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# TEST REPORT

Report Number: 100258341LEX-001 Project Number: G100258341

Report Issue Date: 5/9/2011

Product Name: Single Station Battery-Operated (3V) Residential

**CO Alarm** 

FCCID: ZFH-CO3345 ICID: 9640A-CO3345

FCC Standards: CFR Title 47 FCC Part 15 Subpart B

CFR Title 47 FCC Part 15 Subpart C

Industry Canada Standards: RSS-210 Issue 8, RSS-GEN Issue 3

Tested by: Intertek Testing Services NA, Inc. 731 Enterprise Drive Lexington, KY 40510 Client:
Apollo Fire Detectors Limited
36 Brookside Road
Hampshire, P09 1JR, UK

Report prepared by

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Yuriy Litvinov, EMC Business Manager

INTERTEA.













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#### 1 Introduction and Conclusion

The tests indicated in section 2 were performed on the product constructed as described in section 3. 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 complied with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The test site is listed with the FCC under registration number 485103. The test site is listed with Industry Canada under site number IC 2042M-1.

# 2 Test Summary

Section	Test full name	FCC Reference	IC Reference	Result
4	Duty Cycle Determination	§ 15.35b § 15.231b	RSS-Gen (4.5) RSS-Gen (7.2.3)	Pass
5	Radiated Field Strength and Spurious Emissions (Transmitter)	§ 15.231b	RSS-Gen (4.9) RSS-210 A1.1	Pass
6	Bandwidth	§ 15.231c	RSS-210 A1.1.3, RSS-GEN (4.6.1)	Pass
7	Restrictions	§ 15.231a1-a5	RSS-210 A1.1.1	Pass
8	Radiated Spurious Emissions (Receiver)	§ 15.109	RSS-Gen (4.10) RSS-Gen (6.1)	Pass
-	Conducted Voltage Emissions	§ 15.107, § 15.207	RSS-Gen (7.2.4)	NA1
9	Antenna Requirement	§ 15.203	RSS-Gen (7.1.2)	Pass

<sup>1</sup> The Single Station Battery-Operated (3V) Residential CO Alarm did not have AC power leads.

# 3 Description of Equipment Under Test

Equipment Under Test					
Manufacturer	Apollo Fire Detectors Limited				
Model Number	51000-001				
Serial Number	Test Sample 1				
FCC Identifier	ZFH-CO3345				
IC Identifier	9640A-CO3345				
Receive Date	4/1/2011				
Test Start Date	4/4/2011				
Test End Date	4/6/2011				
Device Received Condition	Good				
Test Sample Type	Production				
Frequency Band	345MHz				
Mode(s) of Operation	Continuous Transmit & Receive Modes				
Modulation Type	Amplitude Shift Keying—On/Off Keying (ASK-OOK)				
Duty Cycle	8.4%				
Transmission Control	Modified to Tx Continuous				
Test Channels	1				
Antenna Type (15.203)	Internal PCB				

# **Description of Equipment Under Test**

The Single Station Battery-Operated (3V) Residential CO Alarm was a wireless carbon monoxide sensor/alarm.

# Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmitting
2	Receive / idle mode
3	A freshly charged battery was used for each test

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# 3.1 EUT Block Diagram:

During the testing the sample was powered by a CR123A battery.

Single Station Battery-Operated (3V) Residential CO Alarm

# 3.2 Cables:

The device is battery powered and no cables connect to the device during operation.

# 3.3 Support Equipment:

No Support Equipment was necessary.

# 4 Duty Cycle Determination (FCC 15A - 15.35(c))

#### 4.1 Test Limits

§ 15.35(b):

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.

### 4.2 Test Procedure

ANSI C63.10: 2009.

4.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	8/27/2010	8/27/2011

### 4.4 Results:

Duration of Pulse Train, T (mSec): 120
Averaging Interval, A<sub>I</sub> (mSec): 100

Number of different Pulses, N: 3 Note: Count only the pulses within the first 100 mSec

	Number (#P <sub>x</sub> )	Pulse Width, mSec (PW <sub>x</sub> )	Product (#P <sub>x</sub> )*(PW <sub>x</sub> )
Pulse Width 1	40	0.132	5.28
Pulse Width 2	12	0.264	3.168
Pulse Width 3			
Pulse Width 4			
Pulse Width 5			
Pulse Width 6			
Pulse Width 7			
Pulse Width 8			
Pulse Width 9			
Pulse Width 10			

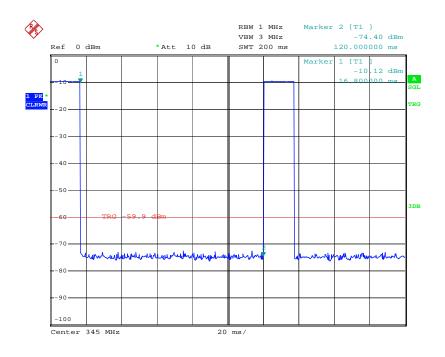
Duty Cycle: 0.08448

Duty Cycle Correction Factor, dB: -21.5

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

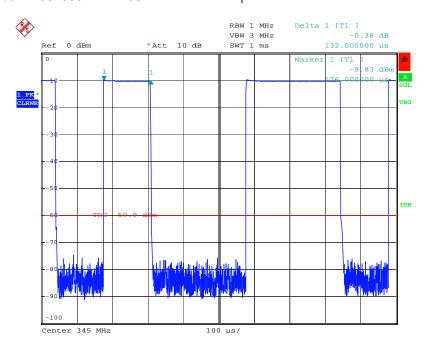
$$DutyCycle = T_{on} \div A_I$$

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



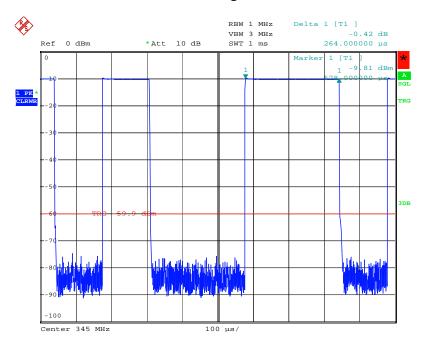
Date: 5.APR.2011 11:16:57

# **Pulse Train Duty Cycle Plot**



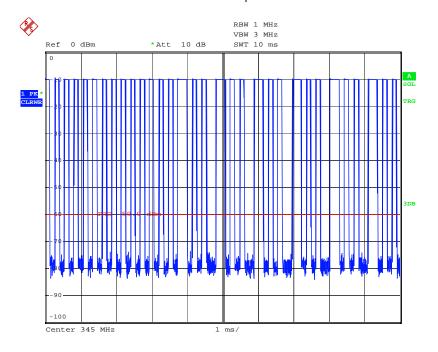
Date: 5.APR.2011 11:38:33

# **Pulse Timing – Short Pulse**



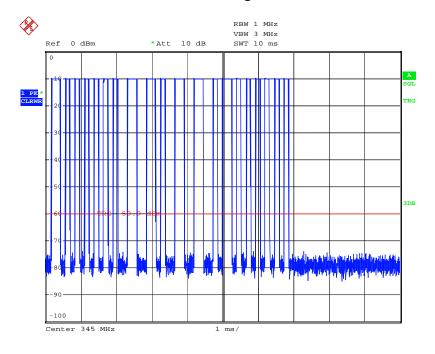
Date: 5.APR.2011 11:37:17

**Pulse Timing – Long Pulse** 



Date: 5.APR.2011 11:44:28

# **Pulse Timing - Section 1**



Date: 5.APR.2011 11:45:42

**Pulse Timing - Section 2** 

# 5 Radiated Field Strength and Spurious Emissions (Transmitter)

#### 5.1 Test Limits

§ 15.231(b): In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

- § 15.231(b1): The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.
- § 15.231(b2): Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.
- § 15.231(b3): The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

Part 15.231(b): Field Strength of Fundamental and Spurious Emissions

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66–40.70	2,250	225
70–130	1,250	125
130–174	<sup>1</sup> 1,250 to 3,750	<sup>1</sup> 125 to 375
174-260	3,750	375
260–470	<sup>1</sup> 3,750 to 12,500	<sup>1</sup> 375 to 1,250
Above 470	12,500	1,250

Part 15.205(a): Restricted Bands of Operations

MHz	MHz	MHz	GHz
0.090–0.110	16.42-16.423	399.9-410	4.5–5.15
1 0.495–0.505	16.69475-16.69525	608–614	5.35-5.46
2.1735–2.1905	16.80425-16.80475	960–1240	7.25–7.75
4.125–4.128	25.5-25.67	1300–1427	8.025-8.5
4.17725–4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73–74.6	1645.5-1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108-121.94	1718.8–1722.2	13.25-13.4
6.31175–6.31225	123-138	2200-2300	14.47–14.5
8.291–8.294	149.9-150.05	2310-2390	15.35–16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7–21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425–8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29–12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975–12.52025	240-285	3345.8–3358	36.43-36.5
12.57675–12.57725	322-335.4	3600-4400	(2)
13.36–13.41.			

 $<sup>^{\</sup>rm 1}\,\rm Until$  February 1, 1999, this restricted band shall be 0.490–0.510 MHz.  $^{\rm 2}\,\rm Above~38.6$ 

Part 15.209(a): Field Strength Limits for Restricted Bands of Operation

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)		
0.009 - 0.490	2,400 / F (kHz)	300		
0.490 - 1.705	24,000 / F (kHz)	30		
1.705 - 30.0	30	30		
30 – 88	100	3		
88 – 216	150	3		
216 – 960	200	3		
Above 960	500	3		

#### 5.2 Test Procedure

ANSI C63.10: 2009

### 5.3 Example of Field Strength Calculation Method:

The measured field strength was calculated by summing the readings taken from the spectrum analyzer with the appropriate correction factors associated with the antenna losses and cable losses. The calculation formula and sample calculations are listed below:

#### Formula:

FS = RA + AF + CF

 $FS = Field Strength in dB\mu V/m$ 

 $RA = Receiver Amplitude in dB\mu V$ 

AF = Antenna Factor in dB

CF = Cable Attenuation Factor in dB (Including preamplifier and filter attenuation)

# Example Calculation:

RA = 19.48 dBuV

AF = 18.52 dB

CF = 0.78 dB

 $FS = 19.48 + 18.52 + 0.78 = 38.78 dB\mu V/m$ 

Level in  $\mu$ V/m = Common Antilogarithm [(38.78 dB $\mu$ V/m)/20] = 86.89  $\mu$ V/m

### 5.4 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	6/29/2010	6/29/2011
			AFS44- 00102000-30-		
Preamplifier	987410	Miteq	10P-44	6/17/2010	6/17/2011
Biconnilog Antenna	00051864	ETS	3142C	12/20/2010	12/20/2011
Horn Antenna	6556	ETS	3115	8/9/2010	8/9/2011
System Controller	121701-1	Sunol Sciences	SC99V	Time of Use	Time of Use

#### 5.5 Results:

The fundamental emission field strength was found to comply with the requirements of §15.231(b). All spurious emissions not falling in restricted bands of §15.205(a) were attenuated by at least 20dB below the level of the fundamental as required by §15.231(b). Additionally, all emissions falling within restricted bands of of §15.205(a) were found to be below the limit specified in Part 15.209(a). The spurious emissions listed in the following tables are the worst case emissions.

**Fundamental Field Strength Measurements** 

	Radiated Fundamental Field Strength									
Test Engineer: J. Centers		Start Date:	4/4/2011		End Date:	4/4/2011				
Temperature:	Temperature: 25.1		Humidity:	48.80%		Pressure:	975.2 mbar			
Specification:	ion: FCC Part 15C		Test Limit:	15.231b						
Notes:										
Α	В	С	D	E	F	G	Н	ı	J	K
Frequency	Polarity (H/V)	Peak Reading (dBuV)	Cab. (dB)	Ant. (dB)	Corr. Peak Reading. (dBuV/m)	Avg Factor (dB)	Corr. Avg Reading. (dBuV/m)	Avg Limit (dBuV/m)	Delta (dB)	Comment
345.0 MHz	V	72.53	2.76	15.7	90.99	20	70.99	77.26	-6.27	RBW=VBW=120kHz (Fundamental)
345.0 MHz	Н	73.57	2.76	15.7	92.03	20	72.03	77.26	-5.23	RBW=VBW=120kHz (Fundamental)
Calculations:					F = C + D +	E	H = F - G			

### **Worst Case Spurious Emissions Measurements**

	Radiated Spurious Emissions									
Test Engineer: J. Centers		Start Date:	4/4/2011		End Date:	4/5/2011				
Temperature: 25.1C		Humidity:	48.80%		Pressure:	975.2 mbar				
Specification: Notes:	•		Test Limit:	15.231b						
Α	В	С	D	Е	F	G	Н		J	K
Frequency	Polarity (H/V)	Peak Reading (dBuV)	Cab. (dB)	Ant. (dB)	Corr. Peak Reading. (dBuV/m)	Avg Factor (dB)	Corr. Avg Reading. (dBuV/m)	Avg Limit (dBuV/m)	Delta (dB)	Comment
2.07 GHz	V	25.37	7.714	27.343	60.427	20	40.427	57.26	-16.833	RBW=VBW=1MHz
2.415 GHz	V	30.82	8.522	28.629	67.971	20	47.971	57.26	-9.289	RBW=VBW=1MHz
2.76 GHz	V	30.69	8.903	28.893	68.486	20	48.486	57.26	-8.774	RBW=VBW=1MHz
3.105 GHz	V	29.35	9.71	30.893	69.953	20	49.953	57.26	-7.307	RBW=VBW=1MHz
1.725 GHz	Н	28.8	7.116	26.469	62.385	20	42.385	57.26	-14.875	RBW=VBW=1MHz
2.07 GHz	Н	29.05	7.714	27.343	64.107	20	44.107	57.26	-13.153	RBW=VBW=1MHz
2.415 GHz	Н	35.56	8.522	28.629	72.711	20	52.711	57.26	-4.549	RBW=VBW=1MHz
2.76 GHz	Н	33.03	8.903	28.893	70.826	20	50.826	57.26	-6.434	RBW=VBW=1MHz (Restricted Band)
3.105 GHz	Н	29.57	9.71	30.893	70.173	20	50.173	57.26	-7.087	RBW=VBW=1MHz
690.0 MHz	Н	20.1	3.87	21.8	45.77	20	25.77	57.26	-31.49	RBW=VBW=120kHz
Calculations:					F = C + D +	E	H = F - G			

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### 6 Bandwidth

### 6.1 Test Limits

§ 15.231(c): The bandwidth of the emission shall be no wider than 0.25% of the center frequency for

devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is

determined at the points 20 dB down from the modulated carrier.

### 6.2 Test Procedure

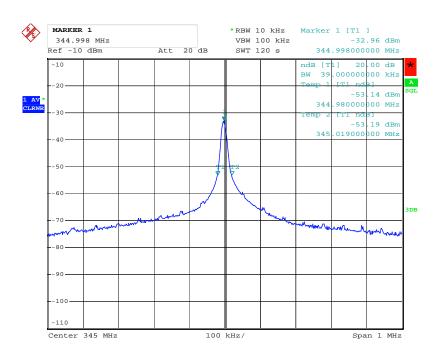
ANSI C63.10: 2009

# 6.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	8/27/2010	8/27/2011

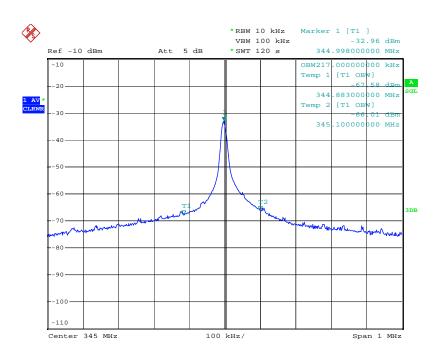
#### 6.4 Results:

Channel Number	Frequency (MHz)	20dB Bandwidth	99% Power Bandwidth	Result
-	345	39 kHz	217 kHz	Pass



Date: 5.APR.2011 11:01:58

#### 20 dB Bandwidth Plot



Date: 5.APR.2011 10:59:07

#### 99% Power Bandwidth Plot

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# 7 Restrictions (FCC 15C - 15.231(a))

#### 7.1 Method:

§ 15.231:

- (a) The provisions of this section are restricted to periodic operation within the band 40.66–40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:
- (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
- (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
- (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition
- (5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

#### 7.2 Data

The tables below include attestations from Apollo Fire Detectors Limited regarding each item covered in Part 15.231a.

#### 15.231(a)

The provisions of this section are restricted to periodic operation within the band 40.66—40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

Response

Frequency Range (MHz, max)	345	
Frequency Range (MHz, min)	345	
Transmit only control signal?	Transmits only a control signal for an alarm	1/1
Continuous transmission?	Does not continuously transmit.	1./1/
Voice transmission?	Does not transmit voice	Myl
Video transmission?	Does not transmit video	1111
Radio control of toy?	Does not control a toy	10

#### 15.231(a)(1)

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Manually operated?	Not a manually operated transmitter	
Deactivates within 5 seconds?	Not a manually operated transmitter, deactivates within 5 seconds	And h



A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Automatically operated?	This is an automatically triggered transmitter	1/
Deactivates within 5 seconds?	Yes	Mh
		770

#### 15.231(a)(3)

Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

time does not exceed two seconds pe	er nour.	,
Periodically transmits at predetermined intervals?	Does transmit at predetermined intervals one pulse every 24 hours	4
Polling signals?	Does not transmit polling signals	All
Polling rate and timing	Does not transmit polling signals	MINU -

#### 15.231(a)(4)

Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition

'n	angine an elemin, may operate daming the	pendency of the alaim condition		/	
		Yes. This device is for			
	For Emergency Use?	emergency use.		1	
	Cease transmission after alarm	Transmission ceases after the	NI	1	
Į	condition clears?	alarm condition clears.	#//	7	

#### 15.231(a)(5

Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

Exceed 15.231(a)(1) or (a)(2) requirements?	Does not exceed the 15.231 (a)(1) or (a)(2) requirements during setup.		1	1	lu
		U	v	11	

# 8 Radiated Spurious Emissions (Receiver)

#### 8.1 Test Limits

§ 15.109: Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength (microvolts/meter)	Field strength (dBuV/m)		
30–88	100	40		
88–216	150	43.5		
216–960	200	46		
Above 960	500	54		

These limits are identical to those in RSS-GEN

#### 8.2 Test Procedure

ANSI C63.4: 2003

### 8.3 Example of Field Strength Calculation Method:

The measured field strength was calculated by summing the readings taken from the spectrum analyzer with the appropriate correction factors associated with the antenna losses and cable losses. The calculation formula and sample calculations are listed below:

### Formula:

FS = RA + AF + CF

 $FS = Field Strength in dB\mu V/m$ 

RA = Receiver Amplitude in dBμV

AF = Antenna Factor in dB

CF = Cable Attenuation Factor in dB (Including preamplifier and filter attenuation)

# Example Calculation:

RA = 19.48 dBuV

AF = 18.52 dB

CF = 0.78 dB

 $FS = 19.48 + 18.52 + 0.78 = 38.78 \, dB\mu V/m$ 

Level in  $\mu V/m$  = Common Antilogarithm [(38.78 dB $\mu V/m$ )/20] = 86.89  $\mu V/m$ 

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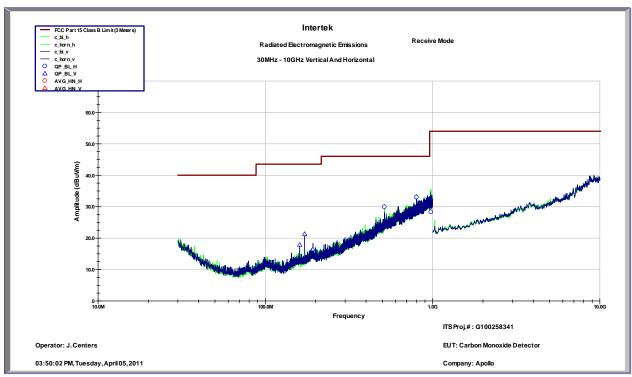
8.4 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	10887490.26	Rohde & Schwarz	ESI26	6/29/2010	6/29/2011
Preamplifier	987410	Mitea	AFS44- 00102000-30- 10P-44	6/17/2010	6/17/2011
Biconnilog Antenna	00051864	ETS	3142C	12/20/2010	12/20/2011
Horn Antenna	6556	ETS	3115	8/9/2010	8/9/2011
System Controller	121701-1	Sunol Sciences	SC99V	Time of Use	Time of Use

# 8.5 Results:

All spurious emissions with the test sample in receive mode were below the limits specified in Part 15.109 for a class B digital device and RSS-GEN Section 6.1.

Radiated Emissions										
Test Engineer:	J. Centers		Start Date:	4/5/2011		End Date:	4/5/2011			
Temperature:	25.1C		Humidity:	48.80%		Pressure:	975.2 mbar			
Specification: Notes:	FCC Part 1 Receiver M		Test Limit:	Class B						
A	В	C	D	E	F	G	Н	I	J	K
Frequency	Polarity (H/V)	Raw Reading (dBuV)	Cab. (dB)	Ant. (dB)	Corr. Reading. (dBuV/m)	Limit (dBuV/m)	Delta (dB)	RBW / Detector	Test Distance	Results
515.46 MHz	Н	8.19	3.36	18.35	29.89	46.02	-16.13	120kHz/QP	3m	Compliant
801.82 MHz	Н	6.56	4.18	22.24	32.98	46.02	-13.04	120kHz/QP	3m	Compliant
977.49 MHz	Н	-0.39	4.61	24.05	28.27	53.98	-25.71	120kHz/QP	3m	Compliant
160.3 MHz	V	6.67	1.94	9.3	17.91	43.52	-25.61	120kHz/QP	3m	Compliant
171.82 MHz	V	10.03	2	9.28	21.31	43.52	-22.21	120kHz/QP	3m	Compliant
192.37 MHz	V	3.59	2.09	10.76	16.44	43.52	-27.08	120kHz/QP	3m	Compliant
Calculations:	•		•		F = C + D + C	E	H = F - G	-		



Peak Scan (Receive Mode)

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# 9 Antenna Requirement per FCC Part 15.203

#### 9.1 Test Limits

§ 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

#### 9.2 Results:

The sample tested met the antenna requirement. The antenna used was permanently attached and integral to the PCB.

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# 10 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	Notes
Radiated emissions, 30 to 1000 MHz	<u>+</u> 3.9dB	
Radiated emissions, 1 to 18 GHz	<u>+</u> 4.2dB	
Radiated emissions, 18 to 40 GHz	<u>+</u> 4.3dB	
Power Port Conducted emissions, 150kHz to 30	<u>+</u> 2.8dB	
MHz		

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# 11 Revision History

Revision Level	Date	Report Number	Notes
0	5/9/2011	100258341LEX-001	Original Issue