

XPT IGBT Module

preliminary

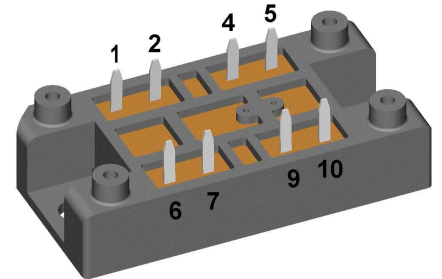
$$V_{CES} = 1200 \text{ V}$$

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

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

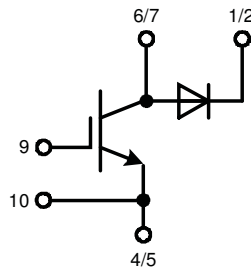
Boost Chopper

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

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;

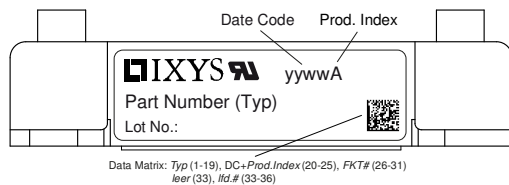
- the conclusion of quality agreements;

- 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 | | | | ± 20 | V | | | |
| V_{GEM} | max. transient gate emitter voltage | | | | ± 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 $V_{CE} = 600\text{V}; I_C = 150\text{A}$ $V_{GE} = \pm 15\text{V}; R_G = 1.2\ \Omega$ | | | | | | | |
| t_r | current rise time | | | | | | $T_{VJ} = 125^{\circ}\text{C}$ | 220 | ns |
| $t_{d(off)}$ | turn-off delay time | | | | | | 100 | ns | |
| t_f | current fall time | | | | | | 400 | ns | |
| E_{on} | turn-on energy per pulse | | | | | | 220 | ns | |
| E_{off} | turn-off energy per pulse | | | | | | 21.5 | mJ | |
| E_{off} | | 17 | mJ | | | | | | |
| RBSOA | 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 | | | |
| SCSOA | 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 | μs | | | |
| 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 | | | |
| Diode | | | | | | | | | |
| 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 | $V_R = 600\text{V}$ $-di_F/dt = 2500\text{A}/\mu\text{s}$ $I_F = 150\text{A}; V_{GE} = 0\text{V}$ | | | | | | | |
| I_{RM} | max. reverse recovery current | | | | | | $T_{VJ} = 125^{\circ}\text{C}$ | 20 | μC |
| t_{rr} | reverse recovery time | | | | | | 175 | A | |
| E_{rec} | reverse recovery energy | | | | | | 350 | ns | |
| 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 |
| 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 description

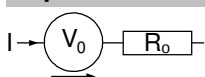
- M = Module
- I = IGBT
- X = XPT IGBT
- A = Gen 1 / std
- 150 = Current Rating [A]
- R = Boost Chopper
- 1200 = Reverse Voltage [V]
- VA = V1-A-Pack

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | MIXA150R1200VA | MIXA150R1200VA | Blister | 24 | 511595 |

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 150\text{ °C}$

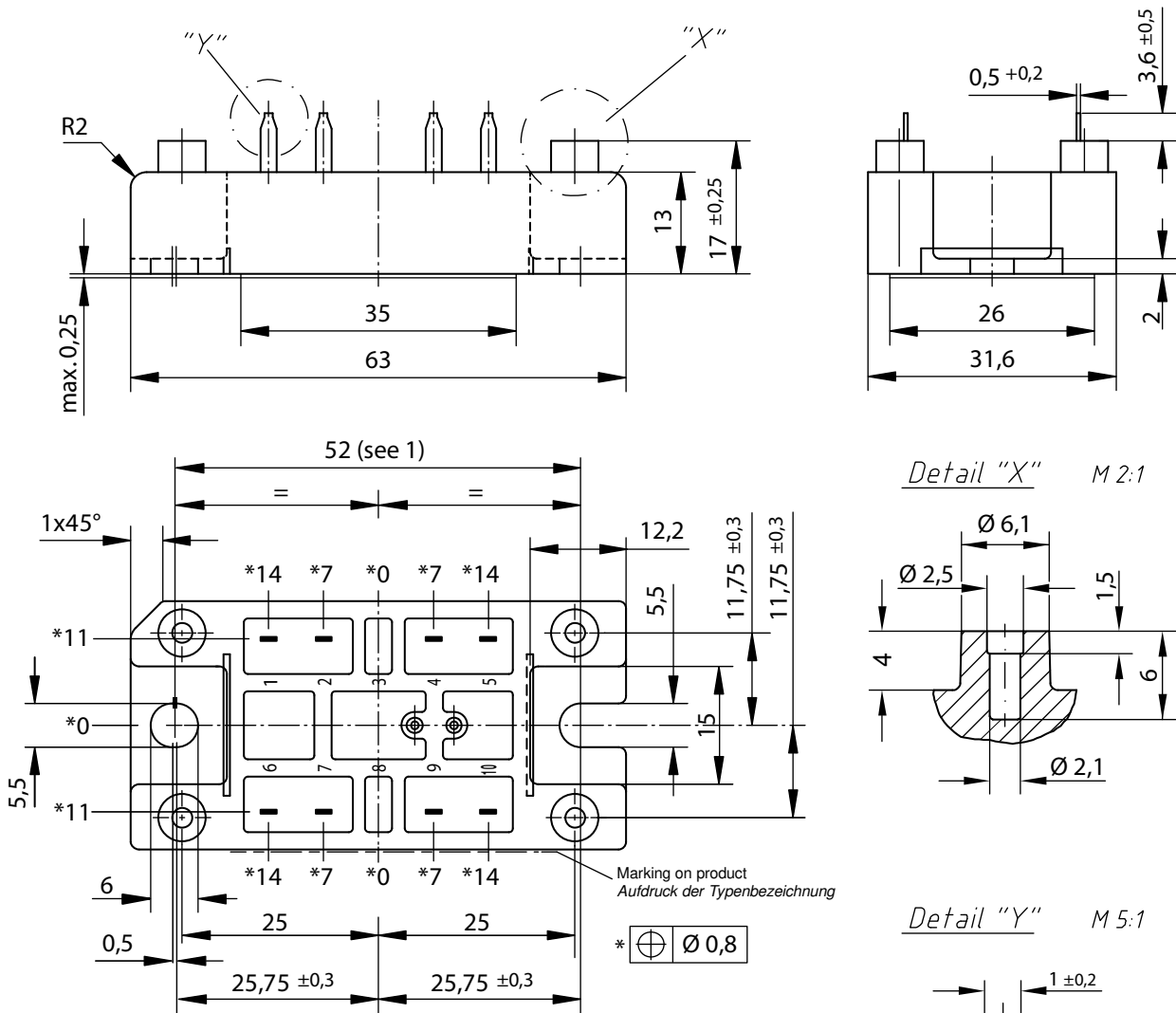


$V_{0\ max}$ threshold voltage

$R_{0\ max}$ slope resistance *

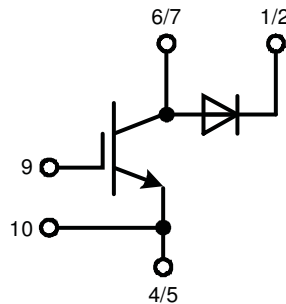
| | IGBT | Diode | |
|--------------|------|-------|----|
| $V_{0\ max}$ | 1.1 | 1.25 | V |
| $R_{0\ max}$ | 9.2 | 5.7 | mΩ |

Outlines V1-A-Pack



Remarks / Bemerkungen:

1. Nominal distance mounting screws on heat sink: 52 mm / Nennabstand Befestigungsschrauben auf Kühlkörper: 52 mm
 2. General tolerance / Allgemeintoleranz: DIN ISO 2768 -T1-c
 3. Surface treatment of pins: tin plated (Sn) in hot dip / Oberflächenbehandlung der Pins: verzinkt (Sn) im Tauchbad
 4. **Detail X:** EJOT PT® self-tapping screws (dimension K25) to be recommended for mounting on PCB / 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^L
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

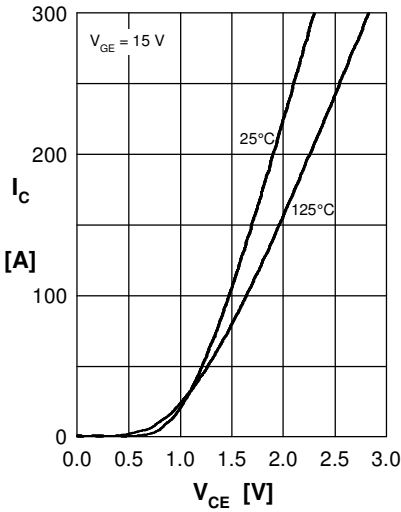


Fig.1 Output characteristics IGBT

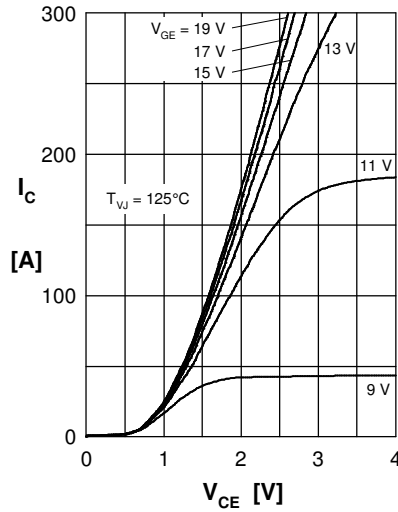


Fig.2 Typ. output characteristics IGBT

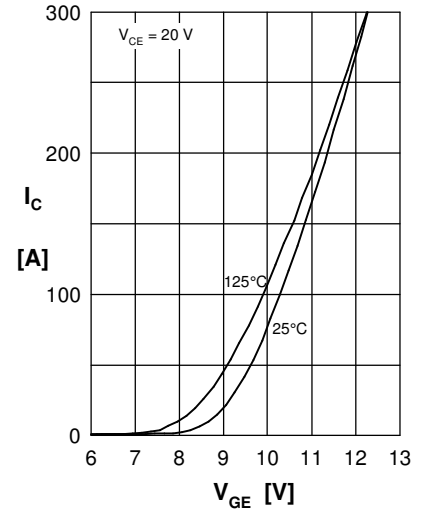


Fig.3 Typ. transfer charact. IGBT

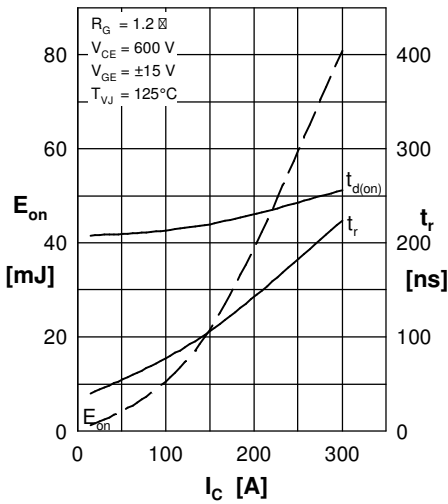


Fig.4 Typ. turn-on energy & switch. times vs. collector current

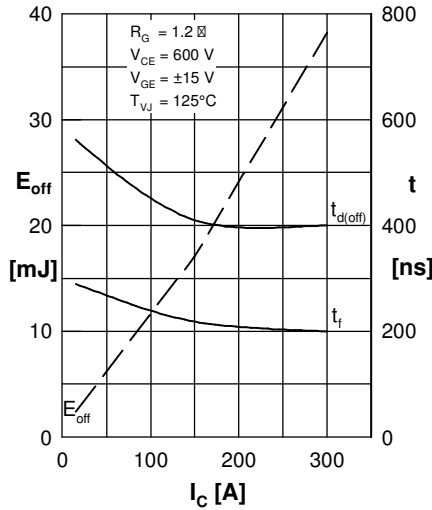


Fig.5 Typ. turn-off energy & switch. times vs. collector current

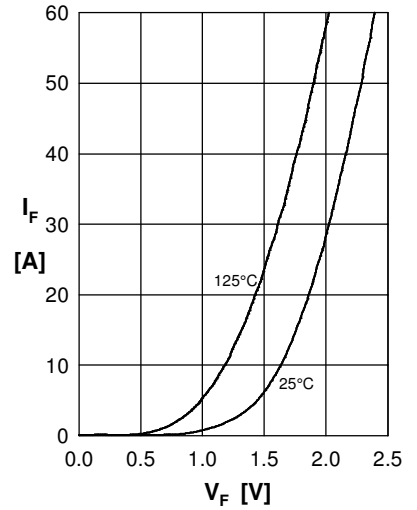


Fig.6 Typ. forward characteristics Diode

Fig.7 Typ. reverse recovery characteristics Diode

Fig.8 Typ. reverse recovery characteristics Diode

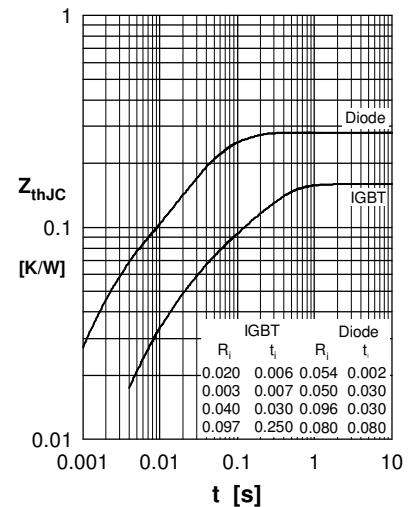


Fig.9 Transient thermal resistance junction to case