

# FM140-M-Q1 THRU FM1200-M-Q1

## List

|                                                         |   |
|---------------------------------------------------------|---|
| List.....                                               | 1 |
| Package outline.....                                    | 2 |
| Features.....                                           | 2 |
| Mechanical data.....                                    | 2 |
| Maximum ratings and Electrical characteristics .....    | 2 |
| Rating and characteristic curves.....                   | 3 |
| Pinning information.....                                | 4 |
| Marking.....                                            | 4 |
| Suggested solder pad layout.....                        | 4 |
| Packing information.....                                | 5 |
| Reel packing.....                                       | 6 |
| Suggested thermal profiles for soldering processes..... | 6 |
| High reliability test capabilities.....                 | 7 |

# FM140-M-Q1 THRU FM1200-M-Q1

## 1.0A Surface Mount Schottky Barrier Rectifiers 40V-200V

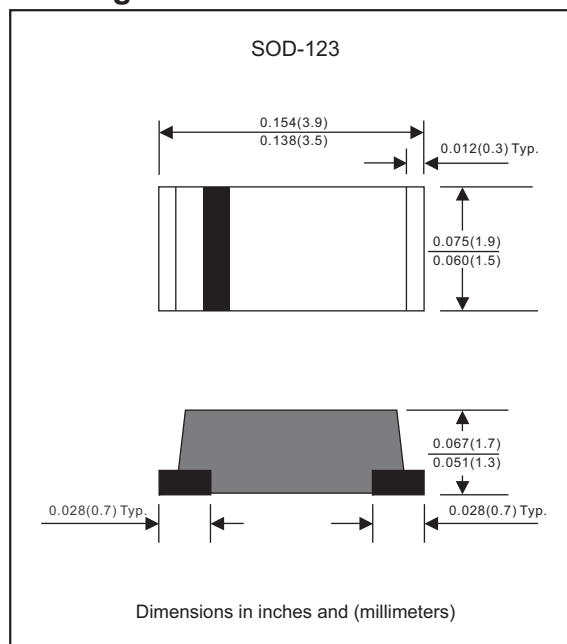
### Features

- Low profile surface mounted application in order to optimize board space
- Tiny plastic SMD package
- Low power loss, high efficiency
- High current capability, low forward voltage drop
- High surge capability
- 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. FM140-M-Q1-H

### Mechanical data

- Epoxy : UL94-V0 rated flame retardant
- Case : Molded plastic, SOD-123 / MINI SMA
- Terminals :Plated terminals, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.018 gram

### Package outline



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

| PARAMETER                                                             | SYMBOLS | FM140-M-Q1  | FM160-M-Q1  | FM1100-M-Q1 | FM1150-M-Q1 | FM1200-M-Q1 | UNITS |
|-----------------------------------------------------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------|
| Maximum repetitive peak reverse voltage                               | VRRM    | 40          | 60          | 100         | 150         | 200         | Volts |
| Maximum RMS voltage                                                   | VRMS    | 28          | 42          | 70          | 105         | 140         | Volts |
| Maximum continuous reverse voltage                                    | VR      | 40          | 60          | 100         | 150         | 200         | Volts |
| Maximum average forward rectified current                             | IO      | 1.0         |             |             |             |             | Amps  |
| Non-repetitive peak forward surge current 8.3ms single half sine-wave | IFSM    | 30          |             |             |             |             | Amps  |
| Typical junction capacitance (Note 1)                                 | CJ      | 50          |             |             |             |             | pF    |
| Operating junction temperature range                                  | TJ      | -55 to +125 | -55 to +150 |             |             |             | °C    |
| Storage temperature range                                             | TSTG    | -65 to +175 |             |             |             |             | °C    |

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

| PARAMETER                                                                                              | SYMBOLS | FM140-M-Q1 | FM160-M-Q1 | FM1100-M-Q1 | FM1150-M-Q1 | FM1200-M-Q1 | UNITS    |
|--------------------------------------------------------------------------------------------------------|---------|------------|------------|-------------|-------------|-------------|----------|
| Maximum instantaneous forward voltage at $I_F=1.0A$                                                    | $V_F$   | 0.50       | 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>10  |            |             |             |             | mA<br>mA |

### Thermal characteristics

| PARAMETER                                               | SYMBOLS         | FM140-M-Q1 | FM160-M-Q1 | FM1100-M-Q1 | FM1150-M-Q1 | FM1200-M-Q1 | UNITS                |
|---------------------------------------------------------|-----------------|------------|------------|-------------|-------------|-------------|----------------------|
| Typical thermal resistance junction to ambient (Note 2) | $R_{\theta JA}$ | 92         |            |             |             |             | $^\circ\text{C} / W$ |
| Typical thermal resistance junction to case (Note 2)    | $R_{\theta JC}$ | 46         |            |             |             |             | $^\circ\text{C} / W$ |

Notes1: 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 (FM140-M-Q1 THRU FM1200-M-Q1)

FIG.1-TYPICAL FORWARD CURRENT DERATING CURVE

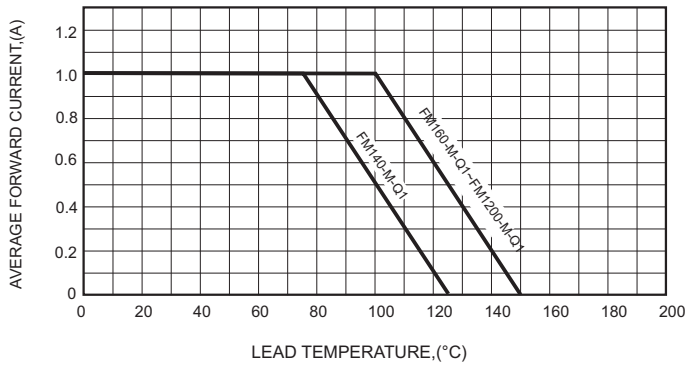


FIG.2-TYPICAL FORWARD CHARACTERISTICS

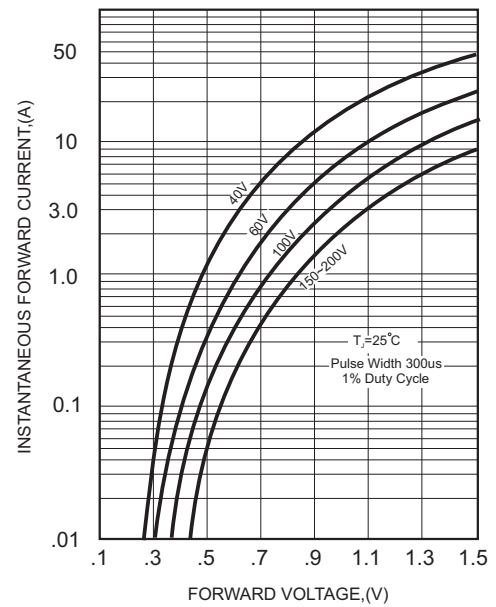


FIG.3-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

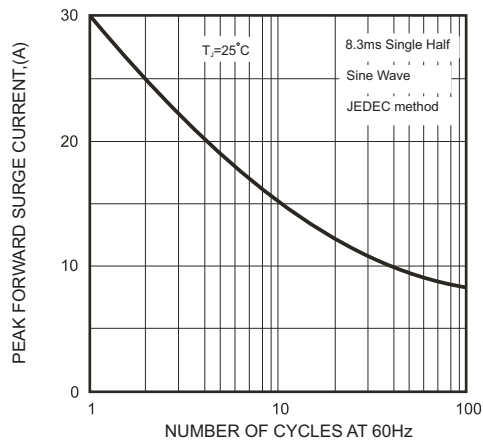


FIG.4-TYPICAL JUNCTION CAPACITANCE

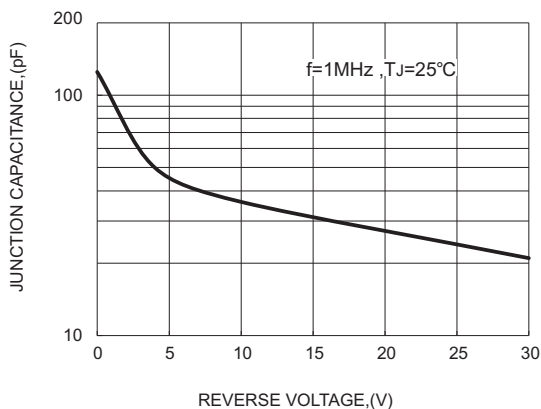
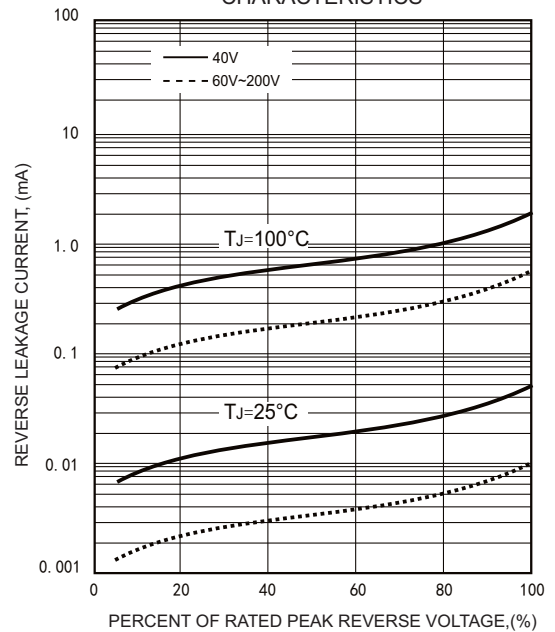


FIG.5 - TYPICAL REVERSE CHARACTERISTICS

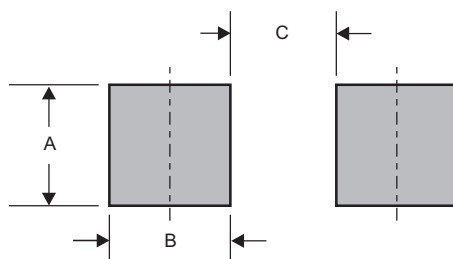


**FM140-M-Q1 THRU FM1200-M-Q1****Pinning information**

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

**Marking**

| Type number | Marking code |
|-------------|--------------|
| FM140-M-Q1  | 14           |
| FM160-M-Q1  | 16           |
| FM1100-M-Q1 | 10           |
| FM1150-M-Q1 | 115          |
| FM1200-M-Q1 | 120          |

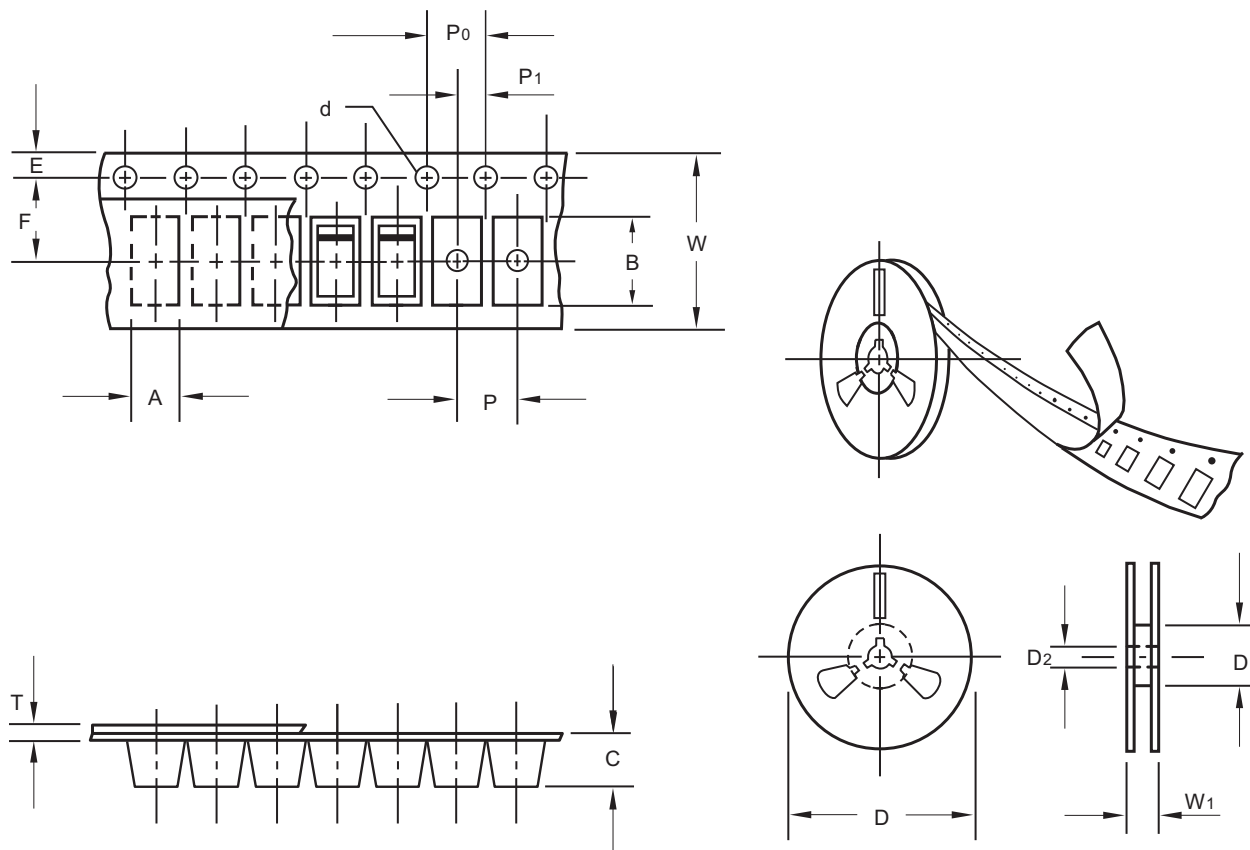
**Suggested solder pad layout**

Dimensions in inches and (millimeters)

| PACKAGE | A            | B            | C            |
|---------|--------------|--------------|--------------|
| SOD-123 | 0.075 (1.90) | 0.055 (1.40) | 0.075 (1.90) |

## FM140-M-Q1 THRU FM1200-M-Q1

## Packing information



unit:mm

| Item                      | Symbol | Tolerance | SOD-123 |
|---------------------------|--------|-----------|---------|
| Carrier width             | A      | 0.1       | 1.90    |
| Carrier length            | B      | 0.1       | 3.90    |
| Carrier depth             | C      | 0.1       | 1.68    |
| Sprocket hole             | d      | 0.1       | 1.50    |
| 13" Reel outside diameter | D      | 2.0       | -       |
| 13" Reel inner diameter   | D1     | min       | -       |
| 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       | 3.50    |
| 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       | 8.00    |
| Reel width                | W1     | 1.0       | 11.40   |

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

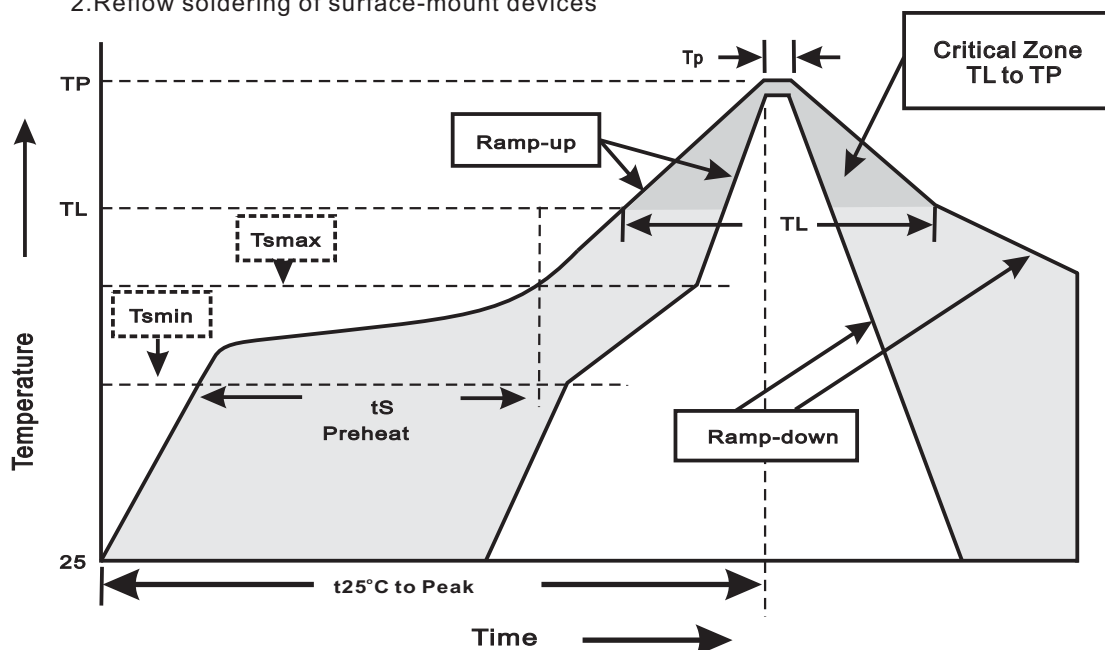
## FM140-M-Q1 THRU FM1200-M-Q1

## Reel packing

| PACKAGE | REEL SIZE | REEL<br>(pcs) | COMPONENT<br>SPACING<br>(m/m) | BOX<br>(pcs) | INNER<br>BOX<br>(m/m) | REEL<br>DIA,<br>(m/m) | CARTON<br>SIZE<br>(m/m) | CARTON<br>(pcs) | APPROX.<br>GROSS WEIGHT<br>(kg) |
|---------|-----------|---------------|-------------------------------|--------------|-----------------------|-----------------------|-------------------------|-----------------|---------------------------------|
| SOD-123 | 7"        | 2,500         | 4.0                           | 25,000       | 183*123*183           | 178                   | 382*257*387             | 200,000         | 10.5                            |

## 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( $T_L$ to $T_P$ )                                                                    | $<3^{\circ}\text{C}/\text{sec}$ |
| Preheat<br>-Temperature Min( $T_{smin}$ )<br>-Temperature Max( $T_{smax}$ )<br>-Time(min to max)( $t_s$ ) | 150°C<br>200°C<br>60~120sec     |
| $T_{smax}$ to $T_L$<br>-Ramp-upRate                                                                       | $<3^{\circ}\text{C}/\text{sec}$ |
| Time maintained above:<br>-Temperature( $T_L$ )<br>-Time( $t_L$ )                                         | 217°C<br>60~260sec              |
| Peak Temperature( $T_P$ )                                                                                 | 255°C-0/+5°C                    |
| Time within 5°C of actual Peak Temperature( $t_P$ )                                                       | 10~30sec                        |
| Ramp-down Rate                                                                                            | $<6^{\circ}\text{C}/\text{sec}$ |
| Time 25°C to Peak Temperature                                                                             | $<6\text{minutes}$              |

**FM140-M-Q1 THRU FM1200-M-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                   |