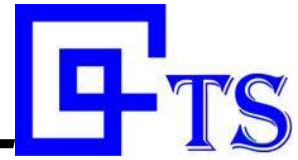


EMC TEST REPORT



Report No. : 61.12.22.0425.01
Applicant : V-TAC EXPORTS LIMITED
Address : ROOM NO 301,KAM ON BUILDING,176A QUEENS ROAD CENTRAL,
CENTRAL,HONG KONG
Manufacturer : V-TAC EXPORTS LIMITED
Address : ROOM NO 301,KAM ON BUILDING,176A QUEENS ROAD CENTRAL,
CENTRAL,HONG KONG
Factory : GUANGDONG COOPER OPTOELECTRONICS INCORPORATED CO.,
LTD.
Address : NO.5 BUILDING 7, NO.27 OF HIGH-TECH EAST ROAD, JIANGHAI
DISTRICT, JIANGMEN CITY, GUANGDONG CHINA
Product Type : LED Strip Light
Model No. : See model list

Standards : EN IEC 55015:2019+A11:2020
EN 61547:2009
EN IEC 61000-3-2:2019+A1:2021
EN 61000-3-3:2013+A1:2019 +A2:2021

Date of Test : 2022-10-24
Date of Issue : 2022-11-04

Test Engineer : Rain Chen

Reviewed By : Crystal Xie



Test Result :	PASS *
----------------------	---------------

* The sample detailed above has been tested to the requirements of Council Directives 2014/30/EU. The test results have been reviewed against the Directives above and found to meet their essential requirement.

Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Electromagnetic Disturbance: 9KHz to 30MHz	EN IEC 55015	EN IEC 55015	Table 3 Column 2	PASS
Radiation Emission, 30MHz to 1000MHz	EN IEC 55015	EN IEC 55015	Table 3b Column 3 & 4	PASS
Electrostatic Discharge (ESD)	EN 61547	IEC 61000-4-2	±4 kV Contact ±8 kV Air	PASS
Radiated Immunity, 80MHz to 1GHz	EN 61547	IEC 61000-4-3	3V/m, 80%, 1kHz, A.M.	PASS

Remark:

The EUT was within the minimum performance (e.g., the EUT made disturbance sound) level set by the applicant.

A.M. Amplitude Modulation.

P.M. Pulse Modulation.

† D.M. – Differential Model

† C.M. – Common Mode

* U_T is the nominal supply voltage

N/A means not applicable.

Contents

Test Summary	2
Contents	3
1 General Information	4
1.1 Client Information	4
1.2 General Description of E.U.T.	4
1.3 Details of E.U.T.	4
1.4 Description of Support Units.....	4
1.5 Test Location	4
1.6 General product information:	4
2 Equipment Used during Test	7
3 Emission Test Results	8
3.1 Radiated Electromagnetic Disturbance: 9 kHz to 30MHz	8
3.1.1 E.U.T. Operation	8
3.1.2 Measurement Data	8
3.1.3 Radiated Electromagnetic Disturbance Test Data	9
3.1.4 Radiated Electromagnetic Disturbance Test Setup Drawing.....	12
3.2 Radiated Emission: 30MHz to 1000MHz	13
3.2.1 Measurement Uncertainty	13
3.2.2 E.U.T. Operation	13
3.2.3 E.U.T. Setup	13
3.2.4 Test procedure.....	13
3.2.5 Corrected Amplitude & Margin Calculation.....	14
3.2.6 Test Results	14
3.2.7 Radiated Emissions Test Data	15
3.2.8 Radiated Emissions Test Setup Drawing	17
4 Immunity Test Results	18
4.1 Performance Criteria Description	18
4.2 ESD	18
4.2.1 E.U.T Operation.....	18
4.2.2 Direct Application Test Results	19
4.2.3 Indirect Application Test Results.....	19
4.2.4 ESD Test Setup Drawing	20
4.3 Radiated Immunity	21
4.3.1 E.U.T Operation.....	21
4.3.2 Test Results	21
4.3.3 Radiated Immunity Test Setup Drawing	22
5 Photographs - Constructional Details	23

1 General Information

1.1 Client Information

Please refer to page 1

1.2 General Description of E.U.T.

Name: LED Strip Light

Model No.: See model list

1.3 Details of E.U.T.

Rating: 12VDC, Class III, ta: 25°C, other see the model list.

1.4 Description of Support Units

The EUT has been tested as an independent unit.

1.5 Test Location

All tests were performed at:

LCTECH Guangdong Testing Services Co., Ltd.

Add.: 1/F., Building I & 2, 3, 4/F., Building II, Technology and Enterprise Development Center,
Guangyuan Road, Xiaolan, Zhongshan, Guangdong, China

1.6 General product information:

These products are Class III low voltage lamp strip.

All models have same structure, only different in power and size. So we choose model
12V-5730-120L-IP20 for full test.

Model list

Model	Input	Rated Power	Length
12V-2835-60L-IP20-3.2W	12VDC	3.2W/m	Max. 5m
12V-2835-60L-IP20	12VDC	4.2W/m	Max. 5m
12V-2835-60L-IP20-5W	12VDC	5W/m	Max. 5m
12V-2835-120L-IP20	12VDC	8W/m	Max. 5m
12V-2835-120L-IP20-10W	12VDC	10W/m	Max. 5m
12V-2835-120L-IP20-12W	12VDC	12W/m	Max. 5m
12V-2835-120L-IP20-14W	12VDC	14W/m	Max. 5m
12V-2835-168L-IP20	12VDC	13W/m	Max. 5m
12V-2835-180L-IP20	12VDC	14W/m	Max. 5m
12V-2835-192L-IP20	12VDC	16W/m	Max. 5m
12V-2835-204L-IP20	12VDC	17W/m	Max. 5m
12V-2835-240L-IP20-17W	12VDC	17W/m	Max. 5m
12V-2835-240L-IP20	12VDC	20W/m	Max. 5m
12V-5050-30L-IP20-RGB	12VDC	4W/m	Max. 5m
12V-5050-30L-IP20	12VDC	6W/m	Max. 5m
12V-5050-60L-IP20-RGB	12VDC	7W/m	Max. 5m
12V-5050-60L-IP20-8W	12VDC	8W/m	Max. 5m
12V-5050-60L-IP20	12VDC	11W/m	Max. 5m
12V-5050-60L-IP20-15W	12VDC	15W/m	Max. 5m
12V-5050-72L-IP20	12VDC	12W/m	Max. 5m
12V-5050-96L-IP20	12VDC	15W/m	Max. 5m
12V-5050-120L-IP20	12VDC	20W/m	Max. 5m
12V-4040-60L-IP20	12VDC	8W/m	Max. 5m
12V-5730-120L-IP20	12VDC	20W/m	Max. 5m
12V-2835-60L-IP65-3.2W	12VDC	3.2W/m	Max. 5m
12V-2835-60L-IP65	12VDC	4.2W/m	Max. 5m
12V-2835-60L-IP65-5W	12VDC	5W/m	Max. 5m
12V-2835-120L-IP65	12VDC	8W/m	Max. 5m
12V-2835-120L-IP65-10W	12VDC	10W/m	Max. 5m
12V-2835-120L-IP65-12W	12VDC	12W/m	Max. 5m
12V-2835-120L-IP65-14W	12VDC	14W/m	Max. 5m
12V-2835-168L-IP65	12VDC	13W/m	Max. 5m
12V-2835-180L-IP65	12VDC	14W/m	Max. 5m
12V-2835-192L-IP65	12VDC	16W/m	Max. 5m
12V-2835-204L-IP65	12VDC	17W/m	Max. 5m
12V-2835-240L-IP65-17W	12VDC	17W/m	Max. 5m
12V-2835-240L-IP65	12VDC	20W/m	Max. 5m
12V-5050-30L-IP65-RGB	12VDC	4W/m	Max. 5m
12V-5050-30L-IP65	12VDC	6W/m	Max. 5m
12V-5050-60L-IP65-RGB	12VDC	7W/m	Max. 5m

12V-5050-60L-IP65-8W	12VDC	8W/m	Max. 5m
12V-5050-60L-IP65	12VDC	11W/m	Max. 5m
12V-5050-60L-IP65-15W	12VDC	15W/m	Max. 5m
12V-5050-72L-IP65	12VDC	12W/m	Max. 5m
12V-5050-96L-IP65	12VDC	15W/m	Max. 5m
12V-5050-120L-IP65	12VDC	20W/m	Max. 5m
12V-4040-60L-IP65	12VDC	8W/m	Max. 5m
12V-5730-120L-IP65	12VDC	20W/m	Max. 5m

2 Equipment Used during Test

Table 1: List of Test and Measurement Equipment

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
Radiated Electromagnetic Disturbance <input checked="" type="checkbox"/>						
1	EMI Test Receiver	Rohde&Schwarz	ESCI	100939	2021-12-14	2022-12-13
2	Triple-loop Antenna	SCHWARZBECK	HXYZ9170	HXYZ9170-1 71	2022-07-11	2023-07-10
Radiated Emission <input checked="" type="checkbox"/>						
3	EMI Test Receiver	R&S	ESCI 7	100965	2021-07-11	2023-07-10
4	Log-periodic Dipole Antenna	Schwarzbeck	VULB 9162	058	2019-07-20	2023-07-19
5	3m Semi-anechoic	Zhongshuo Electronics	9mx6mx6m	N/A	2019-01-02	2023-01-01
6	RF Cable	R&S	R01	10403	2021-12-14	2022-12-13
7	CDNE	KeHuan	KH3663E	36630822	2021-07-11	2023-07-10
Electrostatic Discharge(ESD) <input checked="" type="checkbox"/>						
8	ESD Simulator	TESEQ AG	NSG 437	268	2021-07-11	2023-07-10
Radiated Susceptibility <input checked="" type="checkbox"/>						
9	Signal generator	R&S	SMB 100A	102710	2021-12-14	2022-12-13
10	Power amplifier	BONN Elektronik	BLWA 0810-160/100D	149644	2021-12-14	2022-12-13
11	Isotropic Field Probe	Narda	EP-601	511WX30620	2021-12-14	2022-12-13
12	Log-periodic Antenna	SCHWARZBECK	STLP 9128D	078	2021-12-14	2022-12-13
13	Power Meter	FEANKONIA	PMS 1084	108B1289	2021-12-14	2022-12-13

: Not Used

: Used

3 Emission Test Results

3.1 Radiated Electromagnetic Disturbance: 9 kHz to 30MHz

Test Requirement :	EN IEC 55015
Test Method :	EN IEC 55015
Test Date :	2022-10-24
Frequency Range:	9KHz to 30MHz
Class/Severity:	Table 4 of EN IEC 55015
Detector:	Peak for pre-scan (120kHz resolution bandwidth) Quasi-Peak & average if pre-scan peak within 15dB of average limit.

3.1.1 E.U.T. Operation

Temperature:	24.5°C
Humidity:	52.6 % RH
Atmospheric Pressure:	1002 mbar

EUT Operation:
Compliance test was performed in ON mode.

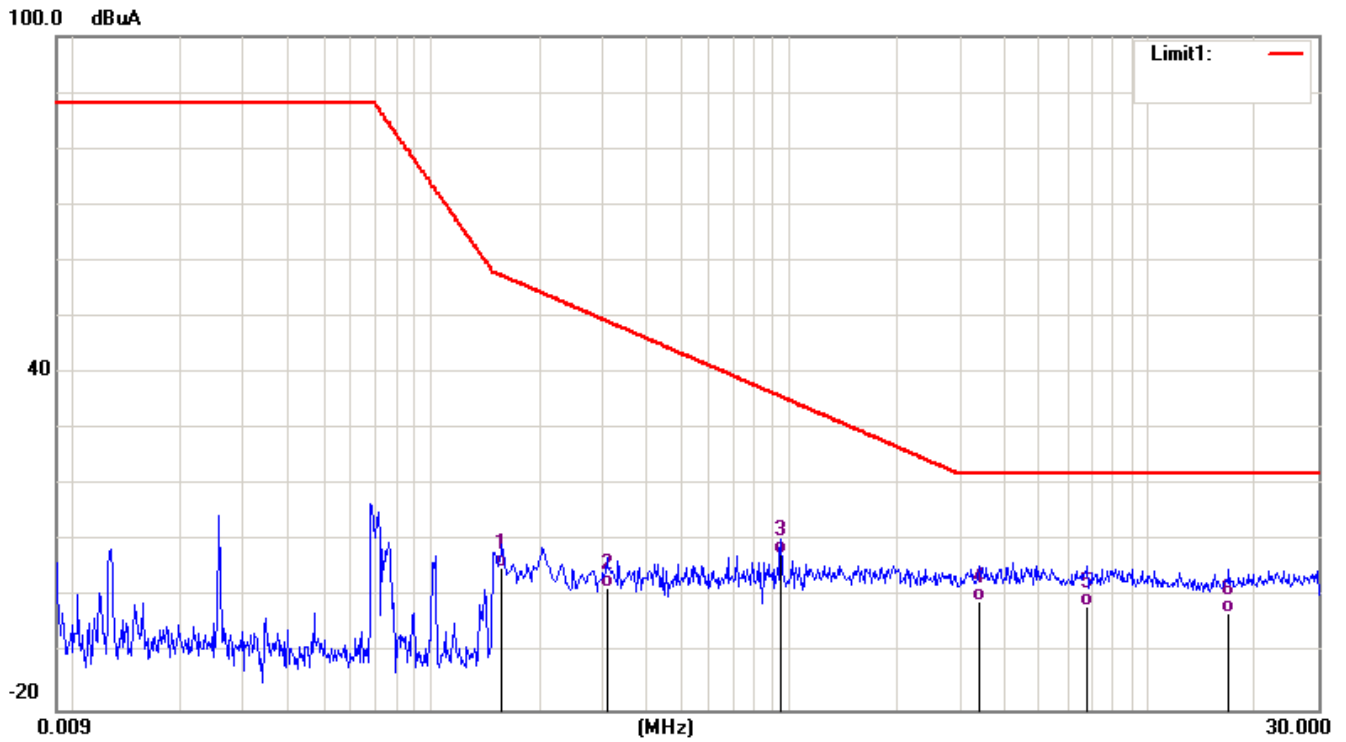
3.1.2 Measurement Data

Please refer to the following peak scan graph for reference.

3.1.3 Radiated Electromagnetic Disturbance Test Data

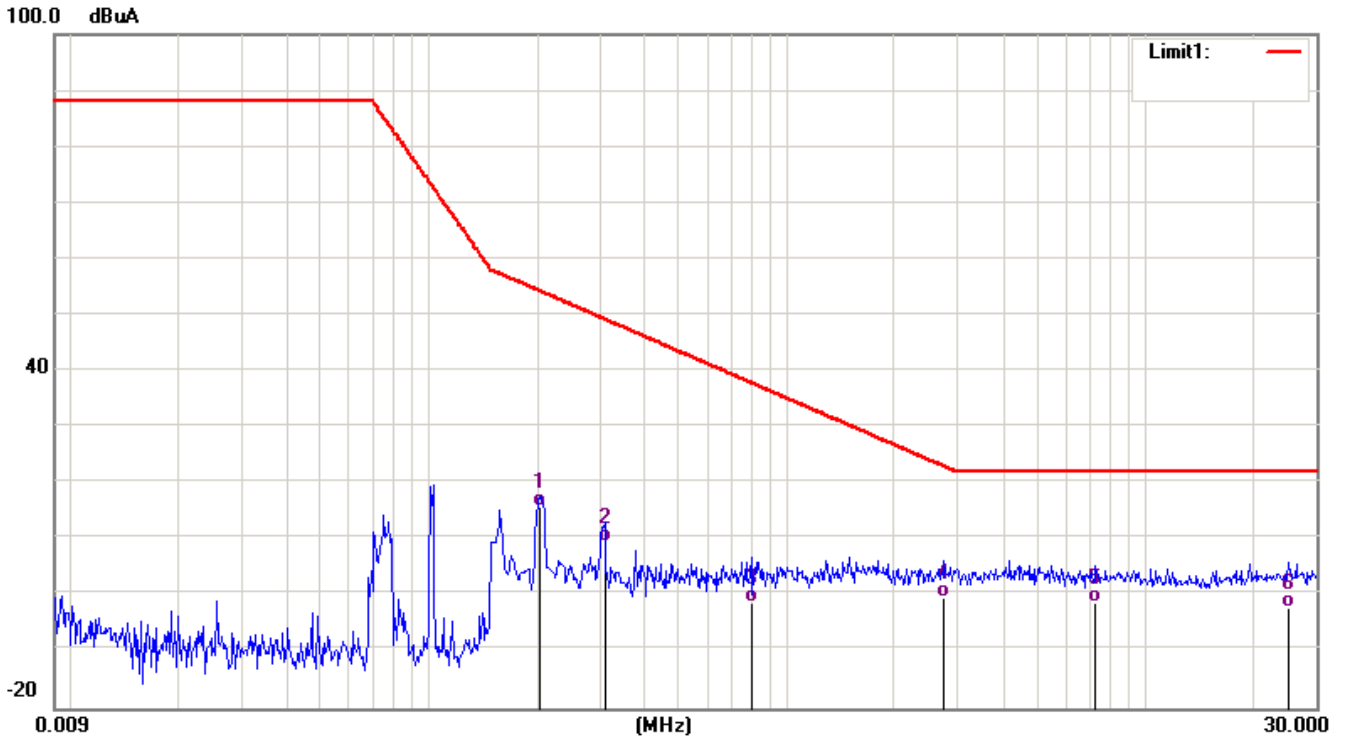
Antenna polarity: X

Model: 12V-5730-120L-IP20



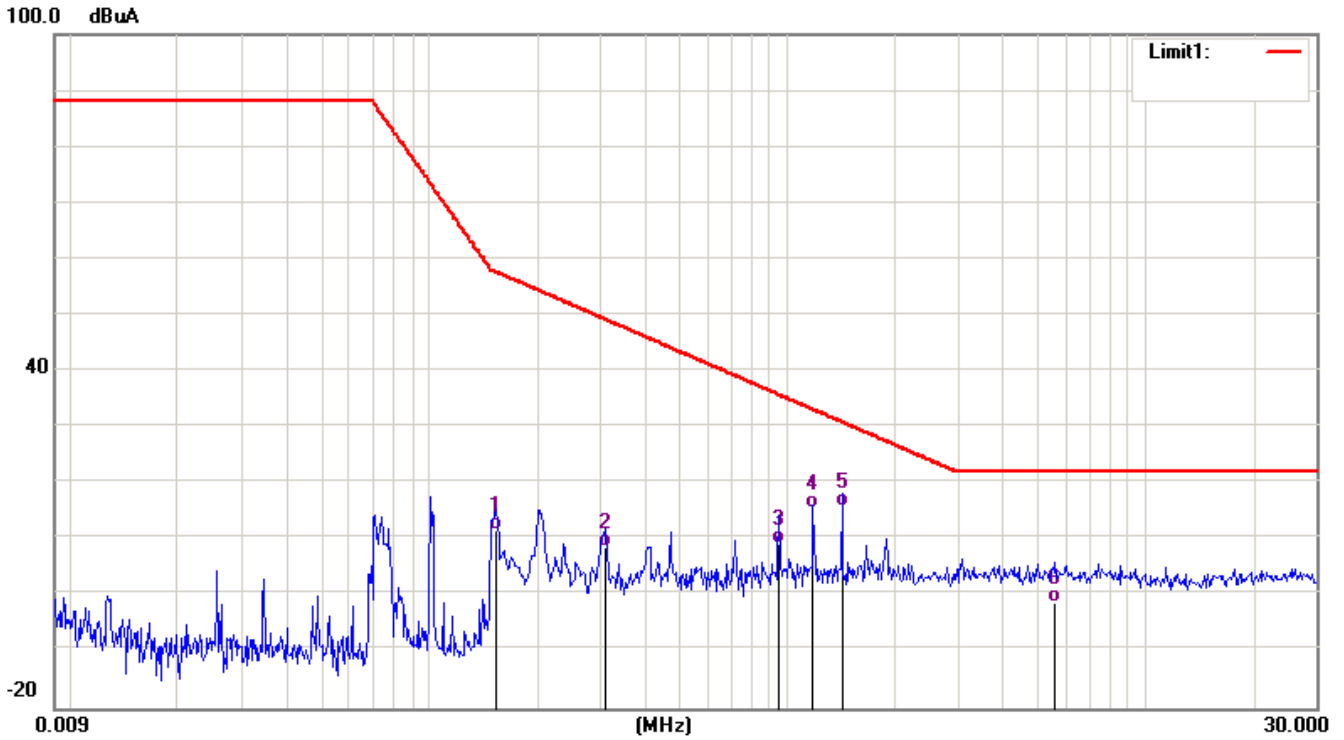
No.	Frequency (MHz)	Reading (dBuA)	Correct Factor(dB)	Result (dBuA)	Limit (dBuA)	Margin (dB)	Remark
1	0.1580	6.16	-0.76	5.40	57.38	-51.98	QP
2	0.3100	2.63	-0.83	1.80	49.28	-47.48	QP
3	0.9500	8.56	-0.92	7.64	35.82	-28.18	QP
4	3.3860	-0.14	-0.49	-0.63	22.00	-22.63	QP
5	6.8340	-1.22	-0.33	-1.55	22.00	-23.55	QP
6	16.9060	-1.78	-0.85	-2.63	22.00	-24.63	QP

Antenna polarity: Y
 Model: 12V-5730-120L-IP20



No.	Frequency (MHz)	Reading (dBuA)	Correct Factor(dB)	Result (dBuA)	Limit (dBuA)	Margin (dB)	Remark
1	0.2060	16.86	-0.86	16.00	54.19	-38.19	QP
2	0.3100	10.28	-0.83	9.45	49.28	-39.83	QP
3	0.7940	-0.25	-0.97	-1.22	37.97	-39.19	QP
4	2.7620	0.09	-0.50	-0.41	22.99	-23.40	QP
5	7.2740	-0.99	-0.39	-1.38	22.00	-23.38	QP
6	25.2460	-3.48	1.37	-2.11	22.00	-24.11	QP

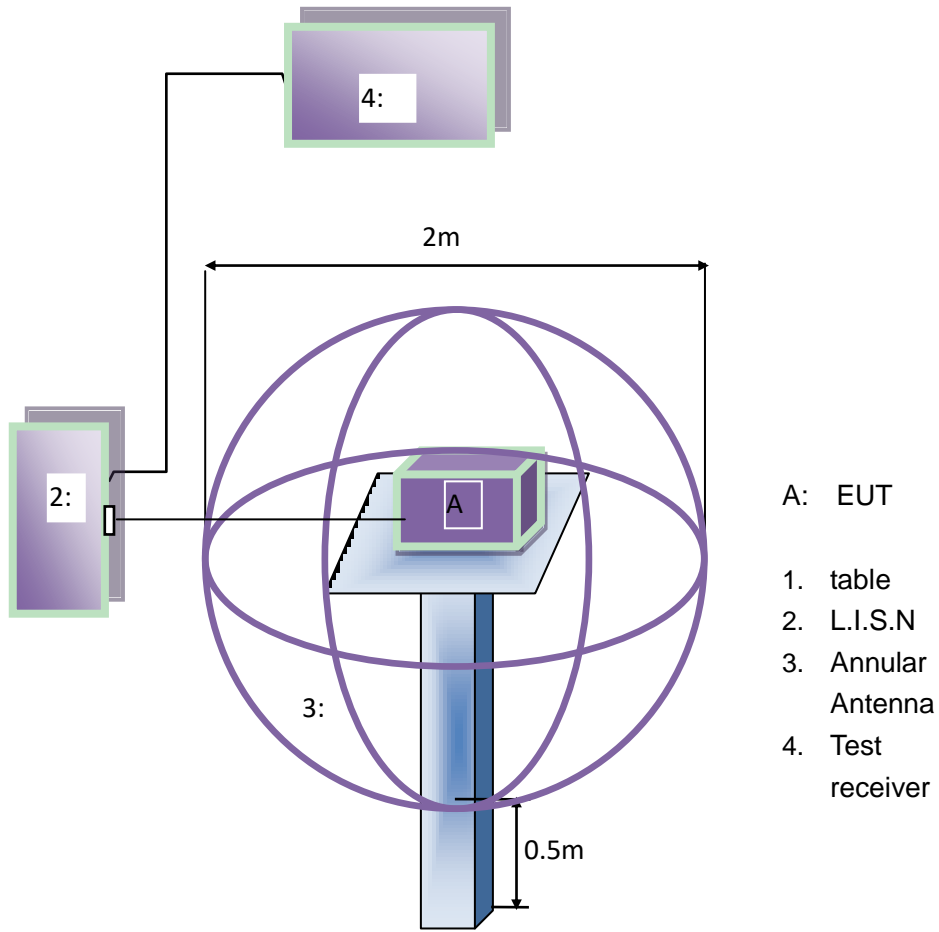
Antenna polarity: Z
 Model: 12V-5730-120L-IP20



No.	Frequency (MHz)	Reading (dBuA)	Correct Factor(dB)	Result (dBuA)	Limit (dBuA)	Margin (dB)	Remark
1	0.1540	12.48	-0.74	11.74	57.68	-45.94	QP
2	0.3100	9.61	-0.83	8.78	49.28	-40.50	QP
3	0.9540	10.05	-0.92	9.13	35.77	-26.64	QP
4	1.1860	16.29	-0.83	15.46	33.15	-17.69	QP
5	1.4260	16.56	-0.74	15.82	30.94	-15.12	QP
6	5.6260	-1.08	-0.27	-1.35	22.00	-23.35	QP

Direction	X- Axis, Y-Axis, Z-Axis	
Frequency [MHz]	QP [dB(μA)]	
	Level	Limit
0,009 – 30,0	More than 20 dB below the limits	

3.1.4 Radiated Electromagnetic Disturbance Test Setup Drawing



Test Setup: Radiated Electromagnetic Disturbance 0.9 - 30MHz

For reference only

3.2 Radiated Emission: 30MHz to 1000MHz

Test Requirement :	EN IEC 55015
Test Date :	2022-10-24
Frequency Range:	30MHz to 1000MHz
Class/Severity:	Table 6
Detector:	Peak for pre-scan (120kHz resolution bandwidth) Quasi-Peak & average if pre-scan peak within 15dB of average limit.

3.2.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC.

The factors contributing to uncertainties are spectrum analyser , cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at HTW is +4.0 dB.

3.2.2 E.U.T. Operation

Temperature:	24.3°C
Humidity:	51.6 % RH
Atmospheric Pressure:	1002 mbar

EUT Operation:
Compliance test was performed in ON mode.

3.2.3 E.U.T. Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, The EUT was placed on the test table with the load on one side.

The external I/O cables were draped along the test table and bundled if necessary.

3.2.4 Test procedure

For the radiated emissions test, since the EUT does not have a power source, there was no connection to AC outlets.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB μ V of specification limits), and are distinguished with a "Qp" in the data table.

The EUT was under normal mode during the final qualification test and the configuration was

used to represent the worst case results

3.2.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and 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 -7dB μ V means the emission is 7dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

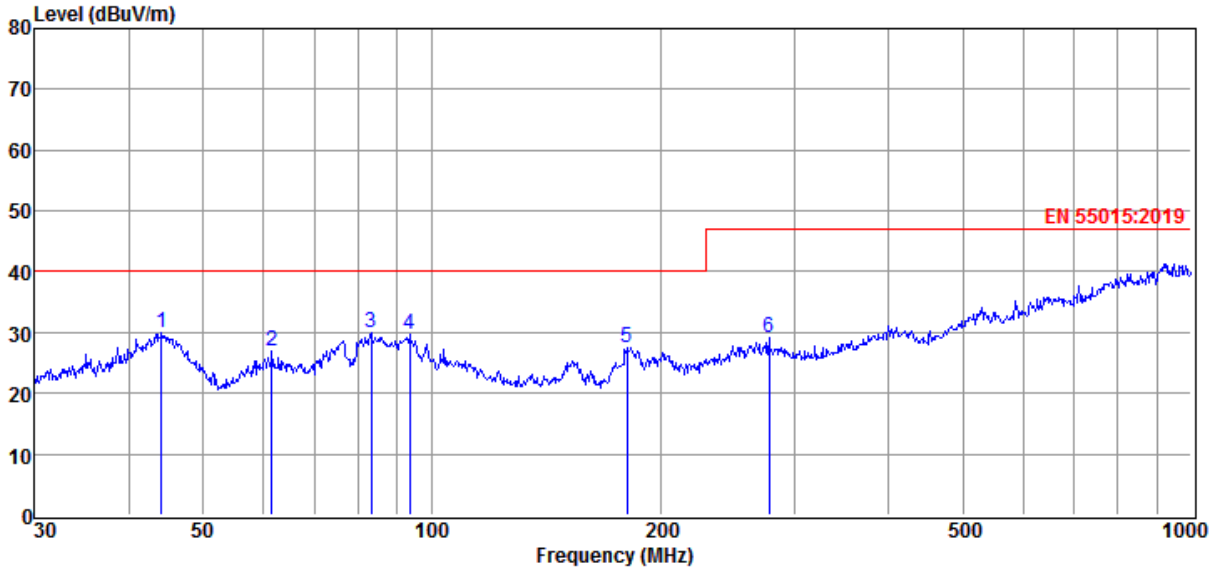
3.2.6 Test Results

PASS

3.2.7 Radiated Emissions Test Data

Horizontal:

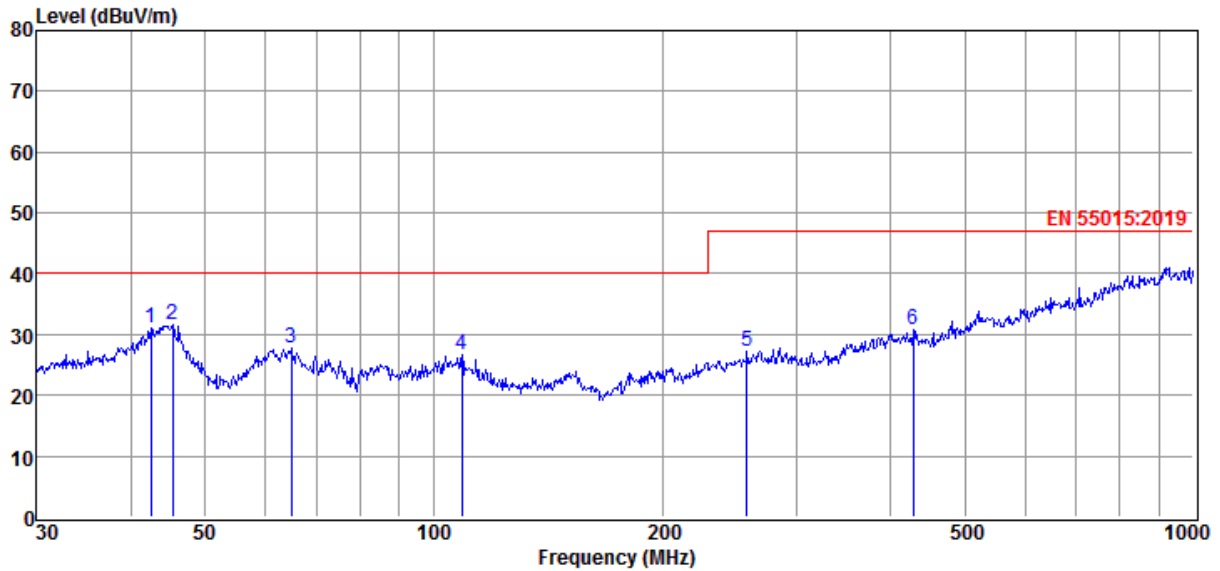
Model: 12V-5730-120L-IP20



Item (Mark)	Freq (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
1	44.12	12.58	16.74	0.00	0.55	29.87	40.00	-10.13	Peak	HORIZONTAL
2	61.56	15.73	10.65	0.00	0.66	27.04	40.00	-12.96	Peak	HORIZONTAL
3	83.23	21.62	7.54	0.00	0.77	29.93	40.00	-10.07	Peak	HORIZONTAL
4	93.44	18.74	10.17	0.00	0.82	29.73	40.00	-10.27	Peak	HORIZONTAL
5	180.65	18.55	7.63	0.00	1.22	27.40	40.00	-12.60	Peak	HORIZONTAL
6	278.07	14.74	12.76	0.00	1.62	29.12	47.00	-17.88	Peak	HORIZONTAL

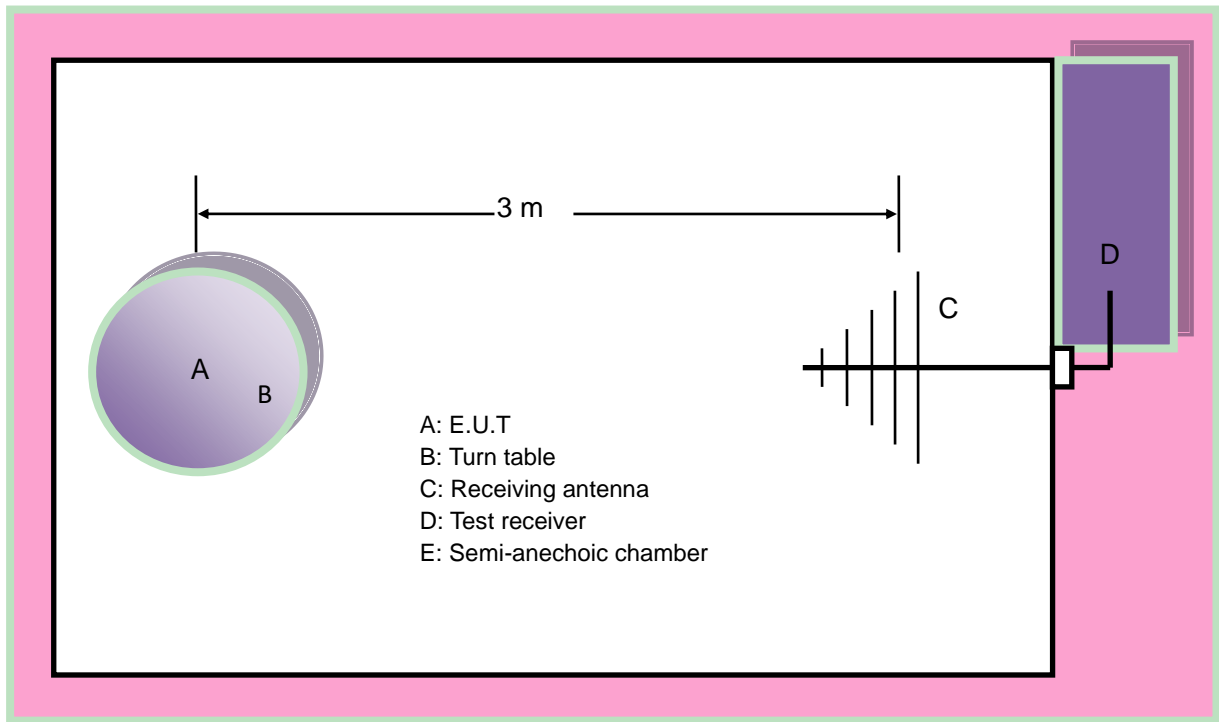
Vertical:

Model: 12V-5730-120L-IP20



Item (Mark)	Freq (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
1	42.45	14.98	15.64	0.00	0.54	31.16	40.00	-8.84	Peak	VERTICAL
2	45.38	14.94	16.11	0.00	0.56	31.61	40.00	-8.39	Peak	VERTICAL
3	64.89	17.64	9.54	0.00	0.67	27.85	40.00	-12.15	Peak	VERTICAL
4	109.03	13.94	11.80	0.00	0.90	26.64	40.00	-13.36	Peak	VERTICAL
5	258.33	13.36	12.27	0.00	1.54	27.17	47.00	-19.83	Peak	VERTICAL
6	428.02	12.93	15.58	0.00	2.28	30.79	47.00	-16.21	Peak	VERTICAL

3.2.8 Radiated Emissions Test Setup Drawing



Test-setup: Radiated emission

For reference only

4 Immunity Test Results

4.1 Performance Criteria Description

- Criterion A: The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
- Criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
- Criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

4.2 ESD

Test requirement:	EN 61547
Test Method:	IEC 61000-4-2
Test Date :	2022-10-24
Discharge Impedance:	330 Ω / 150 pF
Discharge Voltage:	Air Discharge: $\pm 8kV$ Contact Discharge: $\pm 4kV$ HCP & VCP: $\pm 4kV$
Polarity:	Positive & Negative
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 Second minimum

4.2.1 E.U.T Operation

Operating Environment:	
Temperature:	23.5°C
Humidity:	53.2 % RH
Atmospheric Pressure:	1002 mbar

EUT Operation:
Compliance test was performed in ON mode.

4.2.2 Direct Application Test Results

Observations: Test points: 1. All Exposed Surface & Seams;

Direct Application			Test Results	
Discharge Level (kV)	Polarity(+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1	N/A	A

Results:

A: No degradation in the performance of the E.U.T. was observed.

N/A: Not applicable

4.2.3 Indirect Application Test Results

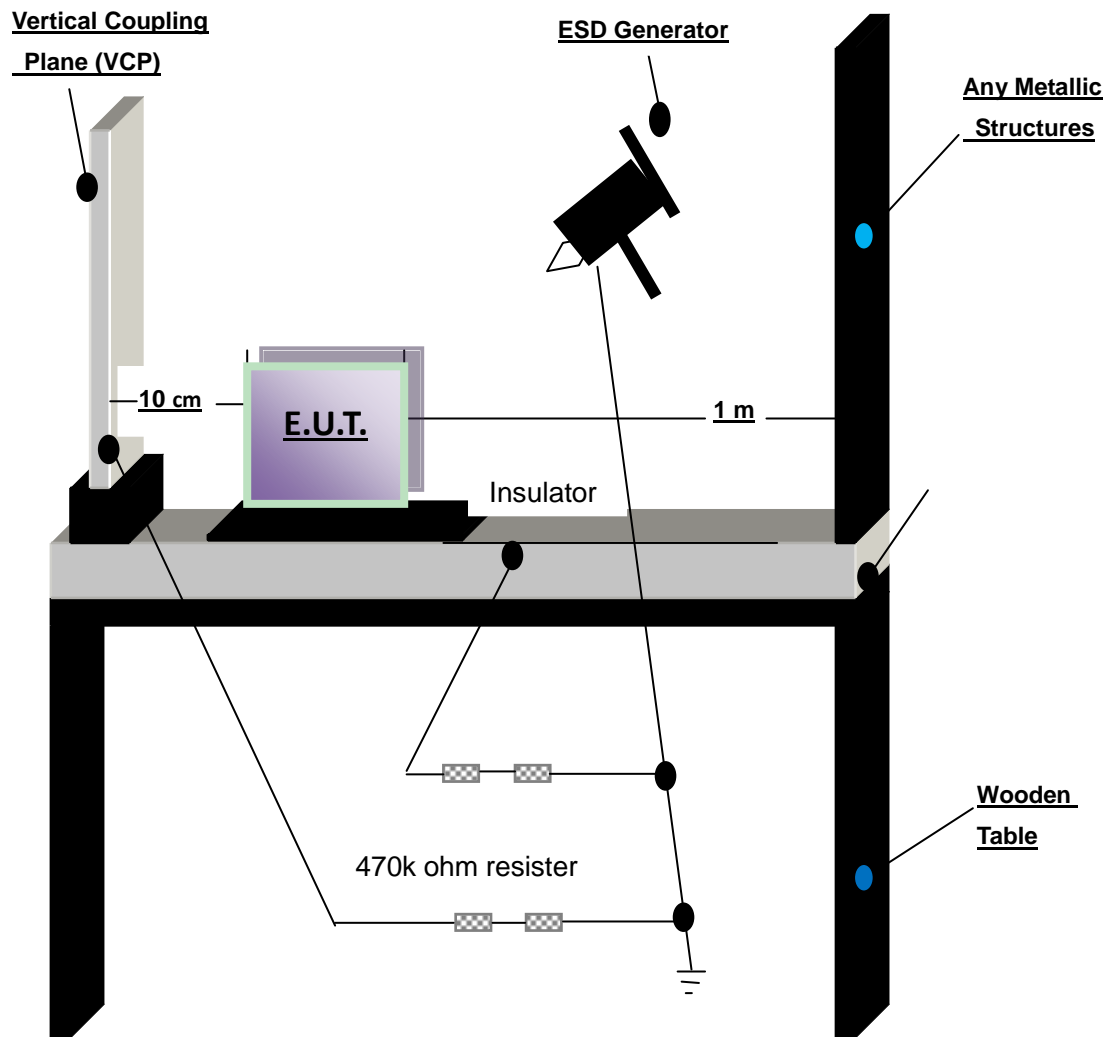
Observations: Test points: 1. All Sides.

Indirect Application			Test Results	
Discharge Level (kV)	Polarity(+/-)	Test Point	Horizontal Coupling	Vertical Coupling
2	+/-	1	A	A
4	+/-	1	A	A

Results: PASS

A: No degradation in the performance of the E.U.T. was observed.

4.2.4 ESD Test Setup Drawing



Test Setup: Electrostatic Discharge (ESD)

For reference only

4.3 Radiated Immunity

Test requirement : EN 61547
Test Method : IEC 61000-4-3
Test Date : 2022-10-24
Frequency Range: 80MHz–1GHz
Face Under Test: Three Mutually Orthogonal Faces
Severity: 3V/m, 1kHz, 80% Amp. Mod. from 80MHz to 1GHz

4.3.1 E.U.T Operation

Operating Environment

Temperature: 24.7°C
Humidity: 52.7 % RH
Barometric Pressure: 1002 mbar

EUT Operation:
Compliance test was performed in ON mode.

4.3.2 Test Results

Frequency	Level	Modulation	EUT Face	Result / Observations
80MHz-1G Hz	3V/m	1kHz, 80%, Amp. Mod.	X Y Z	During test, After test EUT to normal (A).

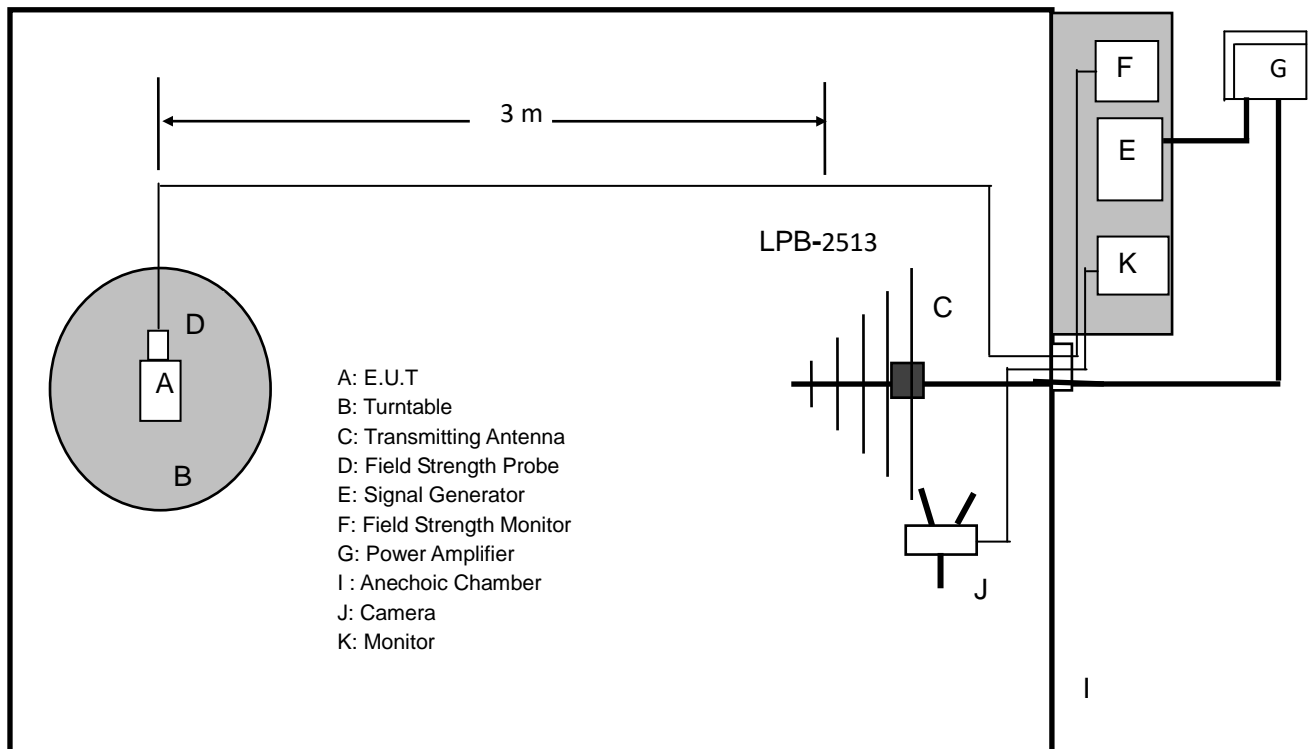
Remarks:

AM : Amplitude Modulation.
PM : Pulse Modulation.
X : EUT as per photograph in section 6.3.5 of this report.
Y : As X, but rotate EUT by 90° clockwise.
Z : As Y, but rotate EUT by 90° vertically.

Results: Pass

A: No degradation in the performance of the E.U.T. was observed.

4.3.3 Radiated Immunity Test Setup Drawing

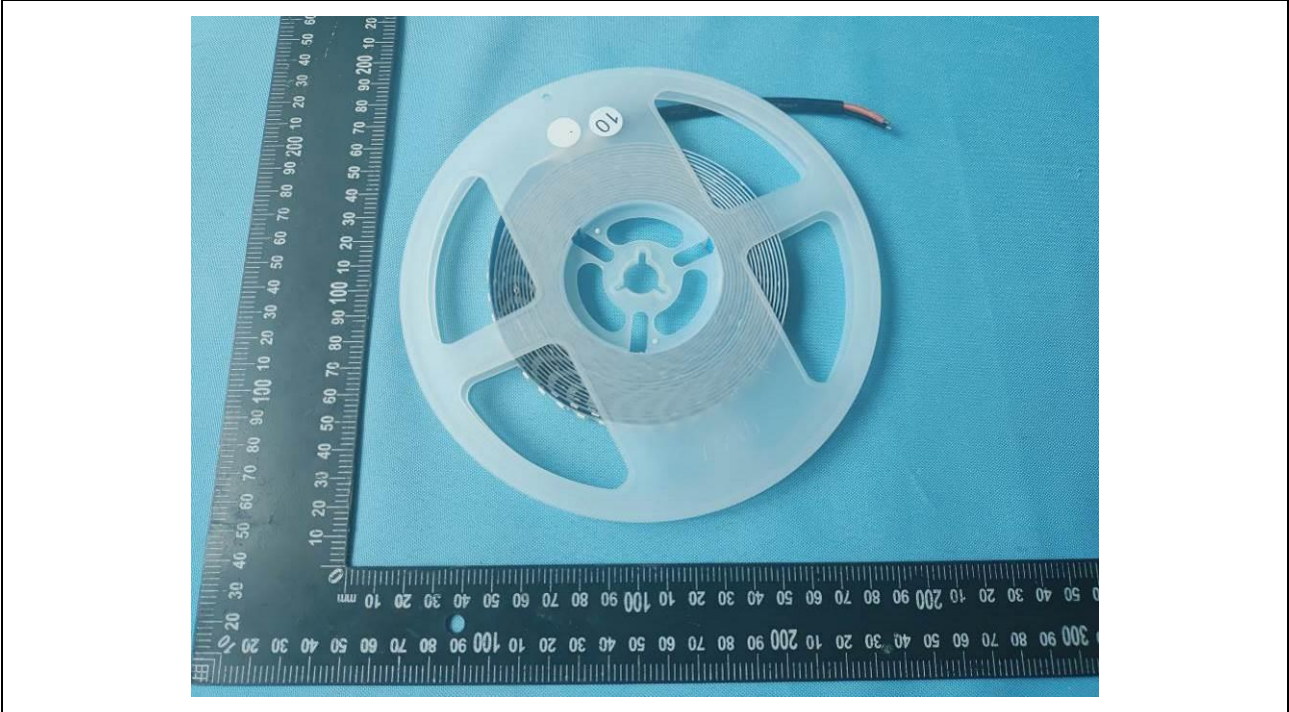


Test-setup: Radiated Immunity

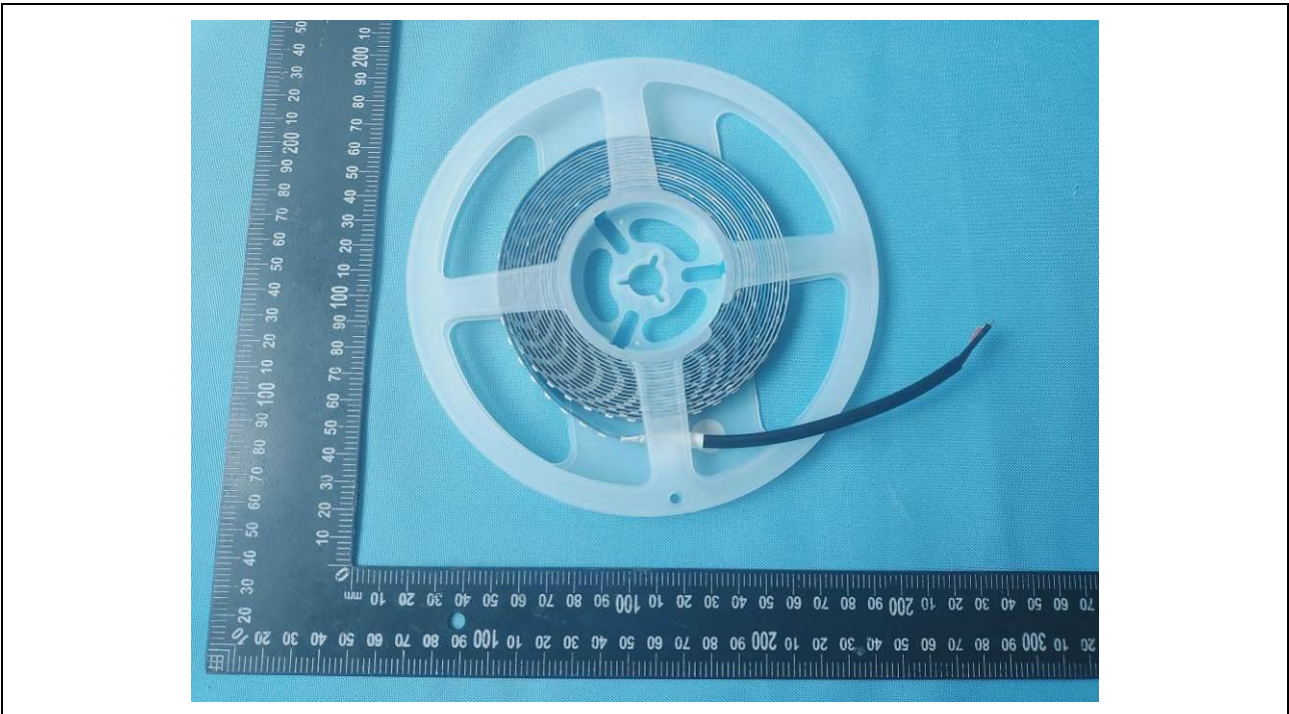
For reference only

5 Photographs - Constructional Details

Details of: General view of 12V-5730-120L-IP20



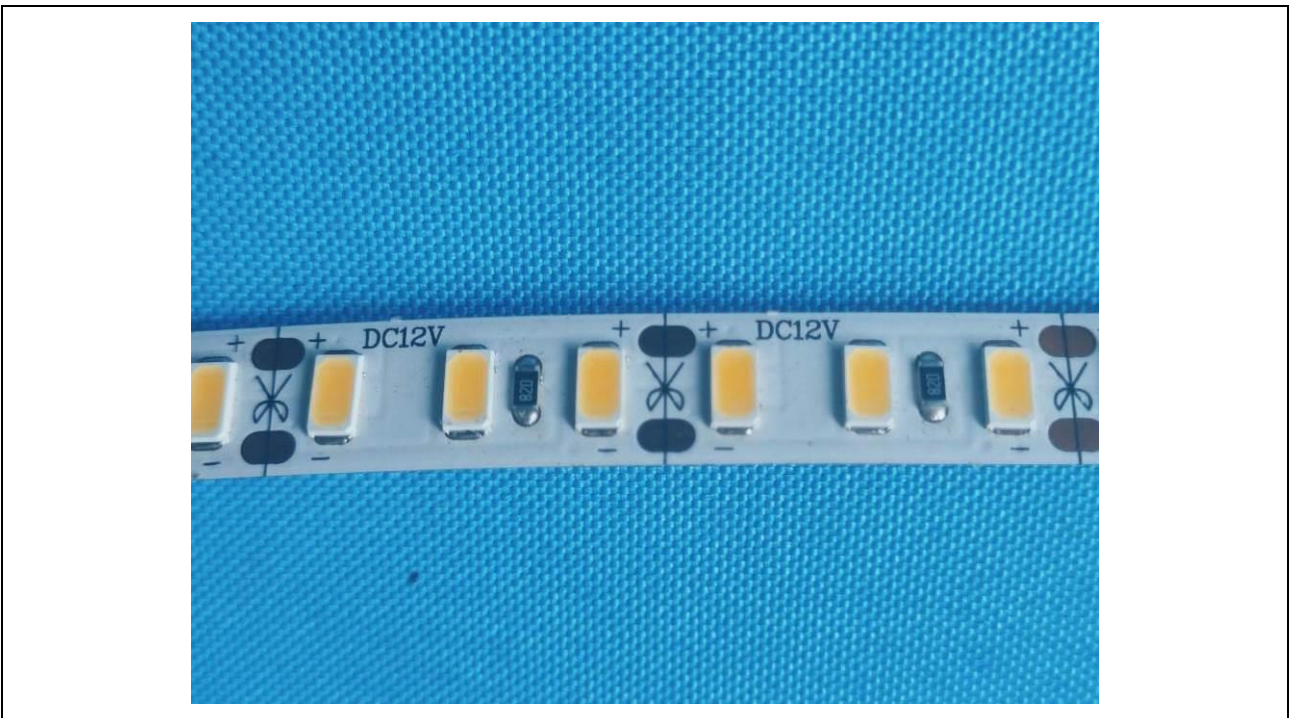
Details of: General view of 12V-5730-120L-IP20



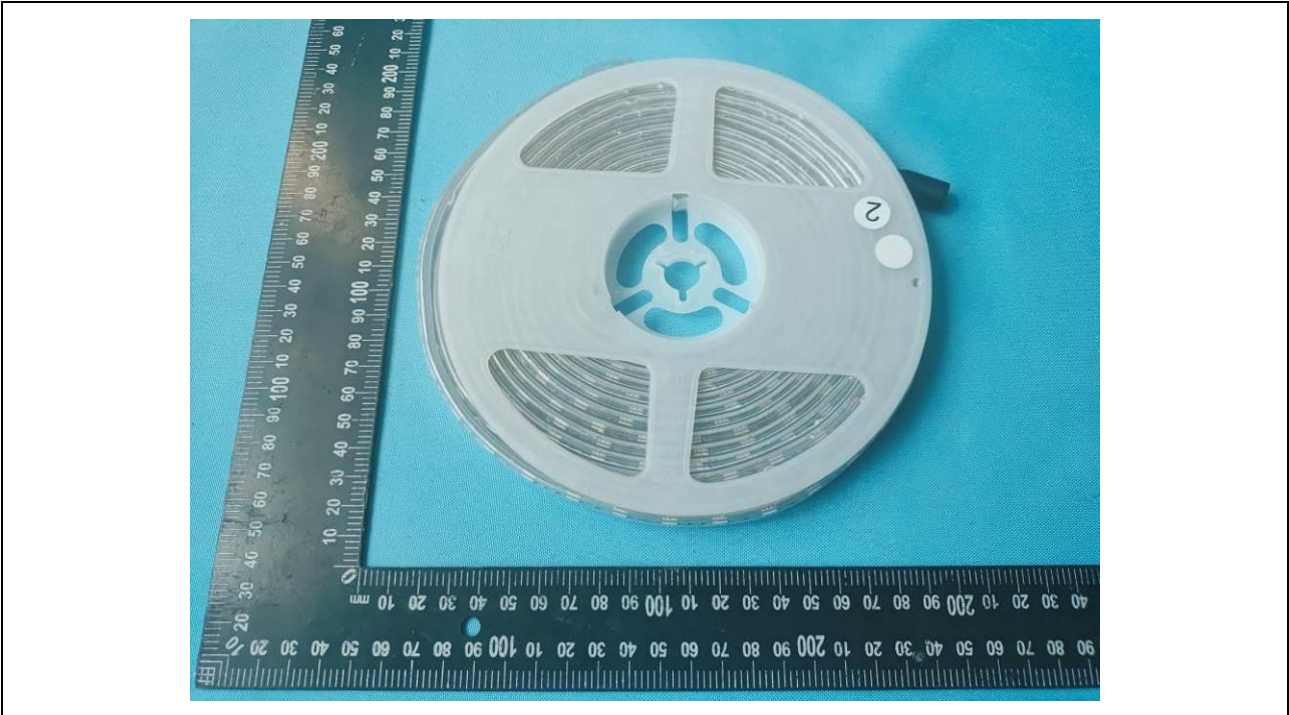
Details of: General view of 12V-5730-120L-IP20



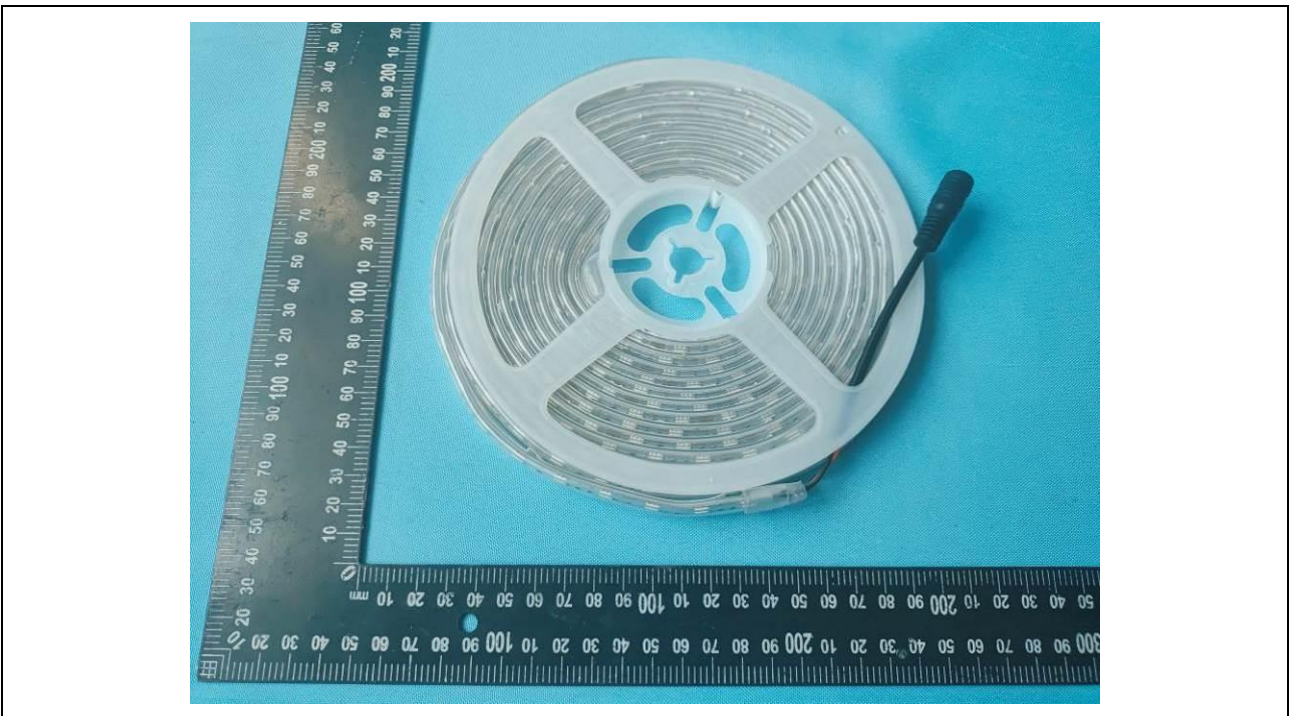
Details of: LED module of 12V-5730-120L-IP20



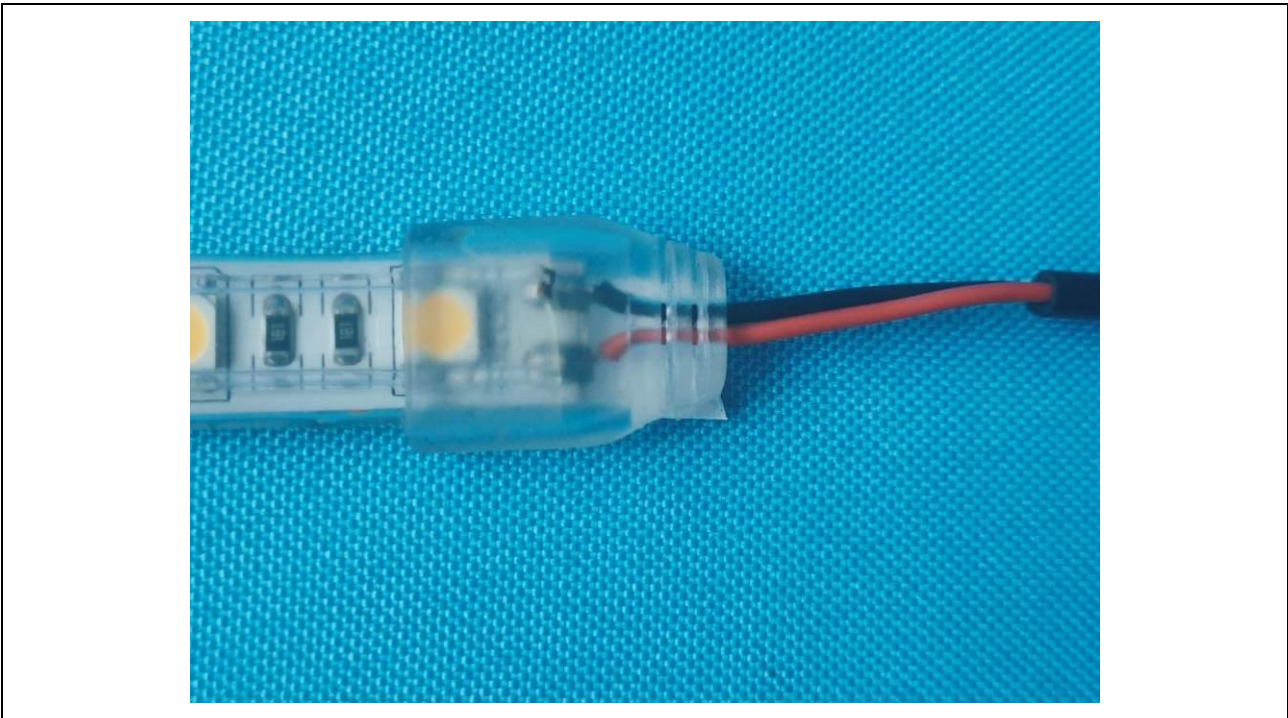
Details of: General view of 12V-5050-60L-IP65



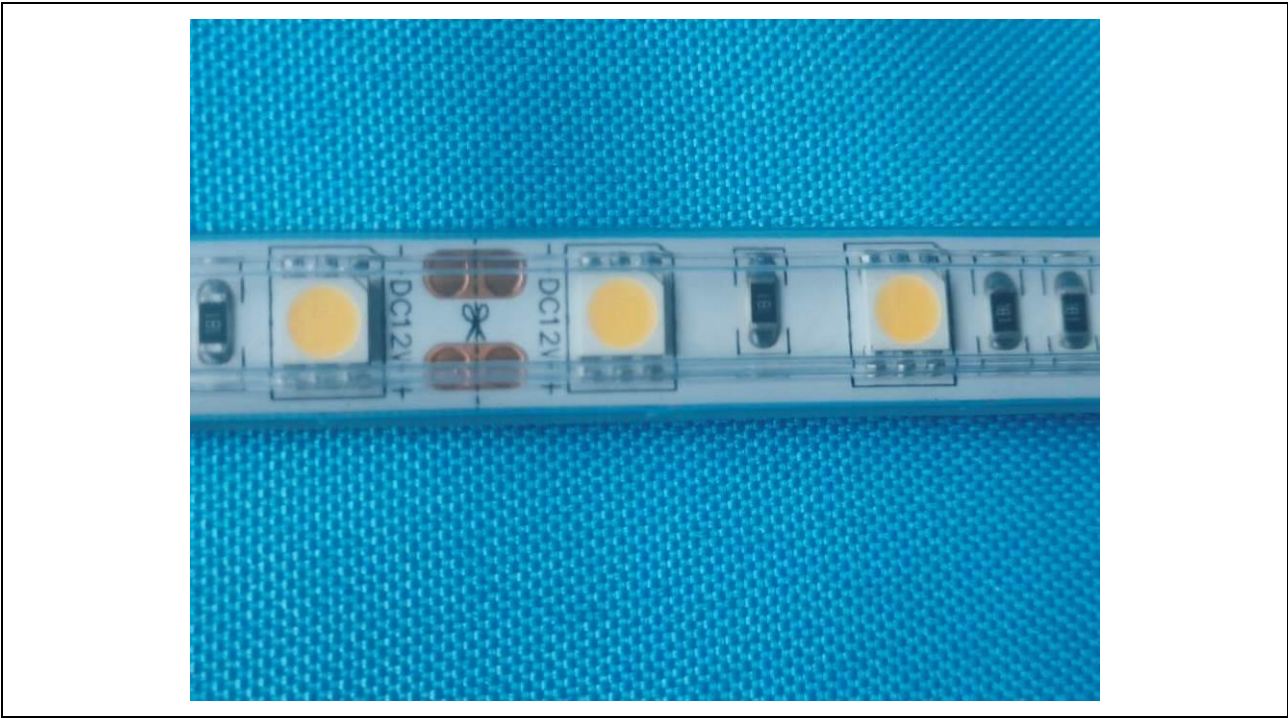
Details of: General view of 12V-5050-60L-IP65



Details of: General view of 12V-5050-60L-IP65



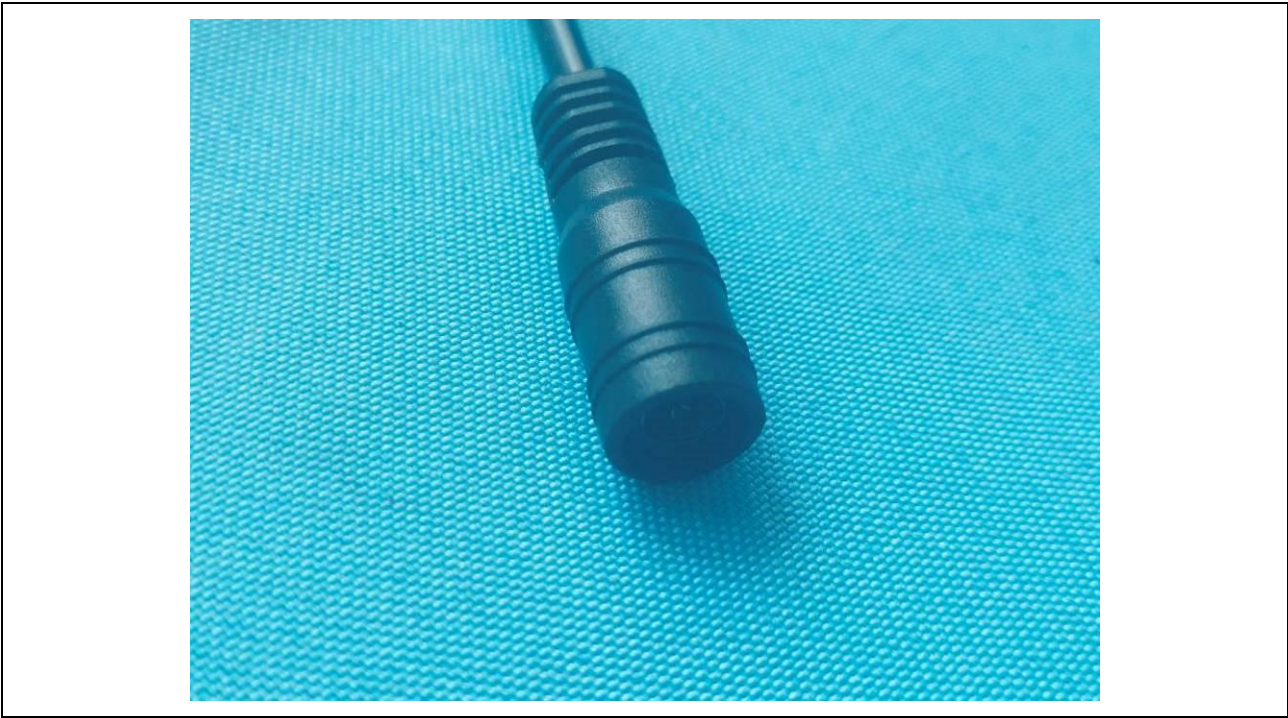
Details of: General view of 12V-5050-60L-IP65



Details of: Connector view of 12V-5050-60L-IP65



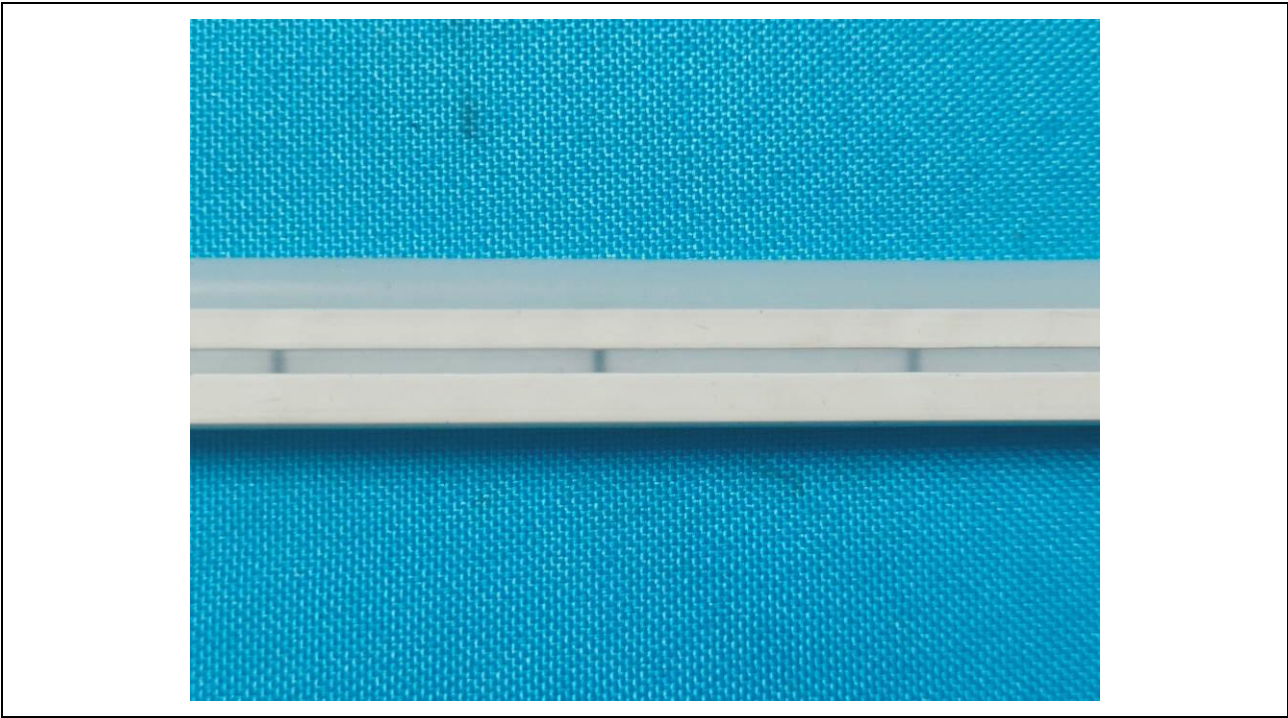
Details of: Connector view of 12V-5050-60L-IP65



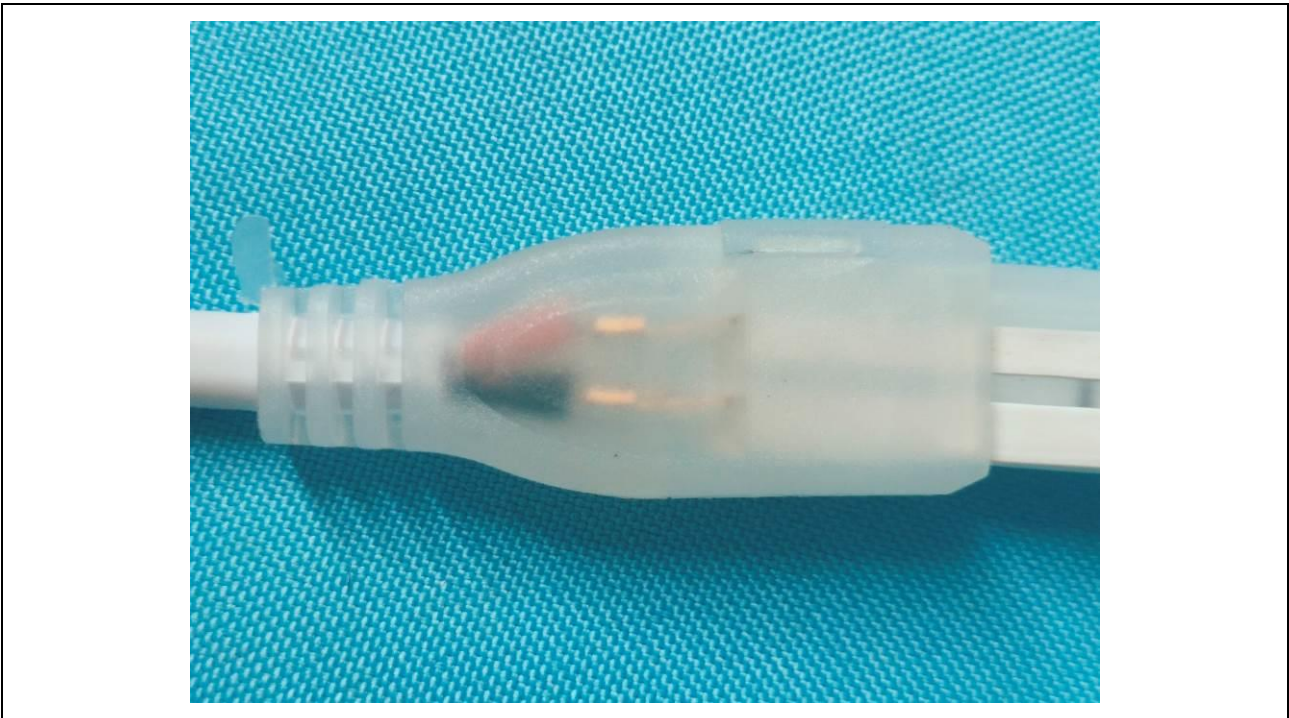
Details of: Alternative general view of 12V-5050-60L-IP65



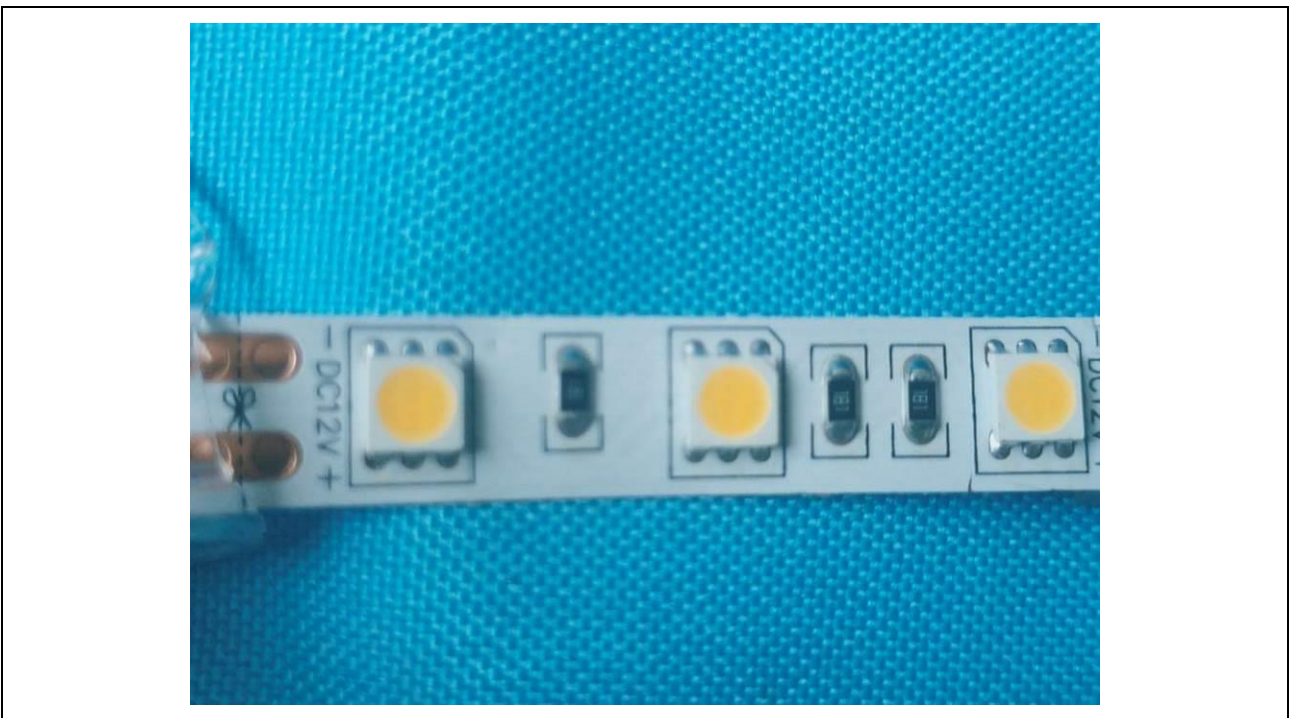
Details of: Alternative general view of 12V-5050-60L-IP65



Details of: Alternative general view of 12V-5050-60L-IP65



Details of: LED module of 12V-5050-60L-IP65



- **END OF REPORT** -