

IGBT (NPT) Module

$$V_{CES} = 2 \times 1200 \text{ V}$$

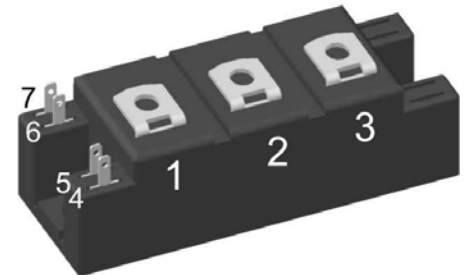
$$I_{C25} = 160 \text{ A}$$

$$V_{CE(sat)} = 2.2 \text{ V}$$

Phase leg

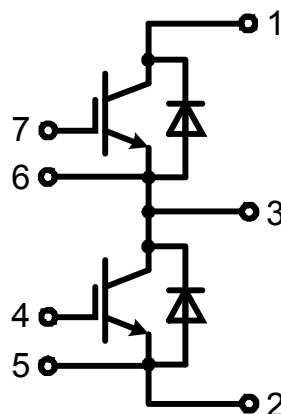
Part number

MII145-12A3



Backside: isolated

 E72873



Features / Advantages:

- 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

Applications:

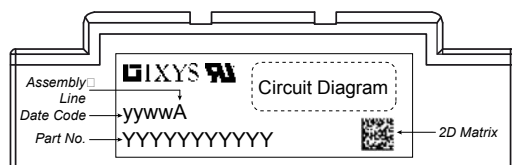
- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers
- Pumps, Fans

Package: Y4

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

IGBT				Ratings				
Symbol	Definition	Conditions		min.	typ.	max.	Unit	
V _{CES}	collector emitter voltage	T _{VJ} = 25°C				1200	V	
V _{GES}	max. DC gate voltage					±20	V	
V _{GEM}	max. transient gate emitter voltage					±30	V	
I _{C25}	collector current	T _C = 25°C				160	A	
I _{C80}		T _C = 80°C				110	A	
P _{tot}	total power dissipation	T _C = 25°C				700	W	
V _{CE(sat)}	collector emitter saturation voltage	I _C = 100A; V _{GE} = 15 V	T _{VJ} = 25°C T _{VJ} = 125°C		2.2 2.7	2.7	V V	
V _{GE(th)}	gate emitter threshold voltage	I _C = 4mA; V _{GE} = V _{CE}	T _{VJ} = 25°C	4.5	5.5	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			6	mA mA	
I _{GES}	gate emitter leakage current	V _{GE} = ±20 V				400	nA	
Q _{G(on)}	total gate charge	V _{CE} = 600 V; V _{GE} = 15 V; I _C = 100 A			480		nC	
t _{d(on)}	turn-on delay time	inductive load T_{VJ} = 125°C V_{CE} = 600V; I_C = 100A V_{GE} = ±15 V; R_G = 6.8 Ω			100		ns	
t _r	current rise time					60		ns
t _{d(off)}	turn-off delay time					600		ns
t _f	current fall time					90		ns
E _{on}	turn-on energy per pulse					16		mJ
E _{off}	turn-off energy per pulse					15		mJ
RBSOA	reverse bias safe operating area	V _{GE} = ±15 V; R _G = 6.8 Ω	T _{VJ} = 125°C					
I _{CM}		V _{CEmax} = 1200V				200	A	
SCSOA	short circuit safe operating area	V _{CEmax} = 1200 V						
t _{SC}	short circuit duration	V _{CE} = 1200V; V _{GE} = ±15 V	T _{VJ} = 125°C			10	μs	
I _{SC}	short circuit current	R _G = 6.8 Ω; non-repetitive			330		A	
R _{thJC}	thermal resistance junction to case					0.18	K/W	
R _{thCH}	thermal resistance case to heatsink				0.18		K/W	
Diode								
V _{RRM}	max. repetitive reverse voltage	T _{VJ} = 25°C				1200	V	
I _{F25}	forward current	T _C = 25°C				150	A	
I _{F80}		T _C = 80°C				95	A	
V _F	forward voltage	I _F = 100A	T _{VJ} = 25°C T _{VJ} = 125°C			2.60	V V	
I _R	reverse current	V _R = V _{RRM}	T _{VJ} = 25°C T _{VJ} = 125°C			1	mA mA	
Q _{rr}	reverse recovery charge	V_R = 600 V -di_F/dt = 600 A/μs I_F = 100A; V_{GE} = 0 V	T _{VJ} = 125°C			8.5	μC	
I _{RM}	max. reverse recovery current					62	A	
t _{rr}	reverse recovery time					200	ns	
E _{rec}	reverse recovery energy					1.5	mJ	
R _{thJC}	thermal resistance junction to case					0.45	K/W	
R _{thCH}	thermal resistance case to heatsink				0.45		K/W	

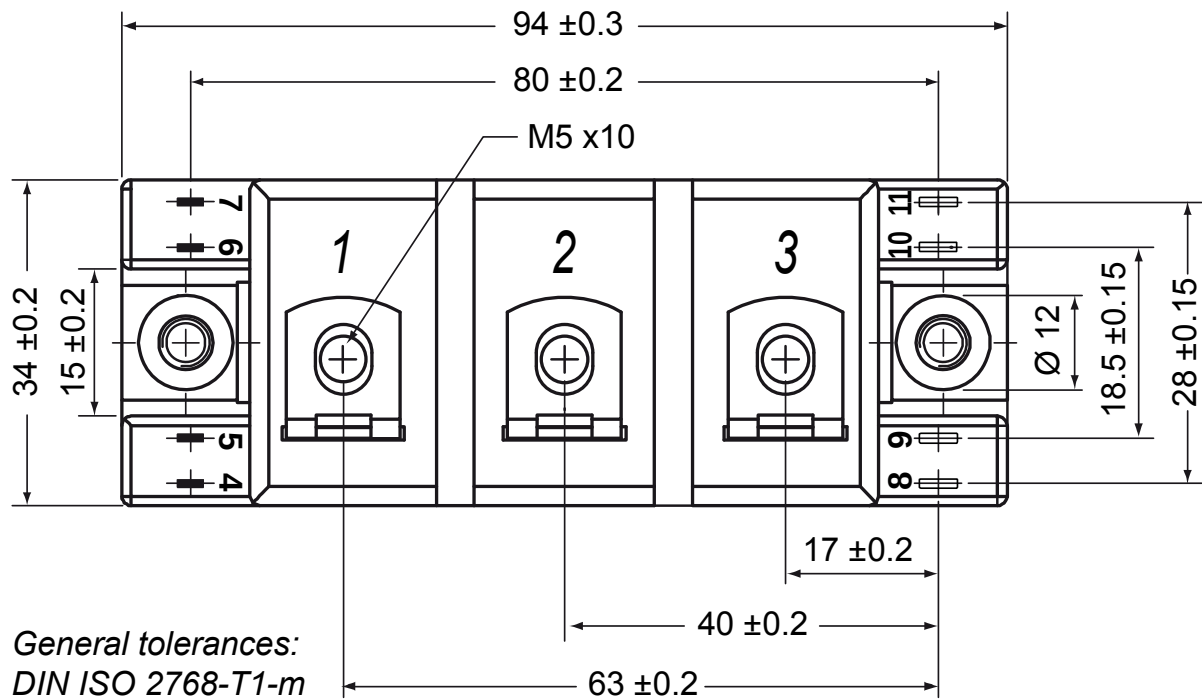
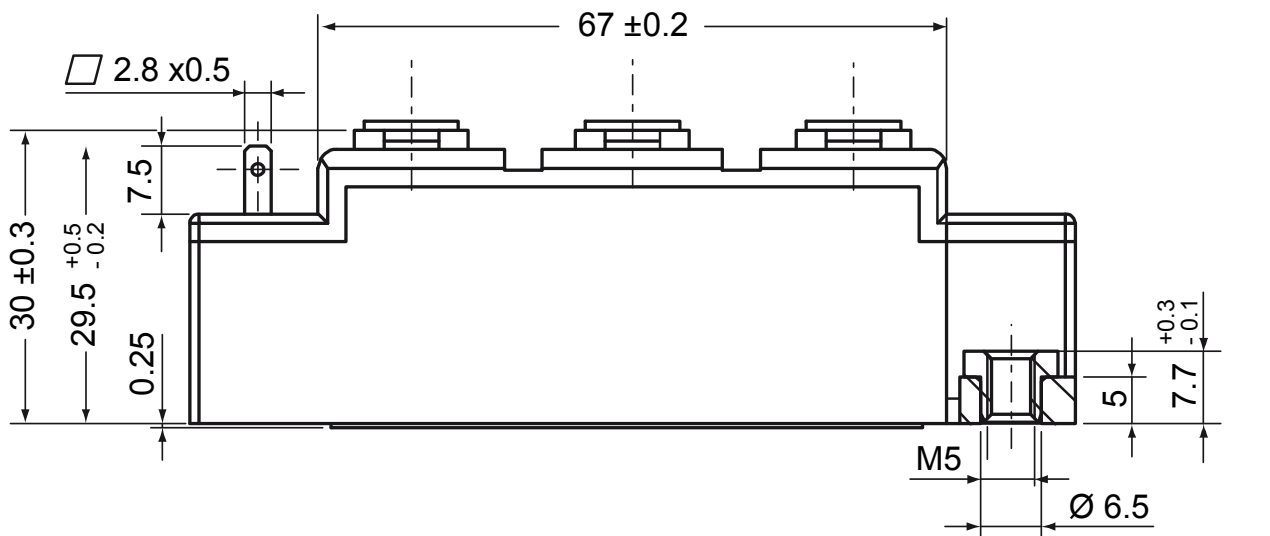
Package Y4				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal				300	A
T_{VJ}	virtual junction temperature			-40		150	°C
T_{op}	operation temperature			-40		125	°C
T_{stg}	storage temperature			-40		125	°C
Weight					110		g
M_D	mounting torque			2.25		2.75	Nm
M_T	terminal torque			4.5		5.5	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	14.0	10.0			mm
$d_{Spb/Apb}$		terminal to backside	16.0	16.0			mm
V_{ISOL}	isolation voltage	t = 1 second	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	3600			V
		t = 1 minute		3000			V



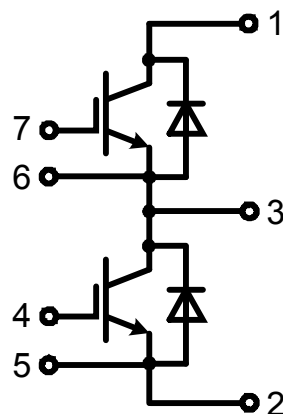
Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MII145-12A3	MII145-12A3	Box	6	473642

Equivalent Circuits for Simulation		* on die level		$T_{VJ} = 150^\circ\text{C}$	
		IGBT	Diode		
	$V_{0\max}$ threshold voltage	1.3	1.3	V	
	$R_{0\max}$ slope resistance *	12	6.5	mΩ	

Outlines Y4



General tolerances:
DIN ISO 2768-T1-m



IGBT

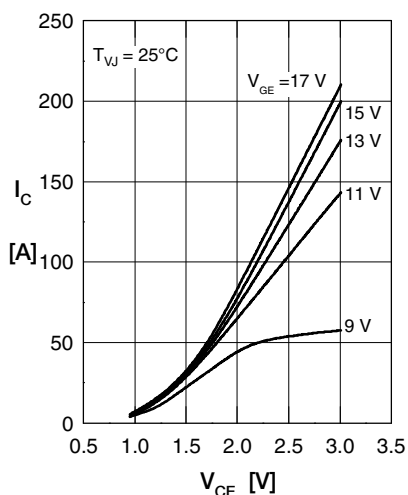


Fig. 1 Typ. output characteristics

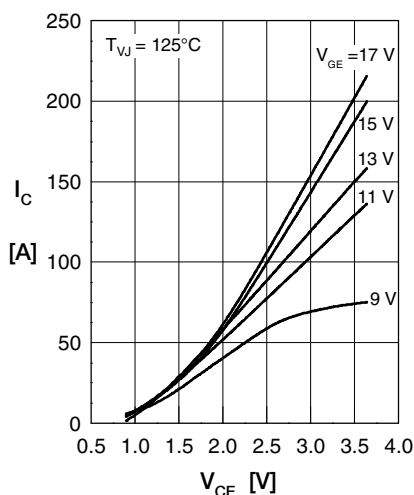


Fig. 2 Typ. output characteristics

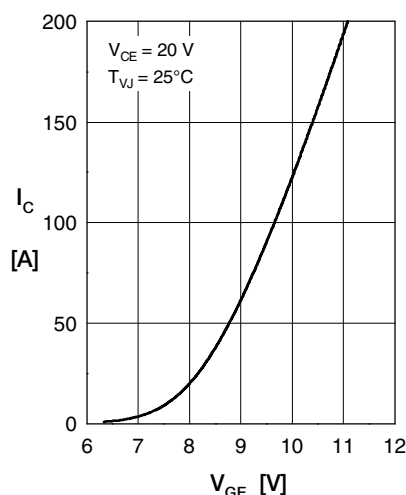


Fig. 3 Typ. transfer characteristics

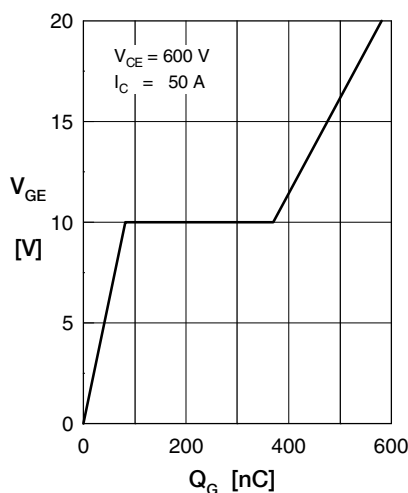


Fig. 4 Typ. turn-on gate charge

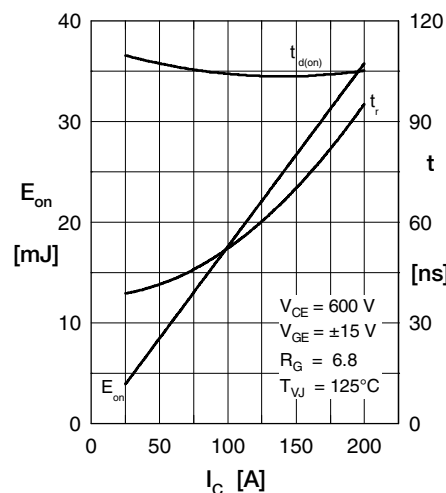


Fig. 5 Typ. turn on energy & switching times versus collector current

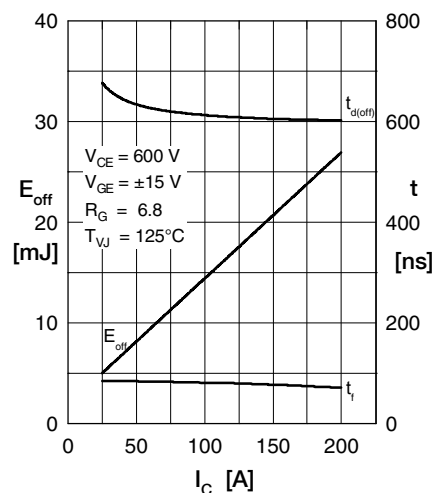


Fig. 6 Typ. turn off energy & switching times versus collector current

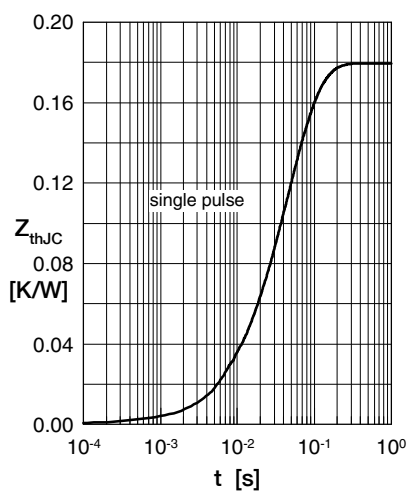


Fig. 12 Typical transient thermal impedance

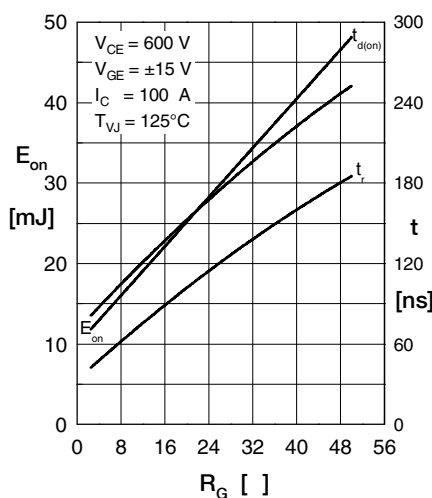


Fig. 9 Typ. turn on energy & switching times versus gate resistor

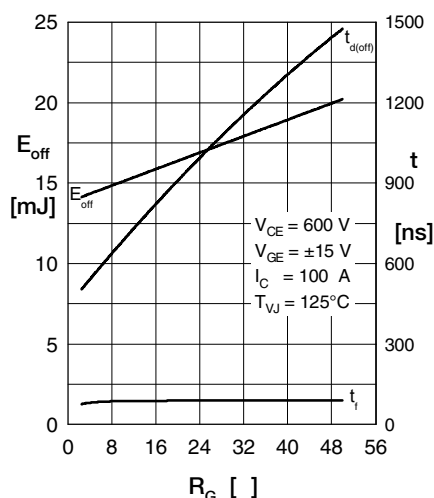


Fig. 9 Typ. turn off energy & switching times versus gate resistor

Diode

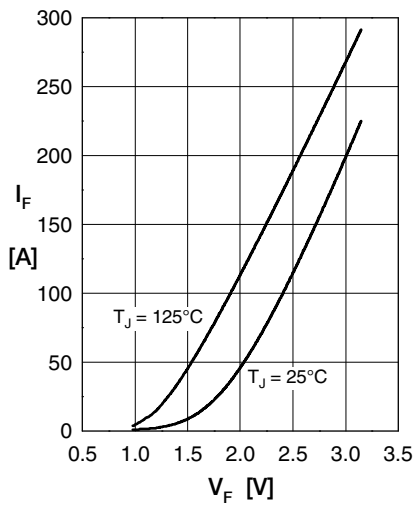


Fig. 1 Typ. Forward current vs. V_F

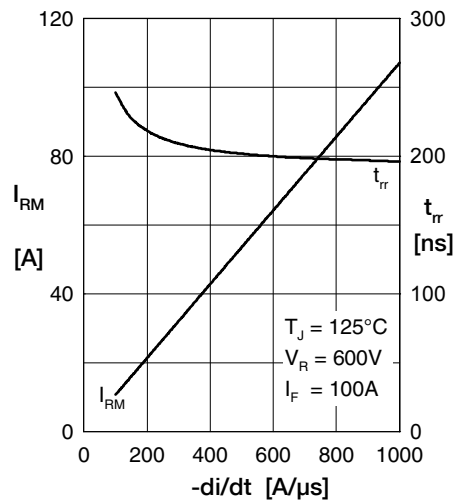


Fig. 2 Typ. peak reverse current I_{RM} versus di/dt

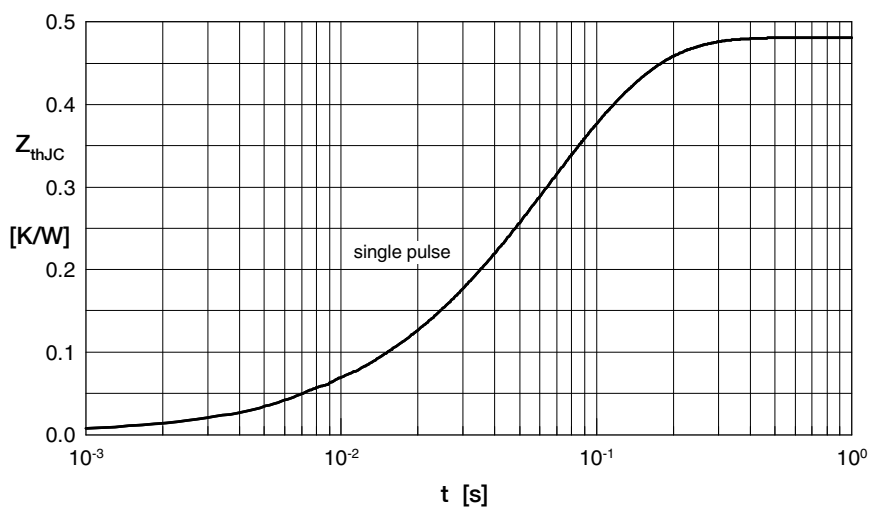


Fig. 3 Typ. transient thermal impedance junction to case