tentative

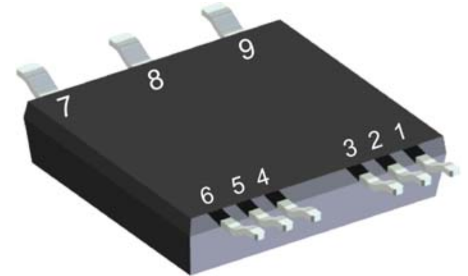
# XPT IGBT

$V_{CES}$ = 1200 V
$I_{C25}$ = 32 A
$V_{CE(sat)}$ = 1.8 V

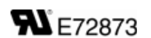
ISOPLUS™ Surface Mount Power Device
Boost Topology
XPT IGBT

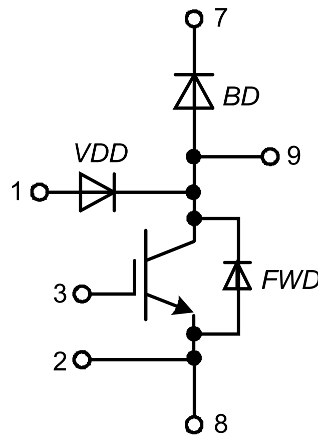
**Part number**

IXA20RG1200DHGLB




Backside: isolated




**Features / Advantages:**

- XPT IGBT
  - low saturation voltage
  - positive temperature coefficient for easy paralleling
  - fast switching
  - short tail current for optimized performance in resonant circuits
- Sonic™ diode
  - fast reverse recovery
  - low operating forward voltage
  - low leakage current
  - low temperature dependency of reverse recovery
- Vcesat detection diode (VDD)
  - integrated into package
  - very fast diode

**Applications:**

- AC drives
  - brake chopper
- PFC
  - boost chopper
- Switched reluctance drives

**Package:** SMPD

- Industry convenient outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling
- Isolation Voltage: 3000 V~



© 2012 IXYS all rights reserved

## Free Wheeling Diode FWD

| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RSM}$ | *max. non-repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $I_R$ | *reverse current, drain current* | $V_R$ = 1200 V | $T_{VJ}$ = 25°C | | | 25 | µA |
| | | $V_R$ = 1200 V | $T_{VJ}$ = 125°C | | | 0.4 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 20 A | $T_{VJ}$ = 25°C | | | 2.20 | V |
| | | $I_F$ = 40 A | | | | | V |
| | | $I_F$ = 20 A | $T_{VJ}$ = 125°C | | | 2.20 | V |
| | | $I_F$ = 40 A | | | | | V |
| $I_{FAV}$ | *average forward current* | $T_C$ = 80°C<br>rectangular d = 0.5 | $T_{VJ}$ = 150°C | | | 18 | A |
| $V_{F0}$ | *threshold voltage* | *for power loss calculation only* | $T_{VJ}$ = 150°C | | | 1.29 | V |
| $r_F$ | *slope resistance* | *for power loss calculation only* | | | | 41 | mΩ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 1.35 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.40 | | K/W |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 93 | W |
| $I_{FSM}$ | *max. forward surge current* | t = 10 ms; (50 Hz), sine; $V_R$ = 0 V | $T_{VJ}$ = 45°C | | | 150 | A |
| $C_J$ | *junction capacitance* | $V_R$ = 400 V f = 1 MHz | $T_{VJ}$ = 25°C | | 10 | | pF |

## VCEsat Detection Diode VDD

| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RRM}$ | *max. repetitive reverse blocking voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $I_R$ | *reverse current, drain current* | $V_{R/D}$ = 1200 V | $T_{VJ}$ = 25°C | | | 2 | µA |
| | | $V_{R/D}$ = 1200 V | $T_{VJ}$ = 125°C | | | 0.03 | mA |
| $V_F$ | *forward voltage drop* | $I_F$ = 1 A | $T_{VJ}$ = 25°C | | | 2.20 | V |
| | | $I_F$ = 1 A | $T_{VJ}$ = 125°C | | | 1.80 | V |
| $V_{F0}$ | *threshold voltage* | *for power loss calculation only* | $T_{VJ}$ = 150°C | | | 1.30 | V |
| $r_F$ | *slope resistance* | *for power loss calculation only* | | | | 390 | mΩ |
| $C_J$ | *junction capacitance* | $V_R$ = 400V; f = 1 MHz | $T_{VJ}$ = 25°C | | tbd | | pF |
| $I_{RM}$ | *max. reverse recovery current* | $V_R$ = 100 V; $I_F$ = 1 A<br>-di/dt = 100 A/µs | $T_{VJ}$ = 25°C | | 2.3 | | A |
| | | | $T_{VJ}$ = 125°C | | tbd | | A |
| $t_{rr}$ | *reverse recovery time* | | $T_{VJ}$ = 25°C | | 40 | | ns |
| | | | $T_{VJ}$ = 125°C | | tbd | | ns |



© 2012 IXYS all rights reserved

## Boost IGBT

| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CES}$ | *collector emitter voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $V_{GES}$ | *max. DC gate voltage* | | | | | ±20 | V |
| $V_{GEM}$ | *max. transient collector gate voltage* | | | | | ±30 | V |
| $I_{C25}$ | *collector current* | | $T_C$ = 25°C | | | 32 | A |
| $I_{C80}$ | | | $T_C$ = 80°C | | | 23 | A |
| $P_{tot}$ | *total power dissipation* | | $T_C$ = 25°C | | | 125 | W |
| $V_{CE(sat)}$ | *collector emitter saturation voltage* | $I_C$ = 15 A; $V_{GE}$ = 15 V | $T_{VJ}$ = 25°C | | 1.8 | 2.1 | V |
| | | | $T_{VJ}$ = 125°C | | 2 | | V |
| $V_{GE(th)}$ | *gate emitter threshold voltage* | $I_C$ = 0.6 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 | | | 0.1 | mA |
| | | | $T_{VJ}$ = 125°C | | 0.1 | | 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; $I_C$ = 15 A | | | 48 | | nC |
| $t_{d(on)}$ | *turn-on delay time* | inductive load<br>$V_{CE}$ = 600 V; $I_C$ = 15 A<br>$V_{GE}$ = ±15 V; $R_G$ = 56 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* | | | | 1.55 | | mJ |
| $E_{off}$ | *turn-off energy per pulse* | | | | 1.7 | | mJ |
| RBSOA | *reverse bias safe operating area* | $V_{GE}$ = ±15 V; $R_G$ = 56 Ω | $T_{VJ}$ = 125°C | | | | |
| $I_{CM}$ | | $V_{CEmax}$ = 1200 V | | | | 45 | A |
| SCSOA | *short circuit safe operating area* | $V_{CEmax}$ = 1200 V | | | | | |
| $t_{SC}$ | *short circuit duration* | $V_{CE}$ = 900 V; $V_{GE}$ = ±15 V | $T_{VJ}$ = 125°C | | | 10 | µs |
| $I_{SC}$ | *short circuit current* | $R_G$ = 56 Ω; non-repetitive | | | 60 | | A |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 1 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.30 | | K/W |

## Boost Diode BD

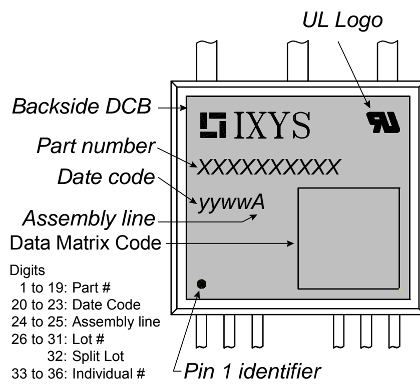
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{RRM}$ | *max. repetitive reverse voltage* | | $T_{VJ}$ = 25°C | | | 1200 | V |
| $I_{F25}$ | *forward current* | | $T_C$ = 25°C | | | 27 | A |
| $I_{F80}$ | | | $T_C$ = 80°C | | | 18 | A |
| $V_F$ | *forward voltage* | $I_F$ = 20 A | $T_{VJ}$ = 25°C | | | 2.20 | V |
| | | | $T_{VJ}$ = 125°C | | 1.90 | | V |
| $I_R$ | *reverse current* | $V_R$ = $V_{RRM}$ | $T_{VJ}$ = 25°C | | | 0.03 | mA |
| | | | $T_{VJ}$ = 125°C | | 0.12 | | mA |
| $Q_{rr}$ | *reverse recovery charge* | $V_R$ = 600 V<br>$-di_F/dt$ = 400 A/µs<br>$I_F$ = 20 A; $V_{GE}$ = 0 V | $T_{VJ}$ = 125°C | | 3 | | µC |
| $I_{RM}$ | *max. reverse recovery current* | | | | 20 | | A |
| $t_{rr}$ | *reverse recovery time* | | | | 350 | | ns |
| $E_{rec}$ | *reverse recovery energy* | | | | 0.7 | | mJ |
| $R_{thJC}$ | *thermal resistance junction to case* | | | | | 1.35 | K/W |
| $R_{thCH}$ | *thermal resistance case to heatsink* | | | | 0.4 | | K/W |



© 2012 IXYS all rights reserved

tentative

| Package SMPD | | | | Ratings | | | |
|---|---|---|---|---|---|---|---|
| Symbol | Definition | Conditions | | min. | typ. | max. | Unit |
| $I_{RMS}$ | *RMS current* | per terminal | | | | 100 | A |
| $T_{stg}$ | *storage temperature* | | | -55 | | 150 | °C |
| $T_{VJ}$ | *virtual junction temperature* | | | -55 | | 150 | °C |
| Weight | | | | | 8.5 | | g |
| $F_C$ | *mounting force with clip* | | | 40 | | 130 | N |
| $V_{ISOL}$ | *isolation voltage* | t = 1 second | 50/60 Hz, RMS; $I_{ISOL} \le 1$ mA | 3000 | | | V |
| | | t = 1 minute | | 2500 | | | V |
| $d_{Spp/App}$ | *creepage distance on surface \| striking distance through air* | | *terminal to terminal* | 1.6 | | | mm |
| $d_{Spb/Apb}$ | | | *terminal to backside* | 4.0 | | | mm |




**Part number**

I = IGBT
X = XPT IGBT
A = Gen 1 / std
20 = Current Rating [A]
RG = boost configuration
1200 = Reverse Voltage [V]
D = IGBT
H = XPT IGBT
G = Gen 1 / std
LB = SMPD-B

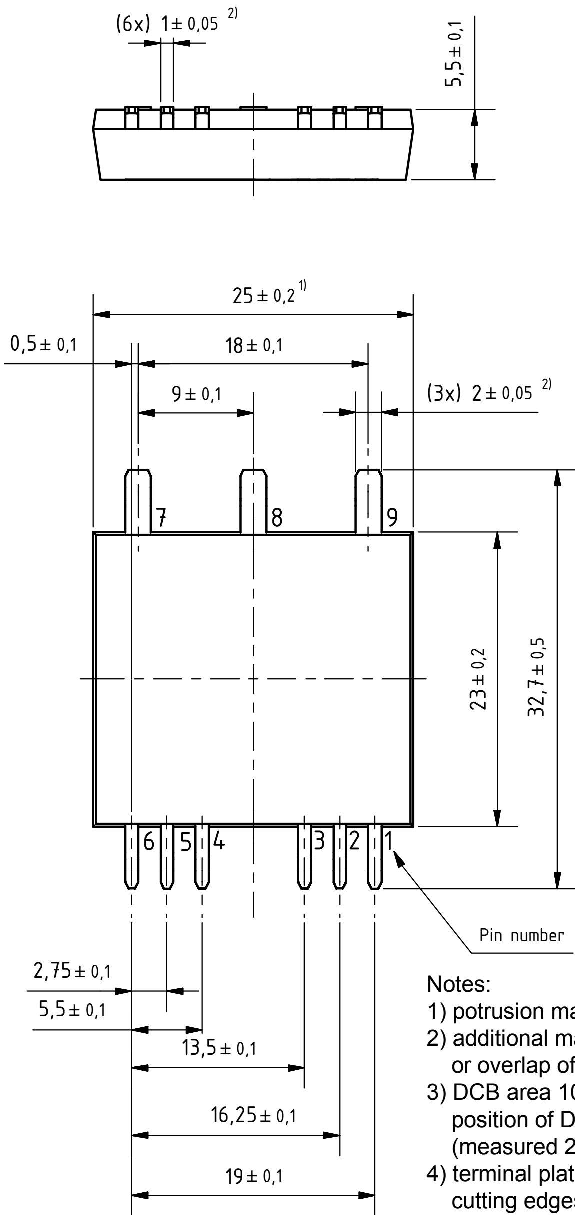
| Ordering | Part Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|---|---|---|---|---|---|
| Standard | IXA20RG1200DHGLB | IXA20RG1200DHGLB | Blister | 45 | 512349 |
| Alternative | IXA20RG1200DHGLB-TRR | IXA20RG1200DHGLB | Tape & Reel | 200 | 512370 |

| Similar Part | Package | Voltage class |
|---|---|---|
| IXA30RG1200DHGLB | SMPD-B | 1200 |
| IXA40RG1200DHGLB | SMPD-B | 1200 |



© 2012 IXYS all rights reserved

## Outlines SMPD




A ( 8 : 1 )

0 + 0,15

2°

0,1

seating plane

4 ± 0,05

0,55 ± 0,1

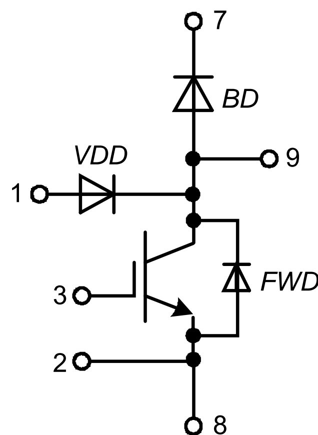
2 ± 0,2

4,85 ± 0,2

3) 0,05

A

Notes:
1) potrusion may add 0.2 mm max. on each side
2) additional max. 0.05 mm per side by punching misalignement or overlap of dam bar or bending compression
3) DCB area 10 to 50 µm convex; position of DCB area in relation to plastic rim: ±25 µm (measured 2 mm from Cu rim)
4) terminal plating: 0.2 - 1 µm Ni + 10 - 25 µm Sn (gal v.) cutting edges may be partially free of plating






© 2012 IXYS all rights reserved

## Boost IGBT

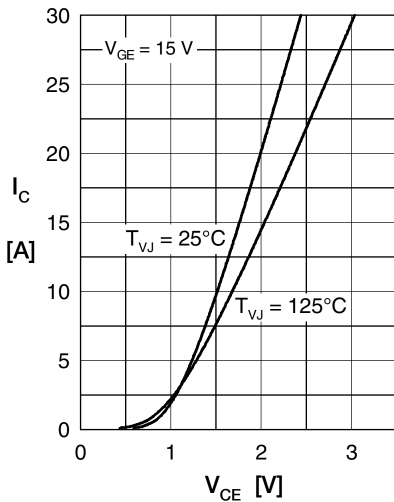



Fig. 1 Typ. output characteristics

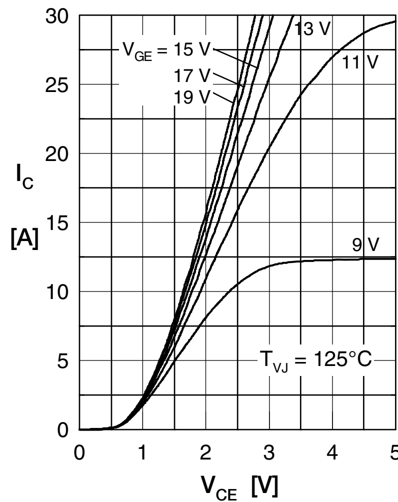



Fig. 2 Typ. output characteristics

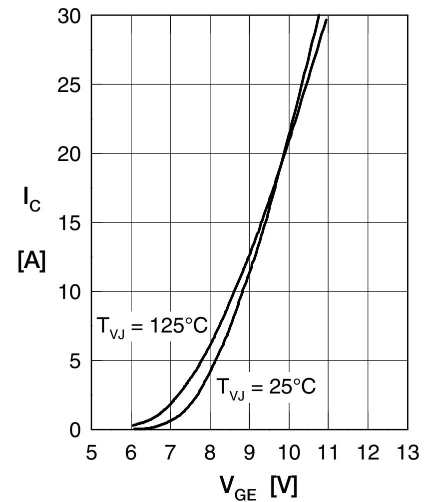



Fig. 3 Typ. tranfer characteristics

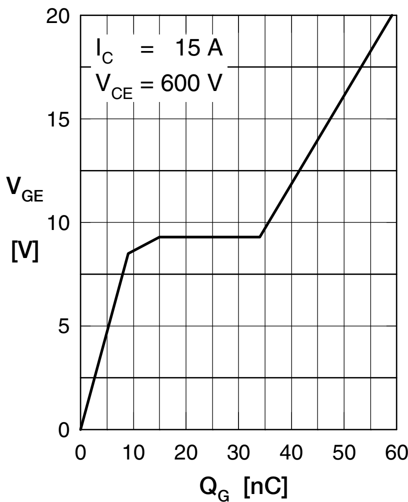



Fig. 4 Typ. turn-on gate charge

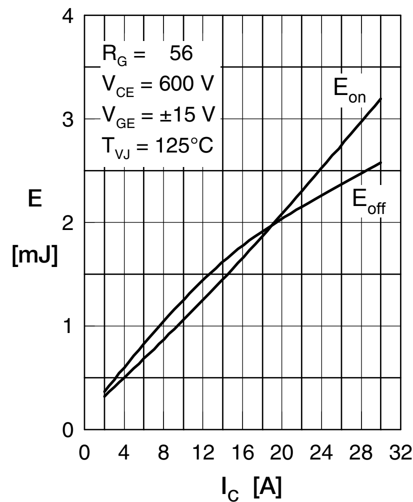



Fig. 5 Typ. switching energy versus collector current

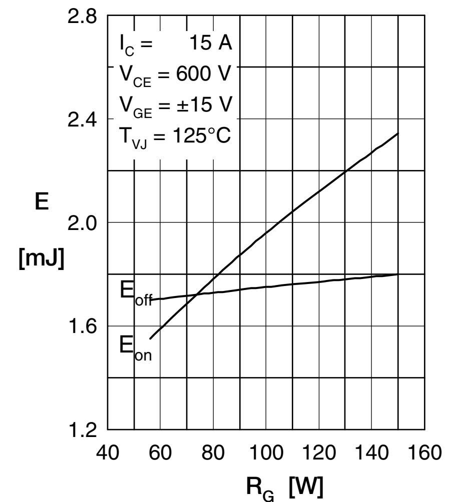



Fig. 6 Typ. switching energy versus gate resistance

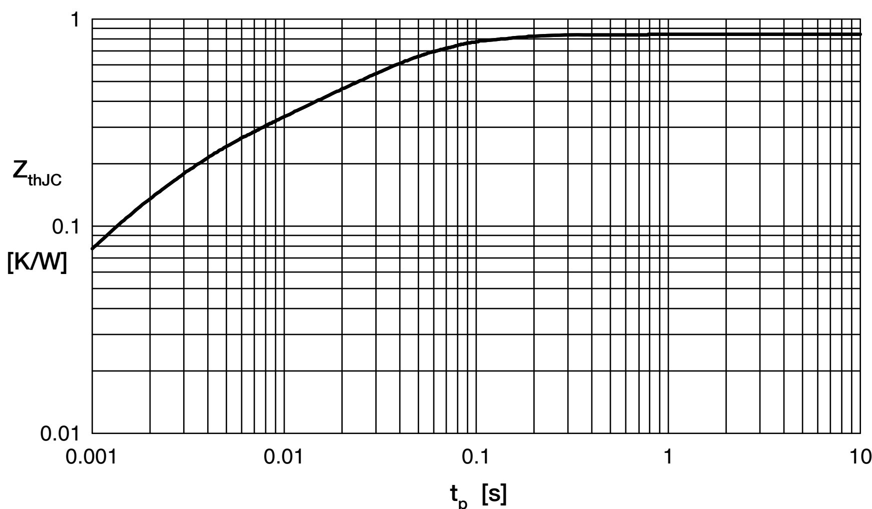



Fig. 7 Typ. transient thermal impedance junction to case



© 2012 IXYS all rights reserved

## Boost Diode BD

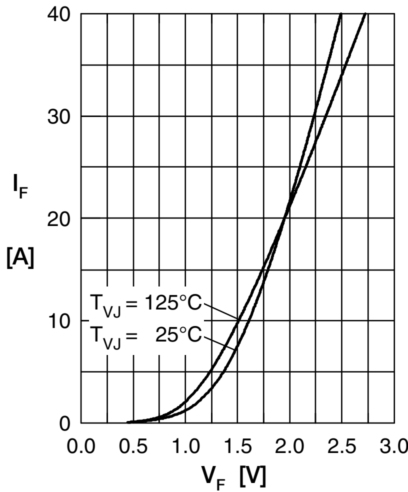



Fig. 1 Typ. Forward current versus $V_F$

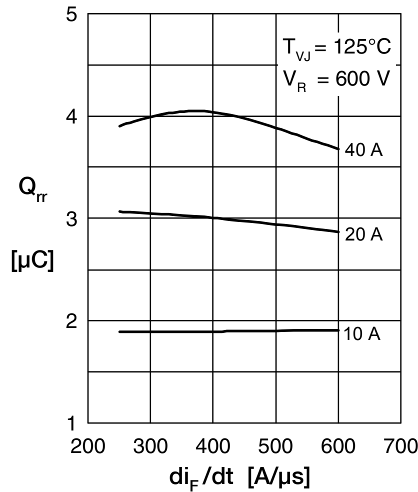



Fig. 2 Typ. reverse recov. charge $Q_{rr}$ versus di/dt

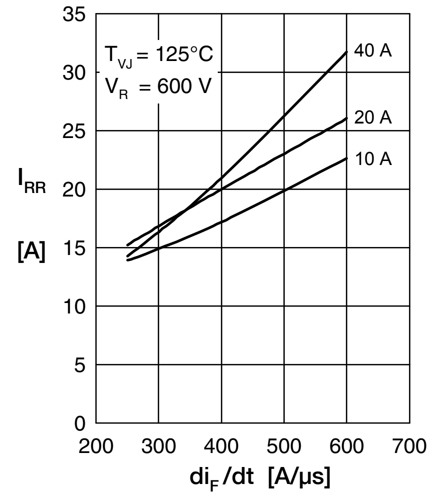
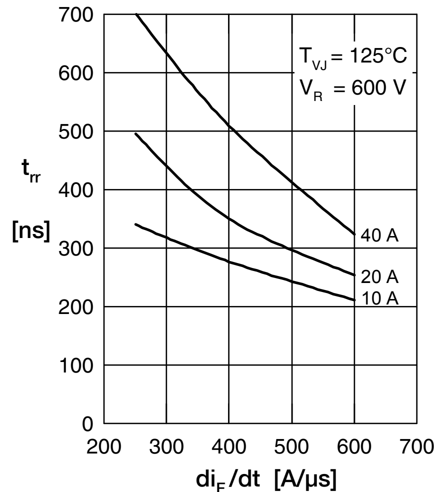



Fig. 3 Typ. peak reverse current $I_{RM}$ versus di/dt

Fig. 4 Dynamic parameters $Q_{rr}$, $I_{RM}$ versus di/dt



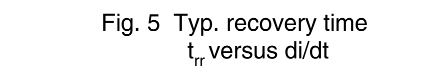




Fig. 5 Typ. recovery time $t_{rr}$ versus di/dt

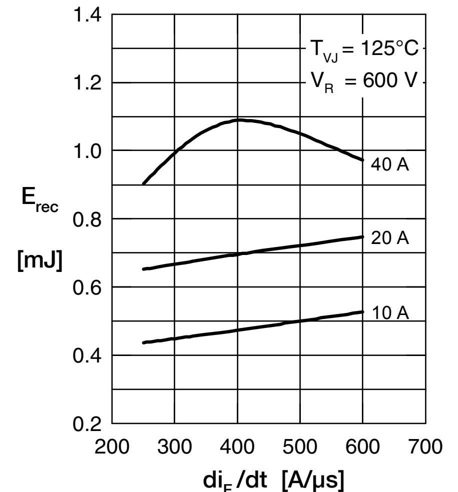



Fig. 6 Typ. recovery energy $E_{rec}$ versus di/dt

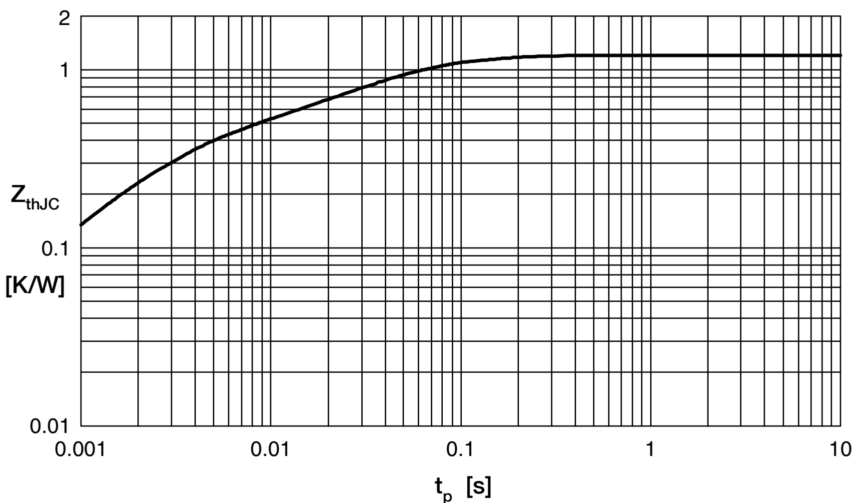



Fig. 7 Typ. transient thermal impedance junction to case



© 2012 IXYS all rights reserved