



30WQ04FN

SCHOTTKY RECTIFIER

3.5 Amp

$$I_{F(AV)} = 3.5\text{Amp}$$
$$V_R = 40\text{V}$$

Major Ratings and Characteristics

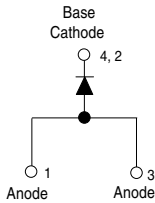
| Characteristics                         | Values     | Units            |
|-----------------------------------------|------------|------------------|
| $I_{F(AV)}$ Rectangular waveform        | 3.5        | A                |
| $V_{RRM}$                               | 40         | V                |
| $I_{FSM}$ @tp = 5 $\mu$ s sine          | 500        | A                |
| $V_F$ @3 Apk, $T_J = 125^\circ\text{C}$ | 0.49       | V                |
| $T_J$                                   | -40 to 150 | $^\circ\text{C}$ |

Description/ Features

The 30WQ04FN surface mount Schottky rectifier 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
- Small foot print, surface mountable
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability

Case Styles



D-PAK (TO-252AA)

## Voltage Ratings

| Part number                                     | 30WQ04FN |
|-------------------------------------------------|----------|
| $V_R$ Max. DC Reverse Voltage (V)               | 40       |
| $V_{RWM}$ Max. Working Peak Reverse Voltage (V) |          |

## Absolute Maximum Ratings

| Parameters                                                              | 30WQ... | Units | Conditions                                                                                                               |
|-------------------------------------------------------------------------|---------|-------|--------------------------------------------------------------------------------------------------------------------------|
| $I_{F(AV)}$ Max. Average Forward Current<br>* See Fig. 5                | 3.5     | A     | 50% duty cycle @ $T_C = 135^\circ\text{C}$ , rectangular wave form                                                       |
| $I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current * See Fig. 7 | 500     | A     | 5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse                                                                      |
|                                                                         | 80      |       | 10ms Sine or 6ms Rect. pulse                                                                                             |
| $E_{AS}$ Non-Repetitive Avalanche Energy                                | 8.0     | mJ    | $T_J = 25^\circ\text{C}$ , $I_{AS} = 1\text{ Amp}$ , $L = 16\text{ mH}$                                                  |
| $I_{AR}$ Repetitive Avalanche Current                                   | 1.0     | A     | Current decaying linearly to zero in 1 $\mu\text{sec}$<br>Frequency limited by $T_J$ max. $V_A = 1.5 \times V_R$ typical |

## Electrical Specifications

| Parameters                                                | 30WQ... | Units            | Conditions                                                            |
|-----------------------------------------------------------|---------|------------------|-----------------------------------------------------------------------|
| $V_{FM}$ Max. Forward Voltage Drop<br>* See Fig. 1 (1)    | 0.53    | V                | @ 3A                                                                  |
|                                                           | 0.67    | V                | @ 6A                                                                  |
|                                                           | 0.49    | V                | @ 3A                                                                  |
|                                                           | 0.62    | V                | @ 6A                                                                  |
| $I_{RM}$ Max. Reverse Leakage Current<br>* See Fig. 2 (1) | 2       | mA               | $T_J = 25^\circ\text{C}$                                              |
|                                                           | 24      | mA               | $T_J = 125^\circ\text{C}$                                             |
| $V_{F(TO)}$ Threshold Voltage                             | 0.34    | V                | $T_J = T_J \text{ max.}$                                              |
| $r_t$ Forward Slope Resistance                            | 37.33   | m $\Omega$       |                                                                       |
| $C_T$ Typical Junction Capacitance                        | 189     | pF               | $V_R = 5V_{DC}$ (test signal range 100Khz to 1Mhz) $25^\circ\text{C}$ |
| $L_S$ Typical Series Inductance                           | 5.0     | nH               | Measured lead to lead 5mm from package body                           |
| dv/dt Max. Voltage Rate of Change                         | 10000   | V/ $\mu\text{s}$ | (Rated $V_R$ )                                                        |

(1) Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2%

## Thermal-Mechanical Specifications

| Parameters                                          | 30WQ...    | Units              | Conditions                |
|-----------------------------------------------------|------------|--------------------|---------------------------|
| $T_J$ Max. Junction Temperature Range (*)           | -40 to 150 | $^\circ\text{C}$   |                           |
| $T_{stg}$ Max. Storage Temperature Range            | -40 to 150 | $^\circ\text{C}$   |                           |
| $R_{thJC}$ Max. Thermal Resistance Junction to Case | 4.7        | $^\circ\text{C/W}$ | DC operation * See Fig. 4 |
| wt Approximate Weight                               | 0.3 (0.01) | g (oz.)            |                           |
| Case Style                                          | D - PAK    |                    | Similar to TO-252AA       |
| Marking Device                                      | 30WQ04FN   |                    |                           |

(\*)  $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{th(j-a)}}$  thermal runaway condition for a diode on its own heatsink

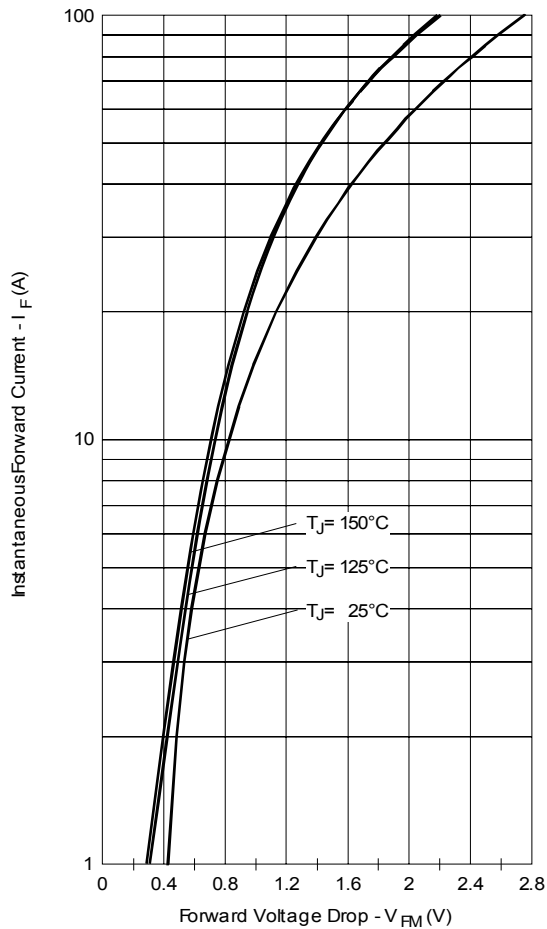


Fig. 1 - Maximum Forward Voltage Drop Characteristics

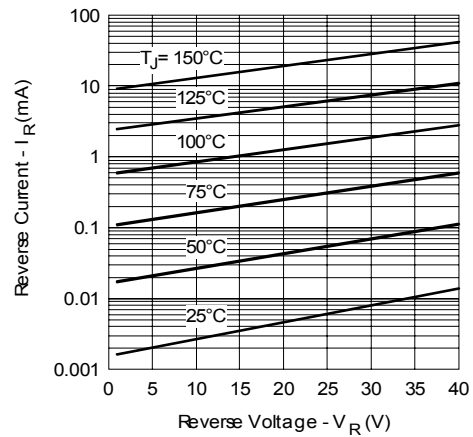


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

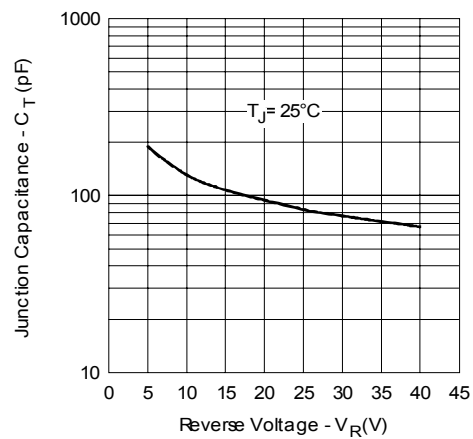


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

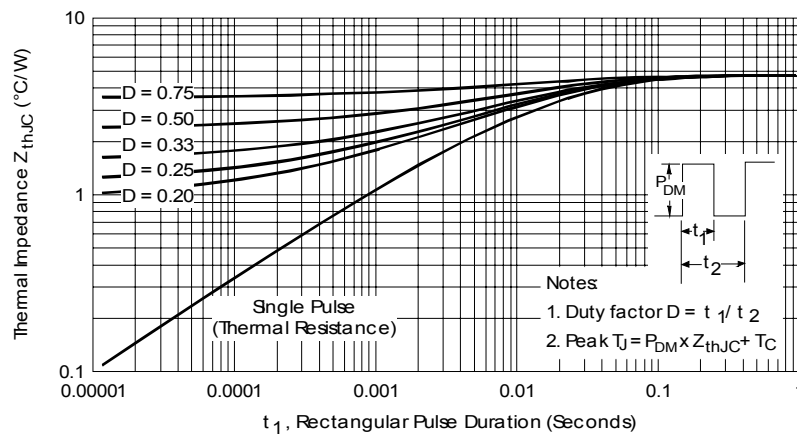


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

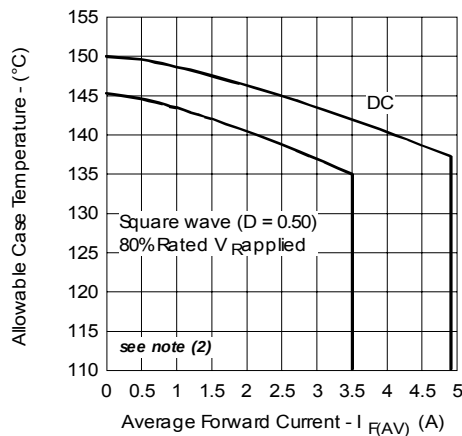


Fig. 5 - Maximum Allowable Case Temperature Vs. Average Forward Current

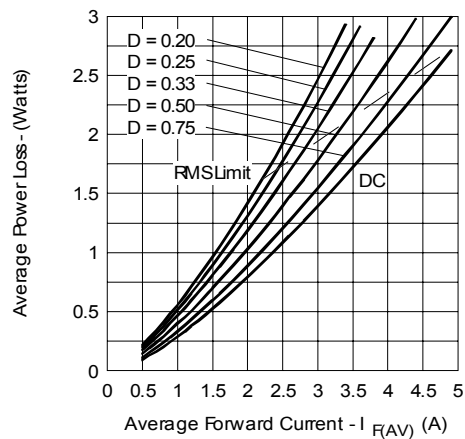


Fig. 6 - Forward Power Loss Characteristics

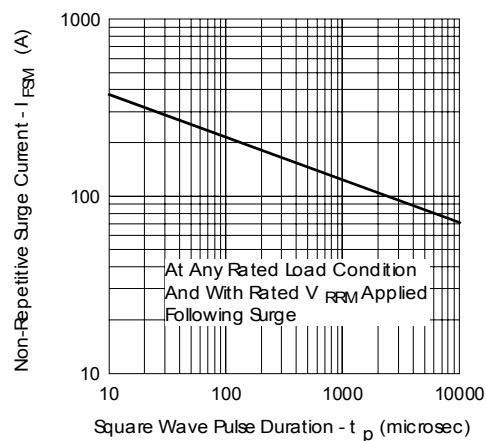


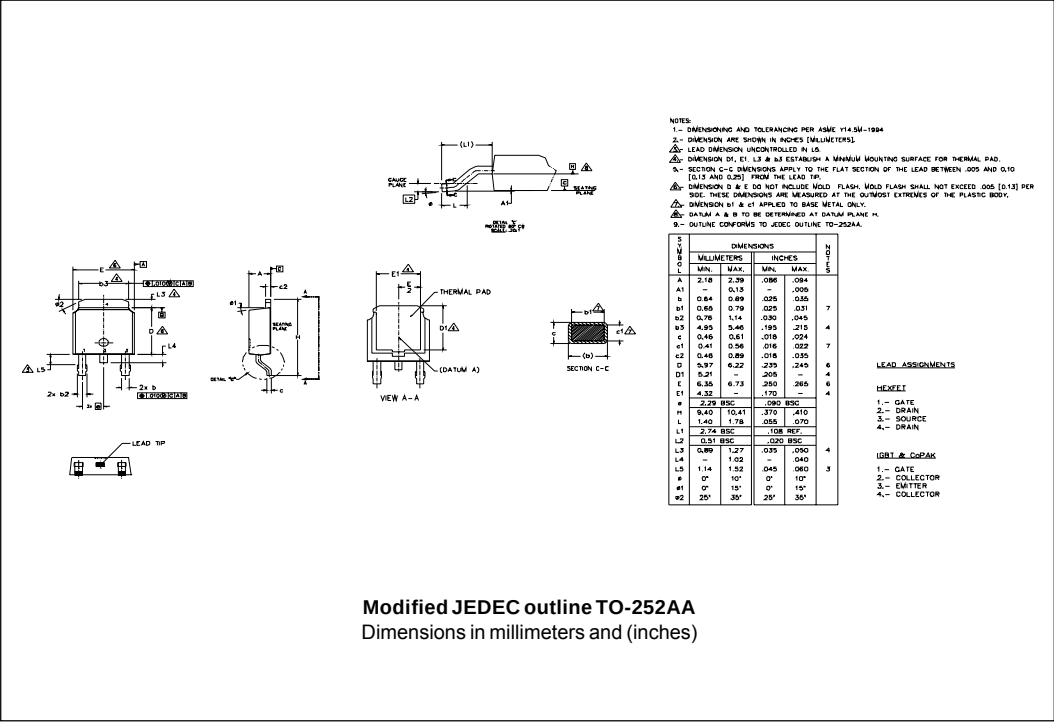
Fig. 7 - Maximum Non-Repetitive Surge Current

(2) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;

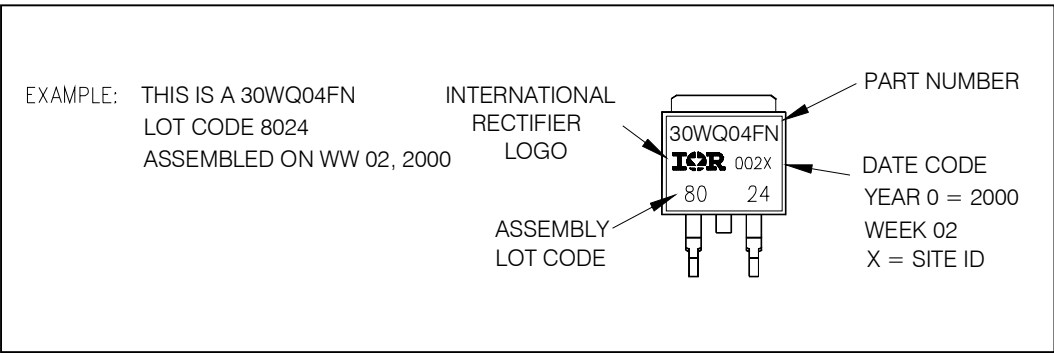
$P_d$  = Forward Power Loss =  $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);

$P_{d_{REV}}$  = Inverse Power Loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R @ V_{R1} = 80\% \text{ rated } V_R$

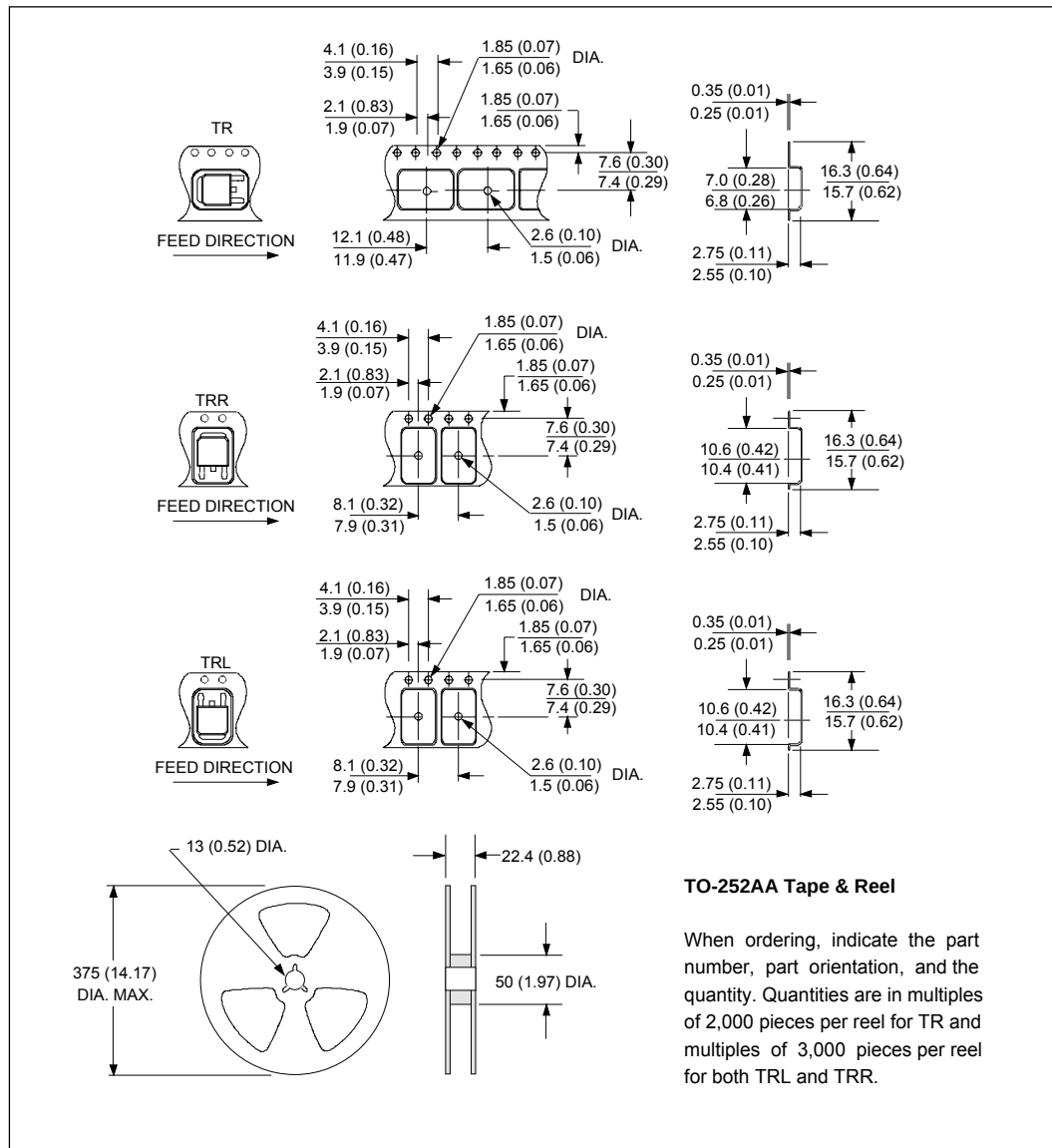
Outline Table



Part Marking Information



## Tape &amp; Reel Information



## Ordering Information Table

| Device Code |    |                                                                                                                                                                                                                |   |    |    |       |
|-------------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|----|-------|
|             | 30 | W                                                                                                                                                                                                              | Q | 04 | FN | TRL - |
|             | 1  | 2                                                                                                                                                                                                              | 3 | 4  | 5  | 6 7   |
| 1           | -  | Current Rating (3.5A)                                                                                                                                                                                          |   |    |    |       |
| 2           | -  | Package Identifier                                                                                                                                                                                             |   |    |    |       |
|             |    | W = D-Pak                                                                                                                                                                                                      |   |    |    |       |
| 3           | -  | Schottky "Q" Series                                                                                                                                                                                            |   |    |    |       |
| 4           | -  | Voltage Rating (04 = 40V)                                                                                                                                                                                      |   |    |    |       |
| 5           | -  | FN = TO-252AA                                                                                                                                                                                                  |   |    |    |       |
| 6           | -  | <ul style="list-style-type: none"> <li>• none = Tube (50 pieces)</li> <li>• TR = Tape &amp; Reel</li> <li>• TRL = Tape &amp; Reel (Left Oriented)</li> <li>• TRR = Tape &amp; Reel (Right Oriented)</li> </ul> |   |    |    |       |
| 7           | -  | <ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free</li> </ul>                                                                                                      |   |    |    |       |

## 30WQ04FN

Bulletin PD-20521 rev. I 05/06

International  
**IR** Rectifier

30WQ04FN

\*\*\*\*\*

\* This model has been developed by \*  
\* Wizard SPICE MODEL GENERATOR (1999) \*  
\* (International Rectifier Corporation) \*  
\* contains Proprietary Information \*  
\*\*\*\*\*

\* SPICE Model Diode is composed by a \*  
\* simple diode plus paralalled VCG2T \*  
\*\*\*\*\*

.SUBCKT 30WQ04FN ANO CAT

D1 ANO 1 DMOD (0.01614)

\*Define diode model

.MODEL DMOD D(IS=1.1021044955238E-04A,N=1.03763733127871,BV=53V,  
+ IBV=0.225832353615935A,RS= 0.000439008,CJO=6.29671162330771E-08,  
+ VJ=0.169606385579256,XTI=2, EG=0.72244495735053)  
\*\*\*\*\*

\*Implementation of VCG2T

VX 1 2 DC 0V

R1 2 CAT TRES 1E-6

.MODEL TRES RES(R=1,TC1=96.5402599365199)

GP1 ANO CAT VALUE={-ABS(I(VX))\*(EXP(((((-3.005809E-03/96.54026)\*(V(2,CAT)\*1E6)/(I(VX)+1E-6)-  
1))+1)\*6.266778E-02\*ABS(V(ANO,CAT))))-1}}  
\*\*\*\*\*

.ENDS 30WQ04FN

Thermal Model Subcircuit

.SUBCKT 30WQ04FN 5 1

|         |   |   |          |
|---------|---|---|----------|
| CTHERM1 | 5 | 4 | 8.75E-04 |
| CTHERM2 | 4 | 3 | 5.09E+01 |
| CTHERM3 | 3 | 2 | 3.62E+02 |
| CTHERM4 | 2 | 1 | 2.35E+03 |

|         |   |   |          |
|---------|---|---|----------|
| RTHERM1 | 5 | 4 | 1.00E-07 |
| RTHERM2 | 4 | 3 | 2.07E+00 |
| RTHERM1 | 3 | 2 | 1.92E+00 |
| RTHERM1 | 2 | 1 | 7.07E-01 |

.ENDS 30WQ04FN

Data and specifications subject to change without notice.  
This product has been designed and qualified for AEC Q101 Level.  
Qualification Standards can be found on IR's Web site.

International  
**IR** Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
TAC Fax: (310) 252-7309  
05/06



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