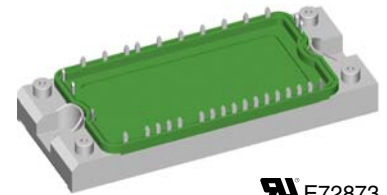
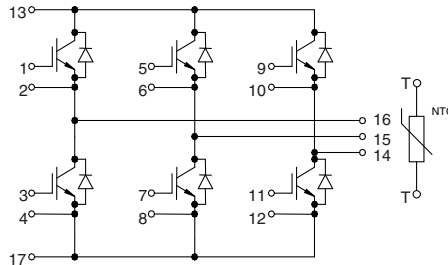


IGBT Modules

Sixpack

Short Circuit SOA Capability
 Square RBSOA

Type:	NTC - Option:
MWI 30-06 A7	without NTC
MWI 30-06 A7T	with NTC



E72873

See outline drawing for pin arrangement

IGBTs				
Symbol	Conditions	Maximum Ratings		
V_{CES}	$T_{VJ} = 25^{\circ}\text{C}$ to 150°C	600	V	
V_{GES}		± 20	V	
I_{C25}	$T_C = 25^{\circ}\text{C}$	45	A	
I_{C80}	$T_C = 80^{\circ}\text{C}$	30	A	
RBSOA	$V_{GE} = \pm 15\text{ V}$; $R_G = 33\ \Omega$; $T_{VJ} = 125^{\circ}\text{C}$ Clamped inductive load; $L = 100\ \mu\text{H}$	$I_{CM} = 60$ $V_{CEK} \leq V_{CES}$	A	
t_{SC} (SCSOA)	$V_{CE} = V_{CES}$; $V_{GE} = \pm 15\text{ V}$; $R_G = 33\ \Omega$; $T_{VJ} = 125^{\circ}\text{C}$ non-repetitive	10	μs	
P_{tot}	$T_C = 25^{\circ}\text{C}$	140	W	
Symbol	Conditions	Characteristic Values ($T_{VJ} = 25^{\circ}\text{C}$, unless otherwise specified)		
		min.	typ.	max.
$V_{CE(sat)}$	$I_C = 30\text{ A}$; $V_{GE} = 15\text{ V}$; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	1.9 2.2	2.4	V V
$V_{GE(th)}$	$I_C = 0.7\text{ mA}$; $V_{GE} = V_{CE}$	4.5	6.5	V
I_{CES}	$V_{CE} = V_{CES}$; $V_{GE} = 0\text{ V}$; $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.5	0.6	mA mA
I_{GES}	$V_{CE} = 0\text{ V}$; $V_{GE} = \pm 20\text{ V}$		200	nA
$t_{d(on)}$	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 300\text{ V}$; $I_C = 30\text{ A}$ $V_{GE} = \pm 15\text{ V}$; $R_G = 33\ \Omega$	50		ns
t_r		50		ns
$t_{d(off)}$		270		ns
t_f		40		ns
E_{on}		1.4		mJ
E_{off}		1.0		mJ
C_{ies}	$V_{CE} = 25\text{ V}$; $V_{GE} = 0\text{ V}$; $f = 1\text{ MHz}$	1600		pF
Q_{Gon}	$V_{CE} = 300\text{ V}$; $V_{GE} = 15\text{ V}$; $I_C = 30\text{ A}$	150		nC
R_{thJC}	(per IGBT)		0.88	K/W

Features

- NPT IGBT technology
- low saturation voltage
- low switching losses
- switching frequency up to 30 kHz
- square RBSOA, no latch up
- high short circuit capability
- positive temperature coefficient for easy parallelling
- MOS input, voltage controlled
- ultra fast free wheeling diodes
- solderable pins for PCB mounting
- package with copper base plate

Advantages

- space savings
- reduced protection circuits
- package designed for wave soldering

Typical Applications

- AC motor control
- AC servo and robot drives
- power supplies

Diodes

Symbol	Conditions	Maximum Ratings	
I_{F25}	$T_C = 25^\circ\text{C}$	36	A
I_{F80}	$T_C = 80^\circ\text{C}$	24	A

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
V_F	$I_F = 30\text{ A}; V_{GE} = 0\text{ V}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$	2.0	2.2	V
I_{RM} t_{rr}	$I_F = 15\text{ A}; di_F/dt = -400\text{ A}/\mu\text{s}; T_{VJ} = 125^\circ\text{C}$ $V_R = 300\text{ V}; V_{GE} = 0\text{ V}$	13		A
		90		ns
R_{thJC}	(per diode)			2.11 K/W

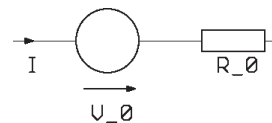
Temperature Sensor NTC (MWI ... A7T version only)

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
R_{25} $B_{25/50}$	$T = 25^\circ\text{C}$	4.75	5.0	5.25 k Ω K

Module

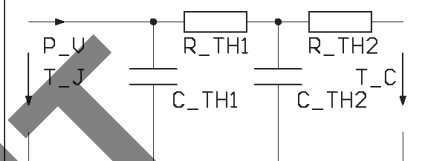
Symbol	Conditions	Maximum Ratings	
T_{VJ}		-40...+150	$^\circ\text{C}$
T_{stg}		-40...+125	$^\circ\text{C}$
V_{ISOL}	$I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$	2500	V~
M_d	Mounting torque (M5)	2.7 - 3.3	Nm

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
$R_{pin-chip}$			5	m Ω
d_S d_A	Creepage distance on surface Strike distance in air	6		mm
R_{thCH}	with heatsink compound		0.02	K/W
Weight			180	g

Equivalent Circuits for Simulation
Conduction


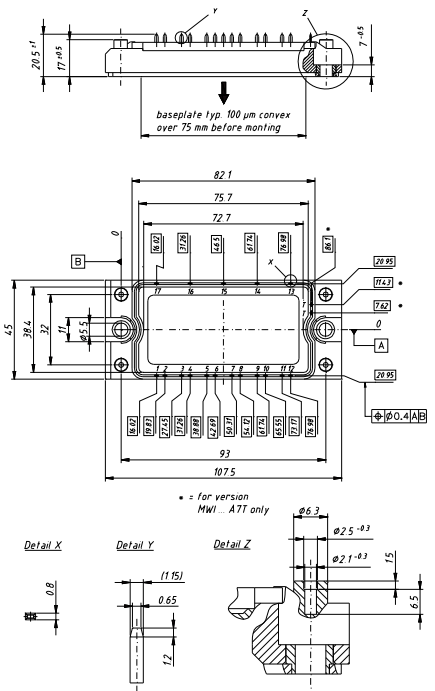
IGBT (typ. at $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$)
 $V_0 = 0.95\text{ V}; R_0 = 42\text{ m}\Omega$

Free Wheeling Diode (typ. at $T_J = 125^\circ\text{C}$)
 $V_0 = 1.09\text{ V}; R_0 = 12\text{ m}\Omega$

Thermal Response


IGBT (typ.)
 $C_{th1} = 0.156\text{ J/K}; R_{th1} = 0.545\text{ K/W}$
 $C_{th2} = 1.164\text{ J/K}; R_{th2} = 0.155\text{ K/W}$

Free Wheeling Diode (typ.)
 $C_{th1} = 0.065\text{ J/K}; R_{th1} = 0.636\text{ K/W}$
 $C_{th2} = 1.766\text{ J/K}; R_{th2} = 0.344\text{ K/W}$

Dimensions in mm (1 mm = 0.0394")


Higher magnification on page B3 - 72

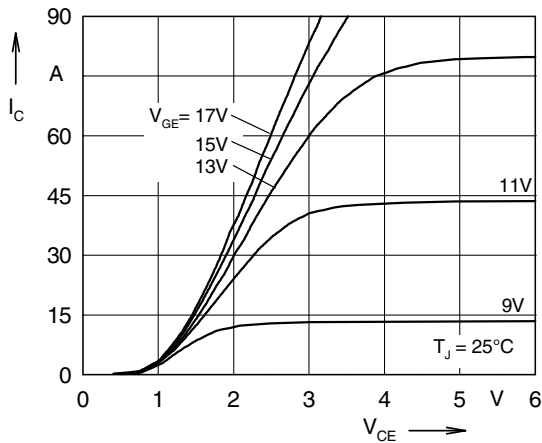


Fig. 1 Typ. output characteristics

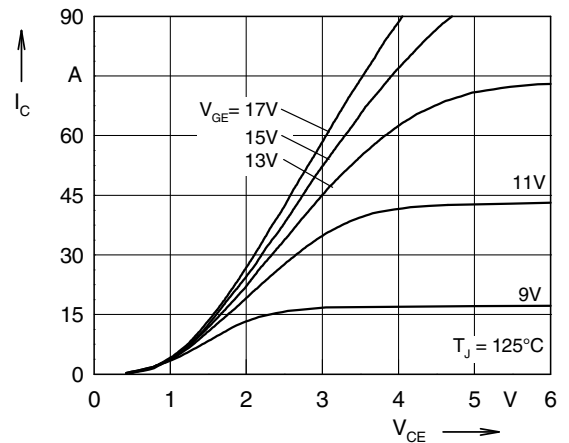


Fig. 2 Typ. output characteristics

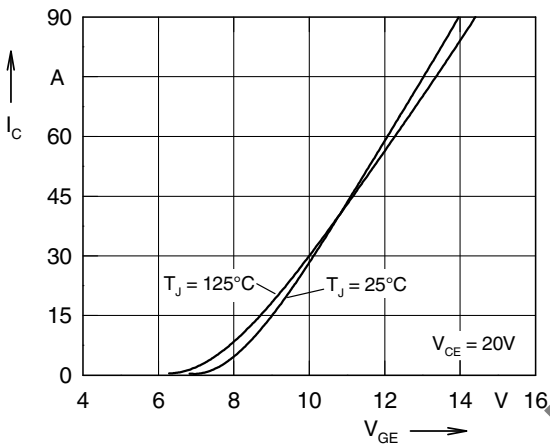


Fig. 3 Typ. transfer characteristics

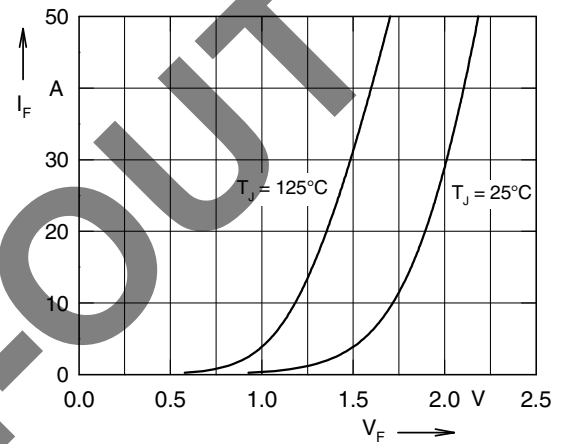


Fig. 4 Typ. forward characteristics of free wheeling diode

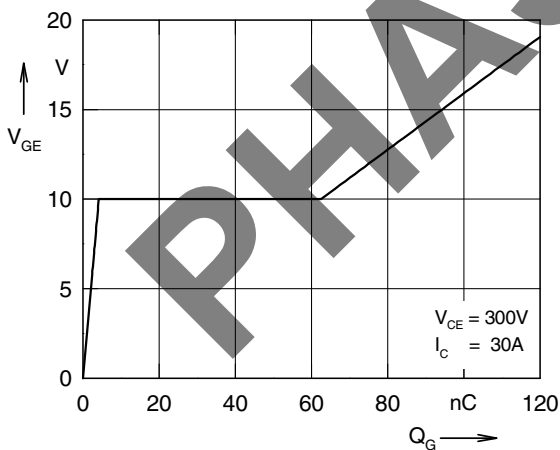


Fig. 5 Typ. turn on gate charge

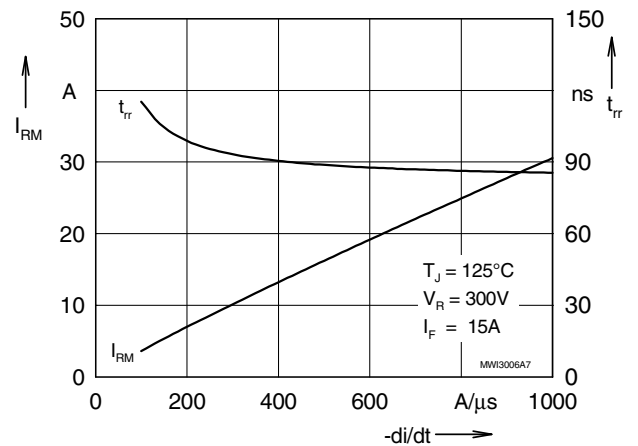


Fig. 6 Typ. turn off characteristics of free wheeling diode

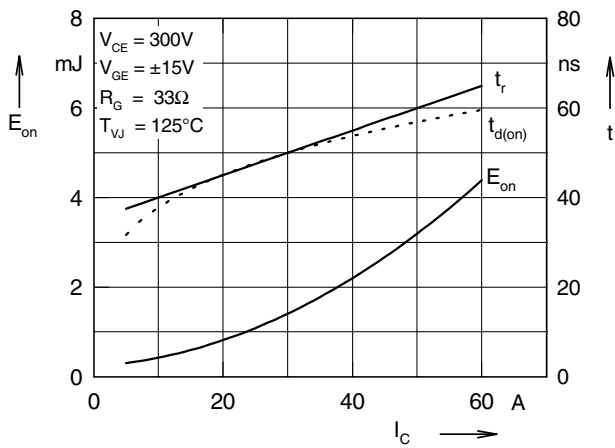


Fig. 7 Typ. turn on energy and switching times versus collector current

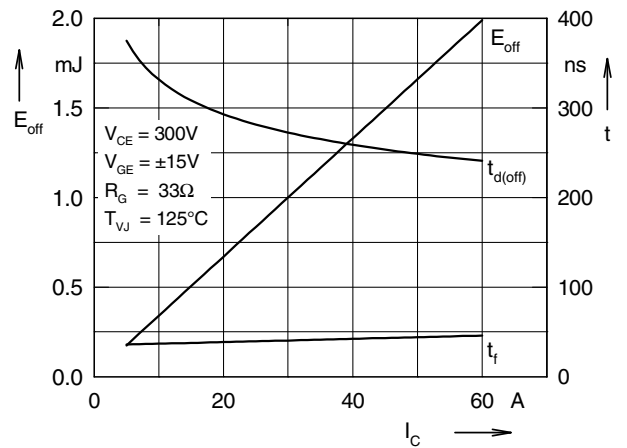


Fig. 8 Typ. turn off energy and switching times versus collector current

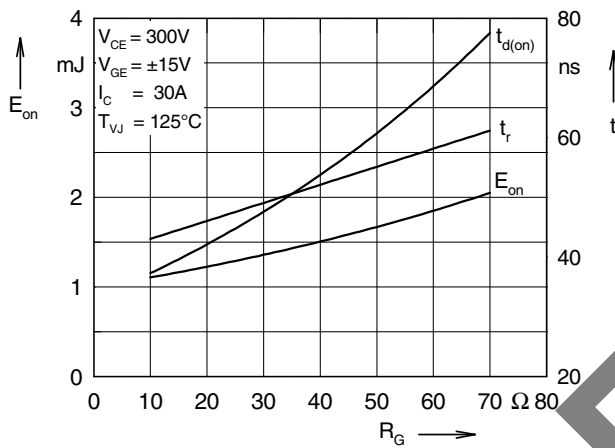


Fig. 9 Typ. turn on energy and switching times versus gate resistor

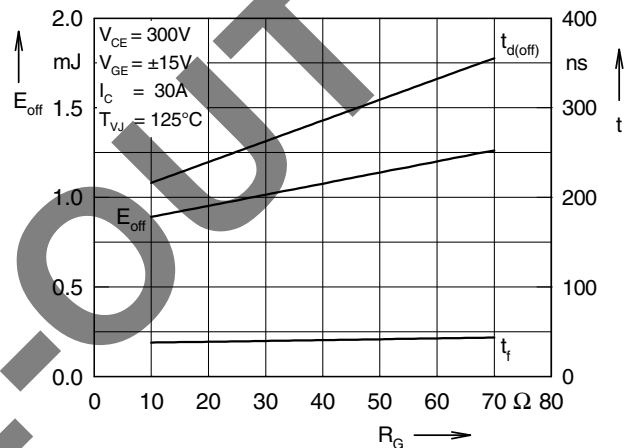


Fig. 10 Typ. turn off energy and switching times versus gate resistor

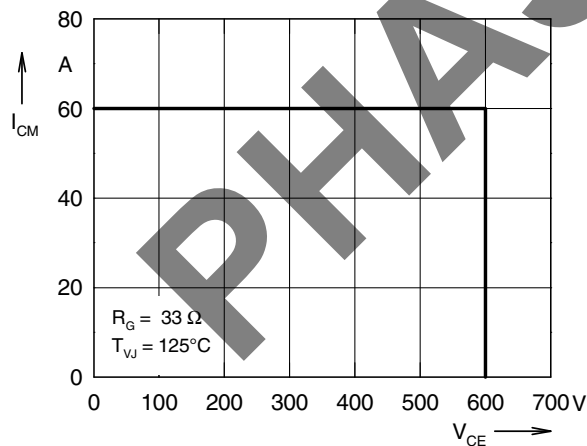


Fig. 11 Reverse biased safe operating area RBSOA

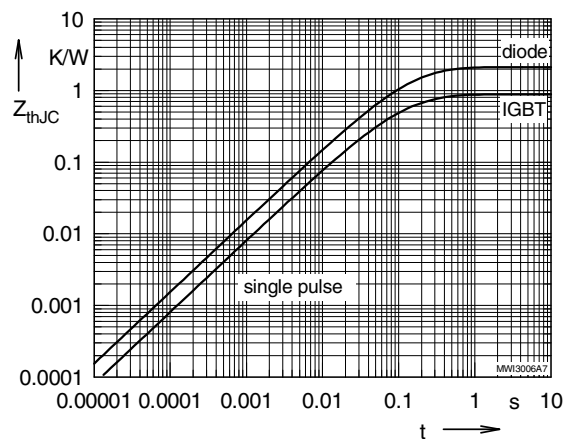


Fig. 12 Typ. transient thermal impedance