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Test Report: Electromagnetic Compatibility – ESA

Legislation

UNECE Regulation 10.05 to Supplement 1

Test Details

Location of Test: TUV SUD America, Inc. Plymouth EMC Laboratory
47523 Clipper St., Plymouth, MI 48170
Date of Test: 01 September 2017
VCA Representative(s): T. Castleman and M. Mahrous
Manufacturer's Representative(s): S. English and J. Sevelan
Reason for Test Report: New approval

Manufacturer Details

Name and Address: Pi Variables, Inc.
14831 Myford Road,
Tustin, California 92780
U.S.A.
Type: Pi-Lit® Ice Cream Sandwich Flare – Rechargeable Set
Commercial Description: Pi-Lit® Ice Cream Sandwich Flare
Category: ESA

Conclusion

The above mentioned component was tested in accordance with the above mentioned legislation and was found to comply in all respects.

Signature:

Name: T. Castleman
Position: Type Approval Engineer
Date: 21 September 2017

List of Annexes

Annex	No of Pages	Subject
I		
II		



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Worst Case Rationale

Unit tested in Charging mode with 6 Flares connected to charging case.
Product not considered immunity related function Radiated Immunity not tested.
Unit contains no Inductive loads therefore emission of conducted disturbance not tested.

Note: Include information on variants and versions this report covers, as applicable

Tests Required

Yes, NA, See Report ... / Approval ... / Annex ...

Radiated Emissions:	Yes
Radiated Immunity:	Not Applicable
BCI Immunity:	Not Applicable
Free Field Immunity:	Not Applicable
150 mm Stripline Immunity:	Not Applicable
800 mm Stripline Immunity:	Not Applicable
Transient Testing:	Yes

Component Specification

Component Part Number: Test item not marked

Manufacturer's Documentation

Manufacturer's documentation is complete and reflects the agreed specification for the component tested, and covers all variants and versions agreed in the worst case rationale.

Yes

Facility and Equipment Checks

Calibration certificates checked and valid, recorded in the following table:

Yes

Equipment	Serial / Certificate No.	Calibration due*
Bi-conical Antenna	233	13/12/2017
Log Periodic	00034420	08/12/2017
Receiver	101381	30/08/2018
Pre-amplifier	QE785	15/10/2017

*Specify calibrated date + (interval) or calibration due date.



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Test Requirements		Complies Yes / NA
Radiated Emissions		
CISPR25, 4.5.	Measuring equipment complies with CISPR 16-1-4 (2010).	Yes
	Types and calibration date: Please see equipment calibration details on page 2	
Test Location		
Ann 7, 3.1. Ann 7, 3.3.	Test performed in: - A.L.S.E (Absorber-lined Shielded Enclosure)* - O.A.T.S (Open Area Test Site)* <i>*Strikethrough, as appropriate.</i>	Yes
Ann 7, 3.3.	O.A.T.S level is a clear area, free from electromagnetic reflecting surfaces, within a circle of 15 m minimum radius.	N/A
Ann 7, 3.3.	Measuring equipment is outside 15 m minimum radius circle.	N/A
Ann 7, 3.4.	Ambient noise is at least 6 dB below reference limits, in either case.	Yes
Test Arrangements		
CISPR25, 4.4.2.	EUT and antenna are more than 2 m from the walls and ceiling, and 1 m from the nearest absorber material.	Yes
CISPR25, 6.1.1.	Ground plane is 900 ± 50 mm high and made from 0.5 mm thick copper, brass or galvanised steel.	Yes
CISPR25, 6.1.1.	Ground plane is at least 2,000 mm length x 1,000 mm width.	Yes
CISPR25, 6.4.2.3.	ESA and harness are supported at 50 ± 5 mm above the ground plane on low relative permittivity material.	Yes
CISPR25, 6.4.2.3.	Face of the ESA is within 200 mm ± 10 mm from the edge of the ground plane.	Yes
CISPR25, 6.4.2.4.	Length of test harness, parallel to the front of the ground plane, is 1,500 ± 75 mm and does not exceed 2,000 mm.	Yes
CISPR25, 6.4.2.4.	Long segment of test harness is located parallel to the edge of the ground plane, facing the antenna at a distance of 100 ± 10 mm from the edge.	Yes



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CISPR25, 6.1.2.	Power supply is Artificial Network (AN) rated at 50 Ω/50 μH.	Yes
	EUT is:	Yes
CISPR25, 6.1.2.	- Remotely grounded (vehicle power return line longer than 200 mm): two artificial networks are required, one for the positive supply line and one for the power return line* - Locally grounded (vehicle power return line 200 mm or shorter): one artificial network is required for the positive supply* <i>*Strikethrough, as appropriate.</i>	
CISPR25, 6.1.2.	Case of the ESA is: - Grounded, simulating actual vehicle configuration* - Not grounded, simulating actual vehicle configuration* <i>*Strikethrough, as appropriate.</i>	Yes
CISPR25, 6.1.2.	AN is electrically bonded to the ground plane.	Yes
	Antenna	
	Types and calibration date:	
	Bi-conical – Log Periodic -	
CISPR25, 6.4.2.6.	Height of the phase centre is 100 ± 10 mm above the ground plane.	Yes
CISPR25, 6.4.2.6.	No part of any antenna radiating element is closer than 250 mm to the floor.	Yes
CISPR25, 6.4.2.6.	Radiating elements of the measuring antenna are not closer than 1,000 mm to any absorber material, except that used on the floor, and are not closer than 2,000 mm to the walls or ceiling of the shielded enclosure.	Yes
CISPR25, 6.4.2.6.	Phase centre (for biconical) or tip (for log-periodic) is 1,000 ± 50 mm from the harness.	Yes
CISPR25, 6.4.2.6.	Antenna calibrated for this distance to correct measuring point (phase centre or tip).	Yes
CISPR25, 6.4.2.6.	Phase centre of the antenna is in line with the centre of the longitudinal part of the wiring harness.	Yes
Ann 7, Ann 8, 4.3.	Pre-test sweep supplied to show compliance throughout frequency range 30 to 1,000 MHz.	N/A
Ann 7, Ann 8, 4.3.	Test frequencies chosen from pre-test data.	N/A



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Narrowband Test Results

Ann 8, 2.	Operational mode of ESA: Mode 1 – Charging Mode	
Ann 8, 2.	Detector used and bandwidth: Average detector	
6.6.2.	ESA meets narrowband emissions limits, with both vertical and horizontal polarisations.	Yes

Broadband Test Results

Ann 7, 2.	Operational mode of ESA: Mode 1 – Charging Mode	
Ann 7, 2.	Detector used and bandwidth: Quasi-Peak	
6.5.2.	ESA meets broadband emissions limits, with both vertical and horizontal polarisations.	Yes

Radiated Immunity – Not Applicable

BCI Immunity – Not Applicable

Free Field Immunity – Not Applicable

150 mm Stripline Immunity – Not Applicable

800 mm Stripline Immunity – Not Applicable



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Transient Testing

Case of ESA is:

- ~~Grounded, simulating actual vehicle configuration*~~
- Not grounded, simulating actual vehicle configuration*

*Strikethrough, as appropriate.

Transient Immunity

- 6.9.1. Test set up according to ISO 7637-2 (second edition 2004 and Amd.1:2008). Yes
- Ann 10, 2. Supply lines and other lines, which may be connected to supply lines, are tested. Yes
- Test voltage and time parameters are within allowed envelopes. Yes
- Test pulses and duration according to the following: Yes

Test Pulse	Immunity Test Level	Functional Status for Systems		Test Duration
		Related to Immunity-related Functions	Not Related to Immunity-related Functions	
1	III	C	D	5000 pulses
2a	III	B	D	5000 pulses
2b	III	C	D	10 pulses
3a	III	A	D	1 hour
3b	III	A	D	1 hour
4	III	B <i>(for ESA, which must be operational during engine start, or C, for other ESA)</i>	D	1 pulse

ESA operational after the tests, according to the above classification. Yes

Emission of Conducted Disturbances – Not Applicable



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Remarks

None

Note: VCA apply measurement uncertainty to calibrated items but not test results.