

CAS300M17BM2

1.7kV, 8.0 mΩ All-Silicon Carbide Half-Bridge Module

C2M MOSFET and Z-Rec™ Diode

| | |
|---------------------------------------------|----------------|
| V_{DS} | 1.7 kV |
| E_{sw, Total @ 300A, 150 °C} | 23.7 mJ |
| R_{DS(on)} | 8.0 mΩ |

Features

- Ultra Low Loss
- High-Frequency Operation
- Zero Reverse Recovery Current from Diode
- Zero Turn-off Tail Current from MOSFET
- Normally-off, Fail-safe Device Operation
- Ease of Paralleling
- Copper Baseplate and Aluminum Nitride Insulator

System Benefits

- Enables Compact and Lightweight Systems
- High Efficiency Operation
- Mitigates Over-voltage Protection
- Reduced Thermal Requirements
- Reduced System Cost

Applications

- HF Resonant Converters/Inverters
- Solar and Wind Inverters
- UPS and SMPS
- Motor Drive
- Traction

Package **62mm x 106mm x 30mm**



| Part Number | Package | Marking |
|--------------|--------------------|---------------------------|
| CAS300M17BM2 | Half-Bridge Module | CAS300M17BM2 1350S-037 |

Maximum Ratings ($T_c = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Value | Unit | Test Conditions | Notes |
|----------------|------------------------------------|-------------|------|---------------------------------------------------|---------|
| $V_{DS\max}$ | Drain - Source Voltage | 1.7 | kV | | |
| $V_{GS\max}$ | Gate - Source Voltage | -10/+25 | V | Absolute maximum values | |
| V_{GSop} | Gate - Source Voltage | -5/20 | V | Recommended operational values | |
| I_D | Continuous MOSFET Drain Current | 325 | A | $V_{GS} = 20\text{ V}, T_c = 25^\circ\text{C}$ | Fig. 26 |
| | | 225 | | $V_{GS} = 20\text{ V}, T_c = 90^\circ\text{C}$ | |
| $I_{D(pulse)}$ | Pulsed Drain Current | 900 | A | Pulse width tp limited by $T_{J(\max)}$ | |
| I_F | Continuous Diode Forward Current | 556 | A | $V_{GS} = -5\text{ V}, T_c = 25^\circ\text{C}$ | Fig. 27 |
| | | 353 | | $V_{GS} = -5\text{ V}, T_c = 90^\circ\text{C}$ | |
| $T_{J\max}$ | Junction Temperature | -40 to +150 | °C | | |
| T_c, T_{STG} | Case and Storage Temperature Range | -40 to +125 | °C | | |
| V_{isol} | Case Isolation Voltage | 4.5 | kV | AC, 50 Hz , 1 min | |
| L_{Stray} | Stray Inductance | 15 | nH | Measured between terminals 2 and 3 | |
| P_D | Power Dissipation | 1760 | W | $T_c = 25^\circ\text{C}, T_j = 150^\circ\text{C}$ | Fig. 25 |



Electrical Characteristics ($T_c = 25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions | Note |
|-----------------------------|----------------------------------|------|------|------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| $V_{(\text{BR})\text{DSS}}$ | Drain - Source Breakdown Voltage | 1.7 | | | kV | $V_{GS} = 0 \text{ V}, I_D = 1 \text{ mA}$ | |
| $V_{GS(\text{th})}$ | Gate Threshold Voltage | 1.8 | 2.3 | | V | $V_{DS} = 10 \text{ V}, I_D = 15 \text{ mA}$ | Fig. 7 |
| I_{DSS} | Zero Gate Voltage Drain Current | | 500 | 1000 | μA | $V_{DS} = 1.7 \text{ kV}, V_{GS} = 0 \text{ V}$ | |
| | | | 1500 | 3000 | μA | $V_{DS} = 1.7 \text{ kV}, V_{GS} = 0 \text{ V}, T_J = 150^\circ\text{C}$ | |
| I_{GSS} | Gate-Source Leakage Current | | 1 | 600 | nA | $V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$ | |
| $R_{\text{DS(on)}}$ | On State Resistance | | 8.0 | 10 | $\text{m}\Omega$ | $V_{GS} = 20 \text{ V}, I_{DS} = 225 \text{ A}$ | Fig. 4, 5, 6 |
| | | | 16.2 | 20 | | $V_{GS} = 20 \text{ V}, I_{DS} = 225 \text{ A}, T_J = 150^\circ\text{C}$ | |
| g_{fs} | Transconductance | | 95 | | S | $V_{DS} = 20 \text{ V}, I_{DS} = 225 \text{ A}$ | Fig. 8 |
| | | | 82 | | | $V_{DS} = 20 \text{ V}, I_D = 225 \text{ A}, T_J = 150^\circ\text{C}$ | |
| C_{iss} | Input Capacitance | | 20 | | nF | $V_{DS} = 1 \text{ kV}, f = 200 \text{ kHz}, V_{AC} = 25 \text{ mV}$ | Fig. 16, 17 |
| C_{oss} | Output Capacitance | | 2.5 | | | | |
| C_{rss} | Reverse Transfer Capacitance | | 0.08 | | | | |
| E_{on} | Turn-On Switching Energy | | 13.0 | | mJ | $V_{DD} = 900 \text{ V}, V_{GS} = -5\text{V}/+20\text{V}$ $I_D = 300 \text{ A}, R_{G(\text{ext})} = 2.5 \Omega$ Load = 77 μH , $T_J = 150^\circ\text{C}$ Note: IEC 60747-8-4 Definitions | Fig. 19 |
| E_{off} | Turn-Off Switching Energy | | 10.0 | | mJ | | |
| $R_{G(\text{int})}$ | Internal Gate Resistance | | 3.7 | | Ω | $f = 1 \text{ MHz}, V_{AC} = 25 \text{ mV}$ | |
| Q_{GS} | Gate-Source Charge | | 273 | | nC | $V_{DD} = 900 \text{ V}, V_{GS} = -5\text{V}/+20\text{V},$ $I_D = 300 \text{ A}$, Per JEDEC24 pg 27 | Fig. 15 |
| Q_{GD} | Gate-Drain Charge | | 324 | | | | |
| Q_G | Total Gate Charge | | 1076 | | | | |
| $t_{d(on)}$ | Turn-on delay time | | 105 | | ns | $V_{DD} = 900 \text{ V}, V_{GS} = -5\text{V}/+20\text{V},$ $I_D = 300 \text{ A}, R_{G(\text{ext})} = 2.5 \Omega$, Timing relative to V_{DS} Note: IEC 60747-8-4, pg 83 Inductive load | Fig. 24 |
| t_r | Rise Time | | 72 | | ns | | |
| $t_{d(off)}$ | Turn-off delay time | | 211 | | ns | | |
| t_f | Fall Time | | 56 | | ns | | |
| V_{SD} | Diode Forward Voltage | | 1.7 | 2.0 | V | $I_F = 300 \text{ A}, V_{GS} = 0$ | Fig. 10 |
| | | | 2.2 | 2.5 | | $I_F = 300 \text{ A}, V_{GS} = 0, T_J = 150^\circ\text{C}$ | Fig. 11 |
| Q_C | Total Capacitive Charge | | 4.4 | | μC | $I_{SD} = 300 \text{ A}, V_{DS} = 900 \text{ V}, T_J = 25^\circ\text{C}, di_{SD}/dt = 9 \text{ kA}/\mu\text{s}, V_{GS} = -5 \text{ V}$ | |

Thermal Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions | Note |
|--------------------|-----------------------------------------------|------|-------|-------|---------------------------|-----------------|---------|
| R_{thJCM} | Thermal Resistance Juction-to-Case for MOSFET | | 0.067 | 0.071 | $^\circ\text{C}/\text{W}$ | | Fig. 27 |
| R_{thJCD} | Thermal Resistance Juction-to-Case for Diode | | 0.060 | 0.065 | | | Fig. 28 |

Additional Module Data

| Symbol | Parameter | Max. | Unit | Test Condition |
|--------|--------------------|------|------|---------------------------|
| W | Weight | 300 | g | |
| M | Mounting Torque | 5 | Nm | To heatsink and terminals |
| | Clearance Distance | 12 | mm | Terminal to terminal |
| | Creepage Distance | 30 | mm | Terminal to terminal |
| | | 40 | mm | Terminal to baseplate |

Typical Performance

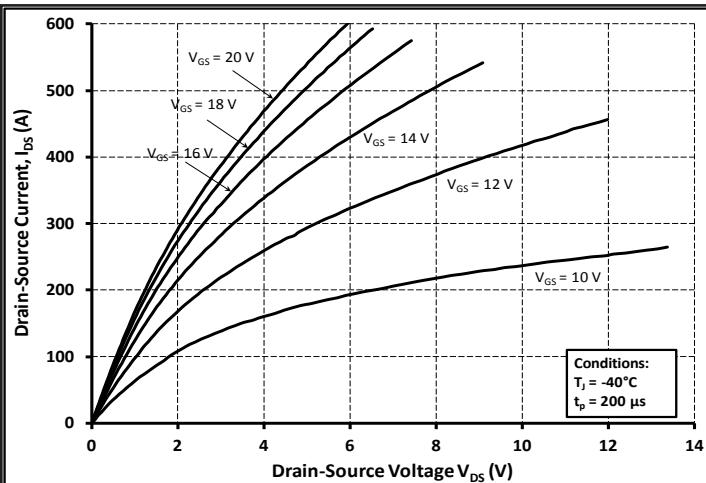


Figure 1. Output Characteristics $T_j = -40^\circ\text{C}$

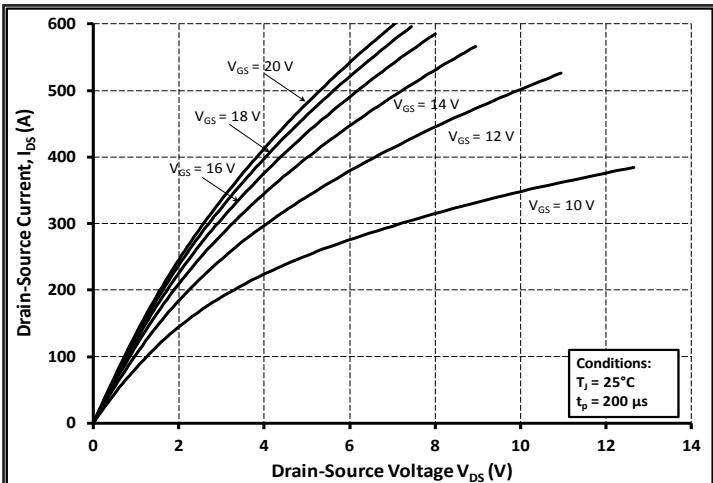


Figure 2. Output Characteristics $T_j = 25^\circ\text{C}$

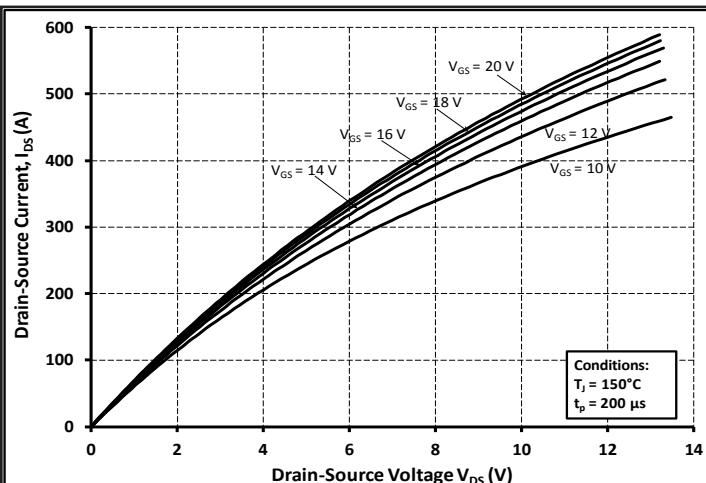


Figure 3. Output Characteristics $T_j = 150^\circ\text{C}$

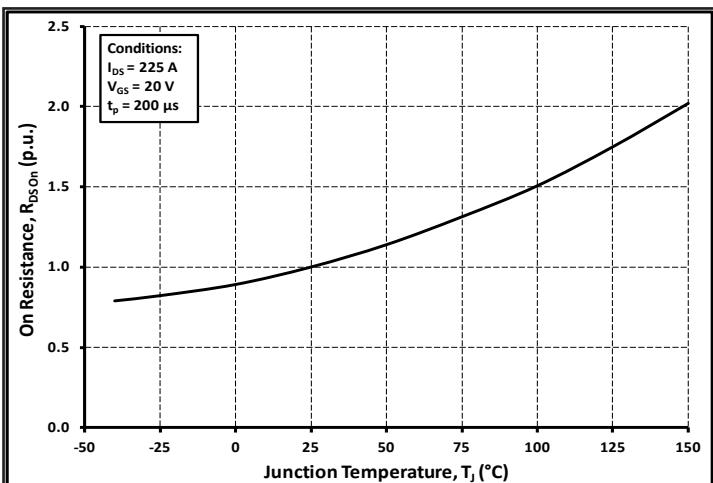


Figure 4. Normalized On-Resistance vs. Temperature

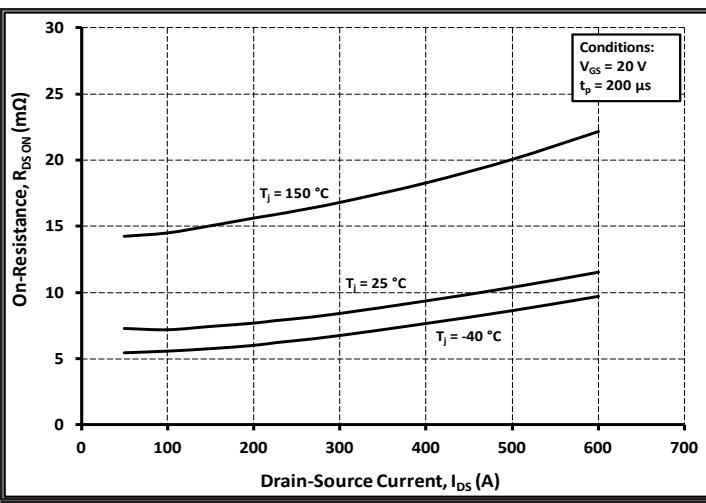


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

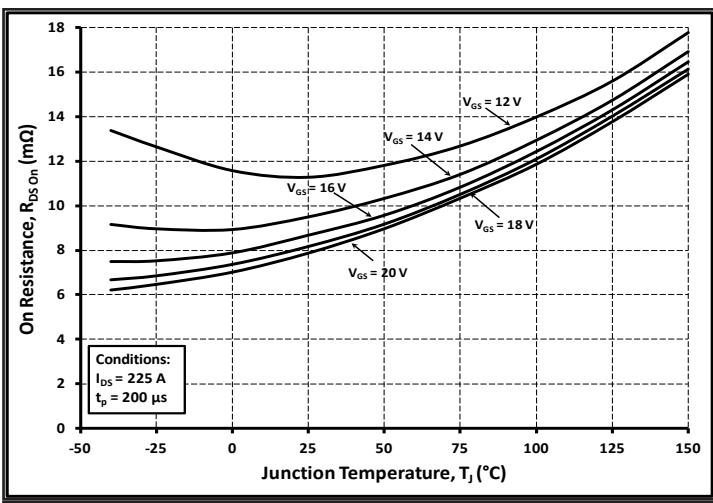


Figure 6. On-Resistance vs. Temperature for
Various Gate-Source Voltage

Typical Performance

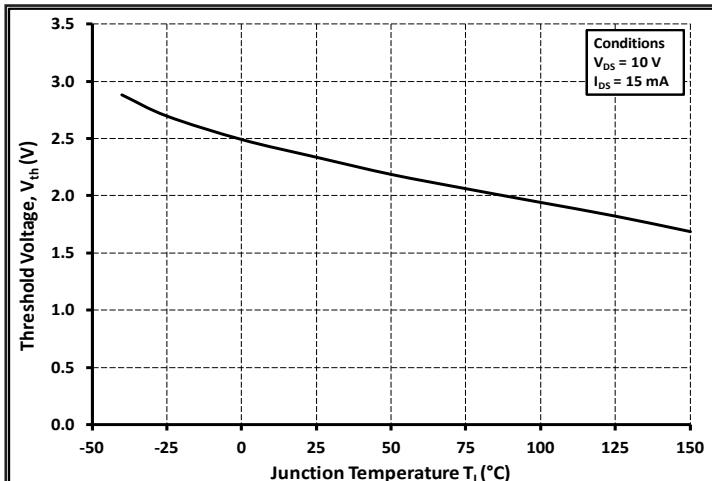


Figure 7. Threshold Voltage vs. Temperature

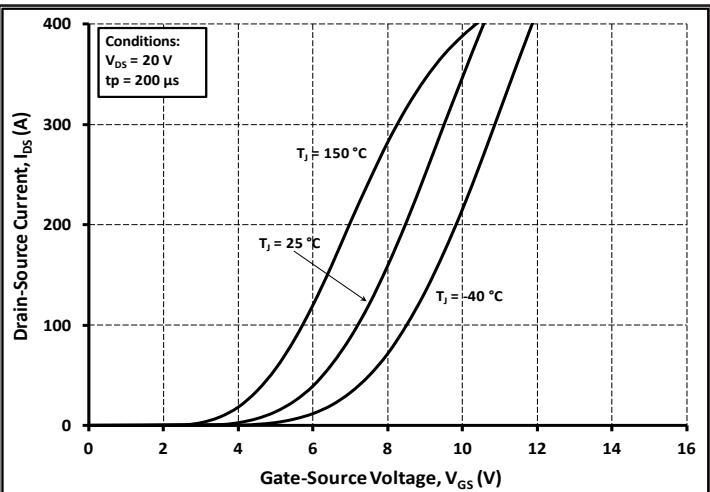


Figure 8. Transfer Characteristic for Various Junction Temperatures

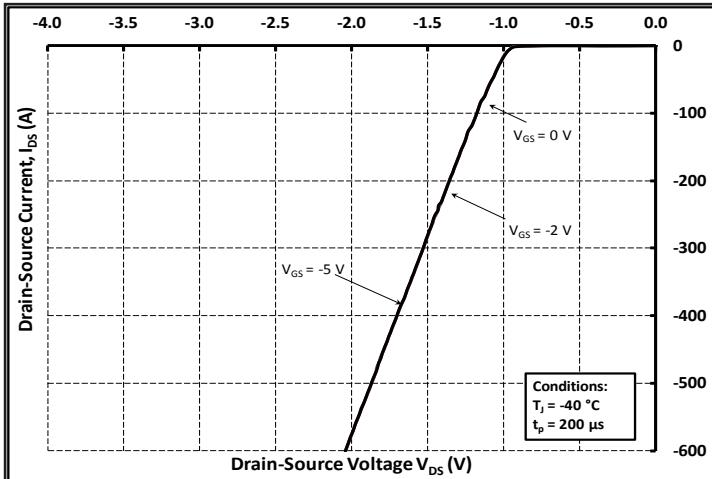


Figure 9. Diode Characteristic at -40°C

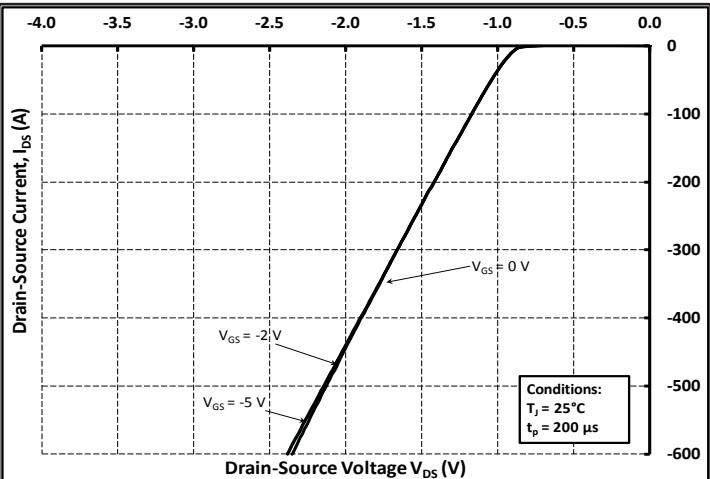


Figure 10. Diode Characteristic at 25°C

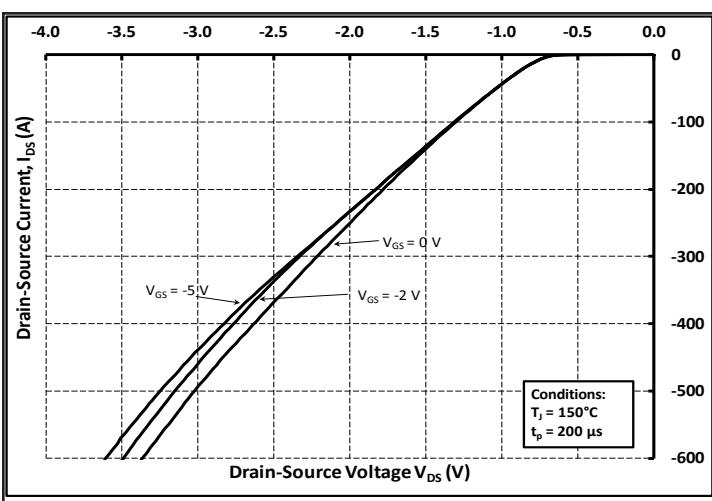


Figure 11. Diode Characteristic at 150°C

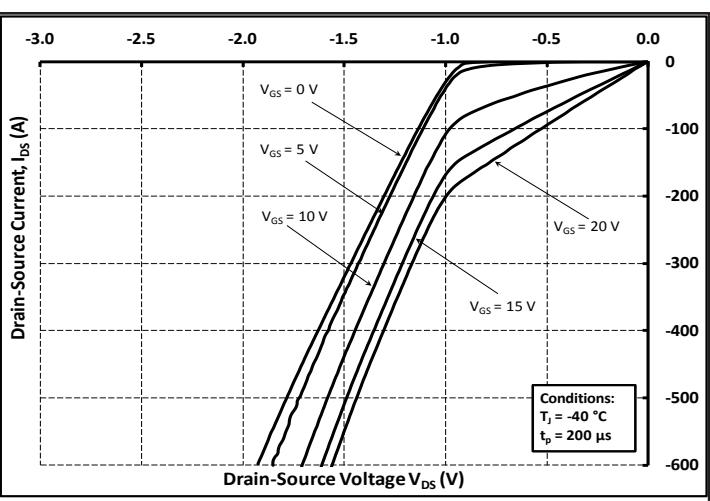


Figure 12. 3rd Quadrant Characteristic at -40°C

Typical Performance

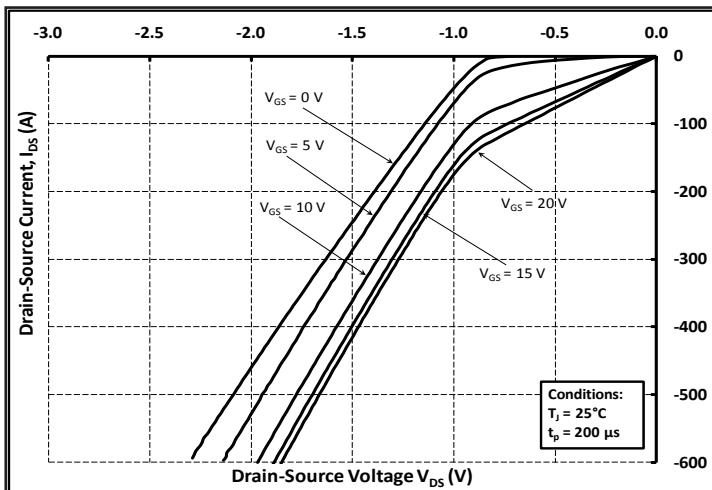


Figure 13. 3rd Quadrant Characteristic at 25 °C

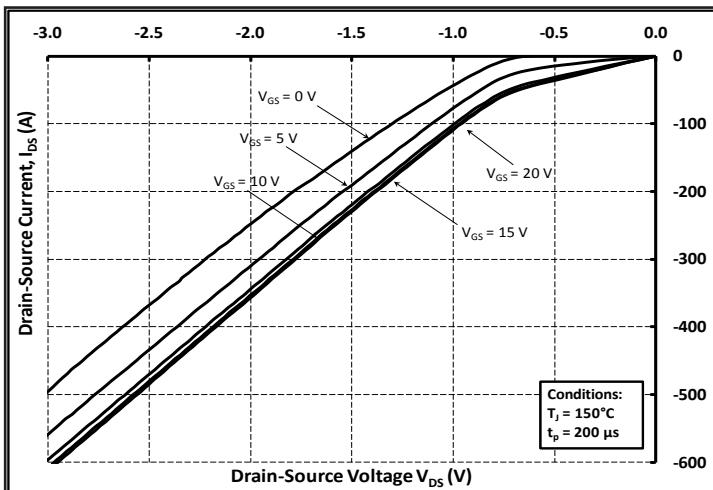


Figure 14. 3rd Quadrant Characteristic at 150 °C

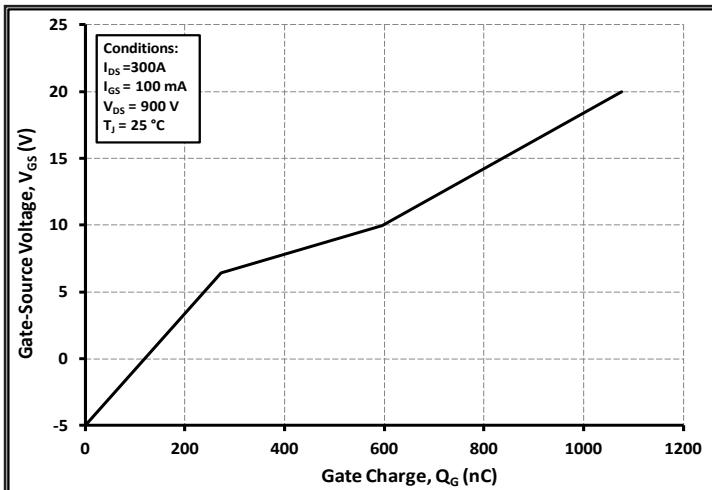


Figure 15. Gate Charge Characteristics

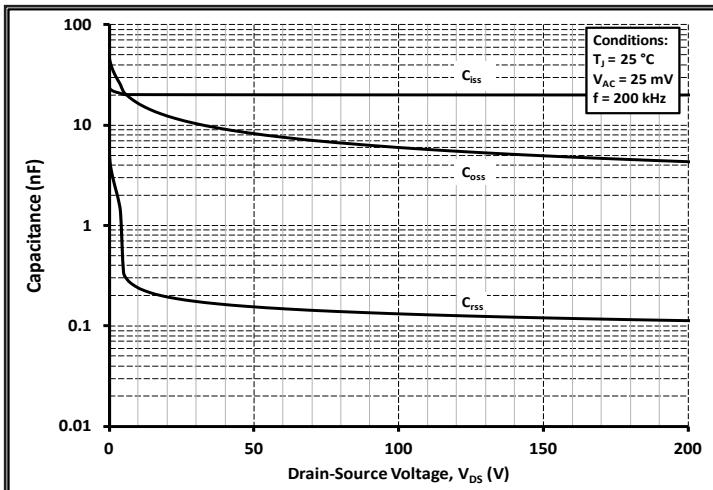


Figure 16. Capacitances vs. Drain-Source Voltage (0 - 200 V)

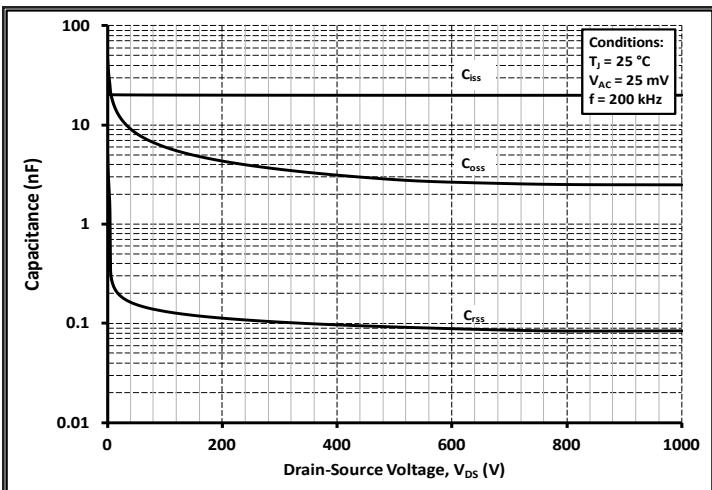


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 1 kV)

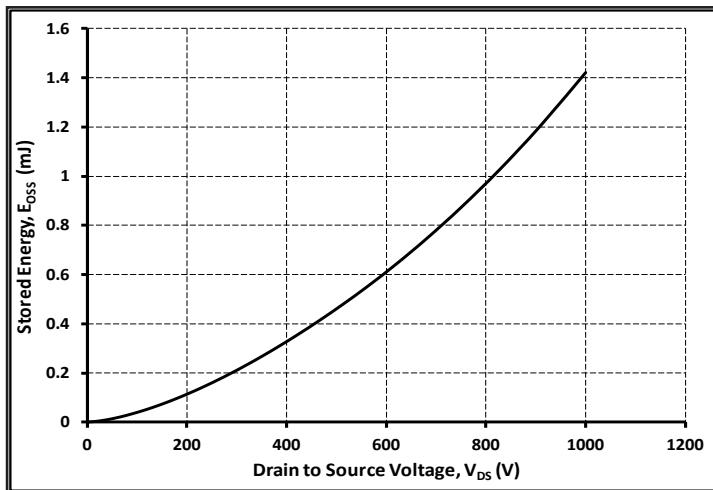


Figure 18. Output Capacitor Stored Energy

Typical Performance

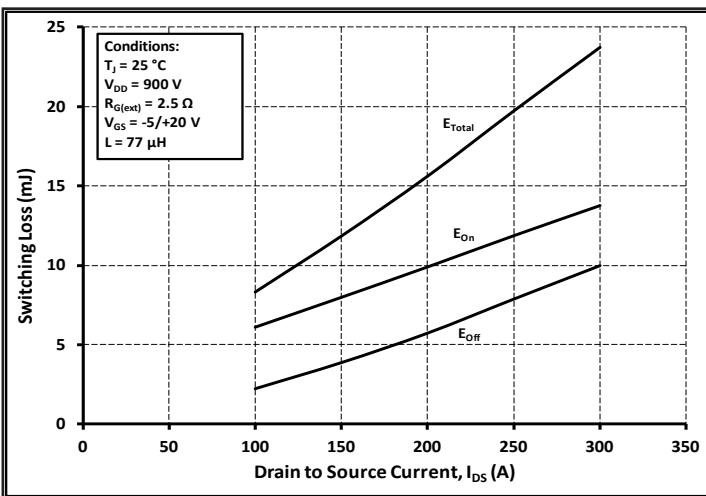


Figure 19. Inductive Switching Energy vs.
Drain Current For $V_{DS} = 900\text{V}$, $R_G = 2.5 \Omega$

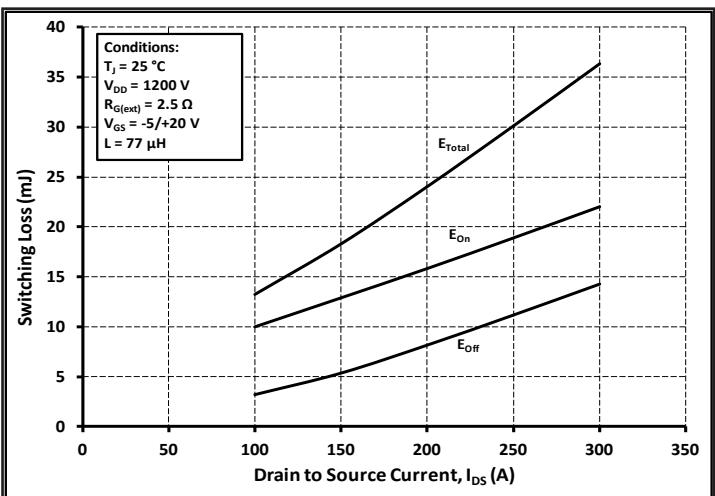


Figure 20. Inductive Switching Energy vs.
Drain Current For $V_{DS} = 1200\text{V}$, $R_G = 2.5 \Omega$

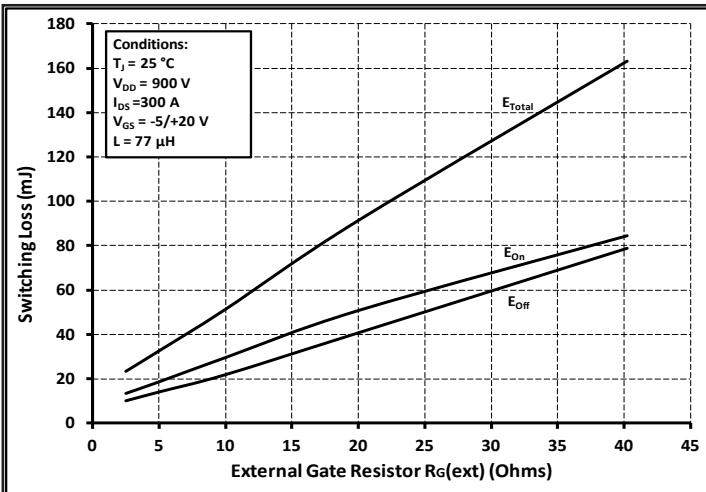


Figure 21. Inductive Switching Energy vs. $R_{G(ext)}$

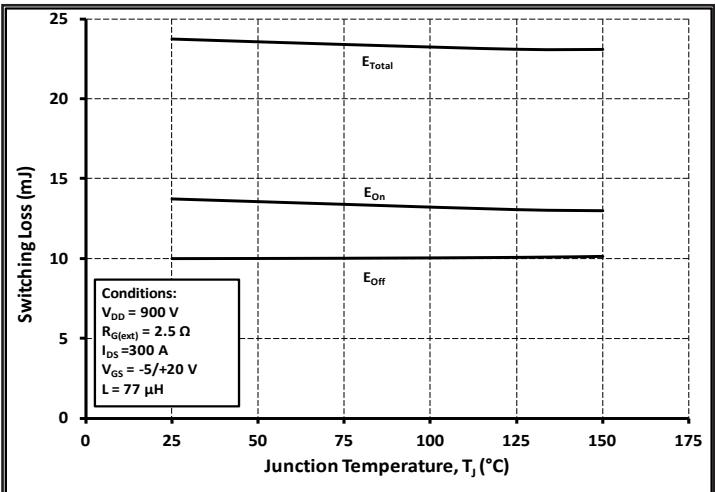


Figure 22. Inductive Switching Energy vs. Temperature

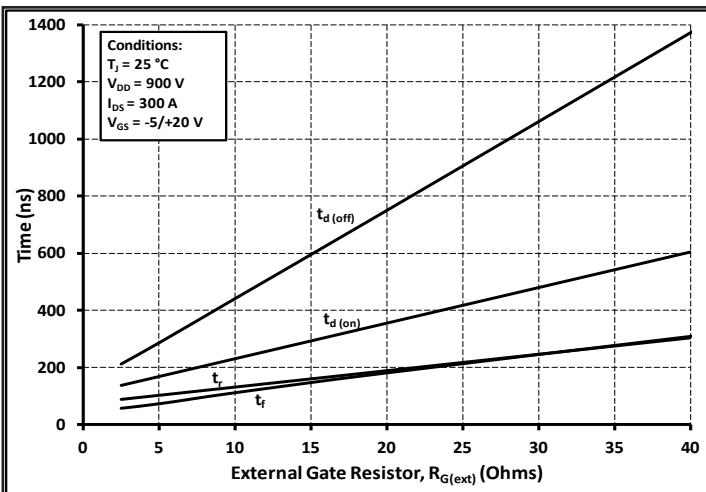


Figure 23. Timing vs. $R_{G(ext)}$

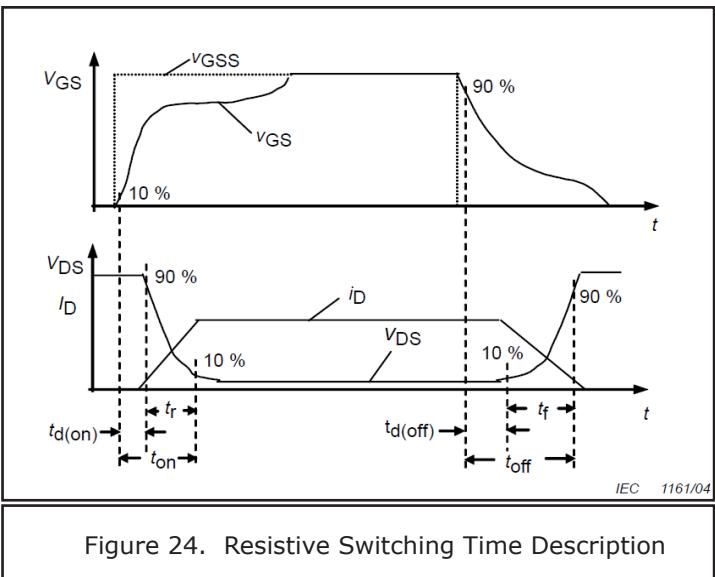


Figure 24. Resistive Switching Time Description

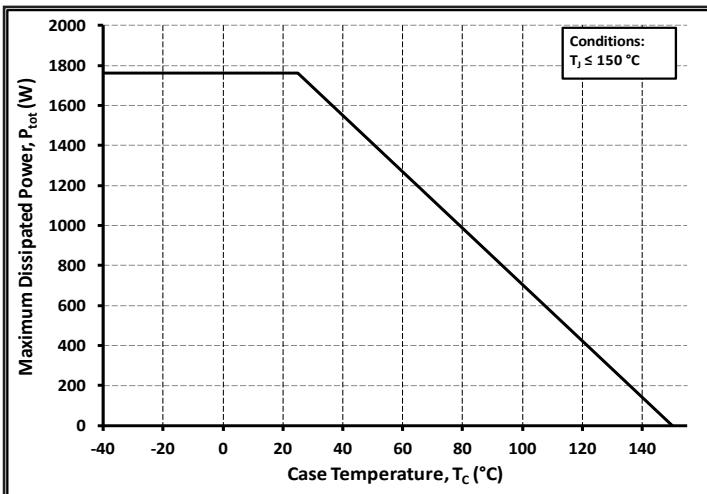


Figure 25. Maximum Power Dissipation (MOSFET) Derating vs. Case Temperature

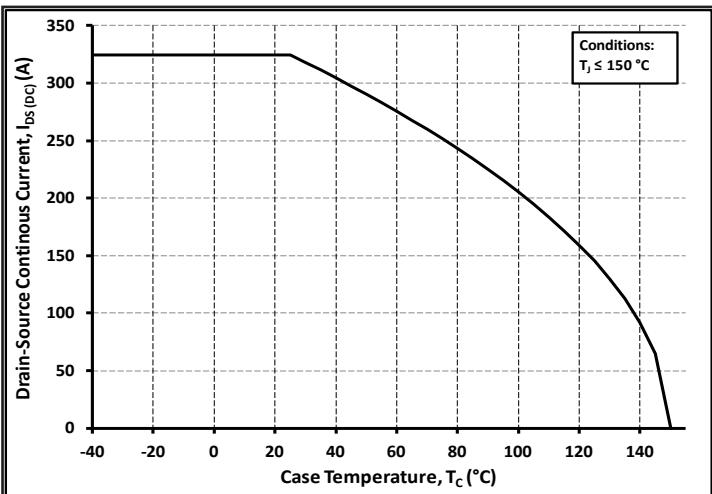


Figure 26. Continuous Drain Current Derating vs Case Temperature

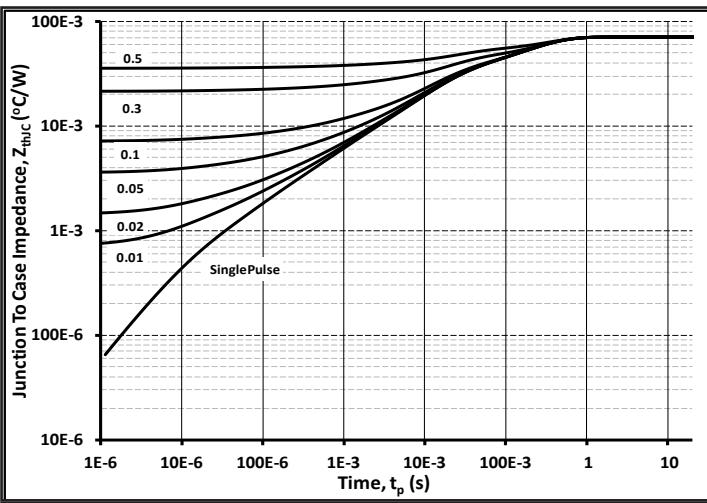


Figure 27. MOSFET Junction to Case Thermal Impedance

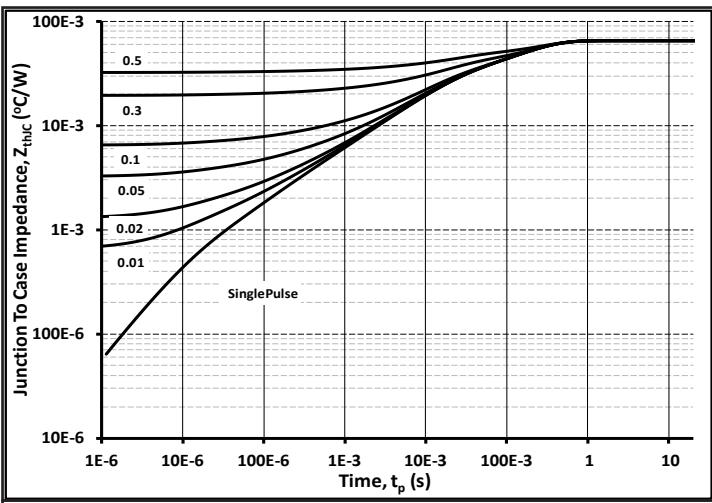


Figure 28. Diode Junction to Case Thermal Impedance

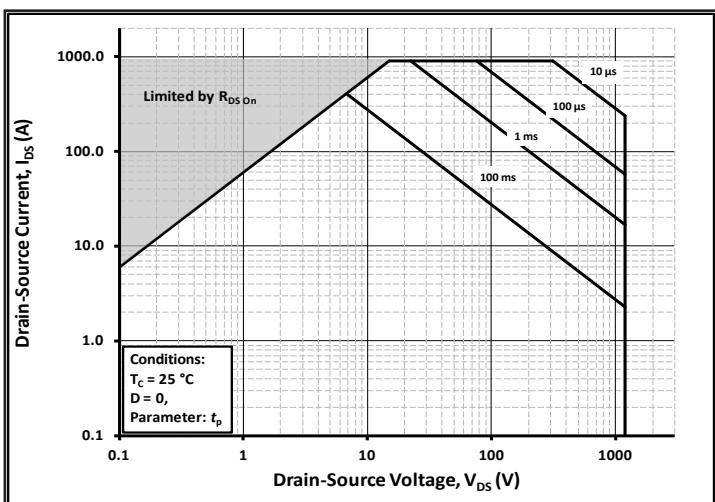
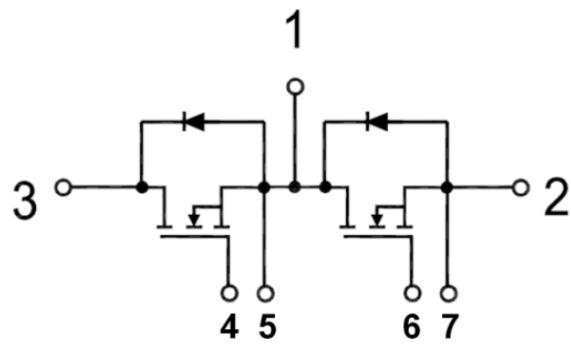
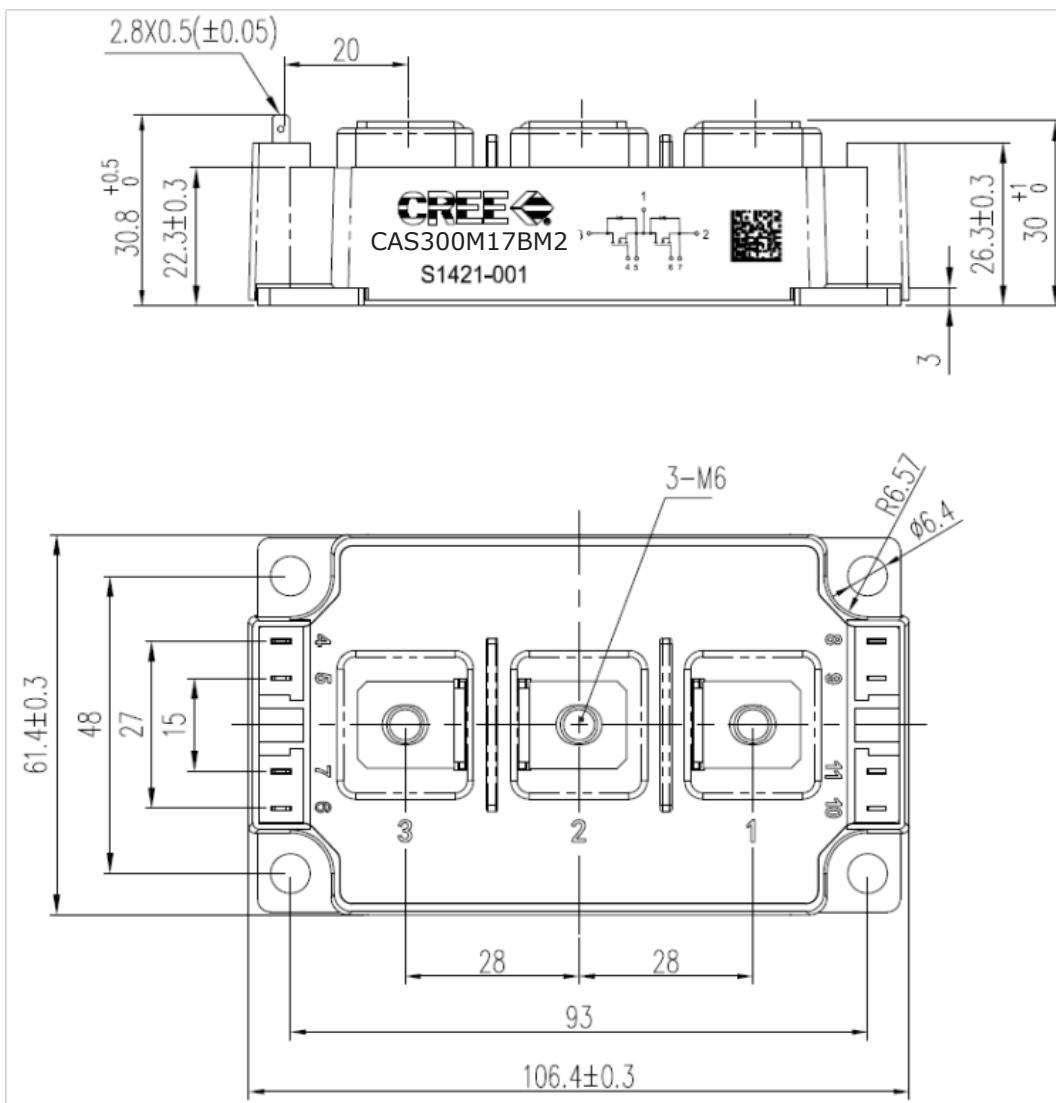


Figure 29. Maximum Power Dissipation (MOSFET) Derating vs. Case Temperature

Schematic



Package Dimensions (mm)





Notes

- **RoHS Compliance**

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented January 2, 2013. RoHS Declarations for this product can be obtained from your Cree representative or from the Product Documentation sections of www.cree.com.

- **REACH Compliance**

REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a Cree representative to insure you get the most up-to-date REACH SVHC Declaration. REACH banned substance information (REACH Article 67) is also available upon request.

- This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, air traffic control systems.

Module Application Note:

The SiC MOSFET module switches at speeds beyond what is customarily associated with IGBT based modules. Therefore, special precautions are required to realize the best performance. The interconnection between the gate driver and module housing needs to be as short as possible. This will afford the best switching time and avoid the potential for device oscillation. Also, great care is required to insure minimum inductance between the module and link capacitors to avoid excessive V_{DS} overshoots.

Please Refer to application note: Design Considerations when using Cree SiC Modules Part 1 and Part 2.
[CPWR-AN12, CPWR-AN13]



**Стандарт
Электрон
Связь**

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

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помещение 100-Н Офис 331