High-Accuracy Temperature Sensor
Monolithic IC MM3154 Series

Outline

This IC is a high-accuracy temperature sensor IC that can linearly output the voltage in response to changes in temperature. The operating temperature range is −40 to 100°C, and the operating supply voltage range is +2.4 to +6.5V.
Compared to conventional thermistors and similar devices, it has superior linearity and a maximum temperature accuracy error of ±2.5°C. It is suitable for use in portable devices as the current consumption is as low as 4.5μA typ. (Ta = 25°C).

Features

1. High temperature accuracy
2. Low current consumption
3. Temperature - output voltage high linearity
4. Wide operating supply voltage
5. High input stability
6. High load stability

Packages

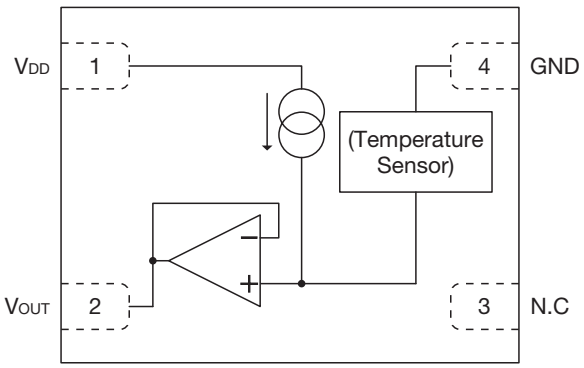
SC-82ABA
SSON-4A

Applications

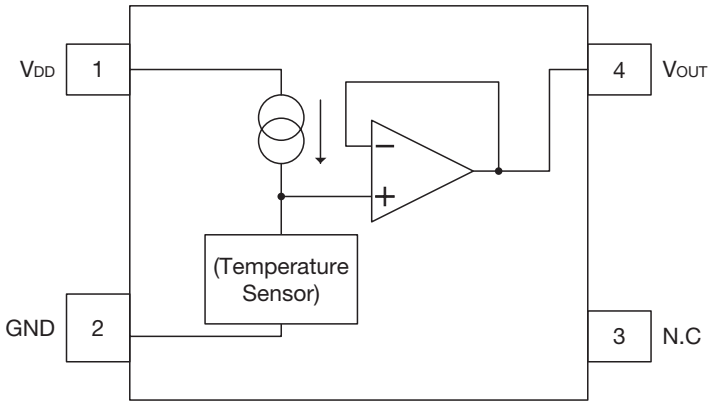
1. Cellular phones/PHS
2. Crystal oscillator modules
3. Computers
4. Power modules
5. Battery packs and chargers

Block Diagram

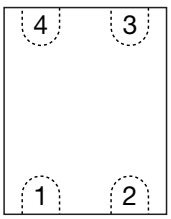
SSON-4A



SC-82ABA

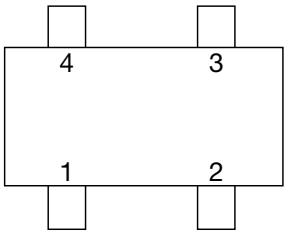


Pin Assignment



SSON-4A
(TOP VIEW)

1	VDD
2	VOUT
3	N.C
4	GND



SC-82ABA
(TOP VIEW)

1	VDD
2	GND
3	N.C
4	VOUT

Pin Description

SSON-4A

Pin No.	Pin name	Function
1	VDD	Power supply pin
2	VOUT	Output pin
3	N.C	No connect
4	GND	Ground pin

SC-82ABA

Pin No.	Pin name	Function
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Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Units
Maximum supply voltage	V_{DD} max.	−0.3~+7.0	V
Maximum output voltage	V_{OUT}	−0.3~V_{DD}+0.3	V
Allowable loss	Pd	150	mW
Storage temperature	T_{STG}	−55~+150	°C

Recommended Operating Conditions

Item	Symbol	Ratings	Units
Operating supply voltage	V_{DDOPR}	+2.4~+6.5	V
Operating temperature	T_{OPR}	−40~+100	°C

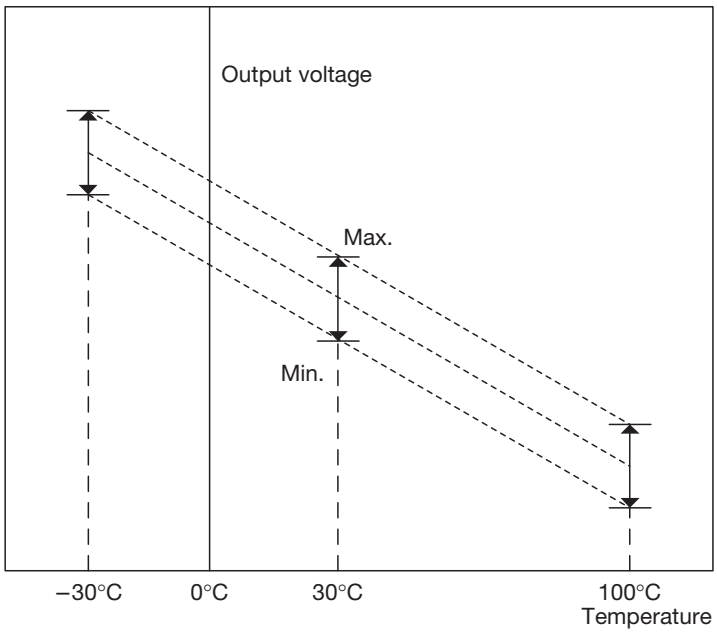
Electrical Characteristics (Except where noted otherwise, Ta=25°C, V_{DD}=5V, I_{OUT}=0A)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Accuracy	Ac	−30°C≤Ta≤100°C			±2.5	°C
Current consumption	I_{DD}			4.5	8.0	µA
Output voltage (note 1)	V_{OUT}	Ta=−30°C	1.931	1.951	1.971	V
		Ta=30°C	1.454	1.474	1.494	V
		Ta=100°C	0.862	0.882	0.902	V
Temperature sensitivity (note 2)	V_{SE}	−30°C≤Ta≤100°C	-8.40	-8.20	-8.00	mV/°C
Nonlinearity (note 3)	⊿N_L	−20°C≤Ta≤80°C		±0.5		%
Line regulation	⊿V_{OUT} /⊿V_{DD}	V_{DD}=+2.4~+6.5V			0.03	%/V
Load regulation *	⊿V_{OUT} /⊿I_{OUT}	I_{OUT}=0~200µA			1.0	mV

* : Don't flow sink current into output pin (V_{OUT}).

note 1 : Output voltage : V_{OUT}

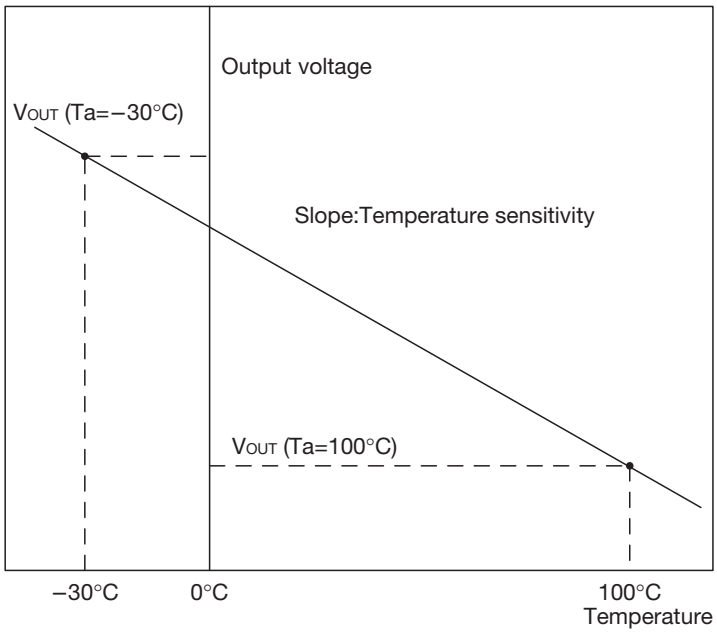
Terminal voltage at the time of Ta=−30°C, 30°C, and 100°C.



note 2 : Temperature sensitivity : V_{SE}

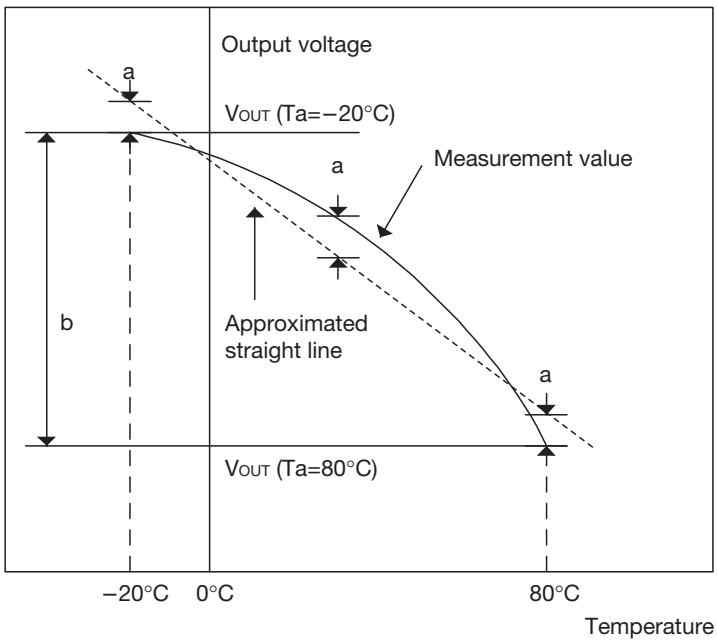
Temperature coefficient of output voltage calculated from output voltage at the time of Ta=−30°C and +100°C.

V_{SE}= (V_{OUT} (100°C)−V_{OUT} (−30°C)) /130



note 3 : Nonlinearity : ⊿ N_L

Characteristic curve of output voltage and deflection with the approximation straight line.
In temperature range from −20 to +80°C, the approximation straight line and the maximum deflection of the measurement value among output voltages obtained from the approximation straight line.
It assumes the approximation straight line to be a straight line to which a is minimized.

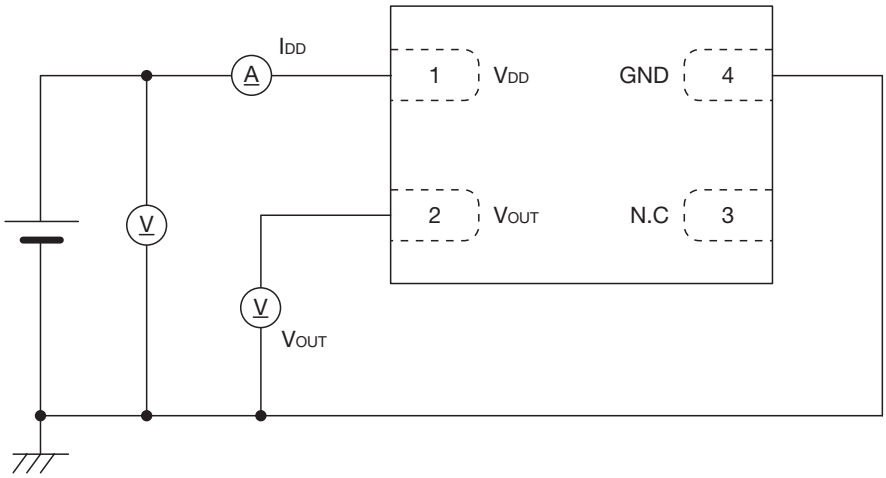


⊿NL=a/b*100

Measuring Circuit

SSON-4A

1



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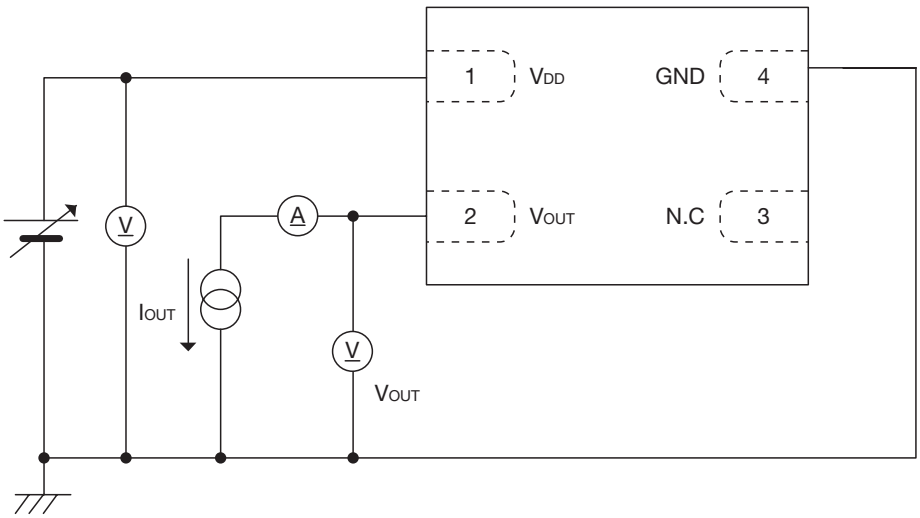
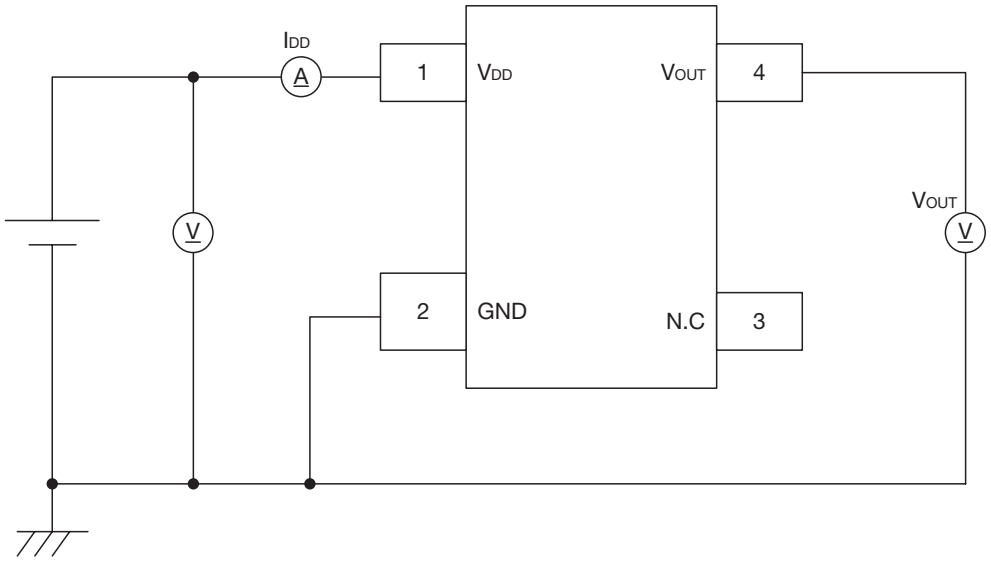
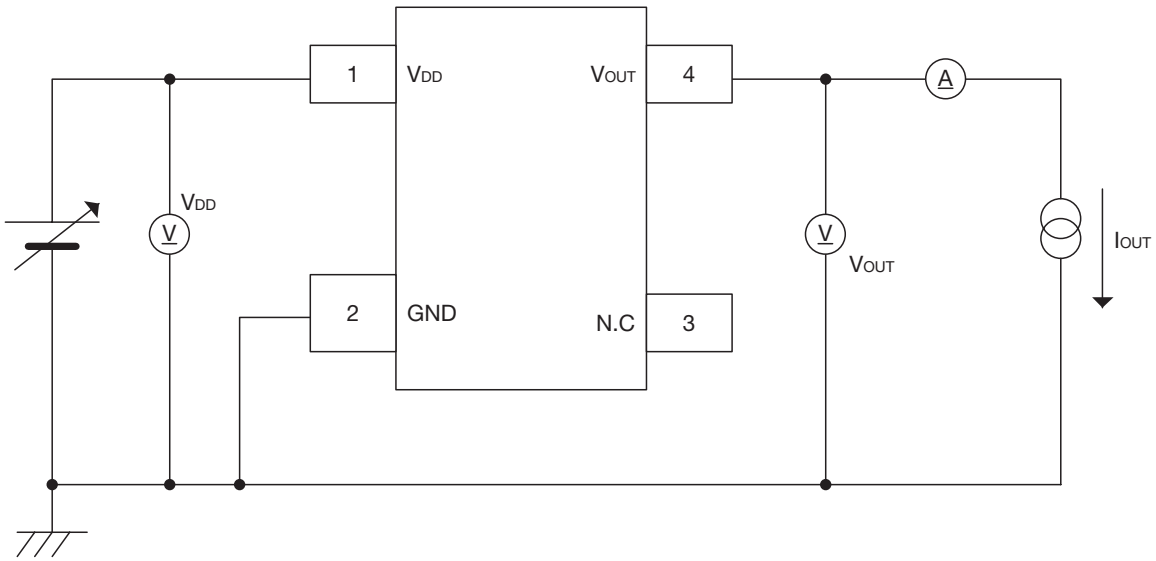


SC-82ABA

1

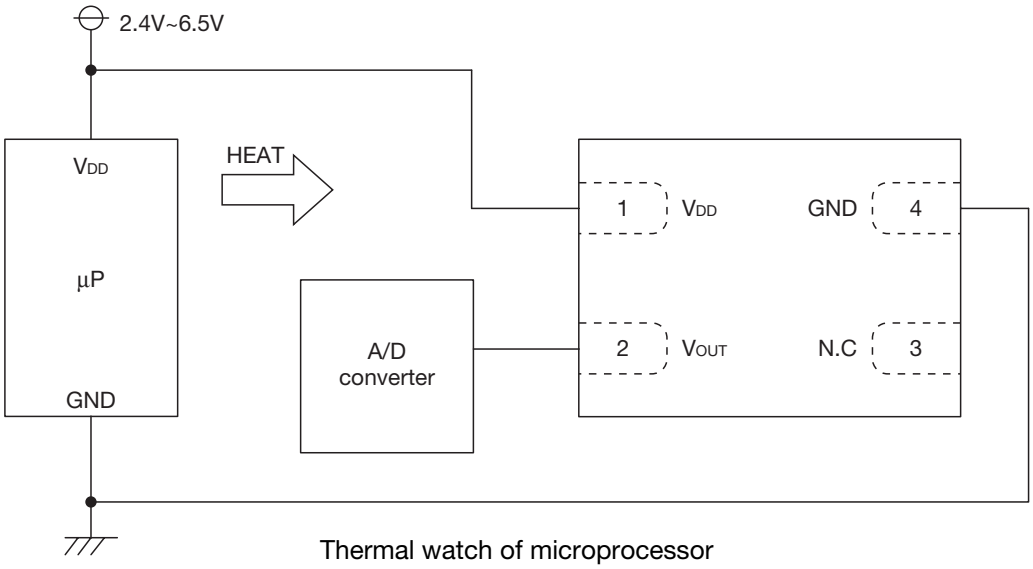

IDD
A
1
VDD
VOUT
4
V
VOUT
V
2
GND
N.C
3

2


1
VDD
VOUT
4
A
VDD
V
V
VOUT
IOUT
2
GND
N.C
3

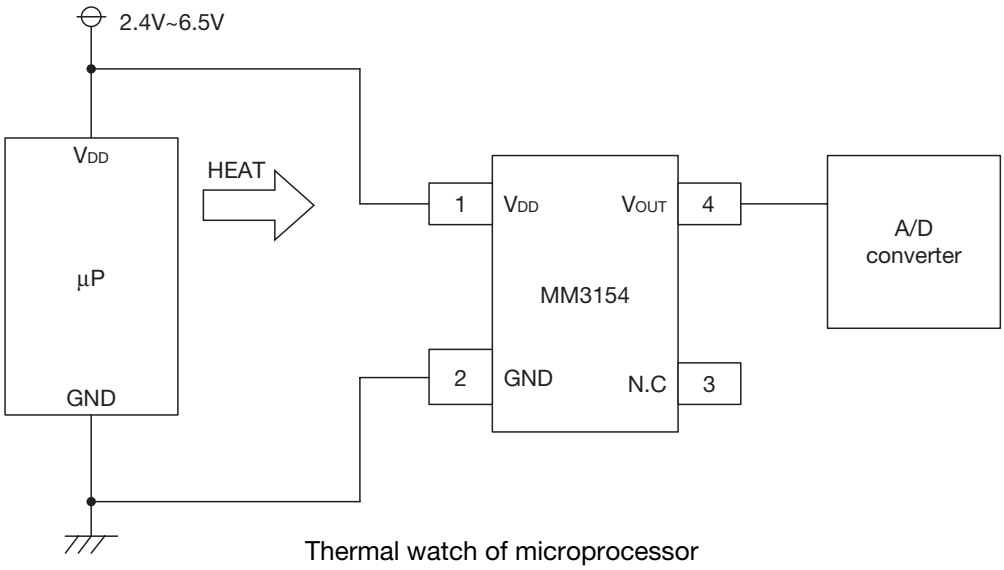
Application Circuit

SSON-4A



Thermal watch of microprocessor

SC-82ABA

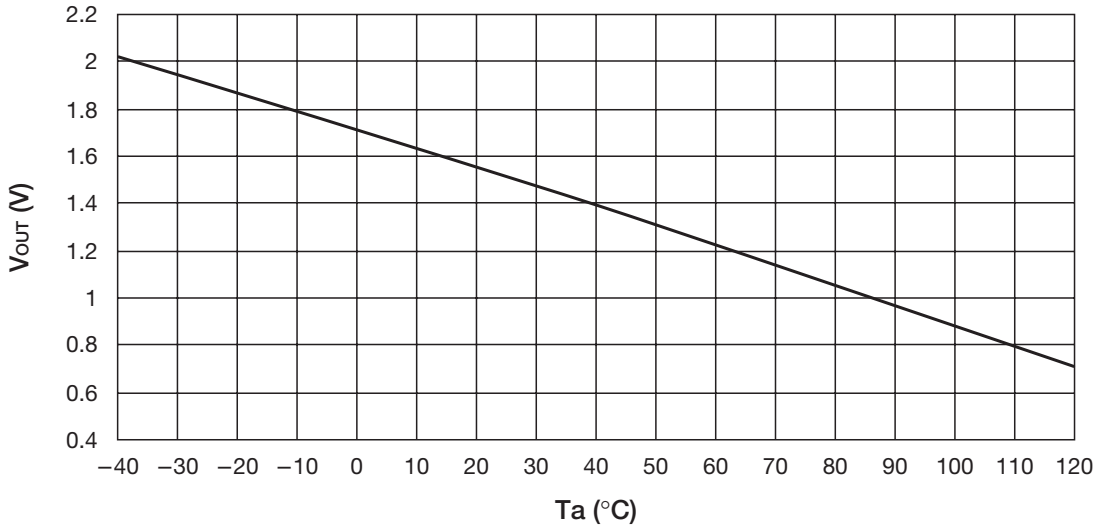


Thermal watch of microprocessor

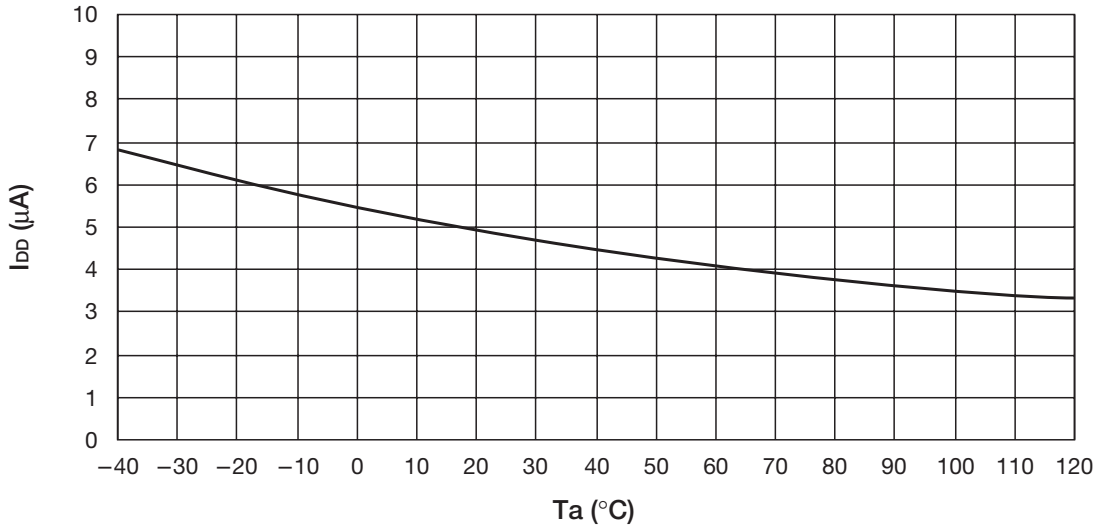
We shall not be liable for any trouble or damage caused by using this circuit.
In the event a problem which may affect industrial property or any other rights of us or a third party is encountered during the use of information described in these circuit, Mitsumi Electric Co., Ltd. shall not be liable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

Characteristics

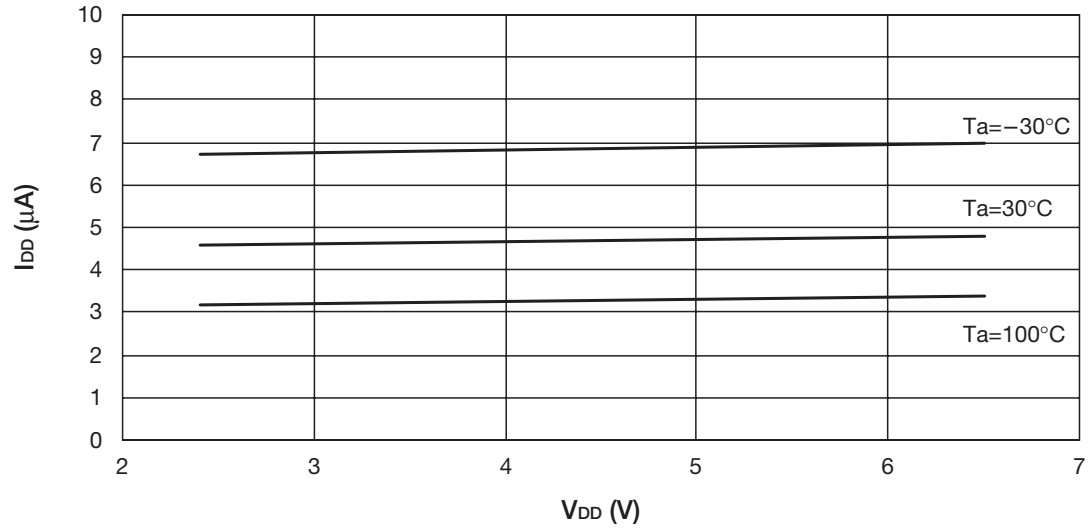
Output voltage vs Temperature



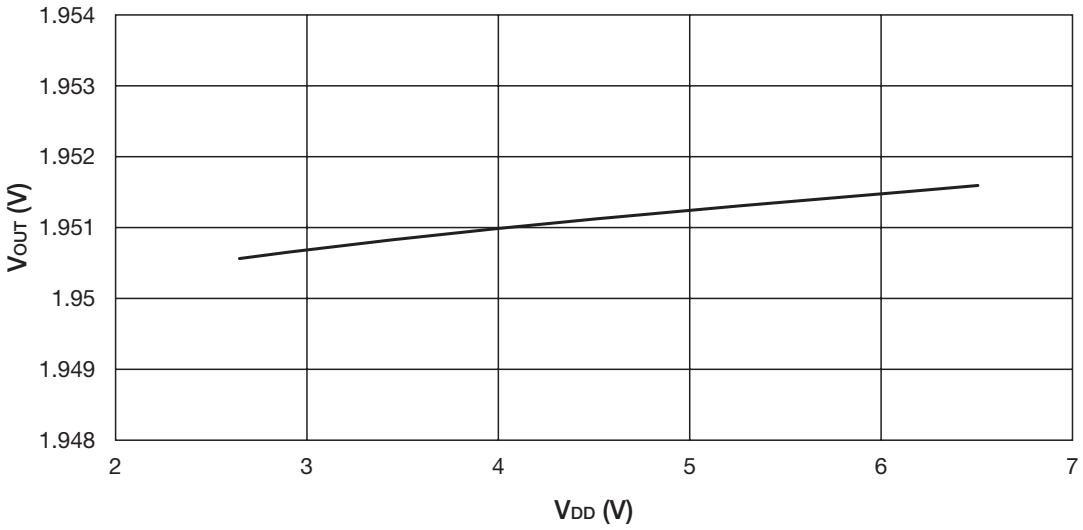
Current consumption vs Temperature



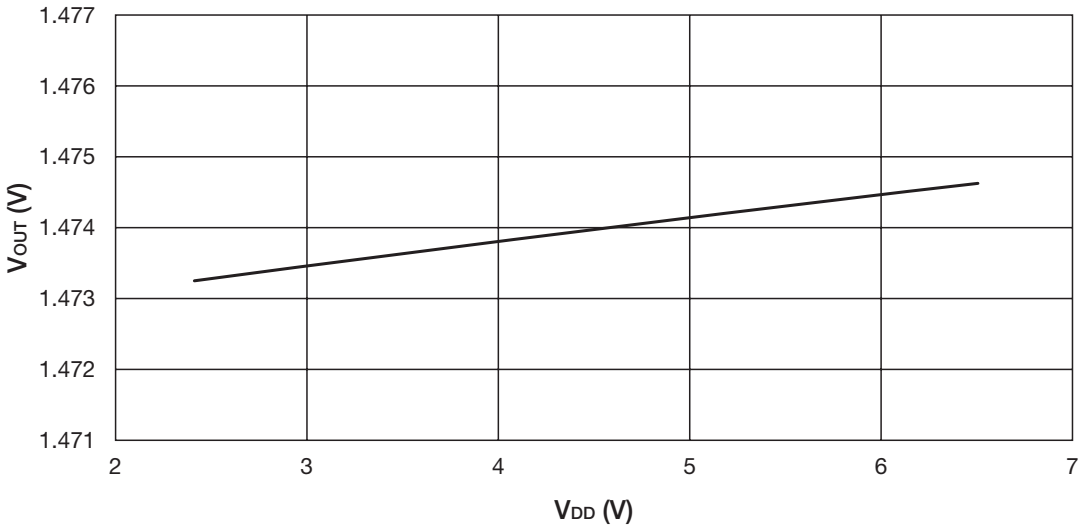
Current consumption vs Supply voltage



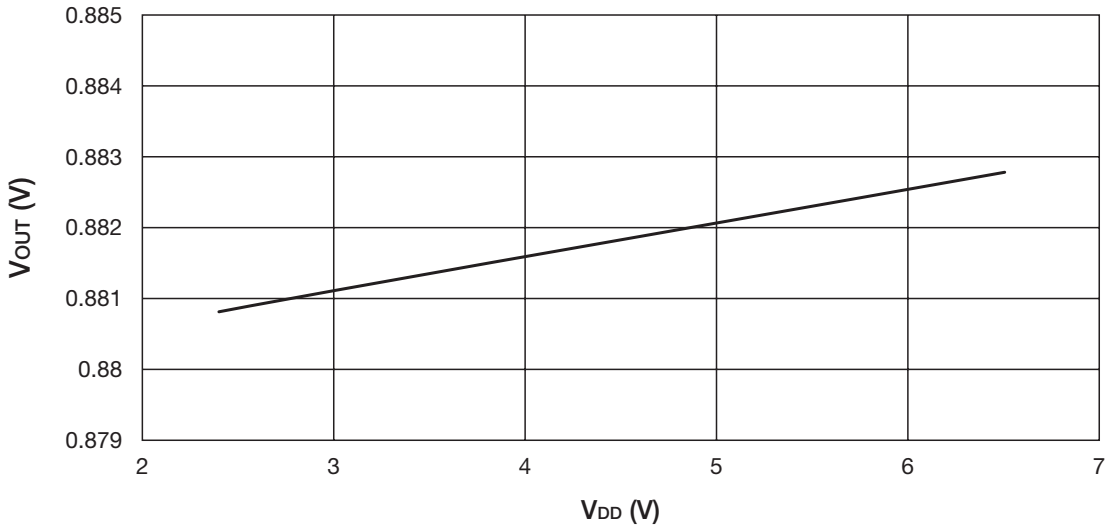
Output voltage vs Supply voltage Ta=−30°C



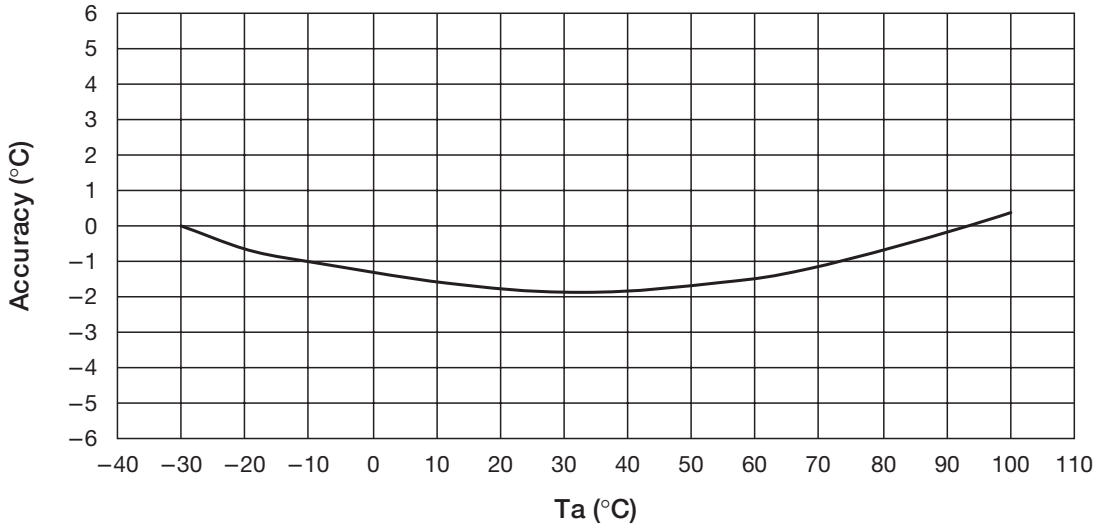
Output voltage vs Supply voltage Ta=30°C



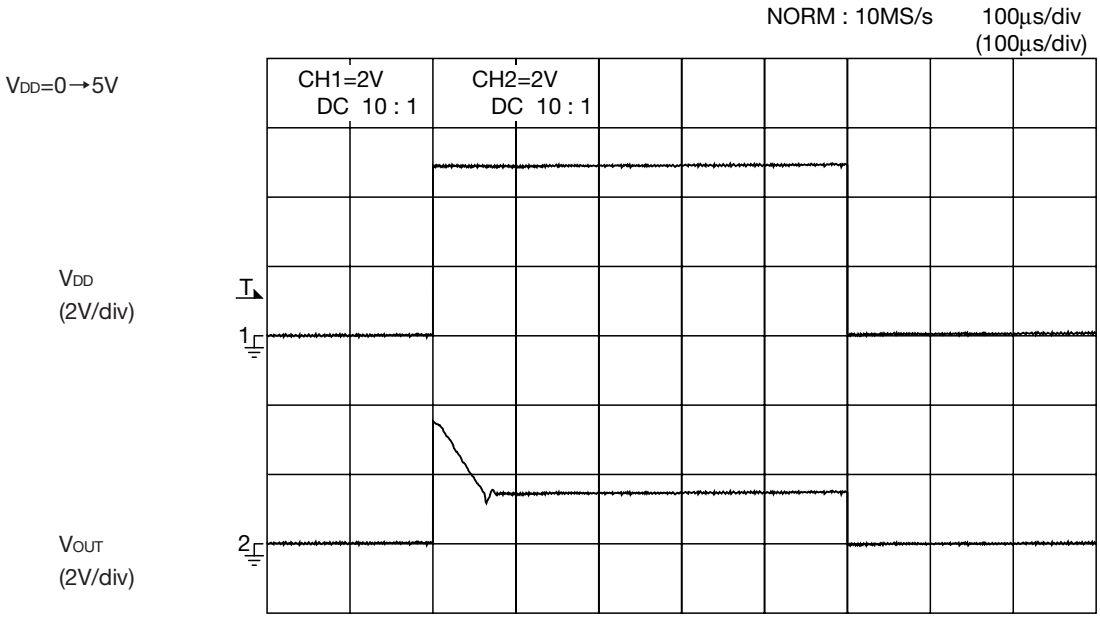
Output voltage vs Supply voltage Ta=100°C

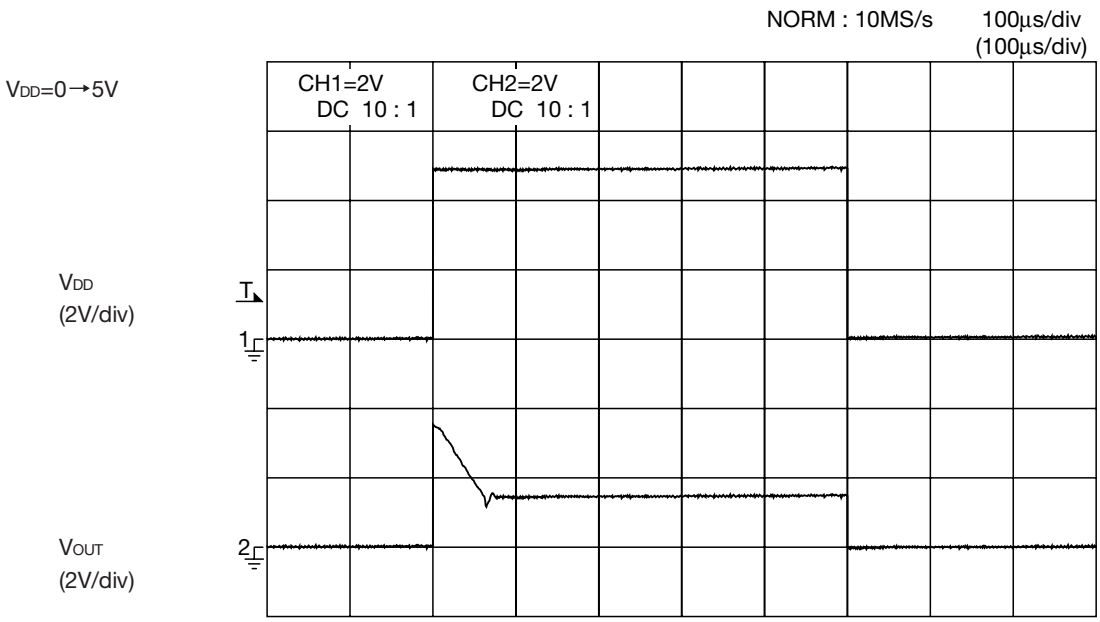


Accuracy vs Temperature

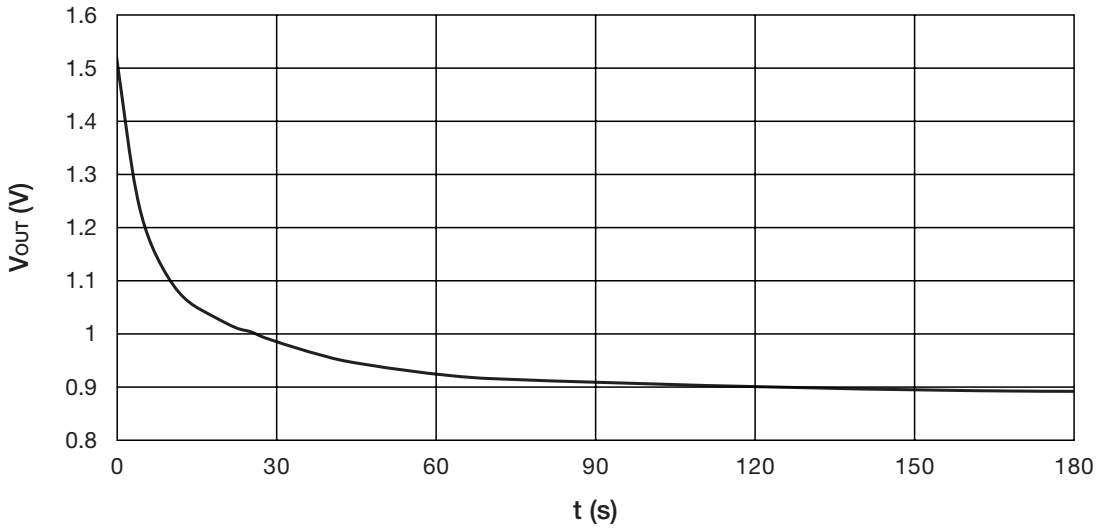


Start-up response





Thermal response characteristic in the air at 25°C →in the air at 100°C



Thermal response characteristic in the air at 25°C →in the liquid at 100°C