

## IGBT

### Phase Leg Module

#### Features

- SPT chip (soft-punch-through)
- MOS input control
- Low  $V_{CE(SAT)}$
- Positive temperature coefficient for easy paralleling
- High short-circuit current capability
- Low switching losses
- Isolation voltage 2500 V RMS

#### Applications

- AC and DC motor control
- AC servo and robot devices
- Power supplies
- Welding inverters

#### Maximum Ratings

Parameter	Symbol	Conditions	Values	Units	Circuit Diagram
-----------	--------	------------	--------	-------	-----------------

#### IGBT

Collector-Emitter Voltage	$V_{CES}$		1200	V	
DC-Collector Current	$I_{CM}$	$T_c=25^\circ\text{C} (85^\circ\text{C})$	450 (300)	A	
Gate Emitter Peak Voltage	$V_{GES}$		$\pm 20$	V	
Operating Temperature	$T_{vj}$		-40 to +125	$^\circ\text{C}$	
Storage Temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$	
Insulation Test Voltage	$V_{ISOL}$	RMS, 1min, 50 Hz	2500	V	

#### Free-wheeling diode

DC-Forward Current	$I_F$	$T_c=25^\circ\text{C} (85^\circ\text{C})$	450 (300)	A
Repetitive Peak Forward Current	$I_{FM}$		$t_p=1\text{ms}$	900 (600)
Forward Surge Current	$I_{FSM}$	$t_p=10\text{ms}, \text{Sin}, T_j=150^\circ\text{C}$	2200	A

#### Thermal Properties

Th. Resistance Junction to Case	$R_{thJC}$	0.06	K/W
Th. Resistance Case to Heat Sink	$R_{thCS}$	0.03	K/W

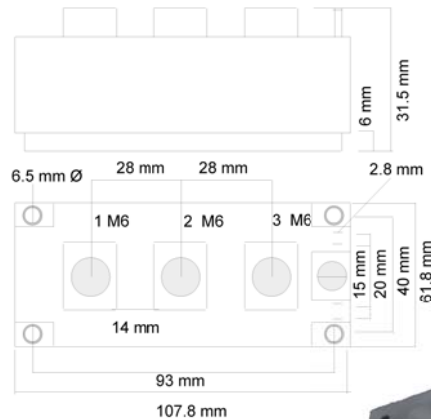
#### Mechanical Properties

	Symbol	Values		
		Min	Typ	Max
Mounting Torque	$M_d$	3		6
Terminal Connection Torque		2.5		5
Weight			324	g
Case Color			White	
Dimensions			107.5x62x31	mm

$$V_{CES} = 1200 \text{ V}$$

$$I_{CM} = 300 \text{ A}$$

$$V_{CE(SAT)} = 2 \text{ V}$$



## Characteristic Values

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	
<b>IGBT</b>						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 2mA, T_j = 25^\circ C$		7.5		V
Collector-Emitter Cut-Off Current	$I_{CES,25}$	$V_{GE} = 0V, V_{CE} = V_{CES}, T_j = 25^\circ C$		0.5		mA
	$I_{CES,125}$	$V_{GE} = 0V, V_{CE} = V_{CES}, T_j = 125^\circ C$		1		mA
Gate-Leakage Current	$I_{GES}$	$V_{GE} = 0V, V_{CE} = 20V, T_j = 25^\circ C$	-400		400	nA
Collector-Emitter Threshold Voltage	$V_{CE(TO)}$	$T_j = 25^\circ C$		1		V
Collector-Emitter Slope Resistance	$R_{CE,25}$	$V_{GE} = 15V, T_j = 25^\circ C$		3		mΩ
	$R_{CE,125}$	$V_{GE} = 15V, T_j = 125^\circ C$		4.5		mΩ
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = 300A, V_{GE} = 15V, T_j = 25^\circ C$		2		V
Input Capacitance	$C_{ies}$	$V_{GE} = 0V, V_{CE} = 25V, f = 1MHz$		26		nF
Output Capacitance	$C_{oes}$			3		nF
Reverse Transfer Capacitance	$C_{res}$			3		nF
Stray Module Inductance	$L_\sigma$			20		nH
Rise Time	$t_R$	$V_{CC} = 600V, I_C = 300A, T_j = 125^\circ C, R_{gon} = R_{goff} = 12\Omega, V_{GE} = \pm 18V$		260		ns
Fall Time	$t_F$			220		ns
Turn-On Energy Loss Per Pulse	$E_{on}$			10.8		mJ
Turn-Off Energy Loss Per Pulse	$E_{off}$			68		mJ
<b>Free-wheeling diode</b>						
Forward Voltage	$V_F$	$I_F = 300A, V_{GE} = 0V, T_j = 25^\circ C$		1.9		V
Threshold Voltage at Diode	$V_{D(TO)}$	$T_j = 25^\circ C$		0.7		V
Peak Reverse Recovery Current	$I_{RRM}$	$I_F = 300A, V_{GE} = 0V, -di/dt = 190 A/\mu s$		43		A
Reverse Recovery Time	$t_{RR}$			1200		ns

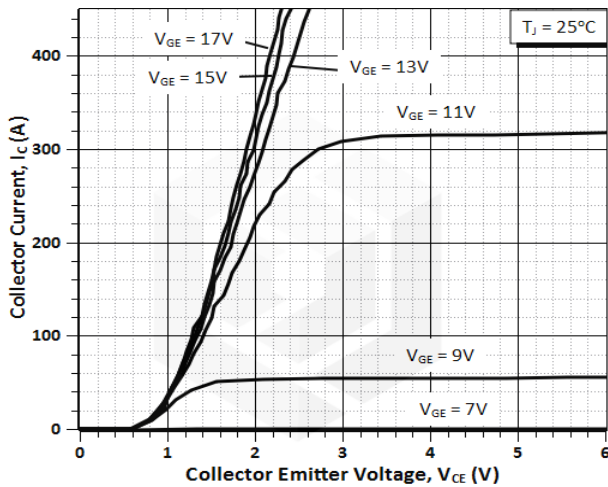


Figure 1: Typical Output Characteristics at 25 °C

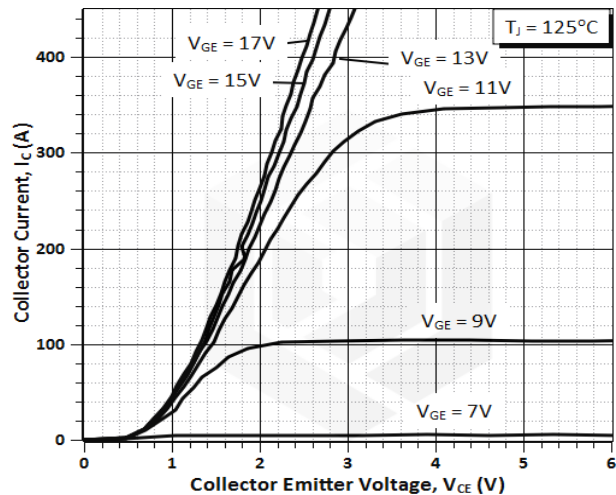


Figure 2: Typical Output Characteristics at 125 °C

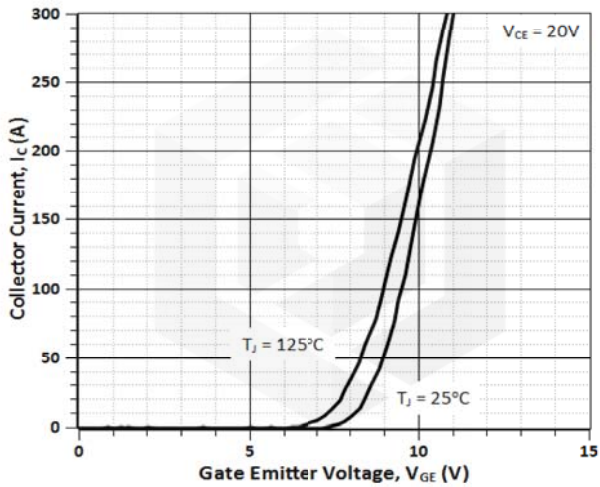


Figure 3: Typical Transfer Characteristics

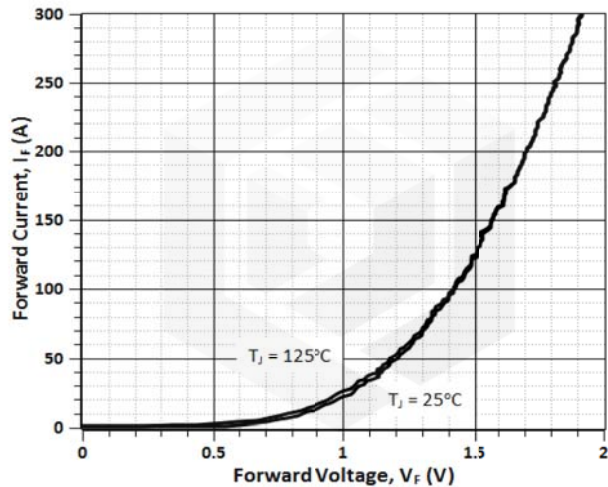


Figure 4: Typical FWD Forward Characteristics

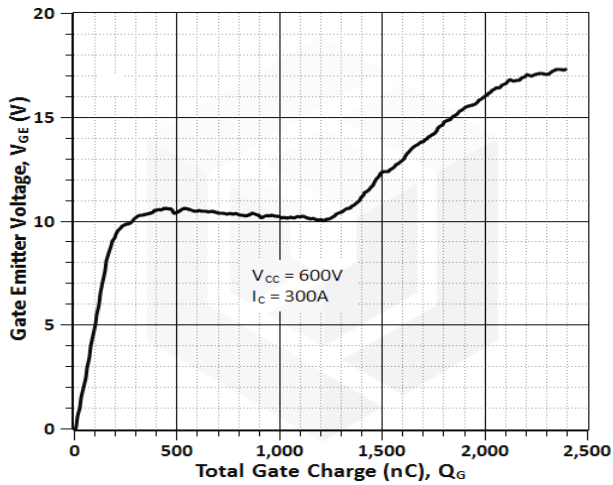


Figure 5: Typical Turn On Gate Charge

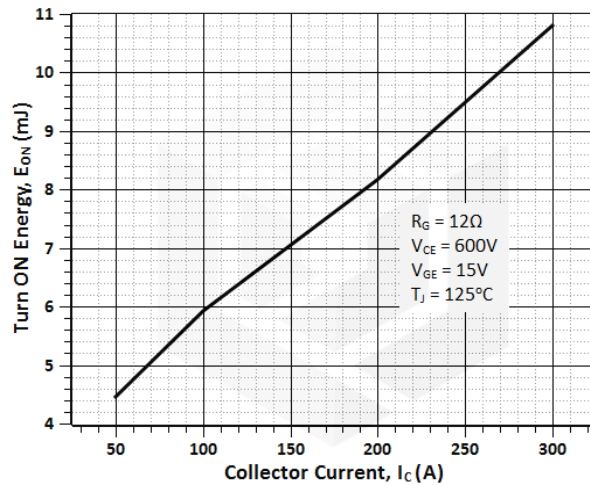


Figure 6: Typical Turn On Energy vs Collector Current

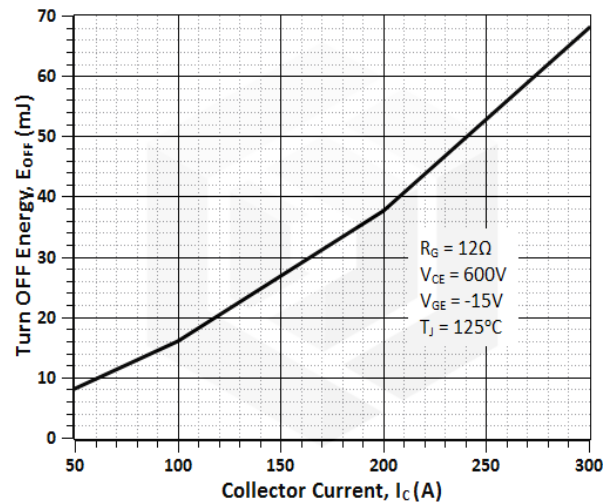


Figure 7: Typical Turn Off Energy vs Collector Current

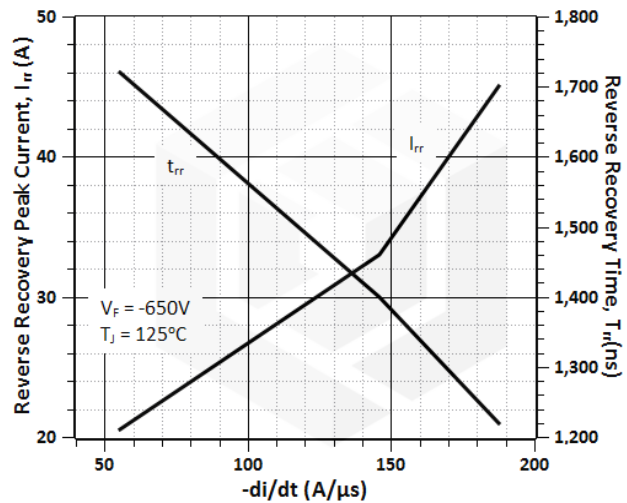


Figure 8: Typical FWD Turn Off Characteristics

Revision History		
Date	Rev.	Notes
2010-10-08	0	Created

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

Information in this document is provided solely in connection with GeneSiC products. GeneSiC Semiconductor, Inc. reserves the right to make changes, corrections, modifications, or improvements without notice.

No license, express or implied to any intellectual property rights is granted under this agreement.

Unless expressly approved in writing by an authorized representative of GeneSiC. GeneSiC products are not designed, authorized or warranted for use in military, aircraft, space, life saving, or life sustaining applications, nor in products or systems where failure or malfunction may result in personal injury, death, or property or environmental damage.