GeneSiC SEMICONDUCTOR

GA35XCP12-247

IGBT/SiC Diode Co-pack

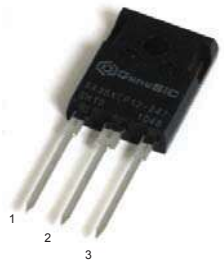
V_{CES}	=	1200 V
I_{CM}	=	35 A
$V_{CE(SAT)}$	=	3.0 V

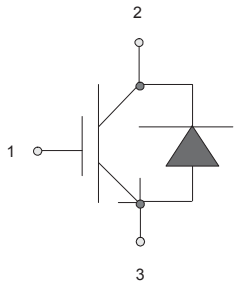
Features

- 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





TO – 247AB

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 = 150 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
IGBT				
Collector-Emitter Voltage	V_{CES}		1200	V
DC-Collector Current	I_{CM}	$T_c \leq 105$ ºC	35	A
Gate Emitter Peak Voltage	V_{GES}		± 20	V
Operating Temperature	T_{vj}		-40 to +150	ºC
Storage Temperature	T_{stg}		-40 to +150	ºC
Free-wheeling diode				
DC-Forward Current	I_F	$T_c \leq 105$ ºC	35	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				
Th. Resistance Junction to Case	R_{thJC}	IGBT	0.34	K/W
Th. Resistance Junction to Case	R_{thJC}	SiC diode	0.31	K/W

Mechanical Properties		Values			
		min.	typ.	max.	
Mounting Torque	M_d	1.5		2	Nm

http://www.genesicsemi.com/index.php/silicon-carbide-products/igbt--sic-rectifier/igbt--sic-rectifier-copack

Electrical Characteristics

Parameter	Symbol	Conditions	Values min.	Values typ.	Values max.	Unit
IGBT						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 0.6 mA, T_j = 25 ºC	5.5	6	6.5	V
Collector-Emitter Leakage Current	$I_{CES,25}$	V_{GE} = 0 V, $V_{CE} = V_{CES}$, T_j = 25 ºC		0.02	0.2	mA
	$I_{CES,150}$	V_{GE} = 0 V, $V_{CE} = V_{CES}$, T_j = 150 ºC		0.3		mA
Gate-Leakage Current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V, T_j = 25 ºC			500	nA
Collector-Emitter Threshold Voltage	$V_{CE(TO)}$	T_j = 25ºC		1.1		V
Collector-Emitter Slope Resistance	$R_{CE,25}$	V_{GE} = 15 V, T_j = 25 ºC		50		mΩ
	$R_{CE,150}$	V_{GE} = 15 V, T_j = 150 ºC		87.5		mΩ
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	I_C = 35 A, V_{GE} = 15 V, T_j = 25 ºC(150 ºC)		3.0(3.9)		V
Input Capacitance	C_{ies}	V_{GE} = 0 V, V_{CE} = 25 V, f = 1 MHz		tbd		nF
Output Capacitance	C_{oes}			tbd		nF
Reverse Transfer Capacitance	C_{res}			tbd		nF
Gate Charge	Q_G	V_{CC}= 800 V, I_C = 35 A, V_{GE}= 15V		50		nC
Reverse Bias Safe Operating Area	RBSOA	T_j=125 ºC, R_g=56Ω, V_{CC}=1200 V, V_{GE}=15 V		45		A
Short Circuit Current	I_{sc}	T_j = 125 ºC, R_g = 56Ω,		60		A
Short Circuit Duration	t_{sc}	V_{CC} = 900 V, V_{GE} = ±15 V			10	µs
Rise Time	t_r	V_{CC}= 800 V, I_C = 35 A, $R_{gon} = R_{goff}$ = 22 Ω, $V_{GE(on)}$ = 15 V, $V_{GE(off)}$= -8 V, T_j= 125 ºC		85		ns
Fall Time	t_f			205		ns
Turn On Delay Time	$t_{d(on)}$			40		ns
Turn Off Delay Time	$t_{d(off)}$			232		ns
Turn-On Energy Loss Per Pulse	E_{on}			2.66		mJ
Turn-Off Energy Loss Per Pulse	E_{off}			4.35		mJ
Free-wheeling diode						
Forward Voltage	V_F	I_F = 35 A, V_{GE} = 0 V, T_j = 25 ºC (150 ºC)		2.6(3.5)		V
Threshold Voltage at Diode	$V_{D(TO)}$	T_j = 25 ºC		0.8		V
Peak Reverse Recovery Current	I_{rrm}	I_F = 35 A, V_{GE} = 0 V, V_R = 650 V, $-dI_F/dt$ = 300 A/µs, T_j = 125 ºC		3.01		A
Reverse Recovery Time	t_{rr}			36		ns
Diode peak rate of fall of reverse recovery current during tb	dI_{rr}/dt			190		A/µs

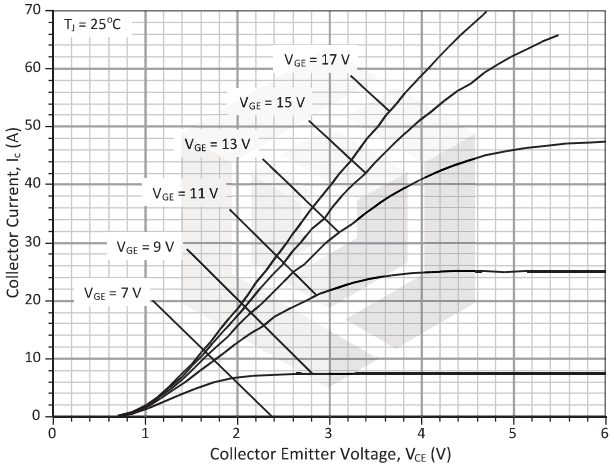


Figure 1: Typical Output Characteristics at 25 °C

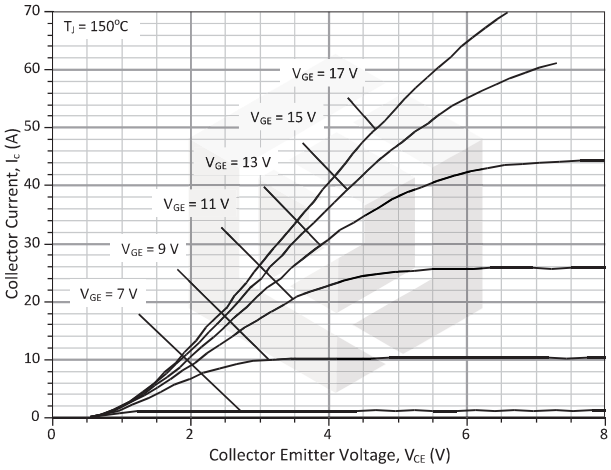


Figure 2: Typical Output Characteristics at 150 °C

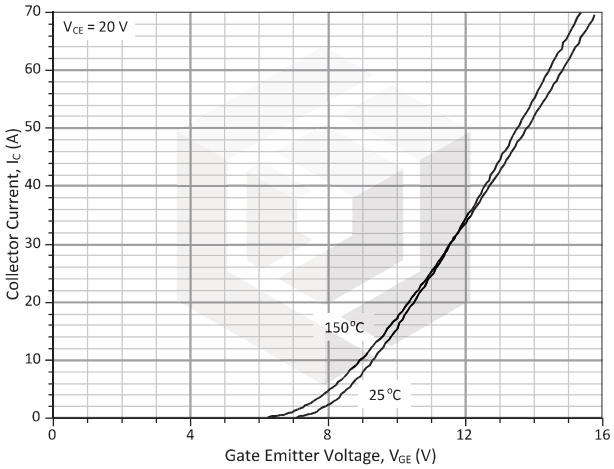


Figure 3: Typical Transfer Characteristics

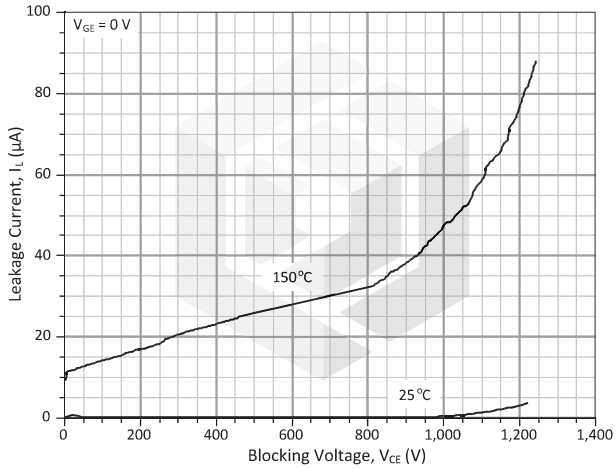


Figure 4: Typical Blocking Characteristics

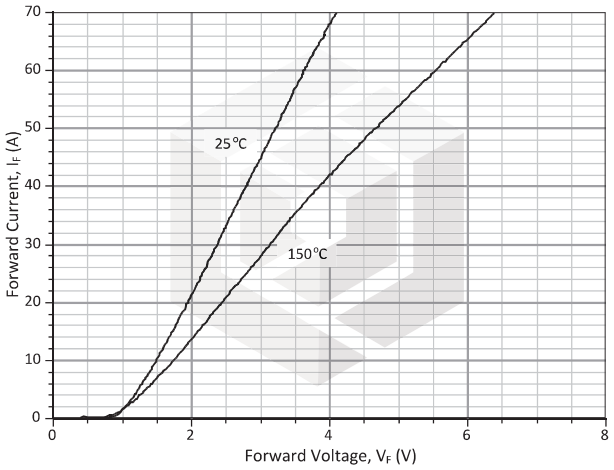


Figure 5: Typical FWD Forward Characteristics

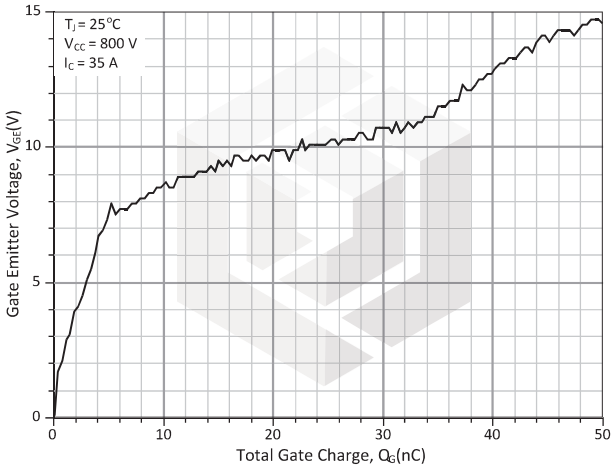


Figure 6: Typical Turn On Gate Charge

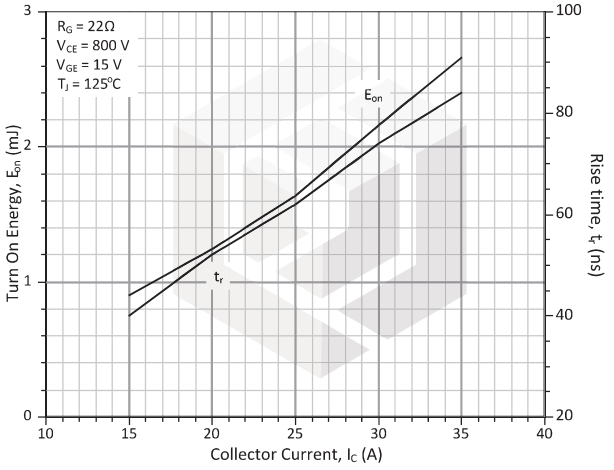


Figure 7: Typical Turn On Energy Losses and Switching Times

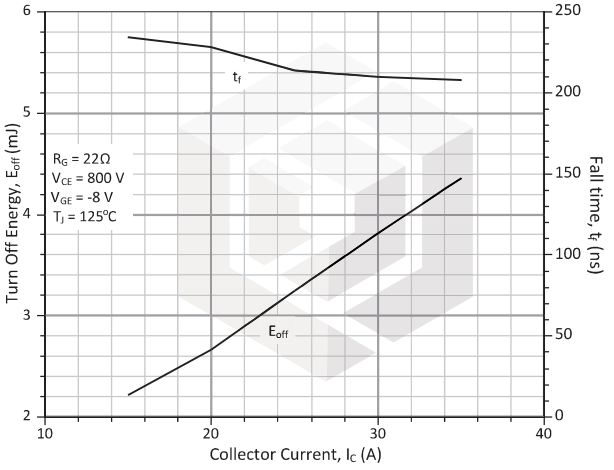


Figure 8: Typical Turn Off Energy Losses and Switching Times

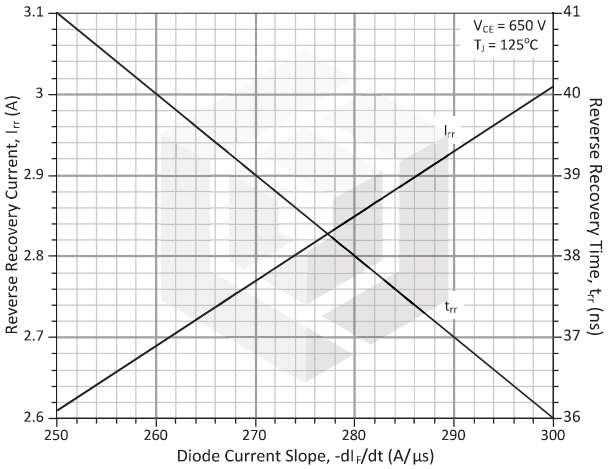
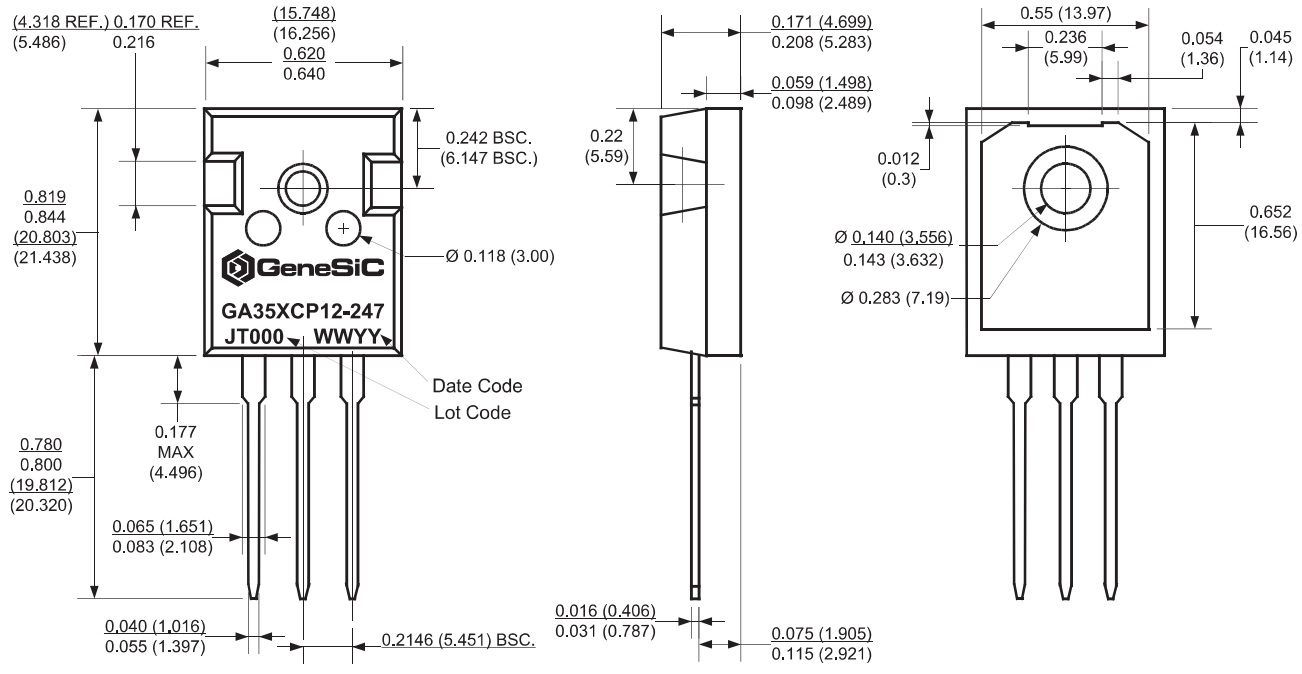


Figure 9: Typical Reverse Recovery Currents and Times

Package Dimensions:

TO-247AB **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
2011/01/06	1	First generation release	

Published by
GeneSiC Semiconductor, Inc.
43670 Trade Center Place Suite 155
Dulles, VA 20166