

Test Report No.	BC400275-1a	Issue Date: October 30, 2004
Model / Serial No.	MN: AC/DC RF Smoke Module	/ SN: 108
Product Type	AC/DC RF smoke detector	
Client	Kidde Safety	
Manufacturer	Kidde Safety	
License holder	Kidde Safety	
Address	4980 Centennial Blvd	
	Colorado Springs, CO 80919	
Test Criteria Applied	FCC CFR47 Part 15.231	
Test Result	PASS	Title 47 CFR 15.231: RADIO
Test Project Number References Total Pages	BC400275-1	FREQUENCY DEVICES operating in the frequency range of 40.66-40.70MHz and above 70MHz (including 15.205, 15.207, 15.209 where applicable)
Including Appendices:	38	
Forth Juckey	Rob	at Crescull

Reviewed By : Todd Seeley

Approved By : Bob Cresswell

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STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty for Conducted Emissions in the frequency range of 150kHz – 30MHz is calculated to be ± 2.30 dB and for Radiated Emissions is calculated to be ± 3.60 dB in the frequency range of 30MHz – 200MHz and ± 3.38 dB in the frequency range of 200MHz – 1000MHz.

EUT Received Date: 6-June-2004

Testing Start Date: 6-June-2004

Testing End Date: 29-October-2004

Rev No 1



2. FC 3. FC 4. FC	C CFR47 Part 15.205 C CFR47 Part 15.207 C CFR47 Part 15.209 C CFR47 Part 15.231 ES-003				
Emission 7	Test Results:				
Conduct	ed Emissions, Powerline (15.207)	- PASS			
Test Resul					
Minimum lir	nit margin	<u>-12.6</u> dB	at	MHz	
Maximum li	imit exceeding	dB	at	MHz	
Remarks:					
					
	Emissions (15.209) / 15.231(b)(3)	- PASS			
Test Resul					
Minimum lir	-	<u>-5.3</u> dB	at	423.69 MHz	
	imit exceeding	dB	at	MHz	
Remarks:					
Radiated	Emissions (15.205) / 15.231(b)(2)	- PASS			
Test Resul	It				
Minimum lir	mit margin	<u>-10.32</u> dB	at	1303.14 MHz	
Maximum li	imit exceeding	dB	at	MHz	
Remarks:					
Dedicted	$E_{\rm missions} = 15.224(s)(1)8(2)$	PASS			
Test Resul	Emissions 15.231(a)(1)&(2) -	FA33			
Remarks:	Required measurement for manually and a activation, See General Remarks.	automatic operated tran	smitter	equipment. <5 Sec. afte	۶r
Radiated	Emissions 15.231(b)(1) - PA	SS			
Test Resul		~~]
Minimum lir	nit margin	-2.26 dB	at	434.37 MHz	
Maximum li	imit exceeding	dB	at	MHz	
Remarks:	Measurements were taken utilizing the me and for limiting peak emissions	thods dictated by Part ²	15.35 fo	or averaging pulsed emis	ssions

The tests were performed according to following regulations:



Radiated	Emissions 15.231(c) - Pass
Test Resu	
Remarks:	Devices operated within the frequency band of 70 – 900MHz: -20dBc Bandwidth maximum of 0.25% of the center frequency
	Devices operated within the frequency band of >900MHz: -20dBc Bandwidth maximum of 0.50% of the center frequency
Radiated	Emissions 15.231(d) - Not Applicable
Test Resu	
Remarks:	Devices operated within the frequency band of 40.66 – 40.70MHz: -20dBc Bandwidth maximum of 0.01% of the center frequency as measured through the temp range of -20 to +50 deg. C, and at 85 - 115% of the nominal supply voltage at 20 deg. C "a new battery would be used in cases where the device is powered from a battery"
Radiated	Emissions 15.231(e) - Not Applicable
Test Resu	lt
Minimum li	mit margin 00.00 dB at 0000.00 MHz
Maximum	imit exceedingdB atMHz
Remarks:	Measurements were taken utilizing the methods dictated by Part 15.35 for averaging pulsed emissions and for limiting peak emissions



GENERAL REMARKS:

The following remarks are to be considered as "where applicable" and are taken into account while completing any FCC/IC/ETSI radio tests at International Approvals Laboratories, LLC.

Testing was performed in 3 different orthogonal axis to determine the worst case emissions from the device. The worst case emissions measurements are shown in this report.

FCC CFR47 Part 15.31: Measurement Standards: In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was varied per Part 15.31 to find worst case emissions.

FCC CFR47 Part 15.35: Measurement Detector Functions and Bandwidths: FCC Part 15.35 was utilized when performing the measurements within this report.

In any case where the device is powered off a battery, a fresh battery was used durring test. In cases where the device is powered off an AC supply, voltage was veried per Part 15.31 to find worst case emissions.

The actual test distance for the FCC Part 15.209 testing was conducted at 10m for the fact that the device was being tested to EN55022 Class B from 30 MHz to 1000 MHz (meets/exceeds the FCC Part 15.209 & 109B limits) The data is automatically extrapolated back to the FCC 3m limits and measurements are corrected to better show the compliance to FCC requirements and reduce confusion. A correction factor of 10.54dB is used in cases of 30MHz and up for a difference between 10m and 3m measurement distances. All measurements that are lesser than 30MHz where applicable are accompanied with the fall of measurements and calculations to support the interpolation.

The EUT requires a minimum of 10 seconds when manually activated to communicate with its host. In CFR47 part 15.231 (a), the EUT must stop transmitting within 5 seconds of manual or automatic activation. To meet both the requirements in 15.231 and the minimum time required for the EUT to communicate with its host, the manufacture has received approval from the FCC to start transmitting when manually activated, shut off within the required 5 seconds and then start again automatically for another period of less than 5 seconds. See plot on page 27.

The pictures show a test date of June 10, 2004. However, the testing was completed for the project on October 29, 2004.

Modifications required to pass:

The value of the power set resistors, R2 was changed from 24.3k to 47.5k to maximize output power.

Test Specification Deviations: NONE



Rule Part 11, 15	Other Rule	Description	Comments
& 18 Devices	Part Devices		
2.1033(b)(1)	2.1033(c)(1)	Manu. Contact	See Page 1 of this report
2.1033(b)(2)	2.1033(c)(2)	FCC Identifier	
2.1033(b)(3)	2.1033(c)(3)	Users Manual to include Operating, installation	Attached as Exhibit
	2.1033(c)(4)	Emissions Designator per 2.	
	2.1033(c)(5)	Frequency Range	Not Applicable to Part 15 Devcies
	2.1033(c)(6)	Power range and controls	Not Applicable to Part 15 Devcies
	2.1033(c)(7)	Maximum power ouput rating	Not Applicable to Part 15 Devcies
	2.1033(c)(8)	DC Voltage and Current suplying final RF stages	Not Applicable to Part 15 Devcies
2.1033(b)(3)	2.1033(c)(9)	Tune –up procedure	Please refer to the users manual for applicability
2.1033(b)(4&5)	2.1033(c)(10)	Complete Circuit Diagrams and circuit operation description	Attached as Exhibit
2.1033(b)(7)	2.1033(c)(11)	Photographs/drawings of the identification label & its location on the device	Attached as Exhibit
2.1033(b)(7)	2.1033(c)(12)	Photographs of the external and internal surfaces, and construction	Attached as Exhibit
	2.1033(c)(13)	Digital Modulation	Not Applicable
2.1033(b)(6)	2.1033(c)(14)	Report of Measurement Data Required by 2.1046 – 2.1057	See Data Below (This report consists of the testing required under Part 15.231)
2.1033(b)(8)		Description of publicly available support equipment used during test	Refer to Exhibit B of this report (Client Test Plan)
2.1033(b)(9)		Statement of Autorization to Part 15.37 of CFR47	The equipment herein is being authorized in accordance to 15.37 of the CFR47 Rules.
2.1033(b)(10)		Direct Sequence Spread Spectrum Devices (DSSS)	Exhibit of compliance to 15.247(e)
2.1033(b)(10)		Frequency Hopping Devices	Exhibit of compliance to 15.247(a)(1)
2.1033(b)(11)		Scanning receiver construction	Exhibit stating compliance to construction in accordance to 15.121.
15.31	15.31	Transmitter Supply Voltage	Testing herein was completed in accordance to FCC CFR47 Part 15.31

Required Information In Accordance to FCC CFR 47 Part 2.1033:

Exhibits Including (where applicable):

- 1. Users Manual
- 2. Operation Description
- 3. Block Diagram
- 4. Report of Measurement
- 5. External & Internal Photographs
- 6. Schematic

- 7. Parts List
- 8. / Tuning Procedure (if applicable)
- 9. Test Setup Photograph
- 10. Label Drawings and or Photograpghs
- 11. Description of Support Equipment (where Applicable)

Required Information in Accordance to Industry Canada Regulations (In addition to the above):

Information Required	Description	Comments
Modulation Type	(i.e. ASK, NON, FSK, DSSS, FHSS, etc.)	
Emissions Designator	Per TRC-49	
In Country Representative	Contact Information	
99% Bandwidth Measurement	Per RSS-210	



Test-setup photo(s): Conducted Emissions





Test-setup photo(s): Conducted Emissions



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Test-setup photo(s): Radiated Intentional Emissions



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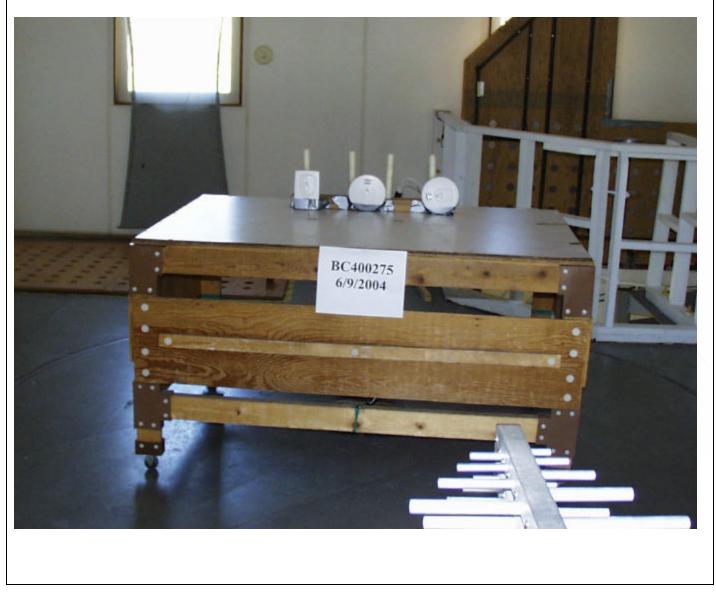
Test-setup photo(s): Radiated Intentional Emissions



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Test-setup photo(s): Radiated Unintentional Emissions





Test-setup photo(s): Radiated Unintentional Emissions





Appendix A

Test Data Sheets

and

Test Equipment Used

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Part 15.231 (b)(1) or (e) Field Strength Emissions from Intentional Radiators

&

Part 15.231 (b)(2) / 15.205 Restricted Bands of Operation

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Field Strength Measurements Fundamental and Spurious of the Transmitter

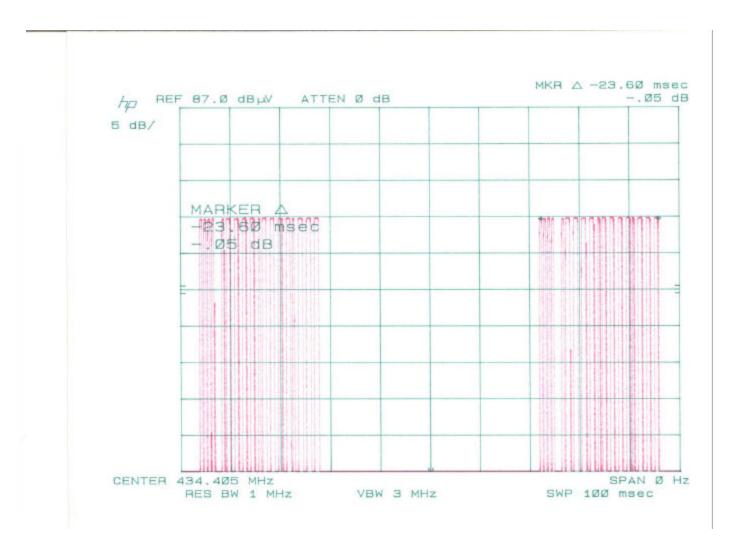
BC400275	Test Area:	Pinewood Site 1 (3m)	Temperature:	22.6	°C
FCC CFR47 Part 15.231/205	Test Date:	10-Oct-2004	Relative Humidity:	39	%
AC/DC RF Smoke Module	EUT Power:	120 VAC / 60 Hz	Air Pressure:	80	kPa
108			Page:		
Kidde Safety			Leve	el Key	
AC/DC RF smoke detector			Pk – Peak	Nb – N	arrow Band
			Qp – QuasiPeak	Bb – Bi	road Band
			Av - Average		
	FCC CFR47 Part 15.231/205 AC/DC RF Smoke Module 108 Kidde Safety	FCC CFR47 Part 15.231/205Test Date:AC/DC RF Smoke ModuleEUT Power:108Kidde Safety	FCC CFR47 Part 15.231/205 Test Date: 10-Oct-2004 AC/DC RF Smoke Module EUT Power: 120 VAC / 60 Hz 108 Kidde Safety	FCC CFR47 Part 15.231/205 Test Date: 10-Oct-2004 Relative Humidity: AC/DC RF Smoke Module EUT Power: 120 VAC / 60 Hz Air Pressure: 108 Page: Kidde Safety Leve AC/DC RF smoke detector Pk – Peak Qp – QuasiPeak	FCC CFR47 Part 15.231/205 Test Date: 10-Oct-2004 Relative Humidity: 39 AC/DC RF Smoke Module EUT Power: 120 VAC / 60 Hz Air Pressure: 80 108 Page: Image: Image: Image: Image: Kidde Safety Level Key Pk – Peak Nb – Na Qp – QuasiPeak Bb – Bit

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
((() ()	((, ()	()	(0-01)	15.231(b)-	()
							15.205	
The followi	ng duty cycle	e was declared by the n	nanufacture	r.				
Duty Cycle	= active / 10	0ms. = 25%						
Averaging emissions		pulsed signals and c	alculation i	n accordance to FCC	CFR47 Part 15.3	5 utilized to calcul	late field strer	ngth
The testing calculated		n accordance to FCC C	FR47 Part	15.205 (restricted band	ds of operation) ar	nd 15.231 emissions	s and delta limi	ts were
Final Corre	cted Peak M	easurement – Duty Cy	cle Correctio	on Factor* = Final Calo	culated Emission			
The Final C	Calculated Er	nission was then comp	ared to the	Limits in CFR47 Part 1	5.205 and 15.231	and the emission/li	mit delta was o	alculated.
the D	TCF is calcul	ated as follows 20*log1	0(duty cycle	in 100mS) "not to exc	eed 20dB"			
Part 15.23	1 (b) and 15.	205 Respectively						
		3 orthogonal axis and p	laced in the	worst cast axis for the	following measu	rements.		
<mark>434.37</mark>	72.5 Pk	2.2 / 16.0 / 0.0	<mark>90.7</mark>	<mark>V / 1.4 / 291.0</mark>	<mark>-12</mark>	<mark>78.7</mark>	<mark>80.84</mark>	<mark>-2.14</mark>
<mark>434.37</mark>	<mark>65.7 Pk</mark>	<mark>2.2 / 16.0 / 0.0</mark>	<mark>84.0</mark>	<mark>H / 2.2 / 22.5</mark>	<mark>-12</mark>	<mark>72.0</mark>	<mark>80.84</mark>	<mark>-8.84</mark>
2nd - 10th	Harmonics	•				•		
<mark>868.75</mark>	<mark>64.7 Pk</mark>	<mark>2.2 / 21.7 / 28.2</mark>	<mark>60.4</mark>	<mark>V / 1.2 / 259.0</mark>	<mark>-12</mark>	<mark>48.4</mark>	<mark>60.84</mark>	<mark>-12.44</mark>
<mark>868.77</mark>	<mark>57.2 Pk</mark>	<mark>2.2 / 21.7 / 28.2</mark>	<mark>52.9</mark>	<mark>H / 1.0 / 22.5</mark>	<mark>-12</mark>	<mark>40.9</mark>	<mark>60.84</mark>	<mark>-19.94</mark>
<mark>1303.14</mark>	<mark>60.6 Pk</mark>	2.6 / 26.2 / 37.4	<mark>52.0</mark>	<mark>H / 2.0 / 0.0</mark>	<mark>-12</mark>	<mark>40.0</mark>	<mark>54</mark>	<mark>-14.00</mark>
1303.15	63.9 Pk	2.6 / 26.2 / 37.4	<mark>55.3</mark>	V / 2.3 / 63.0	<mark>-12</mark>	<mark>43.3</mark>	<mark>54</mark>	<mark>-10.70</mark>
<mark>1737.53</mark>	<mark>52.1 Pk</mark>	<mark>3.0 / 27.9 / 37.2</mark>	<mark>45.9</mark>	<mark>V / 1.0 / 60.0</mark>	<mark>-12</mark>	<mark>33.9</mark>	<mark>60.84</mark>	<mark>-26.94</mark>
<mark>1737.55</mark>	<mark>53.2 Pk</mark>	<mark>3.0 / 27.9 / 37.2</mark>	<mark>47.0</mark>	<mark>H / 1.8 / 0.0</mark>	<mark>-12</mark>	<mark>35.0</mark>	<mark>60.84</mark>	<mark>-25.84</mark>
<mark>2171.91</mark>	<mark>48.2 Pk</mark>	<mark>3.5 / 29.6 / 37.8</mark>	<mark>43.5</mark>	<mark>H / 1.6 / 0.0</mark>	<mark>-12</mark>	<mark>31.5</mark>	<mark>60.84</mark>	<mark>-29.34</mark>
<mark>2171.94</mark>	<mark>47.1 Pk</mark>	<mark>3.5 / 29.6 / 37.8</mark>	<mark>42.4</mark>	<mark>V / 1.5 / 0.0</mark>	<mark>-12</mark>	<mark>30.4</mark>	<mark>60.84</mark>	<mark>-30.44</mark>
<mark>2606.33</mark>	<mark>29.5 Pk</mark>	<mark>4.1 / 30.8 / 37.7</mark>	<mark>26.8</mark>	<mark>V / 1.0 / 0.0</mark>	<mark>-12</mark>	<mark>14.8</mark>	<mark>60.84</mark>	<mark>-46.04</mark>
<mark>2606.33</mark>	<mark>32.6 Pk</mark>	<mark>4.1 / 30.8 / 37.7</mark>	<mark>29.9</mark>	<mark>H / 1.0 / 0.0</mark>	<mark>-12</mark>	<mark>17.9</mark>	<mark>60.84</mark>	<mark>-42.94</mark>
<mark>3040.71</mark>	<mark>32.2 Pk</mark>	<mark>4.6 / 31.8 / 37.5</mark>	<mark>31.1</mark>	<mark>V / 1.0 / 0.0</mark>	<mark>-12</mark>	<mark>19.1</mark>	<mark>60.84</mark>	<mark>-41.74</mark>
<mark>3040.75</mark>	<mark>31.2 Pk</mark>	<mark>4.6 / 31.8 / 37.5</mark>	<mark>30.1</mark>	<mark>H / 1.0 / 0.0</mark>	<mark>-12</mark>	<mark>18.1</mark>	<mark>60.84</mark>	<mark>-42.74</mark>
<mark>3475.11</mark>	<mark>35.4 Pk</mark>	<mark>4.8 / 32.7 / 37.8</mark>	<mark>35.1</mark>	<mark>V / 1.0 / 0.0</mark>	<mark>-12</mark>	<mark>23.1</mark>	<mark>60.84</mark>	<mark>-37.74</mark>
<mark>3475.11</mark>	<mark>30.9 Pk</mark>	<mark>4.8 / 32.7 / 37.8</mark>	<mark>30.7</mark>	H / 1.0 / 0.0	<mark>-12</mark>	<mark>18.7</mark>	<mark>60.84</mark>	<mark>-42.14</mark>
<mark>3909.48</mark>	42.5 Pk	5.5 / 34.1 / 37.7	<mark>44.4</mark>	H / 1.3 / 340.0	<mark>-12</mark>	<mark>32.4</mark>	<mark>54</mark>	<mark>-21.60</mark>
3909.48	46.3 Pk	5.5 / 34.1 / 37.7	<mark>48.3</mark>	V / 1.5 / 350.0	<mark>-12</mark>	<mark>36.3</mark>	<mark>54</mark>	<mark>-17.70</mark>
4343.88	47.5 Pk	6.3 / 33.8 / 38.6	<mark>48.9</mark>	V / 1.2 / 292.0	<mark>-12</mark>	<mark>36.9</mark>	<mark>54</mark>	-17.10
4343.89	42.6 Pk	6.3 / 33.8 / 38.6	44.1	H / 1.2 / 236.0	-12	32.1	54	<mark>-21.90</mark>



Duty Cycle Correction Factor Justification

The following plot was taken to verify the actual Duty Cycle as specified in the FCC CFR47 Rules and was utilized to perform the DCCF adjustment for averaging emissions allowed in FCC CFR47 Part 15.35.





Part 15.231 (b)(3) / 15.207, 15.209 Spurious and Unintentional Emissions

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Conducted Electromagnetic Emissions

Test Report #:	BC400275 Run 01	Test Area:	Pinewood Site 1 Cond	Temperature:	22.6	°C
Test Method:	FCC Part 15.207	Test Date:	10-Oct-2004	Relative Humidity:	39	%
EUT Model #:	AC/DC RF Smoke Module	EUT Power:	120 VAC / 60 Hz	Air Pressure:	80	kPa
EUT Serial #:	108	_				
Manufacturer:	Kidde					
EUT Description:	AC/DC RF smoke detector			Pk-Peak	Nb – N	arrow Band
Notes:				Qp – QuasiPeak	Bb – B	road Band
				Av - Average		

FREQ	LEVEL	CABLE / LISN / ATTEN	FINAL	TEST POINT	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB)	(dBuV)		FCC 15.207	N/A
0.450	2.1 Qp	0.1 / 0.0 / -10.0	12.2	Line 1	-35.8	N/A
0.760	4.0 Qp	0.2 / 0.0 / -10.0	14.2	Line 1	-33.8	N/A
17.79	10.6 Qp	0.9 / 0.9 / -10.0	22.4	Line 1	-25.6	N/A
20.50	20.1 Qp	1.0 / 1.2 / -10.0	32.3	Line 1	-15.7	N/A
24.60	20.3 Qp	1.0 / 1.5 / -10.0	32.9	Line 1	-15.1	N/A
28.70	21.8 Qp	1.2 / 1.9 / -10.0	34.9	Line 1	-13.1	N/A
28.70	22.3 Qp	1.2 / 1.9 / -10.0	35.4	Neutral	-12.6	N/A
24.60	20.7 Qp	1.0 / 1.5 / -10.0	33.3	Neutral	-14.7	N/A
20.50	19.4 Qp	1.0 / 1.2 / -10.0	31.6	Neutral	-16.4	N/A
17.69	6.5 Qp	0.9 / 0.9 / -10.0	18.3	Neutral	-29.7	N/A
4.00	11.3 Qp	0.3 / 0.1 / -10.0	21.7	Neutral	-26.3	N/A
0.760	11.7 Qp	0.2 / 0.0 / -10.0	21.9	Neutral	-26.1	N/A
0.450	2.1 Qp	0.1 / 0.0 / -10.0	12.2	Neutral	-35.8	N/A



Conducted Electromagnetic Emissions

Test Report #:	BC400275 Run 01	Test Area:	Pinewood Site 1 Cond	Temperature:	22.6	°C
Test Method:	FCC Part 15.207	Test Date:	10-Oct-2004	Relative Humidity:	39	%
EUT Model #:	AC/DC RF Smoke Module	EUT Power:	120 VAC / 60 Hz	Air Pressure:	80	kPa
EUT Serial #:	108	_				_
Manufacturer:	Kidde					
EUT Description:	AC/DC RF smoke detector			Pk-Peak	Nb – Na	arrow Band
Notes:				Qp – QuasiPeak	Bb – Br	oad Band
				Av - Average		

FREQ	LEVEL	CABLE / LISN / ATTEN	FINAL	TEST POINT	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB)	(dBuV)		FCC 15.207	N/A
		******** M	easurem	ent Summary	y *****	
28.70	22.3 Qp	1.2 / 1.9 / -10.0	35.4	Neutral	-12.6	N/A
24.60	20.7 Qp	1.0 / 1.5 / -10.0	33.3	Neutral	-14.7	N/A
20.50	20.1 Qp	1.0 / 1.2 / -10.0	32.3	Line 1	-15.7	N/A
17.79	10.6 Qp	0.9 / 0.9 / -10.0	22.4	Line 1	-25.6	N/A
0.760	11.7 Qp	0.2 / 0.0 / -10.0	21.9	Neutral	-26.1	N/A
4.00	11.3 Qp	0.3 / 0.1 / -10.0	21.7	Neutral	-26.3	N/A
17.69	6.5 Qp	0.9 / 0.9 / -10.0	18.3	Neutral	-29.7	N/A
0.450	2.1 Qp	0.1 / 0.0 / -10.0	12.2	Neutral	-35.8	N/A



Test Rep	oort #: BC40	00275 Run 04	Test Area:	Pinewood Site 1 (3	3m) Temp	erature: 20.6 °C
Test Me	ethod: FCC	pt. 15.209	Test Date:	10-Oct-2004	Relative H	umidity: 30 %
EUT Mo	odel #: See N	Votes	EUT Power:	See Notes	Air Pr	essure: 80 kPa
EUT Se	erial #: See N	Votes		-		
Manufac	turer: Kidde)				
EUT Descri	iption: See N	Notes			Pk – Peak	Nb – Narrow Band
Notes: A	C/DC RF sour	nd module 120 VAC / 60 Hz			 Qp – Quasi	Peak Bb – Broad Band
 D	C RF smoke r	module 4.5 VDC battery			Av - Averag	de
		ke module 120 VAC / 60 Hz				
FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dbuV)	(m) (DEG)	15.209 <30MHz	15.209 >30MHz
. ,	, ,	I.4 GHz Horizontal.				
Noise floor.						
4400.00	32.4 Av	6.4 / 33.7 / 39.0	33.5	H/1.0/0.0	N/A	-20.5
No emission	s found: 4 to 4	.4 GHz Vertical.				
Noise floor.			-			
4000.00	31.0 Av	5.7 / 34.4 / 38.7	32.4	V / 1.0 / 0.0	N/A	-21.6
4074.04	44 5 4	0.0 / 00.0 / 07.4	00.7		N1/A	01.0
1271.04	41.5 Av	2.6 / 26.0 / 37.4	32.7	V / 1.0 / 0.0	N/A	-21.3
1271.04	41.2 Av	2.6 / 26.0 / 37.4	32.4	V / 1.0 / 90.0	N/A	-21.6
			1			
1271.04	48.8 Av	2.6 / 26.0 / 37.4	40.0	V/1.0/180.0	N/A	-14.0
		/				1
No higher en	nissions found	I: 1 to 4 GHz Vertical.				
Noise floor.		-				-
4000.00	32.1 Av	5.7 / 34.4 / 37.6	34.6	V / 1.0 / 270.0	N/A	-19.4
The fallowing						
	g was maximiz	zed between 1 and 4 GHz.				
1271.04	50.0 Av	2.6 / 26.0 / 37.4	41.2	V/1.0/280.0	N/A	-12.8
Switched to		2.07 20.07 01.11		* / 110 / 20010		12.0
1271.04	41.5 Av	2.6 / 26.0 / 37.4	32.7	H/1.0/0.0	N/A	-21.3
	1	1	1	1		<u> </u>
1271.04	44.4 Av	2.6 / 26.0 / 37.4	35.5	H / 1.0 / 90.0	N/A	-18.5
		·		· · · · · · · · · · · · · · · · · · ·		·
1271.04	44.2 Av	2.6 / 26.0 / 37.4	35.4	H / 1.0 / 180.0	N/A	-18.6
1271.04	42.6 Av	2.6 / 26.0 / 37.4	33.8	H / 1.0 / 270.0	N/A	-20.2



Test Repo	ort #: BC400	0275 Run 04	Test Area:	Pinewood Site 1 (3	3m)	Temperature:	20.6	°C
Test Me	thod: FCC p	ot. 15.209	Test Date:	10-Oct-2004		Relative Humidity:	30	%
EUT Mod	del #: See N	otes	EUT Power:	See Notes		Air Pressure:	80	kPa
EUT Ser	ial #: See N	otes						
Manufact	urer: Kidde							
EUT Descrip	otion: See N	otes				Pk – Peak	Nb – Nar	row Band
		d module 120 VAC / 60 Hz				Qp – QuasiPeak	Bb – Broa	ad Band
		nodule 4.5 VDC battery				•		
		· · · · · · · · · · · · · · · · · · ·				Av - Average		
		ke module 120 VAC / 60 Hz						
FREQ			FINAL	POL / HGT / AZ	DELTA		DELTA2 (d	-
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dbuV)	(m) (DEG)	15.209 <	<30MHz	15.209 >30N	IHZ
	ssions found:	1 to 4 GHz Horizontal.						
Noise floor.	00 5 4	4.0.400.0.407.0	00.0			(0	04.7	
3500.00	32.5 Av	4.8 / 32.8 / 37.8	32.3	H / 1.0 / 270.0	N/	/A	-21.7	
The fellowing								
The following	was maixmize	ed between 1 and 4 GHz.						
1271.04	50.6 Av	2.6 / 26.0 / 37.4	41.8	H / 1.0 / 282.0	N	/^	-12.2	
1271.04	50.0 AV	2.0720.0737.4	41.0	H/ 1.07 282.0	IN/	A	-12.2	
36.92	39.2 Qp	0.7 / 12.3 / 28.3	23.9	V/1.0/0.0	N	/Α	-16.1	
39.50	39.2 Qp	0.7 / 12.1 / 28.3	23.7	V / 1.0 / 0.0	N/		-16.3	
41.02	42.5 Qp	0.7 / 12.0 / 28.3	27.0	V / 1.0 / 0.0	N/		-13.0	
44.10	42.7 Qp	0.7 / 11.5 / 28.3	26.7	V/1.0/0.0	N/	/A	-13.3	
45.12	45.2 Qp	0.8 / 11.4 / 28.3	29.1	V / 1.0 / 0.0	N	/Α	-10.9	
46.63	46.2 Qp	0.8 / 11.0 / 28.3	29.7	V / 1.0 / 0.0	N	/Α	-10.3	
49.84	46.5 Qp	0.8 / 10.6 / 28.3	29.7	V / 1.0 / 0.0	N	/Α	-10.3	
53.29	40.0 Qp	0.8 / 10.0 / 28.3	22.5	V / 1.0 / 0.0	N/	/A	-17.5	
80.79	35.4 Qp	0.9 / 7.5 / 28.2	15.6	V / 1.0 / 0.0	N/	/A	-24.4	
147.38	33.9 Qp	1.2 / 12.8 / 27.8	20.1	V / 1.0 / 0.0	N/	/Α	-23.4	
36.92	40.7 Qp	0.7 / 12.3 / 28.3	25.3	V / 1.0 / 90.0	N/	/Α	-14.7	
39.50	40.0 Qp	0.7 / 12.1 / 28.3	24.5	V / 1.0 / 90.0	N/	/A	-15.5	
41.02	42.9 Qp	0.7 / 12.0 / 28.3	27.4	V / 1.0 / 90.0	N	Ά	-12.6	
44.10	43.4 Qp	0.7 / 11.5 / 28.3	27.3	V / 1.0 / 90.0	N/		-12.7	
53.29	40.3 Qp	0.8 / 10.0 / 28.3	22.8	V / 1.0 / 90.0	N/	/A	-17.2	
86.61	40.0 Qp	0.9 / 7.9 / 28.1	20.7	V / 1.0 / 90.0	N	/A	-19.3	
		1		1				
39.50	39.8 Qp	0.7 / 12.1 / 28.3	24.3	V / 1.0 / 180.0	N		-15.7	
41.02	43.5 Qp	0.7 / 12.0 / 28.3	27.9	V / 1.0 / 180.0	N/		-12.1	
44.10	44.6 Qp	0.7 / 11.5 / 28.3	28.5	V / 1.0 / 180.0	N/	/Α	-11.5	



Test Repo			275 Run 04	Test Area:	Pinewood Site 1 (3		Tempe		20.6	°C
Test Me	thod:	FCC pt	. 15.209	Test Date:	10-Oct-2004		Relative Hu	midity:	30	%
EUT Mod	del #:	See No	otes	EUT Power:	See Notes		Air Pre	ssure:	80	 kPa
EUT Ser	ial #:	See No	otes							_
Manufact	urer:	Kidde								
EUT Descrip	otion:	See No	otes				Pk-Peak		Nb – Na	arrow Band
Notes: AC	C/DC F	RF sound	module 120 VAC / 60 Hz				Qp – QuasiF	Peak	Bb – Br	oad Band
D	CRFs	moke mo	odule 4.5 VDC battery				Av - Average	e		
			e module 120 VAC / 60 Hz							
FREQ		EVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ		A1 (dB)		DELTA2 ((dB)
(MHz)		BuV)	(dB) (dB\m) (dB)	(dbuV)	(m) (DEG)		<30MHz		5.209 >30	
45.12	`	.8 Qp	0.8 / 11.4 / 28.3	29.7	V/1.0/180.0		<3010112 /A		-10.3	
46.93		1 Qp	0.8 / 11.0 / 28.3	30.6	V/1.0/180.0		/A	-	-9.4	
53.29		2 Qp	0.8 / 10.0 / 28.3	23.7	V/1.0/180.0		/A		-16.3	
147.38		4 Qp	1.2 / 12.8 / 27.8	20.6	V/1.0/180.0		/A		-22.9	
									_	
39.50	40.	1 Qp	0.7 / 12.1 / 28.3	24.6	V / 1.0 / 270.0	N	/A		-15.4	
44.10	45.	4 Qp	0.7 / 11.5 / 28.3	29.3	V / 1.0 / 270.0	N	/A		-10.7	
45.12	47.	1 Qp	0.8 / 11.4 / 28.3	31.0	V / 1.0 / 270.0	N	/A		-9.0	
46.93	47.	7 Qp	0.8 / 11.0 / 28.3	31.2	V / 1.0 / 270.0	N	/A		-8.8	
53.29	41.	.6 Qp	0.8 / 10.0 / 28.3	24.1	V / 1.0 / 270.0	N	/A		-15.9	
147.38	38.	2 Qp	1.2 / 12.8 / 27.8	24.4	V / 1.0 / 270.0	N	/A		-19.1	
The following	were	maximize	ed between 30 and 200 MH	z.					\	
46.93	47	8 Qp	0.8 / 11.0 / 28.3	31.2	V / 1.0 / 227.0	N	/A		-8.8	
40.95	47.	o Qp	0.07 11.07 20.3	51.2	V/1.0/227.0				-0.0	
45.12	48.	4 Qp	0.8 / 11.4 / 28.3	32.3	V/1.0/226.0	N	/A		-7.7	
					11					
No higher em	nission	s found:	0Deg, Horizontal.							
No higher em	nission	s found:	90Deg, Horizontal.							
Nie black en ene		- (
NO NIGNER EM	IISSION	s tound:	180Deg, Horizontal.							
No higher em	ission	s found:	270Deg, Horizontal.							
Noise floor.										
				T	I					
30.00	22	1 Qp	0.6 / 13.2 / 28.3	7.5	H / 2.0 / 270.0	-4	2.0		-32.5	



Test F	Report #:	BC40	0275 Run 04	Test Area:	Pinewood Site 1 (3	3m)	Tempe	rature:	20.6	°C
Test	Method:	FCC p	ot. 15.209	Test Date:	10-Oct-2004		Relative Hu	midity:	30	%
EUT	Model #:	See N	lotes	EUT Power:	See Notes		Air Pre	ssure:	80	 kPa
EUT	Serial #:	See N	lotes			<u></u>				
Manu	facturer:	Kidde								
EUT Des	scription:	See N	lotes				Pk – Peak		Nb – N	arrow Band
	•	REsoun	d module 120 VAC / 60 Hz				Qp – QuasiF	Peak	Bb – B	road Band
-			nodule 4.5 VDC battery				Av - Average			
-							AV - Average	5		
FDFO			ce module 120 VAC / 60 Hz	FINIAL						(-ID)
FREQ				FINAL	POL / HGT / AZ		A1 (dB)		DELTA2	. ,
(MHz)	•	BuV)	(dB) (dB\m) (dB)	(dbuV)	(m) (DEG) V / 1.0 / 0.0		<30MHz /A		5.209 >3 -15.9	
423.69 847.38		.3 Qp .0 Qp	2.2 / 15.7 / 28.1 2.2 / 22.0 / 28.5	30.1 19.7	V/1.0/0.0 V/1.0/0.0		/A /A		-15.8	
047.30	24.	u Qp	2.2722.0720.3	19.7	V71.070.0	IN	/A		-20.3	
423.69	40.	7 Qp	2.2 / 15.7 / 28.1	30.6	V/1.0/90.0	N	/A		-15.4	
847.38		1 Qp	2.2 / 22.0 / 28.5	23.8	V / 1.0 / 90.0		/A		-22.2	
									_	
423.69	49.	2 Qp	2.2 / 15.7 / 28.1	39.0	V/1.0/180.0	N	/A		-7.0	
847.38	28.	4 Qp	2.2 / 22.0 / 28.5	24.1	V / 1.0 / 270.0	N	/A		-21.9	
The follow	ving were	maximiz	zed between 200 and 1000 M	1Hz.						
847.38	32.	1 Qp	2.2 / 22.0 / 28.5	27.8	V / 1.2 / 45.0	N	/A		-18.2	
400.00	50	0.0-	2.2 / 15.7 / 28.1	40.7	N//4.2/402.0	N	/A		5.0	
423.69	50.	.8 Qp	2.2/15.7/28.1	40.7	V / 1.3 / 163.0	IN	/A		-5.3	
Cables we	ere maxim	ized								
Cubico III		200.								
423.69	41.	.8 Qp	2.2 / 15.7 / 28.1	31.6	H/1.0/0.0	N	/A		-14.4	
847.38		.6 Qp	2.2 / 22.0 / 28.5	20.3	H / 1.0 / 0.0	N	/A		-25.7	
260.66		.8 Qp	1.8 / 12.4 / 27.2	9.7	H/1.0/0.0		/A		-36.3	
	1		1	1	I					
260.66	23.	2 Qp	1.8 / 12.4 / 27.2	10.1	H / 1.0 / 90.0	N	/A		-35.9	
423.69	37.	9 Qp	2.2 / 15.7 / 28.1	27.7	H / 1.0 / 90.0	N	/A		-18.3	
847.38	23.	.8 Qp	2.2 / 22.0 / 28.5	19.5	H / 1.0 / 90.0	N	/A		-26.5	
					1					
423.69		.9 Qp	2.2 / 15.7 / 28.1	31.8	H/1.0/180.0		/A		-14.2	
847.38	23.	.4 Qp	2.2 / 22.0 / 28.5	19.1	H / 1.0 / 180.0	N	/A		-26.9	



Test Repo	ort #: E	3C400	0275 Run 04	Test Area:	Pinewood Site 1 (3	3m)	Temper	ature:	20.6	°C
Test Met	thod: F	CC p	t. 15.209	Test Date:	10-Oct-2004		Relative Hur	midity:	30	%
EUT Mod	del #: S	See No	otes	EUT Power:	See Notes		Air Pres	ssure:	80	 kPa
EUT Ser	ial #: S	See No	otes					-		_
Manufact	urer: K	Gidde								
EUT Descrip	otion: S	See No	otes				Pk – Peak		Nb – N	arrow Band
Notes: AC	/DC RF	sound	d module 120 VAC / 60 Hz				Qp – QuasiP	eak	Bb – Bı	oad Band
	C RF smo	oke m	odule 4.5 VDC battery				Av - Average	è		
			e module 120 VAC / 60 Hz				/w /woruge	, ,		
FREQ	LEVE		CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ		A1 (dB)		DELTA2	(dB)
(MHz)			(dB) (dB\m) (dB)	(dbuV)	(m) (DEG)		<30MHz		5.209 >30	
260.66			10.4	H / 1.0 / 270.0		<5011112	1	-35.6		
847.38			2.2 / 22.0 / 28.5	23.0	H/1.0/270.0	N/A		-23.0		
047.00	21.0	αp	2.27 22.07 20.0	20.0	117 1.07 270.0				20.0	
The following	were ma	aximiz	ed between 200 and 1000 M	/Hz.						
847.38	28.1 (Qp	2.2 / 22.0 / 28.5	23.8	H / 1.0 / 335.0	١	√A		-22.2	
423.69	44.9 (Qp	2.2 / 15.7 / 28.1	34.7	H / 2.0 / 156.0	١	I∕A		-11.3	
260.66	26.9 0	Qp	1.8 / 12.4 / 27.2	13.8	H / 1.2 / 10.0	Ν	V/A		-32.2	
	found: 4	to 30	MHz Vertical.							\sim
Noise floor.										
4.00	32.6 (Qp	0.3 / -5.8 / 0.0	27.1	V / 1.0 / 10.0	-2	22.4		N/A	
	found: 4	to 30	MHz Horizontal.							
Noise floor.		-			·					
20.02	8.3 C	λb	0.5 / -7.3 / 0.0	1.5	H / 1.0 / 10.0	-4	8.0		N/A	



Test Repo			0275 Run 04	Test Area:	Pinewood Site 1 (3)	m)	Temperature:	20.6	°C
Test Me	thod:	FCC p	ot. 15.209	Test Date:	10-Oct-2004		Relative Humidity:	30	%
EUT Mod	del #:	See N	otes	EUT Power:	See Notes		Air Pressure:	80	kPa
EUT Ser	rial #:	See N	otes						_
Manufact	turer:	Kidde							
EUT Descrip	- otion:	See N	otes				Pk – Peak	Nb – N	arrow Band
	-		d module 120 VAC / 60 Hz				Qp – QuasiPeak		road Band
								D0 D	Todu Danu
			nodule 4.5 VDC battery				Av - Average		
AC	C/DC R	RF smok	e module 120 VAC / 60 Hz						
FREQ	LE	VEL	CABLE / ANT / PREAMP	FINAL	POL/HGT/AZ	DELT	A1 (dB)	DELTA2	(dB)
(MHz)	(dE	3uV)	(dB) (dB\m) (dB)	(dbuV)	(m) (DEG)	15.209	<30MHz 2	15.209 >3	OMHz
			********* N	leasurem	ent Summary	*******	***		
4400.00	32.	4 Av	6.4 / 33.7 / 39.0	33.5	H/1.0/0.0	N	I/A	-20.5	
4000.00	32.	1 Av	5.7 / 34.4 / 37.6	34.6	V / 1.0 / 270.0	N	I/A	-19.4	
3500.00	32.	5 Av	4.8 / 32.8 / 37.8	32.3	H / 1.0 / 270.0	Ν	I/A	-21.7	
1271.04	50.	6 Av	2.6 / 26.0 / 37.4	41.8	H / 1.0 / 282.0	Ν	I/A	-12.2	
847.38	32.	1 Qp	2.2 / 22.0 / 28.5	27.8	V / 1.2 / 45.0	Ν	I/A	-18.2	
423.69	50.	8 Qp	2.2 / 15.7 / 28.1	40.7	V/1.3/163.0	Ν	I/A	-5.3	
260.66	26.	9 Qp	1.8 / 12.4 / 27.2	13.8	H / 1.2 / 10.0	N	I/A	-32.2	
195.00	23.	1 Qp	1.4 / 13.8 / 27.6	10.8	H / 2.0 / 270.0	N	VA	-32.7	
147.38	38.	2 Qp	1.2 / 12.8 / 27.8	24.4	V / 1.0 / 270.0	N	I/A	-19.1	
86.61	40.	0 Qp	0.9 / 7.9 / 28.1	20.7	V / 1.0 / 90.0	N	I/A	-19.3	
80.79	35.	4 Qp	0.9 / 7.5 / 28.2	15.6	V/1.0/0.0	Ν	I/A	-24.4	
53.29	41.	6 Qp	0.8 / 10.0 / 28.3	24.1	V / 1.0 / 270.0	Ν	I/A	-15.9	
49.84	46.	5 Qp	0.8 / 10.6 / 28.3	29.7	V / 1.0 / 0.0	Ν	I/A	-10.3	
46.93	47.	8 Qp	0.8 / 11.0 / 28.3	31.2	V / 1.0 / 227.0	Ν	I/A	-8.8	
46.63	46.	2 Qp	0.8 / 11.0 / 28.3	29.7	V / 1.0 / 0.0		I/A	-10.3	6
45.12	48.	4 Qp	0.8 / 11.4 / 28.3	32.3	V / 1.0 / 226.0		I/A	-7.7	
44.10		4 Qp	0.7 / 11.5 / 28.3	29.3	V / 1.0 / 270.0		I/A	-10.7	
41.02	-	5 Qp	0.7 / 12.0 / 28.3	27.9	V / 1.0 / 180.0		I/A	-12.1	
39.50		1 Qp	0.7 / 12.1 / 28.3	24.6	V / 1.0 / 270.0		I/A	-15.4	
36.92		7 Qp	0.7 / 12.3 / 28.3	25.3	V / 1.0 / 90.0		I/A	-14.7	
30.00		1 Qp	0.6 / 13.2 / 28.3	7.5	H / 2.0 / 270.0		2.0	-32.5	
20.02		3 Qp	0.5 / -7.3 / 0.0	1.5	H / 1.0 / 10.0		8.0	N/A	
4.00	32.	6 Qp	0.3 / -5.8 / 0.0	27.1	V / 1.0 / 10.0	-2	2.4	N/A	



Part 15.231 (a) (1) & (2) Manual and Automate shutoff

Manual and Automate shutoff within 5 seconds Manual shutoff is followed by automated transmission.

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Ref 69.99	dBµV	#Atten 10 dB		Mkr2 ∆ 4.75 –0.106 d	В
Peak Log					Change Ti
5		1R	1 	2	Clear T
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
Center 43 Res BW 1		#	VBW 1 MHz	Span 0 H Sweep 20 s (401 pts	
Marker 1R	Trace (1)	Type Time	X Axis 5.8 s	Amplitude 53.13 dBµV	<b></b>
1∆ 2R 2∆	(1) (1) (1)	Time Time Time	4.75 s 10.65 s 4.75 s	–1.56 dB 48.65 dBµV –0.106 dB	
A:\ACDC8	50.GIF fi	ile deleted			
I:\ACDC8	50.GIF fi	ile deleted		/	



### Part 15.231 (c) and/or (d) Stability over Temperature and Voltage -20dBc Bandwidth

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## -20dB Bandwidth Measurement

Test F	Report #:	BC300275	Test Area:	Pinewood Site 1 (3m)	Temperature:	25.5	°C
Test	Method:	15.231 (c)	Test Date:	10-Oct-2004	Relative Humidity:	31	%
EUT	Model #:	AC/DC RF Smoke Module	EUT Power:	120 VAC / 60 Hz	Air Pressure:	80	kPa
EUT	Serial #:	108	-		-		_
Manu	facturer:	Kidde Safety					
EUT Des	scription:	AC/DC RF smoke detector					
Notes:	Measure	ments were taken in accordance to	FCC CFR47 P	art 15.231(c).	-		
-	-20dBc E	Bandwidth Section (c) the RBW wa	s set at a minim	um 0f 10 kHz as per	-		
-	ANSI C6	3.4 – 2001 13.1.7					

-20dBc Bandwidth Section (c)

			/
Resolution Bandwidth Utilized	Bandwidth Measured -20dBc	Bandwidth Limit 0.25% or 0.50% of The Fundamental Carrier Freq.	DELTA from Bandwidth Limit to Fundamental Carrier Freq.
(kHz)	(HZ)	(Hz)	(Hz)
100	453,000	1,056,000	633,000

# Temperature Stability Section (d) N/A

Voltage Stability Section (d) N/A



### Equipment Utilized During Test

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 Voice: 303 786 7999
 Fax: 303 449 6160



# **Project Report**

### Technician Karen Parker

Begin Date: End Date: 10/10/2004 10/10/2004

### Project: BC400275

Capital Asset	IDManufacturer	Model #	Serial #	Description	Test Performed	Service Type	Service Date	Service Due
192	RHODE & SCHWARZ	ESH2-Z5	830364/002	LISN 50 ohm/50uH 3 line (1kHz - 30 MHz)	C Conducted Emissions	For Ver	3/8/2004	3/8/2005
198	Hewlett-Packard	11947A	3107A01984	Transient Limiter	C Conducted Emissions	For Ver	9/30/2004	9/30/2005
199	RHODE & SCHWARZ	ESH3	872318/036	Low Frequency Receiver (9 kHz - 30 MHz)	C Conducted Emissions	For Cal	11/10/2003	11/10/2004
6	Hewlett-Packard	8594E	3223A00145	Spectrum Analyzer	R Radiated Emissions	For Cal	1/16/2004	1/16/2005
138	EMC TEST SYSTEMS	3109	3142	Biconical Antenna 30-300MHz	R Radiated Emissions	For Cal	10/3/2004	10/3/2005
171	Hewlett-Packard	85662A	1928A01169	Spectrum Analyzer - Display Section	R Radiated Emissions	For Cal	1/21/2004	1/21/2005
172	Hewlett-Packard	8566B	2430A00759	Spectrum Analyzer	R Radiated Emissions	For Cal	1/21/2004	1/21/2005
187	EMCO	3115	9205-3886	Horn Antenna 1-18GHz	R Radiated Emissions	For Cal	10/6/2004	10/6/2005
203	Avantek	AFT97-8434-10F	1007	RF Pre-Amplifier (4-8 GHz)	R Radiated Emissions	For Ver	4/7/2004	4/7/2005
202	Avantek	AWT-18037	1002	RF Pre-Amplifier (8-18 GHz)	R Radiated Emissions	For Ver	4/7/2004	4/7/2005
213	Mini-Circuits Lab	ZHL-42	N052792-2	Amplifier	R Radiated Emissions	For Ver	6/20/2004	6/20/2005
217	EMCO	3146	9203-3376	Log Periodic Antenna	R Radiated Emissions	For Cal	10/3/2004	10/3/2005
248	Hewlett-Packard	8447F	3113A05545	9 kHz- 1.3GHz Pre Amp	R Radiated Emissions	For Ver	6/5/2004	6/5/2005
165	RHODE & SCHWARZ	HFH2Z2	880669/042	Loop Antenna (polarad)	R Radiated Emissions	For Cal	11/3/2003	11/3/2004

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### Appendix B

Test Plan

and

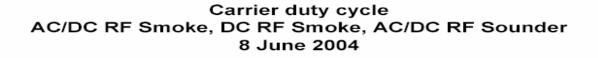
Constructional Data Form

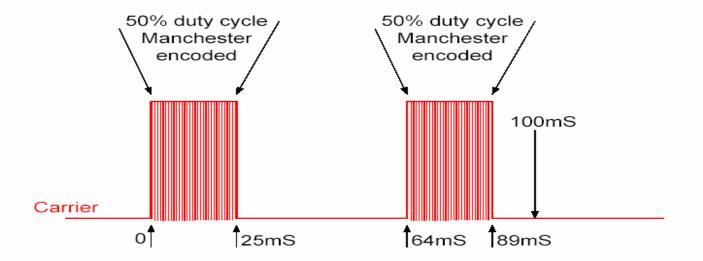
Rev.No 1

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The following graph has been supplied by the customer.





Rev.No 1



## Appendix C

Measurement Protocol

And

**Test Procedures** 

International Approvals Laboratories, LLC

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#### MEASUREMENT PROTOCOL

#### **GENERAL INFORMATION**

#### **Test Methodology**

Conducted and radiated emission testing is performed according to the procedures in ANSI C63.4 & CNS13438.

#### **Justification**

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

#### CONDUCTED EMISSIONS

The final level, expressed in  $dB\mu V$ , is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the applicable limit.

To convert between dB $\mu$ V and  $\mu$ V, the following conversions apply:

- dBµV = 20(log µV)
- $\mu V = \text{Inverse log}(dB\mu V/20)$

### **RADIATED EMISSIONS**

The final level, expressed in  $dB\mu V/m$ , is arrived at by taking the reading from the spectrum analyzer (Level  $dB\mu V$ ) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the applicable limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

Example: At a Test Frequency of 30 MHz, with a peak reading on the spectrum analyzer or measuring receiver of 14 dBmV:

Measured Level	+	Transducer & Cable Loss factor	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
(dBµV)		(dB)		(dBµV/m)	(dBµV/m)		(dBµV/m)		
14.0		14.9		28.9	40.0		28.9		-11.1



#### **DETAILS OF TEST PROCEDURES**

#### General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

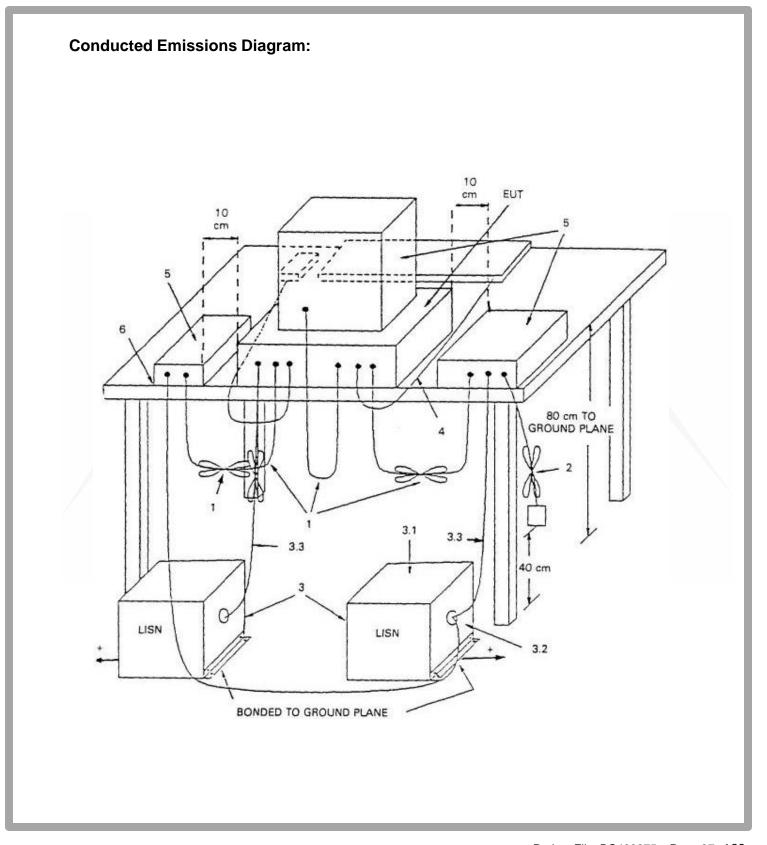
#### **Conducted Emissions**

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50  $\Omega$ /50  $\mu$ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

#### Radiated Emissions

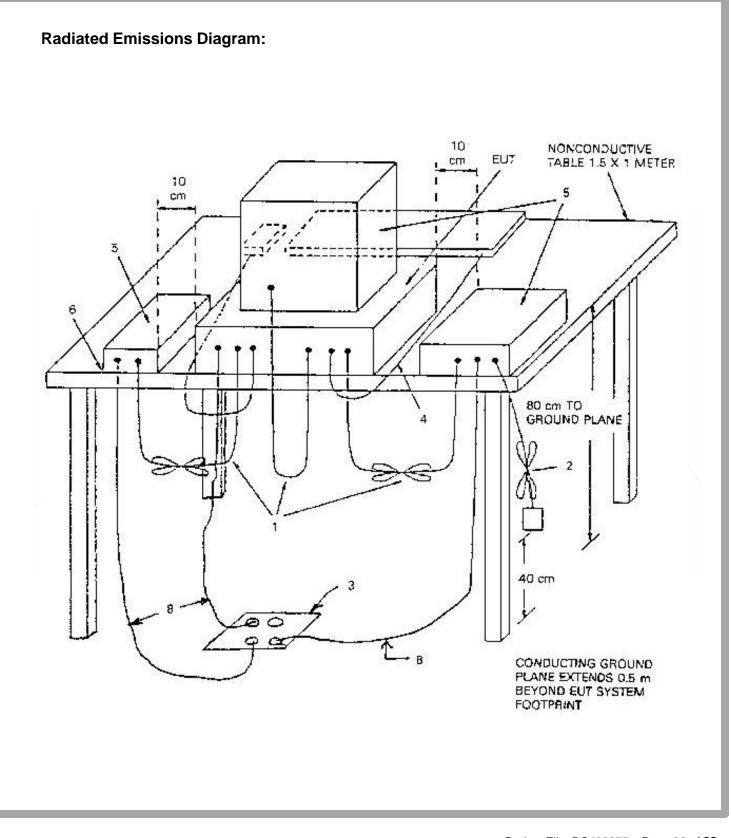
Radiated emissions from the EUT are measured in the frequency range of 30 to 22GHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.





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