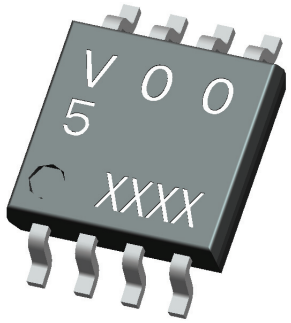
OMRON

Constant Current IC
W2RV005RM

Most Suitable Constant Current IC for Driving Full Color LED

- Built-in 3 lines required to drive full color LED.
- Easy thermal design due to large power dissipation.
- Contained in the 2.9 x 2.8-mm small package.
- Can be used as a stand-alone IC or can be driven by Omron's W2RF004RM and W2RF002RF LED Control IC's.
- RoHS Compliant



Ordering Information

Description	Model
Constant Current IC	**W2RV005RM**

Specifications

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Rating
Supply Voltage	V_{CC}	36 V
Output Voltage	V_{OUT}	36 V
Output Current / terminal	I_{OUT}	50 mA (see note 1)
Input Voltage	V_{IN}	-0.3 to 6 V
Power Dissipation	Pd	IC alone: 387 mW
		Standard Board: 587 mW (see note 2)
Operating Temperature	T_{OPR}	-20 to 85 °C
Storage Temperature	T_{STG}	-40 to 150 °C
Junction Temperature	T_{JMAX}	150 °C

Note: **1.** Take the power consumption and power dissipation into consideration.

2. When implemented on a standard board (70 x 70 x 1.6 mm, Cu 3%, Single-sided glass epoxy board). The value reduces at a rate of about 4.7 mW/°C when the IC is used at Ta = 25°C or higher.

Recommended Operating Conditions

Item	Symbol	Rating
Supply Voltage	V_{CC}	4.5 to 20 V
Output Voltage	V_{OUT}	2.0 to 20 V
Output Current / terminal	I_{OUT}	3.0 to 30 mA

Electrical Characteristics (Ta = 25°C, V_{CC} = 12V)

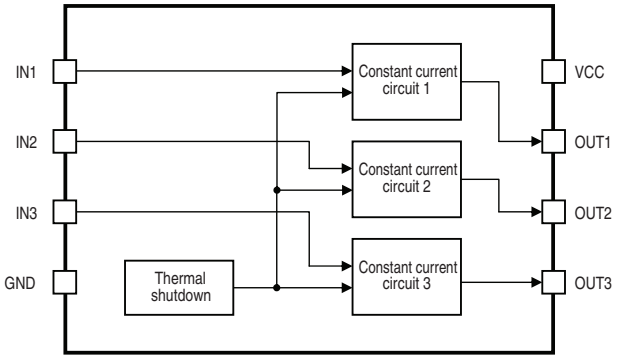
Item	Symbol	Condition	Spec.			Unit	Applicable terminal
			Min.	Typ.	Max.		
Standby current consumption	I_{CC1}	IN1 to 3: OPEN	- - -	0.7	1.4	mA	V_{CC}
Operating current consumption	I_{CC2}	R_{IN} = 6.8 kΩ, V_{OUT} = 4.0 V, All CH: ON	- - -	5.5	7.6	mA	V_{CC}
Output current 1	I_{OUT1}	R_{IN} = 6.8 kΩ, V_{OUT} = 4.0 V, All CH: ON	19.5	20.8	22.1	mA	OUT1 to 3
Output current 2	I_{OUT2}	R_{IN} = 13 kΩ, V_{OUT} = 4.0 V, All CH: ON	10.5	11.2	11.9	mA	OUT1 to 3
Current error between channels	ΔI_{OUT}	R_{IN} = 6.8 kΩ, V_{OUT} = 4.0 V	-3.0	- - -	3.0	%	OUT1 to 3
Output current voltage fluctuation	ΔIV	R_{IN} = 6.8 kΩ, V_{OUT} = 7.0 ± 4.0 V	-3.0	- - -	3.0	%	OUT1 to 3
Inverting input current for OFF	I_{OFF}	- - -	- - -	- - -	17.0	µA	IN1 to 3
Inverting input current for ON	I_{ON}	- - -	42.0	- - -	- - -	µA	IN1 to 3
ON output propagation time	t_{ON}	R_{IN} = 6.8 kΩ, V_{OUT} = 4.0 V, Output current I_{OUT} x 0.9 arrival time	- - -	1.0	- - -	µS	IN1 to 3 OUT1 to 3
OFF output propagation time	t_{OFF}	R_{IN} = 6.8 kΩ, V_{OUT} = 4.0 V, Output current I_{OUT} x 0.1 arrival time	- - -	0.4	- - -	µS	IN1 to 3 OUT1 to 3

Timing Characteristics (Ta = 25°C, VCC = 12V)

Item	Symbol	Condition	Spec.			Unit	Applicable terminal
			Min.	Typ.	Max.		
ON output propagation time	t_{ON}	R_{IN} = 6.8 kΩ, V_{OUT} = 4.0V, Output current I_{OUT} x 0.9 arrival time.	- - -	1.0	- - -	µS	IN1 to 3 OUT1 to 3
OFF output propagation time	t_{OFF}	R_{IN} = 6.8 kΩ, V_{OUT} = 4.0V, Output current I_{OUT} x 0.1 arrival time.	- - -	0.4	- - -	µS	

Engineering Data

Block Diagram

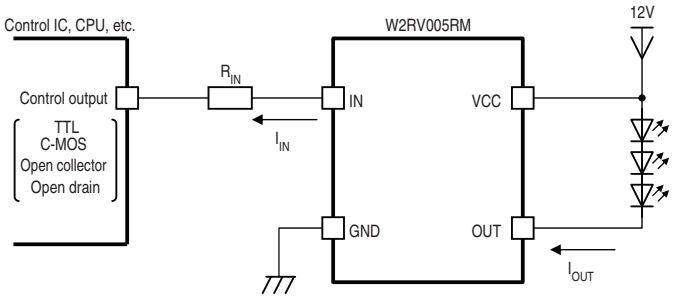


Terminal Designation

Terminal Number	Terminal Name	Description
1	IN1	Input pin 1
2	IN2	Input pin 2
3	IN3	Input pin 3
4	GND	Ground
5	OUT3	Output pin 3
6	OUT2	Output pin 2
7	OUT1	Output pin 1
8	V_{CC}	Power Supply

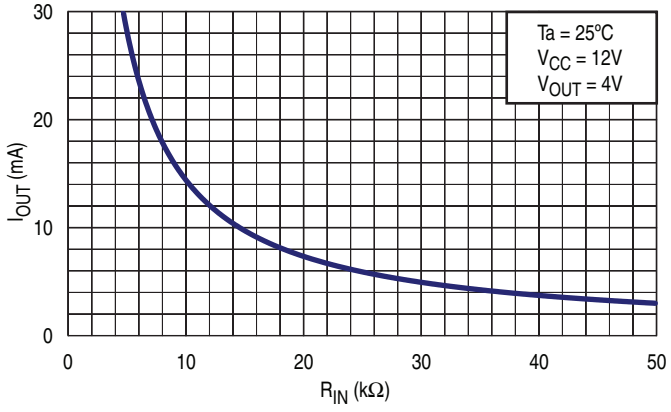
Note: Connect unused input pins to a power supply (voltage equal to V_{CC} or less) like I/O, and leave unused output pins open.

Functions



Control output	Input current I_{IN}	Output current I_{OUT}
Logic H or open	OFF	OFF
Logic L	ON	ON

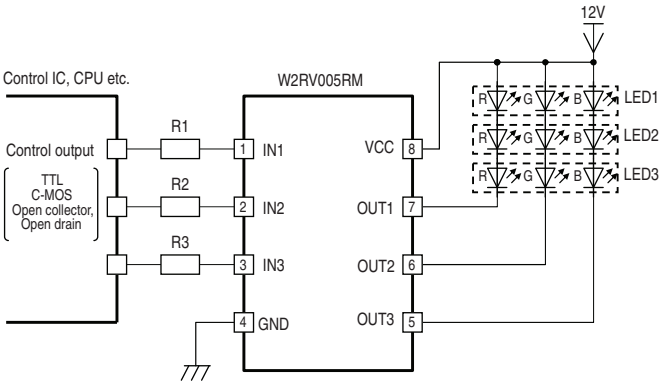
Output Current vs. Input Resistance



Output current I_{OUT} (mA)	Input Resistance R_{IN} (kΩ)
5	29.6
10	14.6
15	9.59
20	7.12
25	5.65
30	4.67

Note: The figures in the table show theoretical values obtained when one end of R_{IN} is connected to GND.

Application Example



Power Consumption Calculation Example

Conditions:
V_F of LED - Red (R): 2.2 V, Green (G): 3.3V, Blue (B): 3.2 V (at 20 mA)
OUT1 ~ 3 are all driven at 20 mA

- Voltage of OUT Terminals

  OUT1: 12-2.2 x 3 = 5.4 V
  OUT2: 12-3.3 x 3 = 2.1 V
  OUT3: 12-3.2 x 3 = 2.4 V

- Power Consumption

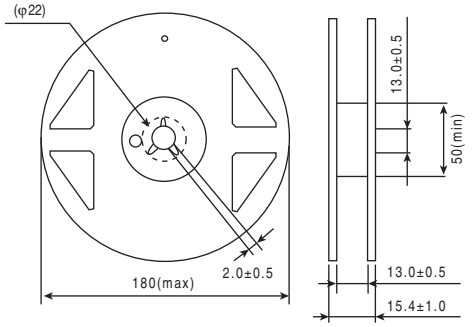
  OUT1: 5.4 V x 20 mA = 108 mW
  OUT2: 2.1 V x 20 mA = 42 mW
  OUT3: 2.4 V x 20 mA = 48 mW
  VCC: 12 V x 5.5 mA = 66 mW
  Total: 108 + 42 + 48 + 66 = 264 mW

Tape Packaging

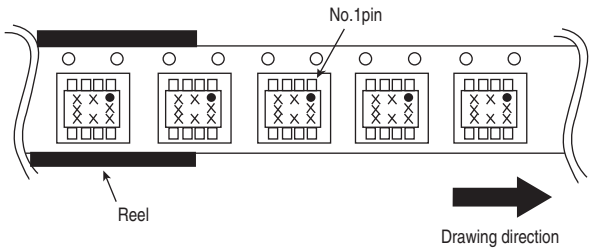
Packaging style: Embossed taping

Packaging quantity: 3,000 pcs/reel

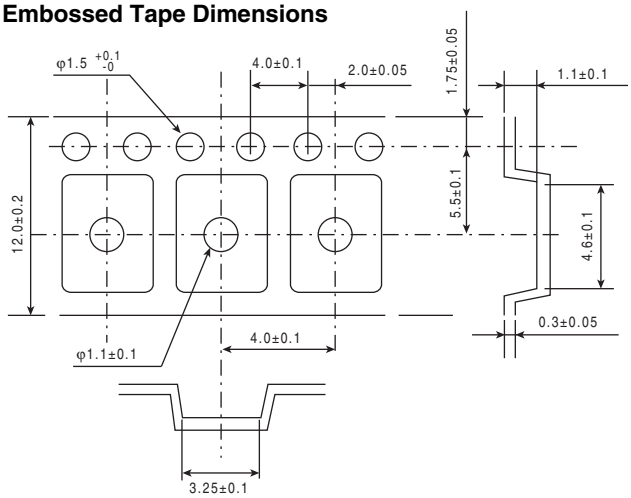
Reel Dimensions



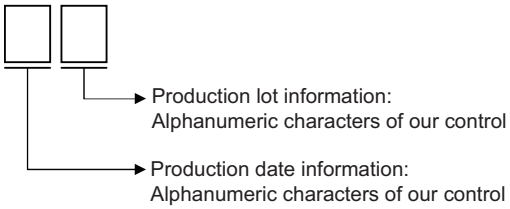
Direction of Insertion



Embossed Tape Dimensions



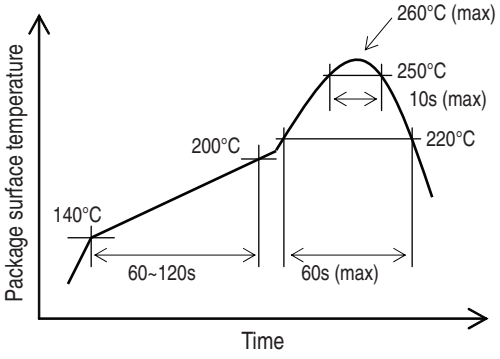
Lot Code Indication



Recommended Reflow Conditions

Allowable Temperature Profile Conditions

Product mounting method should be by Reflow and we recommend the following temperature profile. Reflow no more than two times, maximum.

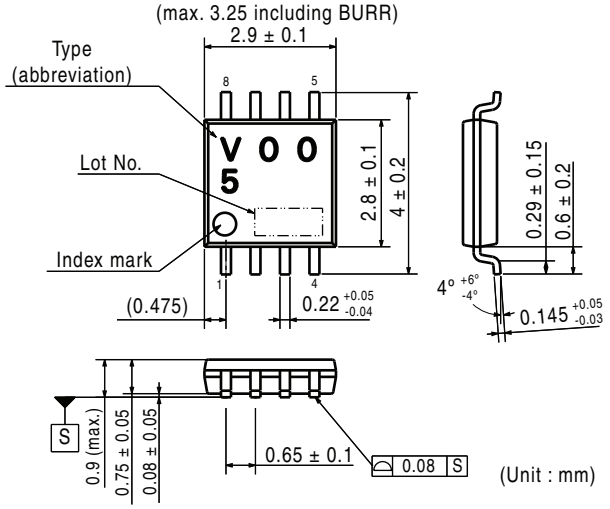


Storage Conditions before Mounting

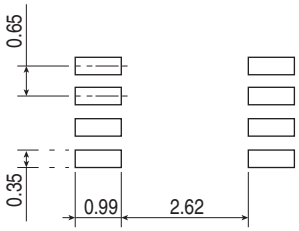
Moisture absorption by the plastic package will increase the possibility of faults, such as cracks; therefore, take enough care for storage.

Storage Conditions	Period
5 to 30°C, 40 to 70%RH	One Year

Dimensions



Recommended PCB Layout



Precautions for Use

■ Correct Use

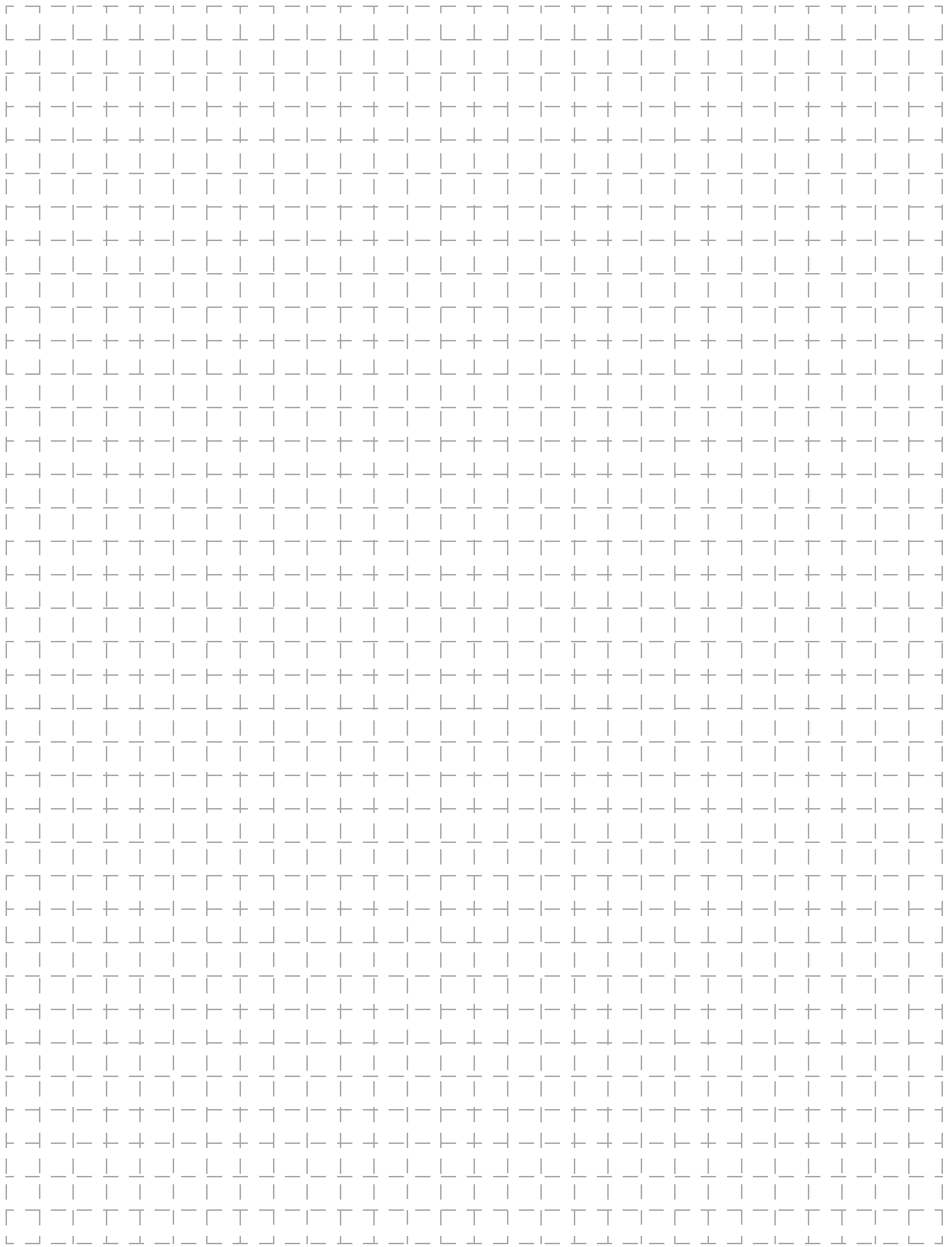
- The absolute maximum rating is the limit value which should not be exceeded even in a flash. Exceeding this value can cause deterioration of the characteristics or complete failure of the IC.
- Sufficiently take into consideration the static electricity, chattering and voltage of the input to be connected when determining each input terminal. Since unused input terminals may cause an undefined state in the internal circuit, connect them to a power supply (voltage = V_{CC} or less), like I/O.
- Although the device contains an ESD protection circuit, static electricity that exceeds the function may damage the device. When handling the device, exercise due caution by, for example, grounding the human body.
- Due to the structure of the IC, parasitic elements are formed unavoidably. Exercise due caution not to use the device in a way that activates the parasitic elements. For example, do not apply a voltage lower than GND to the input terminals.
- Taking the power dissipation in actual use into consideration, perform thermal design with a sufficient margin. When a voltage applied to the IC is high, which is due to, for example, a small number of LED's driven in series, IC heat generation can be controlled by inserting a resistance and spreading power consumption evenly.
- This IC incorporates a built-in thermal shutdown circuit. If the chip temperature rises too high, this circuit works and the output terminal becomes an open state. When the chip temperature returns to a normal range, the output terminal also returns to its original state. This circuit is a protective function for use at an emergency, so please do not use it as a regular function.
- Due to potential damage, do not use product that has been dropped or that has come into contact with water.

■ RoHS Directive Compliance

Models that are indicated as being RoHS compliant are free of the following six substances.

Lead:	1,000 ppm max.
Mercury:	1,000 ppm max.
Cadmium:	100 ppm max.
Hexavalent chromium:	1,000 ppm max.
PBB:	1,000 ppm max.
PBDE:	1,000 ppm max.

MEMO



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To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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