

XPT IGBT

$$V_{CES} = 1200 \text{ V}$$

$$I_{C25} = 32 \text{ A}$$

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

ISOPLUS™ Surface Mount Power Device

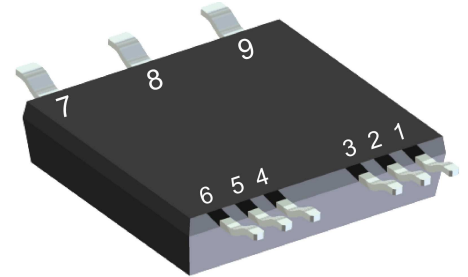
Boost Topology

Boost/Brake Chopper + free wheeling diode + Vcesat-Diode

Part number

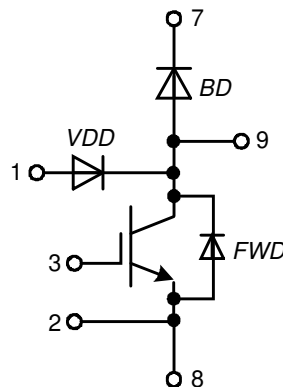
IXA20RG1200DHGLB

Marking on Product: IXA20RG1200DHGLB



Backside: isolated

 E72873



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

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

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Free Wheeling Diode FWD

| Symbol | Definition | Conditions | Ratings | | | |
|------------|--|--|-------------------------|------|------|------------|
| | | | min. | typ. | max. | Unit |
| V_{RSM} | max. non-repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V |
| V_{RRM} | max. repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V |
| I_R | reverse current, drain current * not applicable, see Ices at IGBT | $V_R = 1200 V$ | $T_{VJ} = 25^{\circ}C$ | | 25 | μA |
| | | $V_R = 1200 V$ | $T_{VJ} = 125^{\circ}C$ | | 0.4 | mA |
| V_F | forward voltage drop | $I_F = 20 A$ | $T_{VJ} = 25^{\circ}C$ | | 2.20 | V |
| | | $I_F = 40 A$ | | | | V |
| | | $I_F = 20 A$ | $T_{VJ} = 125^{\circ}C$ | | 2.20 | V |
| | | $I_F = 40 A$ | | | | V |
| I_{FAV} | average forward current | $T_C = 80^{\circ}C$ rectangular $d = 0.5$ | $T_{VJ} = 150^{\circ}C$ | | 18 | A |
| V_{F0} | threshold voltage | } for power loss calculation only | $T_{VJ} = 150^{\circ}C$ | | 1.29 | V |
| r_F | slope resistance | | | | 41 | m Ω |
| 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 | | $T_C = 25^{\circ}C$ | | 93 | W |
| I_{FSM} | max. forward surge current | $t = 10 ms; (50 Hz), sine; V_R = 0 V$ | $T_{VJ} = 45^{\circ}C$ | | 150 | A |
| C_J | junction capacitance | $V_R = 400 V f = 1 MHz$ | $T_{VJ} = 25^{\circ}C$ | 10 | | pF |

VCEsat Detection Diode VDD

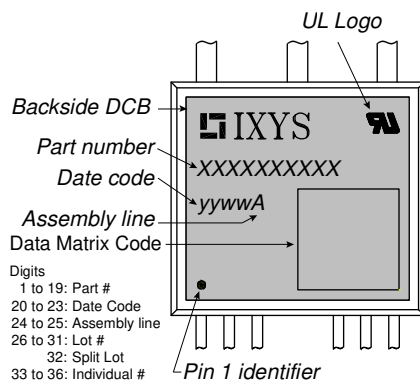
| Symbol | Definition | Conditions | Ratings | | | |
|-----------|--|--|-------------------------|------|------|------------|
| | | | min. | typ. | max. | Unit |
| V_{RRM} | max. repetitive reverse blocking voltage | $T_{VJ} = 25^{\circ}C$ | | | 1200 | V |
| I_R | reverse current, drain current | $V_{R/D} = 1200 V$ | $T_{VJ} = 25^{\circ}C$ | | 2 | μA |
| | | $V_{R/D} = 1200 V$ | $T_{VJ} = +02^{\circ}C$ | | 0.03 | mA |
| V_F | forward voltage drop | $I_F = 1 A$ | $T_{VJ} = 25^{\circ}C$ | | 2.20 | V |
| | | $I_F = 1 A$ | $T_{VJ} = 12^{\circ}C$ | | 1.80 | V |
| V_{F0} | threshold voltage | } for power loss calculation only | $T_{VJ} = 150^{\circ}C$ | | 1.30 | V |
| r_F | slope resistance | | | | 390 | m Ω |
| C_J | junction capacitance | $V_R = 400 V; f = 1 MHz$ | $T_{VJ} = 25^{\circ}C$ | tbd | | pF |
| I_{RM} | max. reverse recovery current | } $V_R = +02 V; I_F = 1 A$ $-di/dt = +02 A/\mu s$ | $T_{VJ} = 25^{\circ}C$ | | 2.3 | A |
| | | | $T_{VJ} = 125^{\circ}C$ | | tbd | A |
| t_{rr} | reverse recovery time | | $T_{VJ} = 25^{\circ}C$ | | 40 | ns |
| | | | $T_{VJ} = 125^{\circ}C$ | | tbd | ns |



| Boost IGBT | | | | Ratings | | | |
|-----------------------|--------------------------------------|---|--------------------------------|---------|----------|---------------|--|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit | |
| V_{CES} | collector emitter voltage | $T_{VJ} = 25^{\circ}\text{C}$ | | | 1200 | V | |
| V_{GES} | max. DC gate voltage | | | | ± 20 | V | |
| V_{GEM} | max. transient gate emitter voltage | | | | ± 30 | V | |
| I_{C25} | collector current | $T_C = 25^{\circ}\text{C}$ | | | 32 | A | |
| I_{C80} | | $T_C = 80^{\circ}\text{C}$ | | | 23 | A | |
| P_{tot} | total power dissipation | $T_C = 25^{\circ}\text{C}$ | | | 125 | W | |
| $V_{CE(sat)}$ | collector emitter saturation voltage | $I_C = 15\text{A}; V_{GE} = 15\text{V}$ | | 1.8 | 2.1 | V | |
| | | | | 2 | | V | |
| $V_{GE(th)}$ | gate emitter threshold voltage | $I_C = 0.6\text{mA}; V_{GE} = V_{CE}$ | 5.4 | 5.9 | 6.5 | V | |
| I_{CES} | collector emitter leakage current | $V_{CE} = V_{CES}; V_{GE} = 0\text{V}$ | | | 0.1 | mA | |
| | | | | | 0.1 | mA | |
| I_{GES} | gate emitter leakage current | $V_{GE} = \pm 20\text{V}$ | | | 500 | nA | |
| $Q_{G(on)}$ | total gate charge | $V_{CE} = 600\text{V}; V_{GE} = 15\text{V}; I_C = 15\text{A}$ | | 48 | | nC | |
| $t_{d(on)}$ | turn-on delay time | inductive load $V_{CE} = 600\text{V}; I_C = 15\text{A}$ $V_{GE} = \pm 15\text{V}; R_G = 56\ \Omega$ | $T_{VJ} = 125^{\circ}\text{C}$ | | 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 | $V_{GE} = \pm 15\text{V}; R_G = 56\ \Omega$ | $T_{VJ} = 125^{\circ}\text{C}$ | | | | |
| I_{CM} | | $V_{CEmax} = 1200\text{V}$ | | | 45 | A | |
| SCSOA | short circuit safe operating area | $V_{CEmax} = 1200\text{V}$ | $T_{VJ} = 125^{\circ}\text{C}$ | | | | |
| t_{SC} | short circuit duration | $V_{CE} = 900\text{V}; V_{GE} = \pm 15\text{V}$ | | | 10 | μs | |
| I_{SC} | short circuit current | $R_G = 56\ \Omega$; 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 | | | | | | | |
| V_{RRM} | max. repetitive reverse voltage | | $T_{VJ} = 25^{\circ}\text{C}$ | | 1200 | V | |
| I_{F25} | forward current | | $T_C = 25^{\circ}\text{C}$ | | 27 | A | |
| I_{F80} | | | $T_C = 80^{\circ}\text{C}$ | | 18 | A | |
| V_F | forward voltage | $I_F = 20\text{A}$ | $T_{VJ} = 25^{\circ}\text{C}$ | | 2.20 | V | |
| | | | $T_{VJ} = 125^{\circ}\text{C}$ | 1.90 | | V | |
| I_R | reverse current | $V_R = V_{RRM}$ | $T_{VJ} = 25^{\circ}\text{C}$ | | 0.03 | mA | |
| | | | $T_{VJ} = 125^{\circ}\text{C}$ | 0.12 | | mA | |
| Q_{rr} | reverse recovery charge | $V_R = 600\text{V}$ $-di_F/dt = 400\text{A}/\mu\text{s}$ $I_F = 20\text{A}; V_{GE} = 0\text{V}$ | $T_{VJ} = 125^{\circ}\text{C}$ | | 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 | |



| Package SMPD | | Ratings | | | | |
|----------------|--|----------------------|------|------|------|------|
| Symbol | Definition | Conditions | min. | typ. | max. | Unit |
| I_{RMS} | RMS current | per terminal | | | 100 | A |
| T_{VJ} | virtual junction temperature | | -55 | | 150 | °C |
| T_{op} | operation temperature | | -55 | | 125 | °C |
| T_{stg} | storage temperature | | -55 | | 150 | °C |
| Weight | | | | 8.5 | | g |
| F_C | mounting force with clip | | 40 | | 130 | N |
| $d_{Spp/ App}$ | creepage distance on surface / striking distance through air | terminal to terminal | 1.6 | | | mm |
| $d_{Spb/ Apb}$ | | terminal to backside | 4.0 | | | mm |
| V_{ISOL} | isolation voltage | t = 1 second | 3000 | | | V |
| | | t = 1 minute | 2500 | | | V |



Part description

- I = IGBT
- X = XPT IGBT
- A = Gen 1 / std
- 20 = Current Rating [A]
- RG = Boost/Brake Chopper + free wheeling diode + Vcesat-Diode
- 1200 = Reverse Voltage [V]
- D = Diode
- H = Sonic Fast Recovery Diode
- G = extreme fast
- LB = SMPD-B

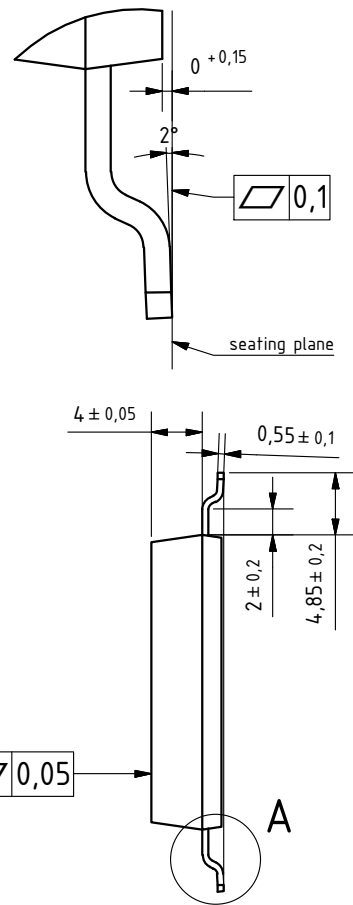
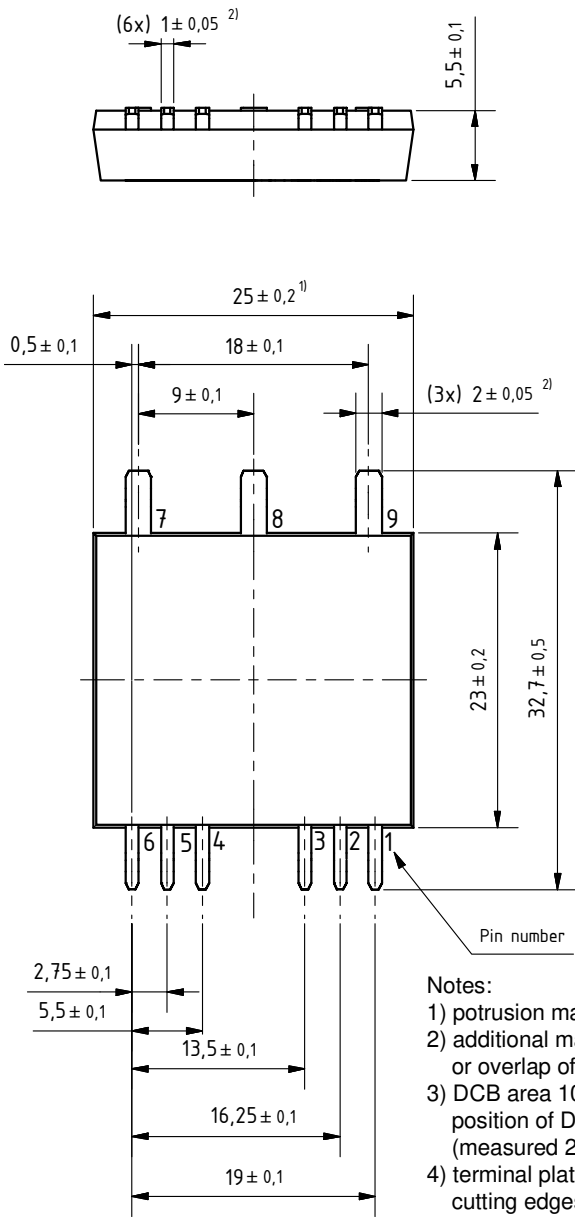
| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|-------------|----------------------|--------------------|---------------|----------|----------|
| Standard | IXA20RG1200DHGLB-TUB | IXA20RG1200DHGLB | Tube | 20 | 516134 |
| Alternative | IXA20RG1200DHGLB-TRR | IXA20RG1200DHGLB | Tape & Reel | 200 | 523508 |

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



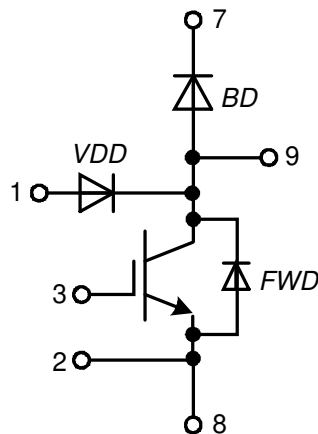
Outlines SMPD

A (8 : 1)



Notes:

- 1) protrusion may add 0.2 mm max. on each side
- 2) additional max. 0.05 mm per side by punching misalignment 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: $\pm 25 \mu\text{m}$ (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





Boost IGBT

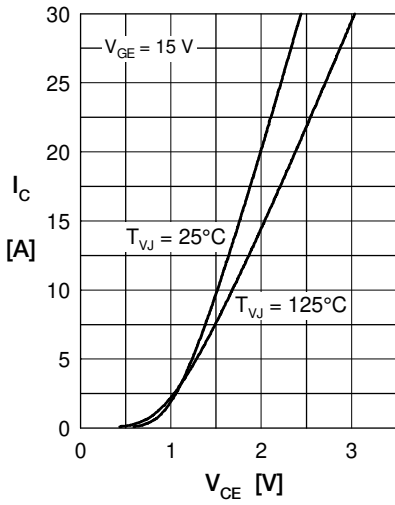


Fig. 1 Typ. output characteristics

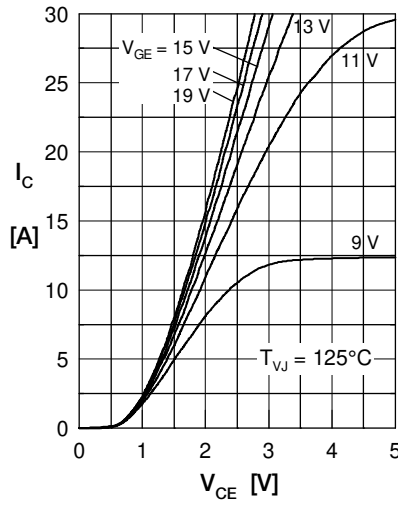


Fig. 2 Typ. output characteristics

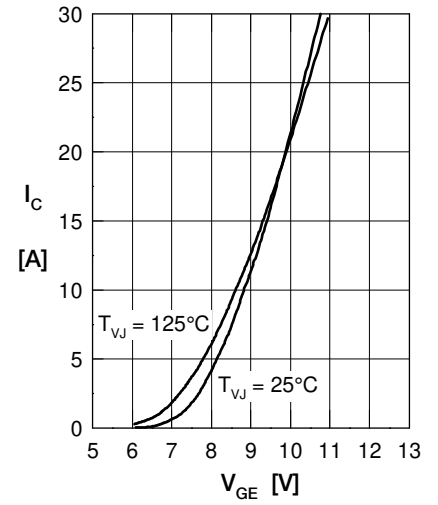


Fig. 3 Typ. transfer characteristics

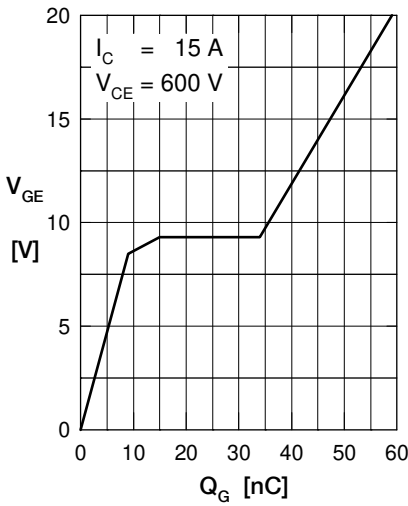


Fig. 4 Typ. turn-on gate charge

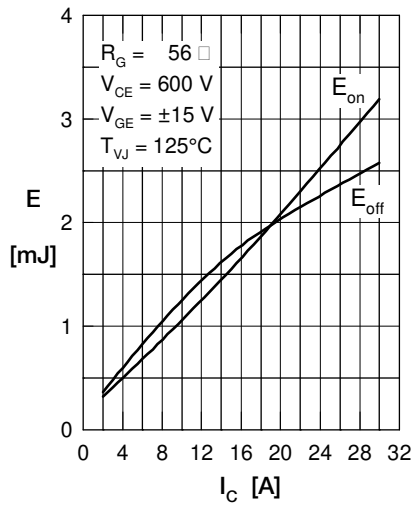


Fig. 5 Typ. switching energy versus collector current

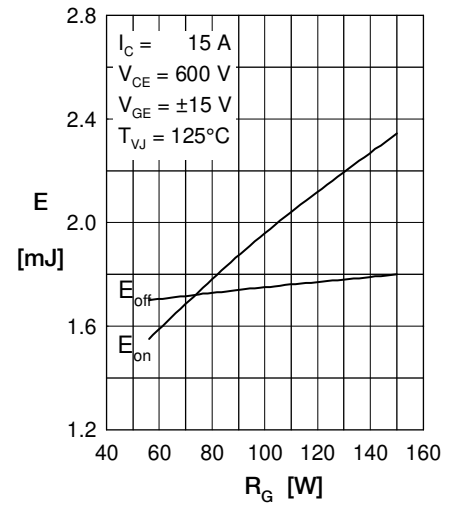


Fig. 6 Typ. switching energy versus gate resistance

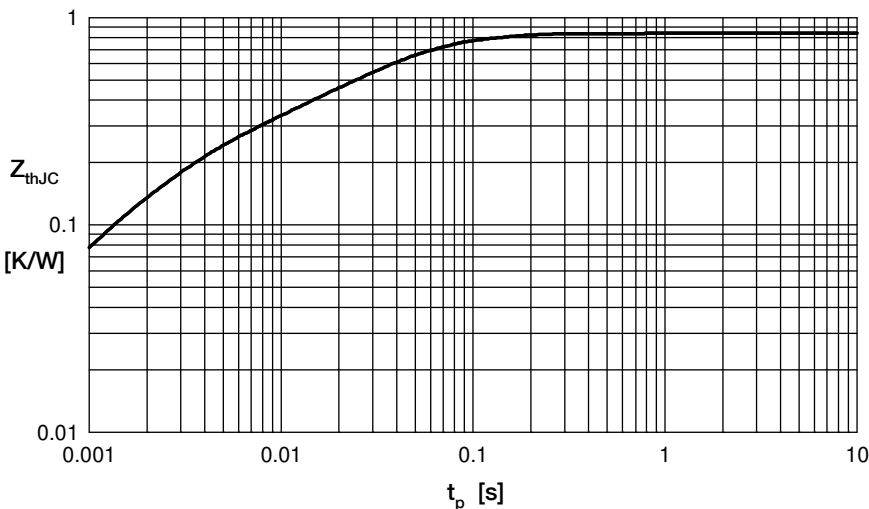


Fig. 7 Typ. transient thermal impedance junction to case

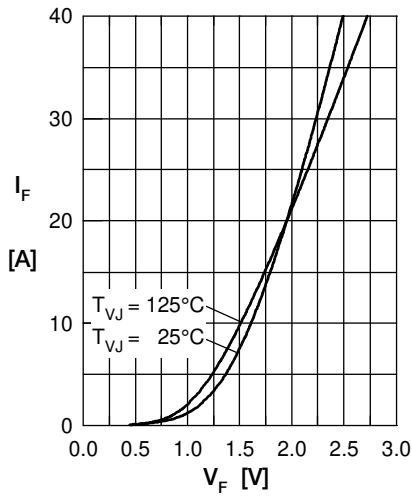
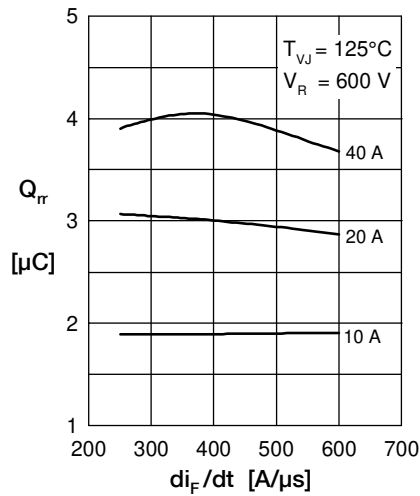
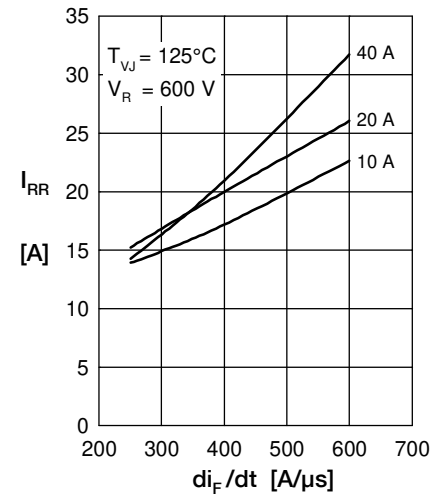
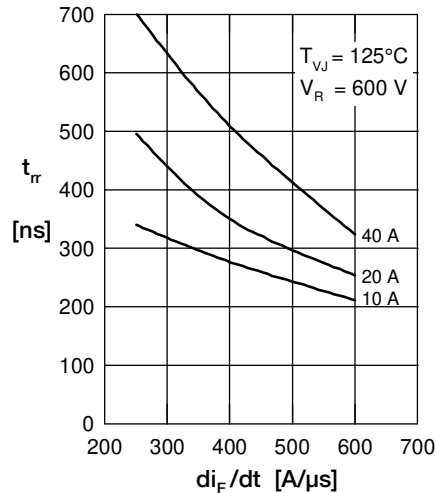
Boost Diode BD

 Fig. 1 Typ. Forward current versus V_F

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

 Fig. 3 Typ. peak reverse current I_{RRM} versus di_F/dt

 Fig. 4 Dynamic parameters Q_{rr} , I_{RRM} versus di_F/dt

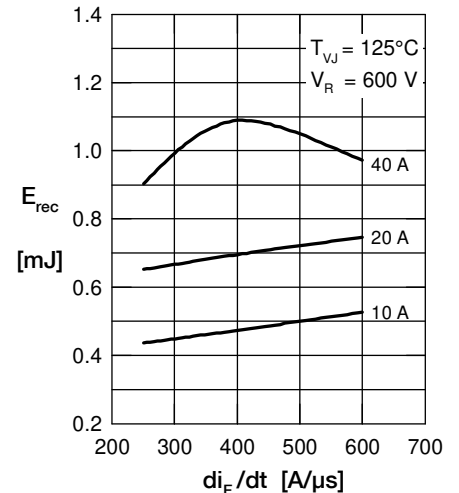
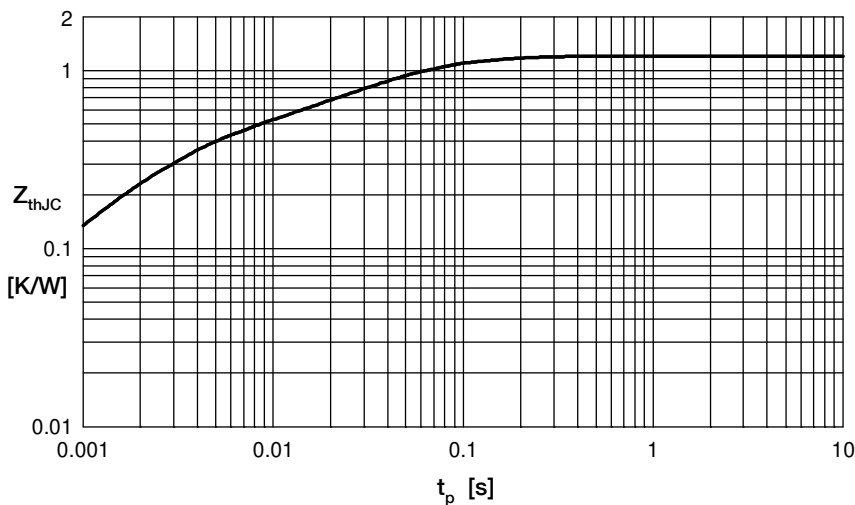
 Fig. 5 Typ. recovery time t_{rr} versus di_F/dt

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


Fig. 7 Typ. transient thermal impedance junction to case