# MBR120LSF, NRVB120LSF

# Surface Mount Schottky Power Rectifier

## Plastic SOD−123 Package

This device uses the Schottky Barrier principle with a large area metal−to−silicon power diode. Ideally suited for low voltage, high frequency rectification or as free wheeling and polarity protection diodes in surface mount applications where compact size and weight are critical to the system. This package also provides an easy to work with alternative to leadless 34 package style. Because of its small size, it is ideal for use in portable and battery powered products such as cellular and cordless phones, chargers, notebook computers, printers, PDAs and PCMCIA cards. Typical applications are AC−DC and DC−DC converters, reverse battery protection, and "Oring" of multiple supply voltages and any other application where performance and size are critical.

### Features

- Guardring for Stress Protection
- Low Forward Voltage
- 125°C Operating Junction Temperature
- Epoxy Meets UL 94 V−0 @ 0.125 in
- Package Designed for Optimal Automated Board Assembly
- ESD Rating:
  - Human Body Model = 3B
  - Machine Model = C
- NRVB Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

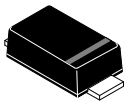
### Mechanical Characteristics

- Device Marking: L2L
- Polarity Designator: Cathode Band
- Weight: 11.7 mg (approximately)
- Case: Epoxy, Molded
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads are Readily Solderable
- Lead and Mounting Surface Temperature for Soldering Purposes: 260°C Max. for 10 Seconds

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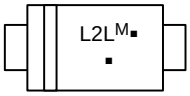
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**SCHOTTKY BARRIER RECTIFIER 1.0 AMPERES 20 VOLTS**



**SOD−123FL**
**CASE 498**

**MARKING DIAGRAM**




L2L = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| MBR120LSFT1G | SOD−123FL (Pb−Free) | 3,000 / Tape & Reel ** |
| NRVB120LSFT1G | SOD−123FL (Pb−Free) | 3,000 / Tape & Reel ** |
| MBR120LSFT3G | SOD−123FL (Pb−Free) | 10,000 / Tape & Reel *** |

** 8 mm Tape, 7" Reel
*** 8 mm Tape, 13" Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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## MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | 20 | V |
| Average Rectified Forward Current<br>(At Rated $V_R$, $T_L$ = 115°C) | $I_O$ | 1.0 | A |
| Peak Repetitive Forward Current<br>(At Rated $V_R$, Square Wave, 100 kHz, $T_L$ = 110°C) | $I_{FRM}$ | 2.0 | A |
| Non−Repetitive Peak Surge Current<br>(Non−Repetitive peak surge current, halfwave, single phase, 60 Hz) | $I_{FSM}$ | 50 | A |
| Storage Temperature | $T_{stg}$ | −55 to 150 | °C |
| Operating Junction Temperature | $T_J$ | −55 to 125 | °C |
| Voltage Rate of Change (Rated $V_R$, $T_J$ = 25°C) | dv/dt | 10,000 | V/μs |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## THERMAL CHARACTERISTICS

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance − Junction−to−Lead (Note 1)<br>Thermal Resistance − Junction−to−Lead (Note 2)<br>Thermal Resistance − Junction−to−Ambient (Note 1)<br>Thermal Resistance − Junction−to−Ambient (Note 2) | $R_{tjl}$<br>$R_{tjl}$<br>$R_{tja}$<br>$R_{tja}$ | 26<br>21<br>325<br>82 | °C/W |

1. Mounted with minimum recommended pad size, PC Board FR4.
2. Mounted with 1 in. copper pad (Cu area 700 $mm^2$).

## ELECTRICAL CHARACTERISTICS

| Characteristic | Symbol | Value | | Unit |
|---|---|---|---|---|
| Maximum Instantaneous Forward Voltage (Note 3), See Figure 2 | $V_F$ | **$T_J$ = 25°C** | **$T_J$ = 85°C** | V |
| ($I_F$ = 0.1 A)<br>($I_F$ = 1.0 A)<br>($I_F$ = 3.0 A) | | 0.34<br>0.45<br>0.65 | 0.26<br>0.415<br>0.67 | |
| Maximum Instantaneous Reverse Current (Note 3), See Figure 4 | $I_R$ | **$T_J$ = 25°C** | **$T_J$ = 85°C** | mA |
| ($V_R$ = 20 V)<br>($V_R$ = 10 V) | | 0.40<br>0.10 | 25<br>18 | |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Pulse Test: Pulse Width ≤ 250 μs, Duty Cycle ≤ 2%.

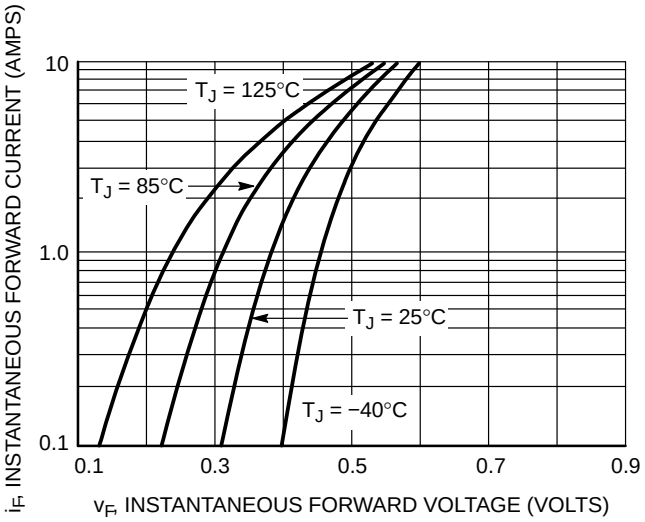



**Figure 1. Typical Forward Voltage**

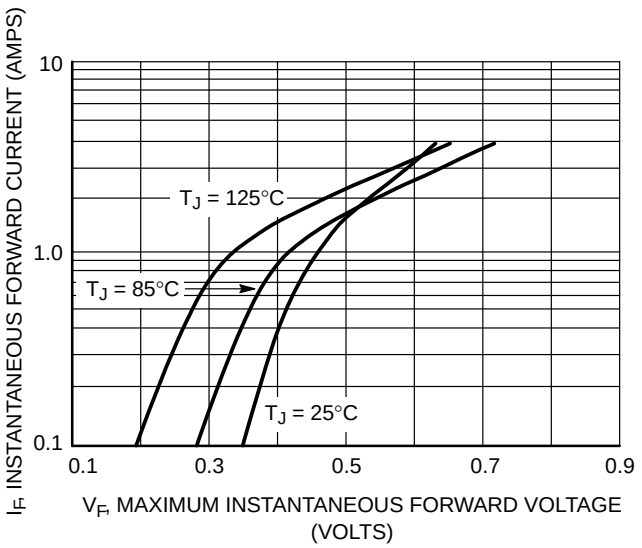



**Figure 2. Maximum Forward Voltage**

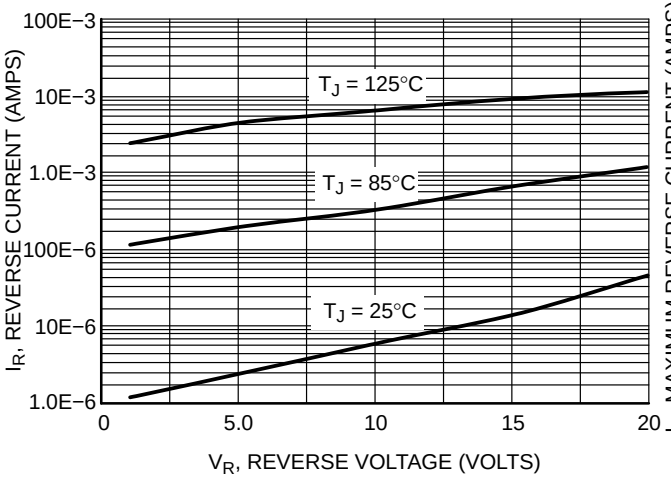



**Figure 3. Typical Reverse Current**

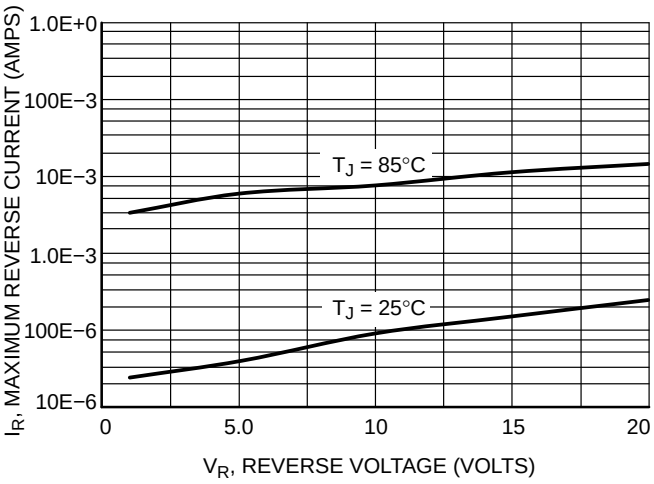



**Figure 4. Maximum Reverse Current**

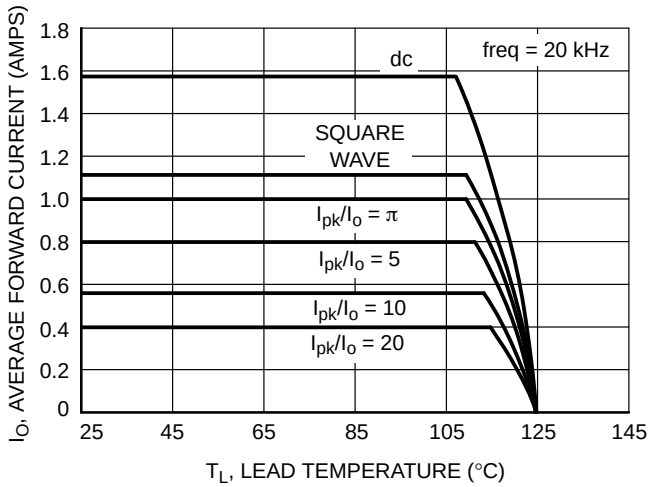



**Figure 5. Current Derating**

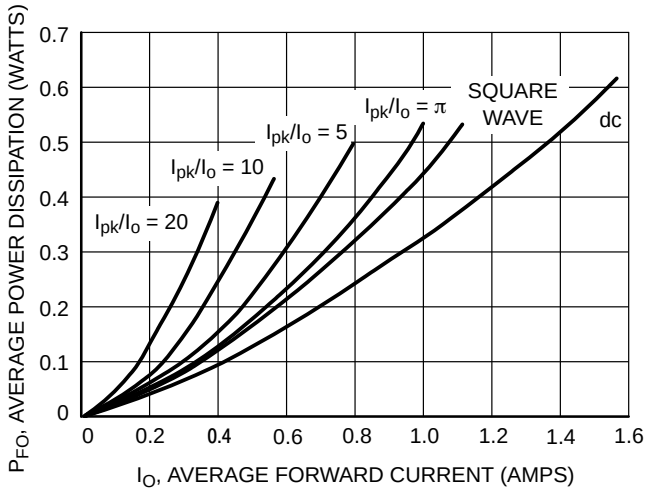



**Figure 6. Forward Power Dissipation**

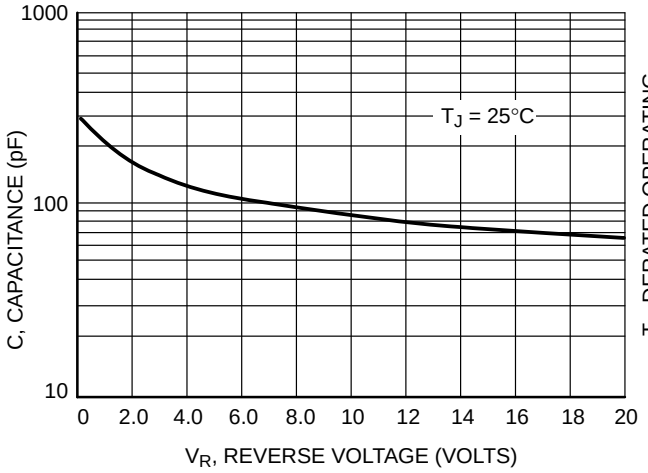



**Figure 7. Capacitance**

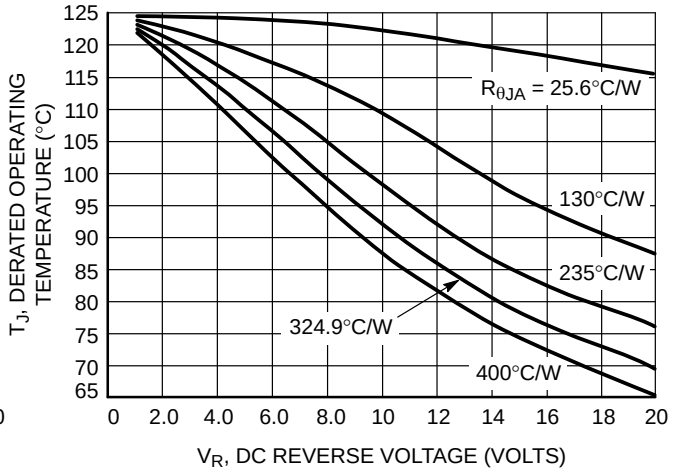



**Figure 8. Typical Operating Temperature Derating***

* Reverse power dissipation and the possibility of thermal runaway must be considered when operating this device under any reverse voltage conditions. Calculations of $T_J$ therefore must include forward and reverse power effects. The allowable operating $T_J$ may be calculated from the equation: $T_J = T_{Jmax} - r(t)(Pf + Pr)$ where
r(t) = thermal impedance under given conditions,
Pf = forward power dissipation, and
Pr = reverse power dissipation
This graph displays the derated allowable $T_J$ due to reverse bias under DC conditions only and is calculated as $T_J = T_{Jmax} - r(t)Pr$, where r(t) = Rthja. For other power applications further calculations must be performed.

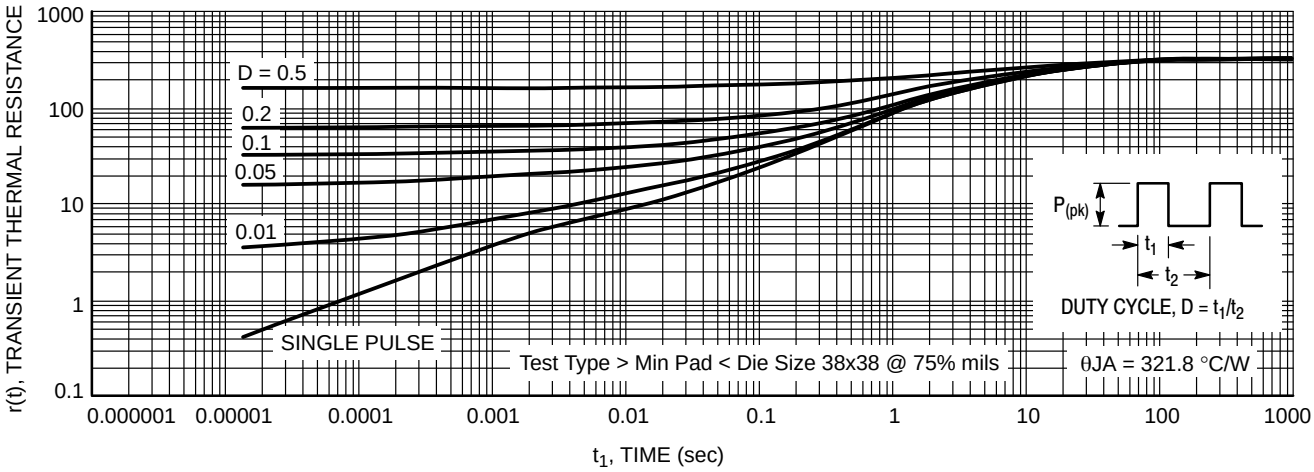
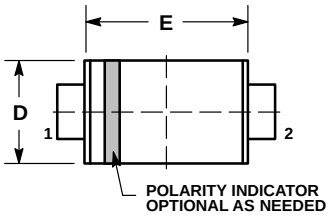


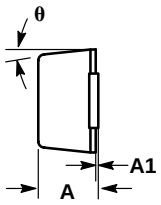

**Figure 9. Thermal Response**

## PACKAGE DIMENSIONS

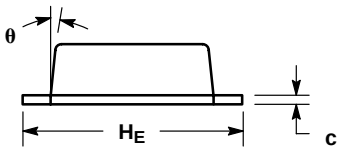
**SOD−123FL**
CASE 498
ISSUE D



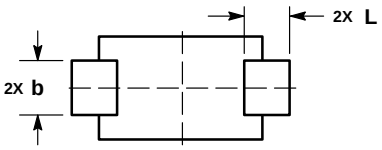

TOP VIEW




END VIEW




SIDE VIEW

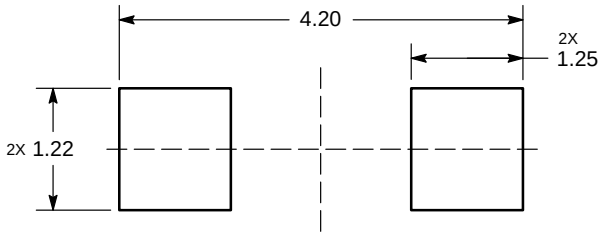



BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH.
4. DIMENSIONS D AND J ARE TO BE MEASURED ON FLAT SECTION OF THE LEAD: BETWEEN 0.10 AND 0.25 MM FROM THE LEAD TIP.

| | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| DIM | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.90 | 0.95 | 0.98 | 0.035 | 0.037 | 0.039 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| b | 0.70 | 0.90 | 1.10 | 0.028 | 0.035 | 0.043 |
| c | 0.10 | 0.15 | 0.20 | 0.004 | 0.006 | 0.008 |
| D | 1.50 | 1.65 | 1.80 | 0.059 | 0.065 | 0.071 |
| E | 2.50 | 2.70 | 2.90 | 0.098 | 0.106 | 0.114 |
| L | 0.55 | 0.75 | 0.95 | 0.022 | 0.030 | 0.037 |
| $H_E$ | 3.40 | 3.60 | 3.80 | 0.134 | 0.142 | 0.150 |
| θ | 0° | – | 8° | 0° | – | 8° |

### RECOMMENDED SOLDERING FOOTPRINT*




DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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