

IGBT (NPT) Module

$$V_{CES} = 1200V$$

$$I_{C25} = 160A$$

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

Buck Chopper + free wheeling Diode

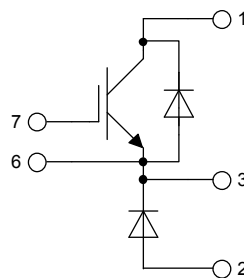
Part number

MDI145-12A3



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

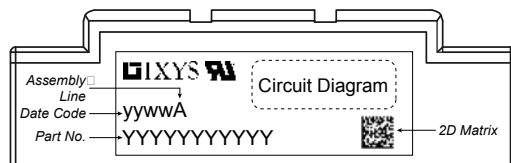
Package: Y4

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

Free Wheeling Diode FWD				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{RSM}	max. non-repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1200	V
V_{RRM}	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1200	V
I_R	reverse current, drain current	$V_R = 1200\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			1	mA
		$V_R = 1200\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$			3	mA
V_F	forward voltage drop	$I_F = 100\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			2.60	V
		$I_F = 200\text{ A}$				3.10	V
		$I_F = 100\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			2.00	V
		$I_F = 200\text{ A}$				2.40	V
I_{FAV}	average forward current	$T_C = 80^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			95	A
		DC current $d = 1$					
V_{F0}	threshold voltage	} for power loss calculation only		$T_{VJ} = 150^{\circ}\text{C}$		1.30	V
r_F	slope resistance					7.5	mΩ
R_{thJC}	thermal resistance junction to case					0.18	K/W
R_{thCH}	thermal resistance case to heatsink				0.18		K/W
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$				700	W
I_{FSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}; V_R = 0\text{ V}$	$T_{VJ} = 45^{\circ}\text{C}$			700	A
C_J	junction capacitance	$V_R = 600\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		30		pF

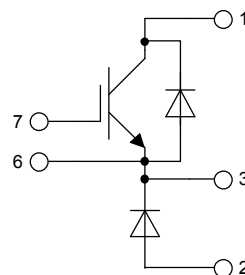
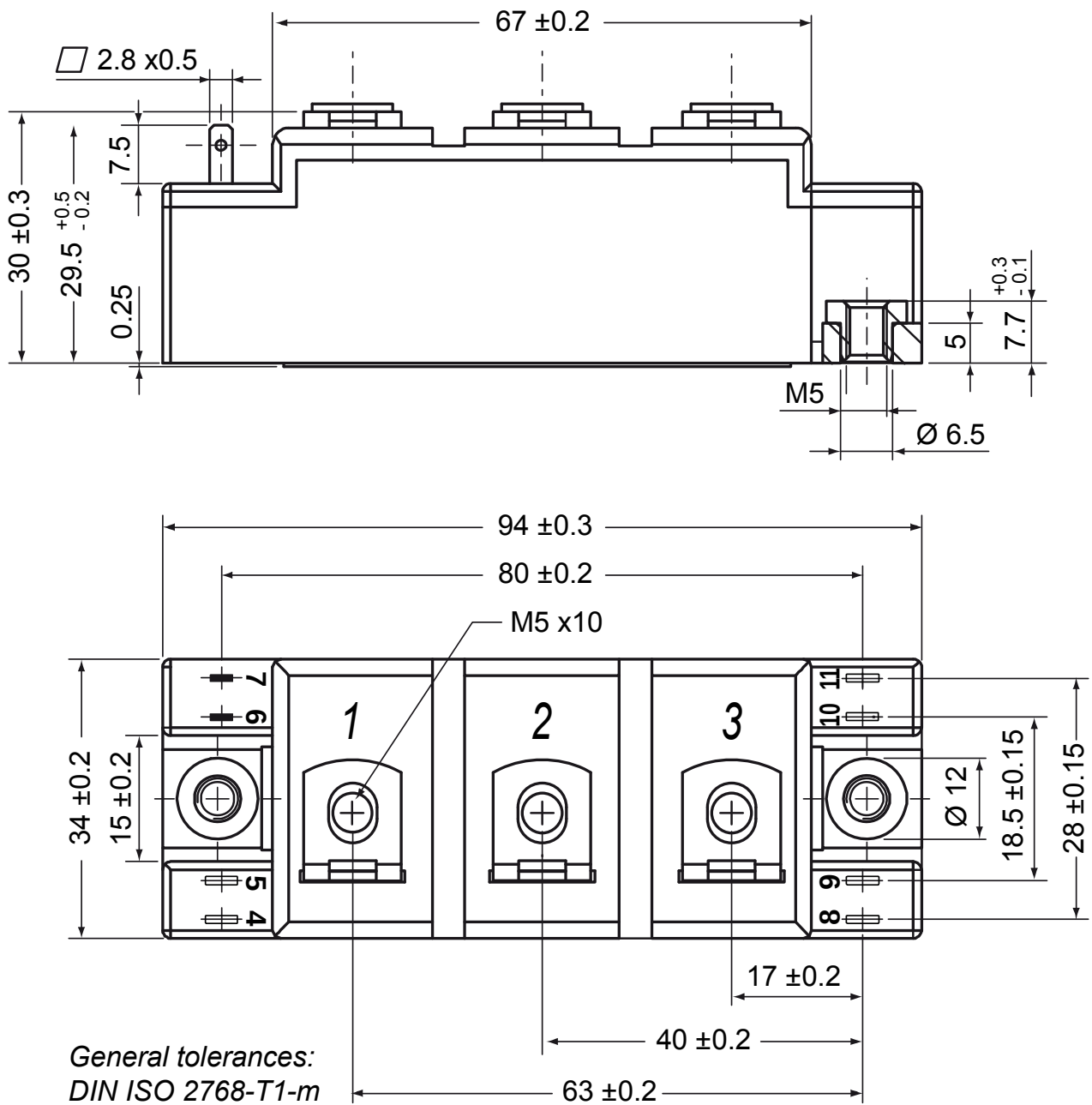
Buck IGBT				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{CES}	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$				1200	V
V_{GES}	max. DC gate voltage					± 20	V
V_{GEM}	max. transient gate emitter voltage					± 30	V
I_{C25}	collector current	$T_C = 25^{\circ}\text{C}$				160	A
I_{C80}		$T_C = 80^{\circ}\text{C}$				110	A
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$				700	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 100\text{A}; V_{GE} = 15\text{V}$	$T_{VJ} = 25^{\circ}\text{C}$		2.2	2.7	V
			$T_{VJ} = 125^{\circ}\text{C}$		2.7		V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 4\text{mA}; V_{GE} = V_{CE}$	$T_{VJ} = 25^{\circ}\text{C}$	4.5	5.5	6.5	V
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{V}$	$T_{VJ} = 25^{\circ}\text{C}$			6	mA
			$T_{VJ} = 125^{\circ}\text{C}$		9		mA
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{V}$				400	nA
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{V}; V_{GE} = 15\text{V}; I_C = 100\text{A}$			480		nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{V}; I_C = 100\text{A}$ $V_{GE} = \pm 15\text{V}; R_G = 6.8\Omega$	$T_{VJ} = 125^{\circ}\text{C}$		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	$V_{GE} = \pm 15\text{V}; R_G = 6.8\Omega$	$T_{VJ} = 125^{\circ}\text{C}$				
I_{CM}		$V_{CEmax} = 1200\text{V}$				200	A
SCSOA	short circuit safe operating area	$V_{CEmax} = 1200\text{V}$	$T_{VJ} = 125^{\circ}\text{C}$				
t_{SC}	short circuit duration	$V_{CE} = 1200\text{V}; V_{GE} = \pm 15\text{V}$				10	μs
I_{SC}	short circuit current	$R_G = 6.8\Omega$; 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
Buck Diode BD							
V_{RRM}	max. repetitive reverse voltage		$T_{VJ} = 25^{\circ}\text{C}$			1200	V
I_{F25}	forward current		$T_C = 25^{\circ}\text{C}$			150	A
I_{F80}			$T_C = 80^{\circ}\text{C}$			95	A
V_F	forward voltage	$I_F = 100\text{A}$	$T_{VJ} = 25^{\circ}\text{C}$			2.60	V
			$T_{VJ} = 125^{\circ}\text{C}$		1.90		V
I_R	reverse current	$V_R = V_{RRM}$	$T_{VJ} = 25^{\circ}\text{C}$			1	mA
			$T_{VJ} = 125^{\circ}\text{C}$		1.5		mA
Q_{rr}	reverse recovery charge	$V_R = 600\text{V}$ $-di_F/dt = 600\text{A}/\mu\text{s}$ $I_F = 100\text{A}; V_{GE} = 0\text{V}$	$T_{VJ} = 125^{\circ}\text{C}$		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					108		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	MDI145-12A3	MDI145-12A3	Box	6	474223

Outlines Y4



Buck IGBT

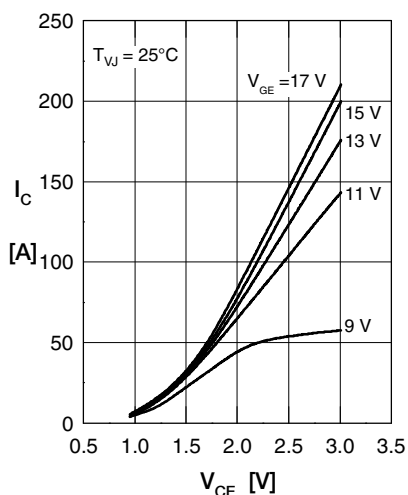


Fig. 1 Typ. output characteristics

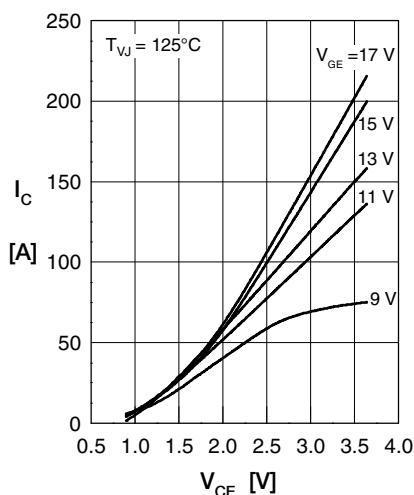


Fig. 2 Typ. output characteristics

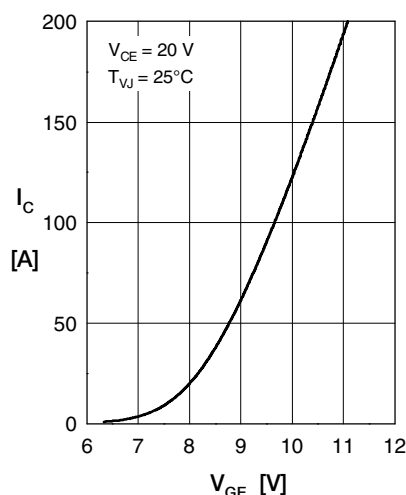


Fig. 3 Typ. transfer characteristics

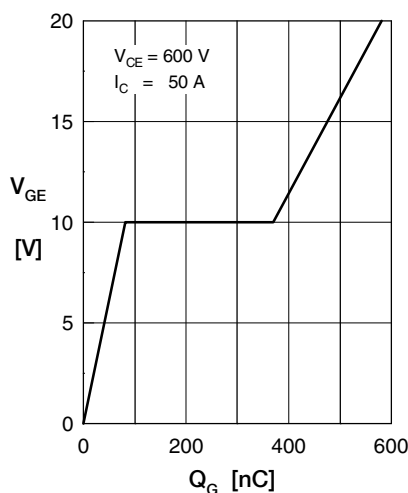


Fig. 4 Typ. turn-on gate charge

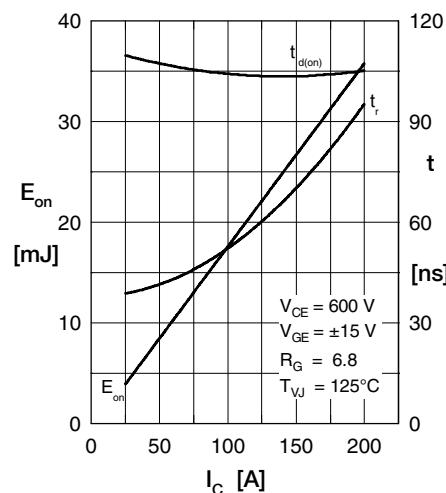


Fig. 5 Typ. turn on energy & switching times versus collector current

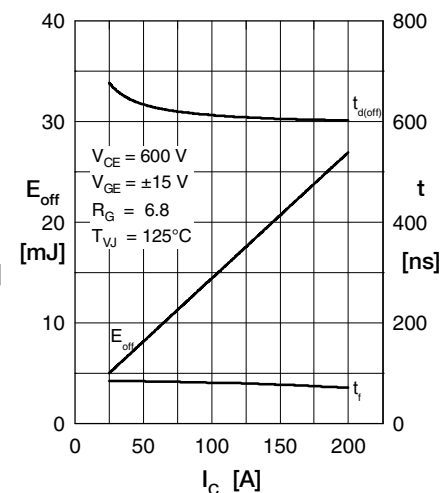


Fig. 6 Typ. turn off energy & switching times versus collector current

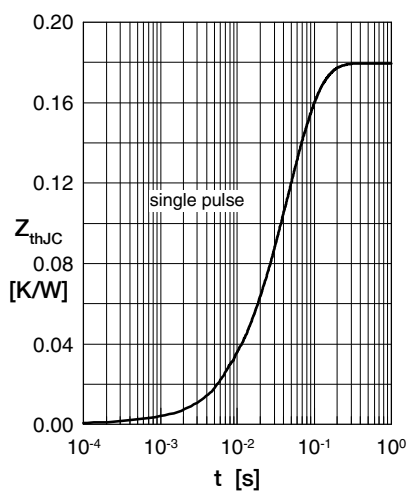


Fig. 12 Typical transient thermal impedance

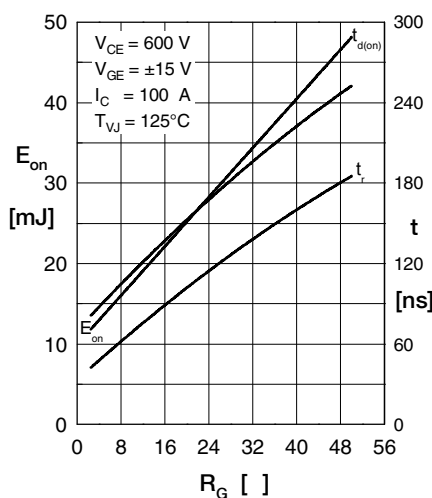


Fig. 9 Typ. turn on energy & switching times versus gate resistor

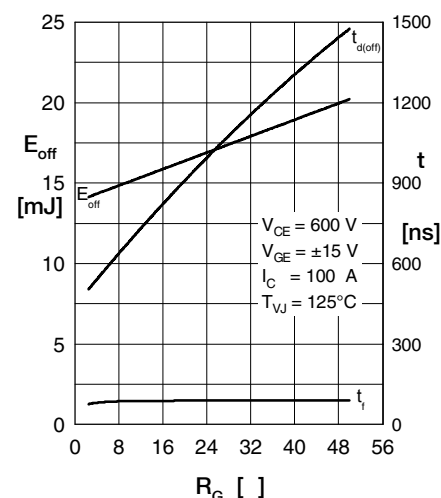


Fig. 9 Typ. turn off energy & switching times versus gate resistor

Buck Diode BD

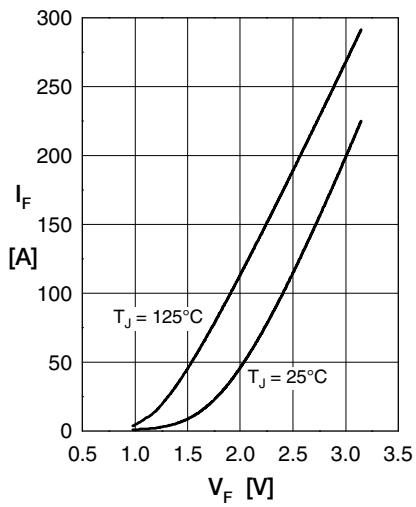


Fig. 1 Typ. Forward current vs. V_F

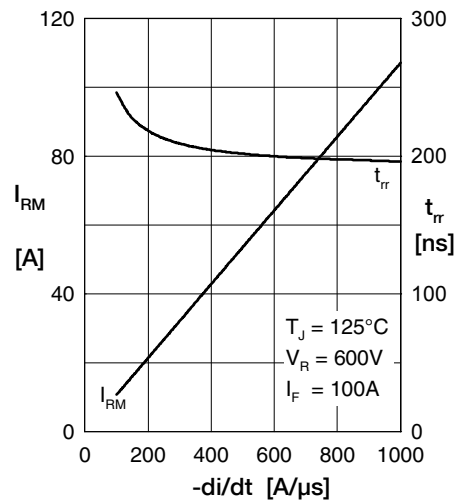


Fig. 2 Typ. peak reverse current I_{RM} versus di/dt

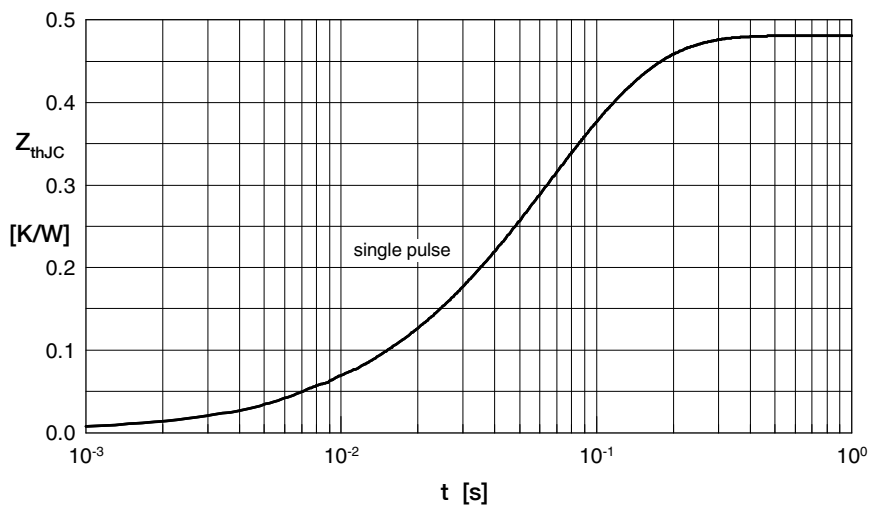


Fig. 3 Typ. transient thermal impedance junction to case