

preliminary

# Sonic Fast Recovery Diode

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

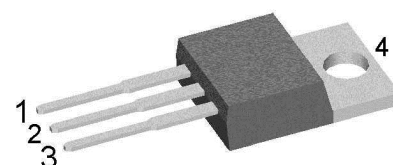
$$I_{FAV} = 2 \times 10 \text{ A}$$

$$t_{rr} = 200 \text{ ns}$$

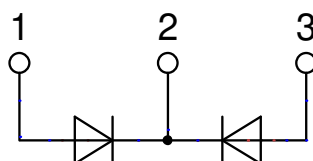
High Performance Fast Recovery Diode  
 Low Loss and Soft Recovery  
 Common Cathode

Part number

**DHG20C1200PB**



Backside: cathode



## Features / Advantages:

- Planar passivated chips
- Very low leakage current
- Very short recovery time
- Improved thermal behaviour
- Very low  $I_{rm}$ -values
- Very soft recovery behaviour
- Avalanche voltage rated for reliable operation
- Soft reverse recovery for low EMI/RFI
- Low  $I_{rm}$  reduces:
  - Power dissipation within the diode
  - Turn-on loss in the commutating switch

## Applications:

- Antiparallel diode for high frequency switching devices
- Antisaturation diode
- Snubber diode
- Free wheeling diode
- Rectifiers in switch mode power supplies (SMPS)
- Uninterruptible power supplies (UPS)

## Package: TO-220

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

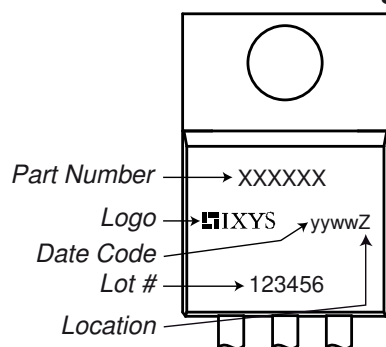
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| Fast Diode        |                                              |                                                                                    |                         | Ratings                  |      |      |      |  |
|-------------------|----------------------------------------------|------------------------------------------------------------------------------------|-------------------------|--------------------------|------|------|------|--|
| Symbol            | Definition                                   | Conditions                                                                         |                         | min.                     | typ. | max. | Unit |  |
| V <sub>RSM</sub>  | max. non-repetitive reverse blocking voltage | T <sub>VJ</sub> = 25°C                                                             |                         |                          |      | 1200 | V    |  |
| V <sub>RRM</sub>  | max. repetitive reverse blocking voltage     | T <sub>VJ</sub> = 25°C                                                             |                         |                          |      | 1200 | V    |  |
| I <sub>R</sub>    | reverse current, drain current               | V <sub>R</sub> = 1200 V                                                            | T <sub>VJ</sub> = 25°C  |                          |      | 10   | μA   |  |
|                   |                                              | V <sub>R</sub> = 1200 V                                                            | T <sub>VJ</sub> = 125°C |                          |      | 0.2  | mA   |  |
| V <sub>F</sub>    | forward voltage drop                         | I <sub>F</sub> = 10 A                                                              | T <sub>VJ</sub> = 25°C  |                          |      | 2.22 | V    |  |
|                   |                                              | I <sub>F</sub> = 20 A                                                              |                         |                          |      | 2.93 | V    |  |
|                   |                                              | I <sub>F</sub> = 10 A                                                              | T <sub>VJ</sub> = 125°C |                          |      | 2.23 | V    |  |
|                   |                                              | I <sub>F</sub> = 20 A                                                              |                         |                          |      | 3.14 | V    |  |
| I <sub>FAV</sub>  | average forward current                      | T <sub>C</sub> = 105°C<br>rectangular      d = 0.5                                 | T <sub>VJ</sub> = 150°C |                          |      | 10   | A    |  |
| V <sub>F0</sub>   | threshold voltage                            | } for power loss calculation only                                                  |                         | T <sub>VJ</sub> = 150°C  |      | 1.23 | V    |  |
| r <sub>F</sub>    | slope resistance                             |                                                                                    |                         |                          |      | 90   | mΩ   |  |
| R <sub>thJC</sub> | thermal resistance junction to case          |                                                                                    |                         |                          |      | 1.5  | K/W  |  |
| R <sub>thCH</sub> | thermal resistance case to heatsink          |                                                                                    |                         |                          | 0.5  |      | K/W  |  |
| P <sub>tot</sub>  | total power dissipation                      | T <sub>C</sub> = 25°C                                                              |                         |                          |      | 85   | W    |  |
| I <sub>FSM</sub>  | max. forward surge current                   | t = 10 ms; (50 Hz), sine; V <sub>R</sub> = 0 V                                     |                         | T <sub>VJ</sub> = 45°C   |      | 60   | A    |  |
| C <sub>J</sub>    | junction capacitance                         | V <sub>R</sub> = 600 V   f = 1 MHz                                                 |                         | T <sub>VJ</sub> = 25°C   | 4    |      | pF   |  |
| I <sub>RM</sub>   | max. reverse recovery current                | } I <sub>F</sub> = 10 A; V <sub>R</sub> = 600 V<br>-di <sub>F</sub> /dt = 250 A/μs |                         | T <sub>VJ</sub> = 25 °C  | 9    |      | A    |  |
|                   |                                              |                                                                                    |                         | T <sub>VJ</sub> = 125 °C | 10.5 |      | A    |  |
| t <sub>rr</sub>   | reverse recovery time                        |                                                                                    |                         | T <sub>VJ</sub> = 25 °C  | 200  |      | ns   |  |
|                   |                                              |                                                                                    |                         | T <sub>VJ</sub> = 125 °C | 350  |      | ns   |  |

preliminary

| Package TO-220 |                              |                            | Ratings |      |      |      |
|----------------|------------------------------|----------------------------|---------|------|------|------|
| Symbol         | Definition                   | Conditions                 | min.    | typ. | max. | Unit |
| $I_{RMS}$      | RMS current                  | per terminal <sup>1)</sup> |         |      | 35   | A    |
| $T_{VJ}$       | virtual junction temperature |                            | -55     |      | 150  | °C   |
| $T_{op}$       | operation temperature        |                            | -55     |      | 125  | °C   |
| $T_{stg}$      | storage temperature          |                            | -55     |      | 150  | °C   |
| Weight         |                              |                            |         | 2    |      | g    |
| $M_D$          | mounting torque              |                            | 0.4     |      | 0.6  | Nm   |
| $F_C$          | mounting force with clip     |                            | 20      |      | 60   | N    |

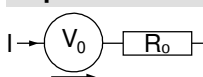
**Product Marking**

**Part description**

D = Diode  
 H = Sonic Fast Recovery Diode  
 G = extreme fast  
 20 = Current Rating [A]  
 C = Common Cathode  
 1200 = Reverse Voltage [V]  
 PB = TO-220AB (3)

| Ordering | Ordering Number | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|-----------------|--------------------|---------------|----------|----------|
| Standard | DHG20C1200PB    | DHG20C1200PB       | Tube          | 50       | 505280   |

**Equivalent Circuits for Simulation**

\* on die level

 $T_{VJ} = 150^{\circ}\text{C}$ 

**Fast Diode**
 $V_{0\max}$  threshold voltage

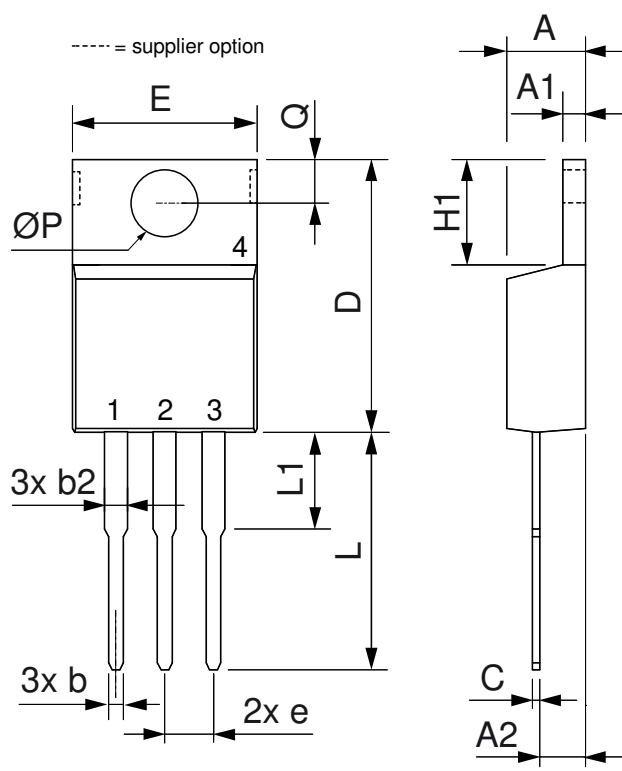
1.23

V

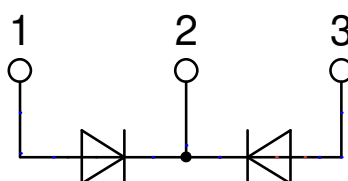
 $R_{0\max}$  slope resistance \*

87

mΩ

**Outlines TO-220**


| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 4.32       | 4.82  | 0.170  | 0.190 |
| A1   | 1.14       | 1.39  | 0.045  | 0.055 |
| A2   | 2.29       | 2.79  | 0.090  | 0.110 |
| b    | 0.64       | 1.01  | 0.025  | 0.040 |
| b2   | 1.15       | 1.65  | 0.045  | 0.065 |
| C    | 0.35       | 0.56  | 0.014  | 0.022 |
| D    | 14.73      | 16.00 | 0.580  | 0.630 |
| E    | 9.91       | 10.66 | 0.390  | 0.420 |
| e    | 2.54       | BSC   | 0.100  | BSC   |
| H1   | 5.85       | 6.85  | 0.230  | 0.270 |
| L    | 12.70      | 13.97 | 0.500  | 0.550 |
| L1   | 2.79       | 5.84  | 0.110  | 0.230 |
| ØP   | 3.54       | 4.08  | 0.139  | 0.161 |
| Q    | 2.54       | 3.18  | 0.100  | 0.125 |



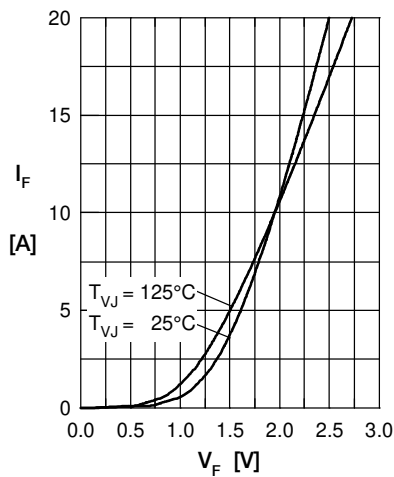
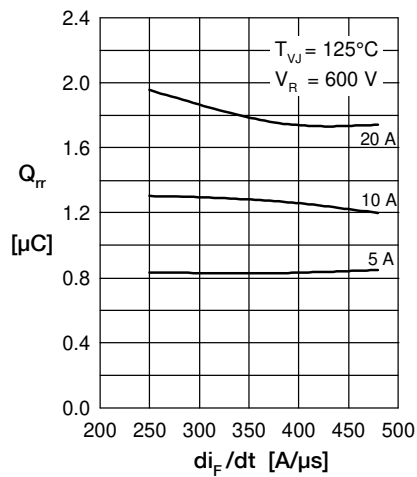
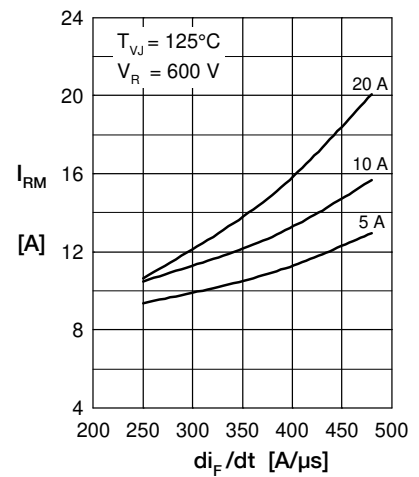
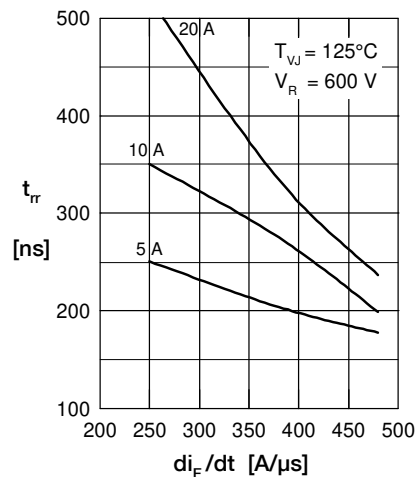
**Fast Diode**

 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  $I_{RM}$  versus  $di_F/dt$ 

 Fig. 4 Dynamic parameters  $Q_{rr}$ ,  $I_{RM}$  versus  $T_{VJ}$ 

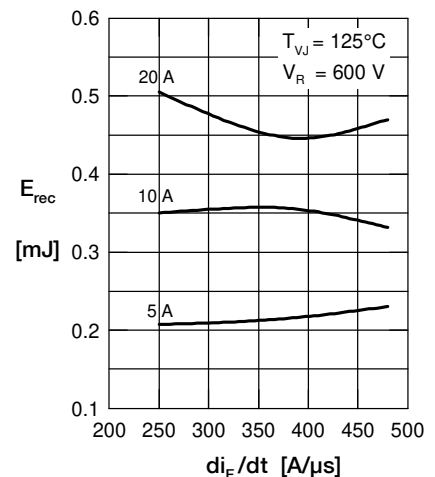
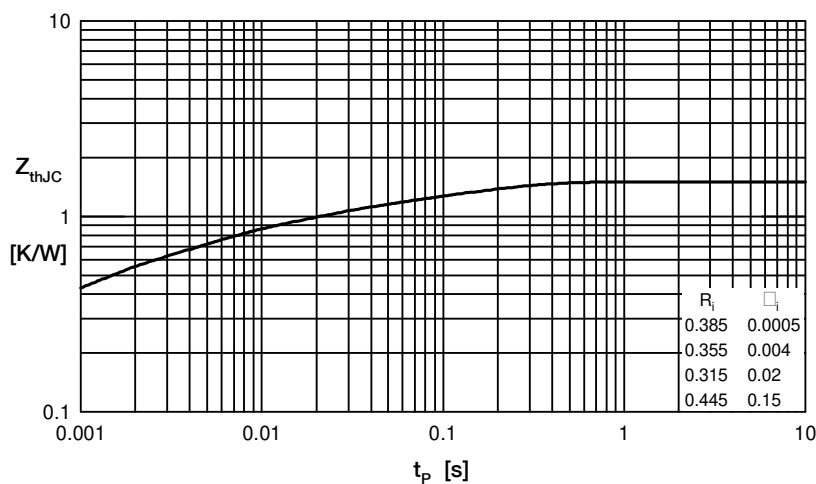
 Fig. 5 Typ. recovery time  $t_{rr}$  versus  $di_F/dt$ 

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


Fig. 7 Typ. transient thermal impedance junction to case