



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

588 West Jindu Road, Songjiang District, Shanghai, China

Telephone: +86 (0) 21 6191 5666

Fax: +86 (0) 21 6191 5678

ee.shanghai@sgs.com

Report No.: SHEM141100297201

Page: 1 of 18

1 Cover Page

FCC REPORT

Application No.:	SHEM1411002972RF
Applicant:	MINE SITE TECHNOLOGIES PTY LTD
FCC ID:	N73-EX09
Equipment Under Test (EUT): NOTE: The following sample(s) submitted was/were identified on behalf of the client as	
Product Name:	Exciter
Model No.(EUT):	EX09
Standards:	FCC PART 15 Subpart C: 2014
Date of Receipt:	November 21, 2014
Date of Test:	November 28, 2014 to August 29, 2015
Date of Issue:	August 29, 2015
Test Result:	Pass*

*In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Parlam Zhan
E&E Section Manager

SGS-CSTC (Shanghai) Co., Ltd.

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

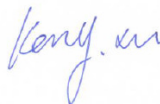
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00	/	December 30, 2014	/	Original

Authorized for issue by:				
Engineer		Eddy Zong _____ Print Name		 _____
Clerk		Susie Liu _____ Print Name		 _____
Reviewer		Keny Xu _____ Print Name		 _____



3 Test

Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	-	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10(2013) Section 6.2	N/A
Radiated Emissions	47 CFR Part 15, Subpart C Section 15.209	ANSI C63.10(2013) Section 6.4&6.5&6.6&6.10	PASS
20dB Bandwidth	47 CFR Part 15, Subpart C Section 15.215	ANSI C63.10(2013) Section 6.9.2	PASS

N/A: Not applicable, please refer to Section 7.2 of this report for details.



4 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 TEST SUMMARY	3
4 CONTENTS	4
5 GENERAL INFORMATION	5
5.1 CLIENT INFORMATION	5
5.2 GENERAL DESCRIPTION OF E.U.T.	5
5.3 TECHNICAL SPECIFICATIONS:	5
5.4 E.U.T OPERATION MODE	5
5.5 DESCRIPTION OF SUPPORT UNITS	5
5.6 TEST LOCATION	5
5.7 TEST FACILITY	6
6 EQUIPMENTS LIST	7
7 TEST RESULTS AND MEASUREMENT DATA	8
7.1 ANTENNA REQUIREMENT	8
7.2 CONDUCTED EMISSIONS	9
7.3 RADIATED EMISSIONS	10
7.4 OCCUPIED BANDWIDTH	16
8 TEST SETUP PHOTOGRAPHS	18
9 EUT CONSTRUCTIONAL DETAILS	18

5 General Information

5.1 Client Information

Applicant:	MINE SITE TECHNOLOGIES PTY LTD
Address of Applicant:	Level 5, 113 Wicks Rd., North Ryde NSW 2113
Manufacturer:	Mine Site Technologies China Co.,Ltd
Address of Manufacturer:	4th Floor,Building 1, No.1413 Moganshan Road, Hangzhou, China,310011
Factory:	Mine Site Technologies China Co.,Ltd
Address of Factory:	4th Floor,Building 1, No.1413 Moganshan Road, Hangzhou, China,310011

5.2 General Description of E.U.T.

Product Description:	RFID Tag Initiator
Power Supply:	DC 24V

5.3 Technical Specifications

Operation Frequency:	125kHz
Modulation Type:	OOK
Antenna Type:	Integral loop antenna

5.4 E.U.T Operation Mode

Test Mode	Description of Test Mode
Engineering mode	Keep EUT working in continuous transmitting

5.5 Description of Support Units

The EUT has been tested independently.

5.6 Test Location

Radiated Emissions test was sub-contracted at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053

Fax: +86 755 2671 0594

Other tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

No.588 West Jindu Road, Songjiang District, Shanghai, China. 201612.

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

5.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2017-07-14.

- **FCC – Registration No.: 402683**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2017-09-16.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A-1. Expiry Date: 2017-06-18.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868 and C-4336 respectively. Date of Registration: 2012-05-29. Date of Expiry: 2017-11-16

6 Equipments List

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
1	10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEL0303	2014-08-02	2015-08-01
2	EMI Test Receiver	Rohde & Schwarz	ESR	SEL0295	2014-06-19	2015-06-18
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	Coaxial cable	SGS	N/A	SEL0288	2014-06-11	2015-06-10
5	Coaxial cable	SGS	N/A	SEL0275	2014-06-11	2015-06-10
6	Coaxial cable	SGS	N/A	SEL0274	2014-06-11	2015-06-10
7	BiConiLog Antenna (30M-1GHz)	Schwarzbeck	VULB9160	SEL0308	2014-07-15	2015-07-14
8	BiConiLog Antenna (30M-1GHz)	Schwarzbeck	VULB9160	SEL0309	2014-07-15	2015-07-14
9	Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEL0310	2014-07-17	2015-07-16
10	Pre-amplifier	Sonoma Instrument Co	310N	SEL0298	2014-07-29	2015-07-28
11	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2014-10-25	2015-10-24

7 Test results and Measurement Data

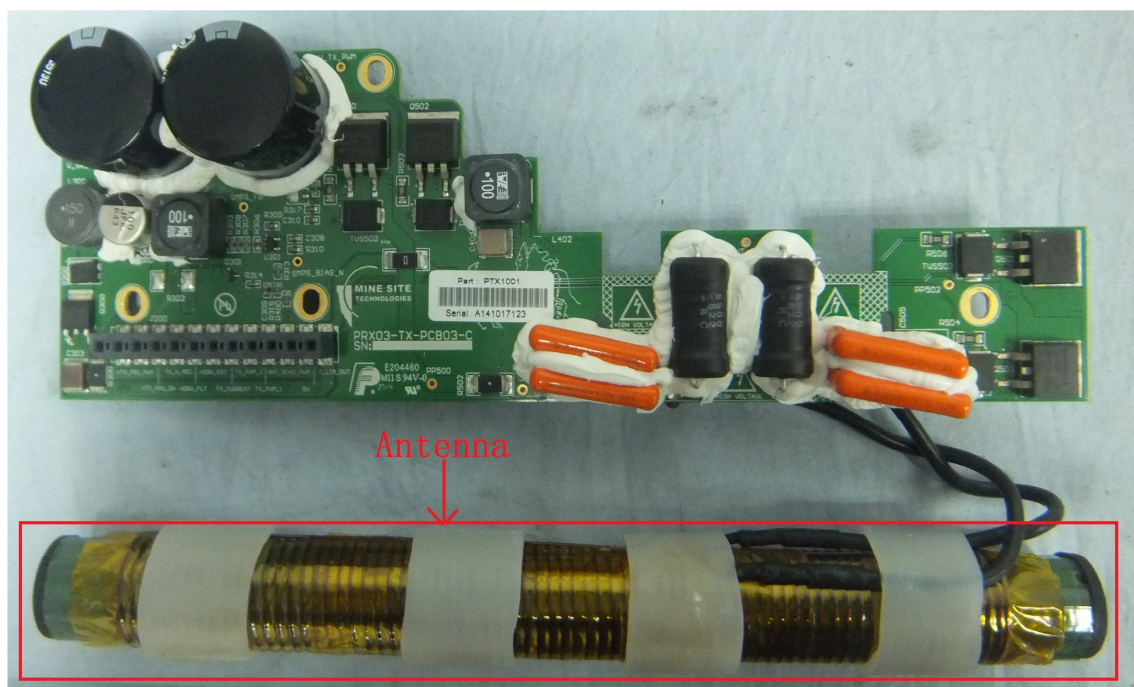
7.1 Antenna Requirement

15.203 Requirement: 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, 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.

EUT Antenna:

The antenna is integrated loop antenna and no consideration of replacement.

Antenna Configuration:



7.2 Conducted Emissions

Test Frequency Range: 150kHz to 30MHz

Limit:

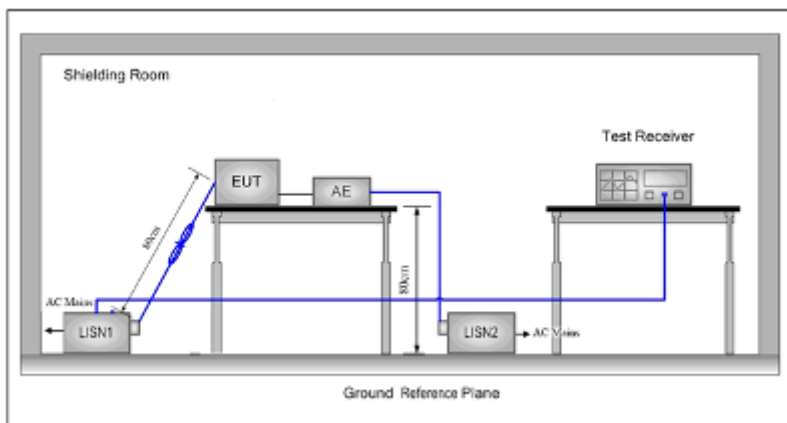
Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Procedure:

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Test Setup:



Test Results: N/A

This EUT is powered by DC source; therefore the AC Conducted Emission test is not applicable.

7.3 Radiated Emissions

Test frequency range: 9KHz – 1GHz

Test Site: Measurement Distance: 3m for above 30MHz (Semi-Anechoic Chamber)
10m for below 30MHz (Semi-Anechoic Chamber)

Receiver Setup:

Frequency (MHz)	RBW	VBW	Detector
0.009-0.015	200Hz	1KHz	Quasi-peak
0.015-30	9kHz	30KHz	Quasi-peak
30-1000	120 kHz	300KHz	Quasi-peak

Note: The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector. For the frequency bands 9~90 kHz, 110~490 kHz and above 1000 MHz, the radiated emission limits are based on measurements employing an average detector.

Limit:

Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)	Limit @3m (dBμV/m)
0.009-0.490	2400/F(kHz)	300	128.5 ~ 93.8
0.490-1.705	24000/F(kHz)	30	73.8 ~63.0
1.705-30	30	30	69.5
30-88	100	3	40.0
88-216	150	3	43.5
216-960	200	3	46.0
960-1000	500	3	54.0

NOTE:

(1) For test distance other than what is specified, but fulfilling the requirements of section 15.31(f) (2) the field strength is calculated by adding additionally an extrapolation factor of 40dB/decade (inverse linear distance for field strength measurements).

So the Distance Extrapolation Factor in dB is $40 \cdot \log(D_{TEST} / D_{SPEC})$

where D_{TEST} = Test Distance and D_{SPEC} = Specified Distance.

Field strength limit (dBμV/m)@test distance= Field strength limit (dBμV/m)@specified distance -Distance Extrapolation Factor

(2) The lower limit shall apply at the transition frequencies.

Test Procedure:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set fixed away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1

- meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
 - If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
 - The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Test Setup:

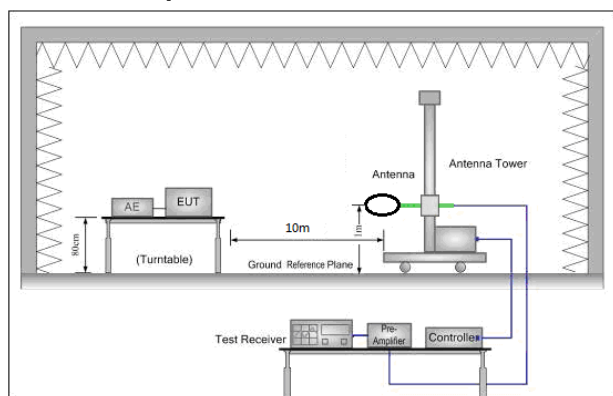


Figure 1. Below 30MHz

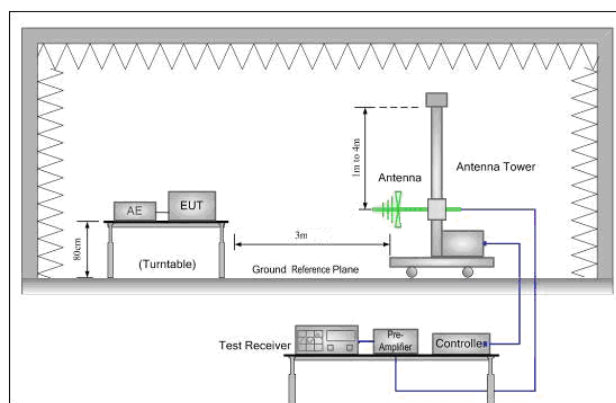


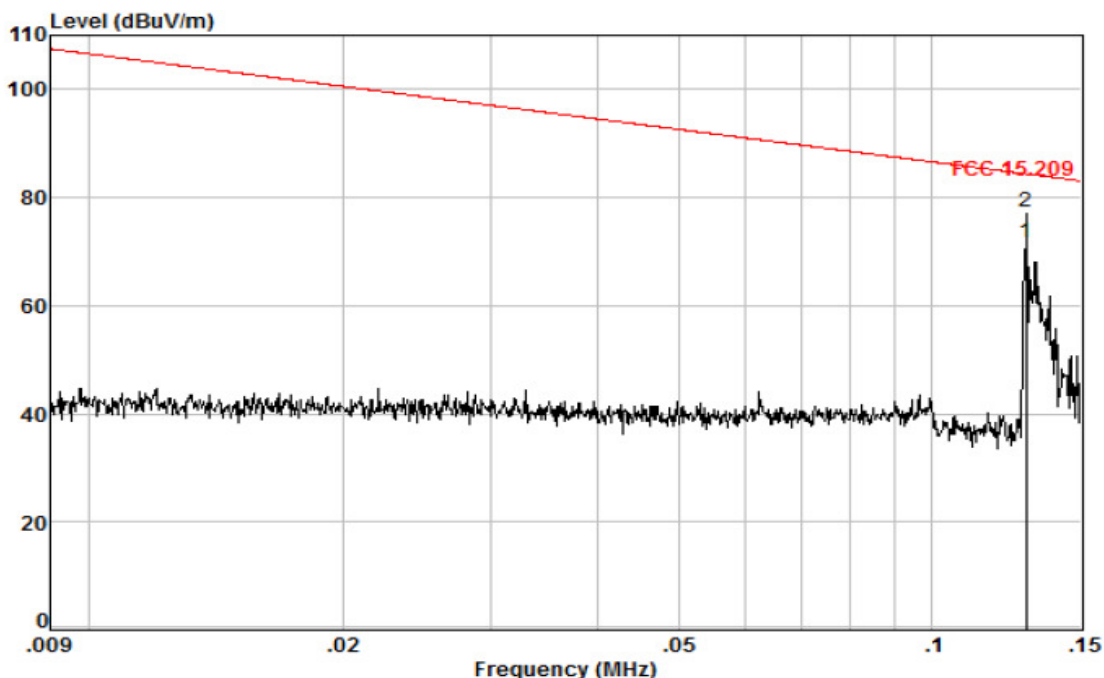
Figure 2. 30MHz to 1GHz

Test Results:

Pass

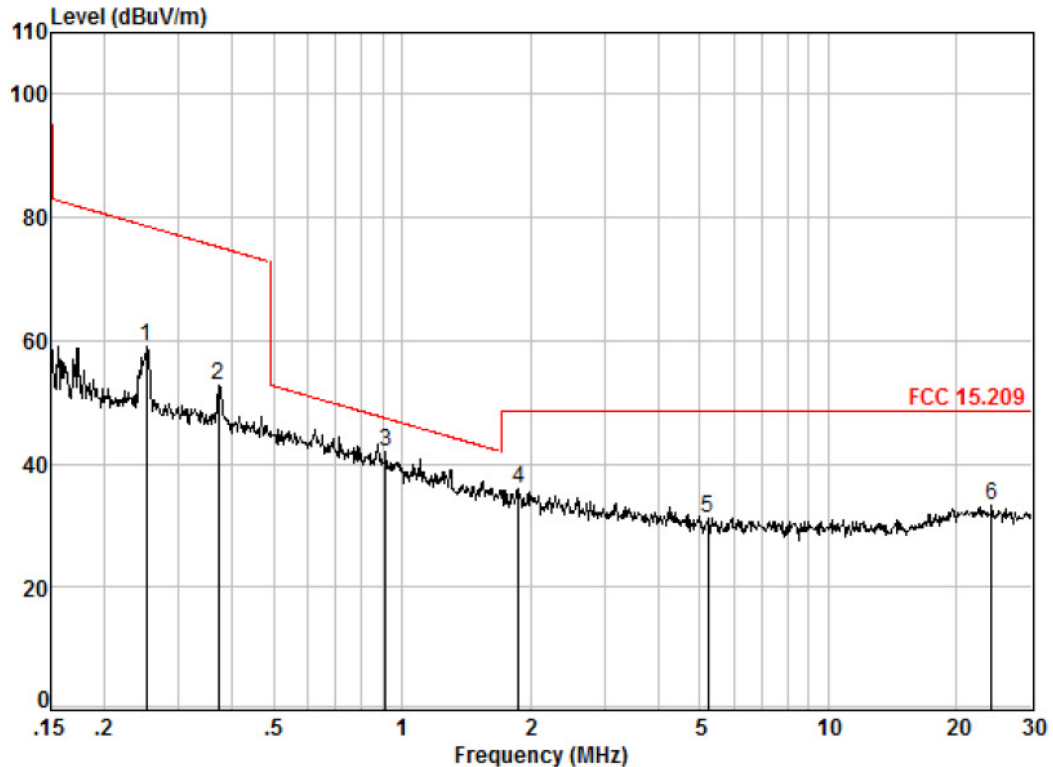
Test Data:

9kHz-150kHz:



		Cable	Ant	Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	0.13	0.06	12.87	0.00	58.70	71.63	84.37	-12.74
2	0.13	0.06	12.87	0.00	64.38	77.31	84.37	-7.06

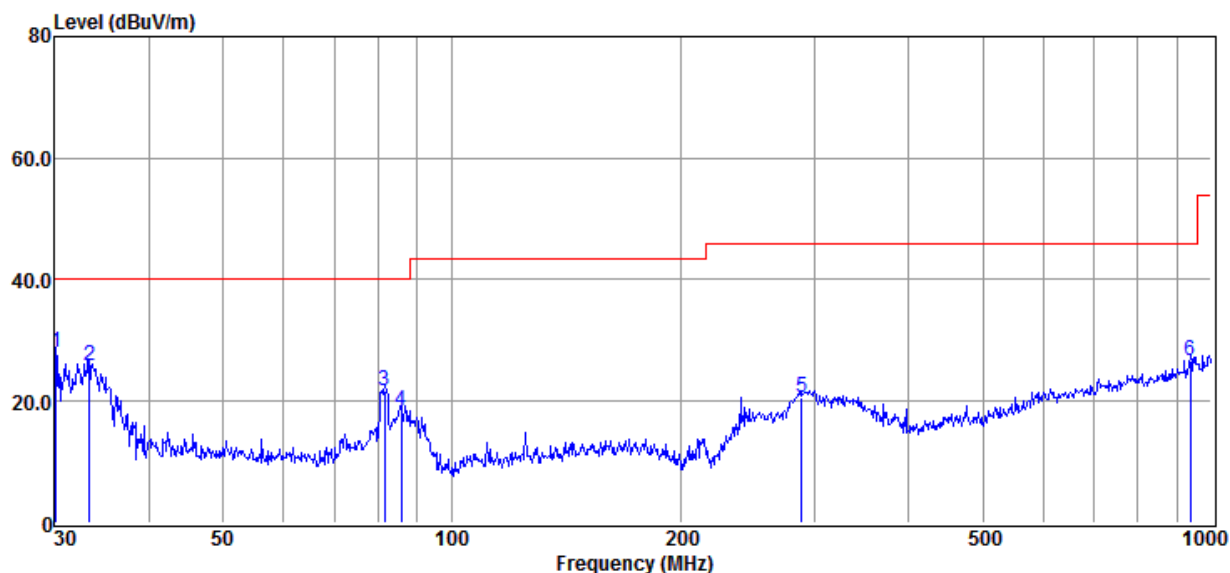
150 kHz-30 MHz:



		Cable	Ant	Preamp	Read	Limit	Over
	Freq	Loss	Factor	Factor	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	0.25	0.08	12.80	0.00	46.16	59.04	-19.57
2	0.37	0.10	12.63	0.00	39.97	52.70	-22.51
3	0.91	0.21	12.74	0.00	29.04	41.99	-5.41
4	1.88	0.33	12.53	0.00	23.04	35.90	-12.60
5	5.22	0.43	10.98	0.00	19.87	31.28	-17.22
6	24.14	0.72	10.13	0.00	22.38	33.23	-15.27

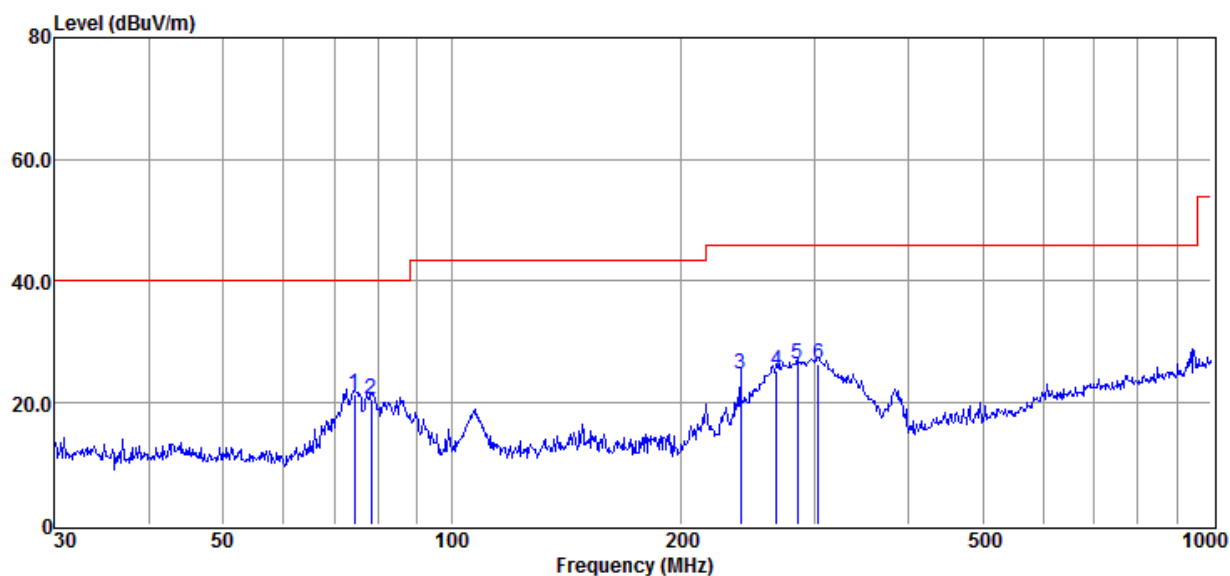
30MHz-1GHz:

Vertical



Item	Freq.	Read Level	Antenna Factor	Preamplifier Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	30.11	38.66	12.50	23.72	0.55	27.99	40.00	-12.01	QP
2	33.33	36.95	12.57	23.71	0.15	25.96	40.00	-14.04	QP
3	81.50	36.29	8.46	23.67	0.72	21.80	40.00	-18.20	QP
4	85.90	32.65	8.56	23.67	0.77	18.31	40.00	-21.69	QP
5	289.00	31.04	11.43	23.66	1.81	20.62	46.00	-25.38	QP
6	938.83	23.72	23.44	23.94	3.56	26.78	46.00	-19.22	QP

Horizontal



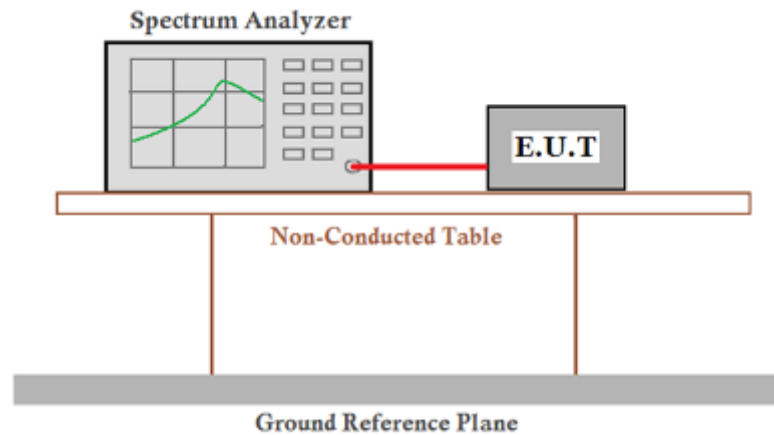
Item	Freq.	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Result Level	Limit Line	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1	74.40	34.93	9.68	23.67	0.64	21.58	40.00	-18.42	QP
2	78.41	34.74	8.77	23.67	0.69	20.53	40.00	-19.47	QP
3	239.99	36.80	10.10	23.64	1.53	24.79	46.00	-21.21	QP
4	267.55	36.55	10.86	23.66	1.67	25.42	46.00	-20.58	QP
5	284.98	36.88	11.34	23.66	1.80	26.36	46.00	-19.64	QP
6	303.54	36.34	11.92	23.67	1.90	26.49	46.00	-19.51	QP

Remark: The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

7.4 Occupied Bandwidth

Test Setup:



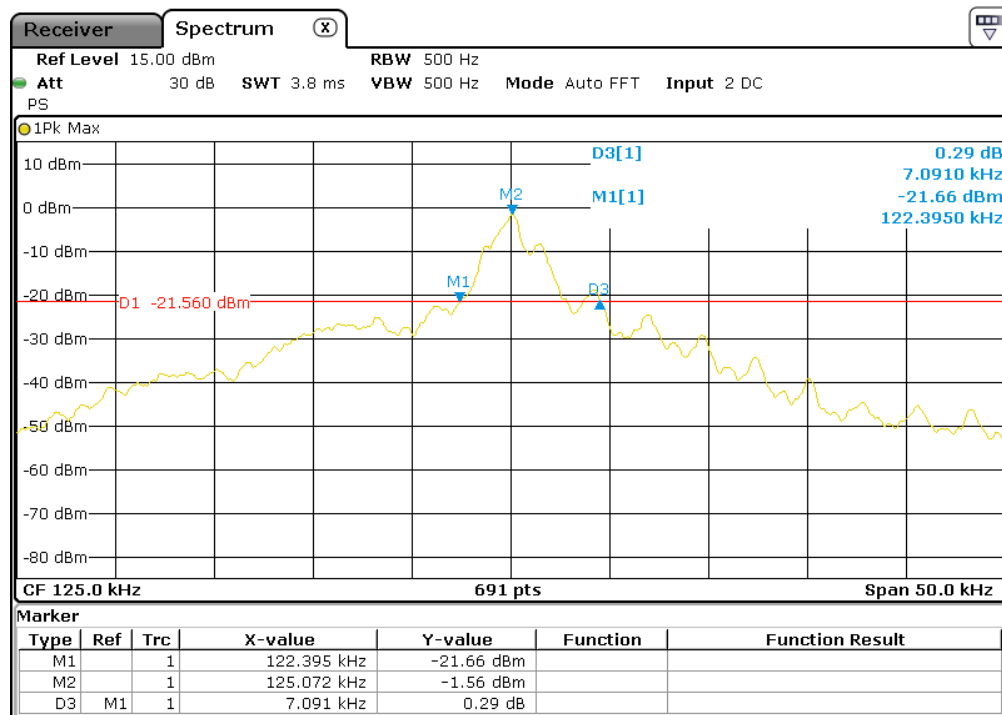
Requirements: Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through §15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Result: Pass

Measurement Data:

20dB bandwidth (kHz)	Result
7.091	Pass

Test plot as follows:





8 Test Setup Photographs

Refer to the < EX09_Test Setup Photos-FCC >

9 EUT Constructional Details

Refer to the < EX09_External Photos-FCC> & < EX09_Internal Photos-FCC>.

--End of the Report--