Bulletin PD-20546 rev. F 03/03

International
IOR Rectifier

# 12CWQ04FN

## SCHOTTKY RECTIFIER

## 12 Amp

**D-Pak (TO-252AA)**

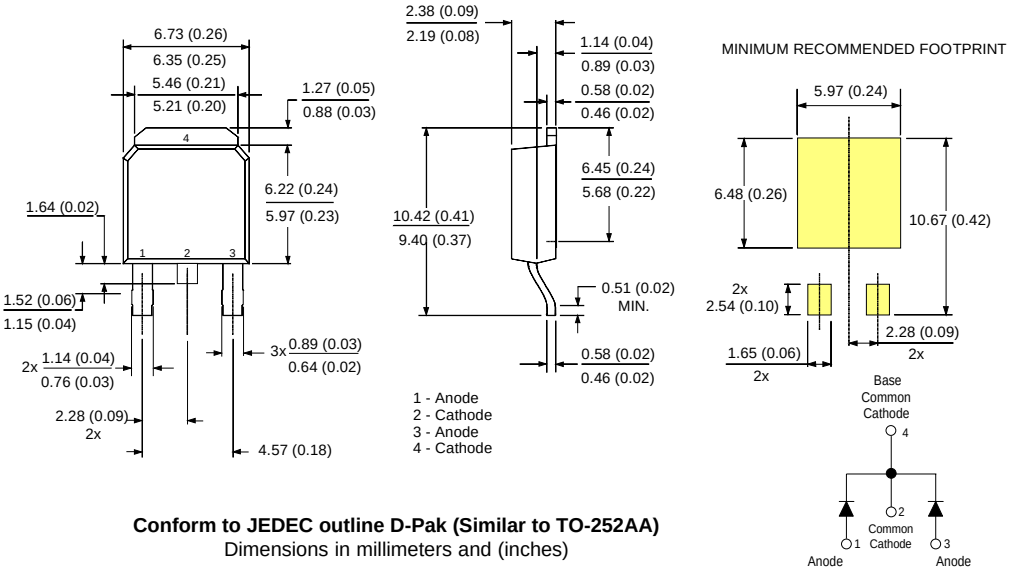
### Major Ratings and Characteristics

| Characteristics | | 12CWQ04FN | Units |
|---|---|---|---|
| $I_{F(AV)}$ | Rectangular waveform | 12 | A |
| $V_{RRM}$ | | 40 | V |
| $I_{FSM}$ | @ tp = 5 µs sine | 340 | A |
| $V_F$ | @ 6 Apk, $T_J$ = 125°C (per leg) | 0.48 | V |
| $T_J$ | range | - 55 to 150 | °C |

### Description/ Features

The 12CWQ04FN surface mount, center tap, Schottky rectifier series has been designed for applications requiring low forward drop and small foot prints on PC board. Typical applications are in disk drives, switching power supplies, converters, free-wheeling diodes, battery charging, and reverse battery protection.

- Popular D-PAK outline
- Center tap configuration
- Small foot print, surface mountable
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability




**Conform to JEDEC outline D-Pak (Similar to TO-252AA)**
Dimensions in millimeters and (inches)

## Voltage Ratings

| | Part number | 12CWQ04FN |
|---|---|---|
| $V_R$ | Max. DC Reverse Voltage (V) | 40 |
| $V_{RWM}$ | Max. Working Peak Reverse Voltage (V) | |

## Absolute Maximum Ratings

| | Parameters | 12CWQ... | Units | Conditions | |
|---|---|---|---|---|---|
| $I_{F(AV)}$ | Max. Average Forward(Per Leg) | 6 | A | 50% duty cycle @ $T_C$ = 134°C, rectangular wave form | |
| | Current* See Fig. 5 (Per Device) | 12 | | | |
| $I_{FSM}$ | Max. Peak One Cycle Non-Repetitive | 340 | A | 5µs Sine or 3µs Rect. pulse | Following any rated load condition and with rated $V_{RRM}$ applied |
| | Surge Current * See Fig. 7 | 70 | | 10ms Sine or 6ms Rect. pulse | |
| $E_{AS}$ | Non-Repet. Avalan. Energy (Per Leg) | 9 | mJ | $T_J$ = 25 °C, $I_{AS}$ = 1.5 Amps, L = 8 mH | |
| $I_{AR}$ | Repetitive Avalanche Current (Per Leg) | 1.2 | A | Current decaying linearly to zero in 1 µsec Frequency limited by $T_J$ max. $V_A$ = 1.5 x $V_R$ typical | |

## Electrical Specifications

| | Parameters | 12CWQ... | Units | Conditions | |
|---|---|---|---|---|---|
| $V_{FM}$ | Max. Forward Voltage Drop | | 0.53 | V @ 6A | $T_J$ = 25 °C |
| | (Per Leg) * See Fig. 1 (1) | 0.68 | V | @ 12A | |
| | | 0.48 | V | @ 6A | $T_J$ = 125 °C |
| | | 0.64 | V | @ 12A | |
| $I_{RM}$ | Max. Reverse Leakage Current | 3 | mA | $T_J$ = 25 °C | $V_R$ = rated $V_R$ |
| | (Per Leg) * See Fig. 2 (1) | 40 | mA | $T_J$ = 125 °C | |
| $V_{F(TO)}$ | Threshold Voltage | 0.28 | V | $T_J$ = $T_J$ max. | |
| $r_t$ | Forward Slope Resistance | 25.58 | mΩ | | |
| $C_T$ | Typ. Junction Capacitance (Per Leg) | 405 | pF | $V_R$ = 5$V_{DC}$, (test signal range 100Khz to 1Mhz) 25°C | |
| $L_S$ | Typical Series Inductance (Per Leg) | 5.0 | nH | Measured lead to lead 5mm from package body | |

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

## Thermal-Mechanical Specifications

| | Parameters | 12CWQ... | Units | Conditions |
|---|---|---|---|---|
| $T_J$ | Max. Junction Temperature Range (*) | -55 to 150 | °C | |
| $T_{stg}$ | Max. Storage Temperature Range | -55 to 150 | °C | |
| $R_{thJC}$ | Max. Thermal Resistance (Per Leg) | 3.0 | °C/W | DC operation * See Fig. 4 |
| | Junction to Case (Per Device) | 1.5 | | |
| wt | Approximate Weight | 0.3 (0.01) | g (oz.) | |
| | Case Style | D-Pak | | Similar to TO-252AA |

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

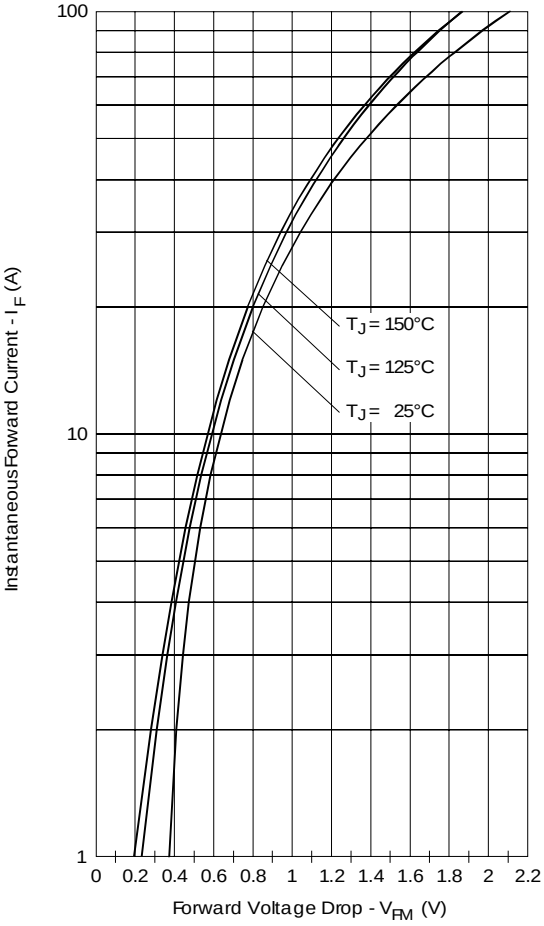



Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

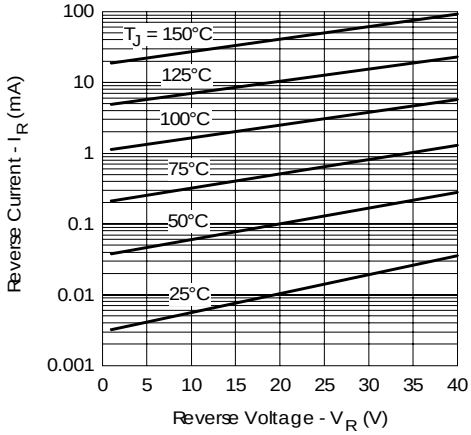



Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

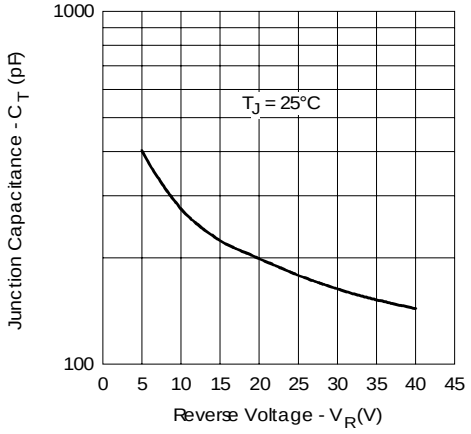



Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

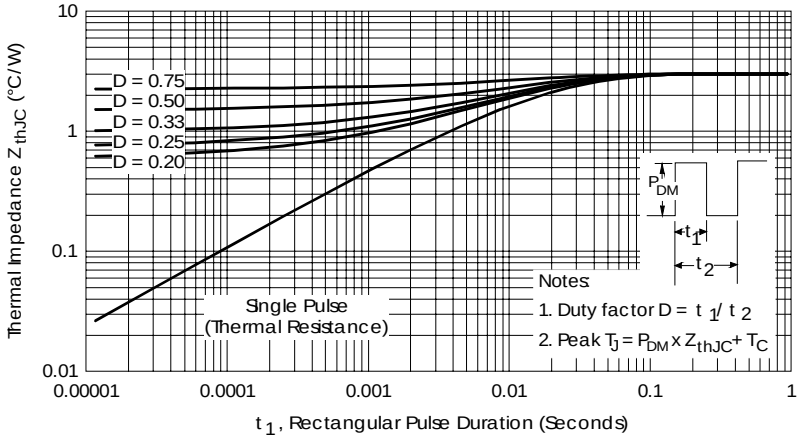



Fig. 4 - Max. Thermal Impedance $Z_{thJC}$ Characteristics (Per Leg)

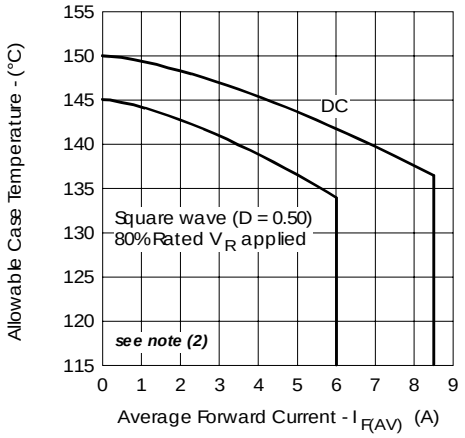



Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

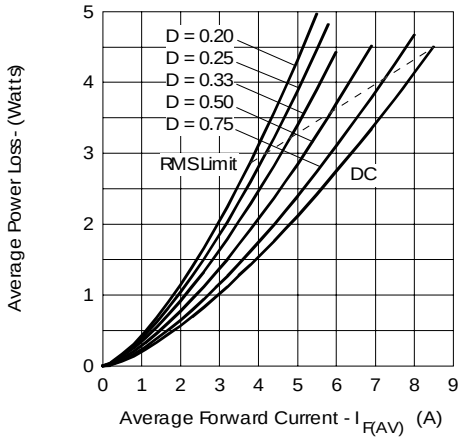



Fig. 6 - Forward Power Loss Characteristics (Per Leg)

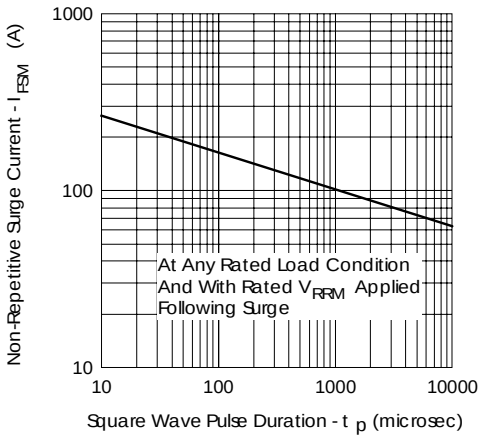
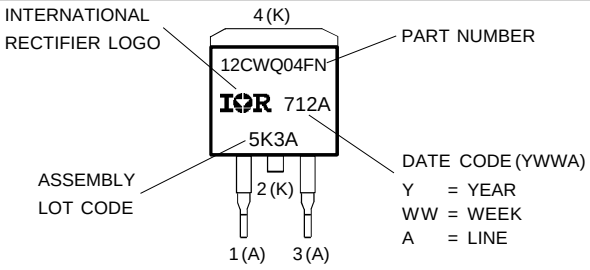



Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

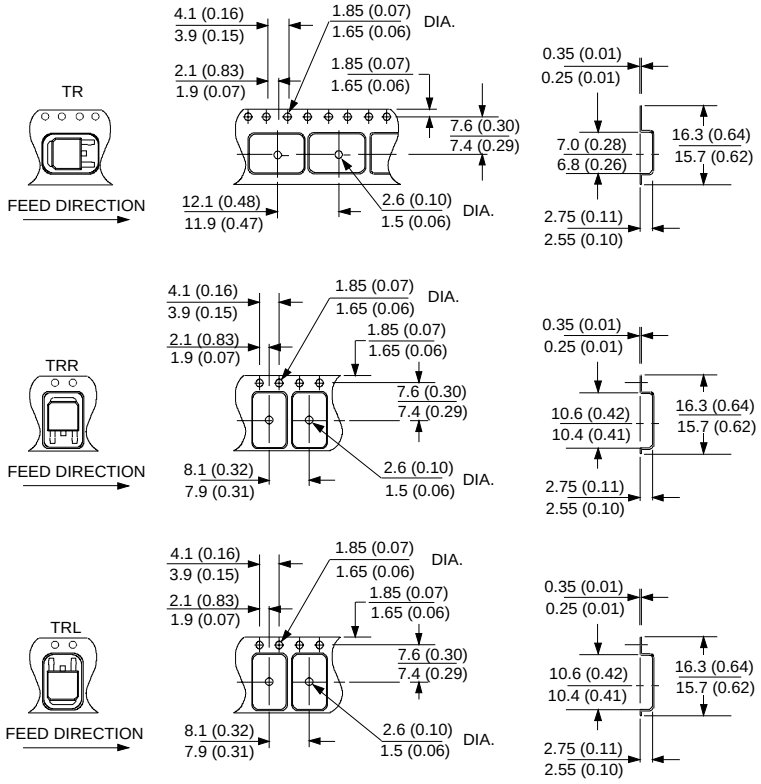
**(2)** Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
$Pd$ = Forward Power Loss = $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$ (see Fig. 6);
$Pd_{REV}$ = Inverse Power Loss = $V_{R1} \times I_R (1 - D)$; $I_R @ V_{R1}$ = 80% rated $V_R$

## Marking Information

EXAMPLE: THIS IS AN 12CWQ04FN




## Tape & Reel Information




**TO-252AA Tape & Reel**

When ordering, indicate the part number, part orientation, and the quantity. Quantities are in multiples of 2,000 pieces per reel for TR and multiples of 3,000 pieces per reel for both TRL and TRR.

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

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