TEST REPORT

Report Number: 100032834DAL-004
Project Number: G100032834

Report Issue Date: January 27, 2011

Product Designation: **916.5MHz FCT-RT Terminal**

Standards: **FCC 15.249 – Operation within the bands 902-928 MHz, 2400-2483.5MHz, 5725-5875, and 24.0-24.25 GHz.**

Tested by:
Intertek Testing Services NA, Inc.
1809 10th St. Suite 400
Plano, TX 75074 - USA

Client:
EJ Ward
8801 Tradeway St
San Antonio, TX 78217

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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 3.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complies with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

2 Test Summary

Section	Test full name	Test date	Result
3	Description of Equipment Under Test	---	---
4	System setup including cable interconnection details, support equipment and simplified block diagram	---	---
5	Overview of EUT	01/06/11	Pass
6	Duty Cycle Determination	01/25/11	Pass
7	Radiated Emissions	01/07/11 and 01/26/10	Pass
8	Occupied Bandwidth	01/07/11	Pass

3 Description of Equipment Under Test

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
916.5MHz FCT-RT Terminal	EJ Ward	SS-SICKVH-F210-T82-H-0	AI0-3625

Receive Date:	12/20/10
Received Condition:	Good
Type:	Production

Description of Equipment Under Test
The EUT is a transmitter that connects to a gas pump hose and transmits to a terminal when it is shaken to indicate which pump is being used when gassing up.

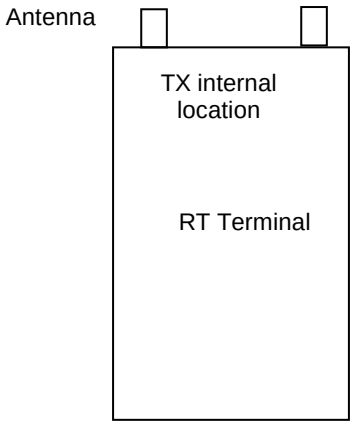
Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	The transmitter was reprogrammed to transmit continuously after being shaken to allow the measurements to be made. The module is battery operated.

4 System setup including cable interconnection details, support equipment and simplified block diagram

4.0 Method:

4.1 EUT Block Diagram:



4.2 Data:

Qty	Description	Length	Shielding	Ferrites
None				

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
none	none	none	none

5 Overview of EUT (Low Power Transmitter) (FCC 15C –EUT Overview)

5.0 Method

Complete the overview spreadsheet.

Related Submittal(s) Grants: This report is for use with an application for certificate of a low power transmitter application.

Data:

Applicant	EJ Ward
Trade Name & Model No.	916.5MHz FCT-RT Terminal
FCC Identifier	TBD
Frequency Range (MHz)	916.5
Antenna Type (15.203)	Vertical Low Profile (3dBi, professionally installed)
Manufacturer name & address	EJ Ward
	8801 Tradeway St
	San Antonio, TX 78217
Related Submittals and Grants:	This report is used with an application for certification of a low power transmitter. One transmitter is included in the application.
Additions, deviations and exclusions from standards	None

6 Duty Cycle Determination (FCC 15A – 15.35(c))

Method:

(c) Unless otherwise specified, e.g. §15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

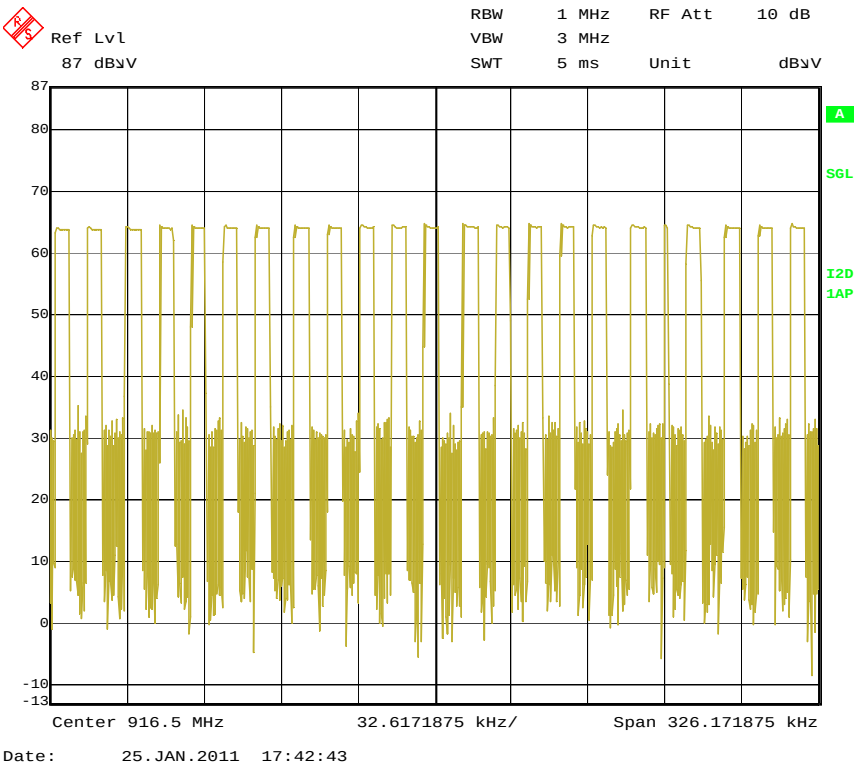
Determine the period of the pulse train, T, in mSec and record the results. T is defined as the time from the beginning of one pulse train to the beginning of the next pulse train.

Count the number of different types of pulses, N and record the results.

For each of the different types of pulses, count the number of occurrences within one pulse train.

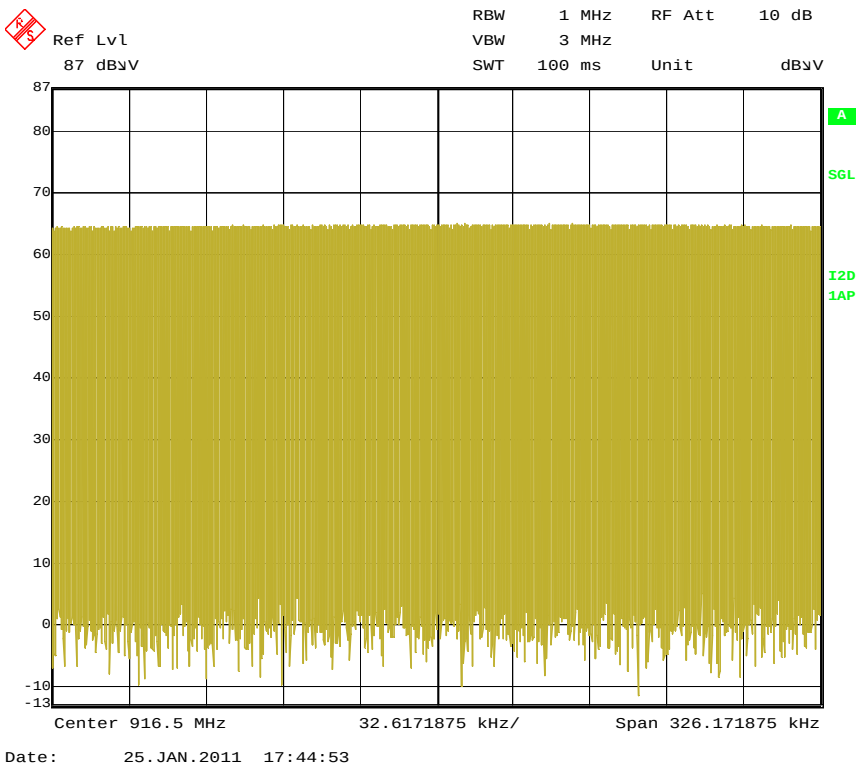
Use the Duty Cycle Correction Factor, DCCF, from the results table and use it to adjust the field strength measurements recorded for radiated emissions.

Plot:



23 pulses in 5ms period

6.0 Duty Cycle Determination (FCC 15A – 15.35(c))



460 pulses in a 100ms period

6.0 Duty Cycle Determination (FCC 15A – 15.35(c))

Duration of Pulse Train, T (mSec):	100
Averaging Interval, A_t (mSec):	100
Number of different Pulses, N:	3

	Number ($\#P_x$)	Pulse Width, mSec (PW_x)	Product ($\#P_x$)*(PW_x)
Pulse Width 1	80	0.1	8
Pulse Width 2	320	0.1125	36
Pulse Width 3	60	0.125	7.5
Pulse Width 4			
Pulse Width 5			
Pulse Width 6			
Pulse Width 7			
Pulse Width 8			
Pulse Width 9			
Pulse Width 10			

Duty Cycle:	0.515
Duty Cycle Correction Factor, dB:	-5.8

$$T_{on} = (PW_1 * \#P)_1 + (PW_2 * \#P_2) + \cdots + (PW_n * \#P_n)$$

$$DutyCycle = T_{on} \div A_t$$

$$DCCF = 20 * Log_{10}(DutyCycle)$$

7 Radiated emissions (E-field) for low power intentional radiators. (Radiated Emissions LPD)

Method:

Measurements shall be performed with a quasi-peak detector instrument that meets the requirements of Section One of CISPR 16.

Bandwidths:
30 MHz to 1000 MHz: 120 kHz RBW and 1 MHz VBW
Above 1000 MHz: 1 MHz RBW and 3 MHz VBW

Detectors:
Equal to or less than 1000 MHz: CISPR quasi-peak detector (alternative: peak detector)
Above 1000 MHz: Average detector (applies to average limit)
Above 1000 MHz: Peak detector (applies to peak limit)

Limits:
Equal to or less than 1000 MHz, the limits are specified as quasi-peak. If a peak detector is used, the limit does not change.
Above 1000 MHz, the limits are specified as average. The peak limit is 20 dB above the average limit. Both peak and average measurements are required to be reported.

Frequency range of radiated measurements
For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:

(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

(3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.

(4) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a)(1) through (a)(3) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this section, whichever is the higher frequency range of investigation.

Measurement antenna requirements:
Below 30 MHz - Loop antenna
30 to 1000 MHz - Biconical, Log Periodic, or equivalent
Above 1000 MHz - Horn or equivalent

Measurements of the radiated field are made with the antenna located at a distance of 3 or 10 meters from the EUT. The limit applied to the measurement shall be appropriate for the test distance. The test distance shall be indicated in the results section.

The EUT shall be arranged and connected with cables terminated in accordance with the product specification.

Exploratory tests should be carried out while varying the cable positions to determine the maximum or near-maximum emission level. During manipulation, cables shall not be placed under or on top of the system test components unless such placement is required by the inherent equipment design.

The antenna shall be adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth shall be varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) shall be varied during the measurements to find the maximum field-strength readings.

If the EUT is handheld, it shall be oriented in each of its othogonal axes.

If the EUT is intended for tabletop use, it shall be placed on a table whose top is 0.8m above the ground plane. The table shall be constructed of nonconductive materials. Its dimensions are at least 1m by 1.5m, but may be extended for larger EUT.

If EUT is floor standing, the EUT was placed on a horizontal metal ground plane and isolated from the ground plane by up to 12 mm of insulating material.

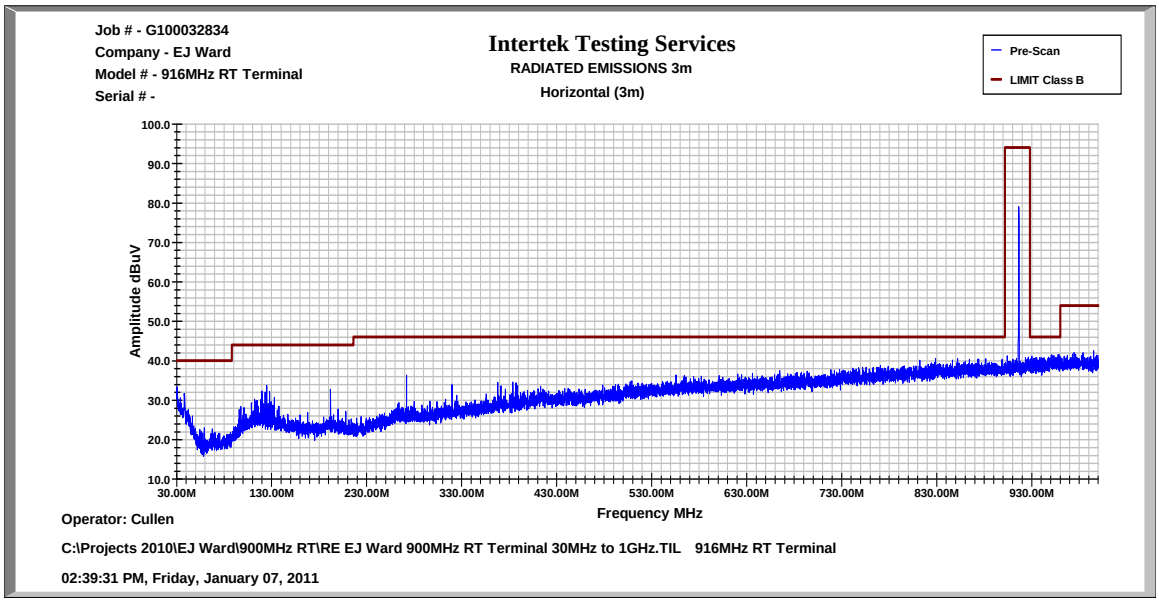
Equipment setup for radiated disturbance tests shall follow the guidelines of ANSI C63.4:2003.

TEST SITE
The test site for radiated emissions is located at 1809 10th Street Suite 400, Plano, TX 75074.

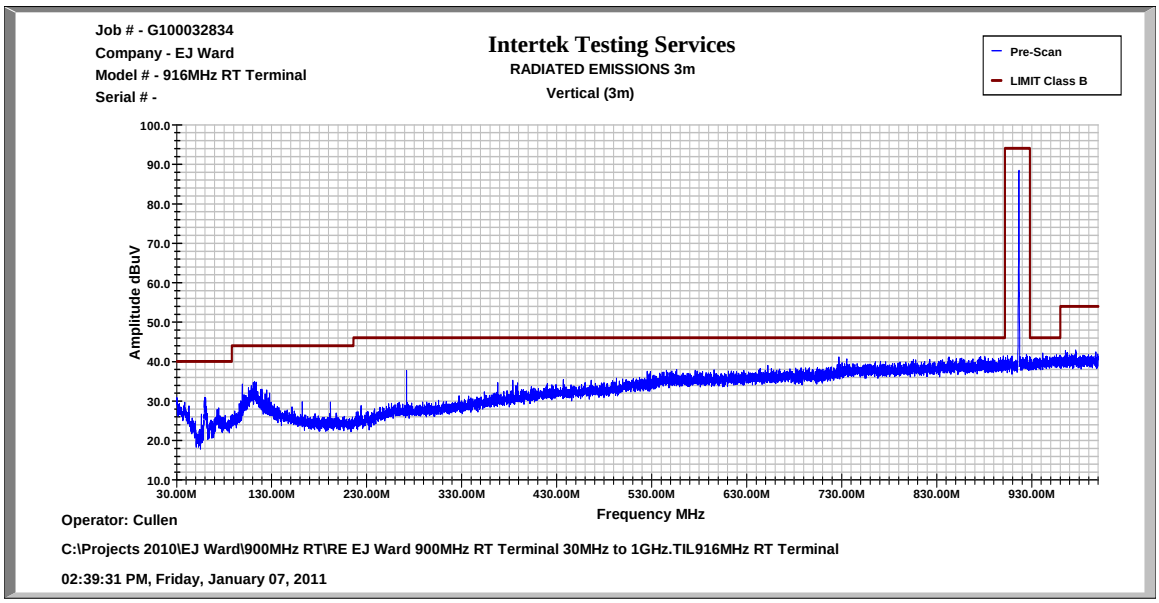
Test Equipment Used:

Description	Manufacturer	Model	Serial Number	Cal Date	Cal Due
EMI Receiver	Rhode & Schwarz	ESI	100044	03/19/10	03/19/11
Bi-ConiLog Antenna	Schaffner	CBL6112B	2726	07/19/10	07/19/11
Spectrum Analyzer	Agilent	E7405A	US40240235	03/17/10	03/17/11
RF Cable	Custom made	#1	245	07/24/10	07/24/11
RF Cable	Custom made	#4	131	07/24/10	07/24/11
SMA Cable	Custom made	SPS-2303	805	07/25/10	07/25/11
Handheld Manometer	Omega	HHP-102F	19.99/29.0 PSIA	03/25/10	03/25/11
Horn Antenna	AH Systems	SAS-571	787	04/06/10	04/06/11
Preamplifier	Miteq	AMF 4D-001180-24-10P	1020106	10/04/10	10/04/11
DMM	Fluke	8060A	7212022	08/02/10	08/02/11

7.0 Radiated emissions (E-field) for low power intentional radiators. (Radiated Emissions LPD)



30MHz to 1GHz (with fundamental frequency notch)

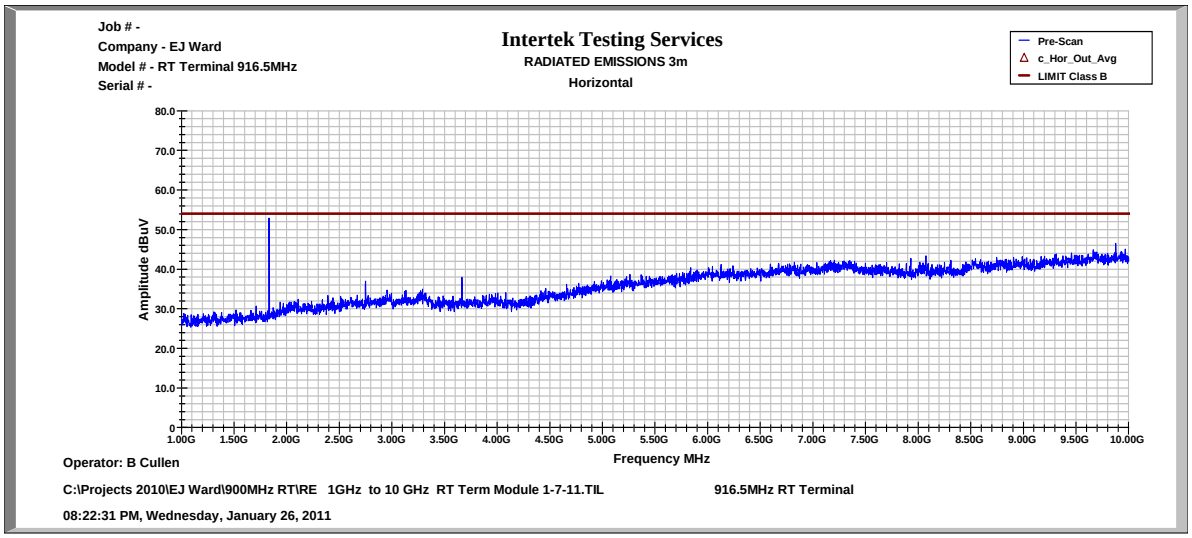


30MHz to 1GHz (with fundamental frequency notch)

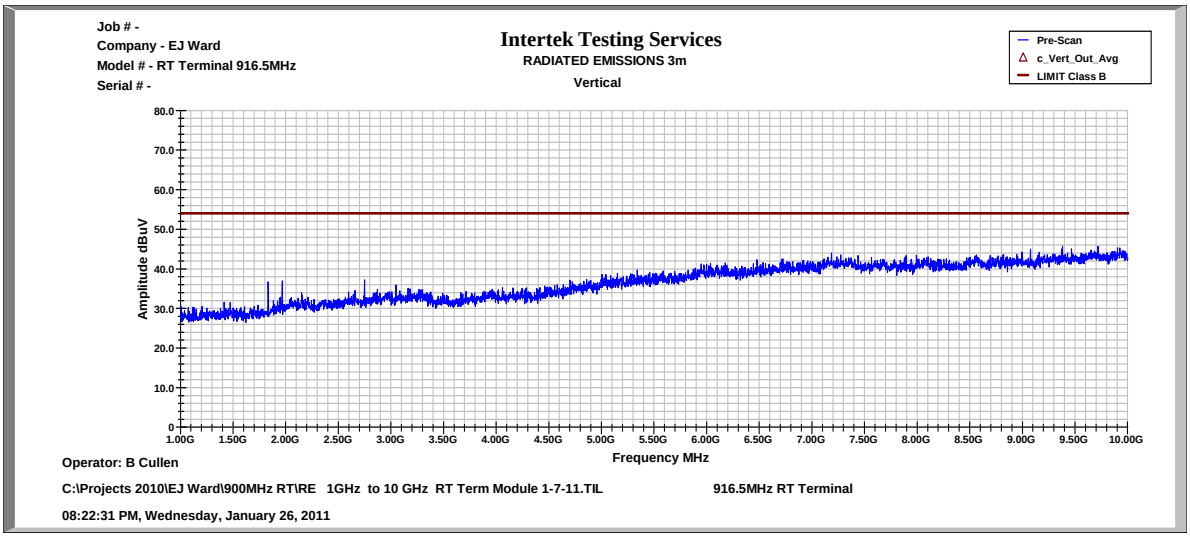
Harmonic and Spurious Tables:

A	B	C	D	E	F	G	H	I	J
Ant. Pol. (V/H)	**Frequency MHz**	**Quasi Reading dB(uV)**	**Antenna Factor dB(1/m)**	**Cable Loss dB**	**Pre-amp Factor dB**	**Net dB(uV/m)**	**Quasi Limit dB(uV/m)**	**Quasi Margin dB**	**Detectors / Bandwidths Det/RBW/VBW**
V	112.000	15.8	12.4	1.6	0.0	29.8	44.0	-14.2	PK/120/300kHz
H	112.000	14.9	12.4	1.6	0.0	28.9	44.0	-15.1	PK/120/300kHz
V	272.000	18.3	13.6	2.4	0.0	34.3	46.0	-11.7	PK/120/300kHz
H	272.000	17.6	13.6	2.4	0.0	33.6	46.0	-12.4	PK/120/300kHz
V	727.100	14.9	20.1	3.9	0.0	38.9	46.0	-7.1	PK/120/300kHz
H	727.100	12.7	20.1	3.9	0.0	36.7	46.0	-9.3	PK/120/300kHz
V	916.500	59.7	22.0	4.5	0.0	86.2	94.0	-7.8	PK/120/300kHz
H	916.500	50.8	22.0	4.5	0.0	77.3	94.0	-16.7	PK/120/300kHz
Calculations		G=C+D+E-F		I=G-H					

7.0 Radiated emissions (E-field) for low power intentional radiators. (Radiated Emissions LPD)



1GHz to 10GHz Harmonic and Spurious emissions peak data meet average limit



1GHz to 10GHz Harmonic and Spurious emissions peak data meet average limit

Harmonic and Spurious Tables:

A	B	C	D	E	F	G	H	I	J
Ant. Pol. (V/H)	**Frequency MHz**	**Avg Reading dB(uV)**	**Antenna Factor dB(1/m)**	**Cable Loss dB**	**Pre-amp Factor dB**	**Net dB(uV/m)**	**Avg Limit dB(uV/m)**	**Avg Margin dB**	**Detectors / Bandwidths Det/RBW/VBW**
V	1833.000	47.5	25.5	3.0	40.0	36.0	54.0	-18.0	PK/1/3MHz
H	1833.000	62.7	25.5	3.0	40.0	51.2	54.0	-2.8	PK/1/3MHz
V	2749.500	44.8	28.6	3.7	40.0	37.1	54.0	-16.9	PK/1/3MHz
H	2749.500	44.5	28.6	3.7	40.0	36.8	54.0	-17.2	PK/1/3MHz
V	3666.000	40.5	29.5	4.3	41.0	33.3	54.0	-20.7	PK/1/3MHz
H	3666.000	38.0	29.5	4.3	41.0	30.8	54.0	-23.2	PK/1/3MHz
V	4582.500	38.1	31.0	4.6	40.5	33.2	54.0	-20.8	PK/1/3MHz
H	4582.500	38.0	31.0	4.6	40.5	33.1	54.0	-20.9	PK/1/3MHz
Calculations		G=C+D+E-F		I=G-H					

All frequencies measured met the restricted band limit of 54dBuV/m.

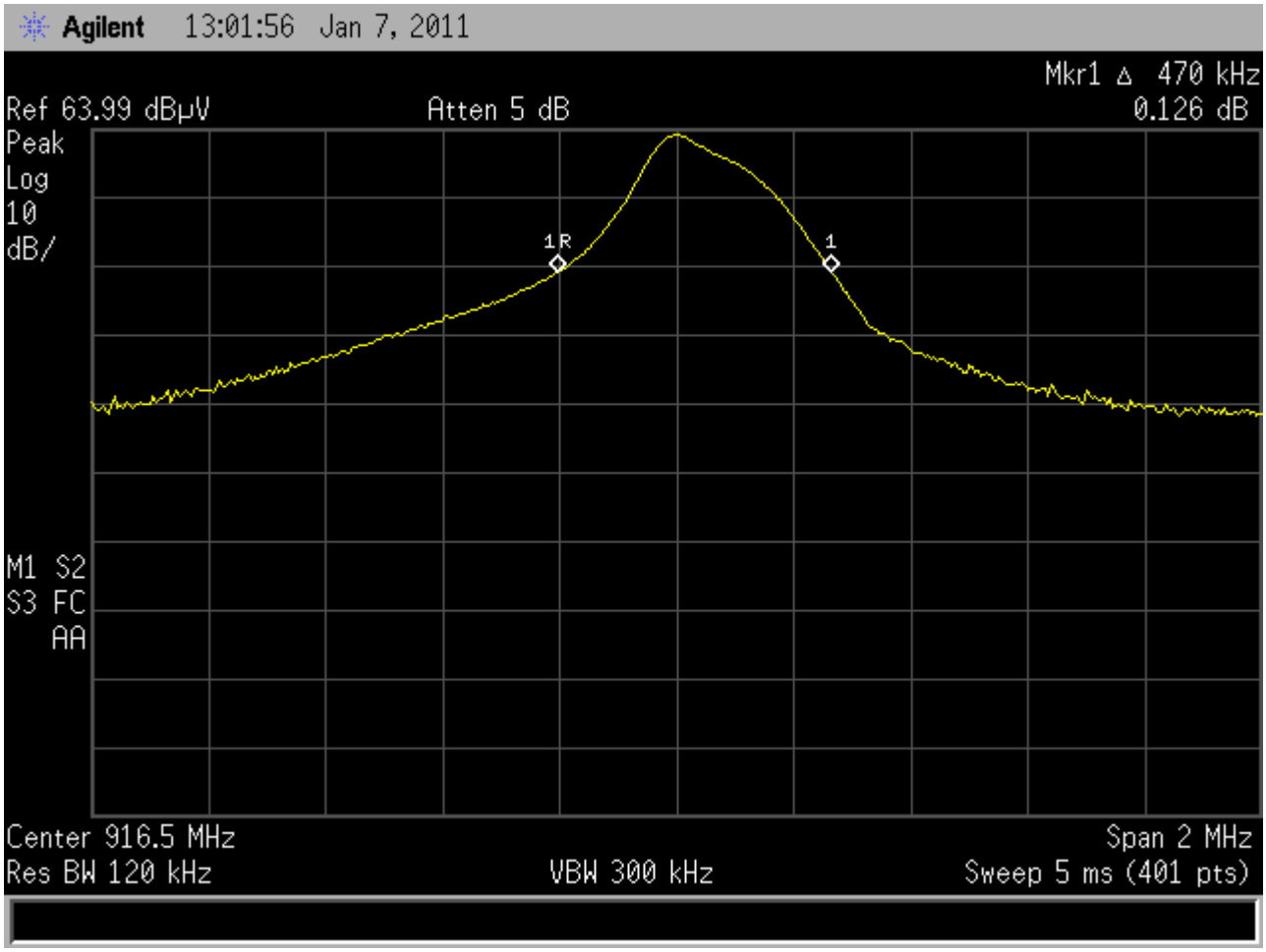
8 Occupied Bandwidth (FCC Part 2.1049)

Method:

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Connect the antenna port of the EUT to a spectrum analyzer using a calibrated coaxial cable and attenuator. Set the EUT to transmit at its highest power setting. The 99% bandwidth function of the analyzer was used to automatically generate the occupied bandwidth plots. Repeat for low, mid, and high channels of each band of the EUT.

For amplifiers, the output bandwidth shall be less than or equal to the input bandwidth.



9 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of k = 2, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty (dB)	Notes
Radiated emissions, 30 to 1000 MHz @ 3m	3.1	
Radiated emissions, 1 to 18 GHz	---	
Radiated emissions, 18 to 40 GHz	---	
AC mains Conducted emissions, 150kHz to 30 MHz	1.7	
Telecom Port Conducted emissions, Voltage 150 kHz to 30 MHz	1.7	
Telecom Port Conducted emissions, Current 150 kHz to 30 MHz	1.5	
Harmonics	---	
Flicker	---	
ESD	---	
Radiated RF field immunity	1.8	
EFT	---	
Surge	---	
Conducted RF immunity	1.6	
Power frequency magnetic field immunity	---	
Voltage dips / interruptions immunity	---	

10 Revision History

Revision Level	Date	Report Number	Notes
0	01/27/11	100032834DAL-004	Original Issue