

## TEST REPORT

Report No.: HK11040905-2

**TFE Hong Kong Limited**

Application  
For  
Certification  
(Original Grant)  
**(FCC ID: Y32-ERFBANT0915)**

Limited Modular Approval  
(Transceiver)

Prepared and Checked by:

Signed On File  
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Date: August 03, 2011

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## GENERAL INFORMATION

**TFE Hong Kong Limited**

**MODEL: TRFM915**

**FCC ID: Y32-ERFBANT0915**

Grantee:	TFE Hong Kong Limited
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Manufacturer:	TFE Hong Kong Limited
Manufacturer Address:	7/F., Gemmy Factory Building, 12 Hung To Road, Kwun Tong, Kowloon, Hong Kong.
Brand Name:	Not Applicable
Model:	TRFM915
Type of EUT:	Limited Modular Approval (Transceiver)
Description of EUT:	RF Transceiver Module
Serial Number:	N/A
FCC ID / IC:	Y32-ERFBANT0915
Date of Sample Submitted:	April 15, 2011
Date of Test:	July 18, 2011
Report No.:	HK11040905-2
Report Date:	August 03, 2011
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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## SUMMARY OF TEST RESULT

MODEL: TRFM915

FCC ID: Y32-ERFBANT0915

TEST SPECIFICATION	REFERENCE	RESULTS
Maximum Peak Output Power	15.247(b), (c) / RSS-210 A8.4	Pass
6 dB Bandwidth	15.247(a)(2) / RSS-210 A8.2	Pass
Maximum Power Density	15.247(e) / RSS-210 A8.2	Pass
Out of Band Antenna Conducted Emission	15.247(d) / RSS-210 A8.5	Pass
Radiated Emission in Restricted Bands	15.247(d)	Pass
Radiated Spurious Emissions	15.247(d) / RSS-210 A8.5	Pass
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 7.2.2	Pass
Antenna Requirement	15.203	Pass (See Note 1)

Note: 1. The professional installation provision of Section 15.203 is not applicable to modules but can apply to limited modular approvals under section 15.212(b) of this section.

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## 1.0 General Description

### 1.1 Product Description

The Equipment Under Test (EUT) is a 900MHz Transceiver Module based on IEEE 802.15.4 standard (Zigbee), which is operating at 906MHz to 924MHz, with 2MHz channel spacing. It is intended for use as a short range radio communication for embedded applications. It is powered by host.

Antenna Type: Trace Antenna: Internal, Integral  
External Antenna: Dedicated

Only one antenna should be used when the RF module installed, either the trace antenna or external antenna. There are two modulation types included in this module; BPSK and OQPSK modulation. All the transmission power, operating channels and type of modulation cannot be changed by user.

This module is only approved for use when installed in devices produced by a specific manufacturer for professional installation.

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

### 1.2 Related Submittal(s) Grants

This is a single application for certification of a RF modulator.

The receiver portion for this transceiver has been authorized by Verification procedure.

### 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). All radiated measurements were performed in an Open Area Test Site. Preliminary scans were performed in the Open Area Test Site only to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **“Justification Section”** of this Application.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been placed on file with the FCC.

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### 2.0 System Test Configuration

#### 2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

The device was powered by DC 3.6V AC/DC Adaptor through the testing Jig (Input: AC 100-120V, Output: DC 3-15V 700mA).

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

The set-up configuration is according to the client's instruction for testing.

#### 2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered up, it transmits the RF signal continuously.

#### 2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

#### 2.4 Equipment Modification

Any modifications installed previous to testing by TFE Hong Kong Limited will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Hong Kong Ltd.

#### 2.5 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

#### 2.6 Support Equipment List and Description

1. AC/DC Adaptor (Input: AC 100-120V, Output: DC 3-15V 700mA)  
(Provided by Intertek)
2. Testing Jig (Provided by Applicant)

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### 3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

#### 3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG - AV$$

where       $FS$  = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$   
               $RA$  = Receiver Amplitude (including preamplifier) in  $\text{dB}\mu\text{V}$   
               $CF$  = Cable Attenuation Factor in dB  
               $AF$  = Antenna Factor in dB  
               $AG$  = Amplifier Gain in dB  
               $AV$  = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RR + LF$$

where       $FS$  = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$   
               $RR$  =  $RA - AG - AV$  in  $\text{dB}\mu\text{V}$   
               $LF$  =  $CF + AF$  in dB

Assume a receiver reading of 52.0  $\text{dB}\mu\text{V}$  is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 27  $\text{dB}\mu\text{V}/\text{m}$ . This value in  $\text{dB}\mu\text{V}/\text{m}$  was converted to its corresponding level in  $\mu\text{V}/\text{m}$ .

$$RA = 52.0 \text{ dB}\mu\text{V}/\text{m}$$

$$AF = 7.4 \text{ dB}$$

$$RR = 18.0 \text{ dB}\mu\text{V}$$

$$CF = 1.6 \text{ dB}$$

$$LF = 9.0 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$AV = 5.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 18 + 9 = 27 \text{ dB}\mu\text{V}/\text{m}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V}/\text{m})/20] = 22.4 \mu\text{V}/\text{m}$$

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### **3.2 Radiated Emission Configuration Photograph**

The worst case in radiated emission was found at 3624.000 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

### **3.3 Radiated Emission Data**

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 0.4 dB

### **3.4 Conducted Emission Configuration Photograph**

For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conducted photos.pdf.

### **3.5 Conducted Emission Data**

For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgment: Passed by more than 20 dB

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### 4.0 Measurement Results

#### 4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

##### Test Setup:

The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt (+30 dBm).

Frequency (MHz)		Antenna 0 (Trace Antenna) Maximum Antenna Gain = 0dBi			
		Output in dBm		Output in mWatt	
		BPSK	OQPSK	BPSK	OQPSK
Lowest Channel:	906	4.61	5.40	2.89	3.47
Middle Channel:	914	5.01	6.01	3.17	3.99
Highest Channel:	924	5.65	7.07	3.67	5.09

Frequency (MHz)		Antenna 1 (External Antenna) Maximum Antenna Gain = 2dBi			
		Output in dBm		Output in mWatt	
		BPSK	OQPSK	BPSK	OQPSK
Lowest Channel:	906	9.11	8.34	8.15	6.82
Middle Channel:	914	8.91	8.14	7.78	6.52
Highest Channel:	924	8.63	7.79	7.29	6.01

EUT dBm max. output level = 9.11 dBm (+30 dBm or less)

Cable loss: 0.5 dB

Limit: = 30 dBm

Refer to the following plots for Conducted Output Power.

##### Trace Antenna (BPSK modulation)

Plot T1A: Lowest Channel Output Power

Plot T1B: Middle Channel Output Power

Plot T1C: Highest Channel Output Power

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### Trace Antenna (OQPSK modulation)

Plot T2A: Lowest Channel Output Power

Plot T2B: Middle Channel Output Power

Plot T2C: Highest Channel Output Power

### External Antenna (BPSK modulation)

Plot E1A: Lowest Channel Output Power

Plot E1B: Middle Channel Output Power

Plot E1C: Highest Channel Output Power

### External Antenna (OQPSK modulation)

Plot E2A: Lowest Channel Output Power

Plot E2B: Middle Channel Output Power

Plot E2C: Highest Channel Output Power

For electronic filing, the above plots are saved with filename: maxop.pdf

For RF Safety, the information is saved with filename: RF exposure.pdf.

#### 4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Frequency (MHz)	6 dB Bandwidth (kHz)			
	Antenna 0 (Trace Antenna)		Antenna 1 (External Antenna)	
	BPSK	OQPSK	BPSK	OQPSK
906	656	800	688	828
914	660	816	680	796
924	660	796	684	788

Cable loss: 0.5 dB

Limit: at least 500kHz

Refer to the following plots for 6dB bandwidth sharp.

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### Trace Antenna (BPSK modulation)

Plot T3A: Lowest Channel 6dB RF Bandwidth

Plot T3B: Middle Channel 6dB RF Bandwidth

Plot T3C: Highest Channel 6dB RF Bandwidth

### Trace Antenna (OQPSK modulation)

Plot T4A: Lowest Channel 6dB RF Bandwidth

Plot T4B: Middle Channel 6dB RF Bandwidth

Plot T4C: Highest Channel 6dB RF Bandwidth

### External Antenna (BPSK modulation)

Plot E3A: Lowest Channel 6dB RF Bandwidth

Plot E3B: Middle Channel 6dB RF Bandwidth

Plot E3C: Highest Channel 6dB RF Bandwidth

### External Antenna (OQPSK modulation)

Plot E4A: Lowest Channel 6dB RF Bandwidth

Plot E4B: Middle Channel 6dB RF Bandwidth

Plot E4C: Highest Channel 6dB RF Bandwidth

For electronic filing, the above plots are saved with filename: 6dB.pdf

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### 4.3 Maximum Power Density Reading, FCC Rule 15.247(e)

The spectrum analyzer RES BW was set to 3kHz. In order to look for a peak, the START and STOP frequencies were set to the band edges of the maximum output passband. If there is no clear maximum amplitude in any given portion of the band, it may be necessary to make measurements at a number of bands defined by several START and STOP frequency pairs.

Cable loss: 0.5 dB

External Attenuation: 0 dB

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are added to the analyzer raw readings.

Frequency (MHz)	Power Density (dBm/3kHz)			
	Antenna 0 (Trace Antenna)		Antenna 1 (External Antenna)	
	BPSK	OQPSK	BPSK	OQPSK
906	-6.86	-7.19	-1.91	-3.23
914	-6.48	-7.58	-2.19	-3.45
924	-5.69	-6.43	-2.55	-3.22

Peak Power Density = -1.91 dBm/3kHz

Cable loss: 0.5 dB

Limit: 8dBm/ 3kHz

Refer to the following plots for Power density data.

#### Trace Antenna (BPSK modulation)

Plot T5A: Lowest Channel Power Density

Plot T5B: Middle Channel Power Density

Plot T5C: Highest Channel Power Density

#### Trace Antenna (OQPSK modulation)

Plot T6A: Lowest Channel Power Density

Plot T6B: Middle Channel Power Density

Plot T6C: Highest Channel Power Density

#### External Antenna (BPSK modulation)

Plot E5A: Lowest Channel Power Density

Plot E5B: Middle Channel Power Density

Plot E5C: Highest Channel Power Density

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### External Antenna (OQPSK modulation)

Plot E6A: Lowest Channel Power Density

Plot E6B: Middle Channel Power Density

Plot E6C: Highest Channel Power Density

For electronic filing, the above plots are saved with filename: maxpd.pdf

#### 4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

The plots showed all spurious emission up to the tenth harmonic. They were found to be at least 20 dB below the highest level of the desired power in the passband.

Refer to the following plots for out of band conducted emissions data:

### Trace Antenna (BPSK modulation)

Plot T7A1 – T7A2: Lowest Channel Emissions

Plot T7B1 – T7B2: Middle Channel Emissions

Plot T7C1 – T7C2: Highest Channel Emissions

Plot T7D1 – T7D2: Modulation Product Emissions of Lowest Channel

Plot T7E1 – T7E2: Modulation Product Emissions of Highest Channel

### Trace Antenna (OQPSK modulation)

Plot T8A1 – T8A2: Lowest Channel Emissions

Plot T8B1 – T8B2: Middle Channel Emissions

Plot T8C1 – T8C2: Highest Channel Emissions

Plot T8D1 – T8D2: Modulation Product Emissions

### External Antenna (BPSK modulation)

Plot E7A1 – E7A2: Lowest Channel Emissions

Plot E7B1 – E7B2: Middle Channel Emissions

Plot E7C1 – E7C2: Highest Channel Emissions

Plot E7D1 – E7D2: Modulation emission of Lowest Channel

Plot E7E1 – E7E2: Modulation emission of Highest Channel

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### External Antenna (OQPSK modulation)

Plot E8A1 – E8A2: Lowest Channel Emissions

Plot E8B1 – E8B2: Middle Channel Emissions

Plot E8C1 – E8C2: Highest Channel Emissions

Plot E8D1 – E8D2: Modulation Product Emissions

For the electronic filing, the above plots are saved with filename: obantcon.pdf

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b), (c):

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The following data list the significant emission frequencies, the limit and the margin of compliance.

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### 4.7 Radiated Spurious Emissions

Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: Trace Antenna (BPSK modulation)

**Table 1**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

#### Lowest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1812.000	55.7	33	27.2	49.9	0	49.9	54.0	-4.1
H	2718.000*	46.0	33	30.4	43.4	0	43.4	54.0	-10.6
H	3624.000*	53.2	33	33.3	53.5	0	53.5	54.0	-0.5
H	4530.000*	43.1	33	34.9	45.0	0	45.0	54.0	-9.0
H	5436.000*	43.9	33	35.7	46.6	0	46.6	54.0	-7.4
H	6342.000	42.6	33	36.9	46.5	0	46.5	54.0	-7.5

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1812.000	55.7	33	27.2	49.9	74.0	-24.1
H	2718.000*	46.0	33	30.4	43.4	74.0	-30.6
H	3624.000*	53.2	33	33.3	53.5	74.0	-20.5
H	4530.000*	43.1	33	34.9	45.0	74.0	-29.0
H	5436.000*	43.9	33	35.7	46.6	74.0	-27.4
H	6342.000	42.6	33	36.9	46.5	74.0	-27.5

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: Trace Antenna (BPSK modulation)

**Table 2**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Middle Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1828.000	55.4	33	27.2	49.6	0	49.6	54.0	-4.4
H	2742.000*	46.2	33	30.4	43.6	0	43.6	54.0	-10.4
H	3656.000*	52.7	33	33.3	53.0	0	53.0	54.0	-1.0
H	4570.000*	43.0	33	34.9	44.9	0	44.9	54.0	-9.1
H	5484.000	44.1	33	35.7	46.8	0	46.8	54.0	-7.2
H	6398.000	42.5	33	36.9	46.4	0	46.4	54.0	-7.6

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1828.000	55.4	33	27.2	49.6	74.0	-24.4
H	2742.000*	46.2	33	30.4	43.6	74.0	-30.4
H	3656.000*	52.7	33	33.3	53.0	74.0	-21.0
H	4570.000*	43.0	33	34.9	44.9	74.0	-29.1
H	5484.000	44.1	33	35.7	46.8	74.0	-27.2
H	6398.000	42.5	33	36.9	46.4	74.0	-27.6

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: Trace Antenna (BPSK modulation)

**Table 3**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Highest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1848.000	55.4	33	27.2	49.6	0	49.6	54.0	-4.4
H	2772.000*	45.2	33	30.4	42.6	0	42.6	54.0	-11.4
H	3696.000*	52.3	33	33.3	52.6	0	52.6	54.0	-1.4
H	4620.000*	42.5	33	34.9	44.4	0	44.4	54.0	-9.6
H	5544.000	42.4	33	36.6	46.0	0	46.0	54.0	-8.0
H	6468.000	42.3	33	36.9	46.2	0	46.2	54.0	-7.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1848.000	55.4	33	27.2	49.6	74.0	-24.4
H	2772.000*	45.2	33	30.4	42.6	74.0	-31.4
H	3696.000*	52.3	33	33.3	52.6	74.0	-21.4
H	4620.000*	42.5	33	34.9	44.4	74.0	-29.6
H	5544.000	42.4	33	36.6	46.0	74.0	-28.0
H	6468.000	42.3	33	36.9	46.2	74.0	-27.8

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

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Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: External Antenna (BPSK modulation)

**Table 4**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Lowest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1812.000	54.3	33	27.2	48.5	0	48.5	54.0	-5.5
H	2718.000*	47.6	33	30.4	45.0	0	45.0	54.0	-9.0
H	3624.000 *	45.3	33	33.3	45.6	0	45.6	54.0	-8.4
H	4530.000 *	43.4	33	34.9	45.3	0	45.3	54.0	-8.7
H	5436.000 *	43.1	33	35.7	45.8	0	45.8	54.0	-8.2
H	6342.000	42.5	33	36.9	46.4	0	46.4	54.0	-7.6

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1812.000	54.3	33	27.2	48.5	74.0	-25.5
H	2718.000*	47.6	33	30.4	45.0	74.0	-29.0
H	3624.000 *	45.3	33	33.3	45.6	74.0	-28.4
H	4530.000 *	43.4	33	34.9	45.3	74.0	-28.7
H	5436.000 *	43.1	33	35.7	45.8	74.0	-28.2
H	6342.000	42.5	33	36.9	46.4	74.0	-27.6

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: External Antenna (BPSK modulation)

**Table 5**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Middle Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1828.000	53.5	33	27.2	47.7	0	47.7	54.0	-6.3
H	2742.000*	48.6	33	30.4	46.0	0	46.0	54.0	-8.0
H	3656.000 *	46.1	33	33.3	46.4	0	46.4	54.0	-7.6
H	4570.000 *	43.4	33	34.9	45.3	0	45.3	54.0	-8.7
H	5484.000	42.6	33	35.7	45.3	0	45.3	54.0	-8.7
H	6398.000	42.9	33	36.9	46.8	0	46.8	54.0	-7.2

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1828.000	53.5	33	27.2	47.7	74.0	-26.3
H	2742.000*	48.6	33	30.4	46.0	74.0	-28.0
H	3656.000 *	46.1	33	33.3	46.4	74.0	-27.6
H	4570.000 *	43.4	33	34.9	45.3	74.0	-28.7
H	5484.000	42.6	33	35.7	45.3	74.0	-28.7
H	6398.000	42.9	33	36.9	46.8	74.0	-27.2

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.
  - \* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

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Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: External Antenna (BPSK modulation)

**Table 6**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Highest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1848.000	53.2	33	27.2	47.4	0	47.4	54.0	-6.6
H	2772.000 *	47.4	33	30.4	44.8	0	44.8	54.0	-9.2
H	3696.000 *	47.0	33	33.3	47.3	0	47.3	54.0	-6.7
H	4620.000 *	42.0	33	34.9	43.9	0	43.9	54.0	-10.1
H	5544.000	41.6	33	36.6	45.2	0	45.2	54.0	-8.8
H	6468.000	42.7	33	36.9	46.6	0	46.6	54.0	-7.4

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1848.000	53.2	33	27.2	47.4	74.0	-26.6
H	2772.000 *	47.4	33	30.4	44.8	74.0	-29.2
H	3696.000 *	47.0	33	33.3	47.3	74.0	-26.7
H	4620.000 *	42.0	33	34.9	43.9	74.0	-30.1
H	5544.000	41.6	33	36.6	45.2	74.0	-28.8
H	6468.000	42.7	33	36.9	46.6	74.0	-27.4

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: Trace Antenna (OQPSK modulation)

**Table 7**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Lowest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1812.000	54.4	33	27.2	48.6	0	48.6	54.0	-5.4
H	2718.000*	47.4	33	30.4	44.8	0	44.8	54.0	-9.2
H	3624.000*	53.3	33	33.3	53.6	0	53.6	54.0	-0.4
H	4530.000*	41.2	33	34.9	43.1	0	43.1	54.0	-10.9
H	5436.000*	42.3	33	35.7	45.0	0	45.0	54.0	-9.0
H	6342.000	41.4	33	36.9	45.3	0	45.3	54.0	-8.7

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1812.000	54.4	33	27.2	48.6	74.0	-25.4
H	2718.000*	47.4	33	30.4	44.8	74.0	-29.2
H	3624.000*	53.3	33	33.3	53.6	74.0	-20.4
H	4530.000*	41.2	33	34.9	43.1	74.0	-30.9
H	5436.000*	42.3	33	35.7	45.0	74.0	-29.0
H	6342.000	41.4	33	36.9	45.3	74.0	-28.7

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: Trace Antenna (OQPSK modulation)

**Table 8**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Middle Channel

Polari-zation	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1828.000	54.2	33	27.2	48.4	0	48.4	54.0	-5.6
H	2742.000 *	46.6	33	30.4	44.0	0	44.0	54.0	-10.0
H	3656.000 *	52.7	33	33.3	53.0	0	53.0	54.0	-1.0
H	4570.000 *	40.9	33	34.9	42.8	0	42.8	54.0	-11.2
H	5484.000	41.9	33	35.7	44.6	0	44.6	54.0	-9.4
H	6398.000	41.1	33	36.9	45.0	0	45.0	54.0	-9.0

Polari-zation	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1828.000	54.2	33	27.2	48.4	74.0	-25.6
H	2742.000 *	46.6	33	30.4	44.0	74.0	-30.0
H	3656.000 *	52.7	33	33.3	53.0	74.0	-21.0
H	4570.000 *	40.9	33	34.9	42.8	74.0	-31.2
H	5484.000	41.9	33	35.7	44.6	74.0	-29.4
H	6398.000	41.1	33	36.9	45.0	74.0	-29.0

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.
  - \* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

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Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: Trace Antenna (OQPSK modulation)

**Table 9**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Highest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1848.000	53.8	33	27.2	48.0	0	48.0	54.0	-6.0
H	2772.000*	46.6	33	30.4	44.0	0	44.0	54.0	-10.0
H	3696.000*	50.6	33	33.3	50.9	0	50.9	54.0	-3.1
H	4620.000*	40.1	33	34.9	42.0	0	42.0	54.0	-12.0
H	5544.000	41.3	33	36.6	44.9	0	44.9	54.0	-9.1
H	6468.000	41.1	33	36.9	45.0	0	45.0	54.0	-9.0

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	1848.000	53.8	33	27.2	48.0	74.0	-26.0
H	2772.000*	46.6	33	30.4	44.0	74.0	-30.0
H	3696.000*	50.6	33	33.3	50.9	74.0	-23.1
H	4620.000*	40.1	33	34.9	42.0	74.0	-32.0
H	5544.000	41.3	33	36.6	44.9	74.0	-29.1
H	6468.000	41.1	33	36.9	45.0	74.0	-29.0

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: External Antenna (OQPSK modulation)

**Table 10**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Lowest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1812.000	56.2	33	27.2	50.4	0	50.4	54.0	-3.6
H	2718.000*	45.0	33	30.4	42.4	0	42.4	54.0	-11.6
H	3624.000*	46.5	33	33.3	46.8	0	46.8	54.0	-7.2
H	4530.000*	40.3	33	34.9	42.2	0	42.2	54.0	-11.8
H	5436.000*	42.9	33	35.7	45.6	0	45.6	54.0	-8.4
H	6342.000	42.1	33	36.9	46.0	0	46.0	54.0	-8.0

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1812.000	56.2	33	27.2	50.4	74.0	-23.6
H	2718.000*	45.0	33	30.4	42.4	74.0	-31.6
H	3624.000*	46.5	33	33.3	46.8	74.0	-27.2
H	4530.000*	40.3	33	34.9	42.2	74.0	-31.8
H	5436.000*	42.9	33	35.7	45.6	74.0	-28.4
H	6342.000	42.1	33	36.9	46.0	74.0	-28.0

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

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Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: External Antenna (OQPSK modulation)

**Table 11**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Middle Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1828.000	55.8	33	27.2	50.0	0	50.0	54.0	-4.0
H	2742.000*	45.4	33	30.4	42.8	0	42.8	54.0	-11.2
H	3656.000*	46.8	33	33.3	47.1	0	47.1	54.0	-6.9
H	4570.000*	40.8	33	34.9	42.7	0	42.7	54.0	-11.3
H	5484.000	43.1	33	35.7	45.8	0	45.8	54.0	-8.2
H	6398.000	42.5	33	36.9	46.4	0	46.4	54.0	-7.6

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1828.000	55.8	33	27.2	50.0	74.0	-24.0
H	2742.000*	45.4	33	30.4	42.8	74.0	-31.2
H	3656.000*	46.8	33	33.3	47.1	74.0	-26.9
H	4570.000*	40.8	33	34.9	42.7	74.0	-31.3
H	5484.000	43.1	33	35.7	45.8	74.0	-28.2
H	6398.000	42.5	33	36.9	46.4	74.0	-27.6

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

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Applicant: TFE Hong Kong Limited

Date of Test: July 18, 2011

Model: TRFM915

Worst-Case Operating Mode: External Antenna (OQPSK modulation)

**Table 12**  
**Radiated Emissions**  
**Pursuant to FCC Part 15 Section 15.247: Emissions Requirement**

### Highest Channel

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Average Factor (dB)	Calculated at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1848.000	55.4	33	27.2	49.6	0	49.6	54.0	-4.4
H	2772.000*	45.6	33	30.4	43.0	0	43.0	54.0	-11.0
H	3696.000*	45.9	33	33.3	46.2	0	46.2	54.0	-7.8
H	4620.000*	40.7	33	34.9	42.6	0	42.6	54.0	-11.4
H	5544.000	42.3	33	36.6	45.9	0	45.9	54.0	-8.1
H	6468.000	42.9	33	36.9	46.8	0	46.8	54.0	-7.2

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	1848.000	55.4	33	27.2	49.6	74.0	-24.4
H	2772.000*	45.6	33	30.4	43.0	74.0	-31.0
H	3696.000*	45.9	33	33.3	46.2	74.0	-27.8
H	4620.000*	40.7	33	34.9	42.6	74.0	-31.4
H	5544.000	42.3	33	36.6	45.9	74.0	-28.1
H	6468.000	42.9	33	36.9	46.8	74.0	-27.2

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.

\* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000MHz and average limit for frequencies over 1000MHz.

## INTERTEK TESTING SERVICES

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### 5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

### 6.0 Product Labelling

For electronics filing, the FCC ID and IC label artwork and the label location are saved with filename: label.pdf.

### 7.0 Technical Specifications

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

### 8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

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### 9.0 Discussion Pulse Desensitivity

Pulse desensitivity is not applicable for this device. Since the transmitter transmits the RF signal continuously.

### 9.1 Calculation of Average Factor

The average factor is not applicable for this device as the transmitted signal is a continuously signal.

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### 9.2 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of transmitter operating under the Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2003. A typical or an unmodulated CW signal at the operating frequency of the EUT has been supplied to the EUT for all measurements. Such a signal is supplied by a signal generator and an antenna in close proximity to the EUT. The signal level is sufficient to stabilize the local oscillator of the EUT.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

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### 9.2 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4 - 2003.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.

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### 10.0 Equipment List

#### 1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2500	EW-0954	EW-0446
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI	3104C	3146
Calibration Date	Jan. 25, 2011	Apr. 14, 2010	Apr. 26, 2010
Calibration Due Date	Jan. 25, 2012	Oct. 14, 2011	Oct. 26, 2011

Equipment	Spectrum Analyzer	Double Ridged Guide Antenna
Registration No.	EW-2188	EW-1015
Manufacturer	AGILENTTECH	EMCO
Model No.	E4407B	3115
Calibration Date	Dec. 27, 2010	Feb. 09, 2010
Calibration Due Date	Dec. 31, 2011	Aug. 09, 2011

#### 2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN	Pulse Limiter
Registration No.	EW-2666	EW-0192	EW-0698
Manufacturer	R&S	R&S	R&S
Model No.	ESCI7	ESH3-Z5	ESH3-Z2
Calibration Date	Oct. 12, 2010	Nov. 30, 2010	Mar. 11, 2011
Calibration Due Date	Oct. 12, 2011	Nov. 30, 2011	Mar. 11, 2012

#### 3) Bandedge Measurement

Equipment	Spectrum Analyzer 30GHz
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Oct. 22, 2010
Calibration Due Date	Oct. 22, 2011