FM811/812

Microprocessor Reset Circuits

Features

- Feature
- Precision Voltage Monitor for 3V, 3.3V or 5V Power Supplies
- 6µA Supply Current
- 140ms Minimum Reset Pulse Width
- $\overline{\text{RESET}}$ Remains Valid with V_{CC} as Low as 1.4V
- Active Low Manual Reset Input
- No External Components
- 4-Pin SOT-143 Package

Applications

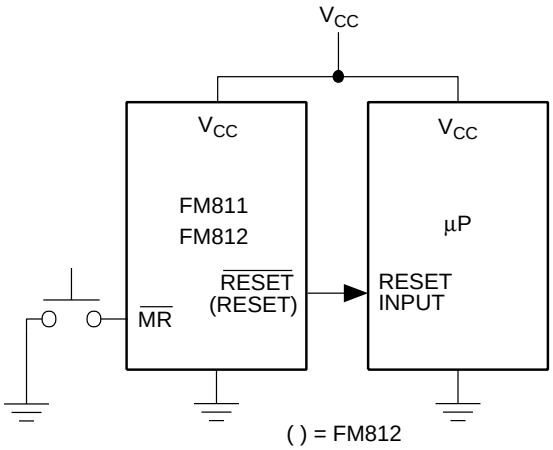
- Critical Microprocessor Power Monitoring
- Portable Equipment
- Intelligent Instruments
- Computers & Printers
- Controllers

Description

The FM811/FM812 is a low cost microprocessor supervisory circuit that asserts a reset if the power supply drops below a designated threshold or the manual reset pin is forced low. Several different reset thresholds are available to accommodate systems operating at 3V, 3.3V or 5V.

The FM811 has an active low $\overline{\text{RESET}}$ output, while the FM812 offers an active high RESET output. The reset output is guaranteed to remain asserted for a minimum of 140ms after V_{CC} has risen above the designated reset threshold. The FM811/FM812 is available in a 4-pin SOT-143.

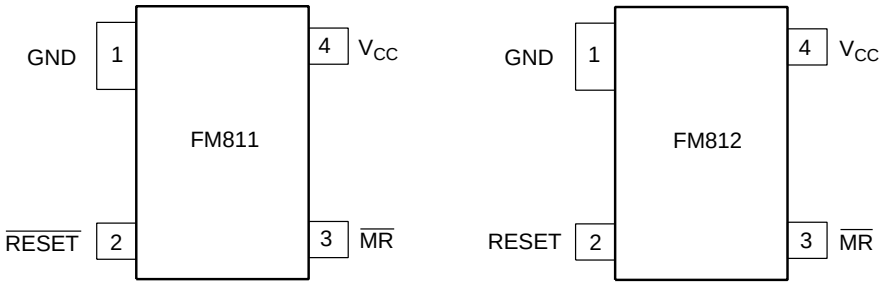
Typical Applications



Preliminary Information

Pin Assignments

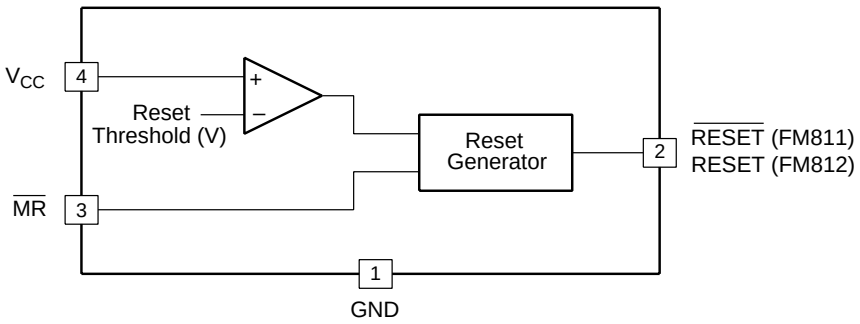
Top View



Pin Definitions

Pin Name	Pin Number		Description
	FM811	FM812	
GND	1	1	Ground Pin
$\overline{RESET}$	2	N/A	$\overline{RESET}$ goes low if V_{CC} falls below the reset threshold and remains asserted for one reset time-out period (140ms min.) after V_{CC} exceeds the reset threshold.
RESET	N/A	2	RESET goes high if V_{CC} falls below the reset threshold and remains asserted for one reset time-out period (140ms min.) after V_{CC} exceeds the reset threshold.
$\overline{MR}$	3	3	Manual reset input. Shorting this pin to GND forces a reset. The reset will remain asserted as long as $\overline{MR}$ is held low and for one reset time-out period (140ms min.) after $\overline{MR}$ goes high. This input cannot be driven by a CMOS or TTL logic. Push-button switch is recommended to be used with this pin. Float if unused.
V_{CC}	4	4	Power supply input, 3V, 3.3V, or 5V

Internal Block Diagram



Preliminary Information

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units
Terminal Voltage	V_{CC}	-0.3 to 6.0	V
	$\overline{MR}$	-0.3 to (V_{CC} + 0.3)	V
Input Current	V_{CC}, $\overline{MR}$	20	mA
Output Current	RESET, $\overline{RESET}$	20	mA
Rate of Rise	V_{CC}	100	V/µs
Operating Temperature Range	T_A	-40 to +85	˚C
Storage Temperature Range		-65 to +150	˚C
Lead Temperature Range		300	˚C
Power Dissipation (T_A = +70˚C)		320	mW

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability. Operating ranges define those limits between which the functionality of the device is guaranteed.

Electrical Characteristics

V_{CC} = 5V for FM81_L/M/J, V_{CC} = 3.3V for FM81_S/T, V_{CC} = 3V for FM81_R, T_A = Operating Temperature Range, unless otherwise noted.

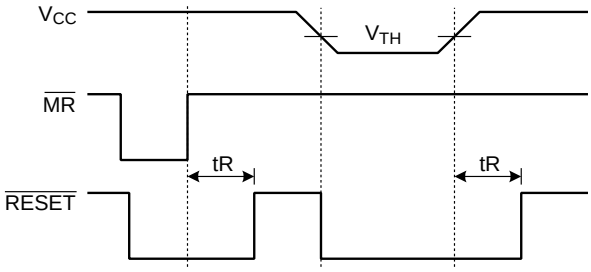
Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Voltage Range	T_A = 0˚C to 70˚C T_A = -40˚C to 85˚C	1.4 1.6		5.5 5.5	V
Supply Current, I_{CC}	FM811L/M/J, FM812L/M/J V_{CC} < 3.6V, FM811R/S/T, FM812R/S/T		9 6	15 10	µA
Reset Voltage Threshold, V_{TH}	FM811L, FM812L FM811M, FM812M FM811J, FM812J FM811T, FM812T FM811S, FM812S FM811R, FM812R	4.40 4.18 3.90 2.97 2.79 2.49	4.63 4.38 4.00 3.08 2.93 2.63	4.86 4.52 4.18 3.19 3.00 2.70	V
Reset Time-out Period, t_R		140	240	560	ms
$\overline{RESET}$ Output Voltage, V_{OH}	I_{SOURCE} = 800µA, FM811L/M/J I_{SOURCE} = 500µA, FM811R/S/T	V_{CC} - 1.5 0.8 x V_{CC}			V
$\overline{RESET}$ Output Voltage, V_{OL}	V_{CC}= V_{TH} Min., I_{SINK} = 3.2mA, FM811L/M/J V_{CC}= V_{TH} Min., I_{SINK} = 1.2mA, FM811R/S/T V_{CC} > 1.4V, I_{SINK} = 50µA, T_A= 0˚C to 70˚C V_{CC} > 1.6V, I_{SINK} = 50µA, T_A= -40˚C to 85˚C			0.4 0.3 0.3 0.3	V
RESET Output Voltage, V_{OH}	1.8V < V_{CC} < V_{TH} Min., I_{SOURCE} = 150µA	0.8 x V_{CC}			V
RESET Output Voltage, V_{OL}	I_{SINK} = 3.2mA, FM810L/M/J I_{SINK} = 1.2mA, FM810R/S/T			0.4 0.35	V
$\overline{MR}$ Minimum Pulse Width		10			µs
$\overline{MR}$ to Reset Delay			0.5		µs
$\overline{MR}$ Input Threshold, V_{IH}	V_{CC} > V_{TH} Max., FM81_L/M/J FM81_R/S/T	2.3 0.7 x V_{CC}			V
$\overline{MR}$ Input Threshold, V_{IL}	V_{CC} > V_{TH} Max., FM81_L/M/J FM81_R/S/T			0.8 0.25xV_{CC}	
$\overline{MR}$ Pull-Up Resistance		10	20	30	kΩ
$\overline{MR}$ Glitch Immunity			100		ns

Preliminary Information

Circuit Description

Microprocessor Reset

The $\overline{\text{RESET}}$ pin is asserted whenever V_{CC} falls below the reset threshold voltage or if $\overline{\text{MR}}$ (manual reset) is forced low. The reset pin remains asserted for a period of 40ms after V_{CC} has risen above the reset threshold voltage or $\overline{\text{MR}}$ has returned high. The reset function ensures the microprocessor is properly reset and powers up into a known condition after a power failure. $\overline{\text{RESET}}$ will remain valid with V_{CC} as low as 1.4V.



V_{CC} Transients

The FM811/ FM812 are relatively immune to negative-going V_{CC} glitches below the reset threshold. Typically, a negative-going transient 125mV below the reset threshold with a duration of 50ms (25ms for FM81_R/S/T) or less will not cause an unwanted reset.

Manual Reset Function

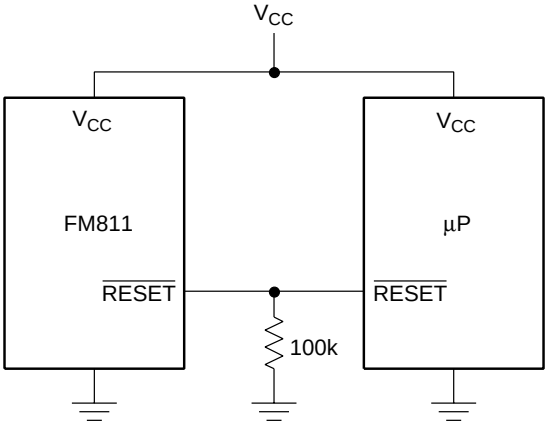
Momentarily connecting the Manual Reset input pin ($\overline{\text{MR}}$) to GND forces a reset. Typically a Push-button switch is used in most of the applications to force a manual reset. See Typical Applications diagram. The reset will remain asserted as long as $\overline{\text{MR}}$ is held low and for one reset time-out period (140ms min.) after $\overline{\text{MR}}$ goes high. Note that this input cannot be driven by a CMOS or TTL logic. This pin should be left floating if manual reset feature is unused.

Interfacing to Bidirectional Reset Pins

The FM811/ FM812 can interface with µPs with bidirectional reset pins by connecting a 4.7kΩ resistor in series with the FM811/ FM812 output and the µP reset pin.

$\overline{\text{RESET}}$ Valid to 0V

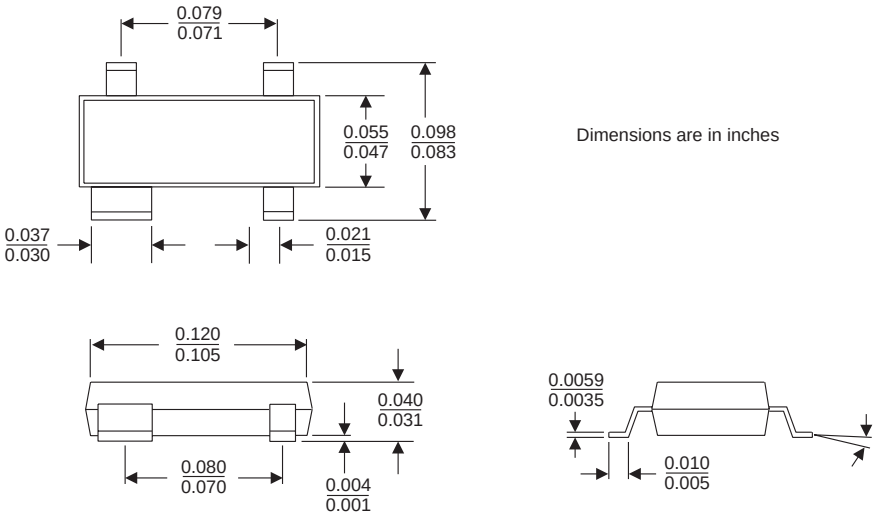
A resistor can be added from the $\overline{\text{RESET}}$ pin to ground to ensure the $\overline{\text{RESET}}$ output remains low with V_{CC} down to 0V. A 100kΩ resistor connected from $\overline{\text{RESET}}$ to ground is recommended. The size of the resistor should be large enough to not load the RESET output and small enough to pull-down any stray leakage currents.



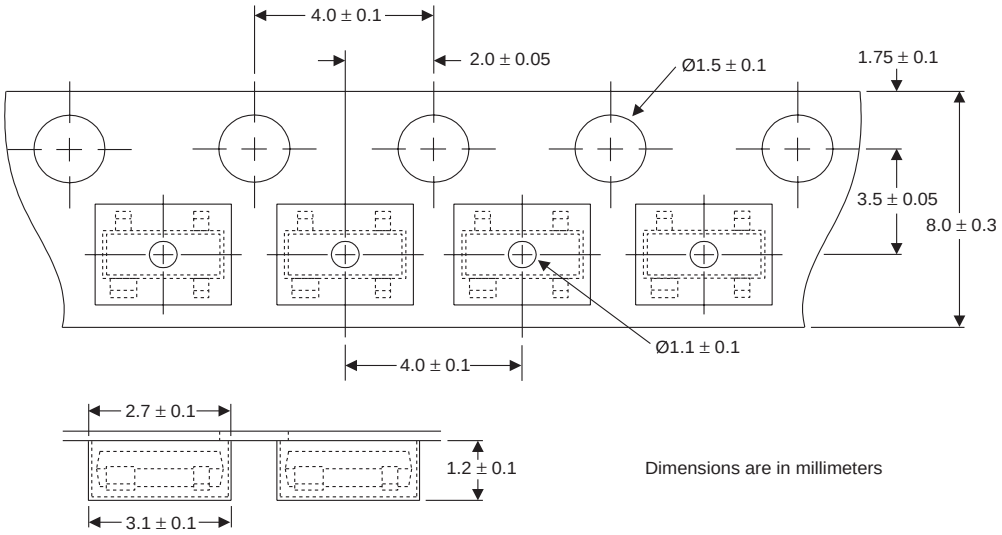
Preliminary Information

Packaging Information

4-Pin SOT-143



Tape and Reel Information



Preliminary Information

Ordering Information

Part Number	Top Marking*	RESET Threshold (V)	Output Type	Package	Packing Method
FM811LUX	KLYY	4.63	Push-Pull, active LOW	4-Pin, SOT143	3000 units in T&R
FM811MUX	KMYY	4.38	Push-Pull, active LOW	4-Pin, SOT143	3000 units in T&R
FM811JUX	KJYY	4.00	Push-Pull, active LOW	4-Pin, SOT143	3000 units in T&R
FM811TUX	KTYY	3.08	Push-Pull, active LOW	4-Pin, SOT143	3000 units in T&R
FM811SUX	KSYY	2.93	Push-Pull, active LOW	4-Pin, SOT143	3000 units in T&R
FM811RUX	KRYY	2.63	Push-Pull, active LOW	4-Pin, SOT143	3000 units in T&R
FM812LUX	LLYY	4.63	Push-Pull, active HIGH	4-Pin, SOT143	3000 units in T&R
FM812MUX	LMYY	4.38	Push-Pull, active HIGH	4-Pin, SOT143	3000 units in T&R
FM812JUX	LJYY	4.00	Push-Pull, active HIGH	4-Pin, SOT143	3000 units in T&R
FM812TUX	LTYY	3.08	Push-Pull, active HIGH	4-Pin, SOT143	3000 units in T&R
FM812SUX	LSYY	2.93	Push-Pull, active HIGH	4-Pin, SOT143	3000 units in T&R
FM812RUX	LRYY	2.63	Push-Pull, active HIGH	4-Pin, SOT143	3000 units in T&R

* YY = Lot Code

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