

# Cree, Inc. Product Change Notification

## PCN-PW068: Addition of New Assembly Location for SiC Schottky Diodes in TO-247-2, TO-220-FullPAK, and TO-220-Isolated Packages

### **Change**

Note: This revision is an update to the original version of PCN-PW061, previously issued May 18, 2018.

ASE Group's package assembly site in Weihai, Shandong, China, is undergoing qualification as an additional packaging and test subcontractor for all Cree SiC Schottky diodes in TO-247-2, TO-220-F2 "FullPAK", and TO-220-Iso "Isolated" discrete power packages. This notice is to inform customers that future deliveries of these products will include devices packaged by ASE Weihai as a qualified subcontractor to Cree. ASE Weihai is already qualified and performs high-volume assembly of Cree SiC MOSFETs and Schottky diodes in TO-247-3, TO-247-4, and TO-220-2 discrete packages.

### **Change Description**

Cree SiC Schottky diodes packaged in TO-247-2 packages are currently assembled by qualified subcontractor PSi Technologies, Inc., located in Calamba City, Philippines. Cree SiC Schottky diodes packaged in TO-220-F2 FullPAK packages and TO-220-Iso Isolated packages are currently assembled by qualified subcontractor MingXin Microelectronics Co., located in Taizhou, China. Pending successful completion of the qualification, assembly for 100% of all Cree Schottky diodes in TO-220-F2 FullPAK packages will be transferred to ASE Weihai (ASEWH).

### **Part Description**

Affected part numbers are all those ending in "F", "I" and "H". Refer to the table below.

Part Number	Blocking Voltage (V)	Current Rating (A)	Package Type
C3D02060F	600	2	TO-220-F2 FullPAK
C3D03060F	600	3	TO-220-F2 FullPAK
C3D04060F	600	4	TO-220-F2 FullPAK
C3D06060F	600	6	TO-220-F2 FullPAK
C3D06065I	650	6	TO-220-Iso Isolated
C3D08065I	650	8	TO-220-Iso Isolated
C3D10065I	650	10	TO-220-Iso Isolated
C4D10120H	1200	10	TO-247-2
C4D15120H	1200	15	TO-247-2
C4D20120H	1200	20	TO-247-2
C3D10170H	1700	10	TO-247-2
C3D25170H	1700	25	TO-247-2

**Impact of Change**

TO-220-F2 FullPAK packages assembled at ASEWH will utilize a different mold compound and a Pb-free die attach, as compared to equivalent packages assembled at MX. The Thermal Resistance from Junction to Case ( $R_{\theta JC}$ ) is lower for FullPAK diodes assembled at ASEWH. Updated datasheets will be released with new thermal resistance and associated parametric values upon successful completion of the qualification. The qualification conditions used for TO-220-F2 FullPAK packages will result in a removal of “automotive qualified” status for these products. The changes in device parametrics will result in all TO-220-F2 FullPAK production to be performed exclusively at ASE.

TO-247-2 packages assembled at ASEWH will utilize a different mold compound as compared to equivalent packages assembled at PSi. Change in thermal resistance will be negligible.

There is no change in package materials for TO-220-Iso Isolated packages.

Minor changes to package dimensions are provided in Figures 1, 2, and 3.

Products assembled at ASEWH will include the alphanumeric digit “W” imprinted in the manufacturer’s marks on a separate line following the core part number. There will be no change to ordering part numbers.

**Reason for Change**

Cree, Inc. continues to solidify broad based sources of supply, to limit interruption, increase capacity, potentially mediate packaging lead-times, and ensure the availability of multiple reliable sources.

**Reason for Notification**

The purpose of this notification is to provide advanced awareness to our customers of the addition of a new packaging facility and associated minor changes in package dimensions and improvements to thermal properties of the TO-220-F2 FullPAK devices.

**Qualification Plan**

*Qualification Vehicle*

<b>Part Number</b>	<b>Blocking Voltage (V)</b>	<b>Current Rating (A)</b>	<b>Package Type</b>	<b>No. of Lots</b>
C3D06060F	600	6	TO-220-F2 FullPAK	3
C3D10065I	650	10	TO-220-Iso Isolated	3
C5D25170H	1700	25	TO-247-2	3

## Reliability Tests

TEST DESCRIPTION	TEST CONDITIONS	REFERENCE	DURATION	NBR OF LOTS RUN	SAMPLE SIZE/LOT	REQUIRED PASS RATE
H3TRB	85°C, 85% RH, device reverse biased to 100V	JESD22-A101	1000 Hrs	3	25	100%
HTRB	175°C ambient, reverse biased to 80% V <sub>RRM</sub>	JESD22-A108C	1000 Hrs	3	25	100%
IOL	T <sub>jmax</sub> = 125°C and ΔT = 100°C or t <sub>on/off</sub> = 3.5 minutes T <sub>A</sub> = 25°C	JESD22-A108C	1000 Hrs	3	25	100%
Temperature Cycling	-55 °C to 150°C, condition H, soak mode 2	JESD22-A104	1000 cycles	3	25	100%

### **Effective Implementation Date**

Implementation will occur upon successful completion of the qualification and publication of a revised datasheet with parametric changes as necessary.

Customers can expect to receive product from ASEWH in TO-220-Iso packages on or after August 31, 2018.

Customers can expect to receive product from ASEWH in TO-247-2 packages on or after August 31, 2018.

Customers can expect to receive product from ASEWH in TO-220-F2 FullPAK packages on or after September 30, 2018.

Please respond to this updated PCN by indicating your approval on the included approval form at the end of this PCN, sign it and return to your local sales representative by August 16, 2018. If you have any concerns or questions, or if you require any assistance in preparing for these changes, please notify your local sales representative. In accordance with JEDEC Standard JESD46D, lack of acknowledgement of the PCN within 30 days constitutes acceptance of the change.

Your prompt reply will help ensure a smooth and well executed transition.

### **Contact**

Any questions or requests for additional information should be directed to your sales representative or by contacting Cree, Inc. directly at 919-287-7888, or via email at [CreePower\\_sales@cree.com](mailto:CreePower_sales@cree.com).

PCN Originator:

Name: Barbieri, T.

Title: Product Marketing Engineer, Cree Power Devices

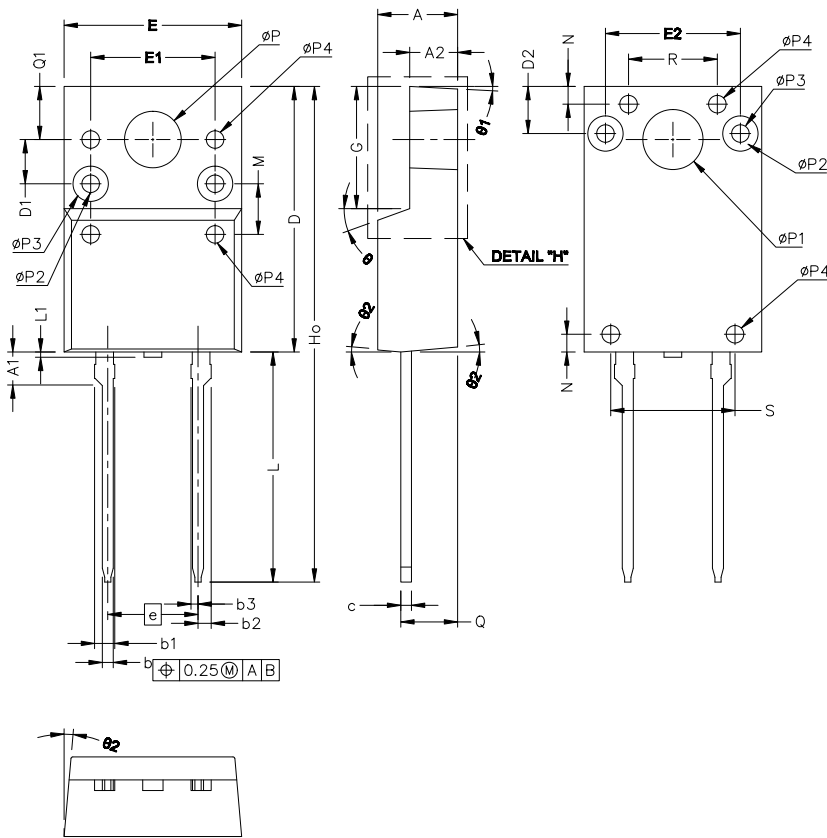
First Edition Issued: May 18, 2018

Revision 1 Issued: July 16, 2018

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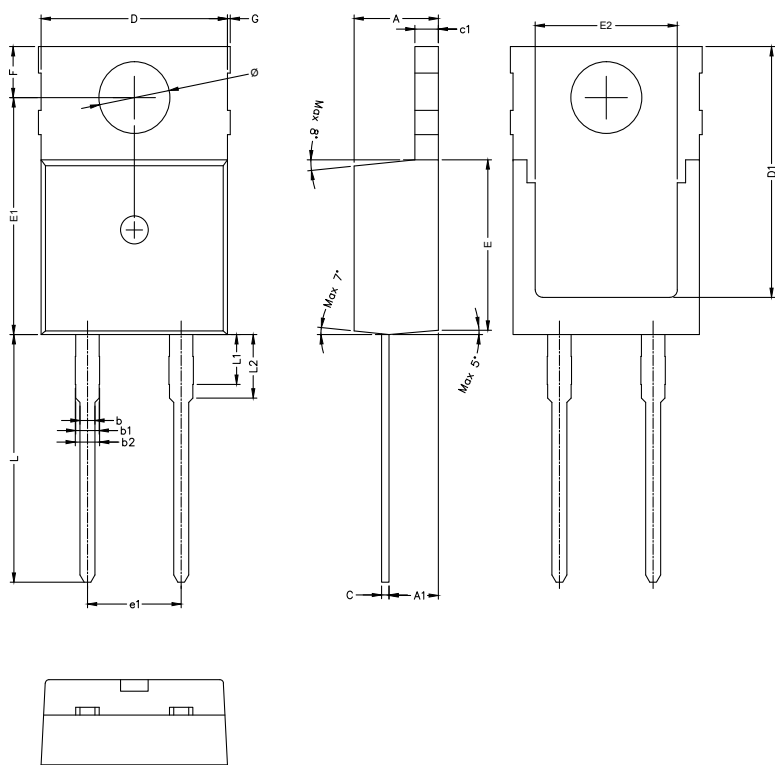
Disclaimer:

If we do not receive any response by the date in the PCN above we consider this as the acceptance of the PCN.



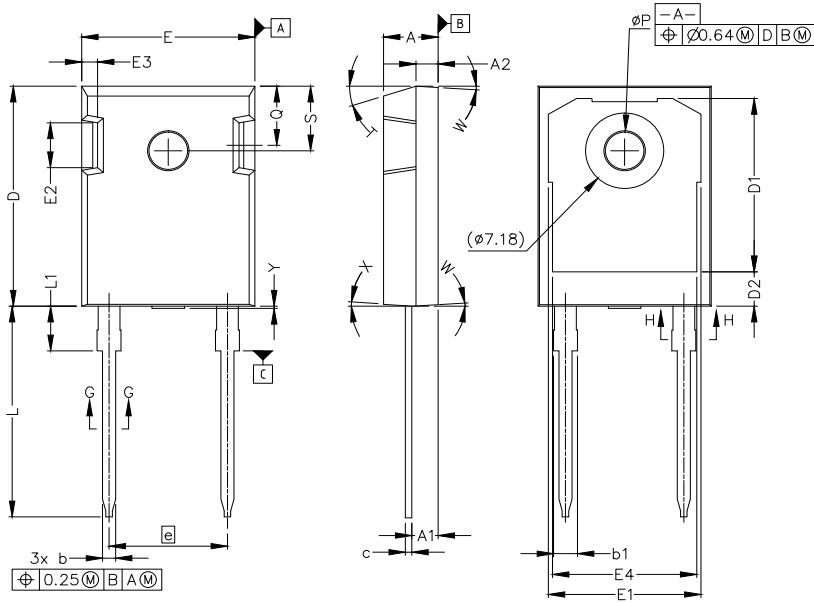
POS	Inches		Millimeters	
	Min	Max	Min	Max
A	0.169	0.185	4.30	4.70
A1	0.071	0.083	1.80	2.10
A2	0.098	0.114	2.50	2.90
b	0.021	0.033	0.54	0.84
b1	0.039	0.051	1.00	1.29
c	0.019	0.031	0.49	0.79
D	0.579	0.602	14.70	15.30
E	0.382	0.406	9.70	10.30
e	0.190	0.210	4.83	5.33
G	0.264	0.280	6.70	7.10
L	0.492	0.531	12.50	13.50
P	0.120	0.134	3.05	3.40
Q	0.122	0.130	3.10	3.30
Q1	0.106	0.130	2.70	3.30

Figure 1: Updated POD for the TO-220-F2 FullPAK. Changes are highlighted in yellow.



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	1.174	0.186	4.42	4.42
A1	0.099	0.111	2.52	2.52
b	0.028	0.036	0.71	0.71
b1	0.046	0.054	1.17	1.17
b2	0.046	0.066	1.17	1.17
c	0.014	0.018	0.36	0.36
c1	0.046	0.054	1.17	1.17
D	0.392	0.404	9.95	9.95
E	0.352	0.366	8.93	8.93
E1	0.494	0.506	12.55	12.55
E2	0.295	0.311	7.50	7.50
e1	0.196	0.204	4.98	4.98
F	0.102	0.114	2.59	2.59
L	0.515	0.531	13.08	13.08
L1	0.097	0.113	2.47	2.47
φ	0.149	0.153	3.79	3.79

**Figure 2: Updated POD for the TO-220-Iso Isolated. Changes are highlighted in yellow.**



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	0.190	0.205	4.70	5.31
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
b	0.039	0.055	0.99	1.40
b1	0.065	0.095	1.65	2.41
c	0.015	0.035	0.38	0.89
D	0.819	0.845	20.80	21.46
D1	0.640	0.683	16.25	17.35
D2	0.112	0.124	2.86	3.16
E	0.620	0.640	15.49	16.26
E1	0.516	0.557	13.10	14.15
E2	0.135	0.201	3.43	5.10
E3	0.039	0.075	1.00	1.90
E4	0.487	0.529	12.38	13.43
e	0.428 BSC		10.88 BSC	
L	0.78	0.80	19.81	20.32
L1	-	0.177	-	4.50
ØP	0.138	0.144	3.51	3.66
Q	0.212	0.244	5.38	6.20
S	0.238	0.248	6.04	6.3
T	17.5° REF.			
W	3.5° REF.			
X	4° REF.			
Y	0	0.5	0	0.02

Figure 3: Updated POD for the TO-247-2. Changes are highlighted in yellow.

## PCN-PW068 CUSTOMER APPROVAL FORM

### Addition of New Assembly Location for SiC Schottky Diodes in TO-247-2, TO-220-FullPAK, and TO-220-Isolated Packages (Revision 1.0)

**Please check the appropriate boxes below:**

We agree with this proposed change and its schedule

We need more information:

**Sender**

Company:

Address/Location:

Name:

Email:

Primary Telephone:

Signature:

Fax:

Date:

**Please return to your Sales Representative**

Company: Cree

Address/Location:

Name:

Email:

Primary Telephone:

Fax:

## Revision History

Version	Date	Author	Changes
0	05/18/2018	T. Barbieri	Origination
1	07/16/2018	T. Barbieri	“Impact of Change”: Added details on material and performance changes; “Effective Implementation Date”: Provided updated implementation dates for the change; Figure 1: Updated drawing and dimensions.