Bulletin PD-20784 07/04

International
IOR Rectifier

# 10BQ040PbF

## SCHOTTKY RECTIFIER 1 Amp

$I_{F(AV)}$ = 1.0Amp
$V_R$ = 40V

### Major Ratings and Characteristics

| Characteristics | Value | Units |
|---|---|---|
| $I_{F(AV)}$ Rectangular waveform | 1.0 | A |
| $V_{RRM}$ | 40 | V |
| $I_{FSM}$ @tp = 5 µs sine | 430 | A |
| $V_F$ @1.0 Apk, $T_J$=125°C | 0.49 | V |
| $T_J$ range | - 55 to 150 | °C |

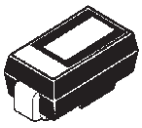
### Description/ Features

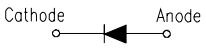
The 10BQ040PbF surface-mount Schottky rectifier has been designed for applications requiring low forward drop and very small foot prints on PC boards. Typical applications are in disk drives, switching power supplies, converters, free-wheeling diodes, battery charging, and reverse battery protection.

- Small foot print, surface mountable
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead-Free ("PbF" suffix)

### Case Styles

10BQ040PbF






SMB

## Voltage Ratings

| | Part number | 10BQ040PbF |
|---|---|---|
| $V_R$ | Max. DC Reverse Voltage (V) | 40 |
| $V_{RWM}$ | Max. Working Peak Reverse Voltage (V) | |

## Absolute Maximum Ratings

| | Parameters | 10BQ | Units | Conditions | |
|---|---|---|---|---|---|
| $I_{F(AV)}$ | Max. Average Forward Current | 1.0 | A | 50% duty cycle @ $T_L$ = 112 °C, rectangular wave form | |
| $I_{FSM}$ | Max. Peak One Cycle Non-Repetitive | 430 | A | 5µs Sine or 3µs Rect. pulse | Following any rated load condition and with rated $V_{RRM}$ applied |
| | Surge Current | 45 | | 10ms Sine or 6ms Rect. pulse | |
| $E_{AS}$ | Non- Repetitive Avalanche Energy | 3.0 | mJ | $T_J$ = 25 °C, $I_{AS}$ = 1A, L = 6mH | |
| $I_{AR}$ | Repetitive Avalanche Current | 1.0 | A | Current decaying linearly to zero in 1 µsec<br>Frequency limited by $T_J$ max. Va = 1.5 x Vr typical | |

## Electrical Specifications

| | Parameters | 10BQ | Units | Conditions | |
|---|---|---|---|---|---|
| $V_{FM}$ | Max. Forward Voltage Drop (1) | 0.53 | V | @ 1A | $T_J$ = 25 °C |
| | * See Fig. 1 | 0.70 | V | @ 2A | |
| | | 0.49 | V | @ 1A | $T_J$ = 125 °C |
| | | 0.64 | V | @ 2A | |
| $I_{RM}$ | Max. Reverse Leakage Current (1) | 0.1 | mA | $T_J$ = 25 °C | $V_R$ = rated $V_R$ |
| | * See Fig. 2 | 4 | mA | $T_J$ = 125 °C | |
| $C_T$ | Typical Junction Capacitance | 80 | pF | $V_R$ = 5$V_{DC}$, (test signal range 100kHz to 1MHz) 25°C | |
| $L_S$ | Typical Series Inductance | 2.0 | nH | Measured lead to lead 5mm from package body | |
| dv/dt | Max. Volatge Rate of Charge (Rated $V_R$) | 10000 | V/ µs | | |

(1) Pulse Width < 300µs, Duty Cycle < 2%

## Thermal-Mechanical Specifications

| | Parameters | 10BQ | Units | Conditions |
|---|---|---|---|---|
| $T_J$ | Max. Junction Temperature Range (*) | - 55 to 150 | °C | |
| $T_{stg}$ | Max. Storage Temperature Range | - 55 to 150 | °C | |
| $R_{thJL}$ | Max. Thermal Resistance Junction to Lead (**) | 36 | °C/W | DC operation |
| $R_{thJA}$ | Max. Thermal Resistance Junction to Ambient | 80 | °C/W | |
| wt | Approximate Weight | 0.10 (0.003) | g (oz.) | |
| | Case Style | SMB | | Similar DO-214AA |
| | Device Marking | IR1F | | |

(*) $\frac{dPtot}{dTj} < \frac{1}{Rth(j\text{-}a)}$ thermal runaway condition for a diode on its own heatsink

(**) Mounted 1 inch square PCB

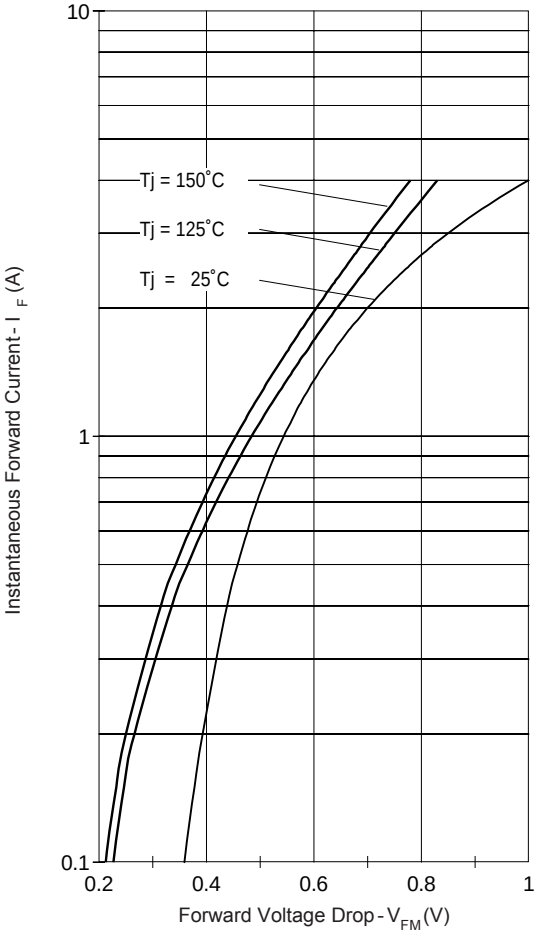



Fig. 1 - Maximum Forward Voltage Drop Characteristics

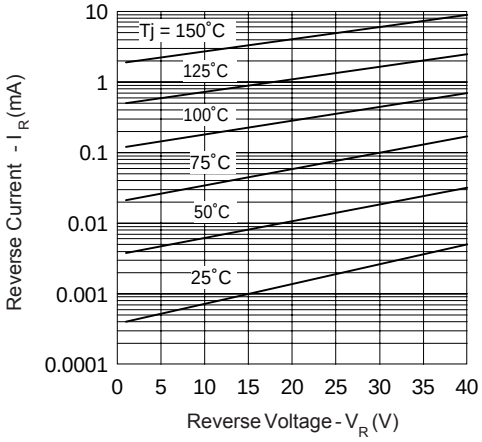



Fig. 2 - Typical Peak Reverse Current Vs. Reverse Voltage

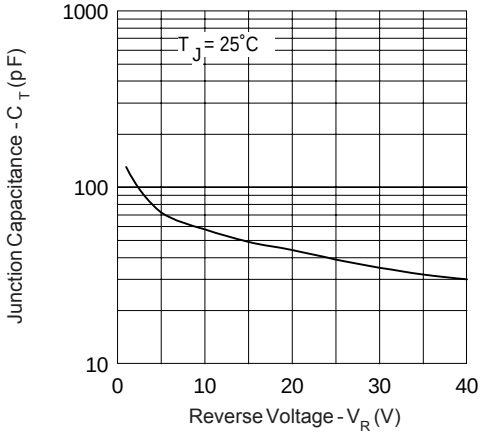



Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

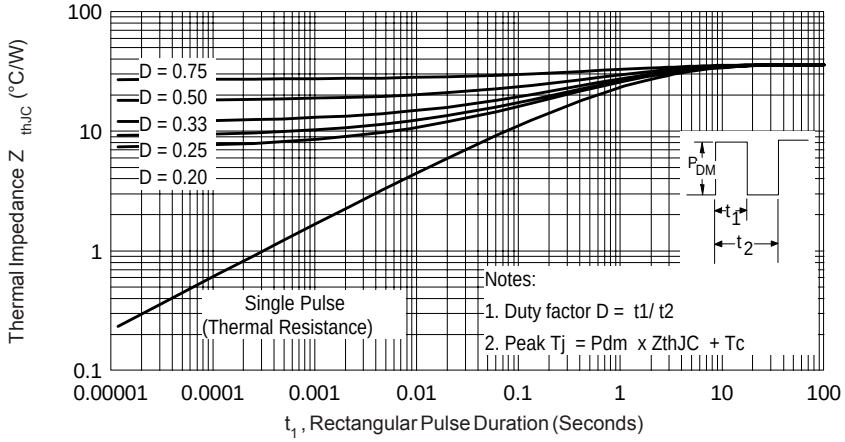



Fig. 4 - Max. Thermal Impedance $Z_{thJC}$ Characteristics (Per Leg)

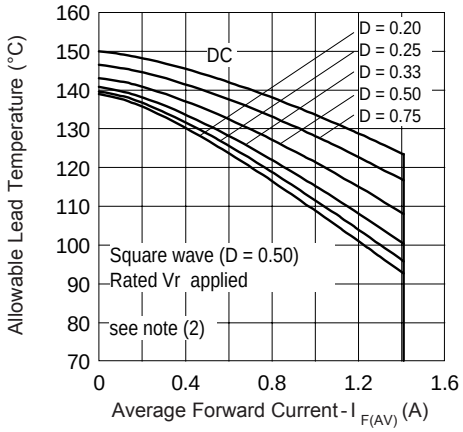



Fig. 4 - Maximum Average Forward Current
Vs. Allowable Lead Temperature

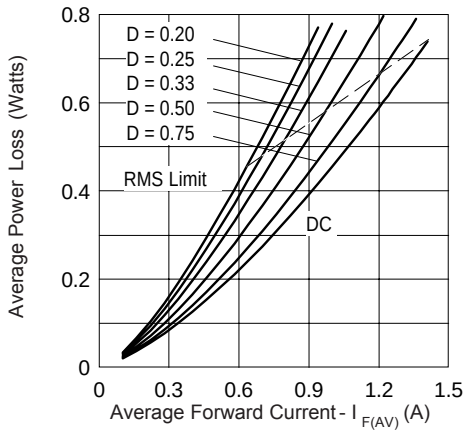



Fig. 5 - Maximum Average Forward Dissipation
Vs. Average Forward Current

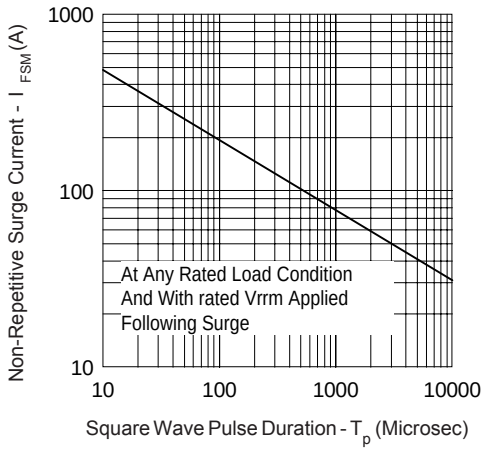
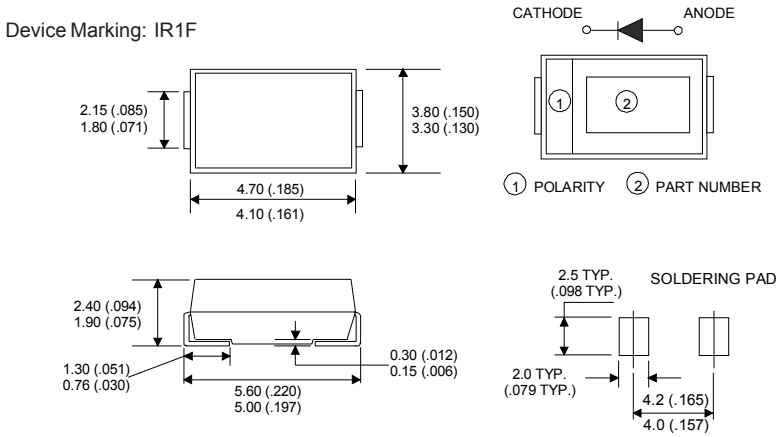



Fig. 6 - Maximum Peak Surge Forward Current Vs. Pulse Duration

**(2)** Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
$Pd$ = Forward Power Loss = $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$ (see Fig. 6);
$Pd_{REV}$ = Inverse Power Loss = $V_{R1} \times I_R (1 - D)$; $I_R @ V_{R1}$ = 80% rated $V_R$

## Outline Table



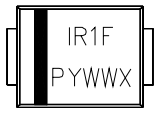

**Outline SMB**

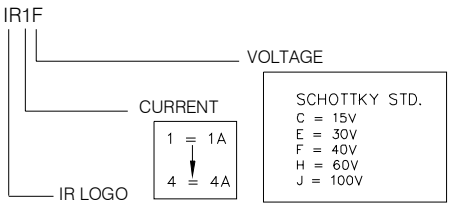
Dimensions in millimeters and (inches)

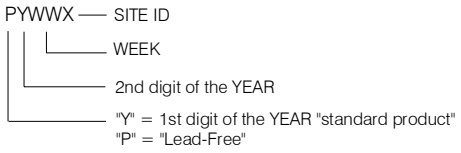
For recommended footprint and soldering techniques refer to application note #AN-994

## Marking & Identification

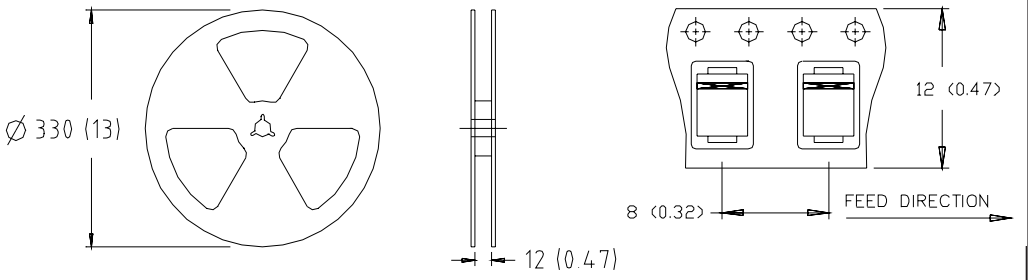
Each device has 2 rows for identification. The first row designates the device as manufactured by International Rectifier, indicated by the letters "IR", and the Part Number (indicates the current, the voltage rating and Schottky Generation). The second row indicates the year, the week of manufacturing and the Site ID.



## Tape & Reel Information




Dimensions in millimetres and (inches)

## Ordering Information Table

**Device Code**

| 10 | B | Q | 040 | TR | PbF |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |

| | | |
|---|---|---|
| **1** | - | Current Rating |
| **2** | - | B = Single Lead Diode |
| **3** | - | Q = Schottky Q Series |
| **4** | - | Voltage Rating (040 = 40V) |
| **5** | - | • none = Box (1000 pieces) |
| | | • TR = Tape & Reel (3000 pieces) |
| **6** | - | • none = Standard Production |
| | | • PbF = Lead-Free |

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level and Lead-Free.
Qualification Standards can be found on IR's Web site.

International
IOR Rectifier

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07/04

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