

# XPT IGBT Module

preliminary

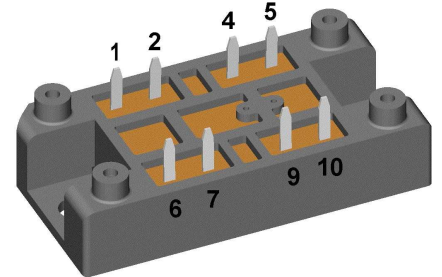
$$V_{CES} = 1200 \text{ V}$$

$$I_{C25} = 250 \text{ A}$$

$$V_{CE(sat)} = 1.7 \text{ V}$$

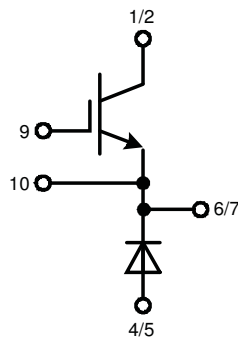
## Buck Chopper

### 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  $\mu$ 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

### Terms Conditions of usage:

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact your local sales office.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact your local sales office.

Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend

- to perform joint risk and quality assessments;

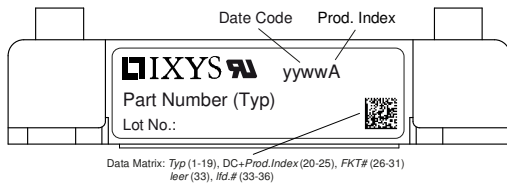
- the conclusion of quality agreements;

- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

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	$T_C = 25^{\circ}\text{C}$			250	A
$I_{C80}$		$T_C = 80^{\circ}\text{C}$			175	A
$P_{tot}$	total power dissipation	$T_C = 25^{\circ}\text{C}$			695	W
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 150\text{A}; V_{GE} = 15\text{V}$			1.7	V
					1.9	V
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 6\text{mA}; V_{GE} = V_{CE}$	6	6.8	7.5	V
$I_{CES}$	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{V}$			0.1	mA
					0.1	mA
$I_{GES}$	gate emitter leakage current	$V_{GE} = \pm 20\text{V}$			500	nA
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{V}; V_{GE} = 15\text{V}; I_C = 150\text{A}$		510		nC
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{V}; I_C = 150\text{A}$ $V_{GE} = \pm 15\text{V}; R_G = 1.2\ \Omega$			220	ns
$t_r$	current rise time				100	ns
$t_{d(off)}$	turn-off delay time				400	ns
$t_f$	current fall time				220	ns
$E_{on}$	turn-on energy per pulse				21.5	mJ
$E_{off}$	turn-off energy per pulse				17	mJ
<b>RBSOA</b>	reverse bias safe operating area	$V_{GE} = \pm 15\text{V}; R_G = 1.2\ \Omega$				
$I_{CM}$		$V_{CEmax} = 1200\text{V}$			450	A
<b>SCSOA</b>	short circuit safe operating area	$V_{CEmax} = 1200\text{V}$				
$t_{SC}$	short circuit duration	$V_{CE} = 900\text{V}; V_{GE} = \pm 15\text{V}$			10	$\mu\text{s}$
$I_{SC}$	short circuit current	$R_G = 1.2\ \Omega; \text{non-repetitive}$		650		A
$R_{thJC}$	thermal resistance junction to case				0.16	K/W
$R_{thCH}$	thermal resistance case to heatsink			0.10		K/W
<b>Diode</b>						
$V_{RRM}$	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V
$I_{F25}$	forward current	$T_C = 25^{\circ}\text{C}$			190	A
$I_{F80}$		$T_C = 80^{\circ}\text{C}$			130	A
$V_F$	forward voltage	$I_F = 150\text{A}$			2.20	V
					1.95	V
$I_R$	reverse current	$V_R = V_{RRM}$			0.3	mA
					0.8	mA
$Q_{rr}$	reverse recovery charge	$V_R = 600\text{V}$ $-di_F/dt = 2500\text{A}/\mu\text{s}$ $I_F = 150\text{A}; V_{GE} = 0\text{V}$			20	$\mu\text{C}$
$I_{RM}$	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
$T_{VJ}$	virtual junction temperature		-40		150	°C
$T_{op}$	operation temperature		-40		125	°C
$T_{stg}$	storage temperature		-40		125	°C
<b>Weight</b>				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 description

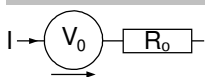
- M = Module
- I = IGBT
- X = XPT IGBT
- A = Gen 1 / std
- 150 = Current Rating [A]
- Q = Buck Chopper
- 1200 = Reverse Voltage [V]
- VA = V1-A-Pack

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MIXA150Q1200VA	MIXA150Q1200VA	Blister	24	512328

### Equivalent Circuits for Simulation

\* on die level

$T_{VJ} = 150\text{ °C}$

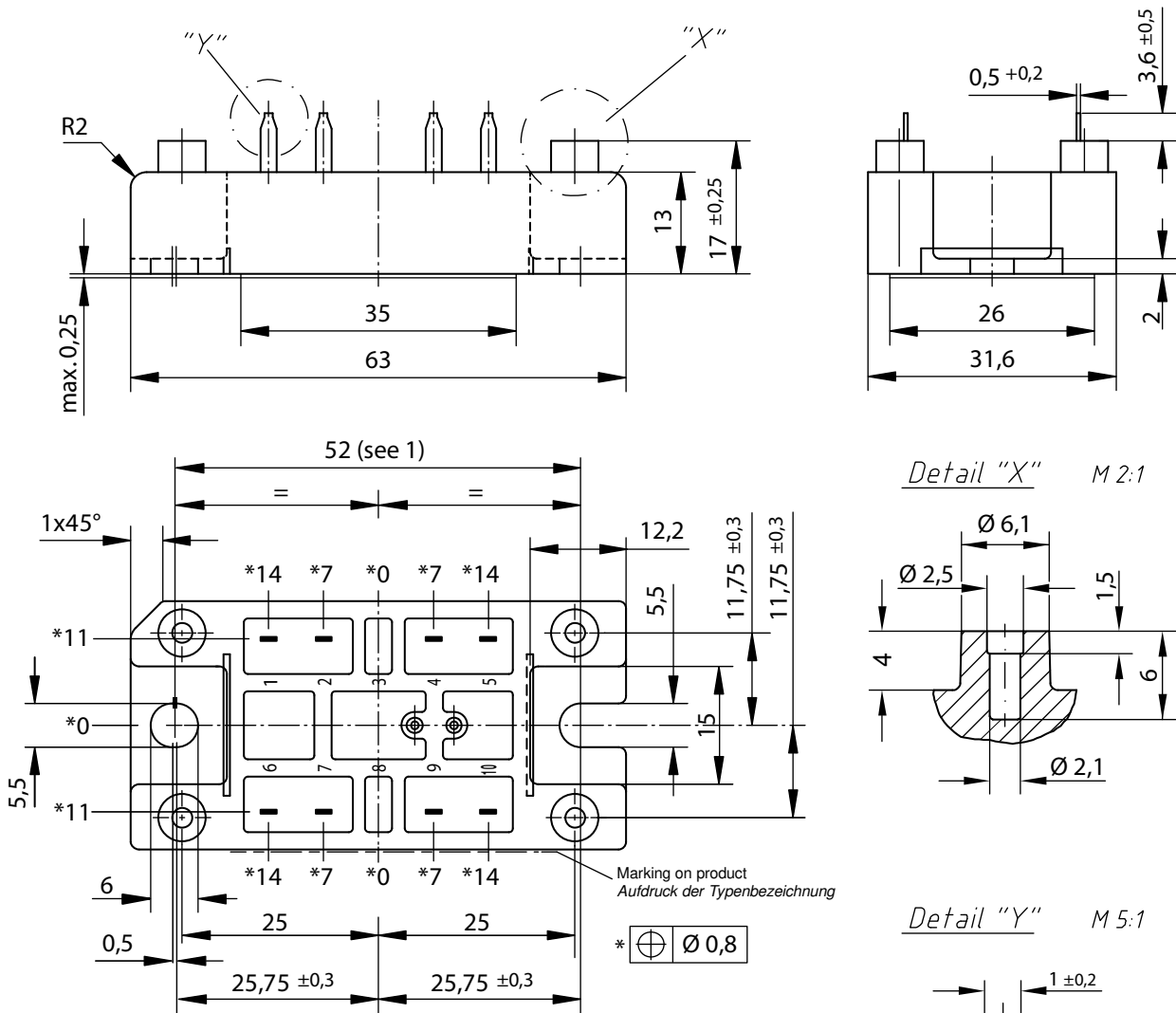


$V_{0\ max}$  threshold voltage

$R_{0\ max}$  slope resistance \*

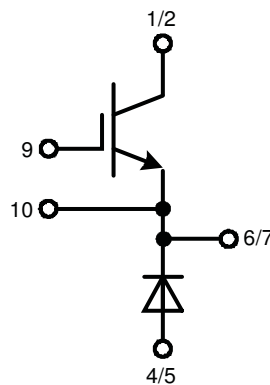
	IGBT	Diode	
$V_{0\ max}$	1.1	1.25	V
$R_{0\ max}$	9.2	5.7	mΩ

## Outlines V1-A-Pack



### Remarks / Bemerkungen:

- Nominal distance mounting screws on heat sink: 52 mm / Nennabstand Befestigungsschrauben auf Kühlkörper: 52 mm
  - General tolerance / Allgemeintoleranz: DIN ISO 2768 -T1-c
  - Surface treatment of pins: tin plated (Sn) in hot dip / Oberflächenbehandlung der Pins: verzinkt (Sn) im Tauchbad
  - Detail X: <sup>L</sup>  
EJOT PT® self-tapping screws (dimension K25) to be recommended for mounting on PCB <sup>L</sup>  
selbstschneidende Schraube (Größe K25) empfohlen für die PCB-Montage
- Take care on the maximum screw length according to board thickness and the maximum hole depth of 6 mm<sup>L</sup>  
Bei der Wahl der Schraubenlänge die PCB-Dicke und die maximale Lochtiefe von 6mm beachten
- Recommended mounting torque: 1.5 Nm / Empfohlenes Drehmoment: 1.5 Nm



## IGBT

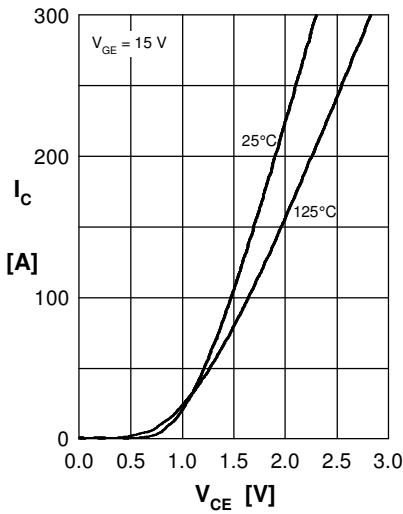


Fig.1 Output characteristics IGBT

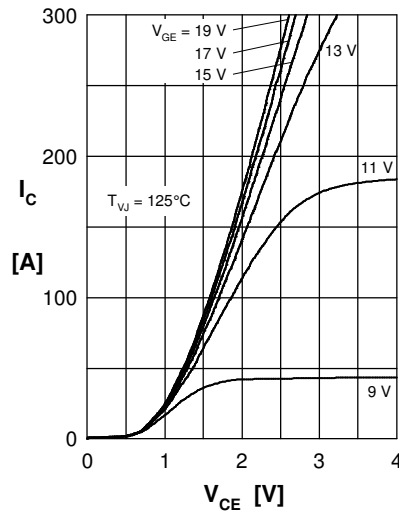


Fig.2 Typ. output characteristics IGBT

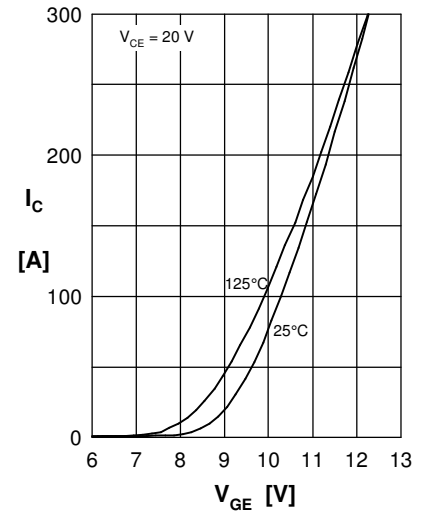


Fig.3 Typ. transfer charact. IGBT

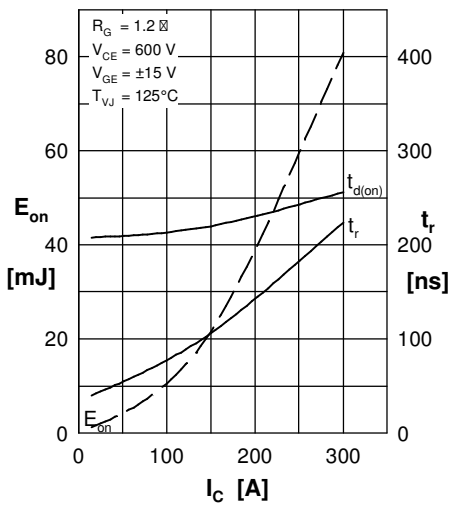


Fig.4 Typ. turn-on energy & switch. times vs. collector current

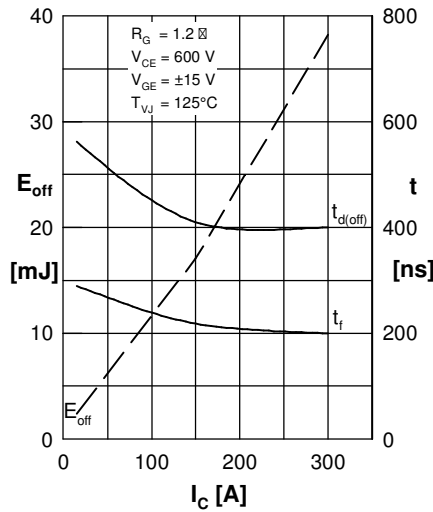


Fig.5 Typ. turn-off energy & switch. times vs. collector current

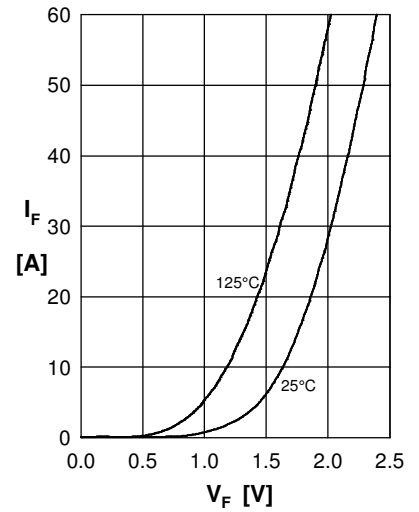


Fig.6 Typ. forward characteristics Diode

Fig.7 Typ. reverse recovery characteristics Diode

Fig.8 Typ. reverse recovery characteristics Diode

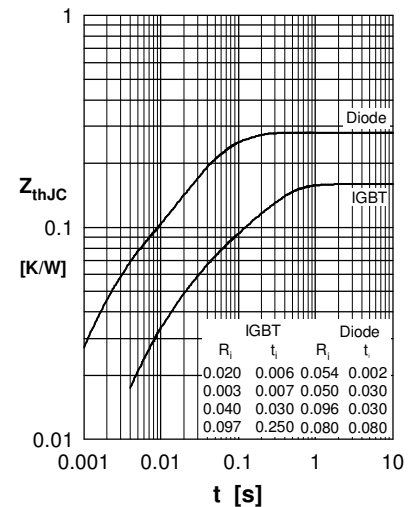


Fig.9 Transient thermal resistance junction to case