IGBT (NPT) Module

V_{CES} = 2x 1200 V
I_{C25} = 160 A
$V_{CE(sat)}$ = 2.2 V

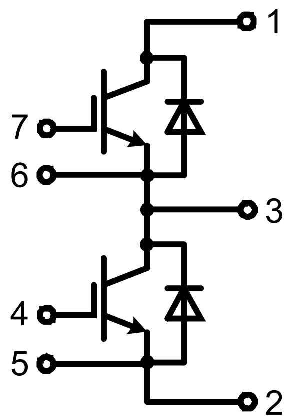
Phase leg

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

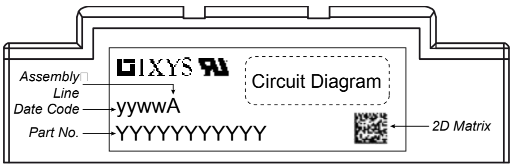
Applications:
- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers
- Pumps, Fans

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		2.2	2.7	V
			T_{VJ} = 125°C		2.7		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			6	mA
			T_{VJ} = 125°C		9		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; V_{CE} = 600V; I_C = 100A; V_{GE} = ±15 V; R_G = 6.8 Ω	T_{VJ} = 125°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} = ±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} = 1200V					
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			2.60	V
			T_{VJ} = 125°C		1.90		V
I_R	*reverse current*	V_R = V_{RRM}	T_{VJ} = 25°C			1	mA
			T_{VJ} = 125°C		1.5		mA
Q_{rr}	*reverse recovery charge*	V_R = 600V; $-di_F/dt$ = 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

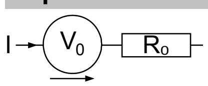
Package Y4				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal				300	A
T_{VJ}	*virtual junction temperature*			-40		150	°C
T_{op}	*operation temperature*			-40		125	°C
T_{stg}	*storage temperature*			-40		125	°C
Weight					110		g
M_D	*mounting torque*			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

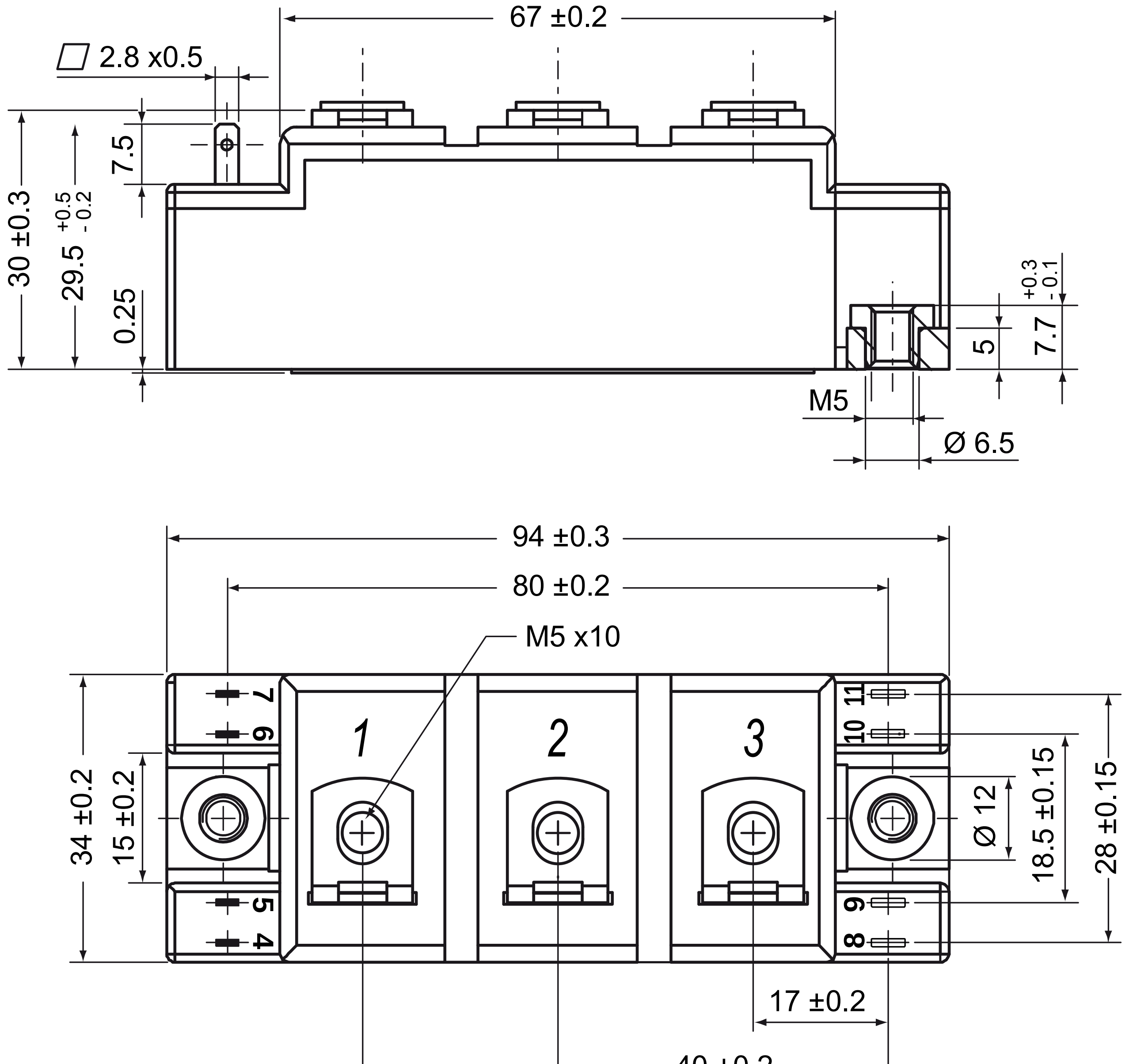
Equivalent Circuits for Simulation

* *on die level* $T_{VJ} = 150\,°C$

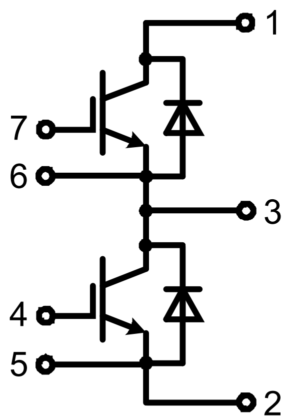


		IGBT	Diode	
$V_{0\,max}$	*threshold voltage*	1.3	1.3	V
$R_{0\,max}$	*slope resistance **	12	6.5	mΩ

Outlines Y4



General tolerances:
DIN ISO 2768-T1-m



IGBT

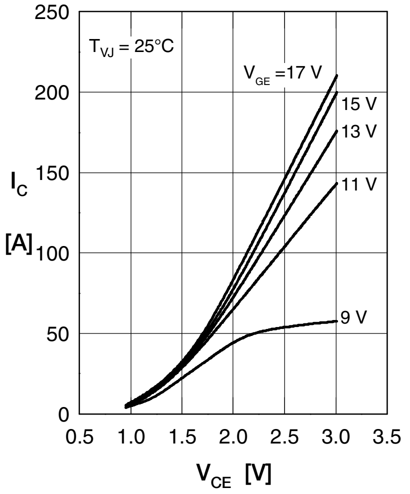


Fig. 1 Typ. output characteristics

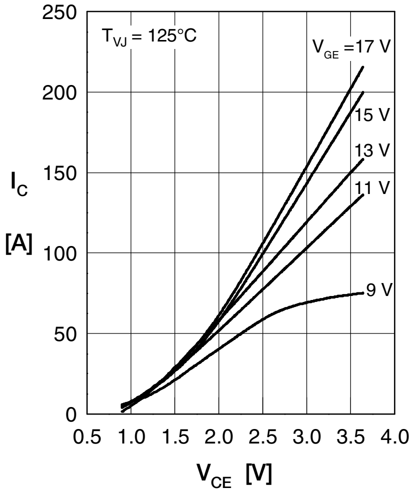


Fig. 2 Typ. output characteristics

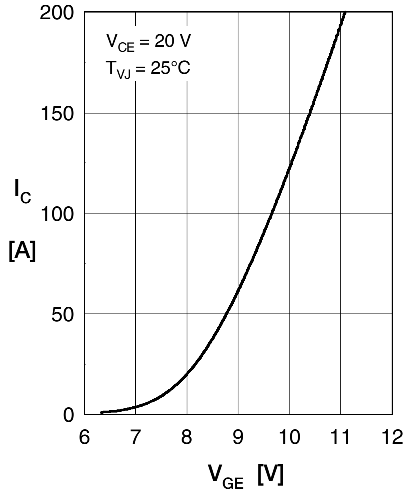


Fig. 3 Typ. transfer characteristics

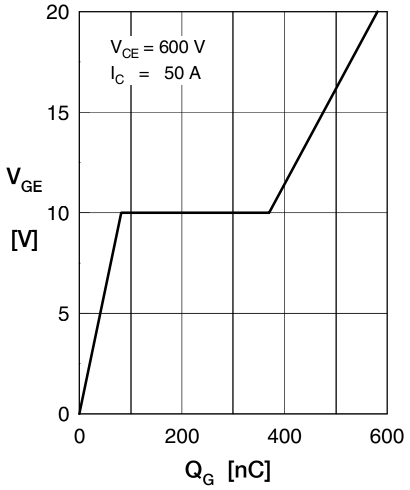


Fig. 4 Typ. turn-on gate charge

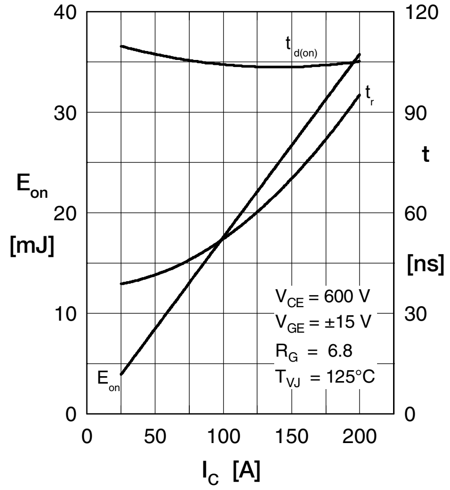


Fig. 5 Typ. turn on energy & switching times versus collector current

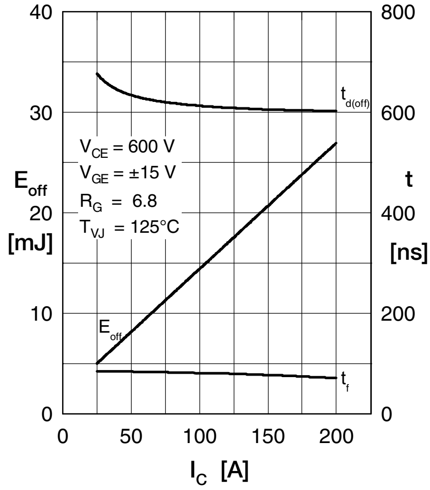


Fig.6 Typ. turn off energy & switching times versus collector current

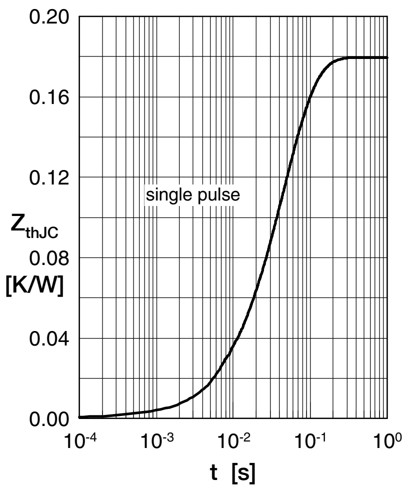


Fig. 12 Typical transient thermal impedance

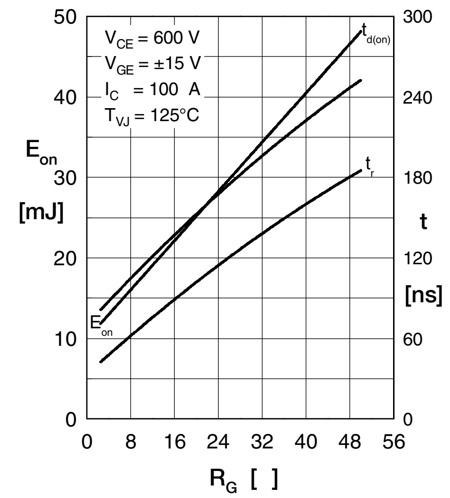


Fig. 9 Typ. turn on energy & switching times versus gate resistor

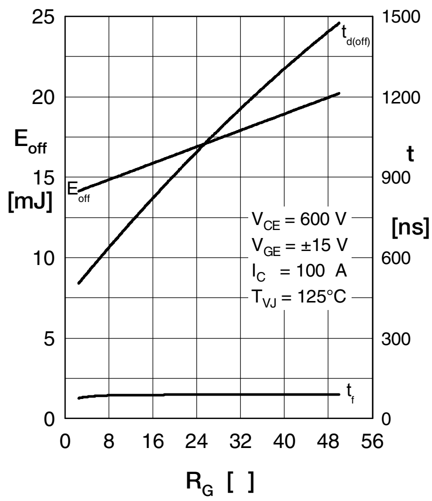


Fig. 9 Typ. turn off energy & switching times versus gate resistor

Diode

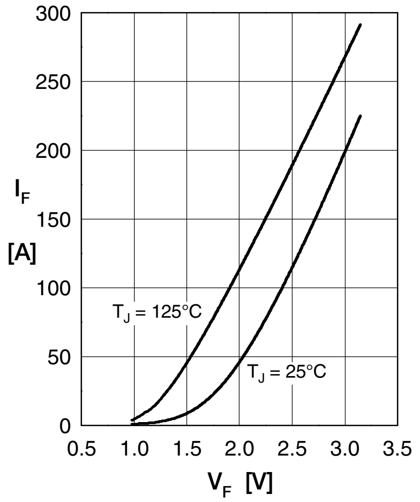


Fig. 1 Typ. Forward current vs. V_F

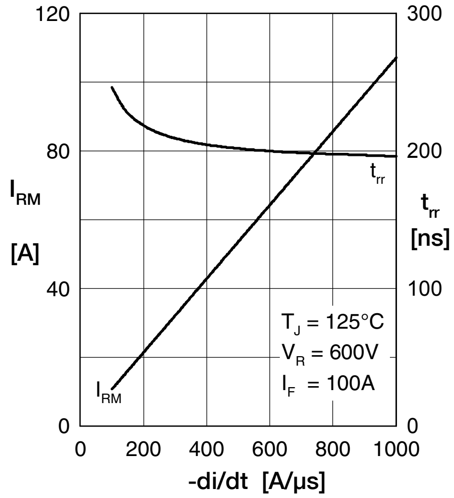


Fig. 2 Typ. peak reverse current I_{RM} versus di/dt

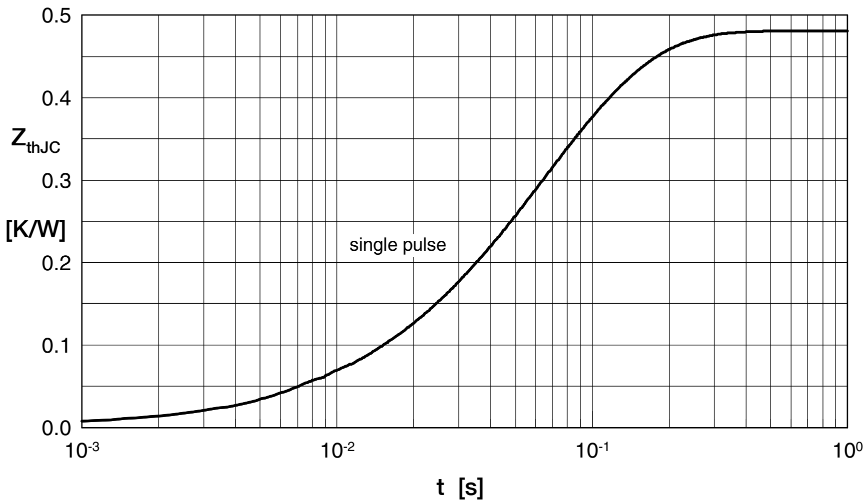


Fig. 3 Typ. transient thermal impedance junction to case