# ISL9R1560PF2

# 15 A, 600 V, STEALTH Diode

### Description

The ISL9R1560PF2 is a STEALTH diode optimized for low loss performance in high frequency hard switched applications. The STEALTH family exhibits low reverse recovery current ($I_{RR}$) and exceptionally soft recovery under typical operating conditions. This device is intended for use as a free wheeling or boost diode in power supplies and other power switching applications. The low $I_{RR}$ and short ta phase reduce loss in switching transistors. The soft recovery minimizes ringing, expanding the range of conditions under which the diode may be operated without the use of additional snubber circuitry. Consider using the STEALTH diode with an SMPS IGBT to provide the most efficient and highest power density design at lower cost.

### Features

- Stealth Recovery, $t_{rr}$ = 29.4 ns (@ $I_F$ = 15 A)
- Max. Forward Voltage, $V_F$ = 2.2 V (@ $T_C$ = 25°C)
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- These Devices are Pb−Free and are RoHS Compliant

### Applications

- Hard Switched PFC Boost Diode
- UPS Free Wheeling Diode
- Motor Drive FWD
- SMPS FWD
- Snubber Diode

**ABSOLUTE MAXIMUM RATINGS** ($T_C$ = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | 600 | V |
| Working Peak Reverse Voltage | $V_{RWM}$ | 600 | V |
| DC Blocking Voltage | $V_R$ | 600 | V |
| Average Rectified Forward Current ($T_C$ = 25°C) | $I_{F(AV)}$ | 15 | A |
| Repetitive Peak Surge Current (20 kHz Square Wave) | $I_{FRM}$ | 30 | A |
| Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60 Hz) | $I_{FSM}$ | 200 | A |
| Power Dissipation | $P_D$ | 37 | W |
| Avalanche Energy (1 A, 40 mH) | $E_{AVL}$ | 20 | mJ |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | −55 to 175 | °C |
| Maximum Temperature for Soldering Leads at 0.063 in (1.6 mm) from Case for 10s | $T_L$ | 300 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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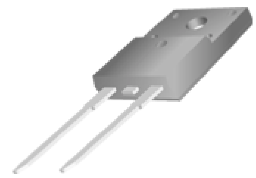
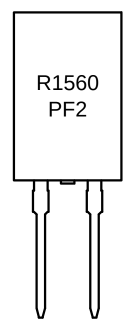
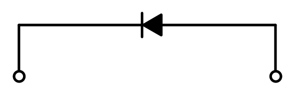


**TO−220F**
**2 LEAD**
**CASE 221AS**

### MARKING DIAGRAM




R1560PF2 = Specific Device Marking




### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

## PACKAGE MARKING AND ORDERING INFORMATION

| Part Number | Top Marking | Package | Tape Width | Quantity |
|---|---|---|---|---|
| ISL9R1560PF2 | R1560PF2 | TO−220F−2L | N/A | 50 Units |

## ELECTRICAL CHARACTERISTICS ($T_C$ = 25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF STATE CHARACTERISTICS** | | | | | | |
| $I_R$ | Instantaneous Reverse Current | $V_R$ = 600 V, $T_C$ = 25°C | − | − | 100 | μA |
| | | $V_R$ = 600 V, $T_C$ = 125°C | − | − | 1.0 | mA |
| **ON STATE CHARACTERISTICS** | | | | | | |
| $V_F$ | Instantaneous Forward Voltage | $I_F$ = 15 A, $T_C$ = 25°C | − | 1.8 | 2.2 | V |
| | | $I_F$ = 15 A, $T_C$ = 125°C | − | 1.65 | 2.0 | V |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| $C_J$ | Junction Capacitance | $I_F$ = 0 A, $V_R$ = 10 V | − | 62 | − | pF |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 1 A, $dI_F/dt$ = 100 A/μs, $V_R$ = 30 V | − | 25 | 30 | ns |
| | | $I_F$ = 15 A, $dI_F/dt$ = 100 A/μs, $V_R$ = 30 V | − | 35 | 40 | ns |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 15 A, $dI_F/dt$ = 200 A/μs, $V_R$ = 390 V, $T_C$ = 25°C | − | 29.4 | − | ns |
| $I_{rr}$ | Maximum Reverse Recovery Current | | − | 3.5 | − | A |
| $Q_{rr}$ | Reverse Recovered Charge | | − | 57 | − | nC |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 15 A, $dI_F/dt$ = 200 A/μs, $V_R$ = 390 V, $T_C$ = 125°C | − | 90 | − | ns |
| S | Softness Factor ($t_b/t_a$) | | − | 2.0 | − | |
| $I_{rr}$ | Maximum Reverse Recovery Current | | − | 5.0 | − | A |
| $Q_{rr}$ | Reverse Recovered Charge | | − | 275 | − | nC |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 15 A, $dI_F/dt$ = 800 A/μs, $V_R$ = 390 V, $T_C$ = 125°C | − | 52 | − | ns |
| S | Softness Factor ($t_b/t_a$) | | − | 1.36 | − | |
| $I_{rr}$ | Maximum Reverse Recovery Current | | − | 13.5 | − | A |
| $Q_{rr}$ | Reverse Recovered Charge | | − | 390 | − | nC |
| $dI_M/dt$ | Maximum di/dt during $t_b$ | | − | 800 | − | A/μs |
| **THERMAL CHARACTERISTICS** | | | | | | |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | | − | − | 4.1 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient | TO−247 | − | − | 70 | °C/W |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## TYPICAL PERFORMANCE CHARACTERISTICS

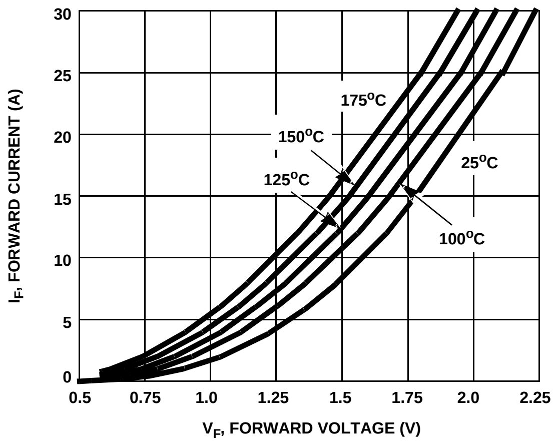



**Figure 1. Forward Current vs. Forward Voltage**

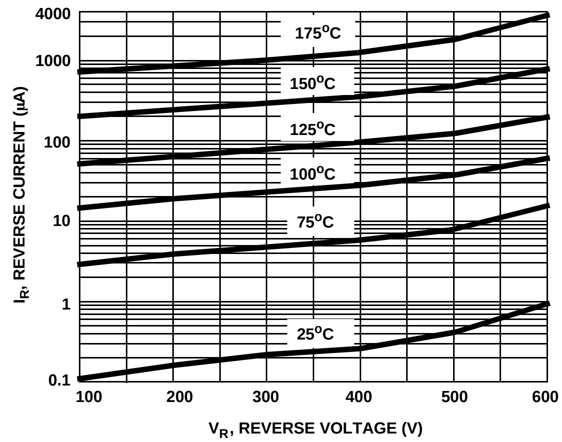



**Figure 2. Reverse Current vs. Reverse Voltage**

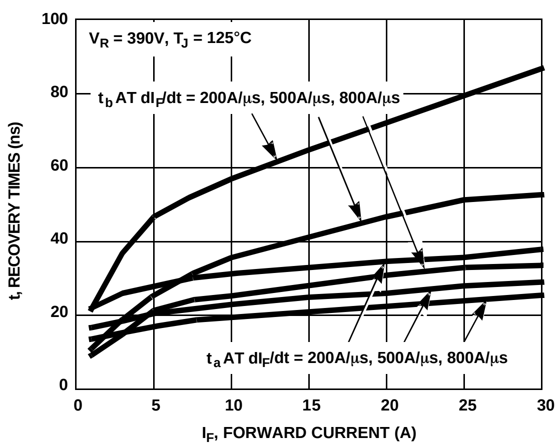



**Figure 3. $t_a$ and $t_b$ Curves vs. Forward Current**

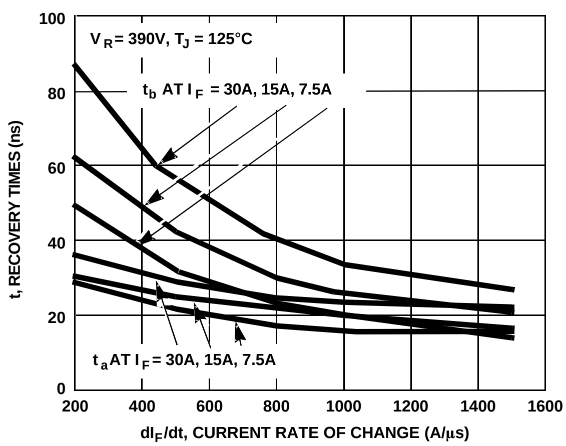



**Figure 4. $t_a$ and $t_b$ Curves vs. $dI_F/dt$**

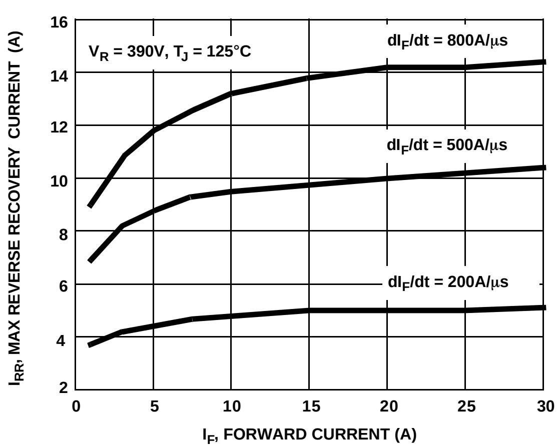



**Figure 5. Maximum Reverse Recovery Current vs. Forward Current**

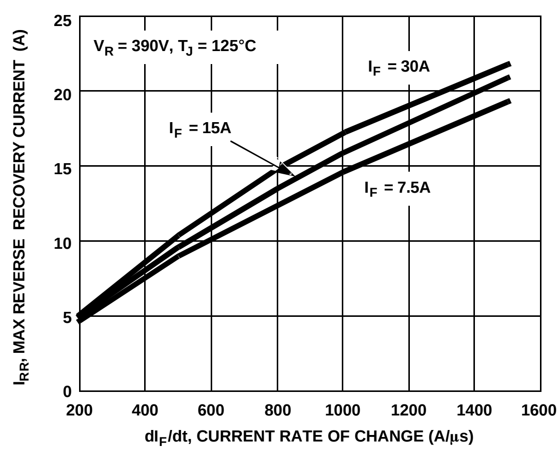



**Figure 6. Maximum Reverse Recovery Current vs. $dI_F/dt$**

## TYPICAL PERFORMANCE CHARACTERISTICS

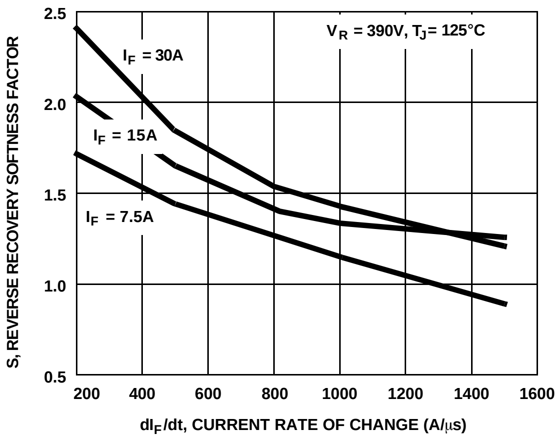



Figure 7. Reverse Recovery Softness Factor vs. $dI_F/dt$

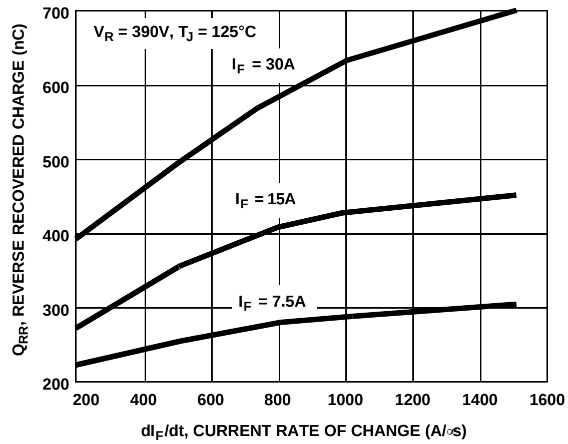



Figure 8. Reverse Recovered Charge vs. $dI_F/dt$

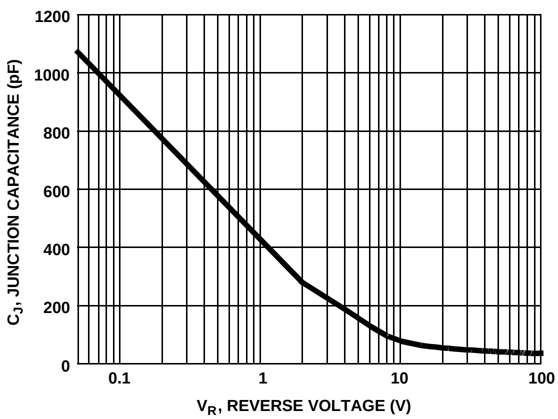



Figure 9. Junction Capacitance vs. Reverse Voltage

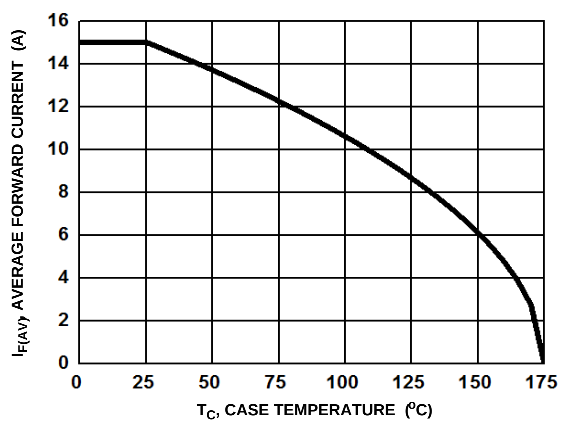



Figure 10. DC Current Derating Curve

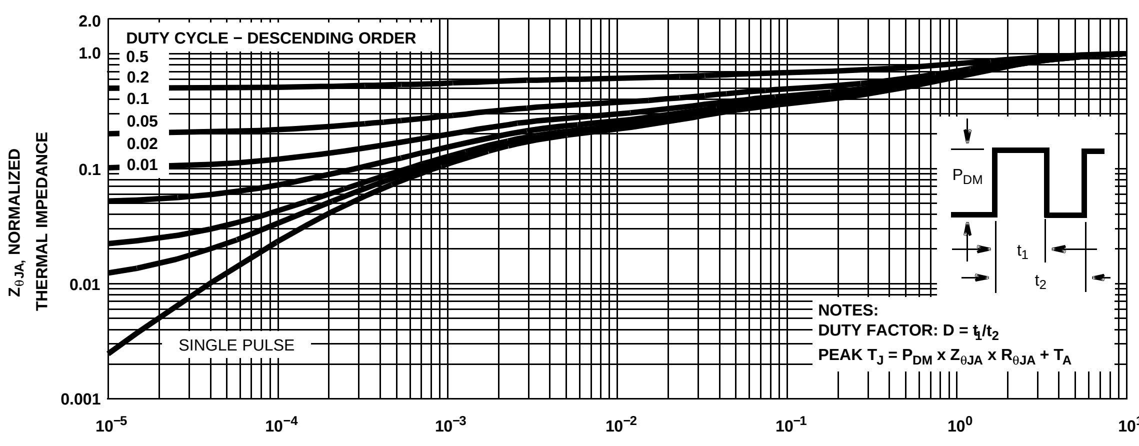



Figure 11. Normalized Maximum Transient Thermal Impedance

## TEST CIRCUIT AND WAVEFORMS

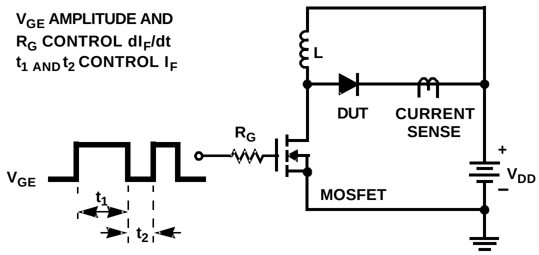



Figure 12. Test Circuit

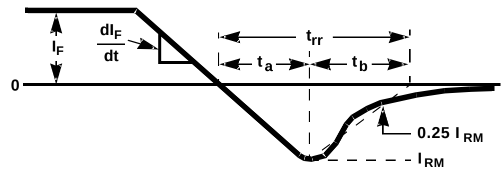



Figure 13. $t_{rr}$ Waveforms and Definitions

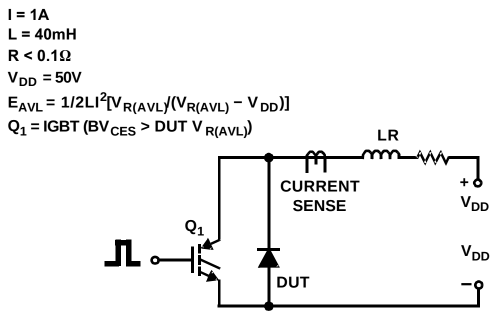



Figure 14. Avalanche Energy Test Circuit

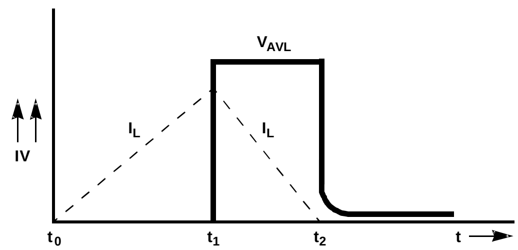



Figure 15. Avalanche Current and Voltage Waveforms

**TO−220 Fullpack, 2−Lead / TO−220F−2FS**
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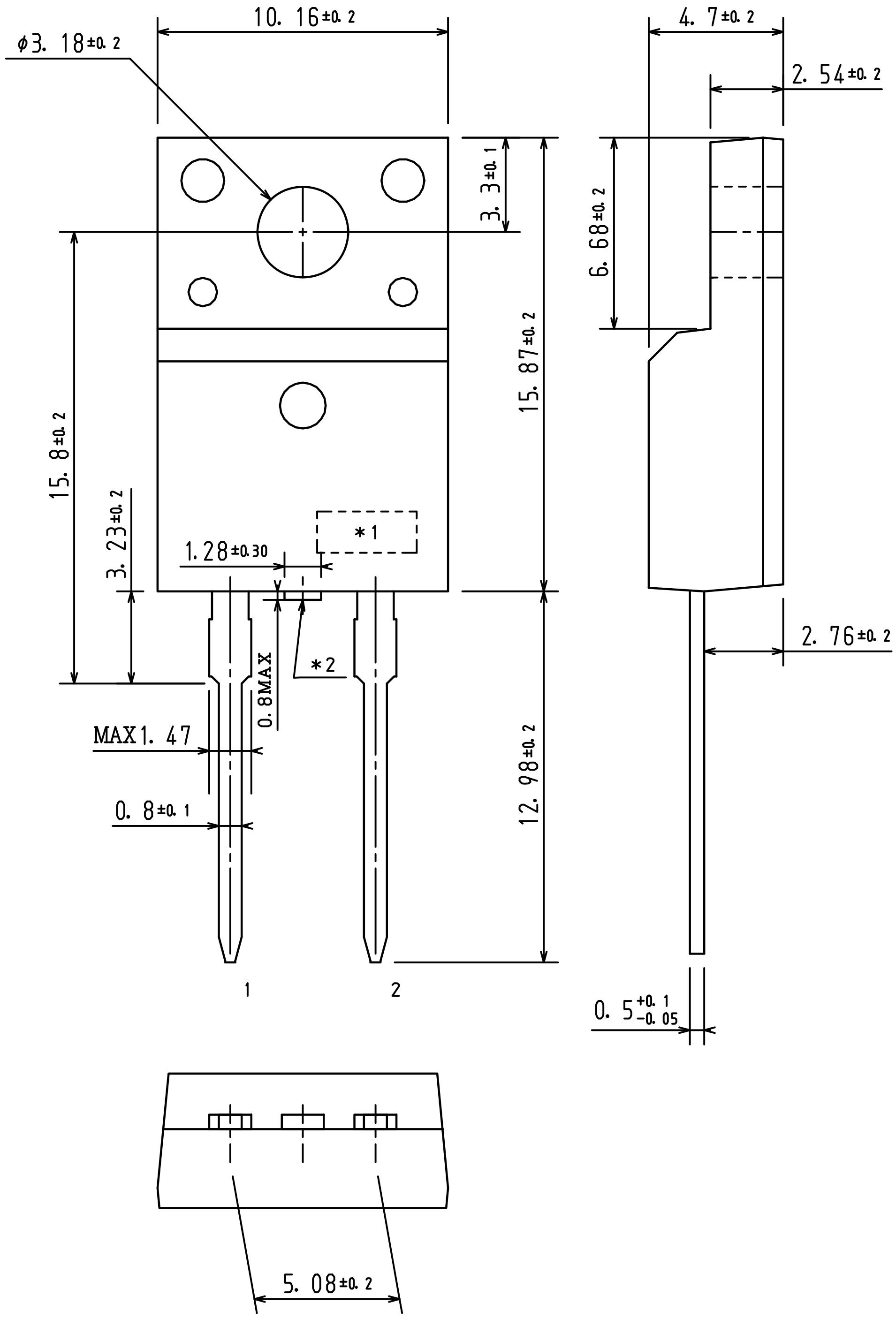


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