

# FM540-Q1 THRU FM5200-Q1

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# FM540-Q1 THRU FM5200-Q1

## 5.0A Surface Mount Schottky Barrier Rectifiers - 40V-200V

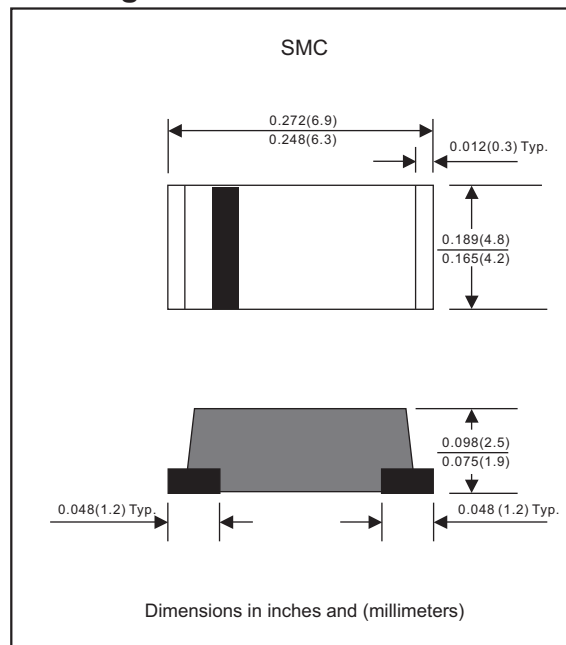
### Features

- 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
- Low power loss, high efficiency
- High current capability, low forward voltage drop
- High surge capability
- Guardring for overvoltage protection
- Ultra high-speed switching
- Silicon epitaxial planar chip, metal silicon junction
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates halogen free parts, ex. FM540-Q1-H

### Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, DO-214AB / 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          | FM540-Q1    | FM560-Q1    | FM5100-Q1 | FM5150-Q1 | FM5200-Q1 | UNITS |
|-----------------------------------------------------------------------|------------------|-------------|-------------|-----------|-----------|-----------|-------|
| Maximum repetitive peak reverse voltage                               | V <sub>RRM</sub> | 40          | 60          | 100       | 150       | 200       | Volts |
| Maximum RMS voltage                                                   | V <sub>RMS</sub> | 28          | 42          | 70        | 105       | 140       | Volts |
| Maximum continuous reverse voltage                                    | V <sub>R</sub>   | 40          | 60          | 100       | 150       | 200       | Volts |
| Maximum average forward rectified current                             | I <sub>O</sub>   | 5.0         |             |           |           |           | Amps  |
| Non-repetitive peak forward surge current 8.3ms single half sine-wave | I <sub>FSM</sub> | 150         |             |           |           |           | Amps  |
| Operating junction temperature range                                  | T <sub>J</sub>   | -55 to +125 | -55 to +150 |           |           |           | °C    |
| Storage temperature range                                             | T <sub>STG</sub> | -65 to +175 |             |           |           |           | °C    |

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

| PARAMETER                                                                                                  | SYMBOLS | FM540-Q1  | FM560-Q1 | FM5100-Q1 | FM5150-Q1 | FM5200-Q1 | UNITS    |
|------------------------------------------------------------------------------------------------------------|---------|-----------|----------|-----------|-----------|-----------|----------|
| Maximum instantaneous forward voltage at $I_F=5.0\text{A}$                                                 | $V_F$   | 0.55      | 0.70     | 0.85      | 0.90      | 0.92      | Volts    |
| Maximum reverse leakage current<br>at rated $V_R$<br>$T_J=25^{\circ}\text{C}$<br>$T_J=100^{\circ}\text{C}$ | $I_R$   | 0.5<br>20 |          |           |           |           | mA<br>mA |

### Thermal characteristics

| PARAMETER                                               | SYMBOLS         | FM540-Q1 | FM560-Q1 | FM5100-Q1 | FM5150-Q1 | FM5200-Q1 | UNITS                         |
|---------------------------------------------------------|-----------------|----------|----------|-----------|-----------|-----------|-------------------------------|
| Typical thermal resistance junction to ambient (note 1) | $R_{\theta JA}$ | 32       |          |           |           |           | $^{\circ}\text{C} / \text{W}$ |
| Typical thermal resistance junction to case (note 1)    | $R_{\theta JC}$ | 16       |          |           |           |           | $^{\circ}\text{C} / \text{W}$ |

Note 1: Mounted on FR-4 PCB Copper, minimum recommended pad layout.

## Rating and characteristic curves (FM540-Q1 THRU FM5200-Q1)

FIG.1-TYPICAL FORWARD CURRENT DERATING CURVE

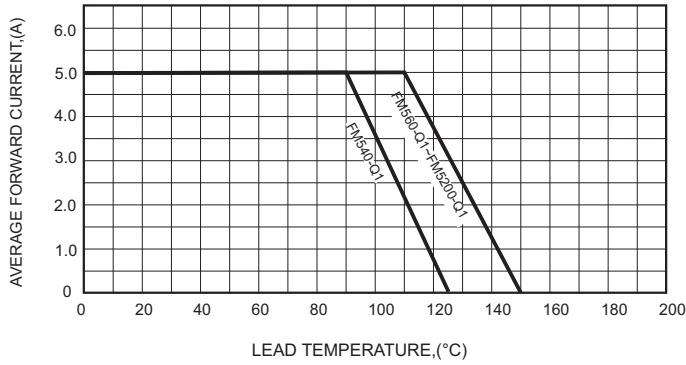


FIG.2-TYPICAL FORWARD CHARACTERISTICS

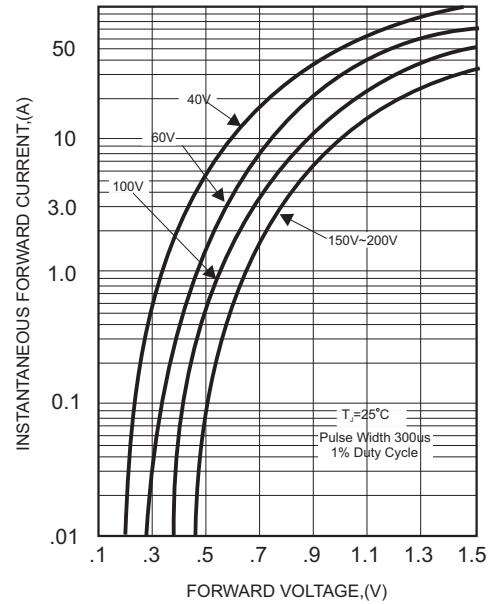


FIG.3-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

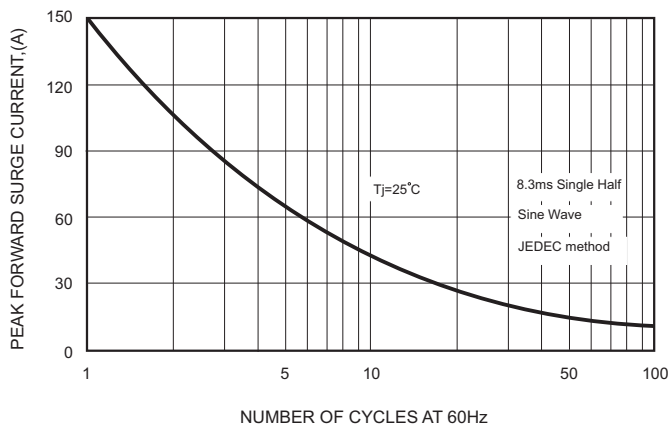


FIG.5 - TYPICAL REVERSE CHARACTERISTICS

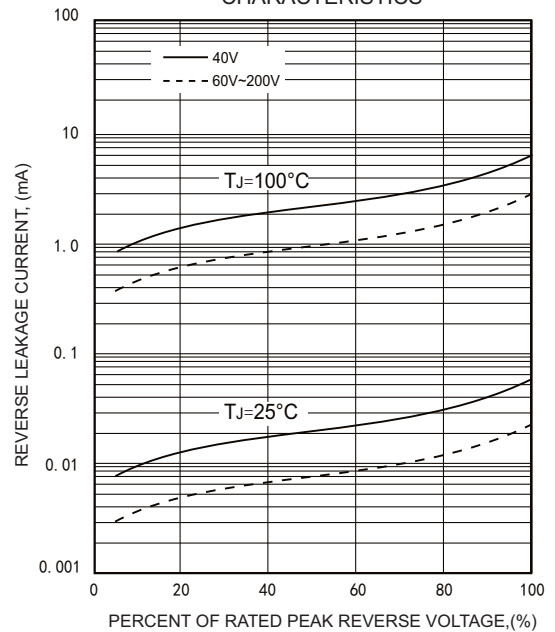
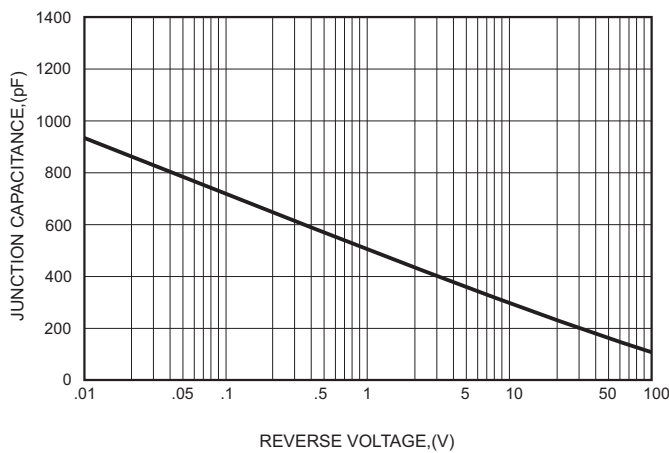


FIG.4-TYPICAL JUNCTION CAPACITANCE



# FM540-Q1 THRU FM5200-Q1

## Pinning information

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

## Marking

| Type number | Marking code |
|-------------|--------------|
| FM540-Q1    | SS54         |
| FM560-Q1    | SS56         |
| FM5100-Q1   | S510         |
| FM5150-Q1   | S515         |
| FM5200-Q1   | S520         |

## 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) |

## FM540-Q1 THRU FM5200-Q1

## 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.

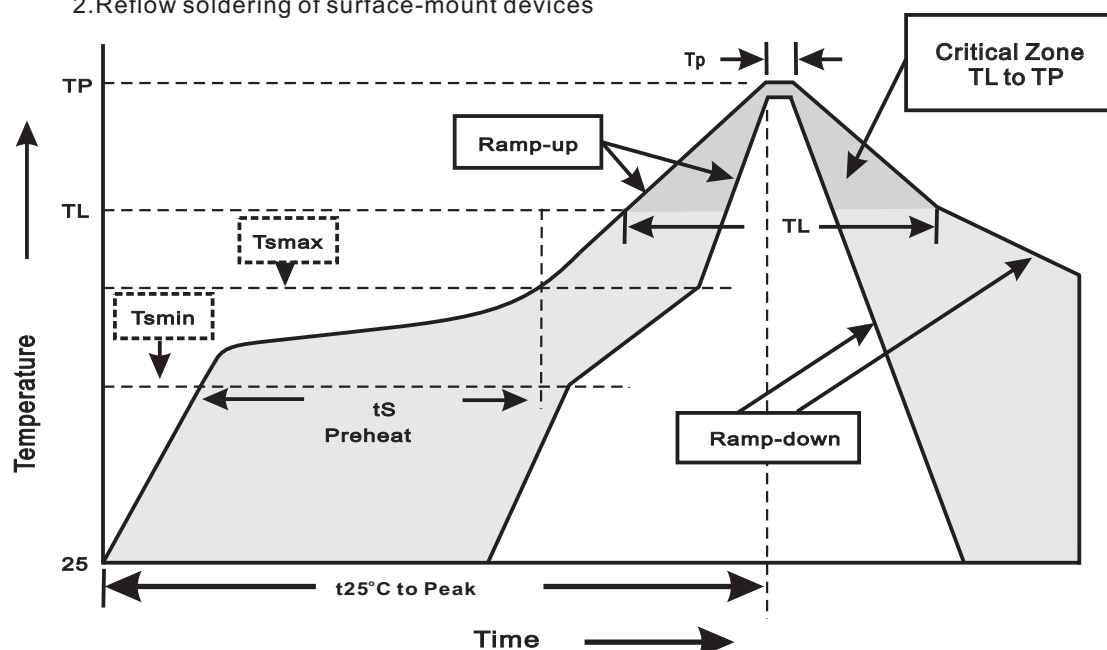
## FM540-Q1 THRU FM5200-Q1

## 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) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| 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                   |

**FM540-Q1 THRU FM5200-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                   |