

## Ultrafast Plastic Rectifier



### FEATURES

- Glass passivated chip junction
- Ultrafast recovery time
- Low switching losses, high efficiency
- High forward surge capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C (for TO-263AB package)
- Solder dip 260 °C, 40 s (for TO-220AC and ITO-220AC package)
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



**RoHS**  
COMPLIANT

### TYPICAL APPLICATIONS

For use in high frequency rectifier of switching mode power supplies, inverters, freewheeling diodes, dc-to-dc converters, and other power switching application.

### MECHANICAL DATA

**Case:** TO-220AC, ITO-220AC, TO-263AB

Epoxy meets UL 94V-0 flammability rating

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD22-B102

E3 suffix for consumer grade, meets JESD 201 class 1A whisker test, HE3 suffix for high reliability grade (AEC Q101 qualified), meets JESD 201 class 2 whisker test

**Polarity:** As marked

**Mounting Torque:** 10 in-lbs maximum

### PRIMARY CHARACTERISTICS

|             |                         |
|-------------|-------------------------|
| $I_{F(AV)}$ | 16 A                    |
| $V_{RRM}$   | 50 V to 600 V           |
| $I_{FSM}$   | 250 A                   |
| $t_{rr}$    | 35 ns, 50 ns            |
| $V_F$       | 0.975 V, 1.30 V, 1.50 V |
| $T_J$ max.  | 150 °C                  |

### MAXIMUM RATINGS ( $T_C = 25$ °C unless otherwise noted)

| PARAMETER                                                                                | SYMBOL         | FES 16AT      | FES 16BT | FES 16CT | FES 16DT | FES 16FT | FES 16GT | FES 16HT | FES 16JT | UNIT |
|------------------------------------------------------------------------------------------|----------------|---------------|----------|----------|----------|----------|----------|----------|----------|------|
| Maximum repetitive peak reverse voltage                                                  | $V_{RRM}$      | 50            | 100      | 150      | 200      | 300      | 400      | 500      | 600      | V    |
| Maximum RMS voltage                                                                      | $V_{RMS}$      | 35            | 70       | 105      | 140      | 210      | 280      | 350      | 420      | V    |
| Maximum DC blocking voltage                                                              | $V_{DC}$       | 50            | 100      | 150      | 200      | 300      | 400      | 500      | 600      | V    |
| Maximum average forward rectified current at $T_C = 100$ °C                              | $I_{F(AV)}$    | 16            |          |          |          |          |          |          |          | A    |
| Peak forward surge current<br>8.3 ms single half sine-wave<br>superimposed on rated load | $I_{FSM}$      | 250           |          |          |          |          |          |          |          | A    |
| Operating storage and temperature range                                                  | $T_J, T_{STG}$ | - 65 to + 150 |          |          |          |          |          |          |          | °C   |
| Isolation voltage (ITO-220AC only)<br>from terminal to heatsink $t = 1$ min              | $V_{AC}$       | 1500          |          |          |          |          |          |          |          | V    |

| ELECTRICAL CHARACTERISTICS (T <sub>C</sub> = 25 °C unless otherwise noted) |                                                                                |                 |           |          |          |          |          |          |          |          |      |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------|-----------|----------|----------|----------|----------|----------|----------|----------|------|
| PARAMETER                                                                  | TEST CONDITIONS                                                                | SYMBOL          | FES 16AT  | FES 16BT | FES 16CT | FES 16DT | FES 16FT | FES 16GT | FES 16HT | FES 16JT | UNIT |
| Maximum instantaneous forward voltage <sup>(1)</sup>                       | 16 A                                                                           | V <sub>F</sub>  | 0.975     |          |          |          | 1.30     |          | 1.50     |          | V    |
| Maximum DC reverse current at rated DC blocking voltage                    | T <sub>C</sub> = 25 °C<br>T <sub>C</sub> = 100 °C                              | I <sub>R</sub>  | 10<br>500 |          |          |          |          |          |          |          | μA   |
| Maximum reverse recovery time                                              | I <sub>F</sub> = 0.5 A,<br>I <sub>R</sub> = 1.0 A,<br>I <sub>rr</sub> = 0.25 A | t <sub>rr</sub> | 35        |          |          |          | 50       |          |          |          | ns   |
| Typical junction capacitance                                               | 4.0 V, 1 MHz                                                                   | C <sub>J</sub>  | 175       |          |          |          |          |          | 145      |          | pF   |

**Note:**(1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle

| THERMAL CHARACTERISTICS (T <sub>C</sub> = 25 °C unless otherwise noted) |                  |     |      |      |      |
|-------------------------------------------------------------------------|------------------|-----|------|------|------|
| PARAMETER                                                               | SYMBOL           | FES | FESF | FESB | UNIT |
| Typical thermal resistance, junction to case                            | R <sub>θJC</sub> | 1.2 | 1.7  | 1.2  | °C/W |

| <b>ORDERING INFORMATION</b> (Example) |                               |                 |              |               |               |
|---------------------------------------|-------------------------------|-----------------|--------------|---------------|---------------|
| PACKAGE                               | PREFERRED P/N                 | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| TO-220AC                              | FES16JT-E3/45                 | 1.78            | 45           | 50/tube       | Tube          |
| ITO-220AC                             | FESF16JT-E3/45                | 1.80            | 45           | 50/tube       | Tube          |
| TO-263AB                              | FESB16JT-E3/45                | 1.33            | 45           | 50/tube       | Tube          |
| TO-263AB                              | FESB16JT-E3/81                | 1.33            | 81           | 800/reel      | Tape and reel |
| TO-220AC                              | FES16JT-E3/45 <sup>(1)</sup>  | 1.78            | 45           | 50/tube       | Tube          |
| ITO-220AC                             | FESF16JT-E3/45 <sup>(1)</sup> | 1.80            | 45           | 50/tube       | Tube          |
| TO-263AB                              | FESB16JT-E3/45 <sup>(1)</sup> | 1.33            | 45           | 50/tube       | Tube          |
| TO-263AB                              | FESB16JT-E3/81 <sup>(1)</sup> | 1.33            | 81           | 800/reel      | Tape and reel |

**Note:**

(1) Automotive grade AEC Q101 qualified

## RATINGS AND CHARACTERISTICS CURVES

( $T_A = 25^\circ\text{C}$  unless otherwise noted)



Figure 1. Maximum Forward Current Derating Curve



Figure 4. Typical Reverse Leakage Characteristics



Figure 2. Maximum Non-Repetitive Peak Forward Surge Current



Figure 5. Typical Junction Capacitance



Figure 3. Typical Instantaneous Forward Characteristics

## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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