

EMC TEST REPORT

FOR

IDS TACTICAL SOLUTIONS LTD

Product Name: Flashlight

Model No: TFL01

Prepared by : IDS TACTICAL SOLUTIONS LTD
Address : 61 Hameysdim St. Kfar-Ahim, 79805 Israel

Report No : REEMC220714077GRE
Date of Receiver : July 14, 2022
Number of tested samples : 1
Date of Test : July 14, 2022–July 20, 2022
Date of Report : July 20, 2022

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	Flashlight
Trade Name	N/A
Model	TFL01
Supplementary Model(s)	ORL01, MRL01, MRL02, MRL03, MMTL01, MMT02, MMT03, TFL01, TRL02, OSL02, OSL04, OML01, OML02, OML03, ZOL01, ZOL02, ZOL03, ZOL04, ZOL05, ZOL06, ZOL07, RSP01, RSP02, RSP06
Test Voltage	DC 5V
Rating	Input: DC 5V
Manufacturer	GUANGZHOU KENWEI ELECTRONIC TECHNOLOGY CO.,LTD
Address	No. 6, Second Lane, Jiucun South Street, Xiyi Village, Luopu Street, Panyu District, Guangzhou, China, 510000
Test Standards	EN IEC 55015:2019/A11:2020 EN 61547:2009 EN IEC 61000-3-2:2019/A1:2021 EN 61000-3-3:2013/A2:2021
Test Result	PASS
Test Engineer	
Reviewed By	

1.2. Test Standards

Pass Indicates that the test is applicable
 N/A Indicates that the test is not applicable

Standard	Test Items	Status
EN IEC 55015:2019/A11:2020	Disturbance Voltage at The Mains Terminals (150KHz To 30MHz)	Pass
	Radiated Disturbances (30MHz To 300MHz)	Pass
	Magnetic Emission (9KHz To 30MHz)	Pass
EN IEC 61000-3-2:2019/A1:2021	Harmonic Current	N/A
EN 61000-3-3:2013/A2:2021	Voltage Fluctuations	N/A
EN 61000-4-2:2009	Electrostatic discharge Immunity	Pass
EN IEC 61000-4-3:2020	Radiated Susceptibility (80MHz to 1GHz)	Pass
EN 61000-4-4:2012	Electrostatic Fast Transient/Burst Immunity	N/A
EN 61000-4-5:2014/A1:2017	Surge Immunity	N/A
EN 61000-4-6:2014/AC:2015	Conducted Susceptibility (150KHz to 80MHz)	N/A
EN 61000-4-8:2010	Power Frequency Magnetic Field Immunity (50/60Hz)	Pass
EN IEC 61000-4-11:2020	Voltage Dips Short Interruptions Immunity Tests	N/A

1.3. Test Methodology

All measurements contained in this report were conducted with CISPR 16-1, radio disturbance and immunity measuring apparatus, and CISPR16-2, Method of measurement of disturbances and immunity.

All measurement required was performed at laboratory of GUANGZHOU KENWEI ELECTRONIC TECHNOLOGY CO.,LTD, at No. 6, Second Lane, Jiucun South Street, Xiyi Village, Luopu Street, Panyu District, Guangzhou, China

1.4. Test Facility

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

The facility complies with the radiated and AC line conducted test site criteria set forth in CISPR 16-1, CISPR16-2.

2. MEASURING DEVICE AND TEST EQUIPMENT

2.1. For Power Line Conducted Emission

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	Test Receiver	Rohde & Schwarz	ESCI TEST RECEIVER	ID:1164.6607K03-10210 9-MH	Dec. 27, 2021
2	L.I.S.N	Rohde & Schwarz	ESH3-Z5.831.5518 .52	9561-G071	Dec. 27, 2021
3	50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A
4	Pulse Limiter	SCHWARZ BECK	VTSD 9561-F Pulse limiter 10dB Ateennator	561-G071	Dec. 27, 2021
5	Cable	SCHWARZ BECK	N/A	N/A	Dec. 27, 2021

2.2. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	Test Receiver	Rohde & Schwarz	ESCI TEST RECEIVER	ID:1164.6607K03-10210 9-MH	Dec. 27, 2021
2	Bilog Antenna	Sunol Sciences	Model JB6 Antenna	A090414	Dec. 27, 2021
3	HF Antenna	Sunol Sciences	Model DRH-118	A091114	N/A
4	50Ω Coaxial Switch	Anritsu	MP59B	M20531	Dec. 27, 2021
5	control	Positioning Controller	Model MF-7802	MF780208362	Dec. 27, 2021
6	Cable(LF)	SCHWARZ BECK	N/A	N/A	Dec. 27, 2021
7	Cable(HF)	SCHWARZ BECK	N/A	N/A	Dec. 27, 2021
8	Amplifier (LF)	SCHWARZ BECK	BBV9743	9743-151	Dec. 27, 2021
9	Amplifier(HF)	SCHWARZ BECK	BBV9718	9718-282	Dec. 27, 2021

2.3. For Harmonic Current / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	Harmonic Current / Flicker Measurement	SCHAFFNER	AC 2000A	20812	Dec. 27, 2021

2.4. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	ESD Tester	PRIMA	61002AG	PR14042705	Dec. 27, 2021

2.5. For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	Signal Generator	HP	8648A	3625U00573	Dec. 27, 2021
2	Amplifier	AR	500A100	17034	NCR
3	Amplifier	AR	100W/1000M	17028	NCR
4	Isotropic Field Monitor	AR	FM2000	16829	NCR
5	Isotropic Field Probe	AR	FP2000	16755	Dec. 27, 2021
6	Biconic Antenna	EMCO	3108	9507-2534	NCR
7	Log-periodic Antenna	AR	AT1080	16812	NCR
8	PC	N/A	486DX2	N/A	N/A

2.6. For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	Burst Tester	HTEC	HEFT 51	144303	Dec. 27, 2021
2	Coupling Clamp	HTEC	IP-4A	147147	Dec. 27, 2021

2.7. For Surge Immunity Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	Surge Tester	Prima	ESD61002AG	PR14042705	Dec. 27, 2021

2.8. For Injected Current Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	Simulator	EMTEST	CWS500C	0900-12	Dec. 27, 2021
2	CDN	EMTEST	CDN-M2	5100100100	Dec. 27, 2021
3	CDN	EMTEST	CDN-M3	0900-11	Dec. 27, 2021
4	Injection CLamp	EMTEST	F-2031-23MM	368	Dec. 27, 2021
5	Attenuator	EMTEST	ATT6	0010222A	Dec. 27, 2021

2.9. For Magnetic Field Immunity Test

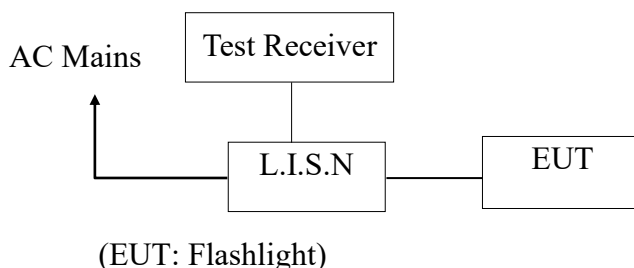
Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	Magnetic Field Tester	HTEC	HPFM T	144301	Dec. 27, 2021

2.10. For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1	Dips Tester	HTEC	HPFS	144304	Dec. 27, 2021

3. POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1. Block Diagram of Test Setup



3.2. Measuring Standard

EN IEC 55015:2019/A11:2020

Power Line Conducted Emission Limits

Frequency (MHz)	Limit (dB μ V)	
	Quasi-Peak Level	Average Level
0.009 ~ 0.05	110	-
0.05 ~ 0.15	90.0~80.0*	-
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

3.3. EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN55015 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN55015 regulations during conducted emission measurement.

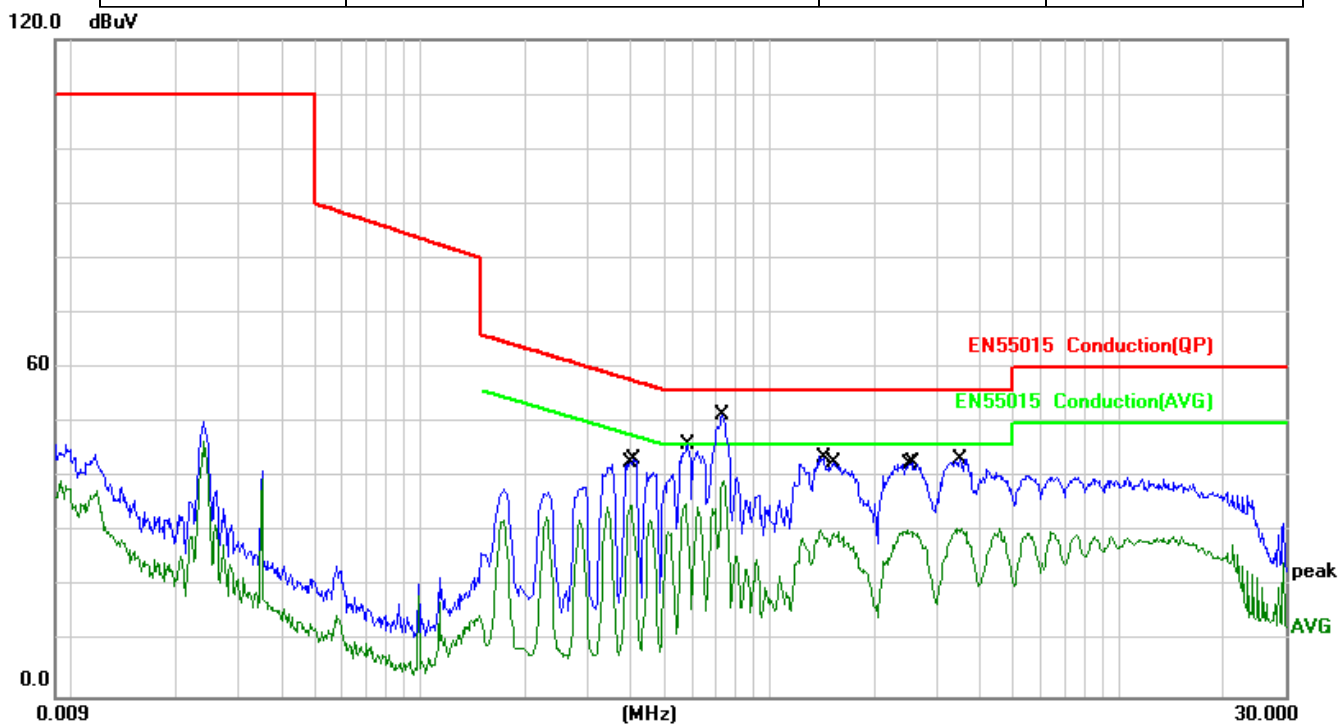
The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9KHz in 150KHz~30MHz and 200Hz in 9KHz~150KHz.

The frequency range from 9kHz to 30MHz is investigated .

Conduction Uncertainty: $U_c = \pm 2.72$ dB

Conducted Emission

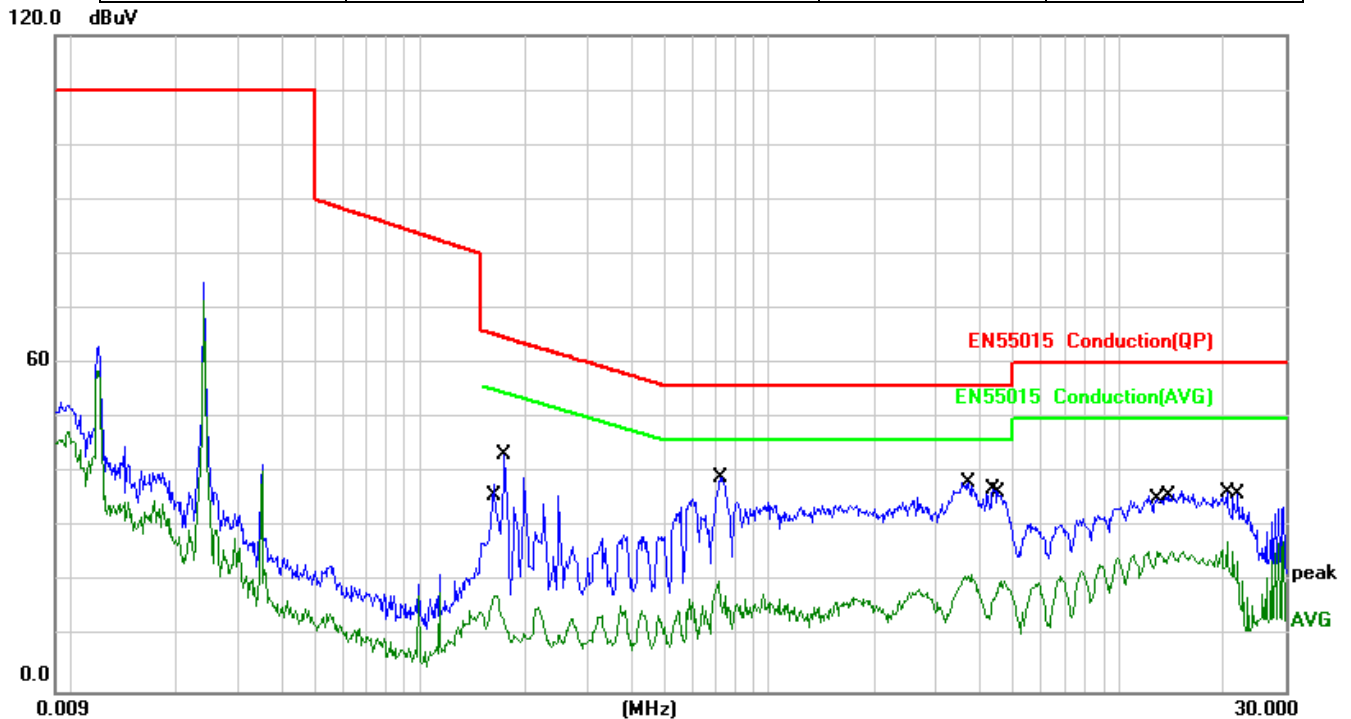
EUT	:	Flashlight	Temperature:	20°C
M/N	:	TFL01	Humidity	: 50%
Test Voltage	:	DC 5V	Test Mode	: On
Test Engineer	:	Bill	Phase	: L-Line



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.3980	25.18	9.87	35.05	47.89	-12.84	AVG	
2		0.4100	33.40	9.87	43.27	57.65	-14.38	QP	
3		0.5740	25.36	9.84	35.20	46.00	-10.80	AVG	
4		0.5860	36.21	9.84	46.05	56.00	-9.95	QP	
5	*	0.7340	41.51	9.82	51.33	56.00	-4.67	QP	
6		0.7380	29.60	9.82	39.42	46.00	-6.58	AVG	
7		1.4060	20.68	9.70	30.38	46.00	-15.62	AVG	
8		1.5260	33.19	9.69	42.88	56.00	-13.12	QP	
9		2.4860	20.88	9.70	30.58	46.00	-15.42	AVG	
10		2.5540	33.02	9.72	42.74	56.00	-13.26	QP	
11		3.5100	33.74	9.69	43.43	56.00	-12.57	QP	
12		3.5380	21.12	9.69	30.81	46.00	-15.19	AVG	

Conducted Emission

EUT	:	Flashlight	Temperature:	20°C
M/N	:	TFL01	Humidity	: 50%
Test Voltage	:	DC 5V	Test Mode	: On
Test Engineer	:	Bill	Phase	: L-Line

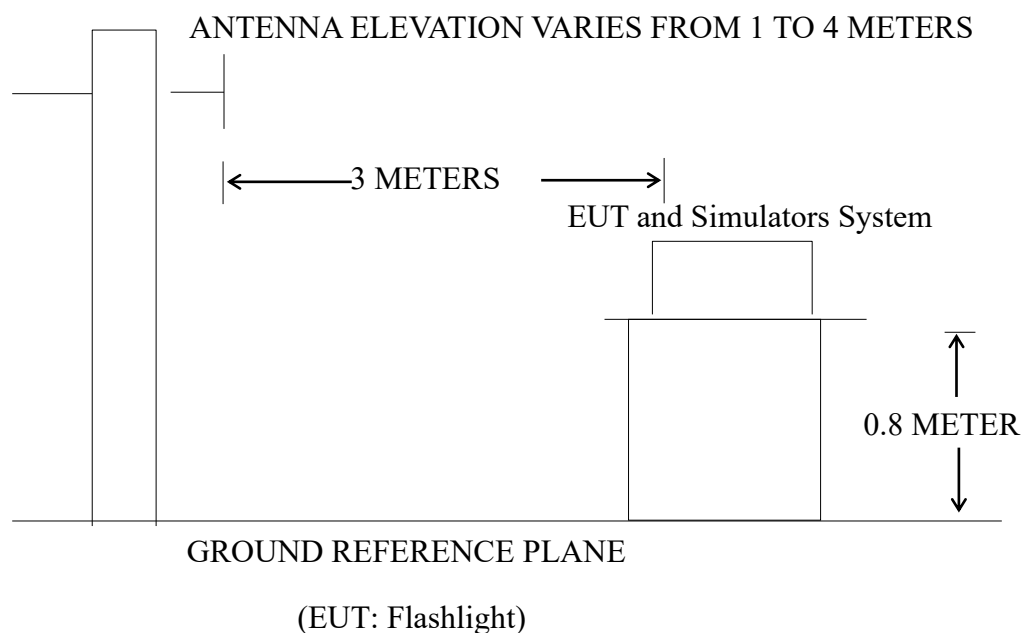


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1660	7.80	9.75	17.55	55.15	-37.60	AVG	
2		0.1740	33.70	9.75	43.45	64.76	-21.31	QP	
3		0.7180	10.36	9.82	20.18	46.00	-25.82	AVG	
4	*	0.7220	29.36	9.82	39.18	56.00	-16.82	QP	
5		3.7140	28.48	9.69	38.17	56.00	-17.83	QP	
6		3.7860	11.70	9.68	21.38	46.00	-24.62	AVG	
7		4.3820	27.34	9.67	37.01	56.00	-18.99	QP	
8		4.5820	10.61	9.67	20.28	46.00	-25.72	AVG	
9		12.8700	15.99	9.76	25.75	50.00	-24.25	AVG	
10		13.9340	26.27	9.71	35.98	60.00	-24.02	QP	
11		20.4340	17.83	9.52	27.35	50.00	-22.65	AVG	
12		21.9500	26.59	9.50	36.09	60.00	-23.91	QP	

4. RADIATED EMISSION MEASUREMENT

4.1. Block Diagram of Test

4.1.1. Block diagram of test setup (In chamber)



4.2. Measuring Standard

EN IEC 55015:2019/A11:2020

Radiated Emission Limits

Including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
30 ~ 230	3	40
230 ~ 300	3	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

4.3. EUT Configuration on Test

The EN55015 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.4. Test Procedure

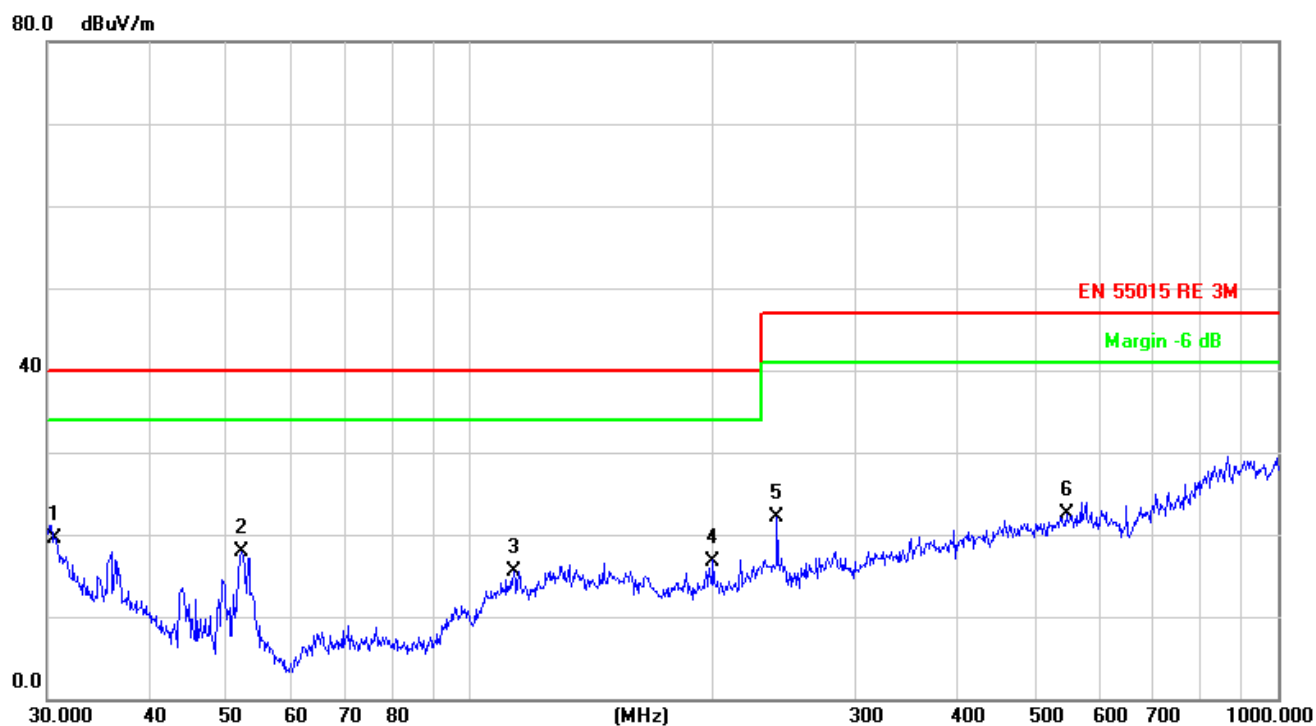
The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

The bandwidth of the Receiver (ESCS30) is set at 120kHz.
The frequency range from 30MHz to 300MHz is investigated.

Radiation Uncertainty: $U_r = \pm 3.84 \text{ dB}$

Radiated Emission Test Data

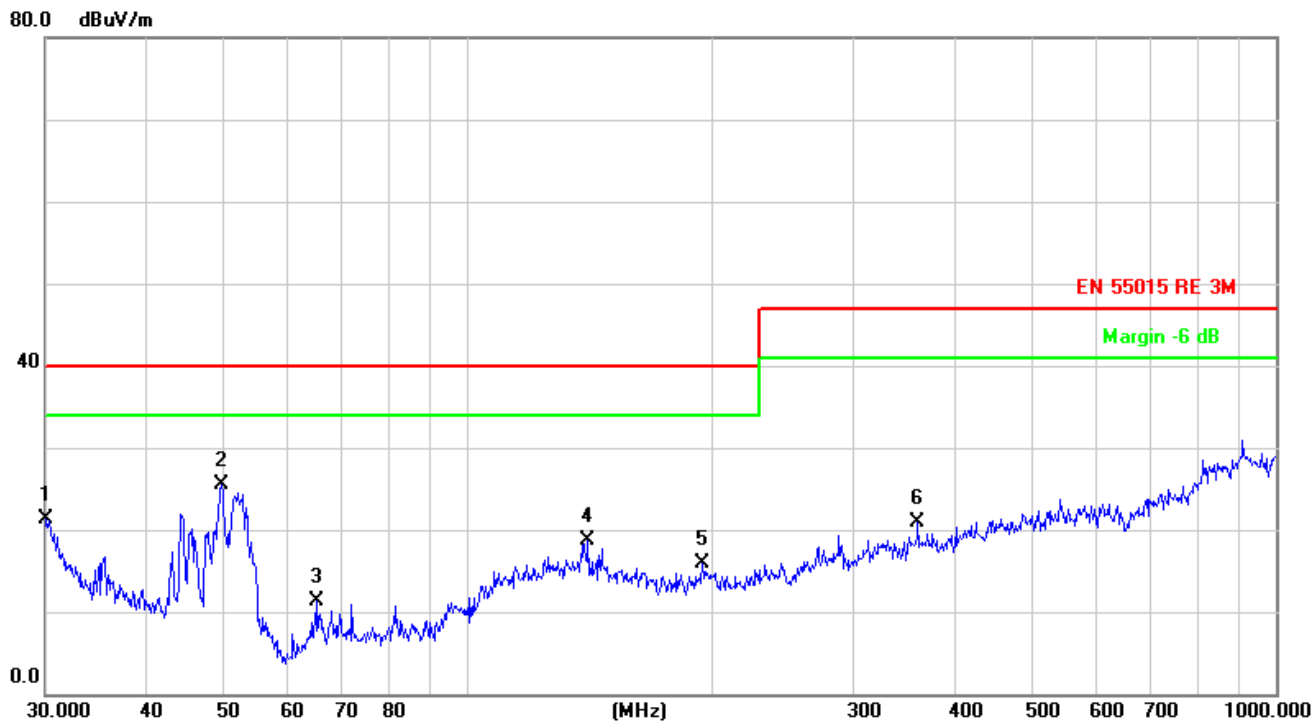
EUT	:	Flashlight	Temperature :	25°C
M/N	:	TFL01	Humidity :	45%
Test Voltage	:	DC 5V	Test Mode :	On
Test Engineer	:	Bill	Polarization :	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	30.6379	19.03	0.46	19.49	40.00	-20.51	QP		
2		52.2079	32.17	-14.19	17.98	40.00	-22.02	QP		
3		113.3163	21.66	-6.17	15.49	40.00	-24.51	QP		
4		199.9856	22.89	-6.09	16.80	40.00	-23.20	QP		
5		239.9874	28.23	-6.06	22.17	47.00	-24.83	QP		
6		547.0977	21.81	0.62	22.43	47.00	-24.57	QP		

Radiated Emission Test Data

EUT	:	Flashlight	Temperature	:	25°C
M/N	:	TFL01	Humidity	:	45%
Test Voltage	:	DC 5V	Test Mode	:	On
Test Engineer	:	Bill	Polarization	:	Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		30.0000	19.65	1.62	21.27	40.00	-18.73	QP		
2	*	49.5328	42.62	-17.19	25.43	40.00	-14.57	QP		
3		65.1145	25.92	-14.54	11.38	40.00	-28.62	QP		
4		140.8351	24.53	-5.85	18.68	40.00	-21.32	QP		
5		195.1365	21.98	-6.10	15.88	40.00	-24.12	QP		
6		360.4476	23.55	-2.73	20.82	47.00	-26.18	QP		

5. MAGNETIC EMISSION DISTURBANCES

5.1 Measurement Uncertainty

The quasi-peak limits of the magnetic component of the radiated disturbance field strength in the frequency range 9 kHz to 30 MHz, measured as a current in 2 m, 3 m or 4 m loop antennas around the Lighting equipment, are given in table 3.

The limits for the 2 m loop diameter apply to equipment not exceeding a length of 1,6 m, those for the 3 m loop diameter for equipment having a length in between 1,6 m and 2,6 m and those for the 4 m loop diameter for equipment having a length in between 2,6 m and 3,6 m.

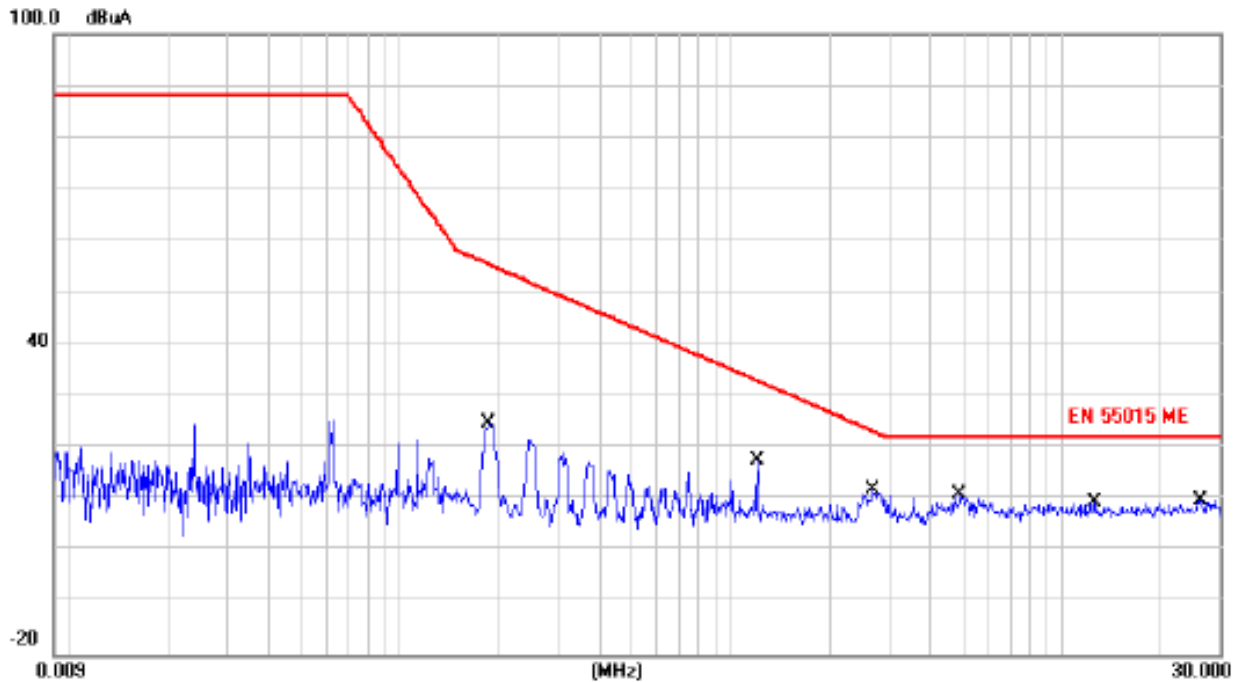
5.2 Limit of Magnetic Emission Disturbances

Table 3a – Radiated disturbance limits in the frequency range 9 kHz to 30 MHz

Frequency range MHz	Limits for loop diameter dB(μA) ^a		
	2 m	3 m	4 m
9 kHz to 70 kHz	88	81	75
70 kHz to 150 kHz	88 to 58 ^b	81 to 51 ^b	75 to 45 ^b
150 kHz to 3,0 MHz	58 to 22 ^b	51 to 15 ^b	45 to 9 ^b
3,0 MHz to 30 MHz	22	15 to 16 ^c	9 to 12 ^c
^a At the transition frequency, the lower limit applies.			
^b Decreasing linearly with the logarithm of the frequency. For electrodeless lamps and luminaires, the limit in the frequency range of 2,2 MHz to 3,0 MHz is 58 dB(μA) for 2 m, 51 dB(μA) for 3 m and 45 dB(μA) for 4 m loop diameter.			
^c Increasing linearly with the logarithm of the frequency.			
NOTE In Japan, the limits for frequencies 9 kHz to 150 kHz do not apply.			

Magnetic Emission Test Data

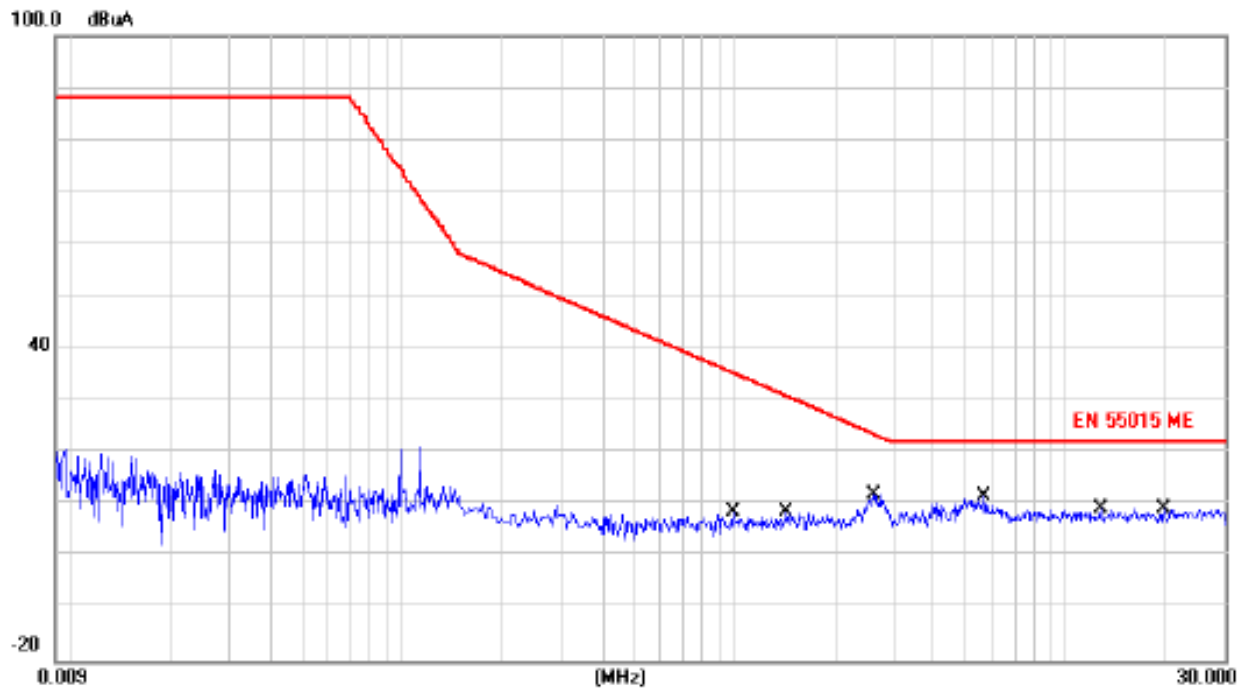
EUT	:	Flashlight	Temperature	:	23°C
M/N	:	TFL01	Humidity	:	48%
Test Voltage	:	DC 5V	Test Mode	:	On
Test Engineer	:	Bill	Comment	:	Loop X



No. Mk.	Freq. MHz	Reading Level dBuA	Correct Factor dB	Measure- ment dBuA	Limit dBuA	Over dB	Detector	Comment
1	0.1860	-11.18	36.00	24.82	55.41	-30.59	QP	
2	1.2059	-18.41	36.00	17.59	32.95	-15.36	QP	
3	2.6900	-24.08	36.00	11.92	23.31	-11.39	QP	
4 *	4.9340	-24.98	36.00	11.02	22.00	-10.98	QP	
5	12.6420	-26.41	36.00	9.59	22.00	-12.41	QP	
6	26.3220	-26.03	36.00	9.97	22.00	-12.03	QP	

Magnetic Emission Test Data

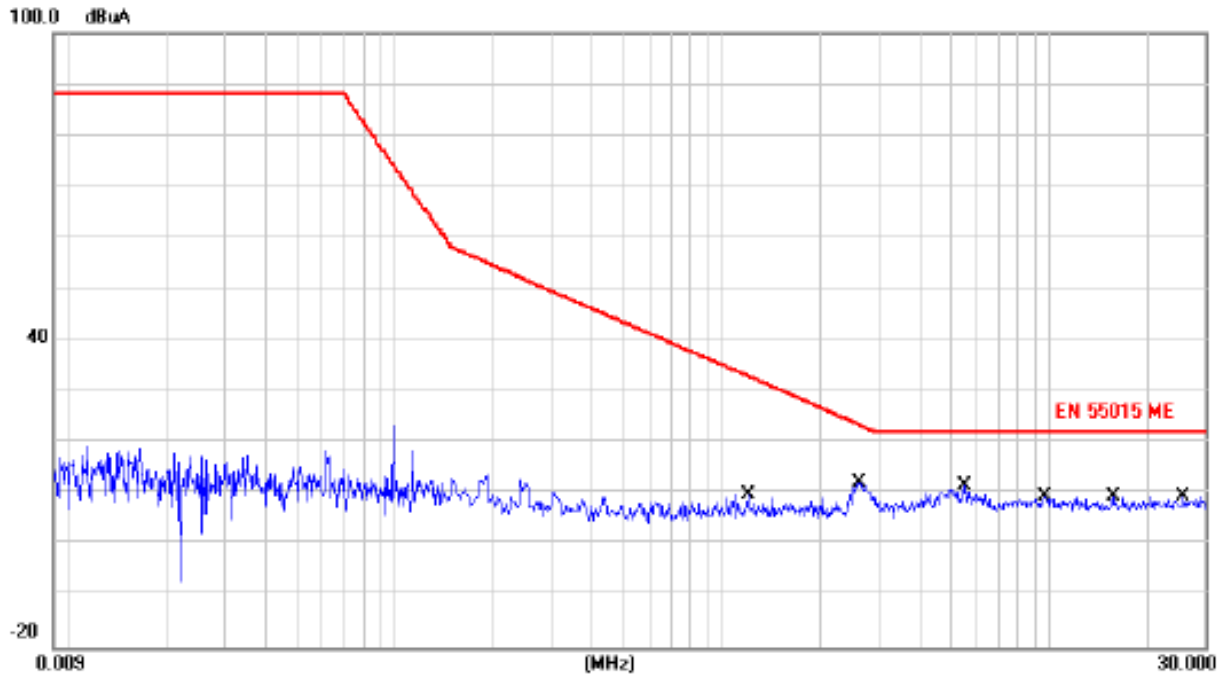
EUT	:	Flashlight	Temperature	:	23°C
M/N	:	TFL01	Humidity	:	48%
Test Voltage	:	DC 5V	Test Mode	:	On
Test Engineer	:	Bill	Comment	:	Loop Y



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
	MHz	dBuA	dB	dBuA	dBuA	dB	Detector	Comment
1	0.9940	-27.49	36.00	8.51	35.27	-26.76	QP	
2	1.4380	-27.43	36.00	8.57	30.83	-22.26	QP	
3	2.6260	-23.96	36.00	12.04	23.60	-11.56	QP	
4 *	5.6579	-24.24	36.00	11.76	22.00	-10.24	QP	
5	12.7820	-26.63	36.00	9.37	22.00	-12.63	QP	
6	19.6259	-26.62	36.00	9.38	22.00	-12.62	QP	

Magnetic Emission Test Data

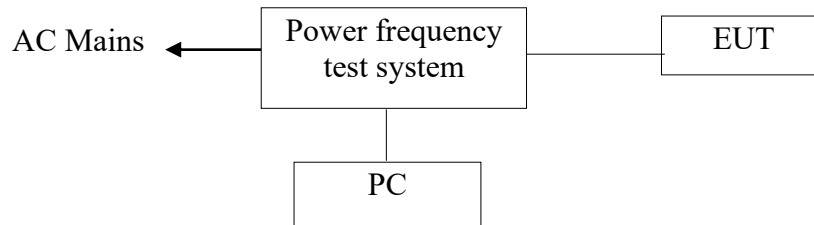
EUT	:	Flashlight	Temperature	:	23°C
M/N	:	TRL01	Humidity	:	48%
Test Voltage	:	DC 5V	Test Mode	:	On
Test Engineer	:	Bill	Comment	:	Loop Z



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
	MHz	dBuA	dB	dBuA	dBuA	dB		
1	1.2059	-26.24	36.00	9.76	32.95	-23.19	QP	
2	2.6300	-23.68	36.00	12.32	23.58	-11.26	QP	
3 *	5.5460	-24.20	36.00	11.80	22.00	-10.20	QP	
4	9.7380	-26.33	36.00	9.67	22.00	-12.33	QP	
5	15.7820	-26.32	36.00	9.68	22.00	-12.32	QP	
6	25.7780	-26.46	36.00	9.54	22.00	-12.46	QP	

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1 Block Diagram of Test Setup



(EUT: Flashlight)

6.2 Measuring Standard

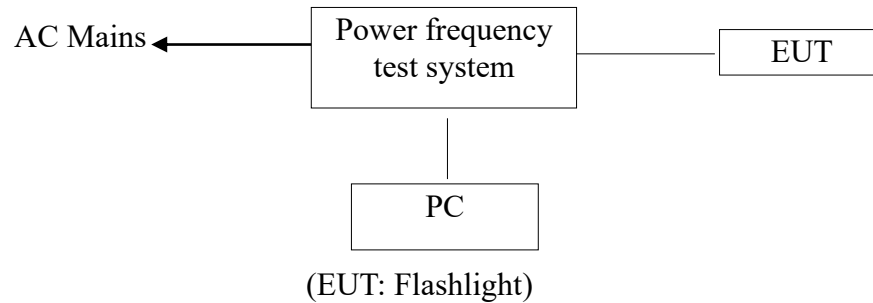
EN IEC 61000-3-2: 2019/A1:2021

6.3 Description of test Equipment

Note: Equipment less than 25W, can not test the harmonic current.

7. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1 Block Diagram of Test Setup



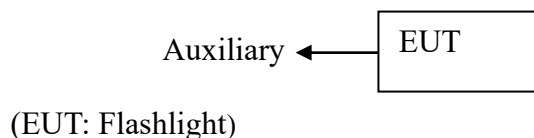
7.2 Measuring Standard

EN 61000-3-3:2013/A2:2021

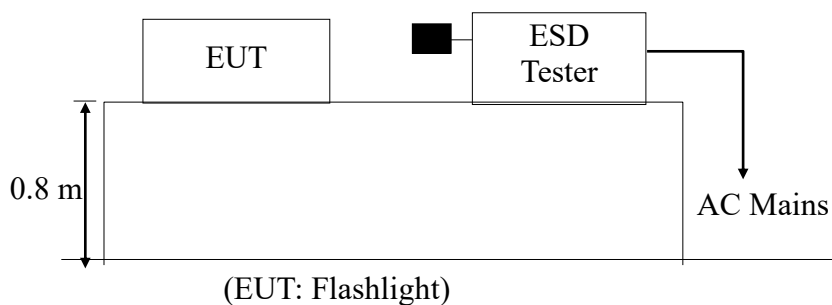
8. ELECTROSTATIC DISCHARGE IMMUNITY TEST

8.1 Block Diagram of Test Setup

8.1.1 Block Diagram of the EUT and the simulators



8.1.2 Block diagram of ESD test setup



8.2 Test Standard

EN 61547:2009 (EN61000-4-2: 2009)

Severity Level: 3 / Air Discharge: $\pm 8\text{KV}$ Level: 2 / Contact Discharge: $\pm 4\text{KV}$

8.3 Severity Levels and Performance Criterion

8.3.1 Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	± 2	± 2
2.	± 4	± 4
3.	± 6	± 8
4.	± 8	± 15
X	Special	Special

8.3.2 Performance criterion: **B**

8.4 Test Procedure

8.4.1 Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

8.4.2 Contact Discharge:

All the procedure shall be same as Section 7.4.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

8.4.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

8.4.4 Indirect discharge for vertical coupling plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

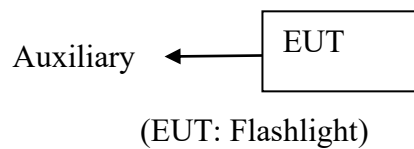
Electrostatic Discharge Test Result

EUT :	Flashlight	Temperature :	20°C
M/N :	TFL01	Humidity :	50%
Test Voltage :	DC 5V	Test Mode :	On
Test Engineer :	Bill	Test Date :	2022-06-23
Air Discharge: $\pm$ 8KV # For each point positive 10 times and negative 10 times discharge.			
Contact Discharge: $\pm$ 4KV # For each point positive 10 times and negative 10 times discharge.			
Location	Discharge Points	Kind A-Air Discharge C-Contact Discharge	Result
HCP	4 Points	C	PASS
VCP	4 Points	C	PASS
Shell	20 Points	C	PASS
Slots	5 Points	A	PASS
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
/	/	/	/
Note: (The Criterion) A:Normal performance within the specification limits; B:Temporary degradation or less of function or performance which is self-recoverable; C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;		Test Equipment :ESD Tester Model: ESD61002A	

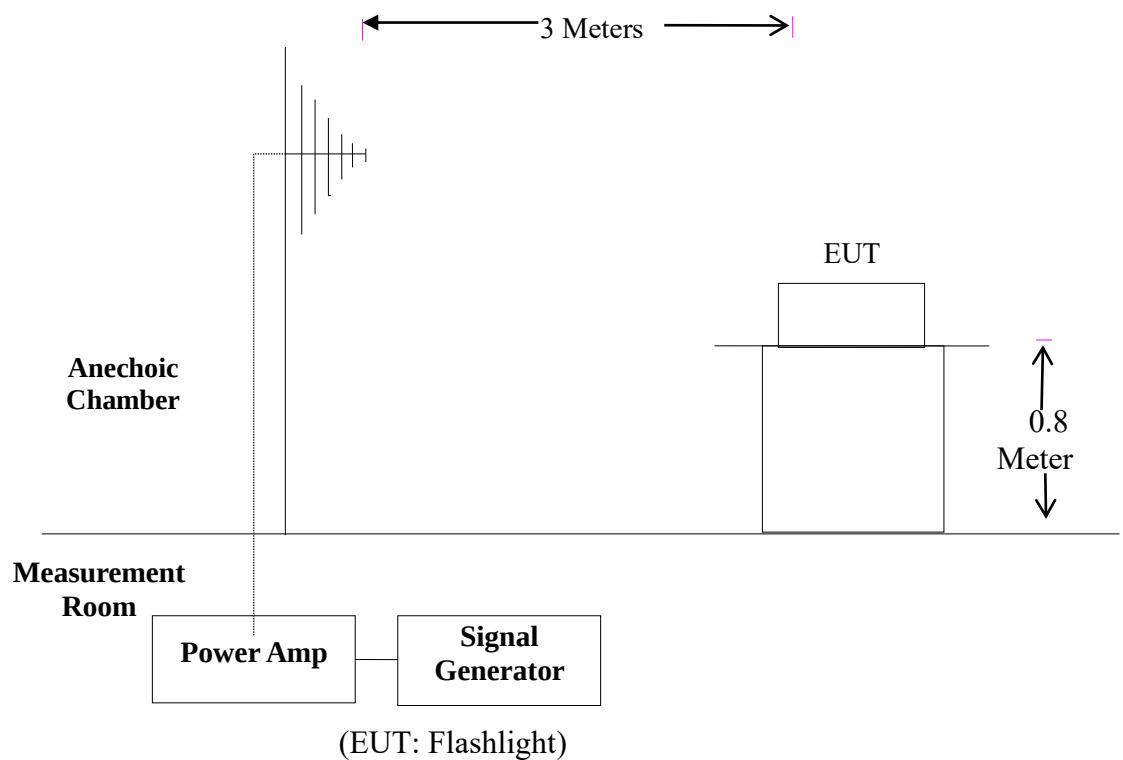
9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

9.1 Block Diagram of Test

9.1.1 Block diagram of connection between the EUT and Load



9.1.2 Block diagram of RS test setup



9.2 Test Standard

EN 61547:2009 (EN IEC 61000-4-3: 2020 (Severity Level: 2, 3V / m))

9.3 Severity Levels and Performance Criterion

9.3.1 Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

9.3.2 Performance Criterion : A

9.4 Test Procedure

The EUT are placed on a table which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor its screen. All the scanning conditions are as following:

Condition of Test	Remark
-----	-----
1. Fielded Strength	3V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80-1000MHz
4. Sweep time of radiated	0.0015 Decade/s
2. Dwell Time	1 Sec.

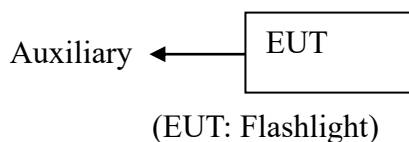
RF Field Strength Susceptibility Test Results

EUT :	Flashlight	Temperature :	22°C
M/N :	TFL01	Humidity :	50 %
Test Voltage :	DC 5V	Test Mode :	On
Field Strength :	3 V/m	Test Date :	2022-06-23
Test Engineer:	Bill	Frequency Range:	80 MHz to 1000 MHz
Modulation:	☐ None	☐ Pulse	☒ AM 1KHz 80%
	Frequency Rang 1: 80~ 1000MHz	Frequency Rang 2:	
Steps	1	/	%
	Horizontal	Vertical	Horizontal
Front	PASS	PASS	/
Right	PASS	PASS	/
Rear	PASS	PASS	/
Left	PASS	PASS	/
Test Equipment : 1. Signal Generator : 2031 (MARCONI) 2. Power Amplifier : 500A100 & 100W/1000M1 (A&R) 3. Power Antenna : 3108 (EMCO) & AT1080 (A&R) 4. Field Monitor : FM2000 (A&R)			
Note: Note: (The Criterion) A: Normal performance within the specification limits; B: Temporary degradation or less of function or performance which is self-recoverable; C: Temporary degradation or loss of function or performance which requires operator intervention or system reset;			

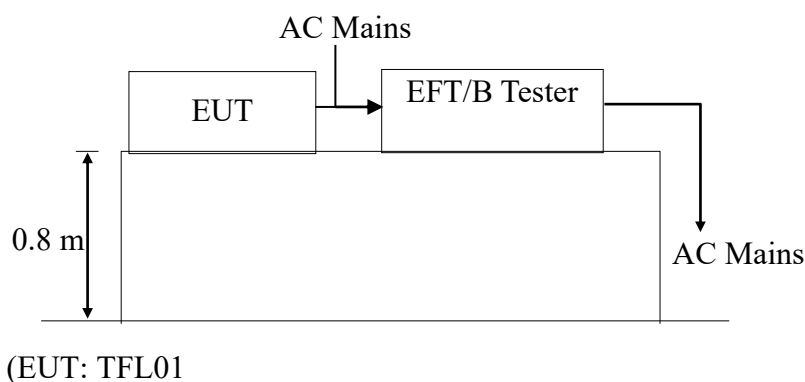
10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1 Block Diagram of Test Setup

10.1.1. Block Diagram of the EUT



10.1.2. EFT Test Setup



10.2 Test Standard

EN 61547:2009 (EN61000-4-4:2012, Severity Level, Level 2: 1KV)

10.3 Severity Levels and Performance Criterion

10.3.1 Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

10.3.2 Performance criterion : B

10.4 Test Procedure

The EUT is put on the table which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.4.1 For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

10.4.2 For signal lines and control lines ports:

No I/O ports. It's unnecessary to test.

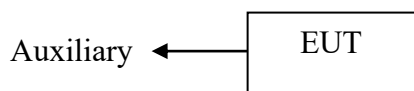
10.4.3 For DC output line ports:

It's unnecessary to test.

11. SURGE IMMUNITY TEST

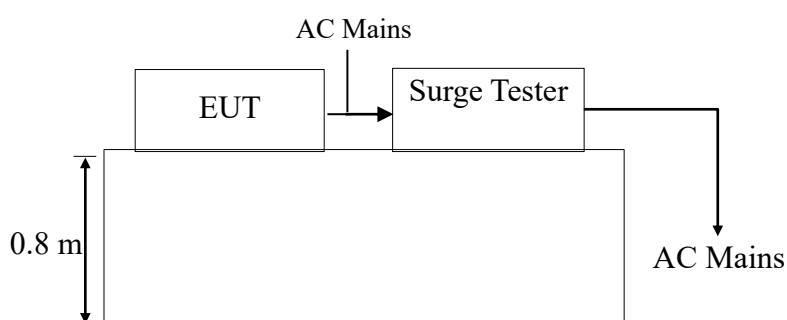
11.1 Block Diagram of Test Setup

11.1.1 Block Diagram of the EUT



(EUT: Flashlight)

11.1.2. Surge Test Setup



(EUT: Flashlight)

11.2 Test Standard

EN 61547:2009 (EN61000-4-5: 2014/A1:2017)

Severity Level: Line to Line: Level 2, 1.0KV

11.3 Severity Levels and Performance Criterion

11.3.1. Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

11.3.2 Performance criterion : C

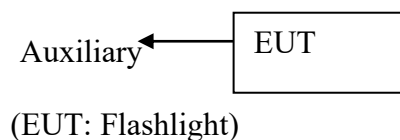
11.4 Test Procedure

- 1) Set up the EUT and test generator as shown on Section 11.1.2.
- 2) For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

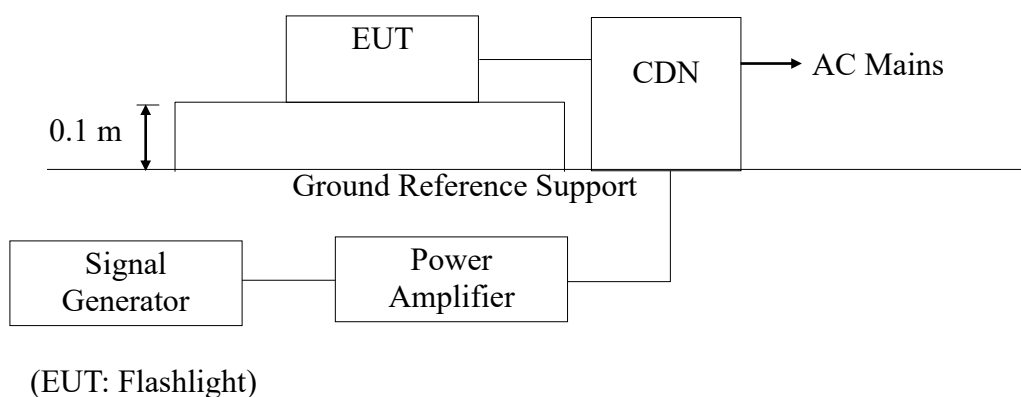
12. INJECTED CURRENTS SUSCEPTIBILITY TEST

12.1 Block Diagram of Test Setup

12.1.1 Block Diagram of the EUT



12.1.2 Block Diagram of Test Setup



12.2 Test Standard

EN 61547:2009 (EN61000-4-6: 2014/AC:2015, Severity Level: Level 2, 3V (rms), (0.15MHz ~ 80MHz)

12.3 Severity Levels and Performance Criterion

12.3.1 Severity level

Level	Field Strength V
1	1
2	3
3	10
X	Special

12.3.2 Performance criterion: A

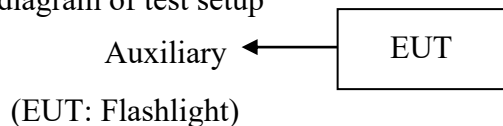
12.4 Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 11.1.2.
- 2) Let the EUT work in test mode and measure it.
- 3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150KHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
- 7) The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

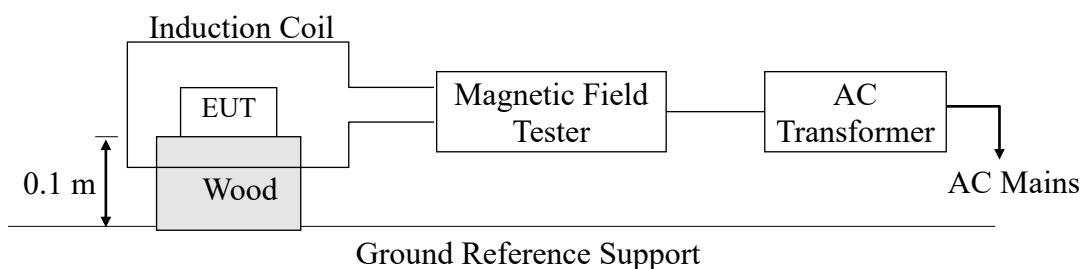
13. MAGNETIC FIELD SUSCEPTIBILITY TEST

13.1 Block Diagram of Test

13.1.1 Block diagram of test setup



13.1.2 Magnetic field test setup



13.2 Test Standard

EN 61547:2009 (EN 61000-4-8: 2010, Severity Level: Level 1, 1A / m)

13.3 Severity Levels and Performance Criterion

13.3.1 Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

13.3.2 Performance Criterion : A

13.4 Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil are set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

Magnetic Field Immunity Test Result

EUT	:	Flashlight	Temperature:	20°C
M/N	:	TFL01	Humidity	: 50%
Test Voltage	:	DC 5V	Test Mode	: On
Test Engineer	:	Bill	Test Date	: 2022-06-23
Test Level (A/M)		Testing Duration	Coil Orientation	Result
3		5 mins	X	Pass
3		5 mins	Y	Pass
3		5 mins	Z	Pass
Test Level (A/M)		Testing Duration	Coil Orientation	Result
/		/	/	/
/		/	/	/
/		/	/	/

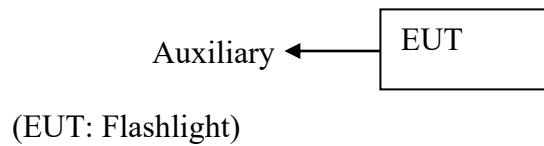
Test Equipment :Magnetic Field Tester Model: HPFMT

Note: (The Criterion)
A:Normal performance within the specification limits;
B:Temporary degradation or less of function or performance which is self-recoverable;
C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;

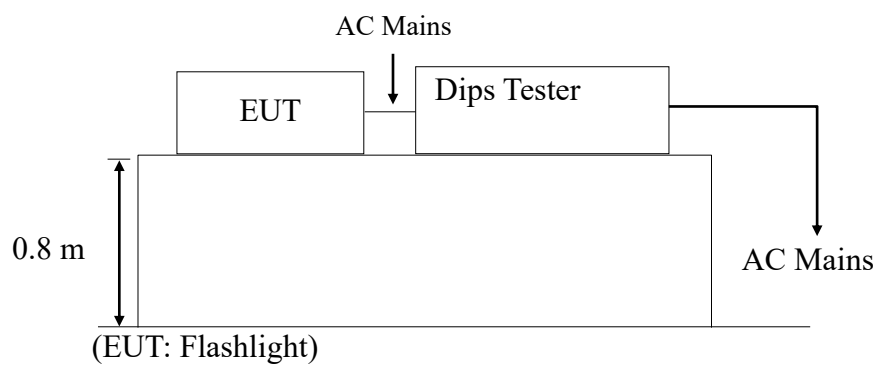
14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1 Block Diagram of Test Setup

14.1.1 Block Diagram of the EUT



14.1.2 Dips Test Setup



14.2 Test Standard

EN 61547:2009 (EN IEC 61000-4-11: 2020)

14.3 Severity Levels and Performance Criterion

14.3.1 Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
70	30	10
0	100	0.5

14.3.2 Performance criterion : **C&B**

14.4 Test Procedure

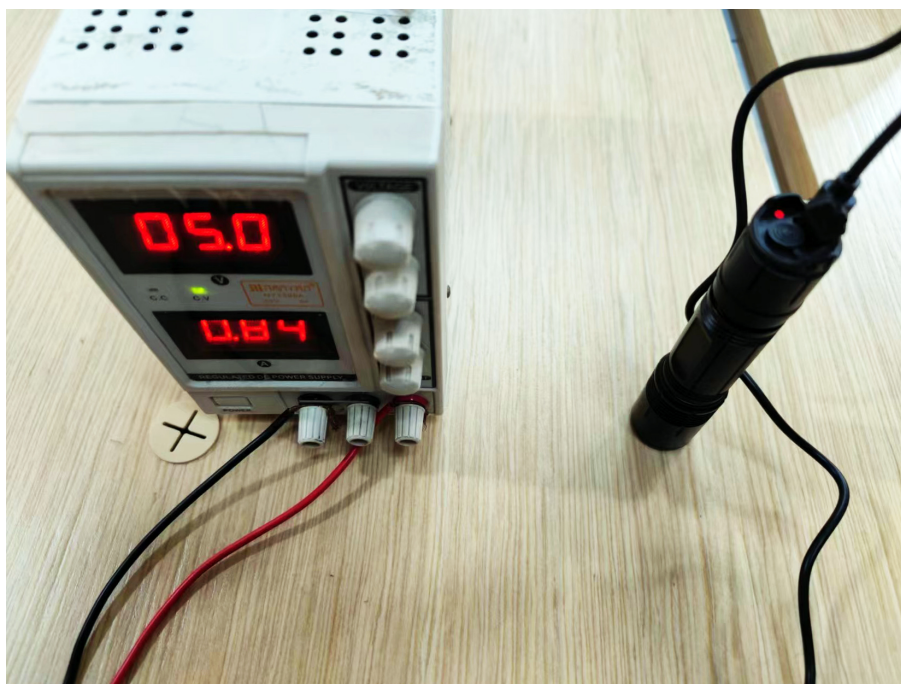
- 1) Set up the EUT and test generator as shown on Section 13.1.2.
- 2) The interruptions is introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

15. PHOTOGRAPH

15.1 Photo of Radiated Emission Measurement



15.2 Photo of Conducted Emission



16. PHOTOGRAPHS OF EUT



Fig.1



Fig.2



Fig.3



Fig.4



Fig.6

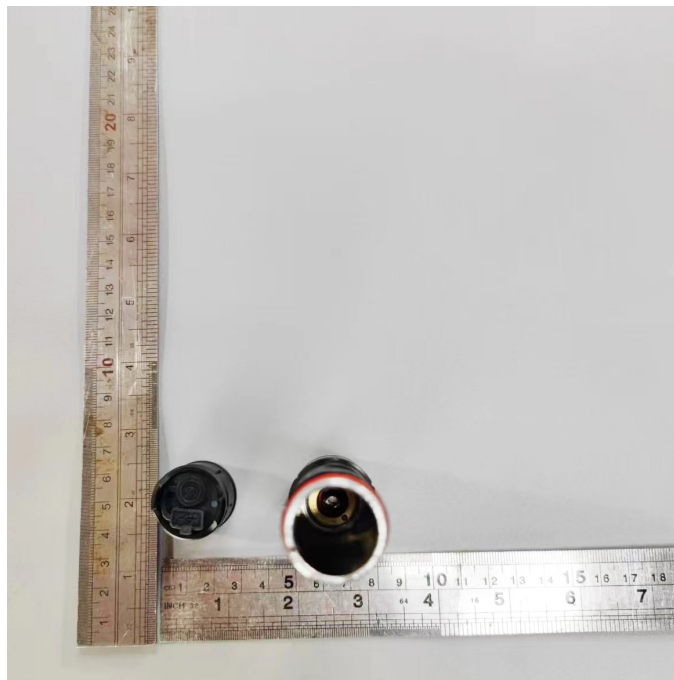


Fig.7



Fig.8

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