



TEST REPORT

Application No.: SHEM1905013075CR
FCC ID: 2AK5Y-C427
Applicant: Control Technology China Co., LTD
Address of Applicant: No. 98 Jianpeng Rd, Jiuting Town, Songjiang District, Shanghai 201615
Manufacturer: Control Technology China Co., LTD
Address of Manufacturer: No. 98 Jianpeng Rd, Jiuting Town, Songjiang District, Shanghai 201615
Equipment Under Test (EUT):
EUT Name: TPMS Activation Too
Model No.: C427001
Trade mark: ATEQ
Standard(s) : 47 CFR Part 15, Subpart C 15.209
Date of Receipt: 2019-05-10
Date of Test: 2019-05-27 to 2019-08-28
Date of Issue: 2019-09-04

Test Result: Pass*

* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

Parlam Zhan
E&E Section Manager

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. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Testing Center EMC Laboratory

NO.588 West Jindu Road, Songjiang District, Shanghai, China 201612
中国·上海·松江区金都西路588号 邮编: 201612

t(86-21) 61915666 f(86-21) 61915678 www.sgsgroup.com.cn
t(86-21) 61915666 f(86-21) 61915678 e sgs.china@sgs.com



Revision Record			
Version	Description	Date	Remark
00	Original	2019-09-04	/

Authorized for issue by:				
		Bill Wu		
		Bill Wu / Project Engineer		
		Parlam Zhan		
		Parlam Zhan / Reviewer		



2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.209	N/A	47 CFR Part 15, Subpart C 15.203	Customer Declaration

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
20dB Bandwidth	47 CFR Part 15, Subpart C 15.209	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.237(b)	Pass
Radiated Emissions (9kHz-30MHz)	47 CFR Part 15, Subpart C 15.209	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.237(c)	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart C 15.209	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.237(c)	Pass



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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 4.2V 3000mAh rechargeable Li-ion battery
	Charging adapter:
	Model: DSA-10PFP-05
	Input: 100-240V~50/60Hz
	Output: 5V 2A
Test voltage:	DC 4.2V
Cable:	USB Cable 80cm
	OBD II Cable 100cm
Antenna Type	Loop Antenna
Modulation Type	ASK
Number of Channels	1
Operation Frequency	125KHz

4.2 Description of Support Units

The EUT has been tested as an independent unit.



4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 8.4 \times 10^{-8}$
2	Timeout	$\pm 2s$
3	Duty cycle	$\pm 0.37\%$
4	Occupied Bandwidth	$\pm 3\%$
5	RF conducted power	$\pm 0.6dB$
6	RF power density	$\pm 2.84dB$
7	Conducted Spurious emissions	$\pm 0.75dB$
8	RF Radiated power	$\pm 4.6dB$ (Below 1GHz)
		$\pm 4.1dB$ (Above 1GHz)
9	Radiated Spurious emission test	$\pm 4.2dB$ (Below 30MHz)
		$\pm 4.4dB$ (30MHz-1GHz)
		$\pm 4.8dB$ (1GHz-18GHz)
		$\pm 5.2dB$ (Above 18GHz)
10	Temperature test	$\pm 1^{\circ}C$
11	Humidity test	$\pm 3\%$
12	Supply voltages	$\pm 1.5\%$
13	Time	$\pm 3\%$

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.



4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shanghai Branch

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

4.5 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.

- **NVLAP (Certificate No. 201034-0)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). Certificate No. 201034-0.

- **FCC –Designation Number: CN5033**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN5033. Test Firm Registration Number: 479755.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

IC Registration No.: 8617A-1. CAB identifier: CN0020.

- **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-13868, C-14336, T-12221, G-10830 respectively.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Radiated Test					
EMI test Receiver	R&S	ESU40	SHEM051-1	2018-12-20	2019-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2018-12-20	2019-12-19
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2017-04-10	2020-04-09
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2017-02-28	2020-02-27
Antenna (25MHz-3GHz)	Schwarzbeck	HL562	SHEM010-1	2017-02-28	2020-02-27
Horn Antenna (1-8GHz)	Schwarzbeck	HF906	SHEM009-1	2017-10-24	2020-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2017-01-14	2020-01-13
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2017-12-03	2020-12-02
Pre-amplifier (9kHz-2GHz)	CLAVIO	BDLNA-0001	SHEM164-1	2018-08-14	2019-08-13
Pre-amplifier (9kHz-2GHz)	CLAVIO	BDLNA-0001	SHEM164-1	2019-08-13	2020-08-12
Pre-amplifier (1-18GHz)	CLAVIO	BDLNA-0118	SHEM050-2	2018-08-14	2019-08-13
Pre-amplifier (1-18GHz)	CLAVIO	BDLNA-0118	SHEM050-2	2019-08-13	2020-08-12
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2018-12-20	2019-12-19
Signal Generator	R&S	SMR40	SHEM058-1	2018-08-14	2019-08-13
Signal Generator	R&S	SMR40	SHEM058-1	2019-08-13	2020-08-12
Band Filter	LORCH	9BRX-875/X150	SHEM156-1	/	/
Band Filter	LORCH	13BRX-1950/X500	SHEM083-2	/	/
Band Filter	LORCH	5BRX-2400/X200	SHEM155-1	/	/
Band Filter	LORCH	5BRX-5500/X1000	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2017-07-22	2020-07-21
RE test Cable	/	RE01, RE02, RE06	/	2018-12-26	2019-12-25

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

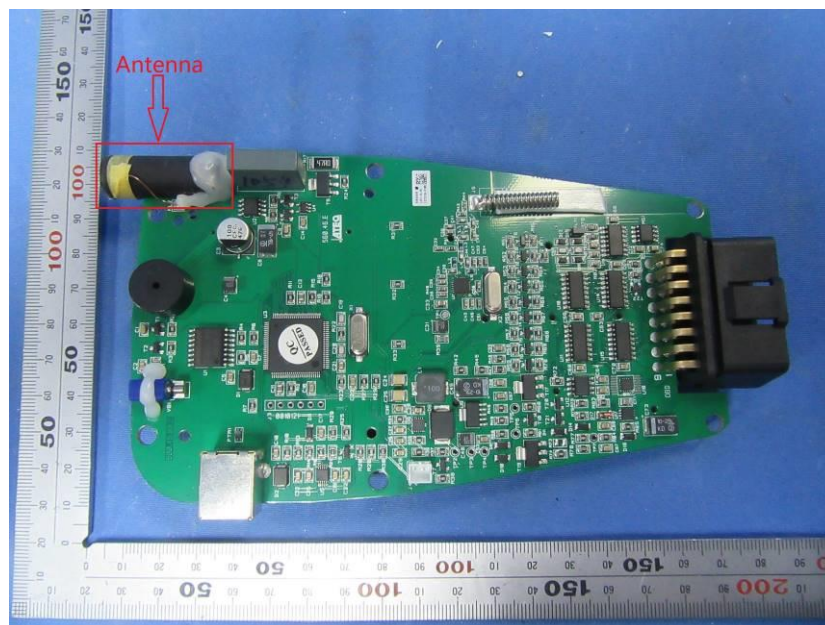
6.1.2 Conclusion

Standard 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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an 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 loop antenna and no consideration of replacement.



7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.237(b)
Test Method: ANSI C63.10 (2013) Section 6.9
Limit: <200 kHz

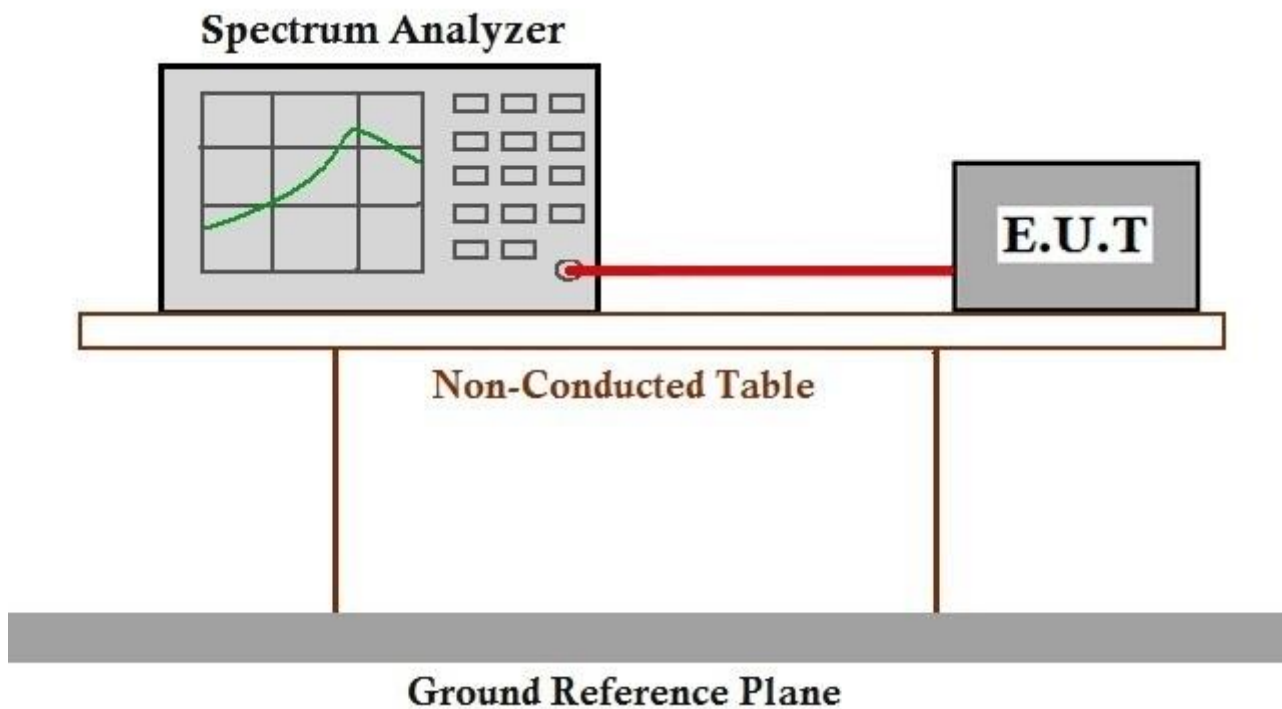
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.1.2 Test Setup Diagram

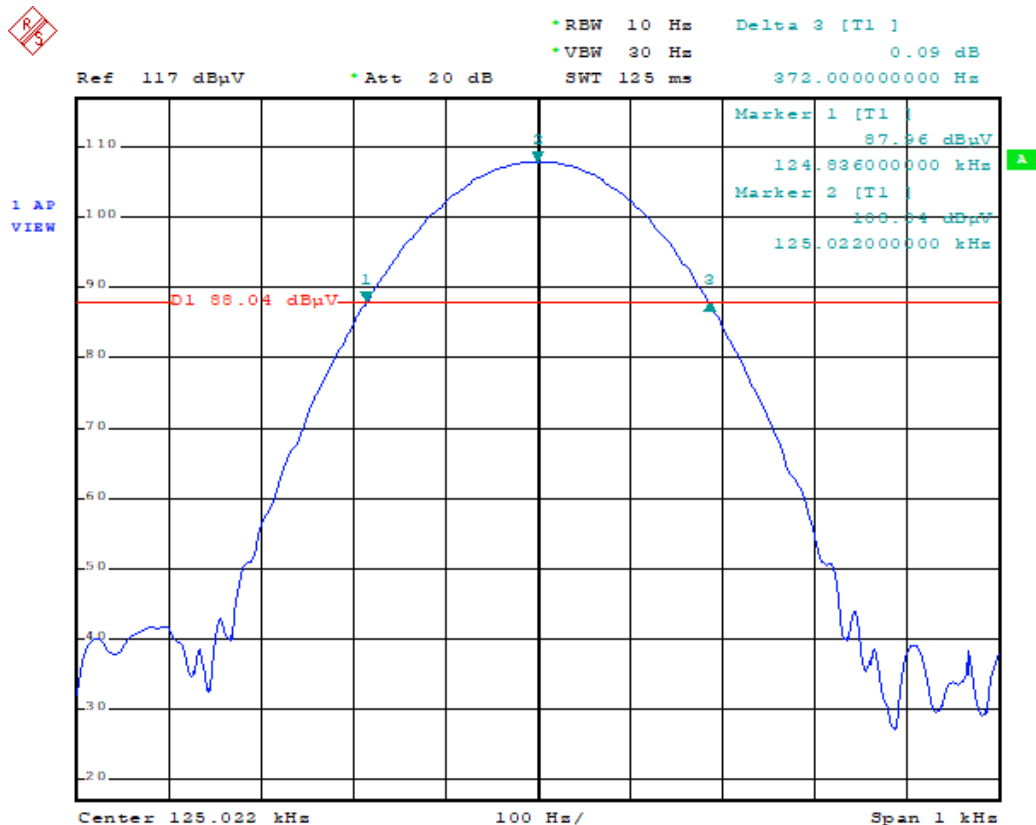


7.1.3 Measurement Procedure and Data

20dB bandwidth (Hz)	Result
372.00	Pass



Test plot as follows:



Date: 27.MAY.2019 15:48:41

7.2 Radiated Emissions

Test frequency range: 9KHz – 1GHz

Test Site: Measurement Distance: 3m

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 (dBμV/m)	Limit @3m (dBμV/m)
0.009-0.490	2400/F(kHz)	300	48.5 ~ 13.8	128.5 ~ 93.8
0.490-1.705	24000/F(kHz)	30	33.8 ~ 23.0	73.8 ~63.0
1.705-30	30	30	29.5	69.5
30-88	100	3	40.0	40.0
88-216	150	3	43.5	43.5
216-960	200	3	46.0	46.0
960-1000	500	3	54.0	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.

Limit:

(Fundamental signal)

Test Procedure:

Frequency	Limit (dBuV/m @3m)	Remark
13.56MHz	124	Quasi-peak Value

- 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 3 meters 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.

- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. 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:

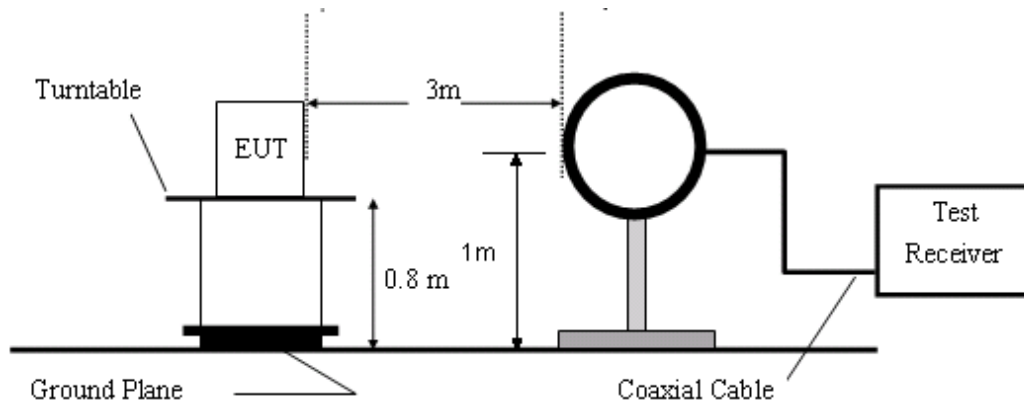


Figure 1. Below 30MHz

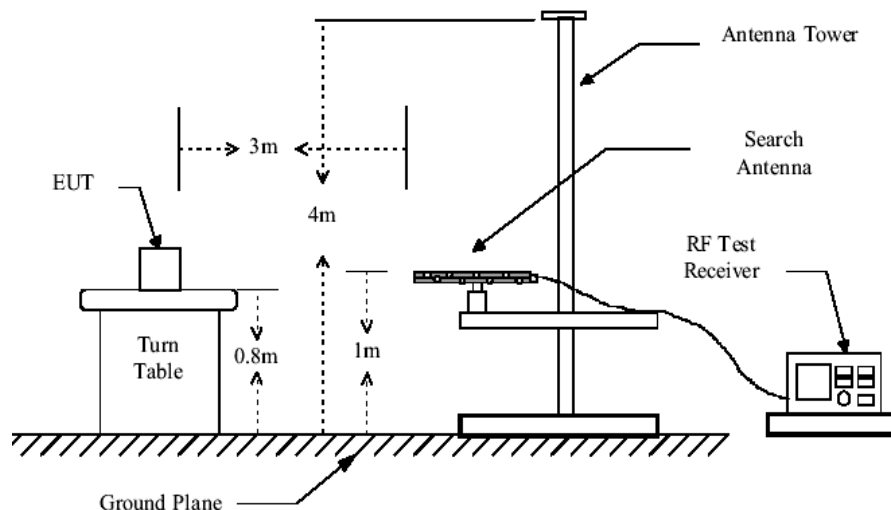
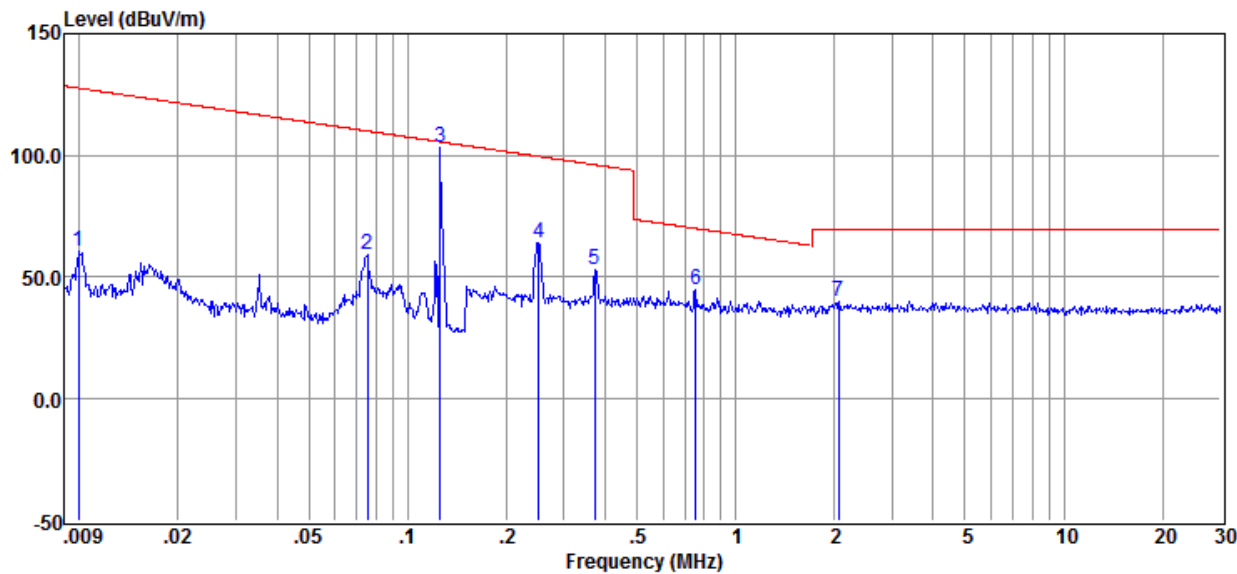


Figure 2. 30MHz to 1GHz

Test Results: Pass



Below 30MHz:

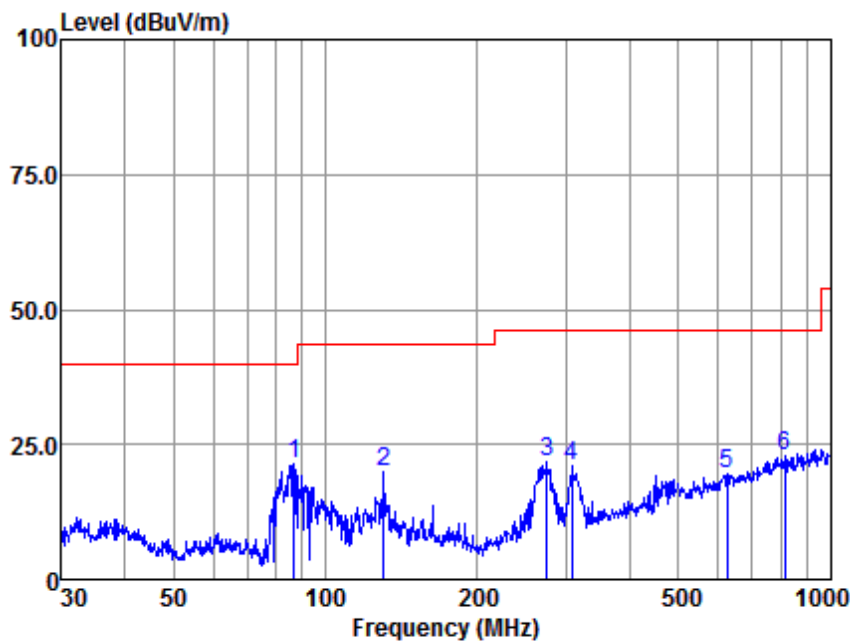


Item	Freq.	Read Level	Antenna Factor	Cable Loss	Result Level@3m	Result Level@S PEC	Limit Line@SP EC	Over Limit	Detector
(Mark)	(MHz)	(dBμV)	(dB/m)	(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	0.010	40.22	20.69	0.03	60.94	-19.06	47.65	-66.71	QP
2	0.075	39.63	19.88	0.05	59.56	-20.44	30.05	-50.49	QP
3	0.126	83.09	19.91	0.05	103.05	23.05	25.61	-2.56	Peak
4	0.250	44.38	19.80	0.06	64.24	-15.76	19.63	-35.39	QP
5	0.373	32.93	19.80	0.06	52.79	-27.21	16.18	-43.39	QP
6	0.755	25.47	19.49	0.07	45.03	5.03	30.06	-25.03	QP
7	2.063	20.24	19.41	0.08	39.73	-0.27	29.5	-29.77	QP

Result Level = Read Level + Antenna Factor + Cable loss - Preamp Factor



30MHz~1GHz:
Vertical



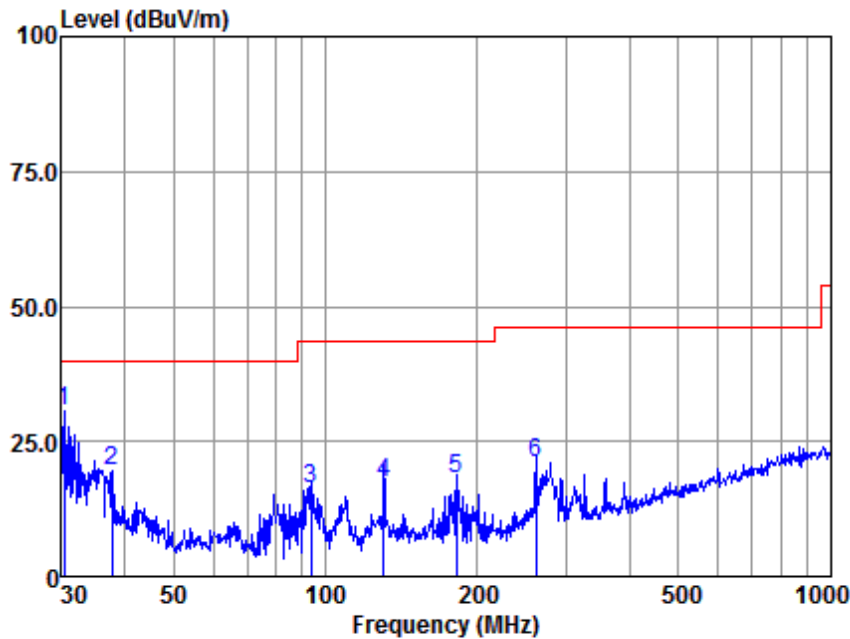
Antenna Polarity :HORIZONTAL
EUT/Project :3074CR
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	86.503	54.58	8.07	0.91	42.28	21.28	40.00	-18.72	QP
2	130.379	48.19	12.71	1.43	42.26	20.07	43.50	-23.43	QP
3	274.194	49.17	12.34	2.21	42.11	21.61	46.00	-24.39	QP
4	307.831	47.22	13.38	2.68	42.08	21.20	46.00	-24.80	QP
5	625.078	37.70	19.59	3.81	41.69	19.41	46.00	-26.59	QP
6	813.112	38.57	22.02	4.40	41.95	23.04	46.00	-22.96	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



Horizontal



Antenna Polarity :VERTICAL
EUT/Project :3074CR
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	30.317	57.08	15.33	0.45	42.38	30.48	40.00	-9.52	QP
2	37.812	45.40	16.11	0.49	42.34	19.66	40.00	-20.34	QP
3	93.440	49.06	8.61	1.05	42.30	16.42	43.50	-27.08	QP
4	130.379	45.62	12.71	1.43	42.26	17.50	43.50	-26.00	QP
5	181.283	46.90	11.63	1.66	42.20	17.99	43.50	-25.51	QP
6	261.058	48.96	11.90	2.21	42.10	20.97	46.00	-25.03	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



8 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

- End of the Report -