

## Constant Voltage and Constant Current controller ME4313

### General Description

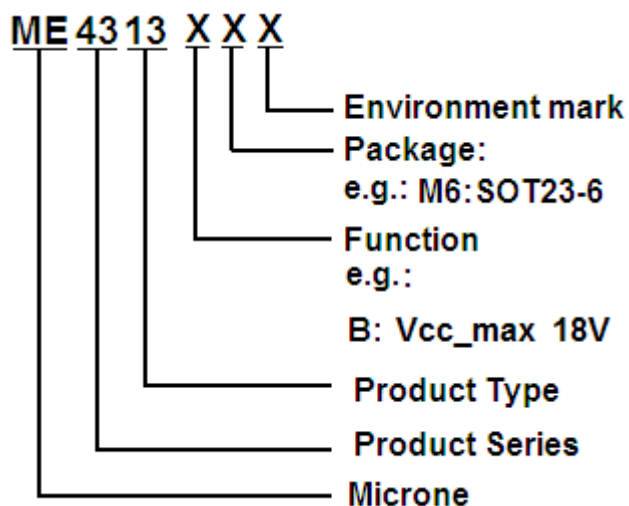
ME4313 is a highly integrated solution for a constant voltage/constant current mode SMPS application.

The ME4313 contains one 1.21V voltage reference with  $\pm 1\%$  accuracy, one current sensing circuit and two operational amplifiers. Combining the voltage reference with one operational amplifier makes ME4313 an ideal voltage controller for use in adapters and battery chargers. The other low voltage reference combined with the other operational amplifier makes it an ideal current limiter for output low side current sensing.

### Features

- Constant Voltage and Constant Current Control
- Precision Internal Voltage Reference
- Few External Components
- Easy Compensation
- Low supply current: 0.5mA
- Operating temperature range: -40 to 125°C
- Available in SOT23-6 package

### Selection Guide

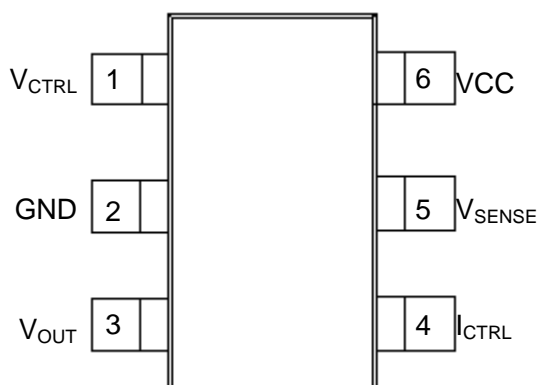


### Typical Application

- Adapters
- Battery Chargers

## Pin Configuration

The ME4313 is offered in SOT23-6 packages shown as below.



## PIN Assignments

Pin Num.	Symbol	Description
1	V <sub>CTRL</sub>	Input pin of the voltage control loop
2	GND	Ground
3	V <sub>OUT</sub>	Output pin. Sinking current only
4	I <sub>CTRL</sub>	Input pin of the current control loop
5	V <sub>SENSE</sub>	Input pin of the current control loop
6	VCC	Power supply

## Absolute Maximum Ratings

Parameter	Range	Unit
Power Supply Voltage VCC	20	V
Input Voltage V <sub>IN</sub>	-0.3 to V <sub>CC</sub>	V
Junction Temperature T <sub>J</sub>	150	°C
Storage Temperature T <sub>STG</sub>	-65 to 150	°C
Lead Temperature (Soldering, 5sec) T <sub>LEAD</sub>	260	°C
Package Thermal Resistance (Junction to Case) θ <sub>JC</sub>	92	°C/W

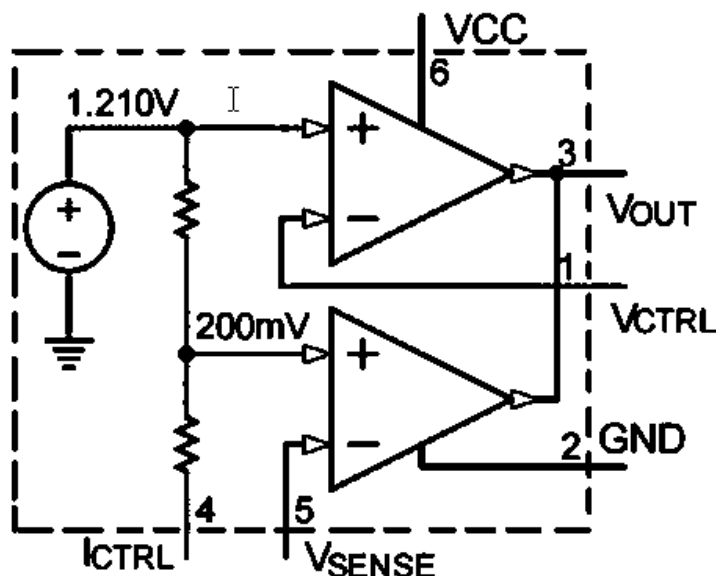
Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage.

These values must therefore not be exceeded under any conditions.

## Recommended Operating Condition

Parameter	Range	Unit
Power Supply Voltage VCC	2.5 to 18	V
Operating Temperature Range T <sub>A</sub>	-40 to 125	°C

## Block Diagram

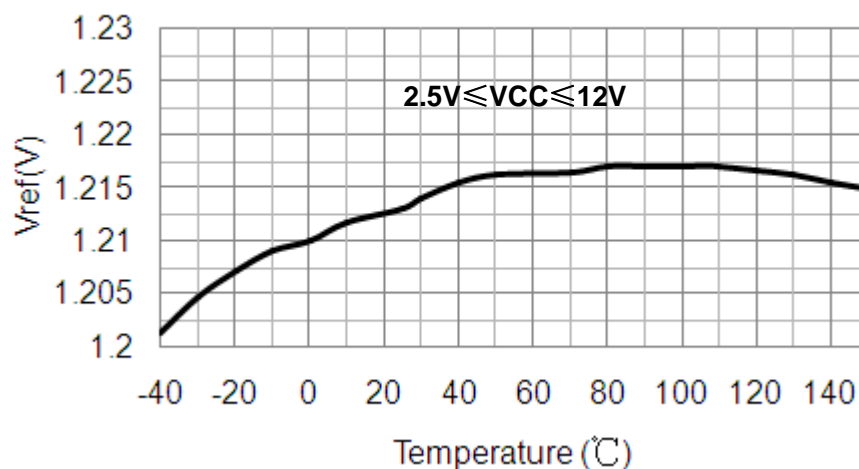


## Electrical Characteristics (T<sub>A</sub> = 25°C, VCC=5V, if not otherwise noted)

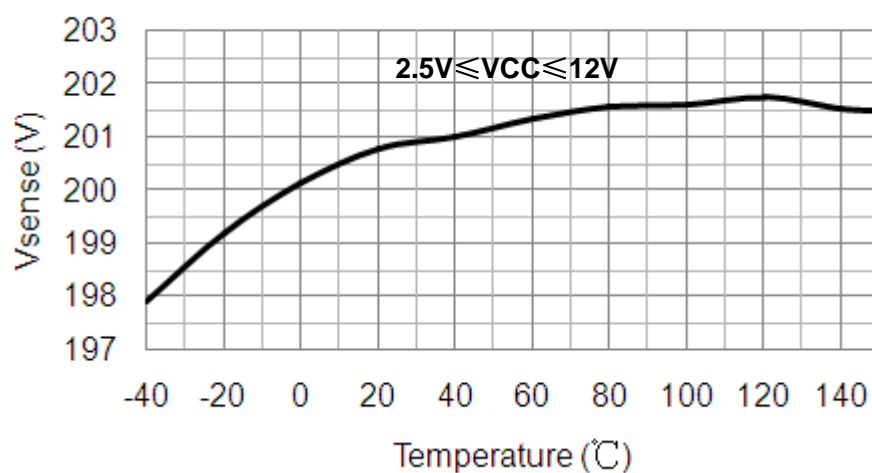
Symbol	Parameter	Test Conditions	Min	Typ.	Max	Unit
<b>Total Current Consumption</b>						
I <sub>CC</sub>	Total Supply Current Not Including the Output Sinking Current		-	0.6	1.2	mA
<b>Voltage Control Loop</b>						
G <sub>mv</sub>	Transconduction Gain (V <sub>CTRL</sub> ). Sink Current Only		1	3.5	-	mA/mV
V <sub>REF</sub>	Voltage Control Loop Reference		1.198	1.21	1.222	V
I <sub>IBV</sub>	Input Bias Current (V <sub>CTRL</sub> )		-	50	-	nA
<b>Current Control Loop</b>						
G <sub>mi</sub>	Transconduction Gain (I <sub>CTRL</sub> )		1.5	7	-	mA/mV
V <sub>SENSE</sub>	Current Control Loop Reference	I <sub>OUT</sub> =2.5mA	196	200	204	mV
I <sub>IBI</sub>	Current Out of Pin ICTRL at -200mV		-	25	-	μA
<b>Output Stage</b>						
V <sub>OL</sub>	Low Output Voltage at 10Ma Sinking Current		-	200	-	mV
I <sub>OS</sub>	Output Short Circuit Current. Output to VCC, Sink Current Only		-	27	60	mA

## Type Characteristics

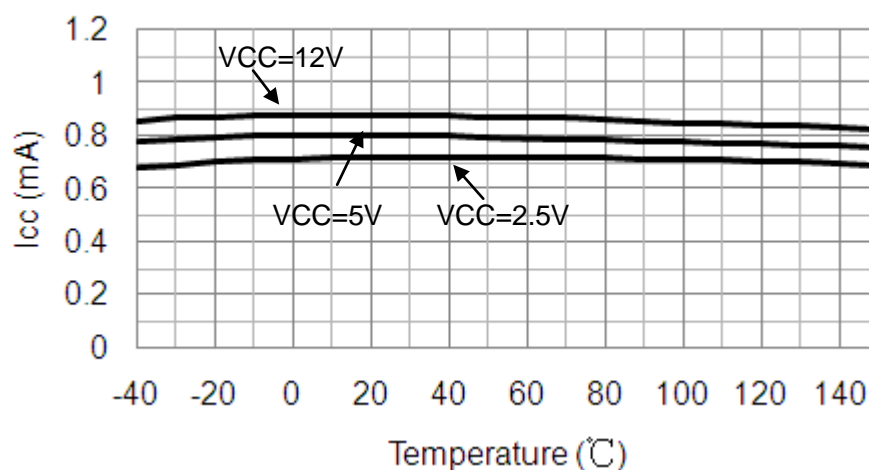
### Vref vs. Temperature



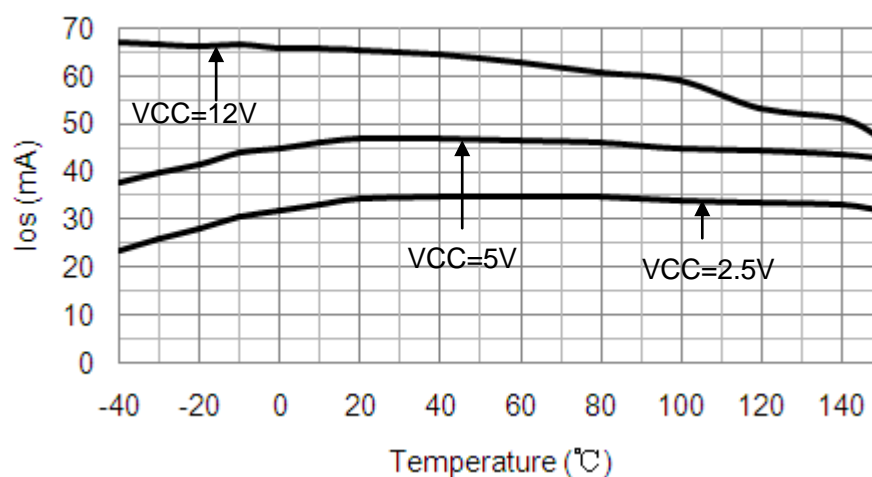
### Vsense vs. Temperature



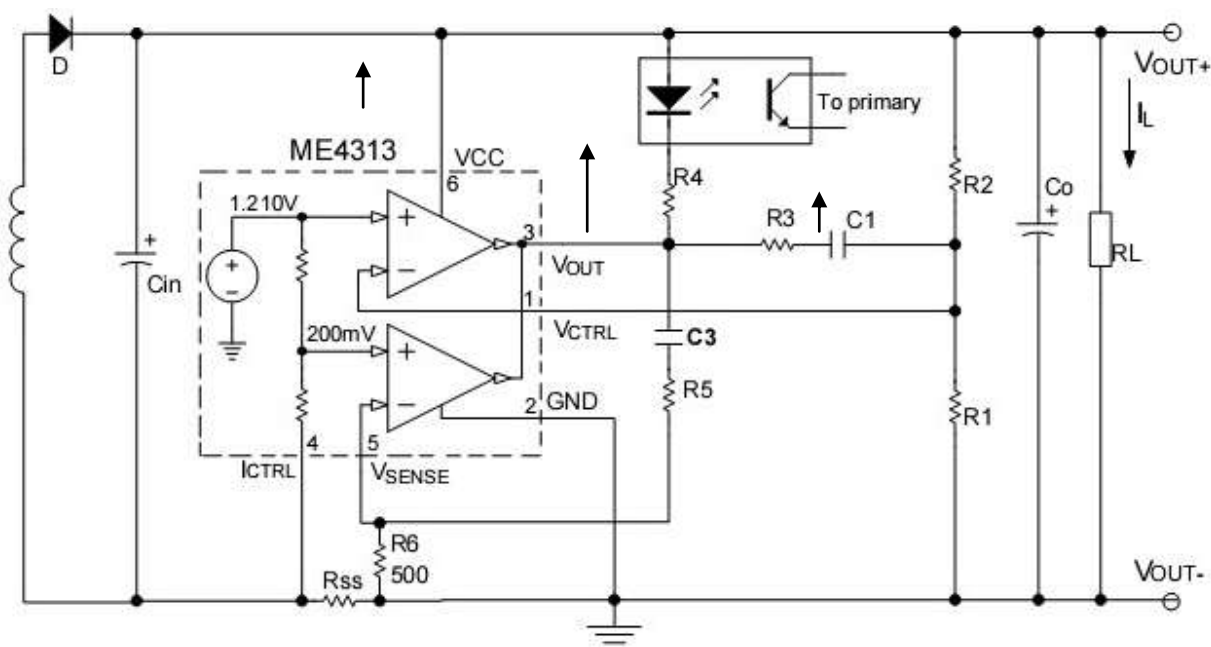
### Icc vs. Temperature



### Output short circuit current $I_{OS}$ vs. Temperature

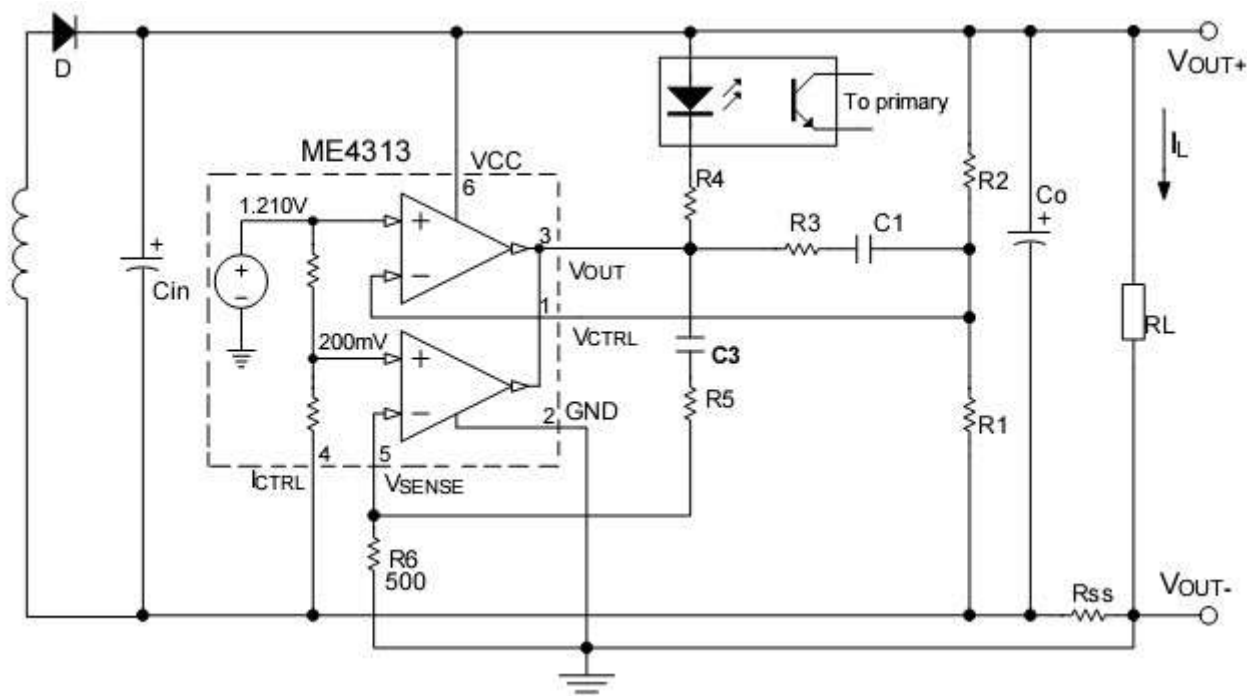


## Typical Application Circuit



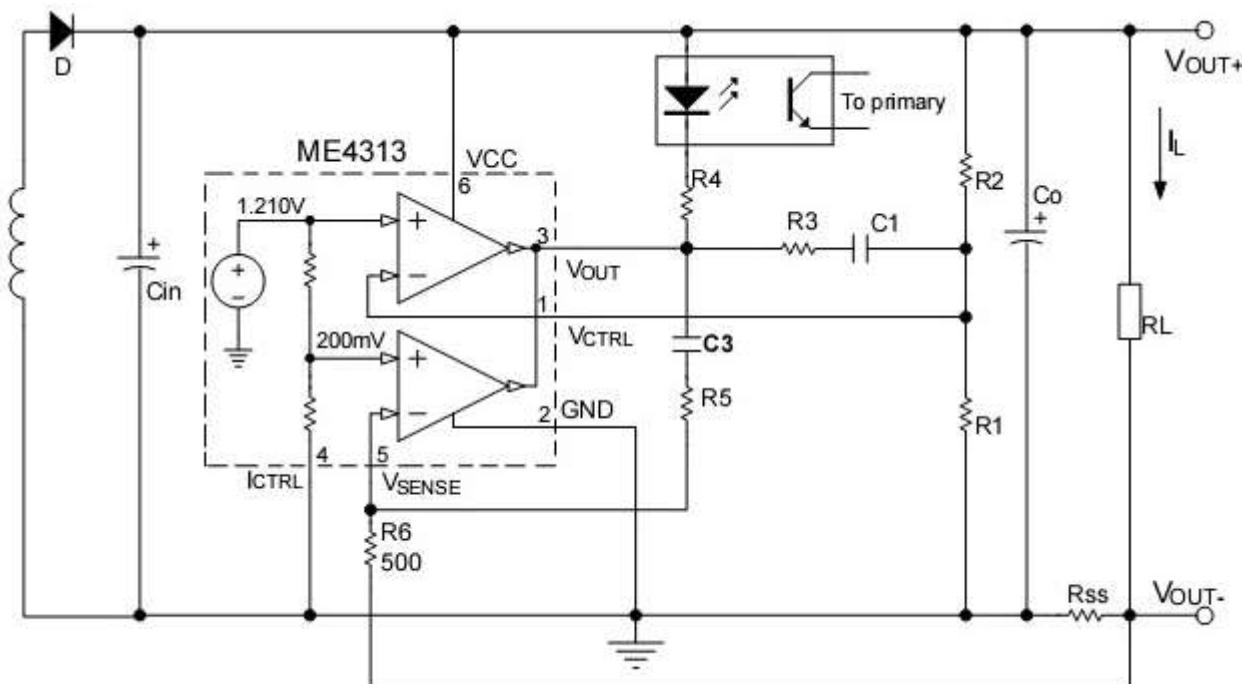
$$V_{OUT} = V_{REF} \times \frac{R1+R2}{R1} \text{ (V)} \quad \text{CurrentLimit} = \frac{V_{SENSE}}{R_{ss}} \text{ (A)}$$

### Fig.1 Typical Application 1 of ME4313



$$V_{OUT} = [V_{REF} + (I_L \times R_{ss})] \times \frac{R1+R2}{R1} - (I_L \times R_{ss}) \text{ (V)} \quad \text{CurrentLimit} = \frac{V_{SENSE}}{R_{ss}} \text{ (A)}$$

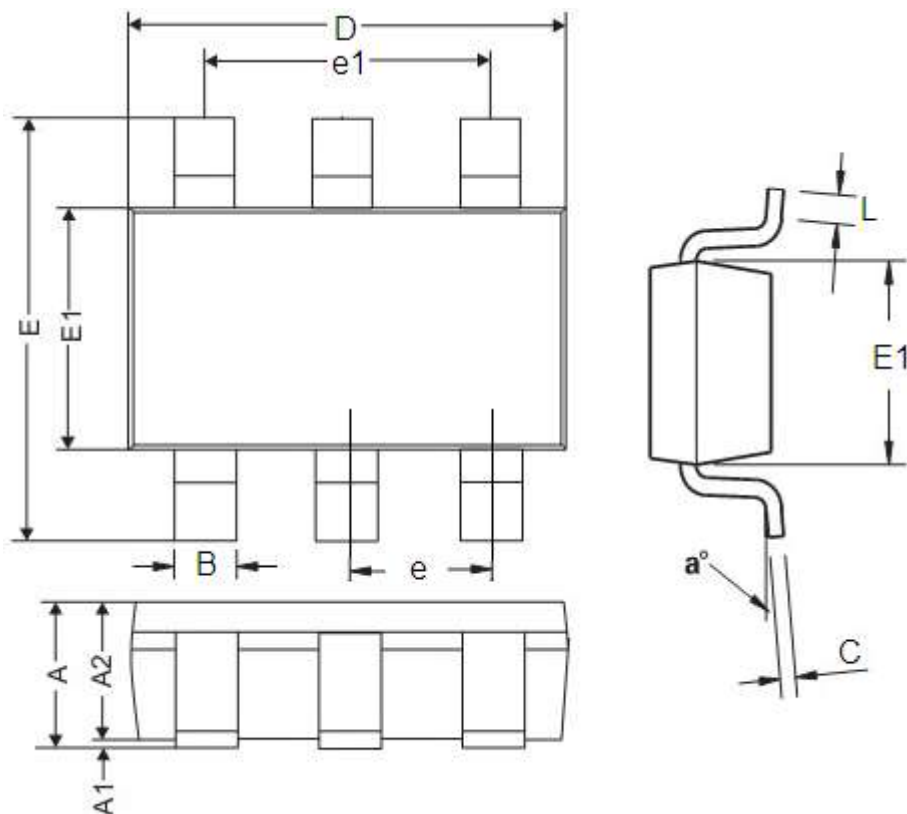
Fig.2 Typical Application 2 of ME4313



$$V_{OUT} = V_{REF} \times \frac{R1+R2}{R1} - (I_L \times R_{ss}) \text{ (V)} \quad \text{CurrentLimit} = \frac{V_{SENSE} \times V_{REF}}{(V_{SENSE} + V_{REF}) R_{ss}} \text{ (A)}$$

## Packaging Information

Package type:SOT23-6 Unit:mm(inch)



DIM	Millimeters		Inches	
	Min	Max	Min	Max
A	0.9	1.45	0.0354	0.0570
A1	0	0.15	0	0.0059
A2	0.9	1.3	0.0354	0.0511
B	0.2	0.5	0.0078	0.0196
C	0.09	0.26	0.0035	0.0102
D	2.7	3.10	0.1062	0.1220
E	2.2	3.2	0.0866	0.1181
E1	1.30	1.80	0.0511	0.0708
e	0.95REF		0.0374REF	
e1	1.90REF		0.0748REF	
L	0.10	0.60	0.0039	0.0236
a°	0°	30°	0°	30°

- The information described herein is subject to change without notice.
- Nanjing Micro One Electronics Inc is not responsible for any problems caused by circuits or diagrams described herein whose related industrial properties, patents, or other rights belong to third parties. The application circuit examples explain typical applications of the products, and do not guarantee the success of any specific mass-production design.
- Use of the information described herein for other purposes and/or reproduction or copying without the express permission of Nanjing Micro One Electronics Inc is strictly prohibited.
- The products described herein cannot be used as part of any device or equipment affecting the human body, such as exercise equipment, medical equipment, security systems, gas equipment, or any apparatus installed in airplanes and other vehicles, without prior written permission of Nanjing Micro One Electronics Inc.
- Although Nanjing Micro One Electronics Inc exerts the greatest possible effort to ensure high quality and reliability, the failure or malfunction of semiconductor products may occur. The user of these products should therefore give thorough consideration to safety design, including redundancy, fire-prevention measures, and malfunction prevention, to prevent any accidents, fires, or community damage that may ensue.