

IGBT (NPT) Module

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

$$I_{C25} = 90A$$

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

Phase leg

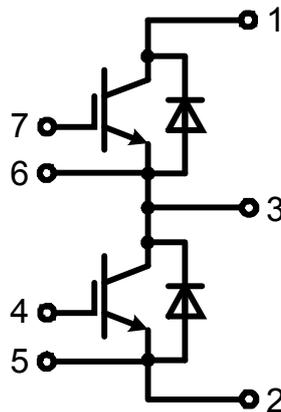
Part number

MII75-12A3



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:

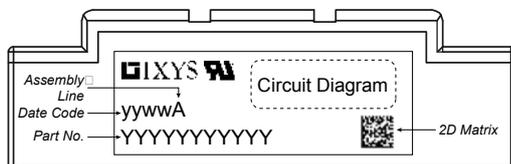
- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers
- Pumps, Fans

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	$T_{VJ} = 25^{\circ}C$			1200	V	
V_{GES}	max. DC gate voltage				± 20	V	
V_{GEM}	max. transient gate emitter voltage				± 30	V	
I_{C25}	collector current	$T_C = 25^{\circ}C$			90	A	
I_{C80}		$T_C = 80^{\circ}C$			60	A	
P_{tot}	total power dissipation	$T_C = 25^{\circ}C$			370	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 50A; V_{GE} = 15V$		2.2	2.7	V	
				2.7		V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 2mA; V_{CE} = V_{CE}$	4.5	5.5	6.5	V	
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0V$			4	mA	
				6		mA	
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20V$			200	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600V; V_{GE} = 15V; I_C = 50A$		240		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600V; I_C = 50A$ $V_{GE} = \pm 15V; R_G = 22\Omega$		100		ns	
t_r	current rise time		$T_{VJ} = 125^{\circ}C$	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		
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15V; R_G = 22\Omega$					
I_{CM}		$V_{CEmax} = 1200V$			100	A	
SCSOA	short circuit safe operating area	$V_{CEmax} = 1200V$					
t_{sc}	short circuit duration	$V_{CE} = 1200V; V_{GE} = \pm 15V$			10	μs	
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	
Diode							
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
I_{F25}	forward current	$T_C = 25^{\circ}C$			100	A	
I_{F80}		$T_C = 80^{\circ}C$			60	A	
V_F	forward voltage	$I_F = 50A$			2.50	V	
				1.80		V	
I_R	reverse current	$V_R = V_{RRM}$			0.65	mA	
				1		mA	
Q_{rr}	reverse recovery charge	$V_R = 600V$ $-di_F/dt = 400A/\mu s$ $I_F = 50A; V_{GE} = 0V$		3.5		μC	
I_{RM}	max. reverse recovery current		$T_{VJ} = 125^{\circ}C$	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
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			3600	V
		t = 1 minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		3000	V

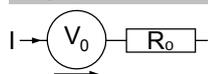


Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MII75-12A3	MII75-12A3	Box	6	466735

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150$ °C

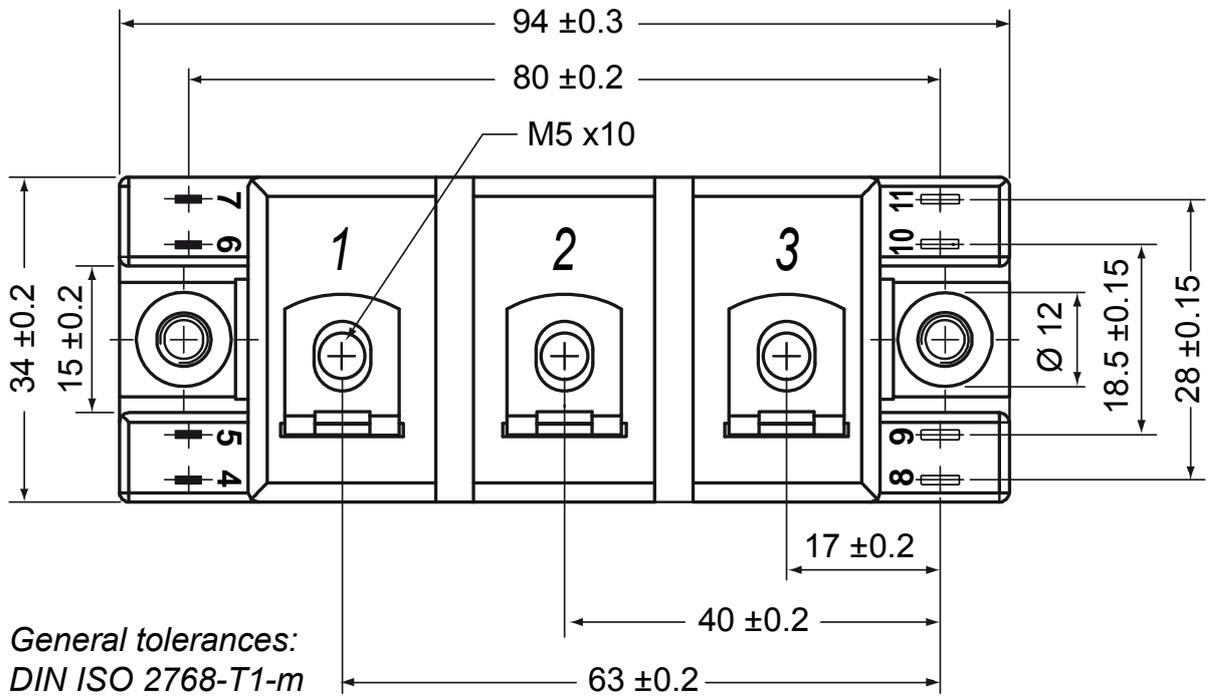
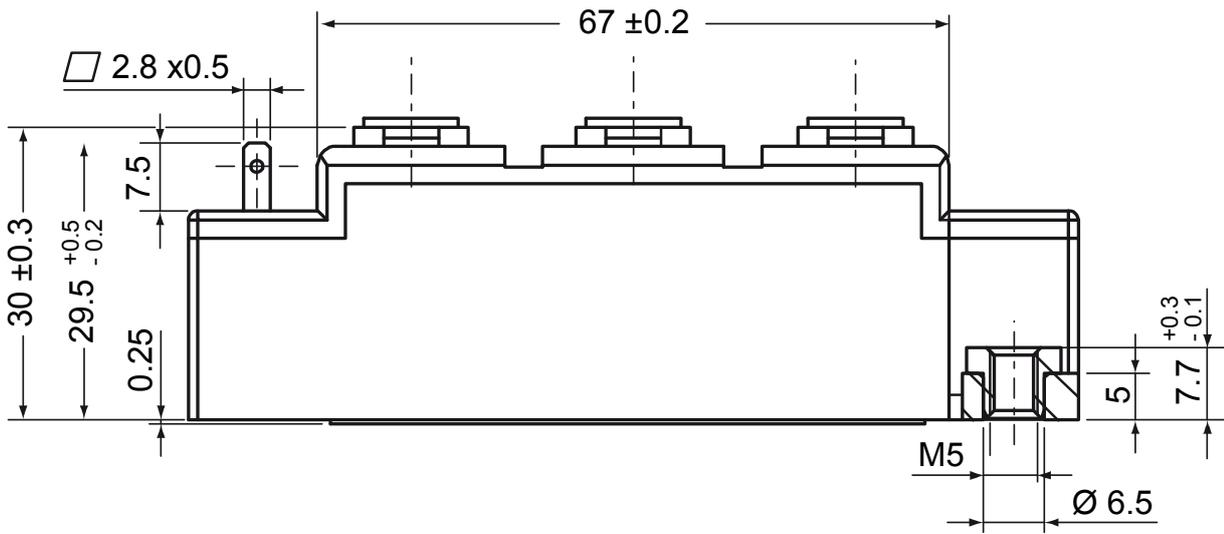


$V_{0\ max}$ threshold voltage

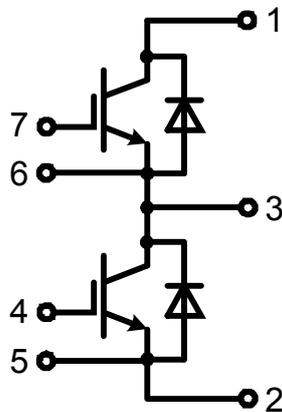
$R_{0\ max}$ slope resistance *

	IGBT	Diode	
$V_{0\ max}$	1.5	1.3	V
$R_{0\ max}$	20.1	10.8	mΩ

Outlines Y4



General tolerances:
DIN ISO 2768-T1-m



IGBT

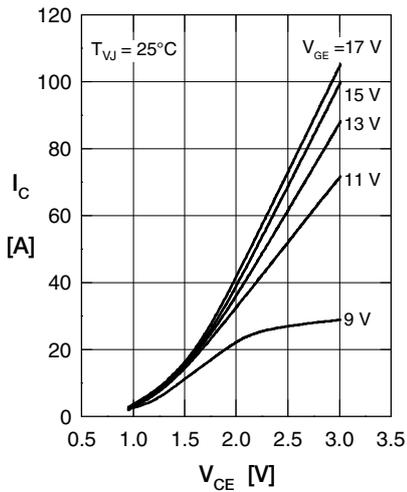


Fig. 1 Typ. output characteristics

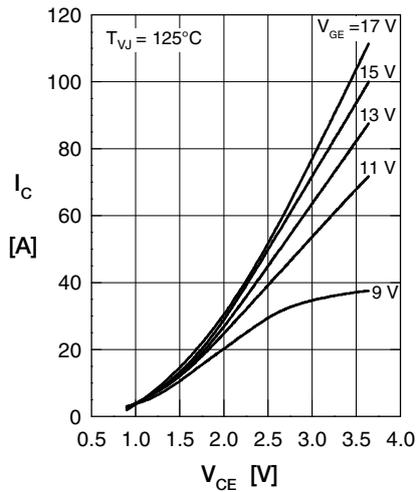


Fig. 2 Typ. output characteristics

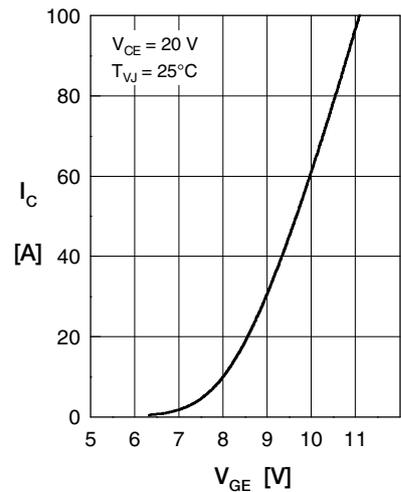


Fig. 3 Typ. transfer characteristics

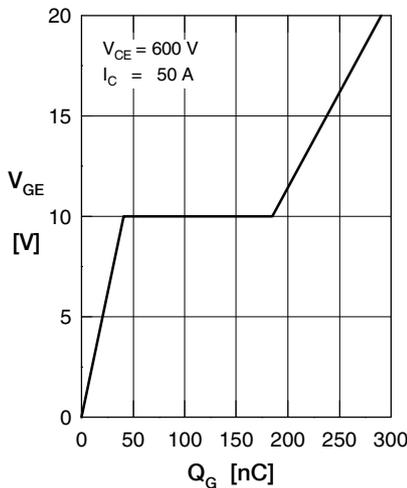


Fig. 4 Typ. turn-on gate charge

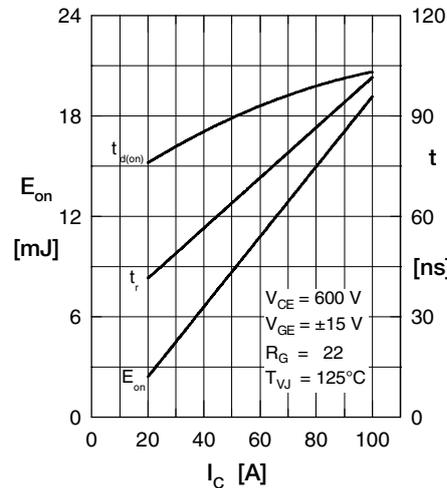


Fig. 5 Typ. turn on energy & switching times versus collector current

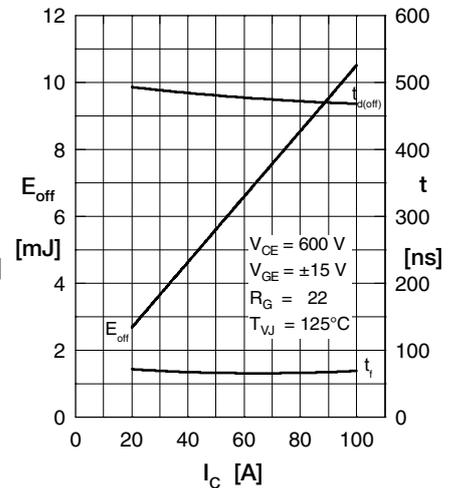


Fig. 6 Typ. turn off energy & switching times versus collector current

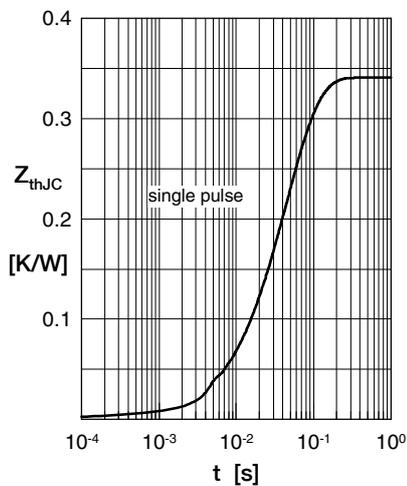


Fig. 12 Typical transient thermal impedance

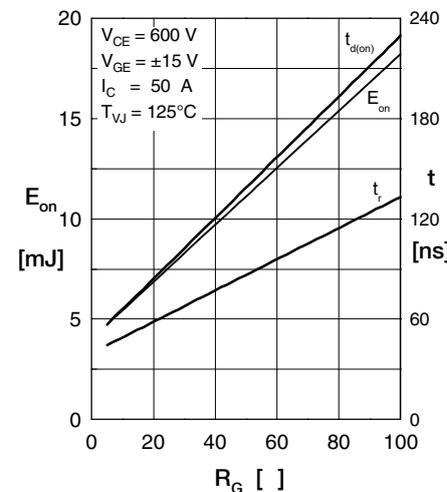


Fig. 9 Typ. turn on energy & switching times versus gate resistor

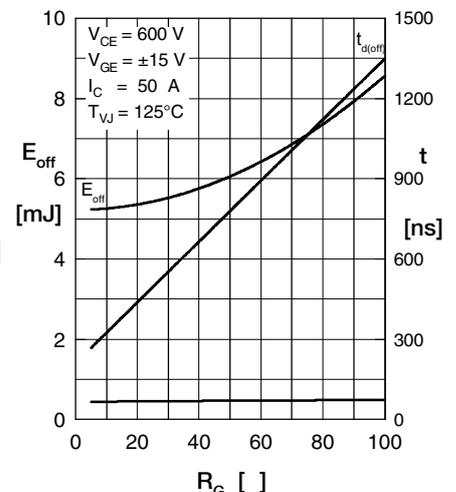


Fig. 9 Typ. turn off energy & switching times versus gate resistor

Diode

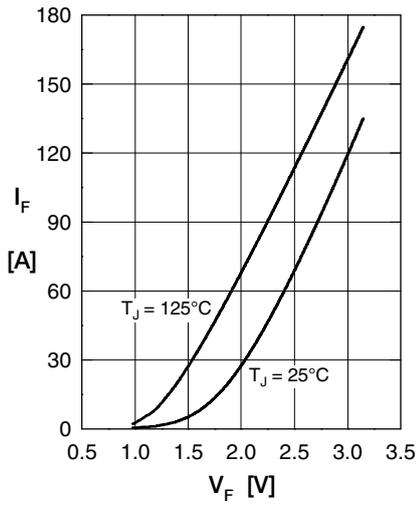


Fig. 1 Typ. Forward current vs. V_F

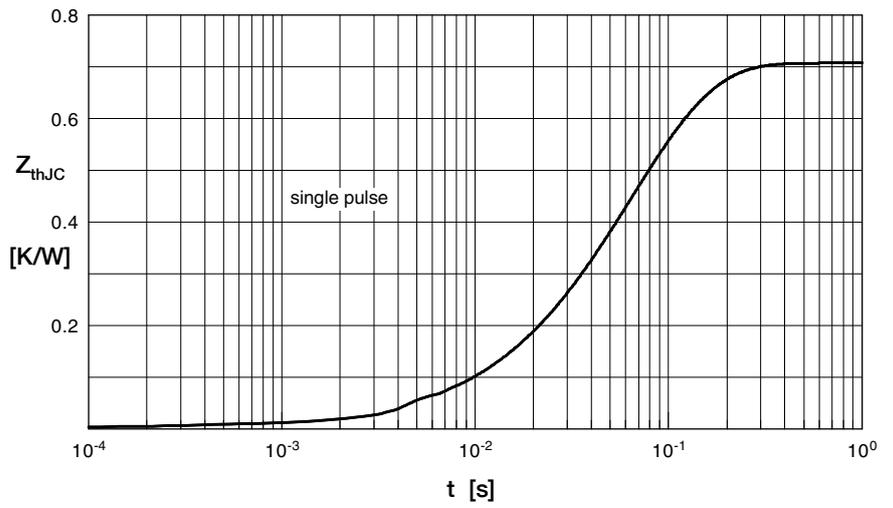


Fig. 2 Typ. transient thermal impedance junction to case

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