RICOH

# R1162x SERIES

## 3-MODE 150mA LDO REGULATOR

NO.EA-110-0512

## OUTLINE

The R1162x Series consist of CMOS-based voltage regulator ICs with high output voltage accuracy and low supply current. Each of these voltage regulator ICs consists of a voltage reference unit, an error amplifier, resistors for setting output voltage, a current limit circuit, and so on. The output voltage is internally fixed with high accuracy.

These ICs perform with the chip enable function and realize a standby mode with ultra low supply current. To prevent the destruction by over current, the current limit circuit is included. The R1162x Series have 3-mode. One is standby mode with CE or standby control pin. Other two modes are realized with ECO pin™. Fast Transient Mode (FT mode) and Low Power Mode (LP mode) are alternative with ECO pin™. Consumption current is reduced at Low Power Mode compared with Fast Transient Mode. The output voltage is maintained between FT mode and LP mode.

Since the packages for these ICs are SOT-23-5 and SON1612-6 packages, high density mounting of the ICs on boards is possible.

## FEATURES

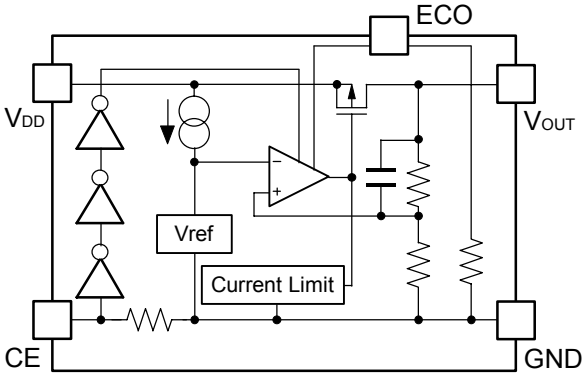
- Ultra-Low Supply Current.....Typ. 5.5μA (Low Power Mode),
  Typ. 70μA (Fast Transient Mode)
- Standby Mode .....Typ. 0.1μA
- Low Dropout Voltage.....Typ. 0.25V ($I_{OUT}$=150mA Output Voltage=3.0V Type)
- High Ripple Rejection .....Typ. 70dB (f=1kHz, FT Mode)
  Typ. 60dB (f=10kHz, FT Mode)
- Low Temperature-Drift Coefficient of Output Voltage Typ. ±100ppm/°C
- Excellent Line Regulation .....Typ. 0.02%/V
- High Output Voltage Accuracy .....±2.0%(±3.0% at LP Mode)
- Small Package .....SOT-23-5 (Super Mini-mold), SON1612-6
- Output Voltage .....Stepwise setting with a step of 0.1V
  in the range of 1.5V to 4.0V is possible
- Built-in fold-back protection circuit .....Typ. 40mA (Current at short mode)
- Performs with Ceramic Capacitors .....$C_{IN}$=1.0μF,$C_{OUT}$=0.47μF

## APPLICATIONS

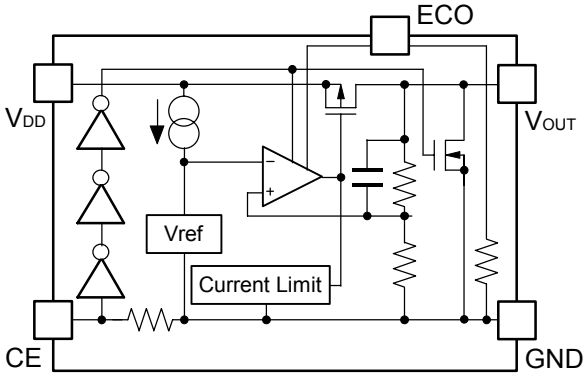
- Precision Voltage References.
- Power source for electrical appliances such as cameras, VCRs and hand-held communication equipment.
- Power source for battery-powered equipment.

# BLOCK DIAGRAM

**R1162xxx1B**




**R1162xxx1D**




# SELECTION GUIDE

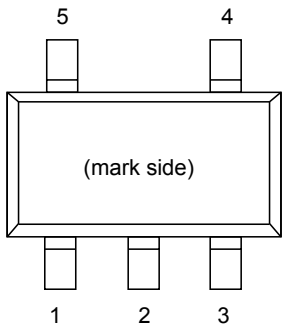
The output voltage, function of auto-discharge, package, and the packing type for the ICs can be selected at the user's request. The selection can be available by designating the part number as shown below;

R1162xxx1x-xx ←Part Number
↑↑ ↑ ↑
a b c d

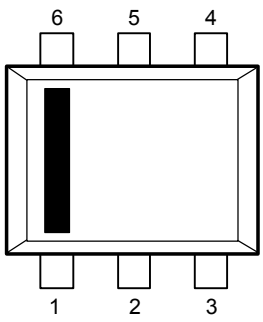
| Code | Contents |
|---|---|
| a | Designation of Package Type :<br>N:SOT-23-5 (Mini-mold)  D:SON1612-6 |
| b | Setting Output Voltage ($V_{OUT}$) :<br>Stepwise setting with a step of 0.1V in the range of 1.5V to 4.0V is possible.<br>Exceptions: 1.85V=R1162x181x5, 2.85V=R1162x281x5 |
| c | Designation of Chip Enable Option :<br>B: "H" active type.<br>D: "H" active type. With auto discharge function |
| d | Designation of Taping Type :<br>Refer to Taping Specifications;TR type is the standard direction. |

## PIN CONFIGURATIONS

- **SOT-23-5**




- **SON1612-6**




## PIN DESCRIPTIONS

- **R1116N (SOT-23-5)**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | $V_{DD}$ | Input Pin |
| 2 | GND | Ground Pin |
| 3 | CE | Chip Enable Pin |
| 4 | ECO | MODE alternative pin |
| 5 | $V_{OUT}$ | Output pin |

- **R1116D (SON1612-6)**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | CE | Chip Enable Pin |
| 2 | GND | Ground Pin |
| 3 | $V_{DD}$ | Input Pin |
| 4 | $V_{OUT}$ | Output Pin |
| 5 | GND | Ground Pin |
| 6 | ECO | MODE alternative pin |

## ABSOLUTE MAXIMUM RATINGS

| Symbol | Item | Rating | Unit |
|---|---|---|---|
| $V_{IN}$ | Input Voltage | 6.5 | V |
| $V_{ECO}$ | Input Voltage (ECO Pin) | −0.3 to 6.5 | V |
| $V_{CE}$ | Input Voltage ( $\overline{CE}$ / CE Pin) | −0.3 to 6.5 | V |
| $V_{OUT}$ | Output Voltage | −0.3 to $V_{IN}$+0.3 | V |
| $I_{OUT}$ | Output Current | 180 | mA |
| $P_D$ | Power Dissipation (SOT-23-5) *1 | 420 | mW |
| | Power Dissipation (SON1612-6) *1 | 500 | MW |
| Topt | Operating Temperature Range | −40 ~ 85 | °C |
| Tstg | Storage Temperature Range | −55 ~ 125 | °C |

∗1 For Power Dissipation, please refer to PACKAGE INFORMATION to be described.

# ELECTRICAL CHARACTERISTICS

- **R1162xxx1B/D**

Topt=25°C

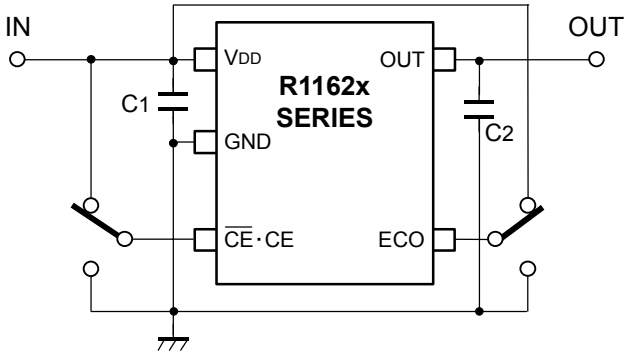
| Symbol | Item | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{OUT}$ | Output Voltage | $V_{IN}$ = Set $V_{OUT}$+1V $V_{ECO}$ = $V_{IN}$<br>1mA ≦ $I_{OUT}$ ≦ 30mA Note 1 | $V_{OUT}$ ×0.98 | | $V_{OUT}$ ×1.02 | V |
| | | $V_{IN}$ = Set $V_{OUT}$ + 1V $V_{ECO}$ =GND<br>1mA ≦ $I_{OUT}$ ≦ 30mA Note 2 | $V_{OUT}$ ×0.97 | | $V_{OUT}$ ×1.03 | V |
| $\Delta V_{OUT}$ | Output Voltage Deviation between FT Mode and LP Mode | $V_{IN}$ = Set $V_{OUT}$+1V, $I_{OUT}$ =30mA<br>$V_{OUT}$ ≦ 2.0V | −1.2 | 0.0 | 1.2 | % |
| | | $V_{OUT}$ ≧ 2.0V | (−24) | 0.0 | (24) | mV |
| $I_{OUT}$ | Output Current | $V_{IN}$ − $V_{OUT}$ = 1.0V | 150 | | | mA |
| $\Delta V_{OUT}$/ $\Delta I_{OUT}$ | Load Regulation(FT Mode) | $V_{IN}$ =Set $V_{OUT}$+1V, $V_{ECO}$=$V_{IN}$<br>1mA ≦ $I_{OUT}$ ≦ 150mA | | 20 | 40 | mV |
| | Load Regulation(LP Mode) | $V_{IN}$ = Set $V_{OUT}$+1V,$V_{ECO}$=GND<br>1mA ≦ $I_{OUT}$ ≦ 150mA | | 20 | 45 | mV |
| $V_{DIF}$ | Dropout Voltage | Refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE | | | | |
| $I_{SS1}$ | Supply Current(FT Mode) | $V_{IN}$ = Set $V_{OUT}$+1V<br>$V_{ECO}$ = $V_{IN}$, $I_{OUT}$=0mA | | 70 | 100 | μA |
| $I_{SS2}$ | Supply Current(LP Mode) | $V_{IN}$ = Set $V_{OUT}$+1V<br>$V_{ECO}$ = GND, $I_{OUT}$=0mA | | 5.5 | 9.0 | μA |
| Istandby | Supply Current (Standby) | $V_{IN}$ = $V_{CE}$ = Set $V_{OUT}$+1V | | 0.1 | 1.0 | μA |
| $\Delta V_{OUT}$/ $\Delta V_{IN}$ | Line Regulation(FT Mode) | Set $V_{OUT}$+0.5V ≦ $V_{IN}$ ≦ 6.0V<br>$I_{OUT}$ = 30mA, $V_{ECO}$ = $V_{IN}$<br>$V_{OUT}$ ≦ 1.6V: 2.2V ≦ $V_{IN}$ ≦ 6.0V | | 0.02 | 0.10 | %/V |
| | Line Regulation(LP Mode) | Set $V_{OUT}$ + 0.5V ≦ $V_{IN}$ ≦ 6.0V<br>$I_{OUT}$ = 30mA, $V_{ECO}$ = GND<br>$V_{OUT}$ ≦ 1.6V: 2.2V ≦ $V_{IN}$ ≦ 6.0V | | 0.05 | 0.20 | %/V |
| RR | Ripple Rejection(FT Mode) | f = 1kHz<br>f = 10kHz,Ripple 0.2Vp-p<br>$V_{IN}$ = Set $V_{OUT}$ + 1V<br>$I_{OUT}$ = 30mA, $V_{ECO}$ = $V_{IN}$ | | 70<br>60 | | dB |
| $V_{IN}$ | Input Voltage | | 2.0 | | 6.0 | V |
| $\Delta V_{OUT}$/ $\Delta$Topt | Output Voltage Temperature Coefficient | $I_{OUT}$ = 30mA<br>−40°C ≦ Topt ≦ 85°C | | ±100 | | ppm /°C |
| Ilim | Short Current Limit | $V_{OUT}$ = 0V | | 40 | | mA |
| $I_{PD}$ | CE Pull-down Constant Current | | | 0.3 | 0.6 | μA |
| $R_{PD}$ | ECO Pull-down Resistance | | 2 | 5 | 30 | MΩ |
| $V_{CEH}$ | CE, ECO Input Voltage “H” | | 1.0 | | 6.0 | V |
| $V_{CEL}$ | CE, ECO Input Voltage “L” | | 0.00 | | 0.35 | V |
| en | Output Noise (Fast Mode) | BW = 10Hz to 100kHz | | 30 | | μVrms |
| en | Output Noise (Low Power Mode) | BW = 10Hz to 100kHz | | 40 | | μVrms |
| $R_{LOW}$ | Nch On resistance for auto-discharge (Applied to D version) | $V_{CE}$=0V | | 60 | | Ω |

# ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE

Topt = 25°C

| Output Voltage $V_{OUT}$ (V) | Dropout Voltage (mV) | | | | |
|---|---|---|---|---|---|
| | Condition | $V_{DIF}$(ECO=H) | | $V_{DIF}$(ECO=L) | |
| | | Typ. | Max. | Typ. | Max. |
| 1.5 ≦ $V_{OUT}$ ≦ 1.6 | $I_{OUT}$ = 150mA | 400 | 680 | 420 | 680 |
| 1.6 ≦ $V_{OUT}$ ≦ 1.7 | | 380 | 550 | 390 | 550 |
| 1.7 ≦ $V_{OUT}$ ≦ 1.8 | | 350 | 520 | 370 | 520 |
| 1.8 ≦ $V_{OUT}$ ≦ 2.0 | | 340 | 490 | 350 | 490 |
| 2.0 ≦ $V_{OUT}$ ≦ 2.8 | | 290 | 425 | 300 | 430 |
| 2.8 ≦ $V_{OUT}$ ≦ 4.0 | | 250 | 350 | 250 | 350 |

# TYPICAL APPLICATION




(External Components)

$C_2$ Ceramic 0.47μF Ex. Murata GRM40B474K

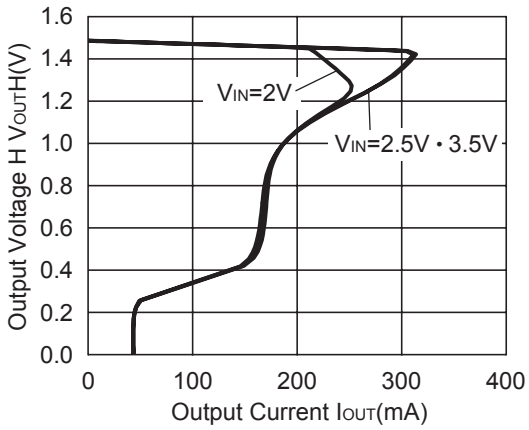
Kyocera CM105B474K

$C_1$ Ceramic 1.0μF

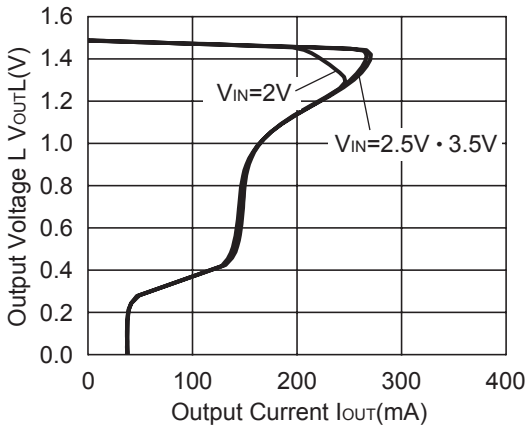
# TYPICAL CHARACTERISTICS Unless otherwise provided, capacitors are ceramic type.

## 1) Output Voltage vs. Output Current

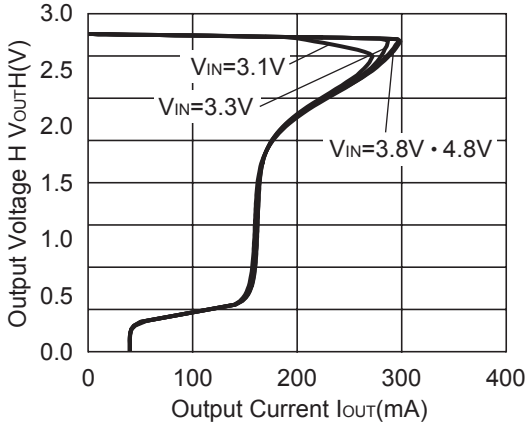
**R1162x15x (ECO=H)**



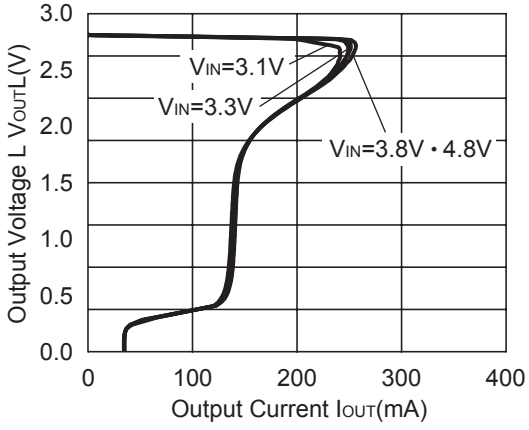

**R1162x15x (ECO=L)**



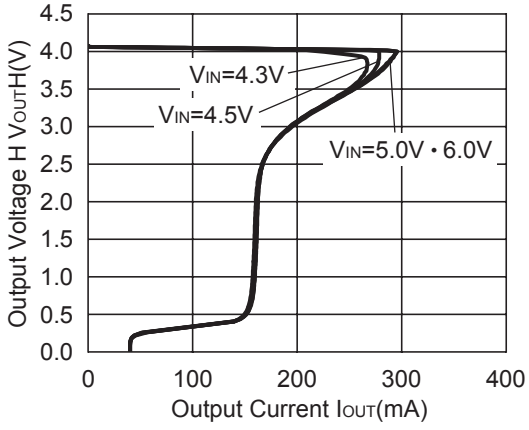

**R1162x28x (ECO=H)**



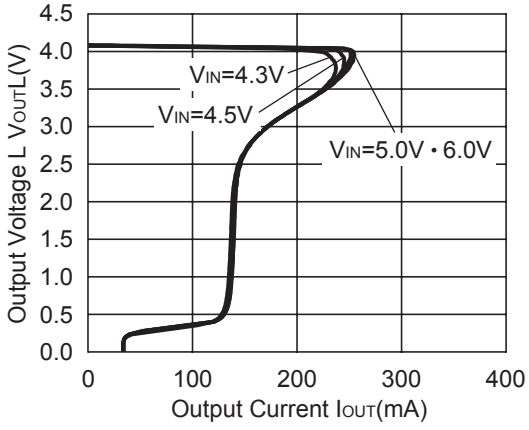

**R1162x28x (ECO=L)**




**R1162x40x (ECO=H)**

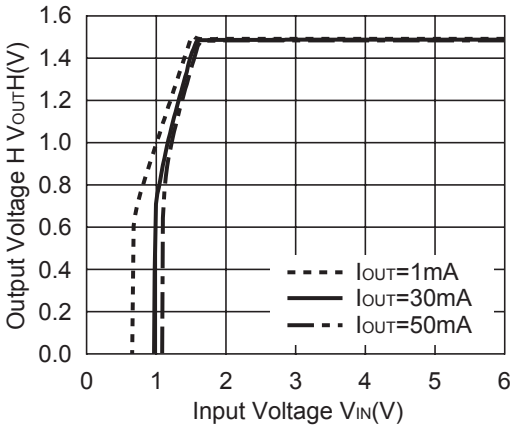



**R1162x40x (ECO=L)**

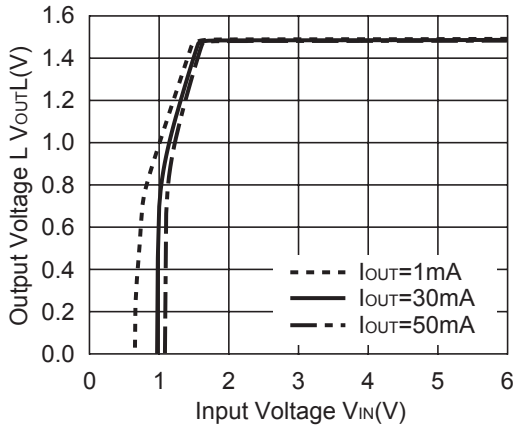


## 2) Output Voltage vs. Input Voltage

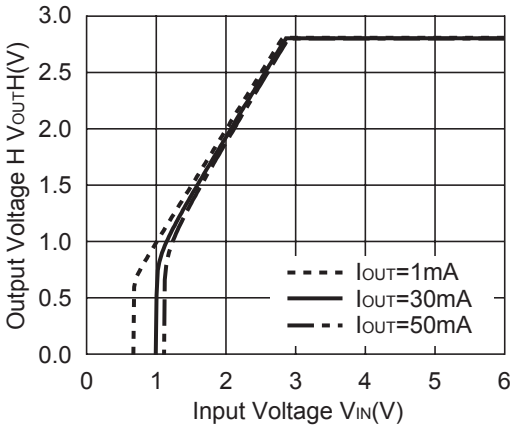
**R1162x15x (ECO=H)**



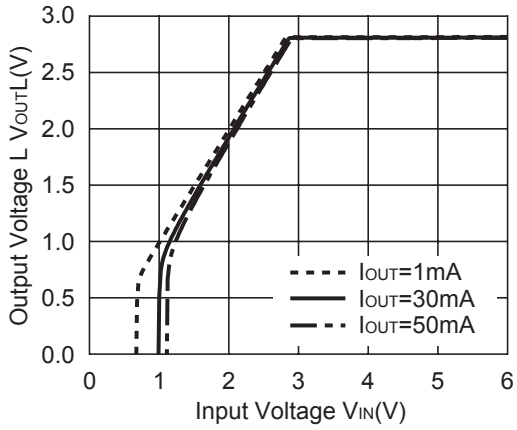

**R1162x15x (ECO=L)**



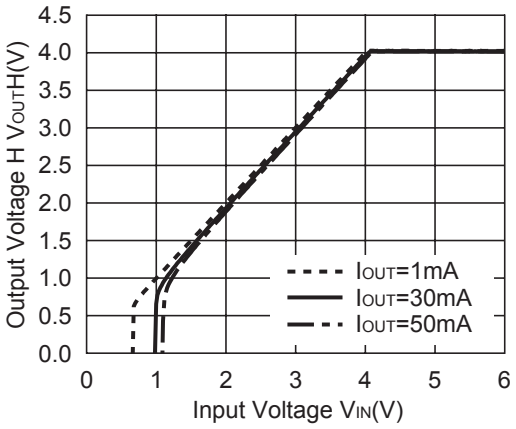

**R1162x28x (ECO=H)**



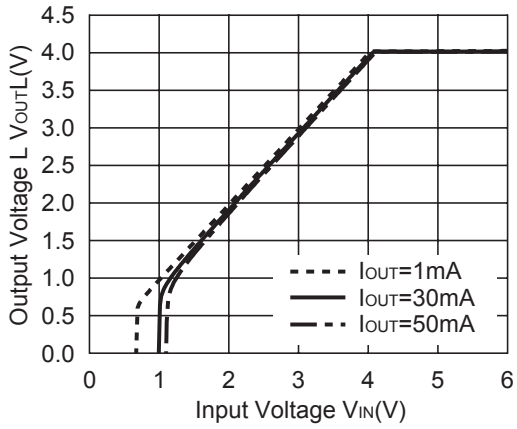

**R1162x28x (ECO=L)**




**R1162x40x (ECO=H)**

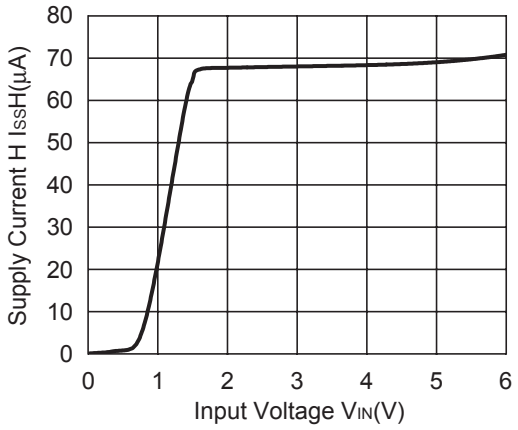



**R1162x40x (ECO=L)**

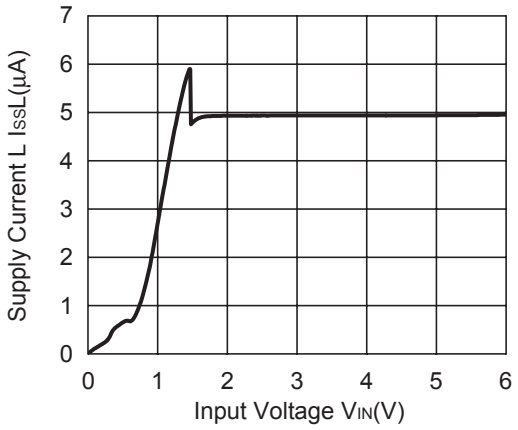


### 3) Supply Current vs. Input Voltage

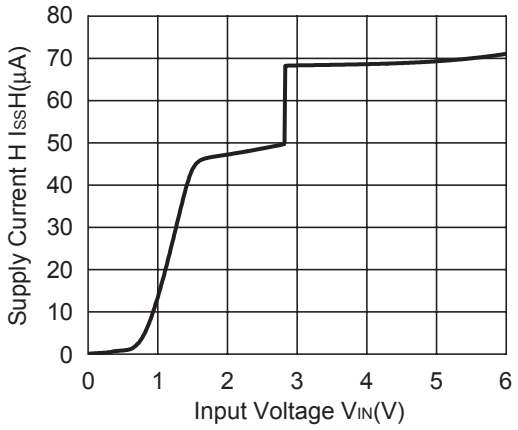
**R1162x15x (ECO=H)**



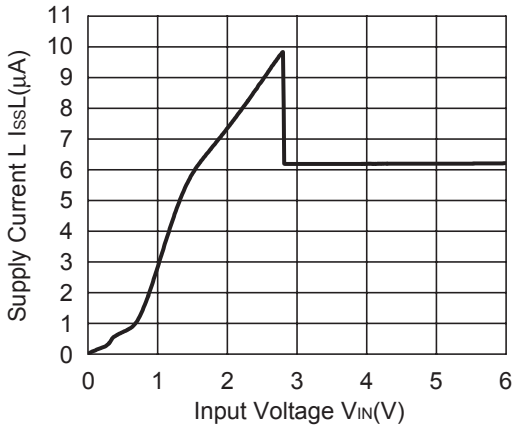

**R1162x15x (ECO=L)**



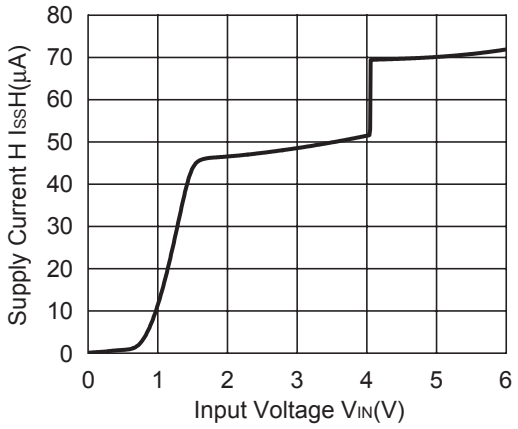

**R1162x28x (ECO=H)**



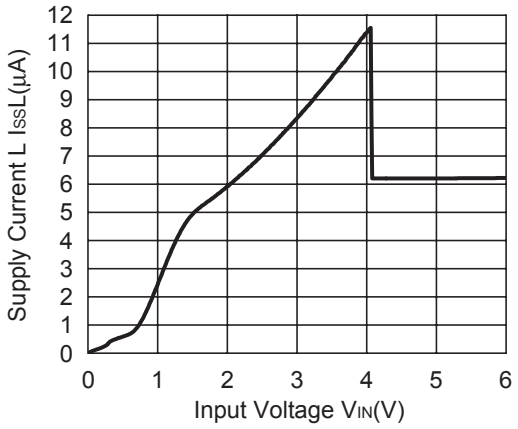

**R1162x28x (ECO=L)**




**R1162x40x (ECO=H)**

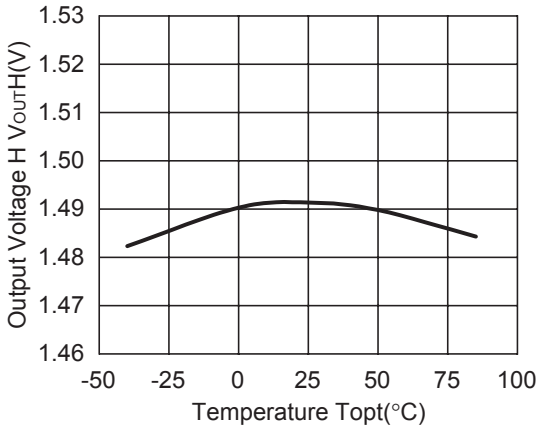



**R1162x40x (ECO=L)**

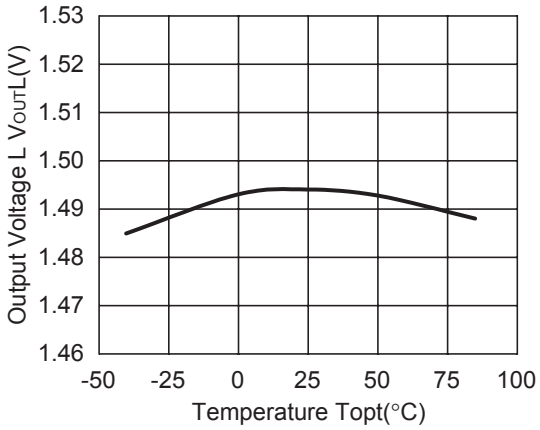


### 4) Output Voltage vs. Temperature

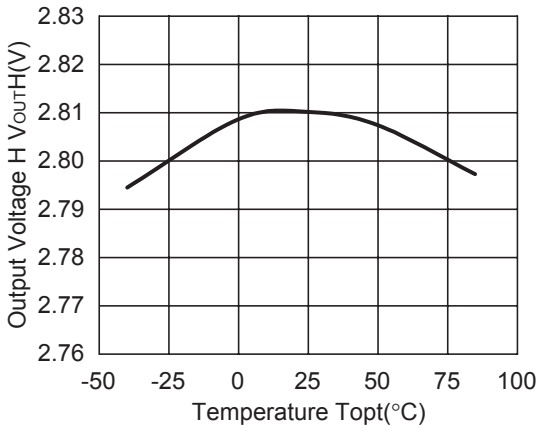
**R1162x15x (ECO=H)**



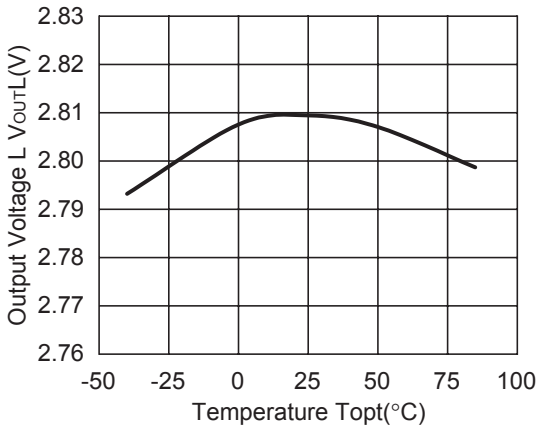

**R1162x15x (ECO=L)**



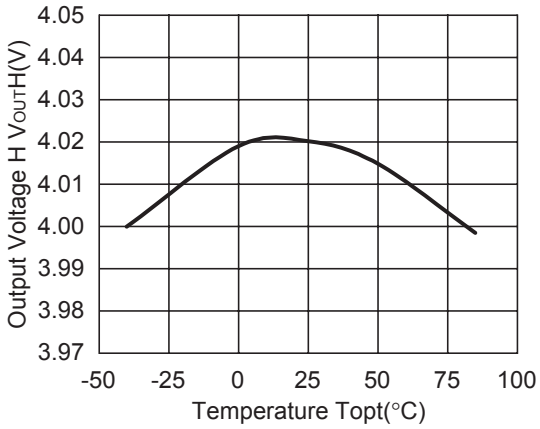

**R1162x28x (ECO=H)**



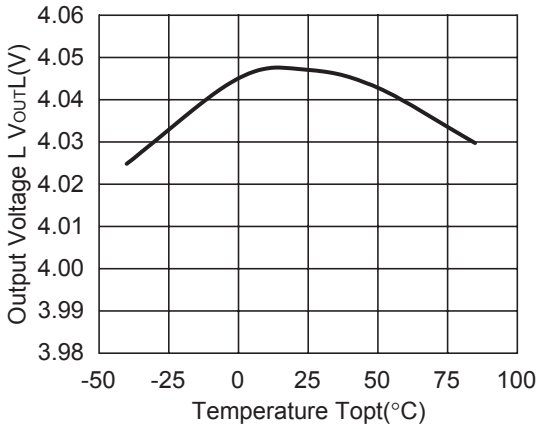

**R1162x28x (ECO=L)**




**R1162x40x (ECO=H)**

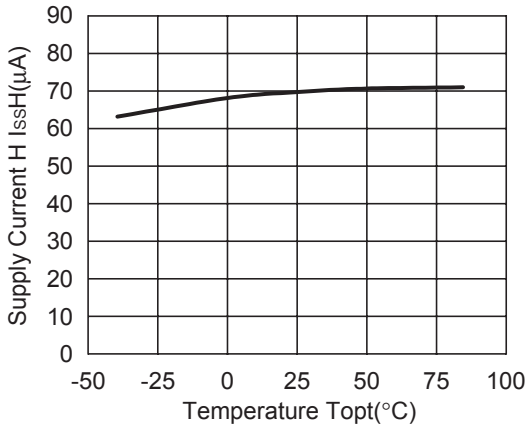



**R1162x40x (ECO=L)**

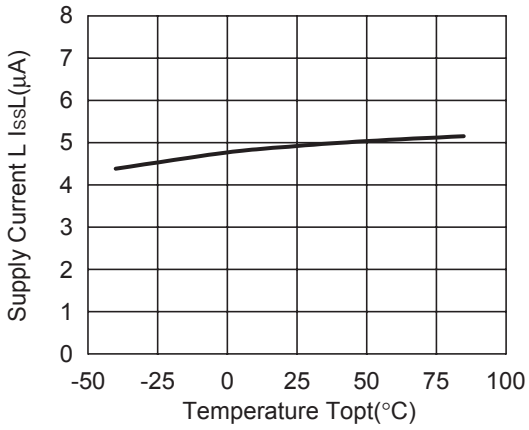


### 5) Supply Current vs. Temperature

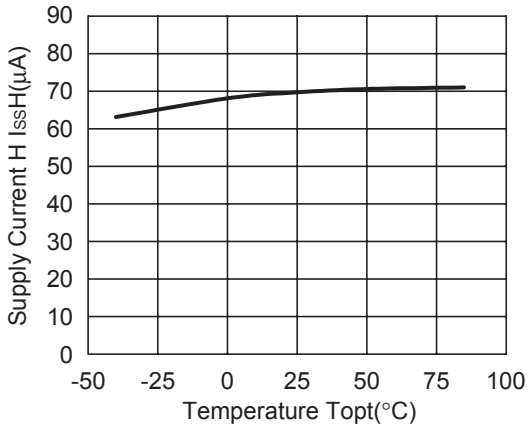
**R1162x15x (ECO=H)**



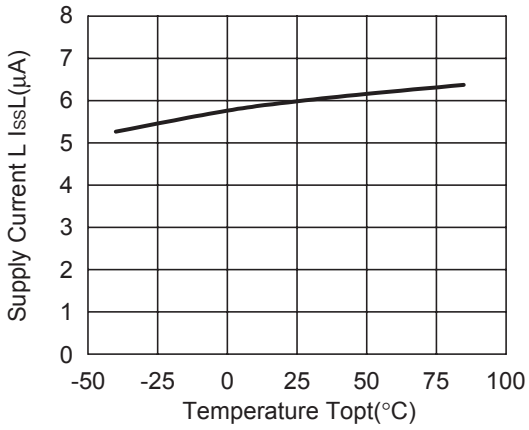

**R1162x15x (ECO=L)**



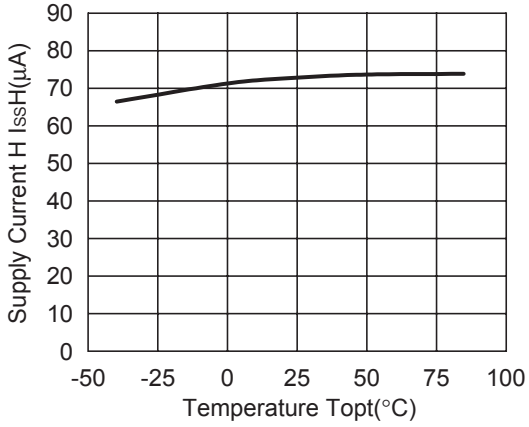

**R1162x28x (ECO=H)**



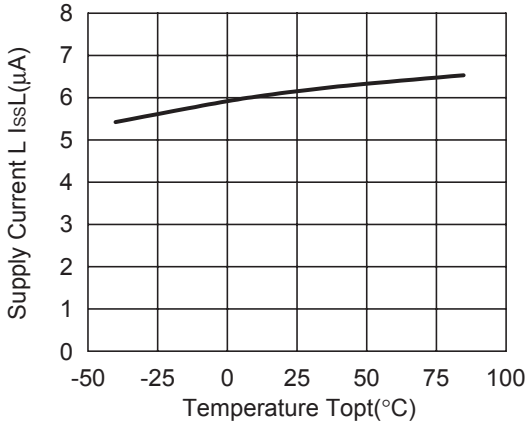

**R1162x28x (ECO=L)**




**R1162x40x (ECO=H)**

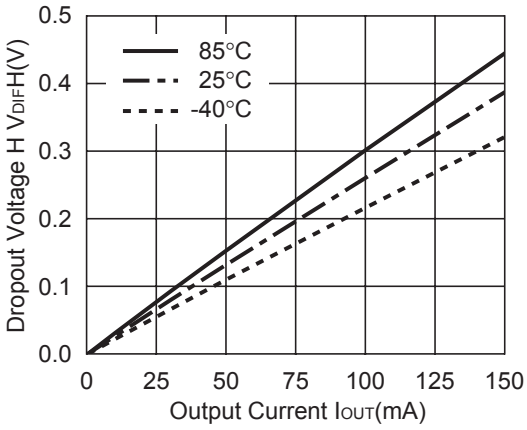



**R1162x40x (ECO=L)**

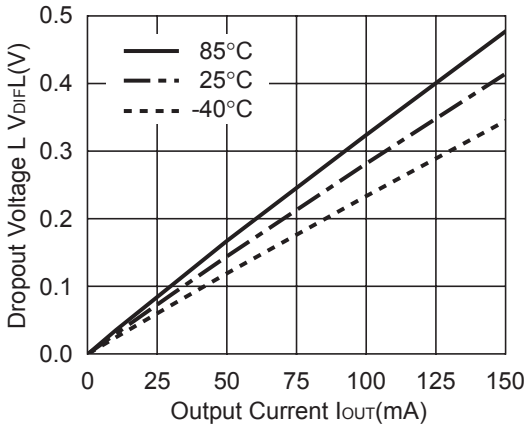


## 6) Dropout Voltage vs. Output Current

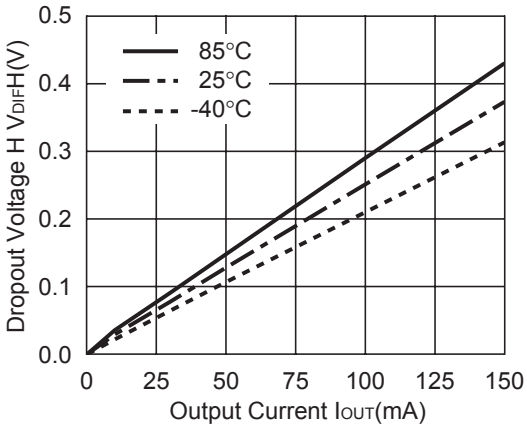
**R1162x15x (ECO=H)**



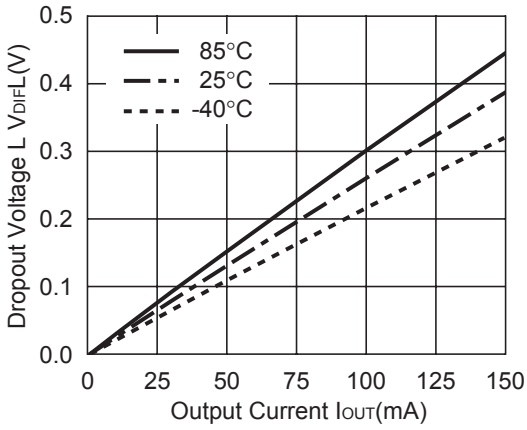

**R1162x15x (ECO=L)**



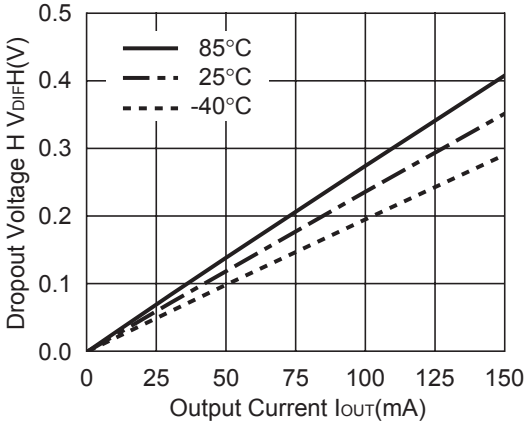

**R1162x16x (ECO=H)**



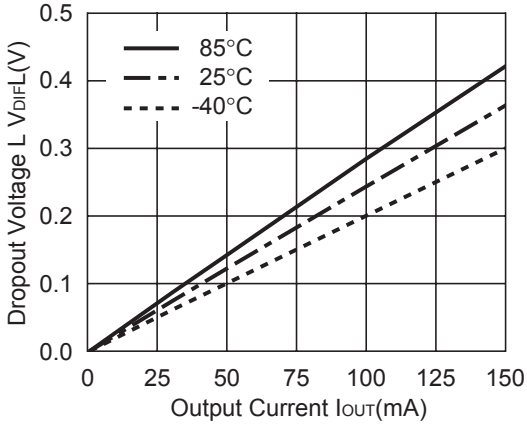

**R1162x16x (ECO=L)**



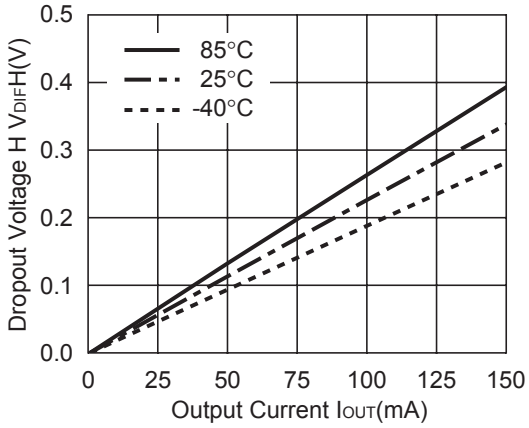

**R1162x17x (ECO=H)**



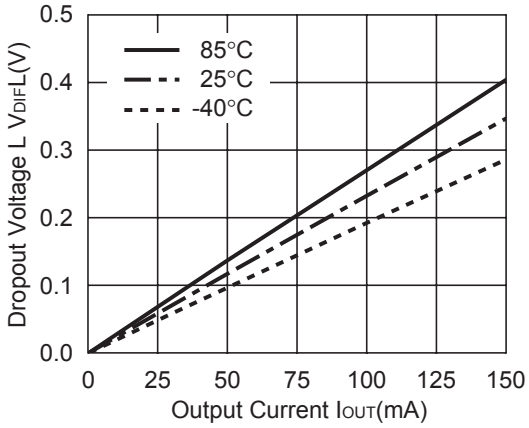

**R1162x17x (ECO=L)**



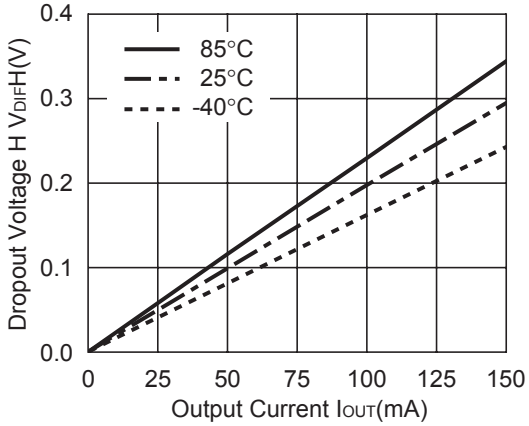
**R1162x18x (ECO=H)**



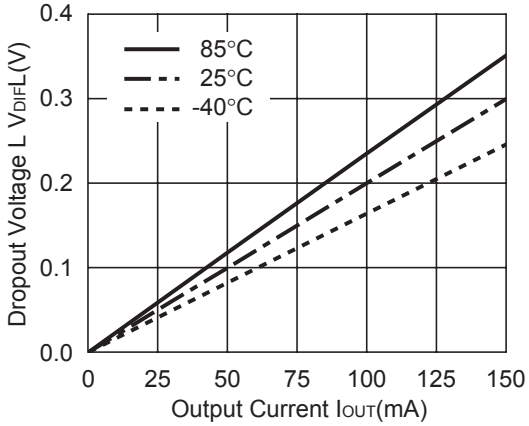

**R1162x18x (ECO=L)**



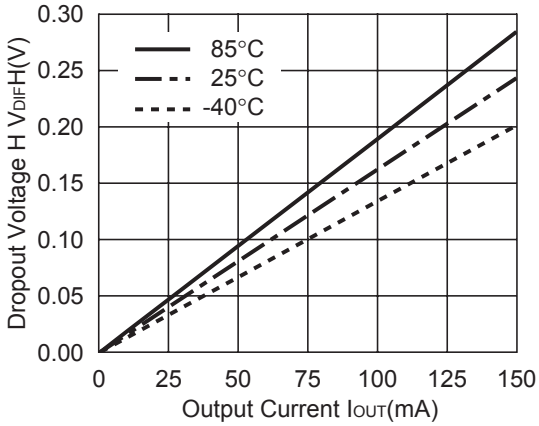

**R1162x21x (ECO=H)**



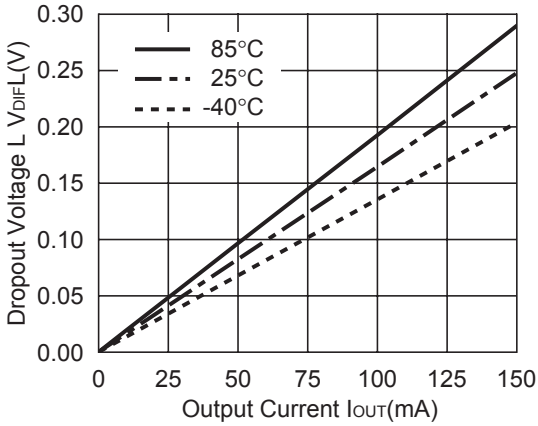

**R1162x21x (ECO=L)**



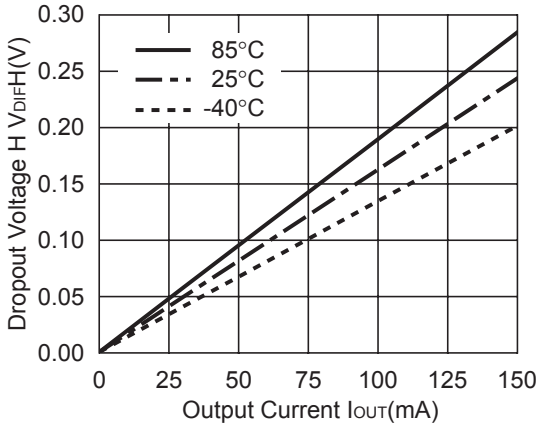

**R1162x28x (ECO=H)**



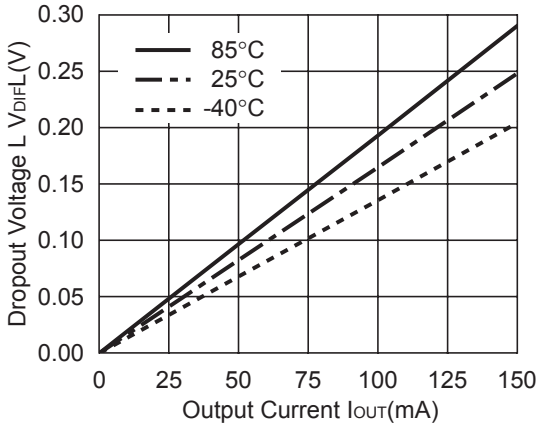

**R1162x28x (ECO=L)**



**R1162x40x (ECO=H)**

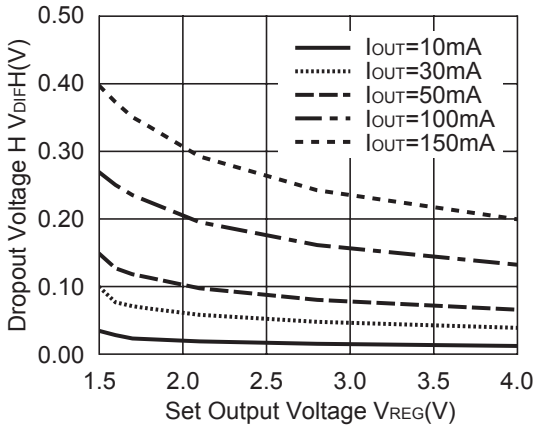



**R1162x40x (ECO=L)**

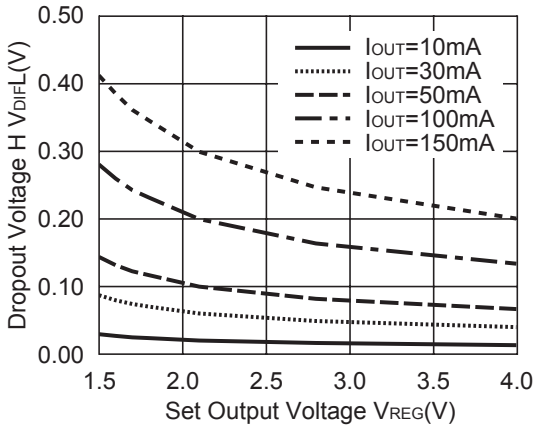



## 7) Dropout Voltage vs. Set Output Voltage

**R1162x (ECO=H)**

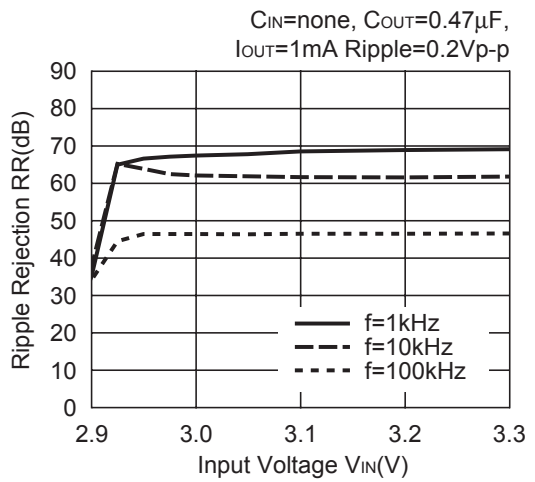



**R1162x (ECO=L)**

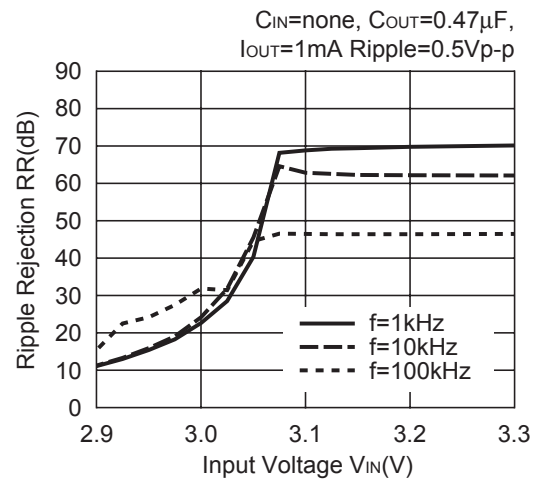



## 8) Ripple Rejection vs. Input Bias Voltage

**R1162x28x (ECO=H)**

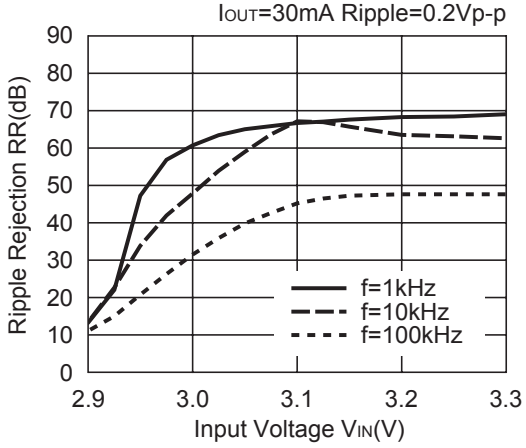



**R1162x28x (ECO=H)**



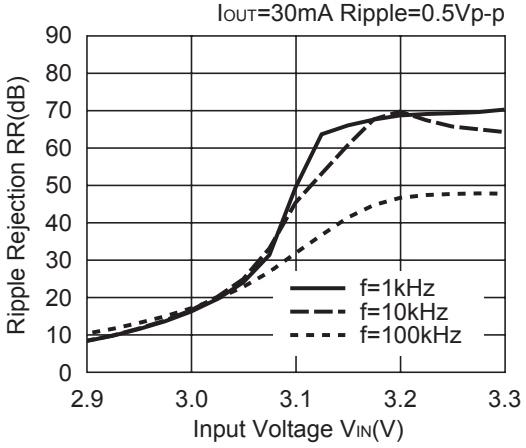
**R1162x28x (ECO=H)**

$C_{IN}$=none, $C_{OUT}$=0.47µF,
$I_{OUT}$=30mA Ripple=0.2Vp-p



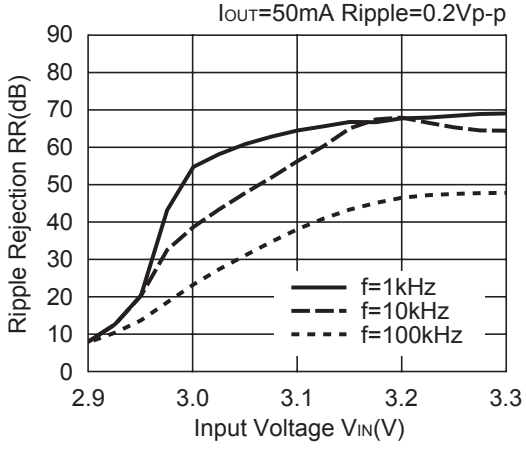

**R1162x28x (ECO=H)**

$C_{IN}$=none, $C_{OUT}$=0.47µF,
$I_{OUT}$=30mA Ripple=0.5Vp-p



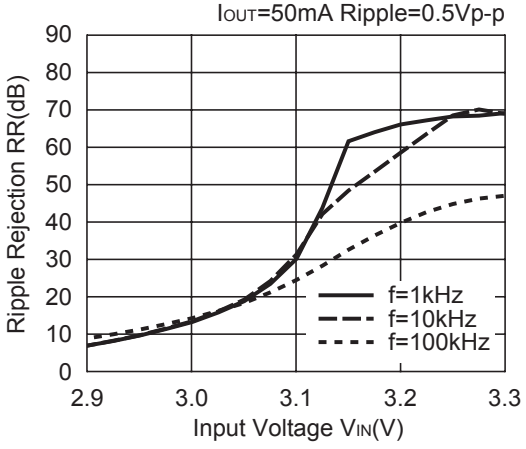

**R1162x28x (ECO=H)**

$C_{IN}$=none, $C_{OUT}$=0.47µF,
$I_{OUT}$=50mA Ripple=0.2Vp-p




**R1162x28x (ECO=H)**

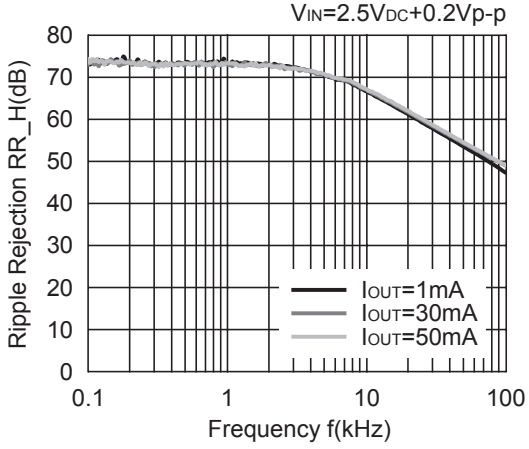
$C_{IN}$=none, $C_{OUT}$=0.47µF,
$I_{OUT}$=50mA Ripple=0.5Vp-p




## 9) Ripple Rejection vs. Frequency

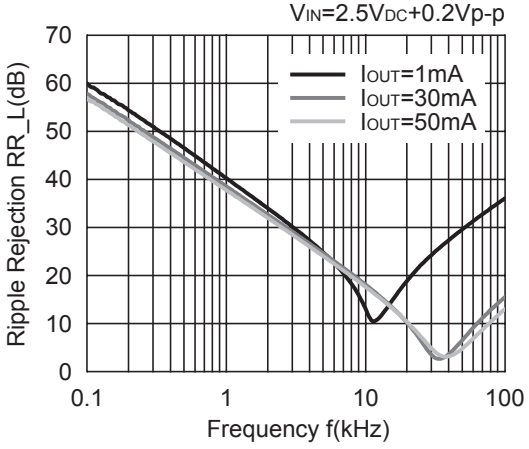
**R1162x15x (ECO=H)**

$C_{IN}$=none, $C_{OUT}$=0.47µF,
$V_{IN}$=2.5$V_{DC}$+0.2Vp-p

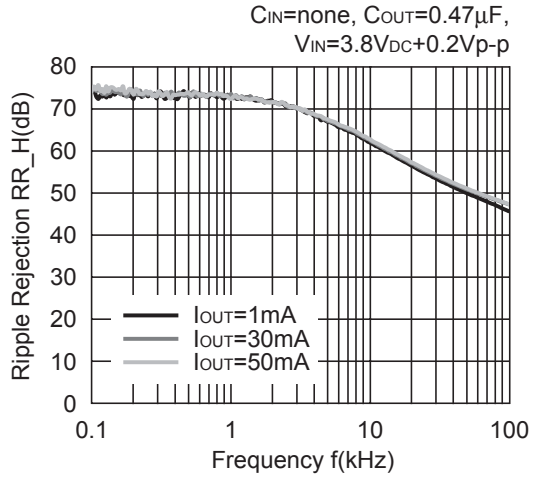



**R1162x15x (ECO=L)**

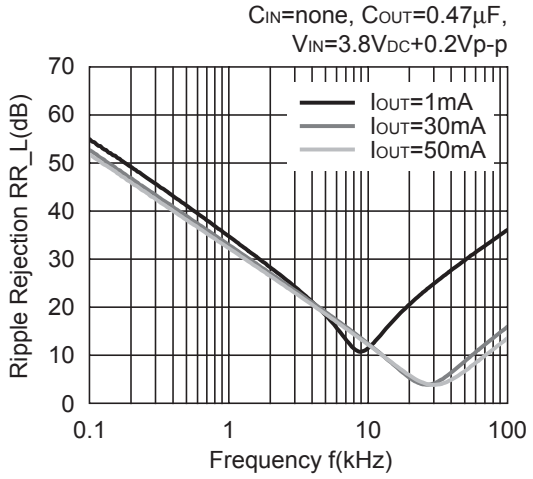
$C_{IN}$=none, $C_{OUT}$=0.47µF,
$V_{IN}$=2.5$V_{DC}$+0.2Vp-p



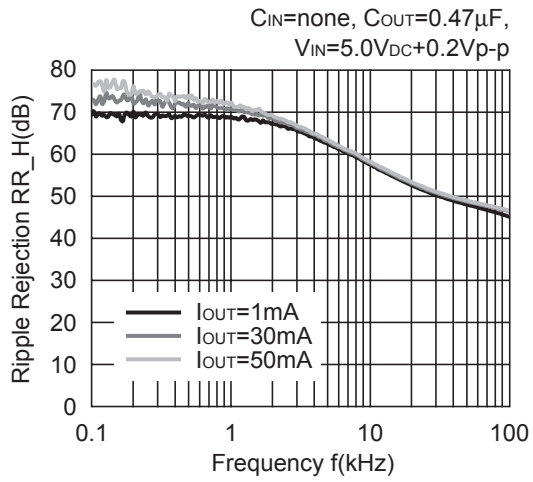
**R1162x28x (ECO=H)**



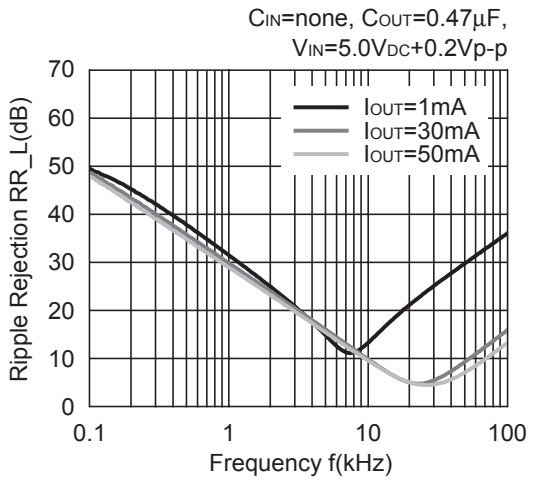

**R1162x28x (ECO=L)**




**R1162x40x (ECO=H)**

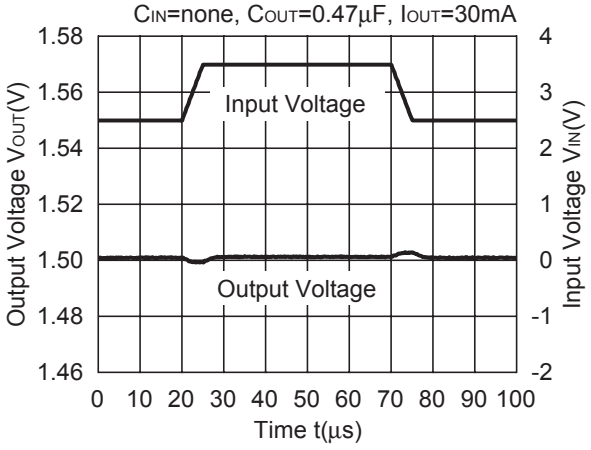



**R1162x40x (ECO=L)**

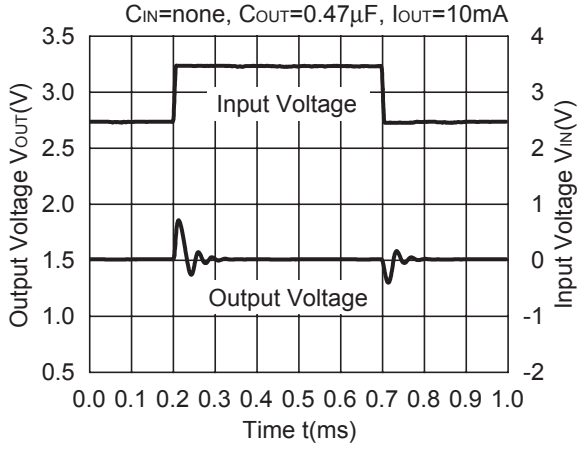



## 10) Input Transient Response

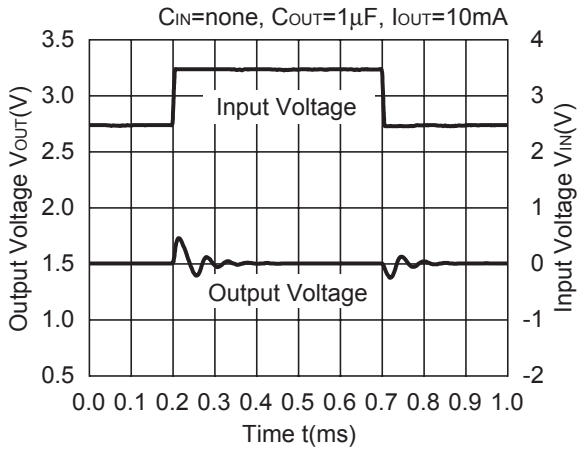
**R1162x15x (ECO=H)**



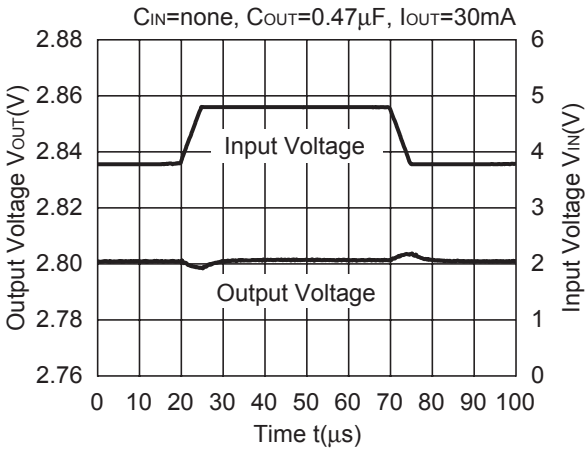

**R1162x15x (ECO=L)**



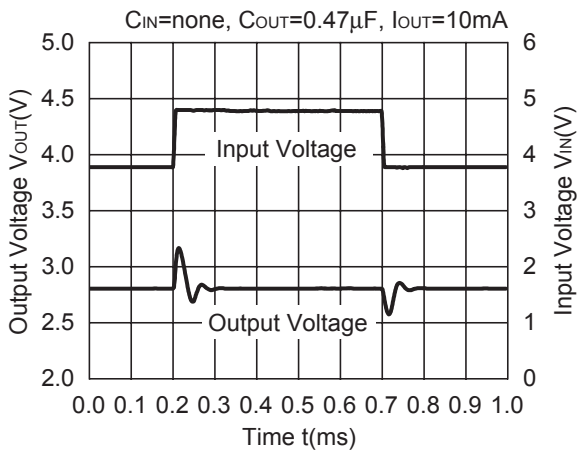
**R1162x15x (ECO=L)**



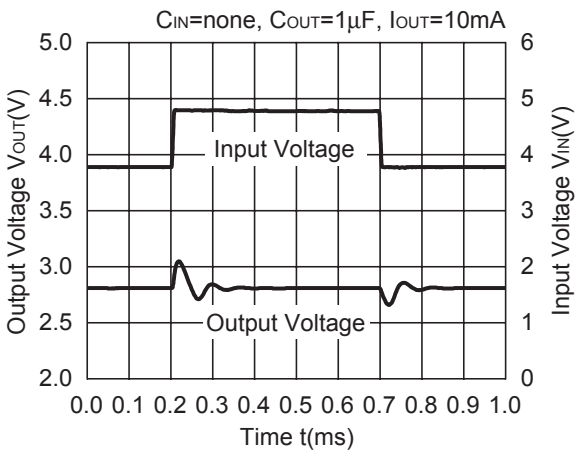

**R1162x28x (ECO=H)**




**R1162x28x (ECO=L)**

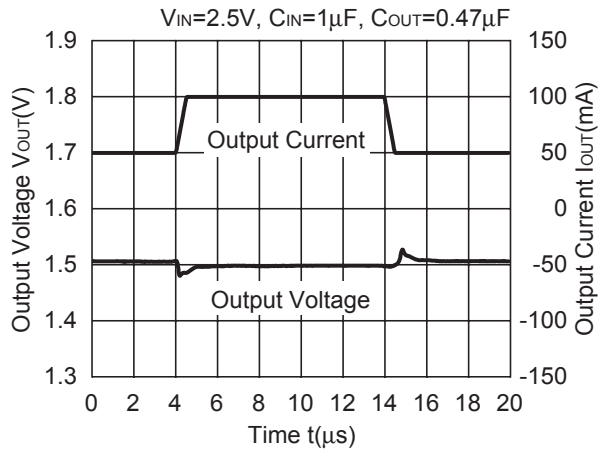



**R1162x28x (ECO=L)**

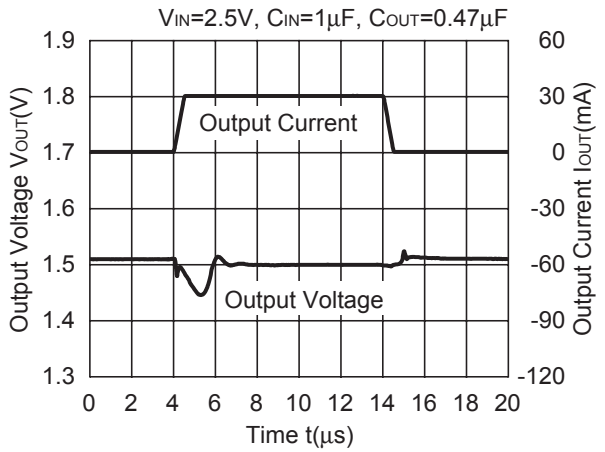



## 11) Load Transient Response

**R1162x15x (ECO=H)**

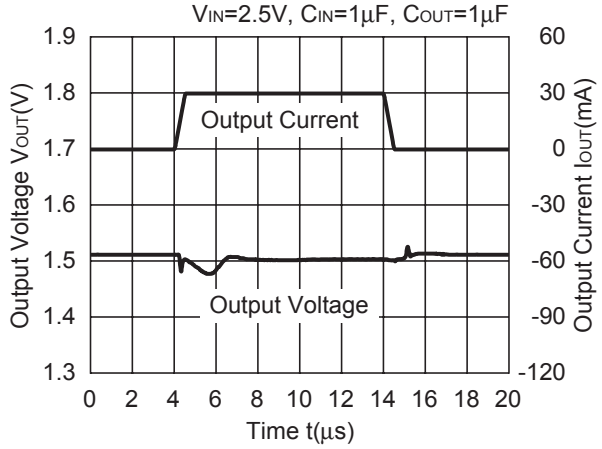



**R1162x15x (ECO=H)**



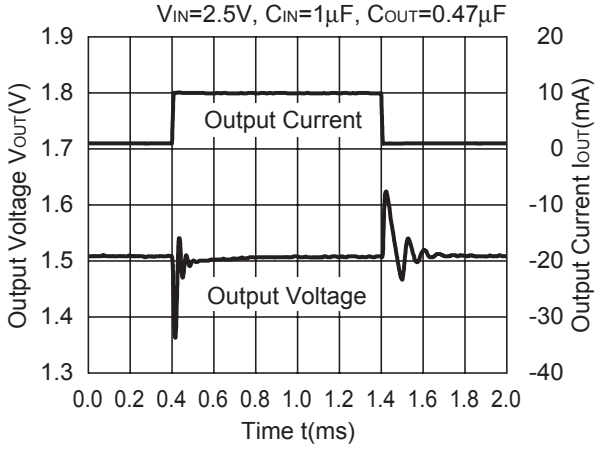
**R1162x15x (ECO=H)**

$V_{IN}$=2.5V, $C_{IN}$=1µF, $C_{OUT}$=1µF



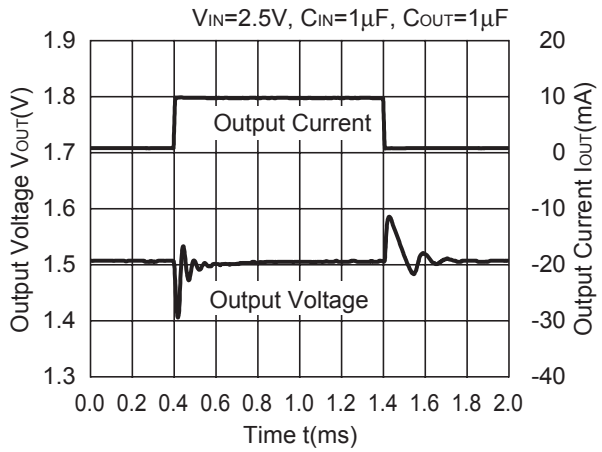

**R1162x15x (ECO=L)**

$V_{IN}$=2.5V, $C_{IN}$=1µF, $C_{OUT}$=0.47µF



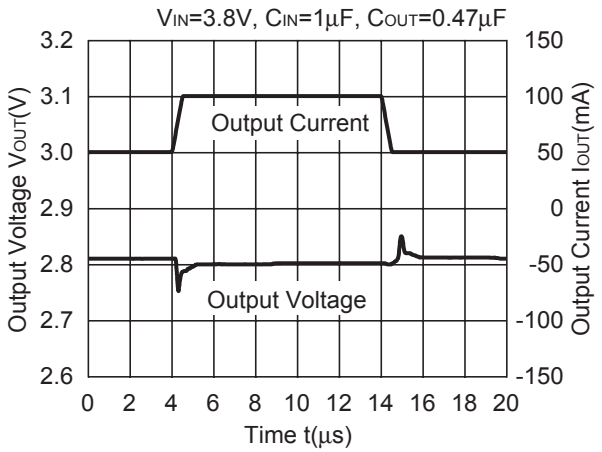

**R1162x15x (ECO=L)**

$V_{IN}$=2.5V, $C_{IN}$=1µF, $C_{OUT}$=1µF



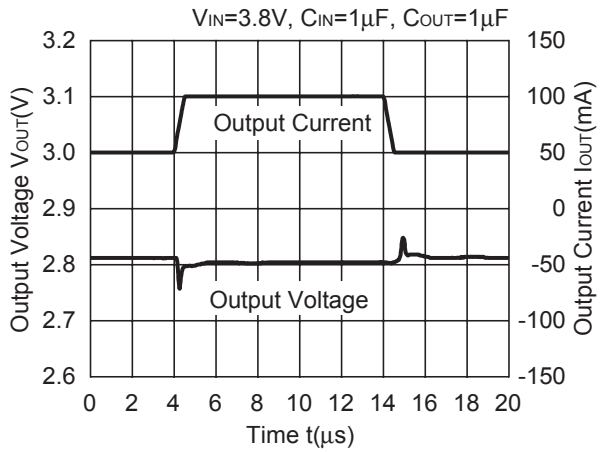

**R1162x28x (ECO=H)**

$V_{IN}$=3.8V, $C_{IN}$=1µF, $C_{OUT}$=0.47µF



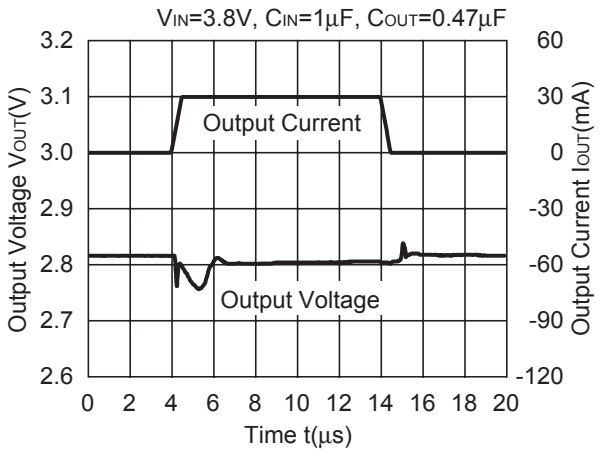

**R1162x28x (ECO=H)**

$V_{IN}$=3.8V, $C_{IN}$=1µF, $C_{OUT}$=1µF

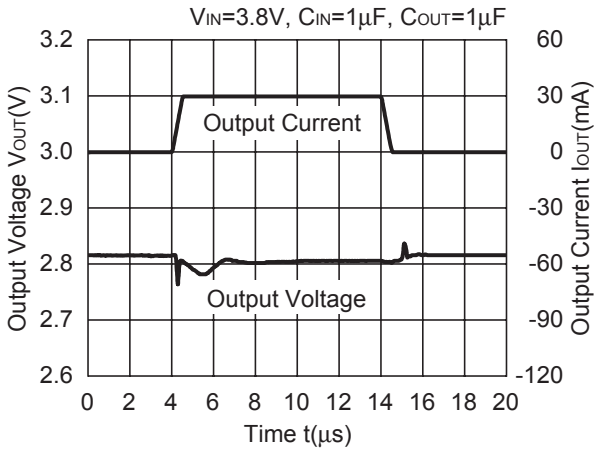



**R1162x28x (ECO=H)**

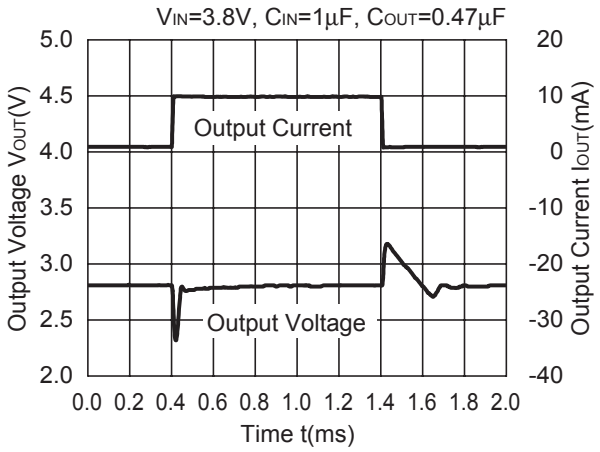
$V_{IN}$=3.8V, $C_{IN}$=1µF, $C_{OUT}$=0.47µF



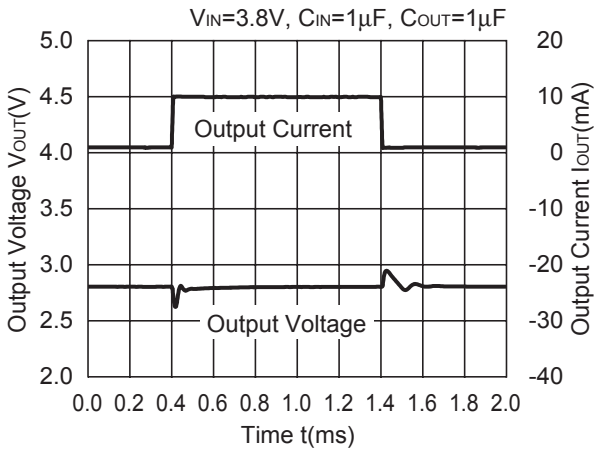
**R1162x28x (ECO=H)**




**R1162x28x (ECO=L)**

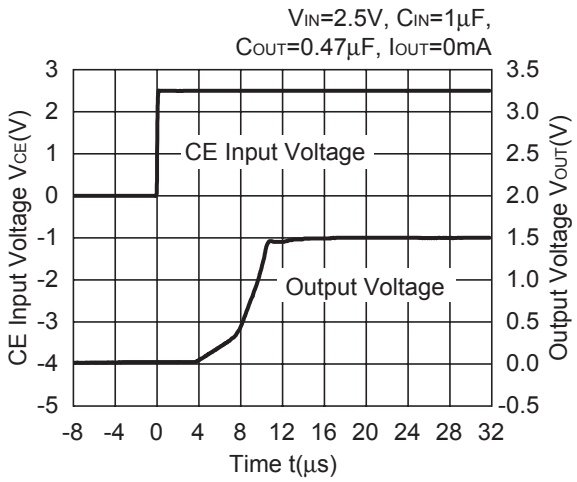



**R1162x28x (ECO=L)**

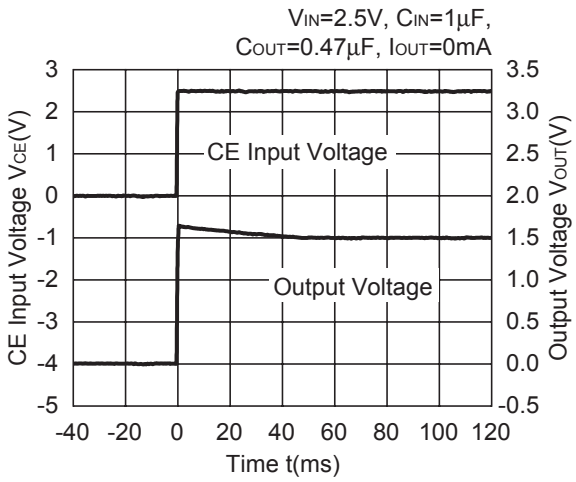



## 12) Turn on speed with CE pin

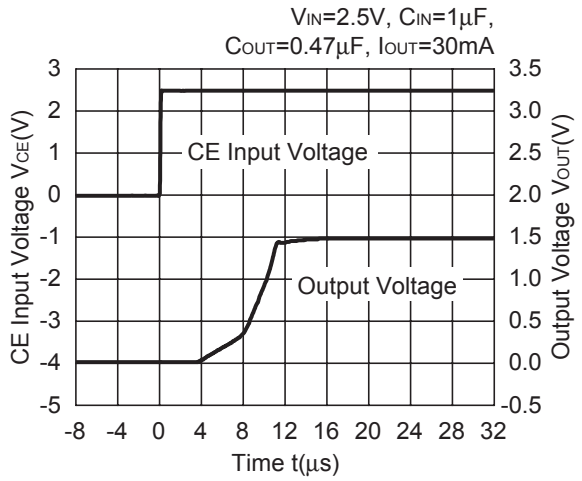
**R1162x15x (ECO=H)**



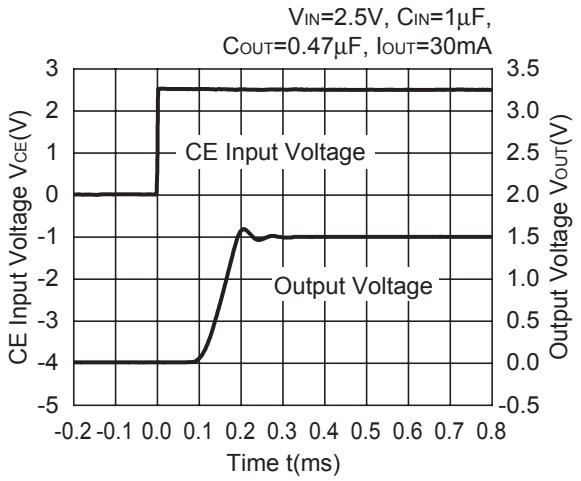

**R1162x15x (ECO=L)**



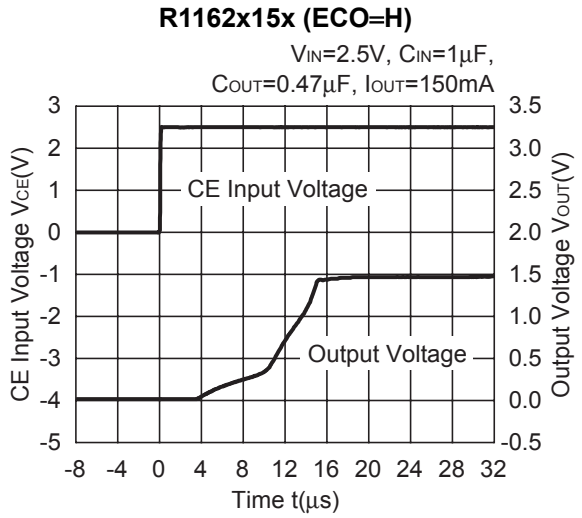
**R1162x15x (ECO=H)**



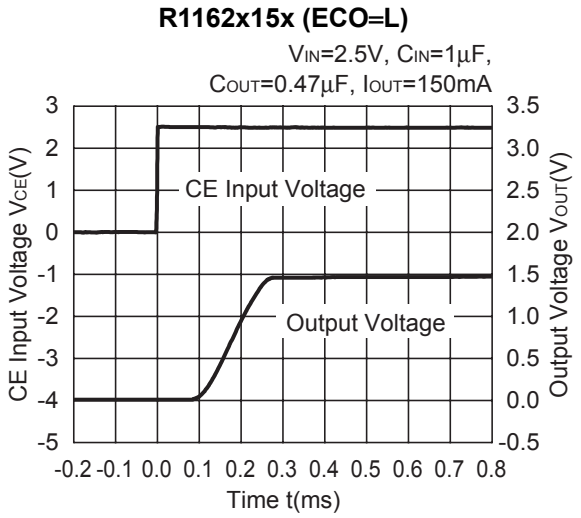

**R1162x15x (ECO=L)**



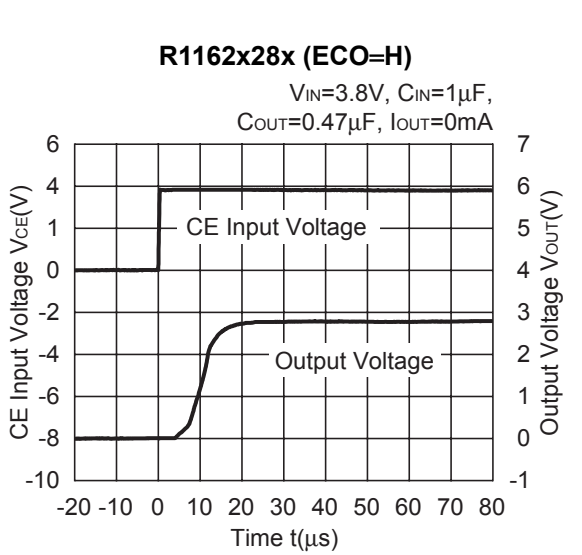

**R1162x15x (ECO=H)**



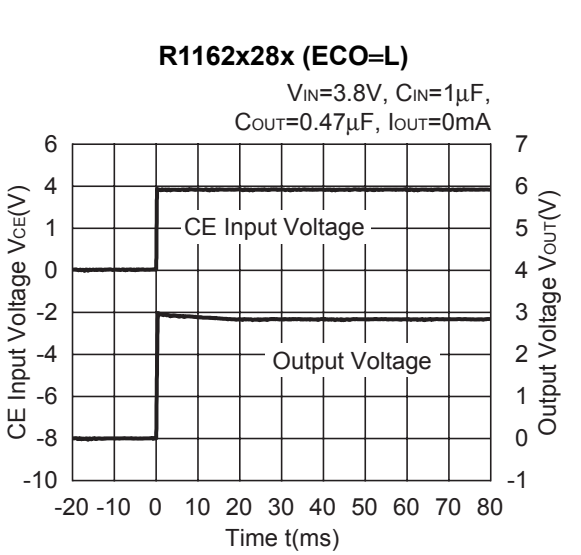

**R1162x15x (ECO=L)**




**R1162x28x (ECO=H)**

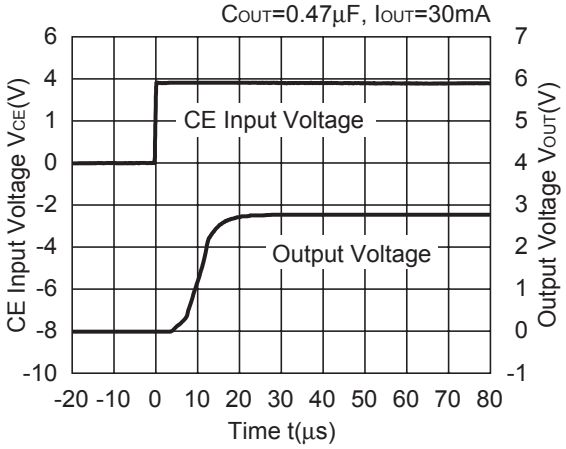



**R1162x28x (ECO=L)**



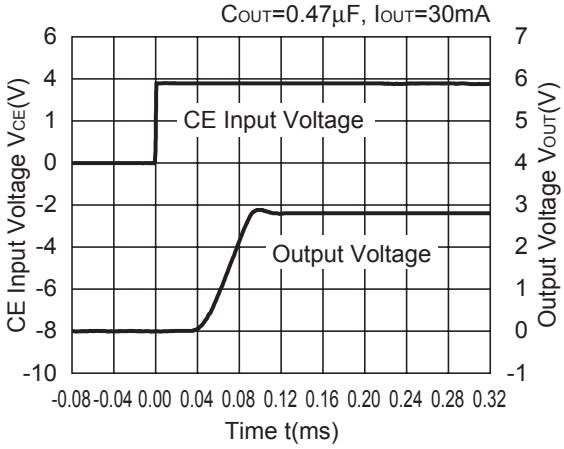
**R1162x28x (ECO=H)**

$V_{IN}$=3.8V, $C_{IN}$=1µF,
$C_{OUT}$=0.47µF, $I_{OUT}$=30mA



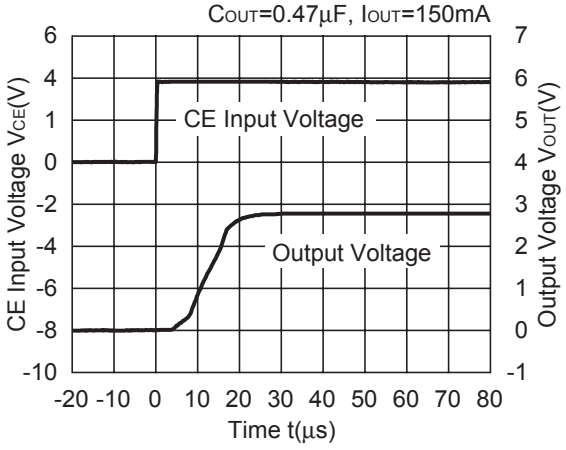

**R1162x28x (ECO=L)**

$V_{IN}$=3.8V, $C_{IN}$=1µF,
$C_{OUT}$=0.47µF, $I_{OUT}$=30mA



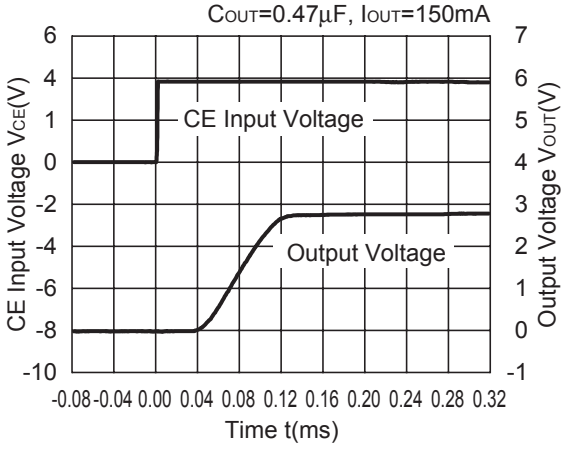

**R1162x28x (ECO=H)**

$V_{IN}$=3.8V, $C_{IN}$=1µF,
$C_{OUT}$=0.47µF, $I_{OUT}$=150mA



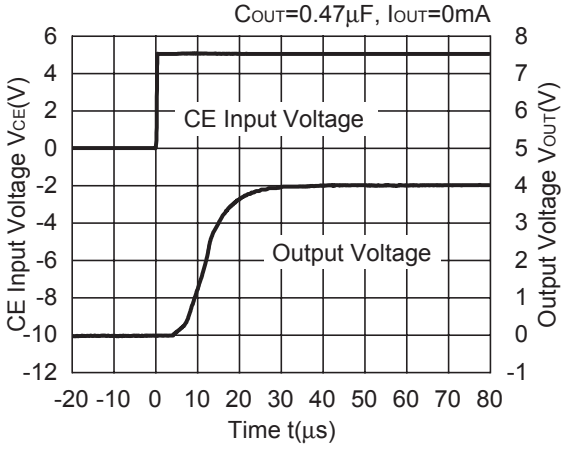

**R1162x28x (ECO=L)**

$V_{IN}$=3.8V, $C_{IN}$=1µF,
$C_{OUT}$=0.47µF, $I_{OUT}$=150mA



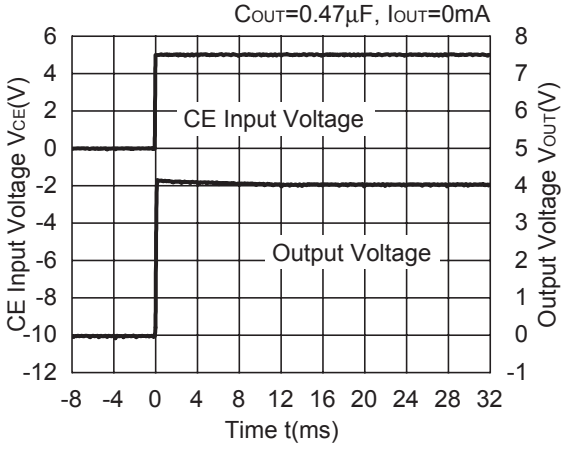

**R1162x40x (ECO=H)**

$V_{IN}$=5.0V, $C_{IN}$=1µF,
$C_{OUT}$=0.47µF, $I_{OUT}$=0mA

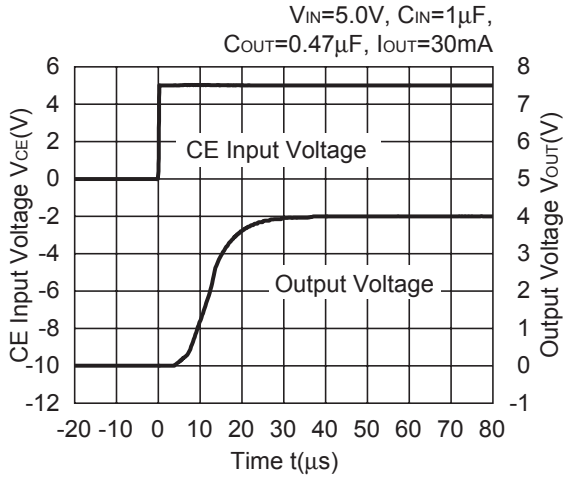



**R1162x40x (ECO=L)**

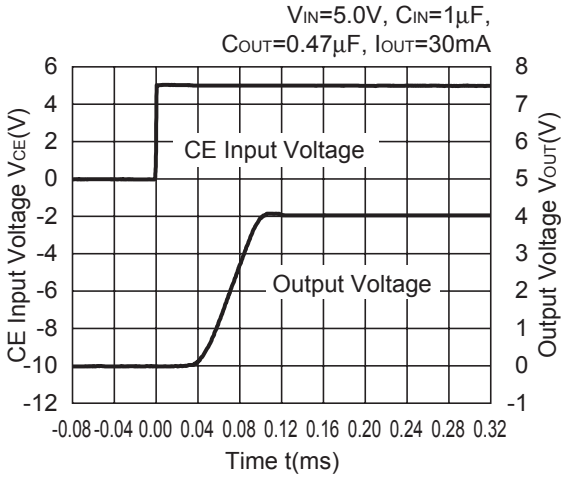
$V_{IN}$=5.0V, $C_{IN}$=1µF,
$C_{OUT}$=0.47µF, $I_{OUT}$=0mA



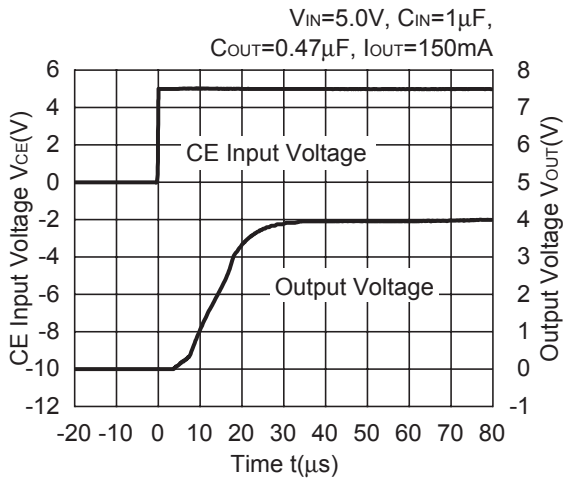
**R1162x40x (ECO=H)**



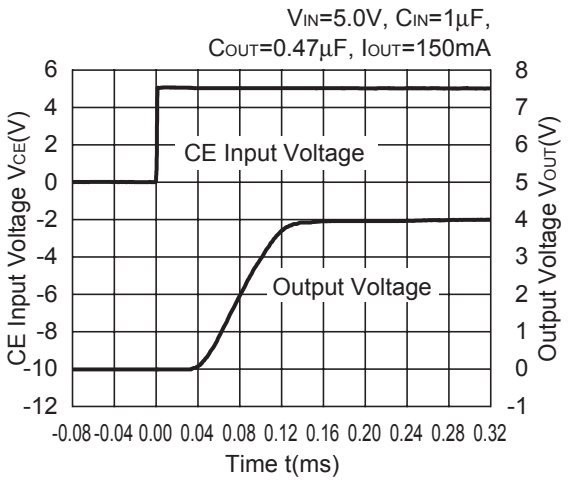

**R1162x40x (ECO=L)**




**R1162x40x (ECO=H)**

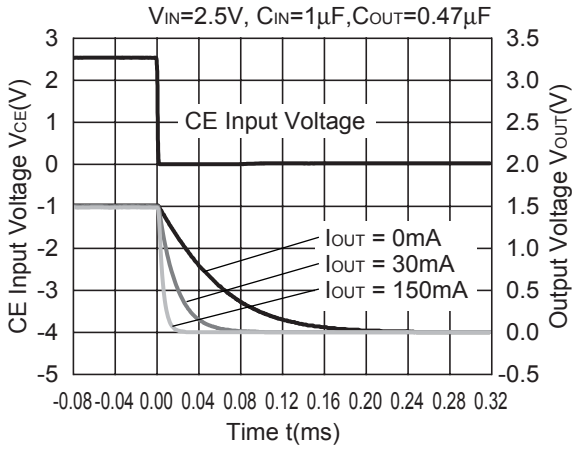



**R1162x40x (ECO=L)**

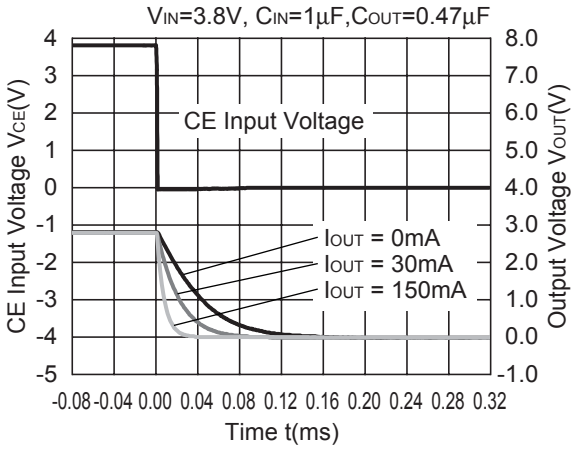


### 13) Turn off speed with CE pin

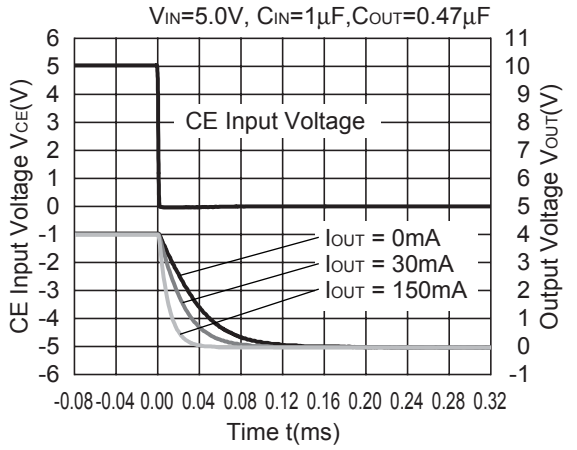
**R1162x15xD**




**R1162x28xD**



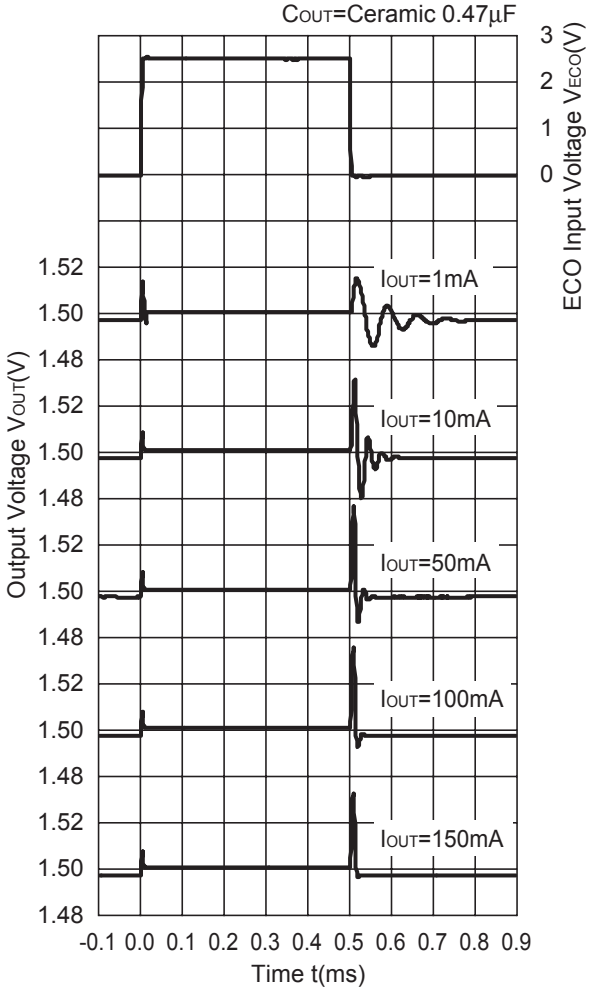

**R1162x40xD**

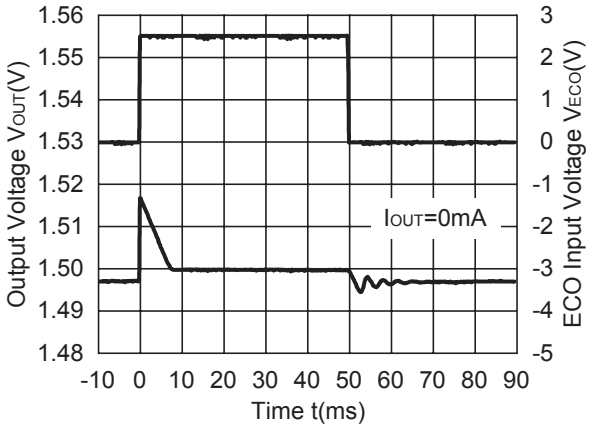


### 14) Output Voltage at Mode alternative point

**R1162x15x**

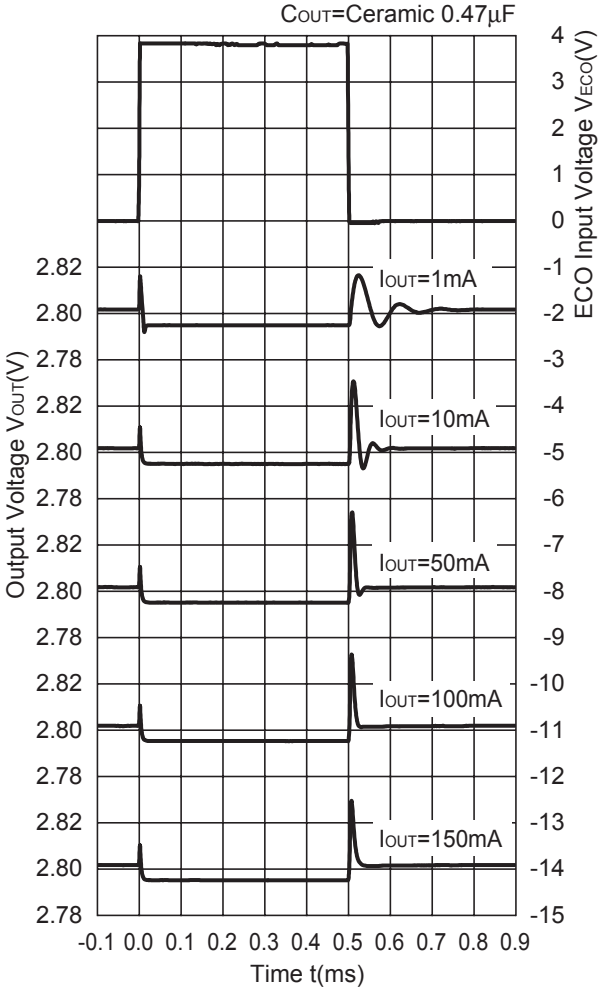
$V_{IN}$=2.5V, $C_{IN}$=Ceramic 1.0µF,
$C_{OUT}$=Ceramic 0.47µF

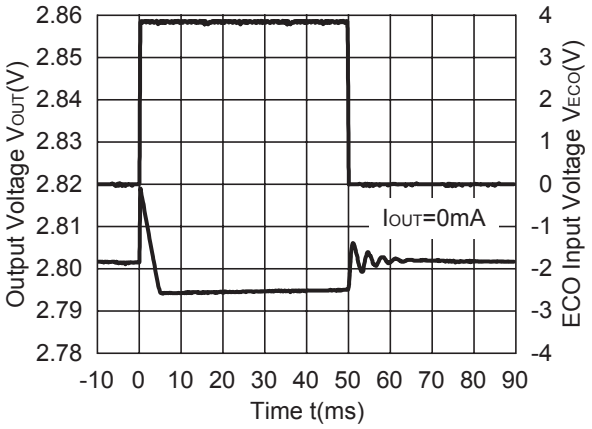


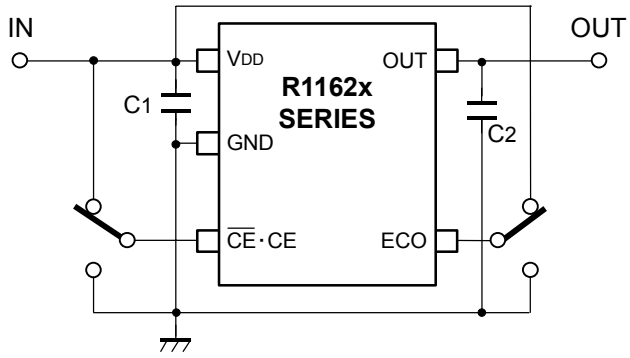

**R1162x28x**

$V_{IN}$=3.8V, $C_{IN}$=Ceramic 1.0µF,
$C_{OUT}$=Ceramic 0.47µF



# TECHNICAL NOTES




(External Components)
$C_2$ Ceramic 0.47μF Ex. Murata GRM40B474K
Kyocera CM105B474K
$C_1$ Ceramic 1.0μF

When using these ICs, consider the following points:

**1.Mounting on PCB**

Make $V_{DD}$ and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a capacitor with as much as 1.0μF capacitor between $V_{DD}$ and GND pin as close as possible.

Set external components, especially the output capacitor as close as possible to the ICs and make wiring as short as possible.

**2.Phase Compensation**

In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, be sure to use a 0.47μF or more capacitor $C_{OUT}$ with good frequency characteristics and ESR (Equivalent Series Resistance).

> If you use a tantalum type capacitor and ESR value of the capacitor is large, output might be unstable. Evaluate your circuit with considering frequency characteristics.
> Depending on the capacitor size, manufacturer, and part number, the bias characteristics and temperature characteristics are different. Evaluate the circuit with actual using capacitors.

# ESR vs. Output Current

When using these ICs, consider the following points:

In these ICs, phase compensation is made for securing stable operation even if the load current is varied.

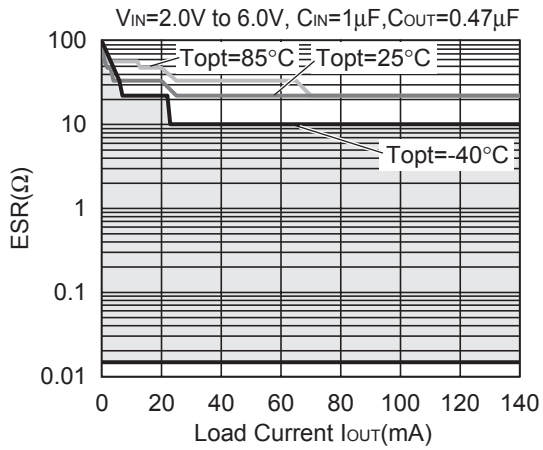
For this purpose, be sure to use a capacitor $C_{OUT}$ with good frequency characteristics and ESR (Equivalent Series Resistance) in the range described as follows:

The relations between $I_{OUT}$ (Output Current) and ESR of Output Capacitor are shown below.
The conditions when the white noise level is under 40μV (Avg.) are marked as the hatched area in the graph.

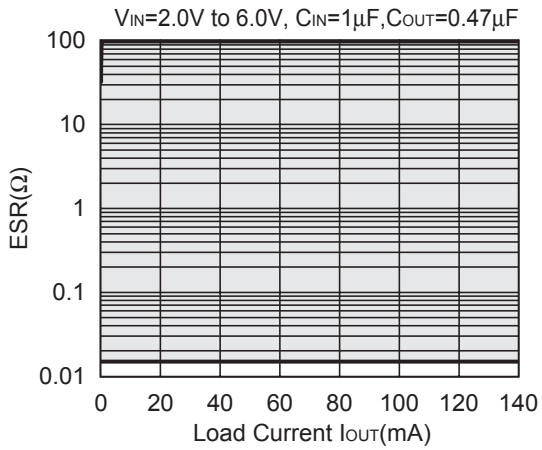
<Test conditions>

(1) Frequency band: 10Hz to 2MHz

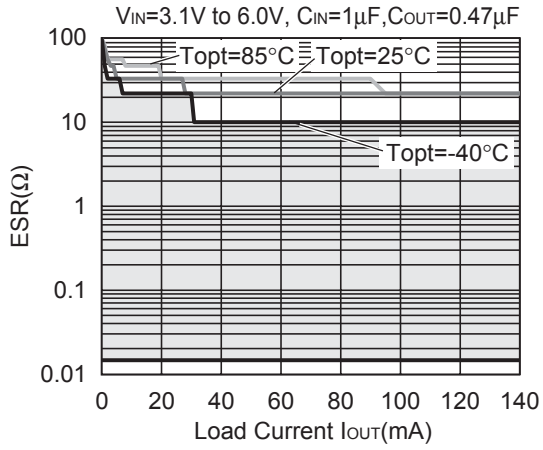
**R1162x15x (ECO=H)**



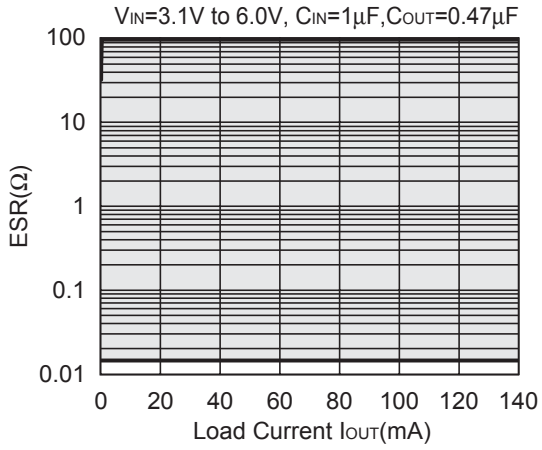

**R1162x15x (ECO=L)**




**R1162x28x (ECO=H)**



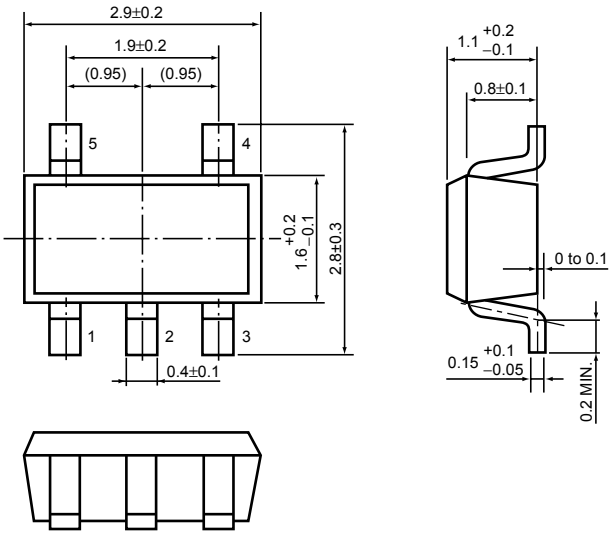

**R1162x28x (ECO=L)**



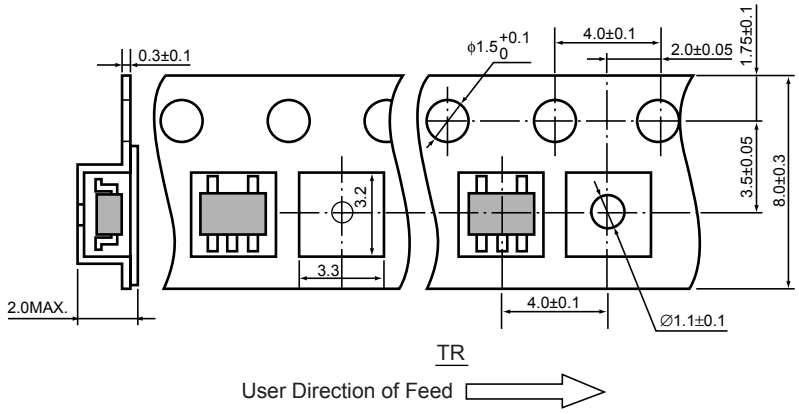
- **SOT-23-5 (SC-74A)**

Unit: mm

# PACKAGE DIMENSIONS

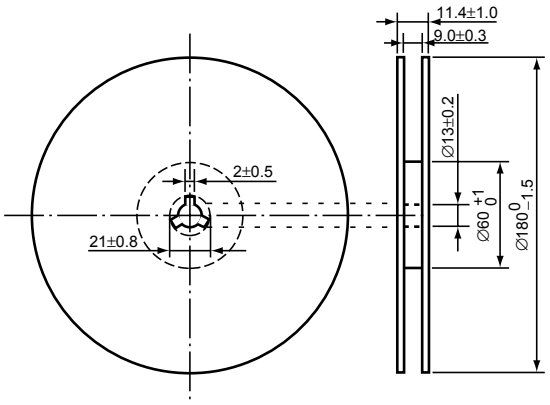



# TAPING SPECIFICATION




# TAPING REEL DIMENSIONS

(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.)

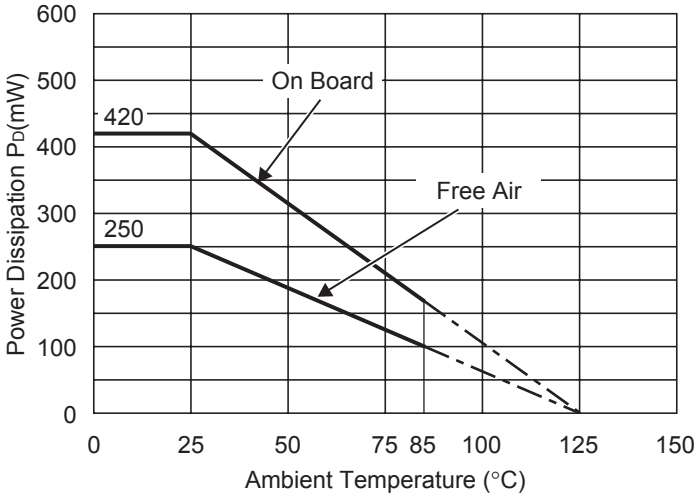
Measurement Conditions

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

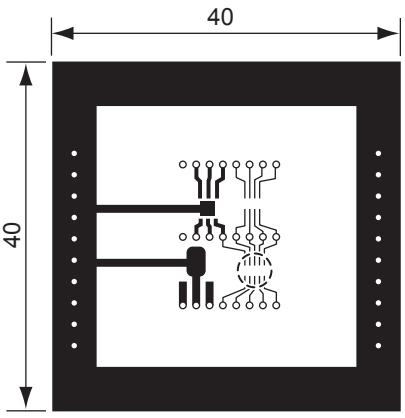
Measurement Result

(Topt=25°C,Tjmax=125°C)

| | Standard Land Pattern | Free Air |
|---|---|---|
| Power Dissipation | 420mW | 250mW |
| Thermal Resistance | θja=(125−25°C)/0.42W=263°C/W | 400°C/W |



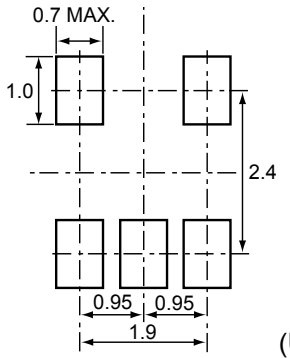

**Power Dissipation**




**Measurement Board Pattern**

IC Mount Area Unit : mm

# RECOMMENDED LAND PATTERN

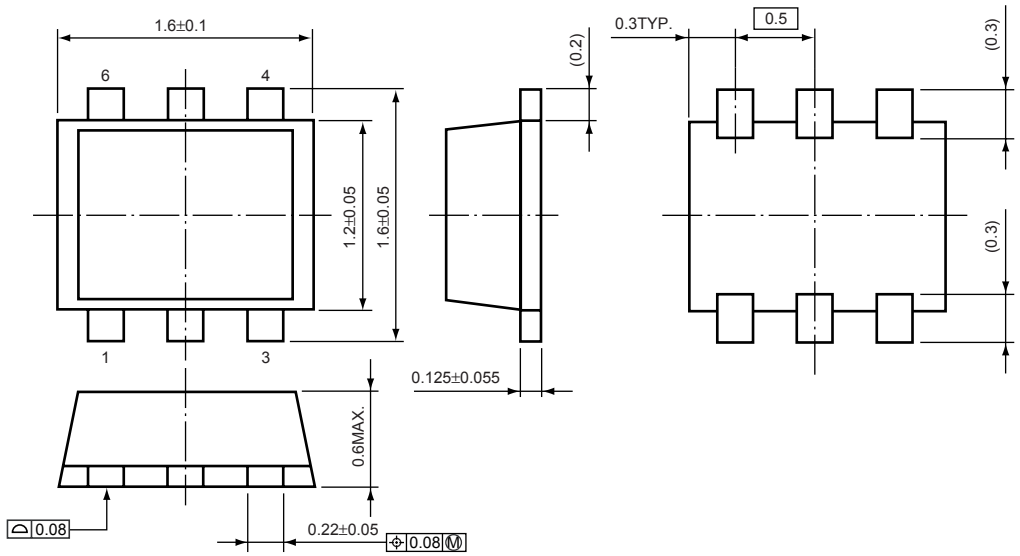



(Unit: mm)

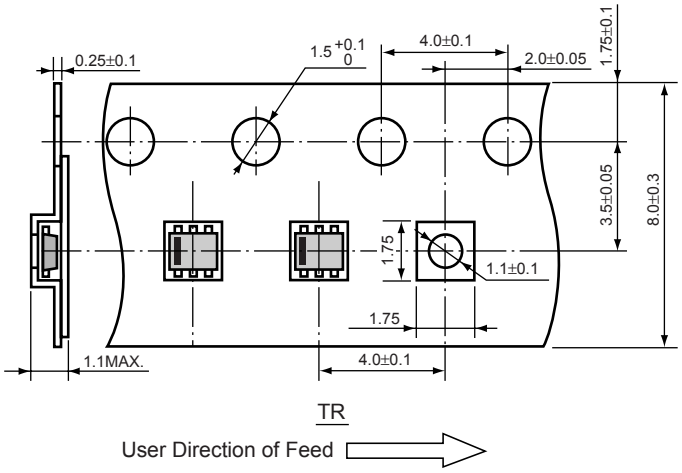
- **SON1612-6**

Unit: mm

# PACKAGE DIMENSIONS

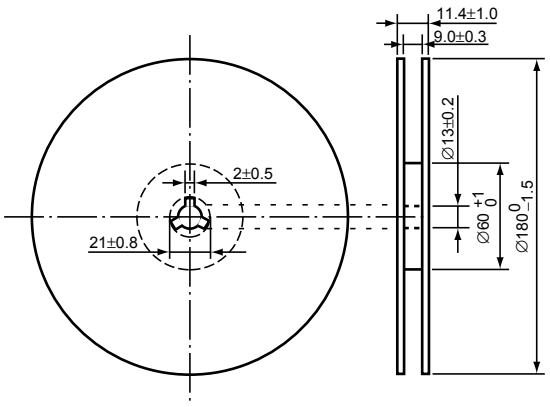



# TAPING SPECIFICATION




# TAPING REEL DIMENSIONS

(1reel=4000pcs)



# Power Dissipation (SON1612-6)

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:

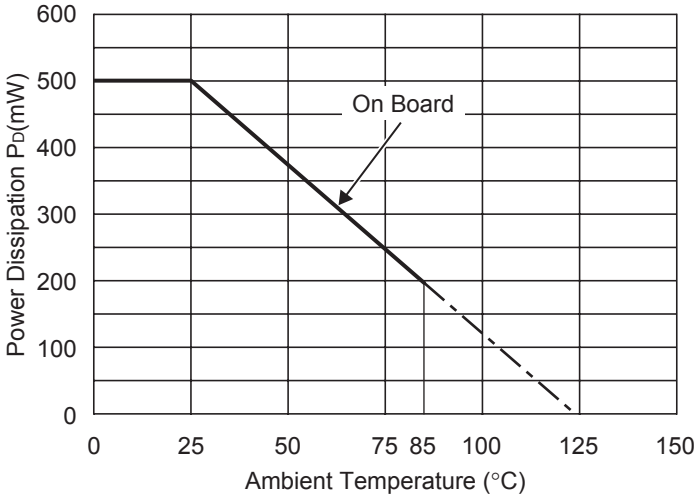
Measurement Conditions

| | Standard Land Pattern |
|---|---|
| Environment | Mounting on Board (Wind velocity=0m/s) |
| Board Material | Glass cloth epoxy plactic (Double sided) |
| Board Dimensions | 40mm × 40mm × 1.6mm |
| Copper Ratio | Top side : Approx. 50%, Back side : Approx.50% |
| Through-hole | ϕ0.5mm × 24pcs |

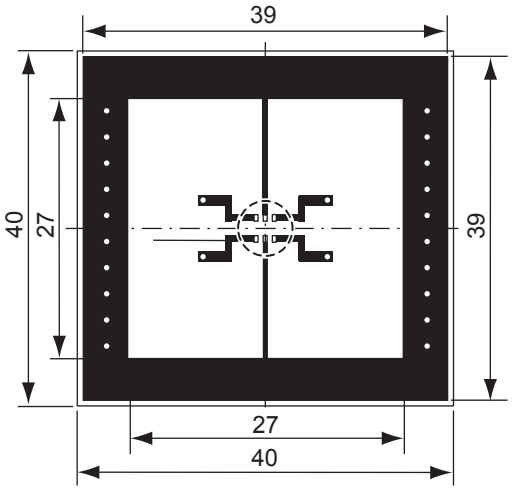
Measurement Result

(Topt=25°C,Tjmax=125°C)

| | Standard Land Pattern |
|---|---|
| Power Dissipation | 500mW |
| Thermal Resistance | θja=(125−25°C)/0.5W=200°C/W |



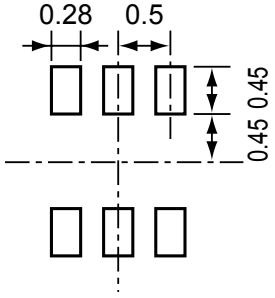

**Power Dissipation**




**Measurement Board Pattern**

IC Mount Area Unit : mm

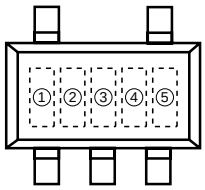
# RECOMMENDED LAND PATTERN




(Unit: mm)

# R1162N SERIES MARK SPECIFICATION

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




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

④, ⑤ : Lot Number

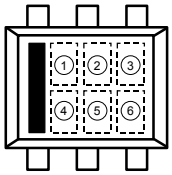
- **Part Number vs. Product Code**

| Part Number | Product Code | | |
|---|---|---|---|
| | ① | ② | ③ |
| R1162N151B | S | 1 | 5 |
| R1162N161B | S | 1 | 6 |
| R1162N171B | S | 1 | 7 |
| R1162N181B | S | 1 | 8 |
| R1162N191B | S | 1 | 9 |
| R1162N201B | S | 2 | 0 |
| R1162N211B | S | 2 | 1 |
| R1162N221B | S | 2 | 2 |
| R1162N231B | S | 2 | 3 |
| R1162N241B | S | 2 | 4 |
| R1162N251B | S | 2 | 5 |
| R1162N261B | S | 2 | 6 |
| R1162N271B | S | 2 | 7 |
| R1162N281B | S | 2 | 8 |
| R1162N291B | S | 2 | 9 |
| R1162N301B | S | 3 | 0 |
| R1162N311B | S | 3 | 1 |
| R1162N321B | S | 3 | 2 |
| R1162N331B | S | 3 | 3 |
| R1162N341B | S | 3 | 4 |
| R1162N351B | S | 3 | 5 |
| R1162N361B | S | 3 | 6 |
| R1162N371B | S | 3 | 7 |
| R1162N381B | S | 3 | 8 |
| R1162N391B | S | 3 | 9 |
| R1162N401B | S | 4 | 0 |
| R1162N181B5 | S | 4 | 1 |
| R1162N281B5 | S | 4 | 2 |

| Part Number | Product Code | | |
|---|---|---|---|
| | ① | ② | ③ |
| R1162N151D | T | 1 | 5 |
| R1162N161D | T | 1 | 6 |
| R1162N171D | T | 1 | 7 |
| R1162N181D | T | 1 | 8 |
| R1162N191D | T | 1 | 9 |
| R1162N201D | T | 2 | 0 |
| R1162N211D | T | 2 | 1 |
| R1162N221D | T | 2 | 2 |
| R1162N231D | T | 2 | 3 |
| R1162N241D | T | 2 | 4 |
| R1162N251D | T | 2 | 5 |
| R1162N261D | T | 2 | 6 |
| R1162N271D | T | 2 | 7 |
| R1162N281D | T | 2 | 8 |
| R1162N291D | T | 2 | 9 |
| R1162N301D | T | 3 | 0 |
| R1162N311D | T | 3 | 1 |
| R1162N321D | T | 3 | 2 |
| R1162N331D | T | 3 | 3 |
| R1162N341D | T | 3 | 4 |
| R1162N351D | T | 3 | 5 |
| R1162N361D | T | 3 | 6 |
| R1162N371D | T | 3 | 7 |
| R1162N381D | T | 3 | 8 |
| R1162N391D | T | 3 | 9 |
| R1162N401D | T | 4 | 0 |
| R1162N181D5 | T | 4 | 1 |
| R1162N281D5 | T | 4 | 2 |

# R1162D SERIES MARK SPECIFICATION

- **SON1612-6**




① to ④ : Product Code (refer to Part Number vs. Product Code)

⑤, ⑥ : Lot Number

- **Part Number vs. Product Code**

| Part Number | Product Code | | | |
|---|---|---|---|---|
| | ① | ② | ③ | ④ |
| R1162D151B | H | 1 | 5 | B |
| R1162D161B | H | 1 | 6 | B |
| R1162D171B | H | 1 | 7 | B |
| R1162D181B | H | 1 | 8 | B |
| R1162D191B | H | 1 | 9 | B |
| R1162D201B | H | 2 | 0 | B |
| R1162D211B | H | 2 | 1 | B |
| R1162D221B | H | 2 | 2 | B |
| R1162D231B | H | 2 | 3 | B |
| R1162D241B | H | 2 | 4 | B |
| R1162D251B | H | 2 | 5 | B |
| R1162D261B | H | 2 | 6 | B |
| R1162D271B | H | 2 | 7 | B |
| R1162D281B | H | 2 | 8 | B |
| R1162D291B | H | 2 | 9 | B |
| R1162D301B | H | 3 | 0 | B |
| R1162D311B | H | 3 | 1 | B |
| R1162D321B | H | 3 | 2 | B |
| R1162D331B | H | 3 | 3 | B |
| R1162D341B | H | 3 | 4 | B |
| R1162D351B | H | 3 | 5 | B |
| R1162D361B | H | 3 | 6 | B |
| R1162D371B | H | 3 | 7 | B |
| R1162D381B | H | 3 | 8 | B |
| R1162D391B | H | 3 | 9 | B |
| R1162D401B | H | 4 | 0 | B |
| R1162D181B5 | H | 4 | 1 | B |
| R1162D281B5 | H | 4 | 2 | B |

| Part Number | Product Code | | | |
|---|---|---|---|---|
| | ① | ② | ③ | ④ |
| R1162D151D | H | 1 | 5 | D |
| R1162D161D | H | 1 | 6 | D |
| R1162D171D | H | 1 | 7 | D |
| R1162D181D | H | 1 | 8 | D |
| R1162D191D | H | 1 | 9 | D |
| R1162D201D | H | 2 | 0 | D |
| R1162D211D | H | 2 | 1 | D |
| R1162D221D | H | 2 | 2 | D |
| R1162D231D | H | 2 | 3 | D |
| R1162D241D | H | 2 | 4 | D |
| R1162D251D | H | 2 | 5 | D |
| R1162D261D | H | 2 | 6 | D |
| R1162D271D | H | 2 | 7 | D |
| R1162D281D | H | 2 | 8 | D |
| R1162D291D | H | 2 | 9 | D |
| R1162D301D | H | 3 | 0 | D |
| R1162D311D | H | 3 | 1 | D |
| R1162D321D | H | 3 | 2 | D |
| R1162D331D | H | 3 | 3 | D |
| R1162D341D | H | 3 | 4 | D |
| R1162D351D | H | 3 | 5 | D |
| R1162D361D | H | 3 | 6 | D |
| R1162D371D | H | 3 | 7 | D |
| R1162D381D | H | 3 | 8 | D |
| R1162D391D | H | 3 | 9 | D |
| R1162D401D | H | 4 | 0 | D |
| R1162D181D5 | H | 4 | 1 | D |
| R1162D281D5 | H | 4 | 2 | D |

| Part Number | Product Code | | | |
|---|---|---|---|---|
| | ① | ② | ③ | ④ |
| R1162D281E5 | H | 4 | 1 | E |

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