

IGBT Modules

H-Bridge

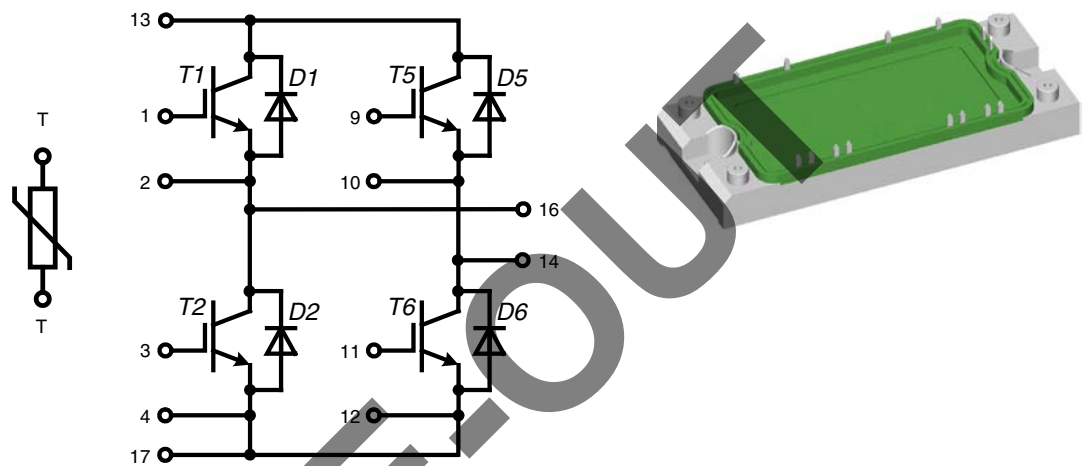
$I_{C25} = 72\text{ A}$
 $V_{CES} = 600\text{ V}$
 $V_{CE(sat) \text{ typ.}} = 1.9\text{ V}$

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:

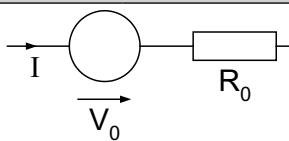
- Industry standard E2-pack
- Designed for wave soldering
- With copper base plate
- Space savings

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			± 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	μs	
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	$I_F = 50 \text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$	1.6	1.8	V
			$T_{VJ} = 125^{\circ}\text{C}$	1.3		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

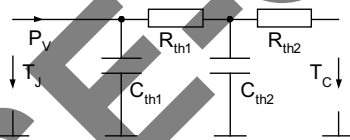
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
T_{VJ}	operating temperature		-40		150	°C
T_{stg}	storage temperature		-40		125	°C
V_{ISOL}	isolation voltage	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$			2500	V~
M_d	mounting torque	(M5)	2.7		3.3	Nm
d_S	creep distance on surface		6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

Equivalent Circuits for Simulation


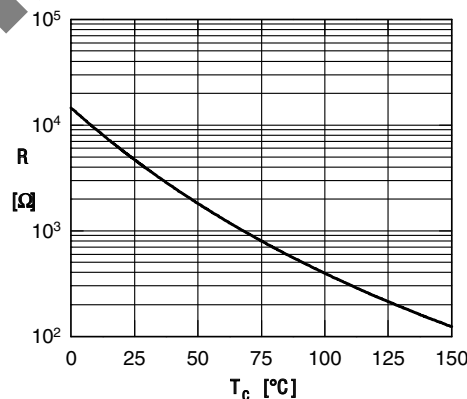
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
V_0	IGBT	$V_{GE} = 15 \text{ V}; T_{VJ} = 125^\circ\text{C}$		0.82		V
R_0				28		mΩ
V_0	free wheeling diode	$T_{VJ} = 125^\circ\text{C}$		0.89		V
R_0				8		mΩ

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

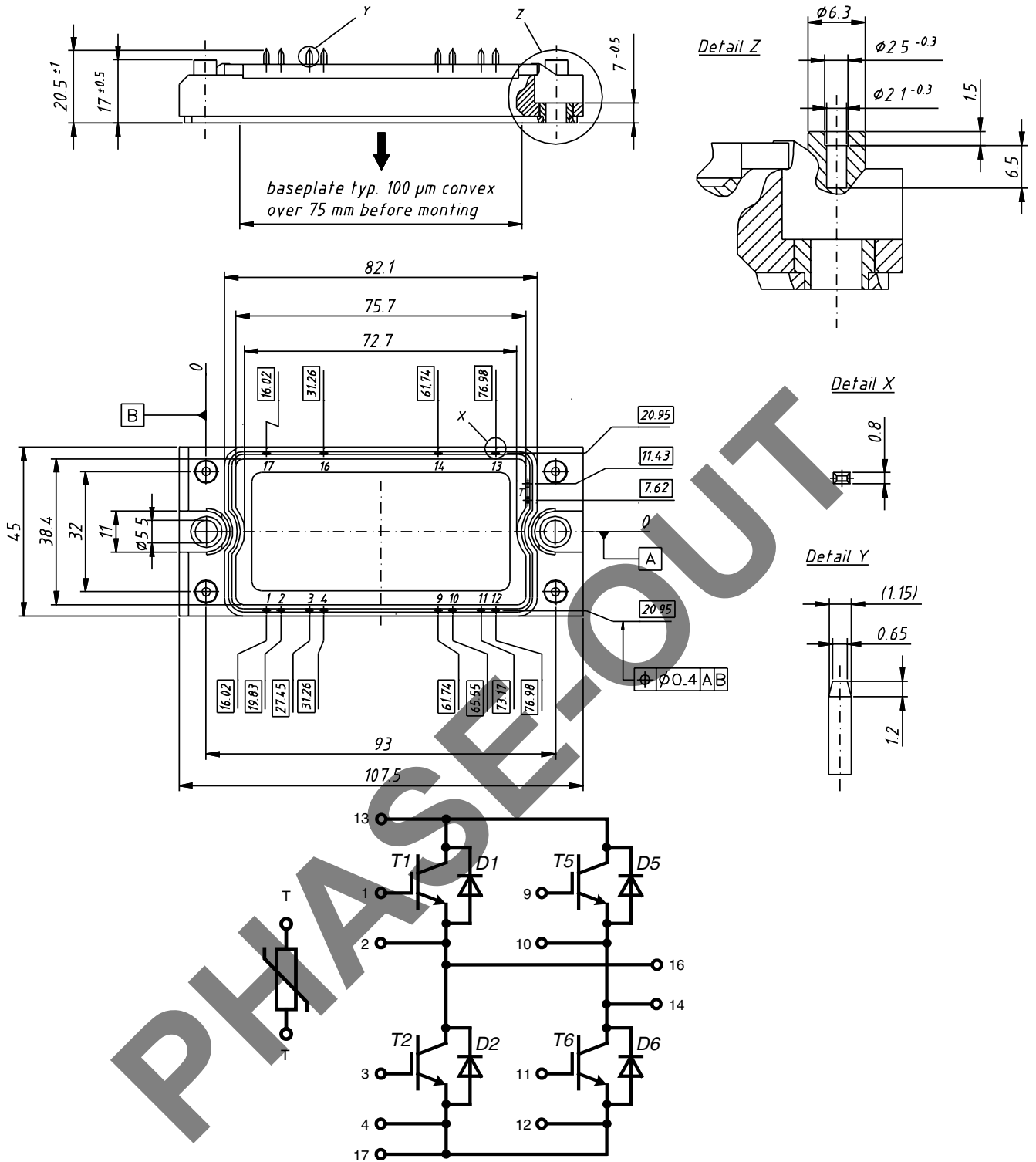
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
R_{25}	resistance	$T_c = 25^\circ\text{C}$	4.75	5.0	5.25	kΩ
$B_{25/85}$				3375		K



Typ. NTC resistance vs. temperature

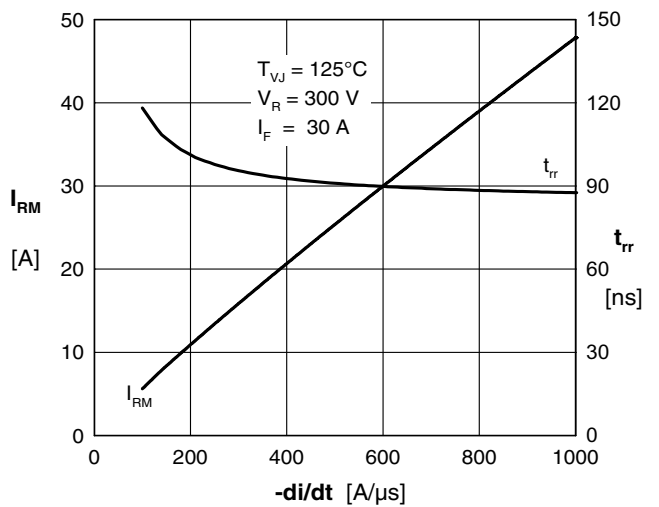
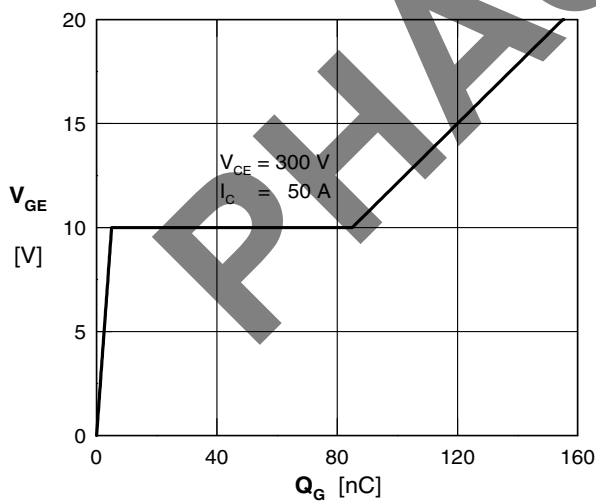
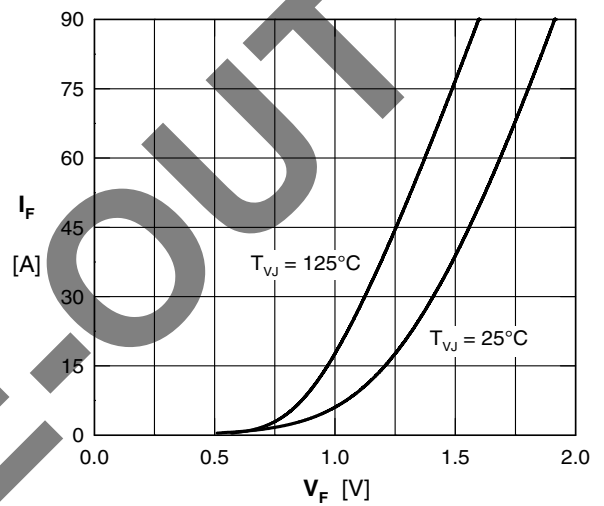
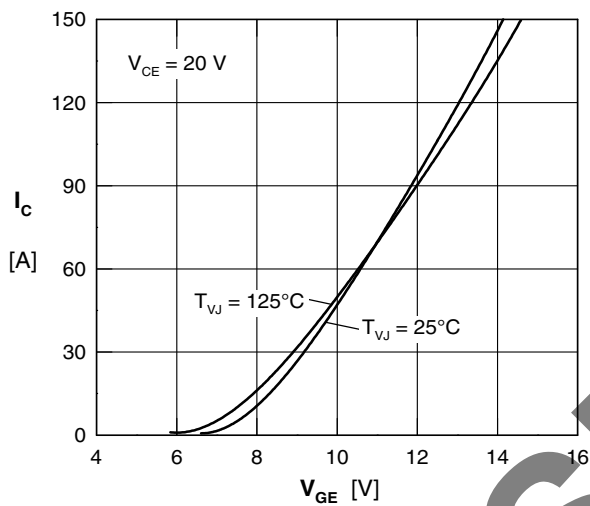
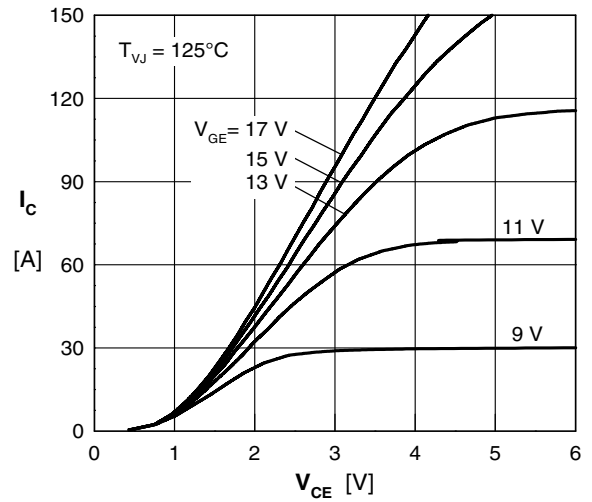
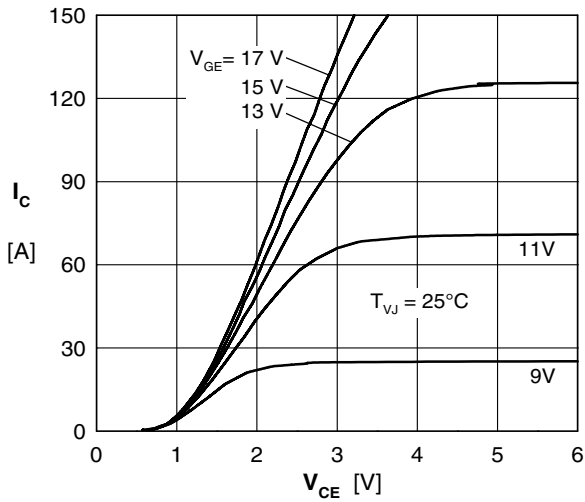
Outline Drawing

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



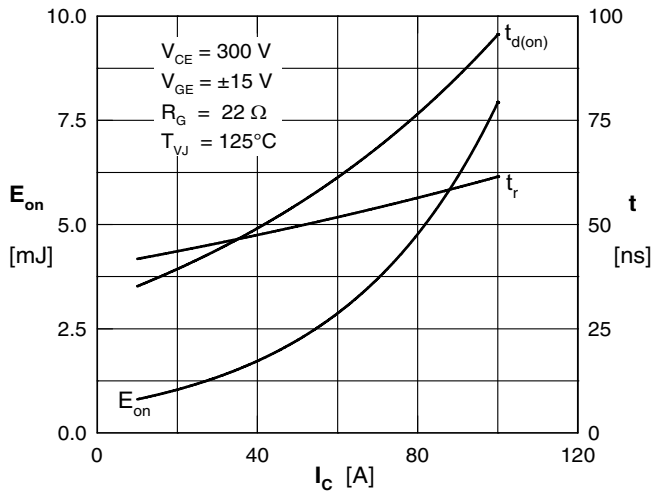


Fig. 7 Typ. turn on energy and switching times versus collector current

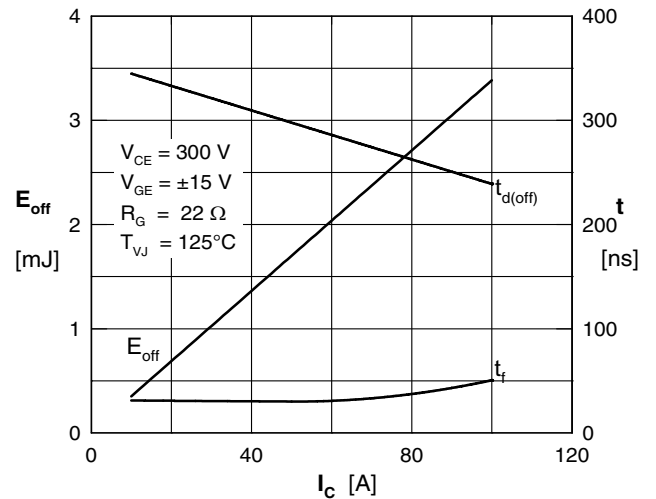


Fig. 8 Typ. turn off energy and switching times versus collector current

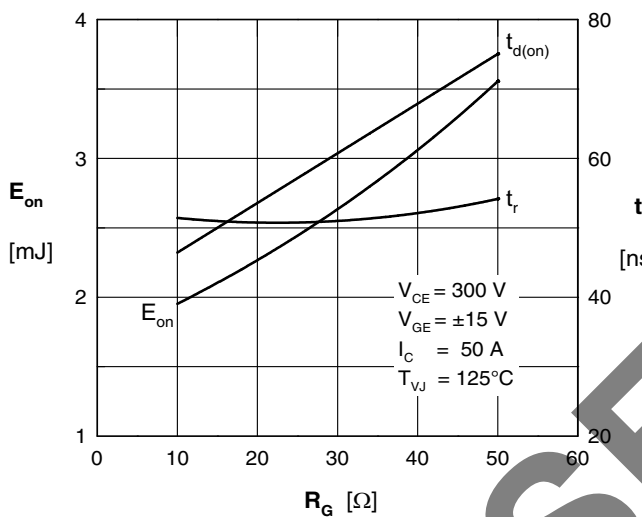


Fig. 9 Typ. turn on energy and switching times versus gate resistor

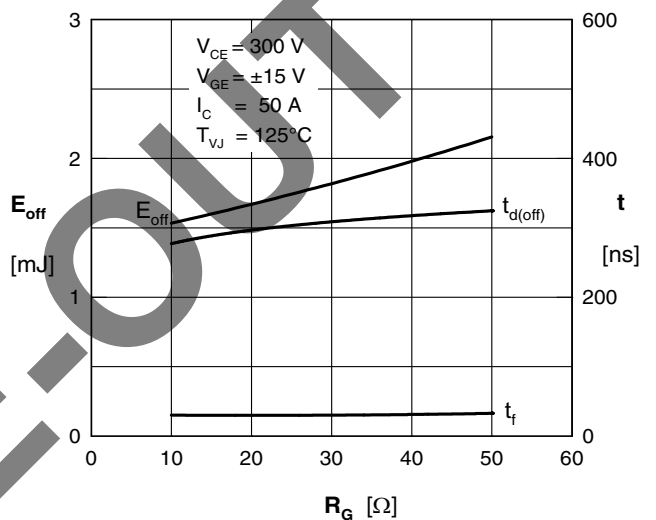


Fig. 8 Typ. turn off energy and switching times versus gate resistor

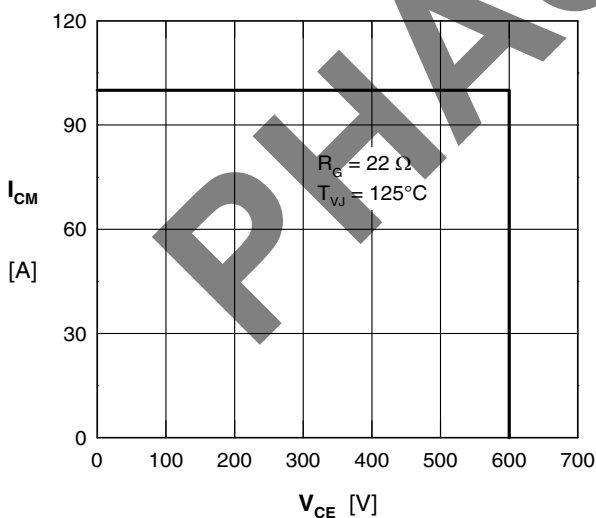


Fig. 11 Reverse biased safe operating area RBSOA

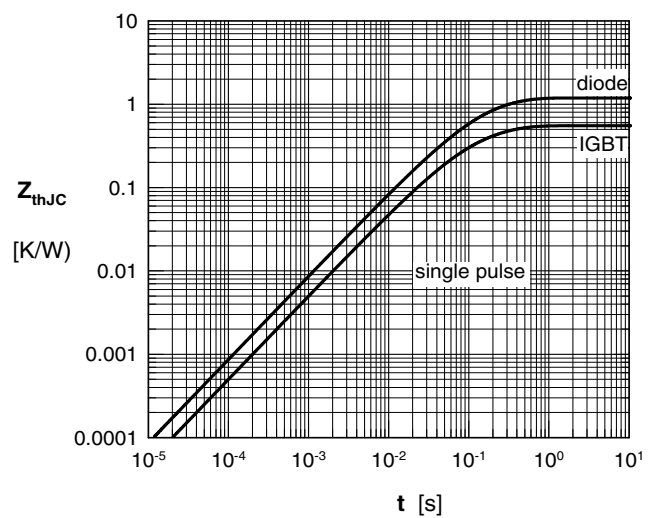


Fig. 12 Typ. transient thermal impedance

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[FD401R17KF6C_B2](#) [FD-DF80R12W1H3_B52](#) [FF200R06YE3](#) [FF300R12KE4_E](#) [FF450R12ME4P](#) [FF600R12IP4V](#) [FP10R06W1E3_B11](#)
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[FZ1000R33HE3](#) [FZ1800R17KF4](#) [DD250S65K3](#) [DF1000R17IE4](#) [DF1000R17IE4D_B2](#) [DF1400R12IP4D](#) [DF200R12PT4_B6](#)
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[FF300R17ME4_B11](#) [FF401R17KF6C_B2](#) [FF650R17IE4D_B2](#) [FF900R12IP4D](#) [FF900R12IP4DV](#) [STGIF7CH60TS-L](#) [FP50R07N2E4_B11](#)
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