GeneSiC SEMICONDUCTOR

GA35XCP12-247

IGBT/SiC Diode Co-pack

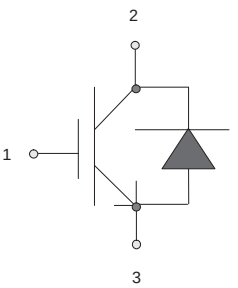
V_{CES}	=	1200 V
I_{CM}	=	35 A
$V_{CE(SAT)}$	=	3.0 V

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 ≤ 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 ≤ 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, V_{CC} = 900 V, V_{GE} = ±15 V		60		A
Short Circuit Duration	t_{sc}				10	µs
Rise Time	t_r	V_{CC}= 800 V, I_C = 35 A, R_{gon} = R_{goff} = 22 Ω, $V_{GE(0n)}$= 15 V, $V_{GE(0ff)}$= -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

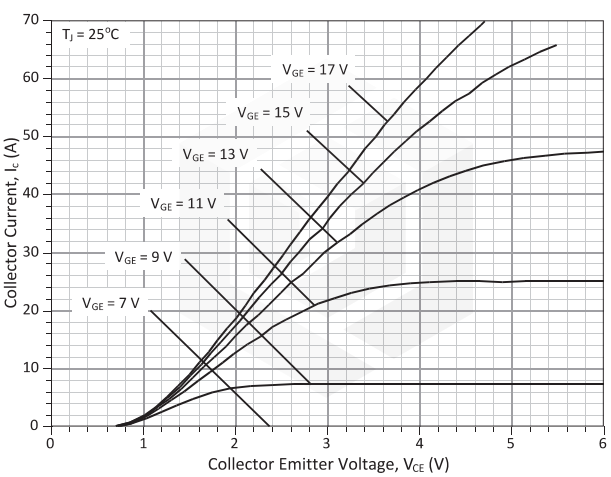


Figure 1: Typical Output Characteristics at 25 ºC

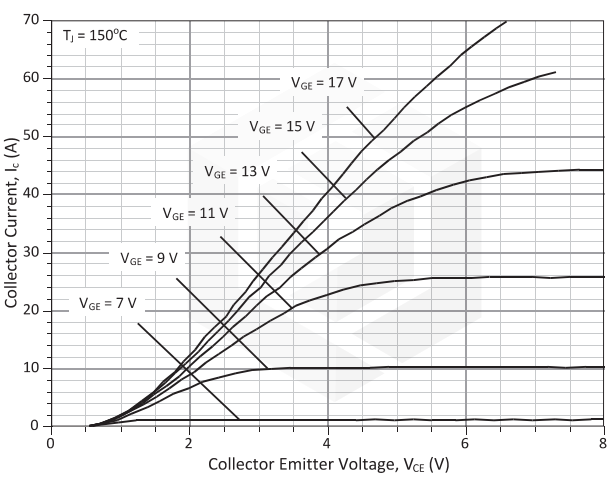


Figure 2: Typical Output Characteristics at 150 ºC

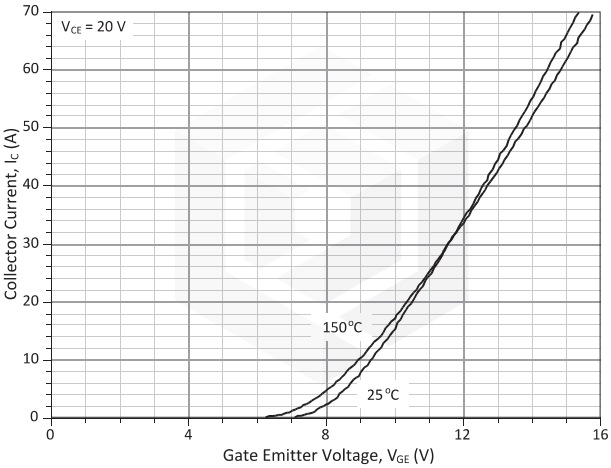


Figure 3: Typical Transfer Characteristics

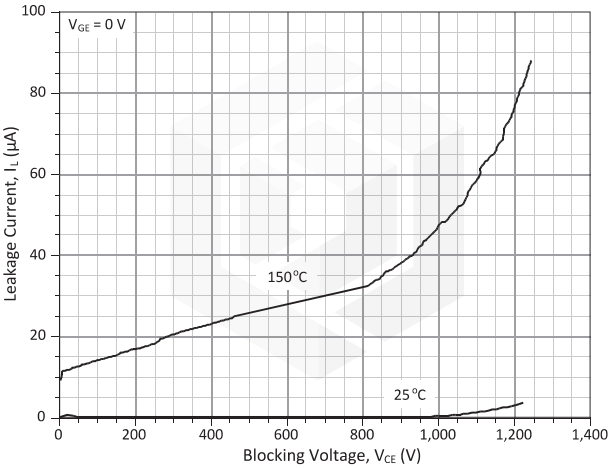


Figure 4: Typical Blocking Characteristics

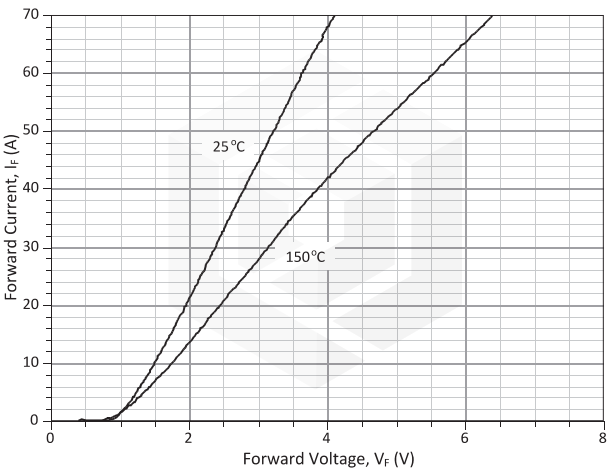


Figure 5: Typical FWD Forward Characteristics

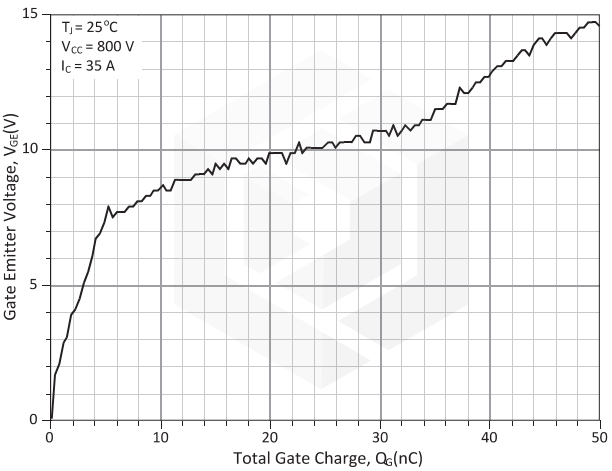


Figure 6: Typical Turn On Gate Charge

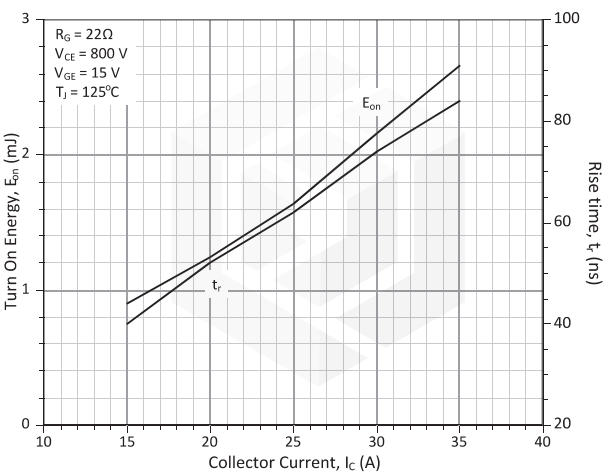


Figure 7: Typical Turn On Energy Losses and Switching Times

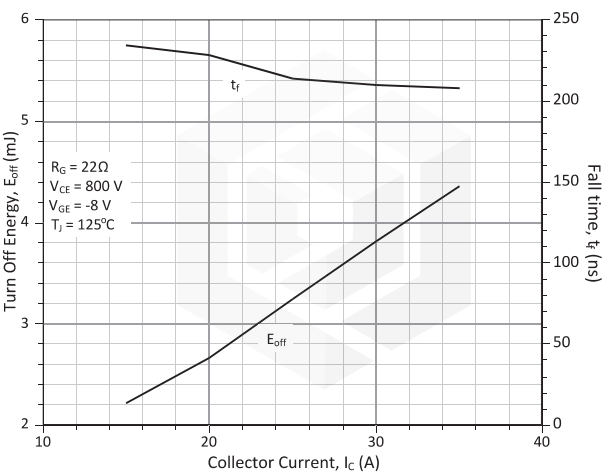


Figure 8: Typical Turn Off Energy Losses and Switching Times

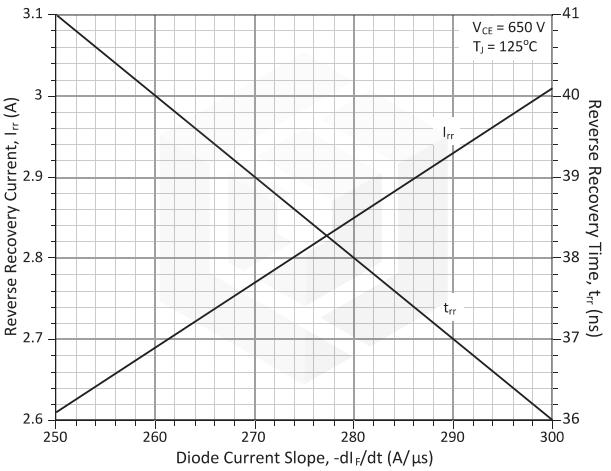
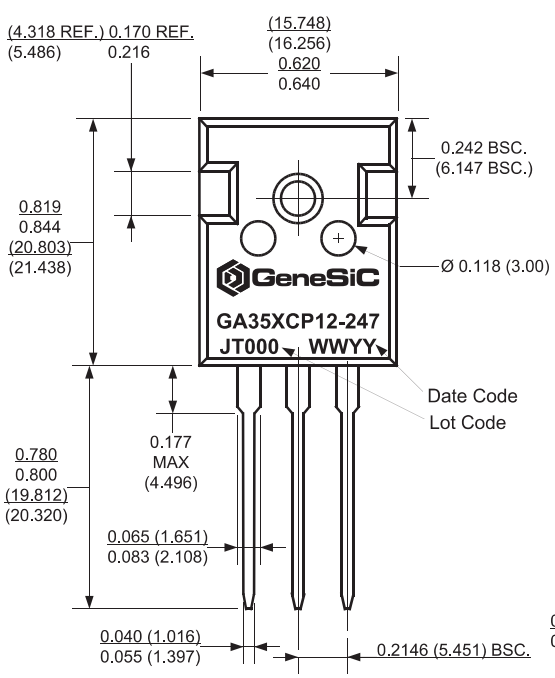


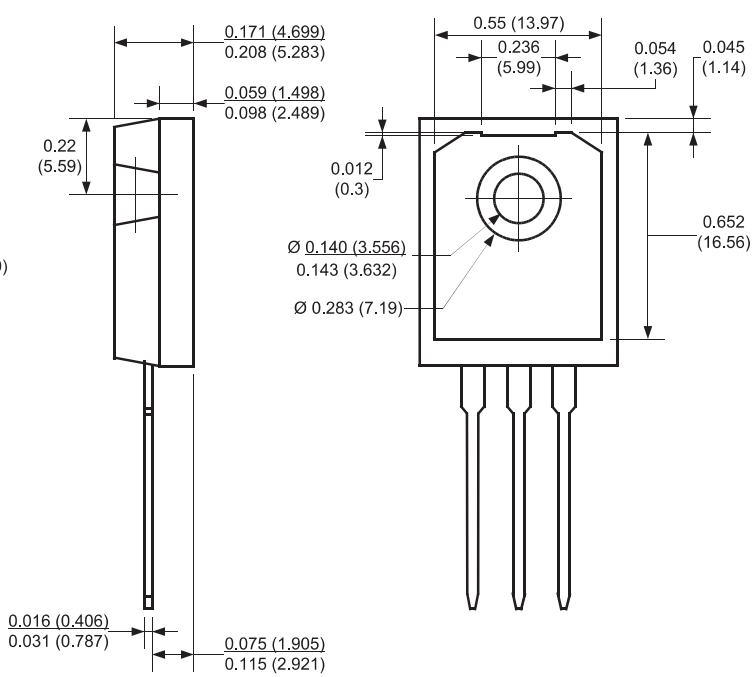
Figure 9: Typical Reverse Recovery Currents and Times

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