

## XPT IGBT

$$V_{CES} = 1200V$$

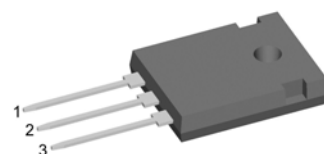
$$I_{C25} = 58A$$

$$V_{CE(sat)} = 1.8V$$

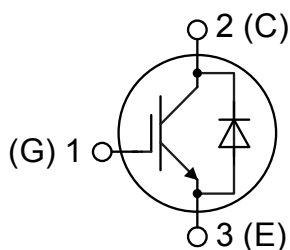
Copack

Part number

**IXA33IF1200HB**



Backside: collector



### 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:

- 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: TO-247

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

| IGBT                 |                                        |                                                                                                                                                                                              |                         | Ratings |      |      |      |
|----------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------|------|------|------|
| Symbol               | Definition                             | Conditions                                                                                                                                                                                   |                         | min.    | typ. | max. | Unit |
| V <sub>CES</sub>     | collector emitter voltage              | T <sub>VJ</sub> = 25°C                                                                                                                                                                       |                         |         |      | 1200 | V    |
| V <sub>GES</sub>     | max. DC gate voltage                   |                                                                                                                                                                                              |                         |         |      | ±20  | V    |
| V <sub>GEM</sub>     | max. transient gate emitter voltage    |                                                                                                                                                                                              |                         |         |      | ±30  | V    |
| I <sub>C25</sub>     | collector current                      | T <sub>C</sub> = 25°C                                                                                                                                                                        |                         |         |      | 58   | A    |
| I <sub>C80</sub>     |                                        | T <sub>C</sub> = 80°C                                                                                                                                                                        |                         |         |      | 34   | A    |
| P <sub>tot</sub>     | total power dissipation                | T <sub>C</sub> = 25°C                                                                                                                                                                        |                         |         |      | 250  | W    |
| V <sub>CE(sat)</sub> | collector emitter saturation voltage   | I <sub>C</sub> = 25A; V <sub>GE</sub> = 15 V                                                                                                                                                 | T <sub>VJ</sub> = 25°C  |         | 1.8  | 2.1  | V    |
|                      |                                        |                                                                                                                                                                                              | T <sub>VJ</sub> = 125°C |         | 2.1  |      | V    |
| V <sub>GE(th)</sub>  | gate emitter threshold voltage         | I <sub>C</sub> = 1mA; V <sub>GE</sub> = V <sub>CE</sub>                                                                                                                                      | T <sub>VJ</sub> = 25°C  | 5.4     | 5.9  | 6.5  | V    |
| I <sub>CES</sub>     | collector emitter leakage current      | V <sub>CE</sub> = V <sub>CES</sub> ; V <sub>GE</sub> = 0 V                                                                                                                                   | T <sub>VJ</sub> = 25°C  |         |      | 0.1  | mA   |
|                      |                                        |                                                                                                                                                                                              | T <sub>VJ</sub> = 125°C |         | 0.1  |      | mA   |
| I <sub>GES</sub>     | gate emitter leakage current           | V <sub>GE</sub> = ±20 V                                                                                                                                                                      |                         |         |      | 500  | nA   |
| Q <sub>G(on)</sub>   | total gate charge                      | V <sub>CE</sub> = 600 V; V <sub>GE</sub> = 15 V; I <sub>C</sub> = 25 A                                                                                                                       |                         |         | 76   |      | nC   |
| t <sub>d(on)</sub>   | turn-on delay time                     | <div><div></div><div>inductive load</div><div>T<sub>VJ</sub> = 125°C</div><div>V<sub>CE</sub> = 600V; I<sub>C</sub> = 25A</div><div>V<sub>GE</sub> = ±15 V; R<sub>G</sub> = 39 Ω</div></div> |                         | 70      |      | ns   |      |
| t <sub>r</sub>       | current rise time                      |                                                                                                                                                                                              |                         | 40      |      | ns   |      |
| t <sub>d(off)</sub>  | turn-off delay time                    |                                                                                                                                                                                              |                         | 250     |      | ns   |      |
| t <sub>f</sub>       | current fall time                      |                                                                                                                                                                                              |                         | 100     |      | ns   |      |
| E <sub>on</sub>      | turn-on energy per pulse               |                                                                                                                                                                                              |                         | 2.5     |      | mJ   |      |
| E <sub>off</sub>     | turn-off energy per pulse              |                                                                                                                                                                                              |                         | 3       |      | mJ   |      |
| RBSOA                | reverse bias safe operating area       | <div><div></div><div>V<sub>GE</sub> = ±15 V; R<sub>G</sub> = 39 Ω</div><div>V<sub>CEmax</sub> = 1200V</div></div>                                                                            | T <sub>VJ</sub> = 125°C |         |      |      |      |
| I <sub>CM</sub>      |                                        |                                                                                                                                                                                              |                         |         |      | 75   | A    |
| SCSOA                | short circuit safe operating area      | <div><div></div><div>V<sub>CEmax</sub> = 900 V</div><div>V<sub>CE</sub> = 900V; V<sub>GE</sub> = ±15 V</div><div>R<sub>G</sub> = 39 Ω; non-repetitive</div></div>                            | T <sub>VJ</sub> = 125°C |         |      | 10   | μs   |
| t <sub>sc</sub>      | short circuit duration                 |                                                                                                                                                                                              |                         |         |      |      |      |
| I <sub>sc</sub>      | short circuit current                  |                                                                                                                                                                                              |                         | 100     |      | A    |      |
| R <sub>thJC</sub>    | thermal resistance junction to case    |                                                                                                                                                                                              |                         |         |      | 0.5  | K/W  |
| R <sub>thCH</sub>    | thermal resistance case to heatsink    |                                                                                                                                                                                              |                         |         | 0.25 |      | K/W  |
|                      |                                        |                                                                                                                                                                                              |                         |         |      |      |      |
| Diode                |                                        |                                                                                                                                                                                              |                         |         |      |      |      |
| V <sub>RRM</sub>     | max. repetitive reverse voltage        | T <sub>VJ</sub> = 25°C                                                                                                                                                                       |                         |         |      | 1200 | V    |
| I <sub>F25</sub>     | forward current                        | T <sub>C</sub> = 25°C                                                                                                                                                                        |                         |         |      | 60   | A    |
| I <sub>F80</sub>     |                                        | T <sub>C</sub> = 80°C                                                                                                                                                                        |                         |         |      | 33   | A    |
| V <sub>F</sub>       | forward voltage                        | I <sub>F</sub> = 30A                                                                                                                                                                         | T <sub>VJ</sub> = 25°C  |         |      | 2.20 | V    |
|                      |                                        |                                                                                                                                                                                              | T <sub>VJ</sub> = 125°C |         | 1.95 |      | V    |
| I <sub>R</sub>       | reverse current                        | V <sub>R</sub> = V <sub>RRM</sub>                                                                                                                                                            | T <sub>VJ</sub> = 25°C  |         |      | *    | mA   |
|                      | * not applicable, see Ices value above |                                                                                                                                                                                              | T <sub>VJ</sub> = 125°C |         | *    |      | mA   |
| Q <sub>rr</sub>      | reverse recovery charge                | <div><div></div><div>V<sub>R</sub> = 600 V</div><div>-di<sub>F</sub>/dt = -600 A/μs</div><div>I<sub>F</sub> = 30A; V<sub>GE</sub> = 0 V</div></div>                                          | T <sub>VJ</sub> = 125°C |         | 3.5  |      | μC   |
| I <sub>RM</sub>      | max. reverse recovery current          |                                                                                                                                                                                              |                         |         | 30   |      | A    |
| t <sub>rr</sub>      | reverse recovery time                  |                                                                                                                                                                                              |                         |         | 350  |      | ns   |
| E <sub>rec</sub>     | reverse recovery energy                |                                                                                                                                                                                              |                         |         | 0.9  |      | mJ   |
| R <sub>thJC</sub>    | thermal resistance junction to case    |                                                                                                                                                                                              |                         |         |      | 0.7  | K/W  |
| R <sub>thCH</sub>    | thermal resistance case to heatsink    |                                                                                                                                                                                              |                         |         | 0.25 |      | K/W  |

| Package TO-247 |                              |              | Ratings |      |      |      |
|----------------|------------------------------|--------------|---------|------|------|------|
| Symbol         | Definition                   | Conditions   | min.    | typ. | max. | Unit |
| $I_{RMS}$      | RMS current                  | per terminal |         |      | 70   | A    |
| $T_{VJ}$       | virtual junction temperature |              | -40     |      | 150  | °C   |
| $T_{op}$       | operation temperature        |              | -40     |      | 125  | °C   |
| $T_{stg}$      | storage temperature          |              | -40     |      | 150  | °C   |
| Weight         |                              |              |         | 6    |      | g    |
| $M_D$          | mounting torque              |              | 0.8     |      | 1.2  | Nm   |
| $F_C$          | mounting force with clip     |              | 20      |      | 120  | N    |

### Product Marking



### Part number

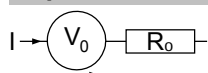
I = IGBT  
X = XPT IGBT  
A = Gen 1 / std  
33 = Current Rating [A]  
IF = Copack  
1200 = Reverse Voltage [V]  
HB = TO-247AD (3)

| Ordering | Part Number   | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|---------------|--------------------|---------------|----------|----------|
| Standard | IXA33IF1200HB | IXA33IF1200HB      | Tube          | 30       | 508562   |

### Equivalent Circuits for Simulation

\* on die level

$T_{VJ} = 150\text{ °C}$



$V_{0\max}$  threshold voltage

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

IGBT

1.1

55

Diode

1.25

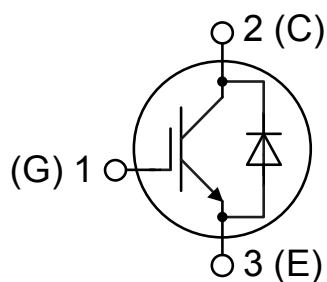
28.3

V

mΩ

**Outlines TO-247**


| Sym. | Inches |       | Millimeter |       |
|------|--------|-------|------------|-------|
|      | min.   | max.  | min.       | max.  |
| A    | 0.185  | 0.209 | 4.70       | 5.30  |
| A1   | 0.087  | 0.102 | 2.21       | 2.59  |
| A2   | 0.059  | 0.098 | 1.50       | 2.49  |
| D    | 0.819  | 0.845 | 20.79      | 21.45 |
| E    | 0.610  | 0.640 | 15.48      | 16.24 |
| E2   | 0.170  | 0.216 | 4.31       | 5.48  |
| e    | 0.215  | BSC   | 5.46       | BSC   |
| L    | 0.780  | 0.800 | 19.80      | 20.30 |
| L1   | -      | 0.177 | -          | 4.49  |
| Ø P  | 0.140  | 0.144 | 3.55       | 3.65  |
| Q    | 0.212  | 0.244 | 5.38       | 6.19  |
| S    | 0.242  | BSC   | 6.14       | BSC   |
| b    | 0.039  | 0.055 | 0.99       | 1.40  |
| b2   | 0.065  | 0.094 | 1.65       | 2.39  |
| b4   | 0.102  | 0.135 | 2.59       | 3.43  |
| c    | 0.015  | 0.035 | 0.38       | 0.89  |
| D1   | 0.515  | -     | 13.07      | -     |
| D2   | 0.020  | 0.053 | 0.51       | 1.35  |
| E1   | 0.530  | -     | 13.45      | -     |
| Ø P1 | -      | 0.29  | -          | 7.39  |



## IGBT

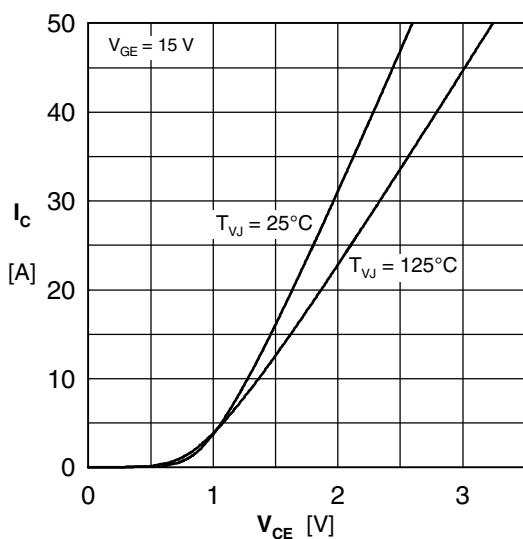


Fig. 1 Typ. output characteristics

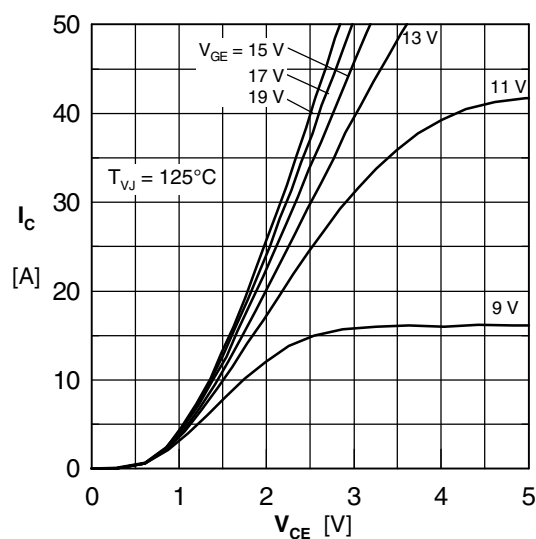


Fig. 2 Typ. output characteristics

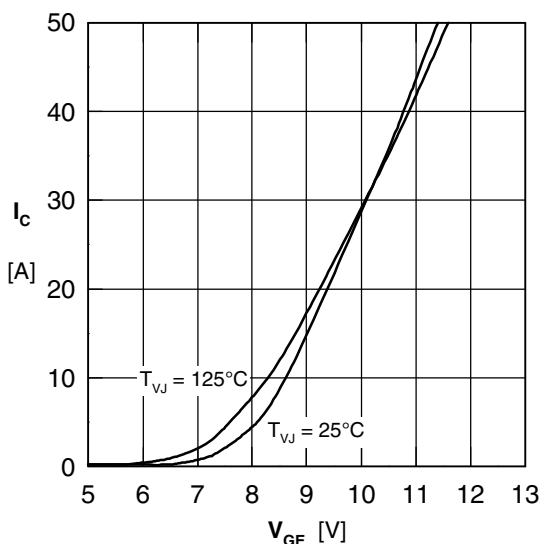


Fig. 3 Typ. transfer characteristics

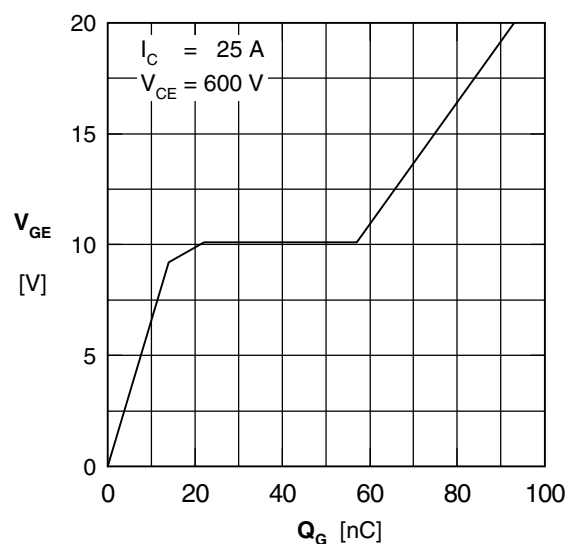


Fig. 4 Typ. turn-on gate charge

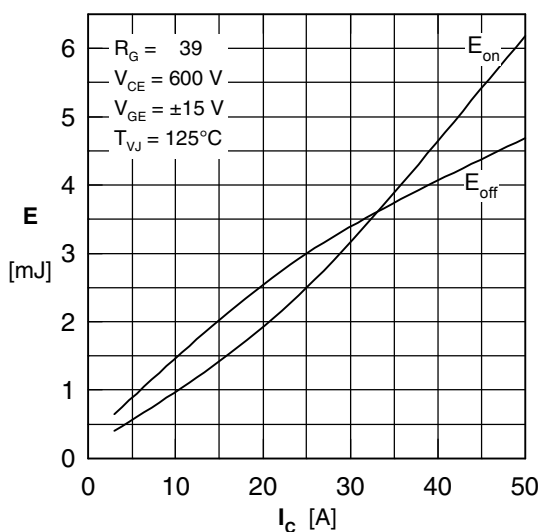


Fig. 5 Typ. switching energy vs. collector current

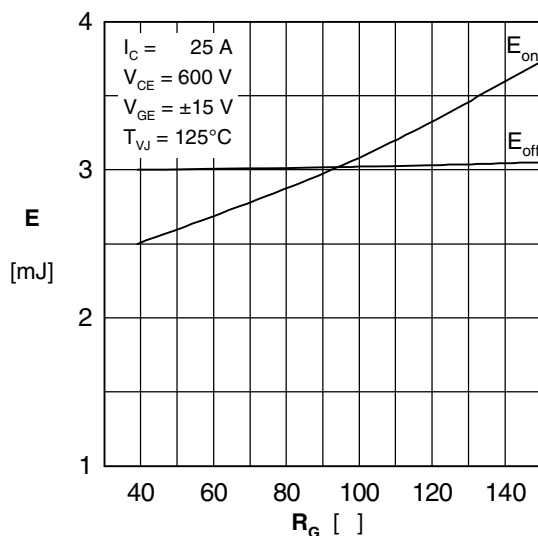


Fig. 6 Typ. switching energy vs. gate resistance

## Diode

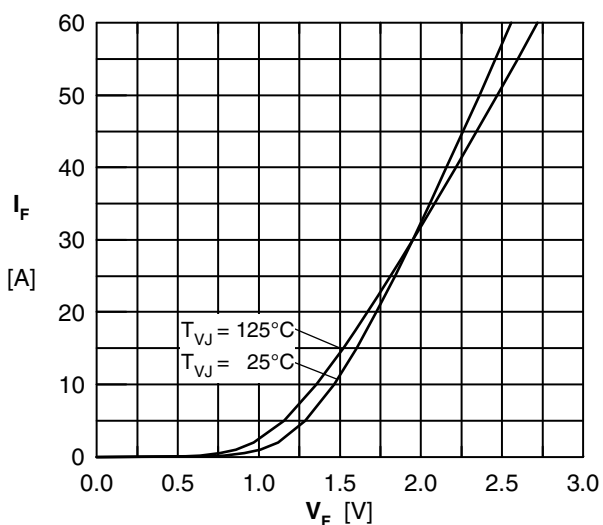


Fig. 7 Typ. Forward current versus  $V_F$

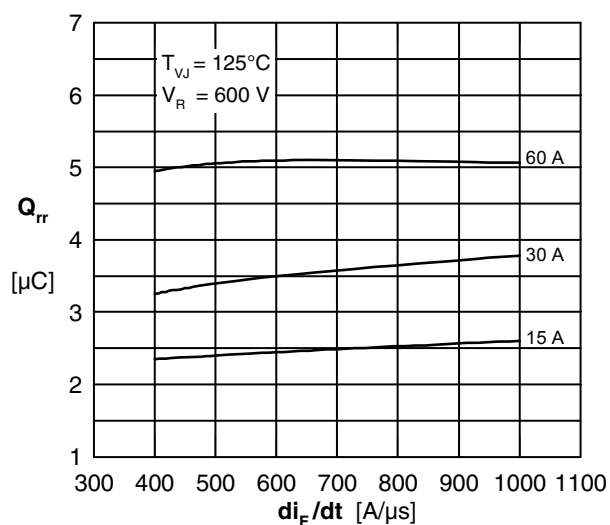


Fig. 8 Typ. reverse recov.charge  $Q_{rr}$  vs.  $di/dt$

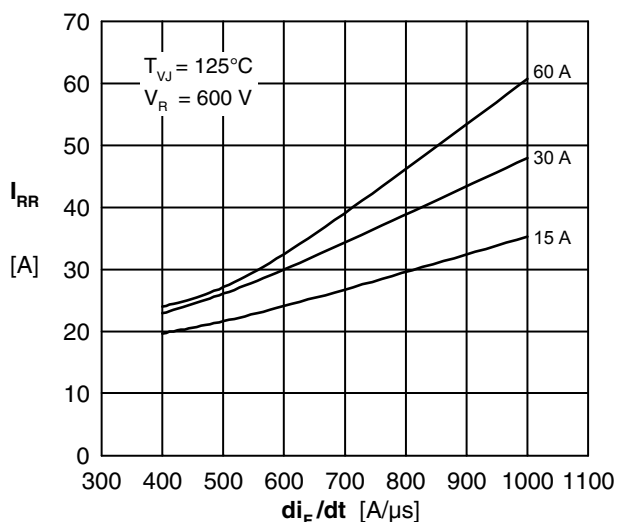


Fig. 9 Typ. peak reverse current  $I_{RM}$  vs.  $di/dt$

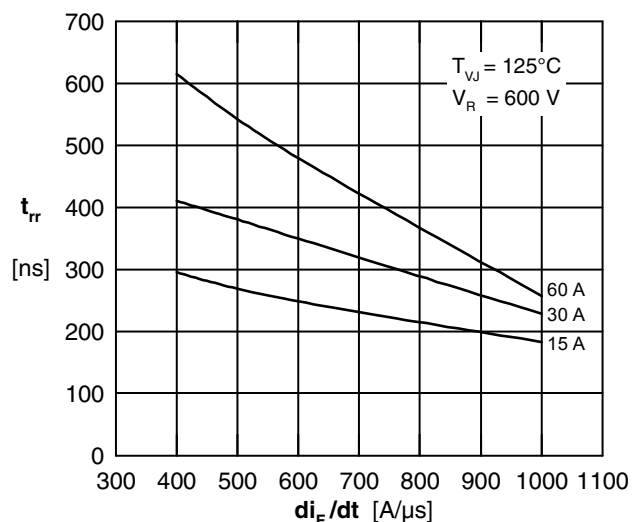


Fig. 10 Typ. recovery time  $t_{rr}$  versus  $di/dt$

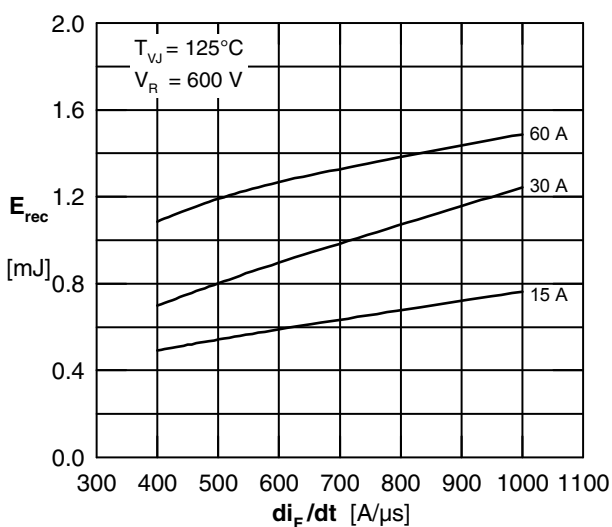


Fig. 11 Typ. recovery energy  $E_{rec}$  versus  $di/dt$

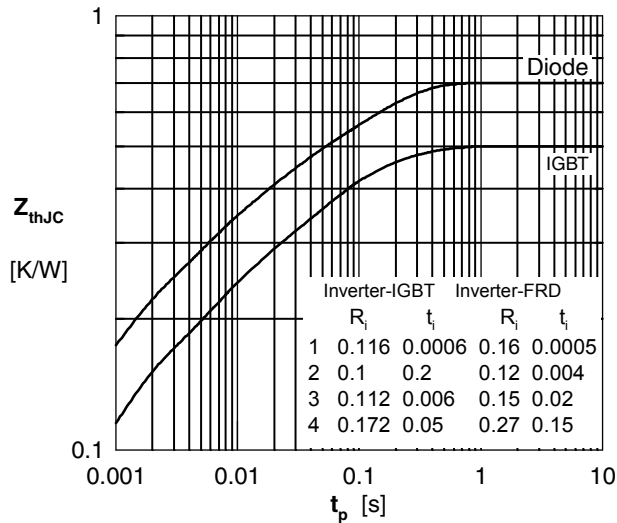


Fig. 12 Typ. transient thermal impedance

# AMEYA360

## Components Supply Platform

### Authorized Distribution Brand :



### Website :

Welcome to visit [www.ameya360.com](http://www.ameya360.com)

### Contact Us :

#### ➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd  
Minhang District, Shanghai , China

#### ➤ Sales :

Direct +86 (21) 6401-6692

Email [amall@ameya360.com](mailto:amall@ameya360.com)

QQ 800077892

Skype ameyasales1 ameyasales2

#### ➤ Customer Service :

Email [service@ameya360.com](mailto:service@ameya360.com)

#### ➤ Partnership :

Tel +86 (21) 64016692-8333

Email [mkt@ameya360.com](mailto:mkt@ameya360.com)