

## IGBT Module

### Features

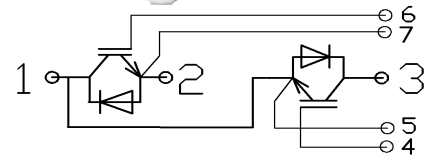
- 1200V 450A,  $V_{CE(sat)(typ.)} = 2.6\text{ V}$
- SPT (Soft Punch Through) technology
- Lower losses
- Higher system efficiency
- Excellent short-circuit capability
- Square RBSOA

### Mechanical Data

- **Case:** D2(6 2mm)(plastic package).  
Lead free; RoHS compliant
- **Molding Compound Flammability Rating:**  
UL 94 V-0

### Benefits

- Inverter for motor drive
- AC and DC servo drive amplifier
- Excellent Current Sharing in Parallel Operation



Equivalent Circuit Schematic

### Applications

CREATEK's IGBTs offer lower losses and higher energy for application such as motor drive ,UPS, inverter and other soft switching applications.

### Absolute Maximum Ratings of IGBT

Symbol	Parameter	Value	Units
$V_{CES}$	Collector to Emitter Voltage	1200	V
$V_{GES}$	Continuous Gate to Emitter Voltage	$\pm 30$	V
$I_C$	Continuous Collector Current	$T_C = 25^\circ\text{C}$	900
		$T_C = 100^\circ\text{C}$	450
$I_{CM}$	Pulse Collector Current	$T_J = 150^\circ\text{C}$	900
$P_D$	Maximum Power Dissipation (IGBT)	$T_C = 25^\circ\text{C}$ , $T_J = 150^\circ\text{C}$	1360
$t_{sc}$	Short Circuit Withstand Time	> 10	$\mu\text{s}$
$T_J$	Maximum IGBT Junction Temperature	150	$^\circ\text{C}$
$T_{JOP}$	Maximum Operating Junction Temperature Range	-40 to +150	$^\circ\text{C}$
$T_{stg}$	Storage Temperature Range	-40 to +125	$^\circ\text{C}$

### Absolute Maximum Ratings of Freewheeling Diode

Symbol	Parameter	Value	Units
$V_{RRM}$	Repetitive Peak Reverse Voltage Preliminary Data	1200	V
$I_F$	Diode Continuous Forward Current	$T_C = 25^\circ\text{C}$	900
	Diode Continuous Forward Current	$T_C = 100^\circ\text{C}$	450
$I_{FM}$	Diode Maximum Forward Current	900	A

## Electrical Characteristics of IGBT ( $T_J=25^{\circ}\text{C}$ unless otherwise noted )

Symbol	Parameter	TestConditions	Min.	Typ.	Max.	Units
$BV_{CES}$	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 1mA$	1200			V
$I_{CES}$	Collector to Emitter Leakage Current	$V_{GE} = 0V, V_{CE} = V_{CES}$			5	mA
$I_{GES}$	Gate to Emitter Leakage Current	$V_{GE} = \pm 30V, V_{CE} = 0V$			400	nA
$V_{GE(th)}$	Gate Threshold Voltage	$I_C = 2mA, V_{CE} = V_{GE}$	4.5		5.7	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Module Level)	$I_C = 450A, V_{GE} = 15V$		2.60	2.80	V
				3.00		

## Electrical Characteristics of IGBT ( $T_J=25^{\circ}\text{C}$ unless otherwise noted )

Symbol	Parameter	TestConditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-on Delay Time	$T_J = 25^{\circ}\text{C}$		65		ns
		$T_J = 125^{\circ}\text{C}$		70		
$t_r$	Turn-on Rise Time	$T_J = 25^{\circ}\text{C}$		110		ns
		$T_J = 125^{\circ}\text{C}$		120		
$t_{d(off)}$	Turn-off Delay Time	$T_J = 25^{\circ}\text{C}$		520		ns
		$T_J = 125^{\circ}\text{C}$		580		
$t_f$	Turn-off Fall Time	$T_J = 25^{\circ}\text{C}$		110		ns
		$T_J = 125^{\circ}\text{C}$		130		
$E_{on}$	Turn-on Switching Loss	$T_J = 25^{\circ}\text{C}$		20.50		mJ
		$T_J = 125^{\circ}\text{C}$		31.00		
$E_{off}$	Turn-off Switching Loss	$T_J = 25^{\circ}\text{C}$		35.00		mJ
		$T_J = 125^{\circ}\text{C}$		52.00		
$Q_g$	Total Gate Charge	$T_J = 25^{\circ}\text{C}$		4560		nC
$R_{gint}$	Integrated gate resistor	$f = 1M; V_{pp} = 1V$	$T_J = 25^{\circ}\text{C}$	2.5		$\Omega$
$C_{ies}$	Input Capacitance	$V_{CE} = 25V$ $V_{GE} = 0V$ $f = 1MHz$	$T_J = 25^{\circ}\text{C}$	21.5		nF
$C_{oes}$	Output Capacitance		$T_J = 25^{\circ}\text{C}$	3.3		
$C_{res}$	Reverse Transfer Capacitance		$T_J = 25^{\circ}\text{C}$	1.9		
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (IGBT)				0.092	$^{\circ}\text{C/W}$

## Electrical and Switching Characteristics of Freewheeling Diode

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
$V_F$	Diode Forward Voltage	$I_F = 450A$ ,	$T_J = 25^\circ C$		1.90	2.20	V
		$V_{GE} = 0V$	$T_J = 125^\circ C$		1.90		
$t_{rr}$	Diode Reverse Recovery Time	$I_F = 450A$ , $di/dt=8500A/\mu s$ , $V_{rr} = 600V$ ,	$T_J = 25^\circ C$		230		ns
			$T_J = 125^\circ C$		400		
$I_{rr}$	Diode Peak Reverse Recovery Current		$T_J = 25^\circ C$		450		A
			$T_J = 125^\circ C$		760		
$Q_{rr}$	Diode Reverse Recovery Charge		$T_J = 25^\circ C$		58.0		nC
			$T_J = 125^\circ C$		85.0		
$E_{rr}$	Diode Reverse Recovery Energy		$T_J = 25^\circ C$		18.0		mJ
			$T_J = 125^\circ C$		29.5		
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Diode)					0.095	$^\circ C/W$

## Absolute Maximum Ratings of Freewheeling Diode

Symbol	Parameter	Min.	Typ.	Max.	Units
$V_{iso}$	Isolation Voltage (All Terminals Shorted), $f = 50Hz$ , 1minute	2500			V
$R_{\theta CS}$	Case-To-Sink(Conductive Grease Applied)		0.1		$^\circ C/W$
M	Power Terminals Screw: M6	3.0		5.0	N·m
M	Mounting Screw: M6	4.0		6.0	N·m
G	Weight		315		g

**Typical Characteristics** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified)

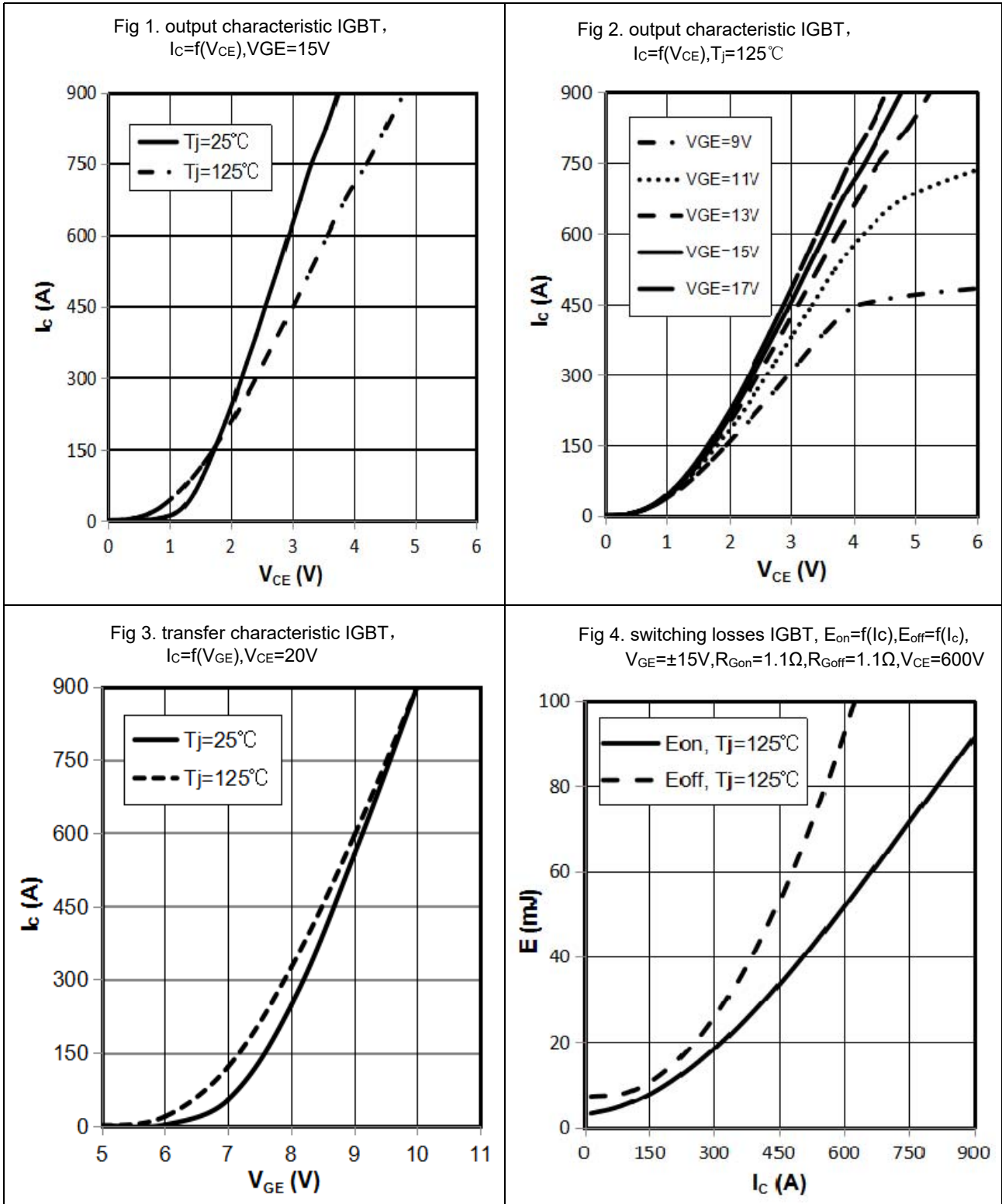


Fig 5. switching losses IGBT,  $E_{on}=f(R_g), E_{off}=f(R_g)$ ,  
 $V_{GE}=\pm 15V, I_c=300A, V_{CE}=600V$

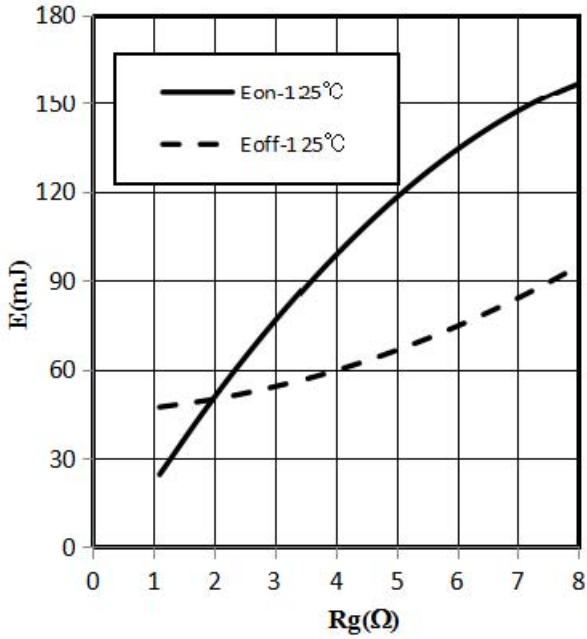


Fig 6. transient thermal impedance IGBT,  $Z_{thjc}=f(t)$

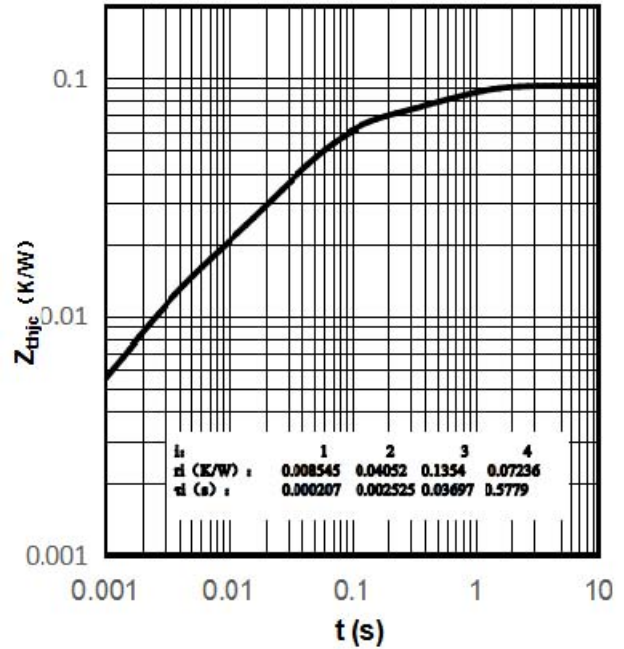


Fig 7. reverse bias safe operating area IGBT,  
 $I_c=f(V_{CE}), V_{GE}=\pm 15V, R_{Goff}=3.3\Omega, T_j=125^\circ C$

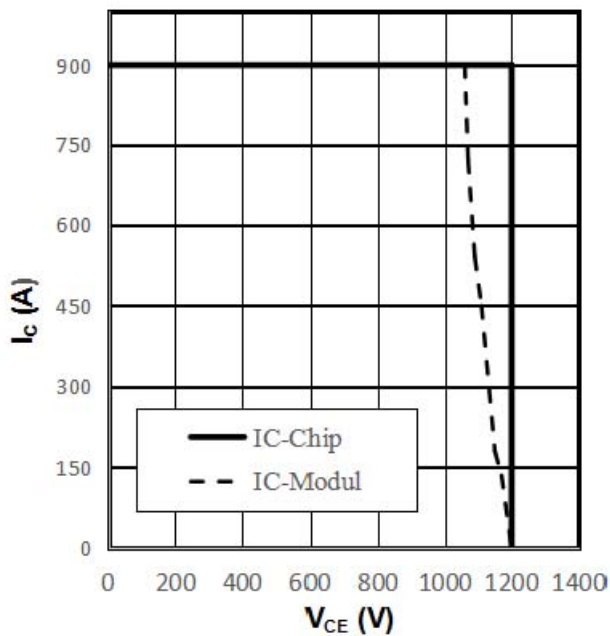
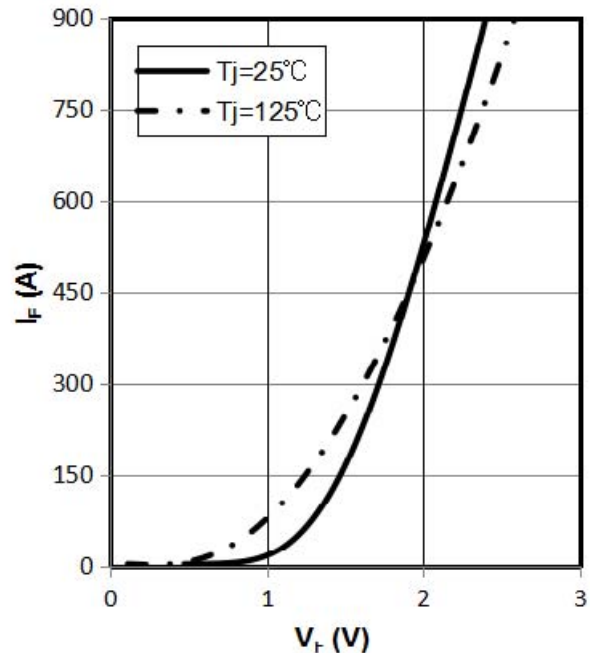
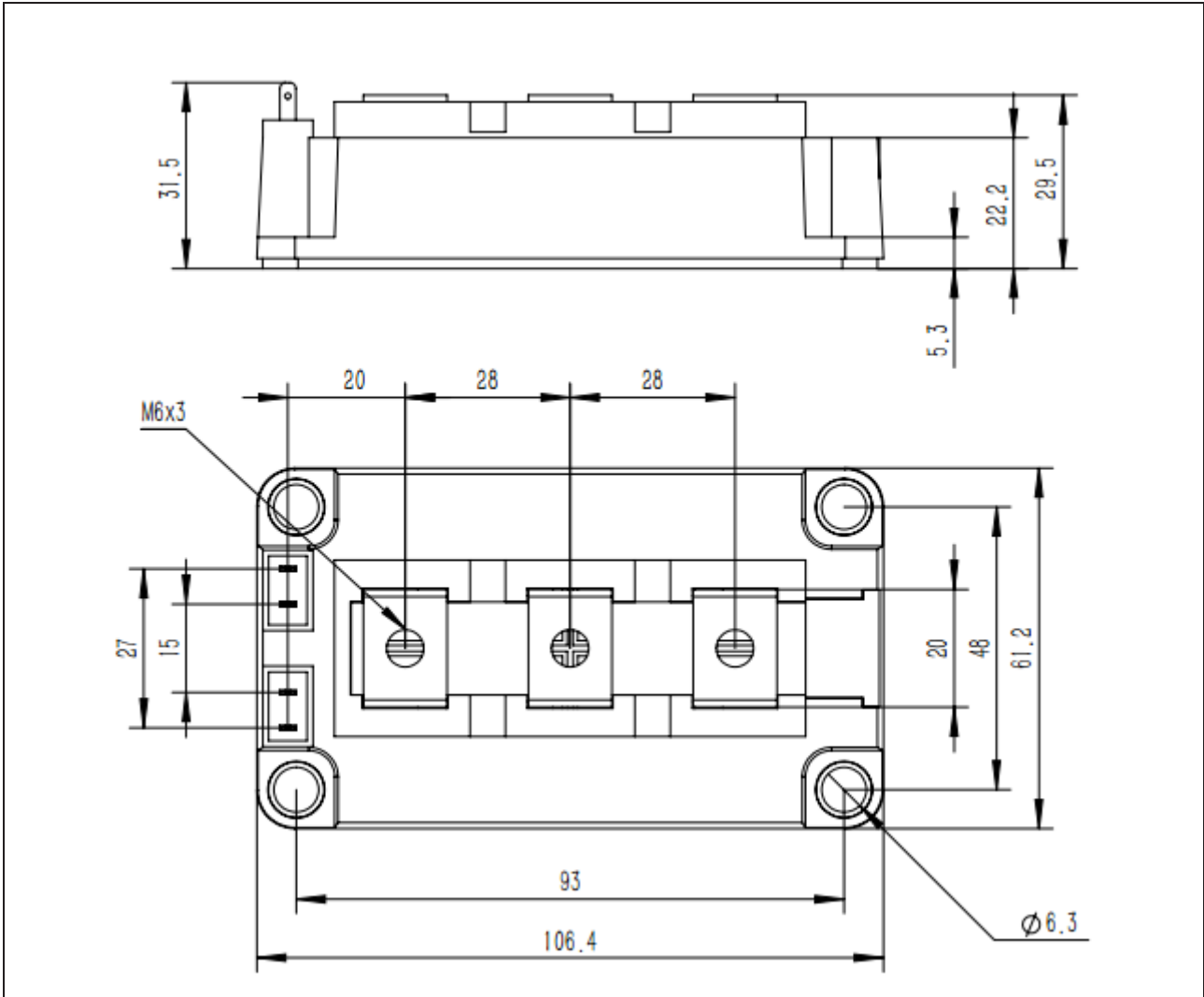


Fig 8. forward characteristic of Diode,  
 $I_F=f(V_F)$



**Package Dimensions(mm)**



**Ordering information**

Order code	Package	Packaging option	Base quantity	Packaging specification
GPU450HF120D2SE	D2(62mm)	BOX	10pcs /BOX	

**Revision history**

Date	Revision	Changes
23-May-2017	1.0	Initial release

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