

Test Report

Report No. : CE2019-00156

Company : Bullsone

Representative : Lee Chang-hun

Address : #2302, M, 32, Songdogwahak-ro, Yeonsu-gu, Incheon, 21984, Republic of Korea

1. Product Name : Air therapy multiaction
- Type and Model : Bullsone air therapy multiaction plus
2. Date of Receipt : 2019-10-25
3. Date of test : 2019-10-30 ~ 2019-11-13
4. Testing Method : EN 55014-1 : 2006/A2:2011, EN 55014-2 : 2015,
EN 61000-3-2 : 2014, EN 61000-3-3 : 2013, EN 50498 : 2010
5. Environment : as stated in the annexed paper
6. Test Results : as stated in the annexed paper

Tested by : Yong Hwan, Kim

Yong Hwan, Kim

Approved by : Yong Sung, Kim

Yong Sung, Kim

1. This report is based on the test and analysis performed with the sample(s) submitted by the client.
Therefore, the report does not guarantee the quality of entire products.
2. This report should not be used for advertising, lawsuit, etc. without any official permission of KTC.
It is only used for the purpose of the quality test.
3. The copy of this report is invalid for use.

2019-11-28



Korea Testing Certification

www.ktc.re.kr [15809] 22 Heungan-daero27beon-gil, Gunpo-si, Gyeonggi-Do, Korea
TEL : +82-1899-7654, FAX : +82-31-428-2926

Test Result

Report No. : CE2019-00156

1.0 Testing Program Details

Testing procedure and testing location	
Testing Laboratory	KTC (Korea Testing Certification)
Testing location / address	(27739) 69, Taejeong-ro, Maengdong-myeon, Eumseong-gun, Chungcheongbuk-do, Republic of Korea
Tested by (name)	Yong Hwan, Kim
Approved by (name)	Yong Sung, Kim
Test item description	Air therapy multiaction
Trade Mark	Bullsone air therapy multiaction plus
Manufacturer	UIL CO., Ltd. 869-26 Bogwang-ro, Kwangtan-myeon, Paju, Gyeonggi-do, Republic of Korea
Model / Type reference	Bullsone air therapy multiaction plus
Ratings	230 V, 50 Hz DC 12 V
Clock frequencies	≤15 MHz
Test Samples	2 Samples (#1, #2)
Modules/parts	-
Category of test item acc. 55014-2	CAT II (Category II)
Hardware / Software version	-
Possible test case verdicts	
- test case does not apply to test object	N/A
- test object does meet requirement	P (Pass)
- test object does not meet requirement	F (Fail)
Testing	
Date of receipt of test item	2019-10-25
Date(s) of performance of tests	2019-10-30 ~ 2019-11-22
General remarks: The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.	

Test Result

Report No. : CE2019-00156

INDEX

1.0	Testing Program Details	2
1.1	General Information	4
1.2	Immunity Performance Criteria	6
1.3	Result Summary	6
1.4	Series Model Description	6
1.5	Test Conditions and Results – Conducted Disturbance	7
1.6	Test Conditions and Results – Radiated Disturbance	11
1.7	Test Conditions and Results – Discontinuous Disturbance	15
1.8	Test Conditions and Results – Harmonic Distortion.....	21
1.9	Test Conditions and Results – Voltage Fluctuations and Flicker.....	25
1.10	Test Conditions and Results – Immunity to Electrostatic Discharges	29
1.11	Test Conditions and Results - Immunity to Radio Frequency Electromagnetic Fields	33
1.12	Test Conditions and Results – Electrical Fast Transients	35
1.13	Test Conditions and Results – Conducted Disturbances Immunity	37
1.14	Test Conditions and Results – Surge Immunity	39
1.15	Test Conditions and Results – Voltage Dips, Interruptions, and Variations	42
1.16	Test Conditions and Results – Radiated Emissions (ALSE)	44
1.17	Test Conditions and Results – Conducted Transient Immunity	52
1.18	Test Conditions and Results – Conducted Transient Immunity	59
2.0	Photographs of the product.....	64

Test Result

Report No. : CE2019-00156

1.1 General Information

1.1.1 Client Information

Name	Bullstone
Address	#2302, M, 32, Songdogwahak-ro, Yeonsu-gu, Incheon, 21984, Republic of Korea

1.1.2 Supporting Equipment Used During Test

Use	Product Type	Manufacturer	Model	Comments
EUT (#1)	Air therapy multiaction	UIL CO., Ltd.	Bullstone air therapy multiaction plus	DC FAN : FD4010H05TB
EUT (#2)	Air therapy multiaction	UIL CO., Ltd.	Bullstone air therapy multiaction plus	DC FAN : HXD4010B05M
AE	Adaptor	RFTECH THAI NGUYEN CO., LTD.	EP-TA50KWK	-
AE	Cigar Jack Charger	Shenzhen BON Electronics Co.,LTD	Bullstone Air therapy multiaction CigarJack	-

Supplementary information: EUT = Equipment Under Test, AE = Auxiliary / Associated Equipment, SIM = Simulator (Not Subjected to Test).

1.1.3 Input / Output Ports

Port No.	Name	Type	Cable Max. > 3 m	Cable Shielded	Comments
1	Adaptor	AC	-	N	-
2	Adaptor output	DC	1.0 m	N	-
3	Cigar Jack Charger	DC	0.7 m	N	-
4	Cigar Jack Charger output	DC	1.0 m	N	-

Supplementary information: AC = AC Power Port, DC = DC Power Port, N/E = Non-Electrical, TP = Telecommunication Ports, I/O = Signal Input or Output Port (Not Involved in Process Control).

1.1.4 Power Interface

Mode No.	Voltage (V)	Current (A)	Power (W)	Frequency (Hz)	Phases (No.)	Comments
1	230 (AC)	-	-	50	1	-
2	12 (DC)	-	-	-	-	-

Supplementary information : -

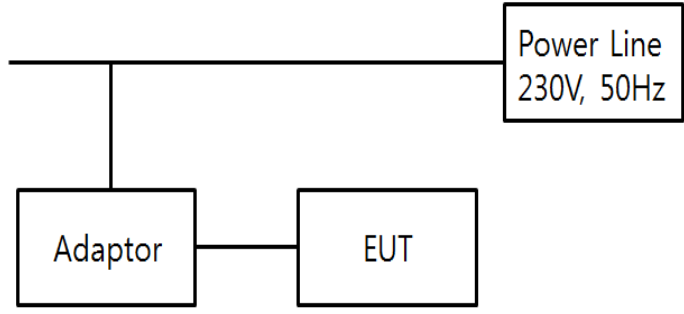
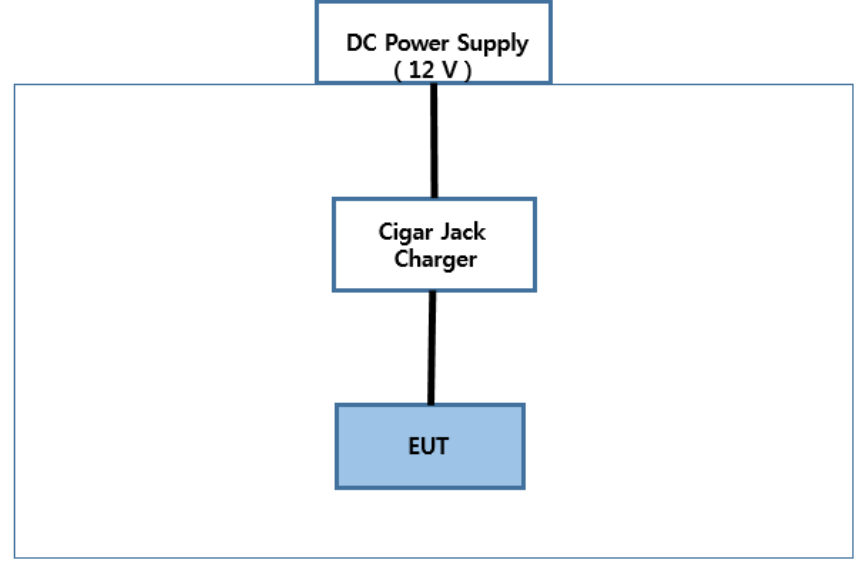
Test Result

Report No. : CE2019-00156

1.1.5 EUT Operation Modes

Mode No.	Description
1	AC input power mode. Supplementary information : Input power AC 220 V is supplied to the EUT through adaptor and the EUT was operated with air therapy.
2	DC input power mode. Supplementary information : Input power DC 12 V is supplied to the EUT through cigar Jack charger and the EUT was operated with air therapy.

1.1.6 EUT Configuration Modes

Mode No.	Description
1	
2	
Supplementary information:-	

Test Result

Report No. : CE2019-00156

1.2 Immunity Performance Criteria

Performance criterion A

The apparatus shall continue to operate as intended during and 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. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B

The apparatus shall continue to operate as intended during and 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. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls.

1.3 Result Summary

Clause	Requirement – Test	Result / Comments	Verdict P / F / N/A
1.5	Conducted Disturbance	Complied with requirement	P
1.6	Radiated Disturbance	Complied with requirement	P
1.7	Discontinuous Disturbance:	Complied with requirement	P
1.8	Harmonic Distortion	Complied with requirement	P
1.9	Voltage Fluctuations and Flicker	Complied with requirement	P
1.10	Electrostatic Discharge	Complied with requirement	P
1.11	Radio Frequency Electromagnetic Fields	Complied with requirement	N/A
1.12	Electrical Fast Transients	Complied with requirement	P
1.13	Injected currents, 0,15 MHz to 230 MHz	Complied with requirement	P
1.14	Surges	Complied with requirement	P
1.15	Voltage dips and interruptions	Complied with requirement	P
1.16	Radiated Emission(ALSE)	Complied with requirement	P
1.17	Conducted Transient Immunity	Complied with requirement	P
1.18	Conducted Transient Emission	Complied with requirement	P

1.4 Series Model Description

-

Test Result

Report No. : CE2019-00156

1.5 Test Conditions and Results – Conducted Disturbance

55014-1	TEST: Limits of Conducted Disturbance				Verdict	
<p><u>Method:</u> The AMN placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0.8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.</p>					P	
Laboratory Parameters		During the test				
Ambient Temperature		(23.2 ± 0.9) °C				
Relative Humidity		(48.4 ± 4.2) %				
Fully configured sample scanned over the following frequency range	Frequency range on each side of line			Measurement Point		
	150 kHz ~ 30 MHz			Main		
Tested date		2019. Nov. 07				
Test sample		#1, #2				
Power interface mode, EUT configurations mode, Operation mode				1		
General limits (Mains ports)						
Frequency (MHz)	Limit dB (µV)					
	Quasi-Peak			Average		
0.15 ~ 0.50	66 ~ 56			59 ~ 46		
0.50 ~ 5	56			46		
5 ~ 30	60			50		
General limits (Associated ports)						
Frequency (MHz)	Limit dB (µV)					
	Quasi-Peak			Average		
0.15 ~ 0.50	80			70		
0.50 ~ 5	74			64		
5 ~ 30	74			64		
Test Equipment Used						
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due	
EMI Test Receiver	Rohde & Schwarz	ESR3	102475	2019-08-21	2020-08-21	
LISN	Rohde & Schwarz	ENV216	102234	2019-05-14	2020-05-14	
Supplementary information: -						

Test Result

Report No. : CE2019-00156

Photo of test setup for Conducted Disturbance



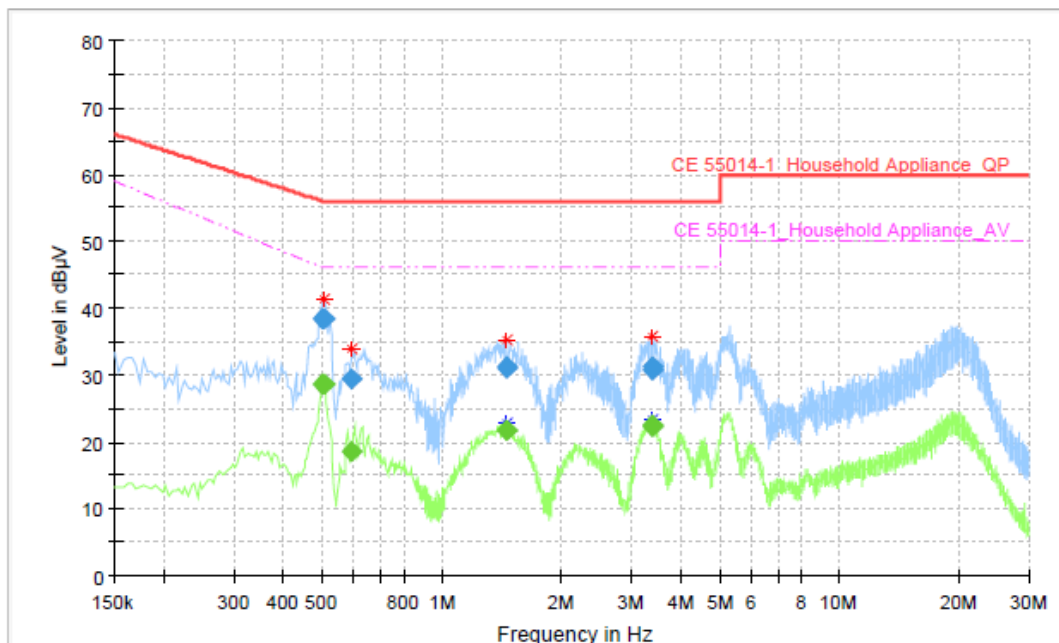
Test Result

Report No. : CE2019-00156

Tabulated Results for Conducted Disturbance_Sample #1_mode 1(1/2)

Test Report

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.502000	---	28.67	46.00	17.33	1000.0	9.000	L1	ON	9.9
0.502000	38.31	---	56.00	17.69	1000.0	9.000	L1	ON	9.9
0.506000	---	28.63	46.00	17.37	1000.0	9.000	L1	ON	9.9
0.506000	38.48	---	56.00	17.52	1000.0	9.000	L1	ON	9.9
0.594000	---	18.63	46.00	27.37	1000.0	9.000	L1	ON	9.9
0.594000	29.28	---	56.00	26.72	1000.0	9.000	L1	ON	9.9
1.450000	---	21.68	46.00	24.32	1000.0	9.000	L1	ON	9.7
1.450000	30.90	---	56.00	25.10	1000.0	9.000	L1	ON	9.7
1.458000	---	21.81	46.00	24.19	1000.0	9.000	L1	ON	9.7
1.458000	31.25	---	56.00	24.75	1000.0	9.000	L1	ON	9.7
3.366000	---	22.53	46.00	23.47	1000.0	9.000	L1	ON	9.8
3.366000	31.26	---	56.00	24.74	1000.0	9.000	L1	ON	9.8
3.378000	---	22.31	46.00	23.69	1000.0	9.000	L1	ON	9.8
3.378000	30.84	---	56.00	25.16	1000.0	9.000	L1	ON	9.8

1. Result = Including LISN Factor + Cable loss + Reading results.

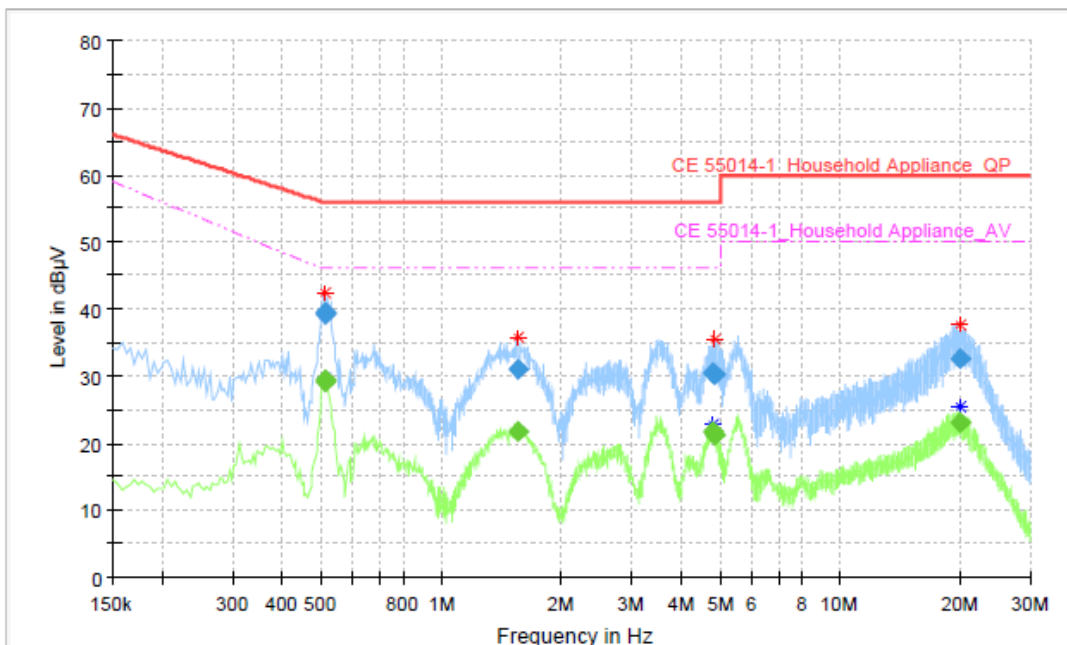
Test Result

Report No. : CE2019-00156

Tabulated Results for Conducted Disturbance_ Sample #2_mode 1(2/2)

Test Report

Full Spectrum



— Preview Result 2-AVG
* Critical_Freqs AVG
— CE 55014-1_Household Appliance_QP
◆ Final_Result QPK
— Preview Result 1-PK+
- - - Critical_Freqs PK+
- - - CE 55014-1_Household Appliance_AV
◆ Final_Result CAV

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.510000	---	29.36	46.00	16.64	1000.0	9.000	L1	ON	9.9
0.510000	39.44	---	56.00	16.56	1000.0	9.000	L1	ON	9.9
0.514000	---	29.09	46.00	16.91	1000.0	9.000	L1	ON	9.9
0.514000	39.15	---	56.00	16.85	1000.0	9.000	L1	ON	9.9
1.550000	---	21.70	46.00	24.30	1000.0	9.000	L1	ON	9.7
1.550000	31.10	---	56.00	24.90	1000.0	9.000	L1	ON	9.7
4.806000	---	21.74	46.00	24.26	1000.0	9.000	L1	ON	9.8
4.806000	30.57	---	56.00	25.43	1000.0	9.000	L1	ON	9.8
4.850000	---	21.29	46.00	24.71	1000.0	9.000	L1	ON	9.8
4.850000	30.22	---	56.00	25.78	1000.0	9.000	L1	ON	9.8
19.926000	---	23.00	50.00	27.00	1000.0	9.000	L1	ON	10.0
19.926000	32.55	---	60.00	27.45	1000.0	9.000	L1	ON	10.0

1. Result = Including LISN Factor + Cable loss + Reading results.

Test Result

Report No. : CE2019-00156

1.6 Test Conditions and Results – Radiated Disturbance

55014-1	TEST: Disturbance power in the frequency range from 30 MHz ~ 300 MHz				Verdict
Method: Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks(LISN). The lead to be measured on is stretched in straight line for a distance sufficient to accommodate the absorbing clamp, and to permit the necessary measuring adjustment of position for tuning. The clamp is placed around the lead so as to measure a quantity proportional to the disturbance on the lead					P
Laboratory Parameters		During the test			
Ambient Temperature		(22.7 ± 0.9) °C			
Relative Humidity		(47.6 ± 4.2) %			
Fully configured sample scanned over the following frequency range		Frequency range		Measurement Point	
		30 MHz ~ 300 MHz		Main	
Tested date		2019. Nov. 08			
Test sample		#1, #2			
Power interface mode, EUT configurations mode, Operation mode				1	
Limits					
Frequency (MHz)		Limit dB (µV/m)			
		Quasi-Peak		Average	
30 to300		45 ~ 55		35 ~ 45	
Supplementary information: -					
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	ESR3	Rohde & Schwarz	102475	2019-08-21	2020-08-21
Absorbing Clamp	MDS-21B	TESEQ	51018	2019-08-28	2020-08-28
Cable Guide Rail	CGR5.4	MATURO	-	-	-
Supplementary information: -					

Test Result

Report No. : CE2019-00156

Photo of test setup for Radiated Disturbance.

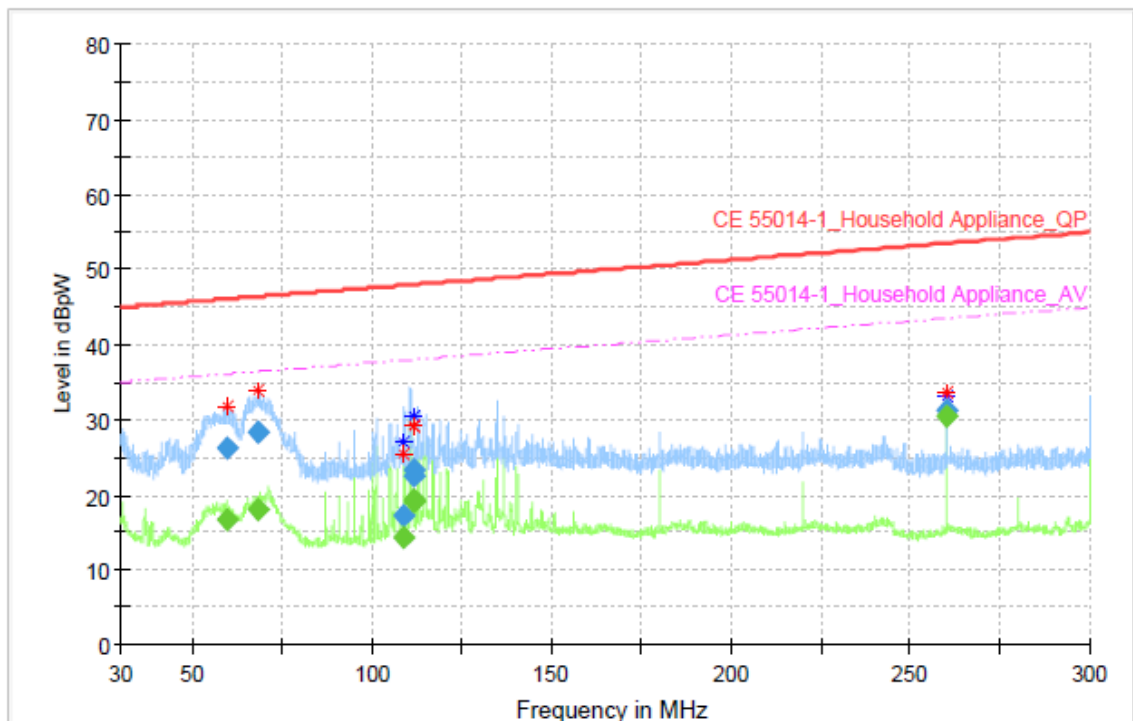


Test Result

Report No. : CE2019-00156

Tabulated Results for Radiated Disturbance_ Sample #1_mode 1(1/2)

Test Report



- ◆ Preview Result 2-AVG
- * Critical_Freqs AVG
- ◆ CE 55014-1_Household Appliance_QP
- ◆ Final_Result QPK
- Preview Result 1-PK+
- *— Critical_Freqs PK+
- - - CE 55014-1_Household Appliance_AV
- ◆ Final_Result CAV

Final Result

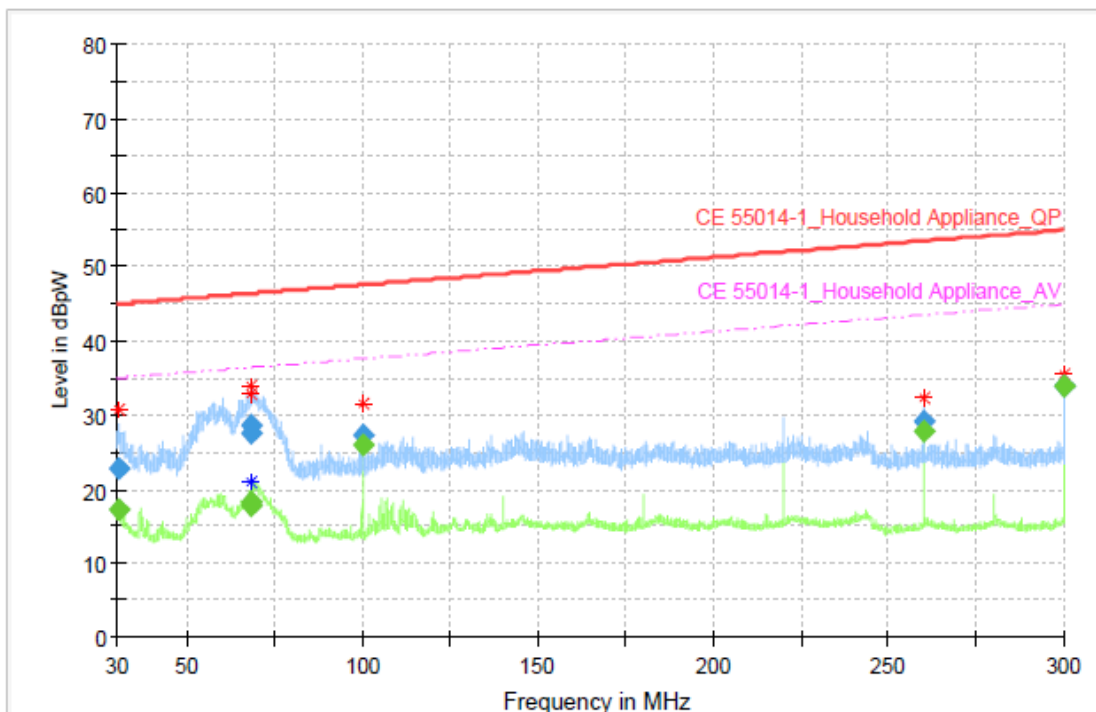
Frequency (MHz)	QuasiPeak (dBpW)	CAverage (dBpW)	Limit (dBpW)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Position (cm)	Corr. (dB)
59.531500	26.21	---	46.09	19.88	10000.0	120.000	124.0	6.5
59.531500	---	16.80	36.09	19.30	10000.0	120.000	124.0	6.5
67.999500	---	18.13	36.41	18.27	10000.0	120.000	122.0	6.6
67.999500	28.42	---	46.41	17.99	10000.0	120.000	122.0	6.6
108.629500	17.16	---	47.91	30.76	10000.0	120.000	66.0	6.7
108.629500	---	14.40	37.91	23.52	10000.0	120.000	66.0	6.7
111.530000	23.29	---	48.02	24.73	10000.0	120.000	425.0	6.8
111.530000	---	19.46	38.02	18.56	10000.0	120.000	425.0	6.8
111.530500	22.42	---	48.02	25.60	10000.0	120.000	425.0	6.8
111.530500	---	19.00	38.02	19.02	10000.0	120.000	425.0	6.8
259.999500	---	30.33	43.52	13.19	10000.0	120.000	8.0	7.2
259.999500	31.22	---	53.52	22.30	10000.0	120.000	8.0	7.2

Test Result

Report No. : CE2019-00156

Tabulated Results for Radiated Disturbance_ Sample #2_mode 1(2/2)

Test Report



- Preview Result 2-AVG
- Preview Result 1-PK+
- CE 55014-1_Household Appliance_QP
- CE 55014-1_Household Appliance_AV
- Critical_Freqs AVG
- Critical_Freqs PK+
- Final_Result QPK
- Final_Result CAV

Final Result

Frequency (MHz)	QuasiPeak (dBpW)	CAverage (dBpW)	Limit (dBpW)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Position (cm)	Corr. (dB)
30.640000	22.76	---	45.02	22.26	10000.0	120.000	381.0	6.4
30.640000	---	17.11	35.02	17.92	10000.0	120.000	381.0	6.4
68.422000	28.49	---	46.42	17.93	10000.0	120.000	341.0	6.6
68.422000	---	18.23	36.42	18.20	10000.0	120.000	341.0	6.6
68.460000	27.51	---	46.42	18.91	10000.0	120.000	142.0	6.6
68.460000	---	17.67	36.42	18.75	10000.0	120.000	142.0	6.6
99.997500	---	26.07	37.59	11.52	10000.0	120.000	488.0	6.7
99.997500	27.21	---	47.59	20.38	10000.0	120.000	488.0	6.7
259.999500	29.26	---	53.52	24.26	10000.0	120.000	390.0	7.2
259.999500	---	27.73	43.52	15.79	10000.0	120.000	390.0	7.2
300.000000	---	33.82	45.00	11.18	10000.0	120.000	19.0	7.3
300.000000	33.87	---	55.00	21.13	10000.0	120.000	19.0	7.3

Test Result

Report No. : CE2019-00156

1.7 Test Conditions and Results – Discontinuous Disturbance

55014-1	TEST: Limits of Discontinuous Disturbance		Verdict
<p><u>Method:</u> Measurement of a disturbance, the amplitude of which exceeds the quasi-peak limit of continuous disturbance, the duration of which is not longer than 200 ms which is separated from a subsequent disturbance by at least 200 ms.</p>			P
Parameters required prior to the test	Laboratory Ambient Temperature	15 ~ 35 °C	
	Relative Humidity	30 ~ 60 %	
	Air pressure	860 ~ 1 060 mbar	
Parameters recorded during the test	Laboratory Ambient Temperature	(22.7 ± 0.9) °C	
	Relative Humidity	(47.6 ± 4.2) %	
Fully configured sample scanned over the following frequency range	150 kHz ~ 30 MHz	Main	
Tested date	2019. Nov. 08		
Test sample	#1, #2		
Power interface mode, EUT configurations mode, Operation mode			1
HOUSEHOLD APPLIANCES AND EQUIPMENT CAUSING SIMILAR DISTURBANCES AND REGULATING CONTROLS INCORPORATING SEMICONDUCTORS DEVICES			
<p>The limits for discontinuous disturbance depend mainly on the character of the disturbance and on the click rate N.</p> <p>First measurement with the limit L and a time of measurement equal to T or 120 min :</p> <p>The click rate is obtained with : $N = \text{Number of clicks } N1 / \text{Time of measurement}$</p> <p>For discontinuous disturbance, the click limit Lq is attained by increasing the relevant limit L with :</p> <p style="text-align: center;"> 44 dB for $N < 0.2$, or $20 \lg (30 / N)$ for $0.2 \leq N < 30$ </p> <p>Second measurement with the limit Lq during the same time T or 120 min :</p> <p>The number of authorized clicks is equal to : $N2 \leq N1/4$</p>			
Frequency (MHz)		Result	
0.15		Pass	
0.5		Pass	
1.4		Pass	
30		Pass	
Supplementary information:			

Test Result

Report No. : CE2019-00156

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
CLICK METER	AFJ Inter. Srl	DDA55	14041832127	2019-08-21	2020-08-21
LISN	AFJ Inter. Srl	LT32C/10	32031837286	2019-08-21	2020-08-21

Photo of test setup for Discontinuous Disturbance



Test Result

Report No. : CE2019-00156

Tabulated Results for Discontinuous Disturbance_ Sample #1_mode 1(1/4)



DDA55 TEST REPORT

TEST PASS

8/11/2019 13:17:57

Title	Default Test 0	Time Test	02:00:00.00
Required		Executed by	
Description			
Model	Default		
Type		SN	
Report			

Mode **Click Rate**

Type of Eut **Air Theraphy**

Rx 150 KHz Att. [dB]	10	Rx 500 kHz Att. [dB]	10
Rx 1.4 MHz Att. [dB]	10	Rx 30 MHz Att. [dB]	10
Rx 150 kHz Input Offset [dB]	10	Rx 500 kHz Input Offset [dB]	9.84
Rx 1.4 MHz Input Offset [dB]	9.8	Rx 30 MHz Input Offset [dB]	9.7
External Att. [dB]	NONE		
Remote	LISN LT32 - LINE 1		

Test Result

Report No. : CE2019-00156

Tabulated Results for Discontinuous Disturbance_ Sample #1_mode 1(2/4)

	150 kHz	500 kHz	1.4 MHz	30 MHz
First Run				
Short	0	0	0	0
Long	0	0	0	0
Long (10 < t ≤ 20 ms)	0	0	0	0
Tot. Clicks Corr	0	0	0	0
Events	0	0	0	0
Time(s)	0.00	0.00	0.00	0.00
Sw.Op.	0	0	0	0
5.4.3.5 events	0	0	0	0
Limit dBuV	66	56	66	60
N	0.00	0.00	0.00	0.00
	PASS	PASS	PASS	PASS

150 kHz	No Clicks	500 kHz	No Clicks
1.4 MHz	No Clicks	30 MHz	No Clicks

New Limit
[dBuV]

Allowed Clicks

SECOND PASS NOT ALLOWED

Short

Long

Tot. Clicks Corr

Events

Time(s)

5.4.3.5 events

Test Result

Report No. : CE2019-00156

Tabulated Results for Discontinuous Disturbance_ Sample #2_mode 1(3/4)



DDA55 TEST REPORT

TEST PASS

8/11/2019 10:34:12

Title	Default Test 0	Time Test	02:00:00.00
Required		Executed by	
Description			
Model	Default		
Type		SN	
Report			

Mode **Click Rate**

Type of Eut **Air Theraphy**

Rx 150 KHz Att. [dB]	10	Rx 500 kHz Att. [dB]	10
Rx 1.4 MHz Att. [dB]	10	Rx 30 MHz Att. [dB]	10
Rx 150 kHz Input Offset [dB]	10	Rx 500 kHz Input Offset [dB]	9.84
Rx 1.4 MHz Input Offset [dB]	9.8	Rx 30 MHz Input Offset [dB]	9.7
External Att. [dB]	NONE		
Remote	LISN LT32 - LINE 1		

Test Result

Report No. : CE2019-00156

Tabulated Results for Discontinuous Disturbance_ Sample #2_mode 1(4/4)

	150 kHz	500 kHz	1.4 MHz	30 MHz
First Run				
Short	0	0	0	0
Long	0	0	0	0
Long (10< t ≤20 ms)	0	0	0	0
Tot. Clicks Corr	0	0	0	0
Events	0	0	0	0
Time(s)	0.00	0.00	0.00	0.00
Sw.Op.	0	0	0	0
5.4.3.5 events	0	0	0	0
Limit dBuV	66	56	66	60
N	0.00	0.00	0.00	0.00
	PASS	PASS	PASS	PASS

150 kHz	No Clicks	500 kHz	No Clicks
1.4 MHz	No Clicks	30 MHz	No Clicks

New Limit
[dBuV]
Allowed Clicks

SECOND PASS NOT ALLOWED

Short
Long
Tot. Clicks Corr
Events
Time(s)
5.4.3.5 events

Test Result

Report No. : CE2019-00156

1.8 Test Conditions and Results – Harmonic Distortion

61000-3-2	TEST: Limits for Harmonic current emissions	Verdict
Method: This test consists on the measurement of harmonics components of the input current which may be produced by equipment having an input current up to and including 16 A per phase, and intended to be connected to public low-voltage distribution systems. The equipment is tested under specified conditions of operation.		P
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	15 to 35 °C	(21.8 ± 0.9) °C
Relative Humidity	30 to 60 %	(47.1 ± 4.2) %
Tested date	2019. Oct. 30	
Test sample	#1, #2	
Power interface mode, EUT configurations mode, Operation mode		1
Classification of Equipment		Class A
Supplementary information:		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Harmonics/Flicker, Dip Test System	Spitzenberger Spies	EMC D 60000/PAS	A3713 00/1 0706	2019-02-01	2020-02-01

Test Result

Report No. : CE2019-00156

Photo of test setup for Harmonic Current Emissions



Test Result

Report No. : CE2019-00156

Tabulated Results for Harmonic Current Emissions_ Sample #1_mode 1(1/2)

Spitzenberger & Spies
Viechtach

DEPARTMENT:EMC CENTER

Model : FXDJ

Maximum RMS current and corresponding values in timewindow 11:

Voltage: 232.36 Vrms THD=0.02 % THV=0.050 V POHV=0.005 V PWHD=0.02 %
 Current: 0.021 Arms THD=168.86 % THC=0.018 A POHC=0.005 A PWHD=357.86 %
 Power: 2.4 W P1=2.4 W 4.8 VA
 Power factor: 0.507 CosPhi1: 1.000

Test conditions: EN 61000-3-2:2014, f=50 Hz, Phase=L1, Range=0.16 A
 Time window=10/12 (200ms), Grouping (>2nd harm.)=on
 No Ztest selected
 harmonic currents < 0.6 % of I or < 5 mA are disregard for calc. of THD, THC, POHC, PWHD

HARMONIC ANALYSIS: Test PASS
 Tobs = entire measurement; POHC: avg=0.00 A, limits=0.25 A
 Iavg=0.019 Arms

Ha	Entire measurement (60.0 min = 18000 time windows)							Worst 2.5 min		Average		P A S S	F A I L
	Maximum	Window	EN61000-3-2 Class A	Margin in MaxWin	100 to 150%	150 to 200%	Ex- ceeded	100 to 150%	Ex- ceeded	Value	Ex- ceeded		
DC	-0.0026 A	15332	-----	-----	0	0	0	n.e.	n.e.	-0.0021 A	0	X	
1	0.0104 A	13	-----	-----	0	0	0	n.e.	n.e.	0.0095 A	0	X	
2	0.0002 A	15961	1.0800 A	-100.0 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
3	0.0070 A	14	2.3000 A	-99.7 %	0	0	0	n.e.	n.e.	0.0064 A	0	X	
4	0.0002 A	15961	0.4300 A	-100.0 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
5	0.0068 A	14	1.1400 A	-99.4 %	0	0	0	n.e.	n.e.	0.0062 A	0	X	
6	0.0002 A	15961	0.3000 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
7	0.0065 A	12	0.7700 A	-99.2 %	0	0	0	n.e.	n.e.	0.0059 A	0	X	
8	0.0001 A	15961	0.2300 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
9	0.0061 A	11	0.4000 A	-98.5 %	0	0	0	n.e.	n.e.	0.0056 A	0	X	
10	0.0001 A	15961	0.1840 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
11	0.0057 A	11	0.3300 A	-98.3 %	0	0	0	n.e.	n.e.	0.0053 A	0	X	
12	0.0001 A	15035	0.1533 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
13	0.0052 A	7653	0.2100 A	-97.5 %	0	0	0	n.e.	n.e.	0.0049 A	0	X	
14	0.0001 A	9475	0.1314 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
15	0.0047 A	7653	0.1500 A	-96.8 %	0	0	0	n.e.	n.e.	0.0044 A	0	X	
16	0.0001 A	9475	0.1150 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
17	0.0042 A	8784	0.1324 A	-96.8 %	0	0	0	n.e.	n.e.	0.0039 A	0	X	
18	0.0001 A	8344	0.1022 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
19	0.0037 A	17976	0.1184 A	-96.9 %	0	0	0	n.e.	n.e.	0.0034 A	0	X	
20	0.0001 A	8344	0.0920 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
21	0.0032 A	17993	0.1071 A	-97.0 %	0	0	0	n.e.	n.e.	0.0029 A	0	X	
22	0.0001 A	7082	0.0836 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
23	0.0027 A	17976	0.0978 A	-97.3 %	0	0	0	n.e.	n.e.	0.0024 A	0	X	
24	0.0001 A	7082	0.0767 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
25	0.0022 A	17993	0.0900 A	-97.6 %	0	0	0	n.e.	n.e.	0.0020 A	0	X	
26	0.0001 A	7082	0.0708 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
27	0.0017 A	17992	0.0833 A	-98.0 %	0	0	0	n.e.	n.e.	0.0015 A	0	X	
28	0.0001 A	6104	0.0657 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
29	0.0013 A	17993	0.0776 A	-98.4 %	0	0	0	n.e.	n.e.	0.0011 A	0	X	
30	0.0001 A	6104	0.0613 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
31	0.0009 A	17993	0.0726 A	-98.8 %	0	0	0	n.e.	n.e.	0.0008 A	0	X	
32	0.0001 A	6107	0.0575 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
33	0.0006 A	17919	0.0682 A	-99.1 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
34	0.0001 A	6551	0.0541 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
35	0.0004 A	17660	0.0643 A	-99.4 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
36	0.0001 A	4002	0.0511 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
37	0.0004 A	48	0.0608 A	-99.4 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
38	0.0001 A	4012	0.0484 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
39	0.0005 A	48	0.0577 A	-99.2 %	0	0	0	n.e.	n.e.	0.0004 A	0	X	
40	0.0001 A	4012	0.0460 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	

average value < 0.6 % of Iavg or < 5 mA n.e. = not evaluated

Test Result

Report No. : CE2019-00156

Tabulated Results for Harmonic Current Emissions_ Sample #2_mode 1(2/2)

Spitzenberger & Spies
Viechtach

DEPARTMENT:EMC CENTER

Model : HWASHIN

Maximum RMS current and corresponding values in timewindow 3:

Voltage: 232.45 Vrms THD=0.02 % THV=0.050 V POHV=0.005 V PWHD=0.02 %
 Current: 0.018 Arms THD=170.47 % THC=0.016 A POHC=0.005 A PWHD=419.99 %
 Power: 2.1 W P1=2.1 W 4.3 VA
 Power factor: 0.499 CosPhi1: 1.000

Test conditions: EN 61000-3-2:2014, f=50 Hz, Phase=L1, Range=0.16 A
 Time window=10/12 (200ms), Grouping (>2nd harm.)=on
 No Ztest selected

harmonic currents < 0.6 % of I or < 5 mA are disregard for calc. of THD, THC, POHC, PWHD

HARMONIC ANALYSIS: Test PASS

Tobs = entire measurement; POHC: avg=0.00 A, limits=0.25 A

Iavg=0.017 Arms

Ha	Entire measurement (60.0 min = 18000 time windows)							Worst 2.5 min		Average		P A S S	F A I L
	Maximum	Window	EN61000-3-2 Class A	Margin in MaxWin	100 to 150%	150 to 200%	Ex- ceeded	100 to 150%	Ex- ceeded	Value	Ex- ceeded		
DC	-0.0032 A	15482	-----	-----	0	0	0	n.e.	n.e.	-0.0027 A	0	X	
1	0.0092 A	3	-----	-----	0	0	0	n.e.	n.e.	0.0085 A	0	X	
2	0.0001 A	650	1.0800 A	-100.0 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
3	0.0058 A	3	2.3000 A	-99.7 %	0	0	0	n.e.	n.e.	0.0053 A	0	X	
4	0.0001 A	655	0.4300 A	-100.0 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
5	0.0057 A	6	1.1400 A	-99.5 %	0	0	0	n.e.	n.e.	0.0052 A	0	X	
6	0.0001 A	984	0.3000 A	-100.0 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
7	0.0055 A	4	0.7700 A	-99.3 %	0	0	0	n.e.	n.e.	0.0050 A	0	X	
8	0.0001 A	433	0.2300 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
9	0.0053 A	2	0.4000 A	-98.7 %	0	0	0	n.e.	n.e.	0.0048 A	0	X	
10	0.0001 A	641	0.1840 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
11	0.0050 A	3	0.3300 A	-98.5 %	0	0	0	n.e.	n.e.	0.0046 A	0	X	
12	0.0001 A	1857	0.1533 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
13	0.0047 A	3	0.2100 A	-97.8 %	0	0	0	n.e.	n.e.	0.0043 A	0	X	
14	0.0001 A	641	0.1314 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
15	0.0043 A	3	0.1500 A	-97.1 %	0	0	0	n.e.	n.e.	0.0039 A	0	X	
16	0.0001 A	662	0.1150 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
17	0.0039 A	2	0.1324 A	-97.1 %	0	0	0	n.e.	n.e.	0.0036 A	0	X	
18	0.0001 A	593	0.1022 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
19	0.0035 A	9	0.1184 A	-97.0 %	0	0	0	n.e.	n.e.	0.0032 A	0	X	
20	0.0001 A	662	0.0920 A	-99.9 %	0	0	0	n.e.	n.e.	0.0001 A	0	X	
21	0.0031 A	7	0.1071 A	-97.1 %	0	0	0	n.e.	n.e.	0.0028 A	0	X	
22	0.0001 A	662	0.0836 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
23	0.0027 A	20	0.0978 A	-97.3 %	0	0	0	n.e.	n.e.	0.0024 A	0	X	
24	0.0001 A	652	0.0767 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
25	0.0023 A	3	0.0900 A	-97.5 %	0	0	0	n.e.	n.e.	0.0020 A	0	X	
26	0.0001 A	441	0.0708 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
27	0.0019 A	68	0.0833 A	-97.8 %	0	0	0	n.e.	n.e.	0.0017 A	0	X	
28	0.0000 A	2034	0.0657 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
29	0.0015 A	74	0.0776 A	-98.1 %	0	0	0	n.e.	n.e.	0.0013 A	0	X	
30	0.0000 A	652	0.0613 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
31	0.0011 A	74	0.0726 A	-98.4 %	0	0	0	n.e.	n.e.	0.0010 A	0	X	
32	0.0000 A	652	0.0575 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
33	0.0008 A	123	0.0682 A	-98.8 %	0	0	0	n.e.	n.e.	0.0007 A	0	X	
34	0.0001 A	1	0.0541 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
35	0.0006 A	74	0.0643 A	-99.1 %	0	0	0	n.e.	n.e.	0.0005 A	0	X	
36	0.0001 A	1	0.0511 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
37	0.0004 A	137	0.0608 A	-99.4 %	0	0	0	n.e.	n.e.	0.0003 A	0	X	
38	0.0001 A	1	0.0484 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	
39	0.0003 A	191	0.0577 A	-99.5 %	0	0	0	n.e.	n.e.	0.0002 A	0	X	
40	0.0001 A	1	0.0460 A	-99.9 %	0	0	0	n.e.	n.e.	0.0000 A	0	X	

average value < 0.6 % of Iavg or < 5 mA n.e. = not evaluated

Test Result

Report No. : CE2019-00156

1.9 Test Conditions and Results – Voltage Fluctuations and Flicker

61000-3-3	TEST: Limitation of Voltage Fluctuations And Flicker		Verdict
Method: The test circuit consists of a test supply voltage, reference impedance, the equipment under test and a flicker meter compliant with IEC 60868. The equipment shall be tested in the condition in which the manufacturer supplies it.			P
Laboratory Parameters:	Required prior to the test	During the test	
Ambient Temperature	15 to 35 °C	(21.8 ± 0.9) °C	
Relative Humidity	30 to 60 %	(47.1 ± 4.2) %	
Tested date	2019. Oct. 30		
Test sample	#1, #2		
Power interface mode, EUT configurations mode, Operation mode		1	
Control Method of Equipment (see below)		1	
1 - without additional conditions			
2 - switched manually, or switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.			
3 - attended while in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.			
Supplementary information:			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Harmonics/Flicker, Dip Test System	Spitzenberger Spies	EMC D 60000/PAS	A3713 00/1 0706	2019-01-31	2020-01-31

Test Result

Report No. : CE2019-00156

Photo of test setup for Voltage Fluctuations And Flicker



Test Result

Report No. : CE2019-00156

Tabulated Results for Voltage Fluctuations And Flicker_ Sample #1_mode 1(1/2)

Spitzenberger & Spies
Viechtach

DEPARTMENT:EMC CENTER

Model : FXDJ

Test conditions: EN 61000-3-3:2013 / 230 V / 50 Hz / Phase L1
EN 61000-4-15:2011 / Obs 12 x 10 min / Ztest (0.400+j0.250) Ohm
Ra+jXa (0.2400+j0.1500) Ohm / Rn+jXn (0.1600+j0.1000) Ohm

FLICKER: Test PASS!

Time	Pmax	Pst	Sliding Plt	Tmax [s]	dmax [%]	dc [%]	PASS	FAIL
10:31:22	0.002	0.0310	- .-----	0.000	+0.000	- .-----	X	
10:41:22	0.001	0.0250	- .-----	0.000	+0.000	- .-----	X	
10:51:22	0.002	0.0330	- .-----	0.000	+0.000	- .-----	X	
11:01:22	0.003	0.0380	- .-----	0.000	+0.000	- .-----	X	
11:11:22	0.000	0.0160	- .-----	0.000	+0.000	- .-----	X	
11:21:22	0.000	0.0160	0.0289	0.000	+0.000	- .-----	X	
11:31:22	0.001	0.0160	0.0270	0.000	+0.000	- .-----	X	
11:41:22	0.001	0.0250	0.0270	0.000	+0.000	- .-----	X	
11:51:22	0.000	0.0160	0.0244	0.000	+0.000	- .-----	X	
12:01:22	0.000	0.0160	0.0182	0.000	+0.000	- .-----	X	
12:11:22	0.001	0.0170	0.0183	0.000	+0.000	- .-----	X	
12:21:22	0.001	0.0160	0.0183	0.000	+0.000	- .-----	X	
Limits:		1.000	0.650	0.500	4.000	3.300		
Plt: 0.024723 (calculated over 12 periods)							X	
Evaluated: PST, PLT, Sliding PLT, dc, dmax, Tmax								

FLICKER: Source test PASS!

Time	Pmax	Pst	Sliding Plt	Tmax [s]	dmax [%]	dc [%]	PASS	FAIL
10:31:22	0.002	0.0340	- .-----	0.000	+0.000	- .-----	X	
10:41:22	0.001	0.0270	- .-----	0.000	+0.000	- .-----	X	
10:51:22	0.002	0.0310	- .-----	0.000	+0.000	- .-----	X	
11:01:22	0.004	0.0420	- .-----	0.000	+0.000	- .-----	X	
11:11:22	0.001	0.0170	- .-----	0.000	+0.000	- .-----	X	
11:21:22	0.001	0.0170	- .-----	0.000	+0.000	- .-----	X	
11:31:22	0.001	0.0170	- .-----	0.000	+0.000	- .-----	X	
11:41:22	0.001	0.0250	- .-----	0.000	+0.000	- .-----	X	
11:51:22	0.001	0.0170	- .-----	0.000	+0.000	- .-----	X	
12:01:22	0.001	0.0180	- .-----	0.000	+0.000	- .-----	X	
12:11:22	0.001	0.0180	- .-----	0.000	+0.000	- .-----	X	
12:21:22	0.001	0.0170	- .-----	0.000	+0.000	- .-----	X	
Plt: 0.026156 (calculated over 12 periods)								
Evaluated: PST <= 0.4 dmax < 20 % dmax1								

Test Result

Report No. : CE2019-00156

Tabulated Results for Voltage Fluctuations And Flicker_ Sample #2_mode 1(2/2)

Spitzenberger & Spies
Viechtach

DEPARTMENT:EMC CENTER

Model : HWASHIN

Test conditions: EN 61000-3-3:2013 / 230 V / 50 Hz / Phase L1
EN 61000-4-15:2011 / Obs 12 x 10 min / Ztest (0.400+j0.250) Ohm
Ra+jXa (0.2400+j0.1500) Ohm / Rn+jXn (0.1600+j0.1000) Ohm

FLICKER: Test PASS!

Time	Pmax	Pst	Sliding Plt	Tmax [s]	dmax [%]	dc [%]	PASS	FAIL
14:22:17	0.001	0.0170	- . - . - .	0.000	+0.000	- . - . - .	X	
14:32:17	0.001	0.0170	- . - . - .	0.000	+0.000	- . - . - .	X	
14:42:17	0.001	0.0170	- . - . - .	0.000	+0.000	- . - . - .	X	
14:52:17	0.001	0.0170	- . - . - .	0.000	+0.000	- . - . - .	X	
15:02:17	0.001	0.0170	- . - . - .	0.000	+0.000	- . - . - .	X	
15:12:17	0.001	0.0170	0.0170	0.000	+0.000	- . - . - .	X	
15:22:17	0.001	0.0180	0.0172	0.000	+0.000	- . - . - .	X	
15:32:17	0.001	0.0170	0.0172	0.000	+0.000	- . - . - .	X	
15:42:17	0.001	0.0170	0.0172	0.000	+0.000	- . - . - .	X	
15:52:17	0.001	0.0170	0.0172	0.000	+0.000	- . - . - .	X	
16:02:17	0.001	0.0170	0.0172	0.000	+0.000	- . - . - .	X	
16:12:17	0.001	0.0170	0.0172	0.000	+0.000	- . - . - .	X	
Limits:		1.000	0.650	0.500	4.000	3.300		
Plt: 0.017088 (calculated over 12 periods)							X	
Evaluated: PST, PLT, Sliding PLT, dc, dmax, Tmax								

FLICKER: Source test PASS!

Time	Pmax	Pst	Sliding Plt	Tmax [s]	dmax [%]	dc [%]	PASS	FAIL
14:22:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
14:32:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
14:42:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
14:52:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
15:02:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
15:12:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
15:22:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
15:32:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
15:42:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
15:52:17	0.001	0.0190	- . - . - .	0.000	+0.000	- . - . - .	X	
16:02:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
16:12:17	0.001	0.0180	- . - . - .	0.000	+0.000	- . - . - .	X	
Plt: 0.018088 (calculated over 12 periods)								
Evaluated: PST <= 0.4 dmax < 20 % dmax1								

Test Result

Report No. : CE2019-00156

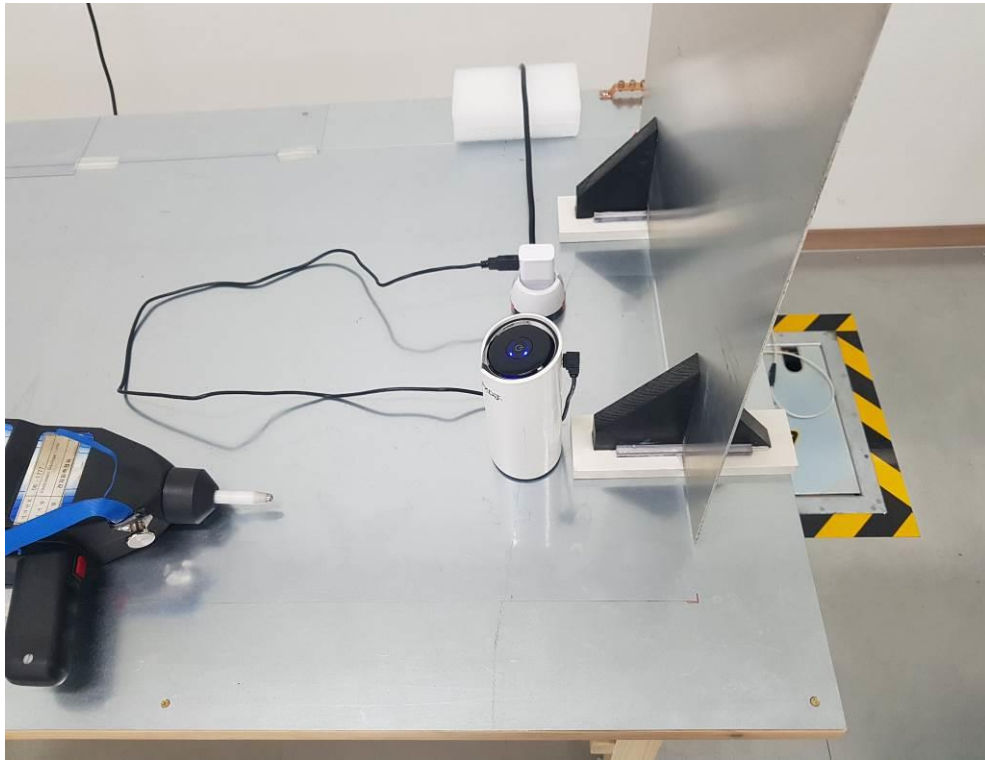
1.10 Test Conditions and Results – Immunity to Electrostatic Discharges

61000-4-2	TEST: Electrostatic discharges			Verdict		
<p>Method: The test is intended to demonstrate the immunity of equipment subjected to static electricity discharges from operators directly and to adjacent objects. The table top equipment under test is placed on a wooden table, 0.8 m high, standing on the ground reference plane. A horizontal coupling plane (HCP), 1.6 x 0.8 m, is placed on the table. The EUT and the cables are isolated from the coupling plane by an insulating support 0.5 mm thick. The floor standing equipment is isolated from the ground reference plane by an insulating support about 0.1 m thick. The vertical coupling plane (VCP) of dimensions 0.5 m x 0.5 m is placed parallel to, and positioned at a distance of 0.1 m from, the EUT.</p>					P	
Laboratory Parameters:		Required prior to the test		During the test		
Ambient Temperature		15 to 35 °C		(22.1 ± 0.9) °C		
Relative Humidity		30 to 60 %		(47.4 ± 4.2) %		
Air Pressure		86 to 106 kPa		(100.5 ± 0.5) kPa		
Tested date		2019. Nov. 13 ~ 2019. Nov. 22				
Test sample		#1, #2				
Power interface mode, EUT configurations mode, Operation mode				1		
Test Levels						
Discharge type	Discharge Level (kV)		Number of discharges per location (each polarity)			
	Positive	Negative				
Air – Direct	8	8	10			
Contact – Direct	4	4	10			
Contact – Indirect	4	4	10			
Discharge location	<p style="text-align: center;">See photo documentation of the test set-up All external locations accessible by hand, Horizontal plate (HCP) Vertical coupling plate (VCP)</p>					
Supplementary information: EUT powered at one of the Nominal input voltages and frequencies						
Test Equipment Used						
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due	
ESD Generator	Haefely Technology	PESD3010	H509179	2019-01-31	2020-01-31	

Test Result

Report No. : CE2019-00156

Photo of test setup for Immunity to Electrostatic Discharges



Test Result

Report No. : CE2019-00156

Tabulated Results for Electrostatic Discharges			
Nominal Voltage (V)..... :		230	
Nominal Frequency (Hz) :		50	
Direct discharges: Air and Contact			
Discharge location	Air discharge voltage (kV)	Polarity	Result
Enclosure (Non Metal Parts of main body)	8	pos./neg.	1
Discharge location	Contact discharge voltage (kV)	Polarity	Result
Enclosure (Metal Parts of main body)	4	pos./neg.	1
Indirect discharges			
Discharge location	Contact discharge voltage (kV)	Polarity	Result
HCP	4	pos./neg.	1
VCP	4	pos./neg.	1
Results Descriptions: X - Not Performed nor required. 1 – Compliant - No perceived discharge, no observed response from EUT. 2 – Compliant –			
Note: Description of the response should detail observations during testing. Supplementary information: Allocations of discharge points see 'Photo of test setup for Immunity to Electrostatic Discharges'. HCP – horizontal coupling plane VCP – vertical coupling plane The tests were performed at 230 V / 50 Hz in EUT operation mode 1 Air discharge: Refer to Photo Blue arrow mark Contact discharge: Refer to Photo Red arrow mark			

Test Result

Report No. : CE2019-00156

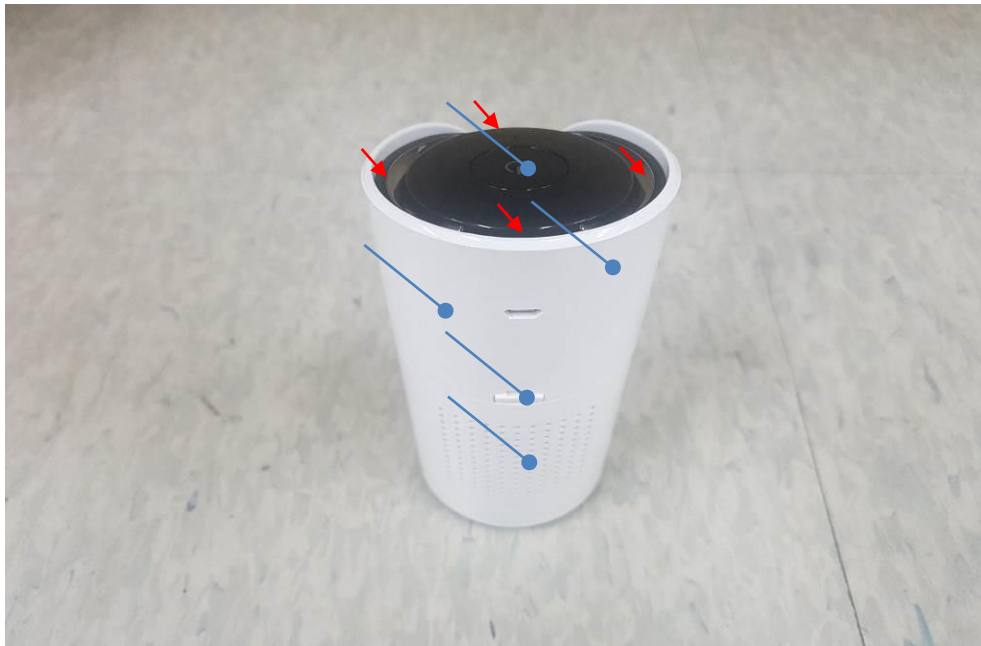
Photo of Electrostatic Discharges Test Locations



Contact discharges



Air discharges



Test Result

Report No. : CE2019-00156

1.11 Test Conditions and Results - Immunity to Radio Frequency Electromagnetic Fields

61000-4-3	TEST: RF electromagnetic fields		Verdict
Method: The test allows estimating of the radiated immunity of electrical and electronic equipment to electromagnetic disturbances coming from intended radio-frequency (RF) transmitters in the frequency range 80 MHz to 1000 MHz. The interference is applied on the enclosure of the equipment by using transmitting antennas.			N/A
Laboratory Parameters:			
	Required prior to the test		During the test
Ambient Temperature	15 to 35 °C		-
Relative Humidity	30 to 60 %		-
Equipment mode	Power interface mode	-	
	EUT configurations mode	-	
	Operation mode	-	
Test specifications			
Calibration Requirements	Uniform field area (UFA)	1.5 m x 1.5 m, 16 points with a minimum UFA size 0.5 m x 0.5 m	
		75 % of calibration points within specifications if UFA is larger than 0.5 m x 0.5 m. 100 % (all 4 points) in the specifications for 0.5 x 0.5 m UFA	
Frequency bandwidth	-		
Modulation	-		
Level	-		
Frequency step	-		
Supplementary information:			
EUT powered at one of the Nominal input voltages and frequencies.			
Dwell time minimum 3 s. Actual dwell time noted in results table.			
Actual test level noted in results table.			
Note * - The tests was performed with an antenna distance of 3 m.			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due

Test Result

Report No. : CE2019-00156

Photo of test setup for Radio Frequency Electromagnetic Fields

Tabulated Results for RF Electromagnetic Field 80 MHz to 2700 MHz				
Nominal Voltage (V)				
Nominal Frequency (Hz)				
Side of the equipment under test	Test Level (V/m)	Antenna polarization (V/H)	Dwell Time (second)	Result
Results Descriptions:				
X - Not performed nor required.				
1 – Compliant - No observed response from EUT.				
Note: Description of the response should detail observations during testing.				

Test Result

Report No. : CE2019-00156

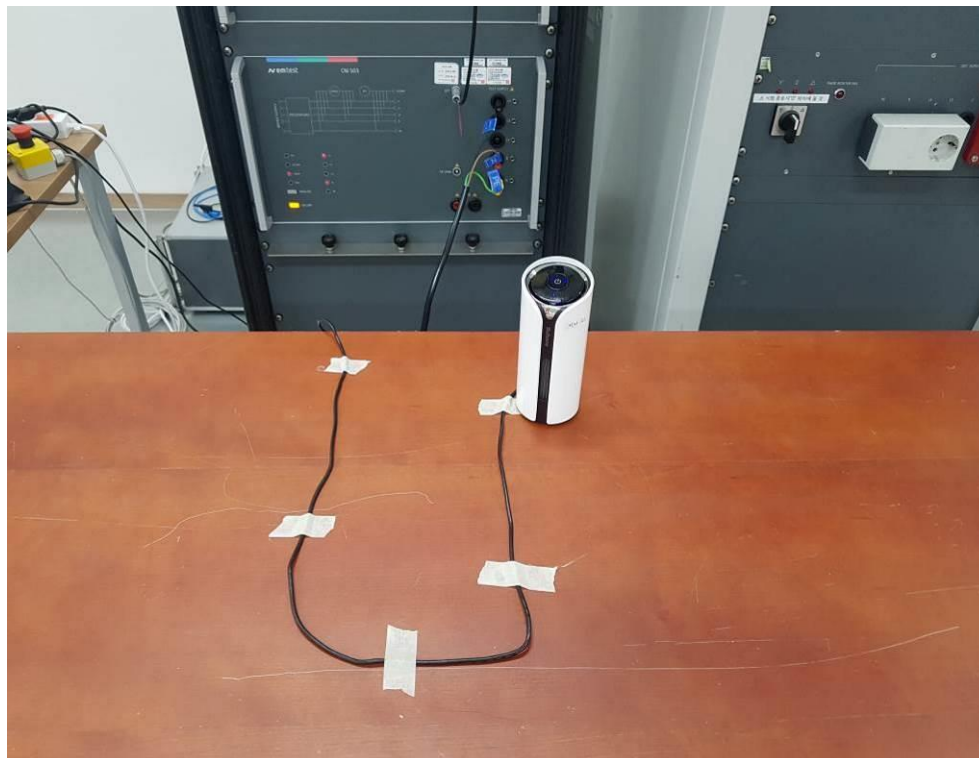
1.12 Test Conditions and Results – Electrical Fast Transients

61000-4-4	TEST: Fast Transients			Verdict	
Method: Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. Mains power tests were conducted with the product connected to a Coupling/Decoupling Network (CDN). I/O lines were tested in a Capacitive Coupling Clamp. One of each unique interface was tested for a period of one (1) minute per polarity.					P
Laboratory Parameters:		Required prior to the test		During the test	
Ambient Temperature		15 to 35 °C		(21.6 ± 0.9) °C	
Relative Humidity		30 to 60 %		(47.2 ± 4.2) %	
Fully configured sample subject to the levels shown below.		Measurement Point			
		Input a.c. Power Ports			
Tested date		2019. Nov. 11			
Test sample		#1, #2			
Power interface mode, EUT configurations mode, Operation mode				1	
Applied Level					
Application Point		(kV)	Coupling Method	Repetition Frequency (kHz)	
Input a.c. Power Ports		±1	Direct Injection	5	
Supplementary information:					
EUT powered at one of the Nominal input voltages and frequencies.					
Note* - SIP/SOPS whose maximum cable length is less than 3 m are excluded					
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EFT/Surge Simulator	EM TEST	UCS500N4	V0846104410	2019-05-13	2020-05-13
Coupling/Decoupling Network	EM TEST	CNI503A4	V0846104413	2019-05-13	2020-05-13

Test Result

Report No. : CE2019-00156

Photo of test setup for Electrical Fast Transients



Tabulated Results for Electrical Fast Transients

Nominal Voltage (V)..... :		230
Nominal Frequency (Hz)		50
Point of application	Results	
Mains	1	
Results Descriptions:		
X – Not performed nor required.		
1 – Compliant – No observed response from EUT.		
2 –		
Supplementary information:		
Note: Description of the response should detail observations during testing.		
The tests were performed at The tests were performed at 230 V / 50 Hz in EUT operation mode 1		

Test Result

Report No. : CE2019-00156

1.13 Test Conditions and Results – Conducted Disturbances Immunity

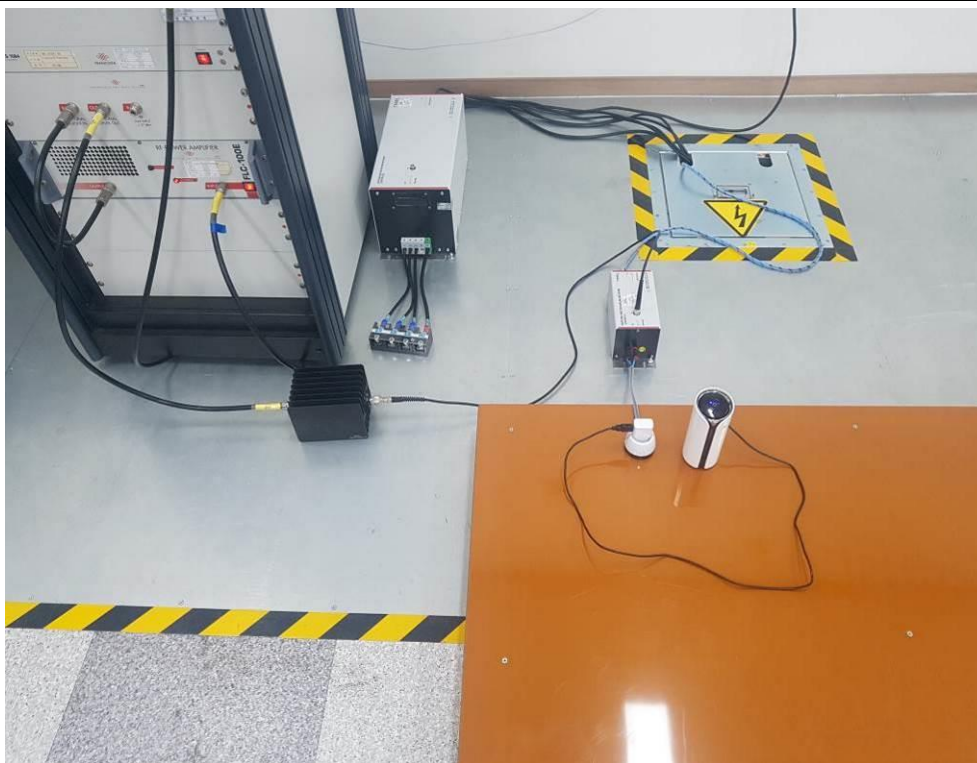
61000-4-6	TEST: RF Continuous Conducted	Verdict
Method: Measurements were made on a ground plane that extends 0.5-meter minimum beyond all sides of the system under test. The EUT was located 10cm above the reference ground plane and any associated I/O cables attached to the EUT were located between 30mm and 50mm above the ground plane. The indicated field was pre-calibrated prior to placement of the system under test.		P
Laboratory Parameters:		Required prior to the test
Ambient Temperature		During the test
Ambient Temperature		15 to 35 °C
Relative Humidity		(21.6 ± 0.9) °C
Relative Humidity		30 to 60 %
Tested date		2019. Nov. 11
Test sample		#1, #2
Power interface mode, EUT configurations mode, Operation mode		1
Test Specifications:		Frequency range
Frequency range		Measurement Point
Fully configured sample scanned over the following frequency range		150kHz to 230 MHz
Level		Input a.c. Power Ports
Level		3 V
Frequency step		1%
Modulation		80% Am at 1kHz*
Supplementary information: EUT powered at one of the Nominal input voltages and frequencies. Dwell time minimum 1 s.		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Signal Generator	R&S	SML 03	103532	2019-01-29	2020-01-29
RF-Power Amplifier	Frankonia	FLC-100E	151207	-	-
RF-Power Meter (3-Channel)	Frankonia	PMS 1084B	-	-	-
Dual Directional Coupler	Werlatone	C6442-714	056590	2019-01-29	2020-01-29
CDN	TESEQ	CDN M316	51272	2019-08-21	2020-08-21

Test Result

Report No. : CE2019-00156

Photo of test setup for Conducted Disturbances



Tabulated Results for Conducted Disturbances

Nominal Voltage (V)		230
Nominal Frequency (Hz)		50
Point of Application	Results	Dwell Time (second)
Mains	1	3

Supplementary information:

Results Descriptions:

X - Not performed nor required.

1 – Compliant - No observed response from EUT.

Test Result

Report No. : CE2019-00156

1.14 Test Conditions and Results – Surge Immunity

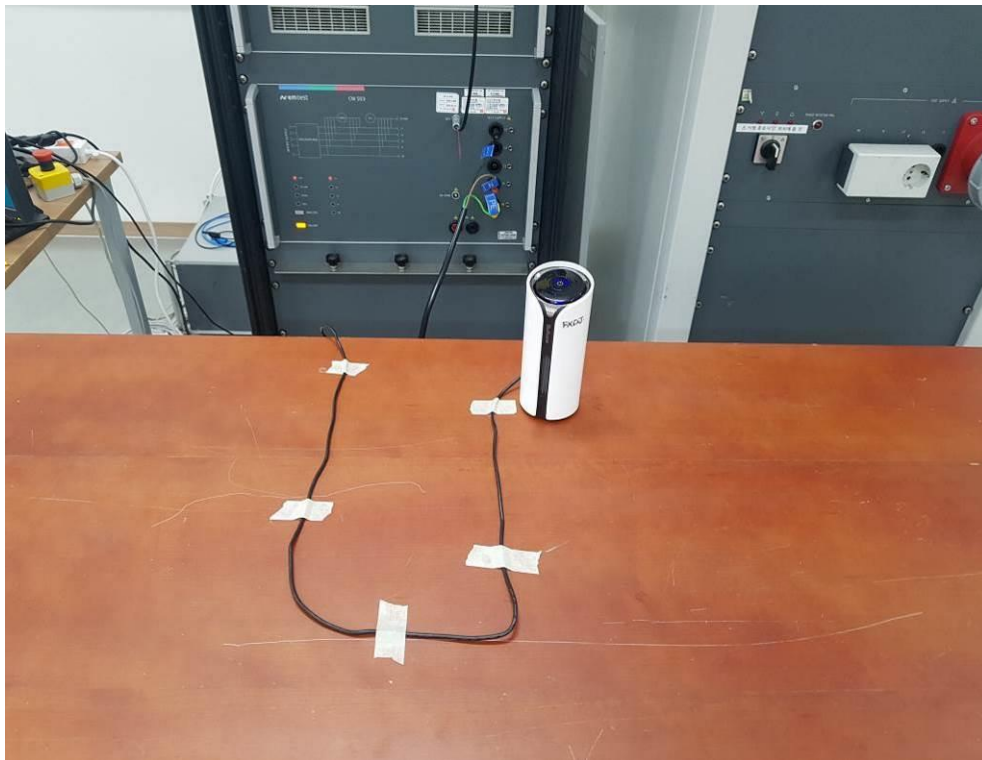
61000-4-5	TEST: Surge Immunity Test		Verdict
<p>Method: Mains power tests were conducted with the product connected to a Coupling/Decoupling Network (CDN). The test voltage was increased from the lowest indicated level up to the maximum level. Five (5) positive surges at a.c. waveform: 90° and five (5) negative surges at a.c. waveform: 270° were applied. Each surge was applied 60 seconds after the previous surge. Signal and Telecommunications ports were subject to five (5) positive and five (negative) surges applied through the appropriate Coupling/Decoupling Network (CDN).</p>			P
Laboratory Parameters:		Required prior to the test	During the test
Ambient Temperature		15 to 35 °C	(21.6 ± 0.9) °C
Relative Humidity		30 to 60 %	(47.2 ± 4.2) %
Fully configured sample subject to the levels shown below.		Measurement Point	
		Input AC Power Ports	
Tested date		2019. Nov. 11	
Test sample		#1, #2	
Power interface mode, EUT configurations mode, Operation mode			1
Applied Level			
Application Point	[kV]	Required Surge Waveform	
Input Power Ports	1.0 (Line to Line)	Combination Wave (2µs x 50µs Voltage, 8µs x 20µs Current)	
	2.0 (Line to Earth)	Combination Wave (2µs x 50µs Voltage, 8µs x 20µs Current)	
Signal input/output*	2.0 (Line to Earth)	Combination Wave (2µs x 50µs Voltage, 8µs x 20µs Current)	
<p>Supplementary information: EUT powered at one of the Nominal input voltages and frequencies. The positive pulses are applied 90° relative to the phase angle of the a.c. line voltage to the equipment under test, and the negative pulses are applied 270° relative to the phase angle of the a.c. line voltage to the equipment under test. Note* - Applicable to output lines intended to connect directly to outdoor cables</p>			

Test Result

Report No. : CE2019-00156

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EFT/Surge Simulator	EM TEST	UCS500N4	V0846104410	2019-05-13	2020-05-13
Coupling/Decoupling Network	EM TEST	CNI503A4	V0846104413	2019-05-13	2020-05-13

Photo of test setup for Surge Immunity



Test Result

Report No. : CE2019-00156

Tabulated Results for Surge – Mains			
Nominal Voltage (V)..... :			230
Nominal Frequency (Hz)..... :			50
Mode of Application	Level	Polarity	Results
Line 1 to Line 2 (Differential mode)	1.0kV	Positive	1
		Negative	1
Line 1 to Earth (Common mode)	2.0kV	Positive	-
		Negative	-
Line 2 to Earth (Common mode)	2.0kV	Positive	-
		Negative	-
Results Descriptions: X – Not performed nor required. 1 – Compliant – No observed response from EUT.			
Supplementary information: Note: Description of the response should detail observations during testing. The tests were performed at The tests were performed at 230 V / 50 Hz in EUT operation mode 1			

Test Result

Report No. : CE2019-00156

1.15 Test Conditions and Results – Voltage Dips, Interruptions, and Variations

61000-4-11	TEST: Voltage Dips and Interruptions		Verdict
Method: The product was subjected to voltage dips and interruptions. Testing was performed with the product connected directly to a generator capable of simulating the voltage drops and interrupts as described.			P
Laboratory Parameters:	Required prior to the test	During the test	
Ambient Temperature	15 to 35 °C	(21.6 ± 0.9) °C	
Relative Humidity	30 to 60 %	(47.2 ± 4.2) %	
Fully configured subjected to the levels indicated below.	Measurement Point		
	Input A.C. Power Ports		
Tested date	2019. Nov. 11		
Test sample	#1, #2		
Power interface mode, EUT configurations mode, Operation mode		1	
Applied Levels			
Voltage Dips % U_T	Cycles	Sync Angle (degrees)	
0	0.5	0	
40	10	0	
70	25	0	
Voltage Interruption % U_T	Cycles	Sync Angle [degrees]	
-	-	-	
Supplementary information: If the Rated voltage range <25% of the lowest rated input voltage, one rated input voltage. Otherwise, minimum and maximum rated voltage. EUT powered at one of the Nominal input frequencies.			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Voltage dips Tester	EM TEST	PFS503N100	V1237113627	2019-03-29	2020-03-29

Test Result

Report No. : CE2019-00156

Photo of test setup for Voltage Dips, Interruptions, and Variations



Tabulated Results for Voltage Dips and Interruptions

Tabulated Results for Voltage Dips and Interruptions			
Minimum Rated Voltage (V)....			230
Frequency (Hz).....			50
Point of application	Voltage Dips	Period (Cycles)	Results
Mains	0	0.5	1
Mains	40	10	1
Mains	70	25	1
Point of application	Voltage Interruptions	Period (Cycles)	Results
-	-	-	-

Supplementary information:

Results Descriptions:

X - Not performed nor required.

1 – Compliant - No observed response from EUT.

2 –

Test Result

Report No. : CE2019-00156

1.16 Test Conditions and Results – Radiated Emissions (ALSE)

50498 : 2010	TEST: Radiated Emissions (narrowband disturbances)				Verdict
Method: The narrowband electromagnetic radiation generated by the ESA representative of its type shall be measured by the method described in Automotive EMC Directive 2004/104/EC, Annex I, 6.6					P
Laboratory Parameters		During the test			
Ambient Temperature		(21.8 ± 0.9) °C			
Relative Humidity		(47.8 ± 4.2) %			
Fully configured sample scanned over the following frequency range		Frequency range			
		30 MHz ~ 1 000 MHz			
Tested date		2019. Nov. 01			
Test sample		#1, #2			
Power interface mode, EUT configurations mode, Operation mode					2
Test limits					
Frequency (MHz)		Limit dB (µV)			
		Average			
30 ~ 75		52 ~ 42			
75 ~ 400		42 ~ 53			
400 ~ 1 000		53			
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESW26	101317	2019-06-13	2020-06-13
Preamplifier	R&S	SCU01F	010038	2019-06-13	2020-06-13
Antenna	R&S	HK116E	101158	2019-07-04	2020-07-04
Antenna	R&S	HL223	100775	2019-06-26	2020-06-26
LISN	R&S	ESH3-Z6	101585	2019-05-14	2020-05-14
LISN	R&S	ESH3-Z6	101584	2019-05-14	2020-05-14
Supplementary information: -					

Test Result

Report No. : CE2019-00156

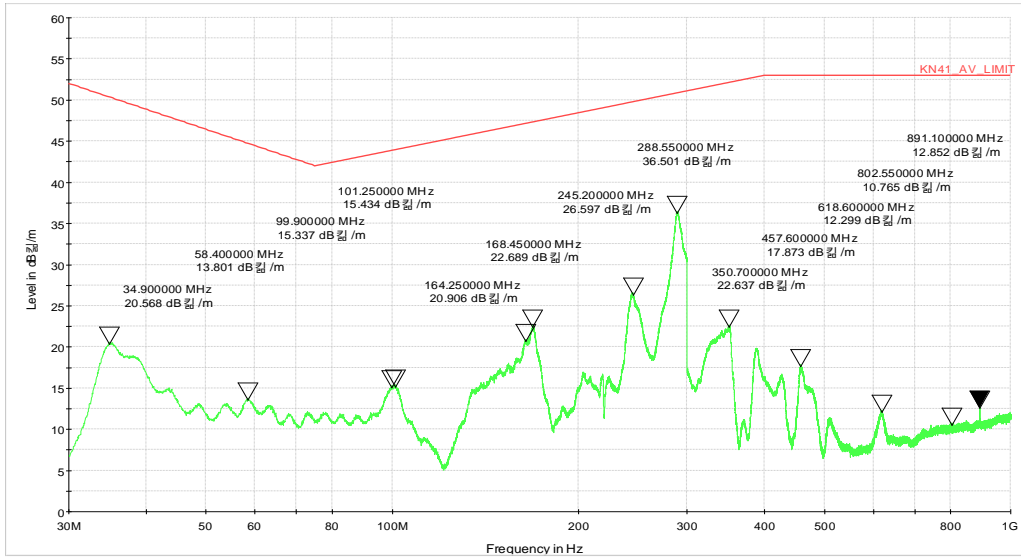
Photo of test setup for Radiated Emissions (ALSE)



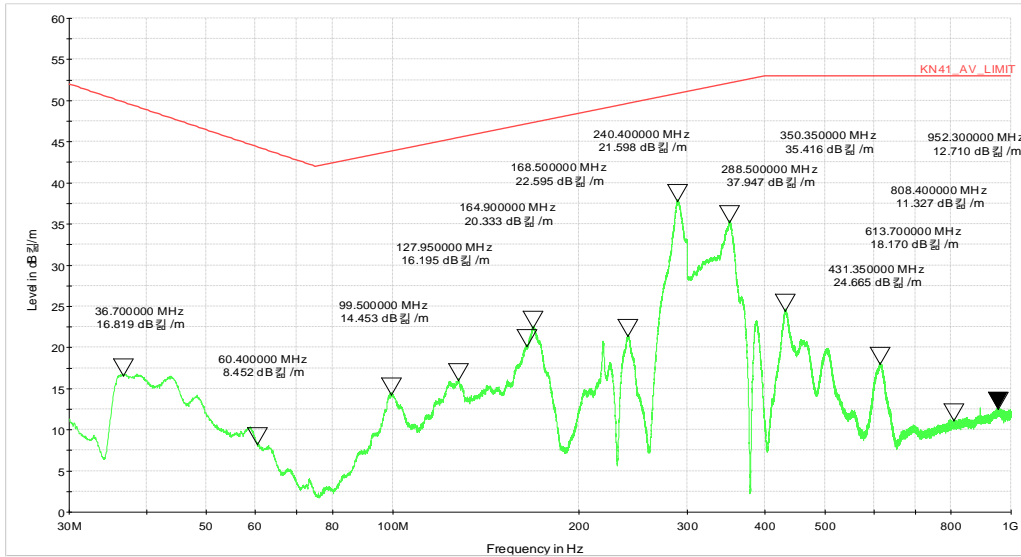
Test Result

Report No. : CE2019-00156

Tabulated Results for Radiated Emissions (narrowband disturbances)_ Sample #1_mode 2 (1/6)



Horizontal – Sample #1_mode 2



Vertical – Sample #1_mode 2

$$\text{Result [dB(μV/m)]} = \text{Reading results [dB(μV)]} + \text{Antenna Factor [dB/m]} + \text{Cable Loss [dB]} - \text{Pre-amplifier Gain [dB]}$$

Test Result

Report No. : CE2019-00156

Tabulated Results for Radiated Emissions (narrowband disturbances)_Sample #1_mode 2 (2/6)

Sample No.: #1

Test mode: 2

Frequency (MHz)	Polarization	Reading results (dB μ V)	Factor			Results Value (dB μ V/m)	Limit (dB μ V/m)	Margin (dB μ V/m)
			Antenna Factor (dB/m)	Cable Loss (dB)	Pre- amplifier Gain (dB)			
34.90	H	36.45	12.44	1.57	29.90	20.56	50.35	29.79
58.40	H	32.41	9.69	1.51	29.81	13.80	44.73	30.93
99.90	H	31.97	10.74	2.22	29.59	15.34	43.88	28.54
101.25	H	31.96	10.81	2.24	29.58	15.43	43.97	28.54
164.25	H	33.84	13.57	2.63	29.14	20.90	47.15	26.25
168.45	H	34.85	14.30	2.64	29.12	22.67	47.32	24.65
245.20	H	34.12	17.92	3.27	28.72	26.59	49.78	23.19
289.55	H	37.25	23.31	3.64	28.70	35.50	50.88	15.38
350.70	H	32.42	14.88	4.01	28.67	22.64	52.14	29.50
457.60	H	25.09	16.94	4.65	28.81	17.87	53.00	35.13
618.60	H	16.72	19.04	5.44	28.91	12.29	53.00	40.71
802.55	H	12.21	21.34	6.39	29.18	10.76	53.00	42.24
891.10	H	14.16	21.14	6.71	29.16	12.85	53.00	40.15

- Result [dB(μ V/m)] = Reading results [dB(μ V)] + Antenna Factor [dB/m] + Cable Loss [dB] – Pre-amplifier Gain [dB]
- Polarization : H (Horizontal), V (Vertical)

Test Result

Report No. : CE2019-00156

Tabulated Results for Radiated Emissions (narrowband disturbances)_ Sample #1_mode 2 (3/6)

Sample No.: #1

Test mode: 2

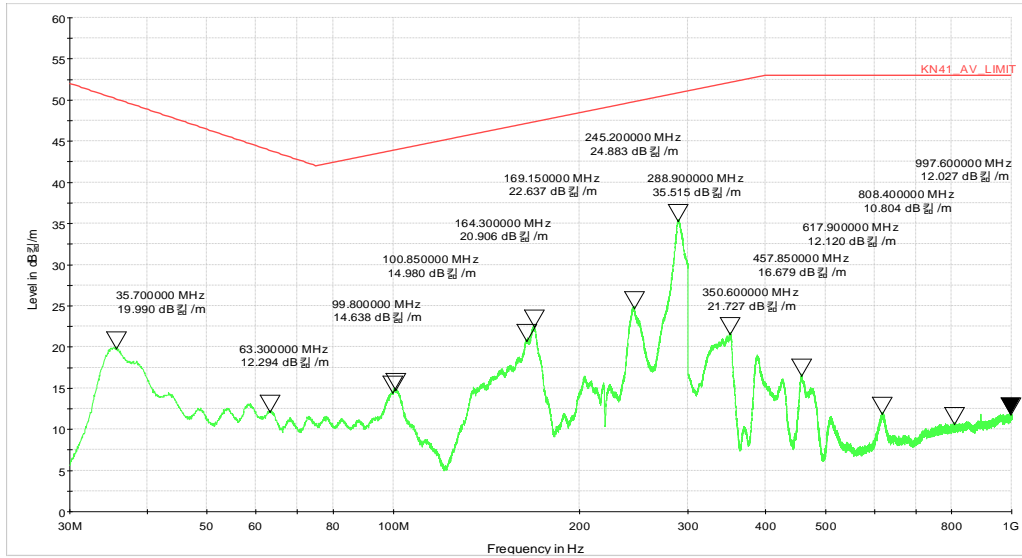
Frequency (MHz)	Polarization	Reading results (dB μ V)	Factor			Results Value (dB μ V/m)	Limit (dB μ V/m)	Margin (dB μ V/m)
			Antenna Factor (dB/m)	Cable Loss (dB)	Pre- amplifier Gain (dB)			
36.70	V	32.86	12.27	1.58	29.89	16.82	49.80	32.98
60.40	V	27.65	9.08	1.52	29.80	8.45	44.36	35.91
99.50	V	30.55	11.29	2.20	29.59	14.45	43.86	29.41
127.95	V	31.04	12.01	2.52	29.38	16.19	45.51	29.32
164.90	V	32.56	14.26	2.65	29.14	20.33	47.18	26.85
166.50	V	34.84	14.21	2.67	29.13	22.59	47.24	24.65
240.40	V	29.48	17.65	3.21	28.75	21.59	49.65	28.06
288.50	V	41.17	21.83	3.64	28.70	37.94	50.85	12.91
350.35	V	45.47	14.60	4.01	28.67	35.41	52.13	16.72
431.35	V	32.33	16.60	4.49	28.76	24.66	53.00	28.34
613.70	V	22.84	18.81	5.42	28.90	18.17	53.00	34.83
808.40	V	12.34	21.74	6.42	29.17	11.33	53.00	41.67
952.30	V	12.92	21.93	7.00	29.14	12.71	53.00	40.29

- Result [dB(μ V/m)] = Reading results [dB(μ V)] + Antenna Factor [dB/m] + Cable Loss [dB] – Pre-amplifier Gain [dB]
- Polarization : H (Horizontal), V (Vertical)

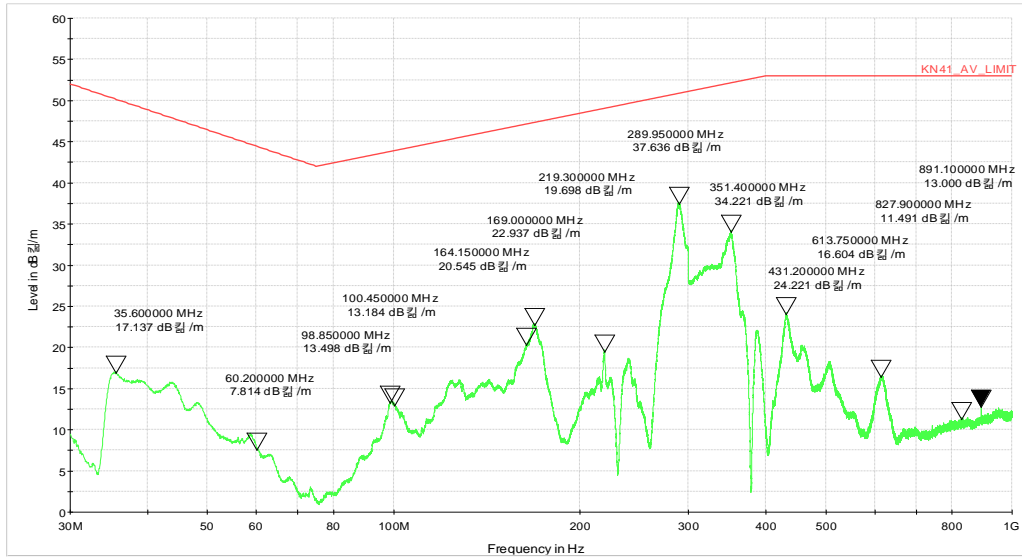
Test Result

Report No. : CE2019-00156

Tabulated Results for Radiated Emissions (narrowband disturbances)_ Sample #2_mode 2 (4/6)



Horizontal – Sample #2_mode 2



Vertical – Sample #2_mode 2

$$\text{Result [dB (μV/m)]} = \text{Reading results [dB (μV)]} + \text{Antenna Factor [dB/m]} + \text{Cable Loss [dB]} - \text{Pre-amplifier Gain [dB]}$$

Test Result

Report No. : CE2019-00156

Tabulated Results for Radiated Emissions (narrowband disturbances)_Sample #2_mode 2 (5/6)

Sample No.: #2

Test mode: 2

Frequency (MHz)	Polarization	Reading results (dB μ V)	Factor			Results Value (dB μ V/m)	Limit (dB μ V/m)	Margin (dB μ V/m)
			Antenna Factor (dB/m)	Cable Loss (dB)	Pre- amplifier Gain (dB)			
35.70	H	36.01	12.31	1.57	29.90	19.99	50.10	30.11
63.30	H	30.77	9.69	1.62	29.79	12.29	43.85	31.56
99.80	H	31.28	10.74	2.21	29.59	14.64	43.88	29.24
100.85	H	31.53	10.79	2.24	29.58	14.98	43.95	28.97
164.30	H	33.84	13.57	2.63	29.14	20.90	47.15	26.25
169.15	H	34.68	14.43	2.64	29.11	22.64	47.34	24.70
245.20	H	32.41	17.92	3.27	28.72	24.88	49.78	24.90
288.90	H	37.34	23.23	3.64	28.70	35.51	50.86	15.35
350.60	H	31.51	14.88	4.01	28.67	21.73	52.13	30.40
457.85	H	23.91	16.94	4.64	28.81	16.68	53.00	36.32
617.90	H	16.54	19.03	5.46	28.91	12.12	53.00	40.88
808.40	H	12.22	21.33	6.42	29.17	10.80	53.00	42.20
997.60	H	12.15	21.82	7.17	29.11	12.03	53.00	40.97

- Result [dB(μ V/m)] = Reading results [dB(μ V)] + Antenna Factor [dB/m] + Cable Loss [dB] – Pre-amplifier Gain [dB]
- Polarization : H (Horizontal), V (Vertical)

Test Result

Report No. : CE2019-00156

Tabulated Results for Radiated Emissions (narrowband disturbances)_Sample #2_mode 2 (6/6)

Sample No.: #2

Test mode: 2

Frequency (MHz)	Polarization	Reading results (dB μ V)	Factor			Results Value (dB μ V/m)	Limit (dB μ V/m)	Margin (dB μ V/m)
			Antenna Factor (dB/m)	Cable Loss (dB)	Pre- amplifier Gain (dB)			
35.60	V	33.14	12.33	1.57	29.90	17.14	50.13	32.99
60.20	V	27.02	9.08	1.51	29.80	7.81	44.40	36.59
98.85	V	29.63	11.28	2.18	29.60	13.49	43.81	30.32
100.45	V	29.25	11.29	2.23	29.59	13.18	43.92	30.74
164.15	V	32.78	14.28	2.62	29.14	20.54	47.15	26.61
169.00	V	35.29	14.12	2.64	29.11	22.94	47.34	24.40
219.30	V	28.63	16.81	3.10	28.85	19.69	49.05	29.36
289.95	V	40.72	21.97	3.64	28.70	37.63	50.89	13.26
351.40	V	44.25	14.63	4.01	28.67	34.22	52.15	17.93
431.20	V	31.89	16.60	4.49	28.76	24.22	53.00	28.78
613.75	V	21.26	18.81	5.43	28.90	16.60	53.00	36.40
827.90	V	12.35	21.73	6.57	29.16	11.49	53.00	41.51
891.10	V	13.76	21.69	6.71	29.16	13.00	53.00	40.00

- Result [dB(μ V/m)] = Reading results [dB(μ V)] + Antenna Factor [dB/m] + Cable Loss [dB] – Pre-amplifier Gain [dB]
- Polarization : H (Horizontal), V (Vertical)

Test Result

Report No. : CE2019-00156

1.17 Test Conditions and Results – Conducted Transient Emission

50498 : 2010	TEST: Limits of conducted Transient Emission				Verdict	
<p><u>Method:</u> The conducted transients emitted on the power cables of the ESA representative of its type shall be measured according to the method described in Automotive EMC Directive 2004/104/EC, Annex I, 6.9, on supply lines as well as to other connections of ESAs which may be operationally connected to supply lines.</p>					P	
Laboratory Parameters		During the test				
Ambient Temperature		(22.1 ± 0.9) °C				
Relative Humidity		(48.2 ± 4.2) %				
Tested date		2019. Nov. 01				
Test sample		#1, #2				
Power interface mode, EUT configurations mode, Operation mode					2	
Limits of conducted Transient Emission						
Polarity of pulse amplitude	Maximum allowed pulse amplitude for					
	Vehicles with 12 V systems			Vehicles with 24 V systems		
Positive	+ 75 V			+ 150 V		
Negative	- 100 V			- 450 V		
Test Equipment Used						
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due	
Oscilloscope	TEKTRONIX	DPO5204B	C030341	2019-01-31	2020-01-31	
HIGH VOLTAGE PROBE	R&S	RT-ZD01	101499	2019-06-17	2020-06-17	
Electronic Switch	emtest	BS 200N100	P1733202195	-	-	
Single Line Artificial Network	emtest	AN200N100	P1740204406	2019-08-28	2020-08-28	
Resistor Box	emtest	RS-BOX	P1720198072	2019-08-21	2020-08-21	
Supplementary information: -						

Test Result

Report No. : CE2019-00156

Photo of test setup for conducted Transient Emission

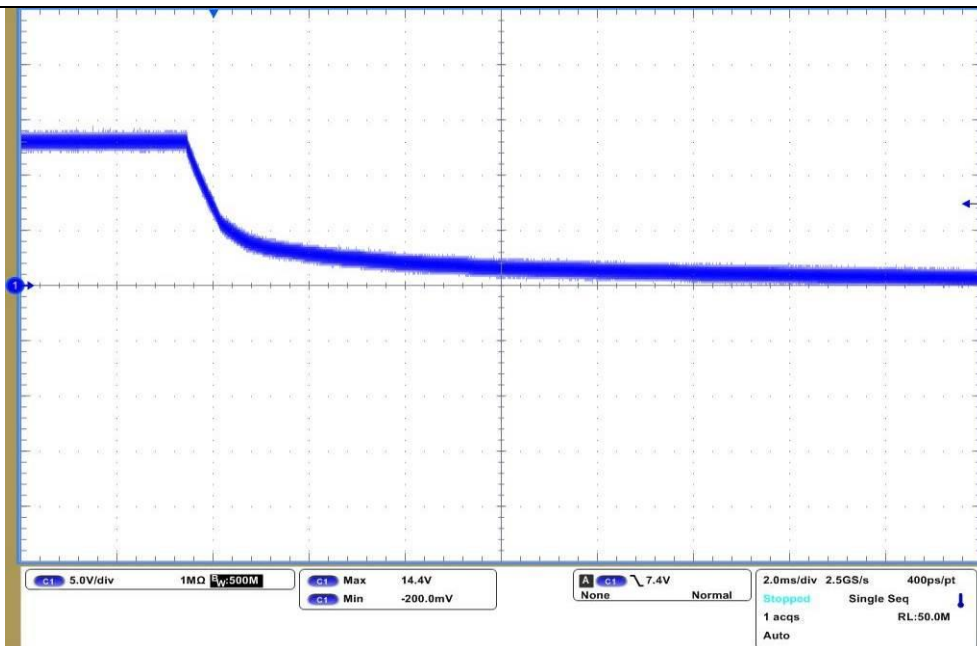


Test Result

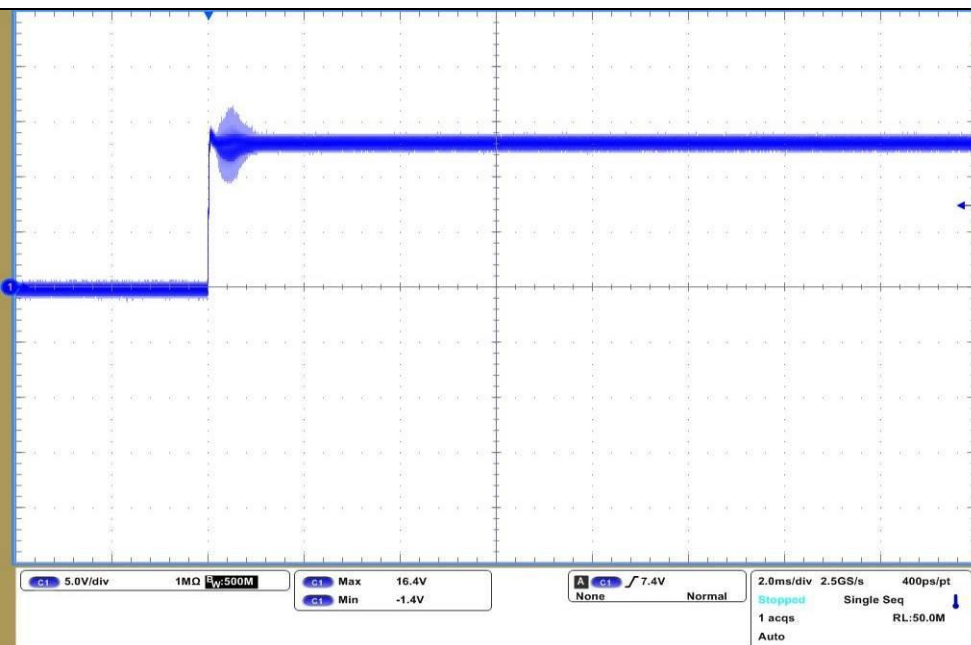
Report No. : CE2019-00156

Tabulated Results for conducted Transient Emission (1/5)

Slow pulse (On to Off) – Sample #1_Mode 2



Slow pulse (Off to On) – Sample #1_Mode 2

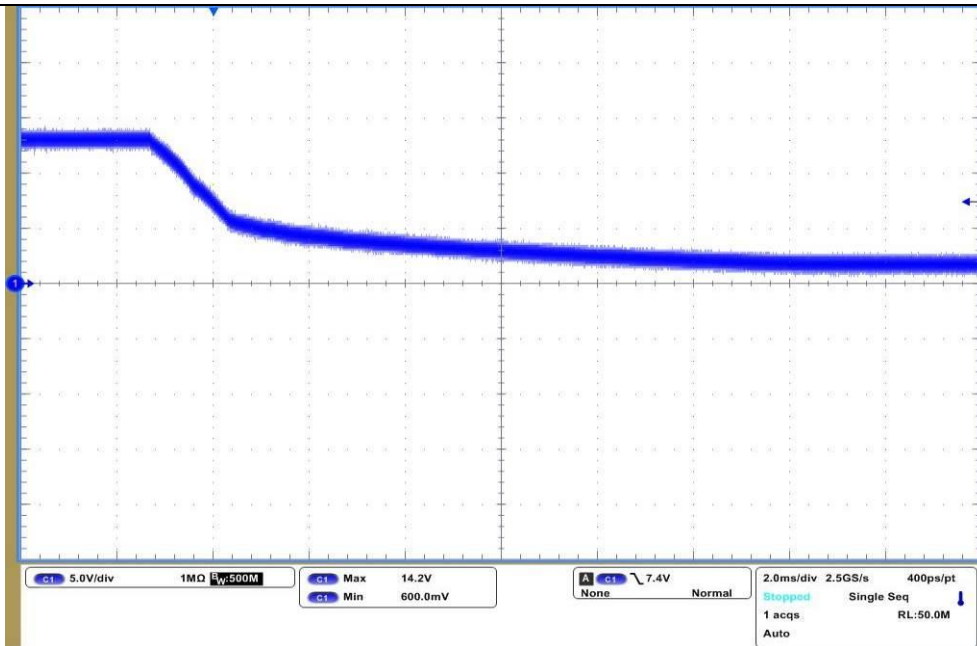


Test Result

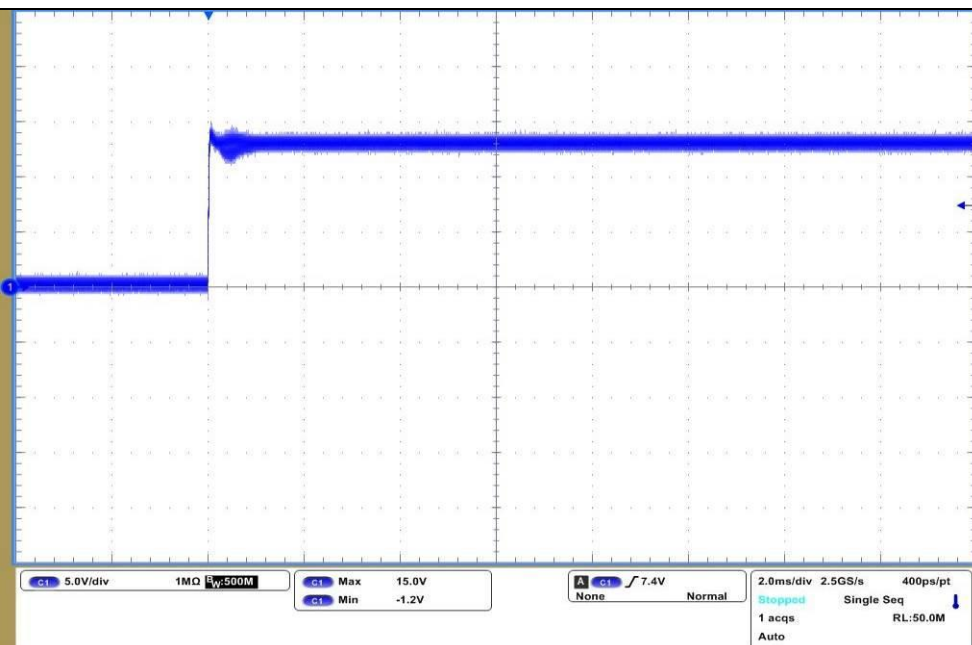
Report No. : CE2019-00156

Tabulated Results for conducted Transient Emission (2/5)

Fast pulse (On to Off) – Sample #1_Mode 2



Fast pulse (Off to On) – Sample #1_Mode 2

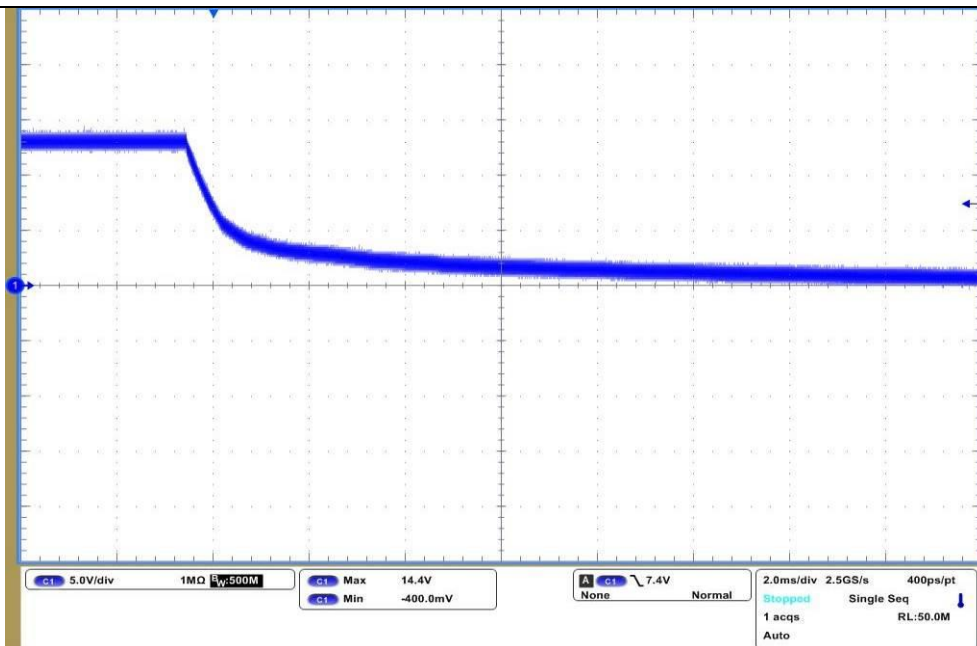


Test Result

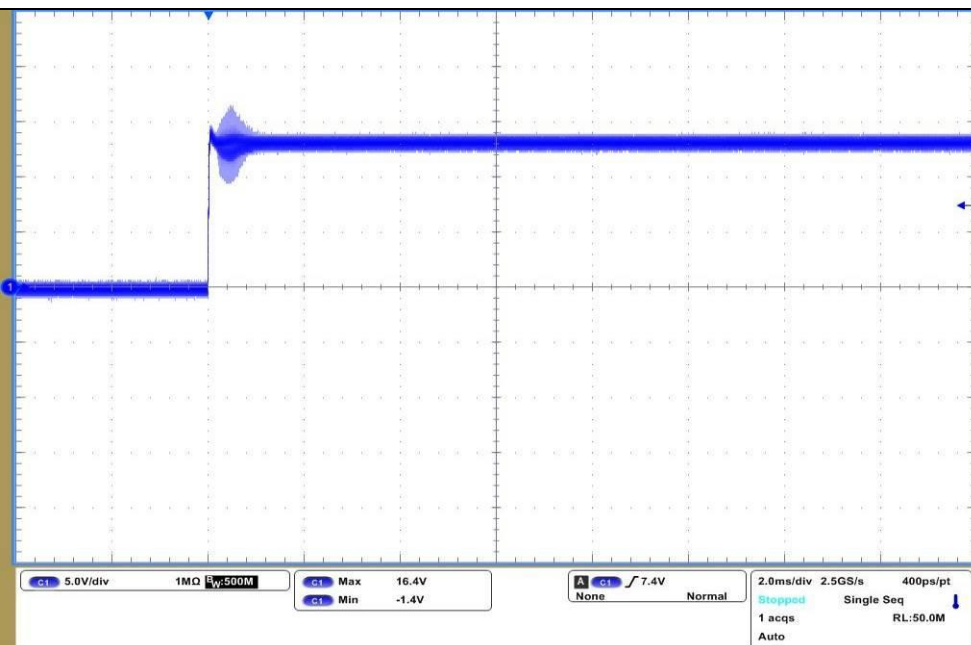
Report No. : CE2019-00156

Tabulated Results for conducted Transient Emission (3/5)

Slow pulse (On to Off) – Sample #2_Mode 2



Slow pulse (Off to On) – Sample #2_Mode 2

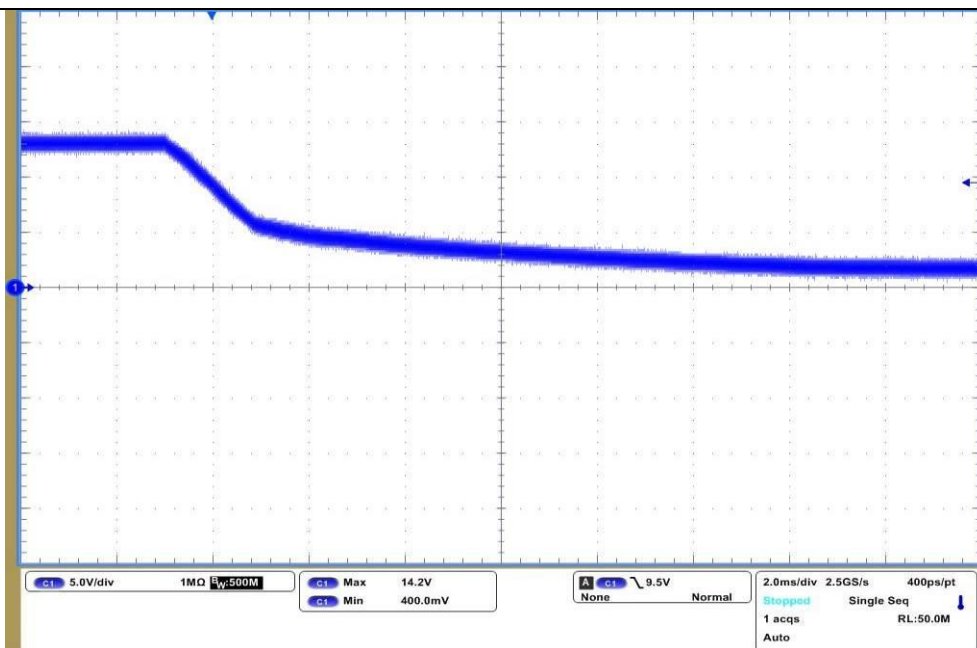


Test Result

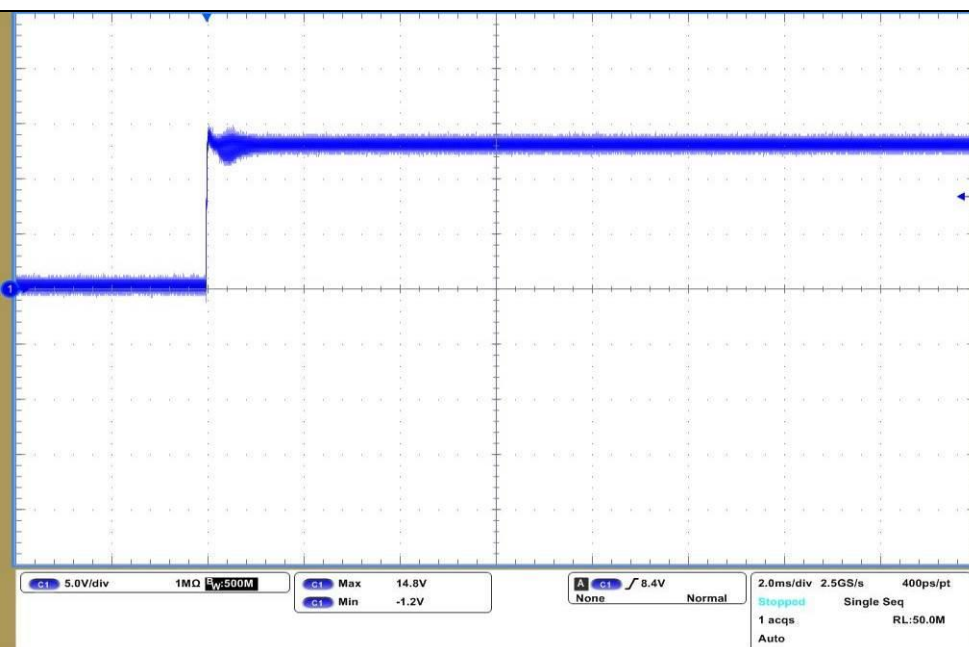
Report No. : CE2019-00156

Tabulated Results for conducted Transient Emission (4/5)

Fast pulse (On to Off) – Sample #2_Mode 2



Fast pulse (Off to On) – Sample #2_Mode 2



Test Result

Report No. : CE2019-00156

Tabulated Results for conducted Transient Emission (5/5)

Sample No.: #1

Test mode: 2

Voltage condition	Mode	Pulse amplitude	Requirement Level (V)	Max. Value (V)	Results
12V	Slow	Positive	+ 75	16.4 V	Compliant
		Negative	- 100	-1.4 V	Compliant
	Fast	Positive	+ 75	15 V	Compliant
		Negative	- 100	-1.2 V	Compliant

Sample No.: #2

Test mode: 2

Voltage condition	Mode	Pulse amplitude	Requirement Level (V)	Max. Value (V)	Results
12V	Slow	Positive	+ 75	16.4 V	Compliant
		Negative	- 100	-1.4 V	Compliant
	Fast	Positive	+ 75	14.8 V	Compliant
		Negative	- 100	-1.2 V	Compliant

Test Result

Report No. : CE2019-00156

1.18 Test Conditions and Results – Conducted Transient Immunity

50498 : 2010	TEST: Limits of Conducted Transient Immunity		Verdict
<p><u>Method:</u> The immunity of ESA representative of its type shall be tested by the method described in Automotive EMC Directive 2004/104/EC, Annex I, 6.8</p> <p>Apply the test pulses 1, 2a, 2b, 3a, 3b and 4 according to ISO7637-2 to the supply lines as well as to other connections of ESAs which may be operationally connected to supply lines.</p>			P
Laboratory Parameters	During the test		
Ambient Temperature	(21.8 ± 0.9) °C		
Relative Humidity	(48.2 ± 4.2) %		
Tested date	2019. Nov. 06		
Test sample	#1, #2		
Power interface mode, EUT configurations mode, Operation mode			2
Test condition (power line)			
Test pulse No.	Level (12 V)	Level (24 V)	Pulse / Time
Pulse 1	-75 V	-450 V	5000 pulses
Pulse 2a	+37 V	+37 V	5000 pulses
Pulse 2b	+10 V	+20 V	10 pulses
Pulse 3a	-112 V	-150 V	60 min
Pulse 3b	+75 V	+150 V	60 min
Pulse 4	-6 V	-12 V	1 pulse
Requirement			
Test pulse No.	Immunity Test level	Functional Status	
Pulse 1	III	D	
Pulse 2a	III	D	
Pulse 2b	III	D	
Pulse 3a	III	D	
Pulse 3b	III	D	
Pulse 4	III	D	
<p>Functional status D is where one or more functions of the ESA do not perform as designed during and after exposure and do not return to normal operation until exposure is removed and the ESA is reset by simple “operator/use” action.</p>			

Test Result

Report No. : CE2019-00156

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Compact Automotive Generator	emtest	UCS 200N50	P1717196699	2019-08-21	2020-08-21
Bi-polar Voltage Drop Simulator	emtest	VDS 200Q50.1	P1741204622	2019-08-21	2020-08-21
REMOTE CONTROLLED DC-SOURCE	emtest	RDS 200N	P1722199340	2019-08-21	2020-08-21
Oscilloscope	TEKTRONIX	DPO5204B	C030341	2019-01-31	2020-01-31
HIGH VOLTAGE PROBE	R&S	RT-ZD01	101499	2019-06-17	2020-06-17
Supplementary information: -					

Photo of test setup for Conducted Transient Immunity



Test Result

Report No. : CE2019-00156

Tabulated Results for Conducted Transient Immunity (1/1)			
1) Test pulse 1			
	Parameter	12 V System	24 V System
	U _s	-75 V ~ -100 V	-450 V ~ -600 V
	U _a	(13.5 ± 0.5) V	(27 ± 1) V
	R _i	10 Ω	50 Ω
	t _d	2 ms	1 ms
	t _r	(1 ⁰ _{-0.5}) μs	(3 ⁰ _{-1.5}) μs
	t ₁	0.5 s ~ 5 s	
	t ₂	200 ms	
	t ₃	< 100 μs	
2) Test pulse 2a			
	Parameter	12 V System	24 V System
	U _a	(13.5 ± 0.5) V	(27 ± 1) V
	U _s	+37 V ~ +50 V	
	R _i	2 Ω	
	t _d	0.05 ms	
	t _r	(1 ⁰ _{-0.5}) μs	
	t ₁	0.2 s ~ 5 s	
3) Test pulse 2b			
	Parameter	12 V System	24 V System
	U _a	(13.5 ± 0.5) V	(27 ± 1) V
	U _s	10 V	20 V
	R _i	0 Ω ~ 0.05 Ω	
	t _d	0.2 s ~ 2 s	
	t ₁₂	(1 ± 0.5) ms	
	t _r	(1 ± 0.5) ms	
	t ₆	(1 ± 0.5) ms	

Test Result

Report No. : CE2019-00156

Tabulated Results for Conducted Transient Immunity (1/1)			
4) Test pulse 3a			
	Parameter	12 V System	24 V System
	Ua	(13.5 ± 0.5) V	(27 ± 1) V
	Us	-112 V ~ -150 V	-150 V ~ -200 V
	Ri	50 Ω	
	td	$(0.1^{+0.1}_0)$ μs	
	tr	5 ns ± 1.5 ns	
	t1	100 μs	
	t4	10 ms	
	t5	90 ms	
5) Test pulse 3b			
	Parameter	12 V System	24 V System
	Ua	(13.5 ± 0.5) V	(27 ± 1) V
	Us	+75 V ~ +100 V	+150 V ~ +200 V
	Ri	50 Ω	
	td	$(0.1^{+0.1}_0)$ μs	
	tr	(5 ± 1.5) ns	
	t1	100 μs	
	t4	10 ms	
	t5	90 ms	
6) Test pulse 4			
	Parameter	12 V System	24 V System
	UB	(12 ± 0.2) V	(24 ± 0.4) V
	Us	-6 V ~ -7 V	-12 V ~ -16 V
	Ua	-2.5 V ~ -6 V Ua ≤ Us 일 때	-5 V ~ -12 V Ua ≤ Us 일 때
	Ri	0 Ω ~ 0.02 Ω	
	t7	15 ms ~ 40 ms	50 ms ~ 100 ms
	t8	≤ 50 ms	
	t9	0.5 s ~ 20 s	
	t10	5 ms	10 ms
t11	5 ms ~ 100 ms	10 ms ~ 100 ms	

Test Result

Report No. : CE2019-00156

Tabulated Results for Conducted Transient Immunity (1/1)					
Sample No.: #1					
Test mode: 2					
Test Pulse	Level	Pulse/Time	Results	Function Status	Result Class
Pulse 1	-75 V	5 000 pulses	The EUT turned off during exposure, the EUT returned to normal function after the operator / user pressed the power button.	D	D
Pulse 2a	+37 V	5 000 pulses	No deviation	D	A
Pulse 2b	+10 V	10 pulses	The EUT turned off during exposure, the EUT returned to normal function after the operator / user pressed the power button..	D	D
Pulse 3a	-112 V	60 min	No deviation	D	A
Pulse 3b	+75 V	60 min	No deviation	D	A
Pulse 4	-6 V	1 pulse	No deviation	D	A
Sample No.: #2					
Test mode: 2					
Test Pulse	Level	Pulse/Time	Results	Function Status	Result Class
Pulse 1	-75 V	5 000 pulses	The EUT turned off during exposure, the EUT returned to normal function after the operator / user pressed the power button.	D	D
Pulse 2a	+37 V	5 000 pulses	No deviation	D	A
Pulse 2b	+10 V	10 pulses	The EUT turned off during exposure, the EUT returned to normal function after the operator / user pressed the power button.	D	D
Pulse 3a	-112 V	60 min	No deviation	D	A
Pulse 3b	+75 V	60 min	No deviation	D	A
Pulse 4	-6 V	1 pulse	No deviation	D	A

Test Result

Report No. : CE2019-00156

2.0 Photographs of the product

Photographs of the product



Front of EUT (#1)

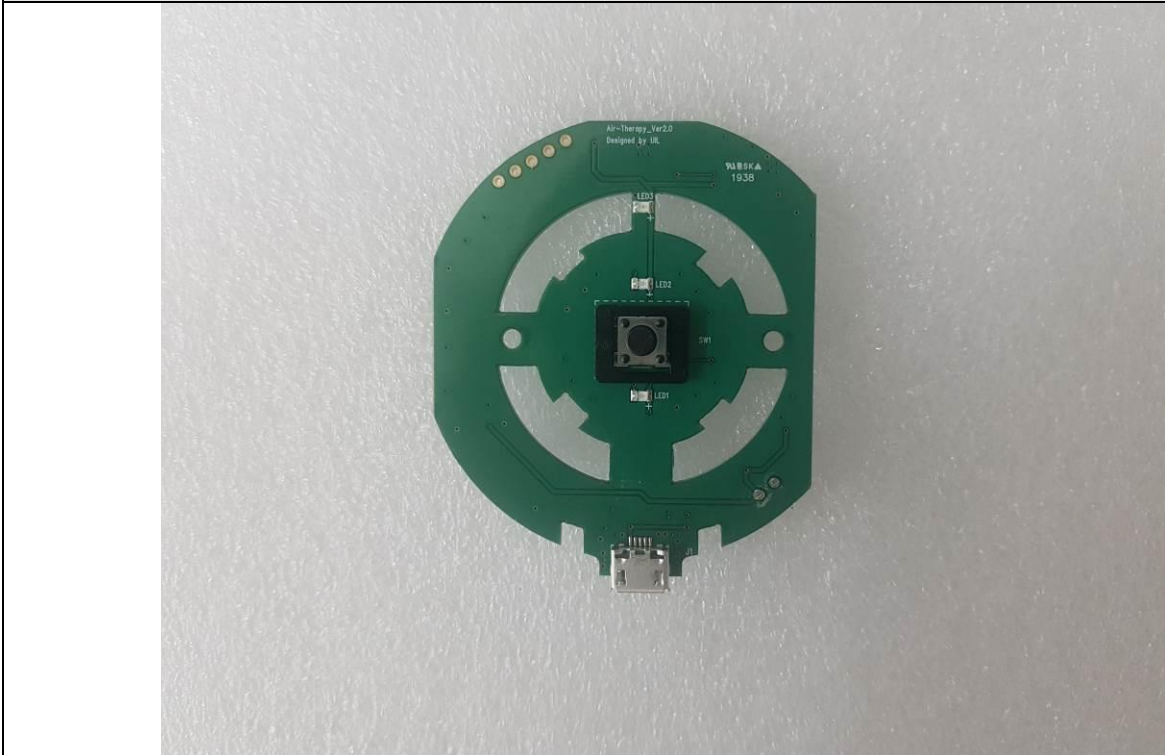


Rear of EUT (#1)

Test Result

Report No. : CE2019-00156

Photographs of the product



Front of PCB (#1)

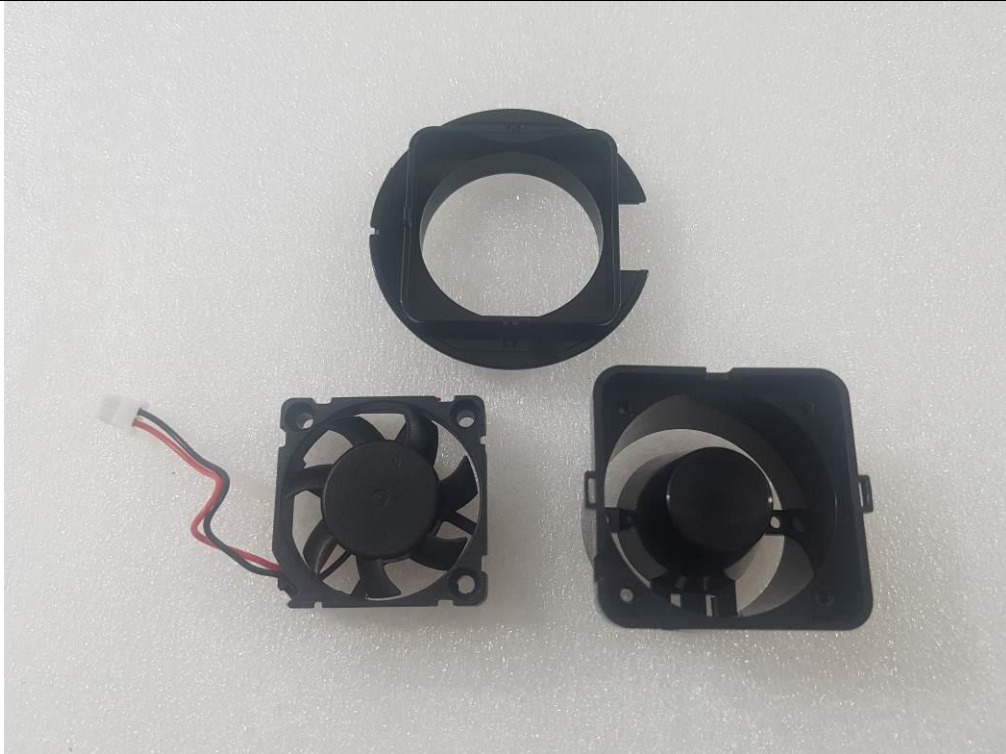


Rear of PCB (#1)

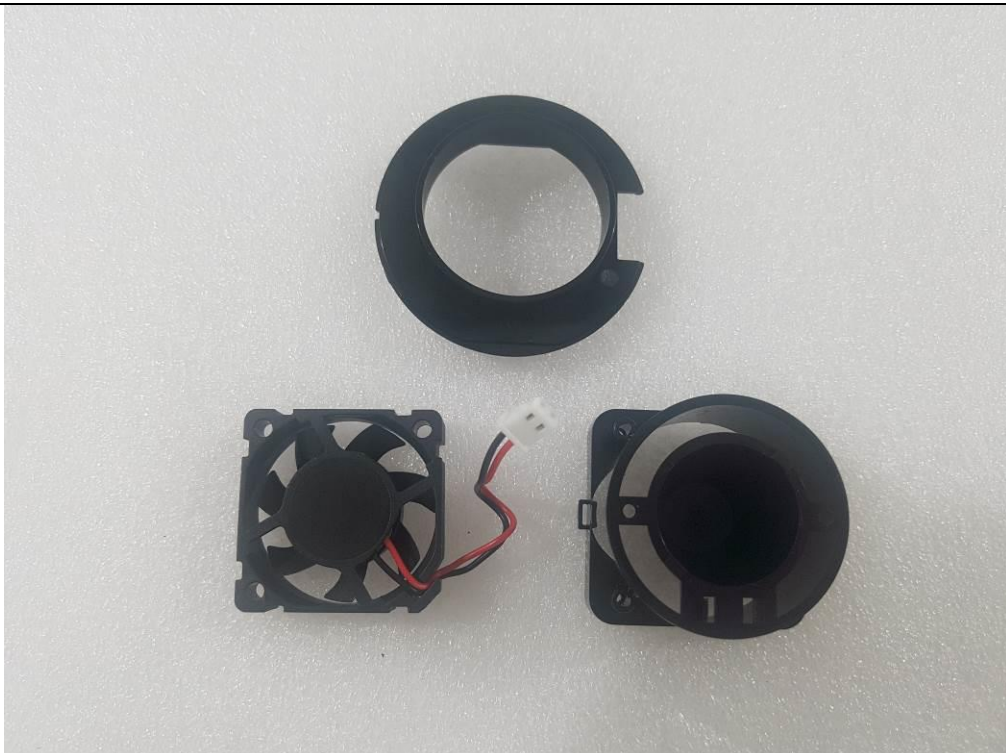
Test Result

Report No. : CE2019-00156

Photographs of the product



Front of DC FAN (#1)



Rear of DC FAN (#1)

Test Result

Report No. : CE2019-00156

Photographs of the product



Front of EUT (#2)

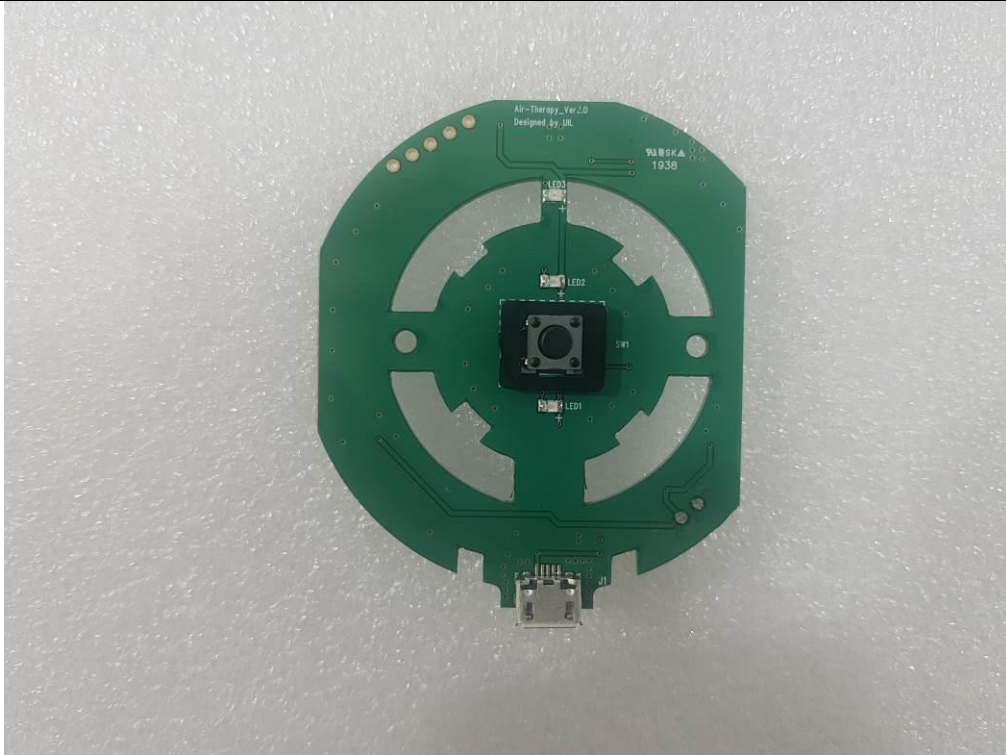


Rear of EUT (#2)

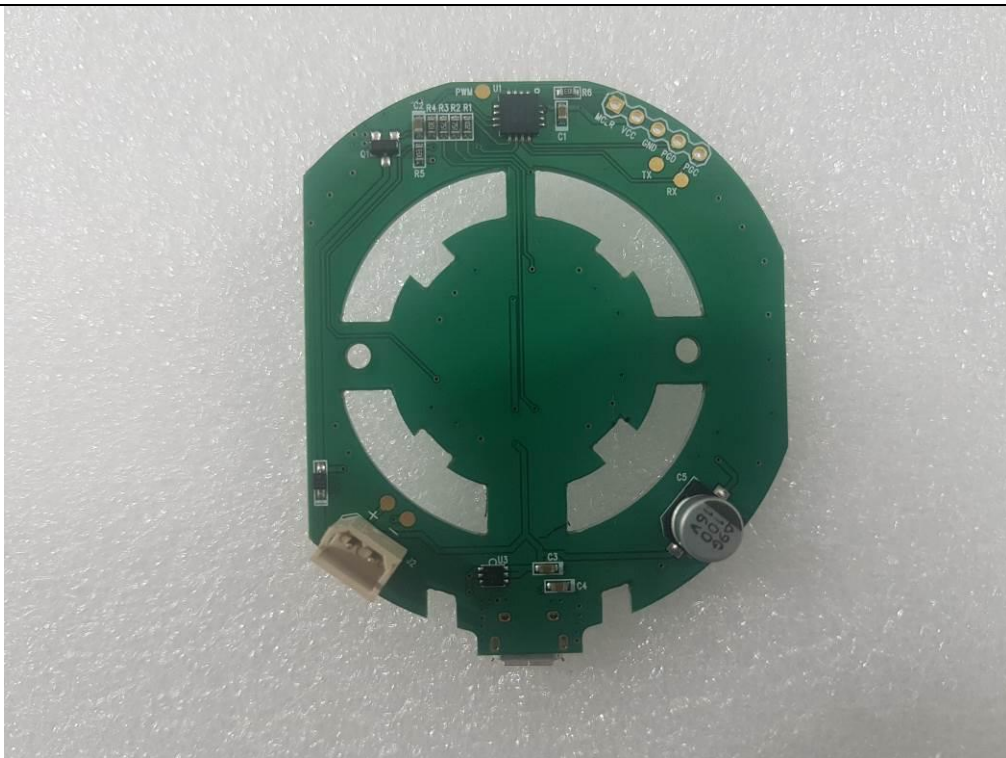
Test Result

Report No. : CE2019-00156

Photographs of the product



Front of PCB (#2)

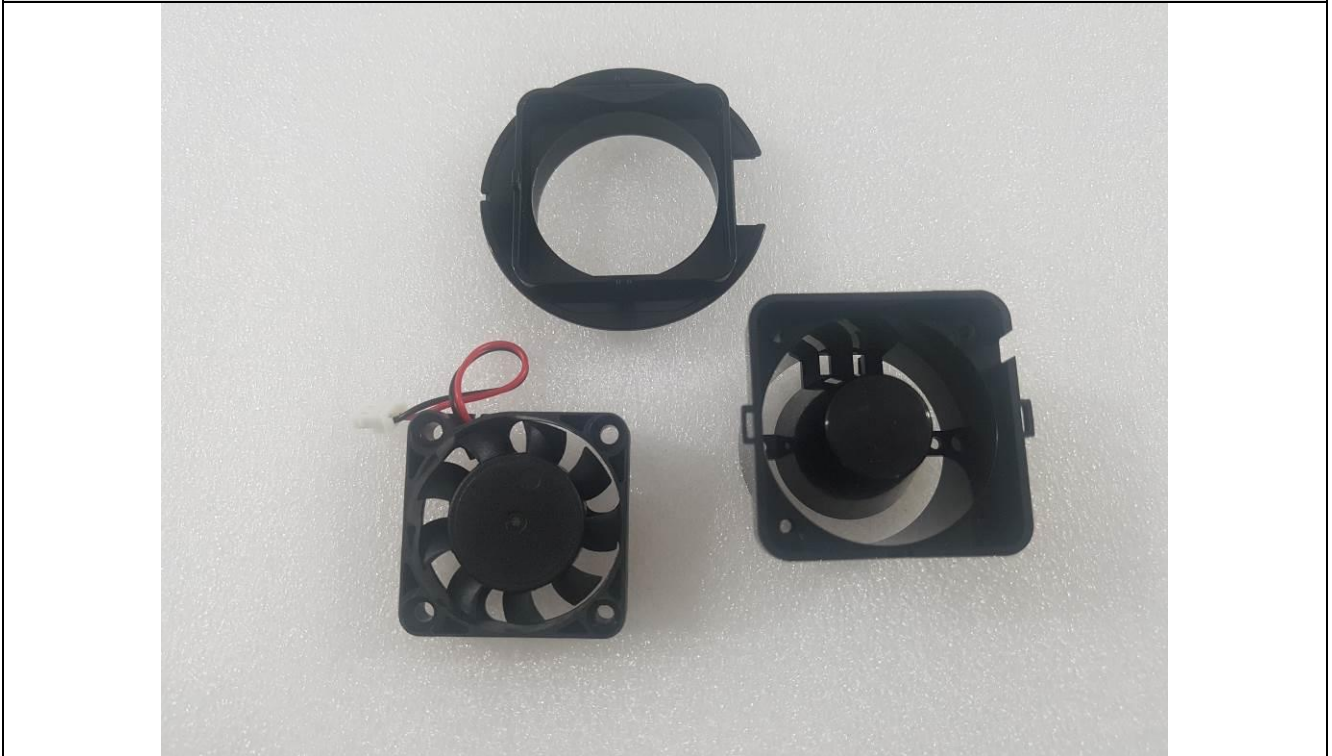


Rear of PCB (#2)

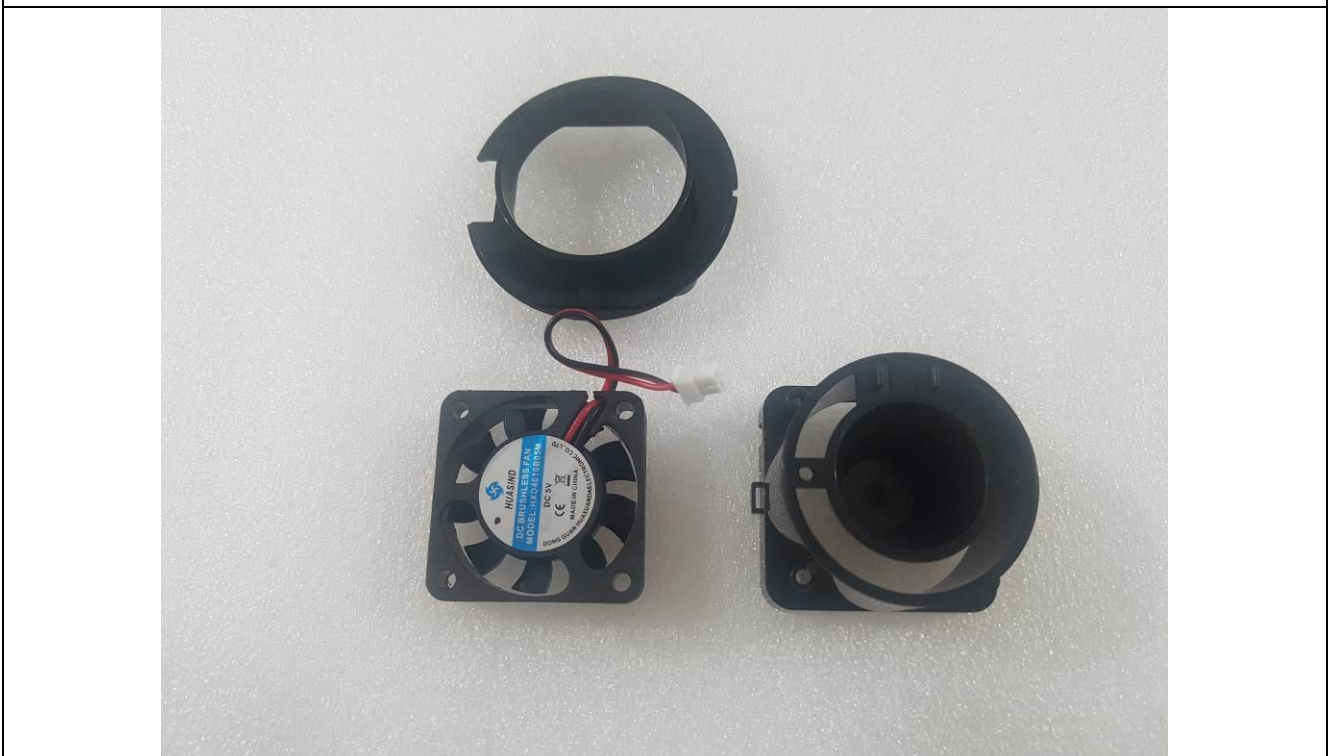
Test Result

Report No. : CE2019-00156

Photographs of the product



Front of DC FAN (#2)



Rear of DC FAN (#2)

Test Result

Report No. : CE2019-00156

Photographs of the product



Front of Cigar Jack Charger



Rear of Cigar Jack Charger

Test Result

Report No. : CE2019-00156

Photographs of the product



Adaptor

End.