

# FM201-Q1 THRU FM207-Q1

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# FM201-Q1 THRU FM207-Q1

## 2.0A Surface Mount General Purpose Rectifiers 50V-1000V

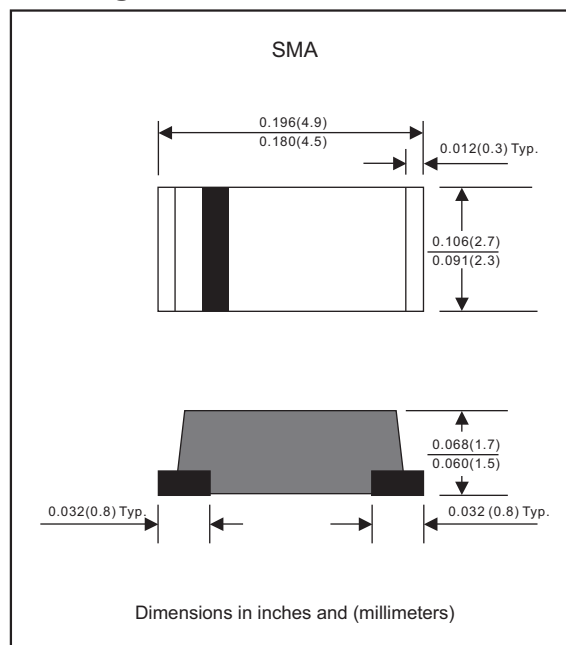
### Features

- 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 capability
- High surge capability
- Glass passivated chip junction
- Lead free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free parts, ex. FM201-Q1-H

### Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SMA
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.05 gram

### Package outline



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

| PARAMETER                                                                             | SYMBOLS   | FM201-Q1    | FM202-Q1 | FM203-Q1 | FM204-Q1 | FM205-Q1 | FM206-Q1 | FM207-Q1 | UNIT               |
|---------------------------------------------------------------------------------------|-----------|-------------|----------|----------|----------|----------|----------|----------|--------------------|
| Maximum repetitive peak reverse voltage                                               | $V_{RRM}$ | 50          | 100      | 200      | 400      | 600      | 800      | 1000     | V                  |
| Maximum RMS voltage                                                                   | $V_{RMS}$ | 35          | 70       | 140      | 280      | 420      | 560      | 700      | V                  |
| Maximum continuous reverse voltage                                                    | $V_R$     | 50          | 100      | 200      | 400      | 600      | 800      | 1000     | V                  |
| Maximum average forward rectified current                                             | $I_o$     | 2.0         |          |          |          |          |          |          | A                  |
| Non-repetitive peak forward surge current 8.3ms single half sine-wave (JEDEC methode) | $I_{FSM}$ | 50          |          |          |          |          |          |          | A                  |
| Typical junction capacitance, Note1                                                   | $C_J$     | 30          |          |          |          |          |          |          | 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 | FM201-Q1   | FM202-Q1 | FM203-Q1 | FM204-Q1 | FM205-Q1 | FM206-Q1 | FM207-Q1 | UNIT                           |
|------------------------------------------------------------|---------|------------|----------|----------|----------|----------|----------|----------|--------------------------------|
| Maximum instantaneous forward voltage at $I_F=2.0\text{A}$ | $V_F$   | 1.1        |          |          |          |          |          |          | V                              |
| Maximum reverse leakage current at rated $V_R$             | $I_R$   | 5.0<br>125 |          |          |          |          |          |          | $\mu\text{A}$<br>$\mu\text{A}$ |

### Thermal characteristics

| PARAMETER                                             | SYMBOLS         | FM201-Q1 | FM202-Q1 | FM203-Q1 | FM204-Q1 | FM205-Q1 | FM206-Q1 | FM207-Q1 | UNIT                 |
|-------------------------------------------------------|-----------------|----------|----------|----------|----------|----------|----------|----------|----------------------|
| Typical thermal resistance junction to ambient, Note2 | $R_{\theta JA}$ | 48       |          |          |          |          |          |          | $^{\circ}\text{C/W}$ |
| Typical thermal resistance junction to case, Note2    | $R_{\theta JC}$ | 26       |          |          |          |          |          |          | $^{\circ}\text{C/W}$ |

Notes 1: Measured at 1MHz and applied reverse voltage of 4.0V D.C

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

## Rating and characteristic curves (FM201-Q1 THRU FM207-Q1)

FIG.1-TYPICAL FORWARD CHARACTERISTICS

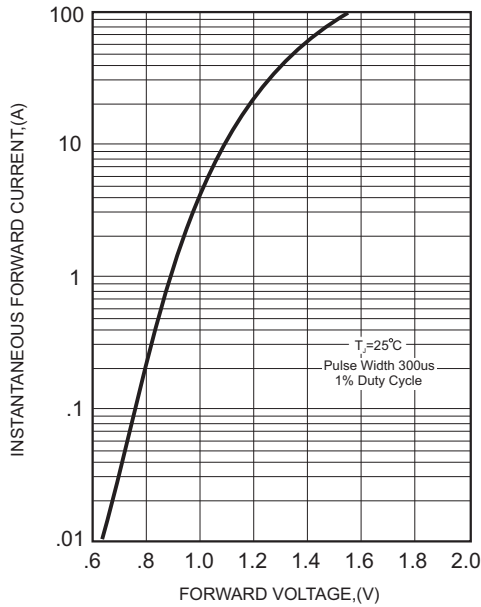


FIG.2-TYPICAL FORWARD CURRENT DERATING CURVE

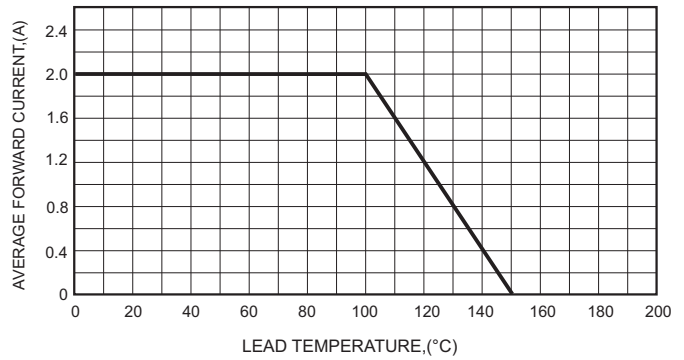


FIG.4-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

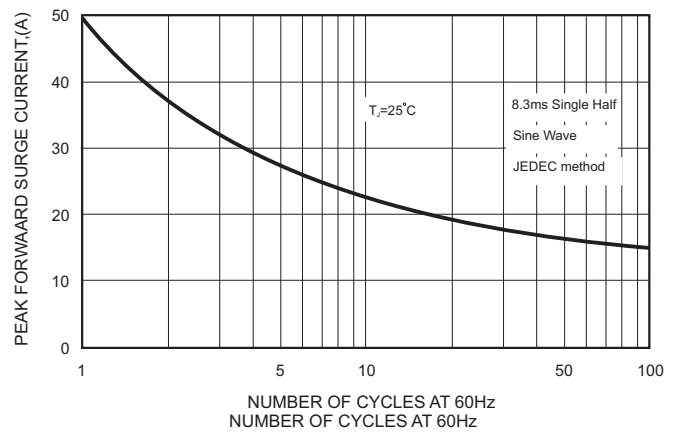


FIG.3 - TYPICAL REVERSE CHARACTERISTICS

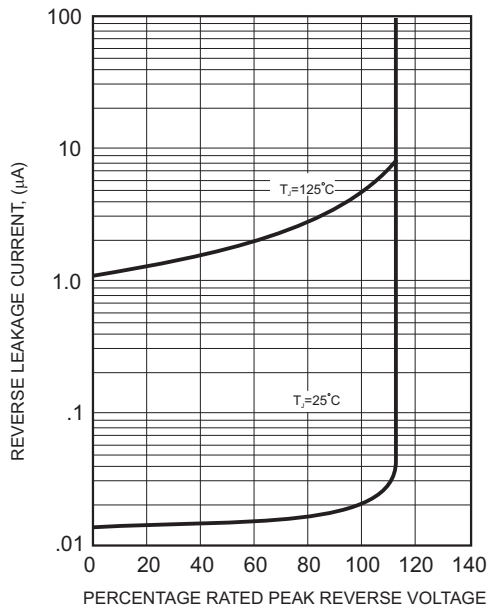
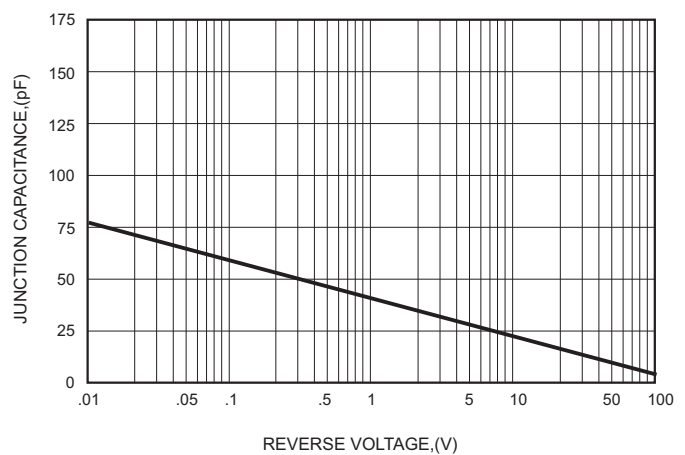


FIG.5-TYPICAL JUNCTION CAPACITANCE



# FM201-Q1 THRU FM207-Q1

## Pinning information

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

## Marking

| Type number | Marking code |
|-------------|--------------|
| FM201-Q1    | A21          |
| FM202-Q1    | A22          |
| FM203-Q1    | A23          |
| FM204-Q1    | A24          |
| FM205-Q1    | A25          |
| FM206-Q1    | A26          |
| FM207-Q1    | A27          |

## Suggested solder pad layout



Dimensions in inches and (millimeters)

| PACKAGE | A            | B            | C            |
|---------|--------------|--------------|--------------|
| SMA     | 0.110 (2.80) | 0.063 (1.60) | 0.087 (2.20) |

## FM201-Q1 THRU FM207-Q1

## Packing information



unit:mm

| Item                      | Symbol | Tolerance | SMA    |
|---------------------------|--------|-----------|--------|
| Carrier width             | A      | 0.1       | 2.80   |
| Carrier length            | B      | 0.1       | 5.00   |
| Carrier depth             | C      | 0.1       | 1.90   |
| 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       | 4.00   |
| 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.

## FM201-Q1 THRU FM207-Q1

## 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) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SMA     | 7"        | 2,000      | 4.0                     | 20,000    | 183*155*183     | 178             | 382*356*392       | 160,000      | 16.0                      |
| SMA     | 13"       | 7,500      | 4.0                     | 15,000    | 335*335*38      | 330             | 350*330*360       | 120,000      | 14.5                      |

## 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                   |

# FM201-Q1 THRU FM207-Q1

## High reliability test capabilities

| Item Test                                       | Conditions                                                                                                                                     | Reference                     |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1. MSL Preconditioning                          | 24hr bake@125°C+168hrs@85°C<br>/85%RH+3xIR@260°C+1flux<br>immersion+alcohol+DI H2O rinse                                                       | JESD22-A113                   |
| 2. Operation Life                               | Ta=25°C,Rated Current (Io=Io max.)Test Duration:1000hrs                                                                                        | MIL-STD-750E<br>METHOD 1027.3 |
| 3. High Temperature Reverse Bias                | 80% Rated VR (Tj=Tj max.)Test Duration:1000hrs                                                                                                 | JESD22-A108                   |
| 4. High Temperature Storage Life                | Ta=125°C Test Duration:1000hrs                                                                                                                 | JESD22 A-103                  |
| 5. Temperature Cycle                            | -55°C(15min) to 150°C(15min)Test Cycles:1000cycles                                                                                             | JESD22 A-104                  |
| 6. Autoclave                                    | P=2atm Ta=121°C RH=100% Test Duration:96hrs                                                                                                    | JESD22 A-102                  |
| 7. Intermittent Operational Life                | Ta=25°C,On/Io Max. 2min, Off/2min,<br>Test Cycles:15000cycles                                                                                  | MIL-STD-750E<br>METHOD 1037   |
| 8. Solderability                                | 245±5°C for 5sec                                                                                                                               | J-STD-002                     |
| 9. Moisture Resistance                          | Ta=85°C/85% Relative humidity Test Duration:1000hrs                                                                                            | MIL-STD-750E<br>METHOD 1021.2 |
| 10. Resistance To Solder Heat                   | 260±5°C for 10sec                                                                                                                              | JESD22 B-106                  |
| 11. High Temperature High Humidity Reverse Bias | Ta=85°C, 85%RH, with device reverse biased at 80% of rated breakdown voltage up to a maximum of 100V or limit of chamber Test Duration:1000hrs | JESD22-A101                   |