RICOH

# R1154x SERIES

## 150mA Voltage Regulator (Wide Input Voltage Range)

NO.EA-100-061107

## OUTLINE

The R1154x series are CMOS-based voltage regulator (VR) ICs. The R1154xxxxxx has features of high output voltage accuracy and ultra-low supply current. A peak current limit circuit, a short current limit circuit, and a thermal shutdown circuit are built in the R1154x series.

The regulator output voltage is fixed in the R1154xxxxB, while adjustable type is the R1154x001C.
Output voltage accuracy is ±2.0%.

Since the packages for these ICs are the SOT-89-5 and SOT-23-5, high density mounting of the ICs on boards is possible.

## FEATURES

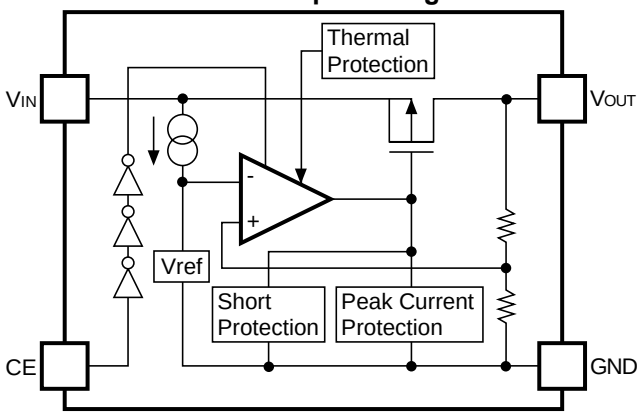
- Supply Current ..... Typ. 5.0μA
- Standby Current ..... Typ. 0.1μA
- Output Voltage Accuracy..... ±2.0%
- Wide Output Voltage Range ..... 2.5V to 12.0V(xxxB)
  adjustable in the range of 2.5V to $V_{IN}$ or 24.0V (001C)
- Input Voltage ..... Max. 24.0V
- Output Current ..... Min. 140mA ($V_{IN}$=$V_{OUT}$+2.0V, 2.5V Output type)
  Min. 150mA ($V_{IN}$=$V_{OUT}$+2.0V, 3.0V Output type)
- Package ..... SOT-89-5, SOT-23-5
- Built-in Peak Current Limit Circuit
- Short Current Limit Circuit
- Thermal Shutdown Circuit

## APPLICATIONS

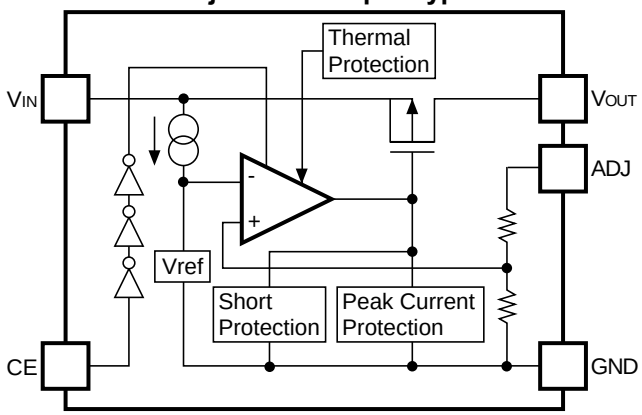
- Power source for home appliances such as refrigerators, rice cookers, Electronic water warmers, etc.
- Power source for car audio equipment, car navigation system, and ETC system.
- Power source for notebook PCs, digital TVs, cordless phones, and LAN system.
- Power source for copiers, printers, facsimiles, and scanners.

# BLOCK DIAGRAMS

**R1154xxxxB**
**Fixed Output Voltage**




**R1154xxxxC**
**Adjustable Output Type**




# SELECTION GUIDE

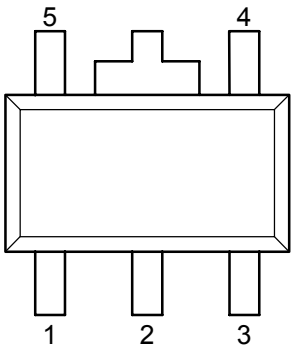
The output voltage can be selected at the user's request.
The selection can be made with designating the part number as follows;

R1154xxxxx-xx-x ←Part Number
↑ ↑ ↑ ↑ ↑
a b c d e

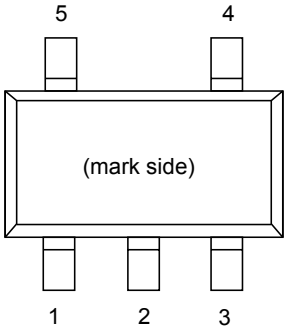
| Code | Contents |
|---|---|
| a | Designation of package type;<br>H: SOT-89-5<br>N: SOT-23-5 |
| b | Designation of output voltage:<br>Adjustable: 001 (Reference voltage=2.5V)<br>Fixed: Stepwise Setting in the range from 2.5V to 12.0V |
| c | Designation of Output Type;<br>B: Fixed Output Type<br>C: Adjustable Output Type |
| d | Designation of Taping Type;T1, T2 (SOT-89-5), TR (SOT-23-5)<br>(Refer to Taping Specifications) |
| e | Designation of composition of plating:<br>–F: Lead free plating (SOT-23-5,SOT-89-5) |

# PIN CONFIGURATION

**SOT-89-5**




**SOT-23-5**




# PIN DESCRIPTION

- **SOT-89-5**

| Pin No | Symbol | Description |
|---|---|---|
| 1 | $V_{OUT}$ | Voltage Regulator Output Pin |
| 2 | GND | Ground Pin |
| 3 | CE | Chip Enable Pin |
| 4 | NC/ADJ | B version: No Connection<br>C version: Reference Voltage of Adjustable Output Pin |
| 5 | $V_{DD}$ | Input Pin |

- **SOT-23-5**

| Pin No | Symbol | Description |
|---|---|---|
| 1 | $V_{OUT}$ | Voltage Regulator Output Pin |
| 2 | GND | Ground Pin |
| 3 | $V_{DD}$ | Input Pin |
| 4 | NC/ADJ | B version: No Connection<br>C version: Reference Voltage of Adjustable Output Pin |
| 5 | CE | Chip Enable Pin |

# ABSOLUTE MAXIMUM RATINGS

| Symbol | Item | Rating | Unit |
|---|---|---|---|
| $V_{IN}$ | Input Voltage | 26.0 | V |
| $V_{CE}$ | Input Voltage (CE Input Pin) | -0.3 to $V_{IN}$+0.3 | V |
| $V_{OUT}$ | Output Voltage | -0.3 to $V_{IN}$+0.3 | V |
| $V_{ADJ}$ | Output Voltage (ADJ Pin) | -0.3 to $V_{IN}$+0.3 | V |
| $I_{OUT}$ | Output Current | 250 | mA |
| $P_D$ | Power Dissipation (SOT-23-5) *Note1 | 420 | mV |
| | Power Dissipation (SOT-89-5) *Note1 | 900 | |
| Topt | Operating Temperature | -40 to +105 | °C |
| Tstg | Storage Temperature | -55 to +125 | °C |

*Note1) For Power Dissipation please refer to PACKAGE INFORMATION to be described.

# ELECTRICAL CHARACTERISTICS

- **R1154xxxxB**

Topt=25°C

| Symbol | Item | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{IN}$ | Input Voltage | | | | 24 | V |
| $V_{OUT}$ | Output Voltage | $V_{IN}$=$V_{OUT}$+2.0V | ×0.98 | | ×1.02 | V |
| $I_{OUT}$ | Output Current | $V_{IN}$–$V_{OUT}$=2.0V | Refer to the Output Current Table | | | |
| $I_{SS}$ | Supply Current | $V_{IN}$=$V_{CE}$<br>$V_{IN}$-$V_{OUT}$=2.0V | | 5 | 10 | μA |
| Istandby | Standby Current | $V_{IN}$=24V, $V_{CE}$=0V | | 0.1 | 1.0 | μA |
| $\Delta V_{OUT}$/ $\Delta I_{OUT}$ | Load regulation | $V_{IN}$–$V_{OUT}$=2.0V<br>1mA ≦ $I_{OUT}$ ≦ 40mA | Refer to the Load Regulation Table | | | |
| $\Delta V_{OUT}$/ $\Delta V_{IN}$ | Line regulation | $I_{OUT}$=20mA<br>$V_{OUT}$+1V ≦ $V_{IN}$ ≦ 24V | | 0.05 | 0.20 | %/V |
| $V_{DIF}$ | Dropout Voltage | $I_{OUT}$=20mA | Refer to the Dropout Voltage Table | | | |
| $\Delta V_{OUT}$/ $\Delta$Topt | Output Voltage Temperature Coefficient | $V_{IN}$–$V_{OUT}$=2.0V $I_{OUT}$=20mA<br>–40°C ≦ Topt ≦ 105°C | | ±100 | | ppm/°C |
| $I_{lim}$ | Short Current Limit | $V_{OUT}$=0V | | 45 | | mA |
| $V_{CEH}$ | CE “H” Input Voltage | | 2.1 | | $V_{IN}$ | V |
| $V_{CEL}$ | CE “L” Input Voltage | | 0.0 | | 0.3 | V |
| $T_{SD}$ | Thermal Shutdown Temperature | Junction Temperature | | 150 | | °C |
| $T_{SR}$ | Thermal Shutdown Released Temperature | Junction Temperature | | 125 | | °C |

- **R1154xxxxC**

Topt=25°C

| Symbol | Item | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{IN}$ | Input Voltage | | | | 24 | V |
| $V_{OUT}$ | Output Voltage | $V_{IN}=V_{OUT}+2.0V, V_{OUT}=V_{ADJ}$<br>$I_{OUT}=20mA$ | 2.45 | 2.50 | 2.55 | V |
| $I_{OUT}$ | Output Current | $V_{IN}=V_{OUT}+2.0V, V_{OUT}=V_{ADJ}$ | 140 | | | mA |
| $I_{SS}$ | Supply Current | $V_{IN}=V_{OUT}+2.0V, V_{OUT}=V_{ADJ}$<br>$V_{CE}=V_{IN}$ | | 5 | 10 | μA |
| Istandby | Standby Current | $V_{IN}$=24V, $V_{OUT}=V_{ADJ}$<br>$V_{CE}$=0V | | 0.1 | 1.0 | μA |
| $\Delta V_{OUT}/\Delta I_{OUT}$ | Load regulation | $V_{IN}=V_{OUT}+2.0V, V_{OUT}=V_{ADJ}$<br>1mA ≦ $I_{OUT}$ ≦ 40mA | | 20 | 50 | mV |
| $\Delta V_{OUT}/\Delta V_{IN}$ | Line regulation | $V_{OUT}$+1V ≦ $V_{IN}$ ≦ 24V<br>$V_{OUT}=V_{ADJ}, I_{OUT}$=20mA | | 0.05 | 0.20 | %/V |
| $V_{DIF}$ | Dropout Voltage | $V_{OUT}=V_{ADJ}, I_{OUT}$=20mA | | 0.20 | 0.40 | V |
| $\Delta V_{OUT}/\Delta Topt$ | Output Voltage Temperature Coefficient | $V_{IN}=V_{OUT}+2.0V, V_{OUT}=V_{ADJ}$<br>$I_{OUT}$=20mA<br>-40°C ≦ Topt ≦ 105°C | | ±100 | | ppm/°C |
| $I_{lim}$ | Short Current Limit | $V_{OUT}=V_{ADJ}$=0V | | 45 | | mA |
| $V_{CEH}$ | CE “H” Input Voltage | | 2.1 | | $V_{IN}$ | V |
| $V_{CEL}$ | CE “L” Input Voltage | | 0.0 | | 0.3 | V |
| $T_{SD}$ | Thermal Shutdown Temperature | Junction Temperature | | 150 | | °C |
| $T_{SR}$ | Thermal Shutdown Released Temperature | Junction Temperature | | 125 | | °C |

- **Output Current (Topt=25°C)**

| Output Voltage $V_{OUT}$ (V) | Output Current (mA) |
|---|---|
| | Min. |
| $2.5 \leqq V_{OUT} \leqq 2.9$ | 140 |
| $3.0 \leqq V_{OUT} \leqq 12.0$ | 150 |

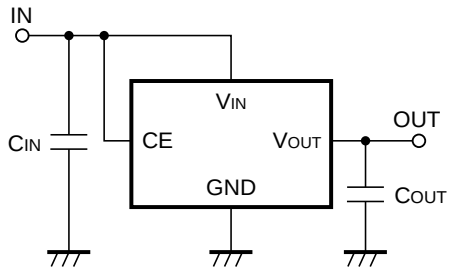
- **Load Regulation (Topt=25°C)**

| Output Voltage $V_{OUT}$ (V) | Load Regulation (mV) | |
|---|---|---|
| | Typ. | Max. |
| $2.5 \leqq V_{OUT} \leqq 3.0$ | 20 | 50 |
| $3.1 \leqq V_{OUT} \leqq 5.0$ | 30 | 75 |
| $5.1 \leqq V_{OUT} \leqq 12.0$ | 40 | 115 |

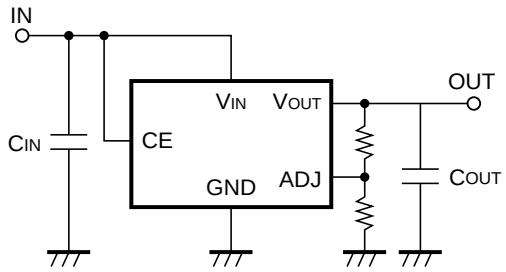
- **Dropout Voltage (Topt=25°C)**

| Output Voltage $V_{OUT}$ (V) | Dropout Voltage (V) | |
|---|---|---|
| | Typ. | Max. |
| $2.5 \leqq V_{OUT} \leqq 7.0$ | 0.20 | 0.40 |
| $7.1 \leqq V_{OUT} \leqq 10.0$ | 0.25 | 0.50 |
| $10.1 \leqq V_{OUT} \leqq 12.0$ | 0.30 | 0.55 |

# TYPICAL APPLICATIONS

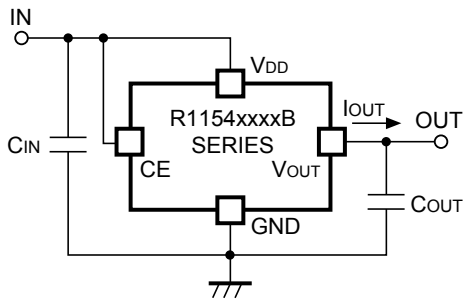



**Fixed Output Voltage Type**

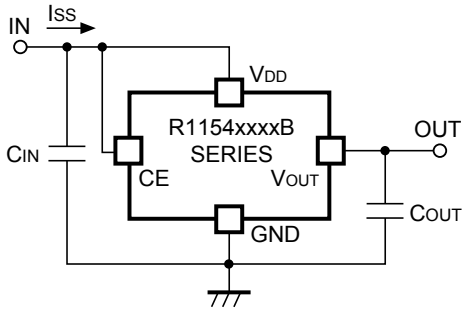



**Adjustable Type**

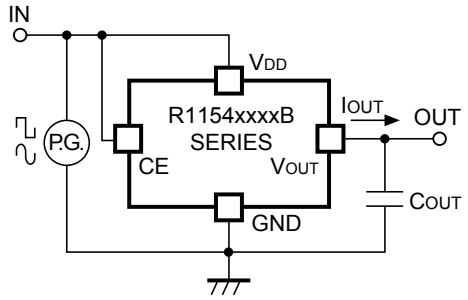
# TEST CIRCUITS



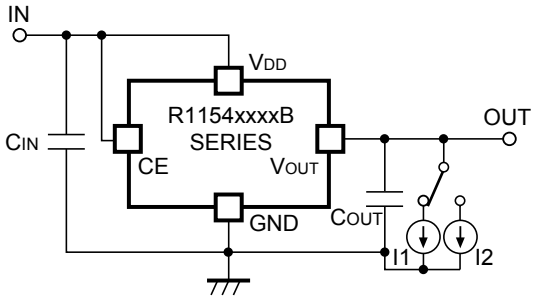

**R1154xxxxB Standard Test Circuit**



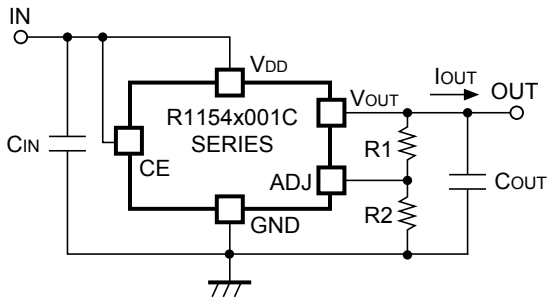

**R1154xxxxB Supply Current Test Circuit**



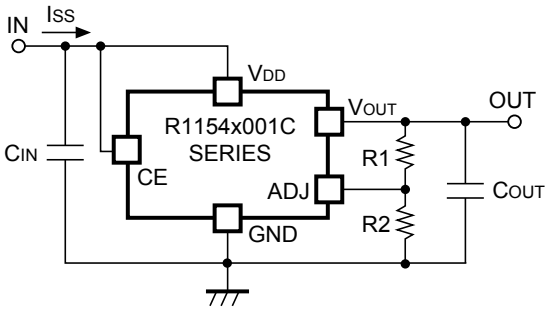

**R1154xxxxB Input Transient Response Test Circuit**



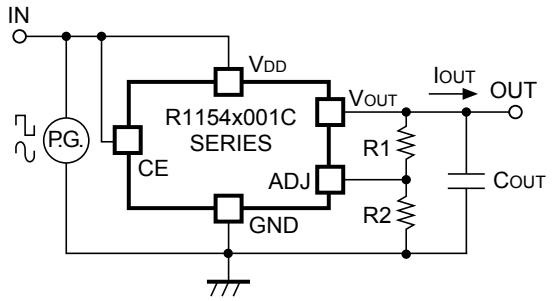

**R1154xxxxB Load Regulation Test Circuit**



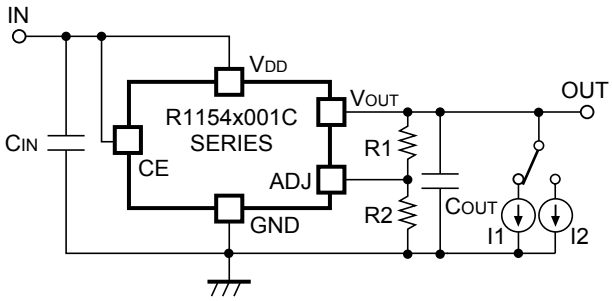

**R1154x001C Standard Test Circuit**




**R1154x001C Supply Current Test Circuit**




**R1154x001C Input Transient Response Test Circuit**

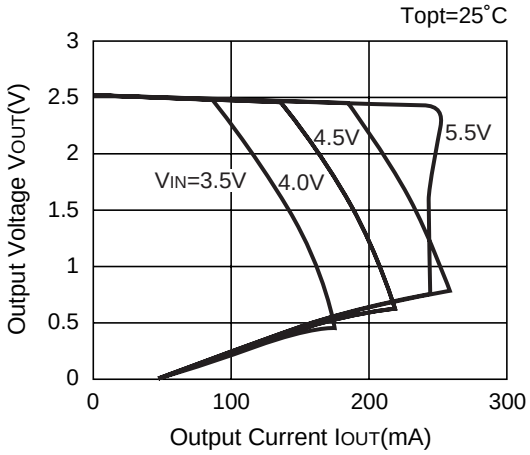



**R1154x001C Load Transient Response Test Circuit**

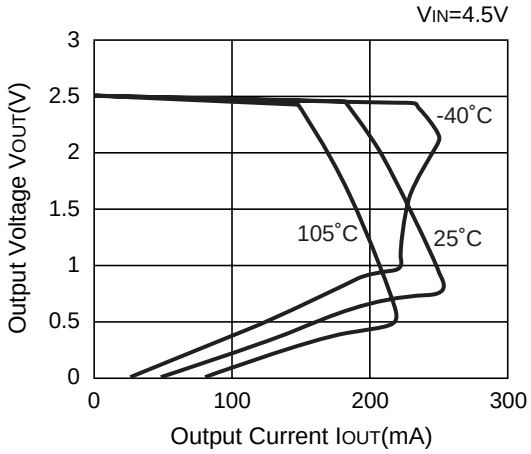
# TYPICAL CHARACTERISTICS

## 1) Output Voltage vs. Output Current

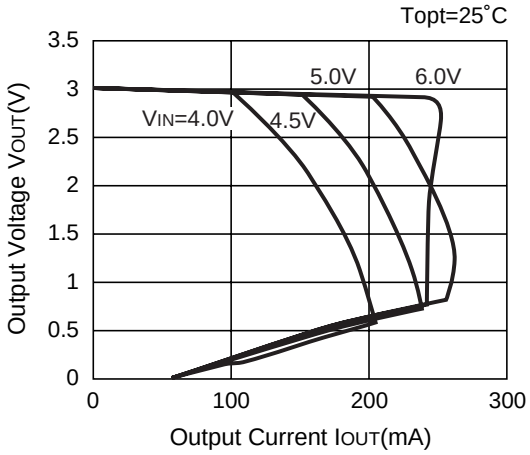
**R1154x025B**



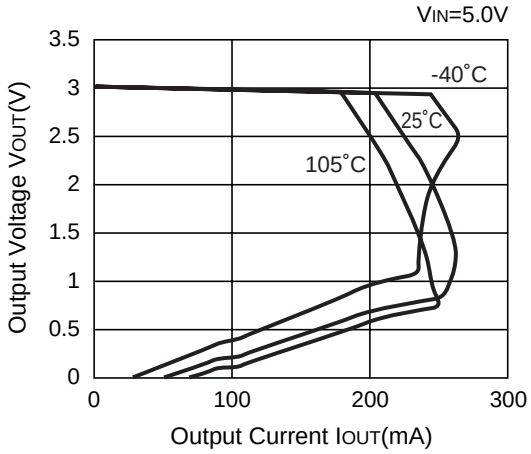

**R1154x025B**



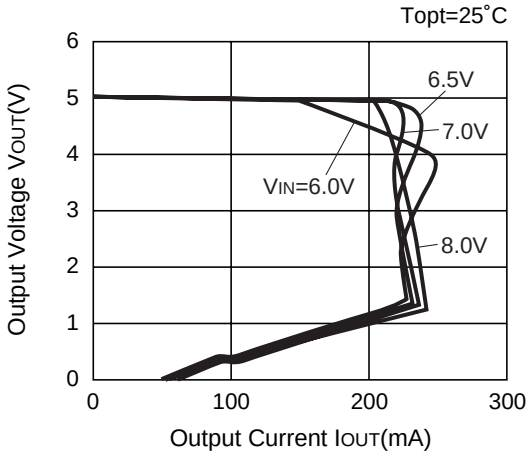

**R1154x030B**




**R1154x030B**




**R1154x050B**

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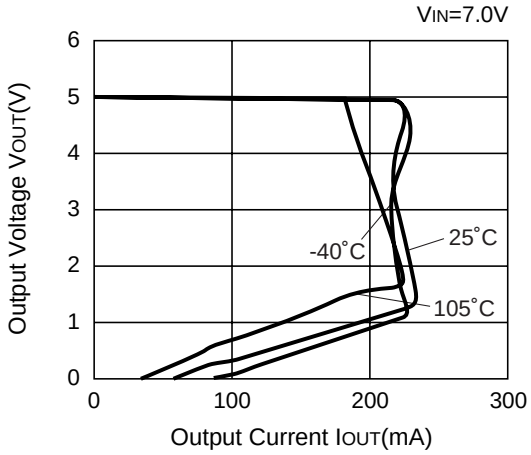
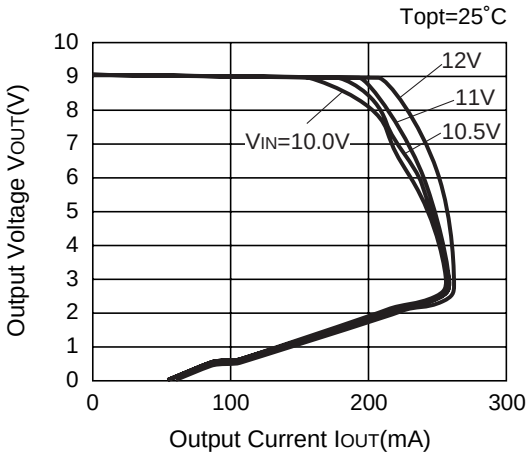


**R1154x090B**

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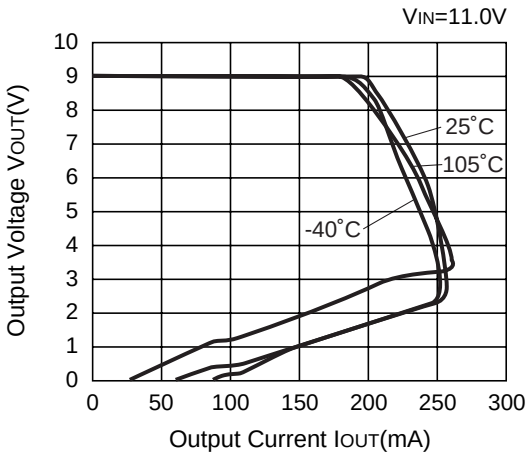
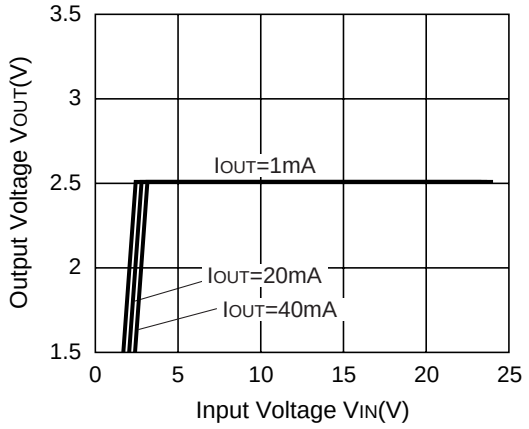



## 2) Input Voltage vs. Output Voltage (Topt=25°C)

**R1154x025B**

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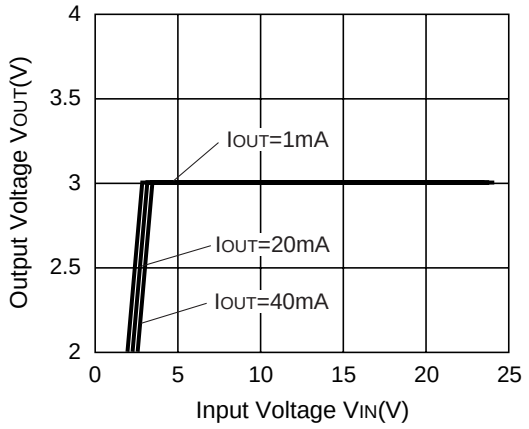


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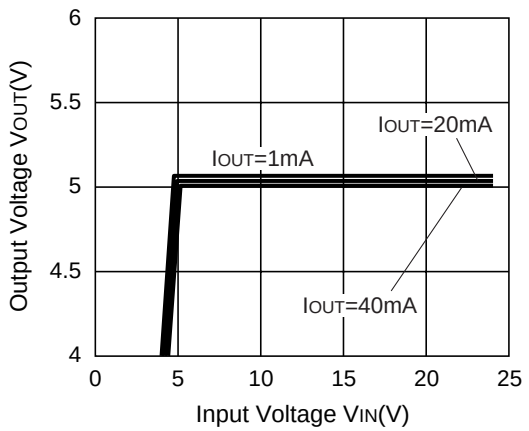


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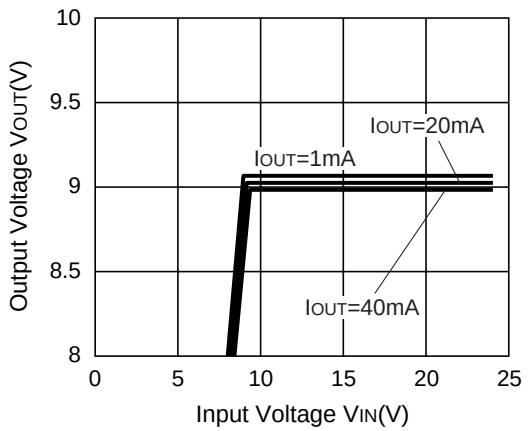
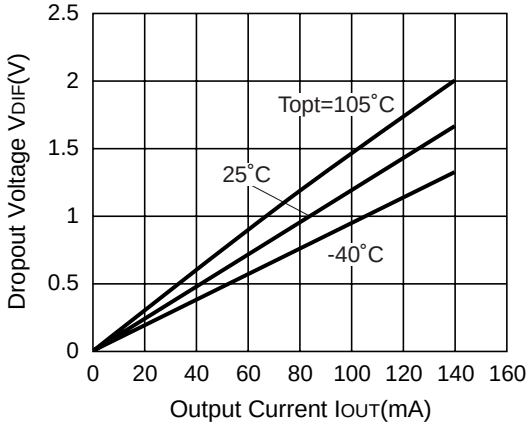
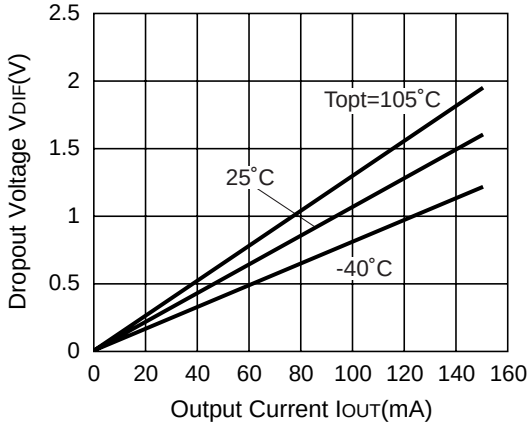


### 3) Dropout Voltage vs. Output Current

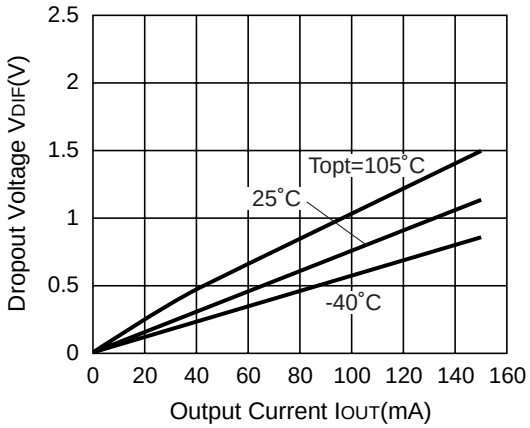
**R1154x025B**



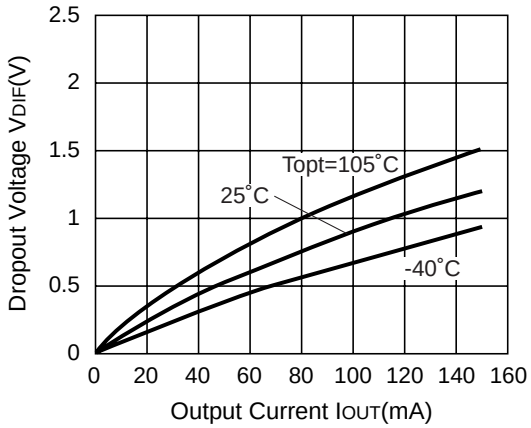

**R1154x030B**




**R1154x050B**

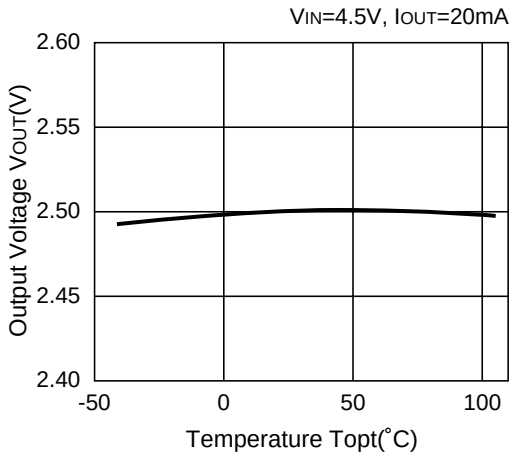



**R1154x090B**

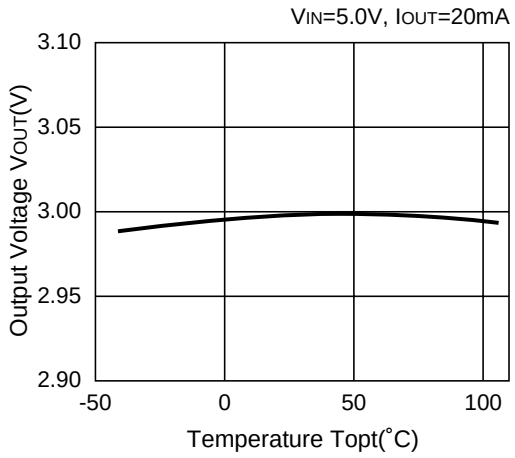



### 4) Output Voltage vs. Temperature

**R1154x025B**

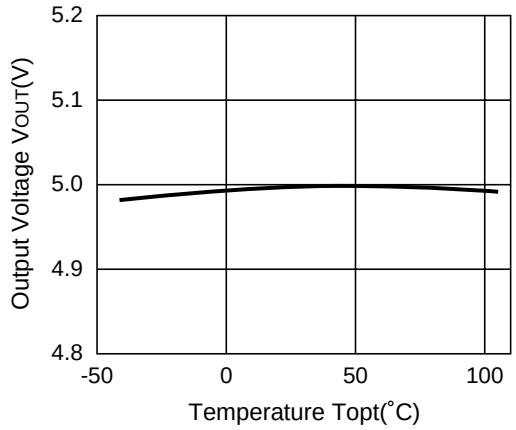



**R1154x030B**



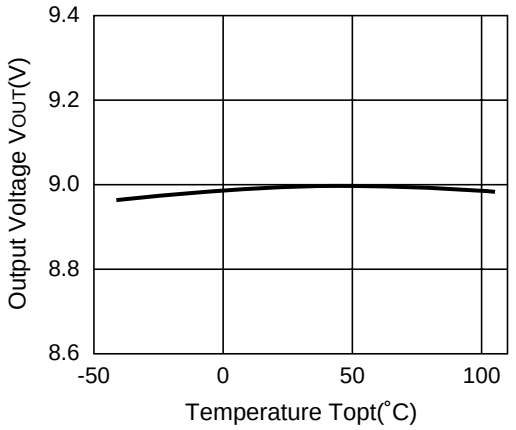
**R1154x050B**

$V_{IN}$=7.0V, $I_{OUT}$=20mA



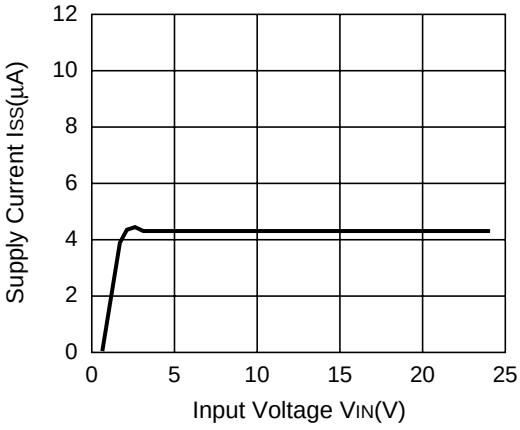

**R1154x090B**

$V_{IN}$=11.0V, $I_{OUT}$=20mA

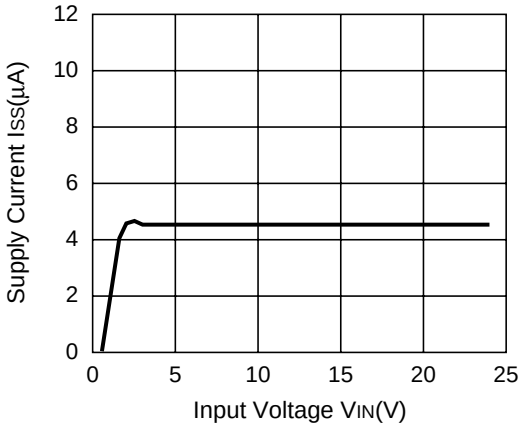



## 5) Supply Current vs. Input Voltage (Topt=25°C)

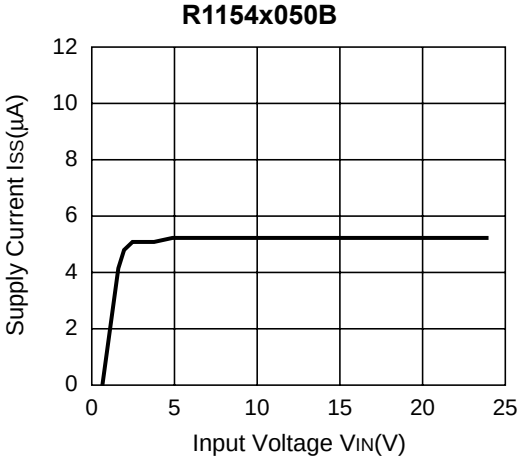
**R1154x025B**



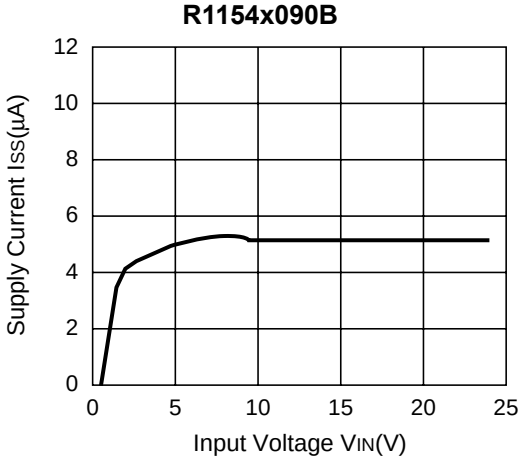

**R1154x030B**



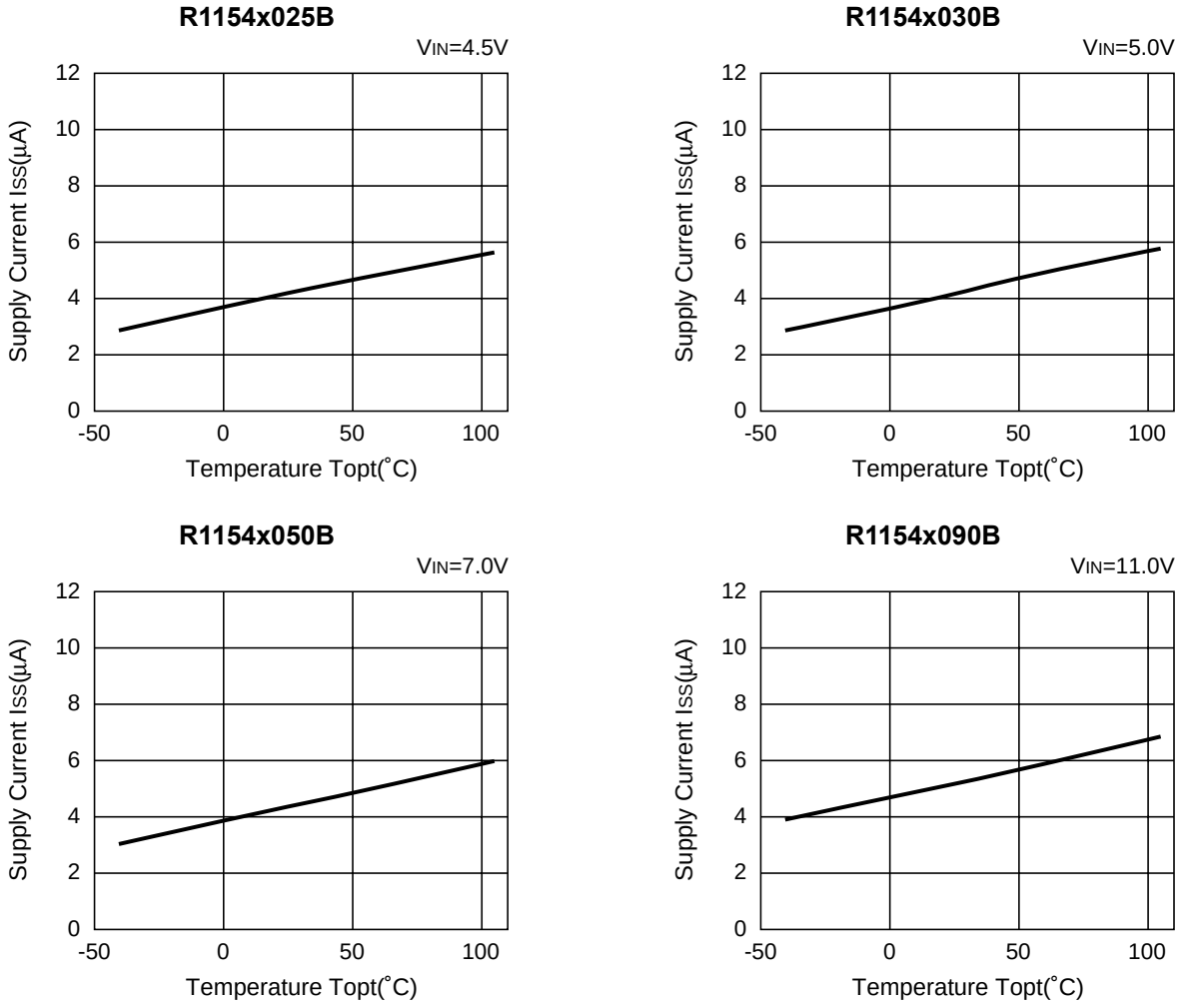

**R1154x050B**



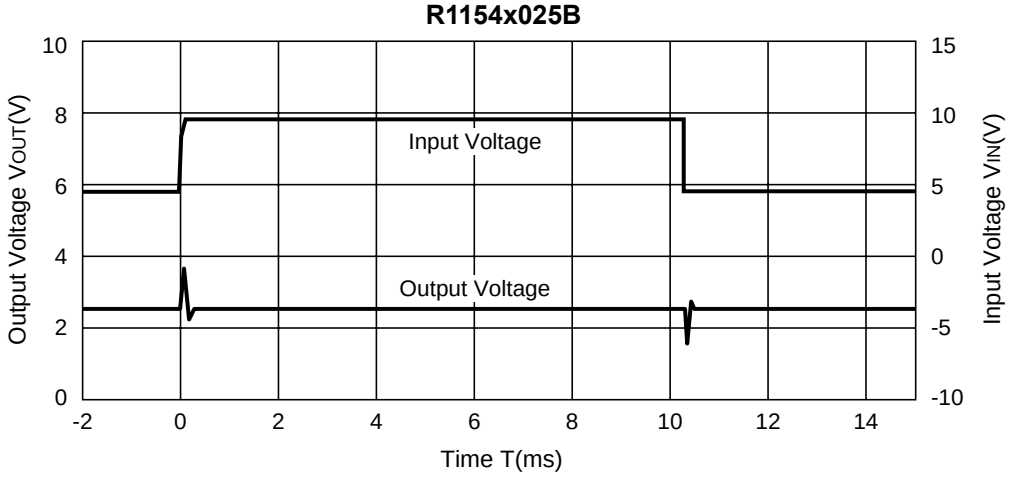

**R1154x090B**



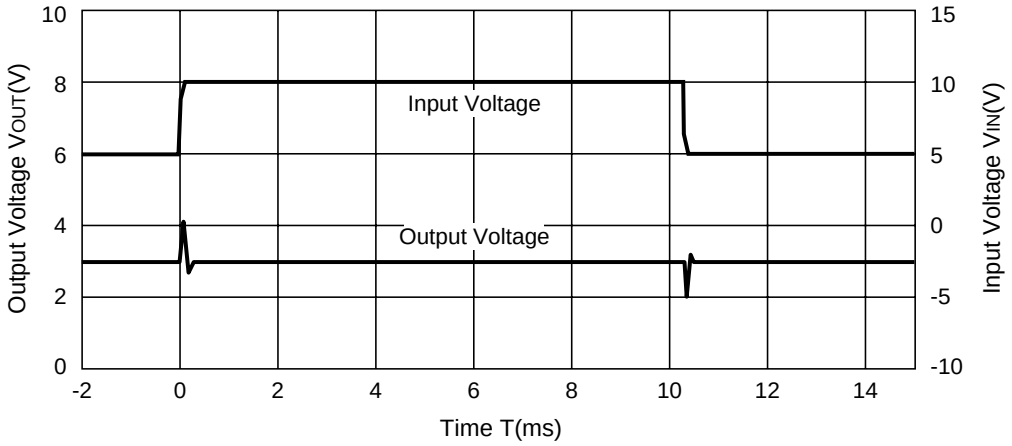
### 6) Supply Current vs. Temperature



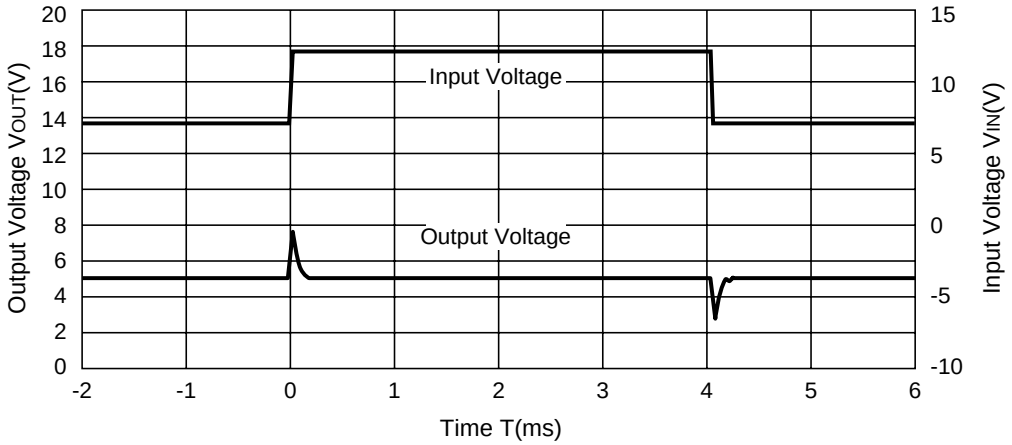

### 7) Input Transient Response ($I_{OUT}$=20mA, $C_{OUT}$=0.1µF, Topt=25°C)



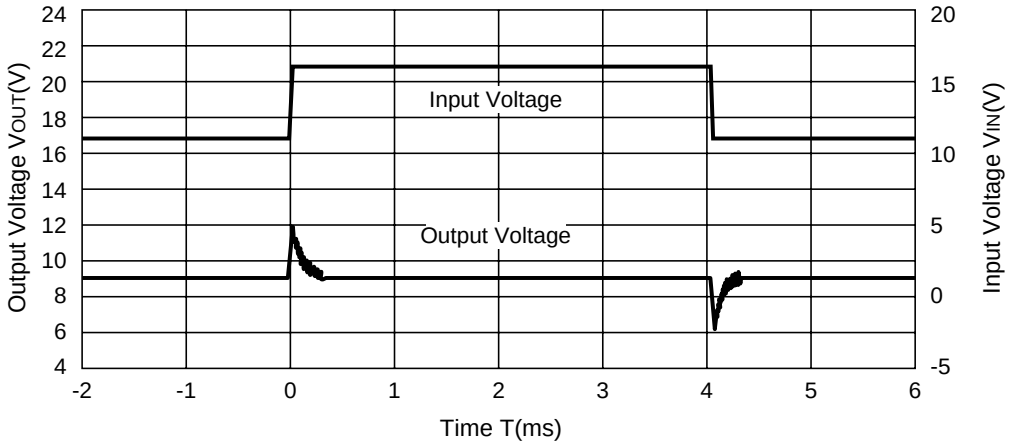
**R1154x030B**




**R1154x050B**

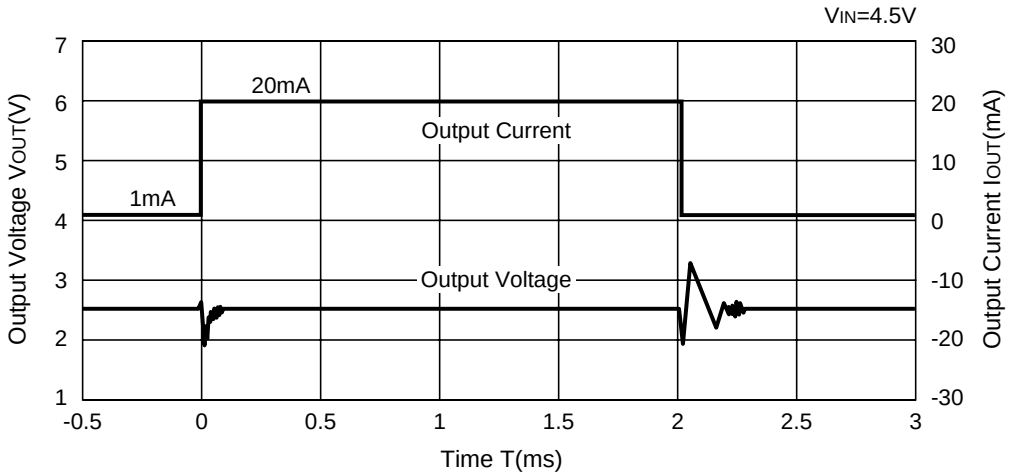



**R1154x090B**

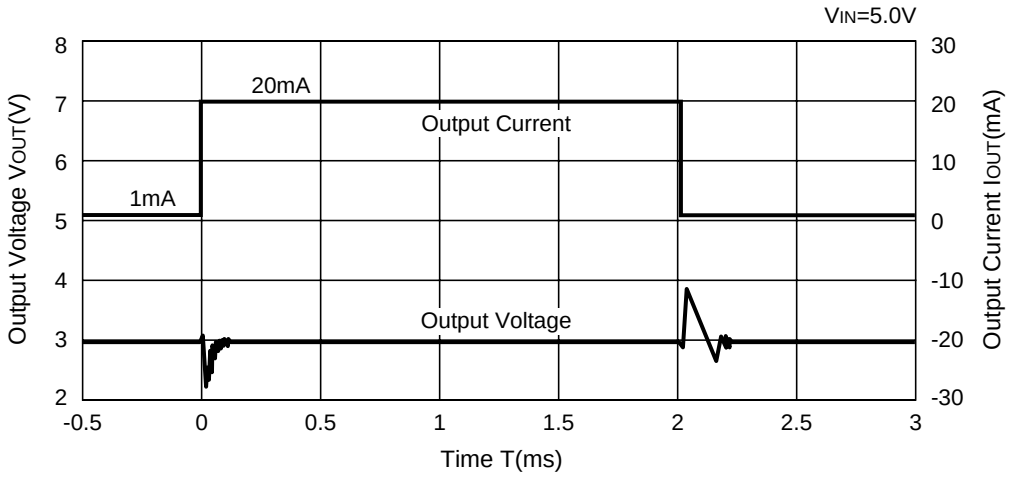


### 8) Load Transient Response ($C_{OUT}$=0.1μF, Topt=25°C)

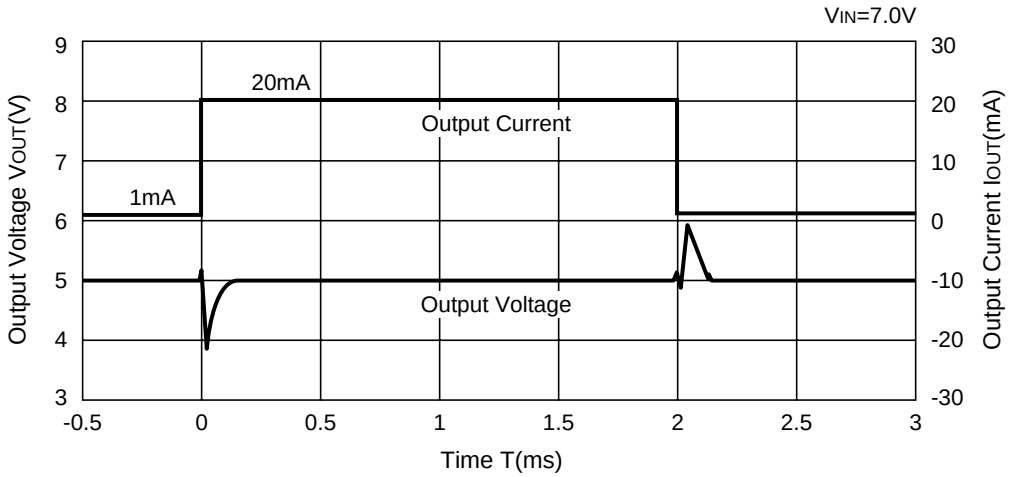
**R1154x025B**



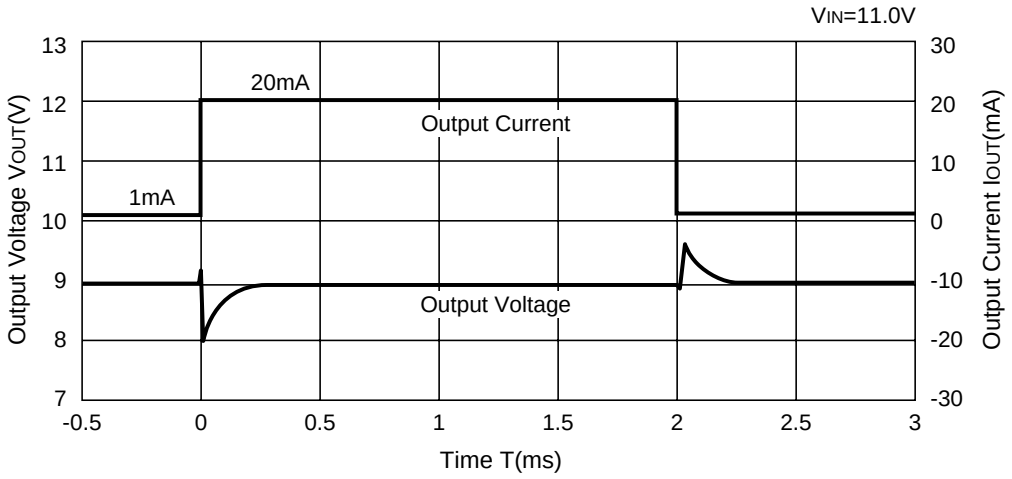

**R1154x030B**




**R1154x050B**

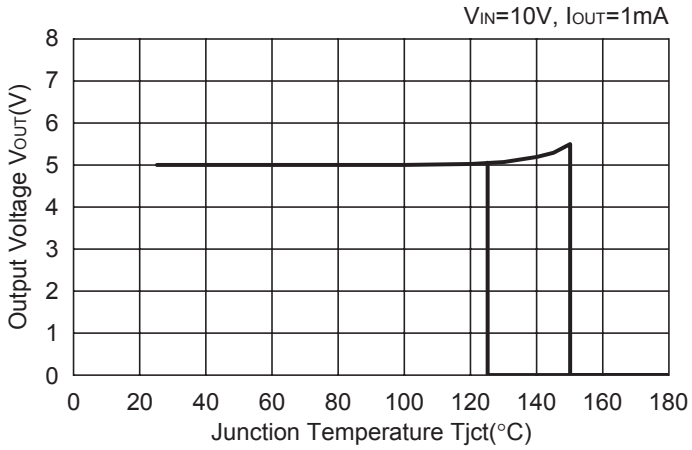


**R1154x090B**




## 9) Thermal Shutdown Characteristics

**R1154x050B**

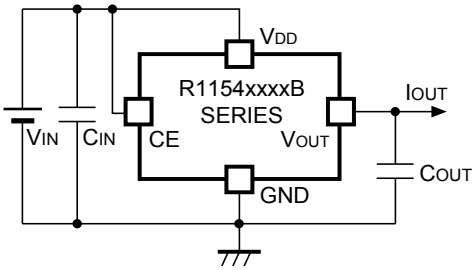


# TECHNICAL NOTES

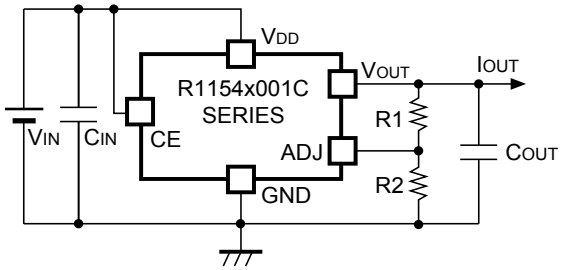
Phase Compensation

Phase Compensation of the R1154x Series has been made internally for stable operation even though the load current would vary. Therefore, without the capacitors, $C_{IN}$ and $C_{OUT}$, the output voltage is regulated, however, for more stable operation, use capacitors as $C_{IN}$ and $C_{OUT}$. Especially, if the input line is long and impedance is high, $C_{IN}$ is necessary, moreover, if you use $C_{OUT}$, transient response will be improved. Recommended value is in the range from 0.1μF to 2.2μF. Wiring should be made as short as possible.

Connect the capacitor, $C_{IN}$ between $V_{DD}$ pin and GND pin and $C_{OUT}$ between $V_{OUT}$ and GND as close as possible.




**R1154xxxxB Typical Application**




**R1154xxxxC Typical Application**

Thermal Shutdown

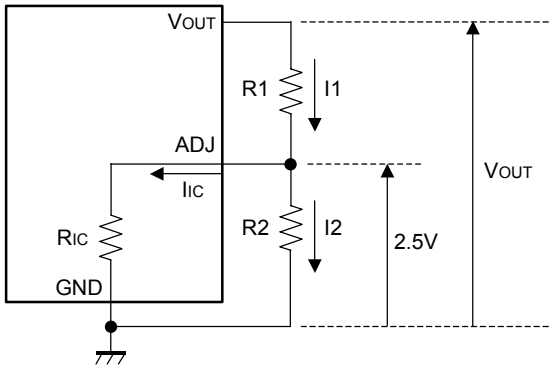
Thermal shutdown function is included in the R1154x Series, if the junction temperature is equal or more than +150°C(Typ.), the operation of regulator would stop. After that, when the junction temperature is equal or less than +125°C(Typ.), the operation of regulator would restart. Unless the cause of rising temperature would remove, the regulator repeats on and off, and output waveform would be like consecutive pulses.

Chip Enable Circuit

Do not make voltage level of chip enable pin keep floating level, or in between $V_{IH}$ and $V_{IL}$. Unless otherwise, Output voltage would be unstable or indefinite, or unexpected current would flow internally.

* Technical Notes on Output Voltage Setting of C type

Figure 1. Adjustable Regulator (C type)



The Output Voltage of Regulator in R1154xxxxC may be adjustable for any output voltage between its 2.5V reference and its $V_{DD}$ setting level. An external pair of resistors is required, as shown in Figure 1. The complete equation for the output voltage is described step by step as follows;

$$I1 = I_{IC} + I2 \quad (1)$$
$$I2 = 2.5/R2 \quad (2)$$

Thus,

$$I1 = I_{IC} + 2.5/R2 \quad (3)$$

Therefore,

$$V_{OUT} = 2.5 + R1 \times I1 \quad (4)$$

Put Equation (3) into Equation (4),then

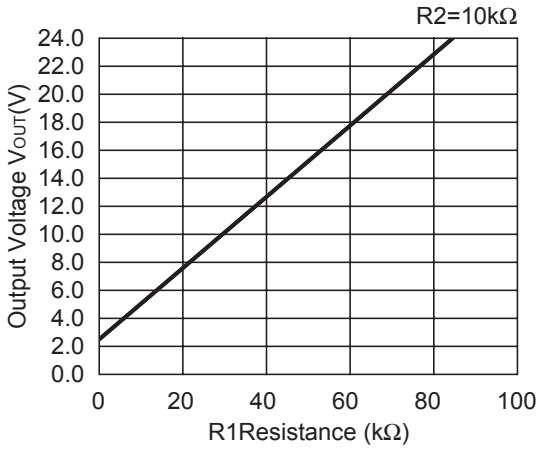
$$V_{OUT} = 2.5 + R1(I_{IC} + 2.5/R2)$$
$$= 2.5(1 + R1/R2) + R1 \times I_{IC} \quad (5)$$

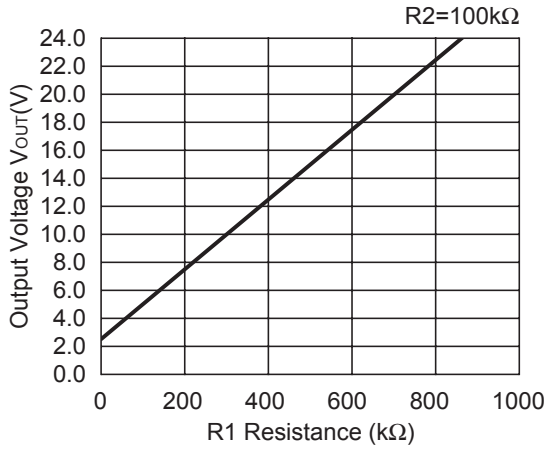
In 2nd term, or $R1 \times I_{IC}$ will produce an error in $V_{OUT}$.
In Equation (5),

$$I_{IC} = 2.5/R_{IC} \quad (6)$$
$$R1 \times I_{IC} = R1 \times 2.5/R_{IC}$$
$$= 2.5 \times R1/R_{IC} \quad (7)$$

For better accuracy, choosing R1 ($<<R_{IC}$) reduces this error.

**Adjustable Resister Dependence of Output Voltage (Topt=25°C)**

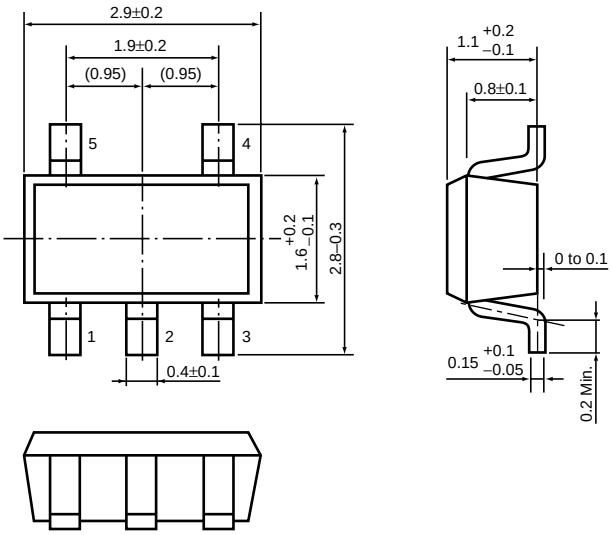


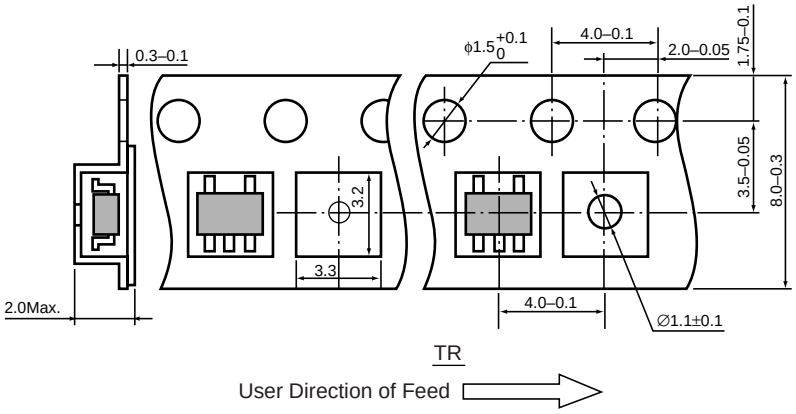
- **SOT-23-5 (SC-74A)**

Unit: mm

## PACKAGE DIMENSIONS

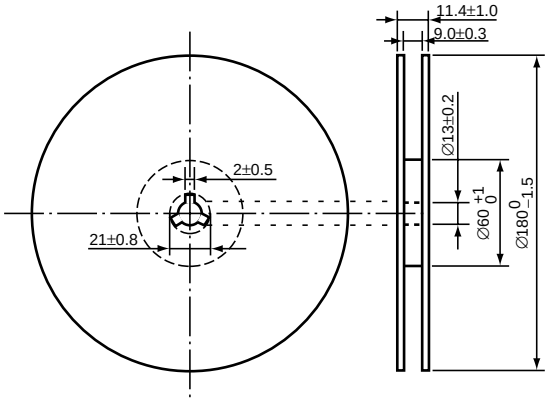



## TAPING SPECIFICATION




## TAPING REEL DIMENSIONS REUSE REEL (EIAJ-RRM-08Bc)

(1reel=3000pcs)



# POWER DISSIPATION (SOT-23-5)

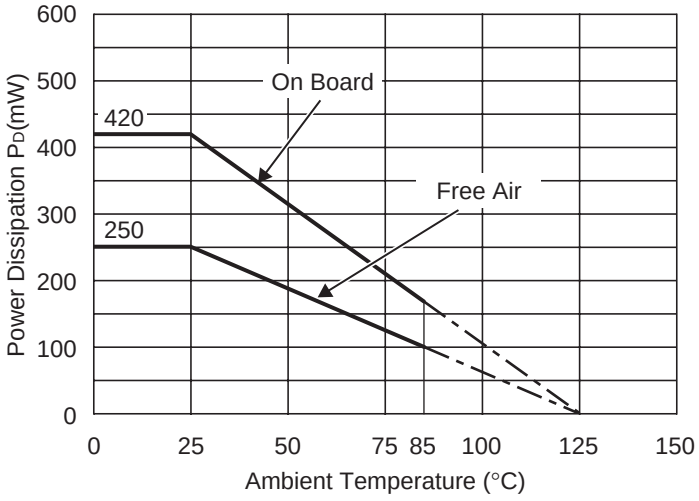
This specification is at mounted on board. Power Dissipation ($P_D$) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:
(Power Dissipation (SOT-23-5) is substitution of SOT-23-6.)

Measurement Conditions

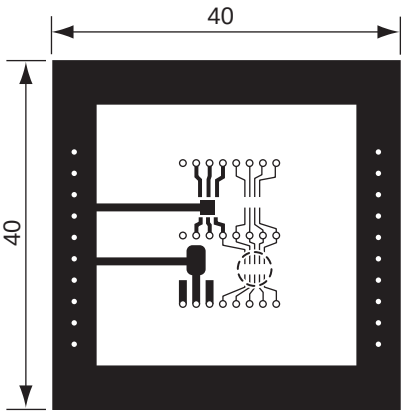
| | Standard Land Pattern |
|---|---|
| Environment | Mounting on Board (Wind velocity=0m/s) |
| Board Material | Glass cloth epoxy plastic (Double sided) |
| Board Dimensions | 40mm × 40mm × 1.6mm |
| Copper Ratio | Top side : Approx. 50% , Back side : Approx. 50% |
| Through-hole | ϕ0.5mm × 44pcs |

Measurement Result (Topt=25°C, Tjmax=125°C)

| | Standard Land Pattern | Free Air |
|---|---|---|
| Power Dissipation | 420mW | 250mW |
| Thermal Resistance | θja=(125−25°C)/0.42W=238°C/W | 400°C/W |



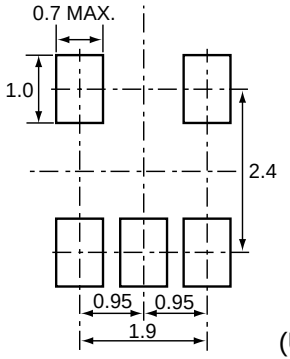

**Power Dissipation**




**Measurement Board Pattern**

IC Mount Area Unit : mm

# RECOMMENDED LAND PATTERN

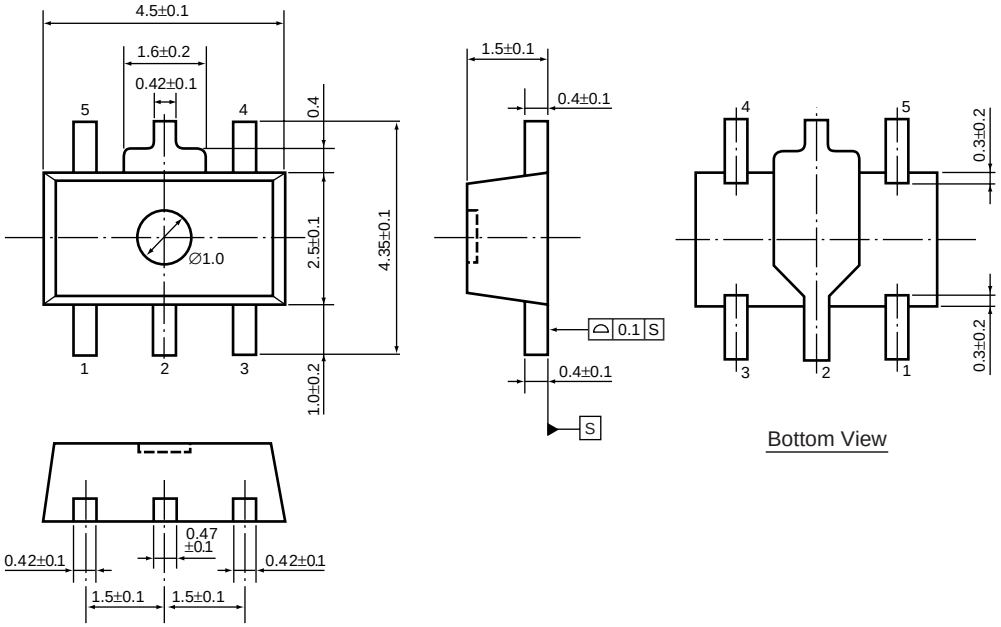



(Unit: mm)

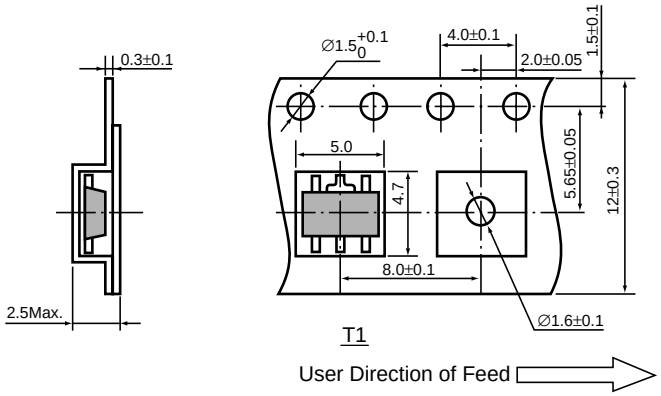
- **SOT-89-5**

Unit: mm

# PACKAGE DIMENSIONS

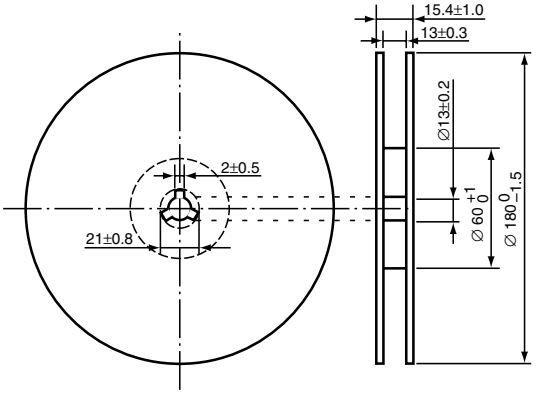



# TAPING SPECIFICATION (T1: Standard Type)




# TAPING REEL DIMENSIONS REUSE REEL (EIAJ-RRM-12Bc)

(1reel=1000pcs)



# POWER DISSIPATION (SOT-89-5)

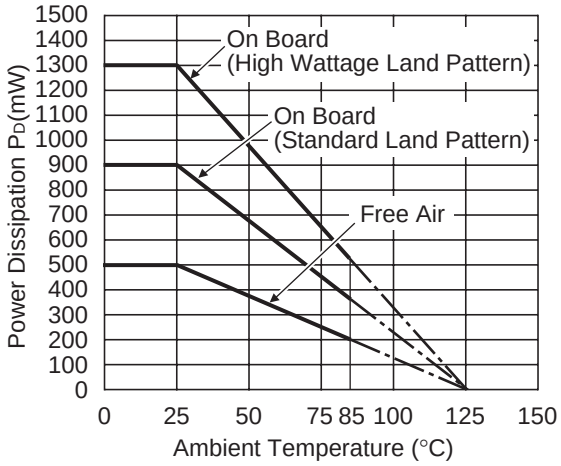
This specification is at mounted on board. Power Dissipation ($P_D$) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

Measurement Conditions

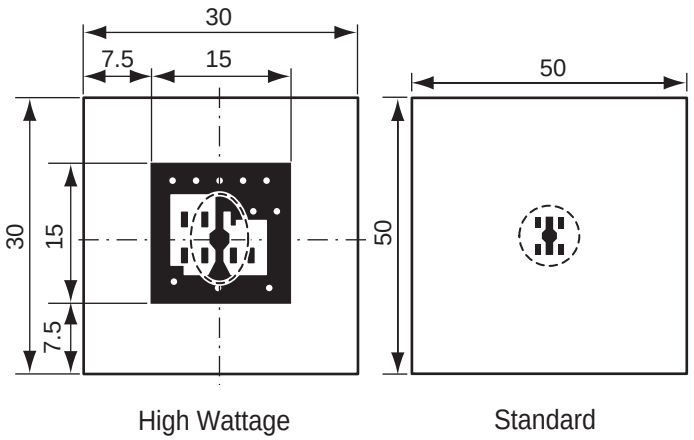
| | High Wattage Land Pattern | Standard Land Pattern |
|---|---|---|
| Environment | Mounting on Board (Wind velocity=0m/s) | Mounting on Board (Wind velocity=0m/s) |
| Board Material | Glass cloth epoxy plastic (Double sided) | Glass cloth epoxy plastic (Double sided) |
| Board Dimensions | 30mm × 30mm × 1.6mm | 50mm × 50mm × 1.6mm |
| Copper Ratio | Top side : Approx. 20% ,<br>Back side : Approx. 100% | Top side : Approx. 10% ,<br>Back side : Approx. 100% |
| Through-hole | ϕ0.85mm × 10pcs | - |

Measurement Result (Topt=25°C,Tjmax=125°C)

| | High Wattage Land Pattern | Standard Land Pattern | Free Air |
|---|---|---|---|
| Power Dissipation | 1300mW | 900mW | 500mW |
| Thermal Resistance | 77°C/W | 111°C/W | 200°C/W |



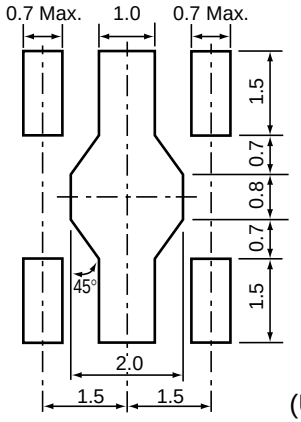

**Power Dissipation**




**Measurement Board Pattern**

IC Mount Area (Unit : mm)

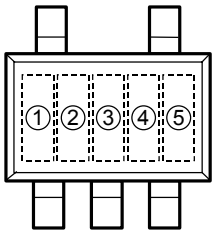
# RECOMMENDED LAND PATTERN (SOT-89-5)




(Unit : mm)

# R1154N SERIES MARK SPECIFICATION

- **SOT-23-5 (SC-74A)**




①, ②, ③ : Product Code (refer to Part Number vs. Product Code)

④, ⑤ : Lot Number

- **Part Number vs. Product Code**

| Part Number | Product Code | | |
|---|---|---|---|
| | ① | ② | ③ |
| R1154N001C | J | 2 | 4 |
| R1154N025B | J | 2 | 5 |
| R1154N026B | J | 2 | 6 |
| R1154N027B | J | 2 | 7 |
| R1154N028B | J | 2 | 8 |
| R1154N029B | J | 2 | 9 |
| R1154N030B | J | 3 | 0 |
| R1154N031B | J | 3 | 1 |
| R1154N032B | J | 3 | 2 |
| R1154N033B | J | 3 | 3 |
| R1154N034B | J | 3 | 4 |
| R1154N035B | J | 3 | 5 |
| R1154N036B | J | 3 | 6 |
| R1154N037B | J | 3 | 7 |
| R1154N038B | J | 3 | 8 |
| R1154N039B | J | 3 | 9 |
| R1154N040B | J | 4 | 0 |
| R1154N041B | J | 4 | 1 |
| R1154N042B | J | 4 | 2 |
| R1154N043B | J | 4 | 3 |
| R1154N044B | J | 4 | 4 |
| R1154N045B | J | 4 | 5 |
| R1154N046B | J | 4 | 6 |
| R1154N047B | J | 4 | 7 |
| R1154N048B | J | 4 | 8 |
| R1154N049B | J | 4 | 9 |
| R1154N050B | J | 5 | 0 |
| R1154N051B | J | 5 | 1 |
| R1154N052B | J | 5 | 2 |
| R1154N053B | J | 5 | 3 |
| R1154N054B | J | 5 | 4 |

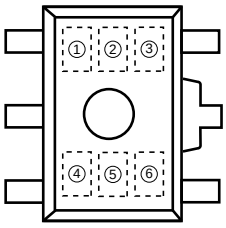
| Part Number | Product Code | | |
|---|---|---|---|
| | ① | ② | ③ |
| R1154N055B | J | 5 | 5 |
| R1154N056B | J | 5 | 6 |
| R1154N057B | J | 5 | 7 |
| R1154N058B | J | 5 | 8 |
| R1154N059B | J | 5 | 9 |
| R1154N060B | J | 6 | 0 |
| R1154N061B | J | 6 | 1 |
| R1154N062B | J | 6 | 2 |
| R1154N063B | J | 6 | 3 |
| R1154N064B | J | 6 | 4 |
| R1154N065B | J | 6 | 5 |
| R1154N066B | J | 6 | 6 |
| R1154N067B | J | 6 | 7 |
| R1154N068B | J | 6 | 8 |
| R1154N069B | J | 6 | 9 |
| R1154N070B | J | 7 | 0 |
| R1154N071B | J | 7 | 1 |
| R1154N072B | J | 7 | 2 |
| R1154N073B | J | 7 | 3 |
| R1154N074B | J | 7 | 4 |
| R1154N075B | J | 7 | 5 |
| R1154N076B | J | 7 | 6 |
| R1154N077B | J | 7 | 7 |
| R1154N078B | J | 7 | 8 |
| R1154N079B | J | 7 | 9 |
| R1154N080B | J | 8 | 0 |
| R1154N081B | J | 8 | 1 |
| R1154N082B | J | 8 | 2 |
| R1154N083B | J | 8 | 3 |
| R1154N084B | J | 8 | 4 |
| R1154N085B | J | 8 | 5 |

| Part Number | Product Code | | |
|---|---|---|---|
| | ① | ② | ③ |
| R1154N086B | J | 8 | 6 |
| R1154N087B | J | 8 | 7 |
| R1154N088B | J | 8 | 8 |
| R1154N089B | J | 8 | 9 |
| R1154N090B | J | 9 | 0 |
| R1154N091B | J | 9 | 1 |
| R1154N092B | J | 9 | 2 |
| R1154N093B | J | 9 | 3 |
| R1154N094B | J | 9 | 4 |
| R1154N095B | J | 9 | 5 |
| R1154N096B | J | 9 | 6 |
| R1154N097B | J | 9 | 7 |
| R1154N098B | J | 9 | 8 |
| R1154N099B | J | 9 | 9 |
| R1154N100B | J | 0 | 0 |
| R1154N101B | J | 0 | 1 |
| R1154N102B | J | 0 | 2 |
| R1154N103B | J | 0 | 3 |
| R1154N104B | J | 0 | 4 |
| R1154N105B | J | 0 | 5 |
| R1154N106B | J | 0 | 6 |
| R1154N107B | J | 0 | 7 |
| R1154N108B | J | 0 | 8 |
| R1154N109B | J | 0 | 9 |
| R1154N110B | J | 1 | 0 |
| R1154N111B | J | 1 | 1 |
| R1154N112B | J | 1 | 2 |
| R1154N113B | J | 1 | 3 |
| R1154N114B | J | 1 | 4 |
| R1154N115B | J | 1 | 5 |
| R1154N116B | J | 1 | 6 |

| Part Number | Product Code | | |
|---|---|---|---|
| | ① | ② | ③ |
| R1154N117B | J | 1 | 7 |
| R1154N118B | J | 1 | 8 |
| R1154N119B | J | 1 | 9 |
| R1154N120B | J | 2 | 0 |

# R1154H SERIES MARK SPECIFICATION

- **SOT-89-5**




①　　: G (fixed)
②, ③, ④　: Product Code
⑤, ⑥　　: Lot Number

(refer to Part Number vs. Product Code)

- **Part Number vs. Product Code**

| Part Number | Product Code | | | |
|---|---|---|---|---|
| | ① | ② | ③ | ④ |
| R1154H025B | G | 0 | 2 | 5 |
| R1154H026B | G | 0 | 2 | 6 |
| R1154H027B | G | 0 | 2 | 7 |
| R1154H028B | G | 0 | 2 | 8 |
| R1154H029B | G | 0 | 2 | 9 |
| R1154H030B | G | 0 | 3 | 0 |
| R1154H031B | G | 0 | 3 | 1 |
| R1154H032B | G | 0 | 3 | 2 |
| R1154H033B | G | 0 | 3 | 3 |
| R1154H034B | G | 0 | 3 | 4 |
| R1154H035B | G | 0 | 3 | 5 |
| R1154H036B | G | 0 | 3 | 6 |
| R1154H037B | G | 0 | 3 | 7 |
| R1154H038B | G | 0 | 3 | 8 |
| R1154H039B | G | 0 | 3 | 9 |
| R1154H040B | G | 0 | 4 | 0 |
| R1154H041B | G | 0 | 4 | 1 |
| R1154H042B | G | 0 | 4 | 2 |
| R1154H043B | G | 0 | 4 | 3 |
| R1154H044B | G | 0 | 4 | 4 |
| R1154H045B | G | 0 | 4 | 5 |
| R1154H046B | G | 0 | 4 | 6 |
| R1154H047B | G | 0 | 4 | 7 |
| R1154H048B | G | 0 | 4 | 8 |
| R1154H049B | G | 0 | 4 | 9 |
| R1154H050B | G | 0 | 5 | 0 |
| R1154H051B | G | 0 | 5 | 1 |
| R1154H052B | G | 0 | 5 | 2 |
| R1154H053B | G | 0 | 5 | 3 |
| R1154H054B | G | 0 | 5 | 4 |

| Part Number | Product Code | | | |
|---|---|---|---|---|
| | ① | ② | ③ | ④ |
| R1154H055B | G | 0 | 5 | 5 |
| R1154H056B | G | 0 | 5 | 6 |
| R1154H057B | G | 0 | 5 | 7 |
| R1154H058B | G | 0 | 5 | 8 |
| R1154H059B | G | 0 | 5 | 9 |
| R1154H060B | G | 0 | 6 | 0 |
| R1154H061B | G | 0 | 6 | 1 |
| R1154H062B | G | 0 | 6 | 2 |
| R1154H063B | G | 0 | 6 | 3 |
| R1154H064B | G | 0 | 6 | 4 |
| R1154H065B | G | 0 | 6 | 5 |
| R1154H066B | G | 0 | 6 | 6 |
| R1154H067B | G | 0 | 6 | 7 |
| R1154H068B | G | 0 | 6 | 8 |
| R1154H069B | G | 0 | 6 | 9 |
| R1154H070B | G | 0 | 7 | 0 |
| R1154H071B | G | 0 | 7 | 1 |
| R1154H072B | G | 0 | 7 | 2 |
| R1154H073B | G | 0 | 7 | 3 |
| R1154H074B | G | 0 | 7 | 4 |
| R1154H075B | G | 0 | 7 | 5 |
| R1154H076B | G | 0 | 7 | 6 |
| R1154H077B | G | 0 | 7 | 7 |
| R1154H078B | G | 0 | 7 | 8 |
| R1154H079B | G | 0 | 7 | 9 |
| R1154H080B | G | 0 | 8 | 0 |
| R1154H081B | G | 0 | 8 | 1 |
| R1154H082B | G | 0 | 8 | 2 |
| R1154H083B | G | 0 | 8 | 3 |
| R1154H084B | G | 0 | 8 | 4 |

| Part Number | Product Code | | | |
|---|---|---|---|---|
| | ① | ② | ③ | ④ |
| R1154H085B | G | 0 | 8 | 5 |
| R1154H086B | G | 0 | 8 | 6 |
| R1154H087B | G | 0 | 8 | 7 |
| R1154H088B | G | 0 | 8 | 8 |
| R1154H089B | G | 0 | 8 | 9 |
| R1154H090B | G | 0 | 9 | 0 |
| R1154H091B | G | 0 | 9 | 1 |
| R1154H092B | G | 0 | 9 | 2 |
| R1154H093B | G | 0 | 9 | 3 |
| R1154H094B | G | 0 | 9 | 4 |
| R1154H095B | G | 0 | 9 | 5 |
| R1154H096B | G | 0 | 9 | 6 |
| R1154H097B | G | 0 | 9 | 7 |
| R1154H098B | G | 0 | 9 | 8 |
| R1154H099B | G | 0 | 9 | 9 |
| R1154H100B | G | 1 | 0 | 0 |
| R1154H101B | G | 1 | 0 | 1 |
| R1154H102B | G | 1 | 0 | 2 |
| R1154H103B | G | 1 | 0 | 3 |
| R1154H104B | G | 1 | 0 | 4 |
| R1154H105B | G | 1 | 0 | 5 |
| R1154H106B | G | 1 | 0 | 6 |
| R1154H107B | G | 1 | 0 | 7 |
| R1154H108B | G | 1 | 0 | 8 |
| R1154H109B | G | 1 | 0 | 9 |
| R1154H110B | G | 1 | 1 | 0 |
| R1154H111B | G | 1 | 1 | 1 |
| R1154H112B | G | 1 | 1 | 2 |
| R1154H113B | G | 1 | 1 | 3 |
| R1154H114B | G | 1 | 1 | 4 |

| Part Number | Product Code | | | |
|---|---|---|---|---|
| | ① | ② | ③ | ④ |
| R1154H115B | G | 1 | 1 | 5 |
| R1154H116B | G | 1 | 1 | 6 |
| R1154H117B | G | 1 | 1 | 7 |
| R1154H118B | G | 1 | 1 | 8 |
| R1154H119B | G | 1 | 1 | 9 |
| R1154H120B | G | 1 | 2 | 0 |

| | | | | |
|---|---|---|---|---|
| R1154H001C | G | 0 | 0 | 1 |