Temperature Switch IC with Hysteresis
Monolithic IC MM3488

Outline

This IC is a temperature switch IC that changes the IC output level from Low to High when the temperature around the IC reaches the detection temperature. With the hysteresis function, IC output level returns to Low when the ambient temperature drops to the hysteresis temperature selected after detection. Detection temperature T_{DET} can be selected in 1.0°C steps between the range of 60 to 90°C with rank expansion, with detection temperature accuracy of ±2.0°C.

Features

1. Low current consumption
2. Small package
3. High Temperature accuracy
4. Low power supply operation range
5. Comes with hysteresis function

Package

SSON-4B

Applications

1. Cellular phones
2. LCD TVs/panels
3. Game equipment
4. PCs
5. System thermal monitor
6. OA equipment

Model Name

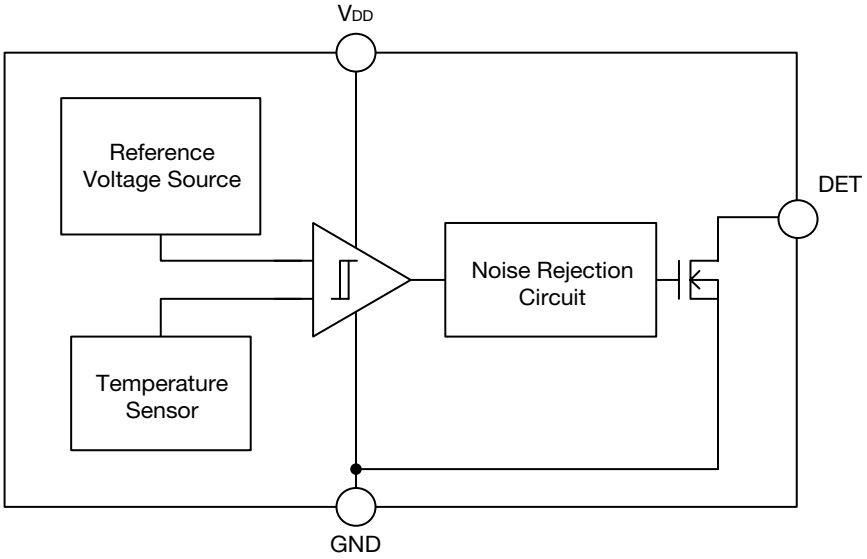
M M 3 4 8 8 □ □ □ R R E

1 2 3 4

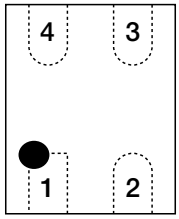
1		2	
Hysteresis Temperature (T_{HYS})		Detecitng Temperature (T_{DET})	
A	T_{HYS}=5.0°C	60	T_{DET}=+60°C
B	T_{HYS}=10°C	≀	T_{DET} is 1.0°C steps
C	T_{HYS}=15°C	90	T_{DET}=+90°C

3		4	
Package		Packing Specifications	
R	SSON-4B	R	R HOUSING (Standard)
		L	L HOUSING

Block Diagram



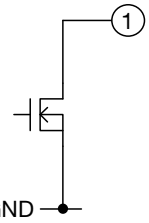
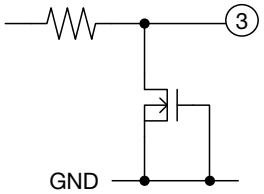
Pin Assignment



SSON-4B
(TOP VIEW)

1	DET
2	GND
3	NC
4	V_{DD}

Pin Description

Pin No.	Pin Name	Function	Internal Equivalent Circuit
1	DET	Temp. Detect Output Pin	
2	GND	Ground pin	
3	NC (Note1)	NC (Testing pin)	
4	V_{DD}	Power supply pin	

Note1 : Testing pin is connected with the internal circuit for testing.
When resistance and capacity are connected with Testing pin, this product produce improper operating signals. Please set Testing pin to the open state.

Absolute Maximum Ratings

Item	Symbol	Ratings	Units
Maximum Supply Voltage	V_{DDmax}	−0.3~+6.0	V
Terminal Voltage	DET_{max}	−0.3~+6.0	V
Storage Temperature	T_{stg}	−55~+125	°C
Power Dissipation	Pd	150	mW

Recommended Operating Conditions

Item	Symbol	Ratings	Units
Operating Supply Voltage	V_{DDopr}	+1.6~+5.0	V
Operating Temperature	T_{opr}	−30~+105	°C

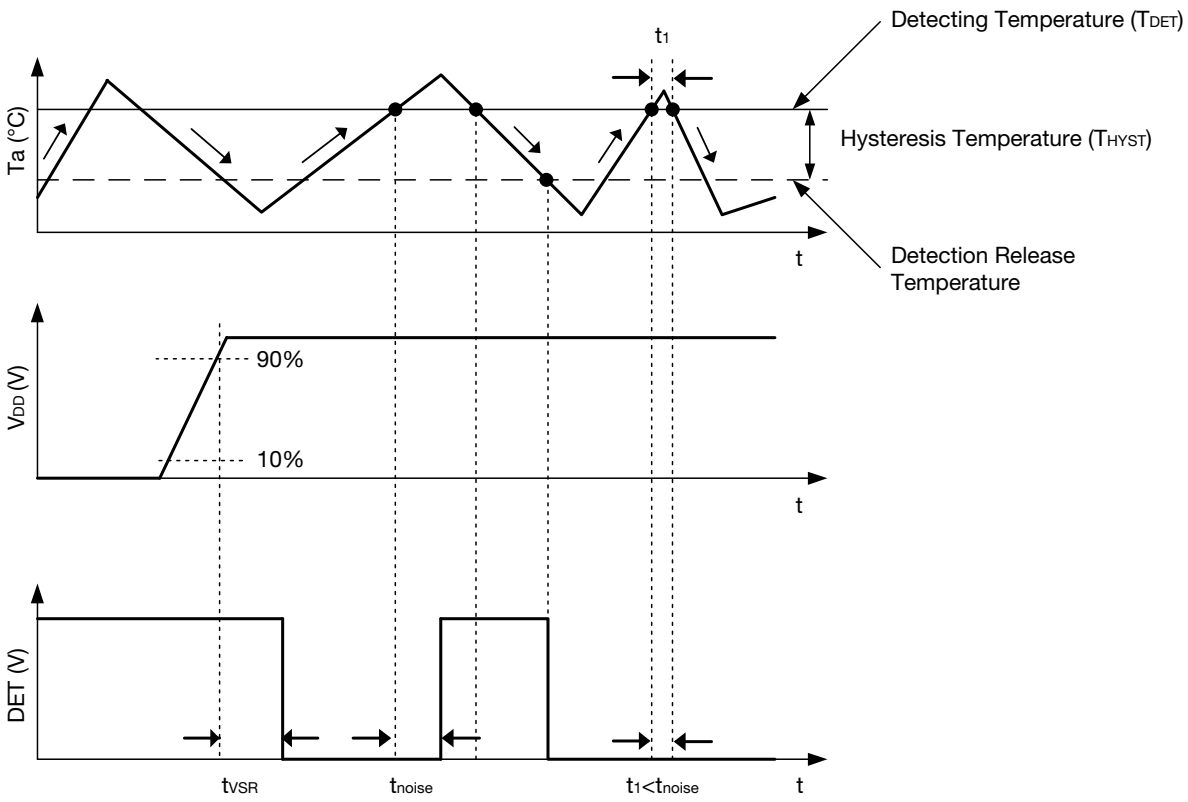
Electrical Characteristics (Except where noted otherwise Ta=25°C, V_{DD}=1.8V)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Operating Supply Voltage	V_{DD}	T_{DET}=60~90°C	1.6	1.8	5.0	V
Detecitng Temperature Accuracy (Note2)	T_{DETAC1}	V_{DD}=1.6~3.3V	−2.0	0	+2.0	°C
	T_{DETAC2}	V_{DD}=3.3~5.0V	−1.5	+0.5	+2.5	°C
Hysteresis Temperature (Note3)	T_{HYS}	T_{HYS}=5.0°C	2.5	5.0	7.5	°C
		T_{HYS}=10°C	7.0	10.0	13.0	°C
		T_{HYS}=15°C	10.5	15.0	19.5	°C
DET Sink Current	I_{DETL}	V_{DET}=0.4V, V_{DET}=Low Level	4.0	12.0		mA
DET Leak Current	I_{LEAK}	V_{DD}=5.0V, V_{DET}=High Level			0.1	µA
Supply Current	I_{DD}			1.5	3.5	µA
Noise Rejection Time	t_{noise}	Ta=+60~+90°C		250	500	µs
VDD Start-up Response	t_{vsr}	$R_{PULL-UP}$ = 1MΩ		100	500	µs

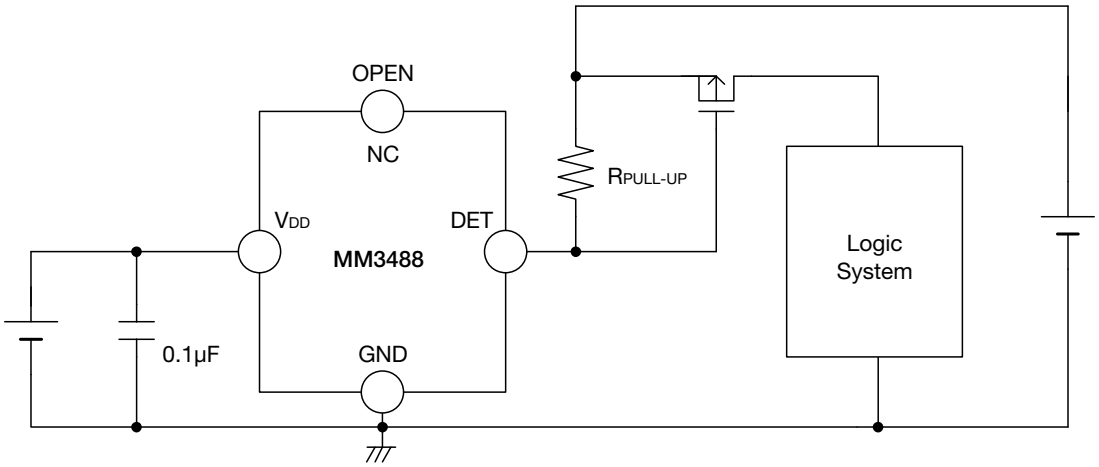
Note2 : Detection temperature can be selected in 1.0°C steps (+60~+90°C)

Note3 : Hysteresis temperature can be selected in 5.0°C steps (5.0°C, 10°C, 15°C)

Timing Chart



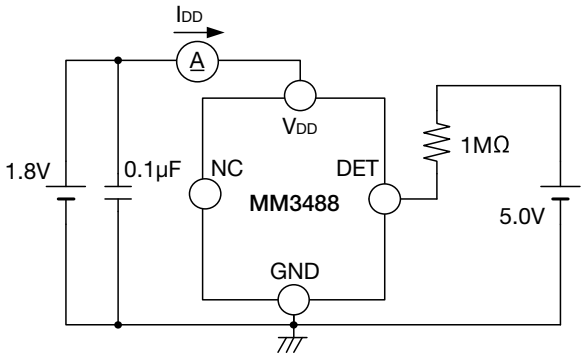
Application Circuit



· We shall not be liable for any trouble or damage caused by using this circuit.
· In the event a problem which may affect industrial property or any other rights of us or a third party is encountered during the use of information described in these circuit, Mitsumi Electric Co., Ltd. shall not be liable for any such problem, nor grant a license therefore.

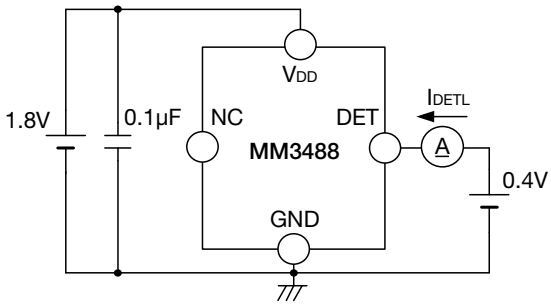
Measuring Circuit

1. Supply Current

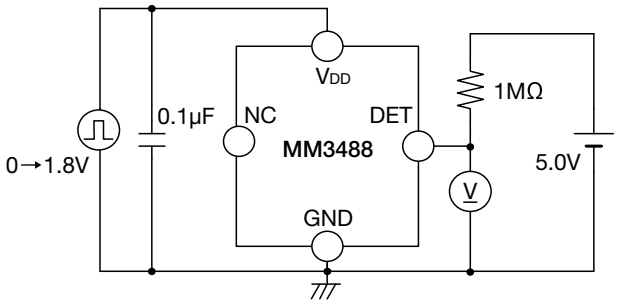


2. DET Sink Current

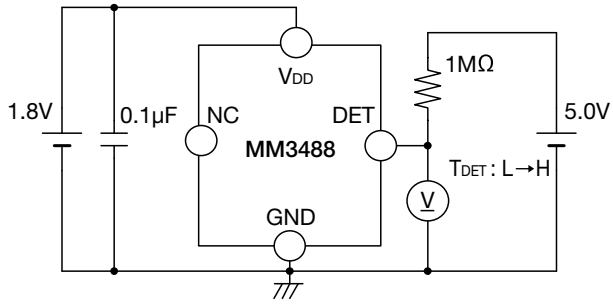
State of DET output Low level



3. Start-up Response

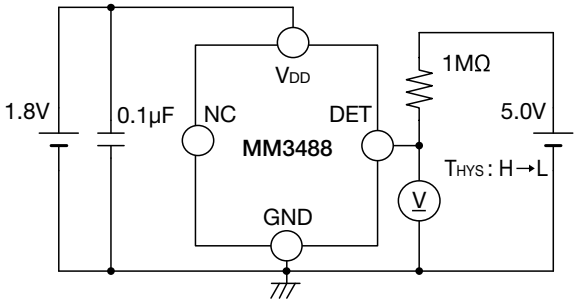


4. Detecting Temperature



L : State of DET output Low level
H : State of DET output Low level
Ta = +40→ +100°C

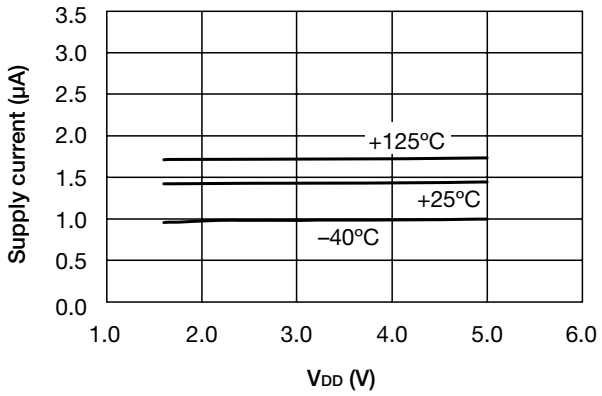
5. Hysteresis Temperature



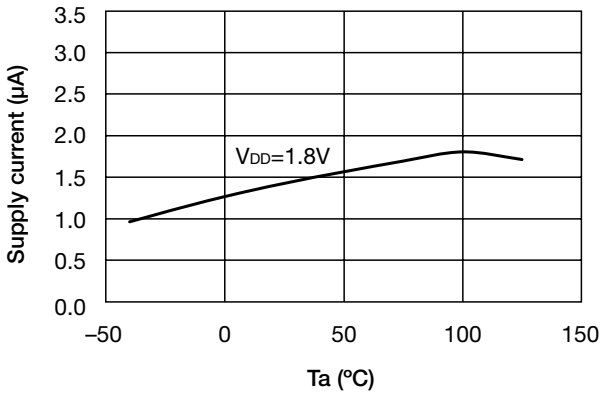
L : State of DET output Low level
H : State of DET output Low level
Ta = +100→ +40°C

Characteristics

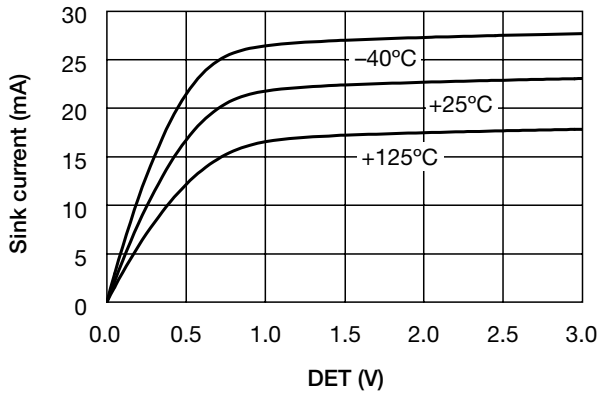
Supply Voltage - Supply Current



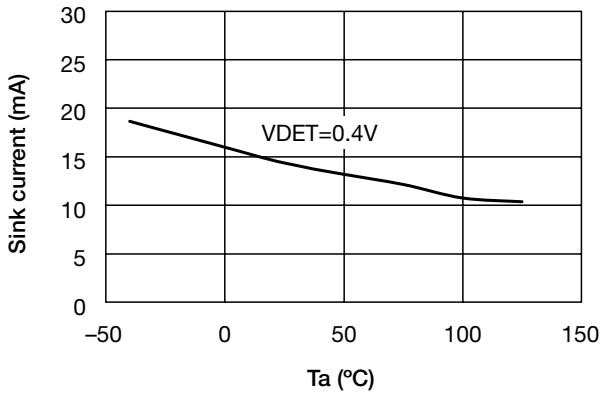
Ambient Temparture - Supply Current



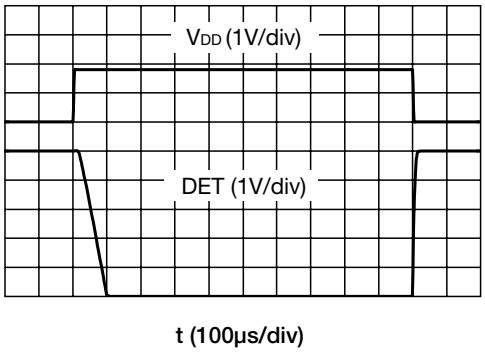
Supply Voltage - DET Sink Current



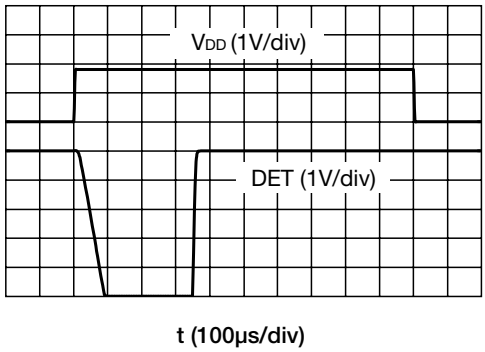
Ambient Temparture - DET Sink Current



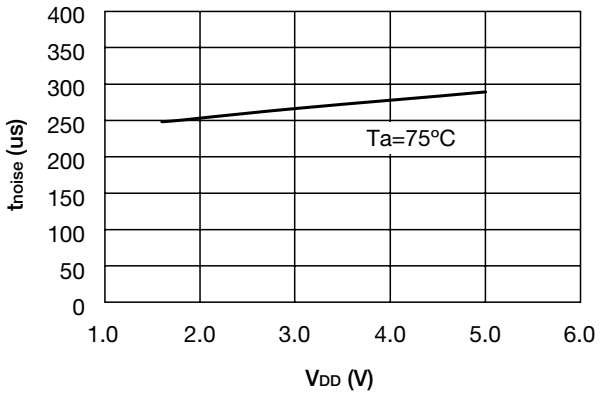
Start-up Response (Ta＜TDET)



Start-up Response (Ta≧TDET)



Supply Voltage - Noise Rejection Time



Ambient Temparture - Noise Rejection Time