



Compliance Testing Report For Australian Standard AS 60529-2004 Degrees of Protection Provided by Enclosures (IP Code)

Client:	Enphase Energy Inc.	
Address:	1420 North McDowell Boulevard, Petaluma, CA 94954, USA	
Report Number:	0414ENPM250_529	
Date of Testing:	27-28 th March 2014	
File Number:	ENP140311	
Equipment Name:	Photovoltaic Micro-inverter	
Equipment Model Number:	M250-60-230-S22	
Equipment Description:	Photovoltaic Micro-inverter	
Result:	COMPLIES*	
Complied By:	Wing Ming Yeung Electrical Safety Test Engineer	
Approved By:	Kenneth Fu Electrical Safety Manager	
Date of Issue:	14 th April 2014	
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SUMMARY OF COMPLIANCE WITH AUSTRALIAN STANDARD AS 60529-2004

The EUT (Equipment Under Test) known as a Photovoltaic Micro-inverter, model number M250-60-230-S22 was supplied for testing to AS 60529-2004 IP67 by Enphase Energy Inc.

The EUT was tested with two different potting compounds.

- Samples marked with Build #393 utilised EFI hardening potting compound
- Samples marked with Build #839 utilised Dow corning soft silicone potting compound

Samples of the two different potting compounds were both tested according to the test requirements of IP67 of AS 60529-2004.

Acceptance conditions for marking (clause 10), specifically relating to product standards outside of AS 60529-2004 were not considered.

In assessing the compliance of water ingress (clause 14.3), the general acceptance condition of clause 8.4 of AS/NZS 3100:2009 + A1, + A2 was used. This included an assessment for electric strength tests of 1420Vdc applied between AC output and earth, and 1780Vdc applied between AC output and DC input.

The Photovoltaic Micro-inverter, model number M250-60-230-S22 **COMPLIES** with the tested clauses for IP67 of AS 60529-2004.

Method

Testing was performed in accordance with the standard.

Possible Test Case Verdicts:

- Test case does not apply to the test object N (N.A)
- Test object does meet the requirements P (Pass)
- Test object does not meet the requirements F (Fail)
- Testing was not performed NT
- Noted ND

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AS 60529-2004			
Clause	Requirement – Test	Result - Remark	Verdict
5	DEGREES OF PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS AND AGAINST SOLID FOREIGN OBJECTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL	Tested for IP first characteristic numeral 6	P
5.1	Protection Against Access to Hazardous Parts		P
5.2	Protection Against Solid Foreign Objects		P
6	DEGREES OF PROTECTION AGAINST INGRESS OF WATER INDICATED BY THE SECOND CHARACTERISTIC NUMERAL	Tested for IP second characteristic numeral 7	P
7	DEGREES OF PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE ADDITIONAL LETTER	Tested only for IP67	N
8	SUPPLEMENTARY LETTERS	Tested only for IP67	N
9	EXAMPLES OF DESIGNATION WITH THE IP CODE		P
9.1	IP Code Not Using Optional Letters	IP67	P
9.2	IP Code Using Optional Letters		N
10	MARKING	Refer to applicable standard	ND
11	GENERAL REQUIREMENTS FOR TESTS		P
11.1	Atmospheric Conditions for Water or Dust Tests	Within specified range	P
11.2	Test Samples	Positioned as in normal use	P
11.3	Application of Test Requirements and Interpretation of Test Results		P
11.4	Combination of Test Conditions for the First Characteristic Numeral		P
11.5	Empty Enclosures	Tested with components inside	N

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AS 60529-2004			
Clause	Requirement – Test	Result - Remark	Verdict
12	TESTS FOR PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL	Tested for IP first characteristic numeral 6	P
12.1	Access Probes	1mm Ø, 100mm	P
12.2	Test Conditions	1N	P
12.3	Acceptance Conditions		P
12.3.1	For low-voltage equipment (rated voltages not exceeding 1 000 V a.c. and 1 500 V d.c.)		P
12.3.2	For high-voltage equipment (rated voltages exceeding 1 000 V a.c. and 1 500 V d.c.)		N
12.3.3	For equipment with hazardous mechanical parts		N
13	TESTS FOR PROTECTION AGAINST SOLID FOREIGN OBJECTS INDICATED BY THE FIRST CHARACTERISTIC NUMERAL	Tested for IP first characteristic numeral 6	P
13.1	Test Means	Dust chamber	P
13.2	Test Conditions for First Characteristic Numerals 1, 2, 3, 4		N
13.3	Acceptance Conditions for First Characteristic Numerals 1, 2, 3, 4		N
13.4	Dust Test for First Characteristic Numerals 5 and 6		P
13.5	Special Conditions for First Characteristic Numeral 5		N
13.5.1	Test conditions for first characteristic numeral 5		N
13.5.2	Acceptance conditions for first characteristic numeral 5		N
13.6	Special Conditions for First Characteristic Numeral 6		P
13.6.1	Test conditions for first characteristic numeral 6	Electronic board was potted, therefore extraction was not applied.	N
13.6.2	Acceptance conditions for first characteristic numeral 6	No dust was found inside AC and DC connectors. Electronic board was potted. No dust found on components.	P

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Clause	Requirement – Test	Result - Remark	Verdict
14	TESTS FOR PROTECTION AGAINST WATER INDICATED BY THE SECOND CHARACTERISTIC NUMERAL	Tested for IP second characteristic numeral 7	P
14.1	Test Means	Water Immersion Tank Water-Level on enclosure: 1 m above samples bottom	P
14.2	Test Conditions		P
14.2.1	Test for second characteristic numeral 1 with the drip box		N
14.2.2	Test for second characteristic numeral 2 with the drip box		N
14.2.3	Test for second characteristic numeral 3 with oscillating tube or spray nozzle		N
14.2.4	Test for second characteristic numeral 4 with oscillating tube or spray nozzle		N
14.2.5	Test for second characteristic numeral 5 with the 6.3 mm nozzle		N
14.2.6	Test for second characteristic numeral 6 with the 12.5 mm nozzle		N
14.2.7	Test for second characteristic numeral 7: temporary immersion between 0.15 m and 1 m	Water Immersion Tank, Samples bottom 1 m under water for 30 minutes.	P
14.2.8	Test for second characteristic numeral 8: continuous immersion subject to agreement		N
14.3	Acceptance Conditions	No water found inside AC and DC connectors. Electronic board was potted. Samples pass Clause 8.4 of AS/NZS 3100:2009 +A1,+A2.	P
15	TESTS FOR PROTECTION AGAINST ACCESS TO HAZARDOUS PARTS INDICATED BY THE ADDITIONAL LETTER	Tested only for IP67	N
15.1	Access Probes		N
15.2	Test Conditions		N
15.3	Acceptance Conditions		N

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AS 60529-2004			
Clause	Requirement – Test	Result - Remark	Verdict

***** END OF REPORT BODY *****

Appendix 1 – Photographic Record of Sample

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Appendix 1 – Photographic Record of Sample



Top side angle view



Bottom side angle view

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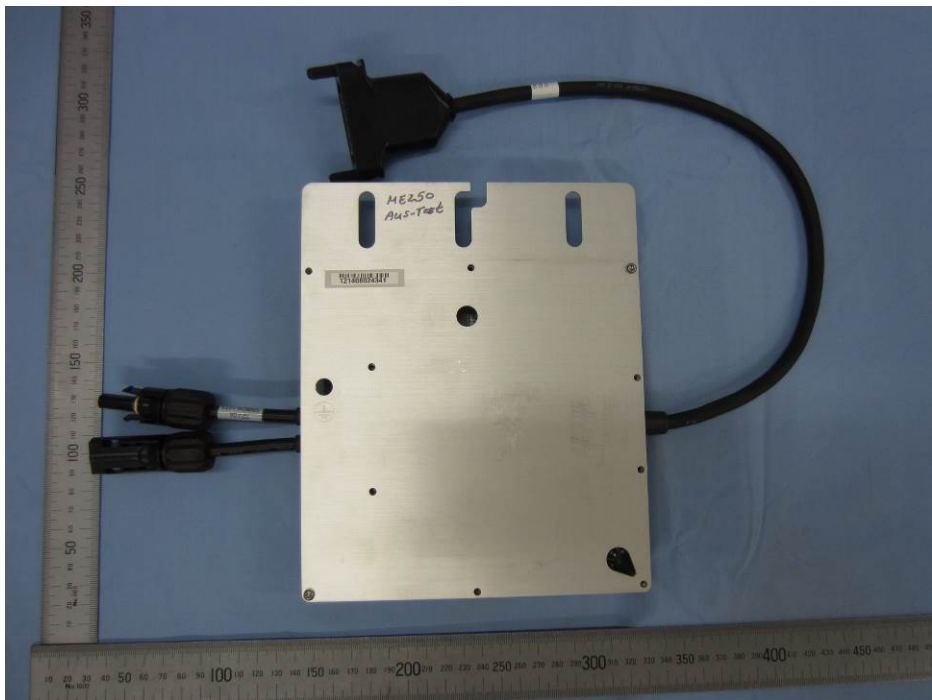
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Appendix 1 – Photographic Record of Sample



Top side



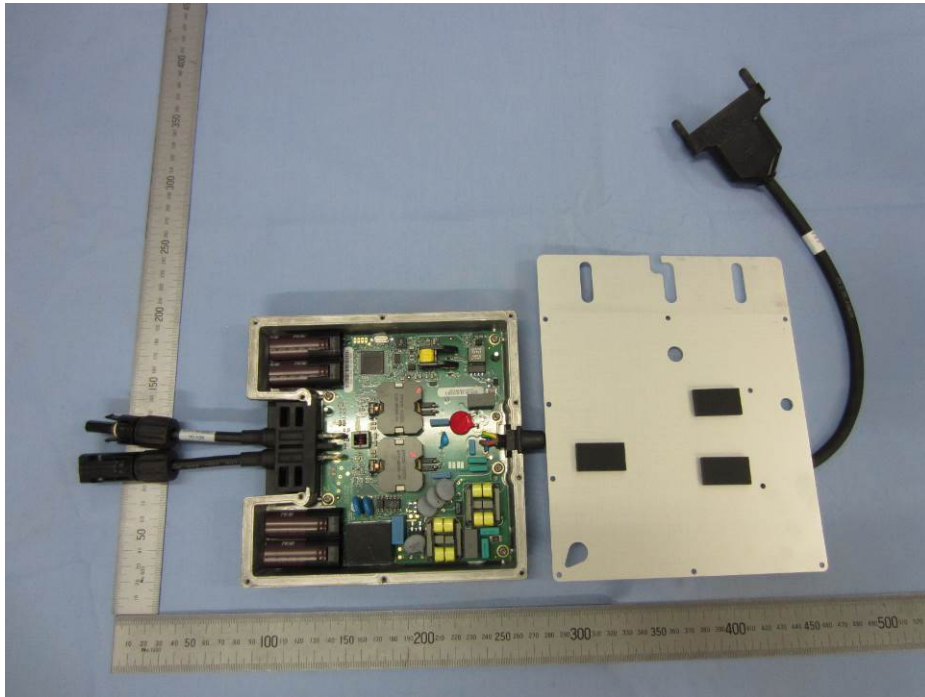
Bottom side

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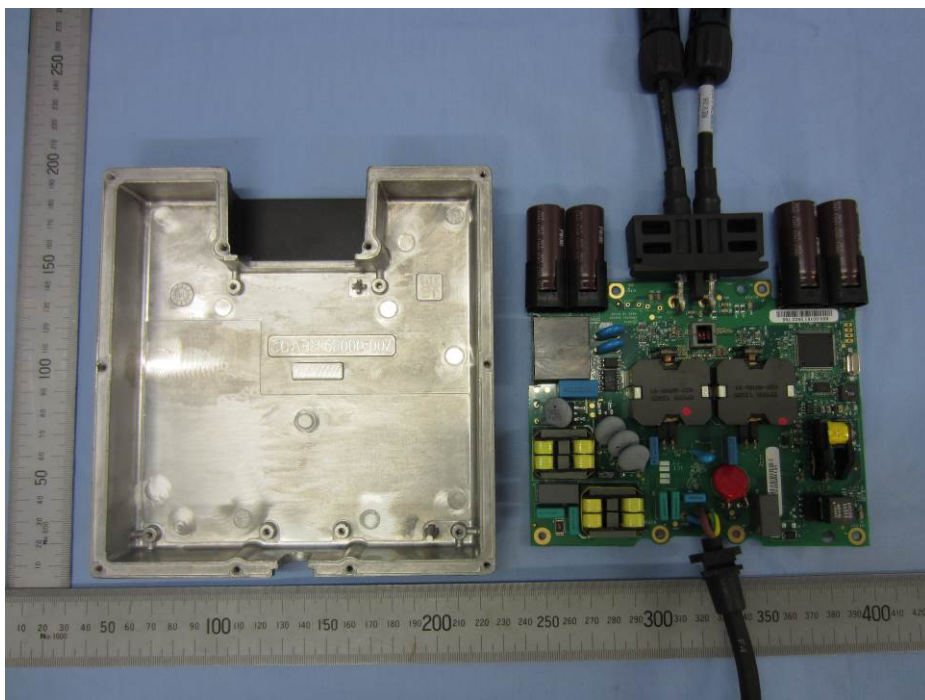
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Appendix 1 – Photographic Record of Sample



Unpotted sample internal view



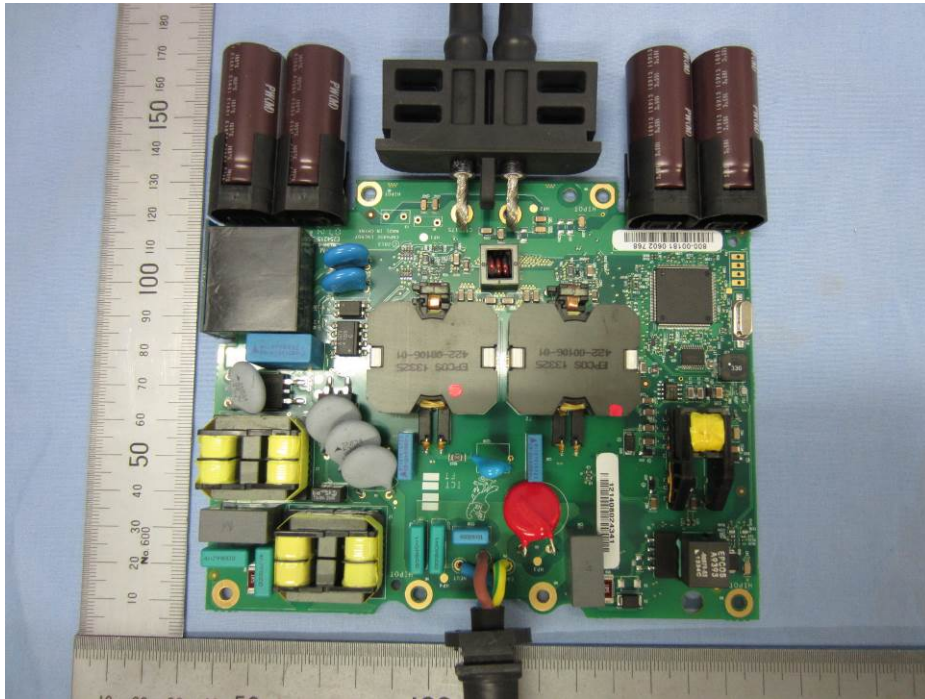
Unpotted sample internal view

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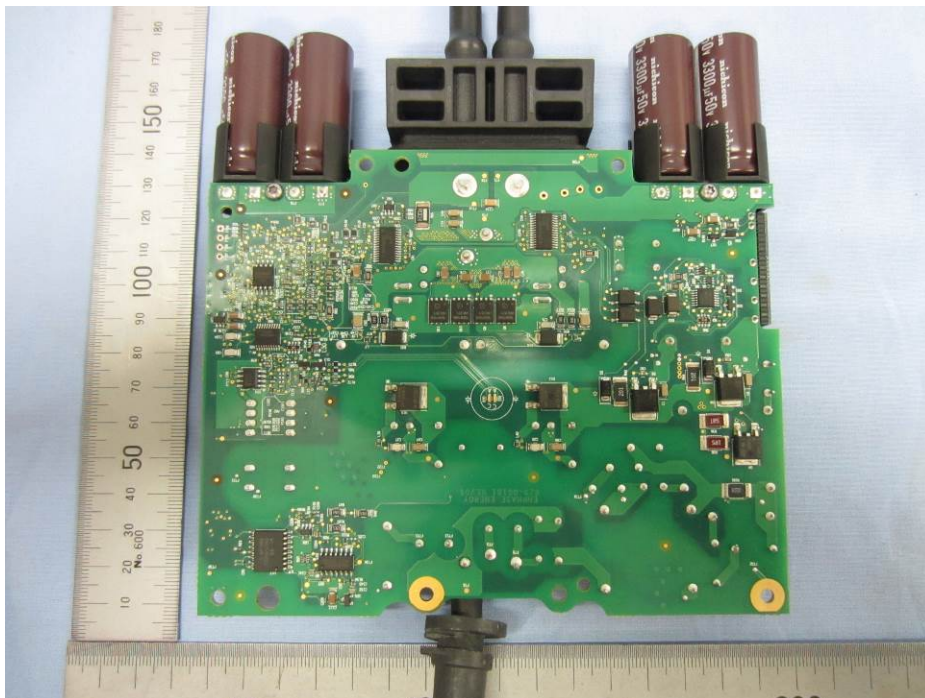
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Appendix 1 – Photographic Record of Sample



PCB top side



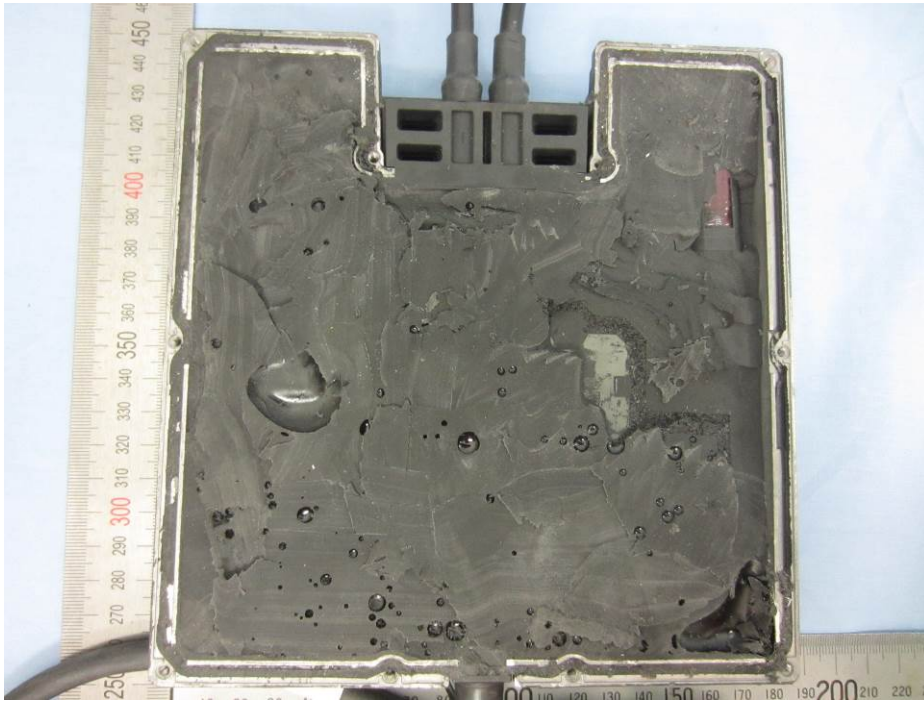
PCB bottom side

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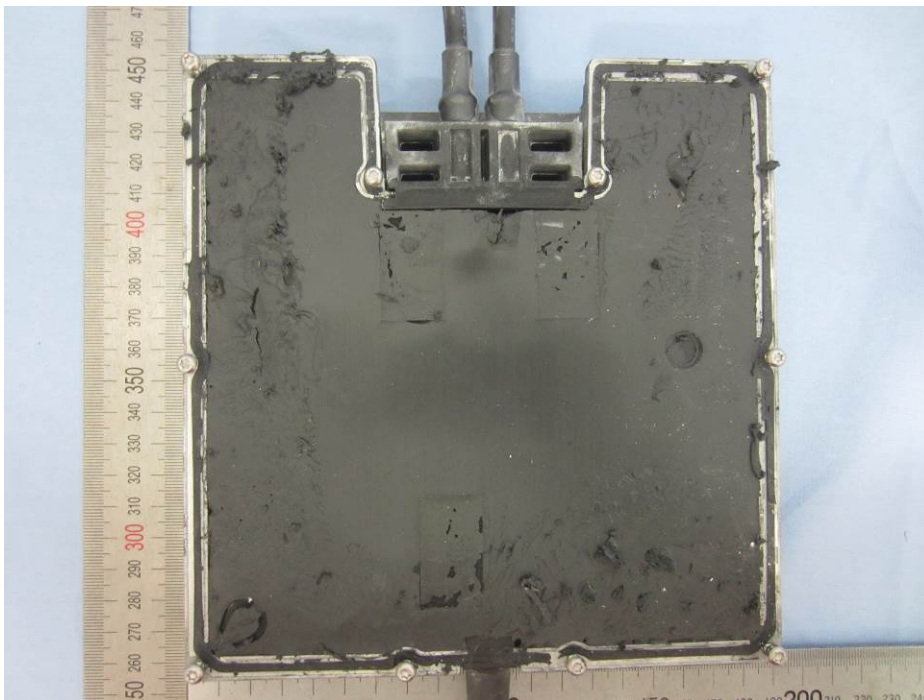
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Appendix 1 – Photographic Record of Sample



Internal view with hardening potting compound



Internal view with soft silicone potting compound

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Appendix 1 – Photographic Record of Sample



Rating Label with device specification



Label with company information and device identity

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