

## IGBT (NPT) Module

$$V_{CES} = 1200V$$

$$I_{C25} = 90A$$

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


Buck Chopper + free wheeling Diode

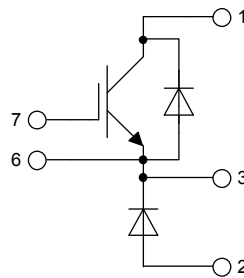
Part number

MDI75-12A3



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

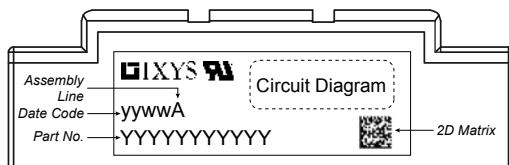
### Package: Y4

- 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	$T_{VJ} = 25^{\circ}C$			1200	V
$V_{RRM}$	max. repetitive reverse blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V
$I_R$	reverse current, drain current	$V_R = 1200 V$	$T_{VJ} = 25^{\circ}C$		650	$\mu A$
		$V_R = 1200 V$	$T_{VJ} = 125^{\circ}C$		2	mA
$V_F$	forward voltage drop	$I_F = 50 A$	$T_{VJ} = 25^{\circ}C$		2.50	V
		$I_F = 100 A$			3.00	V
		$I_F = 50 A$	$T_{VJ} = 125^{\circ}C$		1.90	V
		$I_F = 100 A$			2.30	V
$I_{FAV}$	average forward current	$T_C = 80^{\circ}C$	$T_{VJ} = 150^{\circ}C$		60	A
		DC current $d = 1$				
$V_{FO}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		1.30	V
$r_F$	slope resistance				12	m $\Omega$
$R_{thJC}$	thermal resistance junction to case				0.66	K/W
$R_{thCH}$	thermal resistance case to heatsink			0.66		K/W
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		190	W
$I_{FSM}$	max. forward surge current	$t = 10 ms; (50 Hz), sine; V_R = 0 V$	$T_{VJ} = 45^{\circ}C$		400	A
$C_J$	junction capacitance	$V_R = 600 V f = 1 MHz$	$T_{VJ} = 25^{\circ}C$		30	pF

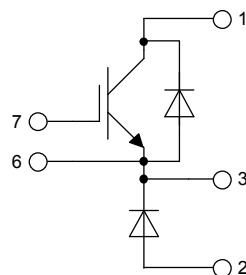
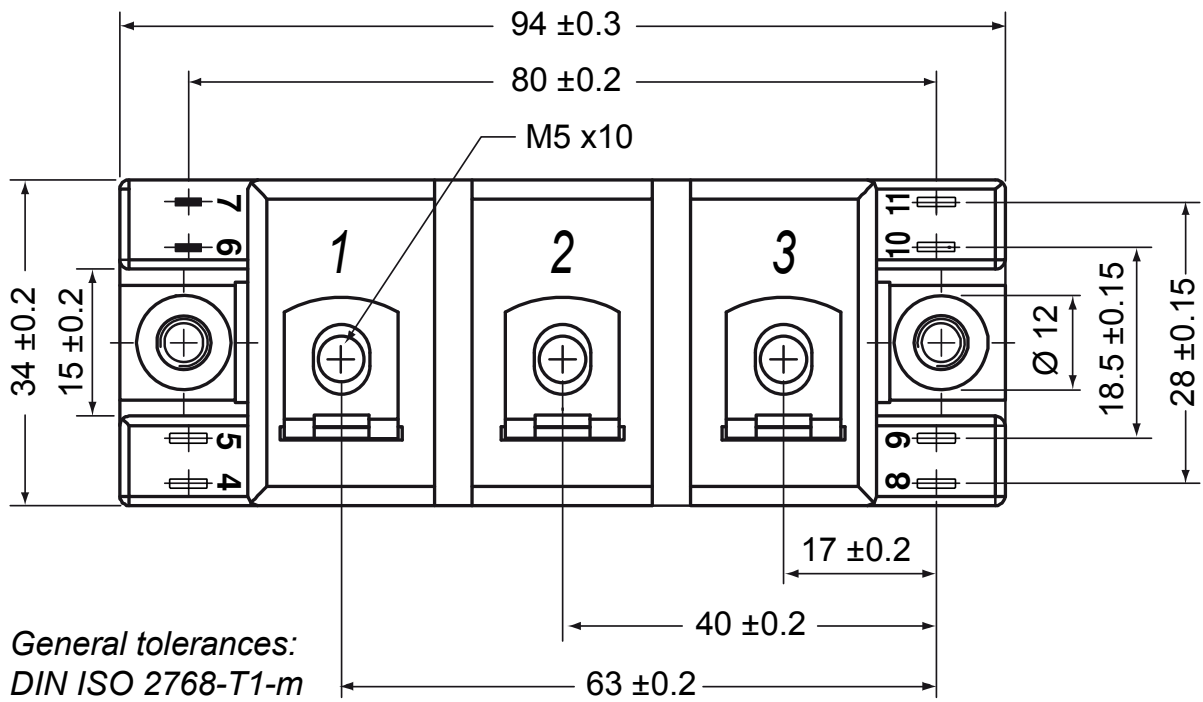
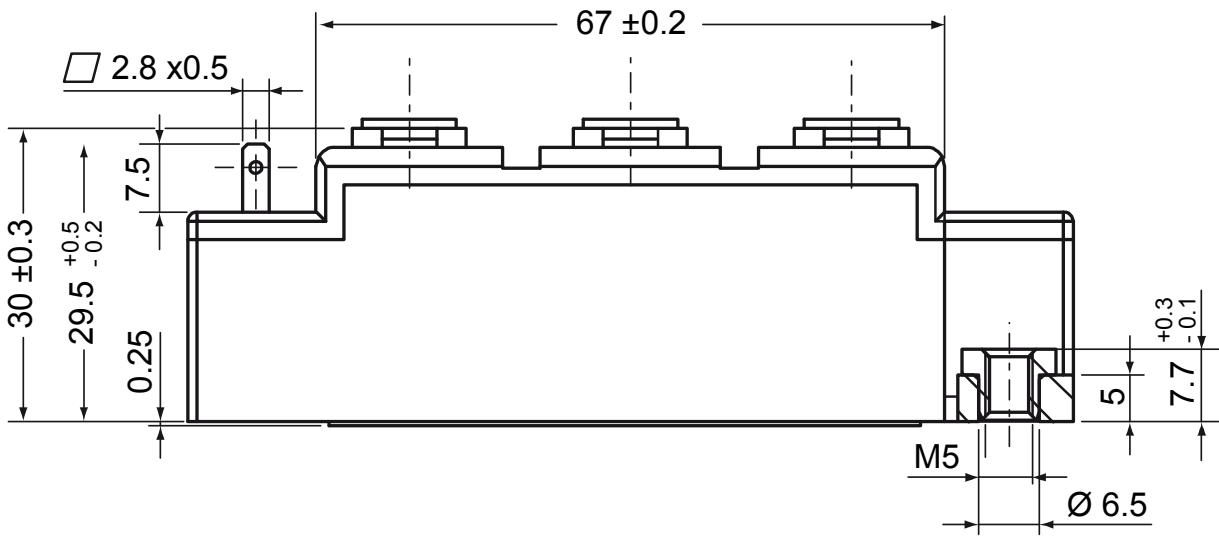
Buck IGBT				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{CES}$	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
$V_{GES}$	max. DC gate voltage				$\pm 20$	V	
$V_{GEM}$	max. transient gate emitter voltage				$\pm 30$	V	
$I_{C25}$	collector current	$T_C = 25^{\circ}\text{C}$			90	A	
$I_{C80}$		$T_C = 80^{\circ}\text{C}$			60	A	
$P_{tot}$	total power dissipation	$T_C = 25^{\circ}\text{C}$			370	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 50\text{A}; V_{GE} = 15\text{V}$			2.2	V	
					2.7	V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 2\text{mA}; V_{GE} = V_{CE}$	4.5	5.5	6.5	V	
$I_{CES}$	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{V}$			4	mA	
					6	mA	
$I_{GES}$	gate emitter leakage current	$V_{GE} = \pm 20\text{V}$			200	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{V}; V_{GE} = 15\text{V}; I_C = 50\text{A}$		240		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{V}; I_C = 50\text{A}$ $V_{GE} = \pm 15\text{V}; R_G = 22\ \Omega$		100		ns	
$t_r$	current rise time			70		ns	
$t_{d(off)}$	turn-off delay time			500		ns	
$t_f$	current fall time			70		ns	
$E_{on}$	turn-on energy per pulse			7.6		mJ	
$E_{off}$	turn-off energy per pulse			5.6		mJ	
<b>RBSOA</b>	reverse bias safe operating area	$V_{GE} = \pm 15\text{V}; R_G = 22\ \Omega$					
$I_{CM}$		$V_{CEmax} = 1200\text{V}$			100	A	
<b>SCSOA</b>	short circuit safe operating area	$V_{CEmax} = 1200\text{V}$					
$t_{sc}$	short circuit duration	$V_{CE} = 1200\text{V}; V_{GE} = \pm 15\text{V}$			10	$\mu\text{s}$	
$I_{sc}$	short circuit current	$R_G = 22\ \Omega; \text{non-repetitive}$		180		A	
$R_{thJC}$	thermal resistance junction to case				0.33	K/W	
$R_{thCH}$	thermal resistance case to heatsink				0.33	K/W	
<b>Buck Diode BD</b>							
$V_{RRM}$	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
$I_{F25}$	forward current	$T_C = 25^{\circ}\text{C}$			100	A	
$I_{F80}$		$T_C = 80^{\circ}\text{C}$			60	A	
$V_F$	forward voltage	$I_F = 50\text{A}$			2.50	V	
				1.80		V	
$I_R$	reverse current	$V_R = V_{RRM}$			0.65	mA	
				1		mA	
$Q_{rr}$	reverse recovery charge	$V_R = 600\text{V}$ $-di_F/dt = 400\text{A}/\mu\text{s}$ $I_F = 50\text{A}; V_{GE} = 0\text{V}$		3.5		$\mu\text{C}$	
$I_{RM}$	max. reverse recovery current			40		A	
$t_{rr}$	reverse recovery time			200		ns	
$E_{rec}$	reverse recovery energy			1		mJ	
$R_{thJC}$	thermal resistance junction to case				0.66	K/W	
$R_{thCH}$	thermal resistance case to heatsink				0.66	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
<b>Weight</b>					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			3600	V
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		3000	V



Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MDI75-12A3	MDI75-12A3	Box	6	474207

**Outlines Y4**



**Buck IGBT**

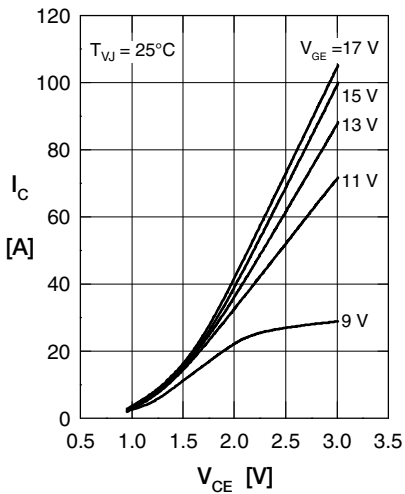


Fig. 1 Typ. output characteristics

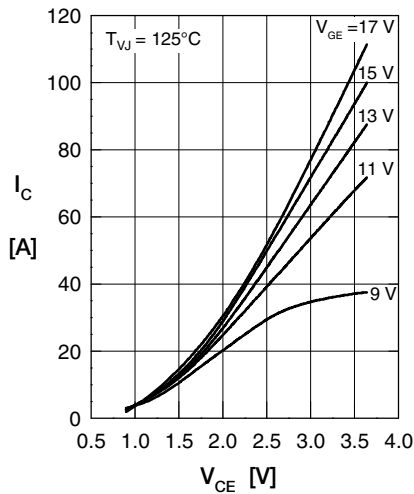


Fig. 2 Typ. output characteristics

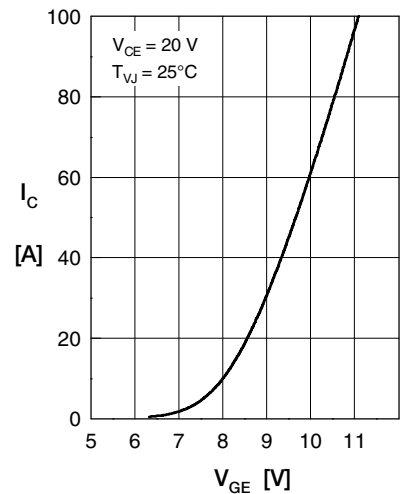


Fig. 3 Typ. transfer characteristics

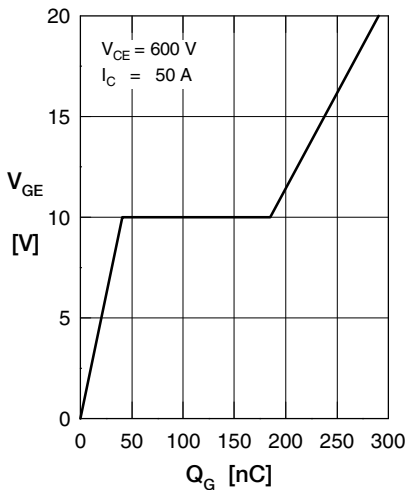


Fig. 4 Typ. turn-on gate charge

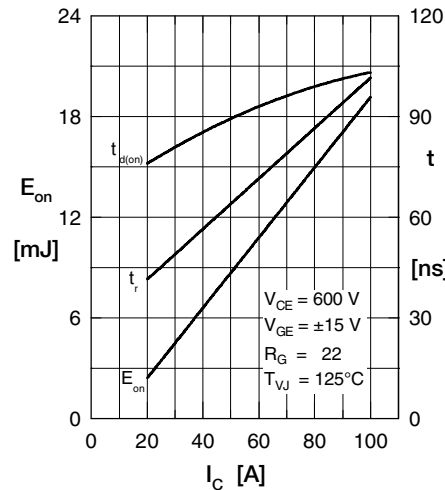


Fig. 5 Typ. turn on energy & switching times versus collector current

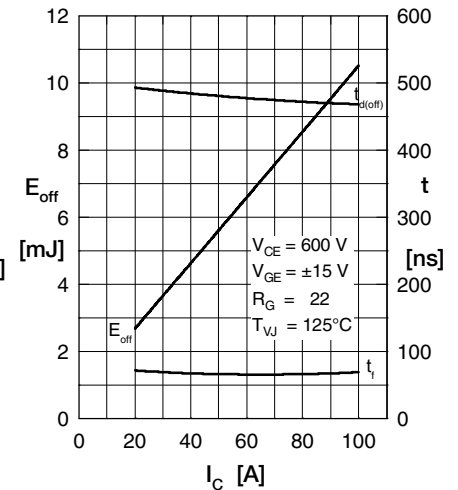


Fig. 6 Typ. turn off energy & switching times versus collector current

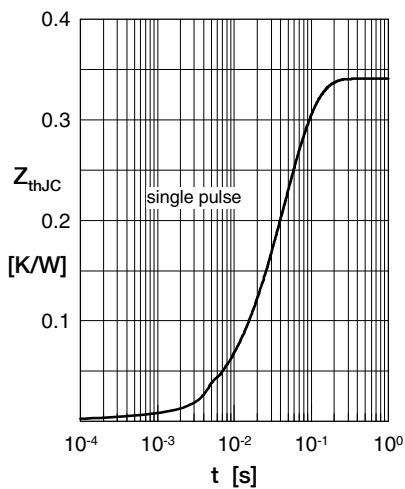


Fig. 12 Typical transient thermal impedance

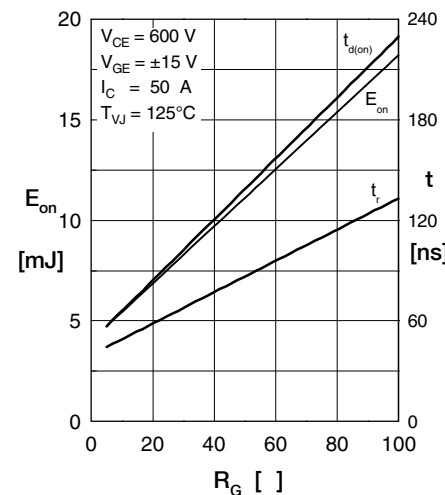


Fig. 9 Typ. turn on energy & switching times versus gate resistor

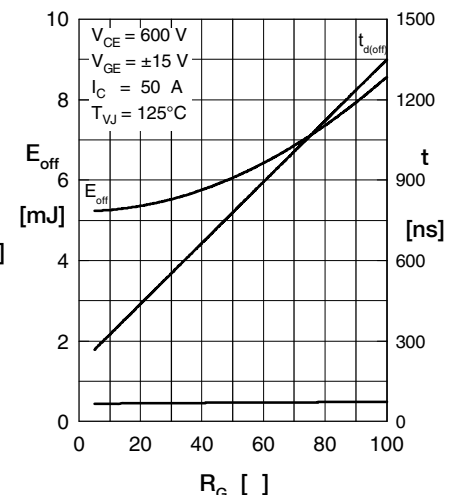


Fig. 9 Typ. turn off energy & switching times versus gate resistor

**Buck Diode BD**

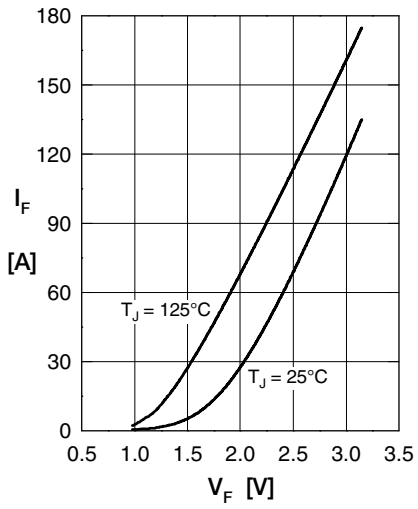


Fig. 1 Typ. Forward current vs.  $V_F$

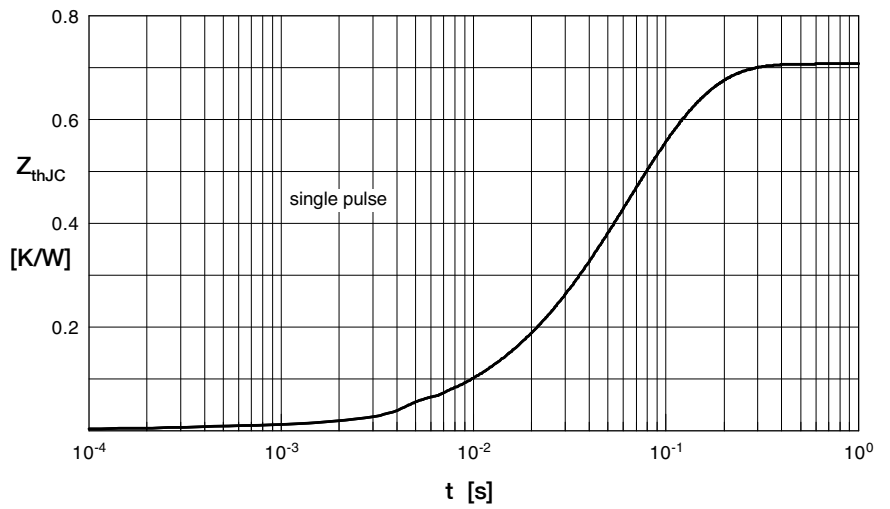


Fig. 2 Typ. transient thermal impedance junction to case