

# MSRB860-1

## Product Preview

### **SWITCHMODE™** **Soft Recovery Power** **Rectifier** **D<sup>2</sup>PAK-SL Straight Lead**



**ON Semiconductor®**

<http://onsemi.com>

Designed for use as free wheeling diodes in variable speed motor control applications and other average frequency switching power supplies. These state-of-the-art devices have the following features:

- Soft Recovery with Guaranteed Low Reverse Recovery Charge ( $Q_{RR}$ ) and Peak Reverse Recovery Current ( $I_{RRM}$ )
- 150°C Operating Junction Temperature
- Epoxy meets UL94,  $V_0$  @ 1/8"
- Low Forward Voltage
- Low Leakage Current
- High Temperature Glass Passivated Junction

#### **Mechanical Characteristics:**

- Case: Molded Epoxy
- Weight: 1.9 Grams (approximately)
- Finish: All External Surfaces Corrosion Resistant and Terminal Leads Readily Solderable
- Lead Temperature for Soldering Purposes: 260°C Max. for 10 Seconds
- Shipped in 50 Units per Plastic Tube
- Marking: MSRB860

**SOFT RECOVERY**  
**POWER RECTIFIER**  
**8.0 AMPERES, 600 VOLTS**



**CASE 418C-01, Style 2**  
**D<sup>2</sup>PAK-SL**

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

## 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>$V_R$ | 600         | V                |
| Average Rectified Forward Current (At Rated $V_R$ , $T_C = 125^\circ\text{C}$ )                              | $I_O$                           | 8.0         | A                |
| Peak Repetitive Forward Current (At Rated $V_R$ , Square Wave, 20 kHz, $T_C = 125^\circ\text{C}$ )           | $I_{FRM}$                       | 16          | A                |
| Non-Repetitive Peak Surge Current<br>(Surge applied at rated load conditions, halfwave, single phase, 60 Hz) | $I_{FSM}$                       | 100         | A                |
| Storage / Operating Case Temperature                                                                         | $T_{stg}, T_C$                  | - 65 to 150 | $^\circ\text{C}$ |
| Operating Junction Temperature                                                                               | $T_J$                           | - 65 to 150 | $^\circ\text{C}$ |

## THERMAL CHARACTERISTICS

|                                          |                 |      |                    |
|------------------------------------------|-----------------|------|--------------------|
| Thermal Resistance — Junction-to-Case    | $R_{\theta JC}$ | 1.6  | $^\circ\text{C/W}$ |
| Thermal Resistance — Junction-to-Ambient | $R_{\theta JA}$ | 72.8 |                    |

## ELECTRICAL CHARACTERISTICS

|                                                                                                                            |               |                          |                           |               |
|----------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------|---------------------------|---------------|
| Maximum Instantaneous Forward Voltage (1) ( $I_F = 8.0\text{ A}$ )                                                         | $V_F$         | $T_J = 25^\circ\text{C}$ | $T_J = 150^\circ\text{C}$ | V             |
| Typical                                                                                                                    |               | 1.7<br>1.4               | 1.3<br>1.1                |               |
| Maximum Instantaneous Reverse Current ( $V_R = 600\text{ V}$ )                                                             | $I_R$         | $T_J = 25^\circ\text{C}$ | $T_J = 150^\circ\text{C}$ | $\mu\text{A}$ |
| Typical                                                                                                                    |               | 10<br>2.0                | 1000<br>80                |               |
| Maximum Reverse Recovery Time (2) ( $V_R = 400\text{ V}$ , $I_F = 8.0\text{ A}$ , $di/dt = 200\text{ A}/\mu\text{s}$ )     | $t_{rr}$      | $T_J = 25^\circ\text{C}$ | $T_J = 125^\circ\text{C}$ | ns            |
| Typical                                                                                                                    |               | 120<br>95                | 190<br>125                |               |
| Typical Recovery Softness Factor ( $V_R = 400\text{ V}$ , $I_F = 8.0\text{ A}$ , $di/dt = 200\text{ A}/\mu\text{s}$ )      | $s = t_b/t_a$ | 2.5                      | 3.0                       |               |
| Typical Peak Reverse Recovery Current ( $V_R = 400\text{ V}$ , $I_F = 8.0\text{ A}$ , $di/dt = 200\text{ A}/\mu\text{s}$ ) | $I_{RRM}$     | 5.8                      | 8.3                       | A             |
| Typical Reverse Recovery Charge ( $V_R = 400\text{ V}$ , $I_F = 8.0\text{ A}$ , $di/dt = 200\text{ A}/\mu\text{s}$ )       | $Q_{RR}$      | 350                      | 700                       | nC            |

(1) Pulse Test: Pulse Width  $\leq 380\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$ (2)  $T_{RR}$  measured projecting from 25% of  $I_{RRM}$  to zero current

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## TYPICAL ELECTRICAL CHARACTERISTICS

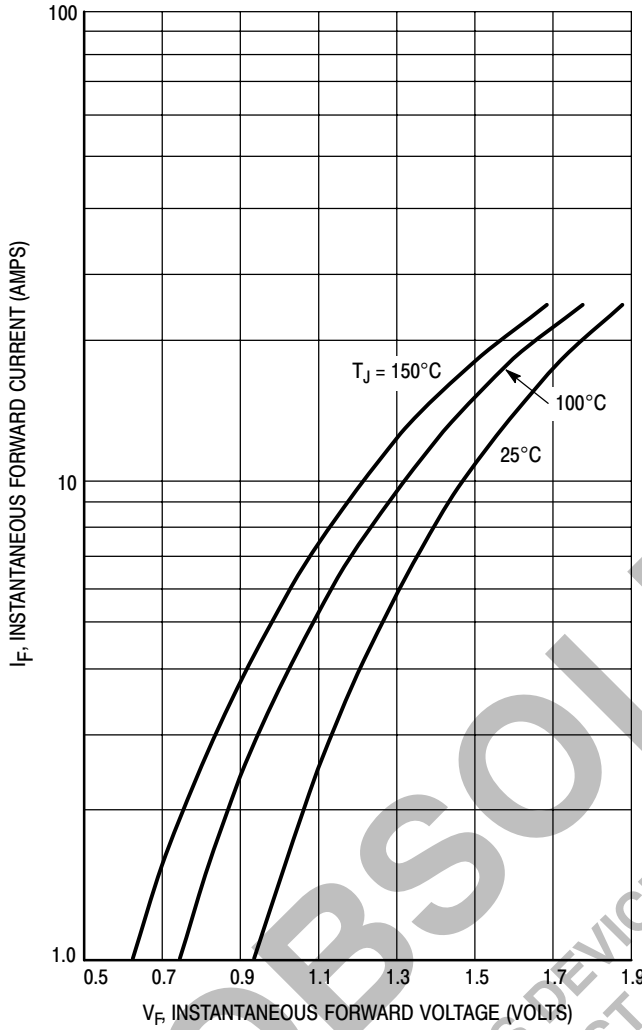


Figure 1. Typical Forward Voltage

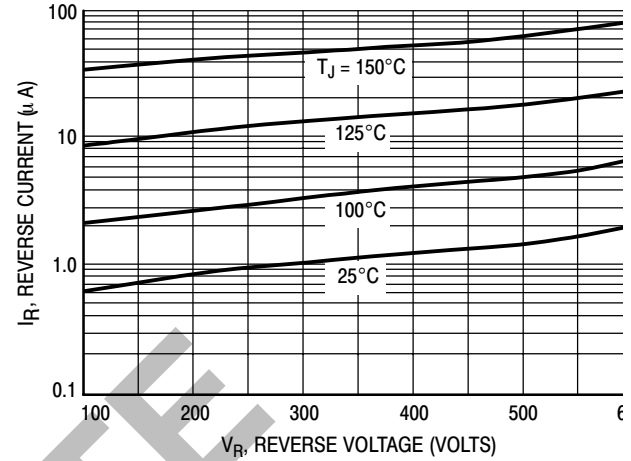


Figure 2. Typical Reverse Current

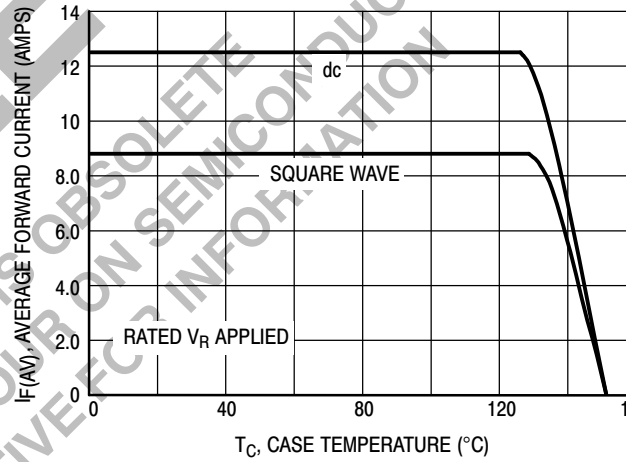


Figure 3. Current Derating, Case

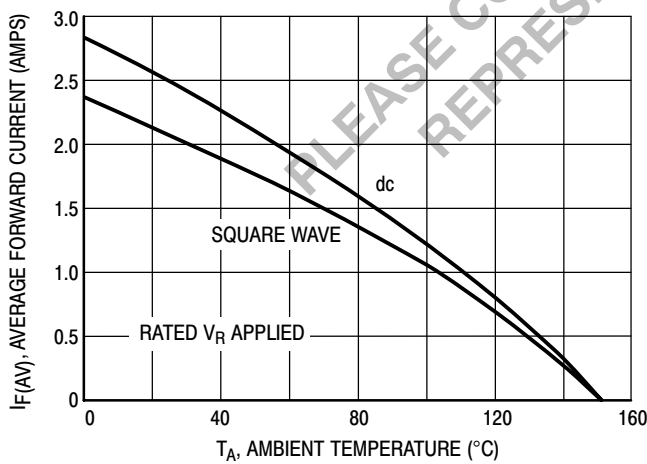


Figure 4. Current Derating, Ambient

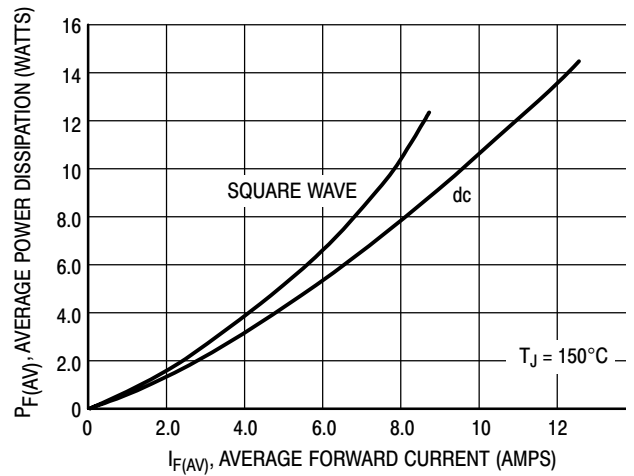


Figure 5. Power Dissipation

## TYPICAL ELECTRICAL CHARACTERISTICS

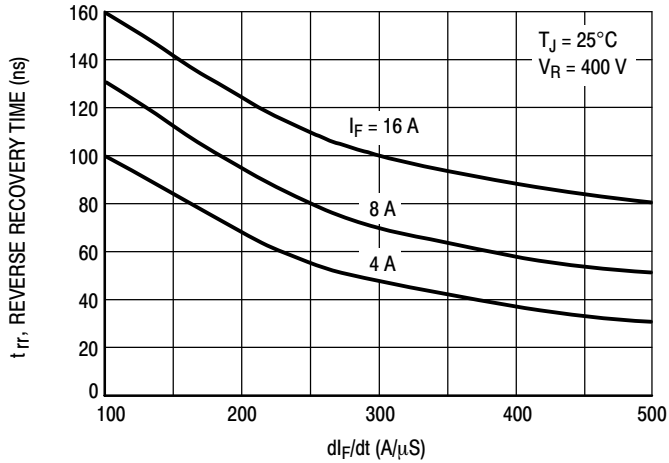


Figure 6. Typical Reverse Recovery Time

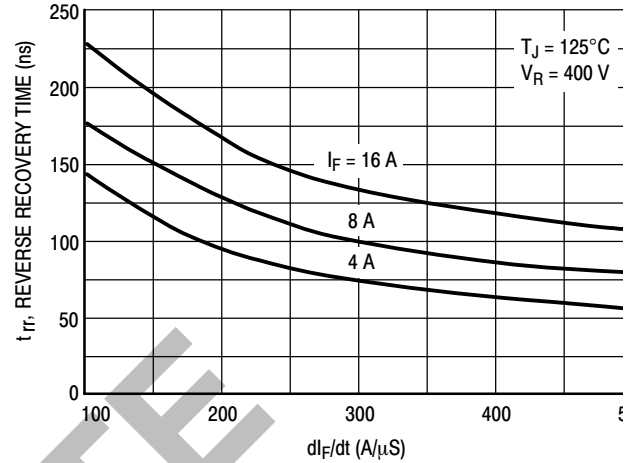


Figure 7. Typical Reverse Recovery Time

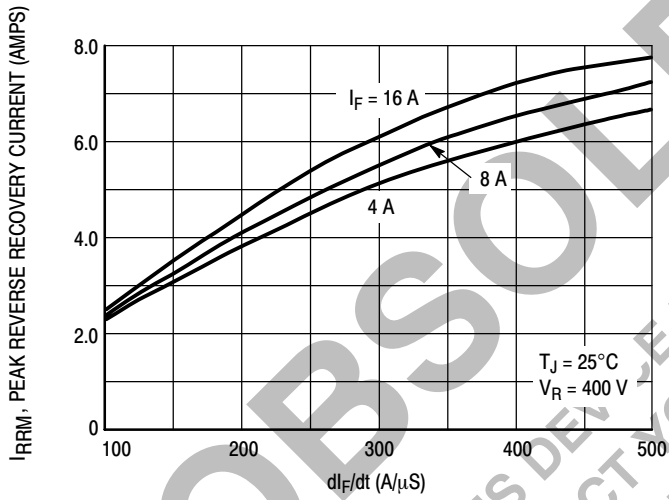


Figure 8. Typical Peak Reverse Recovery Current

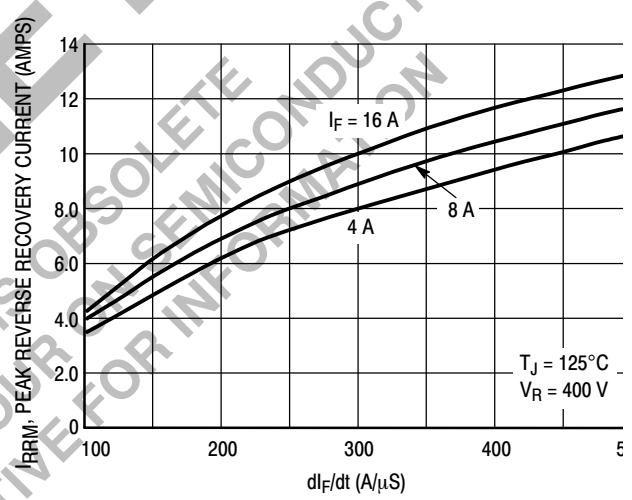


Figure 9. Typical Peak Reverse Recovery Current

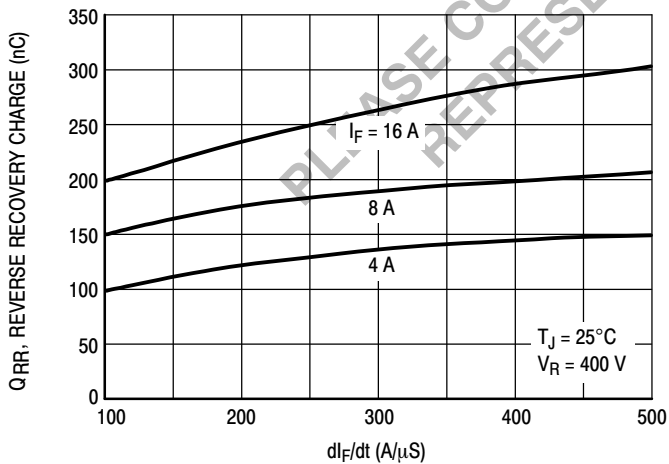


Figure 10. Typical Reverse Recovery Charge

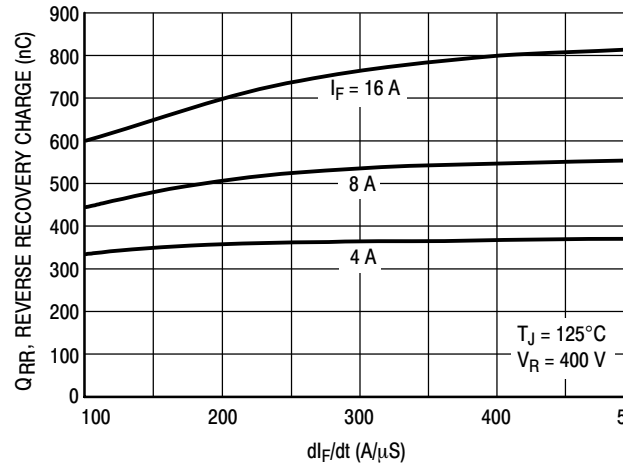


Figure 11. Typical Reverse Recovery Charge

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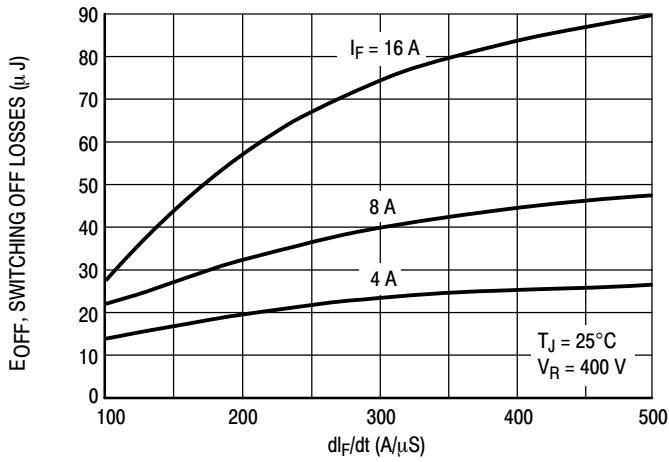


Figure 12. Typical Switching Off Losses

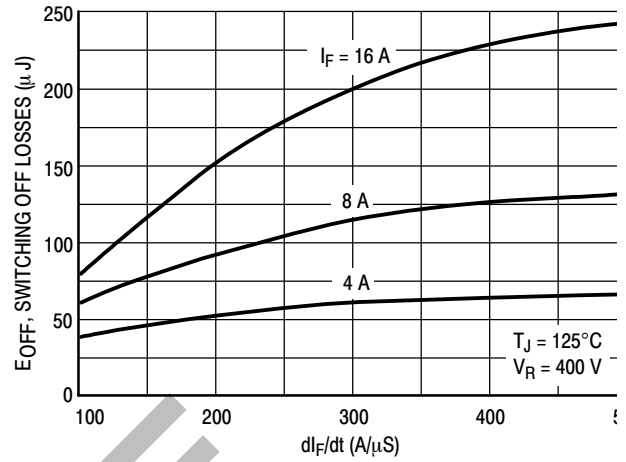


Figure 13. Typical Switching Off Losses

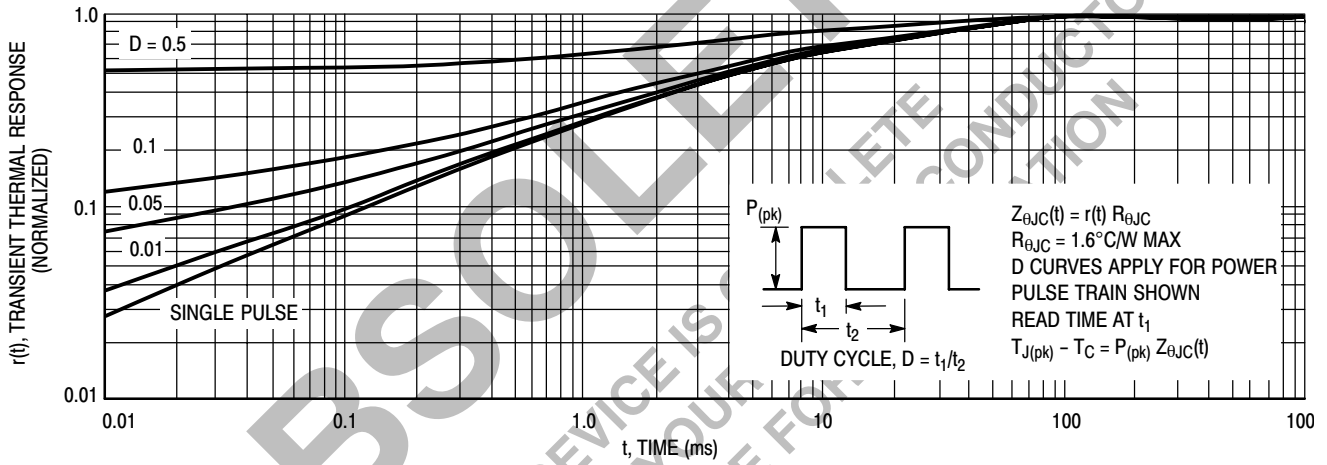
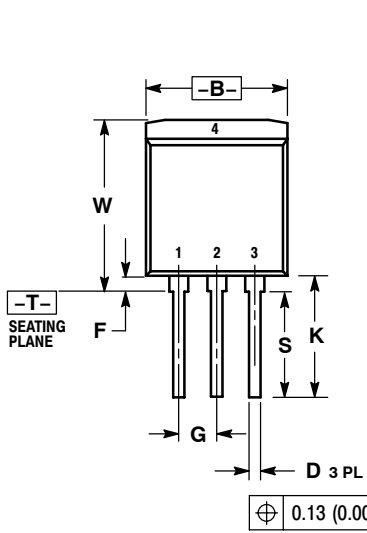


Figure 14. Thermal Response

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## PACKAGE DIMENSIONS

### CASE 418C-01 ISSUE O



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.340     | 0.380 | 8.64        | 9.65  |
| B   | 0.380     | 0.405 | 9.65        | 10.29 |
| C   | 0.160     | 0.190 | 4.06        | 4.83  |
| D   | 0.020     | 0.035 | 0.51        | 0.89  |
| E   | 0.045     | 0.055 | 1.14        | 1.40  |
| F   | 0.039 REF |       | 1.00 REF    |       |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.080     | 0.110 | 2.03        | 2.79  |
| J   | 0.018     | 0.025 | 0.46        | 0.64  |
| K   | 0.280     | 0.360 | 7.11        | 9.14  |
| S   | 0.276 REF |       | 7.00 REF    |       |
| V   | 0.045     | 0.055 | 1.14        | 1.40  |
| W   | 0.423     | 0.462 | 10.75       | 11.75 |

STYLE 2:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

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