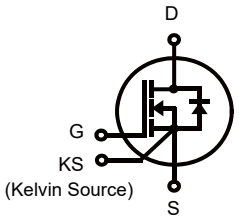
# DACMI050N120BZK2

## SiC MOSFET Power Module

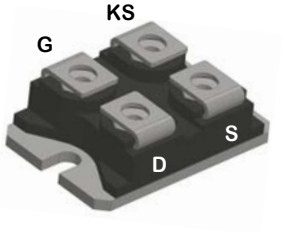
Preliminary

## Features

- $V_{DSS}$ = 1200V
- $R_{DS(ON)}$ typ. 35mΩ@ $V_{GS}$ = 18V
- High speed switching with low capacitances
- Easy to parallel and simple to drive
- Real Kelvin Source Connection
- Pb Free & RoHS Compliant
- Electrically Isolation base plate




**SOT-227**



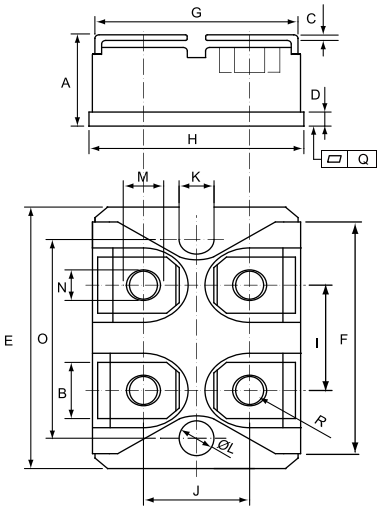

Dimensions in inches and (millimeters)

## Applications

- Solar Inverters
- UPS
- Motor Drive
- Induction heating
- Switch Mode Power Supplies
- Battery Chargers
- DC/DC Converters

### Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

| Parameter | | Symbol | Ratings | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 1200 | V |
| Gate-Source Voltage (dynamic) | | $V_{GS(max)}$ | -10/+23 | V |
| Gate-Source Voltage (static) | | $V_{GS(OP)}$ | -4/+18 | V |
| Drain Current-Continuous | @ $T_C$ =25°C<br>@ $T_C$ =100°C | $I_D$ | 67<br>50 | A |
| Drain Current-Pulsed | @ $T_C$ =25°C | $I_{DM}$ | 134 | A |
| Maximum Power Dissipation | | $P_D$ | 312 | W |
| Storage Temperature Range | | $T_{STG}$ | -40 to +125 | °C |
| Operating Junction Temperature Range | | $T_{VJ}$ | -40 to +175 | °C |
| Thermal Resistance, Junction-to-Case | | $R_{\theta JC}$ | 0.48 | °C/W |
| Isolation Voltage (A.C. 1 minute) between All Terminals and Baseplate | | $V_{iso}$ | 2500 | V |
| Mounting torque (M4 Screw) | To heatsink<br>To terminals | $M_d$ | 1.3<br>1.1 | N m |




| DIMENSIONS | | | | |
|---|---|---|---|---|
| | INCHES | | MM | |
| | MIN | MAX | MIN | MAX |
| A | 0.460 | 0.483 | 11.68 | 12.28 |
| B | 0.307 | 0.323 | 7.80 | 8.20 |
| C | 0.030 | 0.033 | 0.75 | 0.85 |
| D | 0.071 | 0.081 | 1.80 | 2.05 |
| E | 1.488 | 1.504 | 37.80 | 38.20 |
| F | 1.248 | 1.260 | 31.70 | 32.00 |
| G | 0.917 | 0.957 | 23.30 | 24.30 |
| H | 0.996 | 1.008 | 25.30 | 25.60 |
| I | 0.579 | 0.602 | 14.70 | 15.30 |
| J | 0.492 | 0.516 | 12.50 | 13.10 |
| K | 0.161 | 0.169 | 4.10 | 4.30 |
| L | 0.161 | 0.169 | 4.10 | 4.30 |
| M | 0.181 | 0.197 | 4.60 | 5.00 |
| N | 0.165 | 0.181 | 4.20 | 4.60 |
| O | 1.181 | 1.197 | 30.00 | 30.40 |
| Q | -0.002 | 0.004 | -0.05 | 0.10 |
| R | M4*8 | | | |

## Electrical Characteristics @ $T_{VJ}$ =25°C (unless otherwise specified)

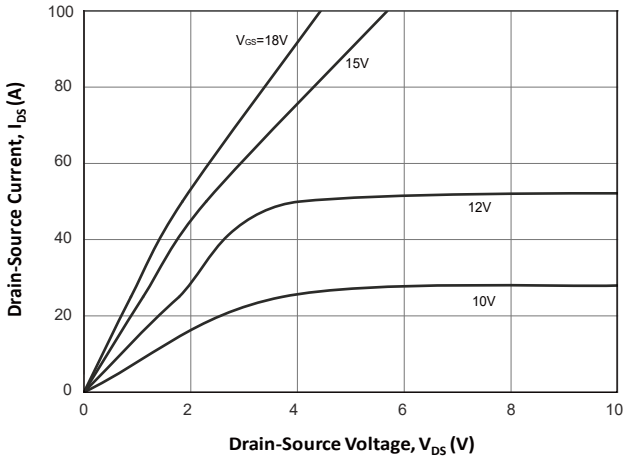
| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **OFF Characteristics** | | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V，$I_{DS}$=0.1mA | | 1200 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$=0V，$V_{DS}$=1200V | | - | - | 200 | uA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{GS}$=20V，$V_{DS}$=0V | | - | - | 500 | nA |
| **ON Characteristics** | | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$，$I_{DS}$=8mA | | 2.1 | 3.0 | 4.2 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}$=18V，$I_{DS}$= 25A | | - | 35 | 45.5 | mΩ |
| Gate Resistance | $R_{G(int)}$ | Internal gate resistor | $T_{VJ}$ =25°C | - | 11.46 | - | Ω |
| **Dynamic Characteristics** | | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=800V<br>$V_{GS}$=0V<br>$V_{AC}$=1V<br>Freq.=100KHz | | - | 2.23 | - | nF |
| Output Capacitance | $C_{oss}$ | | | - | 0.12 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | - | 0.017 | - | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=600V<br>$V_{GS}$=-4V/+18V<br>$I_{DS}$= 50A | | - | 123 | - | nC |
| Gate to Source Charge | $Q_{gs}$ | | | - | 67 | - | |
| Gate to Drain Charge | $Q_{gd}$ | | | - | 8.7 | - | |
| **Switching Characteristics** | | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 600V<br>$V_{GS}$ = -4V/+18V<br>$I_{DS}$=50A<br>$R_{G(on)}$ =2.2Ω<br>$R_{G(off)}$ =2.2Ω | $T_{VJ}$ =25°C | - | 42 | - | ns |
| | | | $T_{VJ}$ =150°C | - | 44 | - | |
| Rise Time | $t_r$ | | $T_{VJ}$ =25°C | - | 41 | - | |
| | | | $T_{VJ}$ =150°C | - | 50 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | $T_{VJ}$ =25°C | - | 84 | - | |
| | | | $T_{VJ}$ =150°C | - | 94 | - | |
| Fall Time | $t_f$ | | $T_{VJ}$ =25°C | - | 11 | - | |
| | | | $T_{VJ}$ =150°C | - | 14 | - | |
| Turn-On Switching Energy | $E_{on}$ | $V_{DD}$ = 600V<br>$V_{GS}$ = -4V/+18V<br>$I_{DS}$ =50A<br>$R_{G(on)}$ =2.2Ω<br>$R_{G(off)}$ =2.2Ω | $T_{VJ}$ =25°C | - | 0.69 | - | mJ |
| | | | $T_{VJ}$ =150°C | - | 0.83 | - | |
| Turn-Off Switching Energy | $E_{off}$ | | $T_{VJ}$ =25°C | - | 1.44 | - | |
| | | | $T_{VJ}$ =150°C | - | 1.5 | - | |
| **Body Diode Characteristics at $T_J$ = 25° C, unless otherwise specified** | | | | | | | |
| Continuous Diode Fwd Current | $I_{SDC}$ | $V_{GS}$= 0V | | - | 50 | - | A |
| Drain-Source Reverse Voltage | $V_{SD}$ | $I_{SD}$ = 40A , $V_{GS}$ = 0V | | - | 4.5 | - | V |
| MOSFET Forward Recovery Charge | $Q_{rr}$ | $V_{DD}$ = 600V<br>$I_{DS}$ =50A<br>$V_{GS}$= -4V/+18V<br>di/dt = 2000 A/μs | $T_{VJ}$ =25°C | - | 54 | - | nC |
| | | | $T_{VJ}$ =150°C | - | 342 | - | |
| MOSFET Peak Forward Recovery Current | Irrm | | $T_{VJ}$ =25°C | - | 8 | - | A |
| | | | $T_{VJ}$ =150°C | - | 20 | - | |
| MOSFET Reverse Recovery Time | $T_{rr}$ | | $T_{VJ}$ =25°C | - | 12 | - | ns |
| | | | $T_{VJ}$ =150°C | - | 29 | - | |

**Notes:**

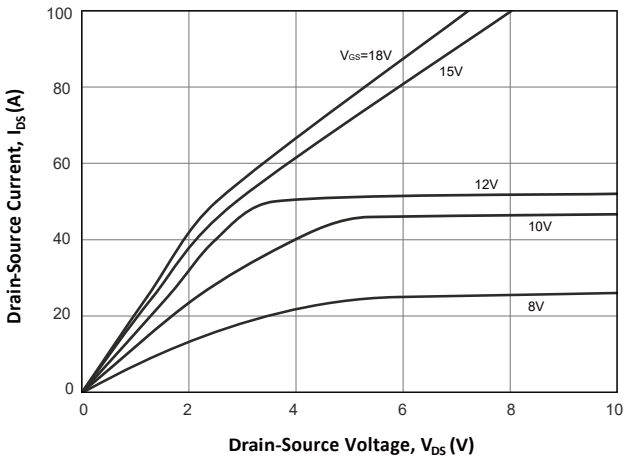
**1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle > 2%.**

## Typical Characteristics

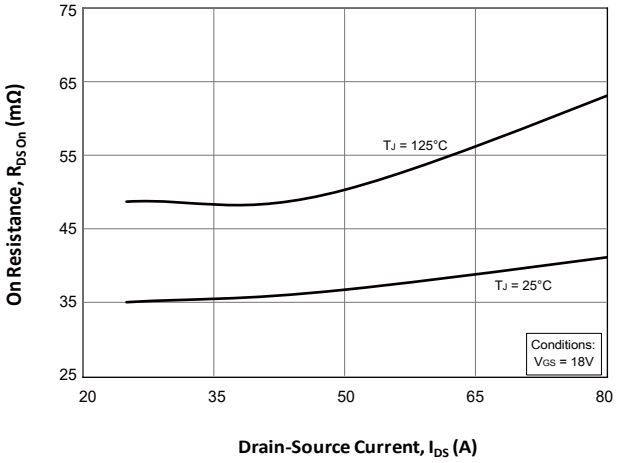
### Fig.1 Output Characteristics at $T_J$ = 25°C



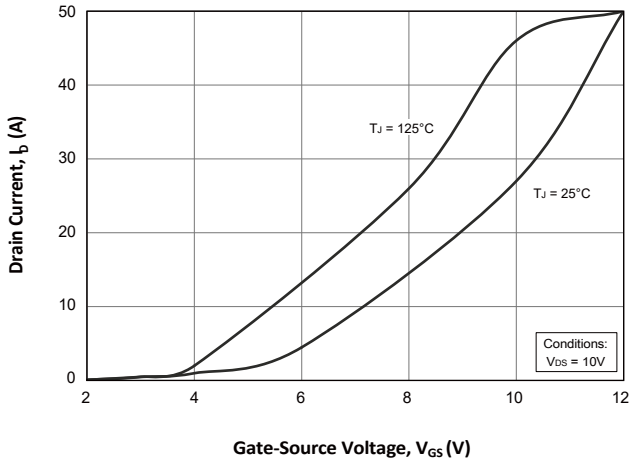

### Fig.2 Output Characteristics at $T_J$ =125°C



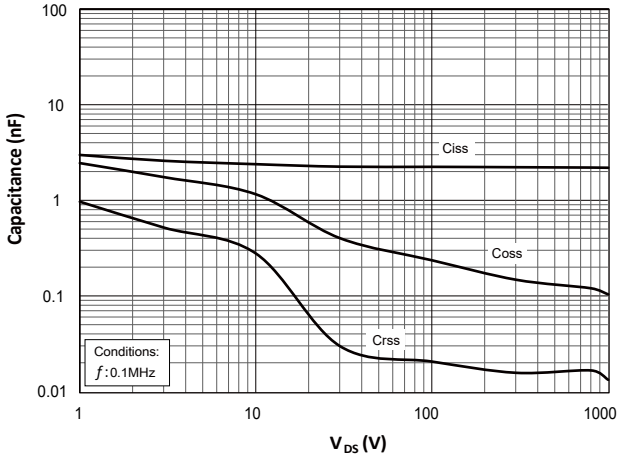

### Fig.3 Drain Source on Resistance



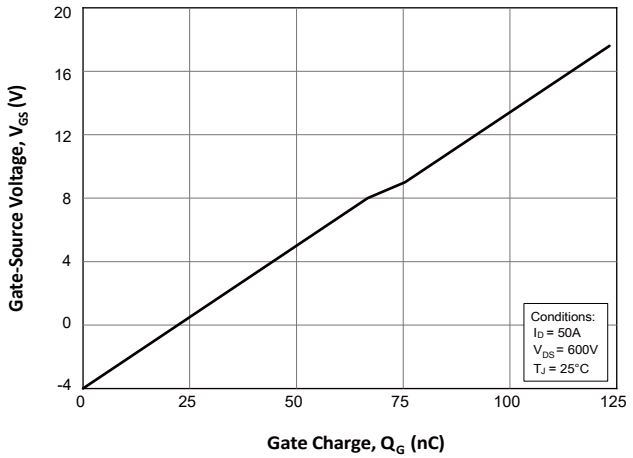

### Fig.4 Transfer Characteristics




### Fig.5 Capacitances vs. Drain-Source Voltage




### Fig.6 Gate Charge Characteristics



Typical Characteristics

**Fig.7 Switching losses vs $R_G$ change $T_J$=125°C**

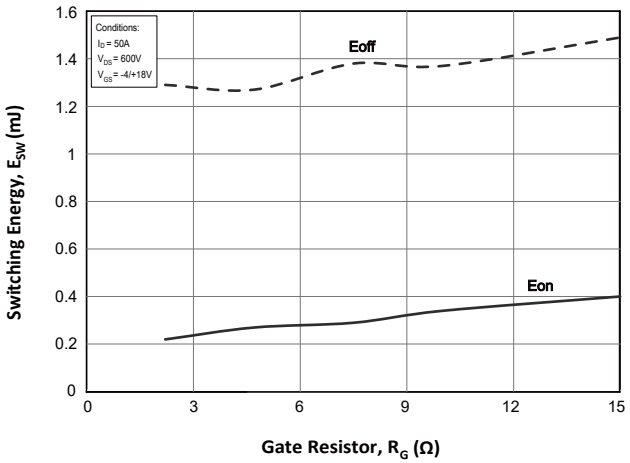



**Fig.8 Switching losses vs $R_G$ change $T_J$=150°C**

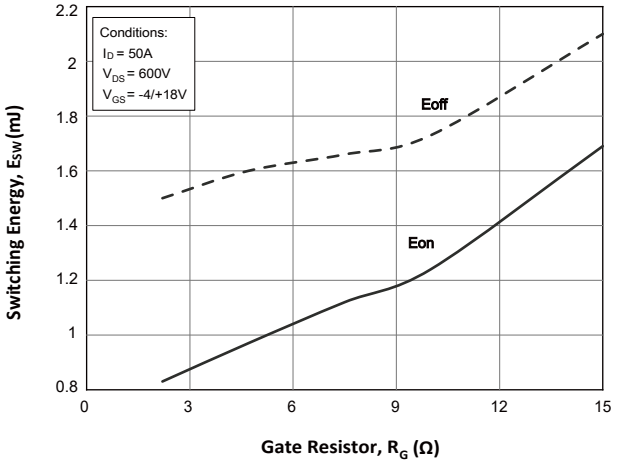



**Fig.9 Switching Timer vs $R_G$ Change $T_J$=125°C**

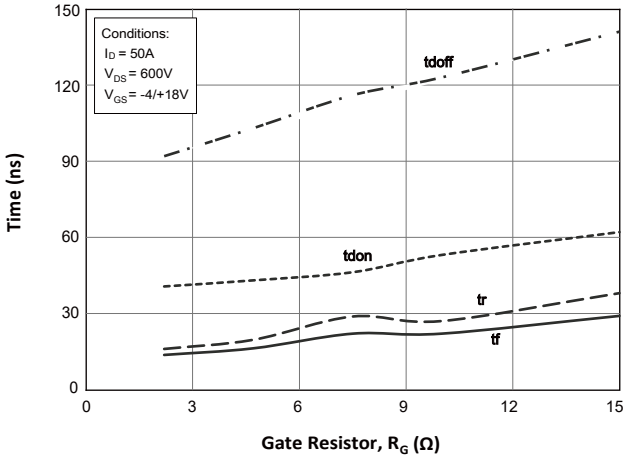



**Fig.10 Switching Timer vs $R_G$ Change $T_J$=150°C**

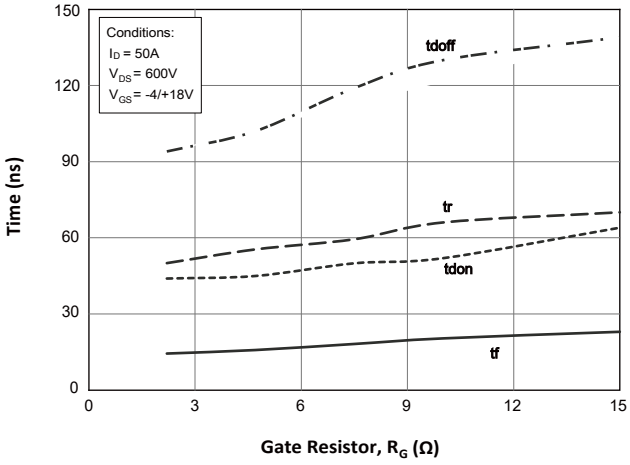



**Fig.11 Clamped Inductive Switching Energy vs. Drain Current $T_J$ =125°C**

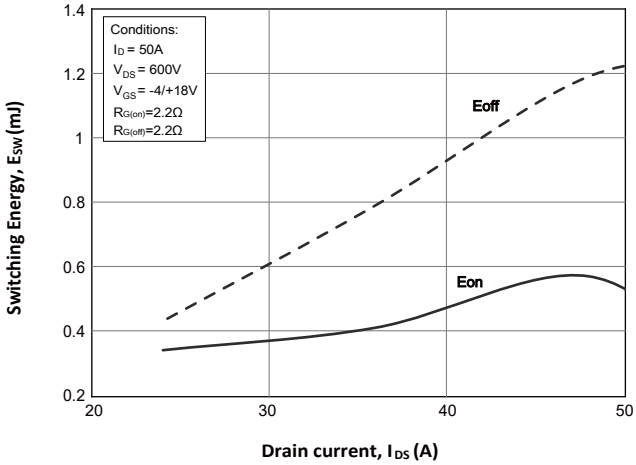
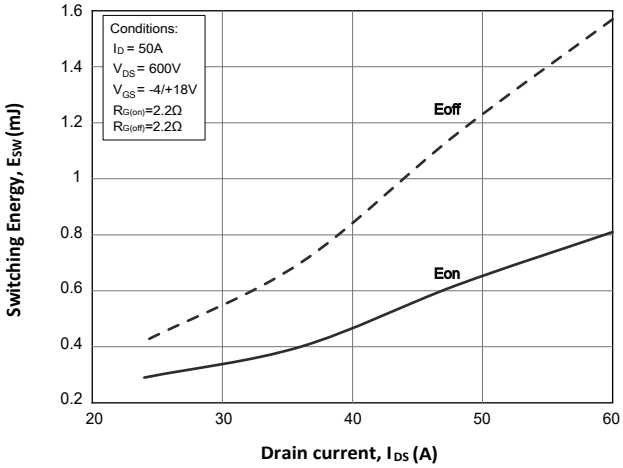



**Fig.12 Clamped Inductive Switching Energy vs. Drain Current $T_J$ =150°C**



Typical Characteristics

**Fig.13 Body Diode curves $T_J$ =25°C**

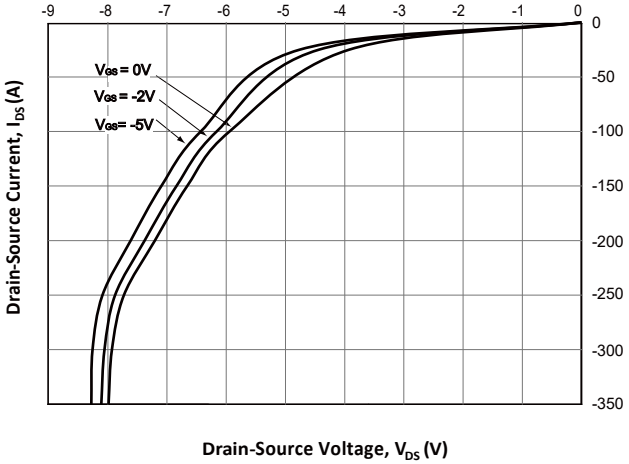



**Fig.14 Body Diode curves $T_J$ = 125°C**

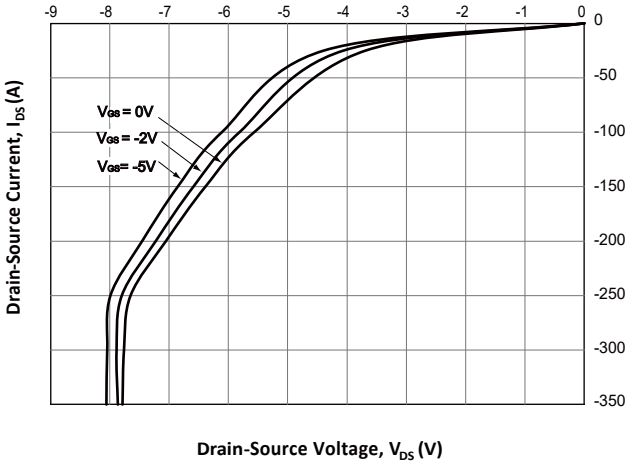



**Fig.15 Continuous Drain Current (MOSFET) vs. Case Temperature**

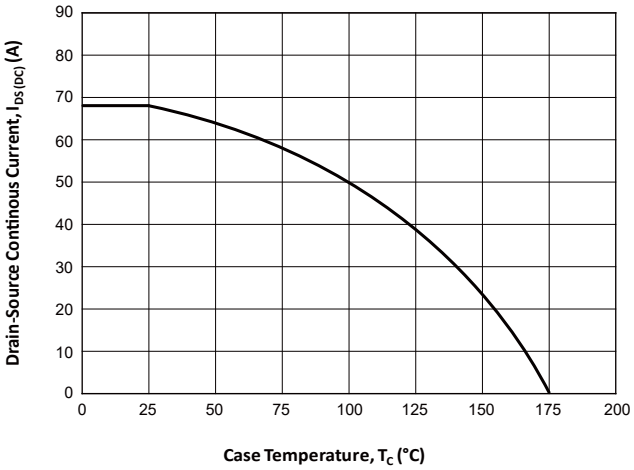
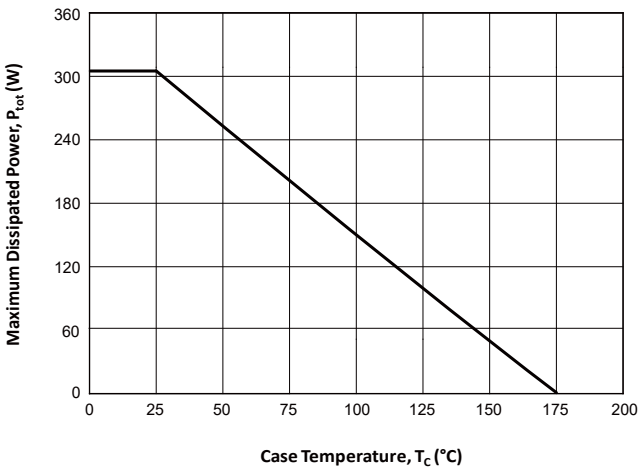



**Fig.16 Max. Power Dissipation (MOSFET) Derating vs. Case Temperature**



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