

# EGFM301 THRU EGFM305

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# EGFM301 THRU EGFM305

## 3.0A Surface Mount Efficient Fast Rectifiers 50V-600V

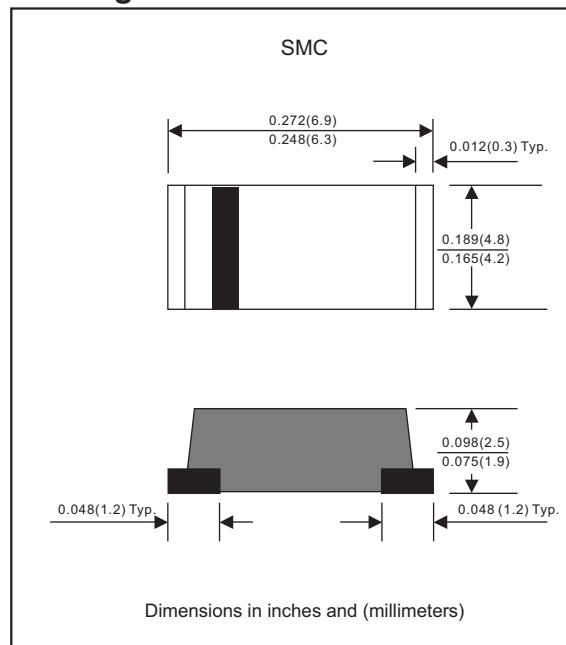
### Features

- Batch process design, excellent power dissipation offers better reverse leakage current and thermal resistance.
- Low profile surface mounted application in order to optimize board space
- High current & surge capability
- Low forward dropdown voltage
- Glass passivated chip junction
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen free parts, ex. EGFM301-H

### Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SMC
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.19 gram

### Package outline



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

| PARAMETER                                                                | SYMBOLS   | EGFM301     | EGFM302 | EGFM303 | EGFM304 | EGFM305 | UNIT               |
|--------------------------------------------------------------------------|-----------|-------------|---------|---------|---------|---------|--------------------|
| Maximum repetitive peak reverse voltage                                  | $V_{RRM}$ | 50          | 100     | 200     | 400     | 600     | V                  |
| Maximum RMS voltage                                                      | $V_{RMS}$ | 35          | 70      | 140     | 280     | 420     | V                  |
| Maximum continuous reverse voltage                                       | $V_R$     | 50          | 100     | 200     | 400     | 600     | V                  |
| Maximum average forward rectified current                                | $I_O$     | 3.0         |         |         |         |         | A                  |
| Non-repetitive peak forward surge current<br>8.3ms single half sine-wave | $I_{FSM}$ | 100         |         |         |         |         | A                  |
| Typical junction capacitance (Note 1)                                    | $C_J$     | 50          |         |         |         |         | pF                 |
| Operating junction temperature range                                     | $T_J$     | -55 to +150 |         |         |         |         | $^{\circ}\text{C}$ |
| Storage temperature range                                                | $T_{STG}$ | -65 to +175 |         |         |         |         | $^{\circ}\text{C}$ |

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

| PARAMETER                                                                                            | SYMBOLS  | EGFM301    | EGFM302 | EGFM303 | EGFM304 | EGFM305 | UNIT                           |
|------------------------------------------------------------------------------------------------------|----------|------------|---------|---------|---------|---------|--------------------------------|
| Maximum instantaneous forward voltage at $I_F=3.0\text{A}$                                           | $V_F$    | 0.875      |         |         | 1.25    | 1.75    | V                              |
| Maximum reverse leakage current $T_J=25^{\circ}\text{C}$<br>at rated $V_R$ $T_J=125^{\circ}\text{C}$ | $I_R$    | 5.0<br>100 |         |         |         |         | $\mu\text{A}$<br>$\mu\text{A}$ |
| Maximum reverse recovery time (Note 2)                                                               | $t_{rr}$ | 25         |         |         |         |         | ns                             |

### Thermal characteristics

| PARAMETER                                               | SYMBOLS         | EGFM301 | EGFM302 | EGFM303 | EGFM304 | EGFM305 | UNIT                 |
|---------------------------------------------------------|-----------------|---------|---------|---------|---------|---------|----------------------|
| Typical thermal resistance junction to ambient (Note 3) | $R_{\theta JA}$ | 20      |         |         |         |         | $^{\circ}\text{C/W}$ |
| Typical thermal resistance junction to case (Note 3)    | $R_{\theta JC}$ | 10      |         |         |         |         | $^{\circ}\text{C/W}$ |

Notes 1: Measured at 1 MHz and applied reverse voltage of 4.0 VDC

2: Reverse recovery time test condition,  $I_F=0.5\text{A}$ ,  $I_R=1.0\text{A}$ ,  $IRR=0.25\text{A}$

3: Mounted on FR-4 PCB copper, minimum recommended pad layout

## Rating and characteristic curves (EGFM301 THRU EGFM305)

FIG.1-TYPICAL FORWARD CHARACTERISTICS

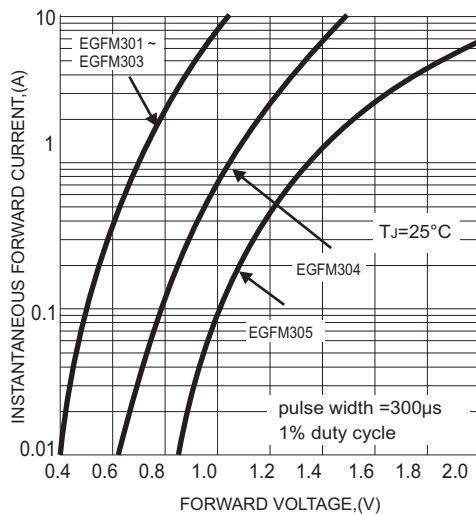


FIG.2-TYPICAL FORWARD CURRENT DERATING CURVE

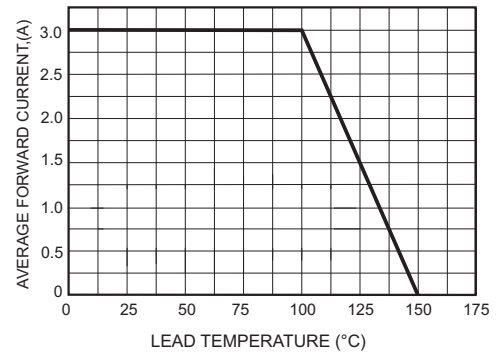
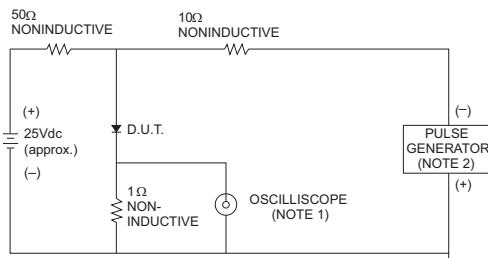


FIG.3- TEST CIRCUIT DIAGRAM AND REVERSE RECOVERY TIME CHARACTERISTICS



NOTES: 1. Rise Time = 7ns max., Input Impedance = 1 megohm, 22pF.  
2. Rise Time = 10ns max., Source Impedance = 50 ohms.

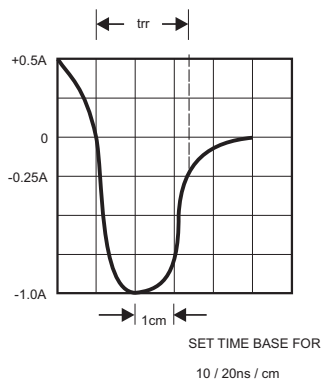


FIG.4-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

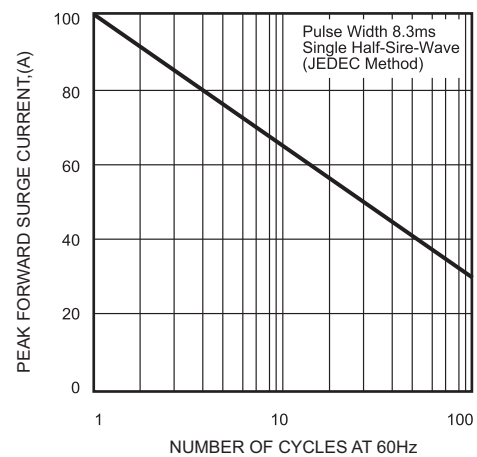
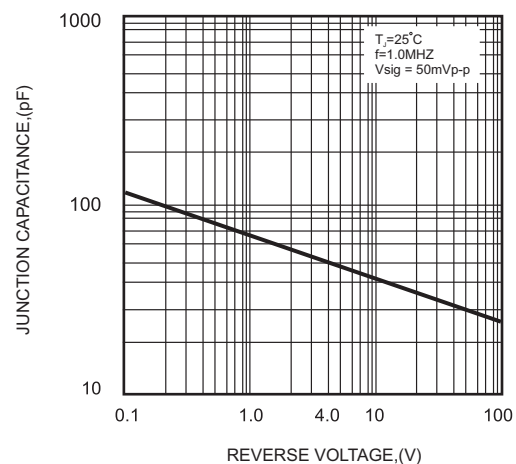


FIG.5-TYPICAL JUNCTION CAPACITANCE



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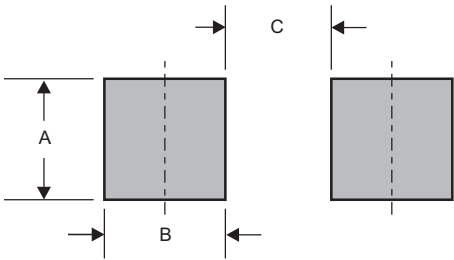
Pinning information

| Pin                        | Simplified outline                                                                | Symbol                                                                              |
|----------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Pin1 cathode<br>Pin2 anode |  |  |

Marking

| Type number | Marking code |
|-------------|--------------|
| EGFM301     | E31          |
| EGFM302     | E32          |
| EGFM303     | E33          |
| EGFM304     | E34          |
| EGFM305     | E35          |

Suggested solder pad layout



Dimensions in inches and (millimeters)

| PACKAGE | A            | B            | C            |
|---------|--------------|--------------|--------------|
| SMC     | 0.189 (4.80) | 0.063 (1.60) | 0.158 (4.00) |

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## Packing information



unit:mm

| Item                      | Symbol | Tolerance | SMC    |
|---------------------------|--------|-----------|--------|
| Carrier width             | A      | 0.1       | 5.10   |
| Carrier length            | B      | 0.1       | 7.20   |
| Carrier depth             | C      | 0.1       | 2.50   |
| Sprocket hole             | d      | 0.1       | 1.50   |
| 13" Reel outside diameter | D      | 2.0       | 330.00 |
| 13" Reel inner diameter   | D1     | min       | 50.00  |
| 7" Reel outside diameter  | D      | 2.0       | 178.00 |
| 7" Reel inner diameter    | D1     | min       | 62.00  |
| Feed hole diameter        | D2     | 0.5       | 13.00  |
| Sprocket hole position    | E      | 0.1       | 1.75   |
| Punch hole position       | F      | 0.1       | 5.50   |
| Punch hole pitch          | P      | 0.1       | 8.00   |
| Sprocket hole pitch       | P0     | 0.1       | 4.00   |
| Embossment center         | P1     | 0.1       | 2.00   |
| Overall tape thickness    | T      | 0.1       | 0.23   |
| Tape width                | W      | 0.3       | 12.00  |
| Reel width                | W1     | 1.0       | 18.00  |

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

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## Reel packing

| PACKAGE | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA, (m/m) | CARTON SIZE (m/m) | CARTON (pcs) | APPROX. GROSS WEIGHT (kg) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SMC     | 13"       | 3,000      | 8.0                     | 6,000     | 335*335*38      | 330             | 350*330*360       | 48,000       | 17.0                      |

## Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



## 3.Reflow soldering

| Profile Feature                                                                                                                 | Soldering Condition         |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Average ramp-up rate(T <sub>L</sub> to T <sub>P</sub> )                                                                         | <3°C/sec                    |
| Preheat<br>-Temperature Min(T <sub>smmin</sub> )<br>-Temperature Max(T <sub>smmax</sub> )<br>-Time(min to max)(t <sub>s</sub> ) | 150°C<br>200°C<br>60~120sec |
| T <sub>smmax</sub> to T <sub>L</sub><br>-Ramp-upRate                                                                            | <3°C/sec                    |
| Time maintained above:<br>-Temperature(T <sub>L</sub> )<br>-Time(t <sub>L</sub> )                                               | 217°C<br>60~260sec          |
| Peak Temperature(T <sub>P</sub> )                                                                                               | 255°C-0/+5°C                |
| Time within 5°C of actual Peak Temperature(t <sub>P</sub> )                                                                     | 10~30sec                    |
| Ramp-down Rate                                                                                                                  | <6°C/sec                    |
| Time 25°C to Peak Temperature                                                                                                   | <6minutes                   |

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## High reliability test capabilities

| Item Test                         | Conditions                                                                                                                                 | Reference                     |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1. Solder Resistance              | at $260 \pm 5^{\circ}\text{C}$ for $10 \pm 2\text{sec.}$                                                                                   | MIL-STD-750D<br>METHOD-2031   |
| 2. Solderability                  | at $245 \pm 5^{\circ}\text{C}$ for 5 sec.                                                                                                  | MIL-STD-202F<br>METHOD-208    |
| 3. High Temperature Reverse Bias  | $V_R = 80\%$ rate at $T_J = 150^{\circ}\text{C}$ for 168 hrs.                                                                              | MIL-STD-750D<br>METHOD-1038   |
| 4. Forward Operation Life         | Rated average rectifier current at $T_A = 25^{\circ}\text{C}$ for 500hrs.                                                                  | MIL-STD-750D<br>METHOD-1027   |
| 5. Intermittent Operation Life    | $T_A = 25^{\circ}\text{C}$ , $I_F = I_O$<br>On state: power on for 5 min.<br>off state: power off for 5 min.<br>on and off for 500 cycles. | MIL-STD-750D<br>METHOD-1036   |
| 6. Pressure Cooker                | $15P_{SIG}$ at $T_A = 121^{\circ}\text{C}$ for 4 hrs.                                                                                      | JESD22-A102                   |
| 7. Temperature Cycling            | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ dwelled for 30 min.<br>and transferred for 5min. total 10 cycles.                          | MIL-STD-750D<br>METHOD-1051   |
| 8. Forward Surge                  | 8.3ms single half sine-wave , one surge.                                                                                                   | MIL-STD-750D<br>METHOD-4066-2 |
| 9. Humidity                       | at $T_A = 85^{\circ}\text{C}$ , RH=85% for 1000hrs.                                                                                        | MIL-STD-750D<br>METHOD-1021   |
| 10. High Temperature Storage Life | at $175^{\circ}\text{C}$ for 1000 hrs.                                                                                                     | MIL-STD-750D<br>METHOD-1031   |