

## Cree® Product Change Notification

**PCN Reference Number:** CREE-PCN-1055

**Date Issued:** 03/19/2020

Please be advised that Cree is making an improvement in the packing method of their discrete through-hole Power MOSFETs and Schottky diodes. This packing improvement will not have any impact on the electrical functionality of these discrete power devices. For your convenience, verification results of new packing method have been added in this PCN.

Be advised that if we do not hear from you within 30 days of the PCN Issue Date, Cree will assume that you have approved the PCN and we will begin shipping the affected product.

Please review the additional PCN information below.

### Affected Product

The improved packing method will be implemented on the TO-247-3L, TO-247-2L, TO-247-4L, TO-247-4L Plus and TO-220-2 (Standard, Full pak & Isolated) based discrete power devices (as shown in Table 1 and Table 2).

Table 1 provides a list of discrete power MOSFETs affected by this improvement in packing method:

Cree Part Number	Package Type	On-State Resistance	Voltage Rating
C3M0030090K	TO-247-4	30 mΩ	900 V
C3M0065090D	TO-247-3	65 mΩ	900 V
C3M0120090D	TO-247-3	120 mΩ	900 V
C3M0280090D	TO-247-3	280 mΩ	900 V
C3M0065100K	TO-247-4	65 mΩ	1000 V
C3M0120100K	TO-247-4	120 mΩ	1000 V
C3M0016120K	TO-247-4	16 mΩ	1200 V
C3M0016120D	TO-247-3	16 mΩ	1200 V
C3M0021120D	TO-247-3	21 mΩ	1200 V
C3M0021120K	TO-247-4	21 mΩ	1200 V
C2M0025120D	TO-247-3	25 mΩ	1200 V
C3M0032120D	TO-247-3	32 mΩ	1200 V
C3M0032120K	TO-247-4	32 mΩ	1200 V
C2M0040120D	TO-247-3	40 mΩ	1200 V
C3M0075120K	TO-247-4	75 mΩ	1200 V
C3M0075120D	TO-247-3	75 mΩ	1200 V
C2M0080120D	TO-247-3	80 mΩ	1200 V
C2M0160120D	TO-247-3	160 mΩ	1200 V
C2M0280120D	TO-247-3	280 mΩ	1200 V
C2M0045170P	TO-247-4 Plus	45 mΩ	1700 V
C2M0045170D	TO-247-3	45 mΩ	1700 V
C2M0080170P	TO-247-4 Plus	80 mΩ	1700 V

<b>C2M1000170D</b>	TO-247-3	1000 mΩ	1700 V
<b>E3M0065090D</b>	TO-247-3	65 mΩ	900 V
<b>E3M0120090D</b>	TO-247-3	120 mΩ	900 V
<b>E3M0280090D</b>	TO-247-3	280 mΩ	900 V

Table 1. Affected discrete power MOSFETs

Table 2 provides a list of discrete SiC Schottky diodes affected by this improvement in packing method:

Cree Part Number	Package	Current Rating	Voltage Rating
<b>CSD01060A</b>	TO-220-2	1 A	600 V
<b>C3D02060A</b>	TO-220-2	2 A	600 V
<b>C3D02060F</b>	TO-220-F2	2 A	600 V
<b>C3D03060A</b>	TO-220-2	3 A	600 V
<b>C3D03060F</b>	TO-220-F2	3 A	600 V
<b>C3D04060A</b>	TO-220-2	4 A	600 V
<b>C3D04060F</b>	TO-220-F2	4 A	600 V
<b>C3D06060F</b>	TO-220-F2	6 A	600 V
<b>C3D06060A</b>	TO-220-2	6 A	600 V
<b>C3D08060A</b>	TO-220-2	8 A	600 V
<b>C3D10060A</b>	TO-220-2	10 A	600 V
<b>C3D16060D</b>	TO-247-3	16 A	600 V
<b>C3D20060D</b>	TO-247-3	20 A	600 V
<b>C3D04065A</b>	TO-220-2	4 A	650 V
<b>C6D04065A</b>	TO-220-2	4 A	650 V
<b>C6D06065A</b>	TO-220-2	6 A	650 V
<b>C3D06065I</b>	TO-220 Isolated	6 A	650 V
<b>C3D06065A</b>	TO-220-2	6 A	650 V
<b>C3D08065A</b>	TO-220-2	8 A	650 V
<b>C6D08065A</b>	TO-220-2	8 A	650 V
<b>C3D08065I</b>	TO-220 Isolated	8 A	650 V
<b>C6D10065A</b>	TO-220-2	10 A	650 V
<b>C3D10065I</b>	TO-220 Isolated	10 A	650 V
<b>C3D10065A</b>	TO-220-2	10 A	650 V
<b>C3D12065A</b>	TO-220-2	12 A	650 V
<b>C3D16065D</b>	TO-247-3	16 A	650 V
<b>C3D16065D1</b>	TO-247-3	16 A	650 V
<b>C3D16065A</b>	TO-220-2	16 A	650 V
<b>C3D20065D</b>	TO-247-3	20 A	650 V
<b>CVFD20065A</b>	TO-220-2	20 A	650 V
<b>C3D30065D</b>	TO-247-3	30 A	650 V
<b>C5D50065D</b>	TO-247-3	50 A	650 V
<b>C4D02120A</b>	TO-220-2	2 A	1200 V
<b>C4D05120A</b>	TO-220-2	5 A	1200 V
<b>C4D08120A</b>	TO-220-2	8 A	1200 V
<b>E4D10120A</b>	TO-220-2	10 A	1200 V

<b>C4D10120A</b>	TO-220-2	10 A	1200 V
<b>C4D10120D</b>	TO-247-3	10 A	1200 V
<b>C4D10120H</b>	TO-247-2	10 A	1200 V
<b>C4D15120H</b>	TO-247-2	15 A	1200 V
<b>C4D15120D</b>	TO-247-3	15 A	1200 V
<b>C4D15120A</b>	TO-220-2	15 A	1200 V
<b>E4D20120A</b>	TO-220-2	20 A	1200 V
<b>C4D20120D</b>	TO-247-3	20 A	1200 V
<b>C4D20120A</b>	TO-220-2	20 A	1200 V
<b>C4D20120H</b>	TO-247-2	20 A	1200 V
<b>C4D30120D</b>	TO-247-3	30 A	1200 V
<b>C4D40120D</b>	TO-247-3	40 A	1200 V
<b>C5D05170H</b>	TO-247-2	5 A	1700 V
<b>C3D10170H</b>	TO-247-2	10 A	1700 V
<b>C5D10170H</b>	TO-247-2	10 A	1700 V
<b>C5D25170H</b>	TO-247-2	25 A	1700 V
<b>C3D25170H</b>	TO-247-2	25 A	1700 V

Table 2. Affected discrete SiC Schottky diodes

## Description of the Change

CREE is improving the packaging method of its through-holes discrete power devices (MOSFETs and Schottky Diodes):

### Discrete power devices based on TO-247-3L, TO-247-4L, TO-247-2L, TO-247-4L PLUS packages:

#### Existing Packing Method:

Package	Tube		Inner Box					Outer Box			
	Tube Dimension (mm)	Qty. per Tube	No. of Tubes	Total Qty.	Inner Box Dimension (mm)	Filler/ Cushion	Gross Weight (kg)	Dimension (mm)	No. of Inner Boxes	Total Qty.	Gross Weight (kg)
TO-247-4L	533.5X46X7.7	30	20	600	560 X 196 X 52	1 Bubble pad	5	590X210X130 590X280X210	2 in 1 5 in 1	1200 3000	11 26
TO-247-3L	533.5X46X7.7	30	20	600	560 X 196 X 52	1 Bubble pad	5	590X210X130 590X280X210	2 in 1 5 in 1	1200 3000	11 26
TO-247-2L	533.5X46X7.7	30	20	600	560 X 196 X 52	1 Bubble pad	5	590X210X130 590X280X210	2 in 1 5 in 1	1200 3000	11 26
TO-247-4L PLUS	533.5X46X7.7	30	20	600	560 X 196 X 52	1 Bubble pad	5	590X210X130 590X280X210	2 in 1 5 in 1	1200 3000	11 26

Table 3. Existing packing method of discrete power devices based on TO-247-3L, TO-247-4L, TO-247-2L, TO-247-4L PLUS Packages



1 Bubble Pad per Inner Box



2 in 1 Outer Box



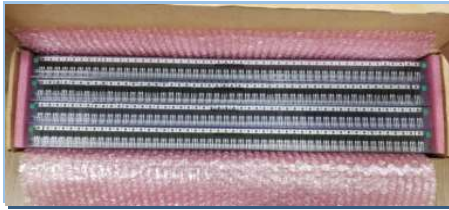
5 in 1 Outer Box

Fig. 1 Existing Packing Method of TO-247 based Discrete Power

#### Improved Packing Method:

Package	Tube		Inner Box					Outer Box			
	Tube Dimension (mm)	Qty. per Tube	No. of Tubes	Total Qty.	Inner Box Dimension (mm)	Filler/ Cushion	Gross Weight (kg)	Dimension (mm)	No. of Inner Boxes	Total Qty.	Gross Weight (kg)
TO-247-4L	533.5X46X7.7	30	15	450	570 X 155 X 53	2 Bubble pad + 2 sponge	4	590X165X130 590X330X130	2 in 1 4 in 1	900 1800	9 ~17
TO-247-3L	533.5X46X7.7	30	15	450	570 X 155 X 53	2 Bubble pad + 2 sponge	4	590X165X130 590X330X130	2 in 1 4 in 1	900 1800	9 ~17
TO-247-2L	533.5X46X7.7	30	15	450	570 X 155 X 53	2 Bubble pad + 2 sponge	4	590X165X130 590X330X130	2 in 1 4 in 1	900 1800	9 ~17
TO-247-4L PLUS	533.5X46X7.7	30	15	450	570 X 155 X 53	2 Bubble pad + 2 sponge	4	590X165X130 590X330X130	2 in 1 4 in 1	900 1800	9 ~17

Table 4. Improved packing method of discrete power devices based on TO-247-3L, TO-247-4L, TO-247-2L, TO-247-4L PLUS Packages



**2 Bubble Pad + 2 Sponge  
per Inner Box**



**2 in 1 Outer Box**



**4 in 1 Outer Box**

*Fig. 2 Improved Packing Method of TO-247 based Discrete Power Devices*

**Comparison of SPQ and MOQ between new and existing packing methods:**

Package	SPQ		MOQ	
	Existing	Improved	Existing	Improved
<b>TO-247-4L</b>	600	450	600	450
<b>TO-247-3L</b>	600	450	600	450
<b>TO-247-2L</b>	600	450	600	450
<b>TO-247-4L PLUS</b>	600	450	600	450

*Table 5. Comparison of SPQ and MOQ of existing and improved packing method of discrete power devices based on TO-247-3L, TO-247-4L, TO-247-2L, TO-247-4L PLUS Packages*

**Discrete power devices based on TO-220-2L (Standard), TO-220-F2 (Fullpak) and TO-220-ISO (Isolated) packages:**

**Existing Packing Method:**

Package	Tube		Inner Box					Outer Box			
	Tube Dimension (mm)	Qty. per Tube	No. of Tubes	Total Qty.	Inner Box Dimension (mm)	Filler/ Cushion	Gross Weight (kg)	Dimension (mm)	No. of Inner Boxes	Total Qty.	Gross Weight (kg)
TO-220-2L	534.5X33X7	50	20	1000	560X196X52	1 Bubble pad	3	590X210X130 590X280X210	2 in 1 5 in 1	2000 5000	7 16
TO-220-F2	550X350X8.5	50	20	1000	575 X 155 X 55	1 Bubble pad	2.4	600X170X120 600X290X170	2 in 1 5 in 1	2000 5000	5.8 13
TO-220-ISO	534.5X33X7	50	20	1000	560X196X52	1 Bubble pad	3	590X210X130 590X280X210	2 in 1 5 in 1	2000 5000	7 16

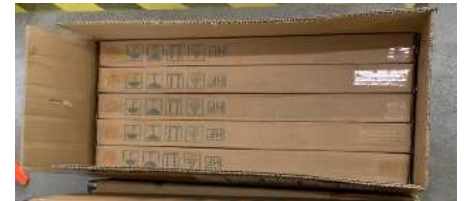
Table 6. Existing packing method of discrete power devices based on TO-220-2L (Standard), TO-220-F2 (Fullpak) and TO-220-ISO (Isolated) Packages



**1 Bubble Pad per Inner Box**



**2 in 1 Outer Box**



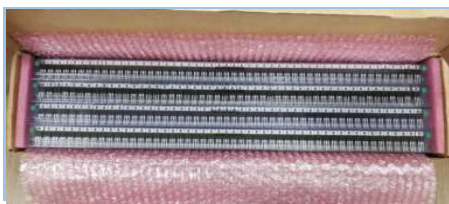
**5 in 1 Outer Box**

Fig. 3 Existing Packing Method of TO-220 based Discrete Power Devices

**Improved Packing Method:**

Package	Tube		Inner Box					Outer Box			
	Tube Dimension (mm)	Qty. per Tube	No. of Tubes	Total Qty.	Inner Box Dimension (mm)	Filler/ Cushion	Gross Weight (kg)	Dimension (mm)	No. of Inner Boxes	Total Qty.	Gross Weight (kg)
TO-220-2L	534.5X33X7	50	20	1000	570 X 155 X 53	2 Bubble pad + 2 sponge	3	590X165X130 590X330X130	2 in 1 4 in 1	2000 4000	7 13
TO-220-F2	550X350X8.5	50	20	1000	570 X 155 X 53	Unchanged	2.4	590X165X130 590X330X130	2 in 1 4 in 1	2000 4000	5.8 11
TO-220-ISO	534.5X33X7	50	20	1000	570 X 155 X 53	2 Bubble pad + 2 sponge	3	590X165X130 590X330X130	2 in 1 4 in 1	2000 4000	7 13

Table 7. Improved packing method of discrete power devices based on TO-220-2L (Standard), TO-220-F2 (Fullpak) and TO-220-ISO (Isolated) Packages



**2 Bubble Pad + 2 Sponge per inner box**



**2 in 1 Outer Box**



**4 in 1 Outer Box**

Fig. 4 Improved Packing Method of TO-220 based Discrete Power Devices

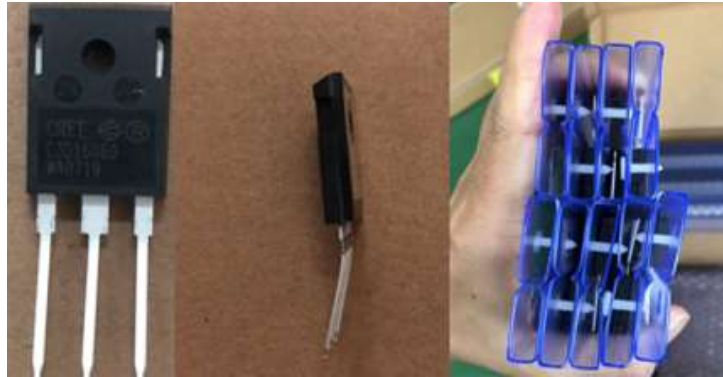
**Comparison of SPQ and MOQ between new and existing packing methods:**

Package	SPQ		MOQ	
	Existing	Improved	Existing	Improved
TO-220-2L	1000	1000	1000	1000
TO-220-F2	1000	1000	1000	1000
TO-220-ISO	1000	1000	1000	1000

*Table 8. Comparison of SPQ and MOQ of existing and improved packing methods of discrete power devices based on TO-220-2L (Standard), TO-220-F2 (Fullpak) and TO-220-ISO (Isolated) Packages*

**Reason for the Change**

The key reason of implementing the new packing method is to avoid the bending of leads (as shown in Fig. 5) that occurs during packing and shipping process.



*Fig. 5 Phenomena of lead bending*

**Change Impact on Form, Fit, Function, or Reliability**

The improved packing method will not change the form, fit, function or the reliability of discrete through-hole power devices (MOSFETs and Schottky diodes) (shown in Table 1. And Table. 2).



## Verification of New Packing Method:

The new packing method has been verified by performing multiple qualification tests on it. The results of these qualification tests have been shown in Table 9.

Qual. Item	Criteria	Status/Results
<b>Dimension check</b>	Follow drawing	Pass
<b>ESD check</b>	Follow drawing	Pass
<b>Inner box burst strength</b>	≥8Kgf/cm <sup>2</sup>	Pass
<b>Outer box burst strength</b>	≥19Kgf/cm <sup>2</sup>	Pass
<b>Fit check</b>	No gap	Pass
<b>Drop test with TO—247 mechanical sample</b>	ISTA-1A No bent lead & other visual defects	Pass

Table 9. Qualification test results of new packing method

## Key Dates

Table 10 provides estimated dates for Key PCN Milestones based on information available at the date the PCN was issued. Any updates to these dates can be provided by the Cree contact listed in Table 10.

<b>Proposed First Ship Date (TO-247 Discrete Devices)</b>	30 Days from PCN Issue Date
<b>Proposed First Ship Date (TO-220 Discrete Devices)</b>	60 Days from PCN Issue Date
<b>Last Date of Unchanged Product (TO-247 Discrete Devices)</b>	April 18th 2020
<b>Last Date of Unchanged Product (TO-220 Discrete Devices)</b>	May 29th 2020

Table 10. Key PCN Estimated Dates

## Cree Contact Information

If you have any questions regarding this Major PCN please contact:

<b>Cree Contact:</b>	<b>Adil Salman</b>
<b>Cree Contact E-Mail:</b>	<a href="mailto:asalman@cree.com">asalman@cree.com</a>
<b>Address:</b>	4600 Silicon Drive Durham, NC 27703 USA

Table 11. PCN Contact