

# EMC TEST REPORT

Application No. : LH-230103040057

Applicant : INTELEK.CZ s.r.o.

## Equipment Under Test (EUT)

EUT Name : Electronic Scale

Model No. : K2/EC5402-BT

Serial No. : N/A

Brand Name : **iGET**  
HOME

Receipt Date : 2023-01-03

Test Date : 2023-01-03 to 2023-01-11

Issue Date : 2023-01-11

Standards : ETSI EN 301 489-1 V2.2.3  
ETSI EN 301 489-17 V3.2.4

Conclusions : **PASS**

In the configuration tested, the EUT complied with the standards specified above. The EUT technically complies with the RED Directive of 2014/53/EU requirements.

Test/Witness Engineer :

*Yark xin*

Approved & Authorized :

*Jack su*



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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# 1. General Information

## 1.1 Client Information

<b>Applicant</b>	:	INTELEK.CZ s.r.o.
<b>Address</b>	:	Olivova 2096/4. Prague 110 00, Czech Republic
<b>Manufacturer</b>	:	INTELEK.CZ s.r.o.
<b>Address</b>	:	Olivova 2096/4. Prague 110 00, Czech Republic

## 1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Electronic Scale	
Model No.	:	K2/EC5402-BT	
Serial No.	:	N/A	
Model Difference	:	The different models are identical in schematic and critical component, the only different is the appearance.	
Product Description	:	Operation Frequency:	2402MHz~2480MHz
		Number of Channel:	79 Channels <b>see note (2)</b>
		Out Power:	3.35 dBm 1Mbps 2.27 dBm 3Mbps
		Antenna Gain:	0 dBi
		Modulation Type:	GFSK 1Mbps(1Mbps) π/4-DQPSK(2Mbps) 8-DPSK(3Mbps)
		Date Rate:	1~3 Mbps
Power Supply	:	DC 4.5V, 30mA	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

### Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. This Test Report EN 301 489 For Bluetooth, under RED Directive Article 3.1(b).
- (2) Channel List:

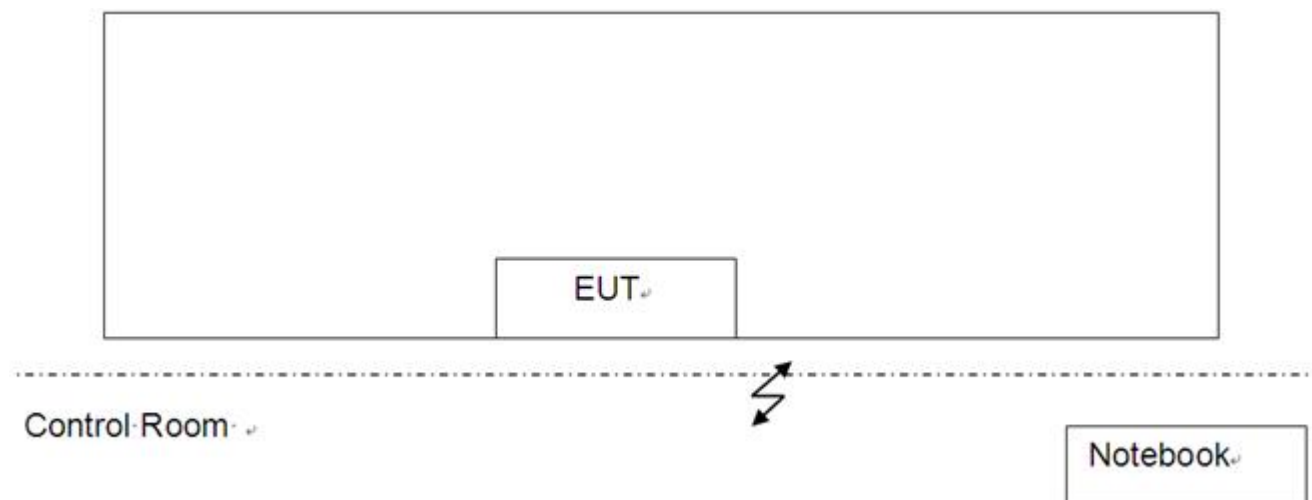
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457

02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

(3) Antenna description:

Ant.	Brand	Model Name	Antenna Type	Gain(dBi)
1	N/A	N/A	Printed Ant	0

### 1.3 Block Diagram Showing the Configuration of System Tested



### 1.4 Description of Support Units

The EUT has been tested as an independent unit.

Name	Model	S/N	Manufacturer	Used "√"
Notebook	B470A2450	VNF3G06957	Lenovo	√

### 1.5 Description of Operating Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Charging and Loading Data
Mode 2	BT Mode

The EUT system operated these modes were found to be the worst case during the pre-scanning test as Following:

For EMI Test	
Final Test Mode	Description
Mode 1	Charging and Loading Data
Mode 2	BT Mode
For EMS Test	

Final Test Mode	Description
Mode 1	Charging and Loading Data
Mode 2	BT Mode

## 1.6 Performance Criterion

According to **ETSI EN 301 489-17** standard, the general performance criteria as following:

Criterion	During Test	After test
A	Shall operate as intended May show degradation of performance (see note 1) Shall be no loss of function Shall be no unintentional transmissions	Shall operate as intended Shall be no degradation of performance (see note 2) Shall be no loss of function Shall be no loss of stored data or user programmable functions
B	May show loss of function (one or more) May show degradation of performance (see note 1) No unintentional transmissions	Functions shall be self-recoverable shall operate as intended after recovering Shall be no degradation of performance (see note 2) Shall be no loss of stored data or user programmable functions
C	May be loss of function (one or more)	Functions shall be recoverable by the operator shall operate as intended after recovering Shall be no degradation of performance (see note 2)

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

## 1.7 The Requirement of Performance Criteria

1	Performance criteria for continuous phenomena applied to transmitters (CT)	Criterion A of the applicable class shall apply
2	Performance criteria for transient phenomena applied to transmitters (TT)	Criterion B of the applicable class shall apply
3	Performance criteria for continuous phenomena applied to receivers (CR)	Criterion A of the applicable class shall apply
4	Performance criteria for transient phenomena applied to transmitters (TR)	Criterion B of the applicable class shall apply

## 1.8 Test Facility

The testing report were performed by the Shenzhen LH Testing Technology Co., Ltd., in their facilities located at 106 and 107, building B15, Yintian Industrial Zone, Yantian community, Xixiang street, Bao'an District, Shenzhen.



## 2 Test Results Summary

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN 55032: 2015/A1: 2020	Conducted Emission	Class B	PASS	
	Radiated Emission	Class B	PASS	
EN IEC 61000-3-2: 2019/A1: 2021	Harmonic Current Emission	Class A or D NOTE(2)	PASS	
EN 61000-3-3: 2013/A1: 2019	Voltage Fluctuations & Flicker		PASS	
EMC Immunity				
Section	Test Item	Performance Criteria	Judgment	Remark
EN 61000-4-2: 2009	Electrostatic Discharge	B	PASS	
EN IEC 61000-4-3:2020	RF electromagnetic field	A	PASS	
EN 61000-4-4: 2012	Fast transients	B	PASS	
EN 61000-4-5: 2014/A1: 2017	Surges	B	PASS	
EN 61000-4-6: 2014	Injected Current	A	PASS	
EN IEC 61000-4-11: 2020	Volt. Interruptions Volt. Dips	B / B / C / C NOTE (3)	PASS	

### NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) The power consumption of EUT is less than 75W and no Limits apply.
- (3) Voltage dip: 0% reduction 0.5 cycle – Performance Criteria B  
 Voltage dip: 0% reduction 1 cycle – Performance Criteria B  
 Voltage dip: 70% reduction 25 cycle – Performance Criteria C  
 Voltage Interruption: 0% residual voltage 250 cycles – Performance Criteria C

### 3 Test Equipment Used

3.1 Test Equipment Used to Measure Conducted Disturbance					
No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
LH-EMC001	EMI Test Receiver	Rohde & Schwarz	ESCS30	Dec. 29, 2022	1 Year
LH-EMC002	AMN	Rohde & Schwarz	ESH3-Z5	Dec. 29, 2022	1 Year
LH-EMC003	ANN	SCHWARZBECK	NNBL8226-2	Dec. 29, 2022	1 Year
3.2 Test Equipment Used to Measure Disturbance Power					
No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
LH-EMC004	EMI Test Receiver	Rohde & Schwarz	ESI26	Dec. 29, 2022	1 Year
LH-EMC005	Bilog Antenna	Chase	CBL6112B	Dec. 29, 2022	1 Year
LH-EMC006	Positioning Controller	C&C	CC-C-1F	Dec. 29, 2022	1 Year
3.3 Test Equipment Used to Measure Harmonic Current/ Voltage Fluctuation and Flicker					
No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
LH-EMC007	Harmonic Flicker Test System	CI	5001ix-CTS-40	Dec. 29, 2022	1 Year
3.4 Test Equipment Used to Measure Electrostatic Discharge Immunity					
No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
LH-EMC008	ESD Tester	SCHNAFFNER	NSG435	Dec. 29, 2022	1 Year
3.5 Test Equipment Used to Measure Conducted Immunity					
No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
LH-EMC009	RF Generator	FRANKONIA	CIT-10/75	Dec. 29, 2022	1 Year
LH-EMC010	Attenuator	FRANKONIA	59-6-33	Dec. 29, 2022	1 Year
LH-EMC011	M-CDN	LUTHI	M2/M3	Dec. 29, 2022	1 Year
LH-EMC012	CDN	LUTHI	AF2	Dec. 29, 2022	1 Year
LH-EMC013	EM Injection Clamp	LUTHI	EM101	Dec. 29, 2022	1 Year
3.6 Test Equipment Used to Measure Electrical Fast Transient/Burst Immunity					
No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
LH-EMC014	Signal Generator	Rohde & Schwarz	SMT03	Dec. 29, 2022	1 Year
LH-EMC015	Power Meter	Rohde & Schwarz	NRVD	Dec. 29, 2022	1 Year
LH-EMC016	Voltage Probe	Rohde & Schwarz	URV5-Z2	Dec. 29, 2022	1 Year

LH-EMC017	Voltage Probe	Rohde & Schwarz	URV5-Z2	Dec. 29, 2022	1 Year
LH-EMC018	Power Amplifier	AR	150W1000	Dec. 29, 2022	1 Year
LH-EMC019	Bilog Antenna	Chase	CBL6111C	Dec. 29, 2022	1 Year
<b>3.7 Test Equipment Used to Measure Electrical Fast Transient/Burst Immunity</b>					
<b>No.</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Last Cal.</b>	<b>Cal. Interval</b>
LH-EMC020	Simulator	EMTEST	UCS500M4	Dec. 29, 2022	1 Year
LH-EMC021	Auto-transformer	EMTEST	V4780S2	Dec. 29, 2022	1 Year
<b>3.8 Test Equipment Used to Measure Surge Immunity</b>					
<b>No.</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Last Cal.</b>	<b>Cal. Interval</b>
LH-EMC022	Simulator	EMTEST	UCS500M4	Dec. 29, 2022	1 Year
LH-EMC023	Coupling Clamp	EMTEST	HFK	Dec. 29, 2022	1 Year
<b>3.9 Test Equipment Used to Measure Voltage Dips and Interruptions Immunity</b>					
<b>No.</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Last Cal.</b>	<b>Cal. Interval</b>
LH-EMC024	Simulator	EMTEST	UCS500N5	Dec. 29, 2022	1 Year
LH-EMC025	Auto-transformer	EMTEST	V4780S2	Dec. 29, 2022	1 Year
<b>3.10 Test Equipment Used to Measure Power Frequency magnetic field</b>					
<b>No.</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Last Cal.</b>	<b>Cal. Interval</b>
LH-EMC026	Power Frequency Magnetic Field Generator	EMTEST	----	Dec. 29, 2022	1 Year

## 4 Conducted Disturbance test

### 4.1 Test Standard and Limit

#### 4.1.1 Test Standard

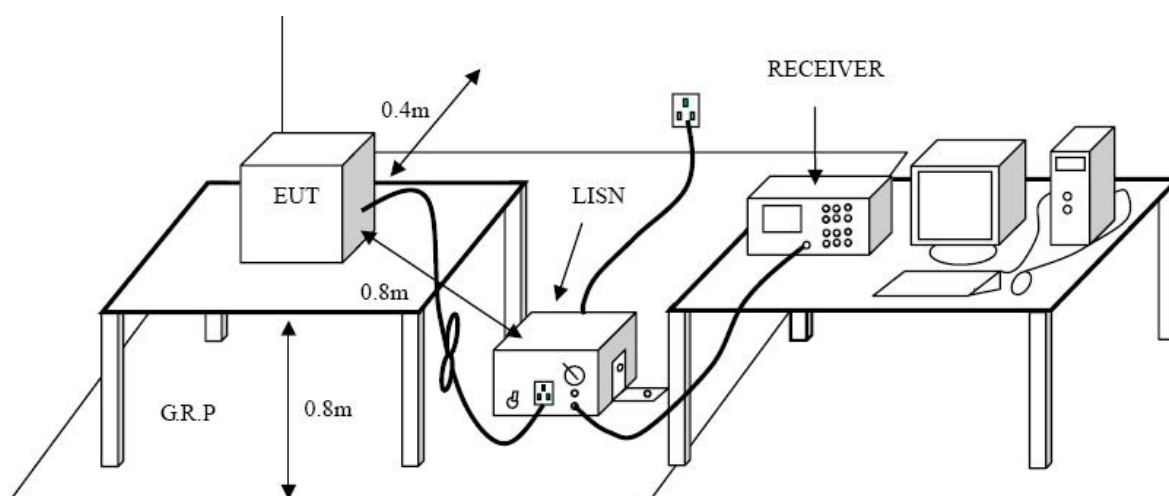
ETSI EN 301 489-1 Cluase 8.4  
ETSI EN 301 489-17  
EN 55032: 2015/A1: 2020 Class B

#### 4.1.2 Test Limit

**Conducted Disturbance Test Limit**

Frequency	Maximum RF Line Voltage (Db $\mu$ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50
Remark: *Decreasing linearly with logarithm of the frequency		

### 4.2 Test Setup



### 4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from the nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

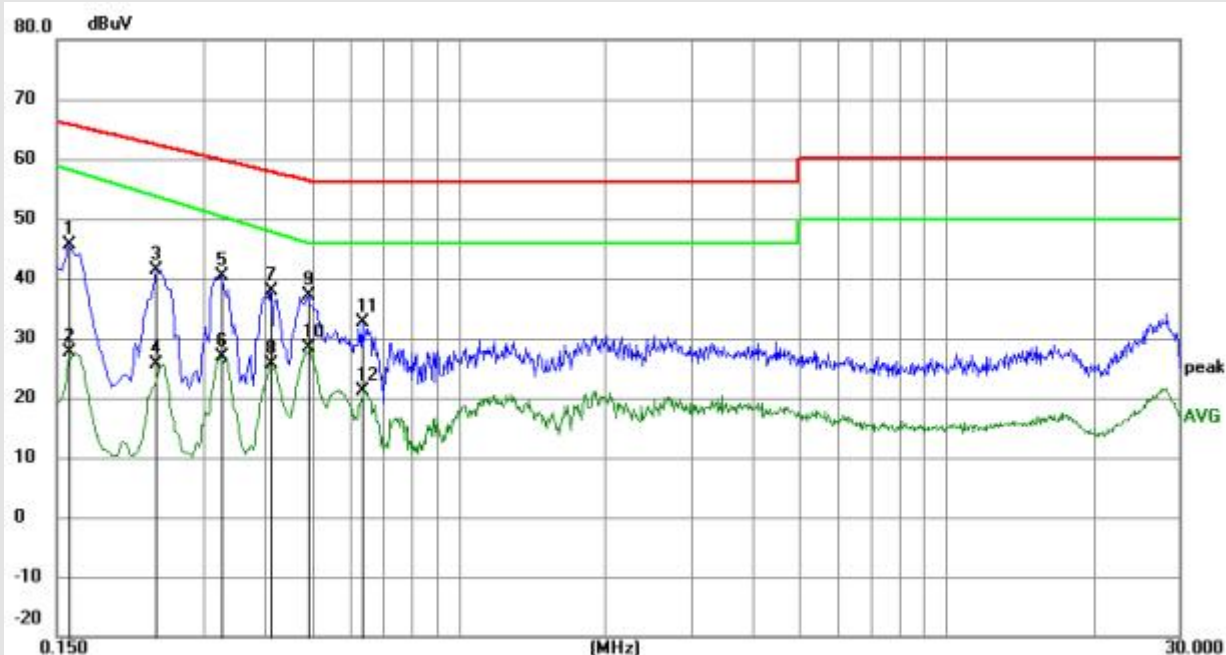
#### 4.4 Test Condition

Temperature	:	23 °C
Relative Humidity	:	48 %
Pressure	:	1010 hPa
Test Power	:	DC 4.5V

#### 4.5 Test Data

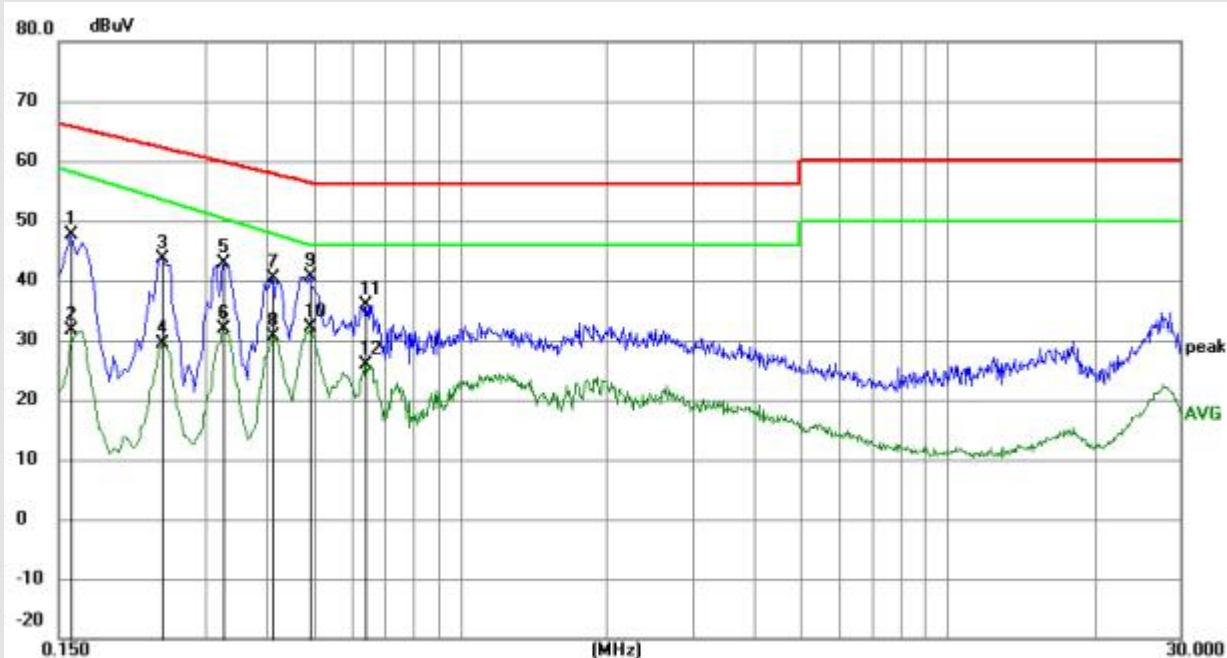
Please refer the following pages.

Temperature :	23℃	Relative Humidity :	48 %
Terminal	Line		
Test Voltage :	DC 4.5V		
Test Mode :	Mode 1		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1590	33.22	12.45	45.67	65.52	-19.85	QP	P	
2	0.1590	15.23	12.45	27.68	58.37	-30.69	AVG	P	
3	0.2400	29.01	12.40	41.41	62.10	-20.69	QP	P	
4	0.2400	13.17	12.40	25.57	53.93	-28.36	AVG	P	
5	0.3255	27.91	12.36	40.27	59.57	-19.30	QP	P	
6	0.3255	14.56	12.36	26.92	50.63	-23.71	AVG	P	
7	0.4109	25.42	12.34	37.76	57.63	-19.87	QP	P	
8	0.4109	13.40	12.34	25.74	48.12	-22.38	AVG	P	
9	0.4919	24.82	12.33	37.15	56.14	-18.99	QP	P	
10	0.4919	16.07	12.33	28.40	46.18	-17.78	AVG	P	
11	0.6359	20.41	12.31	32.72	56.00	-23.28	QP	P	
12	0.6359	8.72	12.31	21.03	46.00	-24.97	AVG	P	

Temperature :	23℃	Relative Humidity :	48 %
Terminal	Neutral		
Test Voltage :	DC 4.5V		
Test Mode :	Mode 1		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1590	35.28	12.45	47.73	65.52	-17.79	QP	P	
2	0.1590	19.14	12.45	31.59	58.37	-26.78	AVG	P	
3	0.2445	31.24	12.40	43.64	61.94	-18.30	QP	P	
4	0.2445	17.00	12.40	29.40	53.72	-24.32	AVG	P	
5	0.3255	30.51	12.36	42.87	59.57	-16.70	QP	P	
6	0.3255	19.58	12.36	31.94	50.63	-18.69	AVG	P	
7	0.4110	28.01	12.34	40.35	57.63	-17.28	QP	P	
8	0.4110	18.39	12.34	30.73	48.12	-17.39	AVG	P	
9	0.4920	28.20	12.33	40.53	56.13	-15.60	QP	P	
10	0.4920	19.88	12.33	32.21	46.17	-13.96	AVG	P	
11	0.6404	23.55	12.31	35.86	56.00	-20.14	QP	P	
12	0.6404	13.66	12.31	25.97	46.00	-20.03	AVG	P	



## 5 Radiated Disturbance Test

### 5.1 Test Standard and Limit

#### 5.1.1 Test Standard

ETSI EN 301 489-1 Clause 8.2  
ETSI EN 301 489-17  
EN 55032: 2015/A1: 2020 Class B.

#### 5.1.2 Test Limit

**Radiated Disturbance Test Limit**

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	dBuV/m	dBuV/m
30 – 230	50	40
230 – 1000	57	47

Notes:

- (1) The limit for radiated test was performed according to as following: EN 55032
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

**Limits Of Radiated Emission Measurment (Above 1000MHz)**

FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
1000-3000	76	56	70	50
3000-6000	80	60	74	54

Notes:

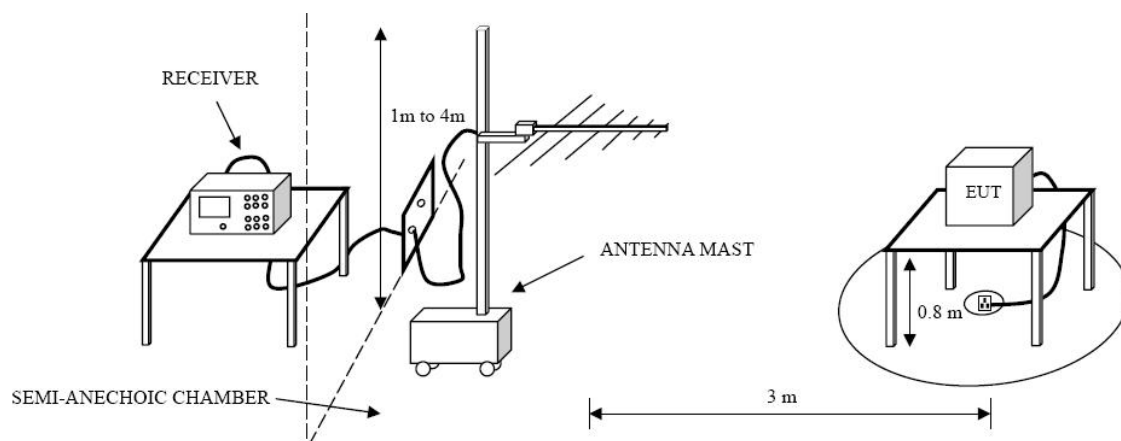
- (1) The lower limit applies at the transition frequency.

**Frequency Range Of Radiated Measurment**

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 6 GHz, whichever is lower



## 5.2 Test Setup



## 5.3 Test Procedure

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m. The table was rotated 360 degrees to determine the position of the highest radiation.

The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

The initial step in collecting radiated emission data is a spectrum Quasi Peak detector mode scanning the measurement frequency range.

If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

## 5.4 Test Condition

Temperature	:	23 °C
Relative Humidity	:	48 %
Pressure	:	1010 hPa
Test Power	:	DC 4.5V

## 5.5 Test Data

Please refer to the following pages.

## (1) Bellow 1 G

<b>Temperature:</b>	23°C	<b>Relative Humidity:</b>	60%
<b>Pressure:</b>	1010 hPa	<b>Test Voltage :</b>	DC 4.5V
<b>Test Mode :</b>	Mode1		

Frequency (MHz)	Ant H / V	Measured (dBuV/m)	Limits (dBm)	Margins (dBm)	Detector	Note
85.6000	H	22.43	40.00	17.57	Peak	
106.2000	H	25.65	40.00	14.35	Peak	
185.4000	H	26.87	40.00	13.13	Peak	
456.1000	H	32.21	47.00	14.79	Peak	
675.5000	H	35.68	47.00	11.32	Peak	

Frequency (MHz)	Ant H / V	Measured (dBuV/m)	Limits (dBm)	Margins (dBm)	Detector	Note
78.8000	V	27.58	40.00	12.42	Peak	
105.2000	V	30.24	40.00	9.76	Peak	
129.4000	V	31.35	40.00	8.65	Peak	
375.1000	V	36.37	47.00	10.63	Peak	
656.5000	V	39.19	47.00	7.81	Peak	

<b>Temperature:</b>	23°C	<b>Relative Humidity:</b>	60%
<b>Pressure:</b>	1010 hPa	<b>Test Voltage :</b>	DC 4.5V
<b>Test Mode :</b>	Mode 2		

Frequency (MHz)	Ant H / V	Measured (dBuV/m)	Limits (dBm)	Margins (dBm)	Detector	Note
85.6000	H	25.78	40.00	14.22	Peak	
135.2000	H	26.62	40.00	13.38	Peak	
220.5000	H	27.55	40.00	12.45	Peak	
575.6000	H	29.52	47.00	17.48	Peak	
786.1000	H	30.73	47.00	16.27	Peak	

Frequency (MHz)	Ant H / V	Measured (dBuV/m)	Limits (dBm)	Margins (dBm)	Detector	Note
83.6000	V	23.56	40.00	16.44	Peak	
128.2000	V	26.89	40.00	13.11	Peak	
226.4000	V	27.23	40.00	12.77	Peak	
485.5000	V	29.54	47.00	17.46	Peak	
756.1000	V	30.91	47.00	16.09	Peak	

(2) Above 1 G

<b>Temperature:</b>	23°C	<b>Relative Humidity:</b>	60%
<b>Pressure:</b>	1010 hPa	<b>Test Voltage:</b>	DC 4.5V
<b>Antenna:</b>	Vertical		
<b>Test Mode:</b>	Mode 2		

No.	Frequency (MHz)	Measurment (dBuv/m)	Limit (dBuv/m)	Margin ( dB)	Detector	Note
1	1221.000	37.59	70	32.41	peak	
2	1221.000	32.08	50	17.92	AVG	

<b>Temperature:</b>	23°C	<b>Relative Humidity:</b>	60%
<b>Pressure:</b>	1010 hPa	<b>Test Voltage:</b>	DC 4.5V
<b>Antenna:</b>	Horizontal		
<b>Test Mode:</b>	Mode 2		

No.	Frequency (MHz)	Measurment (dBuv/m)	Limit (dBuv/m)	Margin ( dB)	Detector	Note
1	1223.000	36.26	70	33.74	peak	
2	1223.000	30.05	50	19.95	AVG	

## 6 HARMONIC CURRENT EMISSION TEST

### 6.1 Test Requirements

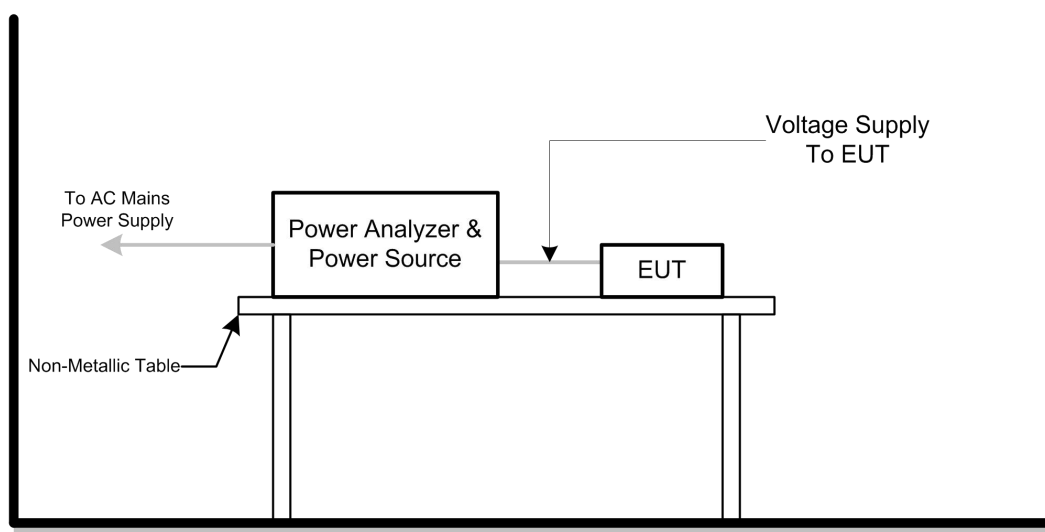
#### 6.1.1 Test Standard

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

#### 6.1.2 Test Level

IEC 555-2					
Table- I			Table- II		
Equipment Category	Harmonic order n	Max. permissible harmonic current (in Amperes)	Equipment Category	Harmonic order n	Max. permissible harmonic current (in Amperes)
Non Portable Tools Or TV Receivers	odd harmonics		TV Receivers	odd harmonics	
	3	2.17		3	0.79
	5	1.11		5	0.63
	7	0.75		7	0.43
	9	0.38		9	0.27
	11	0.31		11	0.15
	13	0.19		13	0.11
	15≤n≤39	0.15·15/n		15≤n≤39	0.10·15/n
	even harmonics			even harmonics	
	2	1.06		2	0.29
	4	0.41		4	0.14
	8	0.28			
	8≤n≤40	0.23·8/n		DC	0.05
EN IEC 61000-3-2					
Equipment Category	Max. permissible harmonic current (in Amperes)	Equipment Category	Harmonic order n	Max. permissible harmonic current (in A) (mA/w)	
Class A	Same as Limits Specified in Table I But only odd Harmonics required	Class D	3	2.28	3.41
			5	1.15	1.93
			7	0.76	1.02
			9	0.42	0.51
			11	0.33	0.35
			8≤n≤40	See Tabel I	3.85/n
			Only odd harmonics required		

## 6.2 Test Setup



## 6.3 Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.

The classification of EUT is according to section 5 of EN IEC 61000-3-2. The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B: Portable tools. Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power less than or equal to 600 W of the following types:  
Personal computers and personal computer monitors and television receivers.

## 6.4 Test Condition

Temperature	:	25 °C
Relative Humidity	:	48 %
Pressure	:	1010 hPa
Test Power	:	DC 4.5V

## 6.5 Test Data

The equipment is powered by DC Power, and rated power less than 75 W, so no requirement for this test.

## 7 Voltage Fluctuation and Flicker Test

### 7.1 Test Standard and Limit

#### 7.1.1 Test Standard

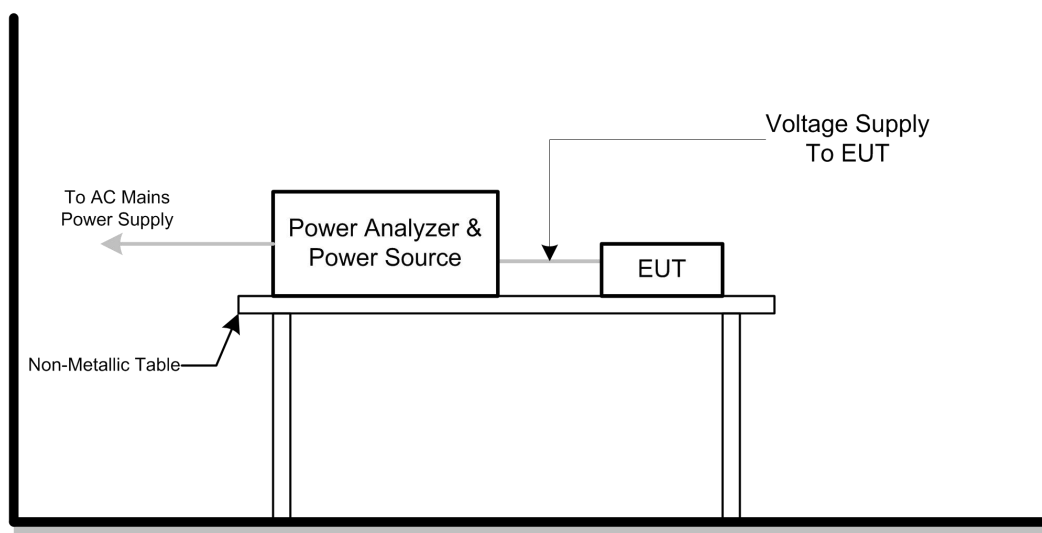
EN 61000-3-3: 2013/A1: 2019

#### 7.1.2 Test Level

**Flicker Test Limit**

Tests	Limits		Descriptions
	IEC555-3	IEC 61000-3-3	
Pst	$\leq 1.0$ , $T_p = 10$ min.	$\leq 1.0$ , $T_p = 10$ min.	Short Term Flicker Indicator
Plt	N/A	$\leq 0.65$ , $T_p = 2$ hr.	Long Term Flicker Indicator
dc	$\leq 3\%$	$\leq 3\%$	Relative Steady-State V-Chang
dmax	$\leq 4\%$	$\leq 4\%$	Maximum Relative V-change
d (t)	N/A	$\leq 3\%$ for $> 200$ ms	RelativeV-change characteristic

### 7.2 Test Setup



### 7.3 Test Procedure

#### 7.3.1 Fluctuation and Flickers Test:

Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

7.3.2 All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

7.3.3 For the actual test configuration, please refer to the related Item –Block Diagram of

system tested.

In order to judge the EUT performance, a camera is used to monitor its screen.

All the scanning conditions are as following:

#### 7.4 Test Condition

#### 7.5 Test Data

The equipment is powered by DC Power, and no requirement for this test.



## 8 Electrostatic Discharge Immunity Test

### 8.1 Test Requirements

#### 8.1.1 Test Standard

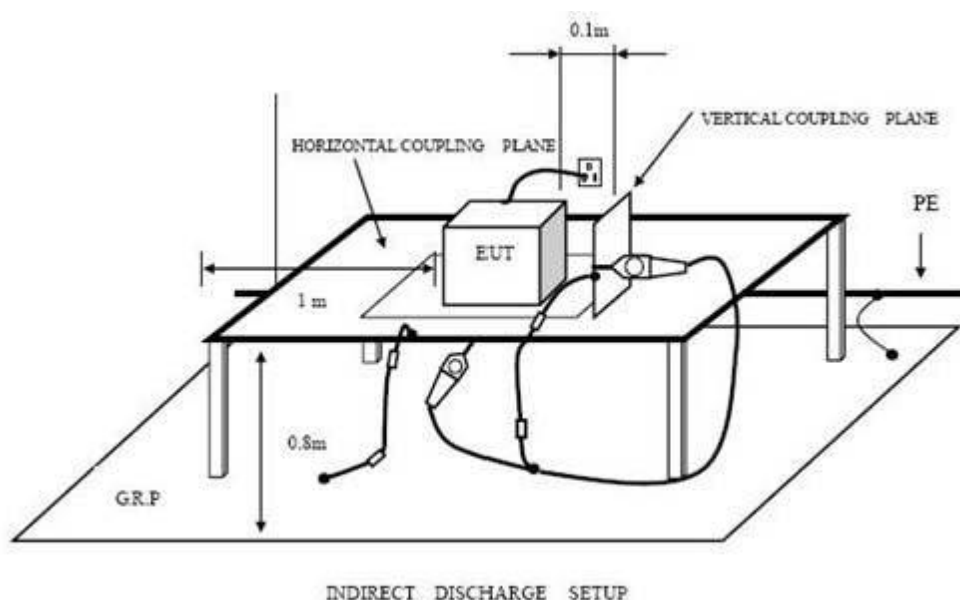
ETSI EN 301 489-1 Clause 9.3  
ETSI EN 301 489-17  
EN 61000-4-2: 2009

#### 8.1.2 Test Level

<b>Discharge Impedance:</b>	330 ohm/ 150pF
<b>Discharge Voltage:</b>	Air Discharge: 2kV/4kV/8kV(Direct) Contact Discharge: 2kV/4kV (Direct /Indirect)
<b>Polarity:</b>	Positive& Negative
<b>Number of Discharge:</b>	Minimum 10 times at each test point
<b>Discharge Mode:</b>	Single Discharge
<b>Discharge Period:</b>	1 second minimum

#### 8.1.3 Performance criterion: B

### 8.2 Test Setup



### 8.3 Test Procedure

#### 8.3.1 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.

#### 8.3.2 Contact Discharge:

All the procedure shall be same as air discharge. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

#### 8.3.3 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.

#### 8.3.4 Indirect discharge for vertical coupling plane

At least 10 single discharges (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.

### 8.4 Test Data

Please refer to the following page.

## Electrostatic Discharge Test Result

Temperature:	22℃	Humidity :	50%
Power supply:	DC 4.5V	Test Mode :	Mode 1
Test Engineer:	Jim		
Criterion: B			
Air Discharge: ±8kV    Contact Discharge: ±4kV			
For each point positive 10 times and negative 10 times discharge.			
Location	Kind C- Air Discharge C-Contact Discharge	Result	
Slot of the EUT	A	A	
Metal Cover	C	A	
HCP	C	A	
VCP of front	C	A	
VCP of rear	C	A	
VCP of left	C	A	
Judgment	PASS		
NOTE			
1) Criteria A: There was no change operated with initial operating during the test.			
2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.			
3) Criteria C: The system shut down during the test.			

## 9 Radiated Electromagnetic Field Immunity test

### 9.1 Test Requirements

#### 9.1.1 Test Standard

ETSI EN 301489-1 Clause 9.2  
ETSI EN 301489-17  
EN IEC 61000-4-3:2020

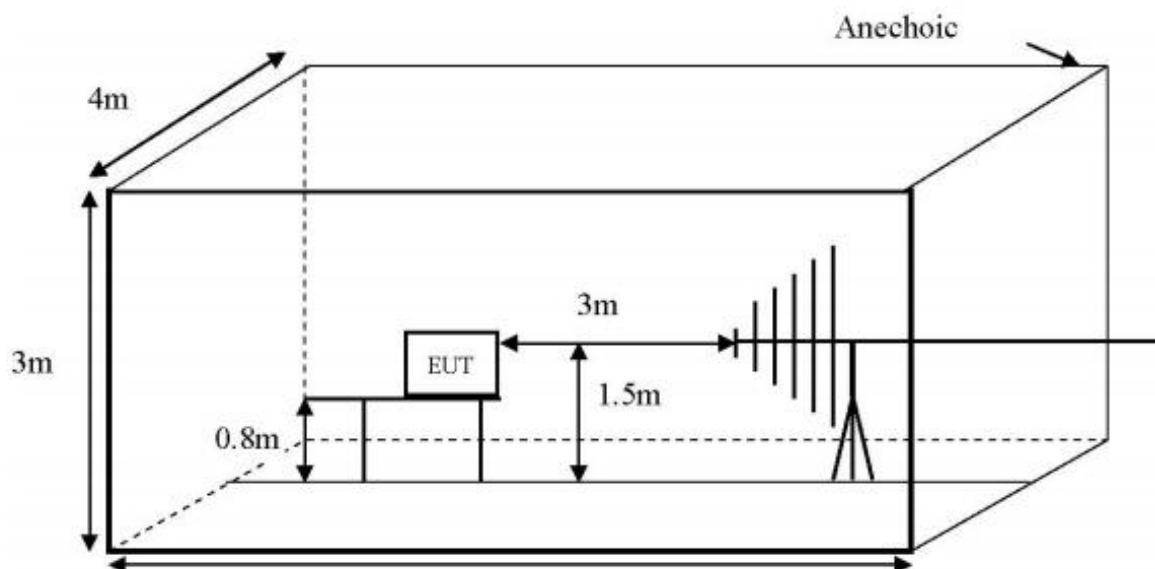
#### 9.1.2 Level

**Test Level for Radiated Electromagnetic Field Immunity Test**

Port	Test Specification
Enclosure Port	80-1000MHz, and 1400-2700MHz 3 V/m 80 % AM (1kHz)

#### 9.1.3 Performance criterion: A

### 9.2 Test Setup



### 9.3 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 is 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 camera is used to monitor its screen.

Condition of Test	Remark
-------------------	--------

1. Fielded Strength	3V/m
2. Radiated Signal	80%AM,1kHz Since Wave
3. Scanning Frequency	80-1000MHz,1400-2700MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	3 Sec.

## 9.4 Test Data

Please refer to the following page.

Temperature:	22℃	Humidity :	50%	
Field Strength:	3V/m	Criterion :	A	
Power Supply:	DC 4.5V	Test Mode :	Mode1/Mode2	
Test Engineer:	Jim			
Modulation:	<input type="checkbox"/> None <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> AM 1KHz 80%			
	Frequency Rang 1:		Frequency Rang 2:	
	80~ 1000MHz		1400~2700MHz	
	Horizontal	Vertical	Horizontal	Vertical
Front	A	A	A	A
Right	A	A	A	A
Rear	A	A	A	A
Left	A	A	A	A
Judgment	PASS		PASS	
Note: 1) Criteria A: There was no change operated with initial operating during the test. 2) Criteria B: The EUT function loss during the test, but self-recoverable after the test. 3) Criteria C: The system shut down during the test.				

## 10 Electrical Fast Transient

### 10.1 Test Requirements

#### 10.1.1 Test Standard

ETSI EN 301489-1 Clause 9.4

ETSI EN 301489-17

EN 61000-4-4: 2012

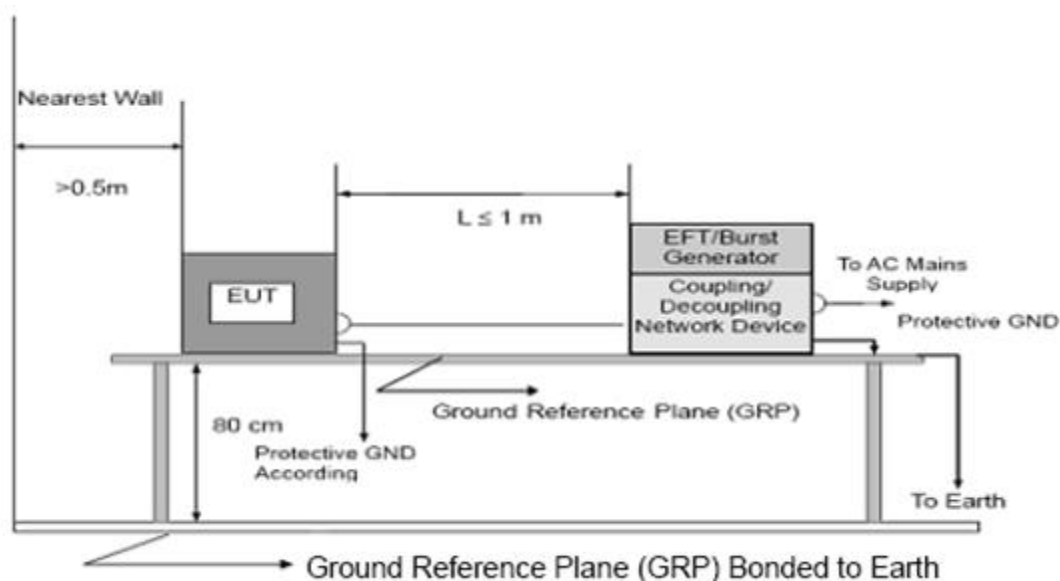
#### 10.1.2 Test Level

**Test Level for Electrical Fast Transient Test**

Test Voltage:	On AC mains power input ports	On DC power, I/O (Input/Output) Signal data and control lines
	1 KV	0.5 KV
Polarity:	Positive & Negative	
Impulse Wave Shape:	5/50ns	
Burst Duration:	15ms	
Burst Period:	300ms	
Test Duration:	2 minutes	

#### 10.1.3 Performance criterion: B

### 10.2 Test Setup



### 10.3 Test Procedure

#### 10.3.1 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 1minute.

10.3.2 For signal lines and control lines ports:

A coupling clamp is use to couple the EFT interference signal to the signal and control lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 minute.

10.3.3 For DC input and DC output power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to DC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 minute.

## 10.4 Test Data

Please refer to the following page.

## Electrical Fast Transient Test Results

Temperature:	22℃	Humidity :	50%
Power Supply:	DC 4.5V	Criterion:	B
Test Engineer:	Jim	Test Mode:	Mode 1
Test Results Description			
Line :	<input checked="" type="checkbox"/> AC Mains Line	<input type="checkbox"/> DC Power Line	<input type="checkbox"/> Signal/Control Line
Test Level:	<input checked="" type="checkbox"/> 1KV	<input type="checkbox"/> 0.5KV	<input type="checkbox"/> 0.5KV
Port(s)	Polarity	Results	Judgment
Line(L)	P	A	PASS
	N	A	PASS
Neutral(N)	P	A	PASS
	N	A	PASS
Ground(PE)	P	A	PASS
	N	A	PASS
Signal /Control Line(LAN)	P	N/A	
	N	N/A	
<p>Note:</p> <p>1) Criteria A: There was no change operated with initial operating during the test.</p> <p>2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.</p> <p>3) Criteria C: The system shut down during the test.</p>			



## 11 Surge Immunity Test

### 11.1 Test Requirements

#### 11.1.1 Test Standard

ETSI EN 301489-1 Clause 9.8

ETSI EN 301489-17

EN 61000-4-5: 2014/A1: 2017

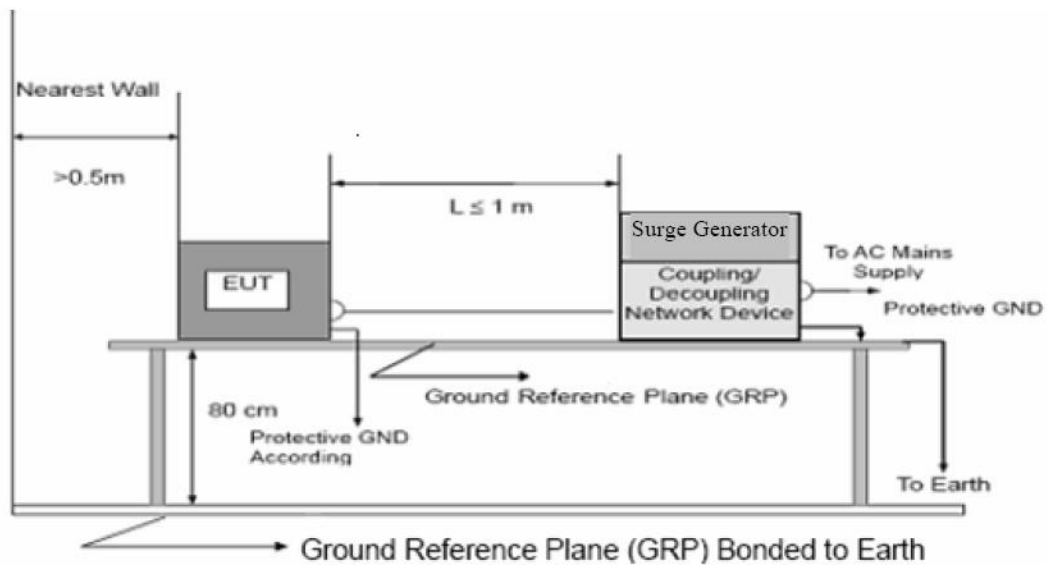
#### 11.1.2 Level

##### Test Level for Surge Immunity Test

<b>Basic Standard:</b>	<b>EN 61000-4-5</b>
<b>Wave-Shape:</b>	Combination Wave 1.2/50us Open Circuit Voltage 8/20us Short Circuit Current
<b>Test Voltage</b>	Power Line:0.5kV,1kV,2kV
<b>Surge Input/Output:</b>	L1-L2,I1-PE,L2-PE
<b>Generator Source:</b>	2 ohm between networks
<b>Impedance:</b>	12ohm between network and ground
<b>Polarity:</b>	Positive/Negative
<b>Phase Angle:</b>	0/90/180/270
<b>Interval:</b>	60s between each surge
<b>Number of Tests:</b>	5 positive and 5 negative at selected points

#### 11.1.3 Performance criterion: B

## 11.2 Test Setup



## 11.3 Test Procedure

11.3.1 Set up the EUT and test generator.

11.3.2 For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge

11.3.3 (At open-circuit condition) and 8/20us current surge to EUT selected points.

11.3.4 At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

11.3.5 Different phase angles are done individually.

11.3.6 Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

## 11.4 Test Data

Please refer to the following page.

Report No. : LH-230103040057

## 12 RF Common Mode 0.15MHz to 80MHz

### 12.1 Test Requirements

#### 12.1.1 Test Standard

ETSI EN 301489-1 Clause 9.6  
 ETSI EN 301489-17  
 EN 61000-4-6: 2014

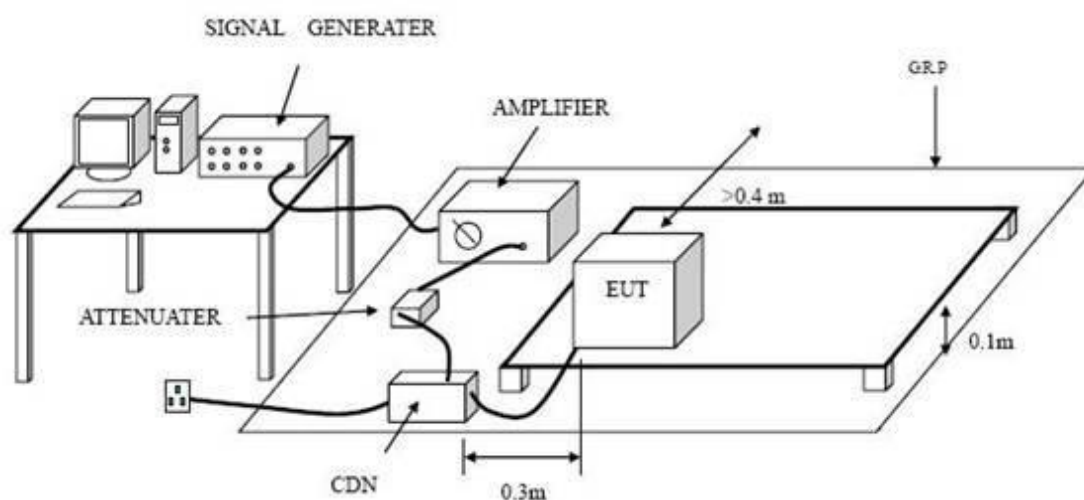
#### 12.1.2 Test Level

**Test Level for Conducted Immunity**

<b>Basic Standard:</b>	EN 61000-4-6
<b>Frequency Range</b>	0.15MHz~80 MHz
<b>Field Strength:</b>	3V rms
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1% of fundamental from 150kHz to 80 MHz
<b>Dwell Time:</b>	2 Seconds

#### 12.1.3 Performance criterion: A

### 12.2 Test Setup



### 12.3 Test Procedure

12.3.1 Set up the EUT, CDN and test generators.

12.3.2 Let the EUT work in test mode and test it.

12.3.3 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).

12.3.4 The disturbance signal description below is injected to EUT through CDN.

12.3.5 The EUT operates within its operational mode(s) under intended climatic conditions after power on.

12.3.6 The frequency range is swept from 0.150MHz to 230MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.

12.3.7 The rate of sweep shall not exceed  $1.5 \times 10^{-3}$  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.

12.3.8 Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

## 12.4 Test Data

Please refer to the following page.

## RF Common Mode Test Results

Temperature:	22℃	Humidity :	50%	
Power Supply :	DC 4.5V	Criterion :	B	
Test Engineer :	Jim	Test Mode :	Mode 1	
Test Results Description				
Frequency Range (MHz)	Injected Position	Voltage Level (e.m.f.)	Result	Judgment
0.15 ~ 80	AC Mains	3V(rms),AM Modulated 1000Hz,80%	A	PASS
0.15 ~ 80	DC Mains	3V(rms),AM Modulated 1000Hz,80%	N/A	
0.15 ~ 8 0	Signal Mains	3V(rms),AM Modulated 1000Hz,80%	N/A	
Note: 1) Criteria A: There was no change operated with initial operating during the test. 2) Criteria B: The EUT function loss during the test, but self-recoverable after the test. 3) Criteria C: The system shut down during the test.				

## 13 Voltage Dips and Interruptions Immunity Test

### 13.1 Test Requirements

#### 13.1.1 Test Standard

ETSI EN 301 489-1 Clause 9.7

ETSI EN 301 489-17

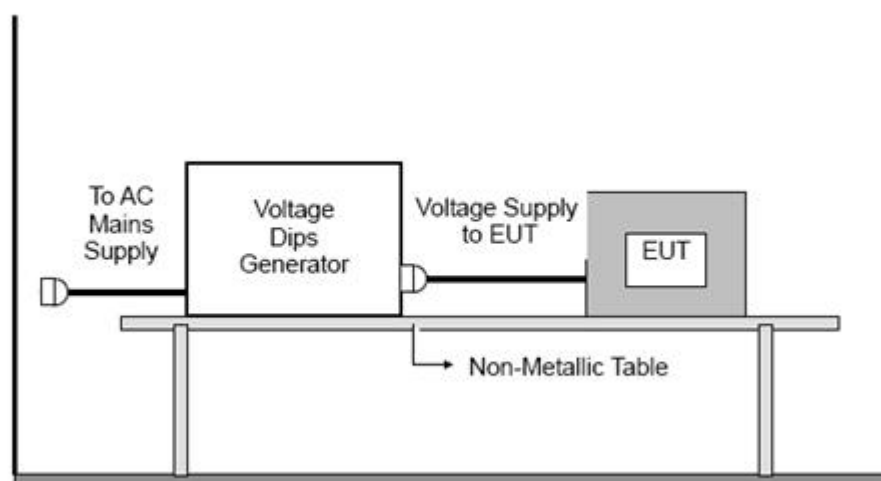
EN IEC 61000-4-11: 2020

#### 13.1.2 Level

#### Test Level for Voltage Dips and Interruptions

<b>Basic Standard:</b>	<b>EN IEC 61000-4-11</b>
<b>Required Performance:</b>	0% residual voltage for 0.5 cycle: B 0% residual voltage for 1 cycle: B 70% residual voltage for 20 cycles: C 0% residual voltage for 250 cycles: C
<b>Test Duration Time:</b>	Minimum three test events in sequence
<b>Interval Between Event:</b>	Minimum ten seconds
<b>Phase Angle:</b>	0°/45°/90°/135°/180°/225°/270°/315°/360°
<b>Test Cycle:</b>	3 times

### 13.2 Test Setup



### 13.3 Test Procedure

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

### 13.4 Test Data

## Voltage Dips and Interruptions Test Results

Temperature:	22℃	Humidity :	50%		
Power Supply:	DC 4.5V	Criterion:	B		
Test Engineer:	Jim	Test Mode:	Mode 1		
Test Results Description					
Voltage Reduction	Cycles	Perform Criteria	Results	Judgment	
Voltage dip 100%	0.5	B	A	PASS	
Voltage dip 100%	1	B	A	PASS	
Voltage dip 30%	25	C	B	PASS	
Voltage Interruption100%	250	C	C	PASS	
Note:					
1) Criteria A: There was no change operated with initial operating during the test.					
2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.					
3) Criteria C: The system shut down during the test.					



## 14 Photographs - Constructional Details

Photo 1 Appearance of EUT



Photo 2 Appearance of EUT

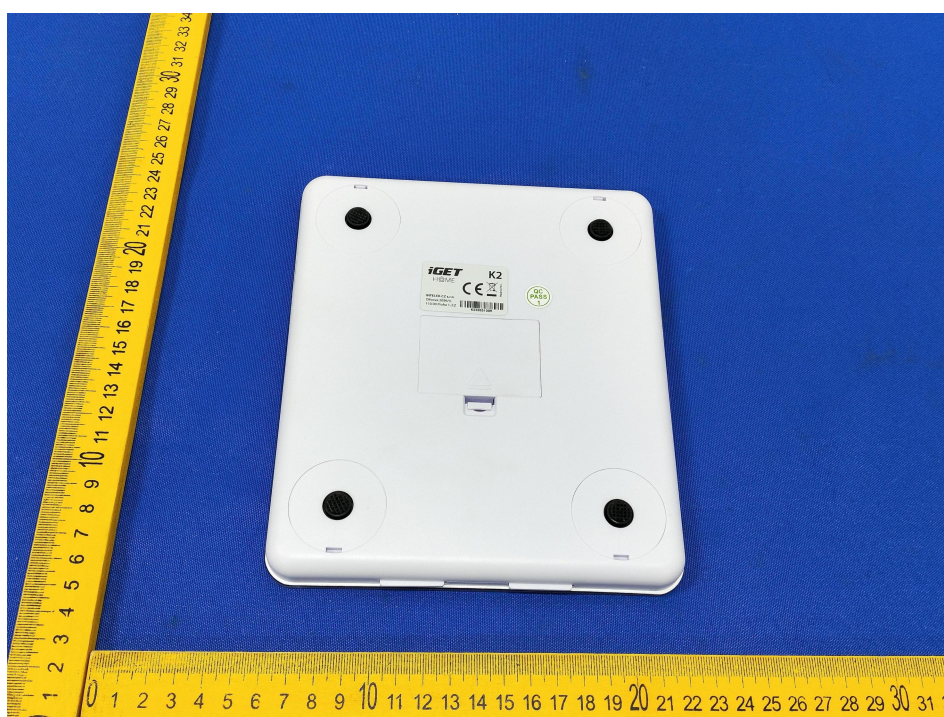




Photo 3 Inside of EUT

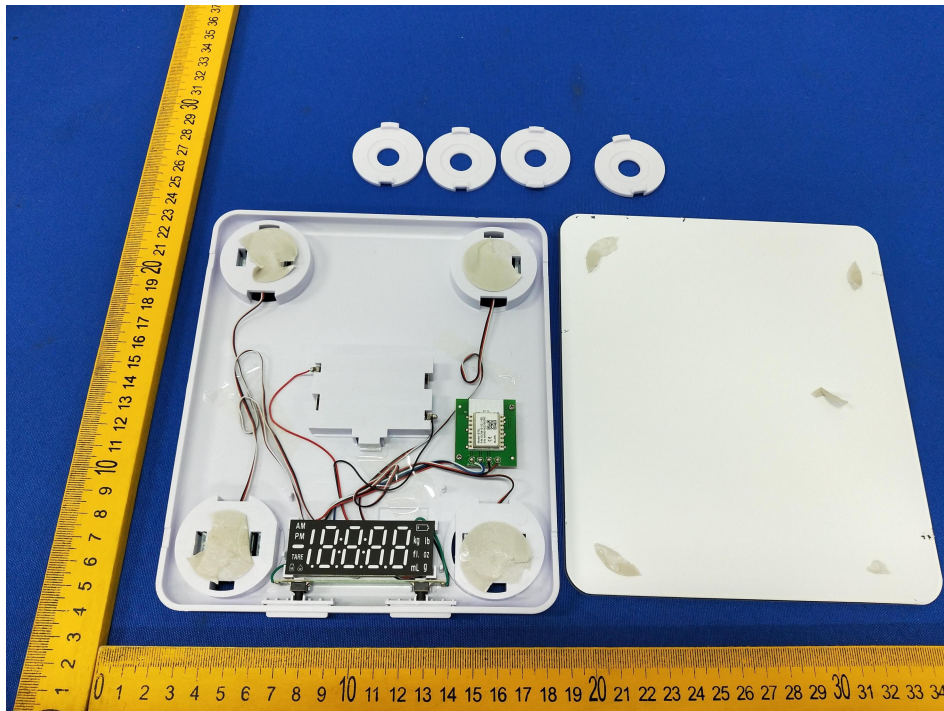


Photo 4 Appearance of PCB

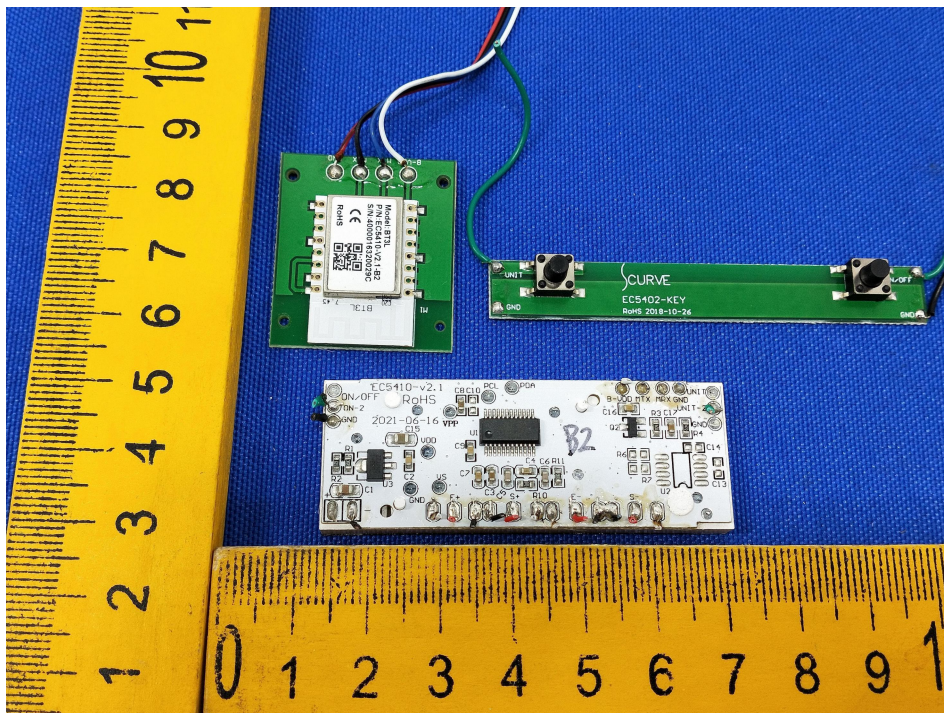
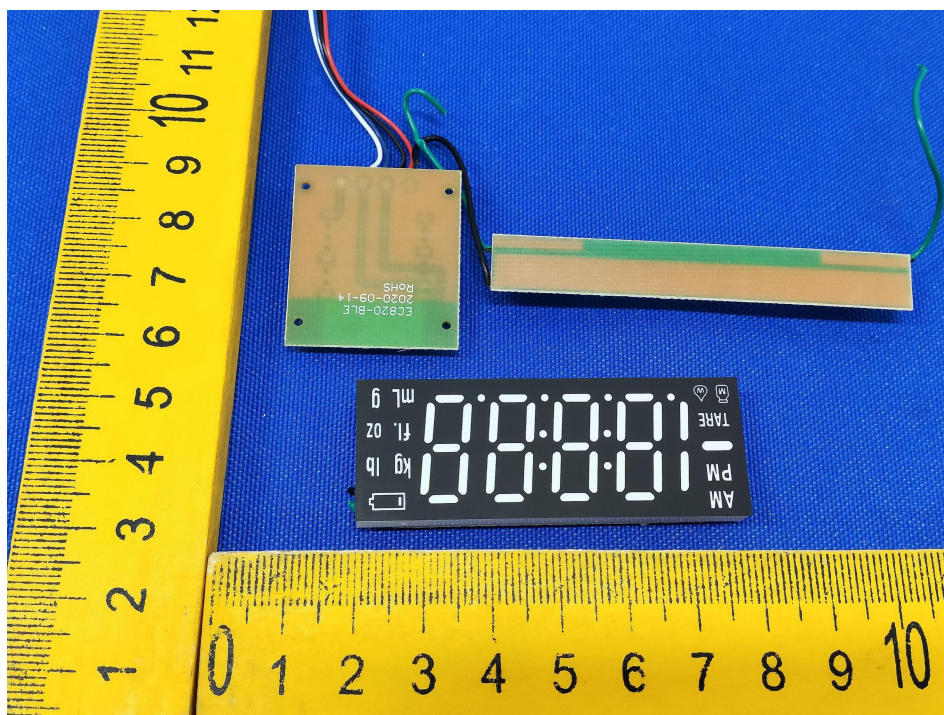


Photo 5 Appearance of PCB



END OF REPORT