

XPT IGBT Module

preliminary

$$V_{CES} = 1200V$$

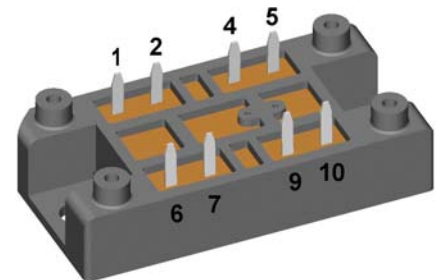
$$I_{C25} = 220A$$

$$V_{CE(sat)} = 1.8V$$

Boost Chopper

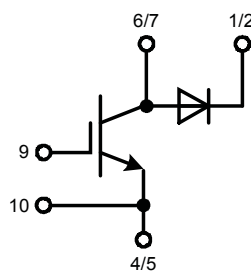
Part number

MIXA150R1200VA



Backside: isolated

 E72873



Features / Advantages:

- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- Rugged XPT design (Xtreme light Punch Through) results in:
 - short circuit rated for 10 μ sec.
 - very low gate charge
 - low EMI
 - square RBSOA @ 3x I_C
- Thin wafer technology combined with the XPT design results in a competitive low $V_{CE(sat)}$
- SONIC™ diode
 - fast and soft reverse recovery
 - low operating forward voltage

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

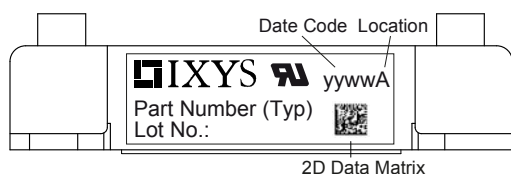
Package: V1-A-Pack

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Height: 17 mm
- 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				220	A	
I _{C80}		T _C = 80°C				150	A	
P _{tot}	total power dissipation	T _C = 25°C				695	W	
V _{CE(sat)}	collector emitter saturation voltage	I _C = 150A; V _{GE} = 15 V	T _{VJ} = 25°C T _{VJ} = 125°C		1.8 2.1	2.1	V V	
V _{GE(th)}	gate emitter threshold voltage	I _C = 6mA; V _{GE} = V _{CE}	T _{VJ} = 25°C	5.4	5.9	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			0.5	mA mA	
I _{GES}	gate emitter leakage current	V _{GE} = ±20 V				500	nA	
Q _{G(on)}	total gate charge	V _{CE} = 600 V; V _{GE} = 15 V; I _C = 150 A			470		nC	
t _{d(on)}	turn-on delay time	inductive load T_{VJ} = 125°C V_{CE} = 600V; I_C = 150A V_{GE} = ±15 V; R_G = 4.7 Ω			70		ns	
t _r	current rise time					40		ns
t _{d(off)}	turn-off delay time					250		ns
t _f	current fall time					100		ns
E _{on}	turn-on energy per pulse					14		mJ
E _{off}	turn-off energy per pulse					16		mJ
RBSOA	reverse bias safe operating area	V _{GE} = ±15 V; R _G = 4.7 Ω	T _{VJ} = 125°C					
I _{CM}		V _{CEmax} = 1200V				450	A	
SCSOA	short circuit safe operating area	V _{CEmax} = 1200 V						
t _{sc}	short circuit duration	V _{CE} = 900V; V _{GE} = ±15 V	T _{VJ} = 125°C			10	μs	
I _{sc}	short circuit current	R _G = 4.7 Ω; non-repetitive			600		A	
R _{thJC}	thermal resistance junction to case					0.18	K/W	
R _{thCH}	thermal resistance case to heatsink				0.20		K/W	
Diode								
V _{RRM}	max. repetitive reverse voltage	T _{VJ} = 25°C				1200	V	
I _{F25}	forward current	T _C = 25°C				190	A	
I _{F80}		T _C = 80°C				130	A	
V _F	forward voltage	I _F = 150A	T _{VJ} = 25°C T _{VJ} = 125°C			2.20	V V	
I _R	reverse current	V _R = V _{RRM}	T _{VJ} = 25°C T _{VJ} = 125°C			0.3	mA mA	
Q _{rr}	reverse recovery charge	V_R = 600 V -di_F/dt = 2500 A/μs I_F = 150A; V_{GE} = 0 V	T _{VJ} = 125°C			20	μC	
I _{RM}	max. reverse recovery current					175	A	
t _{rr}	reverse recovery time					350	ns	
E _{rec}	reverse recovery energy					10	mJ	
R _{thJC}	thermal resistance junction to case					0.28	K/W	
R _{thCH}	thermal resistance case to heatsink				0.20		K/W	

preliminary

Package V1-A-Pack			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			100	A
T_{stg}	storage temperature		-40		125	°C
T_{VJ}	virtual junction temperature		-40		150	°C
Weight				37		g
M_D	mounting torque		2		2.5	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	6.0			mm
$d_{Spb/Apb}$		terminal to backside	12.0			mm
V_{ISOL}	isolation voltage	t = 1 second	3600			V
		t = 1 minute	3000			V

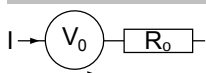

Part number

M = Module
I = IGBT
X = XPT IGBT
A = Gen 1 / std
150 = Current Rating [A]
R = Boost Chopper
1200 = Reverse Voltage [V]
VA = V1-A-Pack

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MIXA150R1200VA	MIXA150R1200VA	Box	10	511595

Equivalent Circuits for Simulation

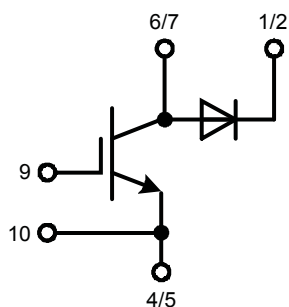
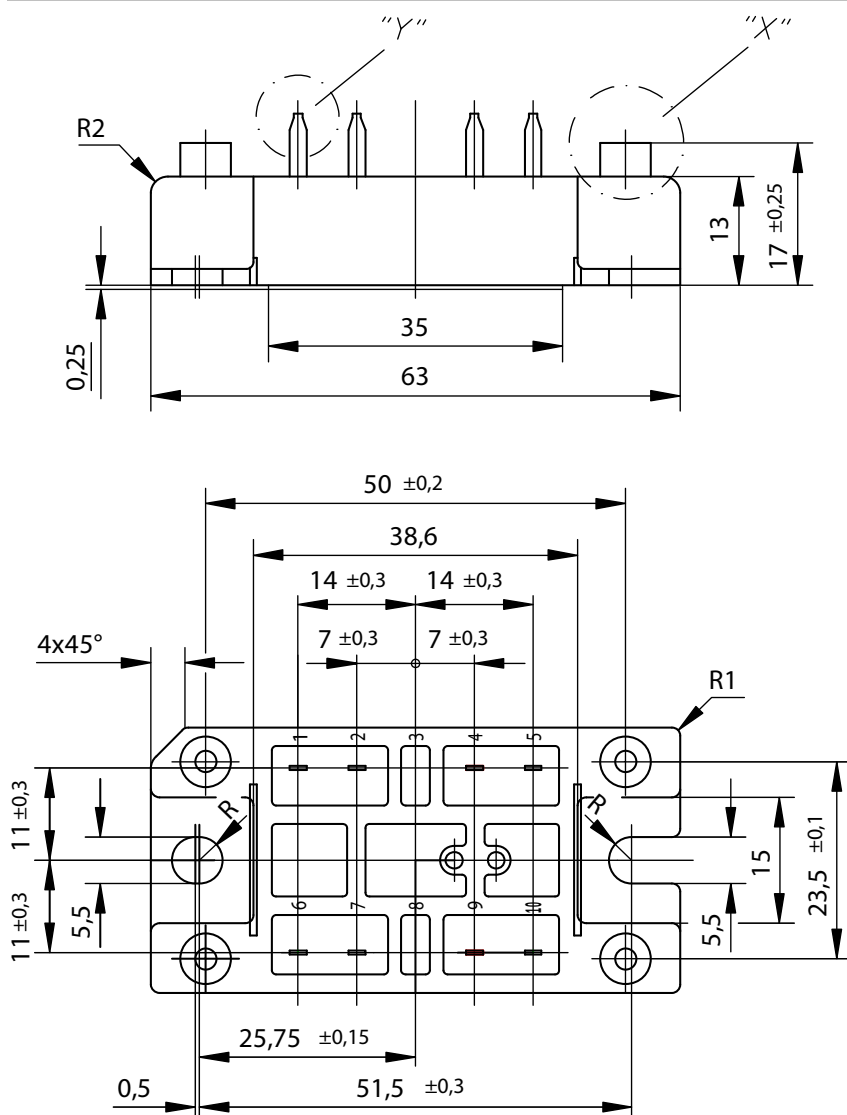
* on die level

 $T_{VJ} = 150^{\circ}\text{C}$


$V_{0\max}$ threshold voltage
 $R_{0\max}$ slope resistance *

	IGBT	Diode
$V_{0\max}$	1.1	1.25
$R_{0\max}$	9.2	5.7

Outlines V1-A-Pack



IGBT

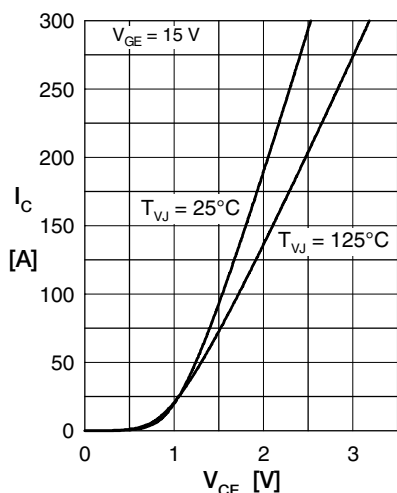


Fig. 1 Typ. output characteristics

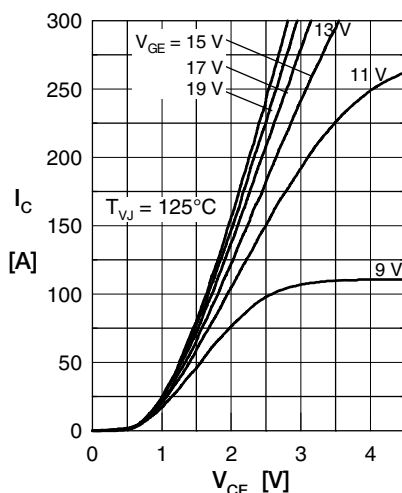


Fig. 2 Typ. output characteristics

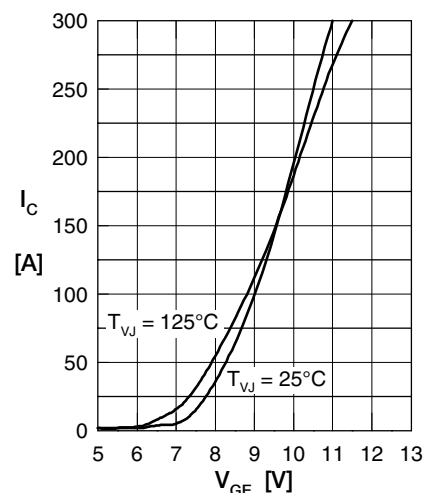


Fig. 3 Typ. transfer characteristics

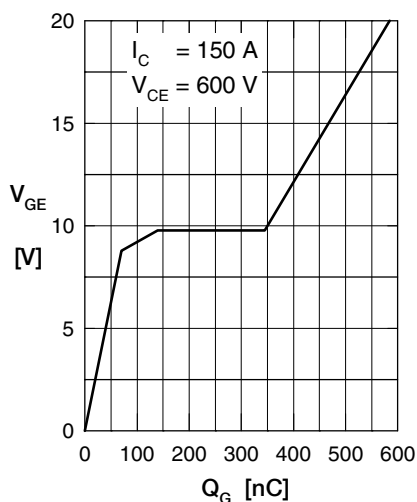


Fig. 4 Typ. turn-on gate charge

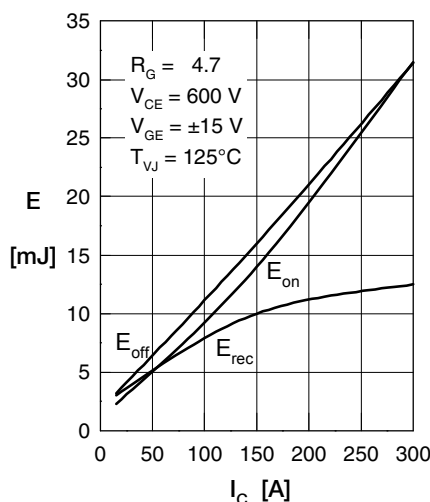


Fig. 5 Typ. switching energy versus collector current

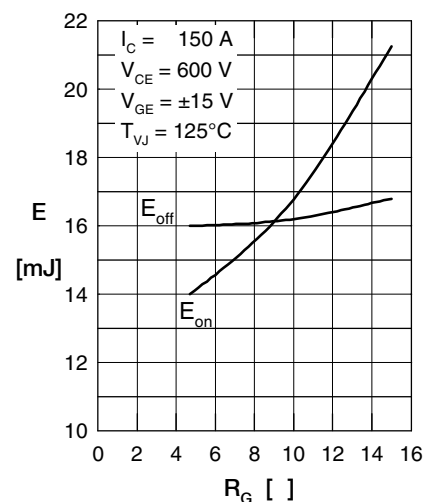


Fig. 6 Typ. switching energy versus gate resistance

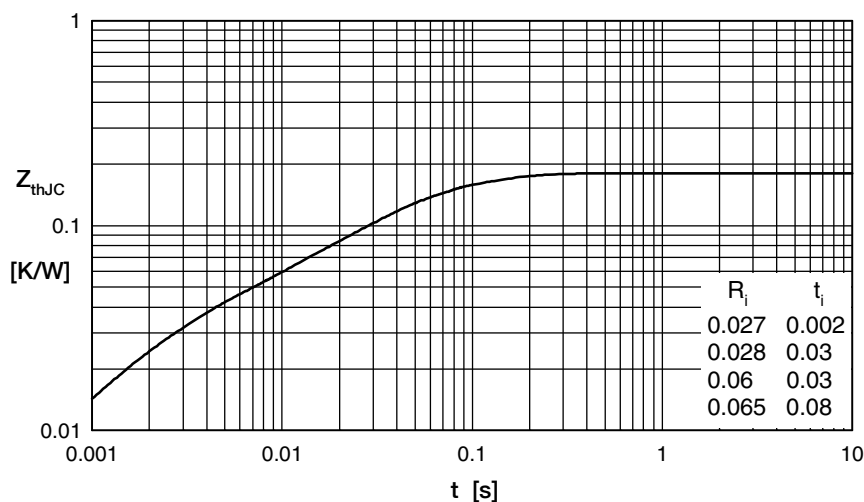


Fig. 7 Typ. transient thermal impedance

Diode

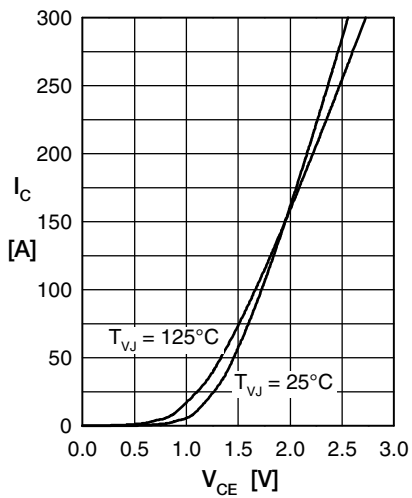


Fig. 1 Typ. Forward current versus V_F

Fig. 2 Typ. reverse recovery charge Q_{rr} versus di/dt

Fig. 3 Typ. peak reverse current I_{RM} versus di/dt

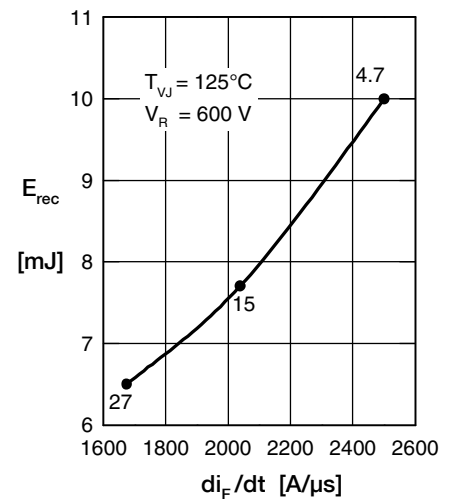


Fig. 6 Typ. recovery energy E_{rec} versus $-di/dt$

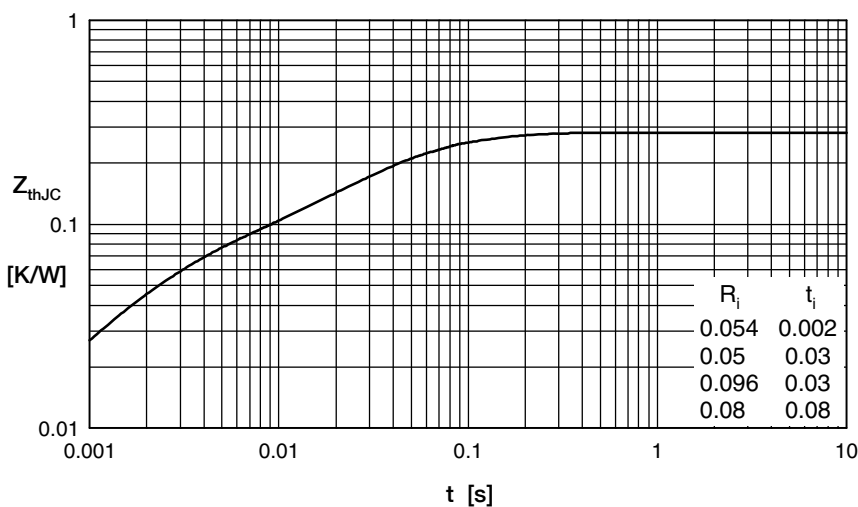


Fig. 7 Transient thermal impedance junction to case