GeneSiC SEMICONDUCTOR

GB100XCP12-227

IGBT/SiC Diode Co-pack

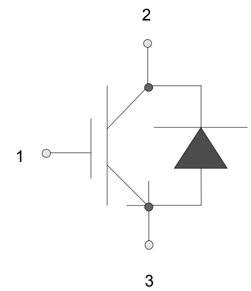
V_{CES}	=	1200 V
I_{CM}	=	100 A
$V_{CE(SAT)}$	=	1.9 V

Features

- Optimal Punch Through (OPT) technology
- SiC freewheeling diode
- Positive temperature coefficient for easy paralleling
- Extremely fast switching speeds
- Temperature independent switching behavior of SiC rectifier
- Best RBSOA/SCSOA capability in the industry
- High junction temperature
- Industry standard packaging

Package

- RoHS Compliant



SOT – 227

Advantages

- Industry's highest switching speeds
- High temperature operation
- Improved circuit efficiency
- Low switching losses

Applications

- Solar Inverters
- Aerospace Actuators
- Server Power Supplies
- Resonant Inverters > 100 kHz
- Inductive Heating
- Electronic Welders

Maximum Ratings at T_j = 175 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
IGBT				
Collector-Emitter Voltage	V_{CES}		1200	V
DC-Collector Current	I_C	$T_C \leq 130$ °C	100	A
Peak Collector Current	I_{CM}	Limited by T_{vjmax}	200	A
Gate Emitter Peak Voltage	V_{GES}		± 20	V
IGBT Short Circuit SOA	t_{psc}	V_{CC} = 900 V, $V_{CEM} \leq 1200$ V $V_{GE} \leq 15$ V, $Tv_j \leq 125$ ºC	10	µs
Operating Temperature	T_{vj}		-40 to +175	°C
Storage Temperature	T_{stg}		-40 to +175	°C
Isolation Voltage	V_{ISOL}	I_{SOL} < 1 mA, 50/60 Hz, t = 1 s	3000	V
Free-wheeling Silicon Carbide diode				
DC-Forward Current	I_F	$T_C \leq 130$ ºC	100	A
Non Repetitive Peak Forward Current	I_{FM}	T_C = 25 ºC, t_P = 10 µs	tbd	A
Surge Non Repetitive Forward Current	$I_{F,SM}$	t_P = 10 ms, half sine, T_C = 25 ºC	tbd	A

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	IGBT	0.08	°C/W
Thermal resistance, junction - case	R_{thJC}	SiC Diode	0.53	°C/W

Mechanical Properties

		Values min.	Values typ.	Values max.	
Mounting Torque	M_d		1.5		Nm
Terminal Connection Torque		1.3		1.5	Nm
Weight			29		g
Case Color			Black		
Dimensions			38 x 25.4 x 12		mm

Electrical Characteristics at T_j = 175 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values min.	Values typ.	Values max.	Unit
IGBT						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 4 mA, T_j = 25 °C	5	6.2	7	V
Collector-Emitter Leakage Current	$I_{CES,25}$	V_{GE} = 0 V, $V_{CE} = V_{CES}$, T_j = 25 °C		0.10	1	mA
	$I_{CES,175}$	V_{GE} = 0 V, $V_{CE} = V_{CES}$, T_j = 175 °C		3.15		mA
Gate-Leakage Current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V, T_j = 175 °C	-400		400	nA
Collector-Emitter Threshold Voltage	$V_{CE(TO)}$	T_j= 25°C		1.1		V
Collector-Emitter Slope Resistance	$R_{CE,25}$	V_{GE} = 15 V, T_j = 25 °C		7.9		mΩ
	$R_{CE,175}$	V_{GE} = 15 V, T_j = 175 °C		11.4		mΩ
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	I_C = 100 A, V_{GE} = 15 V, T_j = 25 °C (175 °C)		1.9 (2.2)		V
Input Capacitance	C_{ies}	V_{GE} = 0 V, V_{CE} = 25 V, f = 1 MHz, T_j = 150 °C		8.55		nF
Output Capacitance	C_{oes}			1.39		nF
Reverse Transfer Capacitance	C_{res}			0.25		nF
Internal Gate Resistance	R_{Gint}			2		Ω
Gate Charge	Q_G	V_{CC}= 750 V, I_C = 100 A, V_{GE}= -8..15 V, T_j= 25 °C (125 °C)		900 (900)		nC
Module Lead Resistance	R_{mod}	T_c= 25 °C (175 °C)		tbd		mΩ
Reverse Bias Safe Operating Area	RBSOA	T_j=175 °C, R_g=56Ω, V_{CC}=1200 V, V_{GE}=15 V		150		A
Short Circuit Current	I_{sc}	T_j = 175 °C, R_g = 56Ω, V_{CC} = 900 V, V_{GE} = ±15 V		470		A
Short Circuit Duration	t_{sc}				10	µs
Rise Time	t_r	V_{CC}= 800 V, I_C = 100 A, $R_{gon} = R_{goff}$ = 10 Ω, $V_{GE(on)}$= 15 V, $V_{GE(off)}$= -8 V, L_S = 0.8 µH, T_j= 25 °C		254		ns
Fall Time	t_f			153		ns
Turn On Delay Time	$t_{d(on)}$			244		ns
Turn Off Delay Time	$t_{d(off)}$			488		ns
Turn-On Energy Loss Per Pulse	E_{on}			14.2		mJ
Turn-Off Energy Loss Per Pulse	E_{off}			15.7		mJ
Rise Time	t_r	V_{CC}= 800 V, I_C = 100 A, $R_{gon} = R_{goff}$ = 10 Ω, $V_{GE(on)}$= 15 V, $V_{GE(off)}$= -8 V, L_S = 0.8 µH, T_j= 175 °C		211		ns
Fall Time	t_f			172		ns
Turn On Delay Time	$t_{d(on)}$			240		ns
Turn Off Delay Time	$t_{d(off)}$			636		ns
Turn-On Energy Loss Per Pulse	E_{on}			11.1		mJ
Turn-Off Energy Loss Per Pulse	E_{off}			21.8		mJ
Free-wheeling Silicon Carbide Diode						
Forward Voltage	V_F	I_F = 100 A, V_{GE} = 0 V, T_j = 25 °C (175 °C)		2.08 (3.5)		V
Threshold Voltage at Diode	$V_{D(TO)}$	T_j = 25 °C		0.8		V
Peak Reverse Recovery Current	I_{rrm}	I_F = 100 A, V_{GE} = 0 V, V_R = 800 V, -dI_F/dt = 625 A/µs, T_j = 175 °C		10		A
Reverse Recovery Time	t_{rr}			100		ns
Rise Time	t_r	V_{CC}= 800 V, I_C = 100 A, $R_{gon} = R_{goff}$ = 10 Ω, $V_{GE(on)}$= 15 V, $V_{GE(off)}$= -8 V, L_S = 0.8 µH, T_j= 25 °C		148		ns
Fall Time	t_f			336		ns
Turn-On Energy Loss Per Pulse	E_{on}			218		µJ
Turn-Off Energy Loss Per Pulse	E_{off}			113		µJ
Reverse Recovery Charge	Q_{rr}			730		nC
Rise Time	t_r	V_{CC}= 800 V, I_C = 100 A, $R_{gon} = R_{goff}$ = 10 Ω, $V_{GE(on)}$= 15 V, $V_{GE(off)}$= -8 V, L_S = 0.8 µH, T_j= 175 °C		178		ns
Fall Time	t_f			268		ns
Turn-On Energy Loss Per Pulse	E_{on}			23		µJ
Turn-Off Energy Loss Per Pulse	E_{off}			334		µJ
Reverse Recovery Charge	Q_{rr}			480		nC

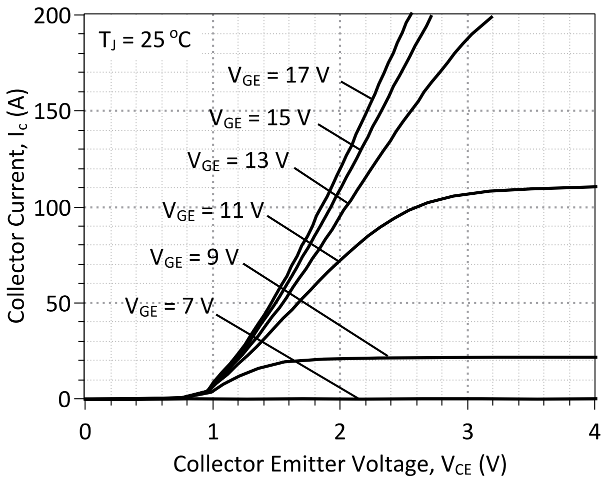


Figure 1: Typical Output Characteristics at 25 °C

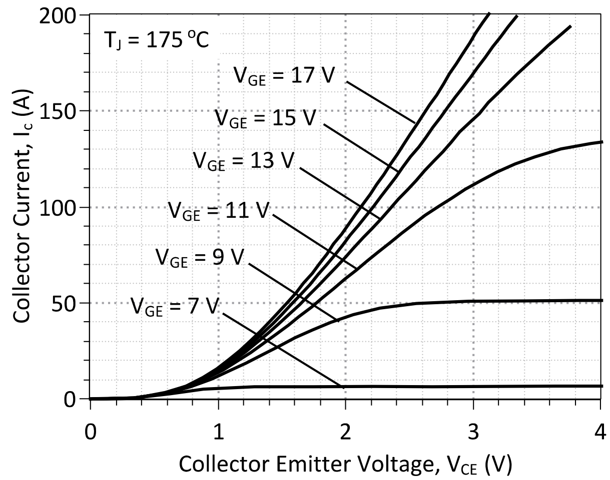


Figure 2: Typical Output Characteristics at 175 °C

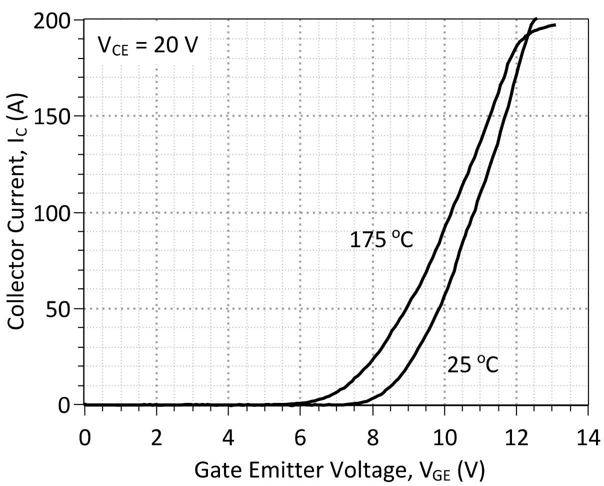


Figure 3: Typical Transfer Characteristics

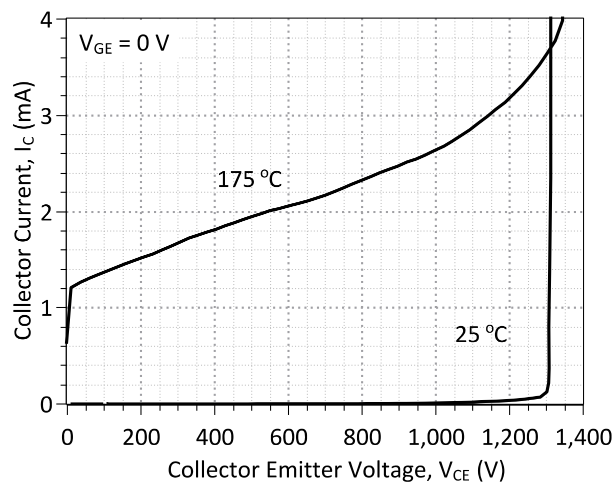


Figure 4: Typical Blocking Characteristics

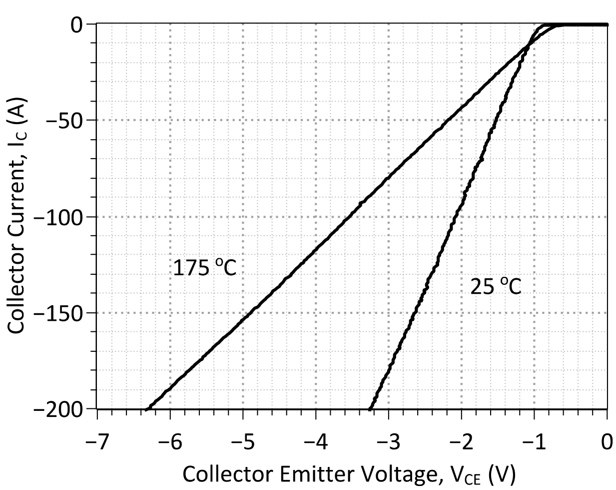


Figure 5: Typical FWD Forward Characteristics

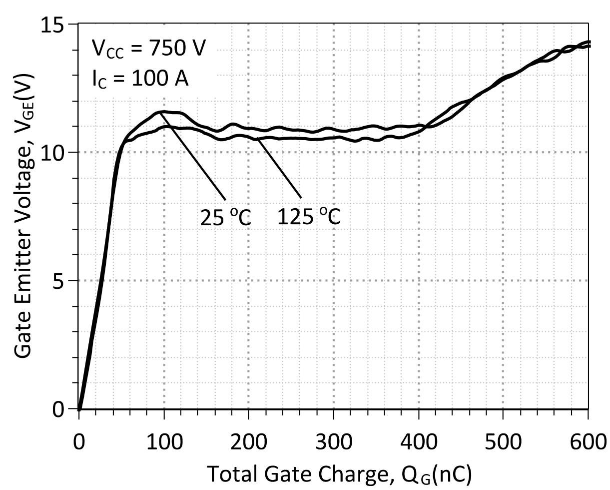


Figure 6: Typical Turn On Gate Charge

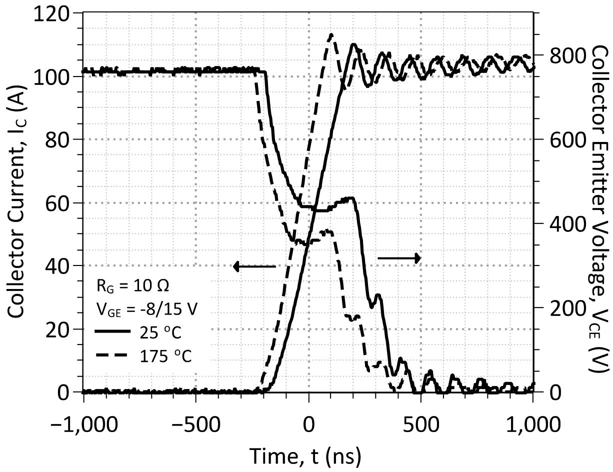


Figure 7: Typical Hard-Switched IGBT Turn On Waveforms

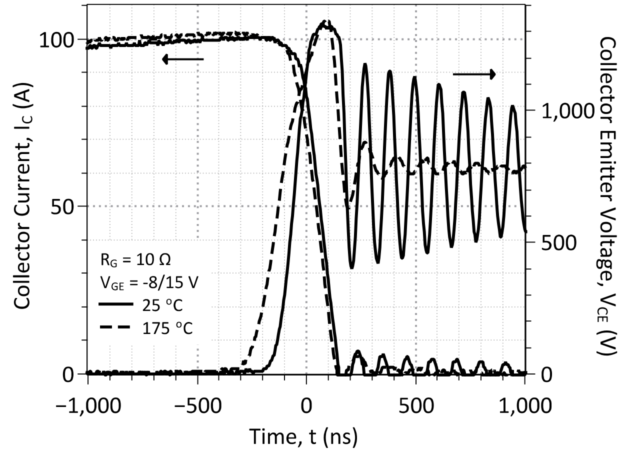


Figure 8: Typical Hard-Switched IGBT Turn Off Waveforms

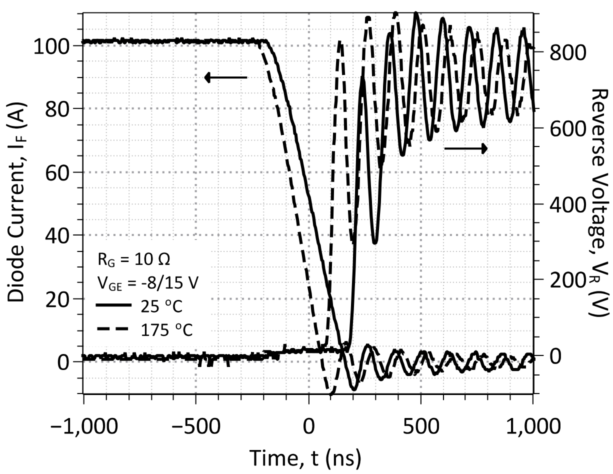


Figure 9: Typical Hard-Switched Free-wheeling SiC Diode Turn Off Waveforms

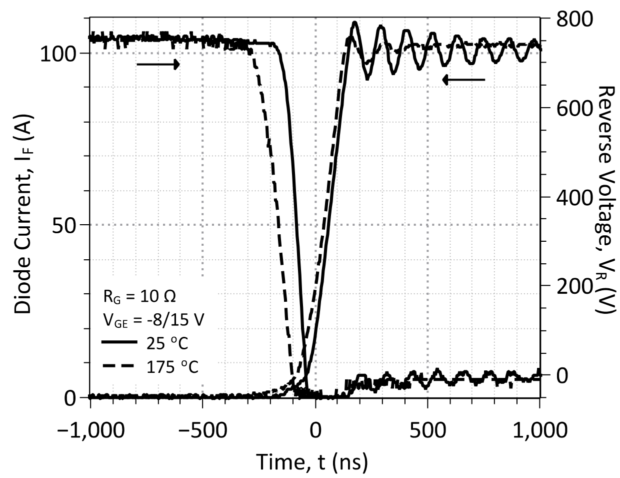


Figure 10: Typical Hard-Switched Free-wheeling SiC Diode Turn On Waveforms

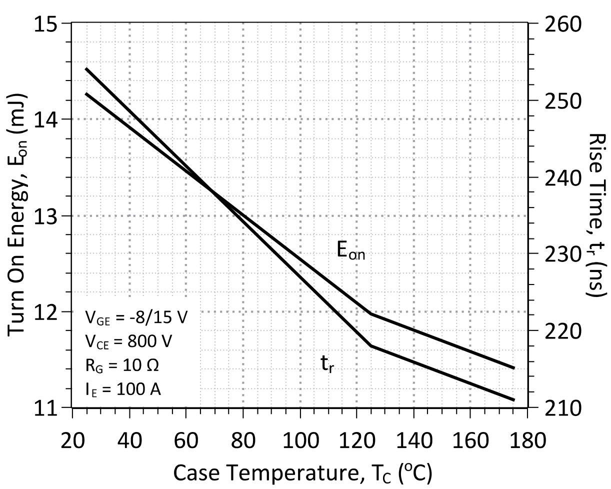


Figure 11: Typical Module Energy Losses and Switching Times at IGBT Turn On vs. Temperature

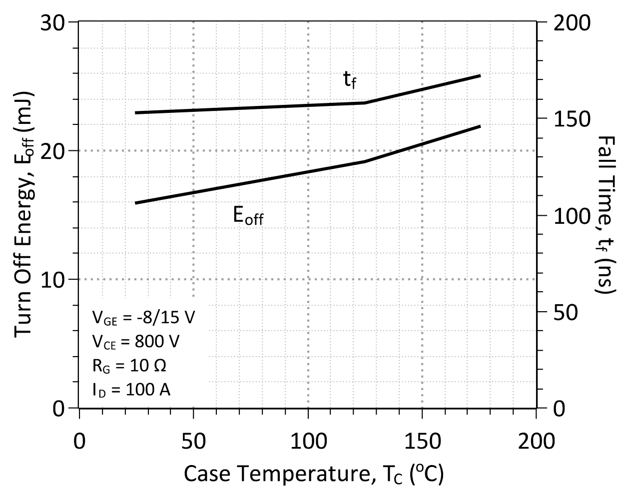


Figure 12: Typical Module Energy Losses and Switching Times at IGBT Turn Off vs. Temperature

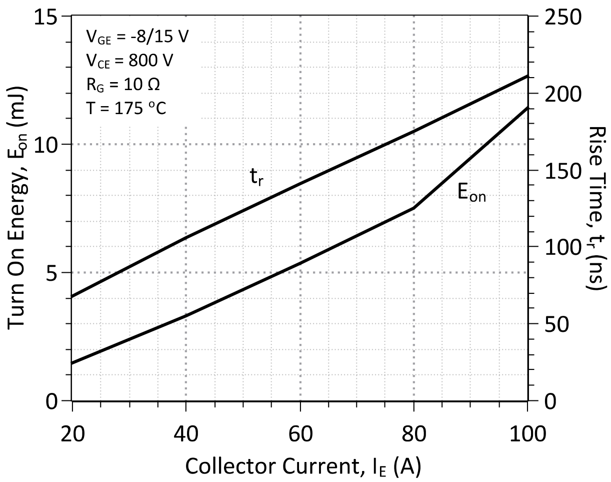


Figure 13: Typical Module Energy Losses and Switching Times at IGBT Turn On vs. Current

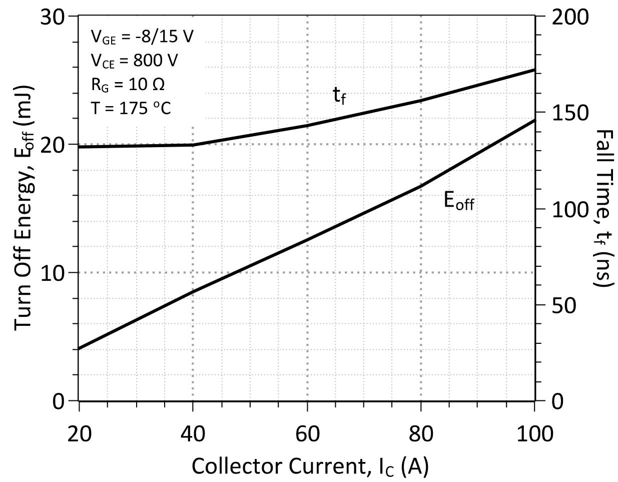


Figure 14: Typical Module Energy Losses and Switching Times at IGBT Turn Off vs. Current

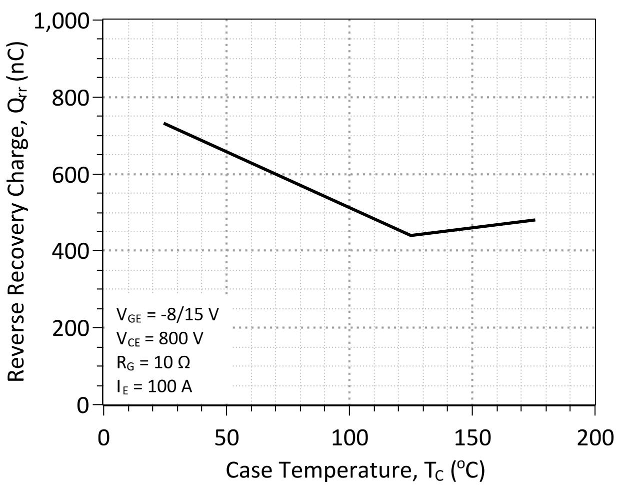


Figure 15: Typical Hard-Switched Reverse Recovery Charge vs. Temperature

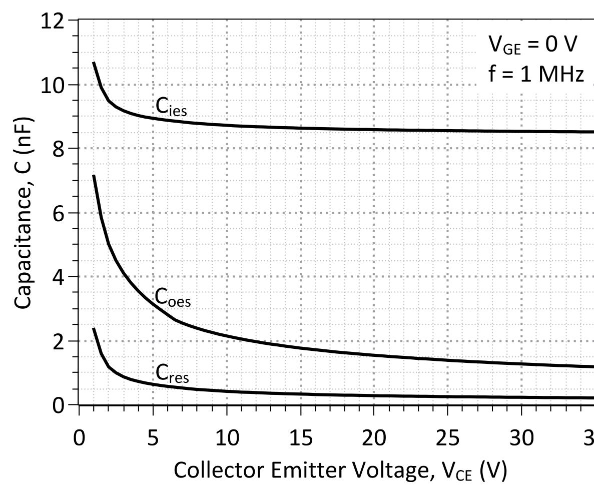
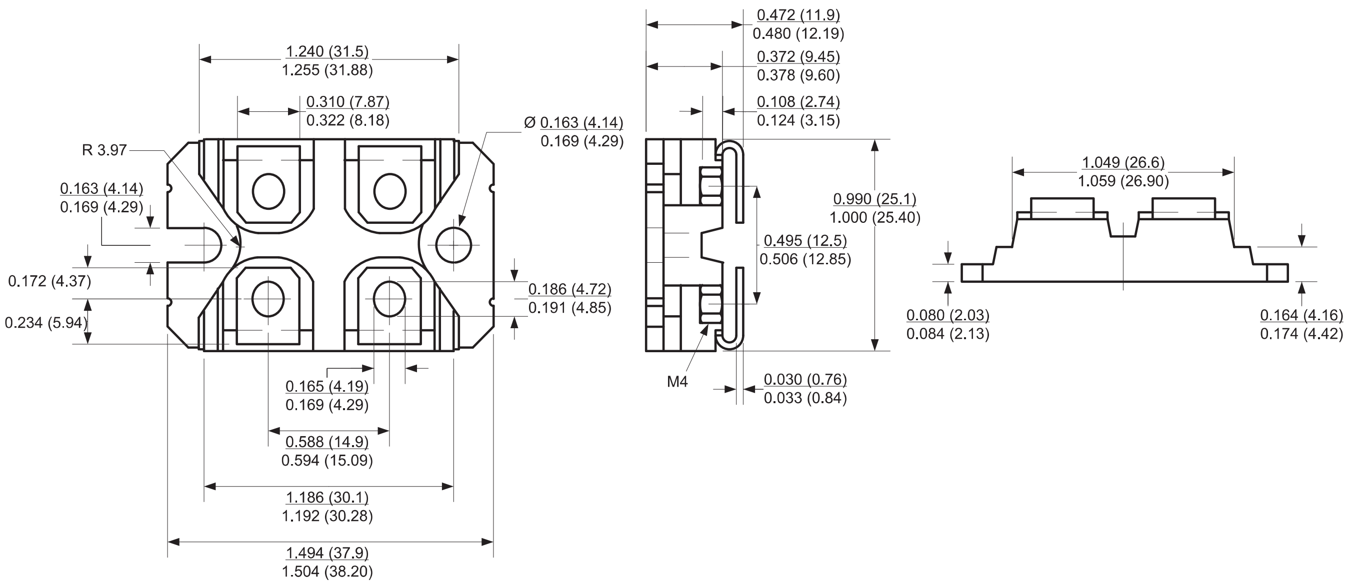


Figure 16: Typical C-V Characteristics

Package Dimensions:

SOT-227 **PACKAGE OUTLINE**



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
2013/02/08	2	Updated Electrical Characteristics	
2012/07/30	1	Second generation release	GA100XCP12-227
2011/01/06	0	Initial release	

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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
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- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

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