

FM1233D

3-Pin μ C Supervisor Circuit

General Description

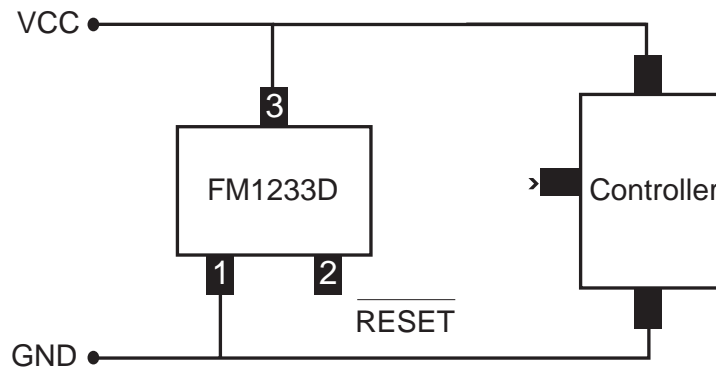
The FM1233D is a supervisor circuit that monitors a microprocessor power supply or other system voltage and issues a reset pulse when a fault condition exists. Several different threshold voltages are offered to accommodate 5V systems with different tolerances.

The device features a precision temperature-compensated voltage reference and comparator. When V_{CC} falls to the threshold voltage, a RESET pulse is issued, holding the output in the active state. When power rises above V_{TH} , the reset remains for approximately 250 ms to allow the system clock and other circuits to stabilize. The reset output of FM1233D is of open-drain active low type.

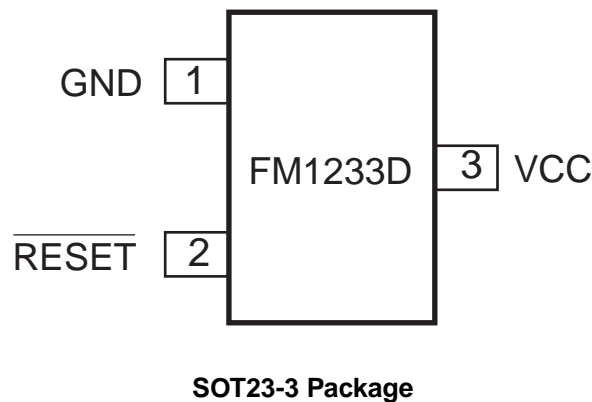
Features

- Precision monitoring of 5V and lower voltage microprocessor systems
- V_{TH} values of 4.62V, 4.38V and 4.12V
- Automatic restart of microprocessor after power failure
- 140ms (min) power-on RESET delay (typ.: 256ms)
- Internal 5k Ω pull-up resistor
- Other reset choices available: 32 to 128ms
- Operating Temperature -40°C to +105°C
- SOT23-3 package

Typical Operating Circuit



Connection Diagram



Absolute Maximum Ratings

| | | | |
|------------------------------------|------------------------------|---|-----------------|
| Voltage on any pin relative to GND | | ESD Rating: | |
| V_{CC} | -0.3V to +6.0V | Human Body Model | $\geq 2KV$ |
| RESET | -0.3V to ($V_{CC} + 0.3V$) | Machine Model | $\geq 200KV$ |
| Input Current | 20mA | Continuous Power Dissipation ($T_A = 70^\circ C$) | |
| Output Current (RESET) | 20mA | SOT23 (derate 4mW above $70^\circ C$) | 300mW |
| | | Operating Temperature Range | -40°C to +105°C |
| | | Storage Temperature Range | -65°C to +150°C |
| | | Lead Temperature (soldering, 10s) | +300°C |

These are stress ratings only, and functional operation is not implied for these levels or beyond. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

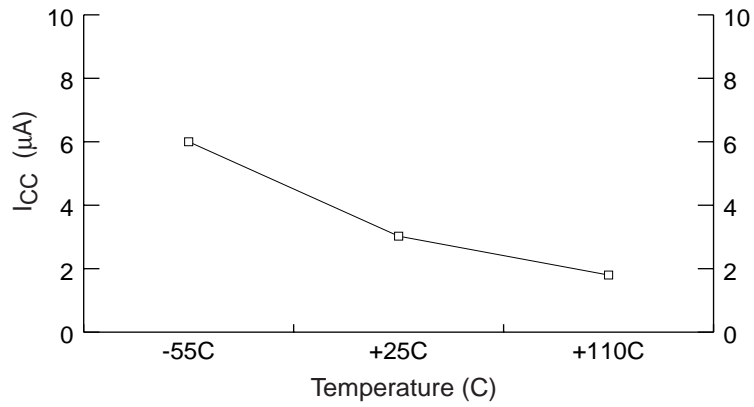
Electrical Characteristics ($V_{CC} = 5V$; $T_A = -40^\circ C$ to $+105^\circ C$ unless otherwise noted) (Note 1)

| Parameter | Symbol | Conditions | | Min | Typ | Max | Units |
|----------------------|-----------|---------------|--|------|------|------|---------|
| Operating Voltage | V_{CC} | | | 4.5 | 5 | 5.5 | V |
| Supply Current | I_{CC} | $V_{CC} < 5V$ | | | 3 | 6 | μA |
| Reset Threshold | V_{TH} | FM1233DF | | 4.40 | 4.63 | 4.86 | V |
| Reset Threshold | V_{TH} | FM1233DD | | 4.16 | 4.38 | 4.55 | V |
| Reset Threshold | V_{TH} | FM1233DE | | 3.91 | 4.12 | 4.32 | V |
| Reset Output Voltage | V_{OL} | FM1233D | $I_{sink} = 5mA$ $V_{CC} = V_{TH(min)}$ | | | 0.4 | V |
| Reset Timeout Period | t_{RST} | FM1233D | | 140 | 256 | 560 | ms |

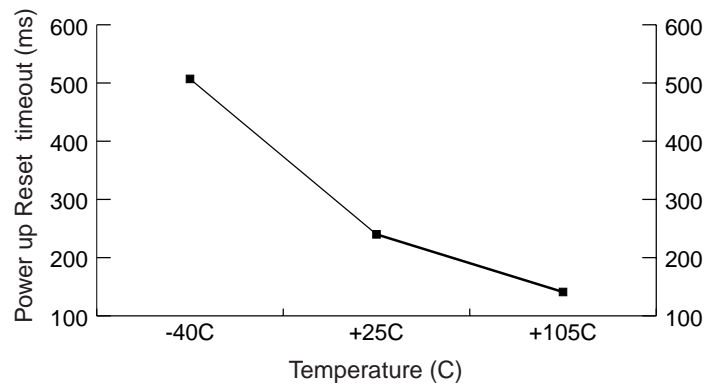
Note 1: Testing at production is done at 25°C only. Limits over temperature are guaranteed by design.

Typical Operating Characteristics

Supply Current Vs. Temperature



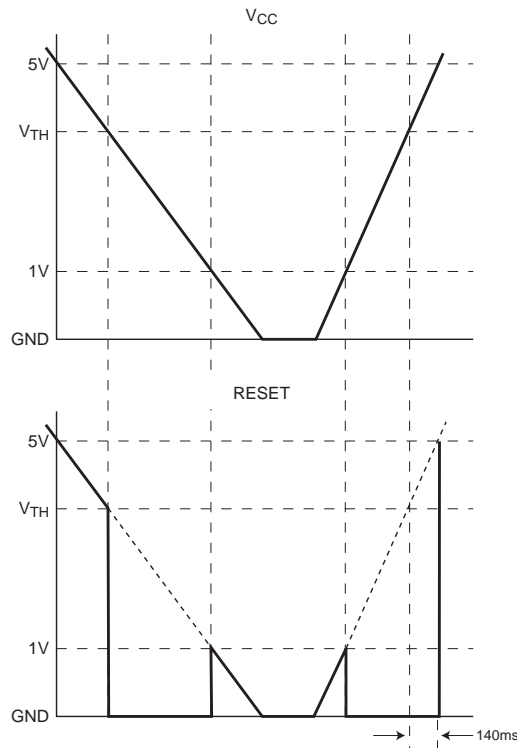
Power up Reset Timeout Vs. Temperature



Pin Descriptions

| Pin Number | Name | Function |
|------------|----------|---|
| 1 | GND | GROUND |
| 2 | RESET | RESET remains LOW while V_{CC} is below V_{TH} , and for at least 140ms after V_{CC} rises above V_{TH} . |
| 3 | V_{CC} | |

Circuit Timing (Ex: FM1233D)



When operating properly with 5V V_{CC} (for example), $\overline{\text{RESET}}$ will also be about 5V. When V_{CC} starts to fall, $\overline{\text{RESET}}$ will follow it down as shown. When V_{CC} drops below V_{TH} , $\overline{\text{RESET}}$ drops to ground ("issues a RESET") and stays there unless V_{CC} also falls below its minimum operating voltage, approx. 1V. At this point, the supervisor loses control, and its output may rise, only to again follow V_{CC} down to the ground.

When V_{CC} begins to rise, $\overline{\text{RESET}}$ follows it until 1.0V or so is reached, whereupon the device regains control, $\overline{\text{RESET}}$ is pulled to ground, etc. When V_{CC} rises above V_{TH} , $\overline{\text{RESET}}$ comes out of RESET 140 ms later.

If it is required that a lower value than $\text{GND} + 1.0\text{V}$ is needed on RESET signal during $V_{CC} \leq 1\text{V}$, a 100K resistor may be used on the device output to GND.

General Description

The FM1233D features a highly accurate voltage reference to which V_{CC} is compared. Once V_{CC} is below the specified threshold, it will drive the $\overline{\text{RESET}}$ line and continue to hold it low until V_{CC} returns above the threshold and the time for the RESET pulse duration has expired. The FM1233D is immune to short negative going transients on the V_{CC} line. The placement of a $0.1\mu\text{F}$ bypass capacitor as close as possible to the V_{CC} pin provides additional transient immunity.

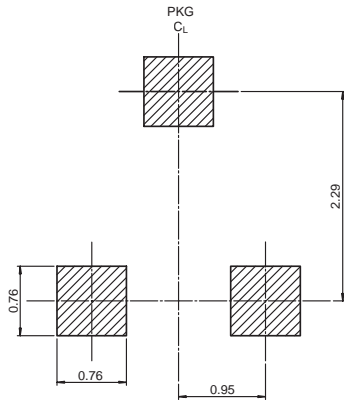
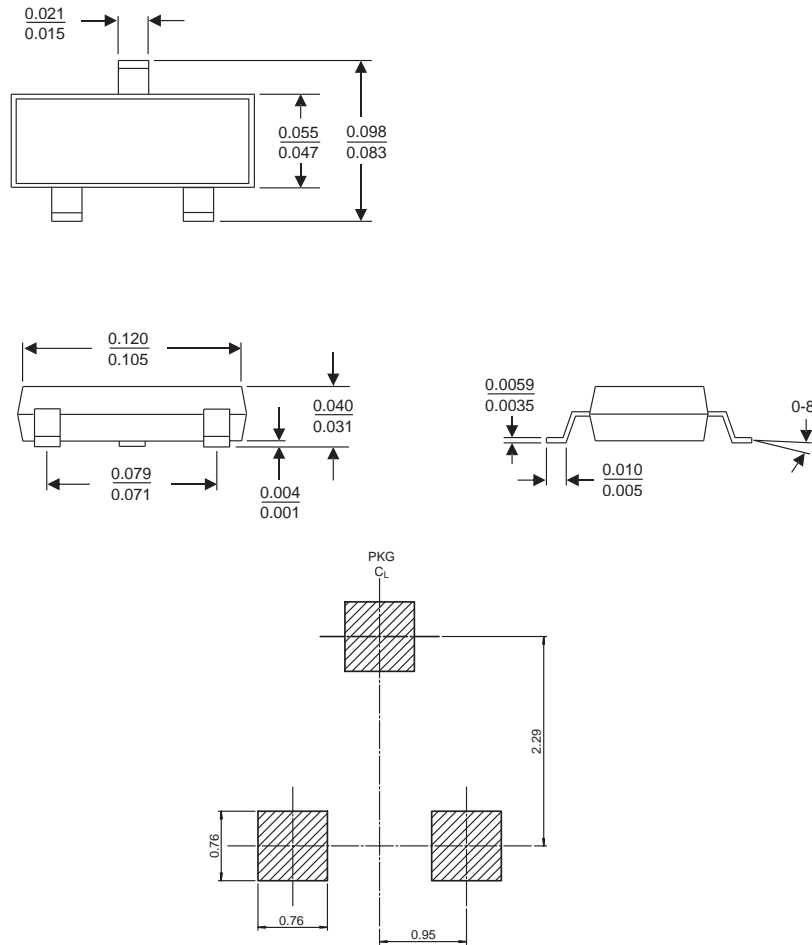
For a V_{CC} value below 1.0V, the FM1233D does not sink very much current on the $\overline{\text{RESET}}$ pin. This is not a problem in most systems since common devices are not functional in this range. If it is desired for the FM1233D reset to be functional below this range, use a $100\text{K}\Omega$ pull-down resistor between $\overline{\text{RESET}}$ and V_{SS} .

Ordering Information

| Part Number | Top Marking | RESET Threshold (V) | Output Type | Package Type | Packing Method |
|-------------|-------------|---------------------|------------------------|--------------|-------------------|
| FM1233DFS3X | 3DF | 4.62 | Open-Drain, active LOW | 3-Pin, SOT23 | 3000 units in T&R |
| FM1233DDS3X | 3DD | 4.38 | Open-Drain, active LOW | 3-Pin, SOT23 | 3000 units in T&R |
| FM1233DES3X | 3DE | 4.12 | Open-Drain, active LOW | 3-Pin, SOT23 | 3000 units in T&R |

Note 5: Devices listed above feature 250ms typical reset pulse width. Consult Fairchild Sales for other reset pulse width options.

Physical Dimensions inches (millimeters) unless otherwise noted



SOT-23 Package Dimensions
FS Pkg Code AU

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