

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

**Major Ratings and Characteristics**

Characteristics	Value	Units
$I_{F(AV)}$ Rectangular waveform	1.0	A
$V_{RRM}$	40	V
$I_{FSM}$ @tp = 5 $\mu$ s sine	380	A
$V_F$ @1.0 Apk, $T_J = 125^\circ\text{C}$	0.53	V
$T_J$ range	-55 to 150	$^\circ\text{C}$

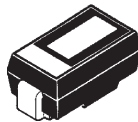
**Description/ Features**

The MBRS140TRPbF 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**

MBRS140TRPbF



SMB



## Voltage Ratings

Part number	MBRS140TRPbF
$V_R$ Max. DC Reverse Voltage (V)	40
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)	

## Absolute Maximum Ratings

Parameters	Value	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current	1.0	A	50% duty cycle @ $T_L = 119^\circ\text{C}$ , rectangular wave form
$I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current	380	A	5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse
	40		10ms Sine or 6ms Rect. pulse
$E_{AS}$ Non- Repetitive Avalanche Energy	3.0	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 1\text{A}$ , $L = 6\text{mH}$
$I_{AR}$ Repetitive Avalanche Current	1.0	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	Typ.	Max	Units	Conditions
$V_{FM}$ Max. Forward Voltage Drop (1)	0.52	0.6	V	@ 1A
	0.70	0.77	V	@ 2A
	0.48	0.53	V	@ 1A
	0.63	0.71	V	@ 2A
				$T_J = 25^\circ\text{C}$
				$T_J = 125^\circ\text{C}$
$I_{RM}$ Max. Reverse Leakage Current (1)	-	0.1	mA	$T_J = 25^\circ\text{C}$
	-	4.0	mA	$T_J = 125^\circ\text{C}$
				$V_R = \text{rated } V_R$
$C_T$ Max. Junction Capacitance	-	80	pF	$V_R = 5V_{DC}$ (test signal range 100kHz to 1MHz) $25^\circ\text{C}$
$L_S$ Typical Series Inductance	-	2.0	nH	Measured lead to lead 5mm from package body
$dv/dt$ Max. Voltage Rate of Change (Rated $V_R$ )	-	10000	V/ $\mu\text{s}$	

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

## Thermal-Mechanical Specifications

Parameters	Value	Units	Conditions
$T_J$ Max. Junction Temperature Range(*)	-55 to 150	$^\circ\text{C}$	
$T_{stg}$ Max. Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$R_{thJL}$ Max. Thermal Resistance Junction to Lead (**)	36	$^\circ\text{C/W}$	DC operation (See Fig. 4)
$R_{thJA}$ Max. Thermal Resistance Junction to Ambient	80	$^\circ\text{C/W}$	DC operation
wt Approximate Weight	0.10(0.003)	g (oz.)	
Case Style	SMB		Similar to DO-214AA
Device Marking	IR14		

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

(\*\*) Mounted 1 inch square PCB

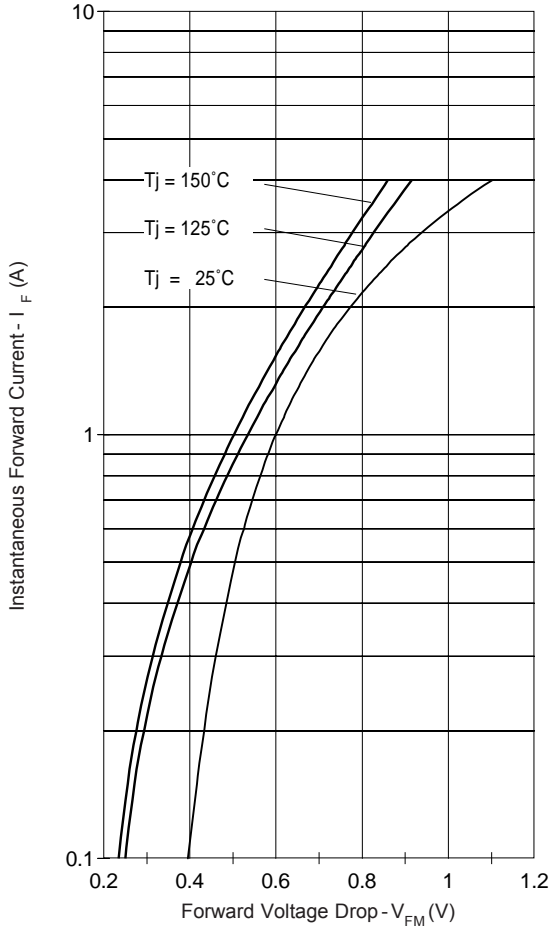


Fig. 1 - Maximum Forward Voltage Drop Characteristics

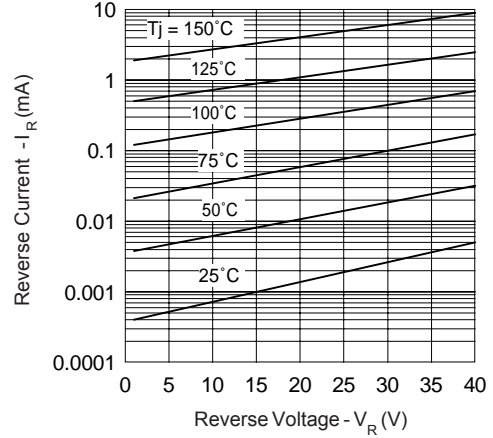


Fig. 2 - Typical Peak Reverse Current Vs. Reverse Voltage

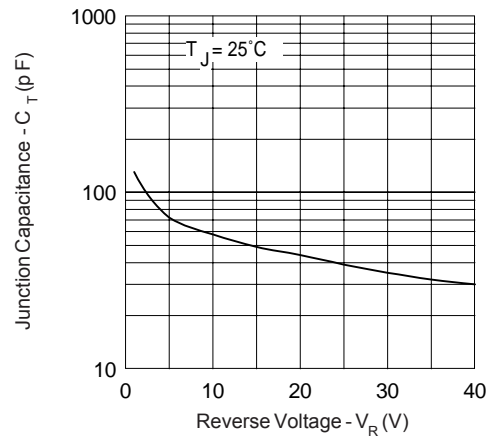


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

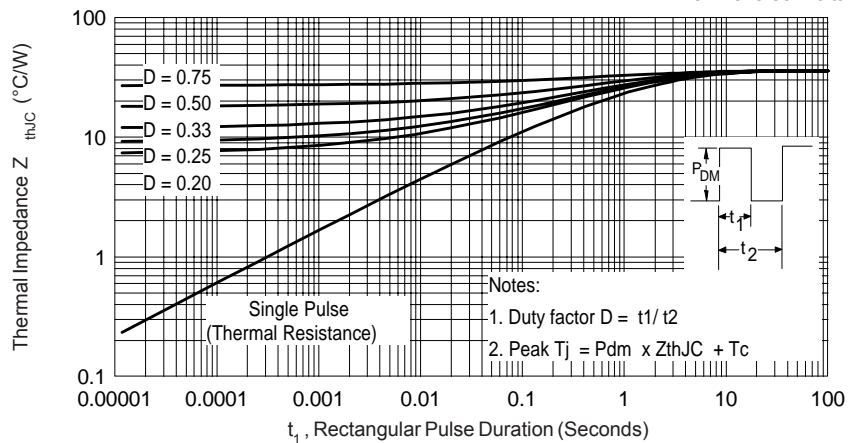


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

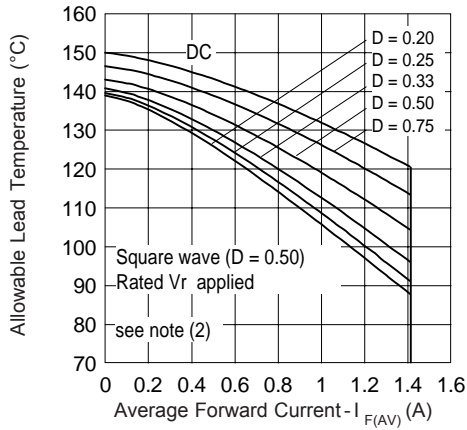


Fig. 4 - Maximum Average Forward Current Vs. Allowable Lead Temperature

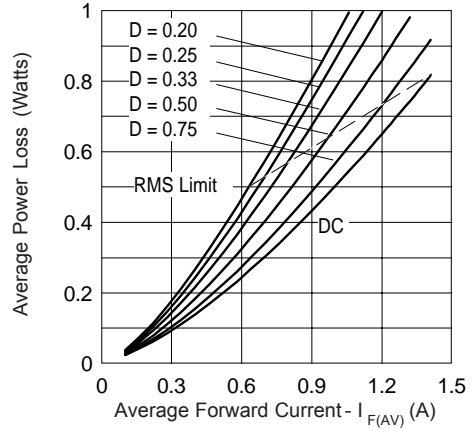


Fig. 5 - Maximum Average Forward Dissipation Vs. Average Forward Current

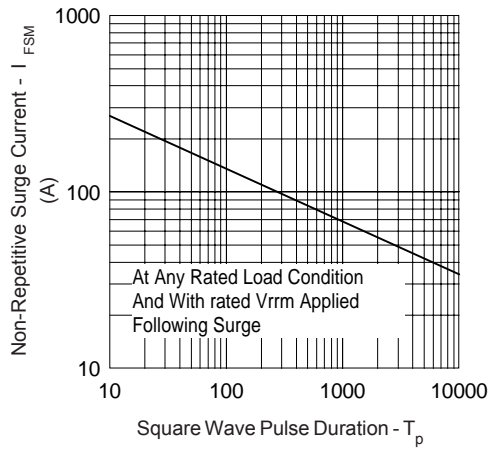
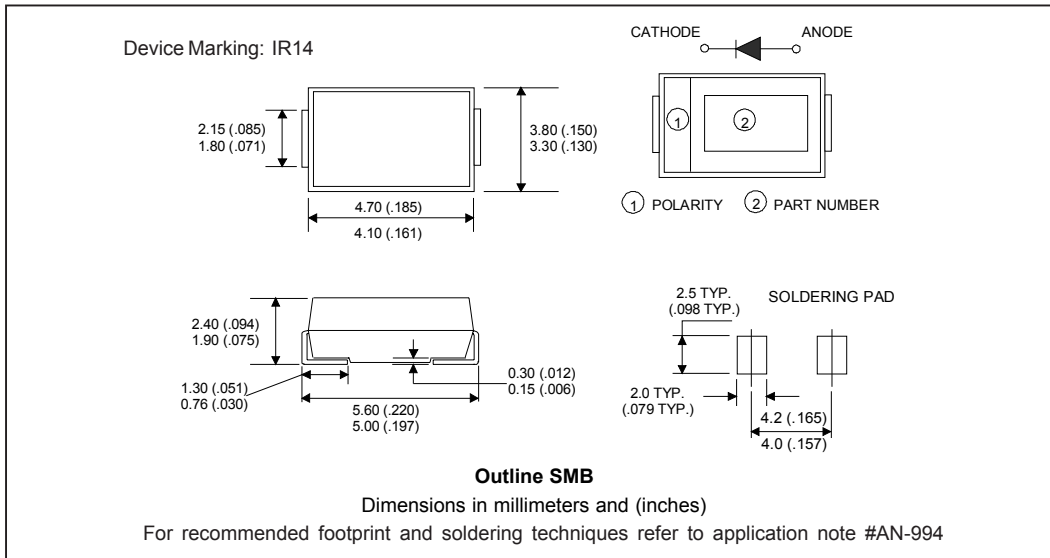


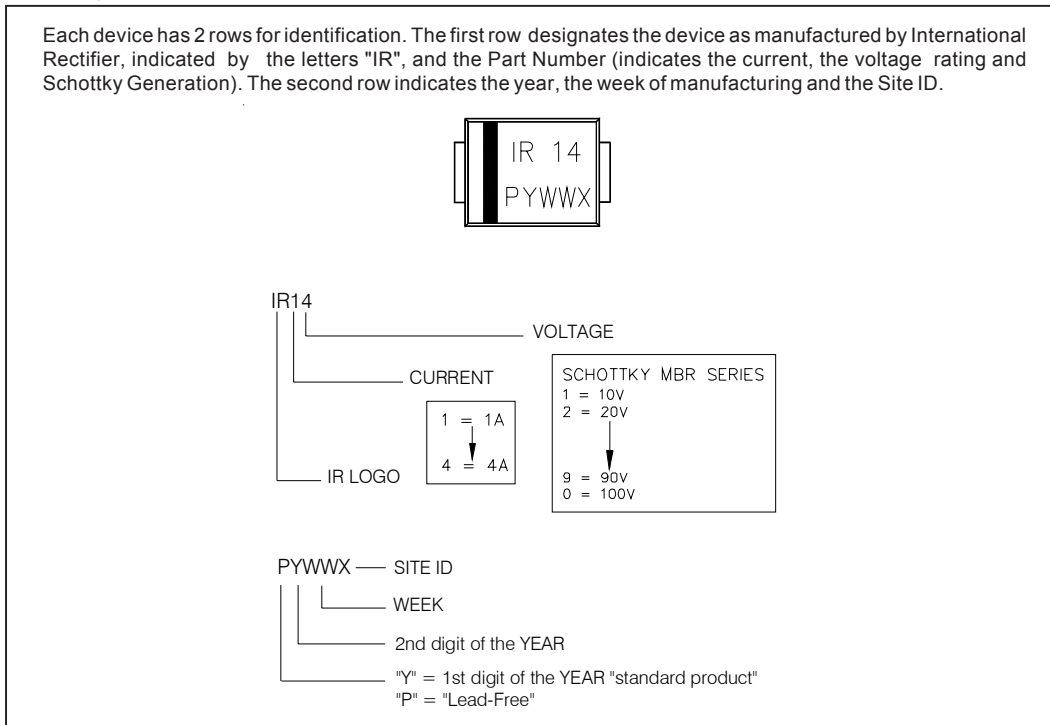
Fig. 6 - Maximum Peak Surge Forward Current Vs. Pulse Duration

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

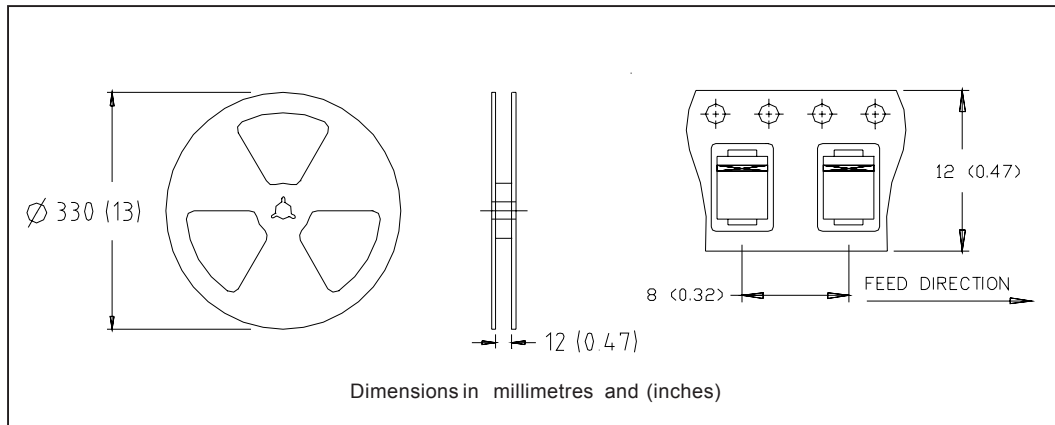
Outline Table



Marking & Identification



Tape & Reel Information



Ordering Information Table

Device Code	
<b>MBR</b>	<b>S</b>
1	2
3	4
5	6
<b>1</b>	- Schottky MBR Series
<b>2</b>	- S = SMB
<b>3</b>	- Current Rating (1 = 1 A)
<b>4</b>	- Voltage Rating (40 = 40V)
<b>5</b>	- TR = Tape & Reel (3000 pieces)
<b>6</b>	- • none = Standard Production • PbF = Lead-Free

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MBRS140TR
*****
* This model has been developed by *
* Wizard SPICE MODEL GENERATOR (1999) *
* (International Rectifier Corporation) *
* Contain Proprietary Information *
*****
* SPICE Model Diode is composed by a *
* simple diode plus paralalled VCG2T *
*****
.SUBCKT MBRS140TR ANO CAT
D1 ANO 1 DMOD (0.00472)
*Define diode model
.MODEL DMOD D(IS=1.97976145988308E-04A,N=1.26859975252172,BV=52V,
+IBV=0.398018928721903A,RS= 0.00064192,CJO=4.04605589057834E-08,
+VJ=1.033218502959,XTI=2, EG=0.793941654518305)
*****
*Implementation of VCG2T
VX 1 2 DC 0V
R1 2 CAT TRES 1E-6
.MODEL TRES RES(R=1,TC1=-5.28209710108381)
GP1 ANO CAT VALUE={-ABS(I(VX))*(EXP(((((-4.223696E-03/-5.282097)*((V(2,CAT)*1E6)/(I(VX)+1E-6)-
1)))+1)*8.300212E-02*ABS(V(ANO,CAT)))-1)}
*****
.ENDS MBRS140TR

Thermal Model Subcircuit
.SUBCKT MBRS140TR 5 1

CTHERM1 5 4 2.37E+00
CTHERM2 4 3 2.83E+01
CTHERM3 3 2 3.25E+02
CTHERM4 2 1 1.15E+04

RTHERM1 5 4 1.18E+01
RTHERM2 4 3 1.55E+01
RTHERM1 3 2 7.12E+00
RTHERM1 2 1 1.32E+00

.ENDS MBRS140TR
    
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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.