

CDMS24780-170

**SILICON CARBIDE  
N-CHANNEL MOSFET**



**TO-247 CASE**



[www.centrasemi.com](http://www.centrasemi.com)

**DESCRIPTION:**

The CENTRAL SEMICONDUCTOR CDMS24780-170 is an N-channel silicon carbide MOSFET designed for high speed switching and fast reverse recovery applications.

**MARKING: CDMS247  
80-170**

**MAXIMUM RATINGS:** ( $T_J=25^\circ\text{C}$ )

Drain-Source Voltage  
Gate-Source Voltage  
Continuous Drain Current  
Pulsed Drain Current  
Operating and Storage Junction Temperature  
Power Dissipation

**SYMBOL**

$V_{DS}$  1700  
 $V_{GS}$  20  
 $I_D$  18  
 $I_{DM}$  20  
 $T_J, T_{stg}$  -55 to +175  
 $P_D$  28

**UNITS**

V  
V  
A  
A  
 $^\circ\text{C}$   
W

**ELECTRICAL CHARACTERISTICS:** ( $T_J=25^\circ\text{C}$ )

| SYMBOL       | TEST CONDITIONS                                         | MIN | TYP  | MAX | UNITS         |
|--------------|---------------------------------------------------------|-----|------|-----|---------------|
| $I_{DSS}$    | $V_{DS}=1200\text{V}, V_{GS}=0\text{V}$                 |     | 45   |     | nA            |
| $I_{GSS}$    | $V_{GS}=15\text{V}$                                     |     | 30   |     | pA            |
| $r_{DS(ON)}$ | $V_{GS}=15\text{V}, I_D=10\text{A}$                     |     | 80   |     | m $\Omega$    |
| $G_m$        | $V_{DS}=10\text{V}, I_D=10\text{A}$                     |     | 4.5  |     | S             |
| $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=10\text{mA}$                        |     | 2.6  |     | V             |
| $R_G$        | $f=1\text{MHz}$                                         |     | 14   |     | $\Omega$      |
| $C_{iss}$    | $V_{DS}=1000\text{V}, V_{GS}=0, f=1.0\text{MHz}$        |     | 0.85 |     | nF            |
| $C_{oss}$    | $V_{DS}=1000\text{V}, V_{GS}=0, f=1.0\text{MHz}$        |     | 40   |     | pF            |
| $C_{rss}$    | $V_{DS}=1000\text{V}, V_{GS}=0, f=1.0\text{MHz}$        |     | 5    |     | pF            |
| $E_{oss}$    | $V_{DS}=800\text{V}, V_{GS}=15\text{V}, I_D=20\text{A}$ |     | 35   |     | $\mu\text{J}$ |
| $E_{on}$     | $V_{DS}=800\text{V}, V_{GS}=15\text{V}, I_D=20\text{A}$ |     | 650  |     | $\mu\text{J}$ |
| $E_{off}$    | $V_{DS}=800\text{V}, V_{GS}=15\text{V}, I_D=20\text{A}$ |     | 150  |     | $\mu\text{J}$ |
| $t_r$        | $V_{DS}=800\text{V}, V_{GS}=15\text{V}, I_D=20\text{A}$ |     | 17   |     | ns            |
| $t_f$        | $V_{DS}=800\text{V}, V_{GS}=15\text{V}, I_D=20\text{A}$ |     | 22   |     | ns            |
| $t_{d(on)}$  | $V_{DS}=800\text{V}, V_{GS}=15\text{V}, I_D=20\text{A}$ |     | 80   |     | ns            |
| $t_{d(off)}$ | $V_{DS}=800\text{V}, V_{GS}=15\text{V}, I_D=20\text{A}$ |     | 36   |     | ns            |
| $V_{SD}$     | $V_{GS}=0\text{V}, I_S=5.0\text{A}$                     |     |      | 5.0 | V             |

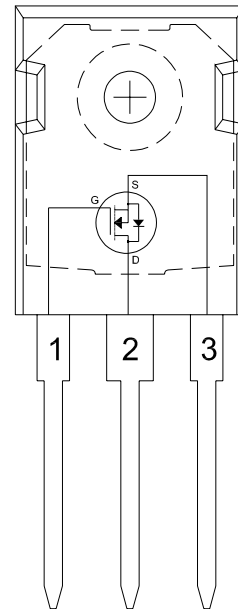
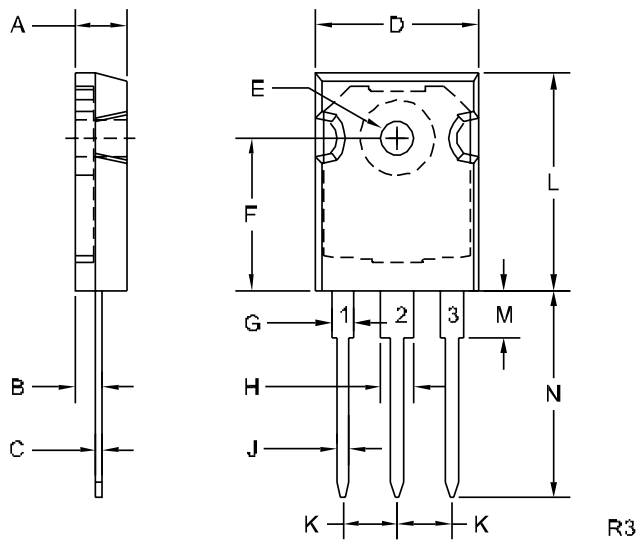
**CDMS24780-170**

**SILICON CARBIDE**

**N-CHANNEL MOSFET**



**TO-247 CASE - MECHANICAL OUTLINE**



**LEAD CODE:**

- 1) Gate
- 2) Drain
- 3) Source

**MARKING:**

**CDMS247**

**80-170**

| SYMBOL  | DIMENSIONS |       |             |       |
|---------|------------|-------|-------------|-------|
|         | INCHES     |       | MILLIMETERS |       |
|         | MIN        | MAX   | MIN         | MAX   |
| A       | 0.184      | 0.211 | 4.68        | 5.36  |
| B       | 0.087      | 0.110 | 2.20        | 2.80  |
| C       | 0.019      | 0.028 | 0.48        | 0.70  |
| D       | 0.606      | 0.638 | 15.38       | 16.20 |
| E (DIA) | 0.128      | 0.144 | 3.25        | 3.65  |
| F       | 0.583      | 0.607 | 14.81       | 15.42 |
| G       | 0.072      | 0.097 | 1.82        | 2.46  |
| H       | 0.115      | 0.127 | 2.92        | 3.23  |
| J       | 0.035      | 0.060 | 0.89        | 1.53  |
| K       | 0.207      | 0.223 | 5.26        | 5.66  |
| L       | 0.812      | 0.881 | 20.63       | 22.38 |
| M       | 0.145      | 0.177 | 3.68        | 4.50  |
| N       | 0.728      | 0.846 | 18.50       | 21.50 |

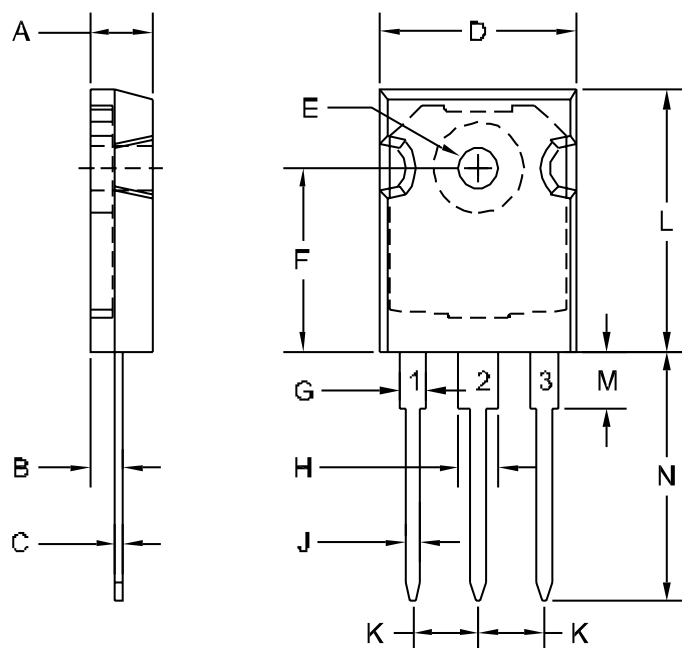
TO-247 (REV: R3)

# Package Details

## TO-247 Case



### Mechanical Drawing



| SYMBOL  | DIMENSIONS |       |             |       |
|---------|------------|-------|-------------|-------|
|         | INCHES     |       | MILLIMETERS |       |
|         | MIN        | MAX   | MIN         | MAX   |
| A       | 0.184      | 0.211 | 4.68        | 5.36  |
| B       | 0.087      | 0.110 | 2.20        | 2.80  |
| C       | 0.019      | 0.028 | 0.48        | 0.70  |
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| E (DIA) | 0.128      | 0.144 | 3.25        | 3.65  |
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| J       | 0.035      | 0.060 | 0.89        | 1.53  |
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| L       | 0.812      | 0.881 | 20.63       | 22.38 |
| M       | 0.145      | 0.177 | 3.68        | 4.50  |
| N       | 0.728      | 0.846 | 18.50       | 21.50 |

TO-247 (REV: R3)

R3

#### Lead Code:

Reference individual device datasheet.

### Packing Options

#### Bulk:

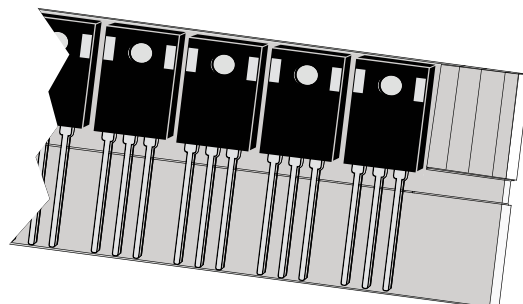
White corrugated box with static shielded bags

**Bulk Packing Quantity:** 100

#### Sleeve:

Antistatic coated plastic sleeve (surface resistivity of  $>10^9$  and  $<10^{13}$  ohms per square)

**Sleeve Packing Quantity:** 30



TO-247 Antistatic Sleeve

R1 (22-February 2023)

# Material Composition Specification

## TO-247 Case



Device average mass ..... 6.175 g  
 Fluctuation margin ..... +/-10%

| Component           | Material                | Material |         | Substance    | CAS #      | Substance |          |         |
|---------------------|-------------------------|----------|---------|--------------|------------|-----------|----------|---------|
|                     |                         | % wt     | mg      |              |            | % wt      | mg       | ppm     |
| active device       | doped Si                | 0.11%    | 7.100   | Si           | 7440-21-3  | 0.11%     | 7.100    | 1,150   |
| die attach          | high temperature solder | 0.23%    | 14.320  | Pb           | 7439-92-1  | 0.21%     | 13.25    | 2,145   |
|                     |                         |          |         | Ag           | 7440-22-4  | 0.01%     | 0.36     | 58      |
|                     |                         |          |         | Sn           | 7440-31-5  | 0.01%     | 0.716    | 116     |
| bond wire           | Aluminum                | 0.23%    | 14.220  | Al           | 7440-57-5  | 0.23%     | 14.220   | 2,303   |
| leadframe           | Cu alloy                | 64.79%   | 4000.65 | Cu           | 7440-50-8  | 64.66%    | 3993.050 | 646,648 |
|                     |                         |          |         | Fe           | 7439-89-6  | 0.10%     | 6.000    | 972     |
|                     |                         |          |         | P            | 7723-14-0  | 0.03%     | 1.600    | 259     |
| encapsulation       | EMC                     | 33.59%   | 2074.21 | silica       | 7631-86-9  | 26.15%    | 1614.50  | 261,457 |
|                     |                         |          |         | epoxy resin  | 29690-82-2 | 3.38%     | 208.85   | 33,821  |
|                     |                         |          |         | phenol resin | 9003-35-4  | 3.05%     | 188.385  | 30,508  |
|                     |                         |          |         | carbon black | 1333-86-4  | 0.10%     | 5.887    | 953     |
|                     |                         |          |         | Sb2O3        | 1309-64-4  | 0.73%     | 45.359   | 7,346   |
|                     |                         |          |         | TBBA         | 79-94-7    | 0.18%     | 11.234   | 1,819   |
| leadframe plating * | tin lead process        | 1.04%    | 64.50   | Sn           | 7440-31-5  | 0.83%     | 51.500   | 8,340   |
|                     |                         |          |         | Pb           | 7439-92-1  | 0.21%     | 13.000   | 2,105   |
|                     | matte tin               | 5.18%    | 64.50   | Sn           | 7440-31-5  | 1.04%     | 64.50    | 10,445  |

\*For Lead Free plating, add suffix "PB FREE" to part number.  
 For Tin/Lead plating, add suffix "TIN/LEAD" to part number.  
 No suffix designation allows for the supply of either lead-free or tin/lead plated product depending on availability.

Disclaimer  
 The information provided in this Material Composition data sheet is, to the best of our knowledge, correct. However, there is no guarantee to completeness or accuracy, as some information is derived from data sources outside the company.

# Material Composition Specification

## TO-247 Case



Device average mass ..... 6.240 g  
 Fluctuation margin ..... +/-10%

| Component         | Material                | Material |         | Substance                       | CAS #      | Substance |         |         |
|-------------------|-------------------------|----------|---------|---------------------------------|------------|-----------|---------|---------|
|                   |                         | % wt     | mg      |                                 |            | % wt      | mg      | ppm     |
| active device     | doped Si                | 0.31%    | 19.20   | Si                              | 7440-21-3  | 0.31%     | 19.20   | 3,077   |
| die attach        | high temperature solder | 10.35%   | 646.02  | Pb                              | 7439-92-1  | 9.11%     | 568.50  | 91,106  |
|                   |                         |          |         | Ag                              | 7440-22-4  | 1.04%     | 64.60   | 10,353  |
|                   |                         |          |         | Sn                              | 7440-31-5  | 0.21%     | 12.92   | 2,071   |
| bond wire         | Aluminum                | 0.22%    | 13.85   | Al                              | 7440-57-5  | 0.22%     | 13.85   | 2,220   |
| leadframe         | Cu alloy                | 54.14%   | 3378.37 | Cu                              | 7440-50-8  | 54.06%    | 3373.30 | 540,593 |
|                   |                         |          |         | Fe                              | 7439-89-6  | 0.08%     | 5.07    | 813     |
| encapsulation*    | EMC GREEN               | 34.56%   | 2156.76 | silica                          | 7631-86-9  | 22.81%    | 1423.46 | 228,119 |
|                   |                         |          |         | Si-oxide Quartz                 | 14808-60-7 | 6.91%     | 431.34  | 69,125  |
|                   |                         |          |         | Phenol-formaldehyde polymer     | 9003-35-4  | 3.46%     | 215.68  | 34,564  |
|                   |                         |          |         | 3-Trimethoxysilylpropane1-thiol | 4420-74-0  | 0.35%     | 21.57   | 3,457   |
|                   |                         |          |         | Triphenylphosphine              | 39319-11-4 | 0.35%     | 21.57   | 3,457   |
|                   |                         |          |         | Ethene, homopolymer             | 9002-88-4  | 0.35%     | 21.57   | 3,457   |
|                   |                         |          |         | carbon black                    | 1333-86-4  | 0.35%     | 21.57   | 3,457   |
| leadframe plating | matte tin               | 0.41%    | 25.80   | Sn                              | 7440-31-5  | 0.41%     | 25.80   | 4,135   |

\*EMC GREEN molding compound is Halogen-Free.

### Disclaimer

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R1 (12-January 2024)

## OUTSTANDING SUPPORT AND SUPERIOR SERVICES



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### PRODUCT SUPPORT

Central's operations team provides the highest level of support to insure product is delivered on-time.

- Supply management (Customer portals)
- Inventory bonding
- Consolidated shipping options
- Custom bar coding for shipments
- Custom product packing

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### DESIGNER SUPPORT/SERVICES

Central's applications engineering team is ready to discuss your design challenges. Just ask.

- Free quick ship samples (2<sup>nd</sup> day air)
- Online technical data and parametric search
- SPICE models
- Custom electrical curves
- Environmental regulation compliance
- Customer specific screening
- Up-screening capabilities
- Special wafer diffusions
- PbSn plating options
- Package details
- Application notes
- Application and design sample kits
- Custom product and package development

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### REQUESTING PRODUCT PLATING

1. If requesting Tin/Lead plated devices, add the suffix "TIN/LEAD" to the part number when ordering (example: 2N2222A TIN/LEAD).
2. If requesting Lead (Pb) Free plated devices, add the suffix "PBFREE" to the part number when ordering (example: 2N2222A PBFREE).

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### CONTACT US

#### Corporate Headquarters & Customer Support Team

Central Semiconductor Corp.  
145 Adams Avenue  
Hauppauge, NY 11788 USA  
Main Tel: (631) 435-1110  
Main Fax: (631) 435-1824  
Support Team Fax: (631) 435-3388  
[www.centrasemi.com](http://www.centrasemi.com)

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