

$$I_{F(AV)} = 5.5\text{Amp}$$

$$V_R = 40\text{V}$$

**Major Ratings and Characteristics**

Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	5.5	A
$V_{RRM}$	40	V
$I_{FSM}$ @ $t_p = 5\mu\text{s}$ sine	340	A
$V_F$ @5 Apk, $T_J = 125^\circ\text{C}$	0.44	V
$T_J$ range	-40 to 150	$^\circ\text{C}$

**Description/ Features**

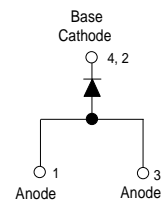
The 50WQ04FNPbF surface mount Schottky rectifier has been designed for applications requiring low forward drop and small foot prints on PC board. Typical applications are in disk drives, switching power supplies, converters, free-wheeling diodes, battery charging, and reverse battery protection.

- 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
- Lead-Free ("PbF" suffix)

**Case Styles**



D-PAK (TO-252AA)



## Voltage Ratings

Part number	50WQ04FNPbF
$V_R$ Max. DC Reverse Voltage (V)	40
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)	

## Absolute Maximum Ratings

Parameters	50WQ...	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current * See Fig. 5	5.5	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	550	A	Following any rated load condition and with rated $V_{RWM}$ applied
	90		
$E_{AS}$ Non-Repetitive Avalanche Energy	9	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 1.5$ Amps, $L = 8$ mH
$I_{AR}$ Repetitive Avalanche Current	1.2	A	Current decaying linearly to zero in 1 $\mu\text{sec}$ Frequency limited by $T_J$ max. $V_A = 1.5 \times V_R$ typical

## Electrical Specifications

Parameters	50WQ...	Units	Conditions
$V_{FM}$ Max. Forward Voltage Drop * See Fig. 1 (1)	0.51	V	@ 5A $T_J = 25^\circ\text{C}$
	0.63	V	@ 10A
	0.44	V	@ 5A $T_J = 125^\circ\text{C}$
	0.59	V	@ 10A
$I_{RM}$ Max. Reverse Leakage Current * See Fig. 2 (1)	3	mA	$T_J = 25^\circ\text{C}$
	40	mA	$T_J = 125^\circ\text{C}$
$V_{F(TO)}$ Threshold Voltage	0.27	V	$T_J = T_J$ max.
$r_t$ Forward Slope Resistance	26.77	m $\Omega$	
$C_T$ Typical Junction Capacitance	405	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

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

## Thermal-Mechanical Specifications

Parameters	50WQ...	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	3.0	$^\circ\text{C/W}$	DC operation * See Fig. 4
wt Approximate Weight	0.3 (0.01)	g (oz.)	
Case Style	D-Pak		Similar to TO-252AA
Device Marking	50WQ04FN		

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

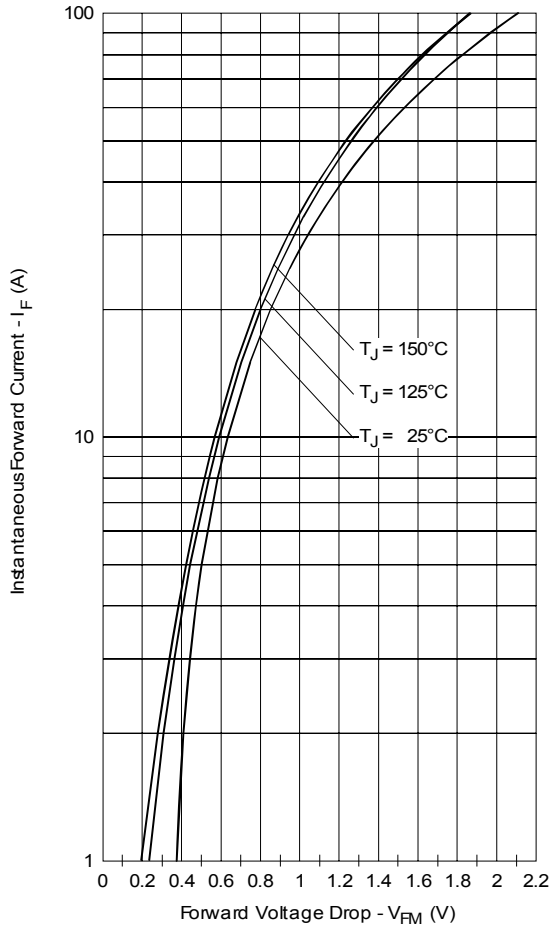


Fig. 1 - Maximum Forward Voltage Drop Characteristics

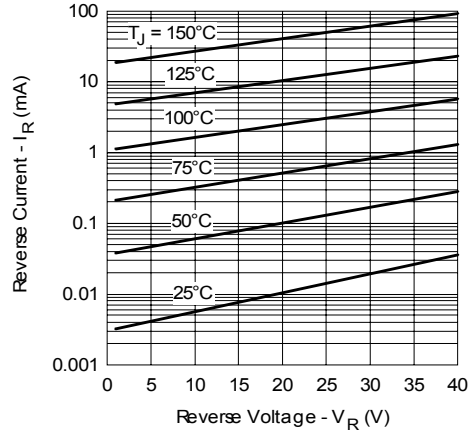


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

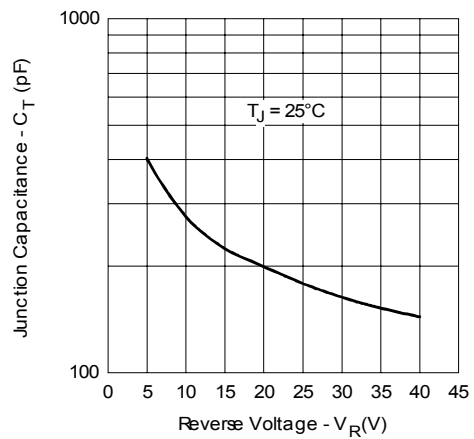


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

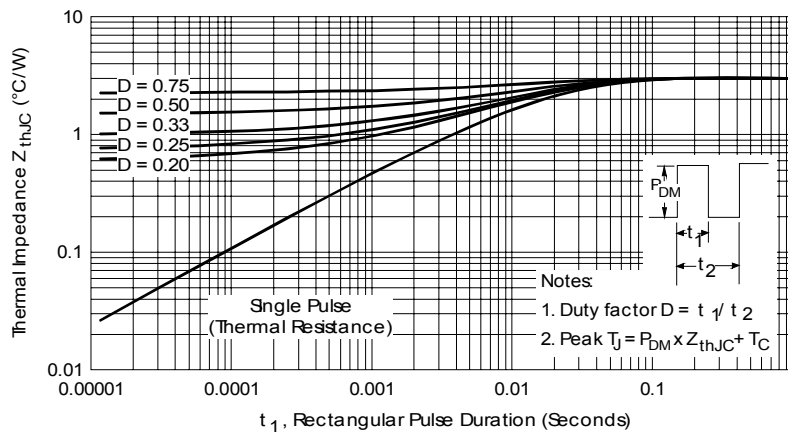


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

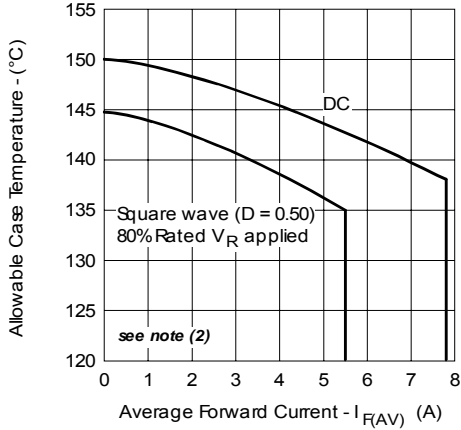


Fig. 5 - Maximum Allowable Case Temperature Vs. Average Forward Current

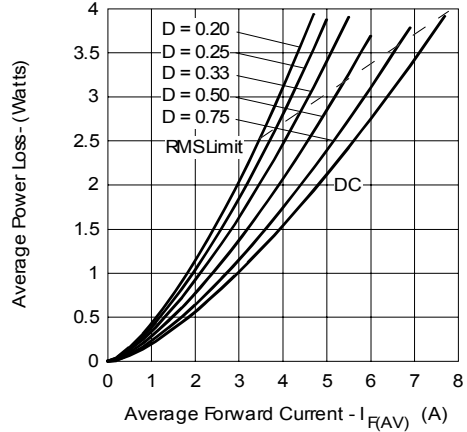


Fig. 6 - Forward Power Loss Characteristics

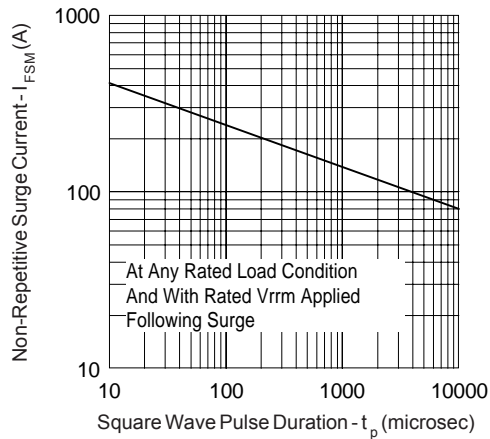


Fig. 7 - Maximum Non-Repetitive Surge Current

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

$Pd$  = 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

**NOTES:**  
 1- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994  
 2- DIMENSION ARE SHOWN IN INCHES [MILLIMETERS]  
 3- LEAD DIMENSION UNCONTROLLED IN L5.  
 4- DIMENSION D1, E1, L3 & R3 ESTABLISH A MINIMUM MOUNTING SURFACE FOR THERMAL PAD.  
 5- SECTION C-C DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .005 AND 0.10 [0.13 AND .025] FROM THE LEAD TIP.  
 6- DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .008 [0.15] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OLDEST EXTREMES OF THE PLASTIC BODY.  
 7- DIMENSION #1 & #1 APPLIED TO BASE METAL ONLY.  
 8- DATUM A & B TO BE DETERMINED AT DATUM PLANE H.  
 9- OUTLINE CONFORMS TO JEDEC OUTLINE TO-252AA.

S Y M B O L	DIMENSIONS		DIMENSIONS		UNIT
	MIN.	MAX.	MIN.	MAX.	
A	2.18	2.39	.086	.094	INCHES
A1	-	0.13	-	.005	
B	0.64	0.89	.025	.035	7
B1	0.60	0.79	.020	.031	
B2	0.76	1.14	.030	.045	4
B3	0.99	0.46	.190	.210	
C	0.46	0.61	.018	.024	7
C1	0.41	0.56	.016	.022	
C2	0.46	0.89	.018	.030	4
D	5.97	6.22	.235	.245	
D1	5.21	-	.200	-	4
E	6.30	6.75	.250	.265	
E1	4.32	-	.170	-	4
H	9.40	10.41	.370	.410	
L	1.40	1.78	.055	.070	INCHES
L1	2.74	3.00	.108	.120	
L2	0.97	1.00	.039	.040	4
L3	0.99	1.27	.039	.050	
L4	-	1.02	-	.040	3
L5	1.14	1.52	.045	.060	
#1	0°	10°	0°	10°	1 = GATE
#2	30°	30°	30°	30°	

**LEAD ASSIGNMENTS**  
 1- GATE  
 2- DRAIN  
 3- SOURCE  
 4- DRAIN

**JEDEC**  
 1- GATE  
 2- DRAIN  
 3- SOURCE  
 4- DRAIN

**IGBT & GTO**  
 1- GATE  
 2- COLLECTOR  
 3- EMITTER  
 4- COLLECTOR

**Modified JEDEC outline TO-252AA**  
 Dimensions in millimeters and (inches)

Part Marking Information

EXAMPLE: THIS IS A 50WQ04FN  
 LOT CODE 8024  
 ASSEMBLED ON WW 02, 2003

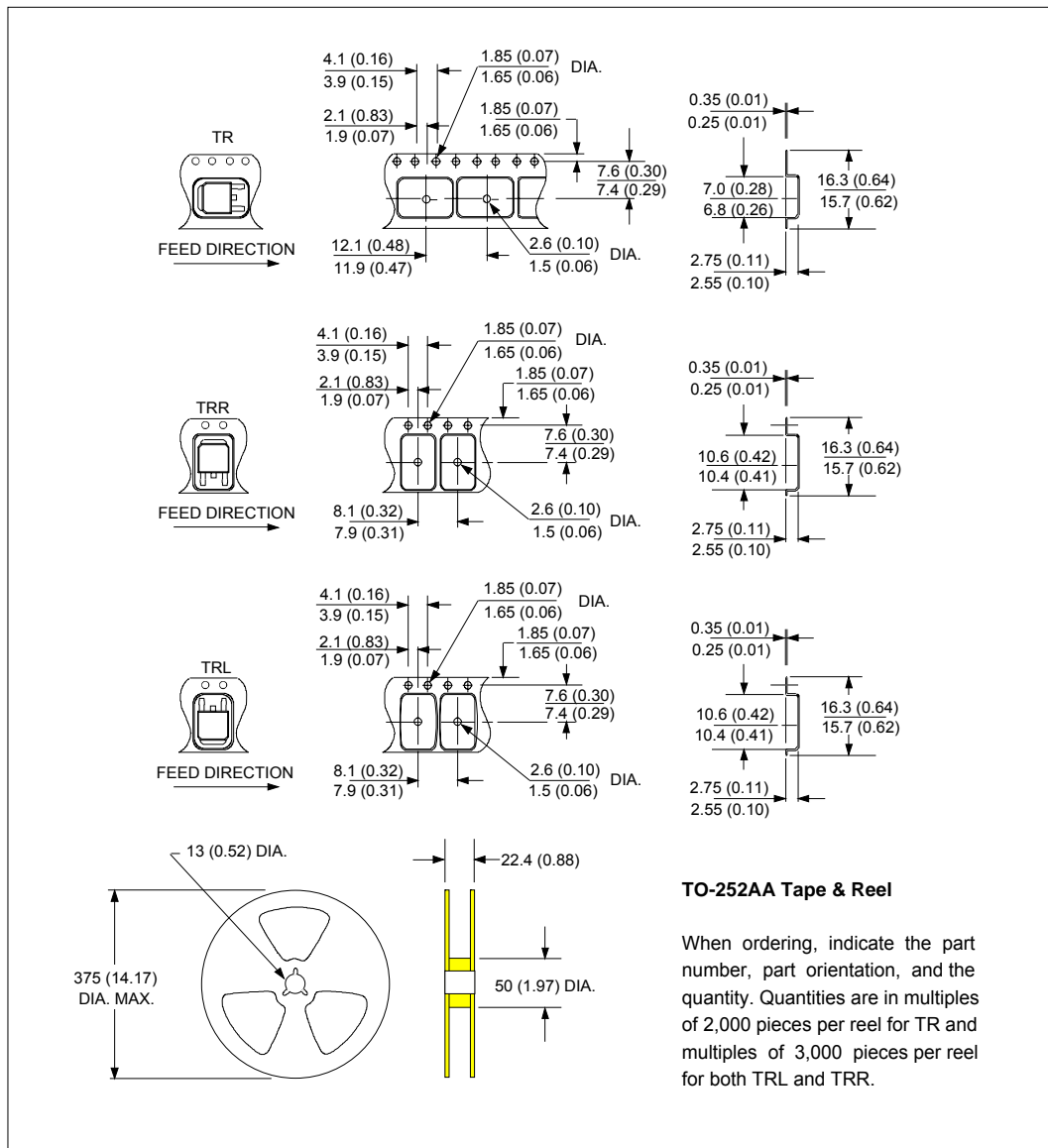
INTERNATIONAL  
 RECTIFIER  
 LOGO

ASSEMBLY  
 LOT CODE

50WQ04FN  
**IRF** P302X  
 80 24

PART NUMBER  
 DATE CODE  
 P = LEAD-FREE  
 YEAR 3 = 2003  
 WEEK 02  
 X = SITE ID

Tape & Reel Information



Ordering Information Table

Device Code															
	<table border="1" style="margin: auto;"> <tr> <td style="padding: 5px;">50</td> <td style="padding: 5px;">W</td> <td style="padding: 5px;">Q</td> <td style="padding: 5px;">04</td> <td style="padding: 5px;">FN</td> <td style="padding: 5px;">TRL</td> <td style="padding: 5px;">PbF</td> </tr> <tr> <td style="text-align: center;">①</td> <td style="text-align: center;">②</td> <td style="text-align: center;">③</td> <td style="text-align: center;">④</td> <td style="text-align: center;">⑤</td> <td style="text-align: center;">⑥</td> <td style="text-align: center;">⑦</td> </tr> </table>	50	W	Q	04	FN	TRL	PbF	①	②	③	④	⑤	⑥	⑦
50	W	Q	04	FN	TRL	PbF									
①	②	③	④	⑤	⑥	⑦									
<b>1</b>	- Current Rating (5.5A)														
<b>2</b>	- Package Identifier W = D-Pak														
<b>3</b>	- Schottky "Q" Series														
<b>4</b>	- Voltage Rating (04 = 40V)														
<b>5</b>	- FN = TO-252AA														
<b>6</b>	- <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>														
<b>7</b>	- <ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free</li> </ul>														

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