

## Normally – OFF Silicon Carbide Super Junction Transistor

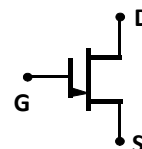
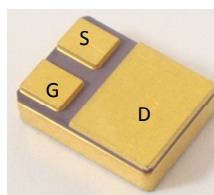
$V_{DS}$	=	<b>650 V</b>
$V_{DS(ON)}$	=	<b>1.7 V</b>
$I_D$	=	<b>16 A</b>
$R_{DS(ON)}$	=	<b>105 mΩ</b>

### Features

- 250 °C maximum operating temperature
- Temperature independent switching performance
- Gate oxide free SiC switch
- Suitable for connecting an anti-parallel diode
- Positive temperature coefficient for easy paralleling
- Low gate charge
- Low intrinsic capacitance

### Package

- RoHS Compliant



**SMD0.5 / TO – 276 (Hermetic Package)**

### Advantages

- Low switching losses
- Higher efficiency
- High temperature operation
- High short circuit withstand capability

### Applications

- Down Hole Oil Drilling, Geothermal Instrumentation
- Hybrid Electric Vehicles (HEV)
- Solar Inverters
- Switched-Mode Power Supply (SMPS)
- Power Factor Correction (PFC)
- Induction Heating
- Uninterruptible Power Supply (UPS)
- Motor Drives

### Maximum Ratings at $T_j = 250\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Drain – Source Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$	650	V
Continuous Drain Current	$I_D$	$T_C = 155\text{ °C}$	16	A
Gate Peak Current	$I_{GM}$		5	A
Reverse Gate – Source Voltage	$V_{GS}$		200	V
Reverse Drain – Source Voltage	$V_{DS}$		40	V
Power Dissipation	$P_{tot}$	$T_C = 25\text{ °C}$	27	W
Operating and Storage Temperature	$T_j, T_{stg}$		-55 to 250	°C

### Electrical Characteristics at $T_j = 250\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

#### On Characteristics

Drain – Source On Voltage	$V_{DS(ON)}$	$I_D = 16\text{ A}, I_G = 500\text{ mA}, T_j = 25\text{ °C}$	1.7			V
		$I_D = 16\text{ A}, I_G = 1000\text{ mA}, T_j = 175\text{ °C}$	2.7			
		$I_D = 16\text{ A}, I_G = 1000\text{ mA}, T_j = 250\text{ °C}$	4.3			
Drain – Source On Resistance	$R_{DS(ON)}$	$I_D = 16\text{ A}, I_G = 500\text{ mA}, T_j = 25\text{ °C}$	105			mΩ
		$I_D = 16\text{ A}, I_G = 1000\text{ mA}, T_j = 175\text{ °C}$	180			
		$I_D = 16\text{ A}, I_G = 1000\text{ mA}, T_j = 250\text{ °C}$	290			
Gate Forward Voltage	$V_{GS(FWD)}$	$I_G = 500\text{ mA}, T_j = 25\text{ °C}$	3			V
		$I_G = 500\text{ mA}, T_j = 250\text{ °C}$	2.6			
DC Current Gain	$\beta$	$V_{DS} = 5\text{ V}, I_D = 20\text{ A}, T_j = 25\text{ °C}$	115			
		$V_{DS} = 5\text{ V}, I_D = 20\text{ A}, T_j = 250\text{ °C}$	75			

#### Off Characteristics

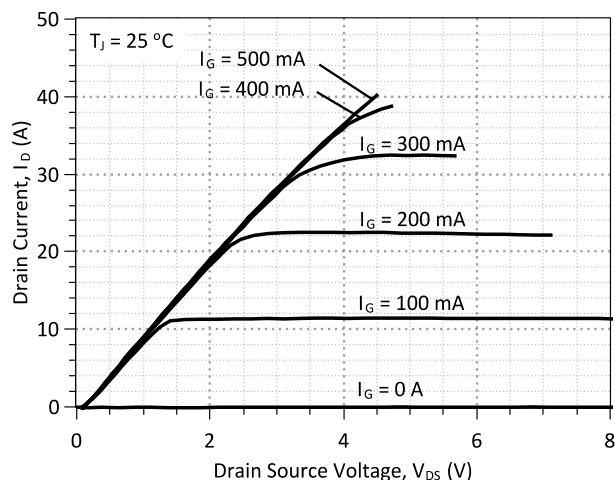
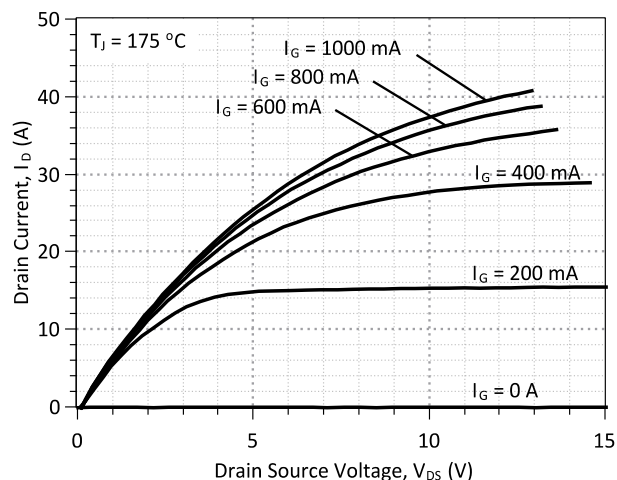
Drain Leakage Current	$I_{DSS}$	$V_R = 650\text{ V}, V_{GS} = 0\text{ V}, T_j = 25\text{ °C}$	1			μA
		$V_R = 650\text{ V}, V_{GS} = 0\text{ V}, T_j = 175\text{ °C}$	7			
		$V_R = 650\text{ V}, V_{GS} = 0\text{ V}, T_j = 250\text{ °C}$	45			

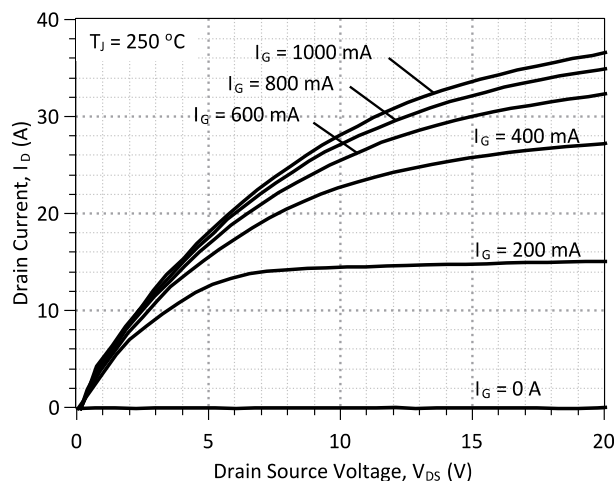
**Electrical Characteristics at  $T_J = 250^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Input Capacitance	$C_{iss}$	$V_{DS} = 35\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$ , $T_{vj} = 25\text{ }^{\circ}\text{C}$		1534		pF
Output Capacitance	$C_{oss}$			157		pF
Reverse Transfer Capacitance	$C_{rss}$			157		pF
Switching Characteristics						
Turn On Delay Time	$t_{d(on)}$	$V_{DD} = 400\text{ V}$ , $I_D = 20\text{ A}$ , $R_{G(on)} = R_{G(off)} = 22\text{ }\Omega$ , $V_{GS} = -8/15\text{ V}$ , $T_J = 175\text{ }^{\circ}\text{C}$ Refer to Figure 10 for gate drive current waveforms		5		ns
Rise Time	$t_r$			37		ns
Turn Off Delay Time	$t_{d(off)}$			68		ns
Fall Time	$t_f$			78		ns
Turn-On Energy Per Pulse	$E_{on}$			66		$\mu\text{J}$
Turn-Off Energy Per Pulse	$E_{off}$		365		$\mu\text{J}$	
Total Switching Energy	$E_{ts}$		431		$\mu\text{J}$	
Turn On Delay Time	$t_{d(on)}$	$V_{DD} = 400\text{ V}$ , $I_D = 20\text{ A}$ , $R_{G(on)} = R_{G(off)} = 22\text{ }\Omega$ , $V_{GS} = -8/15\text{ V}$ , $T_J = 250\text{ }^{\circ}\text{C}$ Refer to Figure 10 for gate drive current waveforms		7		ns
Rise Time	$t_r$			38		ns
Turn Off Delay Time	$t_{d(off)}$			85		ns
Fall Time	$t_f$			86		ns
Turn-On Energy Per Pulse	$E_{on}$			64		$\mu\text{J}$
Turn-Off Energy Per Pulse	$E_{off}$			395		$\mu\text{J}$
Total Switching Energy	$E_{ts}$			459		$\mu\text{J}$

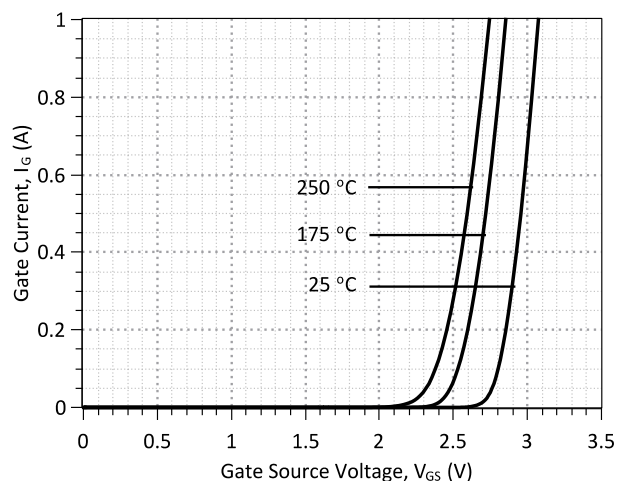
**Thermal Characteristics**

Thermal resistance, junction - case	$R_{thJC}$	0.6	$^\circ\text{C/W}$
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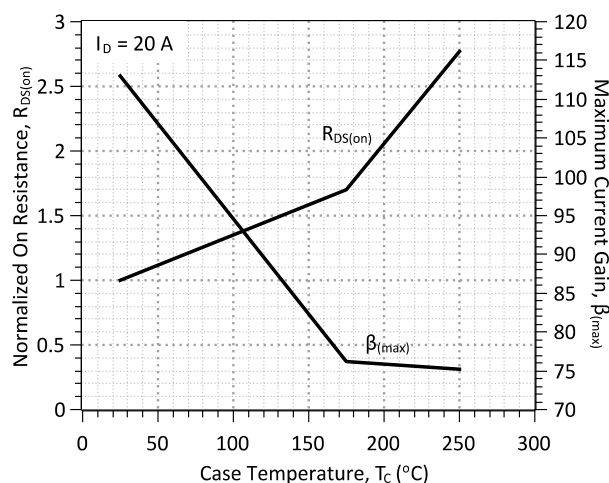

**Figure 1: Typical Output Characteristics at 25 °C**

**Figure 2: Typical Output Characteristics at 175 °C**



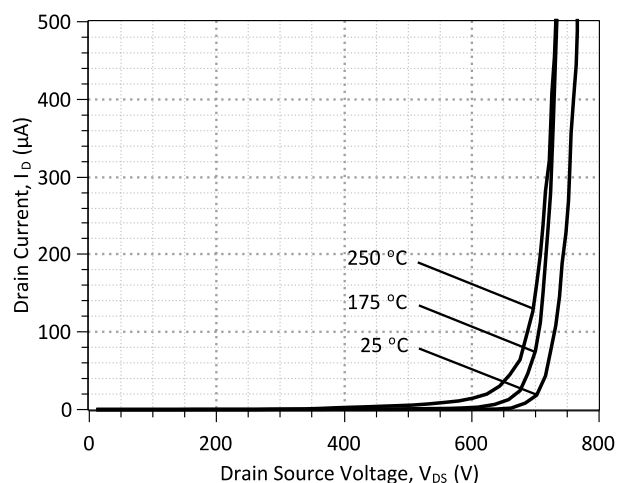
**Figure 3: Typical Output Characteristics at 250 °C**



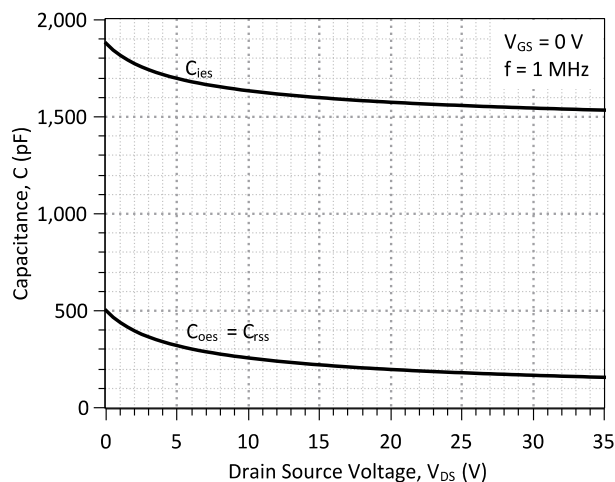
**Figure 4: Typical Gate Source I-V Characteristics vs. Temperature**



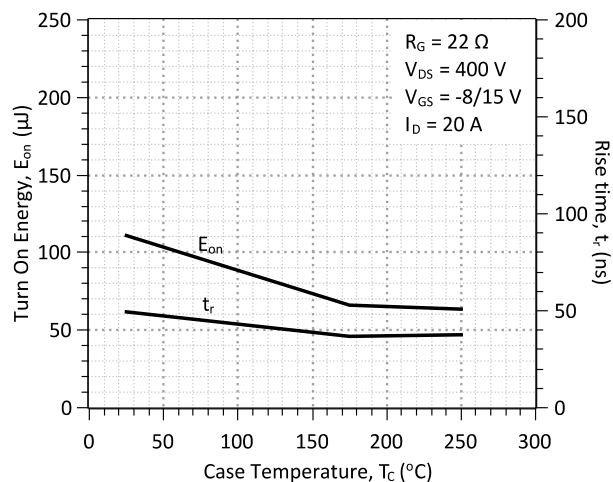
**Figure 5: Normalized On-Resistance and Current Gain vs. Temperature**



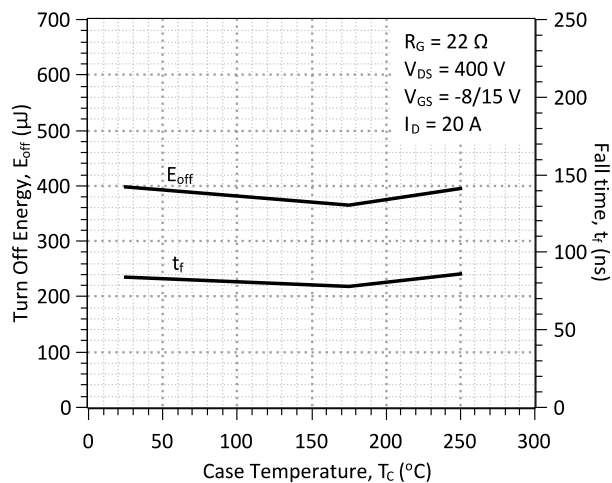
**Figure 6: Typical Blocking Characteristics**



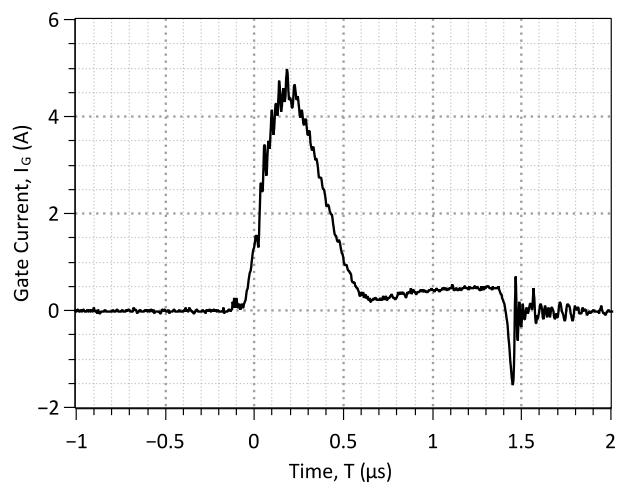
**Figure 7: Typical Capacitance vs Drain-Source Voltage**



**Figure 8: Typical Turn On Energy Losses and Switching Times vs. Temperature**

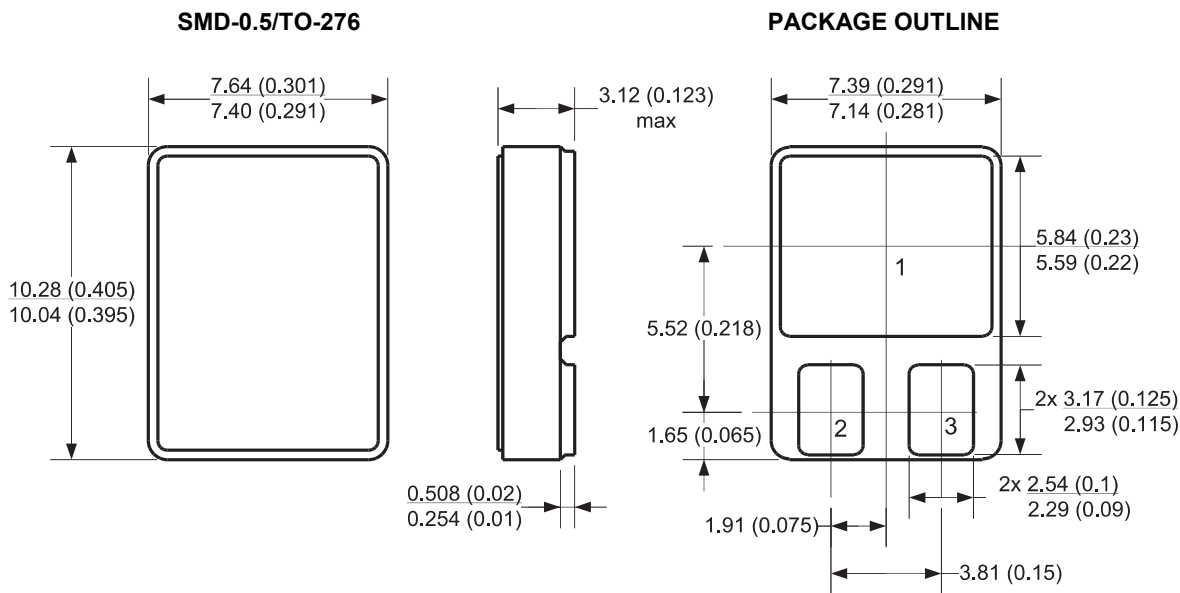


**Figure 9: Typical Turn Off Energy Losses and Switching Times vs. Temperature**



**Figure 10: Typical Gate-Source Switching Waveforms**

### Package Dimensions:



### NOTE

1. CONTROLLED DIMENSION IS INCH. DIMENSION IN BRACKET IS MILLIMETER.
2. DIMENSIONS DO NOT INCLUDE END FLASH, MOLD FLASH, MATERIAL PROTRUSIONS

**Revision History**

Date	Revision	Comments	Supersedes
2012/08/24	0	Initial release	

## Published by

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