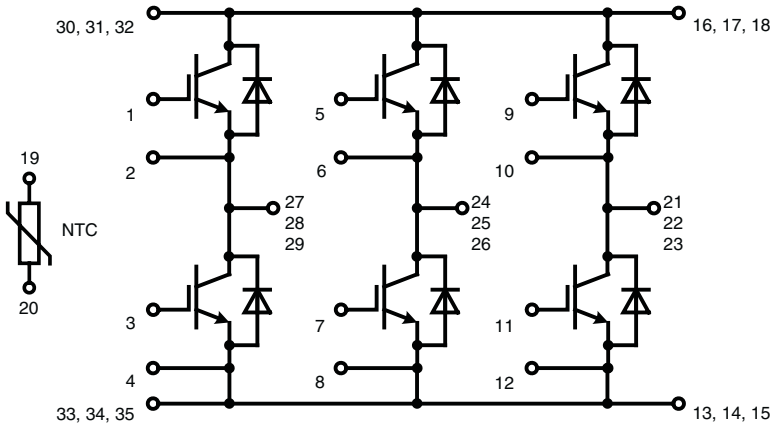
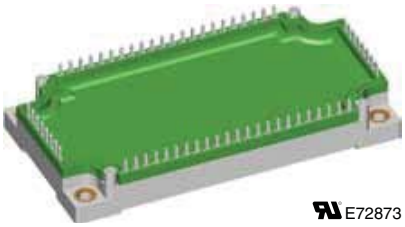
# Six-Pack
## Trench IGBT

$V_{CES}$ = 1200 V
$I_{C25}$ = 145 A
$V_{CE(sat)}$ = 1.7 V

**Part name** (Marking on product)

MWI100-12T8T



E72873

Pin configuration see outlines.

**Features:**

- Trench IGBT technology
- low saturation voltage
- low switching losses
- square RBSOA, no latch up
- high short circuit capability
- positive temperature coefficient for easy parallelling
- MOS input, voltage controlled
- ultra fast free wheeling diodes
- solderable pins for PCB mounting
- package with copper base plate

**Application:**

- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies

**Package:**

- "E3-Pack" standard outline
- Insulated copper base plate
- Soldering pins for PCB mounting
- Temperature sense included

## Ouput Inverter T1 - T6

| Symbol | Definitions | Conditions | | min. | Ratings 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 | | | 145 | A |
| $I_{C80}$ | | | $T_C$ = 80°C | | | 100 | A |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 480 | W |
| $V_{CE(sat)}$ | *collector emitter saturation voltage* | $I_C$ = 100 A; $V_{GE}$ = 15 V | $T_{VJ}$ = 25°C | | 1.7 | 2.1 | V |
| | | | $T_{VJ}$ = 125°C | | 2.0 | | V |
| $V_{GE(th)}$ | *gate emitter threshold voltage* | $I_C$ = 4 mA; $V_{GE}$ = $V_{CE}$ | $T_{VJ}$ = 25°C | 5.0 | 5.8 | 6.5 | V |
| $I_{CES}$ | *collector emitter leakage current* | $V_{CE}$ = $V_{CES}$; $V_{GE}$ = 0 V | $T_{VJ}$ = 25°C | | | 4 | mA |
| | | | $T_{VJ}$ = 125°C | | 1 | | mA |
| $I_{GES}$ | *gate emitter leakage current* | $V_{GE}$ = ±20 V | | | | 500 | nA |
| $C_{ies}$ | *input capacitance* | $V_{CE}$ = 25 V; $V_{GE}$ = 0 V; f = 1 MHz | | | 7210 | | pF |
| $Q_{G(on)}$ | *total gate charge* | $V_{CE}$ = 600 V; $V_{GE}$ = 15 V; $I_C$ = 100 A | | | 550 | | nC |
| $t_{d(on)}$ | *turn-on delay time* | inductive load<br>$V_{CE}$ = 600 V; $I_C$ = 100 A<br>$V_{GE}$ = ±15 V; $R_G$ = 3.9 Ω | $T_{VJ}$ = 125°C | | 270 | | ns |
| $t_r$ | *current rise time* | | | | 50 | | ns |
| $t_{d(off)}$ | *turn-off delay time* | | | | 400 | | ns |
| $t_f$ | *current fall time* | | | | 340 | | ns |
| $E_{on}$ | *turn-on energy per pulse* | | | | 8.5 | | mJ |
| $E_{off}$ | *turn-off energy per pulse* | | | | 13.5 | | mJ |
| **RBSOA** | *reverse bias safe operating area* | $V_{GE}$ = ±15 V; $R_G$ = 3.9 Ω; | $T_{VJ}$ = 125°C<br>$V_{CEK}$ = 1200 V | | | 200 | A |
| **SCSOA** | *short circuit safe operating area* | | | | | | |
| $t_{SC}$ | *short circuit duration* | $V_{CE}$ = 900 V; $V_{GE}$ = ±15 V; | $T_{VJ}$ = 125°C | | | 10 | µs |
| $I_{SC}$ | *short circuit current* | $R_G$ = 3.9 Ω; non-repetitive | | | 400 | | A |
| $R_{thJC}$ | *thermal resistance junction to case* | (per IGBT) | | | | 0.26 | K/W |

## Output Inverter D1 - D6

| Symbol | Definitions | Conditions | | min. | Ratings typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RRM}$ | *max. repetitve reverse voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $I_{F25}$ | *forward current* | | $T_C$ = 25°C | | | 135 | A |
| $I_{F80}$ | | | $T_C$ = 80°C | | | 90 | A |
| $V_F$ | *forward voltage* | $I_F$ = 100 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>$di_F/dt$ = -1600 A/µs<br>$I_F$ = 100 A; $V_{GE}$ = 0 V | $T_{VJ}$ = 125°C | | 12.5 | | µC |
| $I_{RM}$ | *max. reverse recovery current* | | | | 100 | | A |
| $t_{rr}$ | *reverse recovery time* | | | | 350 | | ns |
| $E_{rec}$ | *reverse recovery energy* | | | | 4 | | mJ |
| $R_{thJC}$ | *thermal resistance junction to case* | (per diode) | | | | 0.4 | K/W |

$T_C$ = 25°C unless otherwise stated

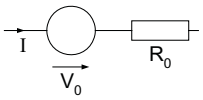
## Temperature Sensor NTC

| 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 |

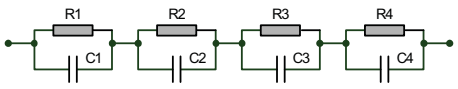
## Module

| 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* | | | | 200 | |
| $M_d$ | *mounting torque (M5)* | | 2.7 | | 3.3 | Nm |
| $d_S$ | *creep distance on surface* | | 10 | | | mm |
| $d_A$ | *strike distance through air* | | 7.5 | | | mm |
| $R_{pin\text{-}chip}$ | *resistance pin to chip* | | | 2.5 | | mΩ |
| $R_{thCH}$ | *thermal resistance case to heatsink* | with heatsink compound | | 0.02 | | K/W |
| **Weight** | | | | 300 | | g |

## 0.0 Equivalent Circuits for Simulation




| Symbol | Definitions | Conditions | | Ratings min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_0$ | *IGBT* | T1 - T6 | $T_{VJ}$ = 125°C | | 1.0 | | V |
| $R_0$ | | | | | 9.1 | | mΩ |
| $V_0$ | *Diode* | D1 - D6 | $T_{VJ}$ = 150°C | | 1.09 | | V |
| $R_0$ | | | | | 9.1 | | mΩ |



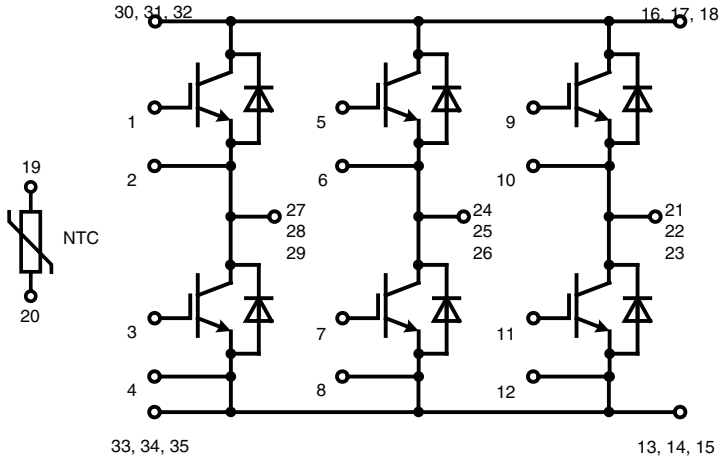

$$Z_{th}(t) = \sum_{i=1}^{n} \left[ R_i \cdot \left( 1 - \exp\left( -\frac{t}{\tau_i} \right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

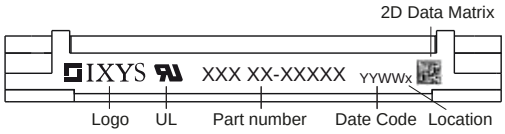
| | IGBT | Diode |
|---|---|---|
| $R_1$ | 0.03985 | 0.084 |
| $R_2$ | 0.05038 | 0.069 |
| $R_3$ | 0.08959 | 0.146 |
| $R_4$ | 0.08018 | 0.101 |
| $\tau_1$ | 0.0025 | 0.0025 |
| $\tau_2$ | 0.076 | 0.076 |
| $\tau_3$ | 0.036 | 0.036 |
| $\tau_4$ | 0.076 | 0.076 |

$T_C$ = 25°C unless otherwise stated

## Circuit Diagram

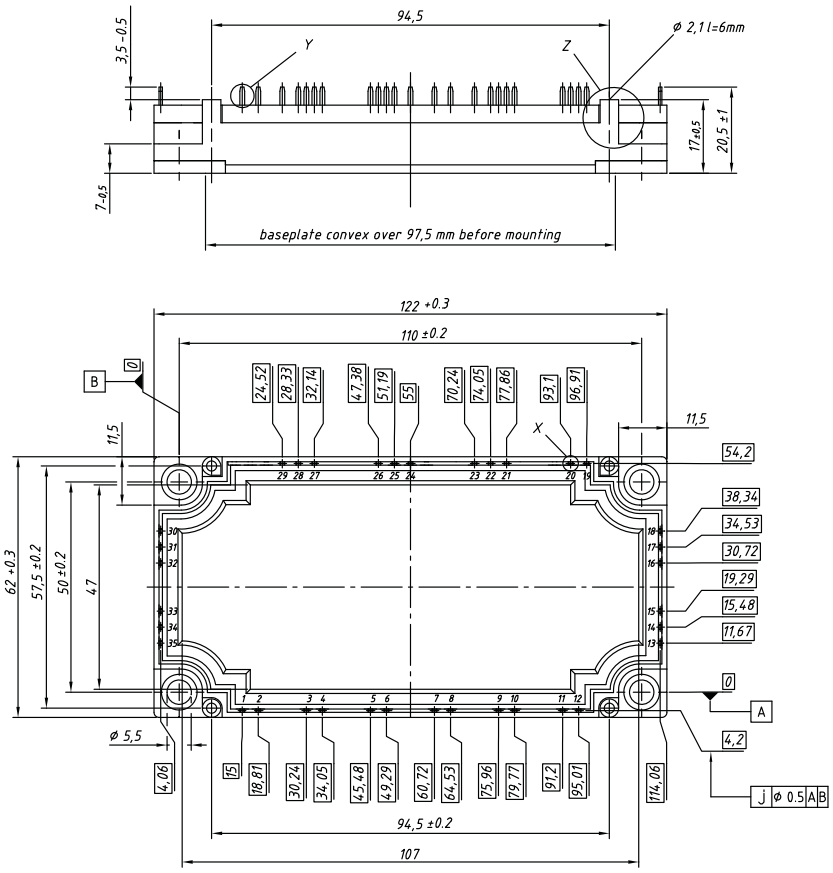


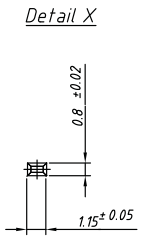

## Marking on Product

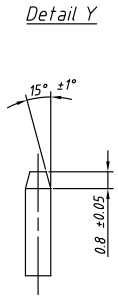


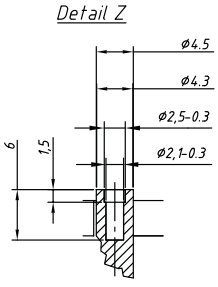

## Outline Drawing

Dimensions in mm (1 mm = 0.0394“)




## Product Marking

| Ordering | Part Name | Marking on Product | Delivering Mode | Base Qty | Ordering Code |
|---|---|---|---|---|---|
| Standard | MWI100-12T8T | MWI100-12T8T | Box | 5 | 502294 |

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

20150123d

## Inverter T1 - T6

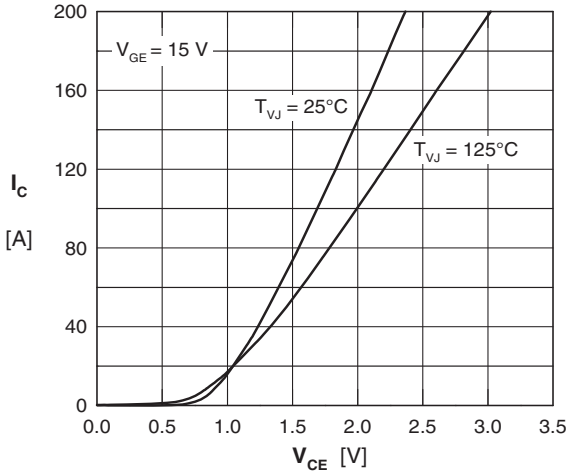



Fig. 1 Typ. output characteristics

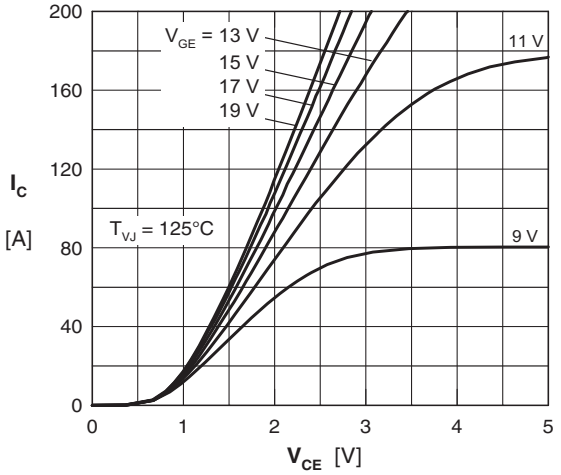



Fig. 2 output characteristics

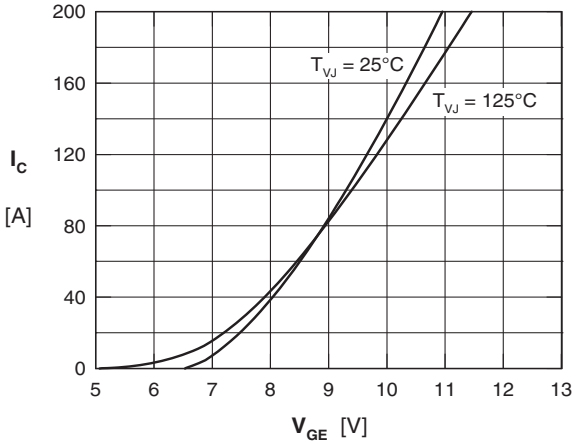



Fig. 3 Typ. transfer characteristics

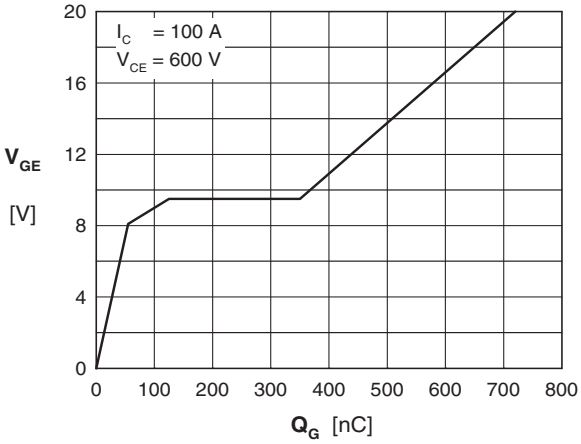



Fig. 4 Typ. turn-on gate charge

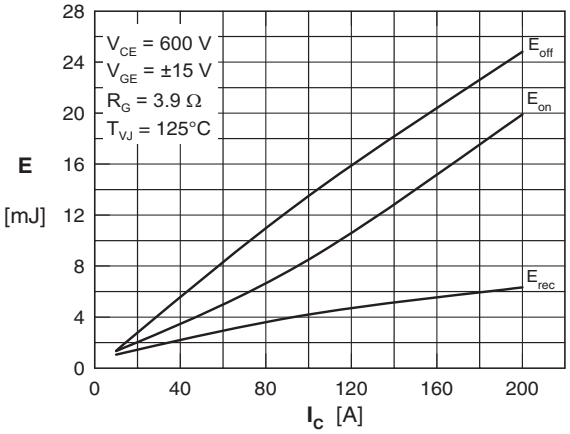



Fig. 5 Typ. switching energy vs. collector current

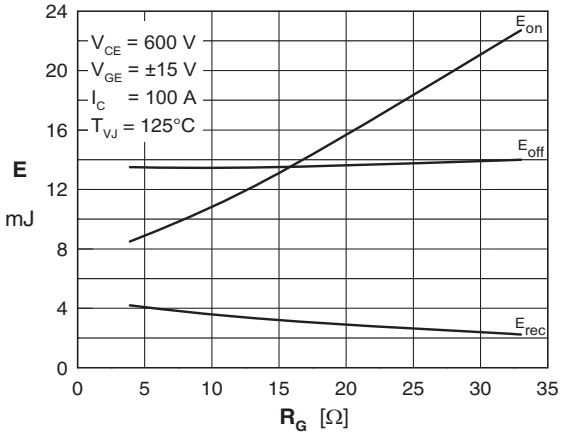



Fig. 6 Typ. switching energy vs. gate resistance

## Inverter D1 - D6

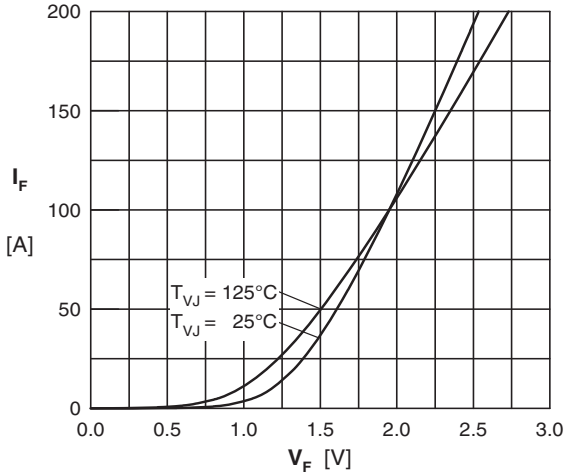



Fig. 7 Typ. Forward current versus $V_F$

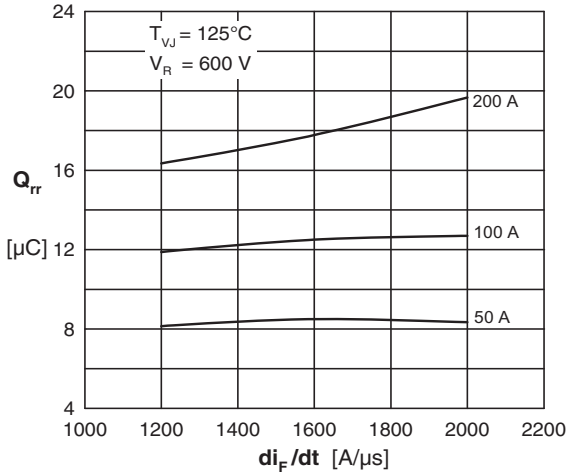



Fig. 8 Typ. reverse recov.charge $Q_{rr}$ vs. di/dt

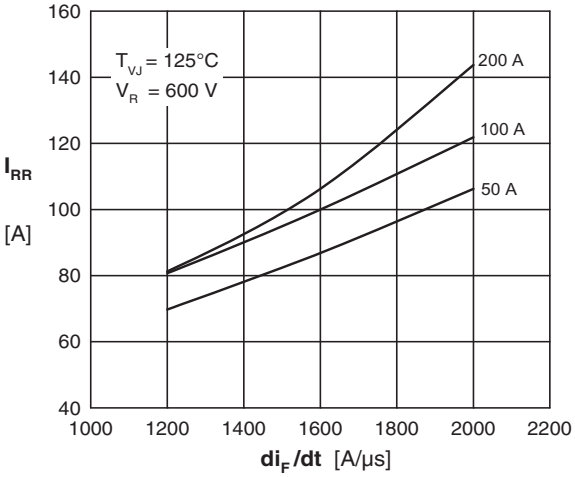



Fig. 9 Typ. peak reverse current $I_{RM}$ vs. di/dt

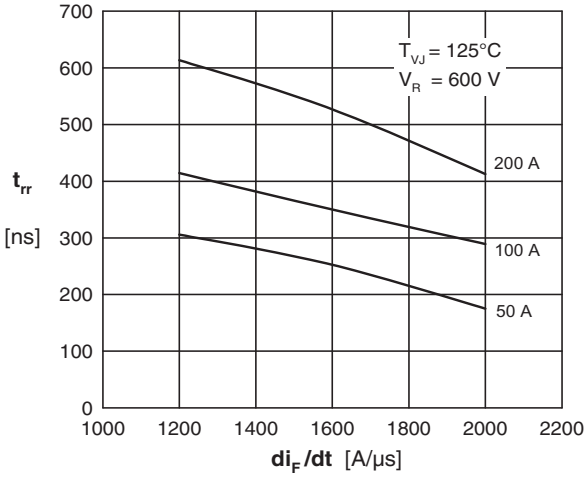



Fig. 10 Typ. recovery time $t_{rr}$ versus di/dt

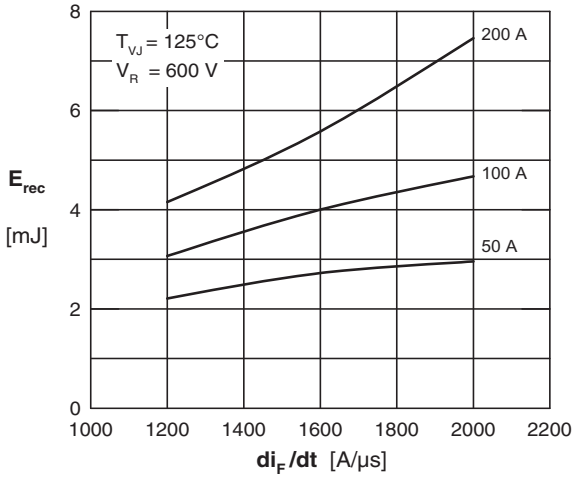



Fig. 11 Typ. recovery energy $E_{rec}$ versus di/dt

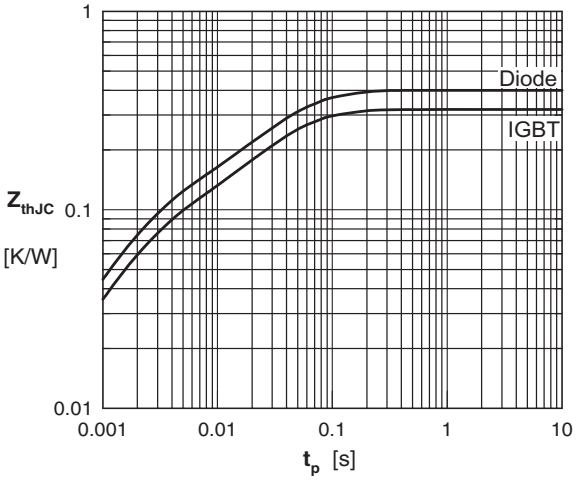



Fig. 12 Typ. transient thermal impedance

## NTC

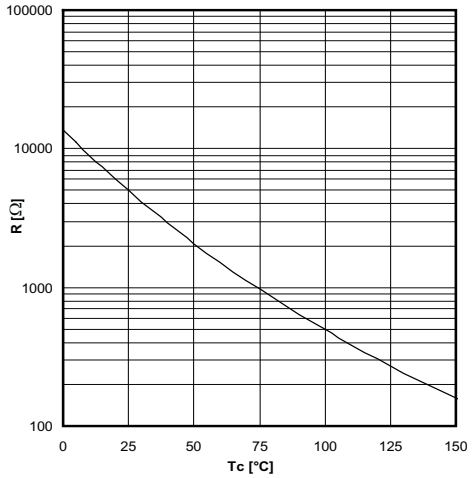



Fig. 13 Typ. NTC resistance vs. temperature