

IGBT Module

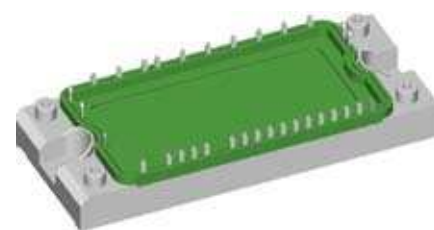
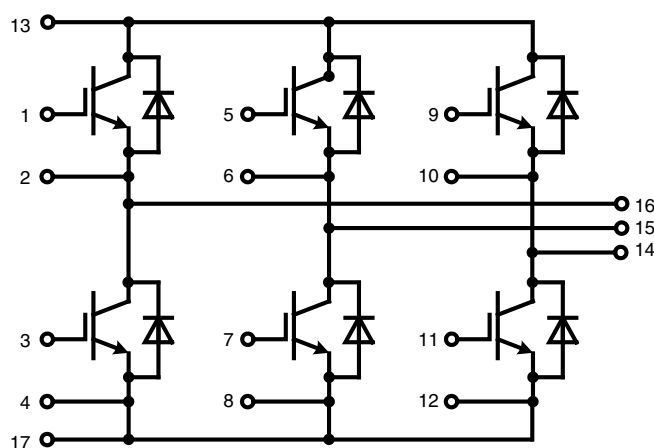
Sixpack

Short Circuit SOA Capability
Square RBSOA

$$\begin{aligned} I_{C25} &= 30 \text{ A} \\ V_{CES} &= 1200 \text{ V} \\ V_{CE(sat) \text{ typ.}} &= 2.0 \text{ V} \end{aligned}$$

Part name (Marking on product)

MWI15-12A7



 E72873

Pin configuration see outlines.

Features:

- NPT IGBT technology
- low saturation voltage
- positive temperature coefficient for easy paralleling
- low switching losses
- switching frequency up to 30 kHz
- square RBSOA, no latch up
- high short circuit capability
- MOS input, voltage controlled
- ultra fast free wheeling diodes
- solderable pins for PCB mounting
- space savings
- reduced protection circuits

Application:

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

Package:

- UL registered
- Industry standard E2-pack
- package with copper base plate
- package designed for wave soldering

IGBTs

				Ratings		
Symbol	Definitions	Conditions	min.	typ.	max.	Unit
V _{CES}	collector emitter voltage	T _{VJ} = 25°C to 150°C			1200	V
V _{GES}	max. DC gate voltage	continuous			±20	V
V _{GEM}	max. transient collector gate voltage	transient			±30	V
I _{C25}	collector current	T _C = 25°C			30	A
I _{C80}		T _C = 80°C			20	A
P _{tot}	total power dissipation	T _C = 25°C			140	W
V _{CE(sat)}	collector emitter saturation voltage	I _C = 15 A; V _{GE} = 15 V	T _{VJ} = 25°C T _{VJ} = 125°C	2.0 2.3	2.6	V V
V _{GE(th)}	gate emitter threshold voltage	I _C = 0.6 mA; V _{GE} = V _{CE}	T _{VJ} = 25°C	4.5	6.5	V
I _{CES}	collector emitter leakage current	V _{CE} = V _{CES} ; V _{GE} = 0 V	T _{VJ} = 25°C T _{VJ} = 125°C	0.8	0.9	mA mA
I _{GES}	gate emitter leakage current	V _{CE} = 0 V; V _{GE} = ±20 V			200	nA
C _{ies}	input capacitance	V _{CE} = 25 V; V _{GE} = 0 V; f = 1 MHz		1000		pF
Q _{G(on)}	total gate charge	V _{CE} = 600 V; V _{GE} = 15 V; I _C = 15 A		70		nC
t _{d(on)}	turn-on delay time	inductive load V _{CE} = 600 V; I _C = 15 A V _{GE} = ±15 V; R _G = 82 Ω	T _{VJ} = 125°C	100		ns
t _r	current rise time			75		ns
t _{d(off)}	turn-off delay time			500		ns
t _f	current fall time			70		ns
E _{on}	turn-on energy per pulse			2.3		mJ
E _{off}	turn-off energy per pulse			1.8		mJ
I _{CM}	reverse bias safe operating area	RBSOA; V _{GE} = ±15 V; R _G = 82 Ω L = 100 μH; clamped induct. load V _{CEmax} = V _{CES} - L _S ·di/dt	T _{VJ} = 125°C	35		A
t _{sc} (SCSOA)	short circuit safe operating area	V _{CE} = V _{CES} ; V _{GE} = ±15 V; R _G = 82 Ω; non-repetitive	T _{VJ} = 125°C	10		μs
R _{thJC}	thermal resistance junction to case	(per IGBT)			0.88	K/W

Diodes

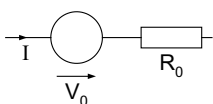
					Ratings		
Symbol	Definitions	Conditions	min.	typ.	max.	Unit	
V_{RRM}	<i>max. repetitive reverse voltage</i>		$T_{VJ} = 150^{\circ}\text{C}$		1200	V	
I_{F25}	<i>forward current</i>		$T_C = 25^{\circ}\text{C}$		25	A	
I_{F80}			$T_C = 80^{\circ}\text{C}$		17	A	
V_F	<i>forward voltage</i>	$I_F = 15\text{ A}; V_{GE} = 0\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	2.4 1.7	2.7	V V	
I_{RM}	<i>max. reverse recovery current</i>	$\left. \begin{array}{l} V_R = 600\text{ V} \\ di_F/dt = -400\text{ A}/\mu\text{s} \\ I_F = 15\text{ A}; V_{GE} = 0\text{ V} \end{array} \right\}$	$T_{VJ} = 125^{\circ}\text{C}$	16		A	
t_{rr}	<i>reverse recovery time</i>			130		ns	
$E_{rec(off)}$	<i>reverse recovery energy</i>			0.49		mJ	
R_{thJC}	<i>thermal resistance junction to case</i>	(per diode)			2.1	K/W	

 $T_C = 25^{\circ}\text{C}$ unless otherwise stated

Module

Symbol	Definitions	Conditions	Ratings			
			min.	typ.	max.	Unit
T_{VJ}	operating temperature		-40		125	°C
T_{VJM}	max. virtual junction temperature				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	(M4)	2.7		3.3	Nm
d_S	creep distance on surface		6			mm
d_A	strike distance through air		6			mm
Weight				180		g
R_{thCH}	thermal resistance case to heatsink	with heatsink compound		0.02		K/W

Equivalent Circuits for Simulation

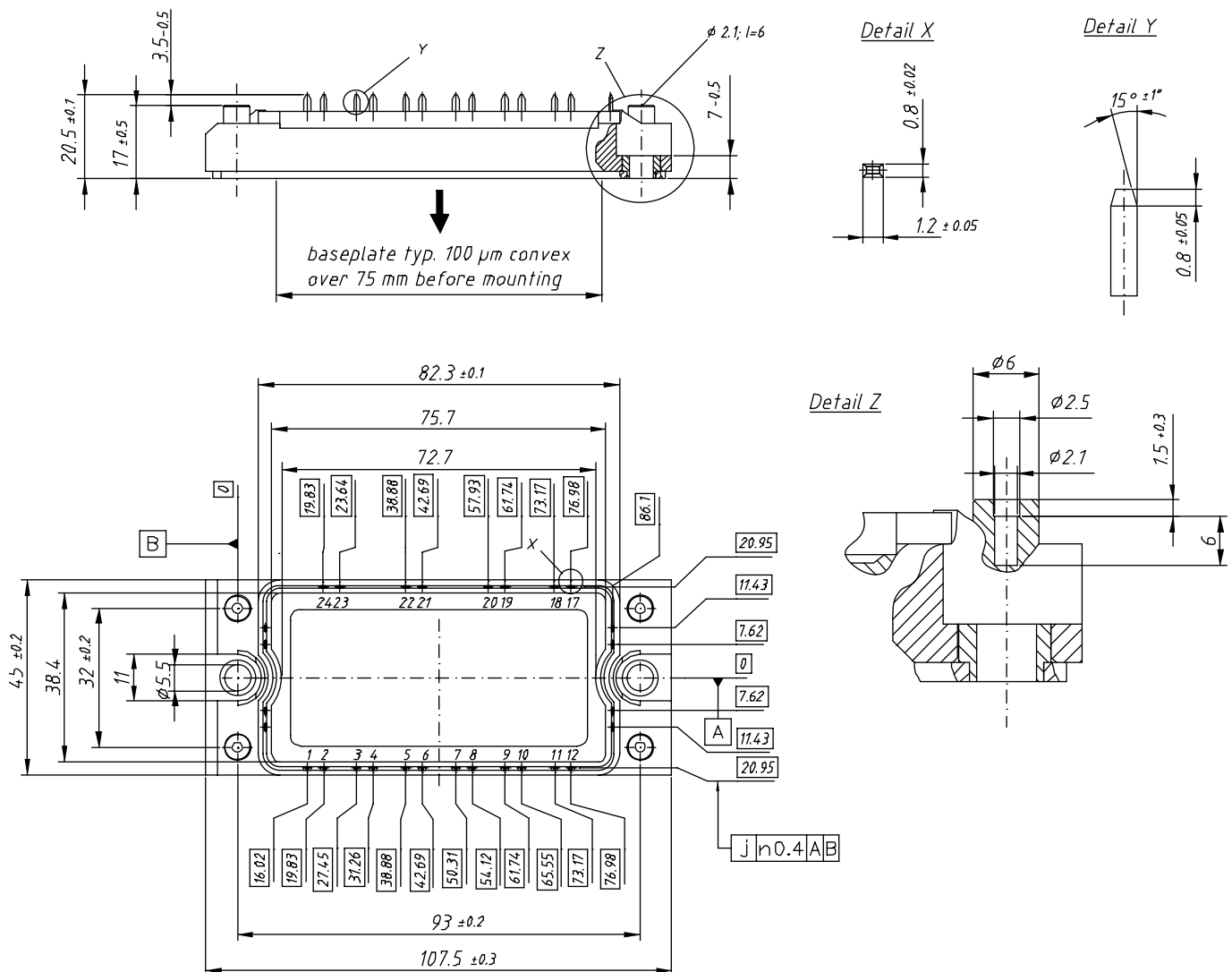


Ratings

Symbol	Definitions	Conditions	min.	typ.	max.	Unit
V_0 R_0	IGBT	T1 - T6 $T_{VJ} = 125^\circ\text{C}$		1.37 62		V mΩ
V_0 R_0	Diode	D1 - D6 $T_{VJ} = 125^\circ\text{C}$		1.327 30		V mΩ
$Z_{th}(t) = \sum_{i=1}^n \left[R_i \cdot \left(1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$ $\tau_i = R_i \cdot C_i$			IGBT		Diode	
R_1 R_2			-	-	-	-
C_1 C_2			-	-	-	-

Outline Drawing

Dimensions in mm (1 mm = 0.0394")



Product Marking

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MWI 15-12A7	MWI15-12A7	Box	10	485063

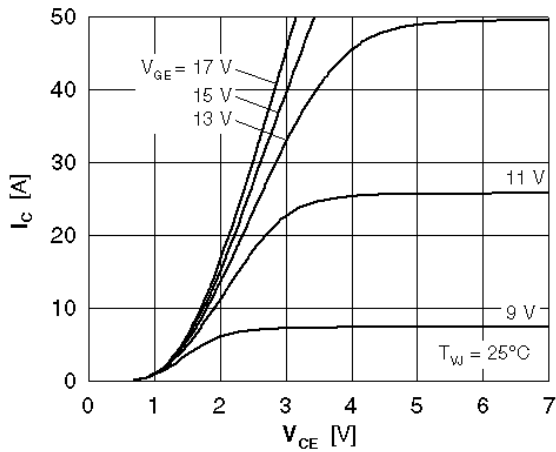


Fig. 1 Typ. output characteristics

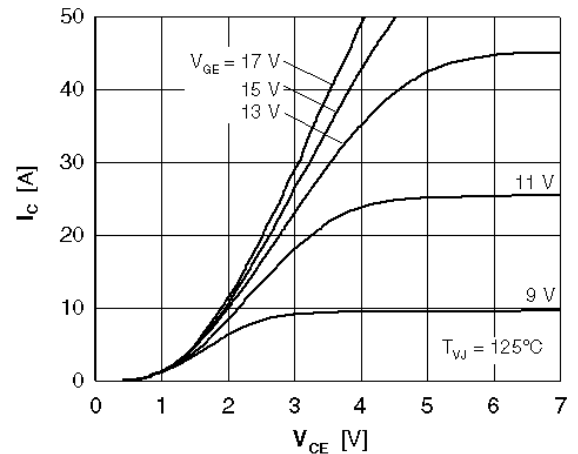


Fig. 2 Typ. output characteristics

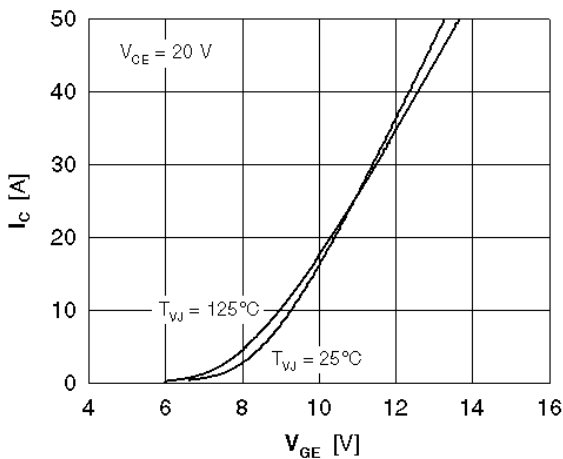


Fig. 3 Typ. transfer characteristics

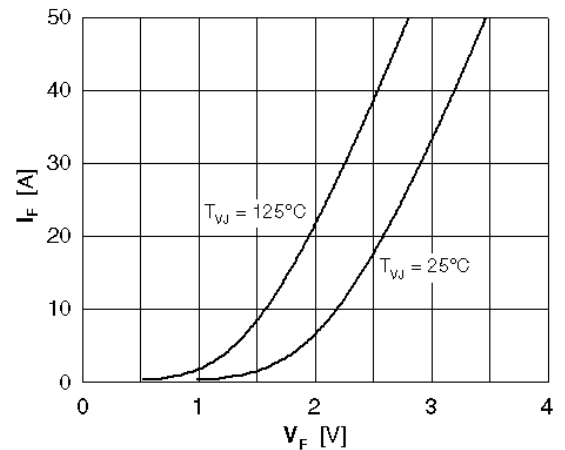


Fig. 4 Typ. forward characteristics of free wheeling diode

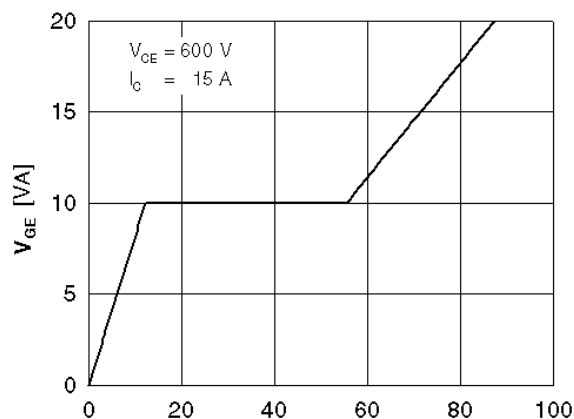


Fig. 5 Typ. turn on gate charge

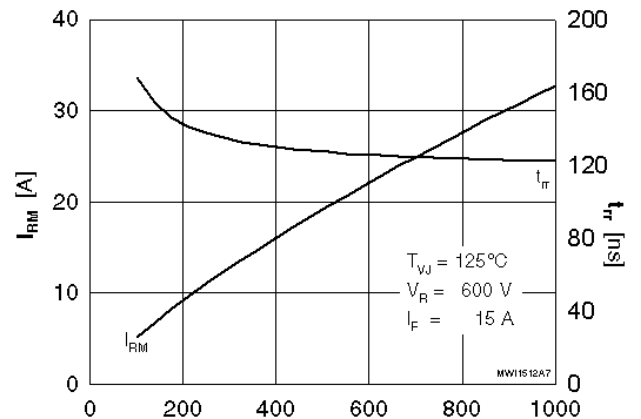


Fig. 6 Typ. turn off characteristics of free wheeling diode

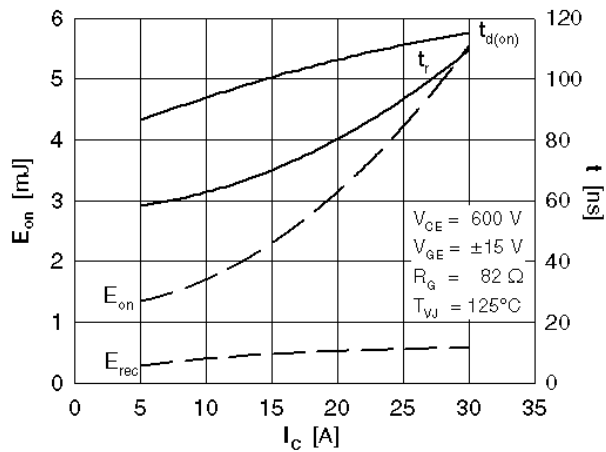


Fig. 7 Typ. turn on energy and switching times versus collector current

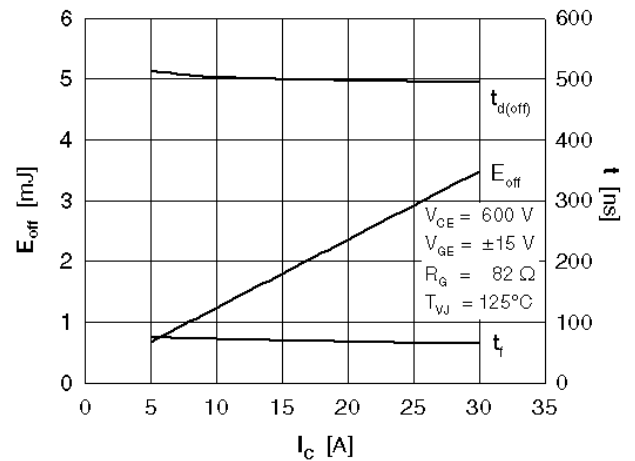


Fig. 8 Typ. turn off energy and switching times versus collector current

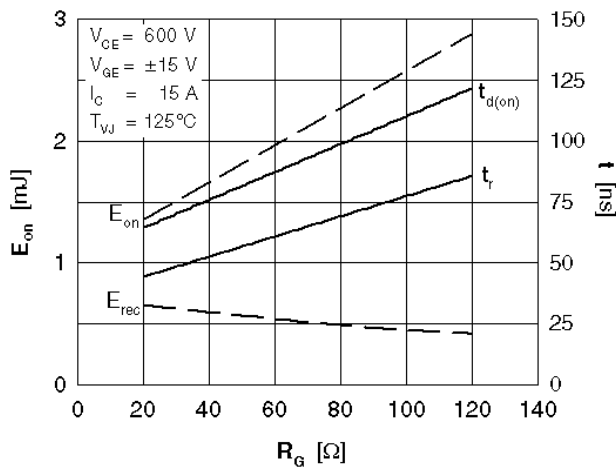


Fig. 9 Typ. turn on energy and switching times versus gate resistor

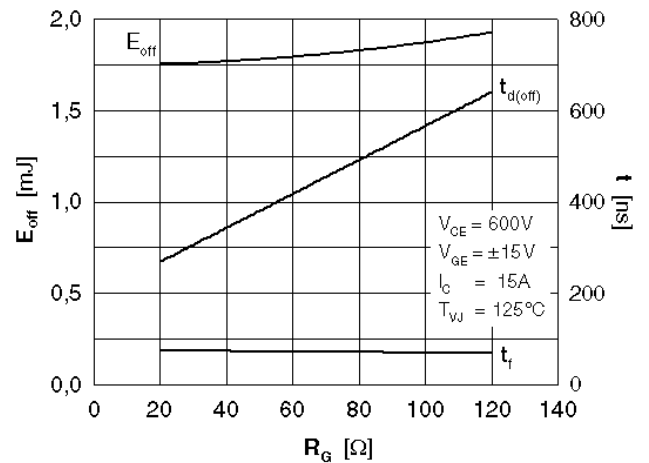


Fig. 10 Typ. turn off energy and switching times versus gate resistor

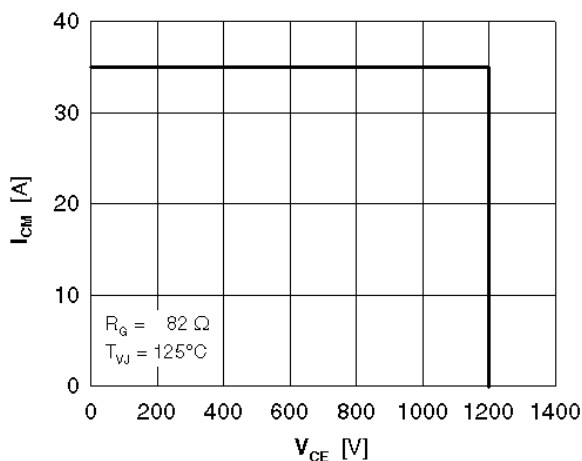


Fig. 11 Reverse biased safe operating area

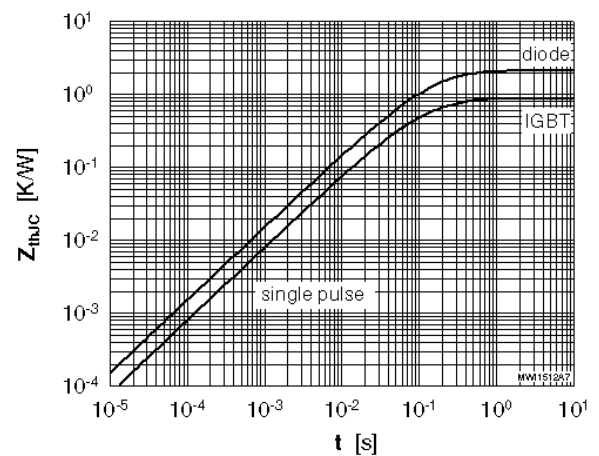


Fig. 12 Typ. transient thermal impedance