FCC TEST REPORT

For

ECRYSTAL CORPORATION

Coal Ash Detector

Model No.: CAS-A-AC

Additional Model No.: CAS-S-AC

Prepared for	:	ECRYSTAL CORPORATION
Address	:	1617 E Adams Blvd, Los Angeles, CA 90011, USA
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Date of receipt of test sample	:	December 10, 2013
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	December 10, 2013 – March 01, 2014
Date of Report	:	March 01, 2014

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FCC TEST REPORT
FCC CFR 47 PART 15 C(15.231): 2012

Report Reference No.	**:**	**LCS131210273TF**
Date of Issue	:	March 01, 2014
Testing Laboratory Name.....	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....	:	Full application of Harmonised standards ■ Partial application of Harmonised standards ☐ Other standard testing method ☐
Applicant's Name.....	**:**	**ECRYSTAL CORPORATION**
Address	:	1617 E Adams Blvd, Los Angeles, CA 90011, USA
Test Specification		
Standard	:	FCC CFR 47 PART 15 Subpart C: 2012, ANSI C63.4-2009
Test Report Form No.....	**:**	LCSEMC-1.0
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2011-03

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Test Item Description.	**:**	**Coal Ash Detector**
Trade Mark	:	ECRYSTAL
Model/ Type reference.....	:	CAS-A-AC
Ratings	:	AC 100~240V, 50/60Hz
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Leo Lee/ File administrators	Fox Zhang/ Technique principal	Gavin Liang/ Manager

FCC--TEST REPORT

Test Report No. : LCS131210273TF	March 01, 2014 Date of issue

Type / Model.....	: CAS-A-AC
EUT.....	: Coal Ash Detector
Applicant.....	**: ECRYSTAL CORPORATION**
Address.....	: 1617 E Adams Blvd, Los Angeles, CA 90011, USA
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: SHANGHAI HUIBO AUTOMATIC GAUGE CO., LTD**
Address.....	: Room 1611, 19 WuNing Road, ShangHai, China
Telephone.....	: /
Fax.....	: /
Factory.....	**: SHANGHAI HUIBO AUTOMATIC GAUGE CO., LTD**
Address.....	: Room 1611, 19 WuNing Road, ShangHai, China
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Coal Ash Detector
Model Number	:	CAS-A-AC
Power Supply	:	AC 100~240V, 50/60Hz
Frequency Range	:	433.92MHz
Modulation Type	:	FSK
Antenna Type and Gain	:	Integral Antenna, 0dBi

1.2. Objective

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators and Industry Canada RSS-210 for Low Power, License-Exempt Radio Communication Devices. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules and Industry Canada Radio Standards Procedure RSP-100.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

1.3. Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:
- Temperature: 15-35ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106kPa

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1.4. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	--

1.5. External I/O Cable

I/O Port Description	Quantity	Cable
--	--	--

1.6. Description of Test Facility

Site Description

EMC Lab. : Accredited by CNAS, June 04, 2010

The Certificate Registration Number. is L4595.

Accredited by FCC, July 14, 2011

The Certificate Registration Number. is 899208.

Accredited by Industry Canada, May. 02, 2011

The Certificate Registration Number. is 9642A-1

1.7. Statement of The Measurement Uncertainty

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	±3.10dB	(1)
		30MHz~200MHz	±2.96dB	(1)
		200MHz~1000MHz	±3.10dB	(1)
		1GHz~26.5GH	±4.20dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the normal operating mode. The TX frequency that was fixed which was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.231 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4

2.4. Instrument Calibration

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

2.5. Test Mode

The EUT has been tested under engineering mode. The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis).
The worst case of X axis was reported.
The EUT receiving AC 120V60Hz power during testing.

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3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmit condition.

3.2. EUT Exercise Software

N/A

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

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4. SUMMARY OF TEST RESULTS

Rules	Description of test	Result
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band	Compliant
§15.209	General Requirement	Compliant
§15.231 (b)	Radiated Emissions	Compliant
§15.231 (c)	20dB Bandwidth Testing	Compliant
§15.231 (a)(2)	Deactivation Testing	Compliant
§15.231	Duty cycle Factor	Compliant
§15.207	Conducted Emissions	Compliant

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5. TEST ITEMS AND RESULTS

5.1. Transmitter Deactivation Time

FCC 15.231 (a)

5.1.1. Limit

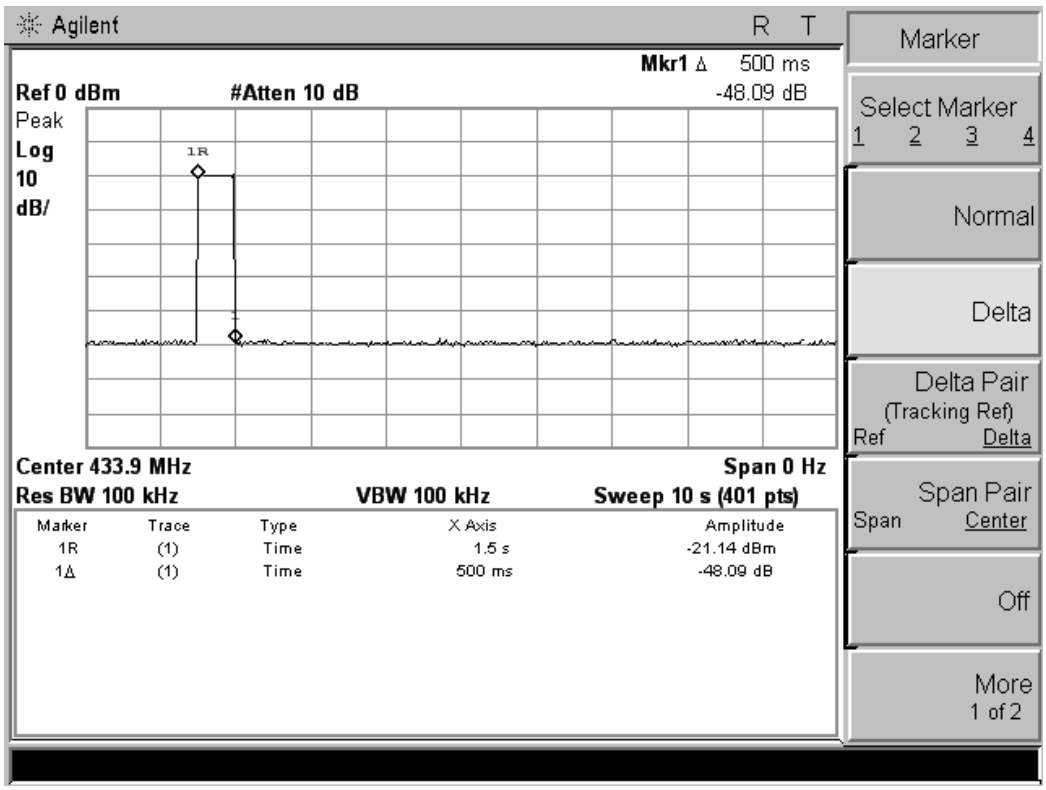
A transmitter activated automatically shall cease transmission within 5 seconds after activation.

5.1.2. Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

5.1.3. Test Results

Frequency (MHz)	Activation Time (s)	Limit: not more than 5 seconds of being released (s)	Conclusion
433.92	0.5	5	PASS



5.2. Transmitter Field Strength of Emissions

5.2.1. Limit

FCC §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:

Fundamental frequency (MHz)	Field Strength of Fundamental (microvolt/meter)	Field Strength of spurious emissions (microvolt/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,370	125 to375
174-260	3,750	375
260-470	3,750 to12, 500	375 to 1,250
Above 470	12,500	1,250

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, µV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, µV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	([2])
13.36 – 13.41	322 - 335.4		

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 72 MHz, 76 88 MHz, 174 216 MHz or 470 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

5.2.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Spectrum Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

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5.2.3. Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.

2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.

3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.

4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading

5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.

6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.

7. When the radiated emissions limits are expressed in terms of the average value of the emissions, 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.

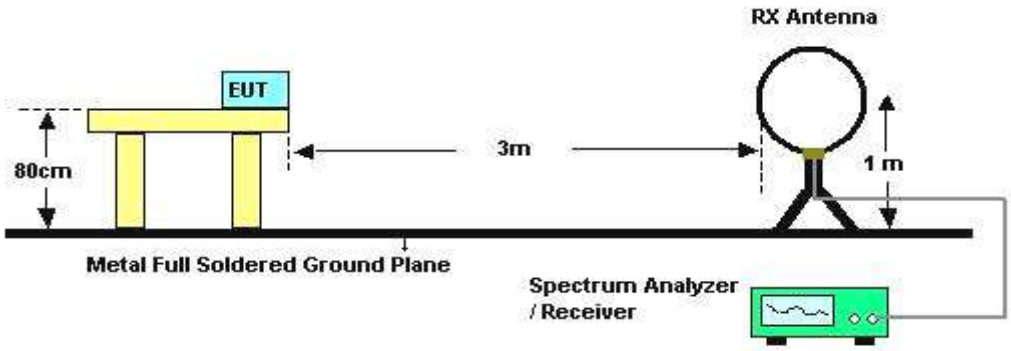
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.

9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

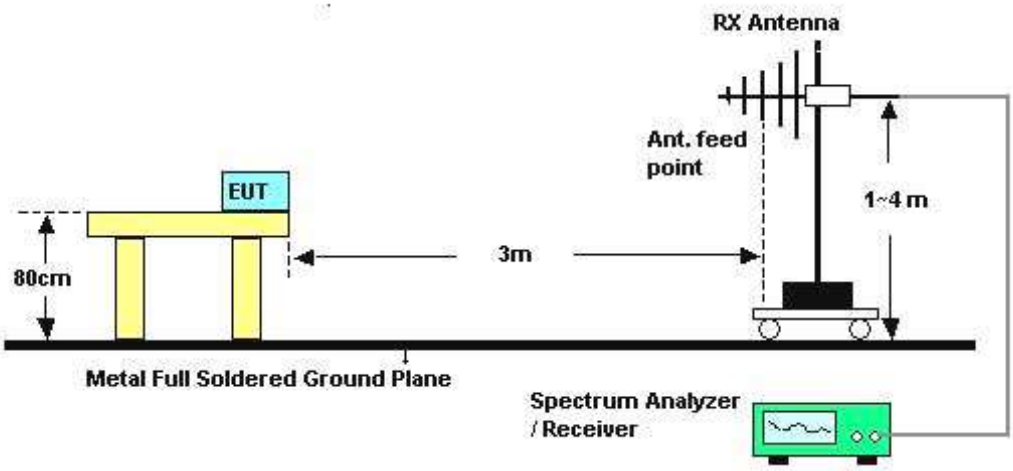
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

5.2.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.6. Results of Radiated Emissions (9kHz~30MHz)

Temperature	25˚C	Humidity	60%
Test Engineer	Tree	Configurations	Automatically

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

Note:

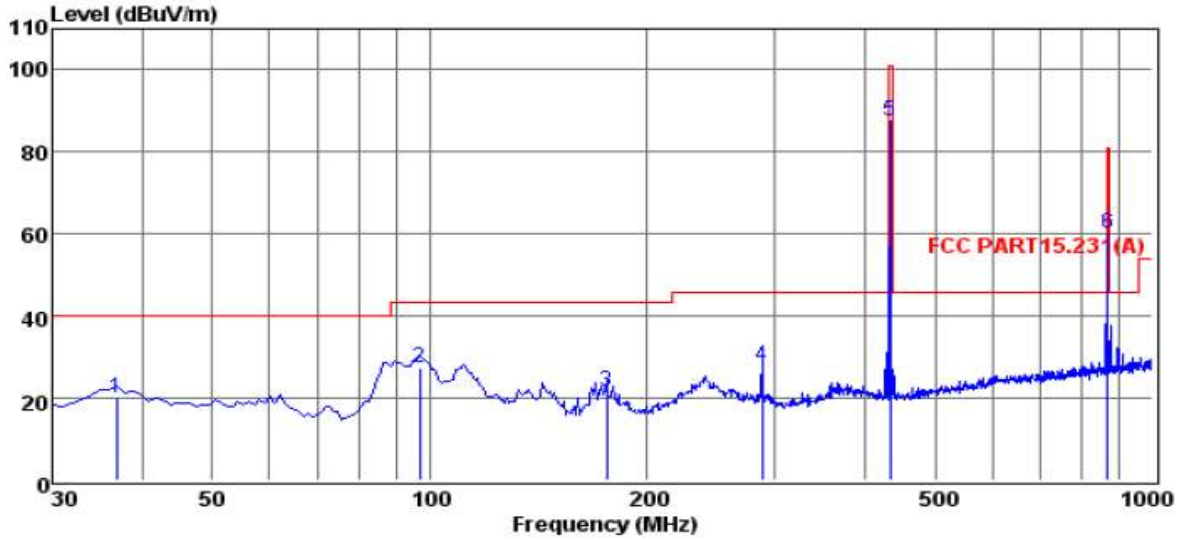
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

5.2.7. Results of Radiated Emissions (30MHz~1GHz)

Temperature	25℃	Humidity	60%
Test Engineer	Tree	Configurations	Fundamental Emissions

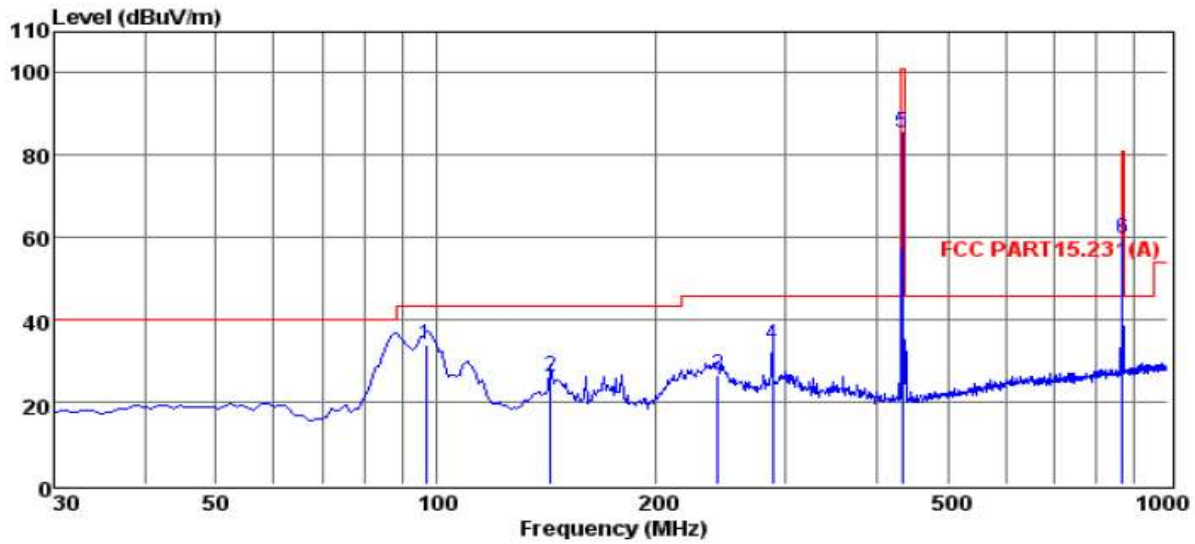


Env./Ins: 24℃/56%
EUT: Coal Ash Detector
M/N: CAS-A-AC
Power Rating: AC 120V/60Hz
Test Mode: TX
Operator: Tree
Memo:
pol: VERTICAL

	Freq MHz	Reading dBuV	CabLos dB	Antfac dB/m	Measured dBuV/m	Limit dBuV/m	Over dB	Remark
1	36.79	6.70	0.41	12.76	19.87	40.00	-20.13	QP
2	96.93	13.71	0.61	12.96	27.28	43.50	-16.22	QP
3	175.50	11.57	0.73	9.36	21.66	43.50	-21.84	QP
4	288.02	13.79	1.05	12.83	27.67	46.00	-18.33	QP
5	433.92	70.74	1.18	15.53	87.45	100.82	-13.37	Peak
6	867.84	37.61	1.87	20.76	60.24	80.82	-20.58	Peak

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Fundamental and Harmonics Average Result					
Freq(MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Conclusion
433.92	87.45	-12.66	74.79	80.8	PASS
867.84	60.24	-12.66	47.58	60.8	PASS



Env./Ins: 24℃/56%
EUT: Coal Ash Detector
M/N: CAS-A-AC
Power Rating: AC 120V/60Hz
Test Mode: TX
Operator: Tree
Memo:
pol: HORIZONTAL

	Freq MHz	Reading dBuV	CabLos dB	Antfac dB/m	Measured dBuV/m	Limit dBuV/m	Over dB	Remark
1	96.93	20.51	0.61	12.96	34.08	43.50	-9.42	QP
2	143.49	17.19	0.71	8.21	26.11	43.50	-17.39	QP
3	242.43	13.76	0.90	12.09	26.75	46.00	-19.25	QP
4	288.02	20.23	1.05	12.83	34.11	46.00	-11.89	QP
5	433.92	68.58	1.18	15.53	85.29	100.82	-15.53	Peak
6	867.84	37.19	1.87	20.76	59.82	80.82	-21.00	Peak

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Fundamental and Harmonics Average Result					
Freq(MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Conclusion
433.92	85.29	-12.66	72.63	80.8	PASS
867.84	59.82	-12.66	47.16	60.8	PASS

5.2.8. Results of Radiated Emissions (Above1GHz)

Temperature	25℃	Humidity	60%
Test Engineer	Tree	Configurations	Harmonics Emissions/ Spurious Emission

Freq. MHz	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
1301.51	44.37	74	-29.63	Peak	Horizontal
1301.51	31.71	54	-22.29	Average	Horizontal
2597.86	46.11	74	-27.89	Peak	Horizontal
2597.86	33.45	54	-20.55	Average	Horizontal
1302.07	44.56	74	-29.44	Peak	Vertical
1302.07	31.90	54	-22.10	Average	Vertical
2600.13	46.49	74	-27.51	Peak	Vertical
2600.13	33.83	54	-20.17	Average	Vertical

1. *Measuring frequencies from 9k~10th harmonic (ex. 5GHz), No emission found between lowest internal used/generated frequency to 30MHz.*
2. *Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 5GHz) were made with an instrument using Peak detector mode.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

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5.3. 20dB Bandwidth Emissions

FCC 15.231 (c)

5.3.1. Limit

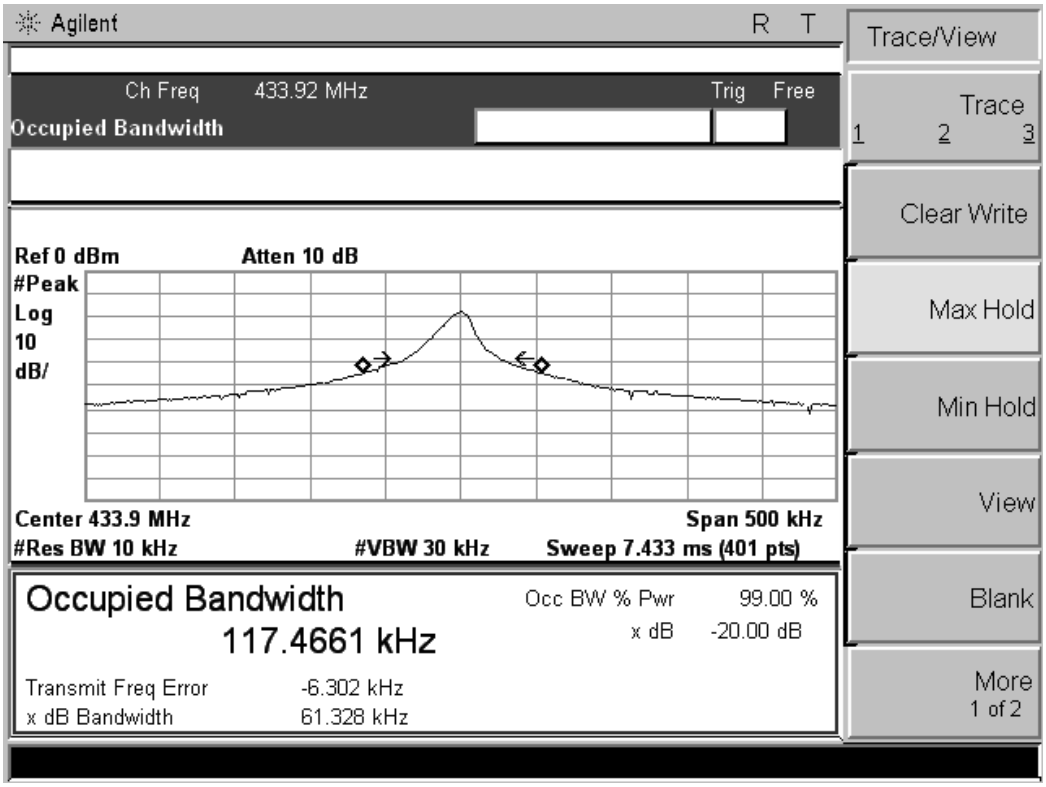
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.3.2. Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

5.3.3. Test Data

Center Frequency of operation MHz	Maximum allowed bandwidth kHz	Measured 20dB bandwidth kHz	Result
433.92	1084.8	61.328	PASS
Maximum allowed bandwidth:	☒0.25% of the centre operating frequency ☐0.5% of the centre operating frequency		
RBW: **VBW:**	☒10kHz ☐100kHz ☐other kHz ☒30kHz ☐300kHz ☐other kHz		



5.4. Duty cycle

5.4.1. Limit

No dedicated limit specified in the Rules.

5.4.2. Test Procedure

5.4.2.1. Place the EUT on the table and set it in transmitting mode.

5.4.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

5.4.2.3. Set centre frequency of spectrum analyzer=operating frequency.

5.4.2.4. Set the spectrum analyzer as RBW=100kHz, VBW=300KHz, Span=0Hz, Adjust Sweep=100ms.

5.4.2.5. Repeat above procedures until all frequency measured was complete.

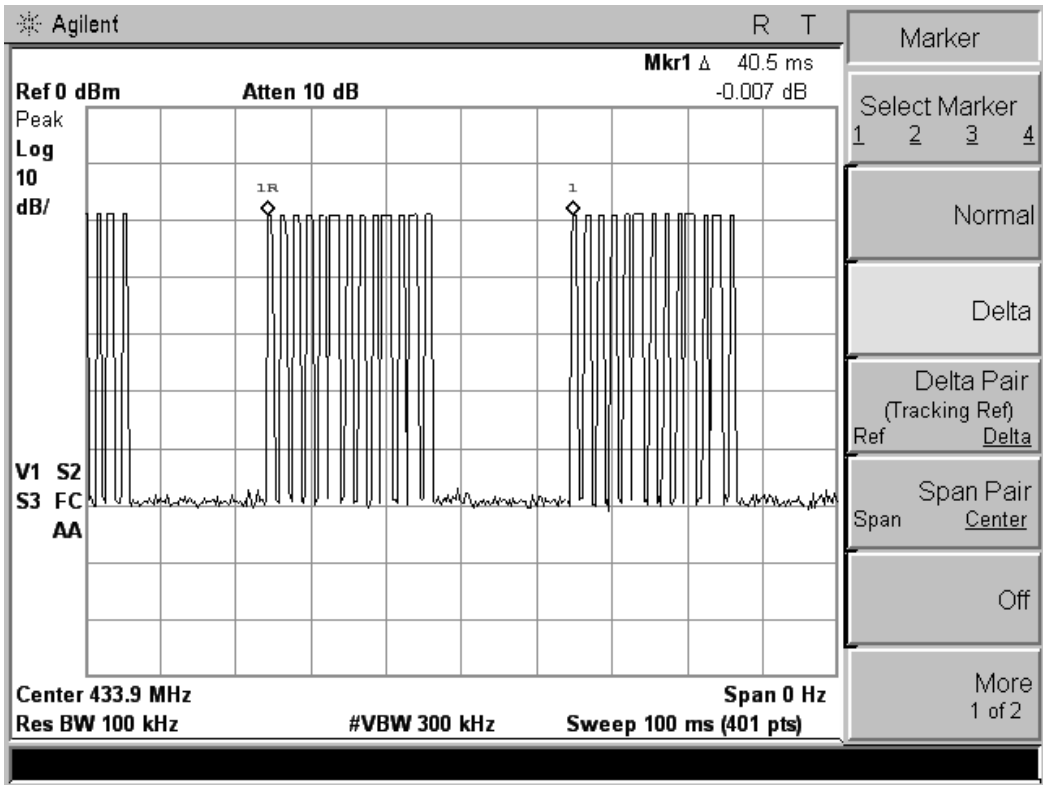
5.4.3. Test Data

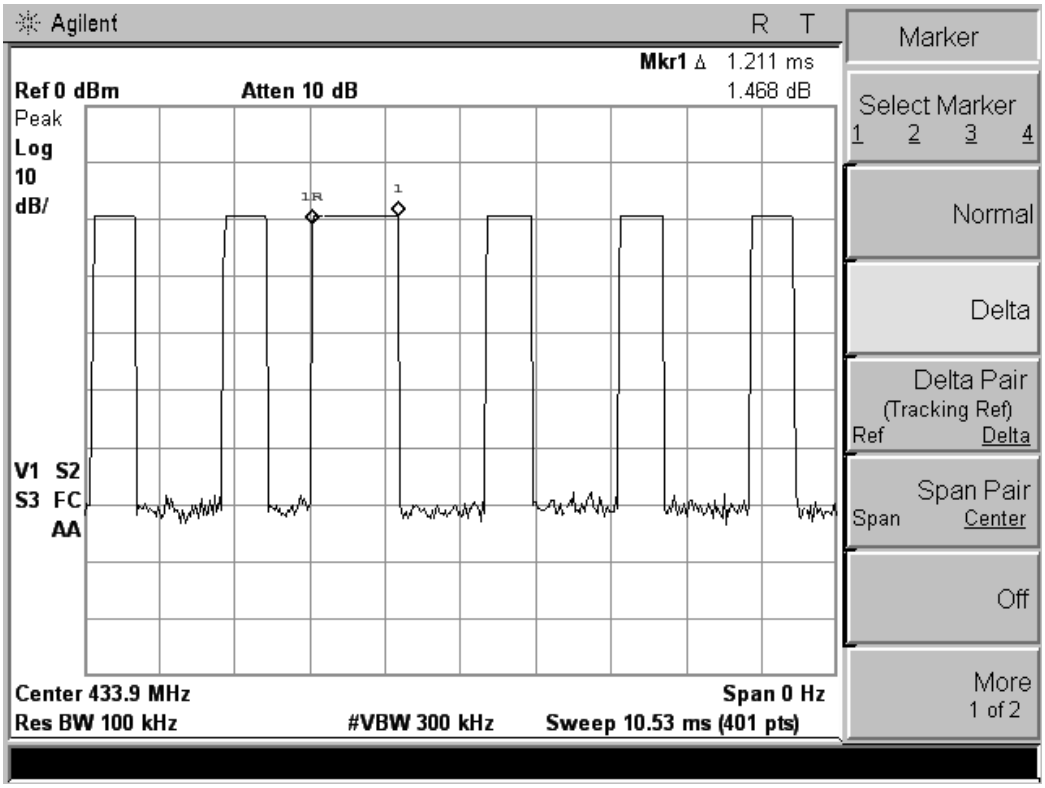
Ton = (1.211*3) + (0.5792*10) = 9.425(ms)

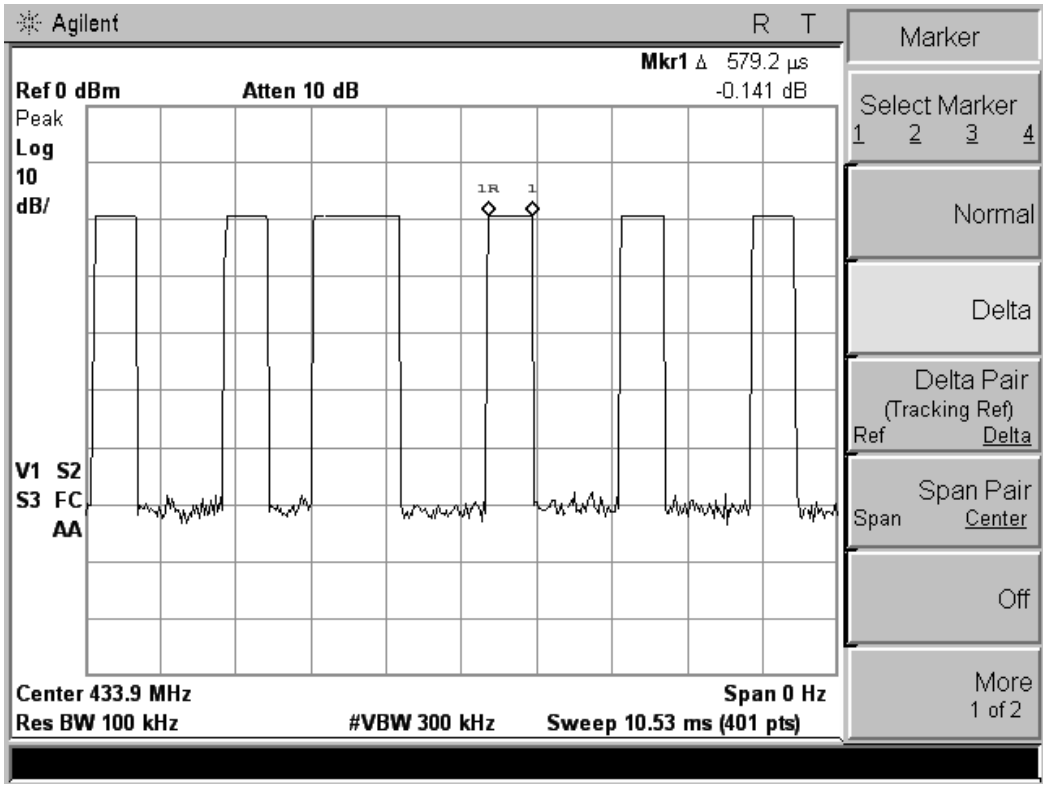
Tp = 40.5(ms)

Average Correction Factory = 20log (Ton/Tp) =20log (9.425/40.5) = -12.66dB

Note: The signal bandwidth was measured and less then 100kHz RBW so PDCF factor is not required to correct the fundamental signal peak result.




Agilent
R T
Mkr1 Δ 1.211 ms
1.468 dB
Ref 0 dBm
Atten 10 dB
Peak
Log
10
dB/
1R
1
V1 S2
S3 FC
AA
Center 433.9 MHz
Span 0 Hz
Res BW 100 kHz
#VBW 300 kHz
Sweep 10.53 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
R T
Mkr1 Δ 579.2 µs
-0.141 dB
Ref 0 dBm
Atten 10 dB
Peak
Log
10
dB/
1R
1
V1 S2
S3 FC
AA
Center 433.9 MHz
Span 0 Hz
Res BW 100 kHz
#VBW 300 kHz
Sweep 10.53 ms (401 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2

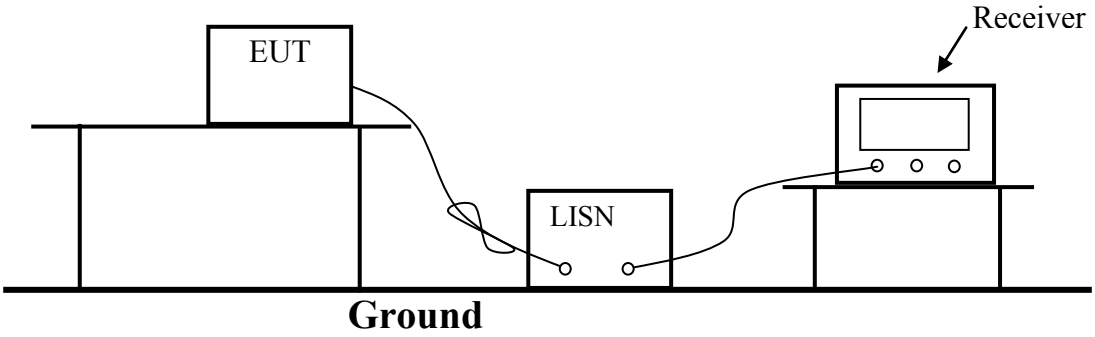
5.5. Power line conducted emissions

5.4.1 Standard Applicable

According to §15.207 (a) or RSS-Gen: For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

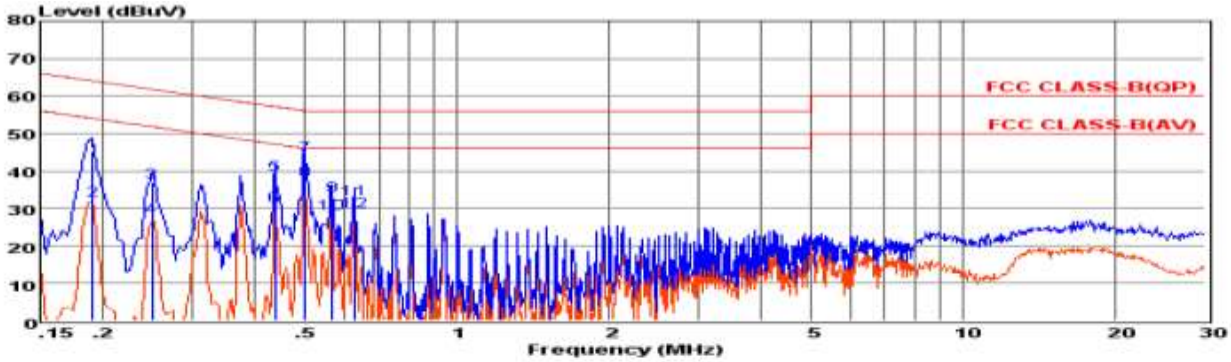
5.4.2 Block Diagram of Test Setup



5.4.3 Test Results

PASS.

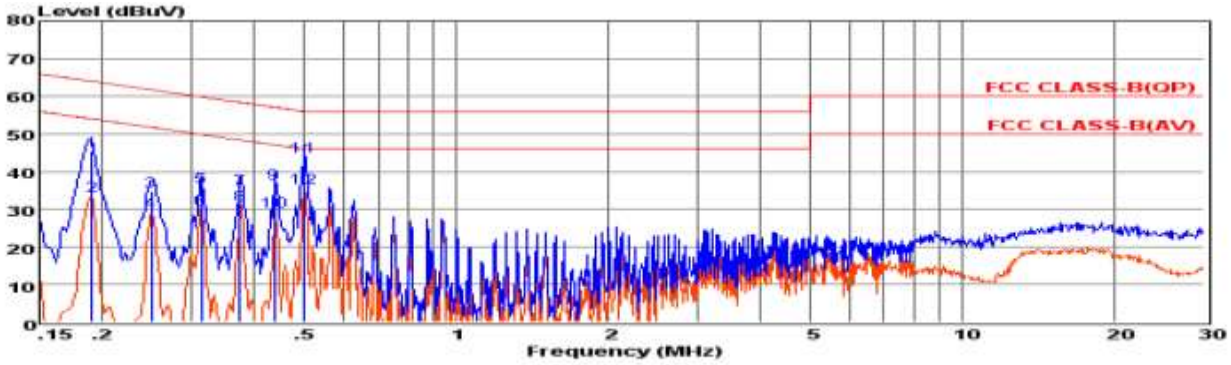
The test data please refer to following page.



Env. Ins: 24*/56%
EUT: Coal Ash Detector
M/N: CAS-A-AC
Power Rating: AC 120V/60Hz
Test Mode: TX
Operator: Tree
Memo:
Pol: LINE

	Freq MHz	Reading dBuV	LisnFac dB	CabLos dB	Measured dBuV	Limit dBuV	Over dB	Remark
1	0.19039	35.64	9.62	0.02	45.28	64.02	-18.74	QP
2	0.19040	22.34	9.62	0.02	31.98	54.02	-22.04	Average
3	0.24945	27.30	9.63	0.03	36.96	61.78	-24.82	QP
4	0.24946	17.99	9.63	0.03	27.65	51.78	-24.13	Average
5	0.43742	29.20	9.62	0.04	38.86	57.11	-18.25	QP
6	0.43743	21.05	9.62	0.04	30.71	47.11	-16.40	Average
7	0.50203	34.47	9.62	0.04	44.13	56.00	-11.87	QP
8	0.50204	27.69	9.62	0.04	37.35	46.00	-8.65	Average
9	0.56709	23.50	9.63	0.04	33.17	56.00	-22.83	QP
10	0.56710	19.00	9.63	0.04	28.67	46.00	-17.33	Average
11	0.62715	22.85	9.63	0.04	32.52	56.00	-23.48	QP
12	0.62716	19.41	9.63	0.04	29.08	46.00	-16.92	Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.



Env. Ins: 24*/56%
EUT: Coal Ash Detector
M/N: CAS-A-AC
Power Rating: AC 120V/60Hz
Test Mode: TX
Operator: Tree
Memo:
Pol: NEUTRAL

	Freq MHz	Reading dBuV	LisnFac dB	CabLos dB	Measured dBuV	Limit dBuV	Over dB	Remark
1	0.19039	35.89	9.61	0.02	45.52	64.02	-18.50	QP
2	0.19040	23.92	9.61	0.02	33.55	54.02	-20.47	Average
3	0.24945	25.28	9.60	0.03	34.91	61.78	-26.87	QP
4	0.24946	19.84	9.60	0.03	29.47	51.78	-22.31	Average
5	0.31328	26.24	9.60	0.03	35.87	59.88	-24.01	QP
6	0.31329	20.34	9.60	0.03	29.97	49.88	-19.91	Average
7	0.37314	25.88	9.61	0.04	35.53	58.43	-22.90	QP
8	0.37315	21.48	9.61	0.04	31.13	48.43	-17.30	Average
9	0.43742	27.26	9.62	0.04	36.92	57.11	-20.19	QP
10	0.43743	19.65	9.62	0.04	29.31	47.11	-17.80	Average
11	0.50203	34.49	9.62	0.04	44.15	56.00	-11.85	QP
12	0.50204	25.94	9.62	0.04	35.60	46.00	-10.40	Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.

5.6. Antenna Requirement

FCC 15.203

5.5.1. Standard Applicable

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 directional gains of antenna used for transmitting is 0dBi, and EUT uses an integral antenna which is permanently attached.

5.5.2. Result

Compliant.

6. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal. Date	Due Date
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	July 15, 2013	July 14, 2014
LISN	MESS Tec	NNB-2/16Z	99079	9KHz-30MHz	June 18, 2013	June 17, 2014
LISN (Support Unit)	EMCO	3819/2NM	9703-1839	9KHz-30MHz	June 18, 2013	June 17, 2014
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	June 18, 2013	June 17, 2014
ISN	SCHAFFNER	ISN ST08	21653	9KHz-30MHz	July 15, 2013	July 14, 2014
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-1GHz 3m	June 18, 2013	June 17, 2014
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHzz	July 15, 2013	July 14, 2014
Amplifier	Agilent	8449B	3008A02120	1GHz-26.5GHz	July 15, 2013	July 14, 2014
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5GHz-40GHz	July 15, 2013	July 14, 2014
Spectrum Analyzer	Agilent	E4407B	MY41440292	9k-26.5GHz	June 18, 2013	June 17, 2014
Loop Antenna	R&S	HFH2-Z2	860004/001	9k-30MHz	June 18, 2013	June 17, 2014
By-log Antenna	SCHAFFNER	CBL 6112D	22237	30MHz-1GHz	June 18, 2013	June 17, 2014
Horn Antenna	EMCO	3115	6741	1GHz-18GHz	June 18, 2013	June 17, 2014
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz-40GHz	June 18, 2013	June 17, 2014
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	June 18, 2013	June 17, 2014
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz-40GHz	June 18, 2013	June 17, 2014
Spectrum Meter	R&S	FSP 30	100023	9kHz-30GHz	July 15, 2013	July 14, 2014
Power Meter	R&S	NRVS	100444	DC-40GHz	July 15, 2013	July 14, 2014
Power Sensor	R&S	NRV-Z51	100458	DC-30GHz	July 15, 2013	July 14, 2014
Power Sensor	R&S	NRV-Z32	10057	30MHz-6GHz	July 15, 2013	July 14, 2014
AC Power Source	HPC	HPA-500E	HPA-9100024	AC 0~300V	June 18, 2013	June 17, 2014
DC power Soure	GW	GPC-6030D	C671845	DC 1V-60V	June 18, 2013	June 17, 2014
Temp. and Humidigy Chamber	Giant Force	GTH-225-20-S	MAB0103-00	N/A	June 18, 2013	June 17, 2014
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	June 18, 2013	June 17, 2014
RF CABLE-2m	JYE Bao	RG142	CB)35-2m	20MHz-1GHz	June 18, 2013	June 17, 2014
Vector signal Generator	R&S	SMU200A	102098	100kHz~6GHz	June 18, 2013	June 17, 2014
Signal Generator	R&S	SMR40	10016	10MHz~4oGHa	June 18, 2013	June 17, 2014
Oscilloscope	Tektonix	TDS380	B016197	400MHz/2GRS	June 18, 2013	June 17, 2014

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7. MANUFACTURER/ APPROVAL HOLDER DECLARATION

The following identical model(s):

CAS-S-AC	--	--	--

Belong to the tested device:

Product description : Coal Ash Detector

Model name : CAS-A-AC

Remark: PCB board, structure and internal of these model(s) are the same, So no additional models were tested.

----------THE END OF REPORT----------

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