

XPT IGBT Module

preliminary

$$V_{CES} = 1200V$$

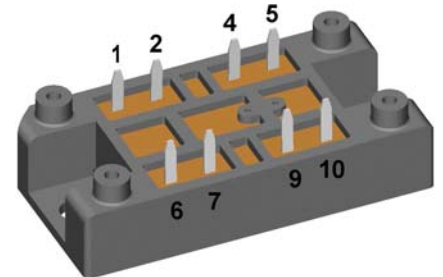
$$I_{C25} = 220A$$

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

Buck Chopper

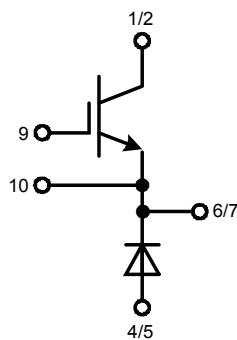
Part number

MIXA150Q1200VA



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:

- Switched-mode power supplies
- Switched reluctance motor drive

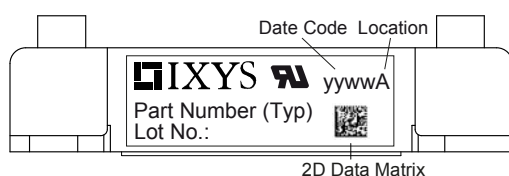
Package: V1-A-Pack

- 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		1.8	2.1	V
			T _{VJ} = 125°C		2.1		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			0.1	mA
			T _{VJ} = 125°C		0.1		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 V _{CE} = 600V; I _C = 150A V _{GE} = ±15 V; R _G = 4.7 Ω	T _{VJ} = 125°C		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			2.20	V
			T _{VJ} = 125°C		1.95		V
I _R	reverse current	V _R = V _{RRM}	T _{VJ} = 25°C			0.3	mA
			T _{VJ} = 125°C		0.8		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

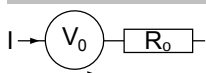

Part number

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

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MIXA150Q1200VA	MIXA150Q1200VA	Box	10	512328

Equivalent Circuits for Simulation

* on die level

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

 $V_{0\max}$ threshold voltage

 $R_{0\max}$ slope resistance *

IGBT

1.1

9.2

Diode

1.25 V

5.7 mΩ

IGBT

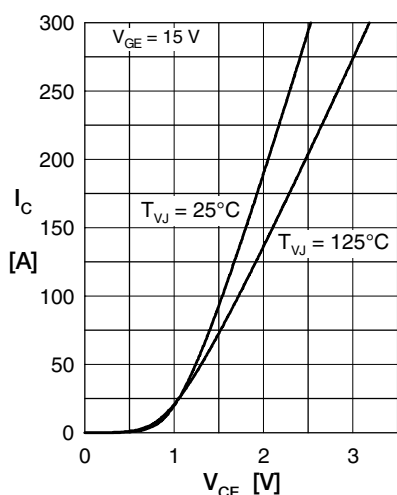


Fig. 1 Typ. output characteristics

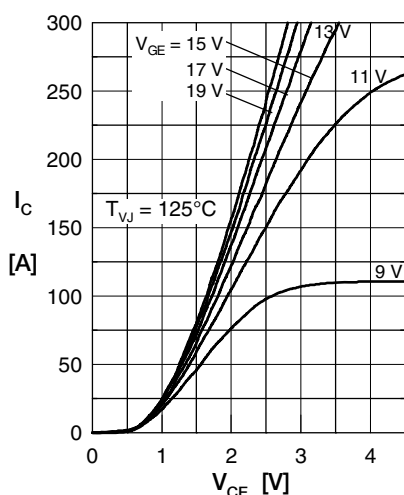


Fig. 2 Typ. output characteristics

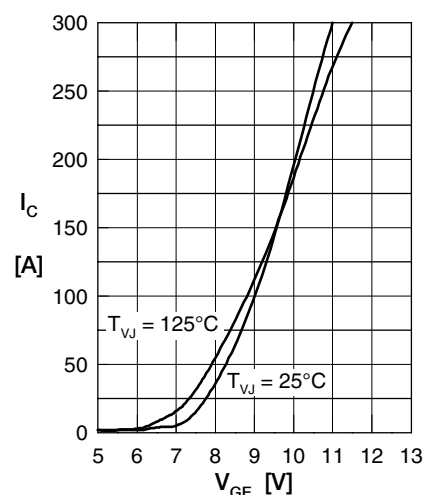


Fig. 3 Typ. transfer characteristics

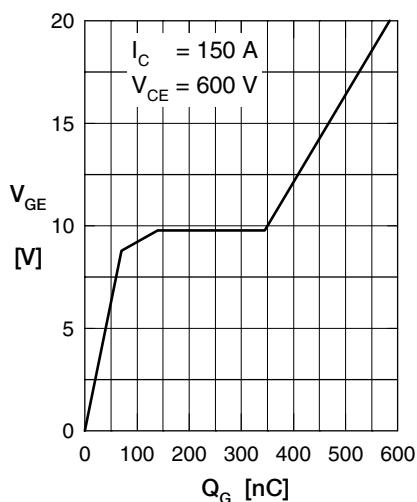


Fig. 4 Typ. turn-on gate charge

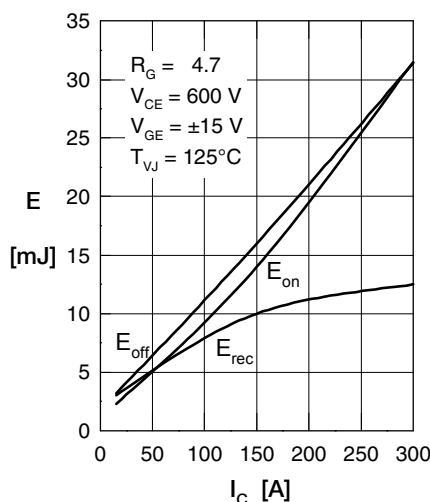


Fig. 5 Typ. switching energy versus collector current

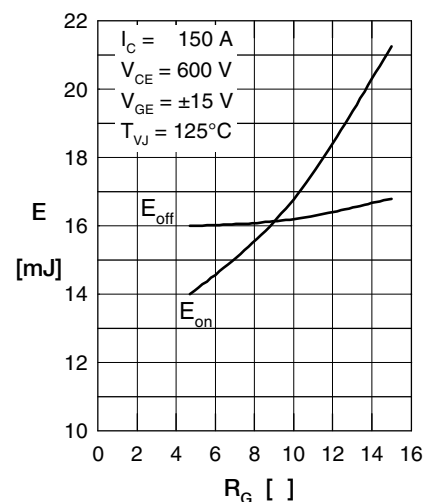


Fig. 6 Typ. switching energy versus gate resistance

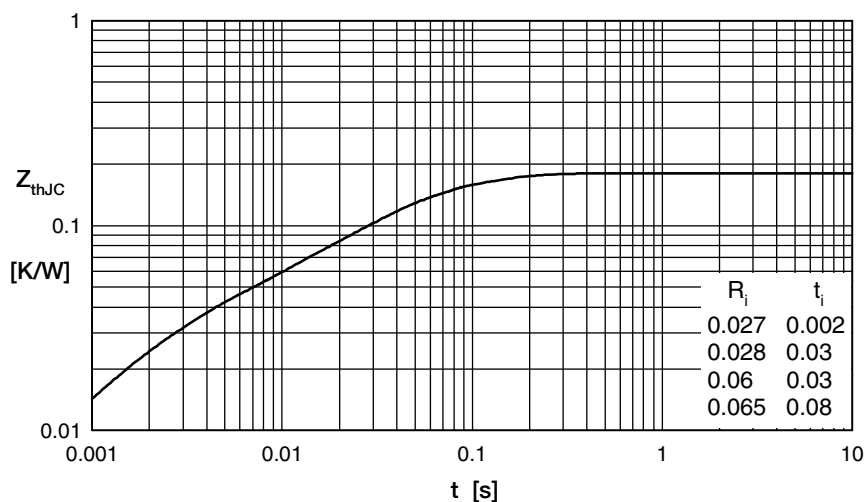


Fig. 7 Typ. transient thermal impedance

Diode

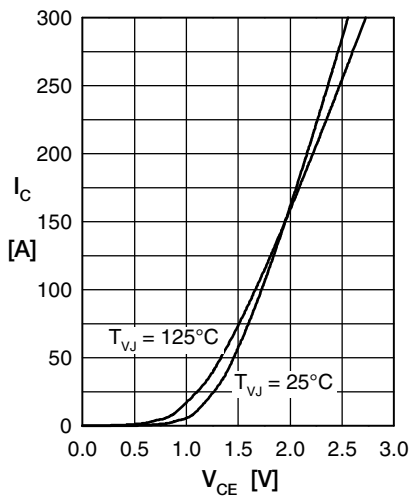


Fig. 1 Typ. Forward current versus V_F

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

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

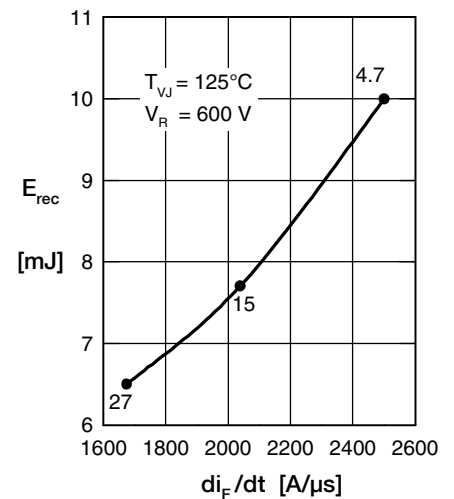


Fig. 4 Dynamic parameters Q_r , I_{RM} versus T_{VJ}

Fig. 5 Typ. recovery time t_{rr} versus $-di_F/dt$

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

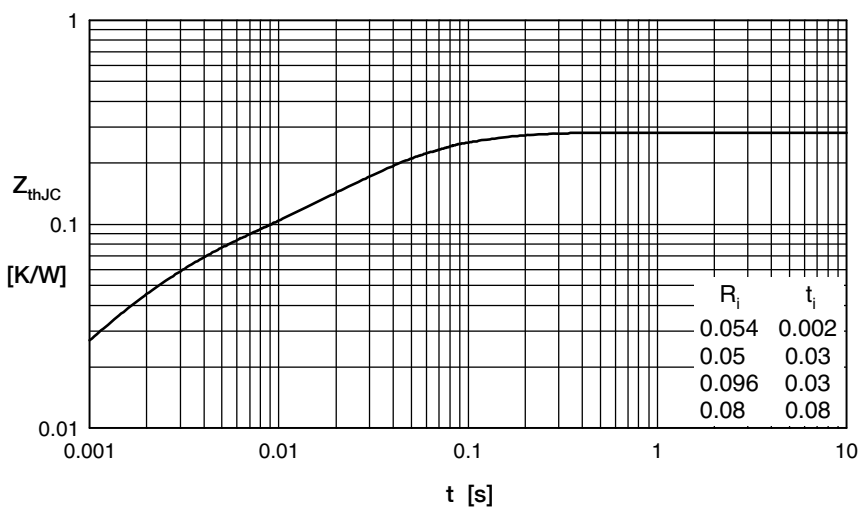


Fig. 7 Transient thermal impedance junction to case