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1N5817 MBR115P
1N5818 MBR120P
1N5819 MBR130P
MBR140P

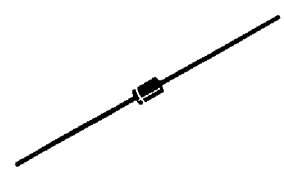
AXIAL LEAD RECTIFIERS

. . . employing the Schottky Barrier principle in a large area metal-to-silicon power diode. State-of-the-art geometry features epitaxial construction with oxide passivation and metal overlap contact. Ideally suited for use as rectifiers in low-voltage, high-frequency inverters, free wheeling diodes, and polarity protection diodes.

- Extremely Low v_F
- Low Stored Charge, Majority Carrier Conduction
- Low Power Loss/High Efficiency

SCHOTTKY BARRIER RECTIFIERS

1 AMPERE
15, 20, 30, 40 VOLTS



*MAXIMUM RATINGS

Rating	Symbol	MBR115P	1N5817 MBR120P	1N5818 MBR130P	1N5819 MBR140P	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	15	20	30	40	V
Non-Repetitive Peak Reverse Voltage	V_{RSM}	15	24	36	48	V
RMS Reverse Voltage	$V_{R(RMS)}$	10	14	21	28	V
Average Rectified Forward Current (2) ($V_{R(equiv)} \leq 0.2\ V_R(dc)$, $T_L = 90°C$, $R_{\theta JA} = 80°C/W$, P.C. Board Mounting, see Note 2, $T_A = 55°C$)	I_O	← 1.0 →				A
Ambient Temperature (Rated $V_R(dc)$, $P_{F(AV)} = 0$, $R_{\theta JA} = 80°C/W$)	T_A	90	85	80	75	°C
Non-Repetitive Peak Surge Current (Surge applied at rated load conditions, half-wave, single phase 60 Hz, $T_L = 70°C$)	I_{FSM}	← 25 (for one cycle) →				A
Operating and Storage Junction Temperature Range (Reverse Voltage applied)	T_J, T_{stg}	← −65 to +125 →				°C
Peak Operating Junction Temperature (Forward Current applied)	$T_{J(pk)}$	← 150 →				°C

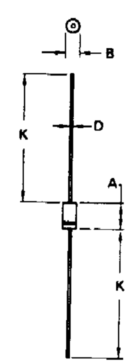
*THERMAL CHARACTERISTICS (Note 2)

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	80	°C/W

*ELECTRICAL CHARACTERISTICS ($T_L = 25°C$ unless otherwise noted) (2)

Characteristic	Symbol	1N5817	1N5818	1N5819	MBR115P MBR120P MBR130P	MBR140P	Unit
Maximum Instantaneous Forward Voltage (1)	v_F						V
($i_F = 0.1$ A)		0.320	0.330	0.340	0.350	0.350	
($i_F = 1.0$ A)		0.450	0.550	0.600	0.550	0.600	
($i_F = 3.0$ A)		0.750	0.875	0.900	0.850	0.900	
Maximum Instantaneous Reverse Current @ Rated dc Voltage (1)	i_R						mA
($T_L = 25°C$)		1.0	1.0	1.0	1.0	1.0	
($T_L = 100°C$)		10	10	10	10	10	

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.
(2) Lead Temperature reference is cathode lead 1/32" from case.
*Indicates JEDEC Registered Data for 1N5817-19.



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	5.97	6.60	0.235	0.260
B	2.79	3.05	0.110	0.120
D	0.76	0.86	0.030	0.034
K	27.94	–	1.100	–

CASE 59-04

MECHANICAL CHARACTERISTICS

CASE . . . . Transfer molded plastic
FINISH . . . . All external surfaces corrosion-resistant and the terminal leads are readily solderable
POLARITY . . . . Cathode indicated by polarity band
MOUNTING POSITIONS . . . . Any
SOLDERING . . . . 220°C 1/16" from case for ten seconds

NOTE 1 – DETERMINING MAXIMUM RATINGS

Reverse power dissipation and the possibility of thermal runaway must be considered when operating this rectifier at reverse voltages above 0.1 V_{RWM}. Proper derating may be accomplished by use of equation (1).

$$T_{A(max)} = T_{J(max)} - R_{\theta JA}P_{F(AV)} - R_{\theta JA}P_{R(AV)} \quad (1)$$

where $T_{A(max)}$ = Maximum allowable ambient temperature
$T_{J(max)}$ = Maximum allowable junction temperature (125°C or the temperature at which thermal runaway occurs, whichever is lowest)
$P_{F(AV)}$ = Average forward power dissipation
$P_{R(AV)}$ = Average reverse power dissipation
$R_{\theta JA}$ = Junction-to-ambient thermal resistance

Figures 1, 2, and 3 permit easier use of equation (1) by taking reverse power dissipation and thermal runaway into consideration. The figures solve for a reference temperature as determined by equation (2).

$$T_R = T_{J(max)} - R_{\theta JA}P_{R(AV)} \quad (2)$$

Substituting equation (2) into equation (1) yields:

$$T_{A(max)} = T_R - R_{\theta JA}P_{F(AV)} \quad (3)$$

Inspection of equations (2) and (3) reveals that T_R is the ambient temperature at which thermal runaway occurs or where T_J = 125°C, when forward power is zero. The transition from one boundary condition to the other is evident on the curves of Figures 1, 2, and 3 as a difference in the rate of change of the slope in the vicinity of 115°C. The data of Figures 1, 2, and 3 is based upon dc conditions. For use in common rectifier circuits, Table 1 indicates suggested factors for an equivalent dc voltage to use for conservative design, that is:

$$V_{R(equiv)} = V_{in(PK)} \times F \quad (4)$$

The factor F is derived by considering the properties of the various rectifier circuits and the reverse characteristics of Schottky diodes.

EXAMPLE: Find $T_{A(max)}$ for 1N5818 operated in a 12-volt dc supply using a bridge circuit with capacitive filter such that I_{DC} = 0.4 A ($I_{F(AV)}$ = 0.5 A), $I_{(FM)}/I_{(AV)}$ = 10, Input Voltage = 10 $V_{(rms)}$, $R_{\theta JA}$ = 80°C/W.

Step 1. Find $V_{R(equiv)}$. Read F = 0.65 from Table 1,
$\therefore V_{R(equiv)} = (1.41)(10)(0.65) = 9.2$ V.

Step 2. Find T_R from Figure 2. Read T_R = 109°C
@ V_R = 9.2 V and $R_{\theta JA}$ = 80°C/W.

Step 3. Find $P_{F(AV)}$ from Figure 4. **Read $P_{F(AV)}$ = 0.5 W
@ $\frac{I_{(FM)}}{I_{(AV)}}$ = 10 and $I_{F(AV)}$ = 0.5 A.

Step 4. Find $T_{A(max)}$ from equation (3).
$T_{A(max)}$ = 109 – (80) (0.5) = 69°C.

**Values given are for the 1N5818. Power is slightly lower for the 1N5817 because of its lower forward voltage, and higher for the 1N5819. Variations will be similar for the MBR-prefix devices, using $P_{F(AV)}$ from Figure 7.

TABLE 1 – VALUES FOR FACTOR F

Circuit	Half Wave		Full Wave, Bridge		Full Wave, Center Tapped*†	
Load	Resistive	Capacitive*	Resistive	Capacitive	Resistive	Capacitive
Sine Wave	0.5	1.3	0.5	0.65	1.0	1.3
Square Wave	0.75	1.5	0.75	0.75	1.5	1.5

*Note that $V_{R(PK)} \approx 2.0\, V_{in(PK)}$. †Use line to center tap voltage for V_{in}.

FIGURE 1 – MAXIMUM REFERENCE TEMPERATURE
1N5817/MBR115P/MBR120P

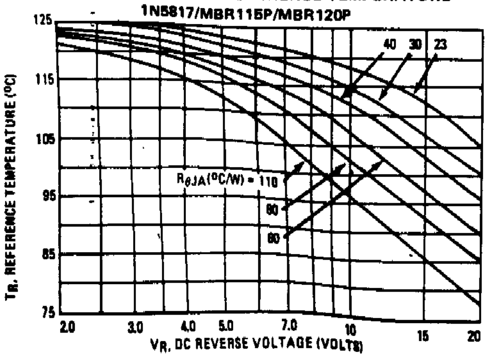


FIGURE 2 – MAXIMUM REFERENCE TEMPERATURE
1N5818/MBR130P

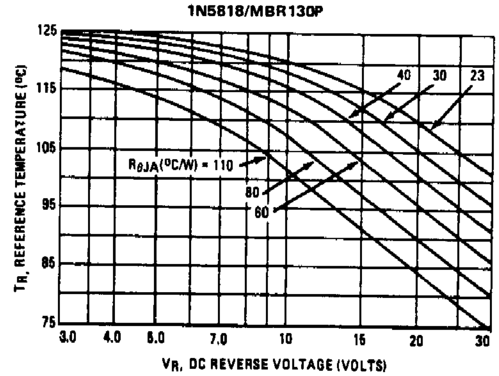


FIGURE 3 – MAXIMUM REFERENCE TEMPERATURE
1N5819/MBR140P

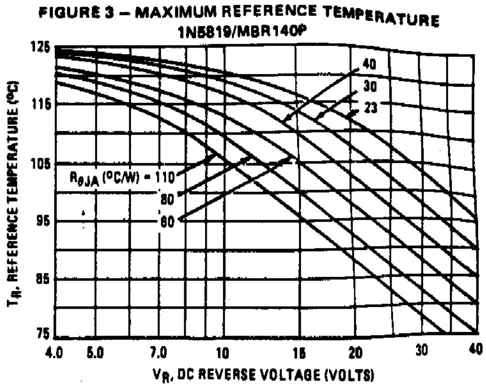


FIGURE 4 – STEADY-STATE THERMAL RESISTANCE