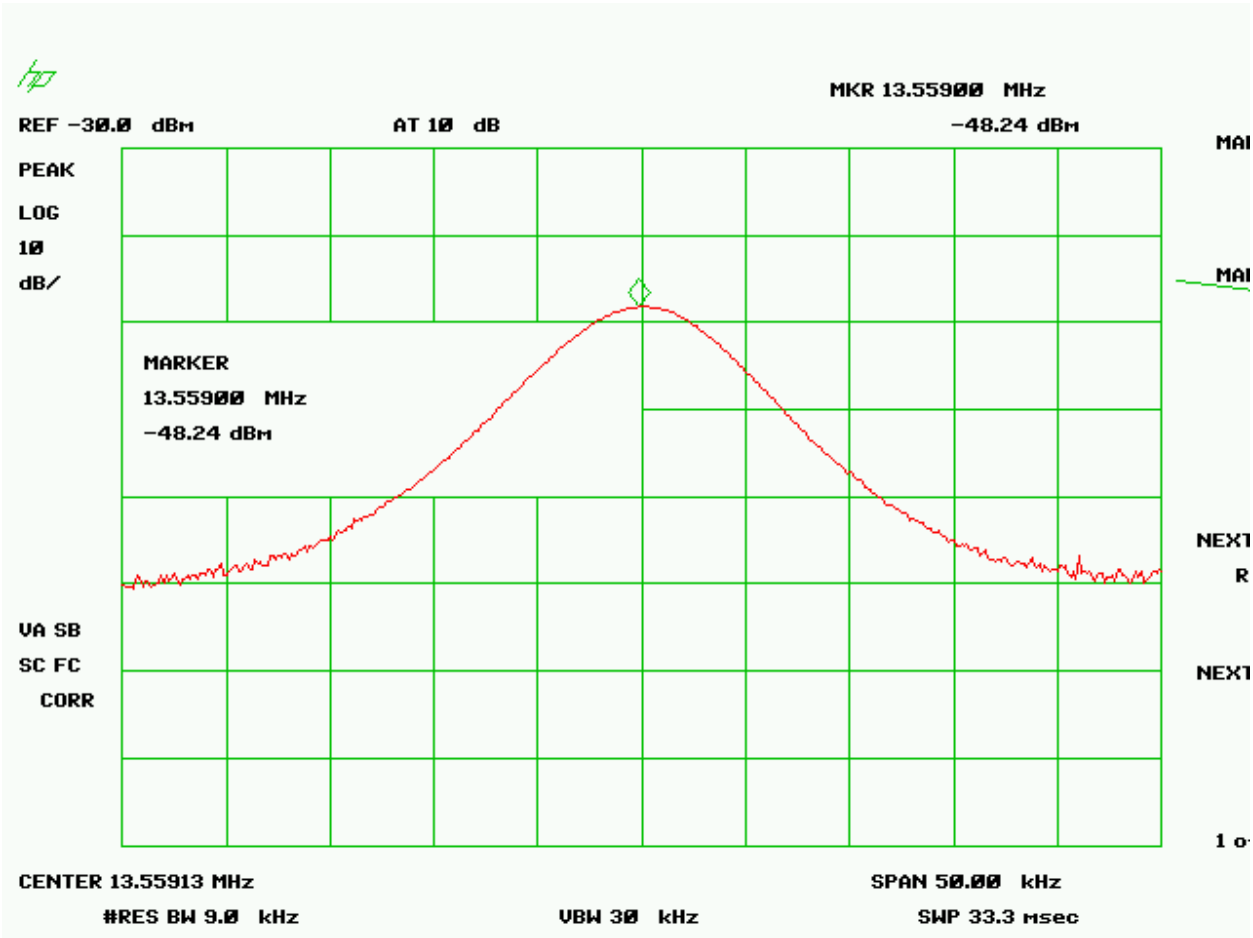


Figure 9. Data Plot, 24.0 VDC, -20 ºC.

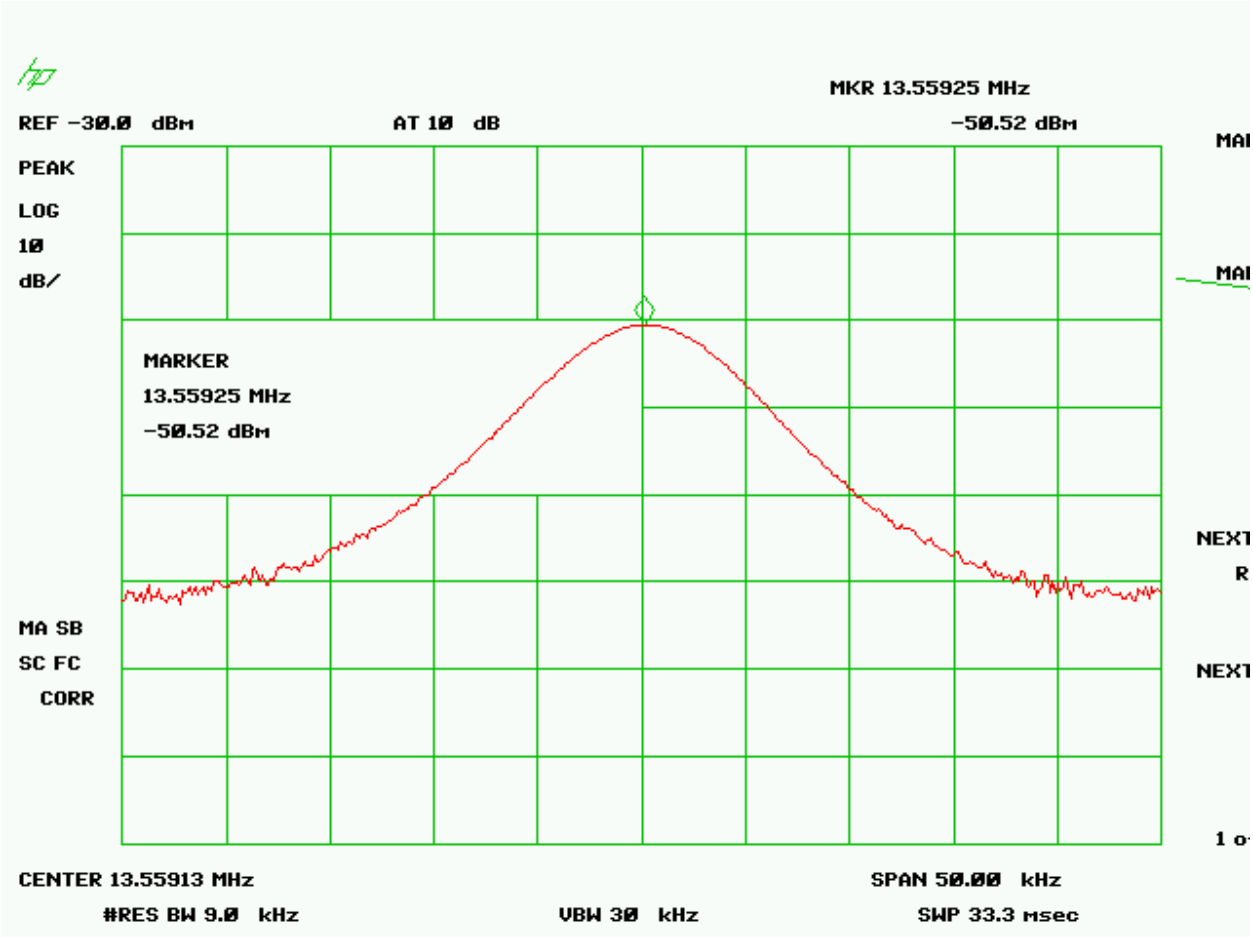
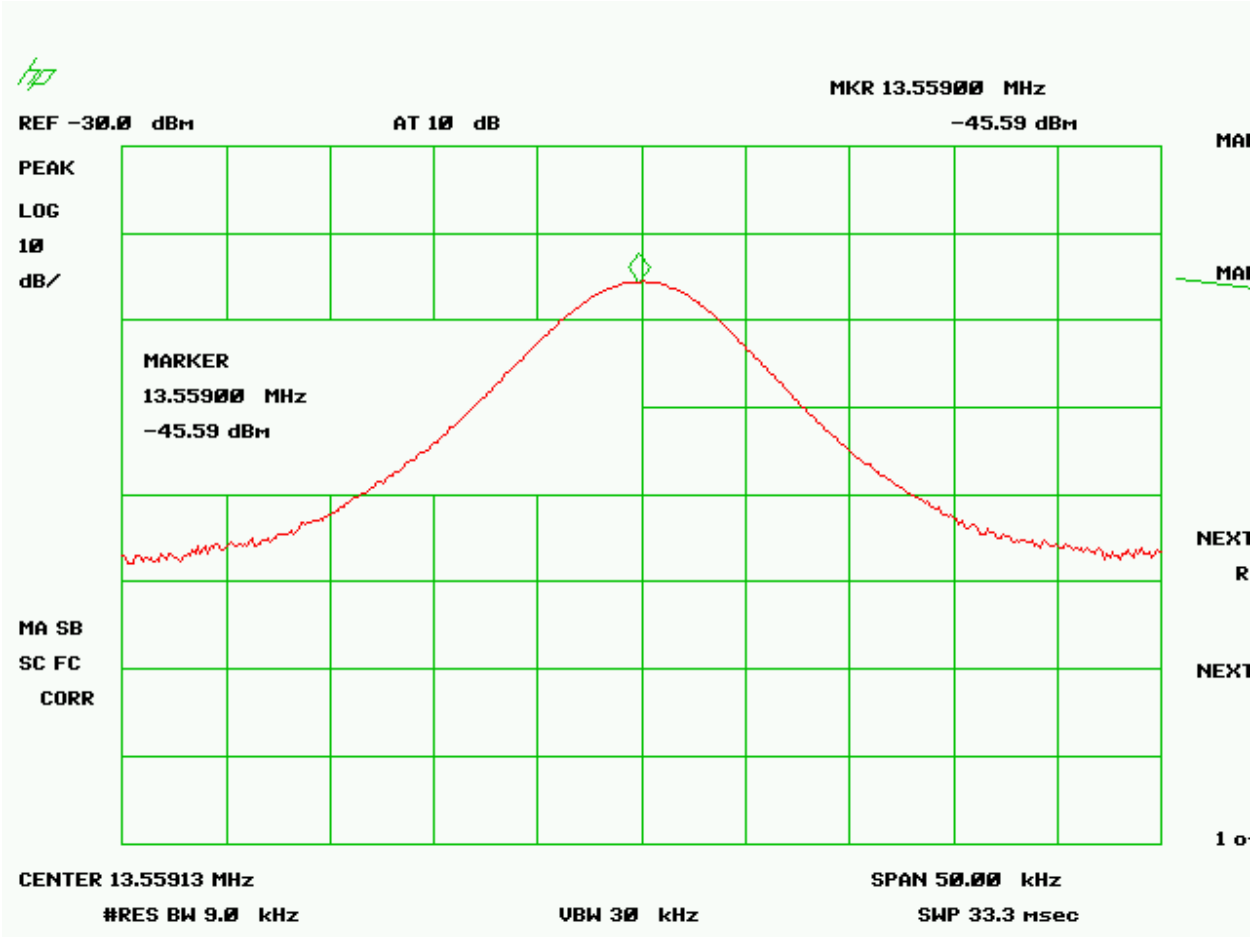


Figure 10. Data Plot 24 VDC, +50 ºC.



2.11. Power Line Conducted Emissions for Transmitter and Receiver/Digital Apparatus.(47 CFR 15.107&15.207)

The conducted voltage measurements have been carried out in accordance with FCC Sections 15.107 and 15.207 per the procedures of ANSI C63.4 paragraph 7, utilizing a spectrum analyzer connected to an LISN and with the EUT placed into a continuous mode of transmit for the transmitter portion of the test and the transmitter disabled for the Receiver/Digital part of the test. The results are given in Table 7.

Table 7. Conducted Emissions Test Data for Transmitter and Receiver/Digital Devices, 15.107 and 15.207 Limits

Conducted Emissions									
Test By: DA	**Test:** FCC Part 15.107 and 15.207 Class B					**Client:** BALOGH T.A.G. Corporation			
	Project: 08-0028					**Model:** TCF-100			
Frequency (MHz)	**Test Data (dBm)**	**Test Data (dBuV)**	**Transducer Table**	**LISN+ CL-AMP (dB)**	**Results (dBuV)**	**Limits (dBuV)**	**Distance / Polarity**	**Margin (dB)**	**Detector**
0.21	-62.5	44.5	LISNP	-0.2+.1	44.4	66.0	Phase	**21.6**	**QP**
0.5	-54.8	52.2	LISNP	-0.1+.04	52.1	56.0	Phase	**3.9**	**PK**
1.07	-75.8	31.2	LISNP	0.04+.16	31.4	56.0	Phase	**25.6**	**PK**
8.95	-82.6	24.4	LISNP	-.01+0.41	24.8	60.0	Phase	**35.2**	**PK**
10.55	-83.1	23.9	LISNP	-.05+0.45	24.3	60.0	Phase	**35.7**	**PK**
20.22	-83.4	23.6	LISNP	-.01+0.61	24.2	60.0	Phase	**35.8**	**PK**
0.236	-63.6	43.4	LISNN	-.1.5+.05	43.3	66.0	Neutral	**22.7**	**QP**
0.501	-61.9	45.1	LISNN	-0.1+.04	45.0	56.0	Neutral	**11.0**	**PK**
1.04	-77.0	30.0	LISNN	0.04+.16	30.2	56.0	Neutral	**25.8**	**PK**
8.46	-82.5	24.5	LISNN	-.01+0.41	24.9	60.0	Neutral	**35.1**	**PK**
13.41	-82.8	24.2	LISNN	.01+0.49	24.7	60.0	Neutral	**35.3**	**PK**
29.72	-82.4	24.6	LISNN	0.0+0.8	25.4	60.0	Neutral	**34.6**	**PK**

No signals are harmonically related to EUT, therefore are all unintentional radiator signals. Limits are from 15.107.

SAMPLE CALCULATIONS: At 0.21 MHz, level = 44.5 dBuV + (- 0.1)dB = 44.4 dBuV.

Test Results Reviewed By: Daniel Aparaschivei **Name: Daniel Aparaschivei**

2.12 Radiated Emissions (47 CFR 15.109(a))

Radiated emissions were evaluated from 30 MHz to 1 GHz. Measurements were made with the analyzer's bandwidth set to 120 kHz measurements made below 1 GHz and 1 MHz for measurements made at 1 GHz and higher. Results are shown in Table 8

Table 8. Radiated Emissions Data for Digital Device, Class A

30 MHz – 1 GHz

Radiated Emissions for Digital Device									
Test By: DA	**Test:** FCC Part 15.109					**Client:** BALOGH T.A.G. Corporation			
			Class: A			**Model:** TCF-100			
Frequency (MHz)	**Test Data (dBm)**	**Test Data (dBuV)**	**Transducer Table**	**AF+CA - AMP Note 1 (dB)**	**Results @ 3m (uV/m)**	**Limits @3m uV/m**	**Distance / Polarization**	**Margin (dB)**	**DET**
250.00	-83.9	23.1	1LP3mV	12.8+2.8	86.1	210.0	3m./VERT	**7.74**	**PK**
250.05	-79.5	27.5	1LP3mH	12.8+2.8	142.88	210.0	3m./HORZ	**3.34**	**PK**
366.1	-82.7	24.3	1LP3mH	15.1+3.50	139.63	210.0	3m./HORZ	**3.54**	**PK**
379.65	-84.5	22.5	1LP3mV	15.1+3.75	116.8	210.0	3m./VERT	**5.09**	**PK**
379.66	-81.7	25.3	1LP3mH	15.25+3.75	164.05	210.0	3m./HORZ	**2.14**	**PK**
393.23	-83.8	23.2	1LP3mH	15.9+3.60	136.45	210.0	3m./HORZ	**3.7**	**PK**
406.76	-86.6	20.4	1LP3mV	15.65+3.75	97.72	210.0	3m./VERT	**6.6**	**PK**
406.77	-84.7	22.3	1LP3mH	16.25+3.75	130.32	210.0	3m./HORZ	**4.14**	**PK**
420.33	-84.5	22.5	1LP3mH	16.05+3.95	133.35	210.0	3m./HORZ	**3.9**	**PK**
420.33	-84.7	22.3	1LP3mV	15.85+3.95	127.35	210.0	3m./VERT	**4.3**	**PK**

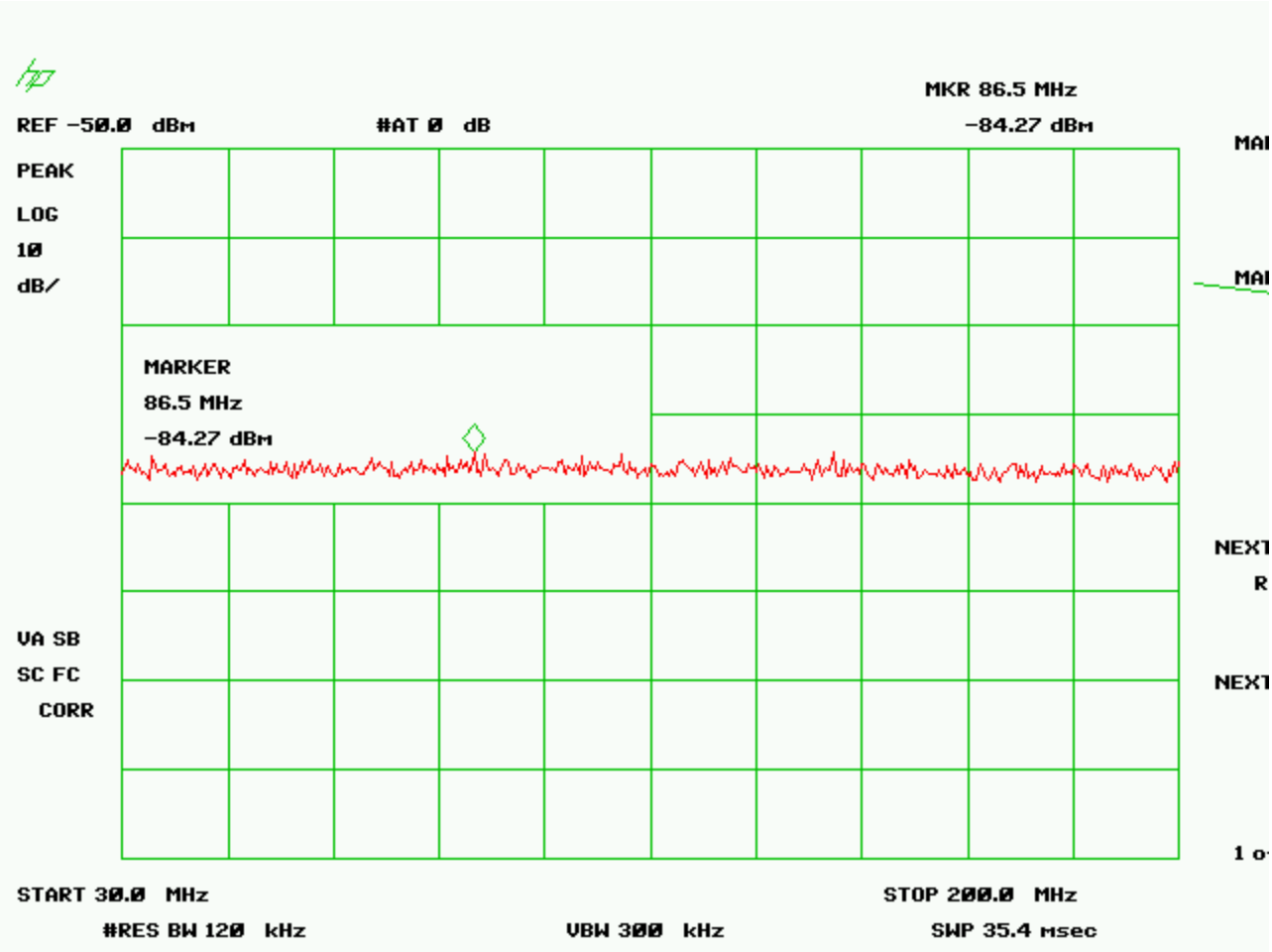
Note 1: The preamplifier was not used for these measurements. The first number is antenna Factor and the second is cable loss.

SAMPLE CALCULATIONS:

RESULTS : At 250 MHz with the antenna vertically polarized,
E = Antilog ((23.1 + 12.8+2.8 + 107)/20) = 86.1 uV/m @ 3m
CONVERSION FROM dBm TO dBuV = 107 dB

Test Results Reviewed By: Daniel Aparaschivei **Name: Daniel Aparaschivei**

Figure 10. Pre-scan Spectrum Representative Plot for Digital Emissions of Transmitter 30 MHz to 200 MHz



5 Photographs

Photos of The Tested EUT

5.1 EUT, Front View
5.2 EUT, Bottom View
5.3 EUT, Bottom View Cover Removed Transceiver board Solder Side
5.4 EUT, Transceiver board Component Side