Module 3: Product Description

Appendix 3.1.2-6: Testing report for System - EN 61000

In this appendix the following two documents are provided:

- Updated testing report issued on May 29, 2019
- Initial testing report issued on November 1, 2018

Please note that the testing report issued on May 29, 2019 is being updated to reflect the new model code for US version of the *IQOS* 3 Charger. New report will be available upon request.

Confidentiality Statement

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Report on the EMC Testing of:

TOBACCO HEATING SYSTEM

Model(s): Refer to Product Information

In accordance with
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 61000-6-1: 2007
EN 61000-6-3: 2007 + A1: 2011

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Add value.
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Prepared for:
Philip Morris Products S.A.
Quai Jeanrenaud 3, 2000 Neuchâtel,
Switzerland

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Document Number: 7191208112-EEC19/02 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	(b) (6)	29 May 2019	(b) (6)
Authorised Signatory	(b) (6)	27 May 2019	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD PSB document control rules. (b) (6)

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with the mentioned standard(s). (b) (6)

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ilac-MRA

Accredited Laboratory SAC-SINGLAS

LA-2007-0380-A	LA-2007-0385-E
LA-2007-0381-F	LA-2007-0386-C
LA-2007-0382-B	LA-2010-0464-D
LA-2007-0383-G	LA-2018-0702-B
LA-2007-0384-G	LA-2018-0703-G

The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council. Inspections/Calibrations/Tests marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our inspection body/laboratory.

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	29 May 2019

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1.2 Introduction

Applicant	:	Philip Morris Products S.A. Quai Jeanrenaud 3, 2000 Neuchâtel, Switzerland
Manufacturer	:	Philip Morris Products S.A. Quai Jeanrenaud 3, 2000 Neuchâtel, Switzerland
Factory	:	**(b) (4)**
Trade Mark	:	IQOS
Model Number(s)	:	Refer to test summary note 5
Serial Number(s)	:	Refer to test summary note 5
Number of Samples Tested	:	Refer to test summary note 5
Test Sample(s) Condition	:	Good
Quotation Reference	:	5190293
Test Specification/Issue/Date	:	EN 61000-3-2: 2014 EN 61000-3-3: 2013 EN 61000-6-1: 2007 EN 61000-6-3: 2007 + A1: 2011
Test Sample(s) Received Date	:	12 Apr 2019
Start of Test	:	17 Apr 2019
Finish of Test	:	09 May 2019

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1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with the specifications as shown below.

Specification Clause	Test Description	Result	Comments/Base Standard
EN 61000-6-3			
11, Table 2	Harmonic Current Emissions (Class A)	Pass	EN 61000-3-2: 2014
11, Table 2	Voltage Fluctuation / Flicker	Pass	EN 61000-3-3: 2013
11, Table 2	Conducted Emissions at AC Mains Terminals	Pass	EN 55016-2-1: 2009 Clause 7 *(CISPR 16-2-1: 2008 Clause 7)*
11, Table 3	Conducted Emissions at DC Mains Terminals	Not Applicable *See Note 1	EN 55016-2-1: 2009 Clause 7 *(CISPR 16-2-1: 2008 Clause 7)*
11, Table 4	Asymmetric Mode Conducted Emissions	Not Applicable *See Note 2	EN 55022: 2010 EN 55016-2-1: 2009 Clause 7 *(CISPR 16-2-1: 2008 Clause 7)*
11, Table 1	Radiated Emissions	Pass	EN 55016-2-3: 2006 Clause 7 *(CISPR 16-2-3: 2006 Clause 7)*
11, Table 2	Discontinuous Disturbance	Not Applicable *See Note 3	EN 55014-1: 2006 + A1: 2009 *(CISPR 14-1: 2005 + A1: 2008)*
EN 61000-6-1			
8, Table 1	Electrostatic Discharge Immunity	Pass	EN 61000-4-2: 2009 *(IEC 61000-4-2: 2008)*
8, Table 1	RF Radiated Immunity	Pass	EN 61000-4-3: 2006 + A1: 2008 + A2: 2010 *(IEC 61000-4-3: 2010)*
8, Tables 2, 3, 4	Electrical Fast Transient / Burst Immunity	Pass	EN 61000-4-4: 2012 *(IEC 61000-4-4: 2012)*
8, Tables 3, 4	Voltage Surge Immunity	Pass	EN 61000-4-5: 2014 *(IEC 61000-4-5: 2014)*
8, Tables 2, 3, 4	Conducted Disturbance Immunity	Pass	EN 61000-4-6: 2014 *(IEC 61000-4-6: 2013)*
8, Table 1	Power Frequency Magnetic Field Immunity	Pass	EN 61000-4-8: 2010 *(IEC 61000-4-8: 2009)*
8, Table 4	Voltage Dips & Interruptions Immunity	Pass	EN 61000-4-11: 2004 *(IEC 61000-4-11: 2004)*

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Notes

1. IQOS Holder A1404 results to be referred to Test Report 7191194758-02.

2. The Equipment Under Test (EUT) is an AC powered device or a device powered by a local battery with connecting cable length not exceeding 30m.

3. The Equipment Under Test (EUT) contains no wired network ports.

4. The Equipment Under Test (EUT) is not a switching device.

5. Pre-scan was performed for all AC Power Adaptor, Pocket Charger and Holder as shown below and the worst emission configuration was selected for final measurement for conducted emission tests and radiated emission tests,

Description	Models	Serial Number
(b) (4)		
Salcomp AC Power Adaptor	S21A20	81920724736_S
Salcomp AC Power Adaptor	S21A22	72931305135_S
Salcomp AC Power Adaptor	S21A23	70140899137
Salcomp AC Power Adaptor	S21A25	80510126739_S
Salcomp AC Power Adaptor	S21A27	80260672234_S
Salcomp AC Power Adaptor	S52A21	81540431934_S
(b) (4)		
(b) (4)	USB Type C Cable	Nil	Nil
	USB Type C Cable	Nil	Nil
	USB Type C Cable	Nil	Nil

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1.4 Product Information

1.4.1 Technical Description

Description	:	The Equipment Under Test (EUT) is a **TOBACCO HEATING SYSTEM (IQOS 3).** It consists of i. IQOS Holder A1404 ii. IQOS Holder A1406 iii. IQOS Pocket Charger A1504 iv. IQOS AC Power Adaptor S21A20, S21A22, S21A23, S21A25, S21A27, S52A21
Microprocessor	:	**(b) (4)**
Operating Frequency	:	Holder – **(b) (4)** Charger -
Clock / Oscillator Frequency	:	Holder - **(b) (4)** Charger – **(b) (4)** Charger BLE – **(b) (4)**
Modulation	:	**(b) (4)**
Antenna Gain	:	**(b) (4)**
Port / Connectors	:	USB-Type C
Rated Power / Accessories	:	i. IQOS Holder Model A1404 Output **(b) (4)** ii. IQOS Holder Model A1406 Output **(b) (4)** iii. IQOS Pocket Charger Model A1504 Output iv. IQOS AC Power Adaptor Rated output: **(b) (4)**

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1.4.2 Test Configuration and Modes of Operation

Test Configurations				
Worst Conducted Emissions Test Configurations				
Configuration	**Adaptor**	**Charger**	**Cable**	**Holder**
1	Salcomp S21A23	**(b) (4)**		--
2	Salcomp S21A23			Aucopo
Worst Radiated Emissions Test Configurations				
Configuration	**Adaptor**	**Charger**	**Cable**	**Holder**
3	--	--	--	Aucopo
4	**(b) (4)**			--
5				Aucopo
ESD Test Configuration				
6	Salcomp S21A20 Salcomp S21A22 Salcomp S21A23 Salcomp S21A25 Salcomp S21A27 Salcomp S52A21	**(b) (4)**		
	(b) (4)			

Mode(s)		Description
1.	Holder Turned ON	The EUT was exercised in the mode(s) throughout the test(s).
2.	Charging Pocket Charger with AC Power Adaptor, BLE connected	
3.	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	

1.4.3 Performance Criteria and Monitoring Methods

Performance Criteria: A
PASS Criteria: The EUT shall meet the minimum criteria as specified: a. The EUT shall continue to operate as intended without operator intervention during and after the test. b. The EUT shall show no degradation of performance or loss of function during and after the test. The degradation of performance is regarded as a degradation to a level not below a minimum performance level specified by the manufacturer for the EUT as its intended. **FAIL Criteria**: For the parameters observed, anything contrary to the pass criteria is considered as FAIL.
Monitoring Method(s): The performance of the EUT was monitored by observing the EUT operation as according to its intended condition.

Performance Criteria: B
PASS Criteria: The EUT shall meet the minimum criteria as specified: a. The EUT shall continue to operate as intended without operator intervention after the test. b. The EUT may show degradation of performance or loss of function during the test, which it must be recoverable to its intended operation after the test. The degradation of performance is regarded as a degradation to a level not below a minimum performance level specified by the manufacturer for the EUT as its intended. c. The EUT shall show no change of operating mode during and after the test. **FAIL Criteria**: For the parameters observed, anything contrary to the pass criteria is considered as FAIL.
Monitoring Method(s): The performance of the EUT was monitored by observing the EUT operation as according to its intended condition.

Performance Criteria: C
PASS Criteria: The EUT shall meet the minimum criteria as specified: a. The EUT may show loss of functions during the test, which shall be recoverable by operators. b. The EUT shall show its intended operations after recovering from operations. c. The EUT shall show no change of operating mode during and after the test. **FAIL Criteria**: For the parameters observed, anything contrary to the pass criteria is considered as FAIL.
Monitoring Method(s): The performance of the EUT was monitored by observing the EUT operation as according to its intended condition.

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1.5 Deviations from the Standard

Nil.

1.6 EUT Modification Record

No modifications were made.

1.7 Test Location(s)

TÜV SÜD PSB Pte Ltd
Electrical & Electronics Centre (EEC), Product Services,
No. 1 Science Park Drive, Singapore 118221

TÜV SÜD PSB Pte Ltd
Electrical & Electronics Centre (EEC), Product Services,
15 International Business Park #01-01, Singapore 609937

1.8 Test Facilities Registrations

Requirements	Registration Numbers
FCC	994109 (Test Firm Registration Number) SG0002 (Designation Number)
ISED	SGAP01 (CAB Identifier) Science Park 2932I-1 (3m and 10m Semi-Anechoic Chamber) International Business Park 2932N-1 (10m Semi-Anechoic Chamber)
VCCI	Science Park R-1335 (10m ANC) C-2306 (C.E @ Lab 3) T-1471 (Telecom Ports @ Lab 3) International Business Park R-3324 (10m ANC), G-203 (10mANC) C-4933 (C.E @ CEIBP) T-2403 (Telecom Ports @ CEIBP)
BSMI	SL2-IS-E-6001R *[CNS-13803 (ISM Equipment)]* SL2-IN-E-6001R *[CNS-13438 (IT Equipment)]* SL2-R1/R2-E-6001R *[CNS-13439 (Broadcast Receivers)]* SL2-A1-E-6001R *[CNS-13783-1 (Household Appliances)]* SL2-L1-E-6001R *[CNS-14115 (Lighting Equipment)]*
SABS	SABS/A-LAB/0029/2018

1.9 Supporting Equipment

Equipment Description (Including Brand Name)	Model, Serial & FCC ID Number	Cable Description (List Length, Type & Purpose)
Mobile Phone (Samsung S7)	M/N: SM-G930FD S/N: R58H54E71QH FCC ID: DoC	NA

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2 Test Details

2.1 Harmonic Current Emissions

2.1.1 Test Limits

Class A

Harmonic Order (n)	Maximum Permissible Harmonic Current (A)
Odd Harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	0.15 x 15 / n
Even Harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	0.23 x 8 / n

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2.1.2 Test Setup

2.1.2.1 The EUT was arranged as shown in the setup photos.

2.1.2.2 The EUT mains cable was plugged into the test system at the reference impedance output, from where the EUT receives its 230V 50Hz supply. The mains cable was laid in the most direct path between the test system and the EUT, with its length not exceeding 1m. The cable length in excess of 1m were bundled parallel to the mains cable.

2.1.2.3 The distance between the test system and the EUT was maintained at 0.8m.

2.1.3 Test Method

2.1.3.1 Verification of the equipment Class was made prior to the test as spelt out in the standard. This was necessary to ensure that the correct Class limit was applied during the test.

2.1.3.2 The EUT was switched on at the start of the test, but actual measurements commenced only after a 10-second delay, as specified in the standard.

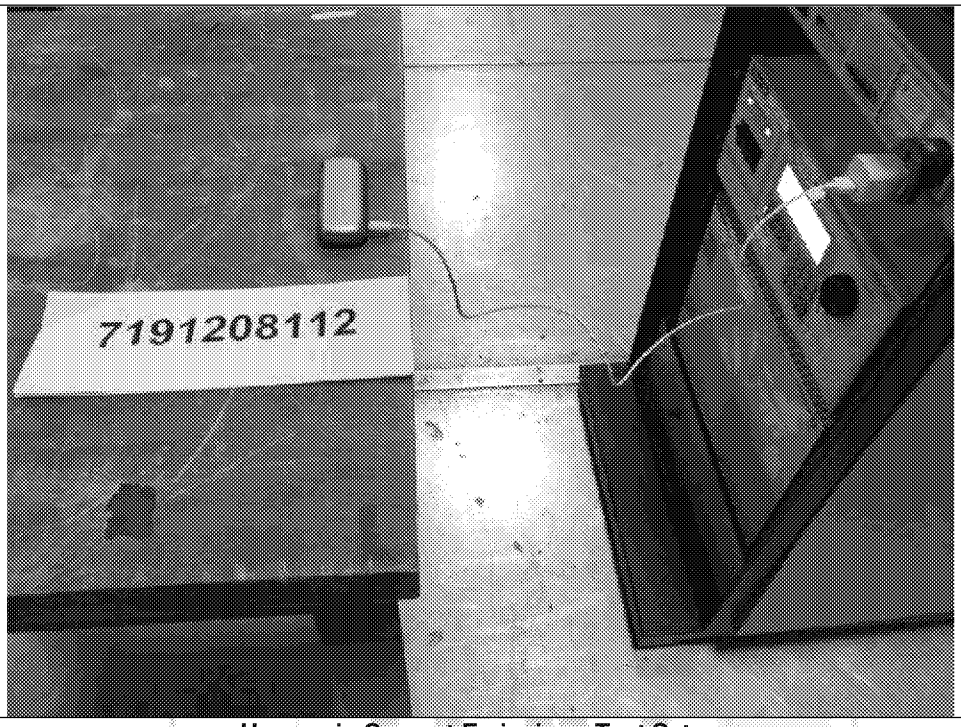
2.1.3.3 The harmonic current emissions were measured automatically within the test system, with the results being downloaded to the test system PC controller.

2.1.3.4 For Class D equipment, the Class D limit was adjusted in real time during the measurements, according to the actual power drawn. The voltage source was monitored simultaneously during the test to ensure that the harmonic content and voltage deviations were within the acceptable limits specified in the standard.

2.1.3.5 For Class B equipment, the Class B limit for transitory harmonics (for orders 2 to 10 not exceeding 10% of the 2.5-minute observation period) was adjusted 1.5 times the limit for steady-state harmonics (Class A limits).

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2.1.4 Test Setup Photographs



Harmonic Current Emissions Test Setup

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2.1.5 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	20°C
Test Input Power	230V 50Hz	Relative Humidity	60%
Test Configuration	1	Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	02 May 2019

Voltage (V)	230.2
Frequency (Hz)	50.0
Current (A)	0.2
Power (W)	2.3
Power Factor	0.3
Class	A
Result	Pass
Voltage Source Qualification Result	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	20°C
Test Input Power	230V 50Hz	Relative Humidity	60%
Test Configuration	2	Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	02 May 2019

Voltage (V)	230.1
Frequency (Hz)	50.0
Current (A)	0.2
Power (W)	2.7
Power Factor	0.3
Class	A
Result	Pass
Voltage Source Qualification Result	Pass

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2.2 Voltage Fluctuation / Flicker

2.2.1 Test Limits

Tests	Limits	Description
P_{st}	1.0	P_{st}: short-term flicker indicator
P_{lt}	0.65	P_{lt}: long-term flicker indicator
d(t) (ms)	500	d(t): maximum time that not exceeds 500ms
d_{max} (%)	4 %	d_{max}: maximum relative voltage change
d_c (%)	3.3 %	d_c: maximum relative steady-state voltage change

2.2.2 Test Setup

2.2.2.1 The EUT was arranged as shown in the setup photos.

2.2.2.2 The EUT mains cable was plugged into the test system at the reference impedance output, from where the EUT receives its 230V 50Hz supply. The mains cable was laid in the most direct path between the test system and the EUT, with its length not exceeding 1m. The cable length in excess of 1m was bundled parallel to the mains cable.

2.2.2.3 The distance between the test system and the EUT was maintained at 0.8m.

2.2.3 Test Method

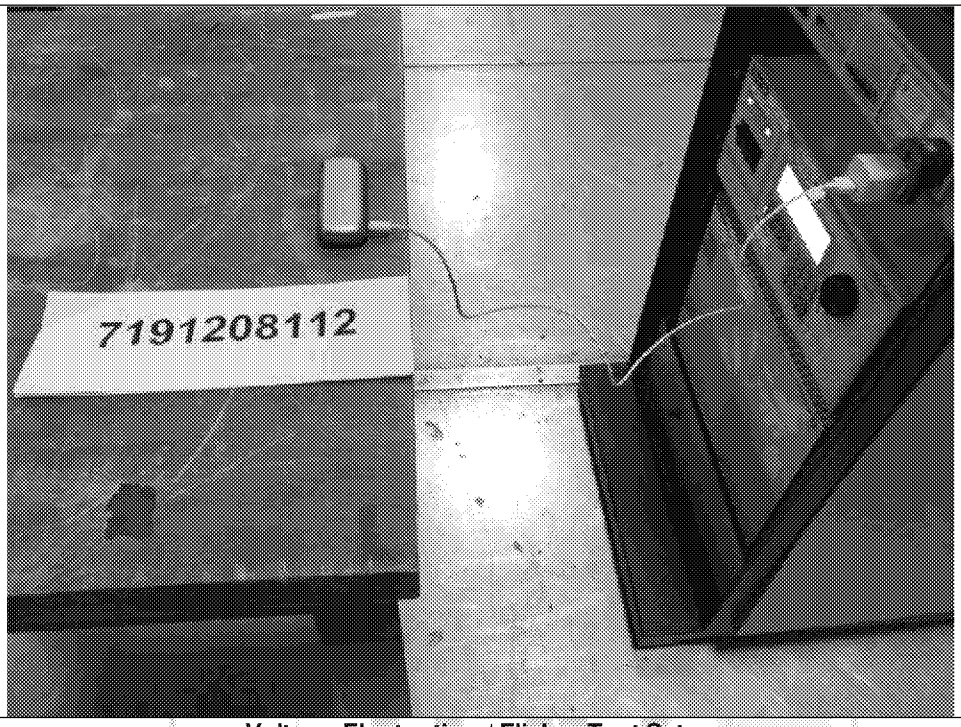
2.2.3.1 The voltage fluctuation/flicker was measured automatically within the test system, with the results being downloaded to the test system PC controller.

2.2.3.2 The test voltage supply, to which the EUT was connected, was checked during the test to ensure that:

a. The voltage was maintained at ±2% of the nominal.
b. The frequency was maintained at 50Hz ±0.5%.
c. The total harmonic distortion of the supply was less than 3%.

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2.2.4 Test Setup Photographs



Voltage Fluctuation / Flicker Test Setup

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2.2.5 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	20°C
Test Input Power	230V 50Hz	Relative Humidity	60%
Test Configuration	1	Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	02 May 2019

Parameters	Reading	Limits	Results
P_{st}	0.0640	1	Pass
d_c (%)	0.0000	3.3	Pass
d_{max} (%)	0.0000	4	Pass
d_t (ms)	0.0000	500	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	20°C
Test Input Power	230V 50Hz	Relative Humidity	60%
Test Configuration	2	Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	02 May 2019

Parameters	Reading	Limits	Results
P_{st}	0.0640	1	Pass
d_c (%)	0.0000	3.3	Pass
d_{max} (%)	0.0000	4	Pass
d_t (ms)	0.0000	500	Pass

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2.3 Conducted Emissions at AC Mains Terminals

2.3.1 Test Limits

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-peak (Q-P)	Average (AV)
0.15 - 0.5	66 – 56 *	56 – 46 *
0.5 - 5.0	56	46
5.0 - 30.0	60	50
* Decreasing linearly with the logarithm of the frequency		

2.3.2 Test Setup

2.3.2.1 The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.

2.3.2.2 The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

2.3.2.3 The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

2.3.2.4 All other supporting equipment were powered separately from another LISN.

2.3.3 Test Method

2.3.3.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.3.3.2 A scan was made on the NEUTRAL line (NEGATIVE line for DC Mains) over the required frequency range using an EMI test receiver.

2.3.3.3 High peaks, relative to the limit line, were then selected.

2.3.3.4 The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 9kHz. Both Quasi-peak and Average measurements were made.

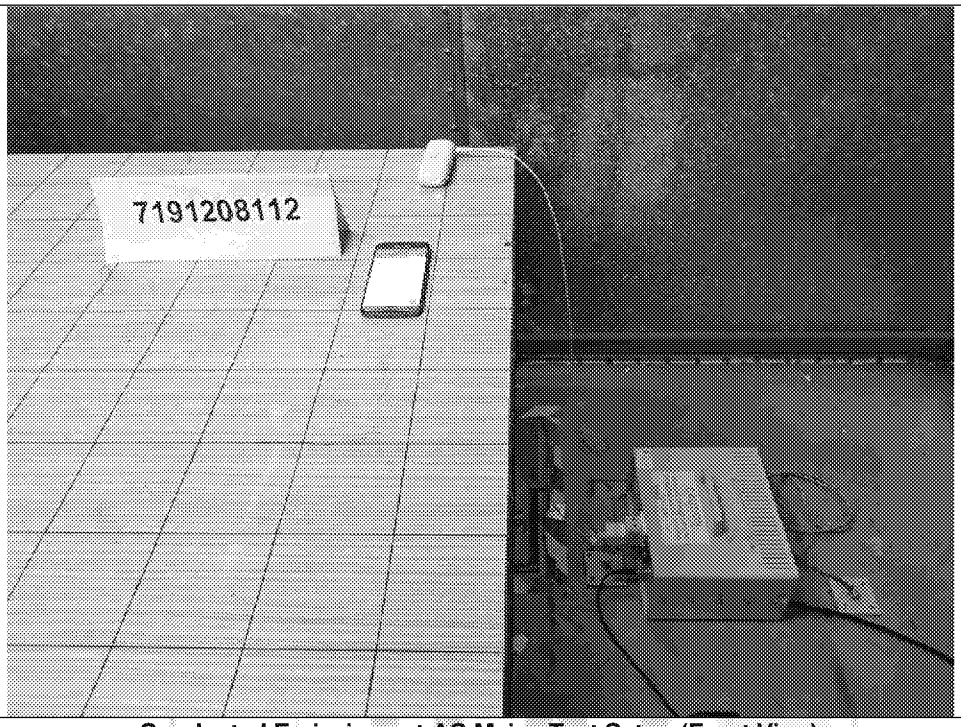
2.3.3.5 The measurements were then repeated for the LIVE line (POSITIVE line for DC Mains).

Sample Calculation Example

At 20 MHz	Q-P limit = 60.0 dBμV
Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB	
Q-P reading obtained directly from EMI Receiver = 40.0 dBμV (Calibrated for system losses)	
Therefore, Q-P margin = 60.0 - 40.0 = 20.0	i.e. 20.0 dB below Q-P limit

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2.3.4 Test Setup Photographs



Conducted Emissions at AC Mains Test Setup (Front View)



Conducted Emissions at AC Mains Test Setup (Rear View)

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2.3.5 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	56%
Line Under Test	AC Mains	Atmospheric Pressure	1030mbar
Configuration	1	Tested By	(b) (6)
		Test Date	24 - 25 Apr 2019

Frequency (MHz)	Q-P Value (dBµV)	Q-P Limit (dBµV)	Q-P Margin (dB)	AV Value (dBµV)	AV Limit (dBµV)	AV Margin (dB)	Line
0.4577	48.2	56.7	8.5	37.8	46.7	8.9	Live
0.5601	50.2	56.0	5.8	39.1	46.0	6.9	Live
0.8091	48.2	56.0	7.8	36.9	46.0	9.1	Live
1.3562	48.5	56.0	7.5	37.3	46.0	8.7	Live
2.4353	49.3	56.0	6.7	39.2	46.0	6.8	Neutral
2.4557	50.5	56.0	5.5	40.1	46.0	5.9	Live

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	56%
Line Under Test	AC Mains	Atmospheric Pressure	1030mbar
Configuration	2	Tested By	(b) (6)
		Test Date	24 - 25 Apr 2019

Frequency (MHz)	Q-P Value (dBµV)	Q-P Limit (dBµV)	Q-P Margin (dB)	AV Value (dBµV)	AV Limit (dBµV)	AV Margin (dB)	Line
0.4566	43.4	56.8	13.4	38.3	46.8	8.5	Live
0.5465	48.3	56.0	7.7	37.7	46.0	8.3	Live
1.3307	48.3	56.0	7.7	37.0	46.0	9.0	Neutral
1.3868	49.1	56.0	6.9	37.5	46.0	8.5	Live
2.4025	49.9	56.0	6.1	40.1	46.0	5.9	Neutral
2.4270	50.6	56.0	5.4	39.8	46.0	6.2	Live

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Notes

1.	All possible modes of operation were investigated from 150kHz to 30MHz. Only the worst-case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2.	A "positive margin" indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative margin" indicates a FAIL.
3.	EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings: 150kHz - 30MHz RBW: 9kHz VBW: 30kHz

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2.4 Radiated Emissions

2.4.1 Test Limits

Frequency Range (MHz)	Quasi-Peak Limits (dBµV/m) @ 3m	Quasi-Peak Limits (dBµV/m) @ 10m
30 - 230	40	30
230 - 1000	47	37
Note : At transition frequency, lower limit applies.		

Frequency Range (GHz)	Average Limits (dBµV/m) @ 3m	Peak Limits (dBµV/m) @ 3m
1 - 3	50	70
3 - 6	54	74
Note : At transition frequency, lower limit applies.		

2.4.2 Test Setup

2.4.2.1 The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.

2.4.2.2 The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

2.4.2.3 The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

2.4.3 Test Method

2.4.3.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.4.3.2 A pre-scan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the pre-scan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.

2.4.3.3 The test was carried out at the selected frequency points obtained from the pre-scan. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:

a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
b. The EUT was then rotated to the direction that gave the maximum emission.
c. Finally, the antenna height was adjusted to the height that gave the maximum emission.

2.4.3.4 A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.

2.4.3.5 The measurements were repeated for the next frequency point, until all selected frequency points were measured.

Sample Calculation Example

At 300 MHz	Q-P limit = 37.0 dBμV/m
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB Q-P reading obtained directly from EMI Receiver = 31.0 dBμV/m (Calibrated level including antenna factors & cable losses)	
Therefore, Q-P margin = 37.0 - 31.0 = 6.0	i.e. 6.0 dB below Q-P limit

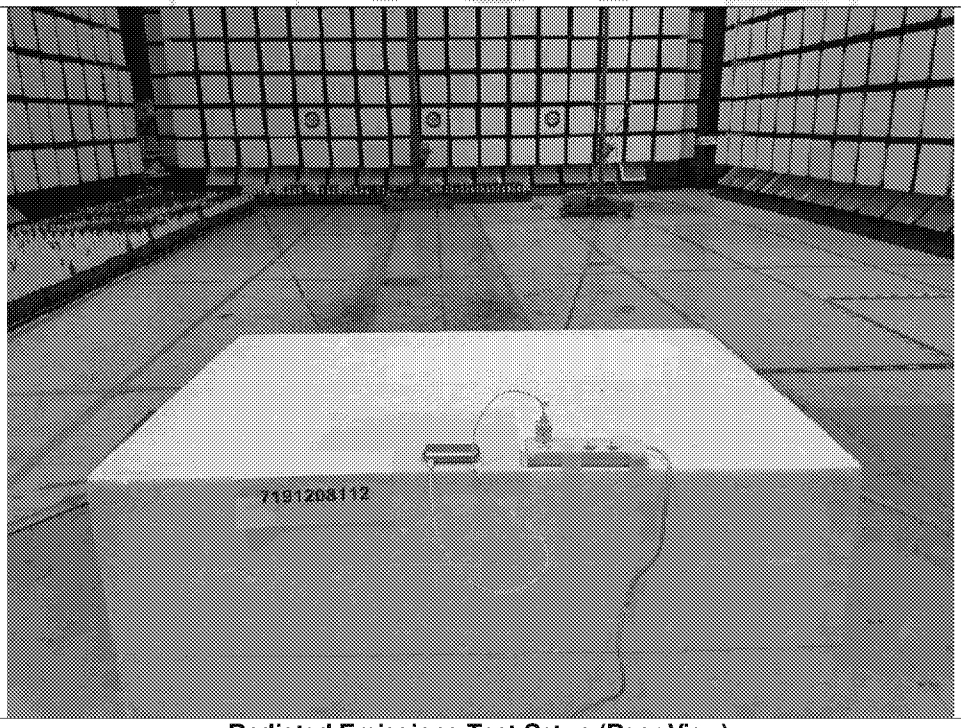
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2.4.4 Test Setup Photographs

30MHz – 1GHz Test Setup



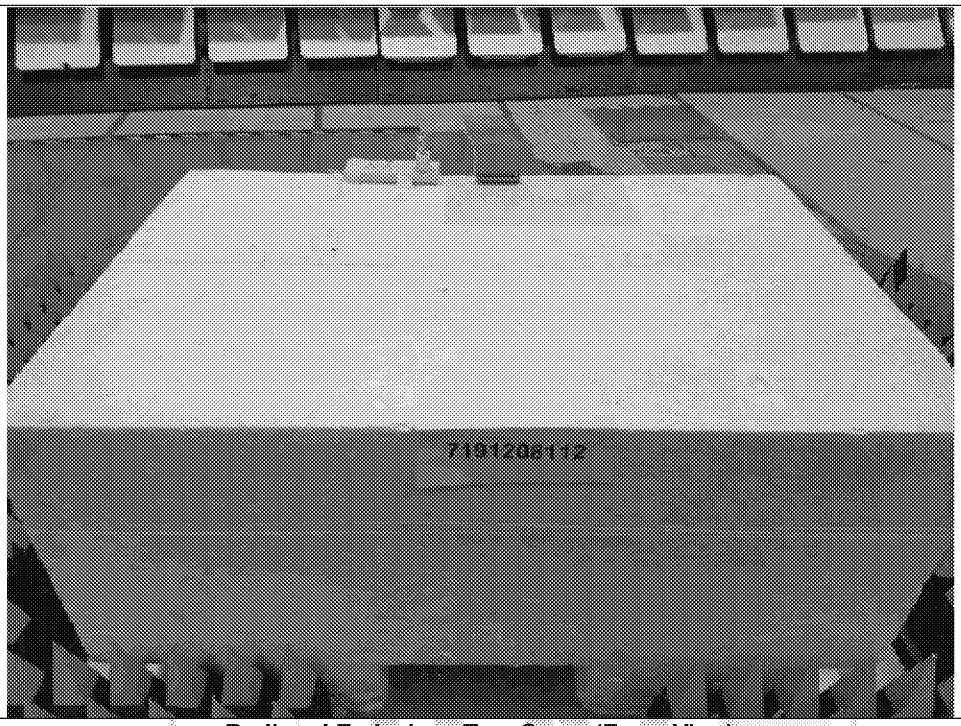
Radiated Emissions Test Setup (Front View)



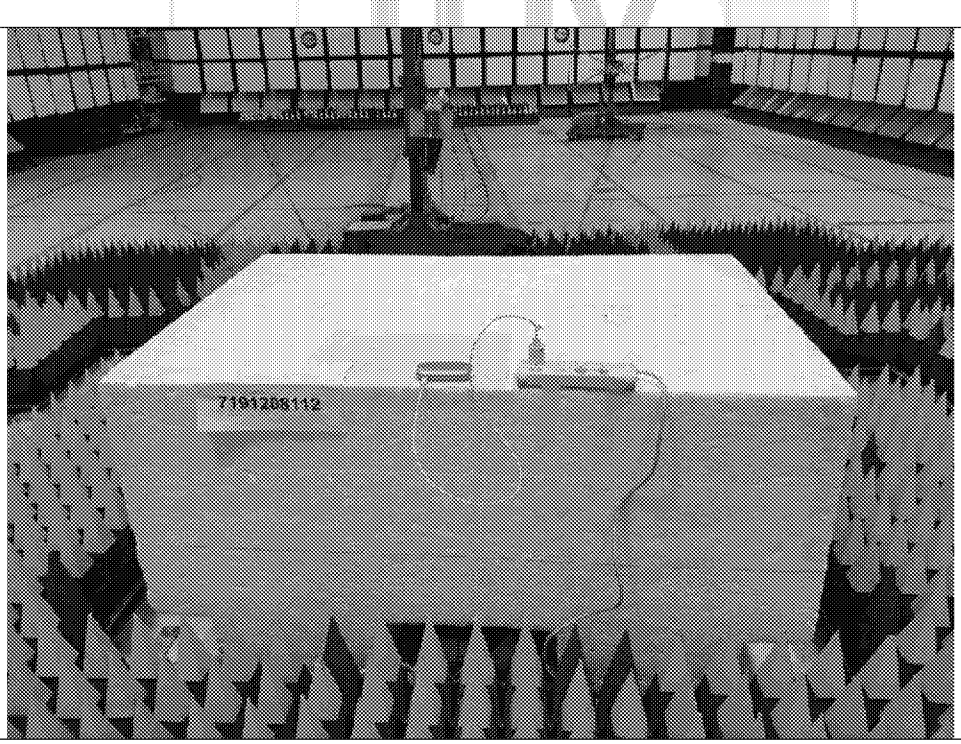
Radiated Emissions Test Setup (Rear View)

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1GHz – 6GHz Test Setup



Radiated Emissions Test Setup (Front View)



Radiated Emissions Test Setup (Rear View)

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2.4.5 Test Results

The detailed of the test results are shown below.

Operating Mode	Holder Turn On	Temperature	24°C
Test Input Power	Battery operated	Relative Humidity	60%
Test Distance	10m (30MHz – 1GHz) 3m (>1GHz –6GHz)	Atmospheric Pressure	1030mbar
Configuration	3	Tested By	(b) (6)
		Test Date	17 – 30 Apr 2019

Emissions from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Polarisation (H/V)
30.0000	25.1	30.0	4.9	400	290	H
30.5880	24.4	30.0	5.6	100	241	H
31.0780	24.6	30.0	5.4	100	204	H
32.1550	23.9	30.0	6.1	100	247	H
33.1350	23.4	30.0	6.6	400	253	V
34.2130	22.9	30.0	7.1	299	346	V

Emissions above 1GHz - 6GHz

Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)
1.8322	35.4	70.0	34.6	-	-	-	101	15	V
1.8489	35.4	70.0	34.6	-	-	-	101	243	V
2.0690	37.8	70.0	32.2	-	-	-	101	67	V
3.7497	41.0	74.0	33.0	-	-	-	101	305	V
3.9113	41.6	74.0	32.4	-	-	-	101	103	V
4.9374	42.6	74.0	31.4	-	-	-	101	212	V

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Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	60%
Test Distance	10m (30MHz – 1GHz) 3m (>1GHz –6GHz)	Atmospheric Pressure	1030mbar
Configuration	4	Tested By	(b) (6)
		Test Date	17 – 30 Apr 2019

Emissions from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Polarisation (H/V)
37.9970	27.5	30.0	2.5	100	56	V
51.0880	7.2	30.0	22.8	157	241	V
60.7970	13.2	30.0	16.8	275	37	V
86.8500	24.4	30.0	5.6	241	292	V
144.2340	13.4	30.0	16.6	139	127	V
191.9950	27.4	30.0	2.6	100	14	V

Emissions above 1GHz - 6GHz

Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)
1.3933	H	33.4	70.0	36.6	-	-	-	100	4
1.4171	V	33.7	70.0	36.3	-	-	-	399	275
2.0307	H	35.6	70.0	34.4	-	-	-	399	44
2.1918	V	37.1	70.0	32.9	-	-	-	399	33
2.2726	V	36.9	70.0	33.1	-	-	-	101	227
2.5346	V	36.7	70.0	33.3	-	-	-	101	157

PSB Singapore

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	60%
Test Distance	10m (30MHz – 1GHz) 3m (>1GHz –6GHz)	Atmospheric Pressure	1030mbar
Configuration	5	Tested By	(b) (6)
		Test Date	17 – 30 Apr 2019

Emissions from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Polarisation (H/V)
37.1970	29.1	30.0	0.9	100	107	V
90.1420	24.6	30.0	5.4	104	277	V
180.3520	26.1	30.0	3.9	178	186	V
188.4340	25.5	30.0	4.5	100	9	V
191.5200	27.0	30.0	3.0	100	4	V
194.6620	26.0	30.0	4.0	100	21	V

Emissions above 1GHz - 6GHz

Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)
1.4883	33.8	70.0	36.2	-	-	-	200	131	H
1.8049	35.6	70.0	34.4	-	-	-	300	270	H
2.2771	37.3	70.0	32.7	-	-	-	101	260	V
2.6250	37.2	70.0	32.8	-	-	-	200	277	V
2.8755	39.2	70.0	30.8	-	-	-	200	301	V
3.5739	42.7	74.0	31.3	-	-	-	399	347	V

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Notes

1.	All possible modes of operation were investigated. Only the worst-case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2.	A "positive margin" indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative margin" indicates a FAIL.
3.	EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings: 30MHz - 1GHz RBW: 120kHz VBW: 1MHz 1GHz – 6GHz RBW: 1MHz VBW: 3MHz
4.	The highest frequency of internal sources of the EUT is above 1GHz, as such, the measurement was made up to 6GHz.
5.	"--" indicates no emissions were found and shows compliance to the limits.

PSB Singapore

2.5 Electrostatic Discharge Immunity

2.5.1 Test Setup

2.5.1.1 The test setup was in accordance with the standard.

2.5.1.2 The electrostatic discharge (ESD) gun was loaded with the correct charging / discharge network specified by the standard.

2.5.1.3 A 0.8m high, non-metallic table, with a Horizontal Coupling Plane (HCP) placed on the tabletop, was used as a test bench. The EUT and supporting equipment were placed on the test bench, isolated from the HCP by a thin insulating sheet.

2.5.1.4 The HCP was grounded to the ground plane via two 470 kΩ "bleed" resistors at each end of the ground cable.

2.5.1.5 A Vertical Coupling Plane (VCP) was also used during the test. The VCP was also grounded to the ground plane in a similar manner as the HCP.

2.5.2 Test Method

2.5.2.1 Direct Air & Contact Discharges

Application of direct air and contact discharges to the discharge points specified by the customer were carried out in the following manner:

a. The EUT was switched on and allowed to warm up to its normal operating condition.
b. The test discharge points are shown in the report.
c. For air discharges, the charged rounded electrode was positioned at a distance away from the test point and moved towards the EUT as fast as possible until contact between the electrode and the EUT was made.
d. For contact discharges, the pointed electrode was applied directly to the test point, in contact with the conductive surface of the EUT. The discharges were then made with the electrode in contact with the EUT.
e. The required number of positive and negative discharges were applied at each test point; with a one second interval between discharges.
f. The EUT was monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

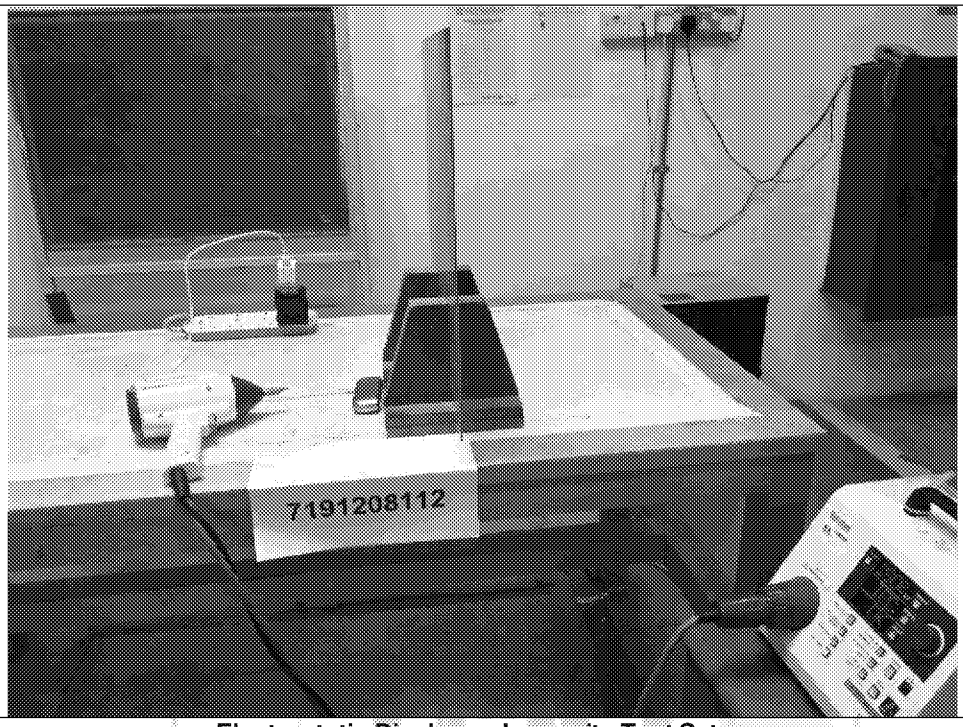
2.5.2.2 Indirect Coupling Plane Discharges

Indirect application of discharges using the HCP and VCP were performed on the sides of the EUT in the following manner:

a. The EUT was switched on and allowed to warm up to its normal operating condition.
b. The discharges to the HCP / VCP were made 0.1m away from one side of the EUT.
c. The required number of positive and negative discharges was applied at each test point; with one second interval between discharges.
d. The EUT was monitored during the test in accordance with the Pass / Fail criteria declared by the customer.
e. The test was then repeated on the remaining necessary sides of the EUT.

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2.5.3 Test Setup Photographs and ESD Test Points



Electrostatic Discharge Immunity Test Setup

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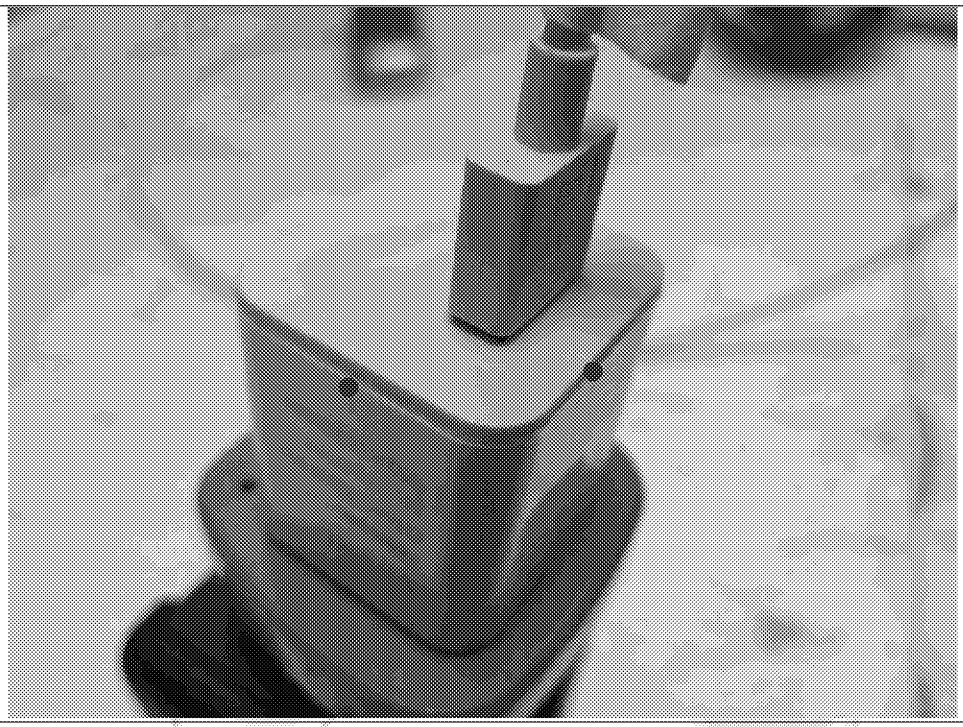
ESD TEST POINTS



ESD TEST POINTS

●	**Air Discharge**
●	**Contact Discharge**

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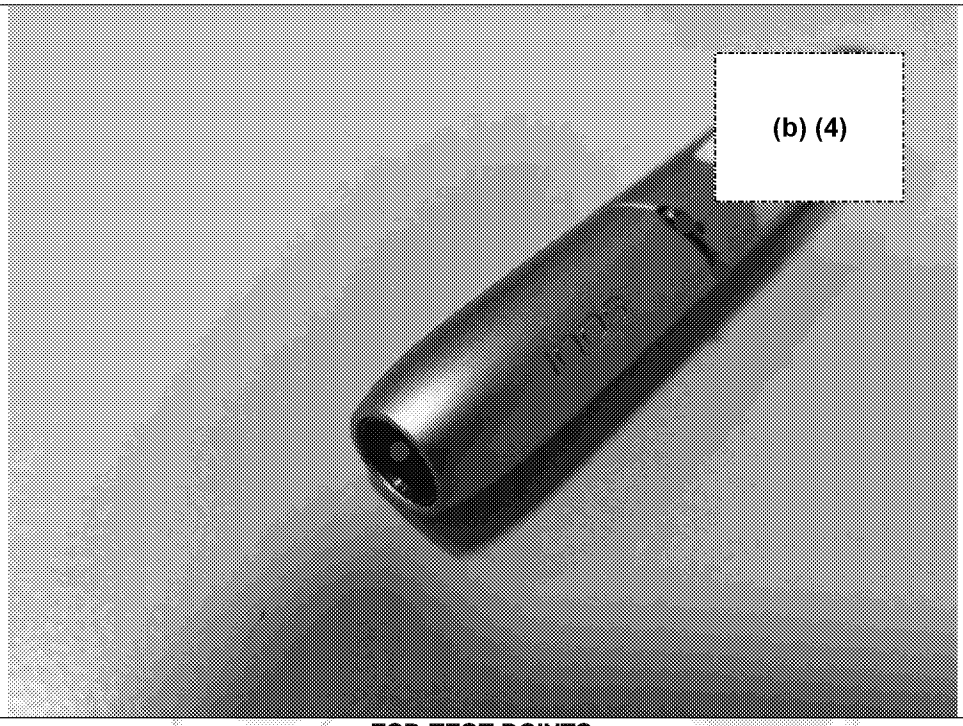
ESD TEST POINTS



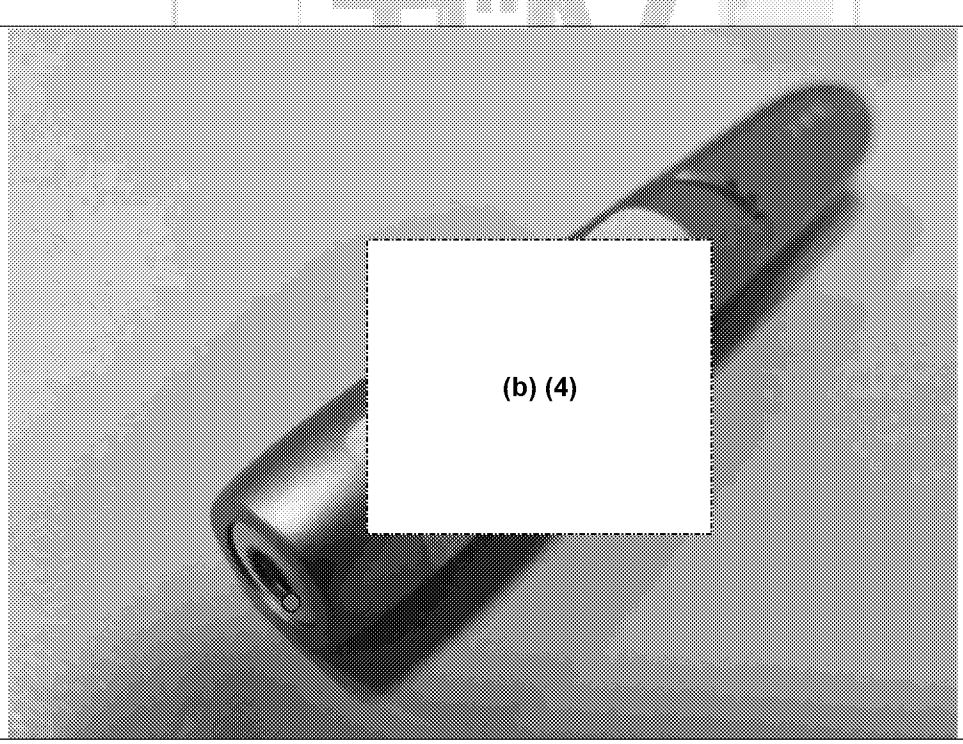
ESD TEST POINTS

●	**Air Discharge**
●	**Contact Discharge**

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ESD TEST POINTS



ESD TEST POINTS

●	Air Discharge
●	Contact Discharge

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2.5.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Holder Turns on	Temperature	23°C
Test Input Power	Battery operated	Relative Humidity	50%
Configuration	6	Atmospheric Pressure	1025mbar
		Tested By	(b) (6)
		Test Date	08 – 09 May 2019

Discharge Type	Test Severity Level	Pass Criteria	Results
Air Discharges	± 2kV, ± 4kV, ± 8kV, ± 10kV, ± 12kV, ± 15kV	B	Pass
Direct Contact Discharges	± 2kV, ± 4kV, ± 8kV, ± 10kV, ± 12kV, ± 15kV	B	Pass
Indirect Contact Discharges	± 2kV, ± 4kV, ± 8kV, ± 10kV, ± 12kV, ± 15kV	B	Pass

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	50%
Configuration	6	Atmospheric Pressure	1025mbar
		Tested By	(b) (6)
		Test Date	08 – 09 May 2019

Discharge Type	Test Severity Level	Pass Criteria	Results
Air Discharges	± 2kV, ± 4kV, ± 8kV, ± 10kV, ± 12kV, ± 15kV	B	Pass
Direct Contact Discharges	± 2kV, ± 4kV, ± 8kV, ± 10kV, ± 12kV, ± 15kV	B	Pass
Indirect Contact Discharges	± 2kV, ± 4kV, ± 8kV, ± 10kV, ± 12kV, ± 15kV	B	Pass

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Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	50%
Configuration	6	Atmospheric Pressure	1025mbar
		Tested By	(b) (6)
		Test Date	08 – 09 May 2019

Discharge Type	Test Severity Level	Pass Criteria	Results
Air Discharges	± 2kV, ± 4kV, ± 8kV, ± 10kV, ± 12kV, ± 15kV	B	Pass
Direct Contact Discharges	± 2kV, ± 4kV, ± 8kV, ± 10kV, ± 12kV, ± 15kV	B	Pass
Indirect Contact Discharges	± 2kV, ± 4kV, ± 8kV, ± 10kV, ± 12kV, ± 15kV	B	Pass

Notes

1.	Please refer to the Pass /Fail criteria to interpret the results.		
2.	Human Body Model	Storage Capacitor	150pF
		Discharge Resistor	330Ω
3.	Discharge Details	No. of Discharges / Point, Level & Polarity	10 air discharges 10 contact discharges
		Discharge Interval	1 second

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2.6 RF Radiated Immunity

2.6.1 Test Setup

2.6.1.1 The EUT was set up inside a fully anechoic chamber in accordance with the standard.

2.6.1.2 An isotropic field probe was placed adjacent to the EUT.

2.6.2 Test Method

2.6.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.6.2.2 The EUT was exercised and monitored in the manner specified by the customer.

2.6.2.3 All test instruments were PC controlled, via their IEEE 488.2 bus interfaces, and the test conducted in the following manner:

a. The testing frequencies were swept over the required frequency range, with a step frequency equal to 1% of preceding frequency. The sweep rate was $\leq 1.5 \times 10^{-3}$ decades/s.

b. For each frequency tested, the incident power to the antenna was adjusted to the required unmodulated test level, as established during the chamber calibration. With the incident power at the correct level, the 80% AM 1kHz was switched on for the specified dwell time.

2.6.2.4 The EUT was continuously monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

2.6.2.5 The test was done in both horizontal and vertical antenna polarizations, and for all necessary sides of the EUT.

PSB Singapore

2.6.3 Test Setup Photographs



RF Radiated Immunity Test Setup

2.6.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Holder Turn on	Temperature	23°C
Test Input Power	Battery Operated	Relative Humidity	52%
Configuration	3	Atmospheric Pressure	1029mbar
		Tested By	(b) (6)
		Test Date	03 – 07 May 2019

Sides Tested	Frequency	Test Severity Level	Pass Criteria	Results
Front, Back, Left, Right	80MHz - 1000MHz	3V/m, 80% AM 1kHz	A	Pass
Front, Back, Left, Right	1400MHz - 6000MHz	3V/m, 80% AM 1kHz	A	Pass

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Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	52%
Configuration	4	Atmospheric Pressure	1029mbar
		Tested By	(b) (6)
		Test Date	03 – 07 May 2019

Sides Tested	Frequency	Test Severity Level	Pass Criteria	Results
Front, Back, Left, Right	80MHz - 1000MHz	3V/m, 80% AM 1kHz	A	Pass
Front, Back, Left, Right	1400MHz - 6000MHz	3V/m, 80% AM 1kHz	A	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	52%
Configuration	5	Atmospheric Pressure	1029mbar
		Tested By	(b) (6)
		Test Date	03 – 07 May 2019

Sides Tested	Frequency	Test Severity Level	Pass Criteria	Results
Front, Back, Left, Right	80MHz - 1000MHz	3V/m, 80% AM 1kHz	A	Pass
Front, Back, Left, Right	1400MHz - 6000MHz	3V/m, 80% AM 1kHz	A	Pass

Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.		
2.	RF Radiated Immunity Details	Frequency Step	1% of preceding frequency
		Sweep Rate	≤ 1.5 X 10^{-3} decades/s

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2.7 Electrical Fast Transient / Burst Immunity

2.7.1 Test Setup

2.7.1.1 The test setup was in accordance with the standard.

2.7.1.2 The test was performed using an EFT/B generator and capacitive coupling clamp that were compliant with the standard.

2.7.1.3 The EFT/B generator was placed on top of the ground plane and connected to the protective earth.

2.7.1.4 D.C./A.C. Power Line Test

a. The EUT was placed on top of a 0.1m high, non-metallic table, and placed at least 0.5m away from the walls of the room and other conductive surfaces.

b. The required power was supplied to the EUT via direct connection to the EFT/B generator.

2.7.1.5 I/O Signal & Control Line Test

a. Insulating supports were used to ensure that the EUT and its cables were 0.1m above the metallic ground plane.

b. The capacitive coupling clamp was placed on top (and in contact with) the metallic ground plane.

c. The Cable Under Test (CUT) was sandwiched between the plates of the capacitive coupling clamp. All other cables were kept as far away from the capacitive coupling clamp as possible, where possible, perpendicularly orientated with respect to the CUT.

d. The EFT/B generator output was connected to the capacitive coupling clamp.

2.7.2 Test Method

2.7.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.7.2.2 D.C./A.C. Power Line Test

a. The EFT/B test system has a built-in coupling/decoupling network, which couples the generated EFT bursts into the EUT power supply lines connected to it.

b. The EFT bursts were coupled to the selected lines of the EUT individually and simultaneously for the necessary test duration.

2.7.2.3 I/O Signal & Control Line Test

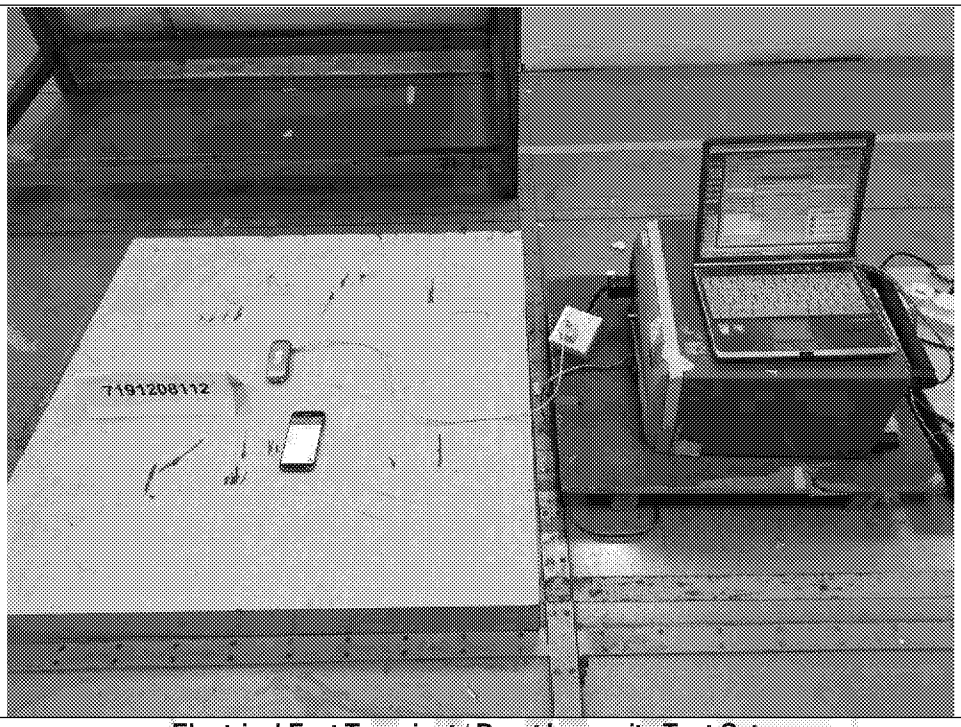
a. The interference impulses were capacitively coupled to the EUT's signal cables for the necessary test duration.

2.7.2.4 The EUT was monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

2.7.2.5 The test was performed with EFT bursts in the positive and negative polarities and repeated on all necessary lines.

PSB Singapore

2.7.3 Test Setup Photographs



Electrical Fast Transient / Burst Immunity Test Setup

PSB Singapore

2.7.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	59%
Configuration	1	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	29 Apr 2019

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
Live Line	± 1.0kV	B	Pass
Neutral Line	± 1.0kV	B	Pass
Earth Line	± 1.0kV	B	Not Applicable *See Note 3
Live + Neutral Lines	± 1.0kV	B	Pass
Live + Neutral + Earth Lines	± 1.0kV	B	Not Applicable *See Note 3
DC LINE			
Nil	± 0.5kV	B	Not Applicable *See Note 5
CONTROL & SIGNAL LINES			
Nil	± 0.5kV	B	Not Applicable *See Note 4

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Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	59%
Configuration	2	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	29 Apr 2019

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
Live Line	± 1.0kV	B	Pass
Neutral Line	± 1.0kV	B	Pass
Earth Line	± 1.0kV	B	Not Applicable *See Note 3
Live + Neutral Lines	± 1.0kV	B	Pass
Live + Neutral + Earth Lines	± 1.0kV	B	Not Applicable *See Note 3
DC LINE			
DC Line	± 0.5kV	B	Not Applicable *See Note 5
CONTROL & SIGNAL LINES			
Nil	± 0.5kV	B	Not Applicable *See Note 4

Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.		
2.	EFT/B Test Details	Waveshape	5/50 Tr/Th ns
		Repetition Frequency	5kHz
		Test Duration / Level & Polarity	1 minute
3.	The EUT is a 2-pin AC device, i.e. the EUT contains no AC protective earth terminal.		
4.	The EUT contains no signal line.		
5.	The EUT is an AC powered device.		

PSB Singapore

2.8 Voltage Surge Immunity

2.8.1 Test Setup

2.8.1.1 The test setup was in accordance with the standard.

2.8.1.2 The test was performed using a voltage surge generator, mains, and signal line coupling/decoupling networks that were compliant with the standard.

2.8.1.3 The voltage surge generator and coupling/decoupling networks were connected to the same protective earth.

2.8.1.4 The test level was set with the surge generator's HV output open-circuited.

2.8.1.5 For testing of the mains line, the mains coupling/decoupling network was inserted into the line. The voltage surge generator HV output cables were connected to the mains coupling/decoupling network, which has the necessary resistor/capacitor configurations (as required by the standard) built-in. The settings on the mains coupling/decoupling network were selected to give the required resistor/capacitor configuration as follows:

a. An 18µF capacitor in series with the output of the generator for differential (line-to-line) mode testing.

b. A 10Ω resistor and 9µF capacitor in series with the output of the generator for common (line-to-ground) mode testing.

2.8.1.6 For testing of the signal lines, the signal line coupling/decoupling network was inserted into the line. The voltage surge generator HV output cables were connected to the signal line coupling/decoupling network, which has the necessary resistor/capacitor/gas arrestor configurations (as required by the standard) built-in. The settings on this network were selected to give the required resistor/capacitor/gas arrestor configuration as reflected in the standard.

2.8.2 Test Method

2.8.2.1 The power supply to EUT was switched on and allowed to warm up to its normal operating condition.

2.8.2.2 For a.c. mains lines, the surge was applied at the 0°, 90°, 180° and 270° angles of the a.c. mains frequency for both positive and negative surges.

2.8.2.3 For d.c. and signal lines, the surge was applied independent from the a.c. mains frequency angle.

2.8.2.4 The correct open-circuit test level was set with the surge generator disconnected from the coupling network.

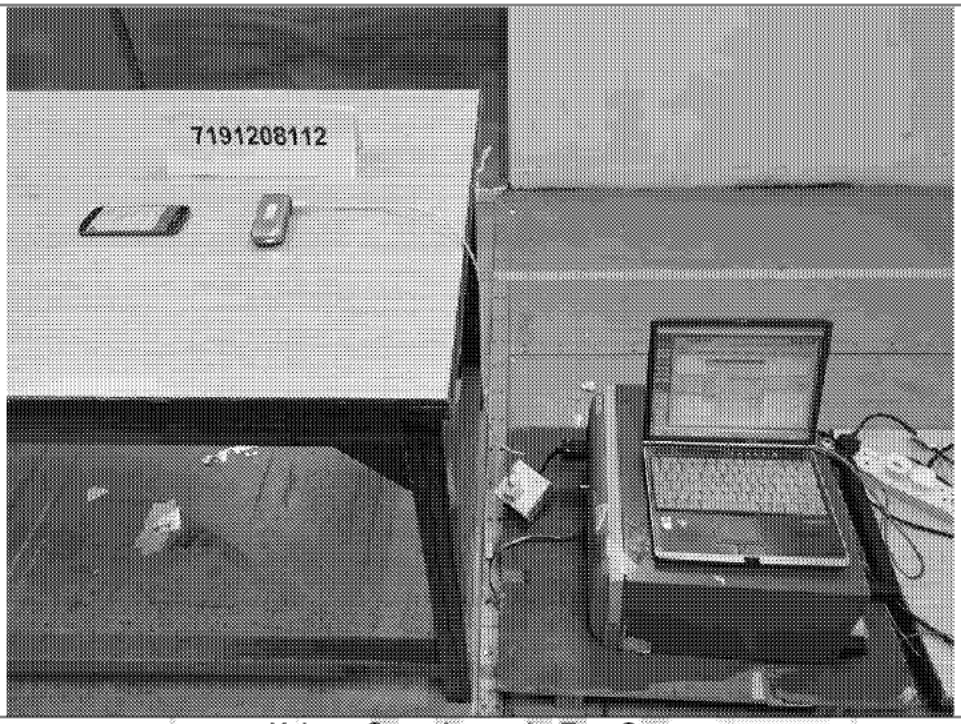
2.8.2.5 The output of the generator was then reconnected back to the coupling network.

2.8.2.6 Five discharges, generated by the voltage surge generator, and were made on each relevant line, for each polarity, at each test level, with the relevant discharge interval.

2.8.2.7 The EUT was observed during, and checked after the test to determine the result.

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2.8.3 Test Setup Photographs



Voltage Surge Immunity Test Setup

2.8.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	59%
Configuration	1	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	29 Apr 2019

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
Neutral - Earth	± 0.5kV, ± 1.0kV, ± 2.0kV	B	Not Applicable *See Note 3
Live – Earth	± 0.5kV, ± 1.0kV, ± 2.0kV	B	Not Applicable *See Note 3
Live - Neutral	± 0.5kV, ± 1.0kV	B	Pass
DC LINE			
Nil	± 0.5kV	B	Not Applicable *See Note 5

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Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	59%
Configuration	2	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	29 Apr 2019

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
Neutral - Earth	± 0.5kV, ± 1.0kV, ± 2.0kV	B	Not Applicable *See Note 3
Live – Earth	± 0.5kV, ± 1.0kV, ± 2.0kV	B	Not Applicable *See Note 3
Live - Neutral	± 0.5kV, ± 1.0kV	B	Pass
DC LINE			
Nil	± 0.5kV	B	Not Applicable *See Note 5

Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.		
2.	Surge Details	Waveshape	1.2/50 (8/20) Tr/Th µs
		No. of Surges / Line, Level & Polarity	5 surges Positive and negative
		Phase Angle	0°, 90°, 180° and 270°
		Surge Interval	60 seconds
3.	The EUT is a 2-pin AC device, i.e. the EUT contains no AC protective earth terminal.		
4.	The EUT is an AC powered device.		

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2.9 Conducted Disturbance Immunity

2.9.1 Test Setup

2.9.1.1 CDN Injection Method

a. The EUT and auxiliary equipment were placed on top of the Ground Reference Plane (GRP) and isolated from it by a 0.1m thick insulating support as shown in the setup photos.
b. The test system includes a RF signal generator, a power amplifier, attenuators, a spectrum analyzer and various types of Coupling/Decoupling Networks (CDNs).
c. The EUT's Cables Under Test (CUT) were cut in order to insert the CDNs into the line. The cable lengths were kept as short as possible to maintain a distance of 0.1m to 0.3m between the EUT and the CDNs.
d. The interconnecting cables between the EUT, CDNs and auxiliary equipment were kept at a height of 3cm to 5cm above the GRP.
e. The CDNs were placed on the GRP, in direct electrical contact with it.

2.9.1.2 EM Clamp Injection Method

a. The EUT and auxiliary equipment were placed on top of the Ground Reference Plane (GRP) and isolated from it by a 0.1m thick insulating support as shown in the setup photos.
b. The test system includes a RF signal generator, a power amplifier, attenuators, a spectrum analyzer and an EMC clamp.
c. The EUT's Cable Under Test (CUT) was clamped using the EM clamp. The cable length was kept as short as possible to maintain a distance of 0.1m to 0.3m between the EUT and the EM clamp.
d. The interconnecting cables between the EUT, EM clamp and auxiliary equipment were kept at a height of 3cm to 5cm above the GRP.
e. The EM clamp was placed on the GRP, in direct electrical contact with it.

2.9.2 Test Method

2.9.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.9.2.2 The interfering signal was swept from 150kHz to 80MHz, with a step frequency equal to 1% of preceding frequency. The sweep rate was $\leq 1.5 \times 10^{-3}$ decades/s.

2.9.2.3 CDN Injection Method

The output power level from the power amplifier to the CDN was adjusted through the signal generator so that the incident power reached the same level as that established during calibration. Once the incident power to the CDN reached the calibrated level, the 80% AM 1kHz AF was switched on for the specified dwell time.

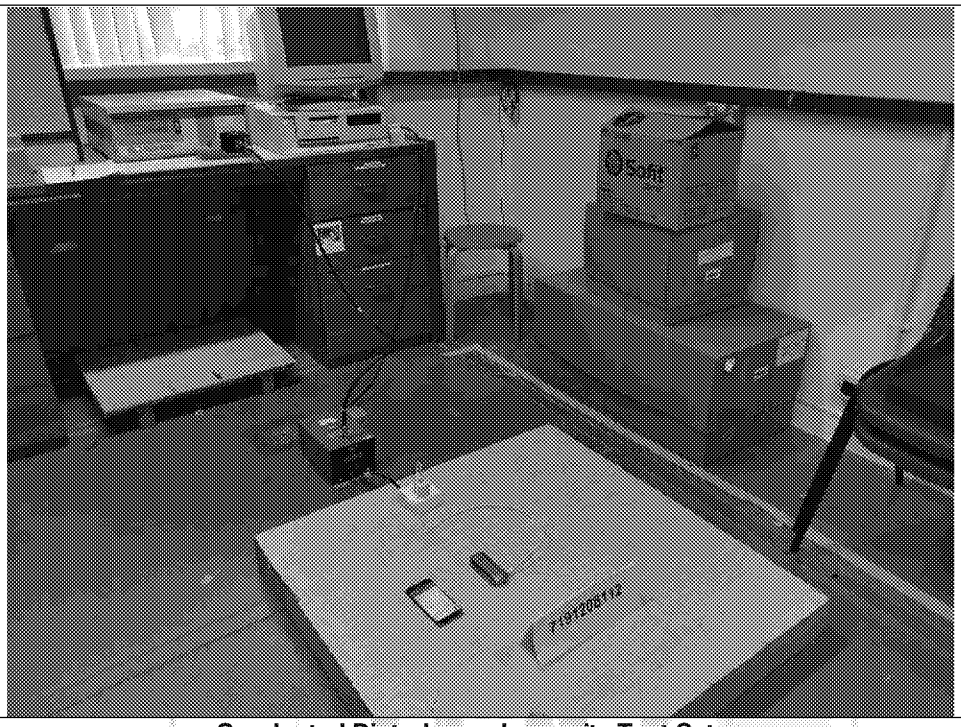
2.9.2.4 EM Clamp Injection Method

The output power level from the power amplifier to the EM clamp was adjusted through the signal generator so that the incident power reached the same level as that established during calibration. Once the incident power to the EM clamp reached the calibrated level, the 80% AM 1kHz AF was switched on for the specified dwell time.

2.9.2.5 The EUT was continuously monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

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2.9.3 Test Setup Photographs



Conducted Disturbance Immunity Test Setup

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2.9.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	26°C
Test Input Power	230V 50Hz	Relative Humidity	57%
Configuration	1	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	29 Apr 2019

Cable	Frequency	Test Severity Level	Pass Criteria	Results
MAINS LINE				
AC Mains	0.15MHz - 80MHz	3V, 80% AM 1kHz	A	Pass
DC LINE				
Nil	0.15MHz - 80MHz	3V, 80% AM 1kHz	A	Not Applicable *See Note 3
CONTROL & SIGNAL LINES				
Nil	0.15MHz - 80MHz	3V, 80% AM 1kHz	A	Not Applicable *See Note 4

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	26°C
Test Input Power	230V 50Hz	Relative Humidity	57%
Configuration	2	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	29 Apr 2019

Cable	Frequency	Test Severity Level	Pass Criteria	Results
MAINS LINE				
AC Mains	0.15MHz - 80MHz	3V, 80% AM 1kHz	A	Pass
DC LINE				
Nil	0.15MHz - 80MHz	3V, 80% AM 1kHz	A	Not Applicable *See Note 3
CONTROL & SIGNAL LINES				
Nil	0.15MHz - 80MHz	3V, 80% AM 1kHz	A	Not Applicable *See Note 4

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Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.		
2.	Conducted Immunity Details	Frequency Step	1% of preceding frequency
		Sweep Rate	$\leq 1.5 \times 10^{-3}$ decades/s
3.	The EUT is an AC powered device.		
4.	The length of USB line is not more than 3m.		

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2.10 Power Frequency Magnetic Field Immunity

2.10.1 Test Setup

2.10.1.1 The test setup was in accordance with the standard.

2.10.1.2 The EUT was kept 0.4m away from walls and conductive surfaces.

2.10.1.3 The EUT cables were arranged in such a way as to expose at least 1m of the cables to the magnetic field.

2.10.1.4 The induction coil is arranged centrally (as far as possible) around the EUT, and connected to the respective test generator.

2.10.1.5 With the test generator switched on, the required test level is set by adjusting the output setting of the test generator.

2.10.2 Test Method

2.10.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.10.2.2 The test generator was then switched on at the correct test level to generate the required magnetic field for the test.

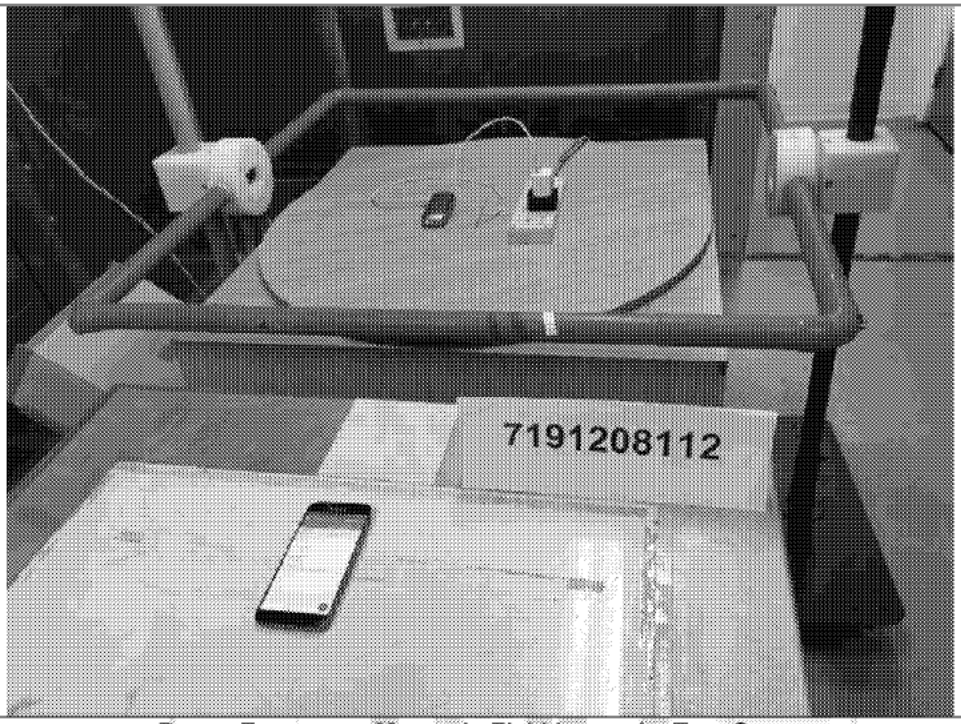
2.10.2.3 The EUT was exposed to the magnetic field for the required duration.

2.10.2.4 The test is repeated for the X, Y and Z axes of the EUT.

2.10.2.5 The EUT was continuously monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

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2.10.3 Test Setup Photographs



Power Frequency Magnetic Field Immunity Test Setup

2.10.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Holder Turn on	Temperature	22°C
Test Input Power	Battery Operated	Relative Humidity	57%
Configuration	3	Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	09 May 2019

Side / Axis	Test Severity Level	Pass Criteria	Results
X, Y, Z	3A/m (50Hz)	A	Pass
X, Y, Z	3A/m (60Hz)	A	Pass

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Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	22°C
Test Input Power	230V 50Hz	Relative Humidity	57%
Configuration	4	Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	09 May 2019

Side / Axis	Test Severity Level	Pass Criteria	Results
X, Y, Z	3A/m (50Hz)	A	Pass
X, Y, Z	3A/m (60Hz)	A	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	22°C
Test Input Power	230V 50Hz	Relative Humidity	57%
Configuration	5	Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	09 May 2019

Side / Axis	Test Severity Level	Pass Criteria	Results
X, Y, Z	3A/m (50Hz)	A	Pass
X, Y, Z	3A/m (60Hz)	A	Pass

Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.

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2.11 Voltage Dips and Interruptions Immunity

2.11.1 Test Setup

2.11.1.1 The test setup was in accordance with the standard.

2.11.1.2 The EUT mains cable was plugged into voltage dips and short interruptions immunity test system generator where it receives its required test supply voltage level. The mains cable was laid in the most direct path between the test system and the EUT, with its length not exceeding 1m. The cable length in excess of 1m was bundled parallel to the mains cable.

2.11.1.3 The distance between the test system and the EUT was maintained at 0.8m.

2.11.2 Test Method

2.11.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.11.2.2 The test system was controlled by the test software to apply the required voltage dips and interrupts to EUT mains cable.

2.11.2.3 The EUT was monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

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2.11.3 Test Setup Photographs



Voltage Dips and Interruptions Immunity Test Setup

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2.11.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	20°C
Test Input Power	230V 50/60Hz	Relative Humidity	60%
Test Configuration	1	Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	02 May 2019

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
AC Mains	100% dip, 0.5 cycle (50Hz)	B	Pass
AC Mains	100% dip, 0.5 cycle (60Hz)	B	Pass
AC Mains	100% dip, 1 cycle (50Hz)	B	Pass
AC Mains	100% dip, 1 cycle (60Hz)	B	Pass
AC Mains	30% dip, 25 cycles (50Hz)	C	Pass
AC Mains	30% dip, 30 cycles (60Hz)	C	Pass
AC Mains	100% interruption, 250 cycles (50Hz)	C	Pass
AC Mains	100% interruption, 300 cycles (60Hz)	C	Pass

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Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	20°C
Test Input Power	230V 50/60Hz	Relative Humidity	60%
Test Configuration	2	Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	02 May 2019

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
AC Mains	100% dip, 0.5 cycle (50Hz)	B	Pass
AC Mains	100% dip, 0.5 cycle (60Hz)	B	Pass
AC Mains	100% dip, 1 cycle (50Hz)	B	Pass
AC Mains	100% dip, 1 cycle (60Hz)	B	Pass
AC Mains	30% dip, 25 cycles (50Hz)	C	Pass
AC Mains	30% dip, 30 cycles (60Hz)	C	Pass
AC Mains	100% interruption, 250 cycles (50Hz)	C	Pass
AC Mains	100% interruption, 300 cycles (60Hz)	C	Pass

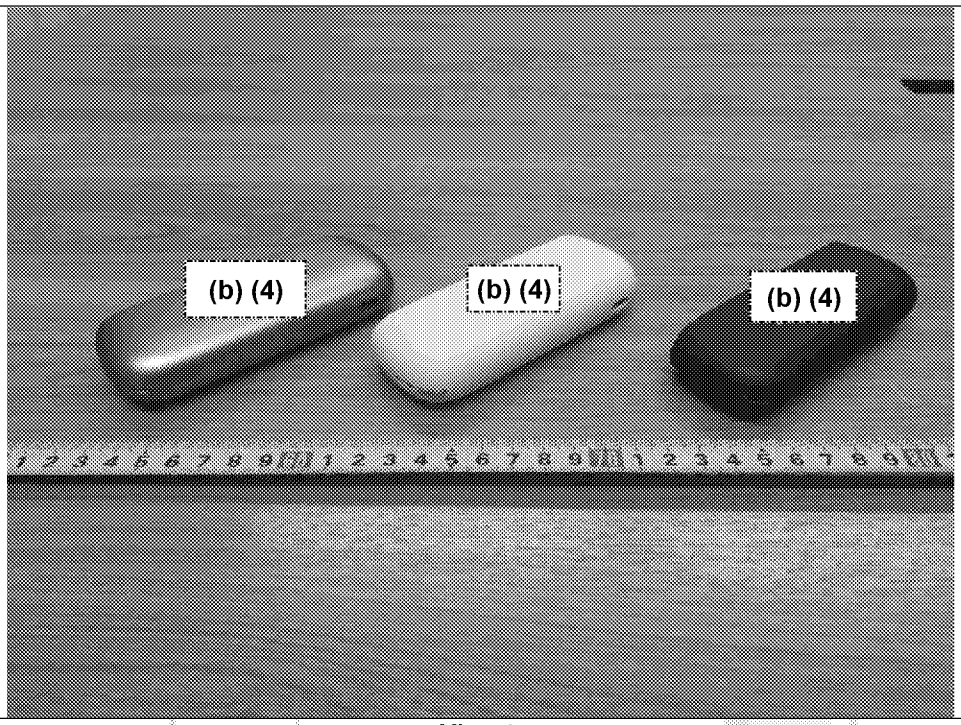
Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.	
2.	VDI Immunity Details	Changes occur at zero-crossing

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3 Photographs

IQOS Pocket Charger A1504
From Left to Right: (b) (4) Pocket Charger



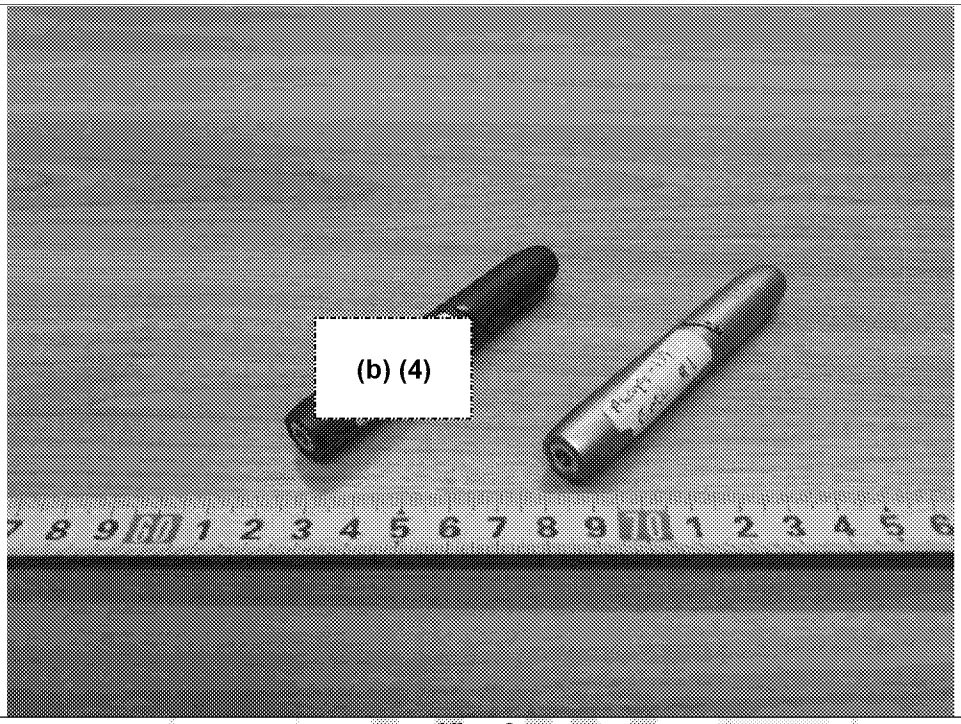
View 1



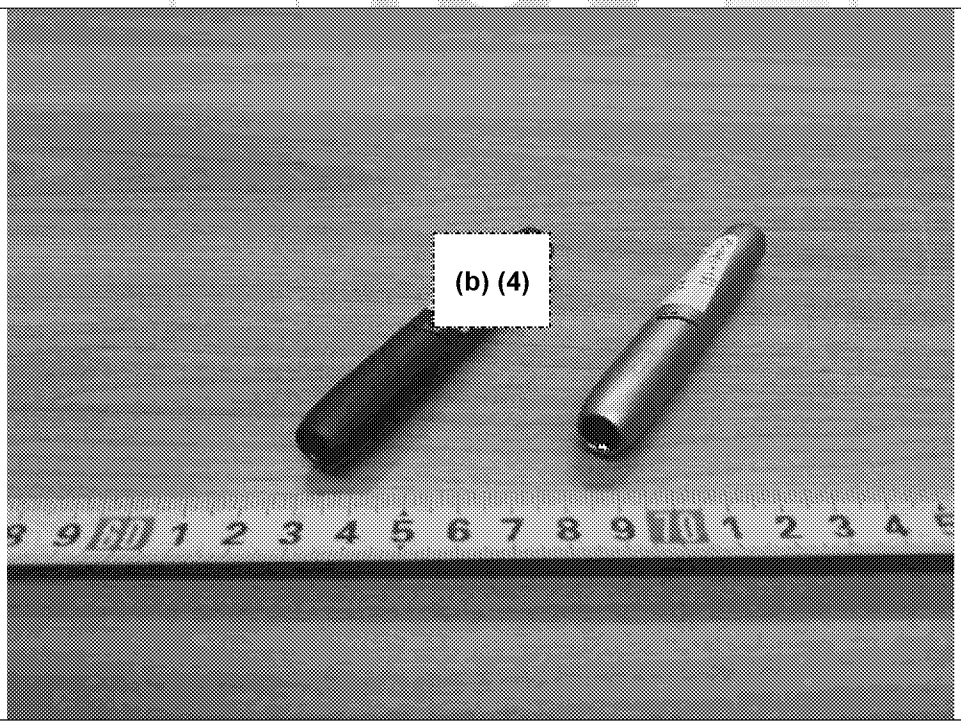
ew 2

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IQOS Holder A1406
From Left to Right: (b) (4) Aucopo Holder



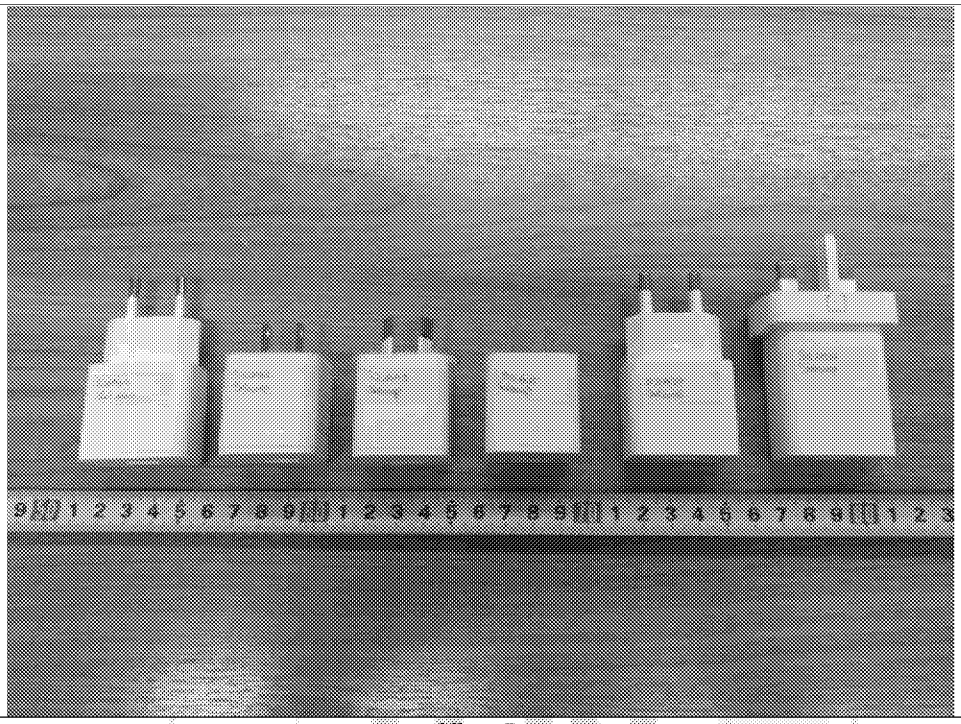
View 3



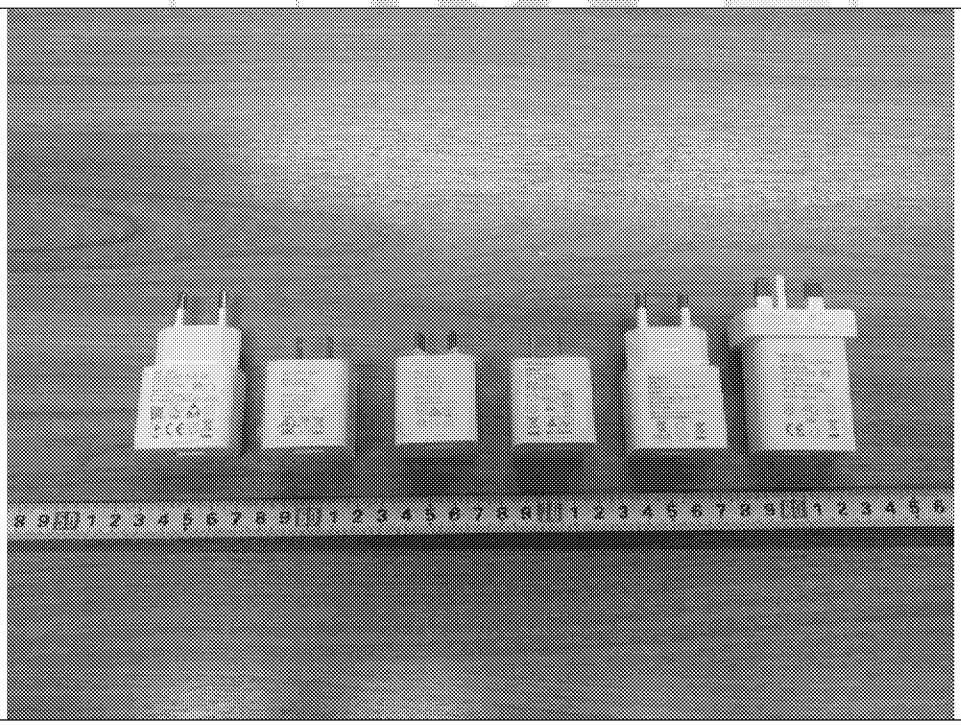
View 4

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Salcomp AC Adaptors
From Left to Right: S21A20, S21A22, S21A23, S21A25, S21A27, S52A21



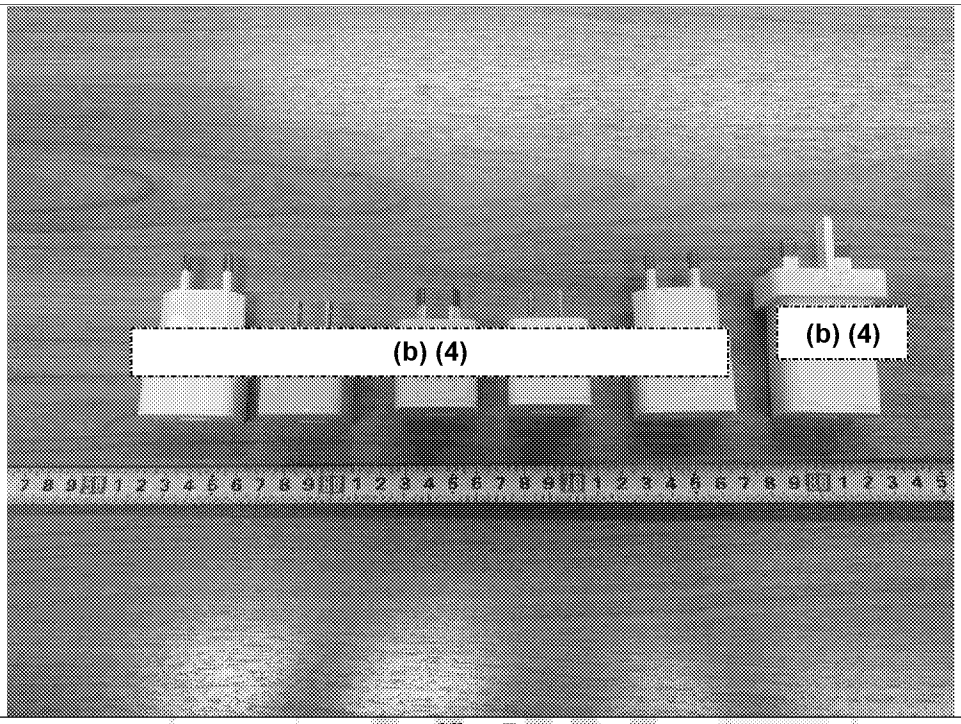
View 5



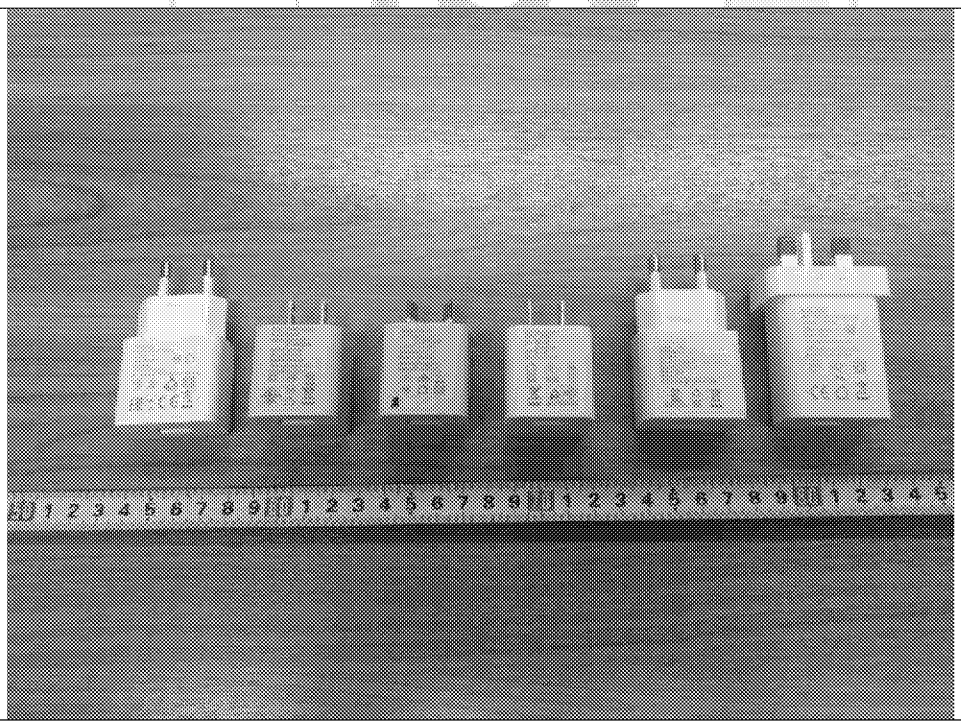
View 6

PSB Singapore

(b) (4) AC Adaptors
From Left to Right: S21A20, S21A22, S21A23, S21A25, S21A27, S52A21



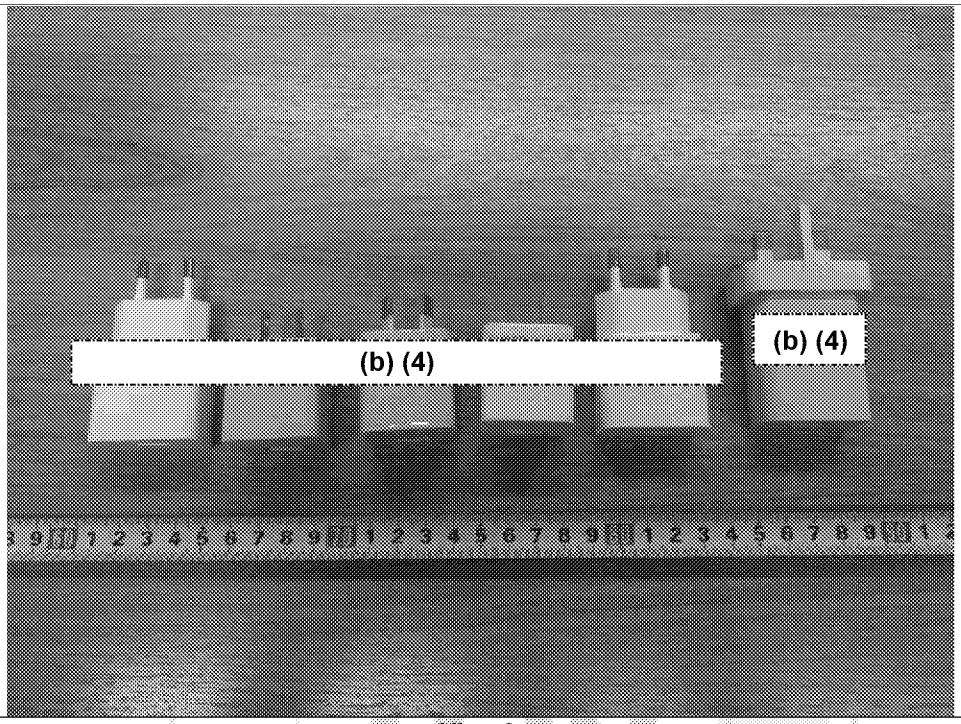
View 7



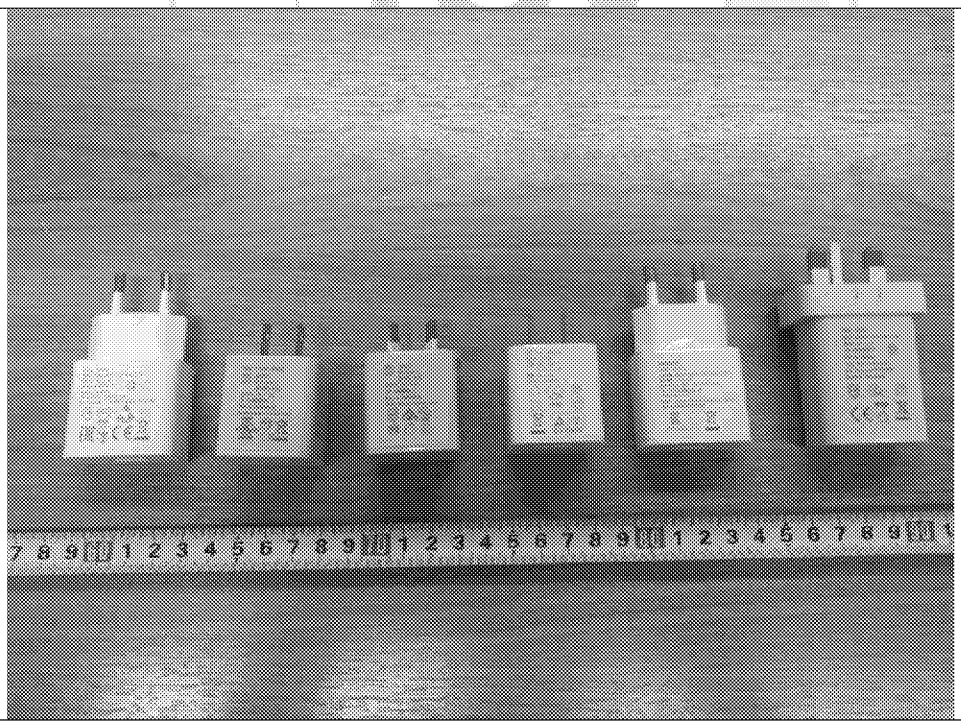
View 8

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(b) (4) AC Adaptors
From Left to Right: S21A20, S21A22, S21A23, S21A25, S21A27, S52A21



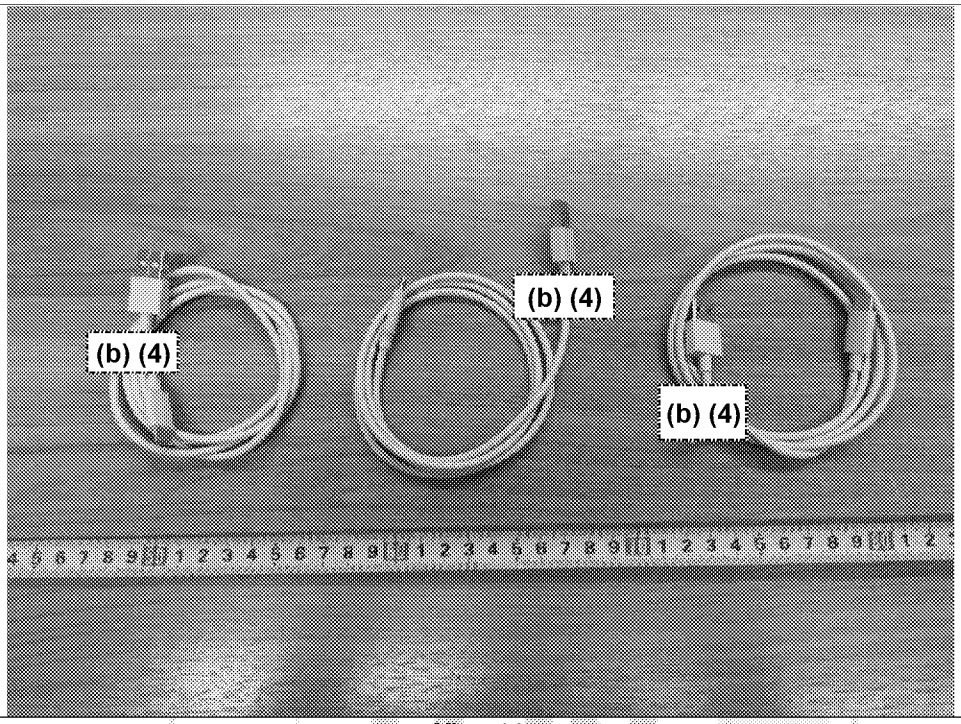
View 9



View 10

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USB Cables
From Left to Right: (b) (4)



View 11

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4 Test Equipment

Instrument	Model	S/No	Cal Due Date
Harmonic Current Emissions, Voltage Fluctuation / Flicker, Voltage Dips & Interruptions Immunity			
Schaffner Profline 2100 System			
Schaffner Advanced Coupling Unit	CCN1000-1	72061	08 Jan 2020
Schaffner 5kVA Power Source	NSG 1007-5-400	54854	08 Jan 2020
Conducted Emissions at Mains Terminals			
Schaffner EMI Receiver	SMR4503	40	14 May 2019
Agilent EMC Analyzer	E7403A	US41160166	06 Jul 2019
Schaffner LISN 2-Line V-Network	NNB41	04/10151	03 Mar 2020
Radiated Emissions			
R&S EMI Test Receiver	ESU 40	1302.6005k40-100355-wq	07 Sep 2019
Schaffner Bilog Antenna	CBL6112B	2597	27 Mar 2020
ETS Horn Antenna	3115	0003-6088	01 Mar 2020
Com-Power Preamplifier (1MHz-1GHz)	PAM-103	441158	18 Jul 2019
R&S Preamplifier (1GHz -18GHz)	SCU18	102191	15 Jan 2020
Electrostatic Discharge Immunity			
NoiseKen ESD Simulator	ESS-B3011A	ESS1683937	20 Nov 2019
NoiseKen ESD Gun	GT-30RA	ESS1683963	20 Nov 2019
Electrical Fast Transient / Burst Immunity & Voltage Surge Immunity			
Schaffner Modula	Modula6100	34406	02 May 2019

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Instrument	Model	S/No	Cal Due Date
RF Radiated Immunity			
AR Laser Powered Field Probe (100k – 6GHz)	FL7006	0423203	13 Nov 2019
Anritsu Signal Generator	MG3692C	110108	21 May 2020
Keysight EPM Series Power Meter	N1913A	MY57390057	25 Oct 2019
Agilent E-Series Avg Power Sensor 1nW – 100mW (-60 to +20dBm) 9kHz - 6GHz	E9304A	MY41496639	25 Oct 2019
Agilent 20MHz Function / Arbitrary Waveform Generator	33220A	MY43004333	17 Jul 2019
AR Laser Powered Field Probe (100k – 6GHz)	FL7006	0423203	13 Nov 2019
Teseq Bilog Antenna (26-3000MHz)	CBL 6144	30366	Output Monitored
AR Directional Coupler	DC6280	300634	24 Aug 2019
AR Amplifier (80-1000MHz)	250W1000A	0324736	Output Monitored
Schwarzbeck Broad-Band Horn Antenna 450MHz - 4GHz	BBHA 9120 E	0899	Output Monitored
ATM Directional Coupler	PNR CHPsc72L-40F-40R	N337706-01	08 Nov 2019
AR Amplifier (0.8-4.2GHz) 700W	682	0340811	Output Monitored
Schwarzbeck Stacked Double Log-Per Antenna 0.7 – 10.5 GHz	STLP 9149	#417	Output Monitored
Milmega Solid State Amplifier 1.8-6.0GHz 100W	AS1860-100	1075348	Output Monitored
Conducted Disturbance Immunity			
Schaffner HF Generator	NSG2070-1	169	01 Mar 2020
FCC Power Line Coupling Decoupling Network	FCC-801-M2-16A	07044	01 Mar 2020
Power Frequency Magnetic Field Immunity			
Magnetic Field Generator	PMM1008	0100J71201	16 Nov 2019

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5 Measurement Uncertainty

All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2.

Test Name	Measurement Uncertainty
Conducted Emissions at Mains Terminals	9kHz to 30MHz, ±2.4dB
Asymmetric Mode Conducted Emissions	9kHz to 30MHz, ±2.4dB
Radiated Emissions	30MHz to 1GHz @ 10m, ±4.0dB 30MHz to 1GHz @ 3m, ±5.6dB >1GHz to 40GHz @3m, ±5.0dB

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Please note that this Report is issued under the following terms :

1. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that TÜV SÜD PSB approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD PSB in any way "guarantees" the later performance of the product/equipment. Unless otherwise stated in this report, no tests were conducted to determine long term effects of using the specific product/equipment.

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5. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

July 2011

PSB Singapore

End of the Test Report

Report on the EMC Testing of:

Tobacco Heating System

Model(s): IQOS 3

In accordance with
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 61000-6-1: 2007
EN 61000-6-3: 2007 + A1: 2011

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Add value.
Inspire trust.

Prepared for:
Philip Morris Products S.A.
Quai Jeanrenaud 3, 2000 Neuchâtel,
Switzerland

COMMERCIAL-IN-CONFIDENCE

Document Number: 7191194758-EEC18/02 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	(b) (6)	01 Nov 2018	(b) (6)
Authorised Signatory	(b) (6)	30 Oct 2018	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD PSB document control rules. (b) (6)

(b) (6)

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with the mentioned standard(s).

TÜV SÜD PSB

ilac-MRA

Accredited Laboratory SAC·SINGLAS

LA-2007-0380-A LA-2007-0384-G
LA-2007-0381-F LA-2007-0385-E
LA-2007-0382-B LA-2007-0386-C
LA-2007-0383-G LA-2010-0464-D

The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council. Inspections/Calibrations/Tests marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our inspection body/laboratory.

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	30 Oct 2018

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1.2 Introduction

Applicant	:	Philip Morris Products S.A.. Quai Jeanrenaud 3, 2000 Neuchâtel, Switzerland
Manufacturer	:	Same as applicant
Factory	:	**(b) (4)**
Trade Mark		IQOS
Model Number(s)	:	1. A1404 (Holder) 2. A1504 (Pocket Charger) 3. AC Power Adaptor (S21A20) 4. USB Cable
Serial Number(s)	:	1. A1404 (Holder) – IQOS3 H A2.0_0239 2. A1504 (Pocket Charger) – IQOS PC A2.0_0112 3. AC Power Adaptor – 81920714536_S 4. USB Cable - Nil
Number of Samples Tested	:	X01
Test Sample(s) Condition	:	Good
Quotation Reference	:	5134045
Test Specification/Issue/Date	:	EN 61000-3-2: 2014 EN 61000-3-3: 2013 EN 61000-6-1: 2007 EN 61000-6-3: 2007 + A1: 2011
Test Sample(s) Received Date	:	09 Oct 2018
Start of Test	:	09 Oct 2018
Finish of Test	:	19 Oct 2018

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1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with the specifications as shown below.

Specification Clause	Test Description	Result	Comments/Base Standard
EN 61000-6-3			
11, Table 2	Harmonic Current Emissions (Class A)	Pass	EN 61000-3-2: 2014
11, Table 2	Voltage Fluctuation / Flicker	Pass	EN 61000-3-3: 2013
11, Table 2	Conducted Emissions at AC Mains Terminals	Pass	EN 55016-2-1: 2009 Clause 7 (CISPR 16-2-1: 2008 Clause 7)
11, Table 3	Conducted Emissions at DC Mains Terminals	Not Applicable *See Note 2	EN 55016-2-1: 2009 Clause 7 (CISPR 16-2-1: 2008 Clause 7)
11, Table 4	Asymmetric Mode Conducted Emissions	Not Applicable *See Note 1	EN 55022: 2010 EN 55016-2-1: 2009 Clause 7 (CISPR 16-2-1: 2008 Clause 7)
11, Table 1	Radiated Emissions	Pass	EN 55016-2-3: 2006 Clause 7 (CISPR 16-2-3: 2006 Clause 7)
11, Table 2	Discontinuous Disturbance	Not Applicable *See Note 2	EN 55014-1: 2006 + A1: 2009 (CISPR 14-1: 2005 + A1: 2008)
EN 61000-6-1			
8, Table 1	Electrostatic Discharge Immunity	Pass	EN 61000-4-2: 2009 (IEC 61000-4-2: 2008)
8, Table 1	RF Radiated Immunity	Pass	EN 61000-4-3: 2006 + A1: 2008 + A2: 2010 (IEC 61000-4-3: 2010)
8, Tables 2, 3, 4	Electrical Fast Transient / Burst Immunity	Pass	EN 61000-4-4: 2012 (IEC 61000-4-4: 2012)
8, Tables 3, 4	Voltage Surge Immunity	Pass	EN 61000-4-5: 2014 (IEC 61000-4-5: 2014)
8, Tables 2, 3, 4	Conducted Disturbance Immunity	Pass	EN 61000-4-6: 2014 (IEC 61000-4-6: 2013)
8, Table 1	Power Frequency Magnetic Field Immunity	Pass	EN 61000-4-8: 2010 (IEC 61000-4-8: 2009)
8, Table 4	Voltage Dips & Interruptions Immunity	Pass	EN 61000-4-11: 2004 (IEC 61000-4-11: 2004)

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Notes

1. The Equipment Under Test (EUT) contains no wired network ports.

2. The Equipment Under Test (EUT) is not a switching device.

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1.4 Product Information

1.4.1 Technical Description

Description	:	The Equipment Under Test (EUT) is a **TOBACCO HEATING SYSTEM (IQOS 3).** It consists of i. IQOS Holder A1404 ii. IQOS Pocket Charger A1504 iii. IQOS AC Power Adaptor S21A20
Microprocessor	:	**(b) (4)**
Operating Frequency	:	Holder – **(b) (4)** Charger –
Clock / Oscillator Frequency	:	Holder – **(b) (4)** Charger – **(b) (4)** Charger BLE – **(b) (4)**
Modulation	:	**(b) (4)**
Antenna Gain	:	**(b) (4)**
Port / Connectors	:	USB-Type C
Accessories / Rated Input Power	:	**(b) (4)**

1.4.2 Test Configuration and Modes of Operation

Mode(s)		Description
1.	Charging Pocket Charger with AC Power Adaptor, BLE connected	The EUT was exercised in the mode(s) throughout the test(s).
2.	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	

1.4.3 Performance Criteria and Monitoring Methods

Performance Criteria: A
PASS Criteria: The EUT shall meet the minimum criteria as specified: a. The EUT shall continue to operate as intended without operator intervention during and after the test. b. The EUT shall show no degradation of performance or loss of function during and after the test. The degradation of performance is regarded as a degradation to a level not below a minimum performance level specified by the manufacturer for the EUT as its intended. **FAIL Criteria**: For the parameters observed, anything contrary to the pass criteria is considered as FAIL.
Monitoring Method(s): The performance of the EUT was monitored by observing the EUT operation as according to its intended condition.

Performance Criteria: B
PASS Criteria: The EUT shall meet the minimum criteria as specified: a. The EUT shall continue to operate as intended without operator intervention after the test. b. The EUT may show degradation of performance or loss of function during the test, which it must be recoverable to its intended operation after the test. The degradation of performance is regarded as a degradation to a level not below a minimum performance level specified by the manufacturer for the EUT as its intended. c. The EUT shall show no change of operating mode during and after the test. **FAIL Criteria**: For the parameters observed, anything contrary to the pass criteria is considered as FAIL.
Monitoring Method(s): The performance of the EUT was monitored by observing the EUT operation as according to its intended condition.

Performance Criteria: C
PASS Criteria: The EUT shall meet the minimum criteria as specified: a. The EUT may show loss of functions during the test, which shall be recoverable by operators. b. The EUT shall show its intended operations after recovering from operations. c. The EUT shall show no change of operating mode during and after the test. **FAIL Criteria**: For the parameters observed, anything contrary to the pass criteria is considered as FAIL.
Monitoring Method(s): The performance of the EUT was monitored by observing the EUT operation as according to its intended condition.

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1.5 Deviations from the Standard

Nil.

1.6 EUT Modification Record

No modifications were made.

1.7 Test Location(s)

TÜV SÜD PSB Pte Ltd
Electrical & Electronics Centre (EEC), Product Services,
No. 1 Science Park Drive, Singapore 118221

TÜV SÜD PSB Pte Ltd
Electrical & Electronics Centre (EEC), Product Services,
13 International Business Park #01-01, Singapore 609932

1.8 Test Facilities Registrations

Requirements	Registration Numbers
FCC	994109 (Test Firm Registration Number) SG0002 (Designation Number)
ISED	Science Park 2932I-1 (3m and 10m Semi-Anechoic Chamber) International Business Park 2932N-1 (10m Semi-Anechoic Chamber)
VCCI	Science Park R-1335 (10m ANC), G-29 (10m ANC) C-2306 (C.E @ Lab 3) T-1471 (Telecom Ports @ Lab 3) International Business Park R-3324 (10m ANC), G-203 (10mANC) C-4933 (C.E @ CEIBP) T-2403 (Telecom Ports @ CEIBP)
BSMI	SL2-IS-E-6001R [CNS-13803 (ISM Equipment)] SL2-IN-E-6001R [CNS-13438 (IT Equipment)] SL2-R1/R2-E-6001R [CNS-13439 (Broadcast Receivers)] SL2-A1-E-6001R [CNS-13783-1 (Household Appliances)] SL2-L1-E-6001R [CNS-14115 (Lighting Equipment)]
SABS	SABS/A-LAB/0029/2018

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1.9 Supporting Equipment

Equipment Description (Including Brand Name)	Model, Serial & FCC ID Number	Cable Description (List Length, Type & Purpose)
Mobile Phone (Samsung S7)	M/N: SM-G930FD S/N: R58H54E71QH FCC ID: DoC	NA
AC Travel Power Adapter (Samsung)	M/N: ETA0U71XWE S/N: RT4F722FS/A-E FCC ID: Nil	1.0m (Unshielded, USB to Micro USB cable)

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2 Test Details

2.1 Harmonic Current Emissions

2.1.1 Test Limits

Class A

Harmonic Order (n)	Maximum Permissible Harmonic Current (A)
Odd Harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	0.15 x 15 / n
Even Harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	0.23 x 8 / n

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2.1.2 Test Setup

2.1.2.1 The EUT was arranged as shown in the setup photos.

2.1.2.2 The EUT mains cable was plugged into the test system at the reference impedance output, from where the EUT receives its 230V 50Hz supply. The mains cable was laid in the most direct path between the test system and the EUT, with its length not exceeding 1m. The cable length in excess of 1m were bundled parallel to the mains cable.

2.1.2.3 The distance between the test system and the EUT was maintained at 0.8m.

2.1.3 Test Method

2.1.3.1 Verification of the equipment Class was made prior to the test as spelt out in the standard. This was necessary to ensure that the correct Class limit was applied during the test.

2.1.3.2 The EUT was switched on at the start of the test, but actual measurements commenced only after a 10-second delay, as specified in the standard.

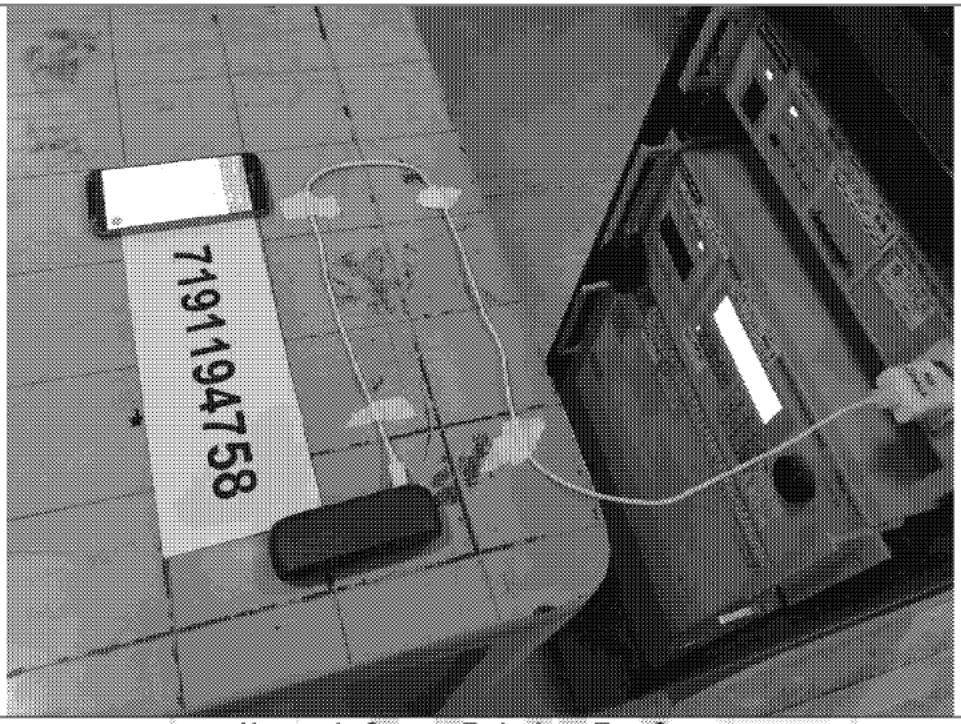
2.1.3.3 The harmonic current emissions were measured automatically within the test system, with the results being downloaded to the test system PC controller.

2.1.3.4 For Class D equipment, the Class D limit was adjusted in real time during the measurements, according to the actual power drawn. The voltage source was monitored simultaneously during the test to ensure that the harmonic content and voltage deviations were within the acceptable limits specified in the standard.

2.1.3.5 For Class B equipment, the Class B limit for transitory harmonics (for orders 2 to 10 not exceeding 10% of the 2.5-minute observation period) was adjusted 1.5 times the limit for steady-state harmonics (Class A limits).

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2.1.4 Test Setup Photographs



Harmonic Current Emissions Test Setup

2.1.5 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	10 Oct 2018

Voltage (V)	230.1
Frequency (Hz)	50.0
Current (A)	0.5
Power (W)	10.6
Power Factor	0.4
Class	A
Result	Pass
Voltage Source Qualification Result	Pass

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Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	10 Oct 2018

Voltage (V)	230.1
Frequency (Hz)	50.0
Current (A)	0.5
Power (W)	11.9
Power Factor	0.4
Class	A
Result	Pass
Voltage Source Qualification Result	Pass

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2.2 Voltage Fluctuation / Flicker

2.2.1 Test Limits

Tests	Limits	Description
P_{st}	1.0	P_{st}: short-term flicker indicator
P_{lt}	0.65	P_{lt}: long-term flicker indicator
d(t) (ms)	500	d(t): maximum time that not exceeds 500ms
d_{max} (%)	4 %	d_{max}: maximum relative voltage change
d_c (%)	3.3 %	d_c: maximum relative steady-state voltage change

2.2.2 Test Setup

2.2.2.1 The EUT was arranged as shown in the setup photos.

2.2.2.2 The EUT mains cable was plugged into the test system at the reference impedance output, from where the EUT receives its 230V 50Hz supply. The mains cable was laid in the most direct path between the test system and the EUT, with its length not exceeding 1m. The cable length in excess of 1m was bundled parallel to the mains cable.

2.2.2.3 The distance between the test system and the EUT was maintained at 0.8m.

2.2.3 Test Method

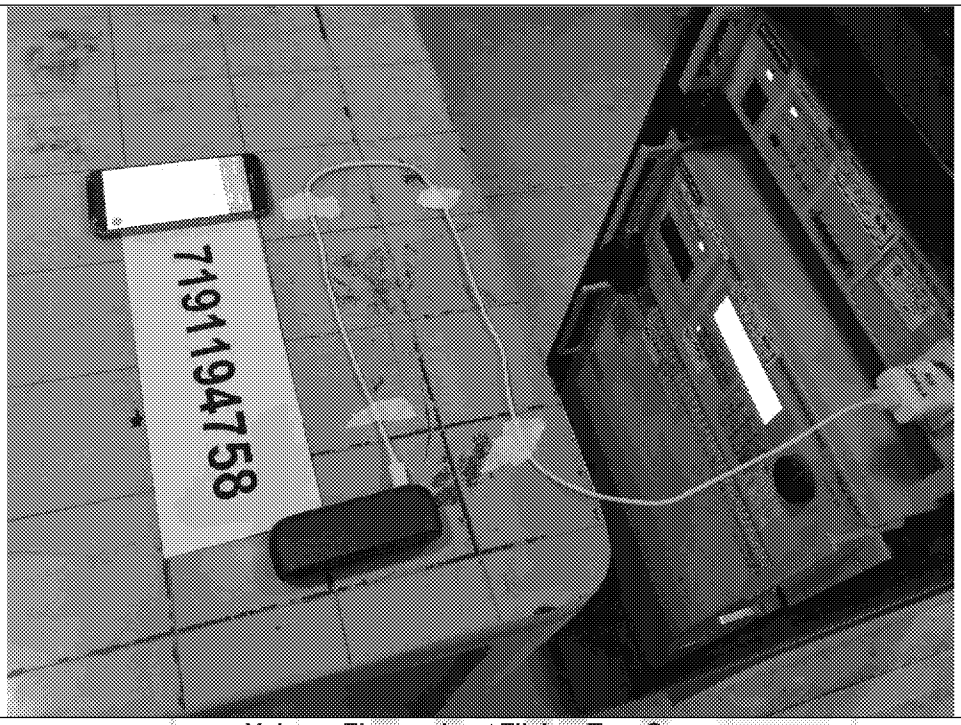
2.2.3.1 The voltage fluctuation/flicker was measured automatically within the test system, with the results being downloaded to the test system PC controller.

2.2.3.2 The test voltage supply, to which the EUT was connected, was checked during the test to ensure that:

a. The voltage was maintained at ±2% of the nominal.
b. The frequency was maintained at 50Hz ±0.5%.
c. The total harmonic distortion of the supply was less than 3%.

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2.2.4 Test Setup Photographs



Voltage Fluctuation / Flicker Test Setup

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2.2.5 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	10 Oct 2018

Parameters	Reading	Limits	Results
P_{st}	0.0640	1	Pass
P_{lt}	0.0280	0.65	Pass
d_c (%)	0.0000	3.3	Pass
d_{max} (%)	0.0000	4	Pass
d_t (ms)	0.0000	500	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	10 Oct 2018

Parameters	Reading	Limits	Results
P_{st}	0.0640	1	Pass
P_{lt}	0.0280	0.65	Pass
d_c (%)	0.0000	3.3	Pass
d_{max} (%)	0.0000	4	Pass
d_t (ms)	0.0000	500	Pass

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2.3 Conducted Emissions at AC Mains Terminals

2.3.1 Test Limits

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-peak (Q-P)	Average (AV)
0.15 - 0.5	66 – 56 *	56 – 46 *
0.5 - 5.0	56	46
5.0 - 30.0	60	50
* Decreasing linearly with the logarithm of the frequency		

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2.3.2 Test Setup

2.3.2.1 The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.

2.3.2.2 The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

2.3.2.3 The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

2.3.2.4 All other supporting equipment were powered separately from another LISN.

2.3.3 Test Method

2.3.3.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.3.3.2 A scan was made on the NEUTRAL line (NEGATIVE line for DC Mains) over the required frequency range using an EMI test receiver.

2.3.3.3 High peaks, relative to the limit line, were then selected.

2.3.3.4 The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 9kHz. Both Quasi-peak and Average measurements were made.

2.3.3.5 The measurements were then repeated for the LIVE line (POSITIVE line for DC Mains).

Sample Calculation Example

At 20 MHz	Q-P limit = 60.0 dBμV
Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB	
Q-P reading obtained directly from EMI Receiver = 40.0 dBμV (Calibrated for system losses)	
Therefore, Q-P margin = 60.0 - 40.0 = 20.0	i.e. 20.0 dB below Q-P limit

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2.3.4 Test Setup Photographs



Conducted Emissions at AC Mains Test Setup (Front View)



Conducted Emissions at AC Mains Test Setup (Rear View)

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2.3.5 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
Line Under Test	AC Mains	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Frequency (MHz)	Q-P Value (dBµV)	Q-P Limit (dBµV)	Q-P Margin (dB)	AV Value (dBµV)	AV Limit (dBµV)	AV Margin (dB)	Line
0.5727	42.9	56.0	13.1	33.6	46.0	12.4	Live
0.7900	44.1	56.0	11.9	33.3	46.0	12.7	Neutral
0.8012	49.3	56.0	6.7	39.2	46.0	6.8	Live
1.1447	43.8	56.0	12.2	33.8	46.0	12.2	Live
1.2854	41.2	56.0	14.8	30.9	46.0	15.1	Neutral
2.8269	42.2	56.0	13.8	33.0	46.0	13.0	Live

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
Line Under Test	AC Mains	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Frequency (MHz)	Q-P Value (dBµV)	Q-P Limit (dBµV)	Q-P Margin (dB)	AV Value (dBµV)	AV Limit (dBµV)	AV Margin (dB)	Line
0.5007	45.4	56.0	10.6	34.6	46.0	11.4	Live
0.9973	50.2	56.0	5.8	40.2	46.0	5.8	Neutral
1.1710	51.1	56.0	4.9	40.4	46.0	5.6	Neutral
1.8046	48.8	56.0	7.2	37.3	46.0	8.7	Neutral
2.6468	47.1	56.0	8.9	36.0	46.0	10.0	Neutral
3.9079	45.9	56.0	10.1	34.7	46.0	11.3	Live

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Notes

1.	All possible modes of operation were investigated from 150kHz to 30MHz. Only the worst-case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2.	A "positive margin" indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative margin" indicates a FAIL.
3.	EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings: 150kHz - 30MHz RBW: 9kHz VBW: 30kHz

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2.4 Radiated Emissions

2.4.1 Test Limits

Frequency Range (MHz)	Quasi-Peak Limits (dBµV/m) @ 3m	Quasi-Peak Limits (dBµV/m) @ 10m
30 - 230	40	30
230 - 1000	47	37
Note : At transition frequency, lower limit applies.		

Frequency Range (GHz)	Average Limits (dBµV/m) @ 3m	Peak Limits (dBµV/m) @ 3m
1 - 3	50	70
3 - 6	54	74
Note : At transition frequency, lower limit applies.		

2.4.2 Test Setup

2.4.2.1 The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.

2.4.2.2 The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

2.4.2.3 The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

2.4.3 Test Method

2.4.3.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.4.3.2 A pre-scan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the pre-scan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.

2.4.3.3 The test was carried out at the selected frequency points obtained from the pre-scan. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:

a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
b. The EUT was then rotated to the direction that gave the maximum emission.
c. Finally, the antenna height was adjusted to the height that gave the maximum emission.

2.4.3.4 A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.

2.4.3.5 The measurements were repeated for the next frequency point, until all selected frequency points were measured.

Sample Calculation Example

At 300 MHz	Q-P limit = 37.0 dBμV/m
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB Q-P reading obtained directly from EMI Receiver = 31.0 dBμV/m (Calibrated level including antenna factors & cable losses)	
Therefore, Q-P margin = 37.0 - 31.0 = 6.0	i.e. 6.0 dB below Q-P limit

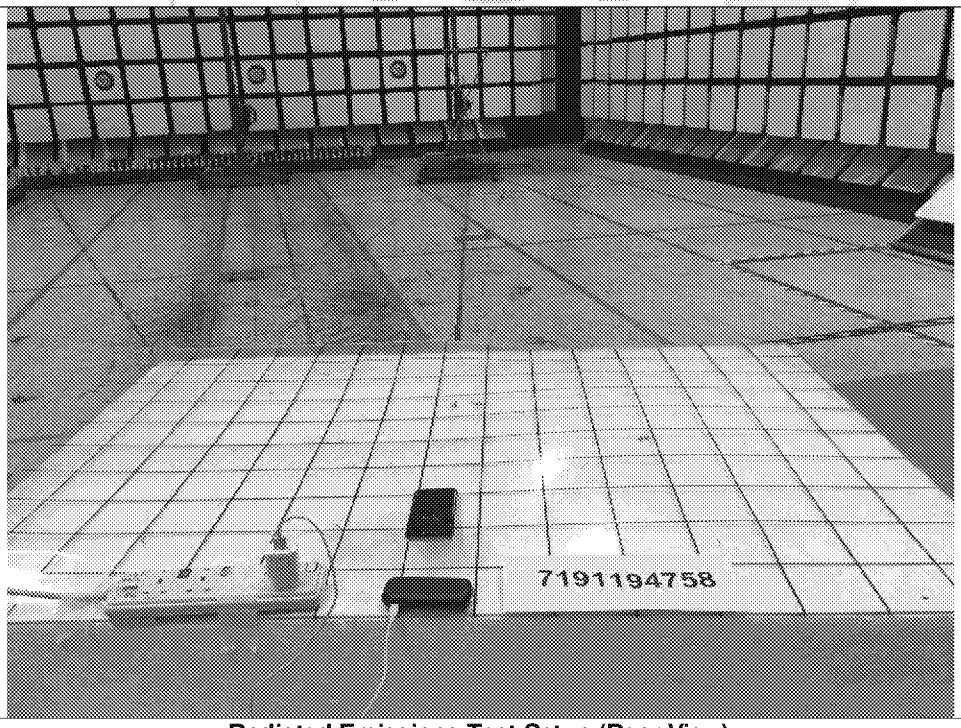
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2.4.4 Test Setup Photographs

30MHz – 1GHz Test Setup



Radiated Emissions Test Setup (Front View)



Radiated Emissions Test Setup (Rear View)

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2.4.5 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
Test Distance	10m (30MHz – 1GHz)	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	10 Oct 2018

Emissions from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Polarisation (H/V)
32.1530	24.5	30.0	5.5	126	320	V
94.1940	25.7	30.0	4.3	158	219	V
107.7640	10.0	30.0	20.0	185	24	V
170.3620	18.9	30.0	11.1	388	204	H
365.7710	16.4	37.0	20.6	100	344	V
967.5410	20.4	37.0	16.6	270	226	H

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
Test Distance	10m (30MHz – 1GHz)	Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	10 Oct 2018

Emissions from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Polarisation (H/V)
32.7640	23.4	30.0	6.6	112	221	V
94.2160	24.6	30.0	5.4	145	204	V
191.3540	11.5	30.0	18.5	396	357	H
191.6000	12.6	30.0	17.4	127	204	V
323.6010	13.9	37.0	23.1	278	218	H
414.6700	18.4	37.0	18.6	210	241	H

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Notes

1.	All possible modes of operation were investigated. Only the worst-case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2.	A "positive margin" indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative margin" indicates a FAIL.
3.	EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings: 30MHz - 1GHz RBW: 120kHz VBW: 1MHz 1GHz – 6GHz RBW: 1MHz VBW: 3MHz
4.	The highest frequency of internal sources of the EUT is less than 108MHz, as such the measurement was made up to 1GHz.

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2.5 Electrostatic Discharge Immunity

2.5.1 Test Setup

2.5.1.1 The test setup was in accordance with the standard.

2.5.1.2 The electrostatic discharge (ESD) gun was loaded with the correct charging / discharge network specified by the standard.

2.5.1.3 A 0.8m high, non-metallic table, with a Horizontal Coupling Plane (HCP) placed on the tabletop, was used as a test bench. The EUT and supporting equipment were placed on the test bench, isolated from the HCP by a thin insulating sheet.

2.5.1.4 The HCP was grounded to the ground plane via two 470 kΩ "bleed" resistors at each end of the ground cable.

2.5.1.5 A Vertical Coupling Plane (VCP) was also used during the test. The VCP was also grounded to the ground plane in a similar manner as the HCP.

2.5.2 Test Method

2.5.2.1 Direct Air & Contact Discharges

Application of direct air and contact discharges to the discharge points specified by the customer were carried out in the following manner:

a. The EUT was switched on and allowed to warm up to its normal operating condition.
b. The test discharge points are shown in the report.
c. For air discharges, the charged rounded electrode was positioned at a distance away from the test point and moved towards the EUT as fast as possible until contact between the electrode and the EUT was made.
d. For contact discharges, the pointed electrode was applied directly to the test point, in contact with the conductive surface of the EUT. The discharges were then made with the electrode in contact with the EUT.
e. The required number of positive and negative discharges were applied at each test point; with a one second interval between discharges.
f. The EUT was monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

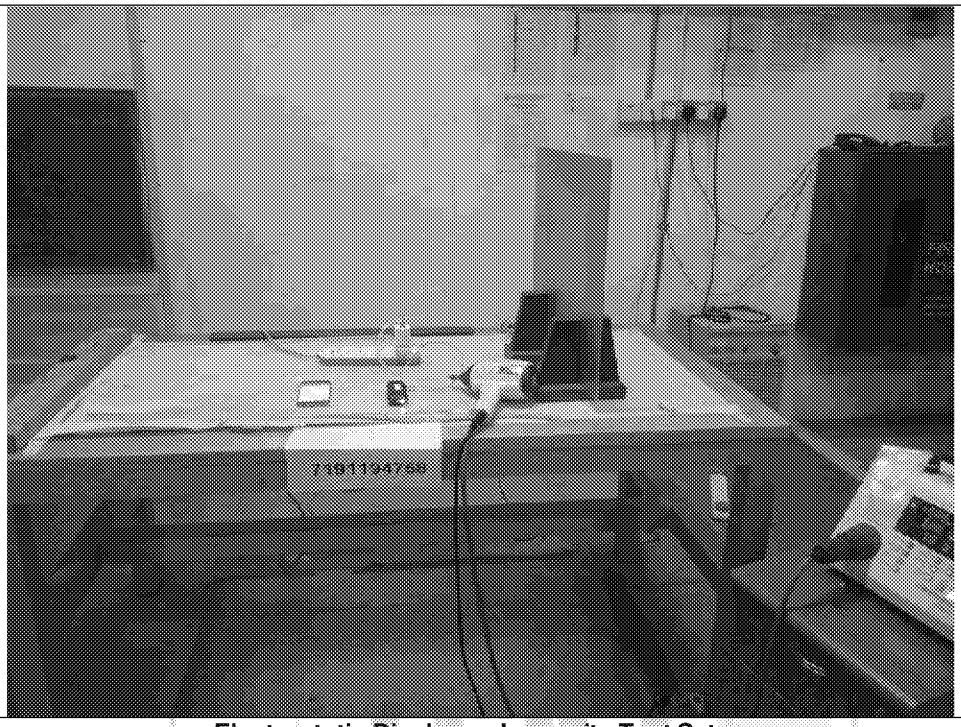
2.5.2.2 Indirect Coupling Plane Discharges

Indirect application of discharges using the HCP and VCP were performed on the sides of the EUT in the following manner:

a. The EUT was switched on and allowed to warm up to its normal operating condition.
b. The discharges to the HCP / VCP were made 0.1m away from one side of the EUT.
c. The required number of positive and negative discharges was applied at each test point; with one second interval between discharges.
d. The EUT was monitored during the test in accordance with the Pass / Fail criteria declared by the customer.
e. The test was then repeated on the remaining necessary sides of the EUT.

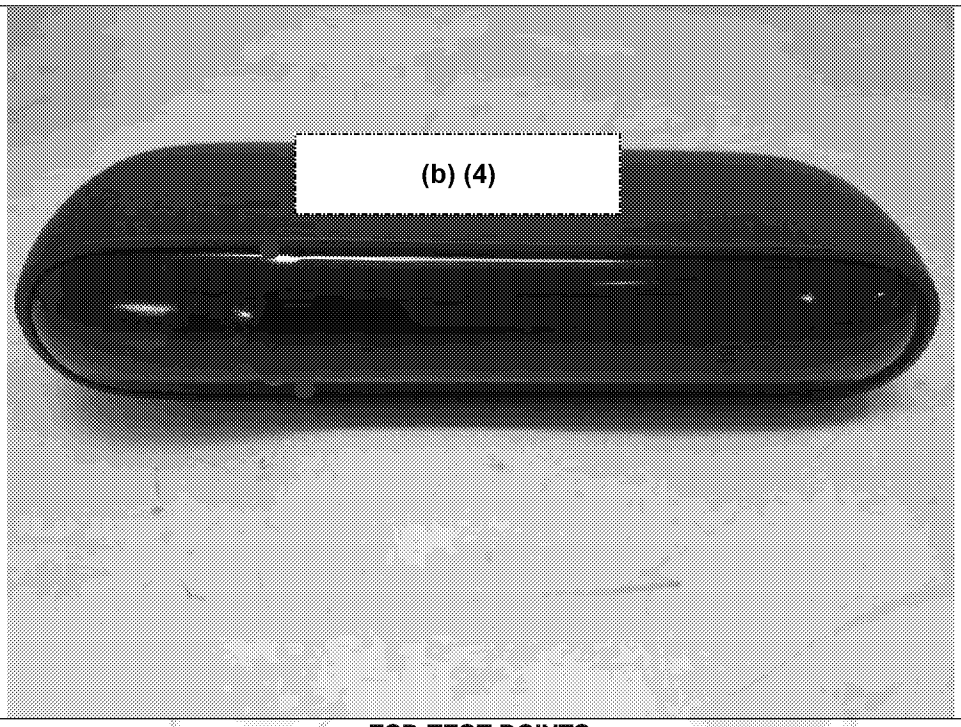
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2.5.3 Test Setup Photographs and ESD Test Points



Electrostatic Discharge Immunity Test Setup

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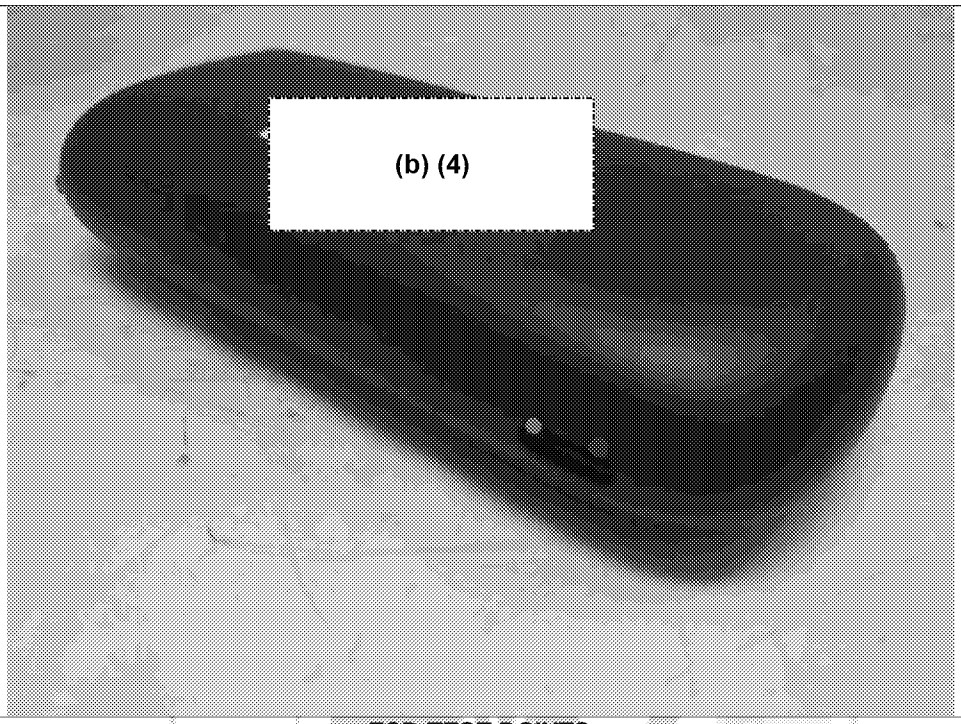
ESD TEST POINTS



ESD TEST POINTS

●	**Air Discharge**
●	**Contact Discharge**

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ESD TEST POINTS



ESD TEST POINTS

●	**Air Discharge**
◎	**Contact Discharge**

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ESD TEST POINTS



ESD TEST POINTS

●	**Air Discharge**
●	**Contact Discharge**

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2.5.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	50%
		Atmospheric Pressure	1040mbar
		Tested By	**(b) (6)**
		Test Date	18 Oct 2018

Discharge Type	Test Severity Level	Pass Criteria	Results
Air Discharges	± 8KV, ± 15KV	B	Pass
Direct Contact Discharges	± 4KV, ± 8KV	B	Pass
Indirect Contact Discharges	± 4KV, ± 8KV	B	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	50%
		Atmospheric Pressure	1040mbar
		Tested By	(b) (6)
		Test Date	18 Oct 2018

Discharge Type	Test Severity Level	Pass Criteria	Results
Air Discharges	± 8KV, ± 15KV	B	Pass
Direct Contact Discharges	± 4KV, ± 8KV	B	Pass
Indirect Contact Discharges	± 4KV, ± 8KV	B	Pass

Notes

1.	Please refer to the Pass /Fail criteria to interpret the results.		
2.	Human Body Model	Storage Capacitor	150pF
		Discharge Resistor	330Ω
3.	Discharge Details	No. of Discharges / Point, Level & Polarity	10 air discharges 10 contact discharges
		Discharge Interval	1 second

PSB Singapore

2.6 RF Radiated Immunity

2.6.1 Test Setup

2.6.1.1 The EUT was set up inside a fully anechoic chamber in accordance with the standard.

2.6.1.2 An isotropic field probe was placed adjacent to the EUT.

2.6.2 Test Method

2.6.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.6.2.2 The EUT was exercised and monitored in the manner specified by the customer.

2.6.2.3 All test instruments were PC controlled, via their IEEE 488.2 bus interfaces, and the test conducted in the following manner:

a. The testing frequencies were swept over the required frequency range, with a step frequency equal to 1% of preceding frequency. The sweep rate was $\leq 1.5 \times 10^{-3}$ decades/s.

b. For each frequency tested, the incident power to the antenna was adjusted to the required unmodulated test level, as established during the chamber calibration. With the incident power at the correct level, the 80% AM 1kHz was switched on for the specified dwell time.

2.6.2.4 The EUT was continuously monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

2.6.2.5 The test was done in both horizontal and vertical antenna polarizations, and for all necessary sides of the EUT.

PSB Singapore

2.6.3 Test Setup Photographs



RF Radiated Immunity Test Setup

PSB Singapore

2.6.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	22°C
Test Input Power	230V 50Hz	Relative Humidity	44%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Sides Tested	Frequency	Test Severity Level	Pass Criteria	Results
Front, Back, Left, Right	80MHz - 1000MHz	3V/m, 80% AM 1kHz	A	Pass
Front, Back, Left, Right	1400MHz - 2000MHz	3V/m, 80% AM 1kHz	A	Pass / Fail
Front, Back, Left, Right	2000MHz - 2700MHz	1V/m, 80% AM 1kHz	A	Pass / Fail

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	22°C
Test Input Power	230V 50Hz	Relative Humidity	44%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Sides Tested	Frequency	Test Severity Level	Pass Criteria	Results
Front, Back, Left, Right	80MHz - 1000MHz	3V/m, 80% AM 1kHz	A	Pass
Front, Back, Left, Right	1400MHz - 2000MHz	3V/m, 80% AM 1kHz	A	Pass / Fail
Front, Back, Left, Right	2000MHz - 2700MHz	1V/m, 80% AM 1kHz	A	Pass / Fail

Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.		
2.	RF Radiated Immunity Details	Frequency Step	1% of preceding frequency
		Sweep Rate	≤ 1.5 X 10^{-3} decades/s

PSB Singapore

2.7 Electrical Fast Transient / Burst Immunity

2.7.1 Test Setup

2.7.1.1 The test setup was in accordance with the standard.

2.7.1.2 The test was performed using an EFT/B generator and capacitive coupling clamp that were compliant with the standard.

2.7.1.3 The EFT/B generator was placed on top of the ground plane and connected to the protective earth.

2.7.1.4 D.C./A.C. Power Line Test

a. The EUT was placed on top of a 0.1m high, non-metallic table, and placed at least 0.5m away from the walls of the room and other conductive surfaces.
b. The required power was supplied to the EUT via direct connection to the EFT/B generator.

2.7.1.5 I/O Signal & Control Line Test

a. Insulating supports were used to ensure that the EUT and its cables were 0.1m above the metallic ground plane.
b. The capacitive coupling clamp was placed on top (and in contact with) the metallic ground plane.
c. The Cable Under Test (CUT) was sandwiched between the plates of the capacitive coupling clamp. All other cables were kept as far away from the capacitive coupling clamp as possible, where possible, perpendicularly orientated with respect to the CUT.
d. The EFT/B generator output was connected to the capacitive coupling clamp.

2.7.2 Test Method

2.7.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.7.2.2 D.C./A.C. Power Line Test

a. The EFT/B test system has a built-in coupling/decoupling network, which couples the generated EFT bursts into the EUT power supply lines connected to it.
b. The EFT bursts were coupled to the selected lines of the EUT individually and simultaneously for the necessary test duration.

2.7.2.3 I/O Signal & Control Line Test

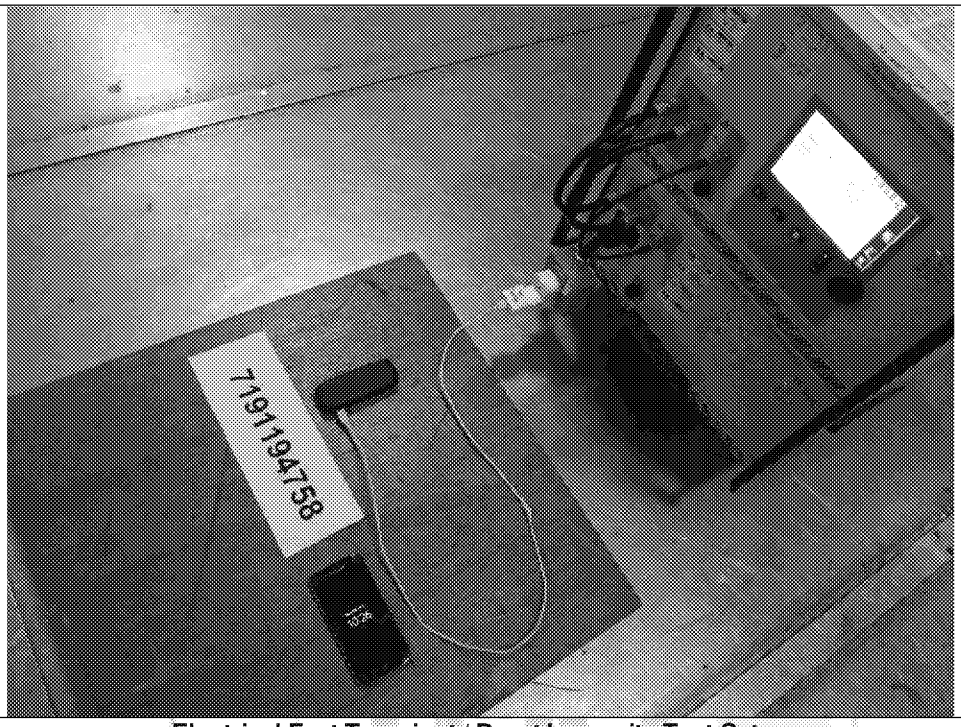
a. The interference impulses were capacitively coupled to the EUT's signal cables for the necessary test duration.

2.7.2.4 The EUT was monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

2.7.2.5 The test was performed with EFT bursts in the positive and negative polarities and repeated on all necessary lines.

PSB Singapore

2.7.3 Test Setup Photographs



Electrical Fast Transient / Burst Immunity Test Setup

PSB Singapore

2.7.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
Live Line	± 1.0kV	B	Pass
Neutral Line	± 1.0kV	B	Pass
Earth Line	± 1.0kV	B	Not Applicable *See Note 3
Live + Neutral Lines	± 1.0kV	B	Pass
Live + Neutral + Earth Lines	± 1.0kV	B	Not Applicable *See Note 3
DC LINE			
DC Line	± 0.5kV	B	Not Applicable *See Note 4
CONTROL & SIGNAL LINES			
Nil	± 0.5kV	B	Not Applicable *See Note 5

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Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
Live Line	± 1.0kV	B	Pass
Neutral Line	± 1.0kV	B	Pass
Earth Line	± 1.0kV	B	Not Applicable *See Note 3
Live + Neutral Lines	± 1.0kV	B	Pass
Live + Neutral + Earth Lines	± 1.0kV	B	Not Applicable *See Note 3
DC LINE			
DC Line	± 0.5kV	B	Not Applicable *See Note 4
CONTROL & SIGNAL LINES			
Nil	± 0.5kV	B	Not Applicable *See Note 5

Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.		
2.	EFT/B Test Details	Waveshape	5/50 Tr/Th ns
		Repetition Frequency	5kHz
		Test Duration / Level & Polarity	2 minutes
3.	The EUT is a 2-pin AC device, i.e. the EUT contains no AC protective earth terminal.		
4.	The EUT is an AC powered device.		
5.	The EUT contains no signal line.		

PSB Singapore

2.8 Voltage Surge Immunity

2.8.1 Test Setup

2.8.1.1 The test setup was in accordance with the standard.

2.8.1.2 The test was performed using a voltage surge generator, mains, and signal line coupling/decoupling networks that were compliant with the standard.

2.8.1.3 The voltage surge generator and coupling/decoupling networks were connected to the same protective earth.

2.8.1.4 The test level was set with the surge generator's HV output open-circuited.

2.8.1.5 For testing of the mains line, the mains coupling/decoupling network was inserted into the line. The voltage surge generator HV output cables were connected to the mains coupling/decoupling network, which has the necessary resistor/capacitor configurations (as required by the standard) built-in. The settings on the mains coupling/decoupling network were selected to give the required resistor/capacitor configuration as follows:

a. An 18µF capacitor in series with the output of the generator for differential (line-to-line) mode testing.

b. A 10Ω resistor and 9µF capacitor in series with the output of the generator for common (line-to-ground) mode testing.

2.8.1.6 For testing of the signal lines, the signal line coupling/decoupling network was inserted into the line. The voltage surge generator HV output cables were connected to the signal line coupling/decoupling network, which has the necessary resistor/capacitor/gas arrestor configurations (as required by the standard) built-in. The settings on this network were selected to give the required resistor/capacitor/gas arrestor configuration as reflected in the standard.

2.8.2 Test Method

2.8.2.1 The power supply to EUT was switched on and allowed to warm up to its normal operating condition.

2.8.2.2 For a.c. mains lines, the surge was applied at the 0°, 90°, 180° and 270° angles of the a.c. mains frequency for both positive and negative surges.

2.8.2.3 For d.c. and signal lines, the surge was applied independent from the a.c. mains frequency angle.

2.8.2.4 The correct open-circuit test level was set with the surge generator disconnected from the coupling network.

2.8.2.5 The output of the generator was then reconnected back to the coupling network.

2.8.2.6 Five discharges, generated by the voltage surge generator, and were made on each relevant line, for each polarity, at each test level, with the relevant discharge interval.

2.8.2.7 The EUT was observed during, and checked after the test to determine the result.

PSB Singapore

2.8.3 Test Setup Photographs



Voltage Surge Immunity Test Setup

PSB Singapore

2.8.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	44%
		Atmospheric Pressure	1028mbar
		Tested By	(b) (6)
		Test Date	18 Oct 2018

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
Neutral - Earth	± 2.0kV	B	Not Applicable *See Note 3
Live – Earth	± 2.0kV	B	Not Applicable *See Note 3
Live - Neutral	± 1.0kV	B	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	24°C
Test Input Power	230V 50Hz	Relative Humidity	44%
		Atmospheric Pressure	1028mbar
		Tested By	(b) (6)
		Test Date	18 Oct 2018

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
Neutral - Earth	± 2.0kV	B	Not Applicable *See Note 3
Live – Earth	± 2.0kV	B	Not Applicable *See Note 3
Live - Neutral	± 1.0kV	B	Pass

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Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.		
2.	Surge Details	Waveshape	1.2/50 (8/20) Tr/Th µs
		No. of Surges / Line, Level & Polarity	5 surges Positive and negative
		Phase Angle	90° and 270°
		Surge Interval	60 seconds
3.	The EUT is a 2-pin AC device, i.e. the EUT contains no AC protective earth terminal.		

PSB Singapore

2.9 Conducted Disturbance Immunity

2.9.1 Test Setup

2.9.1.1 CDN Injection Method

a. The EUT and auxiliary equipment were placed on top of the Ground Reference Plane (GRP) and isolated from it by a 0.1m thick insulating support as shown in the setup photos.
b. The test system includes a RF signal generator, a power amplifier, attenuators, a spectrum analyzer and various types of Coupling/Decoupling Networks (CDNs).
c. The EUT's Cables Under Test (CUT) were cut in order to insert the CDNs into the line. The cable lengths were kept as short as possible to maintain a distance of 0.1m to 0.3m between the EUT and the CDNs.
d. The interconnecting cables between the EUT, CDNs and auxiliary equipment were kept at a height of 3cm to 5cm above the GRP.
e. The CDNs were placed on the GRP, in direct electrical contact with it.

2.9.1.2 EM Clamp Injection Method

a. The EUT and auxiliary equipment were placed on top of the Ground Reference Plane (GRP) and isolated from it by a 0.1m thick insulating support as shown in the setup photos.
b. The test system includes a RF signal generator, a power amplifier, attenuators, a spectrum analyzer and an EMC clamp.
c. The EUT's Cable Under Test (CUT) was clamped using the EM clamp. The cable length was kept as short as possible to maintain a distance of 0.1m to 0.3m between the EUT and the EM clamp.
d. The interconnecting cables between the EUT, EM clamp and auxiliary equipment were kept at a height of 3cm to 5cm above the GRP.
e. The EM clamp was placed on the GRP, in direct electrical contact with it.

2.9.2 Test Method

2.9.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.9.2.2 The interfering signal was swept from 150kHz to 80MHz, with a step frequency equal to 1% of preceding frequency. The sweep rate was $\leq 1.5 \times 10^{-3}$ decades/s.

2.9.2.3 CDN Injection Method

The output power level from the power amplifier to the CDN was adjusted through the signal generator so that the incident power reached the same level as that established during calibration. Once the incident power to the CDN reached the calibrated level, the 80% AM 1kHz AF was switched on for the specified dwell time.

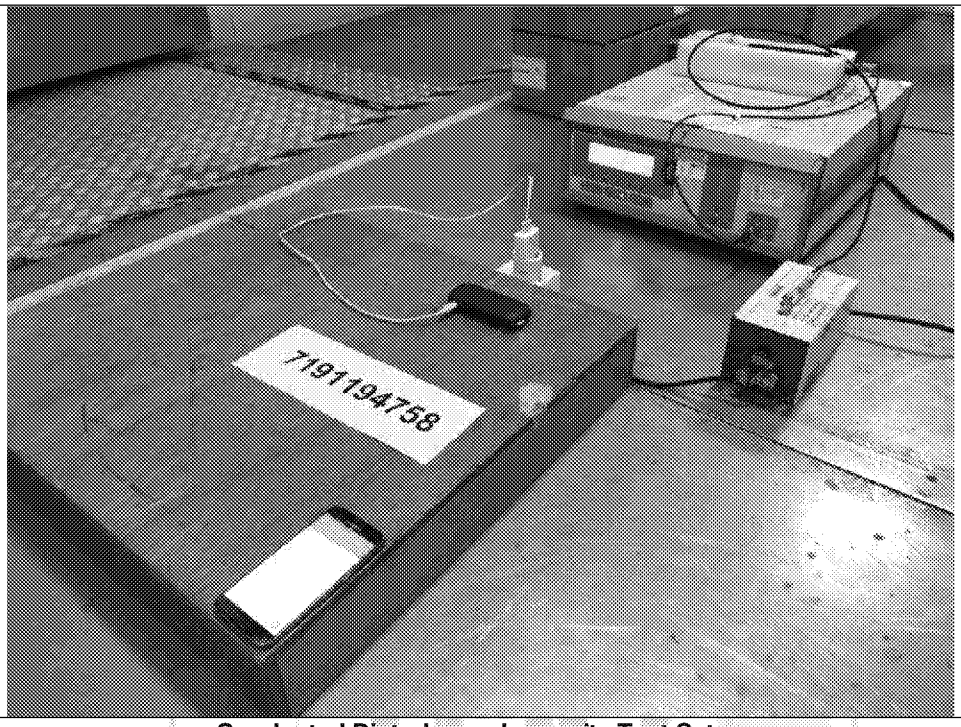
2.9.2.4 EM Clamp Injection Method

The output power level from the power amplifier to the EM clamp was adjusted through the signal generator so that the incident power reached the same level as that established during calibration. Once the incident power to the EM clamp reached the calibrated level, the 80% AM 1kHz AF was switched on for the specified dwell time.

2.9.2.5 The EUT was continuously monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

PSB Singapore

2.9.3 Test Setup Photographs



Conducted Disturbance Immunity Test Setup

PSB Singapore

2.9.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	18°C
Test Input Power	230V 50Hz	Relative Humidity	58%
		Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	19 Oct 2018

Cable	Frequency	Test Severity Level	Pass Criteria	Results
MAINS LINE				
AC Mains	0.15MHz – 80MHz	3V, 80% AM 1kHz	A	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	18°C
Test Input Power	230V 50Hz	Relative Humidity	58%
		Atmospheric Pressure	1035mbar
		Tested By	(b) (6)
		Test Date	19 Oct 2018

Cable	Frequency	Test Severity Level	Pass Criteria	Results
MAINS LINE				
AC Mains	0.15MHz – 80MHz	3V, 80% AM 1kHz	A	Pass

Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.		
2.	Conducted Immunity Details	Frequency Step	1% of preceding frequency
		Sweep Rate	≤ 1.5 X 10^{-3} decades/s

PSB Singapore

2.10 Power Frequency Magnetic Field Immunity

2.10.1 Test Setup

2.10.1.1 The test setup was in accordance with the standard.

2.10.1.2 The EUT was kept 0.4m away from walls and conductive surfaces.

2.10.1.3 The EUT cables were arranged in such a way as to expose at least 1m of the cables to the magnetic field.

2.10.1.4 The induction coil is arranged centrally (as far as possible) around the EUT, and connected to the respective test generator.

2.10.1.5 With the test generator switched on, the required test level is set by adjusting the output setting of the test generator.

2.10.2 Test Method

2.10.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.10.2.2 The test generator was then switched on at the correct test level to generate the required magnetic field for the test.

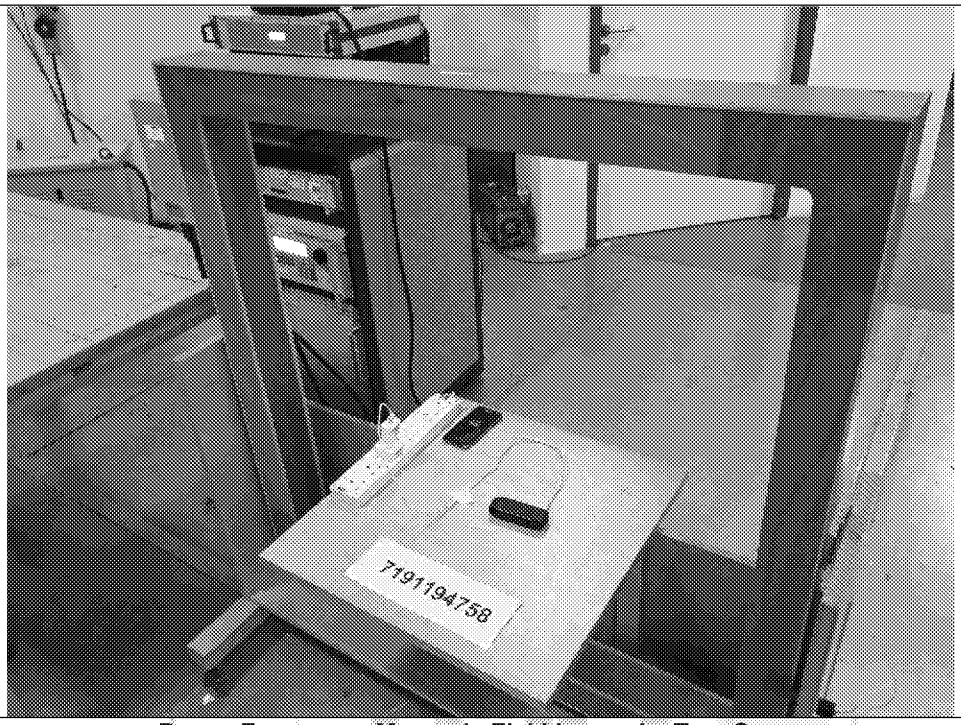
2.10.2.3 The EUT was exposed to the magnetic field for the required duration.

2.10.2.4 The test is repeated for the X, Y and Z axes of the EUT.

2.10.2.5 The EUT was continuously monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

PSB Singapore

2.10.3 Test Setup Photographs



Power Frequency Magnetic Field Immunity Test Setup

PSB Singapore

2.10.4 Test Results

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Side / Axis	Test Severity Level	Pass Criteria	Results
X, Y, Z	3A/m (50Hz)	A	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Side / Axis	Test Severity Level	Pass Criteria	Results
X, Y, Z	3A/m (50Hz)	A	Pass

Notes

1.	Please refer to the Pass/Fail criteria to interpret the results.

PSB Singapore

2.11 Voltage Dips and Interruptions Immunity

2.11.1 Test Setup

2.11.1.1 The test setup was in accordance with the standard.

2.11.1.2 The EUT mains cable was plugged into voltage dips and short interruptions immunity test system generator where it receives its required test supply voltage level. The mains cable was laid in the most direct path between the test system and the EUT, with its length not exceeding 1m. The cable length in excess of 1m was bundled parallel to the mains cable.

2.11.1.3 The distance between the test system and the EUT was maintained at 0.8m.

2.11.2 Test Method

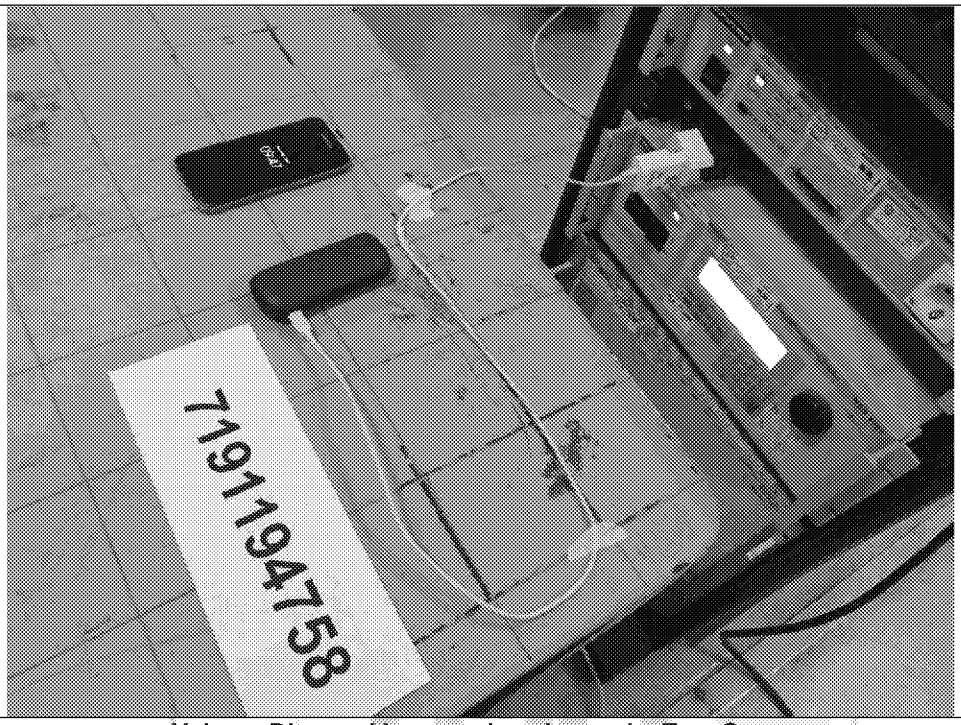
2.11.2.1 The EUT was switched on and allowed to warm up to its normal operating condition.

2.11.2.2 The test system was controlled by the test software to apply the required voltage dips and interrupts to EUT mains cable.

2.11.2.3 The EUT was monitored during the test in accordance with the Pass / Fail criteria declared by the customer.

PSB Singapore

2.11.3 Test Setup Photographs



Voltage Dips and Interruptions Immunity Test Setup

PSB Singapore

2.11.4 Test Results

The detailed of the test results are shown below.

The detailed of the test results are shown below.

Operating Mode	Charging Pocket Charger with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
AC Mains	100% dip, 0.5 cycle (50Hz)	C	Pass
AC Mains	30% dip, 25 cycles	C	Pass
AC Mains	60% dip, 10 cycles	C	Pass

Operating Mode	Charging Pocket Charger (Holder inserted) with AC Power Adaptor, BLE connected	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	51%
		Atmospheric Pressure	1030mbar
		Tested By	(b) (6)
		Test Date	11 Oct 2018

Cable	Test Severity Level	Pass Criteria	Results
MAINS LINE			
AC Mains	100% dip, 0.5 cycle (50Hz)	C	Pass
AC Mains	30% dip, 25 cycles	C	Pass
AC Mains	60% dip, 10 cycles	C	Pass

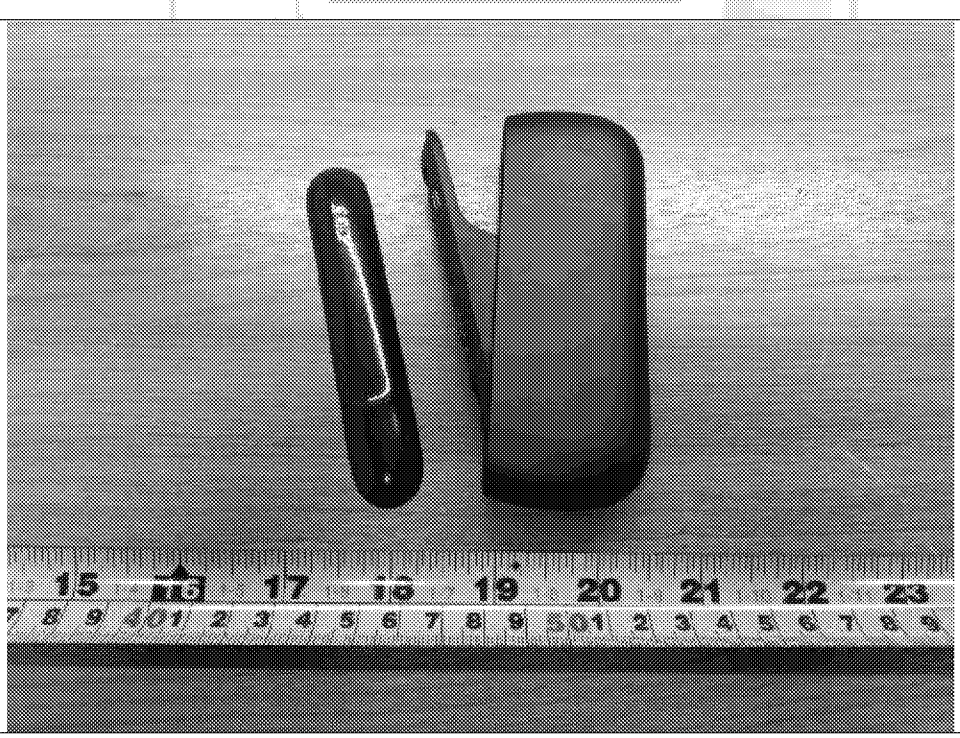
PSB Singapore

3 Photographs

IQOS Pocket Charger A1504



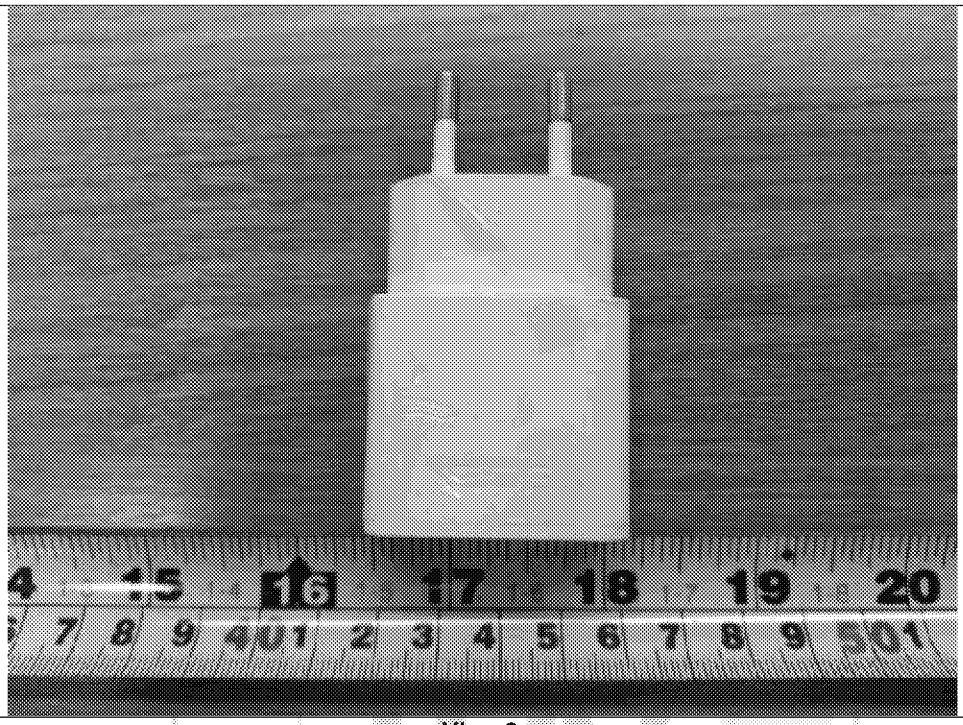
View 1



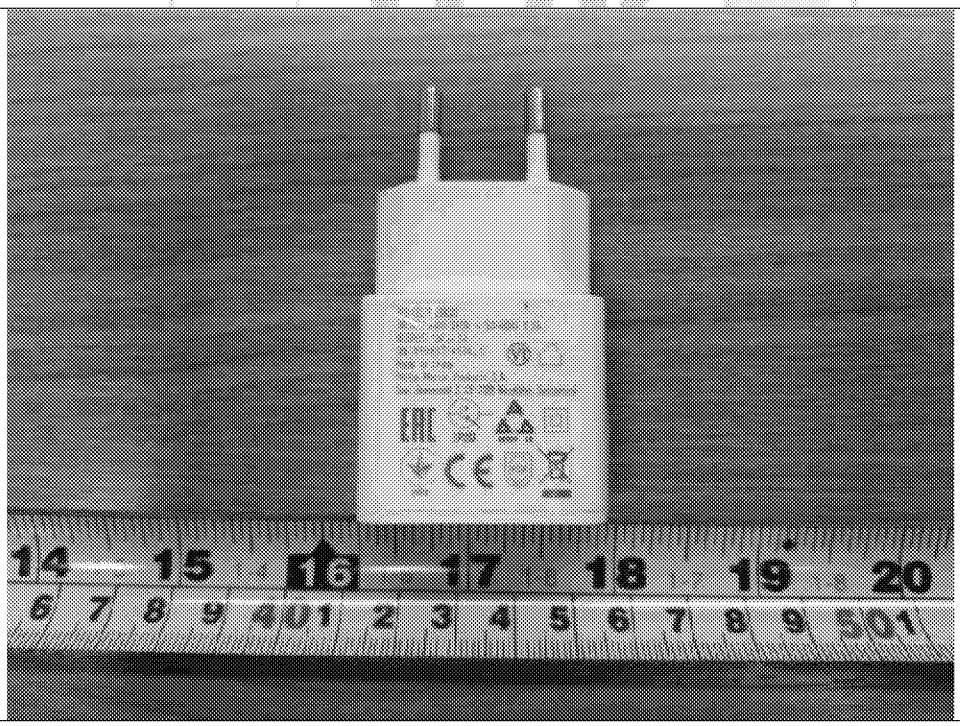
View 2

PSB Singapore

IQOS AC Power Adaptor



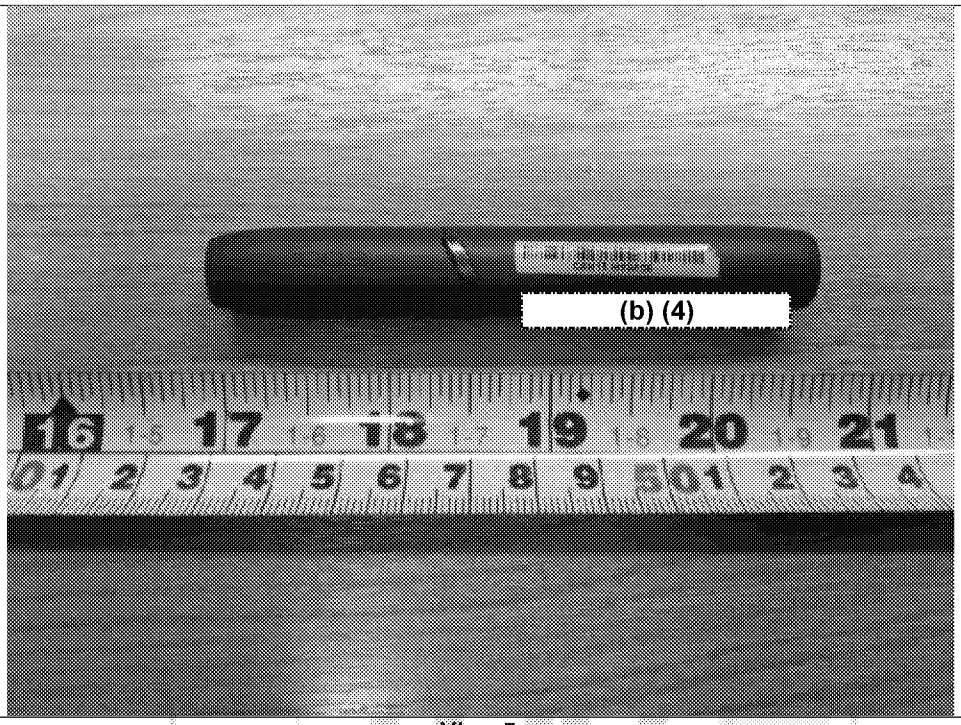
View 3



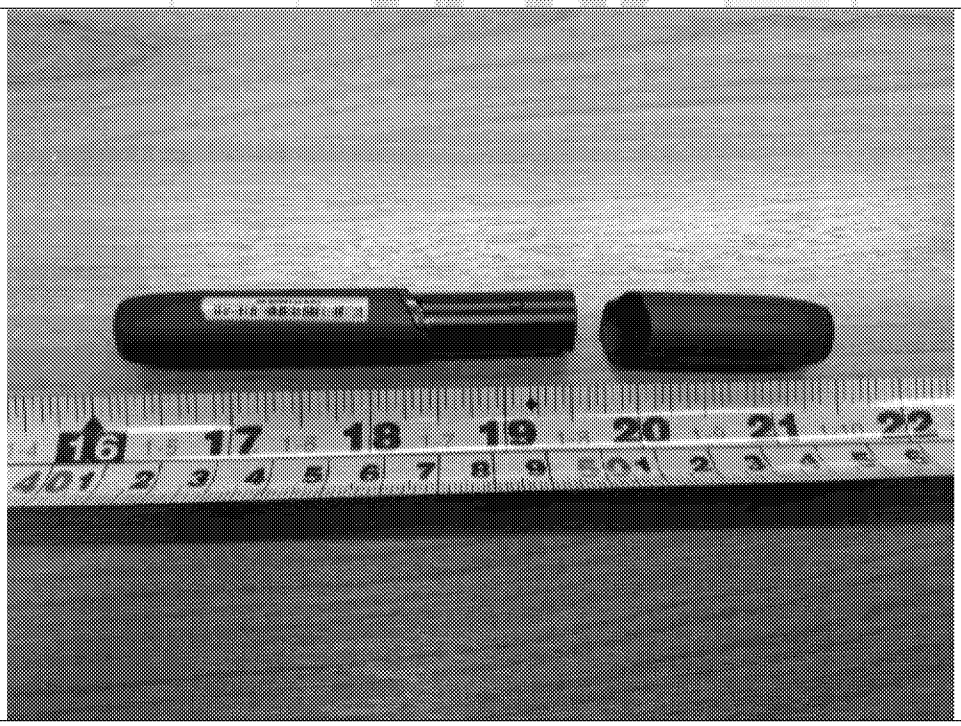
View 4

PSB Singapore

IQOS Holder A1404



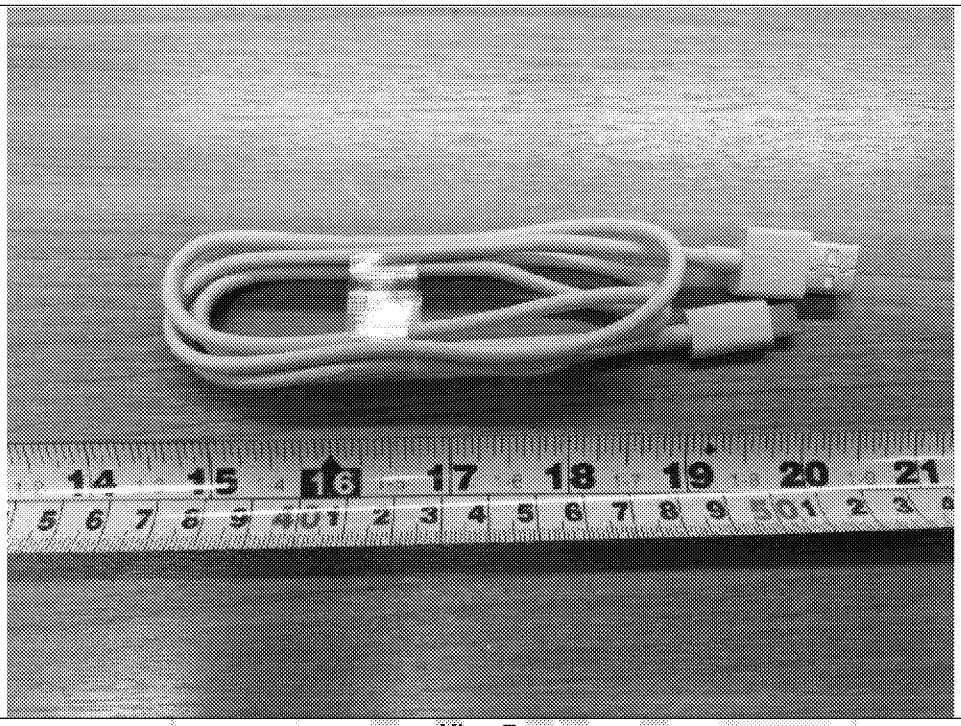
View 5



View 6

PSB Singapore

USB cable



View 7

PSB Singapore

4 Test Equipment

Instrument	Model	S/No	Cal Due Date
Harmonic Current Emissions, Voltage Fluctuation / Flicker			
Schaffner Advanced Coupling Unit	CCN1000-1	72061	11 Dec 2018
Schaffner 5kVA Power Source	NSG 1007-5-400	54854	11 Dec 2018
Conducted Emissions at Mains Terminals / Load Terminals and Additional Terminals			
Rohde & Schwarz EMI Test Receiver (9kHz - 3GHz)	ESCI	100477	13 May 2019
Schaffner LISN 2-Line V-Network	NNB41	04/10151	01 Feb 2019
Radiated Emissions			
Rohde & Schwarz EMI Test Receiver	ESW	101661	06 Dec 2018
Sonoma Preamplifier	310N	270640	10 Jul 2019
TDK RF Solutions Hybrid Log Periodic Antenna	HLP-3003C	130745	31 Oct 2018
Electrostatic Discharge Immunity			
NoiseKen ESD Simulator	ESS-B3011A	ESS1683937	05 Dec 2018
NoiseKen ESD Gun	GT-30RA	ESS1683963	05 Dec 2018
Electrical Fast Transient / Burst Immunity			
Teseq Multifunction Generator Systems	NSG 3060	4030	08 Nov 2018
Coupling Decoupling Network	CDN 3061	5015	08 Nov 2018
EFT / Burst Module	FTM 3425	3572	08 Nov 2018
Voltage Surge Immunity			
Teseq Multifunction Generator Systems	NSG 3060	4030	08 Nov 2018
Coupling Decoupling Network	CDN 3061	5015	08 Nov 2018
Combination Wave Module	CWM 3651	3155	08 Nov 2018

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Instrument	Model	S/No	Cal Due Date
RF Radiated Immunity			
AR Laser Probe	FL7218	0579654	13 Nov 2018
Anritsu Signal Generator	MG3692C	110108	21 May 2020
Agilent EPM-P Series Power Meter	E4416A	GB41290618	11 Dec 2018
Agilent Power Sensor	E9304A	MY41496812	13 Apr 2019
Agilent 20MHz Function / Arbitrary Waveform Generator	33220A	MY43004333	17 Jul 2019
Teseq Bilog Antenna (26-3000MHz)	CBL 6144	30366	Output Monitored
AR Directional Coupler	DC6280	300634	24 Aug 2019
AR Amplifier (80-1000MHz)	250W1000A	0324736	Output Monitored
Schwarzbeck Broad-Band Horn Antenna 450MHz - 4GHz	BBHA 9120 E	0899	Output Monitored
ATM Directional Coupler	PNR CHPsc72L-40F-40R	N337706-01	09 Nov 2018
AR Amplifier (0.8-4.2GHz)	200S1G4A	0372029	Output Monitored
Schwarzbeck Stacked Double Log-Per Antenna 0.7 – 10.5 GHz	STLP 9149	#417	Output Monitored
Milmega Solid State Amplifier 1.8-6.0GHz 100W	AS1860-100	1075348	Output Monitored
Conducted Disturbance Immunity			
Schaffner Immunity Injection Clamp	KEMZ 801	19242	16 May 2019
Schaffner RF Generator	NSG-2070	1057	21 May 2019
Schaffner Coupling and Decoupling Network (2/3-pin)	CDN M016	20809	13 Apr 2019
Power Frequency Magnetic Field Immunity			
Teseq LF Immunity System	NSG 4060	34829	14 Mar 2019
Teseq Magnet Field 1m Loop Antenna	INA 2171 B	34011	14 Mar 2019
Voltage Dips & Interruptions Immunity			
Schaffner 5kVA Power Source	NSG 1007-5-400	54854	27 Oct 2018
Schaffner Profline 2100 AC Switching Unit	NSG 2200-1	200226-001EK	27 Oct 2018

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5 Measurement Uncertainty

All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2.

Test Name	Measurement Uncertainty
Conducted Emissions at Mains Terminals	9kHz to 30MHz, ±2.1dB
Asymmetric Mode Conducted Emissions	9kHz to 30MHz, ±2.9dB
Radiated Emissions	30MHz to 1GHz, ±3.8dB >1GHz to 40GHz, ±4.5dB

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July 2011

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End of the Test Report