

## IGBT Module

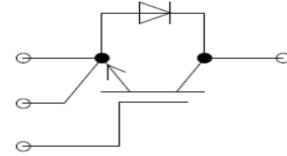
### Features

- 1200V 600A,  $V_{CE(sat)(typ.)} = 3.0\text{ V}$
- Ultrafast switching speed
- Excellent short circuit ruggedness
- 62mm Single tube module



### Mechanical Data

- **Case:** D2(62mm)(plastic package).  
Lead free; RoHS compliant
- **Molding Compound Flammability Rating:**  
UL 94 V-0



Equivalent Circuit Schematic

### Benefits

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

### 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	$T_C = 25^\circ\text{C}$	1200
		$T_C = 100^\circ\text{C}$	600
$I_{CM}$	Pulse Collector Current	$T_J = 150^\circ\text{C}$	1200
$P_D$	Maximum Power Dissipation (IGBT)	$T_C = 25^\circ\text{C}, T_J = 150^\circ\text{C}$	2660
$t_{sc}$	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	$T_C = 25^\circ\text{C}$	1200
	Diode Continuous Forward Current	$T_C = 100^\circ\text{C}$	600
$I_{FM}$	Diode Maximum Forward Current	1200	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	$I_C = 1mA, V_{CE} = V_{GE}$	4.5		5.7	V	
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Module Level)	$I_C = 600A, V_{GE} = 15V$	$T_J = 25^{\circ}\text{C}$		3.00	3.20	V
			$T_J = 125^{\circ}\text{C}$		3.60		

### 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	$V_{CC} = 600V$ $I_C = 600A$ $R_G = 1.1\Omega$ $V_{GE} = \pm 15V$ Inductive Load	$T_J = 25^{\circ}\text{C}$		140	ns
			$T_J = 125^{\circ}\text{C}$		150	
$t_r$	Turn-on Rise Time		$T_J = 25^{\circ}\text{C}$		120	ns
			$T_J = 125^{\circ}\text{C}$		125	
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^{\circ}\text{C}$		870	ns
			$T_J = 125^{\circ}\text{C}$		920	
$t_f$	Turn-off Fall Time		$T_J = 25^{\circ}\text{C}$		120	ns
			$T_J = 125^{\circ}\text{C}$		135	
$E_{on}$	Turn-on Switching Loss		$T_J = 25^{\circ}\text{C}$		15.5	mJ
			$T_J = 125^{\circ}\text{C}$		25.0	
$E_{off}$	Turn-off Switching Loss	$T_J = 25^{\circ}\text{C}$		43.0	mJ	
		$T_J = 125^{\circ}\text{C}$		52.5		
$Q_g$	Total Gate Charge	$T_J = 25^{\circ}\text{C}$		5000	nC	
$R_{gint}$	Integrated gate resistor	$f = 1M; V_{pp} = 1V$	$T_J = 25^{\circ}\text{C}$		1.3	$\Omega$
$C_{ies}$	Input Capacitance	$V_{CE} = 25V$ $V_{GE} = 0V$ $f = 1MHz$	$T_J = 25^{\circ}\text{C}$		50	nF
$C_{oes}$	Output Capacitance		$T_J = 25^{\circ}\text{C}$		7.0	
$C_{res}$	Reverse Transfer Capacitance		$T_J = 25^{\circ}\text{C}$		4.0	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (IGBT)				0.047	$^{\circ}\text{C/W}$

**Electrical and Switching Characteristics of Freewheeling Diode**

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
$V_F$	Diode Forward Voltage	$I_F = 600A$ ,	$T_J = 25^\circ C$		1.90	2.20	V
		$V_{GE} = 0V$	$T_J = 125^\circ C$		1.90		
$t_{rr}$	Diode Reverse Recovery Time	$I_F = 600A$ , $di/dt=6500A/\mu s$ , $V_{rr} = 600V$ ,	$T_J = 25^\circ C$		230		ns
			$T_J = 125^\circ C$		320		
$I_{rr}$	Diode Peak Reverse Recovery Current		$T_J = 25^\circ C$		450		A
			$T_J = 125^\circ C$		590		
$Q_{rr}$	Diode Reverse Recovery Charge		$T_J = 25^\circ C$		56.5		nC
			$T_J = 125^\circ C$		98.0		
$E_{rr}$	Diode Reverse Recovery Energy		$T_J = 25^\circ C$		25.0		mJ
			$T_J = 125^\circ C$		37.5		
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Diode)					0.057	$^\circ C/W$

**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: M4	1.0		2.0	N·m
	Power Terminals Screw: M6	3.0		5.0	N·m
M	Mounting Screw: M6	4.0		6.0	N·m
G	Weight		320		g

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

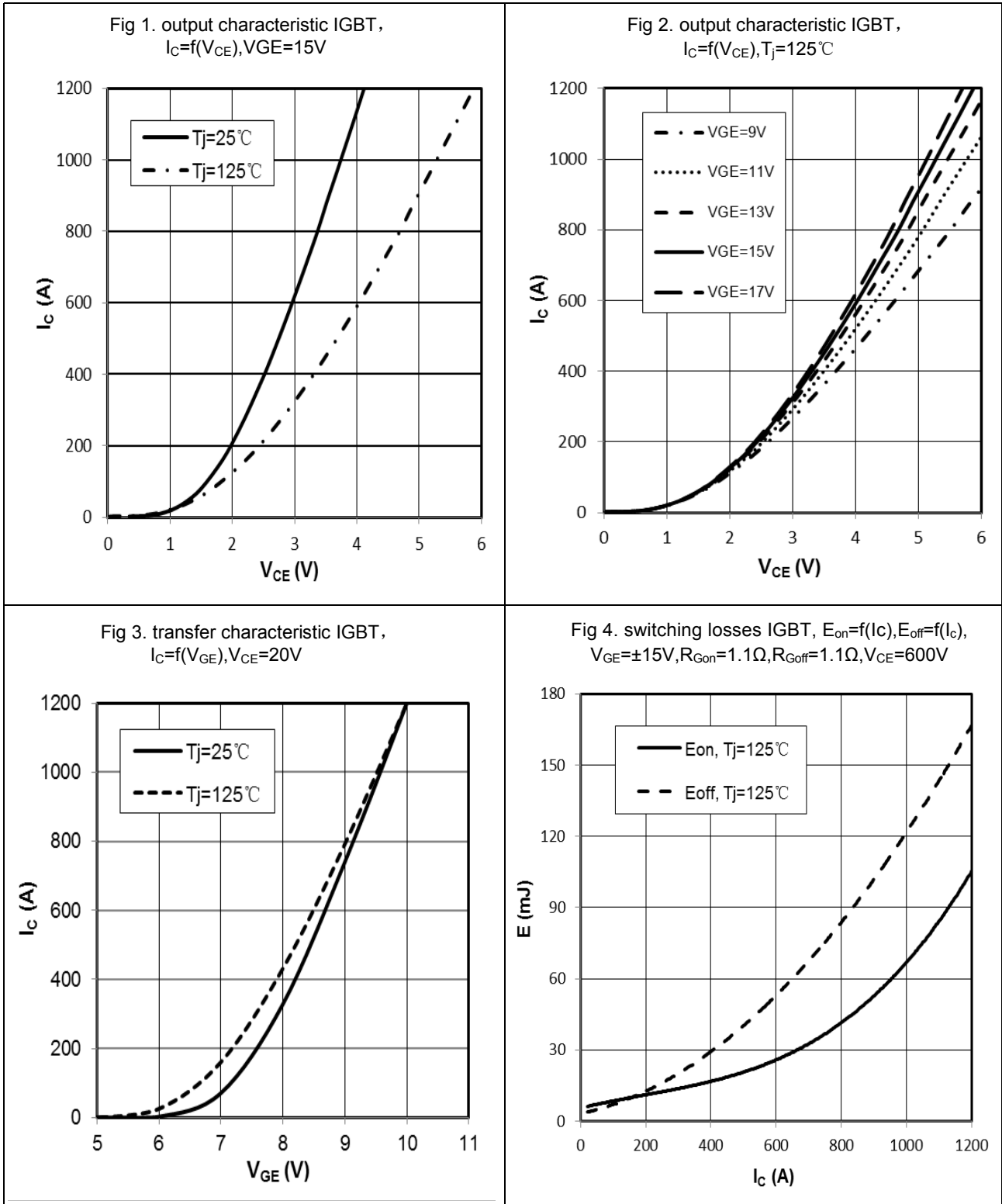


Fig 5. switching losses IGBT,

$E_{on}=f(R_g), E_{off}=f(R_g), V_{GE}=\pm 15V, I_C=600A, V_{CE}=600V$

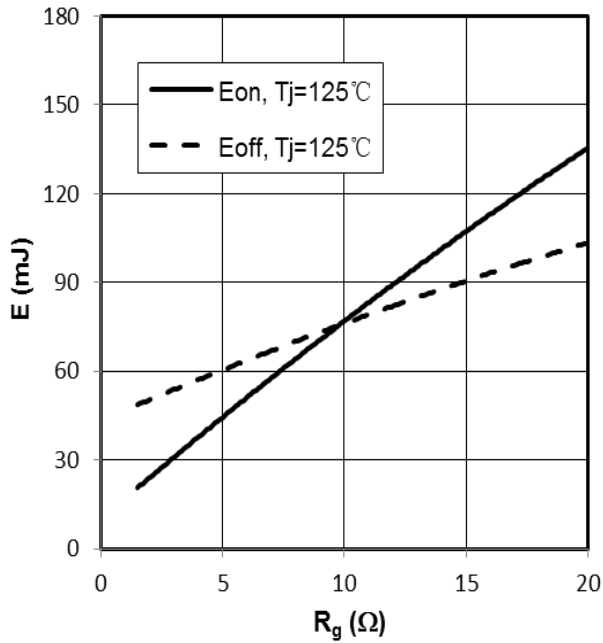


Fig 6. transient thermal impedance IGBT ,  $Z_{thjc}=f(t)$

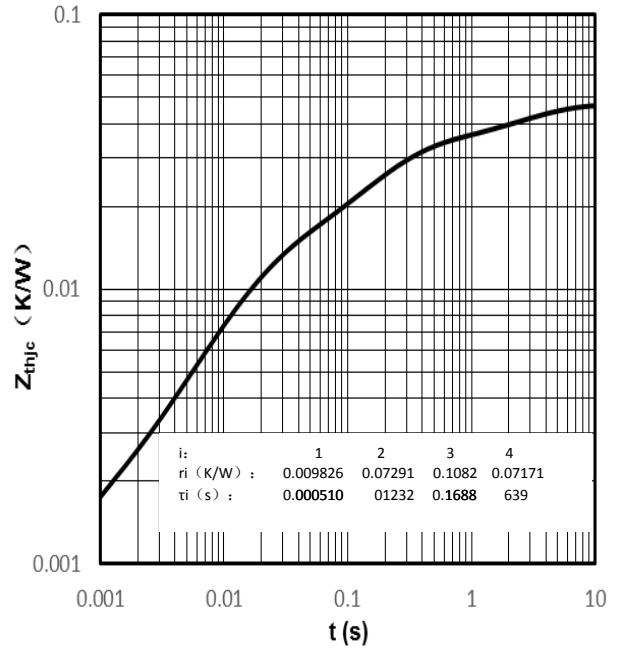


Fig 7. reverse bias safe operating area IGBT,

$I_C=f(V_{CE}), V_{GE}=\pm 15V, R_{Goff}=1.1\Omega, T_vj=125^\circ C$

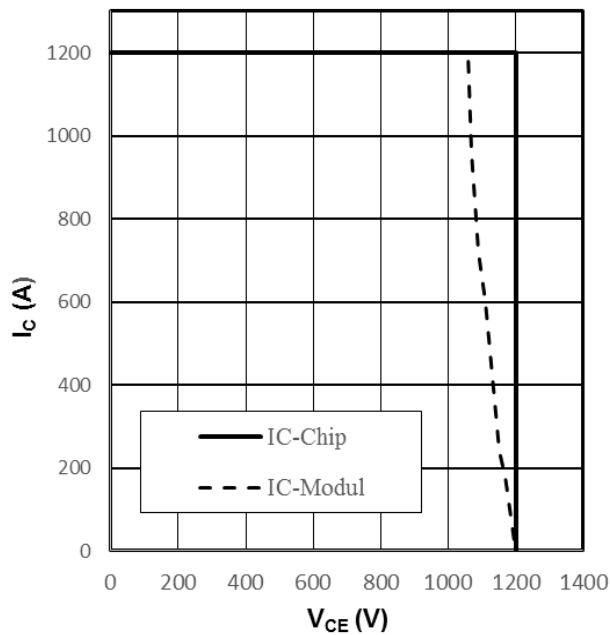


Fig 8. forward characteristic of Diode ,  $I_F=f(V_F)$

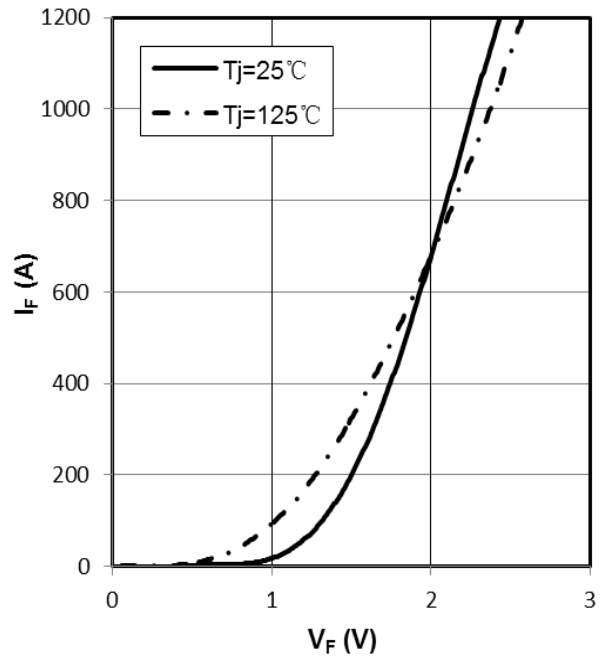


Fig 9. switching losses Diode,  
 $E_{rr}=f(I_F), R_{Gon}=1.1 \Omega, V_{CE}=600V$

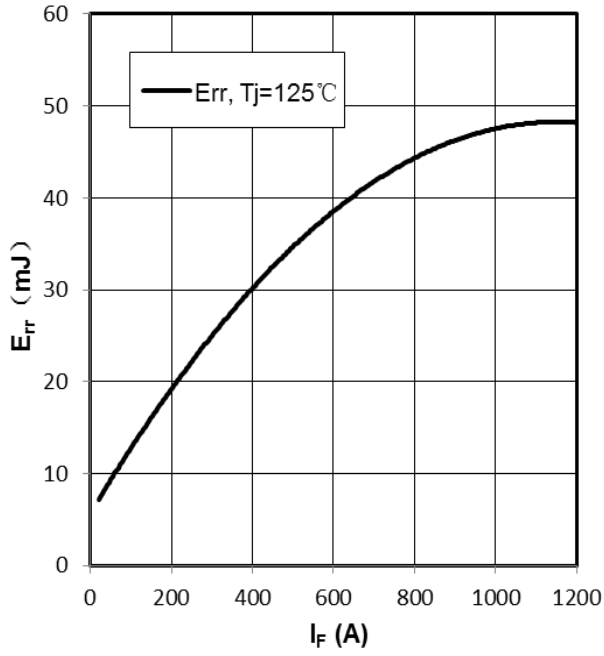
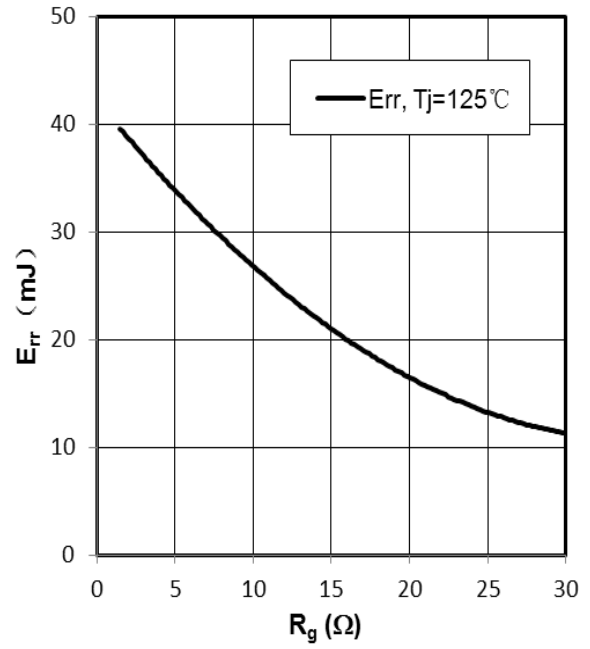
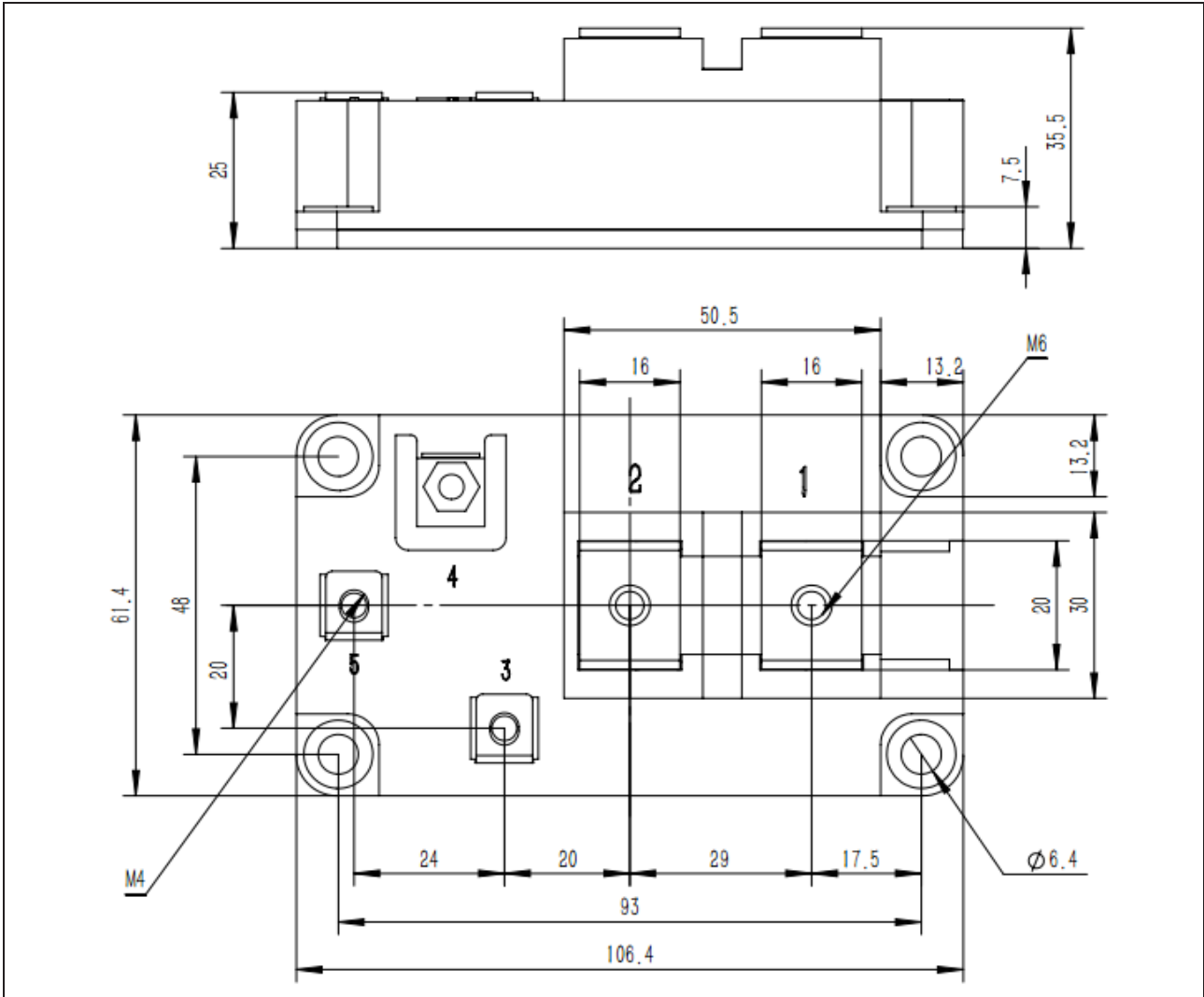


Fig 10. switching losses Diode,  
 $E_{rr}=f(R_g), I_F=400A, V_{CE}=600V$



## Package Dimensions(mm)



## Ordering information

Order code	Package	Packaging option	Base quantity	Packaging specification
GPU600SG120D2	D2(62mm)	BOX	10pcs /BOX	

## Revision history

Date	Revision	Changes
23-May-2016	1.0	Initial release
30-July-2018	2.0	Update

## CAUTION / WARNING

Information in this document is believed to be accurate and reliable. However, CREATEK does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Users should independently evaluate the suitability of and test each product selected for their own applications, and CREATEK assumes no liability whatsoever relating to the choice, selection or use of the CREATEK products and services described herein.

CREATEK reserves the right to change or update, without notice, any information contained in this publication; to change, without notice, the design, construction, processing, or specification of any product; and to discontinue or limit production or distribution of any product.

Information in this document supersedes and replaces all information previously supplied.

Products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an CREATEK product can reasonably be expected to result in personal injury, death or severe property or environmental damage. CREATEK accepts no liability for inclusion and/or use of CREATEK products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from national authorities.


Resale of CREATEK products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by CREATEK for the CREATEK product or service described herein and shall not create or extend in any manner whatsoever, any liability of CREATEK.

CREATEK expressly disclaims all implied warranties regarding the information contained herein, including, but not limited to, any implied warranties of merchantability or fitness for a particular purpose. CREATEK only obligations are those in the CREATEK Standard Terms and Conditions of Sale and in no case will CREATEK be liable for any incidental, indirect, or consequential damages arising from the sale, resale, use, or misuse of its products.

---

Specifications are subject to change without notice

© Copyright 2009, CREATEK Microelectronics

 CREATEK® is a registered trademark of CREATEK Microelectronics

All rights reserved