

IGBT Modules

H-Bridge

Short Circuit SOA Capability
 Square RBSOA

$$I_{C25} = 72 \text{ A}$$

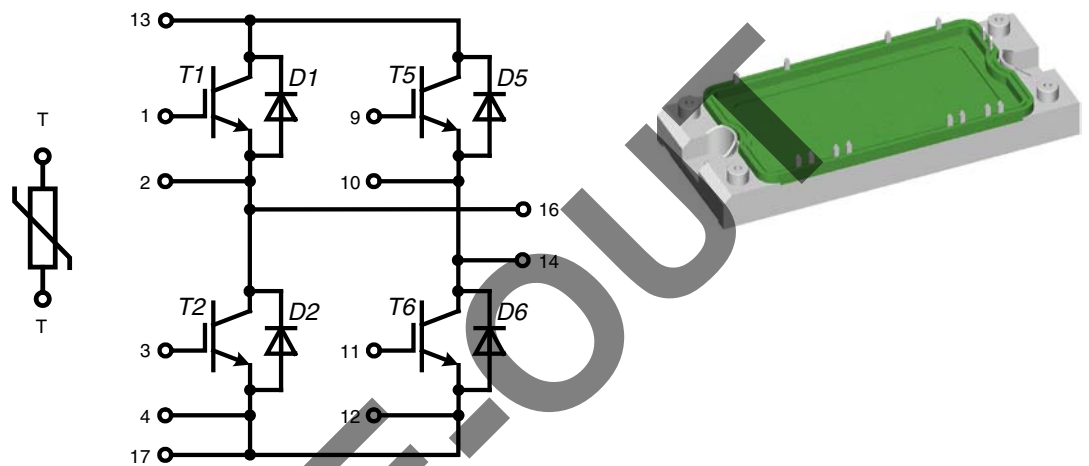
$$V_{CES} = 600 \text{ V}$$

$$V_{CE(sat) \text{ typ.}} = 1.9 \text{ V}$$

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

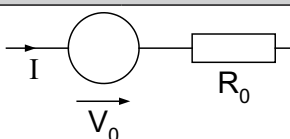
Symbol	Definitions	Conditions	Ratings			
			min.	typ.	max.	Unit
V_{CES}	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$ to 150°C			600	V
V_{GES}	max. DC gate voltage	continuous			± 20	V
I_{C25}	collector current	$T_C = 25^{\circ}\text{C}$			72	A
I_{C80}		$T_C = 80^{\circ}\text{C}$			50	A
P_{tot}	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	2.4	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 0.03	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 $V_{CE} = 300\text{ V}; I_C = 50\text{ A}$ $V_{GE} = \pm 15\text{ V}; R_G = 22\ \Omega$	$T_{VJ} = 125^{\circ}\text{C}$	50		ns
t_r	current rise time			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; $T_{VJ} = 125^{\circ}\text{C}$		$\leq V_{CES}$		
t_{SC} (SCSOA)	short circuit safe operating area	$V_{CE} = 600\text{ V}; V_{GE} = \pm 15\text{ V}; R_G = 22\ \Omega$; non-repetitive		10		μs
R_{thJC}	thermal resistance junction to case	(per IGBT)			0.55	K/W

Diodes

Symbol	Definitions	Conditions	Maximum Ratings				
V _{RRM}	max. repetitive reverse voltage				600	V	
I _{F25}	forward current	T _C = 25°C			72	A	
I _{F80}		T _C = 80°C			45	A	
Symbol	Conditions	Characteristic Values					
				min.	typ.	max.	
V _F	forward voltage	I _F = 50 A	T _{VJ} = 25°C T _{VJ} = 125°C		1.6 1.3	1.8	V V
I _{RM}	max. reverse recovery current	V _R = 300 V; I _F = 30 A di _F /dt = -500 A/μs	T _{VJ} = 125°C		25		A
t _{rr}	reverse recovery time				90		ns
R _{thJC}	thermal resistance junction to case	(per diode)	T _{VJ} = 25°C			1.19	K/W

Module

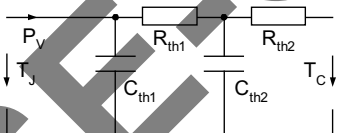
Symbol	Definitions	Conditions	Ratings			
			min.	typ.	max.	Unit
T_{VJ}	operating temperature		-40		150	°C
T_{stg}	storage temperature		-40		125	°C
V_{ISOL}	isolation voltage	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$			2500	V~
M_d	mounting torque	(M5)	2.7		3.3	Nm
d_s	creep distance on surface		6			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


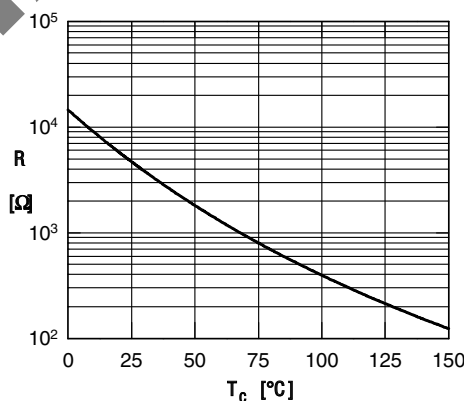
Symbol	Definitions	Conditions	Ratings			
			min.	typ.	max.	Unit
V_0	IGBT	$V_{GE} = 15 \text{ V}; T_{VJ} = 125^\circ\text{C}$		0.82		V
R_0				28		mΩ
V_0	free wheeling diode	$T_{VJ} = 125^\circ\text{C}$		0.89		V
R_0				8		mΩ

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

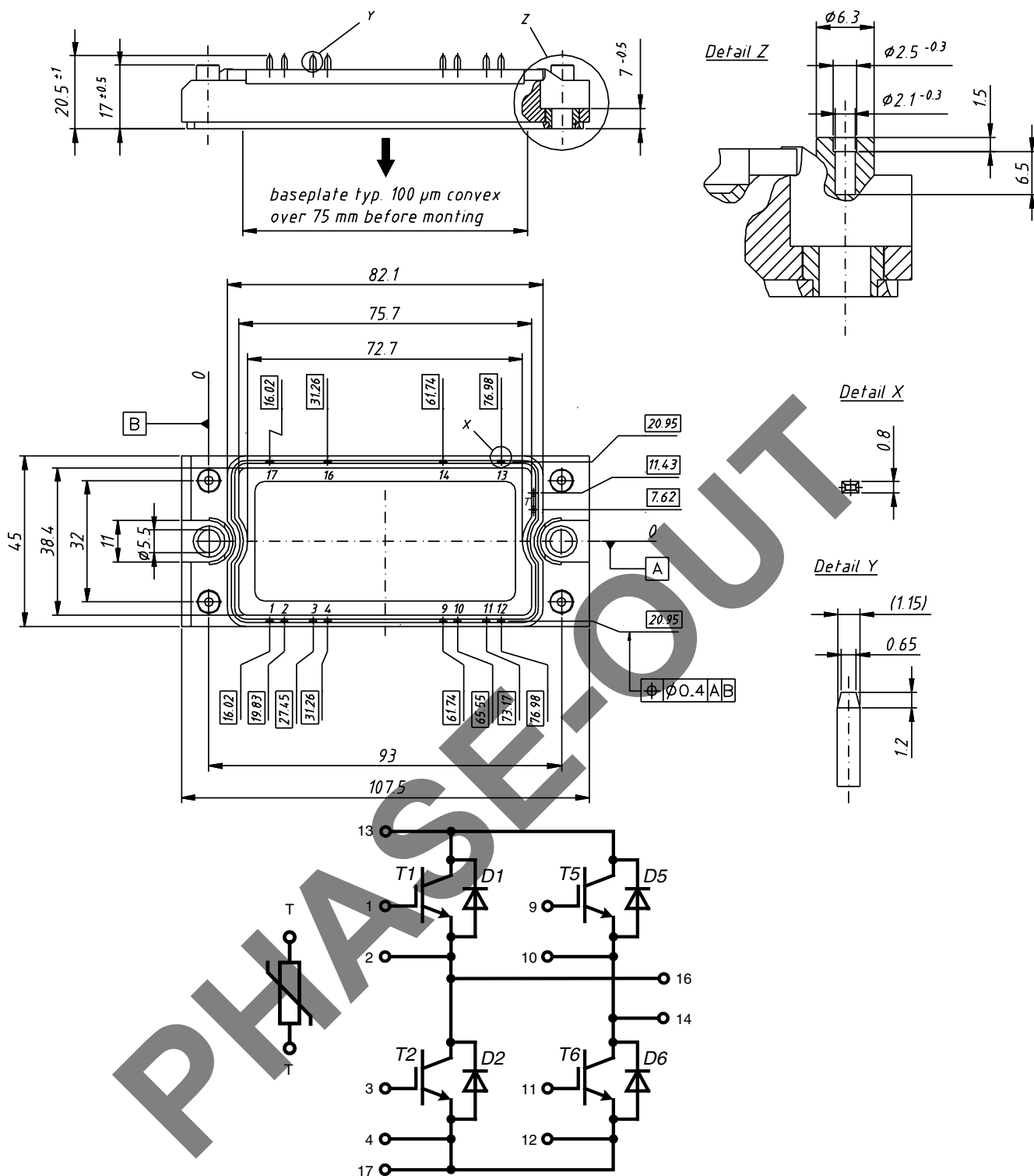
Symbol	Definitions	Conditions	Ratings			
			min.	typ.	max.	Unit
R_{25}	resistance	$T_c = 25^\circ\text{C}$	4.75	5.0	5.25	kΩ
$B_{25/85}$				3375		K



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

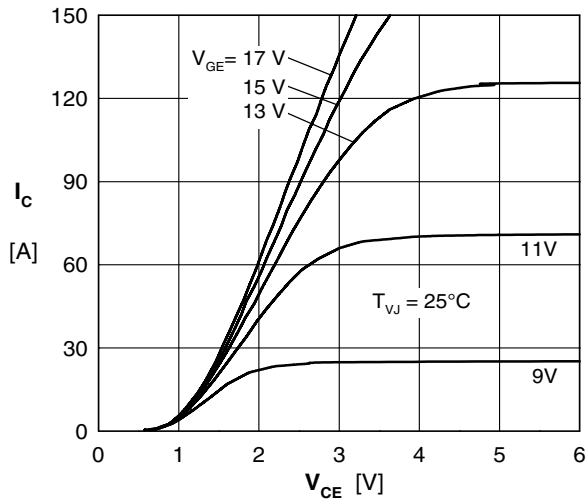


Fig. 1 Typ. output characteristics

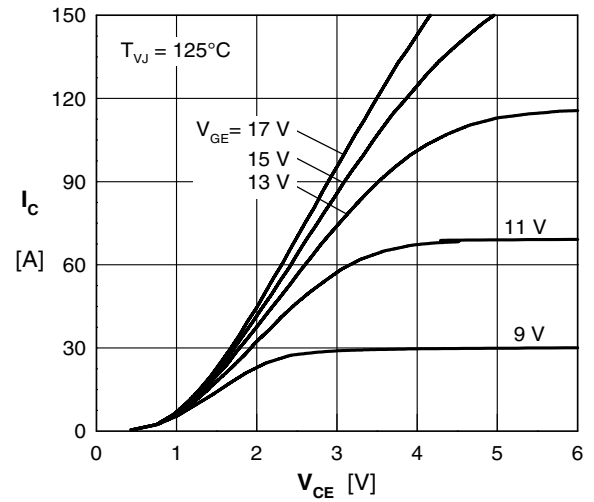


Fig. 2 Typ. output characteristics

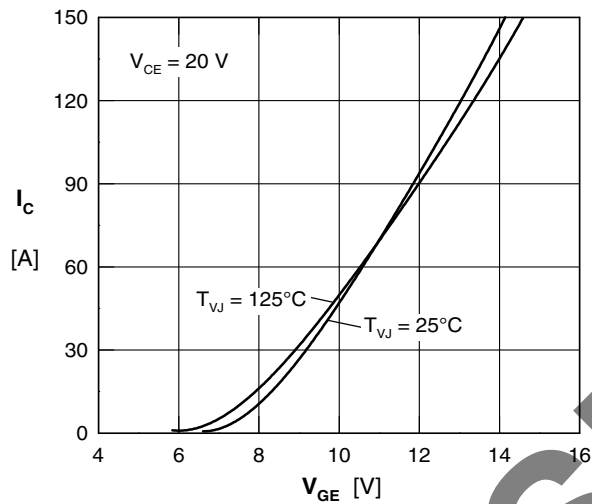


Fig. 3 Typ. transfer characteristics

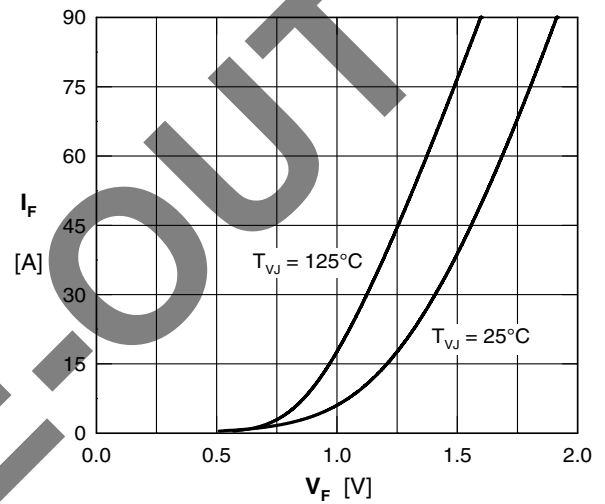


Fig. 4 Typ. forward characteristics of free wheeling diode

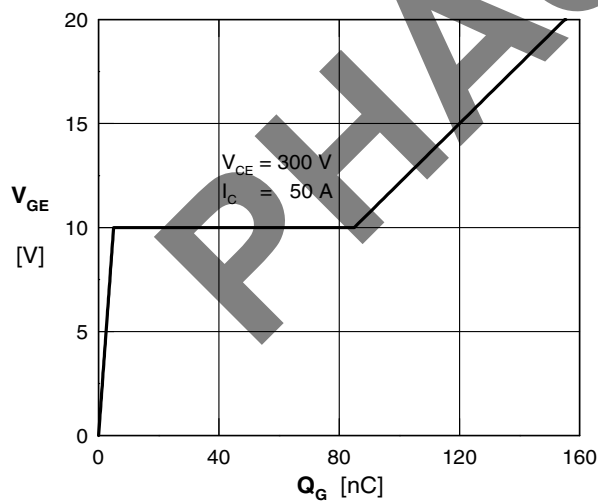


Fig. 5 Typ. turn on gate charge

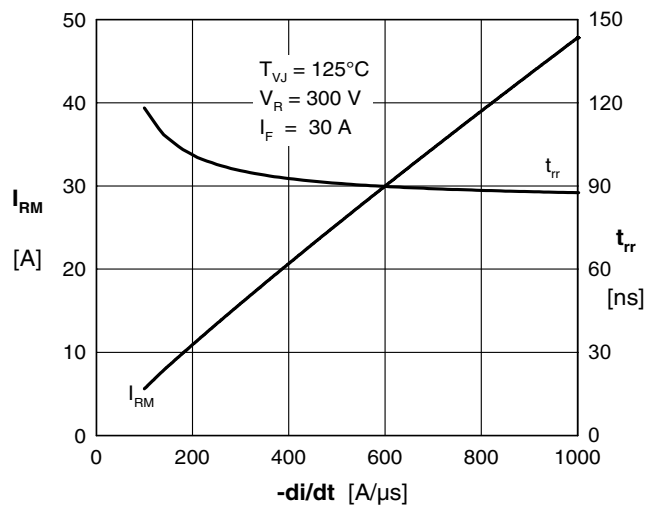


Fig. 6 Typ. turn off characteristics of free wheeling diode

