

# IGBT Modules

## H-Bridge

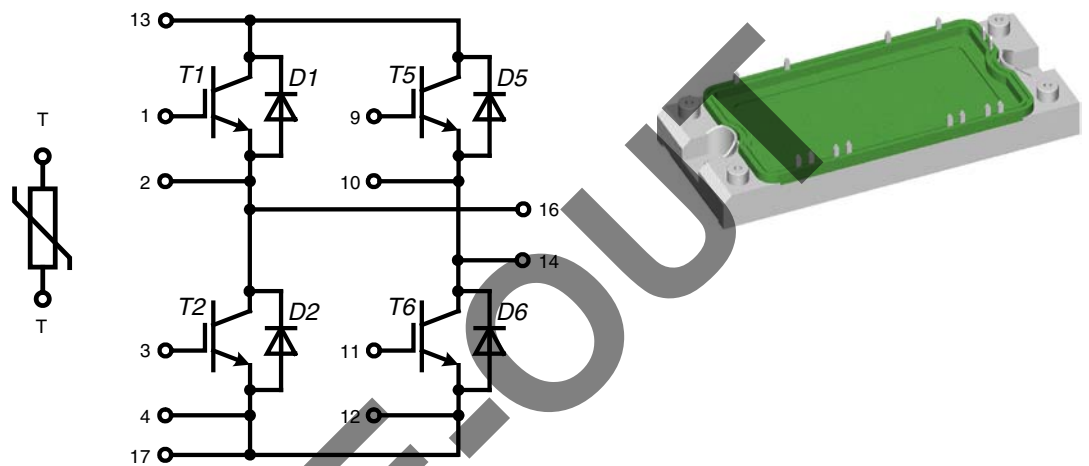
$I_{C25} = 72\text{ A}$   
 $V_{CES} = 600\text{ V}$   
 $V_{CE(sat) \text{ typ.}} = 1.9\text{ V}$

Short Circuit SOA Capability  
 Square RBSOA

**Part name** (Marking on product)

MKI 50-06A7

MKI 50-06A7T (with NTC)



**Features:**

- NPT IGBT technology
- Low saturation voltage
- Low switching losses
- Square RBSOA, no latch up
- High short circuit capability
- Positive temperature coefficient for easy paralleling
- MOS input, voltage controlled
- Ultra fast free wheeling diodes
- Solderable pins for PCB mounting
- Reduced protection circuits

**Application:**

- Motor control
  - DC motor armature winding
  - DC motor excitation winding
  - synchronous motor excitation winding
- Supply of transformer primary winding
  - power supplies
  - welding
  - X-ray
  - UPS
  - battery charger

**Package:**

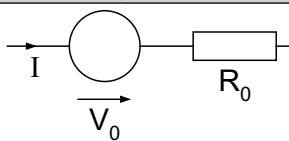
- Industry standard E2-pack
- Designed for wave soldering
- With copper base plate
- Space savings

IGBTs							
Symbol	Definitions	Conditions	Ratings				
			min.	typ.	max.	Unit	
$V_{CES}$	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$			600	V	
$V_{GES}$	max. DC gate voltage	continuous			$\pm 20$	V	
$I_{C25}$	collector current	$T_C = 25^{\circ}\text{C}$			72	A	
$I_{C80}$		$T_C = 80^{\circ}\text{C}$			50	A	
$P_{tot}$	total power dissipation	$T_C = 25^{\circ}\text{C}$			225	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 50\text{ A}; V_{GE} = 15\text{ V}$			1.9 2.2	V V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 1\text{ mA}; V_{GE} = V_{CE}$	4.5		6.5	V	
$I_{CES}$	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{ V}$			0.7	0.6 mA mA	
$I_{GES}$	gate emitter leakage current	$V_{CE} = 0\text{ V}; V_{GE} = \pm 20\text{ V}$			200	nA	
$C_{ies}$	input capacitance	$V_{CE} = 25\text{ V}; V_{GE} = 0\text{ V}; f = 1\text{ MHz}$			2800	pF	
$Q_{G(on)}$	total gate charge	$V_{CE} = 300\text{ V}; V_{GE} = 15\text{ V}; I_C = 50\text{ A}$			120	nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 300\text{ V}; I_C = 50\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 22\ \Omega$			50	ns	
$t_r$	current rise time		$T_{VJ} = 125^{\circ}\text{C}$			60	ns
$t_{d(off)}$	turn-off delay time					300	ns
$t_f$	current fall time					30	ns
$E_{on}$	turn-on energy per pulse					2.3	mJ
$E_{off}$	turn-off energy per pulse					1.7	mJ
$I_{CM}$	reverse bias safe operating area	RBSOA; $V_{GE} = \pm 15\text{ V}; R_G = 22\ \Omega; L = 100\ \mu\text{H}$			100	A	
$V_{CEK}$		clamped inductive load;			$\leq V_{CES}$		
$t_{SC}$ (SCSOA)	short circuit safe operating area	$V_{CE} = 600\text{ V}; V_{GE} = \pm 15\text{ V}; R_G = 22\ \Omega; \text{non-repetitive}$			10	$\mu\text{s}$	
$R_{thJC}$	thermal resistance junction to case	(per IGBT)			0.55	K/W	

Diodes						
Symbol	Definitions	Conditions	Maximum Ratings			
			min.	typ.	max.	Unit
$V_{RRM}$	max. repetitive reverse voltage				600	V
$I_{F25}$	forward current	$T_C = 25^{\circ}\text{C}$			72	A
$I_{F80}$		$T_C = 80^{\circ}\text{C}$			45	A
Symbol	Conditions	Characteristic Values				
		min.	typ.	max.	Unit	
$V_F$	forward voltage	$I_F = 50\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.6 1.3	1.8	V V
$I_{RM}$	max. reverse recovery current	$V_R = 300\text{ V}; I_F = 30\text{ A}$ $di_F/dt = -500\text{ A}/\mu\text{s}$		25		A
$t_{rr}$	reverse recovery time		$T_{VJ} = 125^{\circ}\text{C}$		90	
$R_{thJC}$	thermal resistance junction to case	(per diode)	$T_{VJ} = 25^{\circ}\text{C}$		1.19	K/W

**Module**

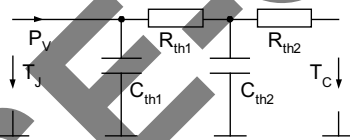
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
$T_{VJ}$	operating temperature		-40		150	°C
$T_{stg}$	storage temperature		-40		125	°C
$V_{ISOL}$	isolation voltage	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$			2500	V~
$M_d$	mounting torque	(M5)	2.7		3.3	Nm
$d_S$	creep distance on surface		6			mm
$d_A$	strike distance through air		6			mm
$R_{thCH}$	with heatsink compound			0.02		K/W
<b>Weight</b>				180		g

**Equivalent Circuits for Simulation**


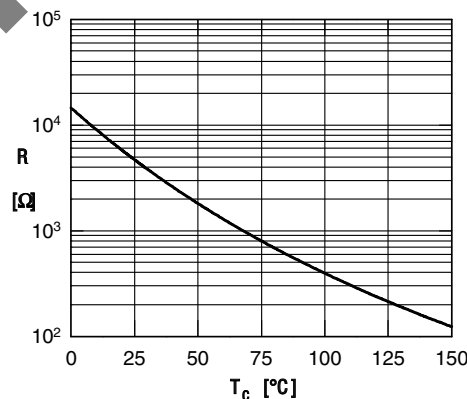
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
$V_0$	IGBT	$V_{GE} = 15 \text{ V}; T_{VJ} = 125^\circ\text{C}$		0.82		V
$R_0$				28		mΩ
$V_0$	free wheeling diode	$T_{VJ} = 125^\circ\text{C}$		0.89		V
$R_0$				8		mΩ

**Thermal Response**

$C_{th1}$	IGBT			0.201		J/K
$C_{th2}$				1.252		J/K
$R_{th1}$				0.42		K/W
$R_{th2}$				0.131		K/W
$C_{th1}$	free wheeling diode			0.116		J/K
$C_{th2}$				0.88		J/K
$R_{th1}$				0.973		K/W
$R_{th2}$				0.277		K/W


**Temperature Sensor NTC**

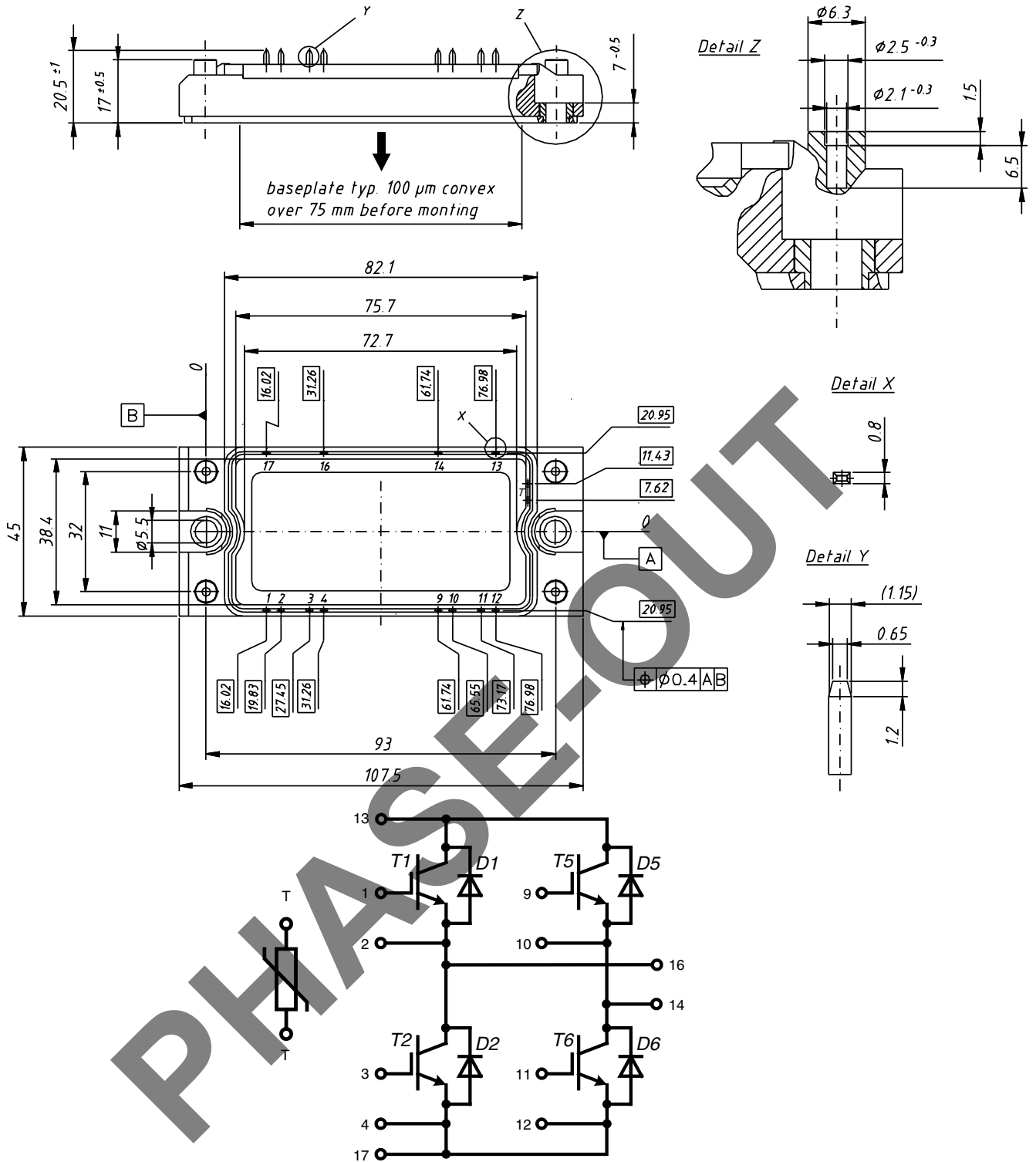
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
$R_{25}$	resistance	$T_c = 25^\circ\text{C}$	4.75	5.0	5.25	kΩ
$B_{25/85}$				3375		K



Typ. NTC resistance vs. temperature

### Outline Drawing

Dimensions in mm (1 mm = 0.0394")



### Product Marking

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MKI50-06A7	MKI50-06A7	Box	10	495182
Standard	MKI50-06A7T	MKI50-06A7T	Box	10	503275

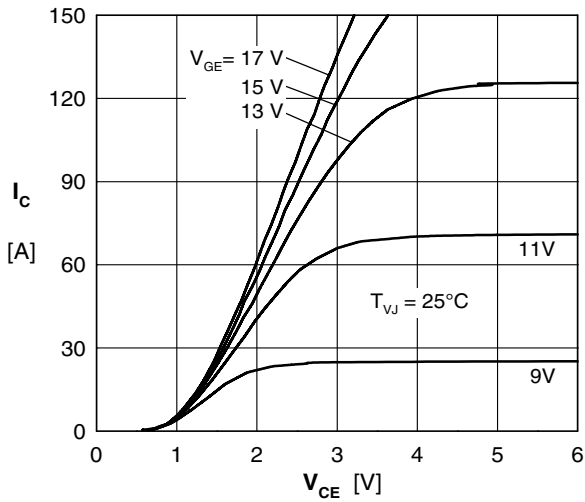


Fig. 1 Typ. output characteristics

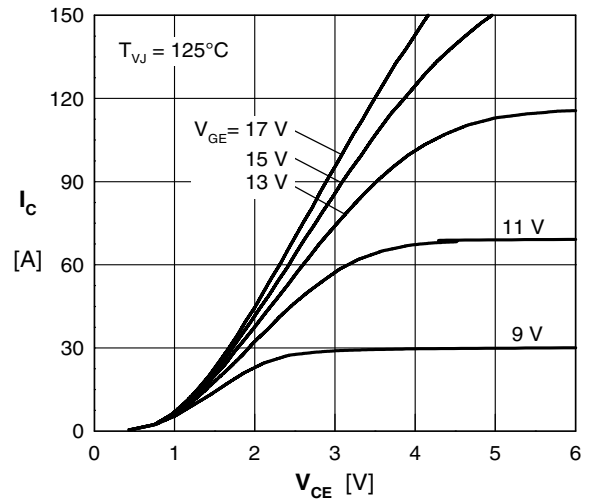


Fig. 2 Typ. output characteristics

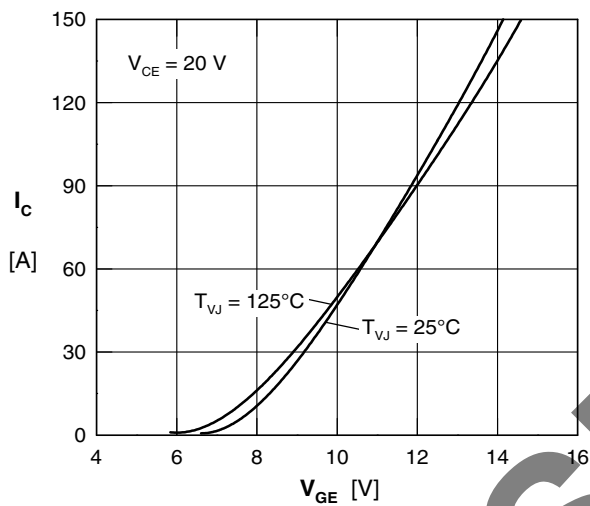


Fig. 3 Typ. transfer characteristics

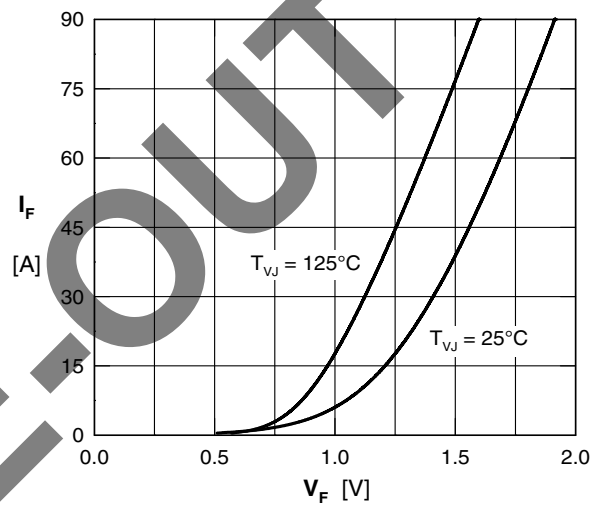


Fig. 4 Typ. forward characteristics of free wheeling diode

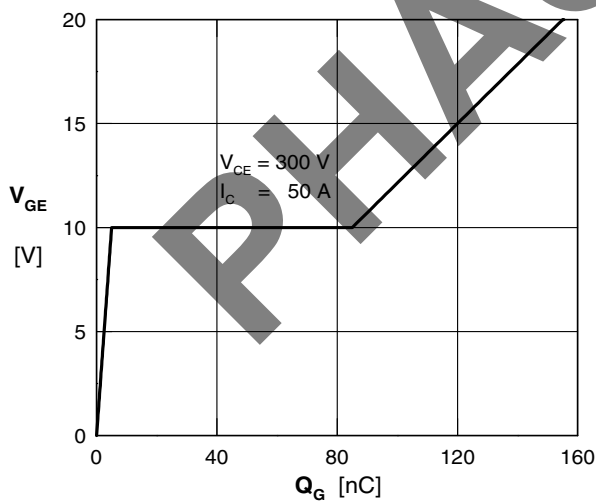


Fig. 5 Typ. turn on gate charge

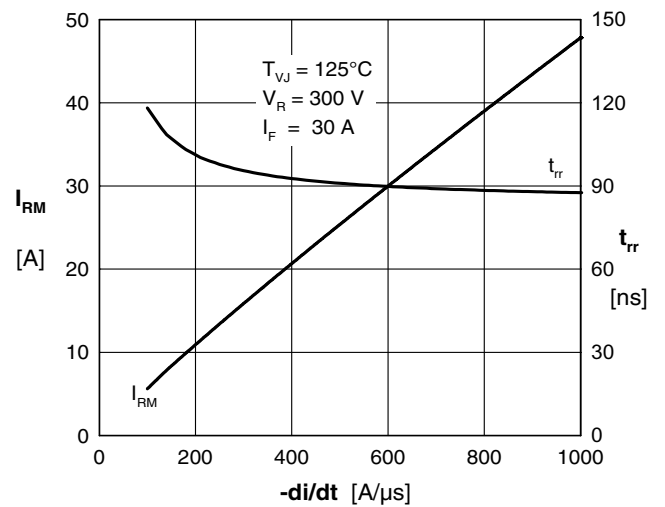


Fig. 6 Typ. turn off characteristics of free wheeling diode

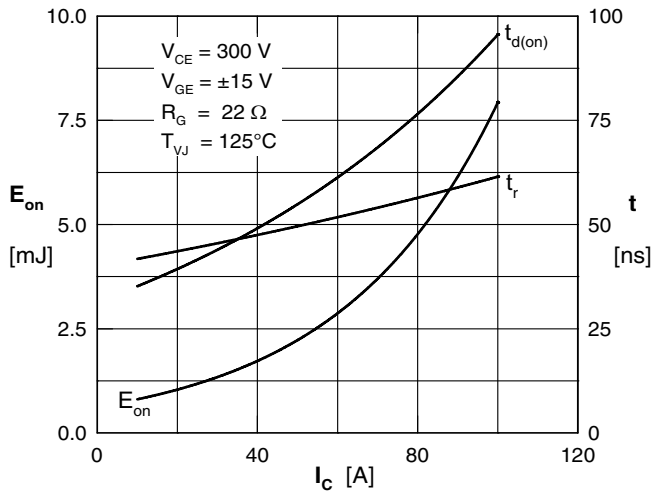


Fig. 7 Typ. turn on energy and switching times versus collector current

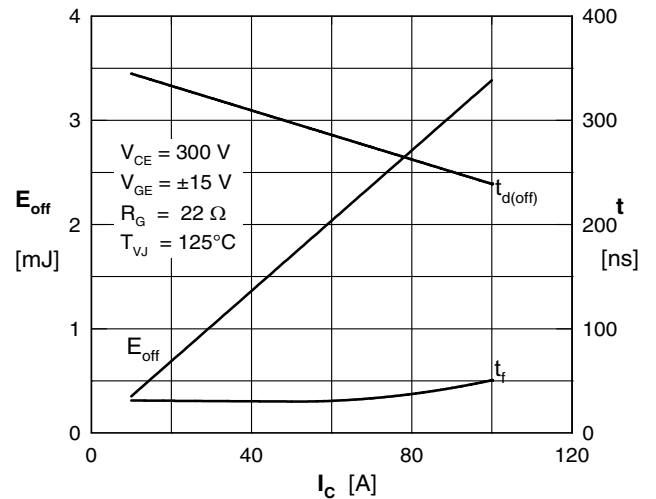


Fig. 8 Typ. turn off energy and switching times versus collector current

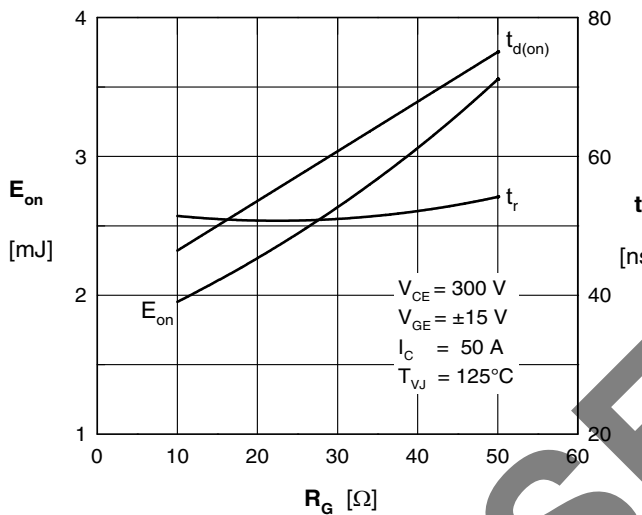


Fig. 9 Typ. turn on energy and switching times versus gate resistor

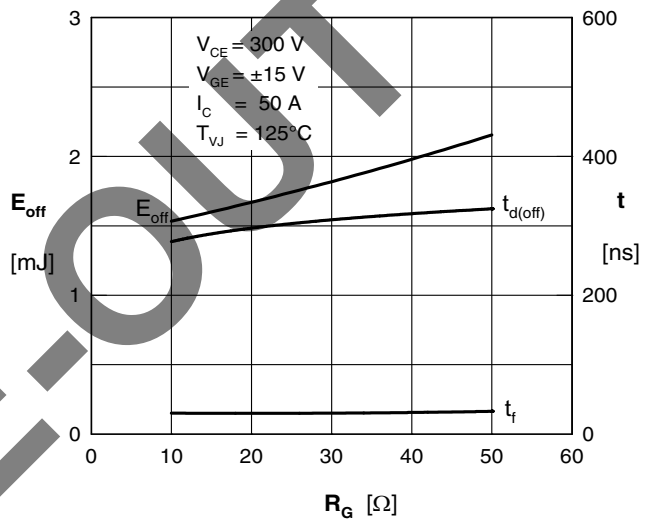


Fig. 8 Typ. turn off energy and switching times versus gate resistor

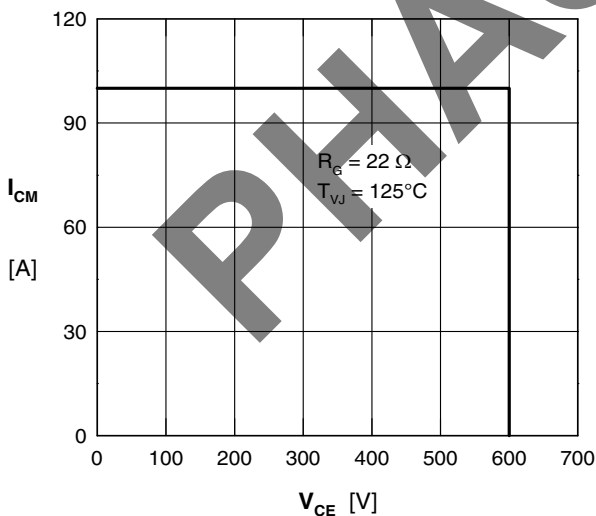


Fig. 11 Reverse biased safe operating area RBSOA

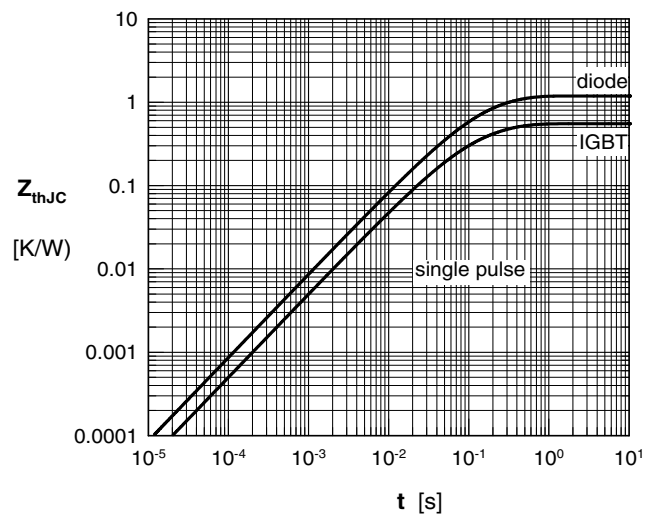


Fig. 12 Typ. transient thermal impedance

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Discrete Semiconductor Modules](#) category:*

*Click to view products by [IXYS](#) manufacturer:*

Other Similar products are found below :

[M252511FV](#) [DD260N12K-A](#) [DD380N16A](#) [DD89N1600K-A](#) [APT2X21DC60J](#) [APT58M80J](#) [B522F-2-YEC](#) [MSTC90-16](#) [ND104N16K](#)  
[25.163.0653.1](#) [25.163.2453.0](#) [25.163.4253.0](#) [25.190.2053.0](#) [25.194.3453.0](#) [25.320.4853.1](#) [25.320.5253.1](#) [25.326.3253.1](#) [25.326.3553.1](#)  
[25.330.1653.1](#) [25.330.4753.1](#) [25.330.5253.1](#) [25.334.3253.1](#) [25.334.3353.1](#) [25.350.2053.0](#) [25.352.4753.1](#) [25.522.3253.0](#) [T483C](#) [T484C](#)  
[T485F](#) [T485H](#) [T512F-YEB](#) [T513F](#) [T514F](#) [T554](#) [T612FSE](#) [25.161.3453.0](#) [25.179.2253.0](#) [25.194.3253.0](#) [25.325.1253.1](#) [25.326.4253.1](#)  
[25.330.0953.1](#) [25.332.4353.1](#) [25.350.1653.0](#) [25.350.2453.0](#) [25.352.1453.0](#) [25.352.1653.0](#) [25.352.2453.0](#) [25.352.5453.1](#) [25.522.3353.0](#)  
[25.602.4053.0](#)