EMC
Measurement and Test Report

For

SYSMAX Innovations Co., Ltd.

Rm 2601-06, Central Tower, NO.5 Xiancun Road, Tianhe District,

Guangzhou, 510623, Guangdong, China

Test Standards:	EN 55015:2013/A1:2015 EN 61547:2009
Product Description:	LED Flashlight
Tested Model:	EF1
Report No.:	STR19018057E
Tested Date:	2015-06-18 to 2015-06-24
Issued Date:	2019-01-09
Tested By:	Mark Chen / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager

Prepared By:

Shenzhen SEM Test Technology Co., Ltd.
1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C.（518101）
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

Note: This test report is limited to the above client company and the product model only. Part of the test data is cited the early report, Report Numbers is STR15068146E. It may not be duplicated without prior permitted by Shenzhen SEM Test Technology Co., Ltd

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1.GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	SYSMAX Innovations Co., Ltd.
Address of applicant:	Rm 2601-06, Central Tower, NO.5 Xiancun Road, Tianhe District, Guangzhou, 510623, Guangdong, China
Manufacturer:	SYSMAX Innovations Co., Ltd.
Address of manufacturer:	Rm 2601-06, Central Tower, NO.5 Xiancun Road, Tianhe District, Guangzhou, 510623, Guangdong, China

General Description of EUT	
Product Name:	LED Flashlight
Trade Name:	NITECORE
Model No.:	EF1
Adding Model(s):	EF1GT
Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model EF1, but the circuit and the electronic construction do not change, declared by the manufacturer. *Part of the test data is cited the early report, Report Numbers is STR17048186E.*	

Technical Characteristics of EUT	
Rated Output Voltage:	DC 3.7V
Rated Output Current:	3.2A
Rated Output Power:	10W
Power Adaptor Model:	/

1.2 Test Standards

The following report is prepared on behalf of the SYSMAX Innovations Co., Ltd. in accordance with EN55015, Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment, and EN61000-3-2, Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase), and EN61000-3-3, Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection, and EN61547, Equipment for general lighting purposes - EMC immunity requirements.

The objective of the manufacturer is to demonstrate compliance with the standards EN55015, EN61000-3-2, EN61000-3-3, and EN61547 for general lighting purposes equipment.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with the standards EN55015, EN61000-3-2, EN61000-3-3, and EN61547 for general lighting purposes equipment, and all related testing and measurement techniques intentional standards.

1.4 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

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1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
TM1	Lighting	/

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.6 Performance Criteria for EMS

All the test data has been collected, reduced, and analyzed within this report in accordance with Immunity requires the following as specific performance criteria:

A. The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance level may be specified by the manufacturer as a permissible loss of performance.

B. The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is permitted.

C. Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2016-06-04	2017-06-03
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-04	2017-06-03
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2016-06-04	2017-06-03
SEMT-1011	Trilog Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-04	2017-06-03
SEMT-1068	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-333	2016-06-04	2017-06-03
SEMT-1042	Horn Antenna	ETS	3117	00086197	2016-06-04	2017-06-03
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2016-06-04	2017-06-03
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2016-06-04	2017-06-03
SEMT-1066	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2016-06-04	2017-06-03
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2016-06-04	2017-06-03
SEMT-1003	AC LISN	Schwarz beck	NSLK8126	8126-224	2016-06-04	2017-06-03
SEMT-1060	DC LISN	Schwarz beck	NNBM8126D	279	2016-06-04	2017-06-03
SEMT-1061	DC LISN	Schwarz beck	NNBM8126D	280	2016-06-04	2017-06-03
SEMT-1085	8-WIRE LISN	Schwarz beck	8158	CAT3-8158-0059	2016-06-04	2017-06-03
SEMT-1086	8-WIRE LISN	Schwarz beck	8158	CAT5-8158-0117	2016-06-04	2017-06-03
SEMT-1005	Clamp	Schwarz beck	MDS21	3809	2016-06-04	2017-06-03
SEMT-1014	Loop Antenna	EVERFINE	LLA-2	711001	2016-06-04	2017-06-03
SEMT-1071	VDH Test Head	AFJ	VDH 30	SC022Z	2016-06-04	2017-06-03
SEMT-1056	Digital Power Analyzer	California Instrument	CTS	72831	2016-06-04	2017-06-03
SEMT-1057	Power Source	California Instrument	5001IX-CTS-400	25965	2016-06-04	2017-06-03
SEMT-1027	ESD Generator	TESQ AG	NSG 437	161	2016-06-04	2017-06-03
SEMT-1055	Signal Generator	HP	8648A	3642U01277	2016-06-04	2017-06-03
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
SEMT-1067	Amplifier	Agilent	8447D	2944A10179	2016-06-04	2017-06-03
SEMT-1024	Transient 2000	EMC PARTNER	TRA2000	863	2016-06-04	2017-06-03
SEMT-1045	CS Immunity Tester	EMTEST	CWS500	0900-03	2016-06-04	2017-06-03

2. SUMMARY OF TEST RESULTS

Standards	Description of Test Item	Result
EN55015	Disturbance Voltages	N/A
	Radiated Electromagnetic Disturbances (Frequency range 9kHz to 30MHz)	Compliant
	Radiated Electromagnetic Disturbances (Frequency range 30MHz to 300MHz)	Compliant
EN61000-3-2	Harmonic Current Emission	N/A
EN61000-3-3	Voltage Fluctuation And Flicker	N/A
EN61547	Electrostatic Discharge Immunity in accordance with IEC 61000-4-2	Compliant
	Radio-Frequency Electromagnetic Field Immunity in accordance with IEC 61000-4-3	Compliant
	Electrical Fast Transient/Burst Immunity in accordance with IEC 61000-4-4	N/A
	Surges Immunity in accordance with IEC 61000-4-5	N/A
	Injected Currents Immunity in accordance with IEC 61000-4-6	N/A
	Power-frequency Magnetic Field Immunity in accordance with IEC 61000-4-8	N/A
	Voltage Dips/Interruptions Immunity in accordance with IEC 61000-4-11	N/A

N/A: not applicable

3. Radiated Electromagnetic Disturbances (9kHz to 30MHz)

3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 3.6 dB.

3.2 Test Procedure

Test is conducted under the description of EN 55015, According to Clause 4.4

3.3 Test Result

Testing according to limit table 3b and the emissions below 10dB are not report.
Test Result: Pass
Please refer to the plots:

Plot of Electromagnetic Disturbances Test Data

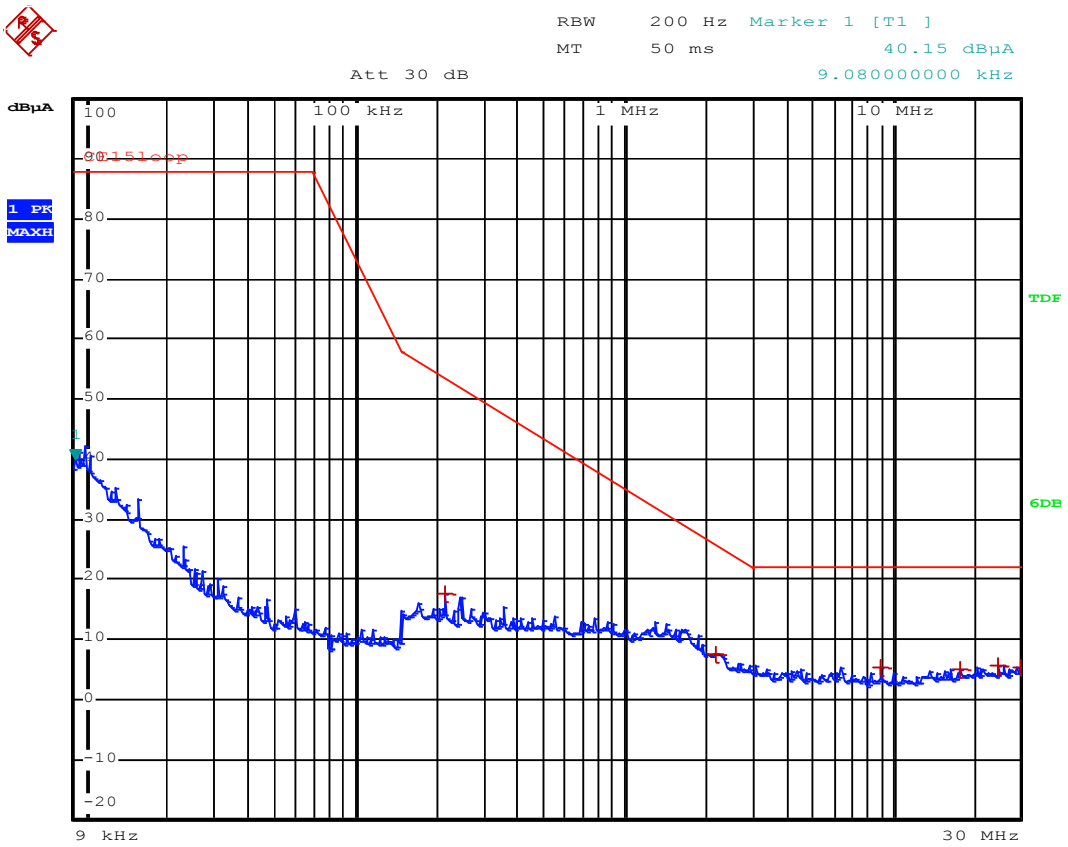
EUT: *LED Flashlight*

Tested Model: *EF1*

Operating Condition: *TM1*

Comment: *DC 3.7V*

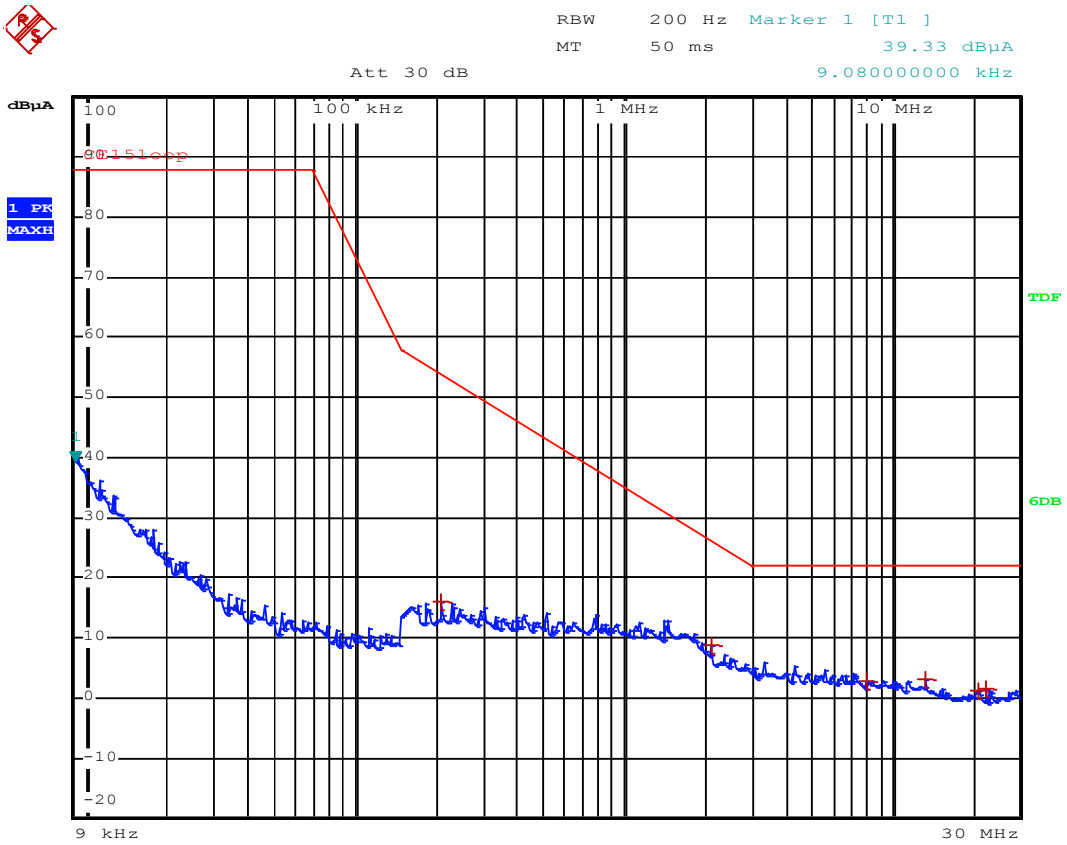
Test Specification: *X*



EDIT PEAK LIST (Prescan Results)

Trace1:	CE15loop		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµA	DELTA LIMIT dB
1 Max Peak	214 kHz	17.67	-36.06
1 Max Peak	2.21 MHz	7.71	-17.95
1 Max Peak	8.998 MHz	5.36	-16.63
1 Max Peak	17.802 MHz	5.18	-16.81
1 Max Peak	24.786 MHz	5.68	-16.31
1 Max Peak	29.778 MHz	5.49	-16.50

Test Specification: *Y*

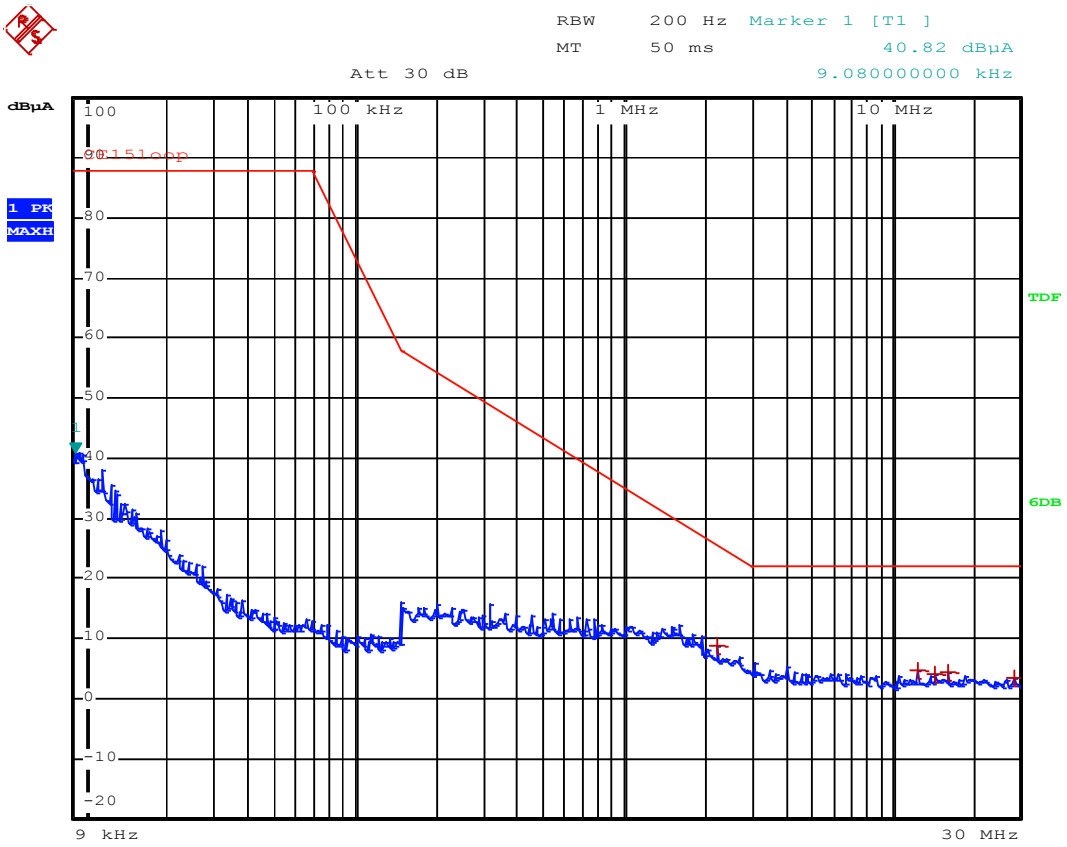


EDIT PEAK LIST (Prescan Results)

Trace1:	CE15loop
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµA	DELTA LIMIT dB
1 Max Peak	206 kHz	15.95	-38.23
1 Max Peak	2.122 MHz	8.80	-17.35
1 Max Peak	8.006 MHz	2.97	-19.02
1 Max Peak	13.366 MHz	3.22	-18.77
1 Max Peak	21.026 MHz	1.38	-20.61
1 Max Peak	22.438 MHz	1.45	-20.54

Test Specification: *Z*



EDIT PEAK LIST (Prescan Results)

Trace1:	CE15loop
Trace2:	---
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµA	DELTA LIMIT dB
1 Max Peak	2.25 MHz	8.96	-16.49
1 Max Peak	12.558 MHz	4.79	-17.20
1 Max Peak	14.482 MHz	4.02	-17.98
1 Max Peak	16.078 MHz	4.31	-17.68
1 Max Peak	28.502 MHz	3.60	-18.39

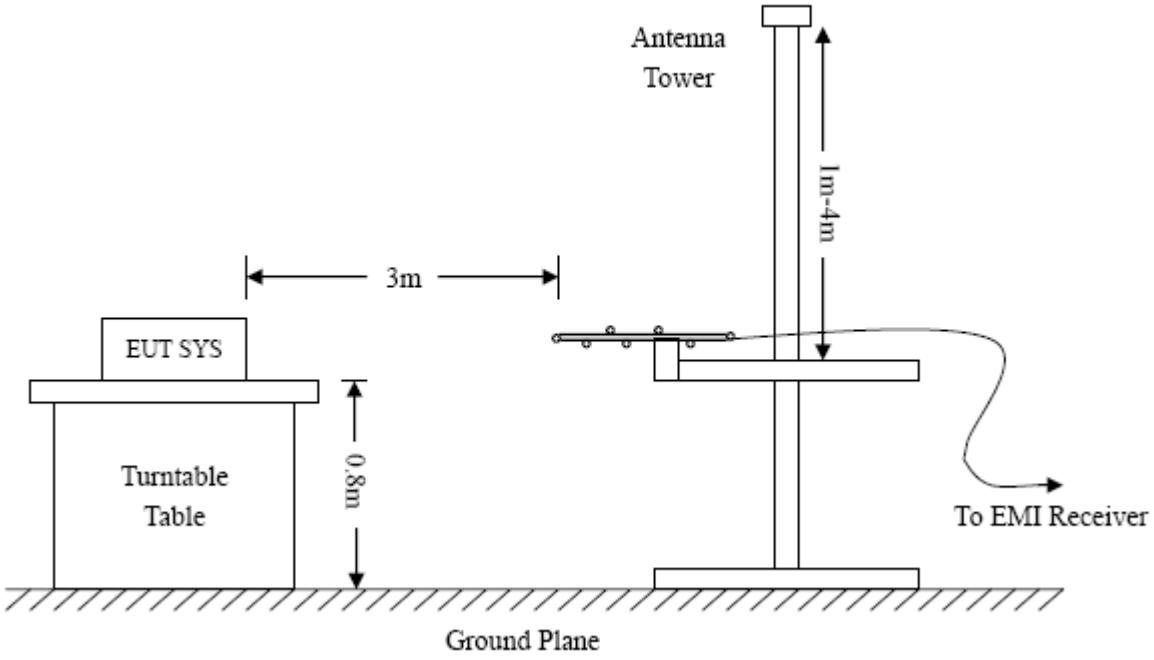
4. Radiated Electromagnetic Disturbances (30MHz to 300MHz)

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 5.10 dB.

4.2 Test Procedure

Test is conducting under the description of EN55015 According to Clause 4.4.2.



4.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for a lighting device. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – EN55015 Limit

4.4 Environmental Conditions

Temperature:	23° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

4.5 Summary of Test Results/Plots

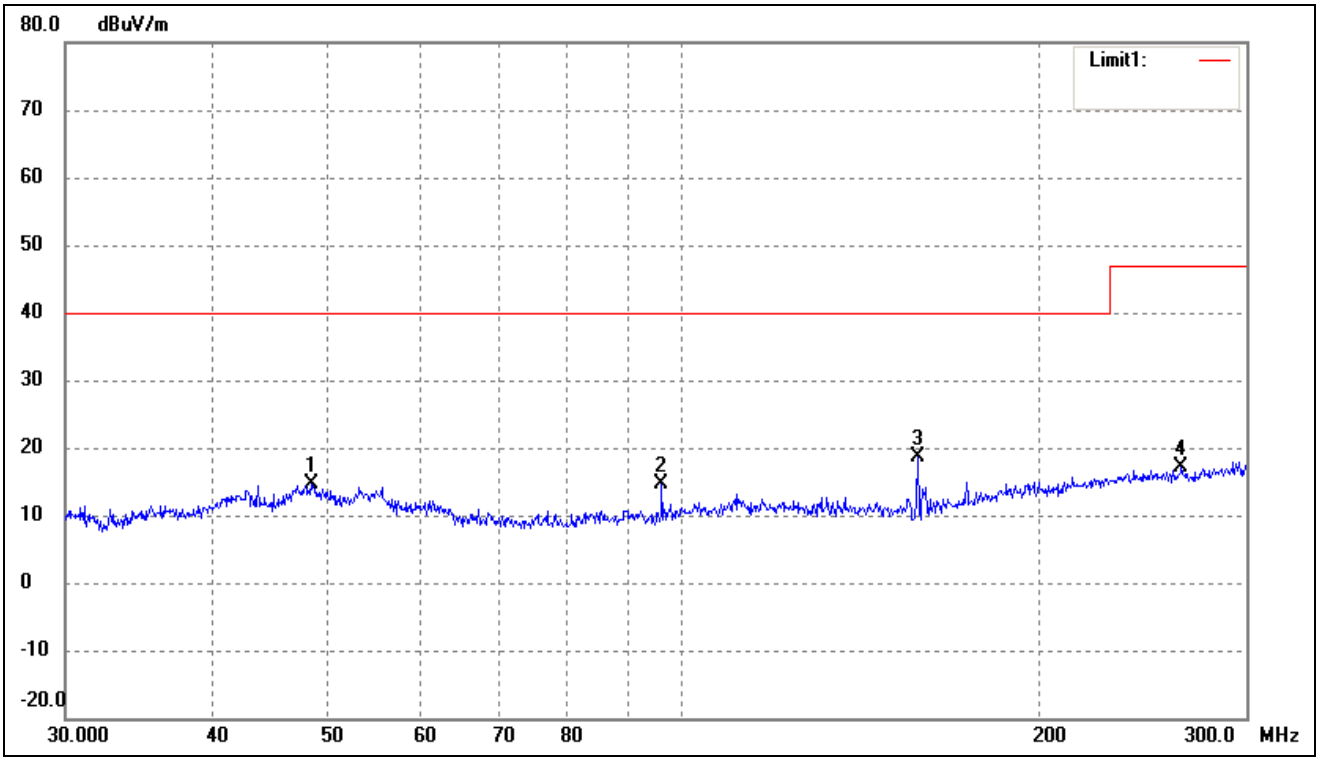
According to the data in section 5.5, the EUT complied with the EN55015 standards, and had the worst margin is:

-15.73 dB at **76.9345 MHz** in the **Vertical** polarization, **30 MHz to 300 MHz, 3Meters**

Plot of Radiated Emissions Test Data

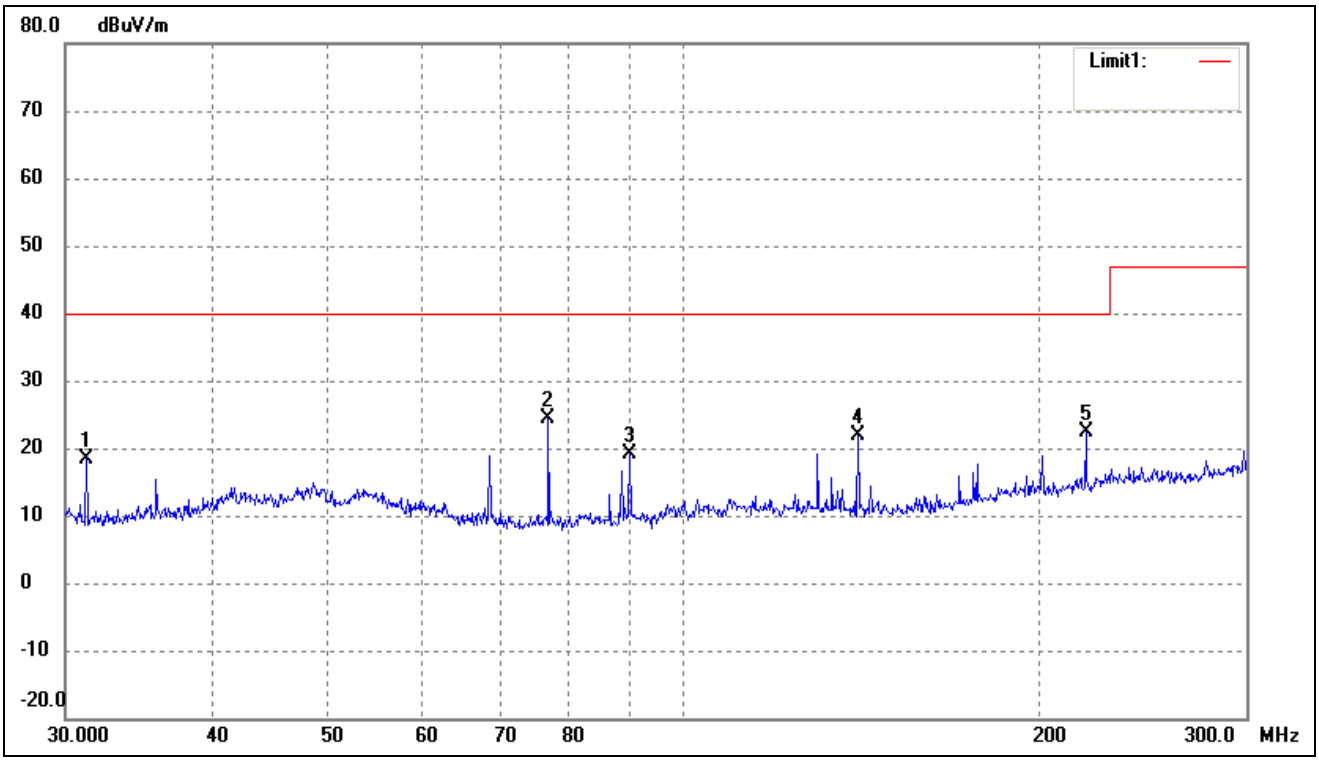
EUT: *LED Flashlight*
Tested Model: *EF1*
Operating Condition: *TM1*
Comment: *DC 3.7V*

Test Specification: *Horizontal*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	48.4308	23.13	-8.59	14.54	40.00	-25.46	124	100	peak
2	95.9669	26.25	-11.53	14.72	40.00	-25.28	149	100	peak
3	158.1690	29.21	-10.65	18.56	40.00	-21.44	166	100	peak
4	264.3147	23.29	-6.07	17.22	47.00	-29.78	174	100	peak

Test Specification: *Vertical*



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	31.2695	29.46	-11.12	18.34	40.00	-21.66	114	100	peak
2	76.9345	36.62	-12.35	24.27	40.00	-15.73	149	100	peak
3	90.1823	31.06	-12.00	19.06	40.00	-20.94	166	100	peak
4	140.6440	32.66	-10.89	21.77	40.00	-18.23	174	100	peak
5	219.3417	29.61	-7.34	22.27	40.00	-17.73	201	100	peak

5. Electrostatic Discharge Immunity (ESD)

5.1 Test Procedure

Test is conducting under the description of IEC61000-4-2.

Test Performance

Performance Criterion: B

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

5.2 Electrostatic Discharge Immunity Test Data

Table 1: Electrostatic Discharge Immunity (Air Discharge)

EN 61000-4-2	Test Levels (kV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
Surface	A	A	A	A	A	A	A	A	/	/
Button	B	B	B	B	B	B	B	B	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

EN 61000-4-2	Test Levels (kV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
/	/	/	/	/	/	/	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

EN 61000-4-2	Test Levels (kV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
Front Side	A	A	A	A	/	/	/	/	/	/
Top Side	A	A	A	A	/	/	/	/	/	/
Back Side	A	A	A	A	/	/	/	/	/	/
Left Side	A	A	A	A	/	/	/	/	/	/
Right Side	A	A	A	A	/	/	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

EN 61000-4-2	Test Levels (kV)									
Test Points	-2	+2	-4	+4	-6	+6	-8	+8	-15	+15
Front Side	A	A	A	A	/	/	/	/	/	/
Top Side	A	A	A	A	/	/	/	/	/	/
Back Side	A	A	A	A	/	/	/	/	/	/
Left Side	A	A	A	A	/	/	/	/	/	/
Right Side	A	A	A	A	/	/	/	/	/	/

Test Result: Pass

6. Radio-Frequency Electromagnetic Fields (R/S)

6.1 Test Procedure

Test is conducting under the description of IEC61000-4-3.

Test Performance

Performance Criterion: A

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1010 mbar

6.2 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental
Dwell time: 1 second
Modulation: AM by 1kHz sine wave with 80% modulation depth

Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	3	A	A	A	A	A	A	A	A

Test Result: Pass

EXHIBIT 1 - PRODUCT LABELING

Proposed CE Label Format

NITECORE
Model: EF1
Brand: Nitecore
Importer Name: XXX
Importer Address: XXX
SYSMAX Innovations Co., Ltd.
Rm 2601-06, Central Tower, NO.5 Xiancun Road, Tianhe District, Guangzhou, 510623, Guangdong, China

Specifications: Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The 'CE' marking must be affixed to the EUT or to its data plate. Where this is not possible or not warranted on account of the nature of the apparatus, it must be affixed to the packaging, if any, and to the accompanying documents. The 'CE' marking is allowed less than 5 mm but must clear. If the 'CE' marking is reduced or enlarged the proportions given in the above graduated drawing must be respected. The Importer name, address and Manufacturer name and address should indicate on marking label or packaging or in a document accompanying

Proposed Label Location on EUT

CE Label Location

EXHIBIT 2 - EUT PHOTOGRAPHS

EUT View 1

EUT View 2

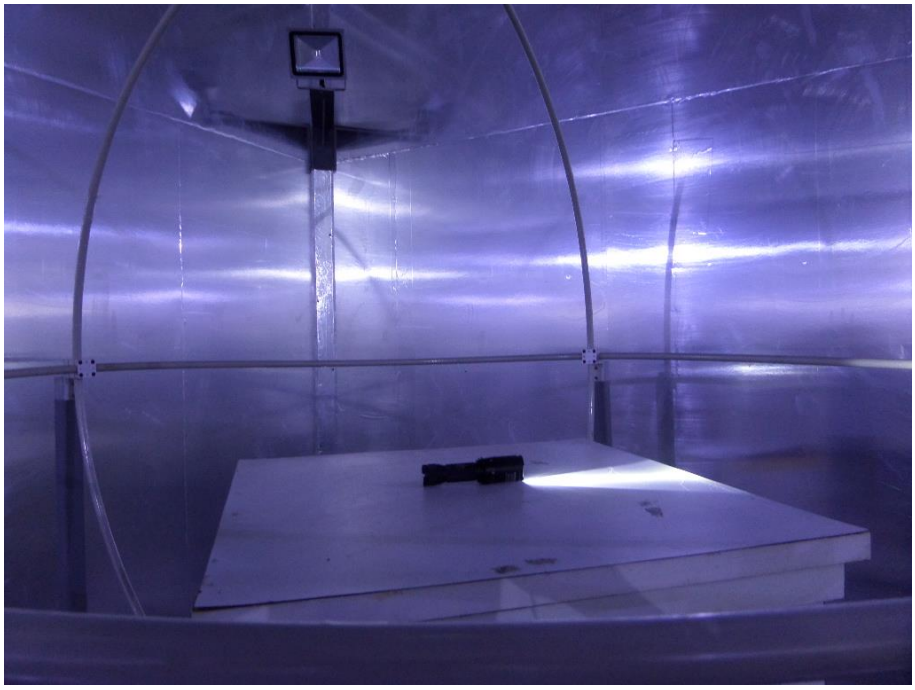
EUT View 3

EUT View 4

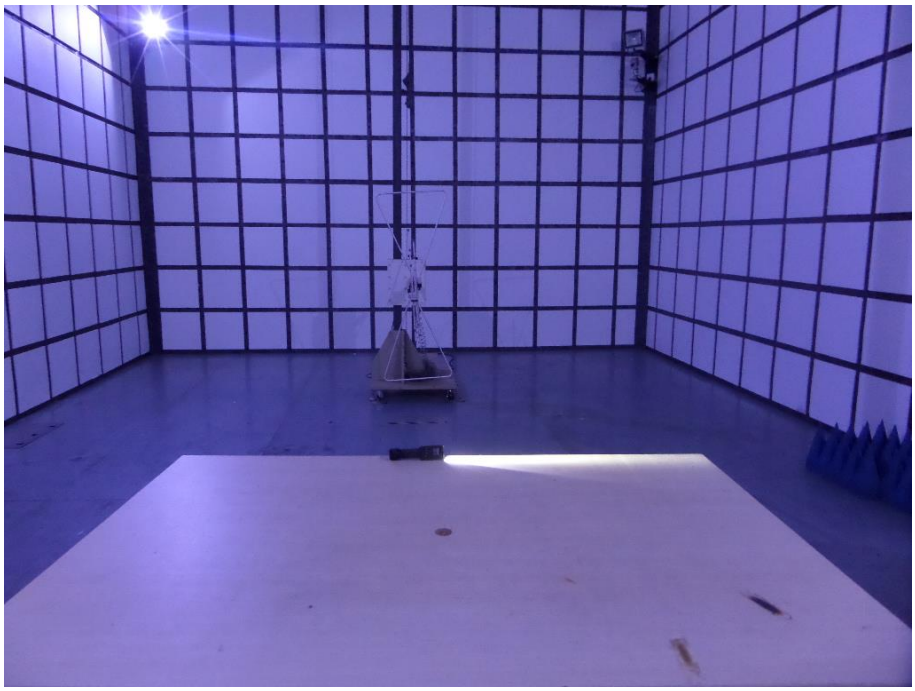
EUT Housing and Board View 1

EXHIBIT 3 - TEST SETUP PHOTOGRAPHS

Radiation Emission Test View (9kHz to 30MHz)

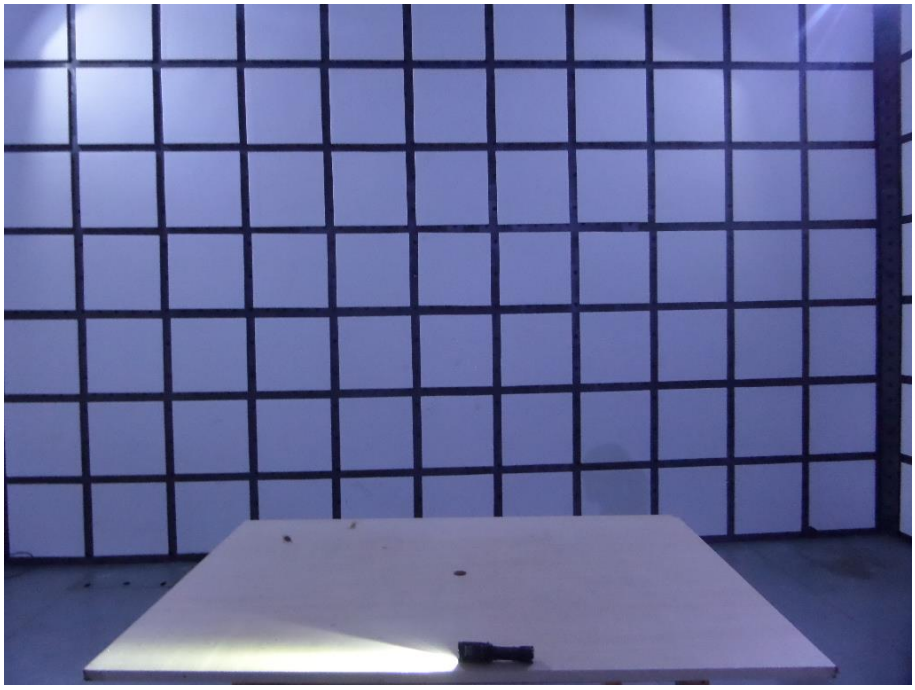


Radiation Emission Test View (30MHz to 300MHz)



IEC61000-4-2 Test View

IEC61000-4-3 Test View



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