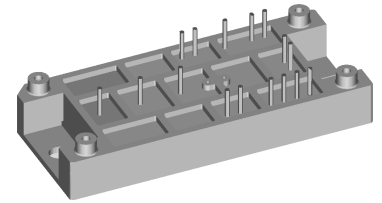
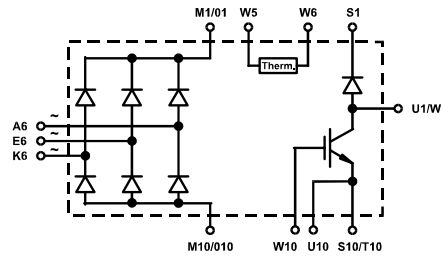


Three Phase Rectifier Bridge with IGBT and Fast Recovery Diode for Braking System

$V_{RRM} = 1200/1600 \text{ V}$
 $I_{dAVM} = 121/157 \text{ A}$

Preliminary Data

| V_{RRM} | Type | V_{RRM} | Type |
|-----------|----------------|-----------|----------------|
| V | | V | |
| 1200 | VUB 120-12 NO1 | 1600 | VUB 120-16 NO1 |
| 1200 | VUB 160-12 NO1 | 1600 | VUB 160-16 NO1 |



| Symbol | Test Conditions | Maximum Ratings | | |
|------------|--|--|----------------|------------------|
| | | VUB 120 | VUB160 | |
| V_{RRM} | | 1200/1600 | 1200/1600 V | |
| I_{dAVM} | | 121 | 157 A | |
| I_{FSM} | Rectifier Diodes | $T_C = 75^\circ\text{C}$, sinusoidal 120° | | |
| | | $T_C = 75^\circ\text{C}$, sinusoidal 120° | | |
| | $T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$ | 650 | 850 A | |
| | $T_{VJ} = 150^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$ | 580 | 760 A | |
| I^2t | Rectifier Diodes | $T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$ | 2110 | 3610 A |
| | | $T_{VJ} = 150^\circ\text{C}$, $t = 10 \text{ ms}$, $V_R = 0 \text{ V}$ | 1680 | 2880 A |
| P_{tot} | Rectifier Diodes | $T_C = 25^\circ\text{C}$ per diode | 130 | 160 W |
| V_{CES} | IGBT | $T_{VJ} = 25^\circ\text{C}$ to 150°C | 1200 | 1200 V |
| V_{GE} | | Continuous | ± 20 | ± 20 V |
| I_{C25} | IGBT | $T_C = 25^\circ\text{C}$, DC | 100 | 150 A |
| I_{C75} | | $T_C = 75^\circ\text{C}$, DC | 71 | 106 A |
| I_{C75} | | $T_C = 75^\circ\text{C}$, $d = 0.5$ | 56 | 85 A |
| I_{CM} | IGBT | $t_p = \text{Pulse width limited by } T_{VJM}$ | 200 | 300 A |
| P_{tot} | IGBT | $T_C = 25^\circ\text{C}$ | 400 | 600 W |
| V_{RRM} | Fast Recovery Diode | | 1200 | V |
| I_{FAV} | | $T_C = 75^\circ\text{C}$, rectangular $d = 0.5$ | 25 | A |
| I_{FRMS} | | $T_C = 75^\circ\text{C}$, rectangular $d = 0.5$ | 39 | A |
| I_{FRM} | | $T_C = 75^\circ\text{C}$, $t_p = 10 \mu\text{s}$, $f = 5 \text{ kHz}$ | tbid | A |
| I_{FSM} | Fast Recovery Diode | $T_{VJ} = 45^\circ\text{C}$, $t = 10 \text{ ms}$ | 200 | A |
| | | $T_{VJ} = 150^\circ\text{C}$, $t = 10 \text{ ms}$ | 180 | A |
| P_{tot} | Fast Recovery Diode | $T_C = 25^\circ\text{C}$ | 100 | W |
| T_{VJ} | Module | | -40...+150 | $^\circ\text{C}$ |
| T_{VJM} | | | 150 | $^\circ\text{C}$ |
| T_{stg} | | | -40...+125 | $^\circ\text{C}$ |
| V_{ISOL} | Module | 50/60 Hz $t = 1 \text{ min}$ | 3000 | V~ |
| | | $I_{ISOL} \leq 1 \text{ mA}$ $t = 1 \text{ s}$ | 3600 | V~ |
| M_d | Module | Mounting torque (M5) (10-32 unf) | 2-2.5 18-22 | Nm lb.in. |
| d_s | Module | Creep distance on surface | 12.7 | mm |
| d_A | | Strike distance in air | 9.4 | mm |
| a | | Maximum allowable acceleration | 50 | m/s^2 |
| Weight | Module | typ. | 80 | g |

Features

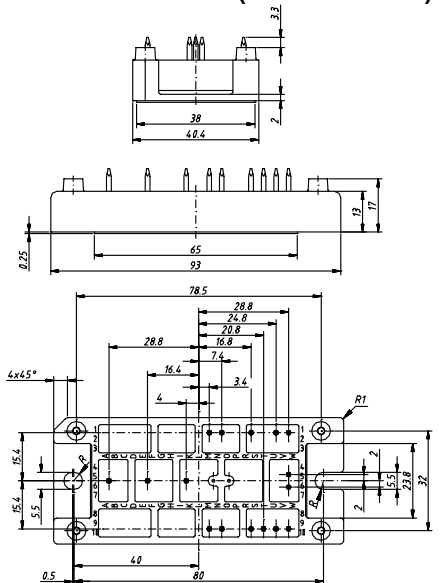
- Soldering connections for PCB mounting
- Isolation voltage 3600 V~
- Ultrafast diode
- Convenient package outline
- UL registered E 72873
- Case and potting UL94 V-0
- Thermistor

Applications

- Drive Inverters with brake system

Advantages

- 2 functions in one package
- Easy to mount with two screws
- Suitable for wave soldering
- High temperature and power cycling capability

Dimensions in mm (1 mm = 0.0394")


Data according to IEC 60747
 IXYS reserves the right to change limits, test conditions and dimensions.

| Symbol | Test Conditions | Characteristic Values | | | |
|--|---|---|--------------------|----------------------|------------------|
| | | (T _{VJ} = 25°C, unless otherwise specified) | | | |
| | | min. | typ. | max. | |
| Rectifier Diodes | I_R | $V_R = V_{RRM}, T_{VJ} = 25^\circ\text{C}$ $V_R = V_{RRM}, T_{VJ} = 150^\circ\text{C}$ | | 0.3 mA 5 mA | |
| | V_F | $I_F = 150\text{ A}, T_{VJ} = 25^\circ\text{C}$ | VUB 120 VUB 160 | 1.59 V 1.49 V | |
| | V_{T0} | For power-loss calculations only | VUB 120 VUB 160 | 0.80 V 0.75 V | |
| | r_T | $T_{VJ} = 150^\circ\text{C}$ | VUB 120 VUB 160 | 6.1 mΩ 4.6 mΩ | |
| | R_{thJC} | per diode | VUB 120 VUB 160 | 1.0 K/W 0.8 K/W | |
| | R_{thJH} | | VUB 120 VUB 160 | 1.3 K/W 1.1 K/W | |
| | $V_{BR(CES)}$ $V_{GE(th)}$ | $V_{GS} = 0\text{ V}, I_C = 3\text{ mA}$ | | 1200 | V |
| | | $I_C = 20\text{ mA}$ $I_C = 30\text{ mA}$ | VUB 120 VUB 160 | 5 5 | 8 V 8 V |
| | I_{CES} | $T_{VJ} = 25^\circ\text{C}, V_{CE} = 1200\text{ V}$ | VUB 120 VUB 160 | | 0.8 mA 1.2 mA |
| | | $T_{VJ} = 125^\circ\text{C}, V_{CE} = 0,8 \cdot V_{CES}$ | VUB 120 VUB 160 | | 3 mA 4.5 mA |
| V_{CEsat} | $V_{GE} = 15\text{ V}, I_C = 50\text{ A}$ | VUB 120 | | 2.9 V | |
| | $V_{GE} = 15\text{ V}, I_C = 75\text{ A}$ | VUB 160 | | 2.9 V | |
| t_{sc} (SCSOA) | $V_{GE} = 15\text{ V}, V_{CE} = 720\text{ V}, T_{VJ} = 125^\circ\text{C},$ $R_G = 11\ \Omega, \text{ non repetitive}$ | VUB 120 | | 10 μs | |
| | $R_G = 7\ \Omega, \text{ non repetitive}$ | VUB 160 | | 10 μs | |
| RBSOA | $V_{GE} = 15\text{ V}, V_{CE} = 960\text{ V}, T_{VJ} = 125^\circ\text{C},$ Clamped Inductive load, $L = 100\ \mu\text{H}$ | $R_G = 11\ \Omega$ | VUB 120 | 100 A | |
| | | $R_G = 7\ \Omega$ | VUB 160 | 150 A | |
| | | | | | |
| C_{ies} | $V_{CE} = 25\text{ V}, f = 1\text{ MHz}, V_{GE} = 0\text{ V}$ | VUB 120 VUB 160 | 9 13.5 | nF nF | |
| $t_{d(on)}$ $t_{d(off)}$ E_{on} E_{off} | $V_{CE} = 720\text{ V}, I_C = 50/75\text{ A}$ $V_{GE} = 15\text{ V}, R_G = 11/7\ \Omega$ Inductive load; $L = 100\ \mu\text{H}$ $T_{VJ} = 125^\circ\text{C}$ | VUB 120 | 300 | ns | |
| | | VUB 160 | 350 | ns | |
| | | VUB 120 | 12 | mJ | |
| | | VUB 120 | 18 | mJ | |
| | | VUB 160 | 16 | mJ | |
| R_{thJC} | | VUB 120 VUB 160 | | 0.32 K/W 0.21 K/W | |
| | | VUB 120 VUB 160 | | 0.45 K/W 0.30 K/W | |
| I_R | $V_R = V_{RRM}, T_{VJ} = 25^\circ\text{C}$ $V_R = 0,8 \cdot V_{CES}, T_{VJ} = 125^\circ\text{C}$ | | 4 | 0.75 mA 7 mA | |
| | $I_F = 30\text{ A}, T_{VJ} = 25^\circ\text{C}$ | | | 2.55 V | |
| V_{T0} | For power-loss calculations only | | | 1.65 V | |
| r_T | $T_{VJ} = 150^\circ\text{C}$ | | | 18.2 mΩ | |
| I_{RM} | $I_F = 30\text{ A}, -di_F/dt = 240\text{ A}/\mu\text{s}, V_R = 540\text{ V}$ | | 16 | 18 A | |
| t_{rr} | $I_F = 1\text{ A}, -di_F/dt = 100\text{ A}/\mu\text{s}, V_R = 30\text{ V}$ | | 40 | 60 ns | |
| R_{thJC} R_{thJH} | | | | 1.2 K/W 1.6 K/W | |
| R_{25} | Siemens S 891/2,2/+9 | | | 2.2 kΩ | |

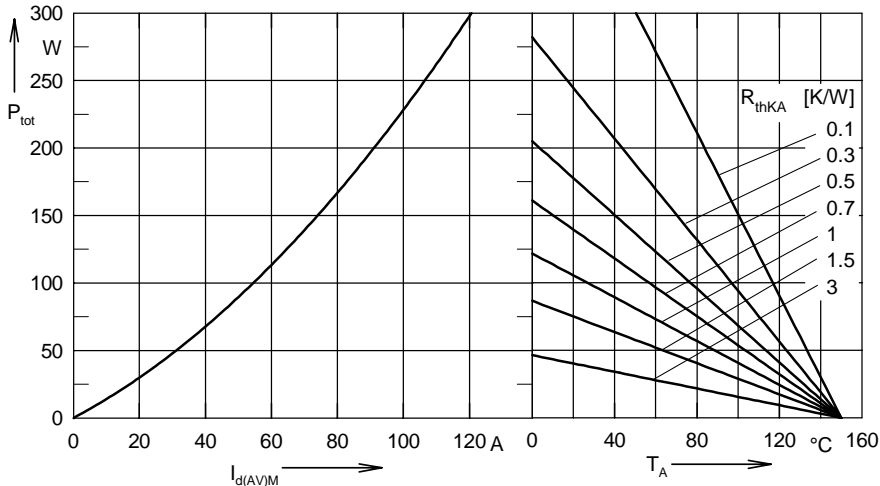


Fig. 1 Power dissipation versus direct output current and ambient temperature (Rectifier bridge)

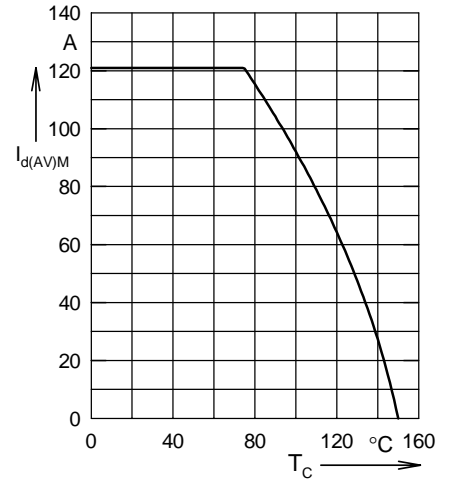


Fig. 2 Maximum forward current versus case temperature (Rectifier bridge)

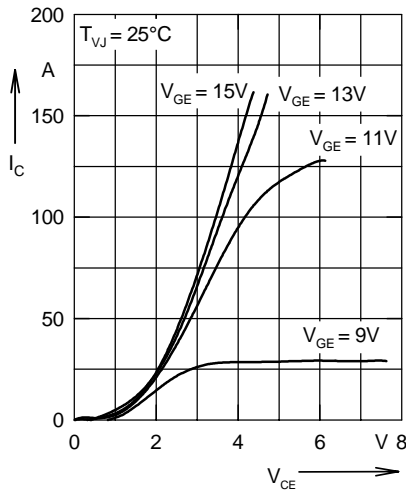


Fig. 3 Output characteristics for braking (IGBT)

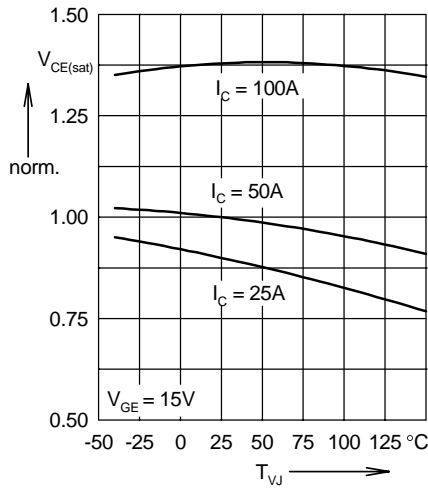


Fig. 4 Temperature dependence of output saturation voltage, normalized (IGBT)

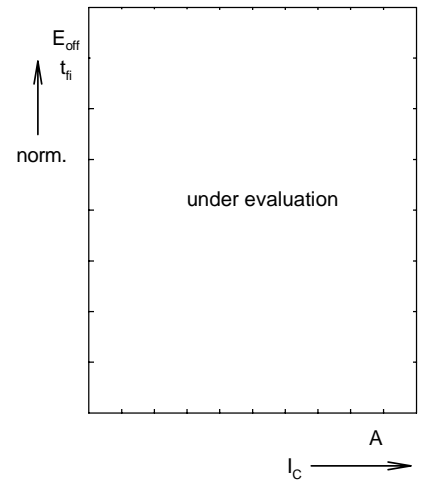


Fig. 5 Turn-off energy per pulse and fall time in collector current, normalized (IGBT)

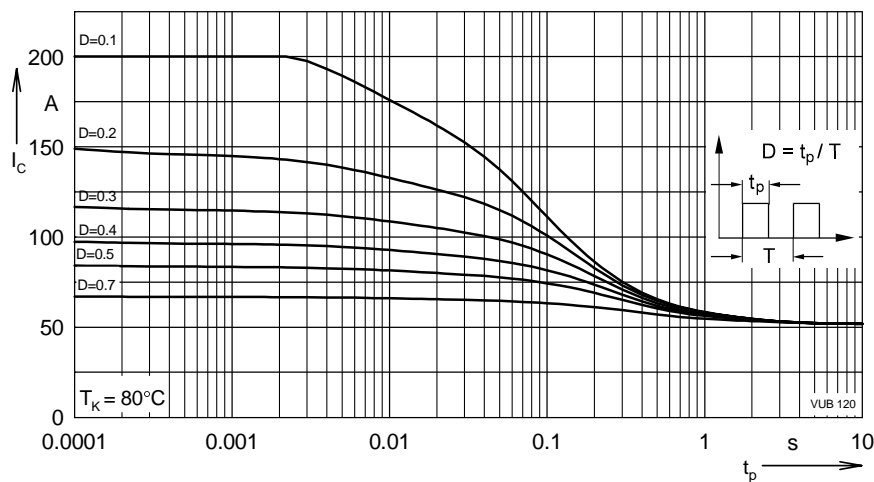


Fig. 6 Collector current dependence on pulse width and duty cycle (IGBT)

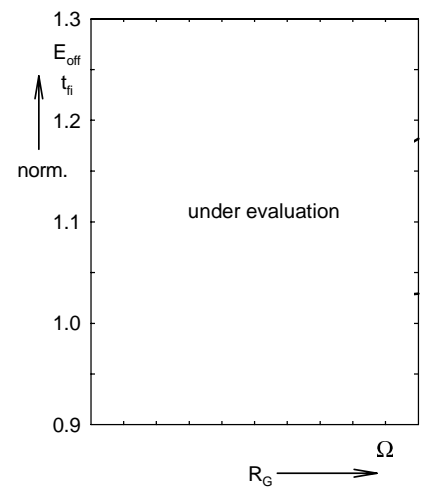


Fig. 7 Turn-off energy per pulse and fall time on R_G (IGBT)

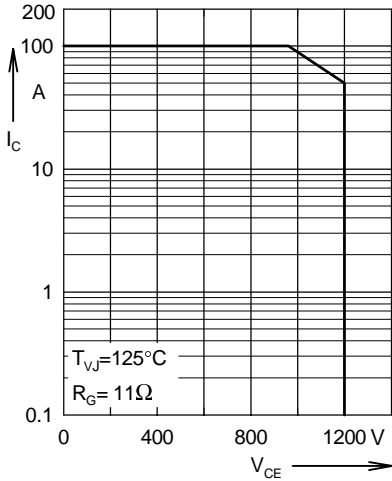


Fig. 8 Reverse biased safe operation area (IGBT)

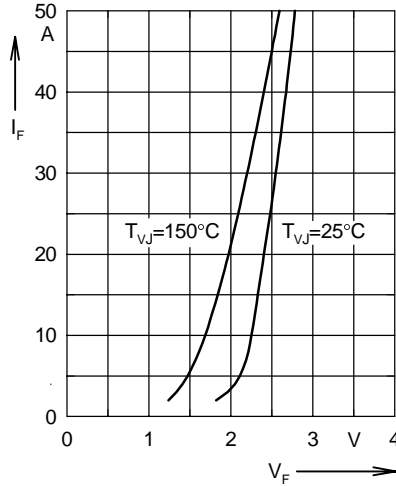


Fig. 9 Forward current versus voltage drop (Fast Diode)

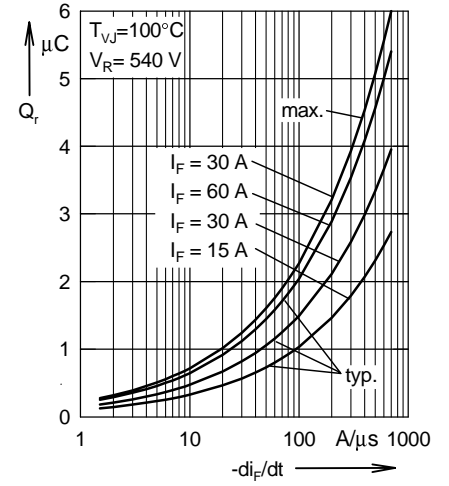


Fig. 10 Recovery charge versus $-di_F/dt$ (Fast Diode)

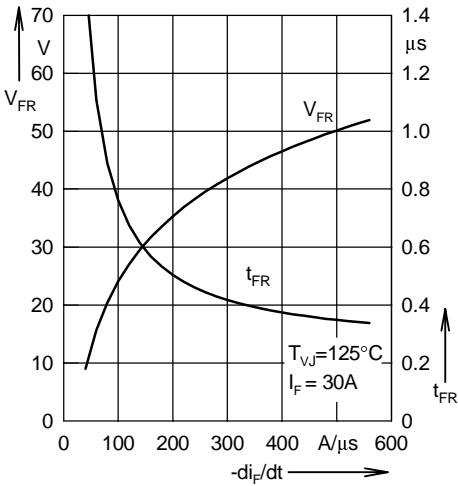


Fig. 11 Peak forward voltage and recovery time versus $-di_F/dt$ (Fast Diode)

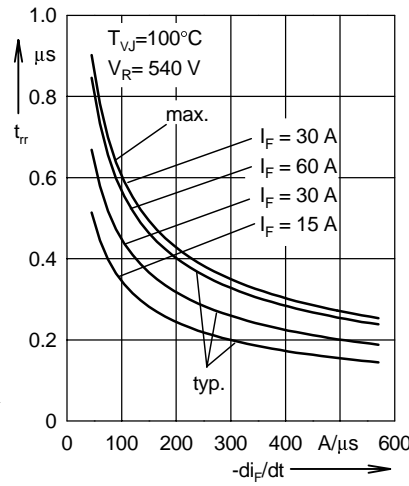


Fig. 12 Recovery time versus $-di_F/dt$ (Fast Diode)

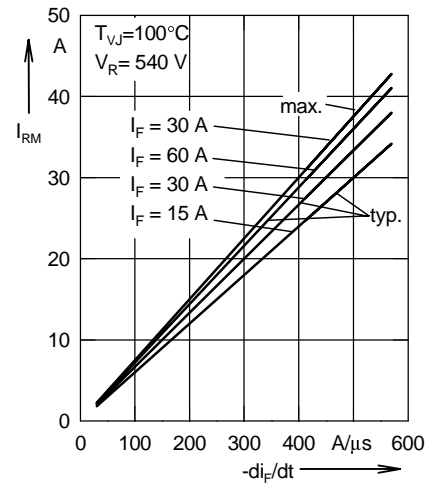


Fig. 13 Peak reverse current versus $-di_F/dt$ (Fast Diode)

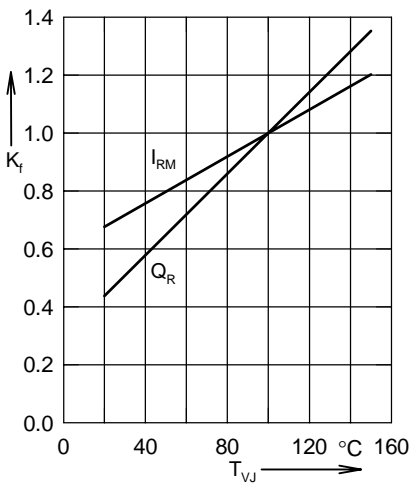


Fig. 14 Dynamic parameters versus junction temperature (Fast Diode)

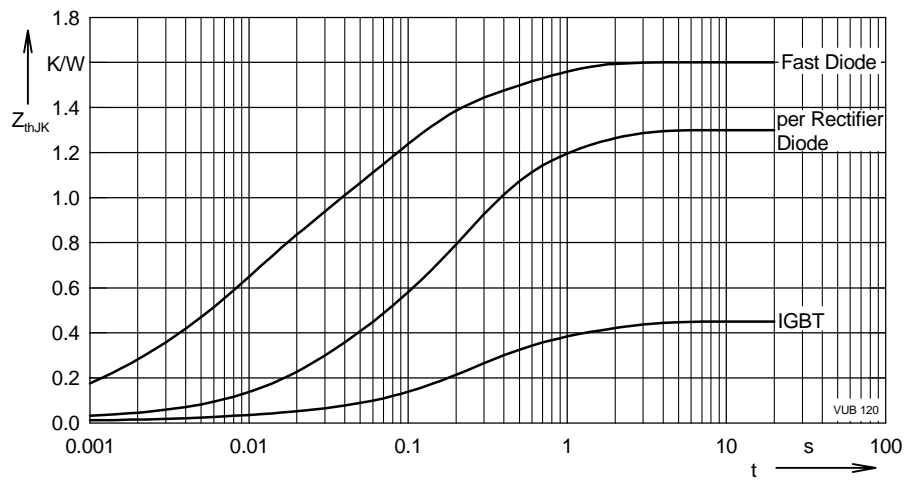


Fig. 15 Transient thermal impedance junction to heatsink Z_{thJK}