Bulletin PD-21089 rev. A 05/06

International
IOR Rectifier

12CWQ06FNPbF

SCHOTTKY RECTIFIER

12 Amp

$I_{F(AV)}$ = 12Amp
V_R = 60V

Major Ratings and Characteristics

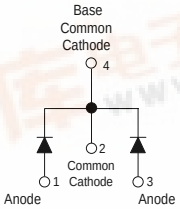
Characteristics		Values	Units
$I_{F(AV)}$	Rectangular waveform	12	A
V_{RRM}		60	V
I_{FSM}	@ tp = 5 µs sine	320	A
V_F	@6 Apk, T_J = 125°C (per leg)	0.57	V
T_J	range	-55 to 150	°C

Description/ Features

The 12CWQ06FNPbF 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
- Lead-Free ("PbF" suffix)

Case Styles



D-PAK (TO-252AA)

Voltage Ratings

	Part number	12CWQ06FNPbF
V_R	Max. DC Reverse Voltage (V)	60
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 = 131°C, rectangular wave form	
	Current * See Fig. 5 (Per Device)	12			
I_{FSM}	Max. Peak One Cycle Non-Repetitive	320	A	5µs Sine or 3µs Rect. pulse	Following any rated load condition and with rated V_{RRM} applied
	Surge Current * See Fig. 7	105		10ms Sine or 6ms Rect. pulse	
E_{AS}	Non-Repet. Avalan. Energy (Per Leg)	7	mJ	T_J = 25 °C, I_{AS} = 1.2 Amps, L = 10 mH	
I_{AR}	Repetitive Avalanche Current (Per Leg)	0.8	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	0.61	V	@ 6A	T_J = 25 °C
	(Per Leg) * See Fig. 1 (1)	0.79	V	@ 12A	
		0.57	V	@ 6A	T_J = 125 °C
		0.72	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)	35	mA	T_J = 125 °C	
$V_{F(TO)}$	Threshold Voltage	0.36	V	T_J = T_J max.	
r_t	Forward Slope Resistance	24.14	mΩ		
C_T	Typ. Junction Capacitance (Per Leg)	360	pF	V_R = 5V_{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
	Marking Device	12CWQ06FN		

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

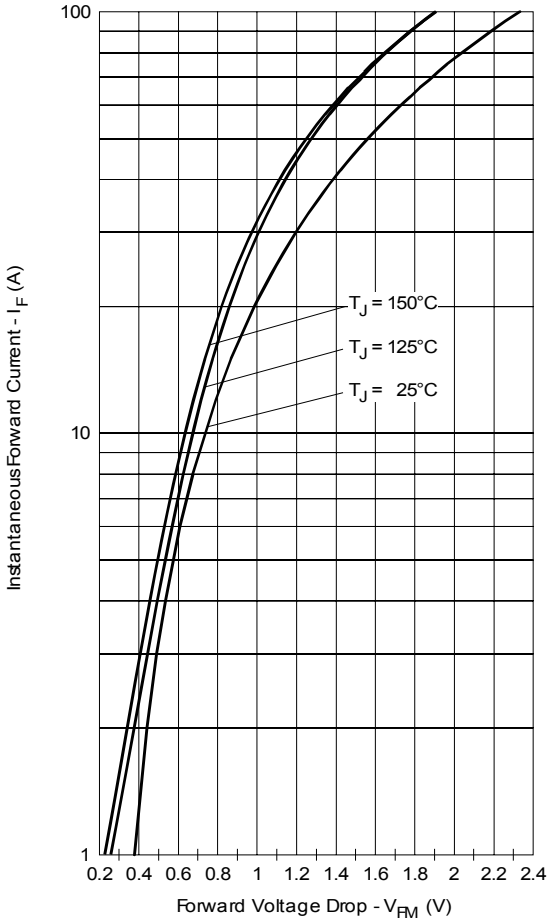


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

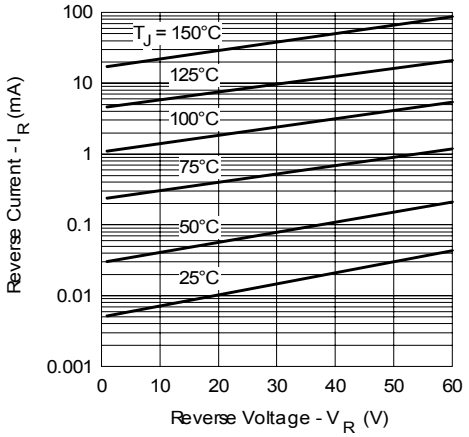


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

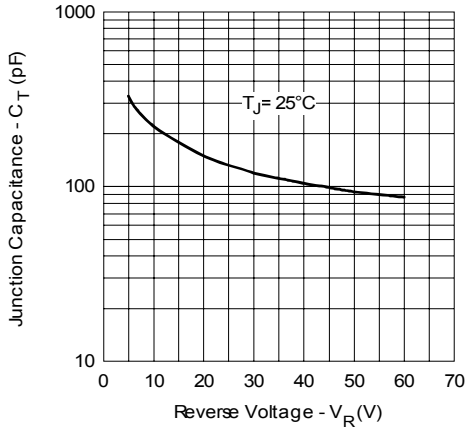


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

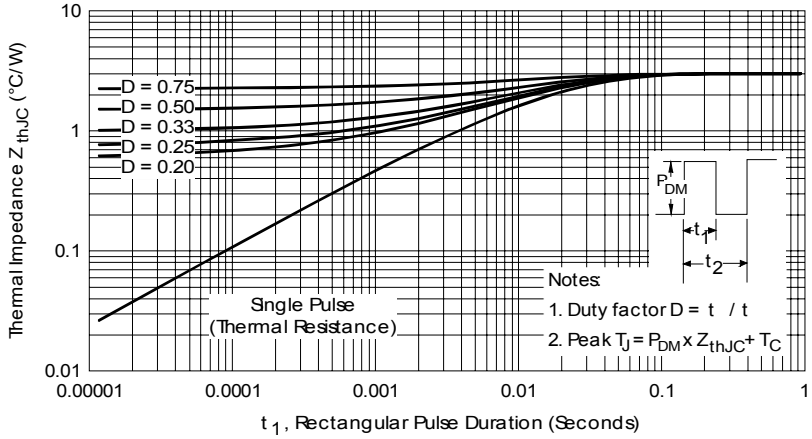


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

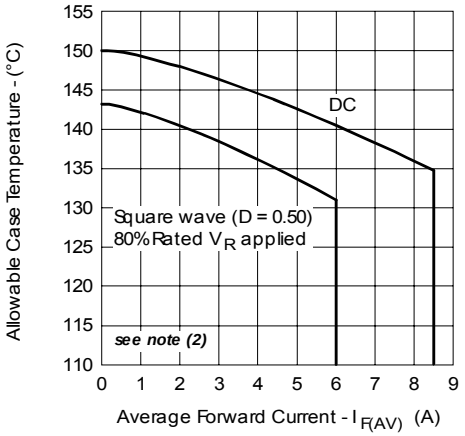


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

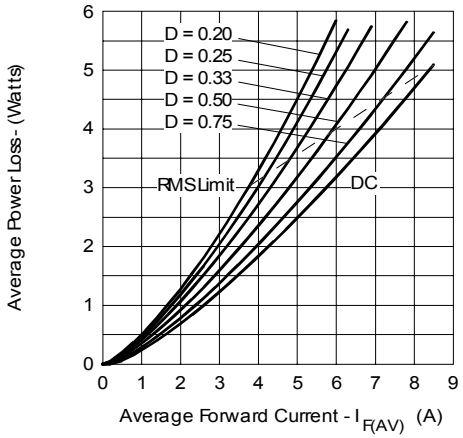


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

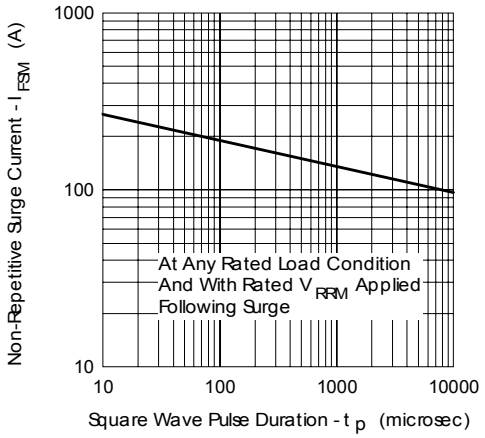
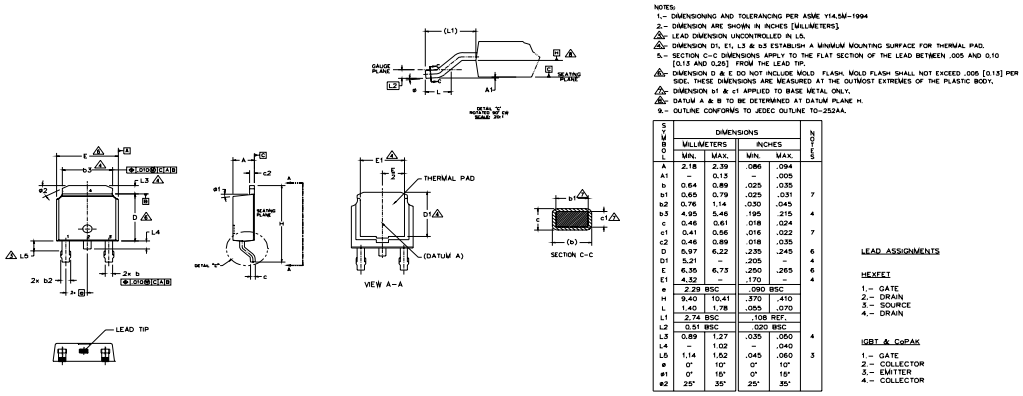


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

(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

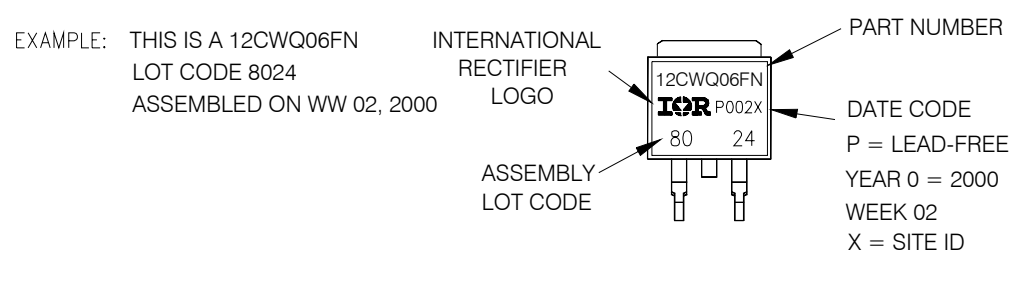
Outline Table



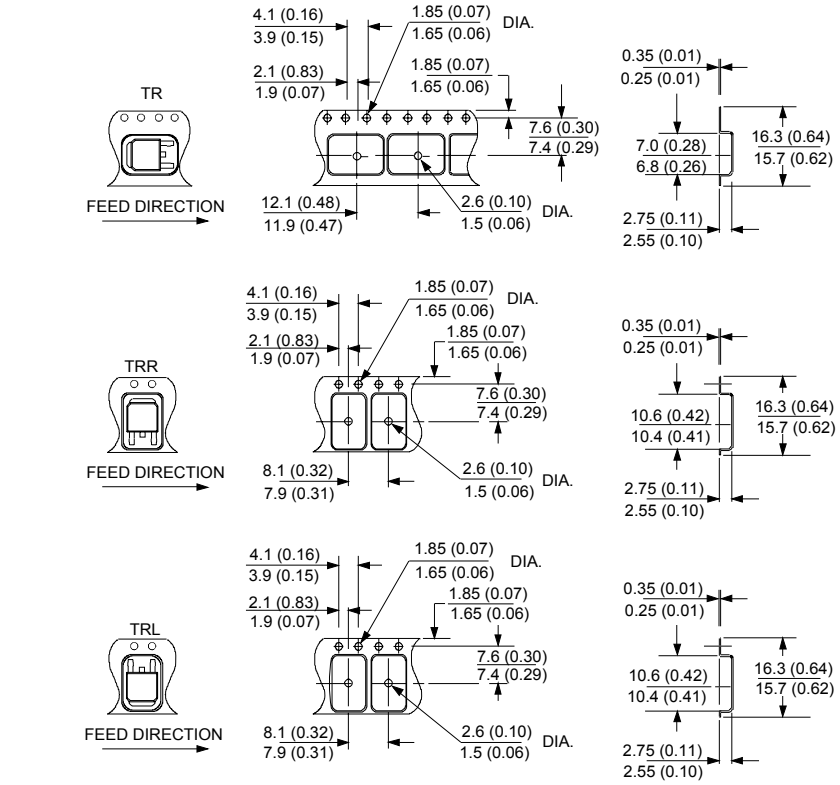
SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	2.18	2.39	.086	.094	
A1	–	0.13	–	.005	
b	0.64	0.89	.025	.035	
b1	0.65	0.79	.025	.031	7
b2	0.76	1.14	.030	.045	
b3	4.95	5.46	.195	.215	4
c	0.46	0.61	.018	.024	
c1	0.41	0.56	.016	.022	7
c2	0.46	0.89	.018	.035	
D	5.97	6.22	.235	.245	6
D1	5.21	–	.205	–	4
E	6.35	6.73	.250	.265	6
E1	4.32	–	.170	–	4
e	2.29 BSC		.090 BSC		
H	9.40	10.41	.370	.410	
L	1.40	1.78	.055	.070	
L1	2.74 BSC		.108 REF.		
L2	0.51 BSC		.020 BSC		
L3	0.89	1.27	.035	.050	4
L4	–	1.02	–	.040	
L5	1.14	1.52	.045	.060	3
ø	0°	10°	0°	10°	
ø1	0°	15°	0°	15°	
ø2	25°	35°	25°	35°	

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

Part Marking Information



Tape & Reel Information

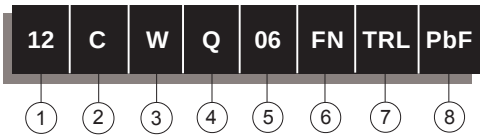


TO-252AA Tape & Reel

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.

Ordering Information Table

Device Code



1	-	Current Rating (12A)
2	-	Center Tap Configuration
3	-	Package Identifier W = D-Pak
4	-	Schottky "Q" Series
5	-	Voltage Rating (06 = 60V)
6	-	FN = TO-252AA
7	-	• none = Tube (50 pieces) • TR = Tape & Reel • TRL = Tape & Reel (Left Oriented) • TRR = Tape & Reel (Right Oriented)
8	-	• none = Standard Production • PbF = Lead-Free

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12CWQ06FN
*****************************************
* 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 paralled VCG2T         *
*****************************************
.SUBCKT 12CWQ06FN ANO CAT
D1 ANO 1 DMOD (0.03191)
*Define diode model
.MODEL DMOD D(IS=8.95944674613071E-05A,N=1.03666612245428,BV=67V,
+ IBV=0.232083097618696A,RS= 0.00089348,CJO=2.04854724822182E-08,
+ VJ=1.34189135485872,XTI=2, EG=0.732501148466477)
*****************************************
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=52.5561105683715)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP((((-3.507402E-03/52.55611)*((V(2,CAT)*1E6)/
(I(VX)+1E-6)-1))+1)*4.963732E-02*ABS(V(ANO,CAT)))-1)}
*****************************************
.ENDS 12CWQ06FN


Thermal Model Subcircuit
.SUBCKT 12CWQ06FN  5 1

CTHERM1     5    4     8.75E-04
CTHERM2     4    3     5.33E+01
CTHERM3     3    2     2.05E+02
CTHERM4     2    1     7.61E+02

RTHERM1     5    4     1.00E-07
RTHERM2     4    3     1.65E+00
RTHERM1     3    2     1.12E+00
RTHERM1     2    1     2.29E-01


.ENDS 12CWQ06FN
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Data and specifications subject to change without notice.
This product has been designed and qualified for Consumer Level and Lead-Free.
Qualification Standards can be found on IR's Web site.

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