

FM220 THRU FM2100

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FM220 THRU FM2100

2.0A Surface Mount Schottky Barrier Rectifiers - 20V-100V

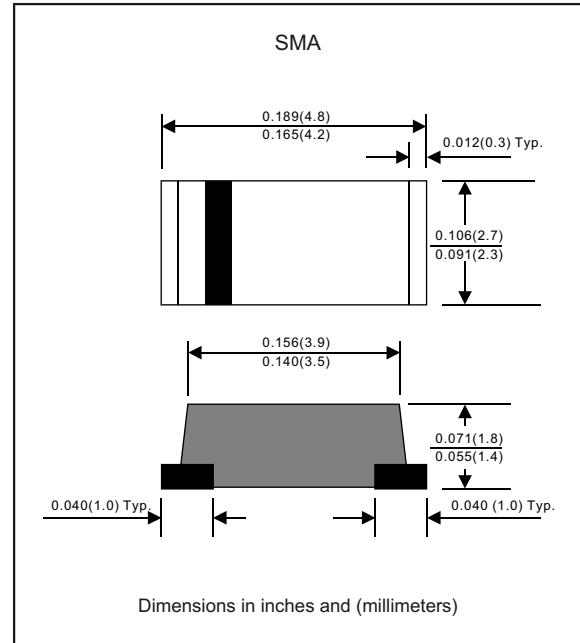
Features

- 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 environmental standards of MIL-STD-19500 /228

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, DO-214AC /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 | CONDITIONS | Symbol | MIN. | TYP. | MAX. | UNIT |
|----------------------------|-----------------------------------------------------------------------|-----------------|------|------|------|-----------------------------|
| Forward rectified current | See Fig.1 | I_o | | | 2.0 | A |
| Forward surge current | 8.3ms single half sine-wave superimposed on rate load (JEDEC methode) | I_{FSM} | | | 50 | A |
| Reverse current | $V_R = V_{RRM} \quad T_A = 25^{\circ}\text{C}$ | I_R | | | 0.5 | mA |
| | $V_R = V_{RRM} \quad T_A = 125^{\circ}\text{C}$ | | | | 10 | |
| Thermal resistance | Junction to ambient | $R_{\theta JA}$ | | 55 | | $^{\circ}\text{C}/\text{W}$ |
| | Junction to case | $R_{\theta JC}$ | | 30 | | $^{\circ}\text{C}/\text{W}$ |
| Diode junction capacitance | f=1MHz and applied 4V DC reverse voltage | C_J | | 160 | | pF |
| Storage temperature | | T_{STG} | -65 | | +175 | $^{\circ}\text{C}$ |

| SYMBOLS | V_{RRM}^{*1} (V) | V_{RMS}^{*2} (V) | V_R^{*3} (V) | V_F^{*4} (V) | Operating temperature $T_J, (^{\circ}\text{C})$ |
|---------|-----------------------|-----------------------|-------------------|-------------------|----------------------------------------------------|
| FM220 | 20 | 14 | 20 | 0.50 | -55 to +125 |
| FM230 | 30 | 21 | 30 | | |
| FM240 | 40 | 28 | 40 | | |
| FM250 | 50 | 35 | 50 | 0.70 | -55 to +150 |
| FM260 | 60 | 42 | 60 | | |
| FM280 | 80 | 56 | 80 | 0.85 | |
| FM2100 | 100 | 70 | 100 | | |

*1 Repetitive peak reverse voltage

*2 RMS voltage

*3 Continuous reverse voltage

*4 Maximum forward voltage

Rating and characteristic curves (FM220 THRU FM2100)

FIG.1-TYPICAL FORWARD CURRENT DERATING CURVE

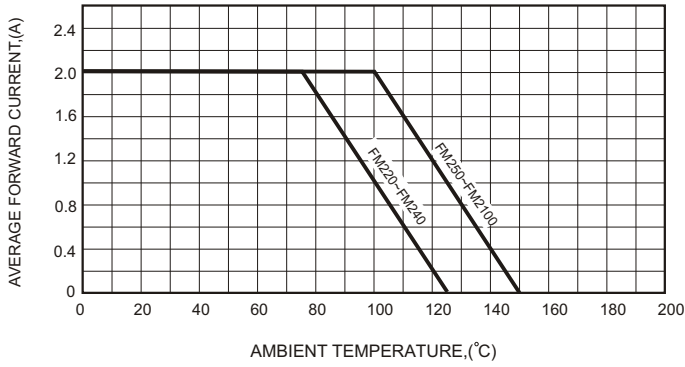


FIG.2-TYPICAL FORWARD CHARACTERISTICS

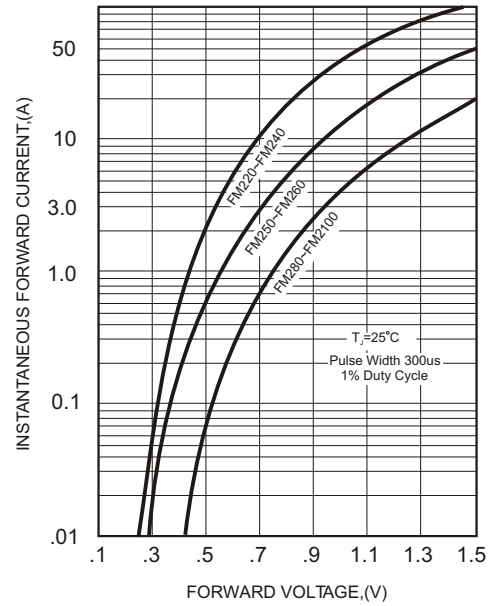


FIG.3-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

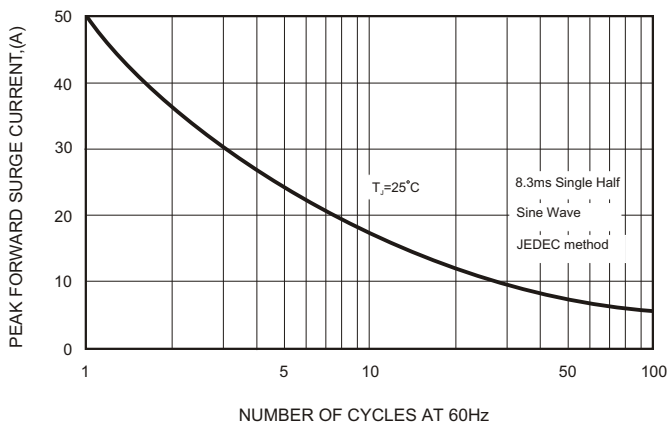


FIG.5 - TYPICAL REVERSE CHARACTERISTICS

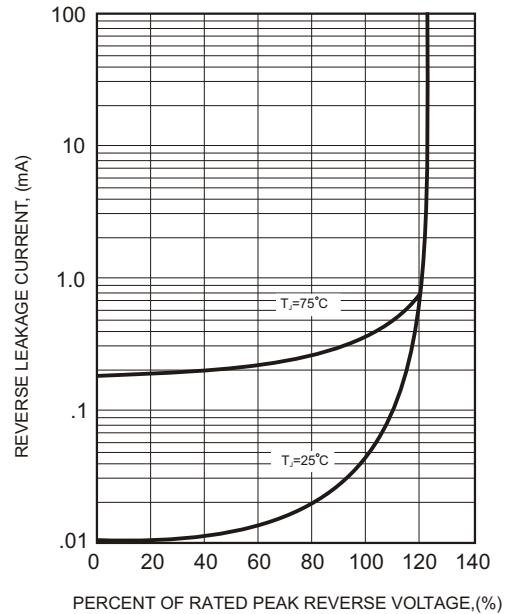
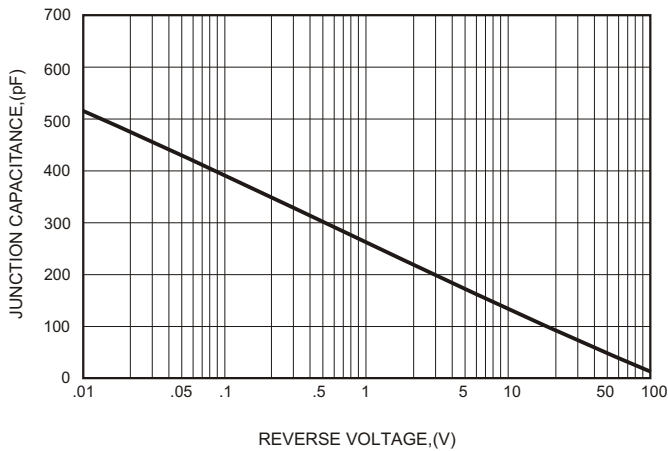




FIG.4-TYPICAL JUNCTION CAPACITANCE



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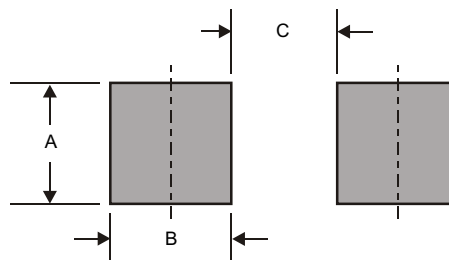
Pinning information

| Pin | Simplified outline | Symbol |
|----------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Pin1 cathode Pin2 anode |  |  |

Marking

| Type number | Marking code |
|-------------|--------------|
| FM220 | SK22 |
| FM230 | SK23 |
| FM240 | SK24 |
| FM250 | SK25 |
| FM260 | SK26 |
| FM280 | SK28 |
| FM2100 | S210 |

Suggested solder pad layout

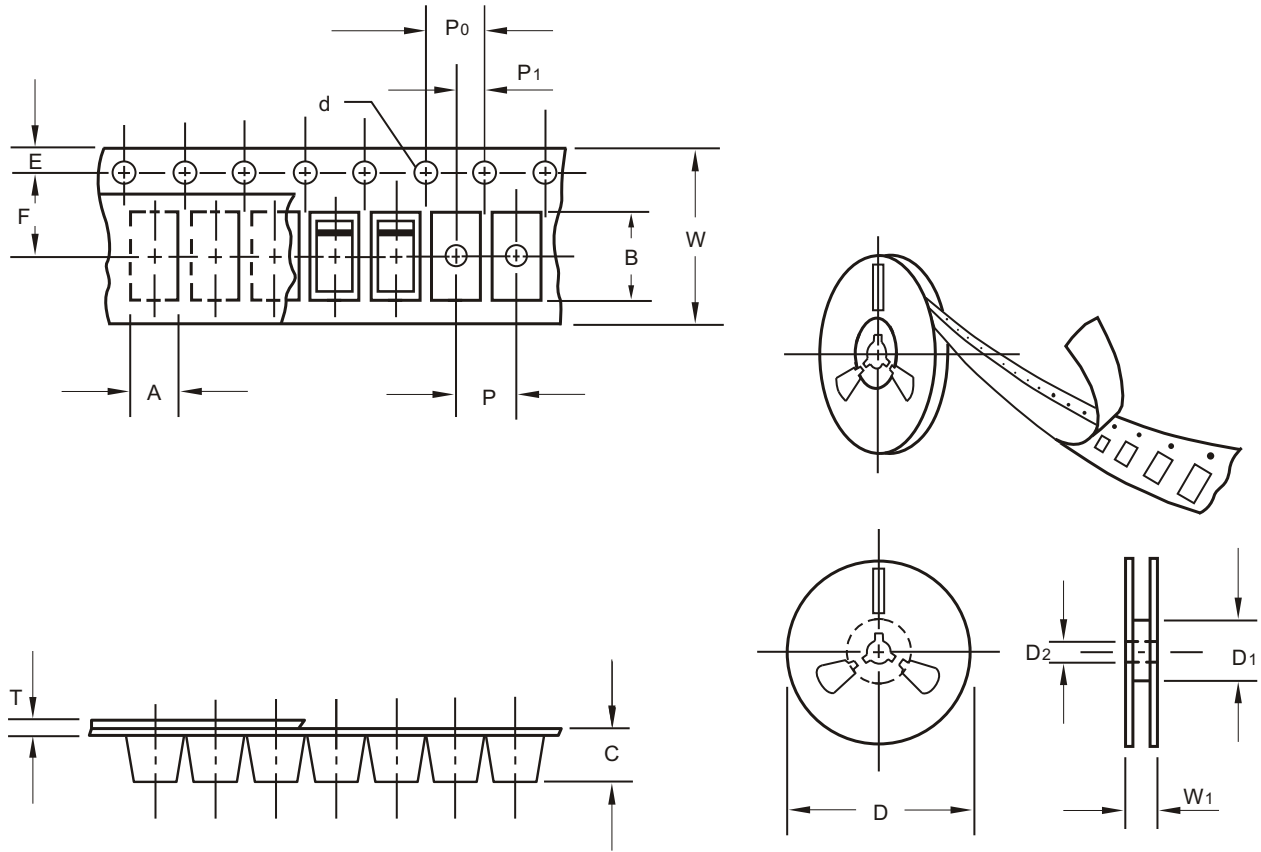


Dimensions in inches and (millimeters)

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

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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.

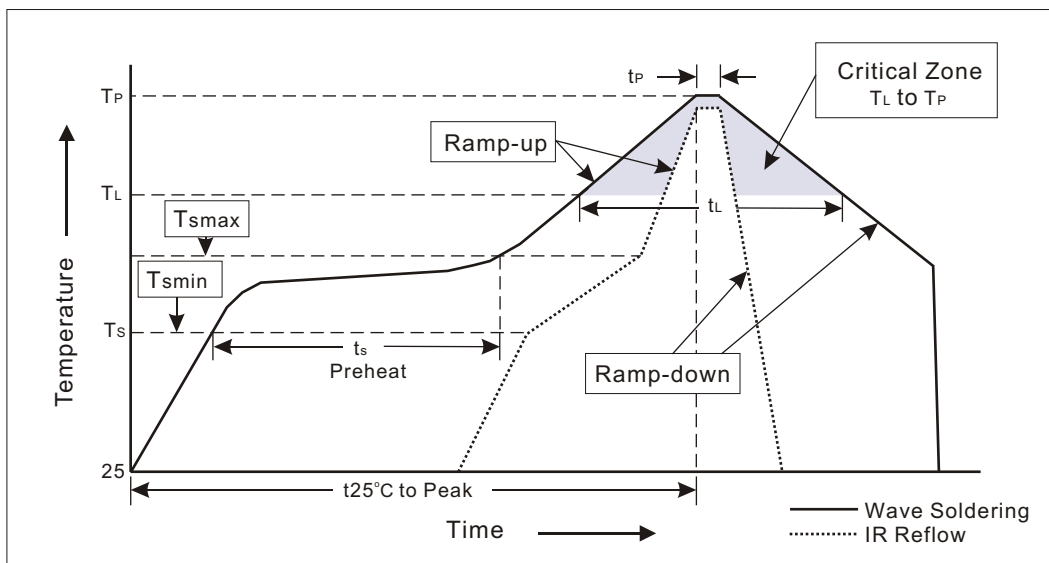
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Reel packing

| 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) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SMA | 7" | 2000 | 4.0 | 8000 | 185*185*67 | 178 | 430*190*220 | 48,000 | 5.6 |
| SMA | 13" | 7500 | 4.0 | 15,000 | 337*337*37 | 330 | 360*340*370 | 120,000 | 14.2 |

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=10°C~35°C Humidity=65%±15%
- 2.Reflow soldering of surface-mount devices



3.Flow (wave)soldering (solder dipping)

| Profile Feature | Soldering Condition |
|-----------------------------------------------------------------------------------------------------------|-----------------------------|
| Average ramp-up rate(T_L to T_P) | <3°C/sec |
| Preheat -Temperature Min(T_{Smin}) -Temperature Max(T_{Smax}) -Time(min to max)(t_s) | 100°C 150°C 60~120sec |
| T_{Smax} to T_L -Ramp-upRate | <3°C/sec |
| Time maintained above: -Temperature(T_L) -Time(t_L) | 183°C 60~150sec |
| 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°C/sec |
| Time 25°C to Peak Temperature | <6minutes |

FM220 THRU FM2100**High reliability test capabilities**

| Item Test | Conditions | Reference |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1. Solder Resistance | at $260\pm 5^{\circ}\text{C}$ for $10\pm 2\text{sec}$. immerse body into solder $1/16''\pm 1/32''$ | MIL-STD-750D METHOD-2031 |
| 2. Solderability | at $245\pm 5^{\circ}\text{C}$ for 5 sec. | MIL-STD-202F METHOD-208 |
| 3. High Temperature Reverse Bias | $V_R=80\%$ rate at $T_A=125^{\circ}\text{C}$ for 168 hrs. | MIL-STD-750D METHOD-1026 |
| 4. Forward Operation Life | Rated average rectifier current at $T=25^{\circ}\text{C}$ for 500hrs. | MIL-STD-750D METHOD-1027 |
| 5. Intermittent Operation Life | $T_A = 25^{\circ}\text{C}$, $I_F = I_O$ On state: power on for 5 min. off state: power off for 5 min. on and off for 500 cycles. | MIL-STD-750D METHOD-1036 |
| 6. Pressure Cooker | $15P_{SIG}$ at $T_A=121^{\circ}\text{C}$ for 4 hrs. | |
| 7. Temperature Cycling | -55°C to $+125^{\circ}\text{C}$ dwelled for 30 min. and transferred for 5min. total 10 cycles. | MIL-STD-750D METHOD-1051 |
| 8. Thermal Shock | 0°C for 5 min. rise to 100°C for 5 min. total 10 cycles. | MIL-STD-750D METHOD-1056 |
| 9. Forward Surge | 8.3ms single half sine-wave superimposed on rated load, one surge. | MIL-STD-750D METHOD-4066-2 |
| 10. Humidity | at $T_A=65^{\circ}\text{C}$, RH=98% for 1000hrs. | MIL-STD-750D METHOD-1038 |
| 11. High Temperature Storage Life | at 175°C for 1000hrs. | MIL-STD-750D METHOD-1031 |
| 12. Solvent Resistance | Dip into Freon at 25°C for 1 min. | MIL-STD-202F METHOD-215 |