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**1200V/80 mohm SiC MOSFET
in SOT-227 Package**

$$V_{RRM} = 1200V$$

$$I_D = 20A @ T_C = 80^{\circ}C$$

$$R_{DS_ON} = 80 \text{ mohm} @ T_J = 25^{\circ}C$$

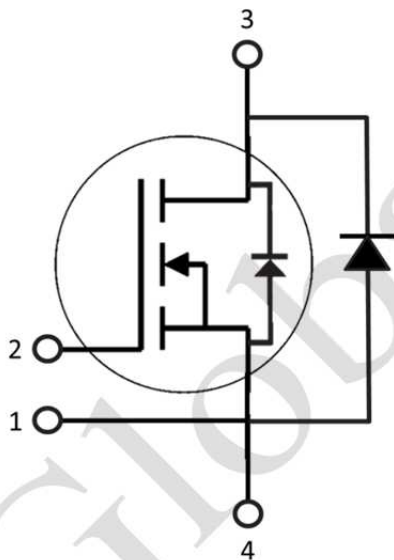


Features

- High speed switching SiC MOSFET
- Freewheeling diode with zero reverse recovery SiC SBDs
- Low R_{DS_ON}
- Simple to drive
- Low stray inductance
- High junction temperature operation
- Easy to parallel and mounting

Applications

- Photo Voltaic Inverter
- Motor Driver
- Multi-level Converter
- High voltage AC/DC Converter



Benefits

- Outstanding power conversion efficiency at high switching frequency operation
- Low switching losses and Low EMI noises
- Very rugged and easy mount
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_c of V_f
- Reduced cooling requirement
- RoHS Compliant

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

Parameters	Symbol	Conditions	Specifications	Units
SiC MOSFET				
Maximum Drain-Source Voltage	V_{DSS}	$T_j = 25^{\circ}\text{C} \sim 150^{\circ}\text{C}$	1200	V
Continuous Drain Current	I_D	$T_j = 25^{\circ}\text{C}, V_{GS}=20\text{V}$	40	A
		$T_j = 150^{\circ}\text{C}, V_{GS}=20\text{V}$	20	A
Pulsed Drain Current	I_{DS}	Limited by T_{j_max}	60	A
Gate-Source Voltage	V_{GS}		-10/+25	V
Maximum Power Dissipation	P_D	$T_C = 25^{\circ}\text{C}$	TBD	W
		$T_C = 100^{\circ}\text{C}$	TBD	W
Operating Junction Temperature	T_j		-40 ~ 150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}		-40 ~ 125	$^{\circ}\text{C}$
SiC SBDs				
Maximum Reverse Voltage	V_{RRM}		1200	V
Average Forward Current	I_{DAV}	$T_j = 25^{\circ}\text{C}$	10	A
		$T_j = 150^{\circ}\text{C}$	5	A
Non-repetitive Forward Surge Current	I_{FSM}	Pulse width t_p limited by T_{jmax}	20	A

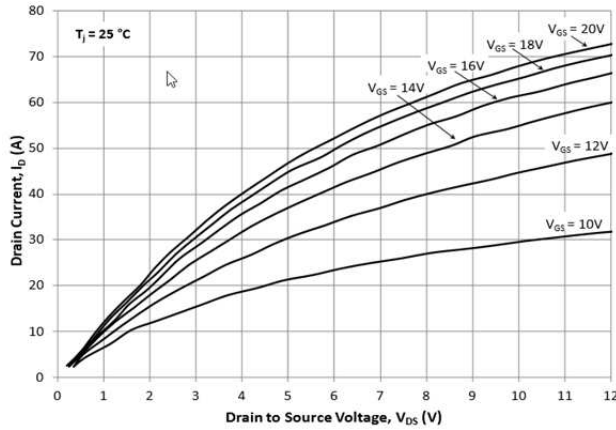
Electrical Characteristics ($T_j=25^{\circ}\text{C}$ unless otherwise specified)

Parameters	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{V}, I_D=100\mu\text{A}$	1200	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=2.5\text{mA}, T_j = 25^{\circ}\text{C}$	1.7	2.2	--	V
		$V_{GS}=V_{DS}, I_D=2.5\text{mA}, T_j = 150^{\circ}\text{C}$	--	1.6	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=1200\text{V}, V_{GS}=0\text{V}, T_j = 25^{\circ}\text{C}$	--	1	100	μA
		$V_{DS}=1200\text{V}, V_{GS}=0\text{V}, T_j = 150^{\circ}\text{C}$	--	TBD	--	μA
Gate Source Leakage Current	I_{GSS}	$V_{GS}=20\text{V}, V_{DS}=0\text{V}$	--	--	250	nA
Internal Gate Resistance	R_G	$f = 1\text{MHz}, V_{AC} = 25\text{mV}$, ESR of C_{ISS}		1.5		Ω
Drain-Source On-state Resistance	$R_{DS(ON)}$	$V_{GS} = 20\text{V}, I_D=20\text{A}, T_j = 25^{\circ}\text{C}$	--	80	--	m Ω
		$V_{GS} = 20\text{V}, I_D=20\text{A}, T_j = 150^{\circ}\text{C}$	--	150	--	m Ω
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{V}, V_{DS} = 800\text{V}$, freq = 1MHz, $V_{AC} = 25\text{mV}$, measured at one MOSFET.	--	950	--	pF
Output Capacitance	C_{OSS}		--	80	--	pF
Reverse transfer Capacitance	C_{rSS}		--	6.5	--	pF
Turn-on Delay Time	$t_{d(on)i}$	$V_{DS} = 800\text{V}, V_{GS} = -5/20\text{V}$ $I_D = 20\text{A}, R_{G(ext)} = 2.5\Omega$, $L = 856\mu\text{H}$. Refer to definition.	--	15	--	ns
Rise Time	t_{ri}		--	35	--	ns
Turn-off Delay Time	$t_{d(off)i}$		--	32	--	ns

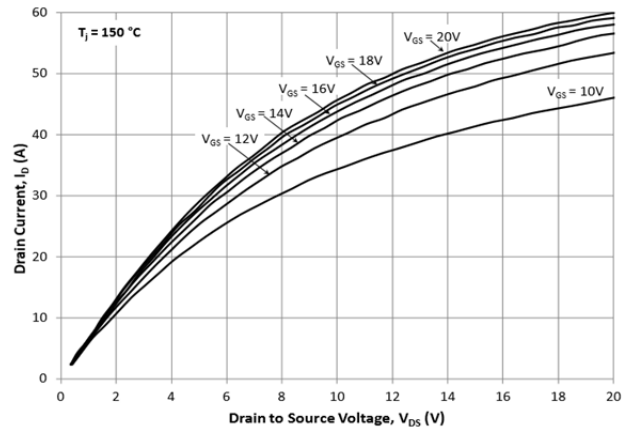
Fall Time	t_{fi}		--	26	--	ns
Turn-on Switching Loss	E_{ON}			0.4		mJ
Turn-off Switching Loss	E_{OFF}			0.25		mJ
Body Diode Forward Voltage	V_{SD}	$I_F = 10A, T_j = 25^\circ C$	--	3.3	--	V
		$I_F = 10A, T_j = 150^\circ C$	--	TBD	--	V
Total Gate Charge	Q_g	$V_{DS}=800V, V_{GS} = -5/20V$	--	49.2	--	nC
Gate-Source Charge	Q_{GS}	$I_D = 20A$	--	10.8	--	nC
Gate-Drain Charge	Q_{GD}		--	18	--	nC
SiC SBDs						
Maximum peak repetitive reverse voltage	V_{RRM}		1200	--	--	V
Maximum Reverse Leakage Current	I_{RM}	$V_R = 1200V, T_j = 25^\circ C$	--	1	10	μA
		$V_R = 1200V, T_j = 150^\circ C$	--	30	300	μA
Diode Forward Voltage	V_F	$I_F = 5A, T_j = 25^\circ C$	--	1.6	1.8	V
		$I_F = 5A, T_j = 150^\circ C$	--	2.2	2.7	V
Total Capacitive Charge	Q_C	$V_R=1200V, I_F < I_{F,max}$	--	22	--	nC
Switching Time	t_C	$di_F/dt = 500 A/\mu s, T_j = 25^\circ C$	--	--	10	ns
Total Capacitance	C	$V_R = 1V, f = 1 MHz$	--	317	--	pF
		$V_R = 600V, f = 1 MHz$	--	19	--	pF
		$V_R = 1200V, f = 1 MHz$	--	18	--	pF

Thermal and Package Characteristics ($T_j=25^\circ C$ unless otherwise specified)

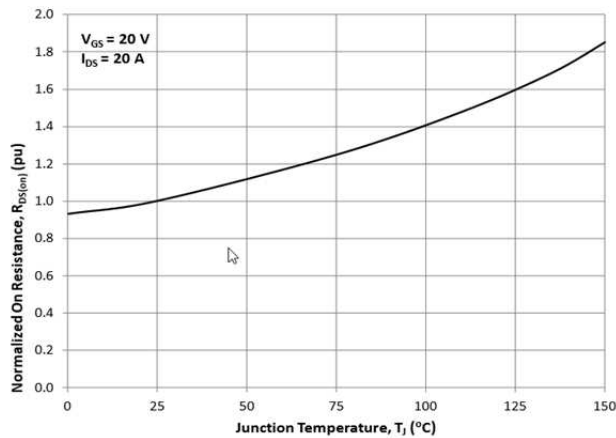
Parameters	Symbol	Conditions	Min	Typ	Max	Units
Junction to Case Thermal Resistance	R_{THJC}	Per MOSFET	--	--	0.6	$^\circ C/W$
		Per SBD			1.5	$^\circ C/W$
Mounting Torque	M_d				1.5	N-m
Terminal Connection Torque	M_{dt}		1.3	--	1.5	N-m
Package Weight	W_t			32		g
Isolation Voltage	V_{ISOL}	$I_{ISOL} < 1mA, 50/60Hz, t=1 min$	2500			V



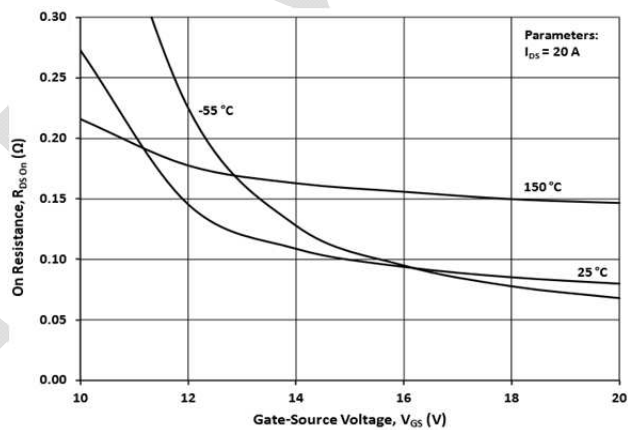
Typical Forward Characteristics $T_j=25\text{ }^\circ\text{C}$



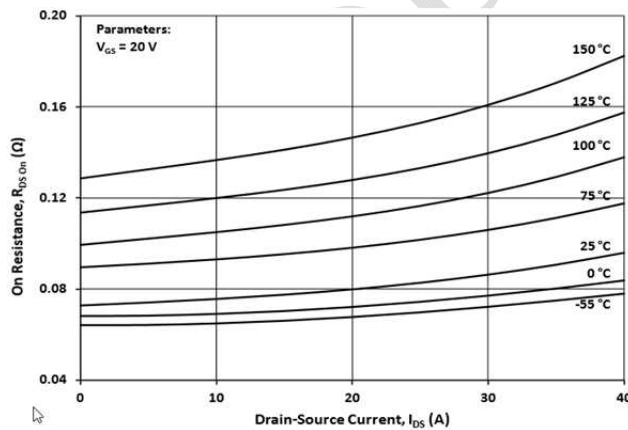
Typical Forward Characteristics $T_j=150\text{ }^\circ\text{C}$



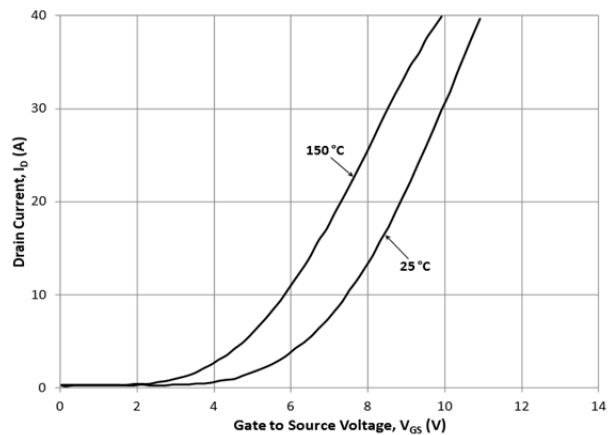
Normalized R_{DS_ON} vs. Temperature



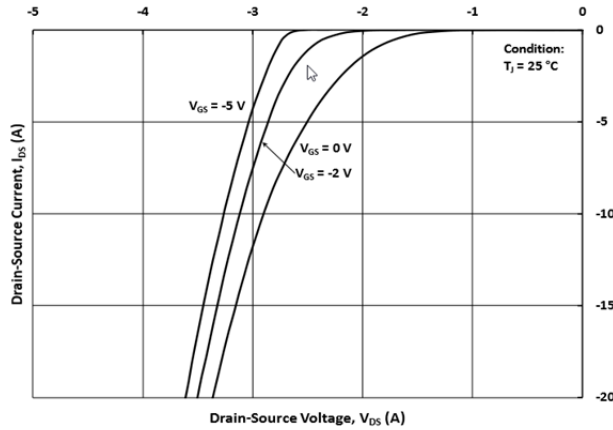
R_{DS_ON} vs. Gate Voltage



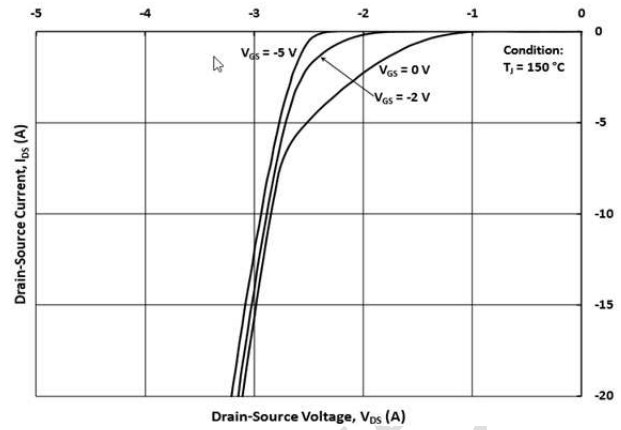
R_{DS_ON} vs. Drain Current



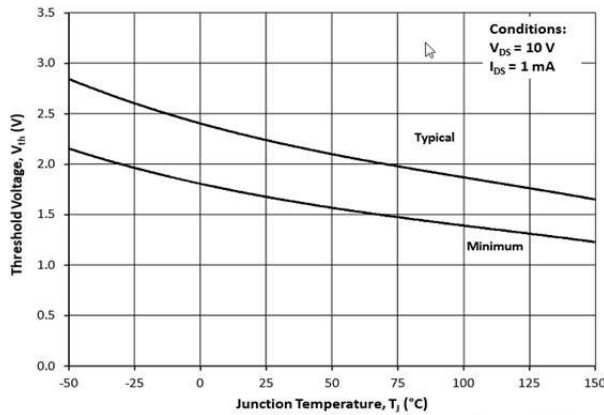
Transfer Characteristics



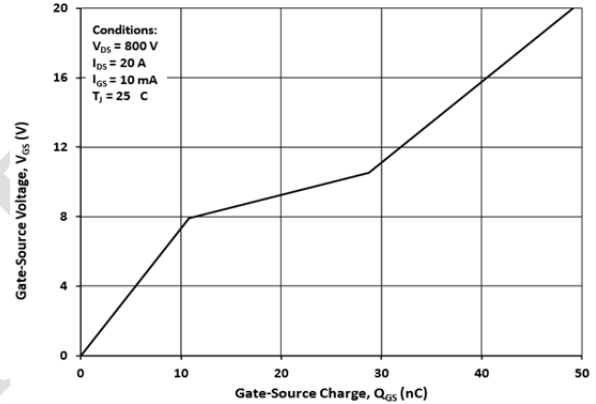
Body Diode Characteristics $T_j=25\text{ }^\circ\text{C}$



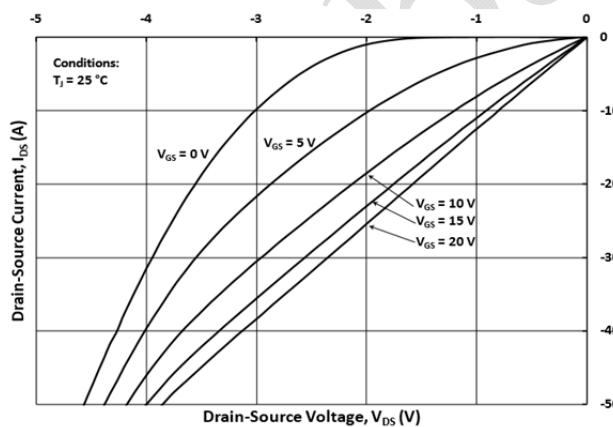
Body Diode Characteristics $T_j=150\text{ }^\circ\text{C}$



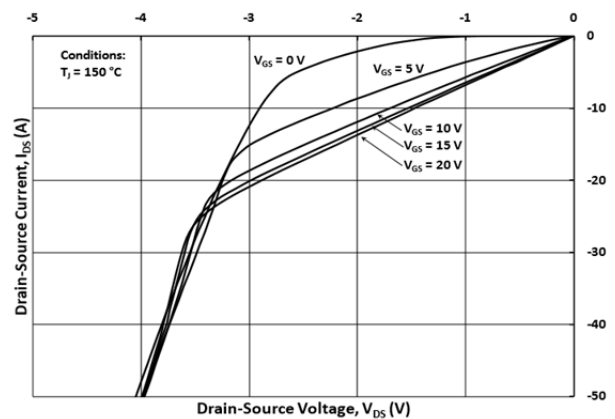
Threshold Voltage vs. Temperature



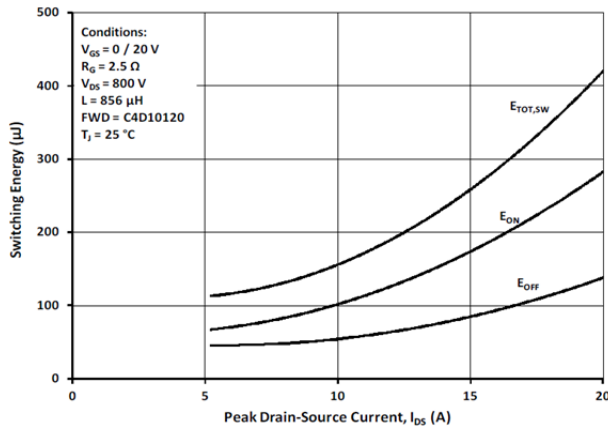
Gate Charge Characteristics



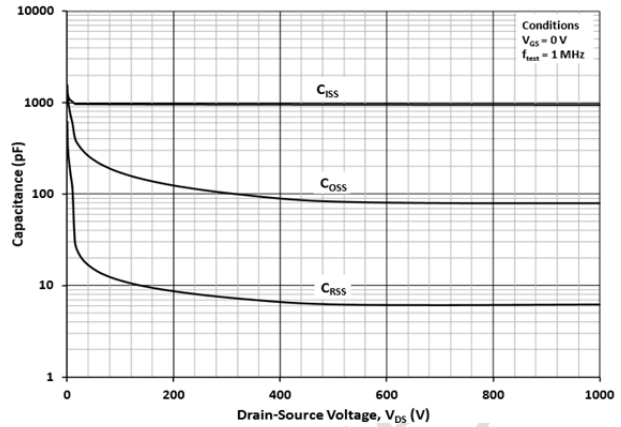
3rd Quadrant Characteristics $T_j=25\text{ }^\circ\text{C}$



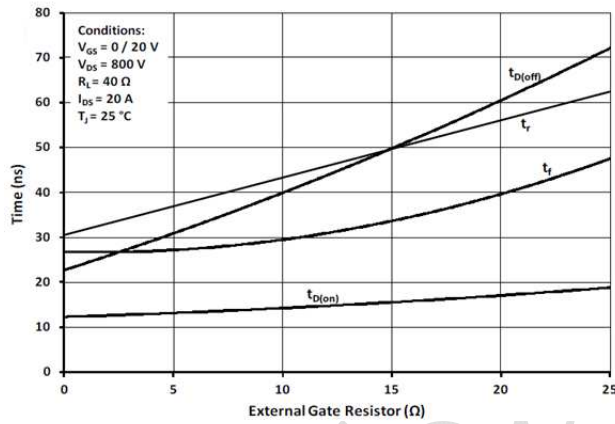
3rd Quadrant Characteristics $T_j=150\text{ }^\circ\text{C}$



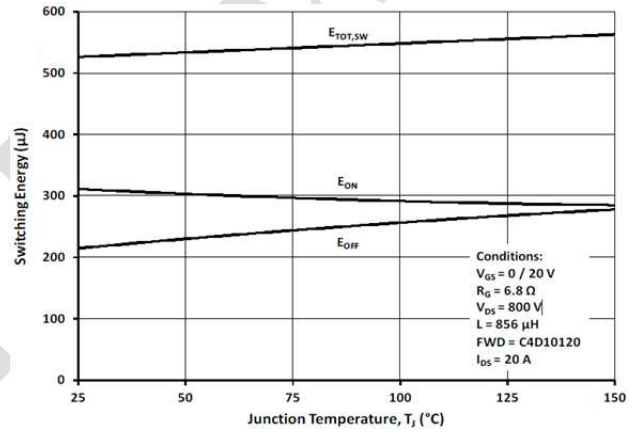
Switching Loss vs. Drain Current ($V_{DD}=800V$)



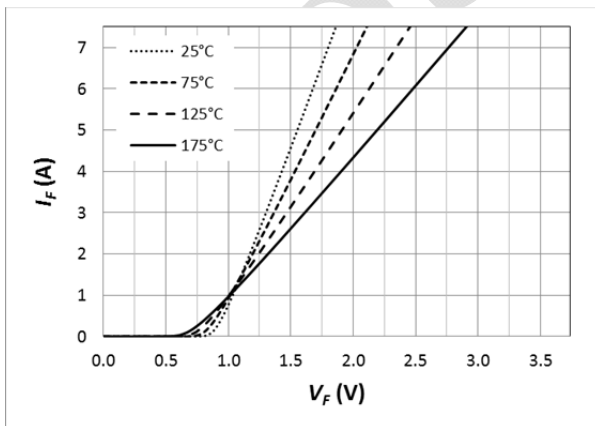
Capacitances vs. Drain-Source Voltage (0~1k V)



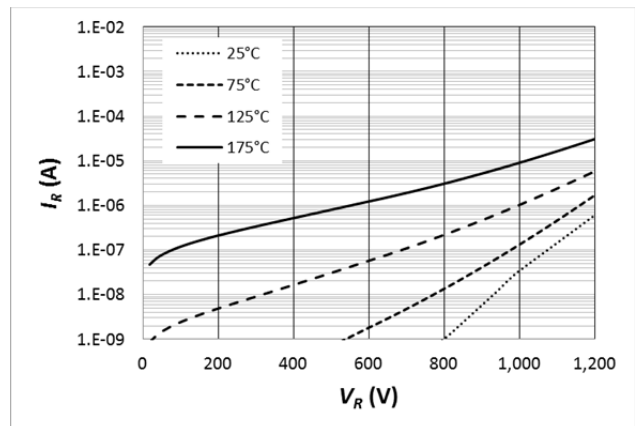
Resistive Switching Time vs. $R_{G(ext)}$



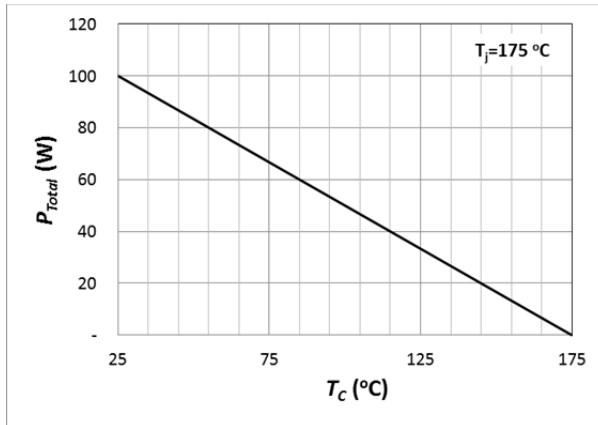
Clamped Inductive Switching Energy vs. Temperature



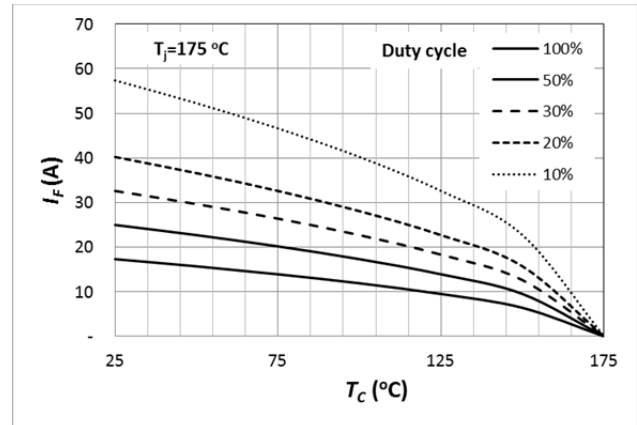
Forward Characteristics (parameterized on T_J)



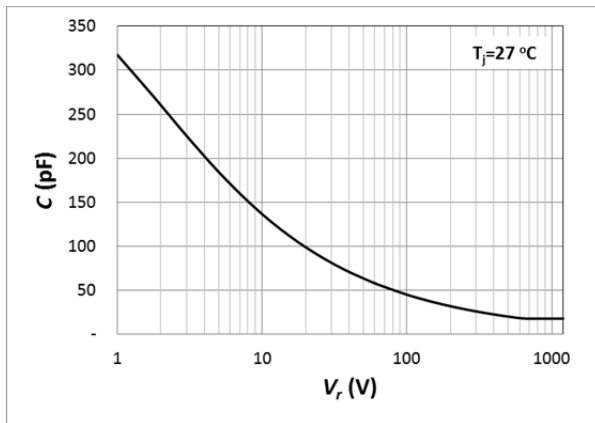
Reverse Characteristics (parameterized on T_J)



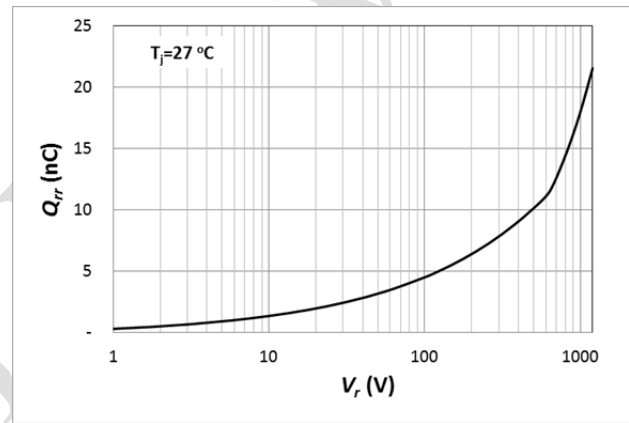
Power Derating



Current Derating

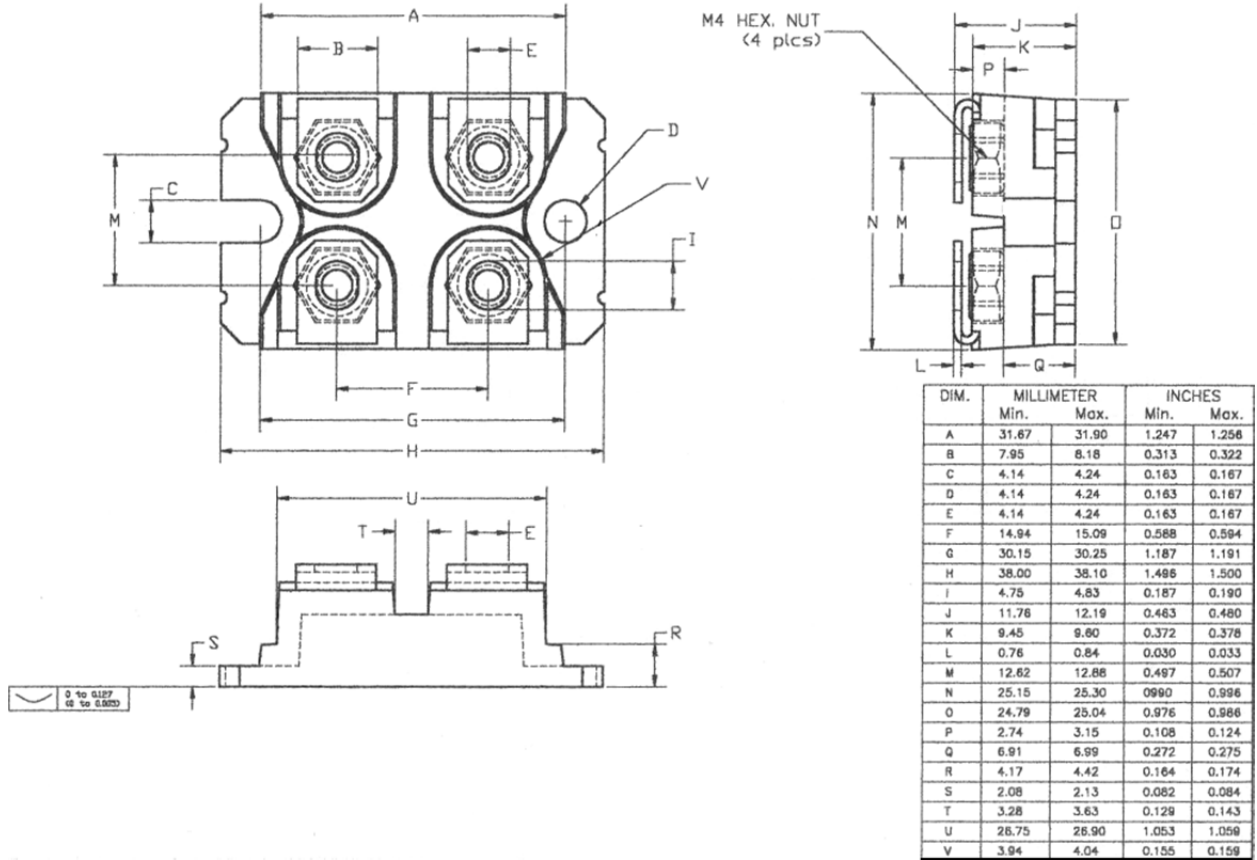


Capacitance



Recovery Charge

SOT-227 Package Outline and Dimension



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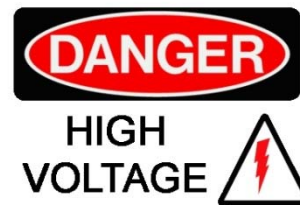
Revision History

Date	Revision	Notes
10/3/2016	0.1	Initial release

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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 March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.gptechgroup.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 our office at GPTG Headquarters in Lake Forest, California to insure you get the most up-to-date REACH SVHC Declaration.
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