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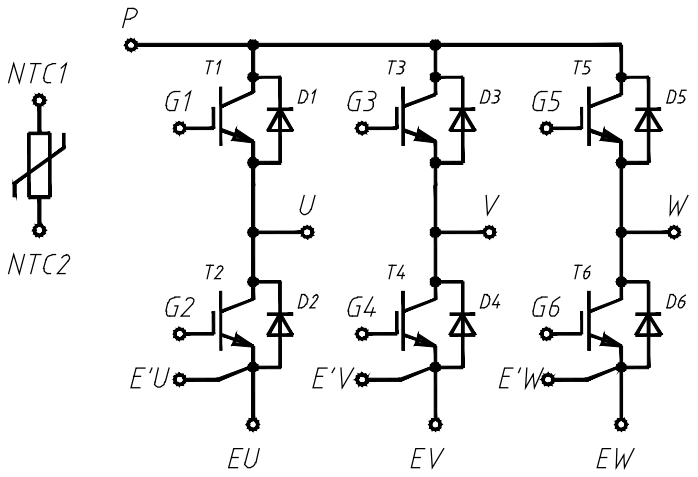
# Six-Pack
XPT IGBT

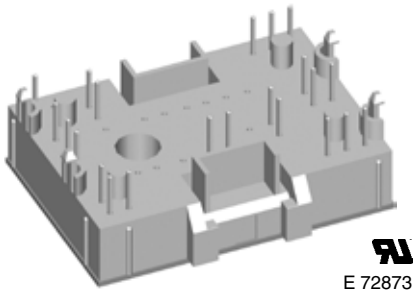
$V_{CES}$ = 1200 V
$I_{C25}$ = 17 A
$V_{CE(sat)}$ = 1.8 V

Preliminary data

**Part name** (Marking on product)

MIXA10W1200TMH



E 72873

Pin configuration see outlines.

**Features:**

- High level of integration - only one power semiconductor module required for the whole drive
- Rugged XPT design (Xtreme light Punch Through) results in:
  - short circuit rated for 10 µsec.
  - very low gate charge
  - square RBSOA @ 3x $I_C$
  - low EMI
- Thin wafer technology combined with the XPT design results in a competitive low $V_{CE(sat)}$
- Temperature sense included
- SONIC™ diode
  - fast and soft reverse recovery
  - low operating forward voltage

**Application:**

- AC motor drives
- Pumps, Fans
- Washing machines
- Air-conditioning system
- Inverter and power supplies

**Package:**

- "Mini" package
- Assembly height is 17 mm
- Insulated base plate
- Pins suitable for wave soldering and PCB mounting
- Assembly clips available
  - IXKU 5-505 screw clamp
  - IXRB 5-506 click clamp
- UL registered E72873

## Ouput Inverter T1 - T6

| Symbol | Definitions | Conditions | | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CES}$ | *collector emitter voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $V_{GES}$ | *max. DC gate voltage* | continuous | | | | ±20 | V |
| $V_{GEM}$ | *max. transient collector gate voltage* | transient | | | | ±30 | V |
| $I_{C25}$ | *collector current* | | $T_C$ = 25°C | | | 17 | A |
| $I_{C80}$ | | | $T_C$ = 80°C | | | 12 | A |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 65 | W |
| $V_{CE(sat)}$ | *collector emitter saturation voltage* | $I_C$ = 9 A; $V_{GE}$ = 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* | $I_C$ = 0.3 mA; $V_{GE}$ = $V_{CE}$ | $T_{VJ}$ = 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 | | 0.02 | 0.15 | mA |
| | | | $T_{VJ}$ = 125°C | | 0.3 | | 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; $I_C$ = 10 A | | | 27 | | nC |
| $t_{d(on)}$ | *turn-on delay time* | inductive load<br>$V_{CE}$ = 600 V; $I_C$ = 10 A<br>$V_{GE}$ = ±15 V; $R_G$ = 100 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* | | | | 1.1 | | mJ |
| $E_{off}$ | *turn-off energy per pulse* | | | | 1.1 | | mJ |
| **RBSOA** | *reverse bias safe operating area* | $V_{GE}$ = ±15 V; $R_G$ = 100 Ω; $V_{CEK}$ = 1200 V | $T_{VJ}$ = 125°C | | | 30 | A |
| $I_{SC}$ **(SCSOA)** | *short circuit safe operating area* | $V_{CE}$ = 900 V; $V_{GE}$ = ±15 V; $R_G$ = 100 Ω; $t_p$ = 10 µs; non-repetitive | $T_{VJ}$ = 125°C | | 40 | | A |
| $R_{thJC}$ | *thermal resistance junction to case* | (per IGBT) | | | | 2.0 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.7 | | K/W |

## Output Inverter D1 - D6

| Symbol | Definitions | Conditions | | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RRM}$ | *max. repetitve reverse voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $I_{F25}$ | *forward current* | | $T_C$ = 25°C | | | 19 | A |
| $I_{F80}$ | | | $T_C$ = 80°C | | | 13 | A |
| $V_F$ | *forward voltage* | $I_F$ = 10 A; $V_{GE}$ = 0 V | $T_{VJ}$ = 25°C | | 1.95 | 2.2 | V |
| | | | $T_{VJ}$ = 125°C | | 1.95 | | V |
| $Q_{rr}$ | *reverse recovery charge* | $V_R$ = 600 V<br>$di_F/dt$ = -250 A/µs<br>$I_F$ = 10 A; $V_{GE}$ = 0 V | $T_{VJ}$ = 125°C | | 1.3 | | µC |
| $I_{RM}$ | *max. reverse recovery current* | | | | 10.5 | | A |
| $t_{rr}$ | *reverse recovery time* | | | | 350 | | ns |
| $E_{rec}$ | *reverse recovery energy* | | | | 0.35 | | mJ |
| $R_{thJC}$ | *thermal resistance junction to case* | (per diode) | | | | 2.4 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.8 | | K/W |

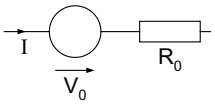
## Module

| Symbol | Definitions | Conditions | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|
| $T_{VJ}$ | *operating temperature* | | -40 | | 125 | °C |
| $T_{VJM}$ | *max. virtual junction temperature* | | | | 150 | °C |
| $T_{stg}$ | *storage temperature* | | -40 | | 125 | °C |
| $V_{ISOL}$ | *isolation voltage* | $I_{ISOL} \leq 1$ mA; 50/60 Hz | | | 2500 | V~ |
| **CTI** | *comparative tracking index* | | | | - | |
| $F_C$ | *mounting force* | | 40 | | 80 | N |
| $d_S$ | *creep distance on surface* | | 12.7 | | | mm |
| $d_A$ | *strike distance through air* | | 12 | | | mm |
| **Weight** | | | | 35 | | g |

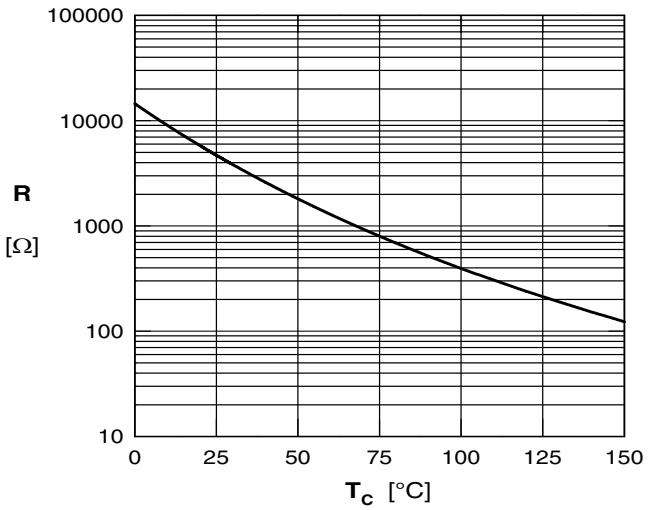
## Temperature Sensor NTC

| Symbol | Definitions | Conditions | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|
| $R_{25}$ | *resistance* | $T_C$ = 25°C | 4.75 | 5.0 | 5.25 | kΩ |
| $B_{25/50}$ | | | | 3375 | | K |

## Equivalent Circuits for Simulation

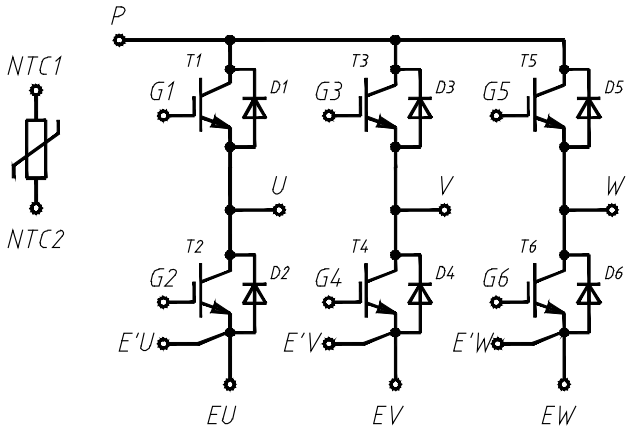



| Symbol | Definitions | Conditions | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|
| $V_0$ | *IGBT* | $T_{VJ}$ = 150°C | | 1.1 | | V |
| $R_0$ | | | | 153 | | mΩ |
| $V_0$ | *Diode* | $T_{VJ}$ = 150°C | | 1.25 | | V |
| $R_0$ | | | | 85 | | mΩ |



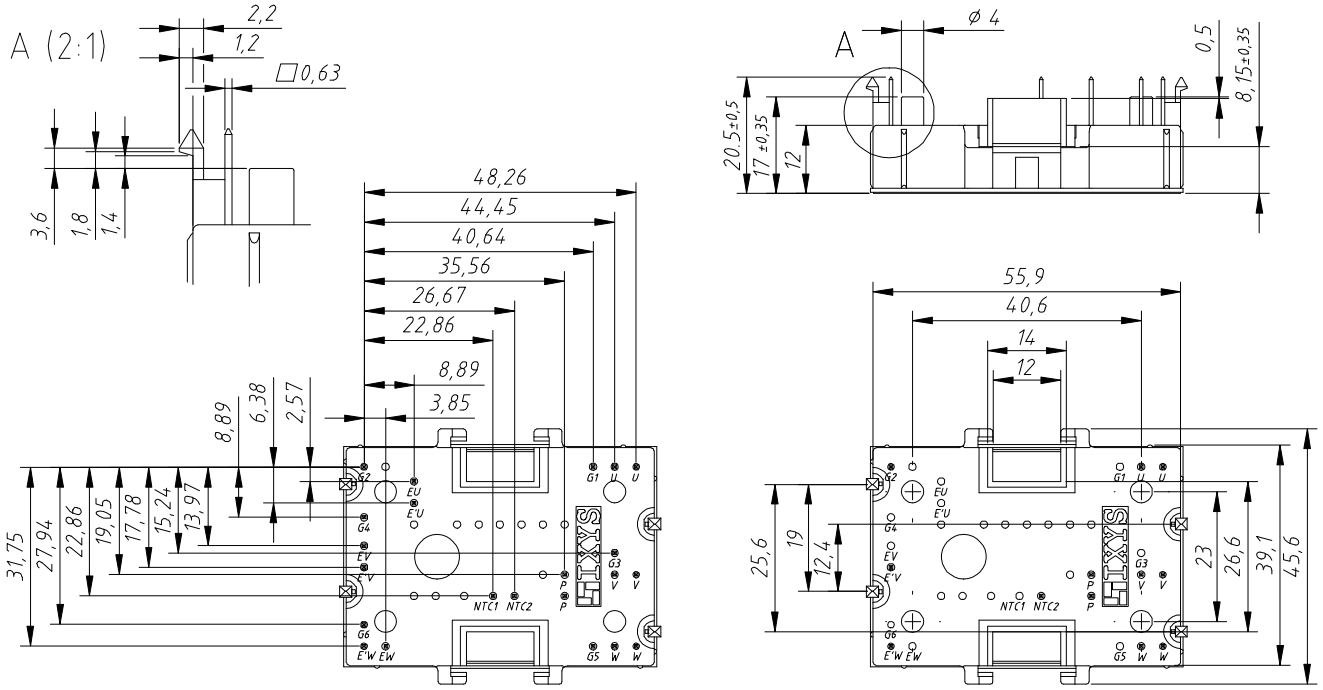

Typ. NTC resistance versus temperature

## Circuit Diagram



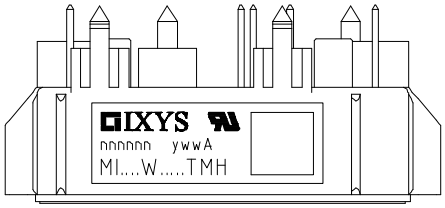

## Outline Drawing

Dimensions in mm (1 mm = 0.0394“)




*Bemerkungen:*
*1) Toleranz für Pin Positionen entsprechend* ⌖ ∅ 0.4
*2) Vorgesehen für die Montage auf Leiterplatten mit einer Dicke von 1.6 ±0.2 mm*

*Remarks:*
*1.) pin positions with tolerance* ⌖ ∅ 0.4
*2) mounting on PCB with thickness of 1.6 ±0.2 mm*




**Part number**

M = Module
I = IGBT
X = XPT
A = standard
10 = Current Rating [A]
W = 6-Pack
1200 = Reverse Voltage [V]
T = NTC
MH = MiniPack2

| Ordering | Part Name | Marking on Product | Delivering Mode | Base Qty | Ordering Code |
|---|---|---|---|---|---|
| Standard | MIXA 10 W 1200 TMH | MIXA10W1200TMH | Box | 20 | 509381 |

IXYS reserves the right to change limits, test conditions and dimensions.

20110322b

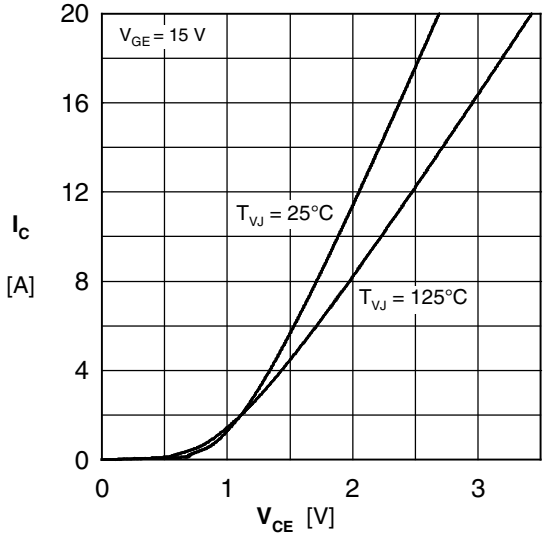



Fig. 1 Typ. output characteristics

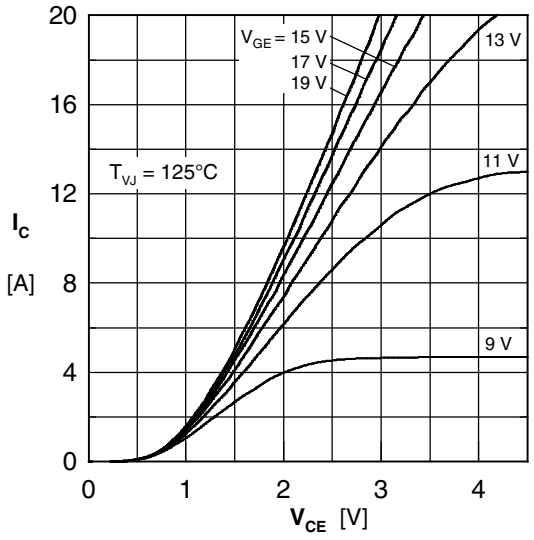



Fig. 2 Typ. output characteristics

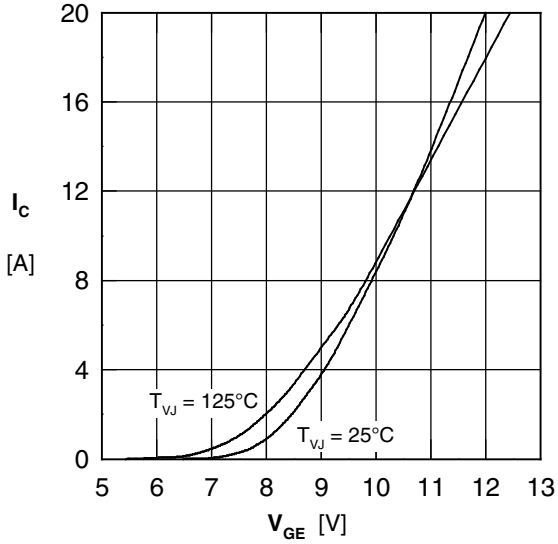



Fig. 3 Typ. tranfer characteristics

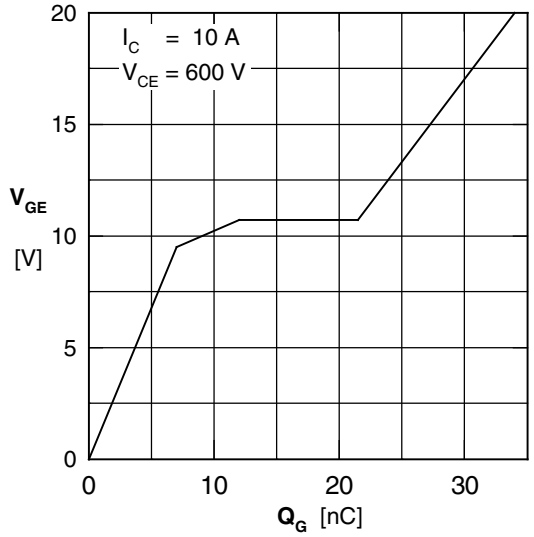



Fig. 4 Typ. turn-on gate charge

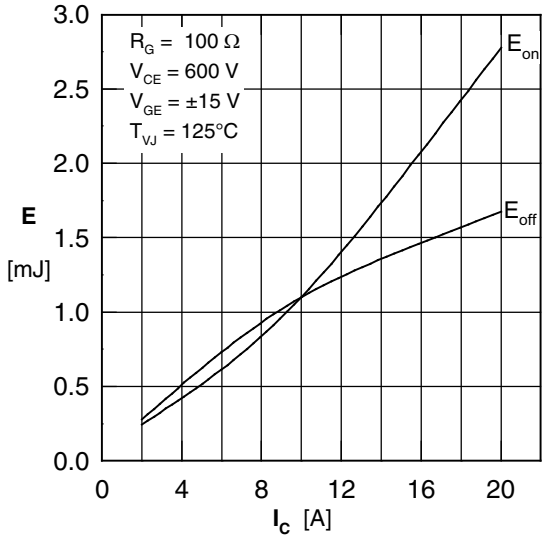



Fig. 5 Typ. switching energy vs. collector current

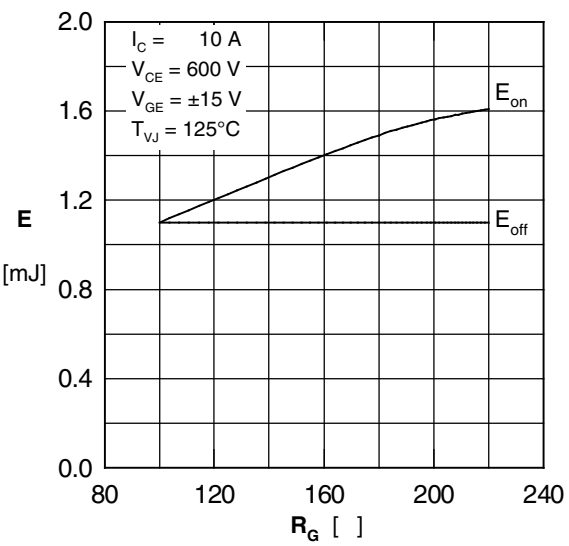



Fig. 6 Typ. switching energy vs. gate resistance

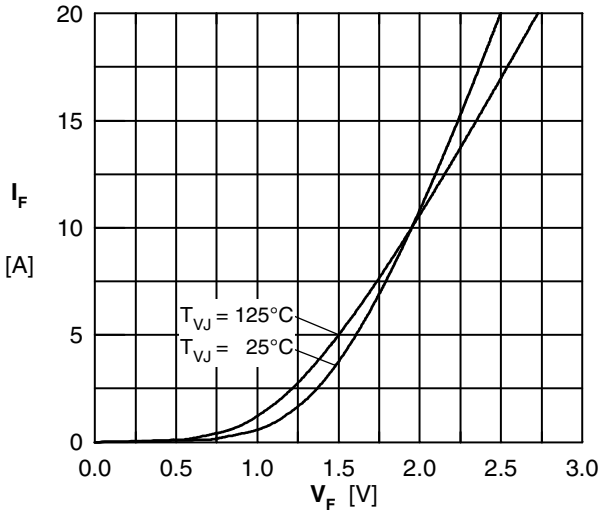



Fig. 7 Typ. forward characteristics

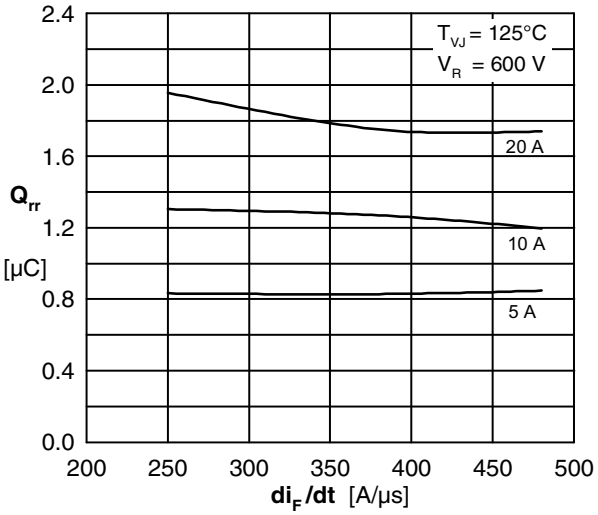



Fig. 8 Typical reverse recovery charge $Q_{rr}$ versus. $di_F/dt$ (125°C)

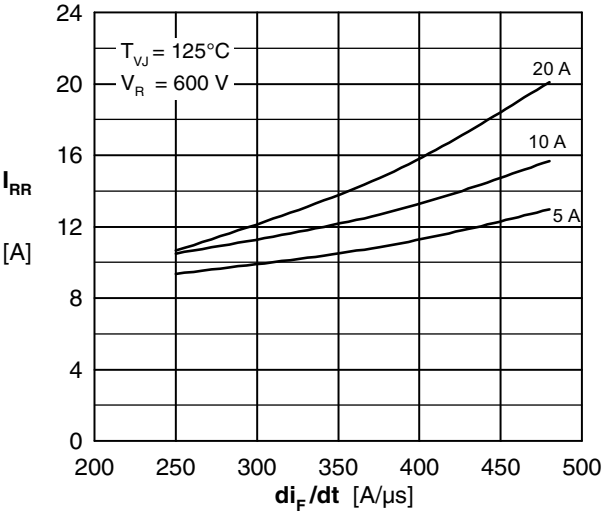



Fig. 9 Typical peak reverse current $I_{RR}$ versus $di_F/dt$ (125°C)

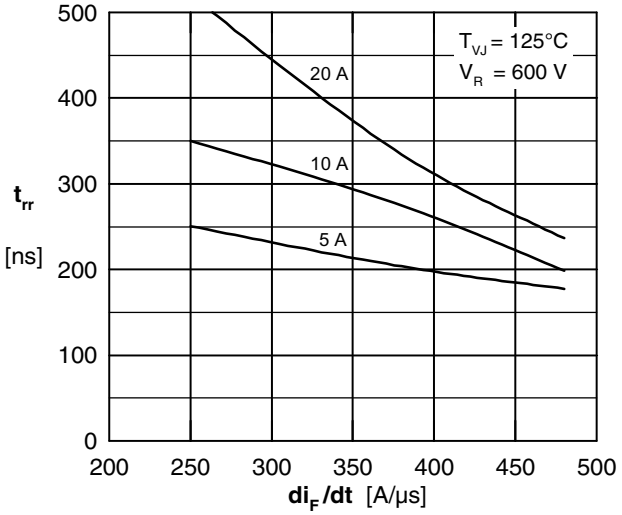



Fig. 10 Typ. recovery time $t_{rr}$ vs. di/dt (125°C)

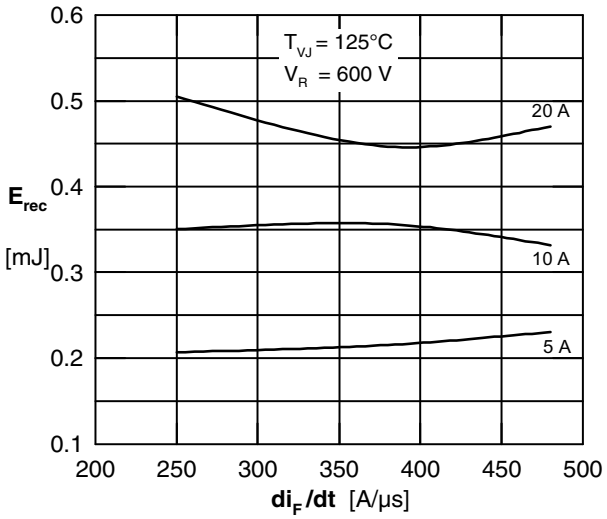
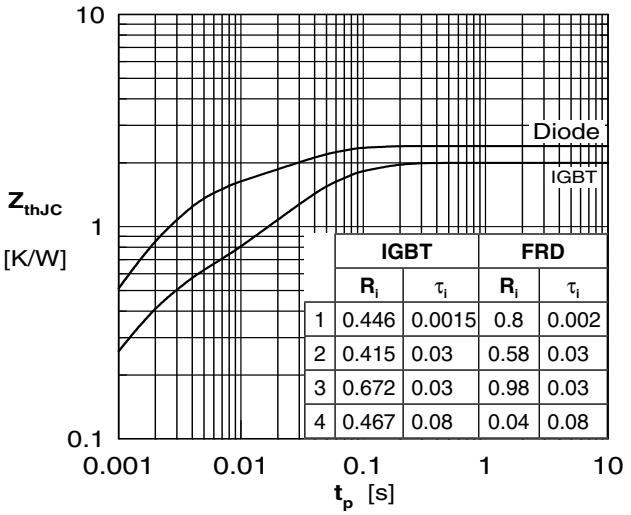



Fig. 11 Typ. recovery energy $E_{rec}$ vs. $di_F/dt$ (125°C)




| | IGBT | | FRD | |
|---|---|---|---|---|
| | $R_i$ | $\tau_i$ | $R_i$ | $\tau_i$ |
| 1 | 0.446 | 0.0015 | 0.8 | 0.002 |
| 2 | 0.415 | 0.03 | 0.58 | 0.03 |
| 3 | 0.672 | 0.03 | 0.98 | 0.03 |
| 4 | 0.467 | 0.08 | 0.04 | 0.08 |

Fig. 12 Transient thermal impedance