

## 0.6% ACCURACY LOW NOISE 300mA LDO REGULATOR

NO.EA-167-160425

### OUTLINE

The RP101x Series are CMOS-based voltage regulator ICs with high output voltage accuracy, extremely low supply current, low ON-resistance, and high ripple rejection. Each of these ICs consists of a voltage reference unit, an error amplifier, resistor-net for voltage setting, a current limit circuit, and a chip enable circuit.

These ICs perform with low dropout voltage and a chip enable function. The line transient response and load transient response of the RP101x Series are excellent, thus these ICs are very suitable for the power supply for hand-held communication equipment.

The output voltage of these ICs is fixed with high accuracy. Since the packages for these ICs are SOT-23-5 and DFN(PLP)1612-4 (t=0.6mm type) or DFN(PLP)1612-4B (t=0.4mm type), therefore high density mounting of the ICs on boards is possible.

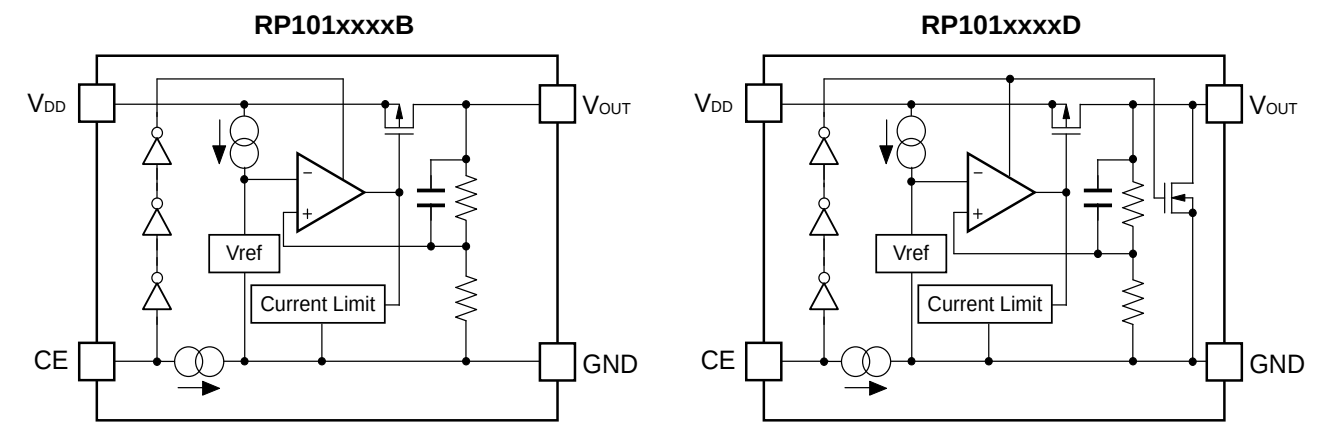
### FEATURES

- Supply Current ..... Typ. 18 $\mu$ A
- Standby Current ..... Typ. 0.1 $\mu$ A
- Dropout Voltage..... Typ. 0.13V (I<sub>OUT</sub>=150mA, V<sub>OUT</sub>=2.8V)
- Ripple Rejection ..... Typ. 75dB (f=1kHz)
- Temperature-Drift Coefficient of Output Voltage ..... Typ.  $\pm$ 30ppm/ $^{\circ}$ C
- Line Regulation ..... Typ. 0.02%/V
- Output Voltage Accuracy .....  $\pm$ 0.6%
- Packages..... DFN(PLP)1612-4, DFN(PLP)1612-4B, SOT-23-5
- Input Voltage Range ..... 1.7V to 5.25V
- Output Voltage Range ..... 1.2V to 3.3V (0.1V steps)  
(For other voltages, please refer to MARK INFORMATION.)
- Built-in Fold Back Protection Circuit..... Typ. 40mA (Current at short mode)
- Ceramic capacitors are recommended to be used with this IC .... 1.0 $\mu$ F or more

### APPLICATIONS

- Power source for portable communication equipment.
- Power source for electrical appliances such as cameras, VCRs and camcorders.
- Power source for battery-powered equipment.
- Power source for home appliances.

BLOCK DIAGRAMS



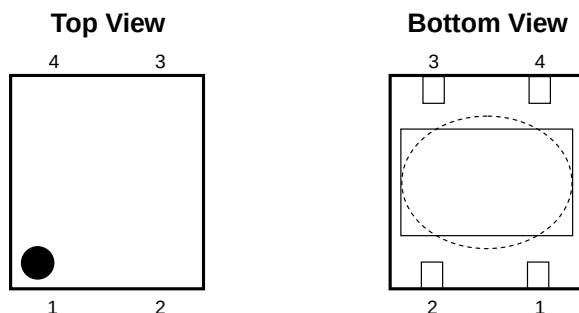
SELECTION GUIDE

The output voltage, auto discharge function, package, and the taping type, etc. for the ICs can be selected at the user's request.

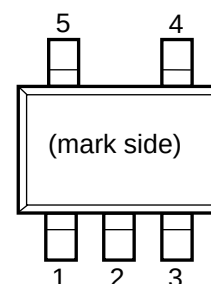
| Product Name                                                                                                                                                                                                      | Package                   | Quantity per Reel | Pb Free | Halogen Free |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------|---------|--------------|
| RP101Kxx1*-TR                                                                                                                                                                                                     | DFN(PLP)1612-4 (t=0.6mm)  | 5,000 pcs         | Yes     | Yes          |
| RP101Kxx2*-TR                                                                                                                                                                                                     | DFN(PLP)1612-4B (t=0.4mm) | 5,000 pcs         | Yes     | Yes          |
| RP101Nxx1*-TR-FE                                                                                                                                                                                                  | SOT-23-5                  | 3,000 pcs         | Yes     | Yes          |
| xx: The output voltage can be designated in the range from 1.2V(12) to 3.3V(33) in 0.1V steps.<br>(For other voltages, please refer to MARK INFORMATION.)                                                         |                           |                   |         |              |
| * : CE pin polarity and auto discharge function at off state are options as follows.<br>(B) "H" active, without auto discharge function at off state<br>(D) "H" active, with auto discharge function at off state |                           |                   |         |              |

## PIN CONFIGURATIONS

### • DFN(PLP)1612-4, DFN(PLP)1612-4B



### • SOT-23-5



## PIN DESCRIPTIONS

### • DFN(PLP)1612-4, DFN(PLP)1612-4B

| Pin No | Symbol    | Pin Description              |
|--------|-----------|------------------------------|
| 1      | $V_{OUT}$ | Output Pin                   |
| 2      | GND       | Ground Pin                   |
| 3      | CE        | Chip Enable Pin ("H" Active) |
| 4      | $V_{DD}$  | Input Pin                    |

\*) Tab is GND level. (They are connected to the reverse side of this IC.)

The tab is better to be connected to the GND, but leaving it open is also acceptable.

### • SOT-23-5

| Pin No | Symbol    | Pin Description              |
|--------|-----------|------------------------------|
| 1      | $V_{DD}$  | Input Pin                    |
| 2      | GND       | Ground Pin                   |
| 3      | CE        | Chip Enable Pin ("H" Active) |
| 4      | NC        | No Connection                |
| 5      | $V_{OUT}$ | Output Pin                   |

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**RP101x**

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NO.EA-167-160425

**ABSOLUTE MAXIMUM RATINGS**

| Symbol    | Item                                  | Rating               | Unit |
|-----------|---------------------------------------|----------------------|------|
| $V_{IN}$  | Input Voltage                         | 6.0                  | V    |
| $V_{CE}$  | Input Voltage (CE Pin)                | 6.0                  | V    |
| $V_{OUT}$ | Output Voltage                        | -0.3 to $V_{IN}+0.3$ | V    |
| $I_{OUT}$ | Output Current                        | 310                  | mA   |
| $P_D$     | Power Dissipation (DFN(PLP)1612-4) *  | 610                  | mW   |
|           | Power Dissipation (DFN(PLP)1612-4B) * | 580                  |      |
|           | Power Dissipation (SOT-23-5) *        | 420                  |      |
| $T_{opt}$ | Operating Temperature Range           | -40 to 85            | °C   |
| $T_{stg}$ | Storage Temperature Range             | -55 to 125           | °C   |

\*) For Power Dissipation, please refer to PACKAGE INFORMATION.

**ABSOLUTE MAXIMUM RATINGS**

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the life time and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

## ELECTRICAL CHARACTERISTICS

### ● RP101xxxxB/D

$V_{IN}$ =Set  $V_{OUT}+1V$ ,  $I_{OUT}=1mA$ ,  $C_{IN}=C_{OUT}=1\mu F$ , unless otherwise noted.

$T_{opt}=25^{\circ}C$

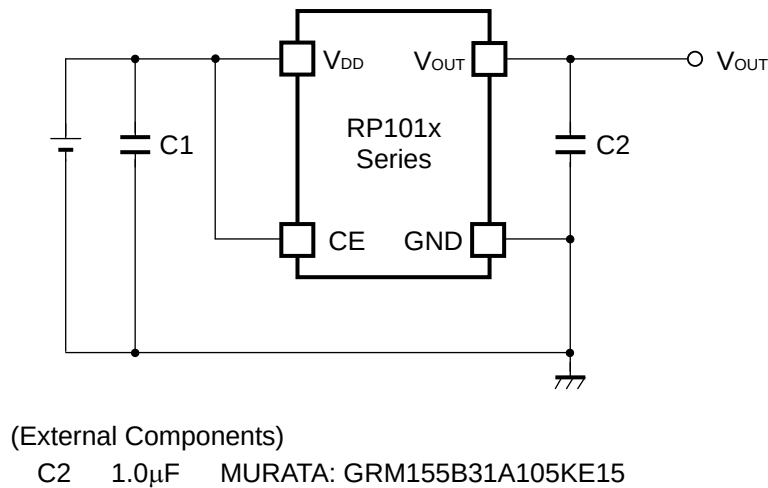
| Symbol                          | Item                                            | Conditions                                                                                                                      | Min.                          | Typ.     | Max.           | Unit             |
|---------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------|----------------|------------------|
| $V_{OUT}$                       | Output Voltage                                  | $V_{OUT} > 2.0V$                                                                                                                | $\times 0.994$                |          | $\times 1.006$ | V                |
|                                 |                                                 | $V_{OUT} \leq 2.0V$                                                                                                             | -12                           |          | +12            | mV               |
| $I_{OUT}$                       | Output Current                                  |                                                                                                                                 | 300                           |          |                | mA               |
| $\Delta V_{OUT}/\Delta I_{OUT}$ | Load Regulation                                 | $1mA \leq I_{OUT} \leq 150mA$                                                                                                   |                               | 20       | 40             | mV               |
| $V_{DIF}$                       | Dropout Voltage                                 | $I_{OUT}=150mA$                                                                                                                 | $1.2V \leq V_{OUT} < 1.5V$    | 0.40     | 0.50           | V                |
|                                 |                                                 |                                                                                                                                 | $1.5V \leq V_{OUT} < 1.7V$    | 0.24     | 0.38           |                  |
|                                 |                                                 |                                                                                                                                 | $1.7V \leq V_{OUT} < 2.0V$    | 0.21     | 0.34           |                  |
|                                 |                                                 |                                                                                                                                 | $2.0V \leq V_{OUT} < 2.5V$    | 0.17     | 0.30           |                  |
|                                 |                                                 |                                                                                                                                 | $2.5V \leq V_{OUT} < 2.8V$    | 0.14     | 0.25           |                  |
|                                 |                                                 |                                                                                                                                 | $2.8V \leq V_{OUT} \leq 3.3V$ | 0.13     | 0.23           |                  |
| $I_{SS}$                        | Supply Current                                  | $I_{OUT}=0mA$                                                                                                                   |                               | 18       | 25             | $\mu A$          |
| $I_{standby}$                   | Standby Current                                 | $V_{CE}=0V$                                                                                                                     |                               | 0.1      | 2.0            | $\mu A$          |
| $\Delta V_{OUT}/\Delta V_{IN}$  | Line Regulation                                 | Set $V_{OUT}+0.5V \leq V_{IN} \leq 5.0V$                                                                                        |                               | 0.02     | 0.10           | %/V              |
| RR                              | Ripple Rejection                                | $f=1kHz$ , Ripple 0.2Vp-p<br>$V_{IN}$ =Set $V_{OUT}+1V$ , $I_{OUT}=30mA$<br>(In case that $V_{OUT} \leq 2.0V$ , $V_{IN}=3.0V$ ) |                               | 75       |                | dB               |
| $V_{IN}$                        | Input Voltage*1                                 |                                                                                                                                 | 1.7                           |          | 5.25           | V                |
| $\Delta V_{OUT}/\Delta T_{opt}$ | Output Voltage Temperature Coefficient          | $-40^{\circ}C \leq T_{opt} \leq 85^{\circ}C$                                                                                    |                               | $\pm 30$ |                | ppm/ $^{\circ}C$ |
| $I_{SC}$                        | Short Current Limit                             | $V_{OUT}=0V$                                                                                                                    |                               | 40       |                | mA               |
| $I_{PD}$                        | CE Pull-down Current                            |                                                                                                                                 |                               | 0.3      |                | $\mu A$          |
| $V_{CEH}$                       | CE Input Voltage "H"                            |                                                                                                                                 | 1.1                           |          |                | V                |
| $V_{CEL}$                       | CE Input Voltage "L"                            |                                                                                                                                 |                               |          | 0.3            | V                |
| en                              | Output Noise                                    | BW=10Hz to 100kHz<br>$I_{OUT}=30mA$                                                                                             |                               | 30       |                | $\mu V_{rms}$    |
| $R_{LOW}$                       | Low Output Nch Tr. ON Resistance (of D version) | $V_{IN}=4.0V$ , $V_{CE}=0V$                                                                                                     |                               | 30       |                | $\Omega$         |

\*) The maximum Input Voltage of the ELECTRICAL CHARACTERISTICS is 5.25V. In case of exceeding this specification, the IC must be operated on condition that the Input Voltage is up to 5.5V and the total operating time is within 500hrs.

#### RECOMMENDED OPERATING CONDITIONS (ELECTRICAL CHARACTERISTICS)

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

## TYPICAL APPLICATION



## TECHNICAL NOTES

When using these ICs, consider the following points:

### Phase Compensation

In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, use a capacitor C2 with 1.0μF or more capacity.

Ceramic capacitors have different temperature characteristics and bias characteristics depending on their dimensions and manufacturers. If the setting voltage is 2.5V or more and the capacitor's dimensions for V<sub>OUT</sub> equal to 1.0mm by 0.5mm or smaller than that, the capacitance value might be extremely low. As a result, the capacitance might be much less than expected. In such cases, the operation might be unstable at low temperature. (–20°C or less) In that case, use a larger capacity, or a large dimensions' capacitor. (For example 1.6mm by 0.8mm)

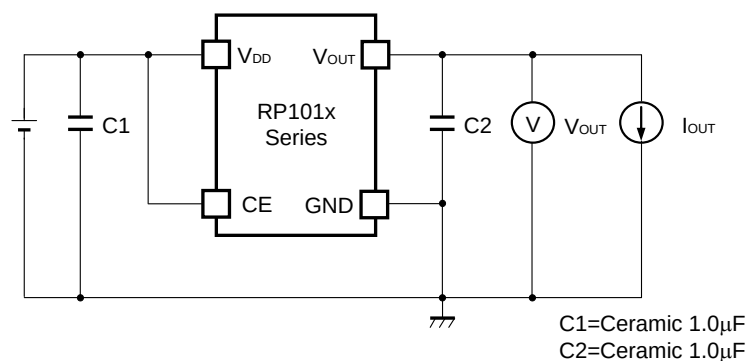
If a tantalum capacitor is selected as an output capacitor, large ESR may be a cause of unstable operation. Evaluate the operation of PCB with considerable frequency characteristics.

### PCB Layout

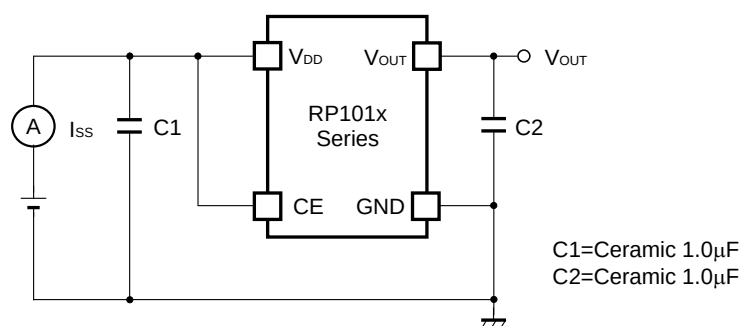
Make V<sub>DD</sub> and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a capacitor C1 with a capacitance value as much as 1.0μF or more between V<sub>DD</sub> and GND pin, and as close as possible to the pins.

Set external components, especially the output capacitor C2, as close as possible to the ICs, and make wiring as short as possible.

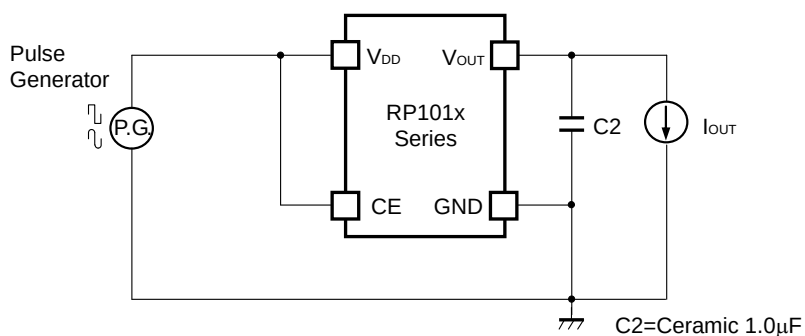
## TEST CIRCUITS



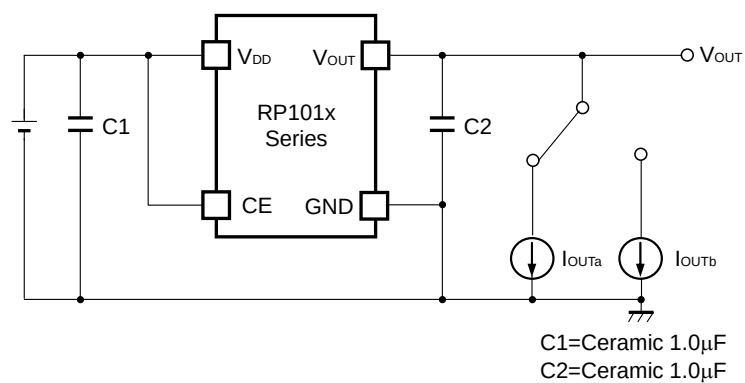
**Basic Test Circuit**



**Test Circuit for Supply Current**



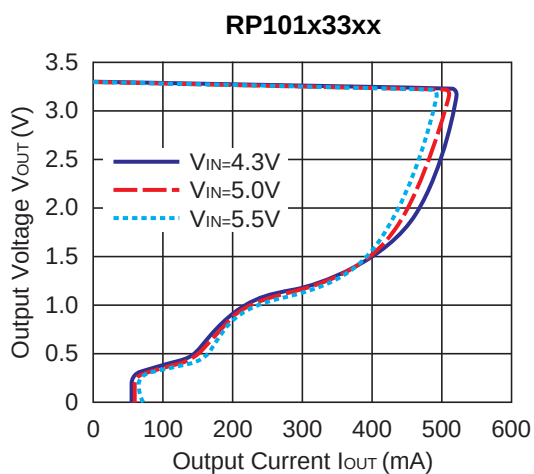
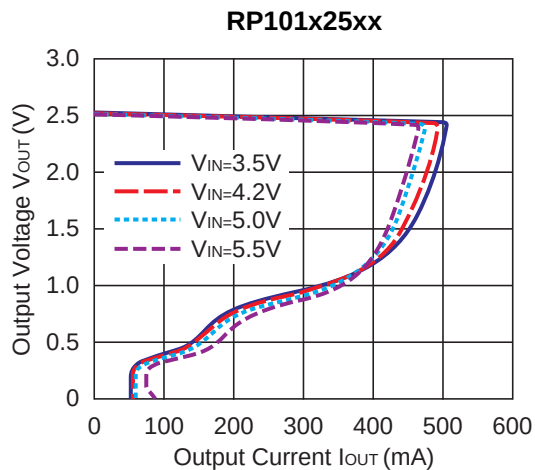
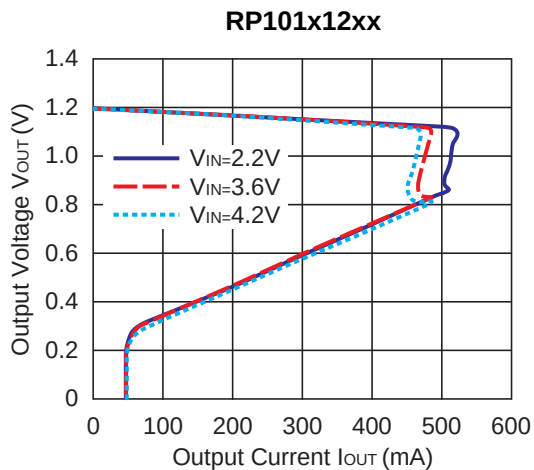
**Test Circuit for Ripple Rejection**



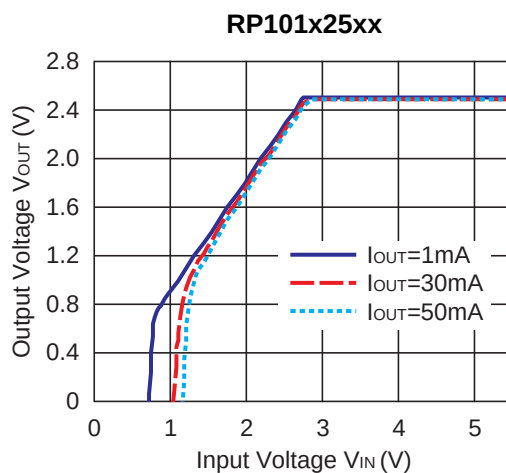
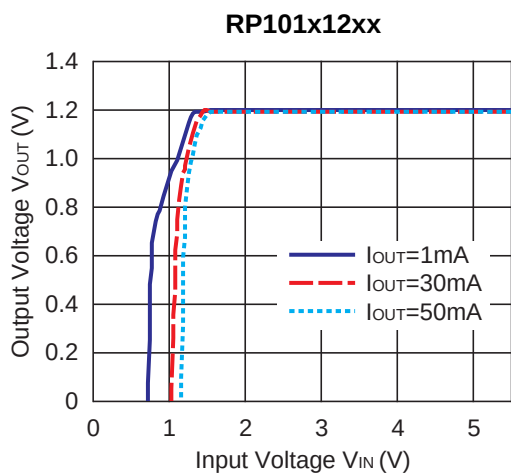
**Test Circuit for Load Transient Response**

## TYPICAL CHARACTERISTICS

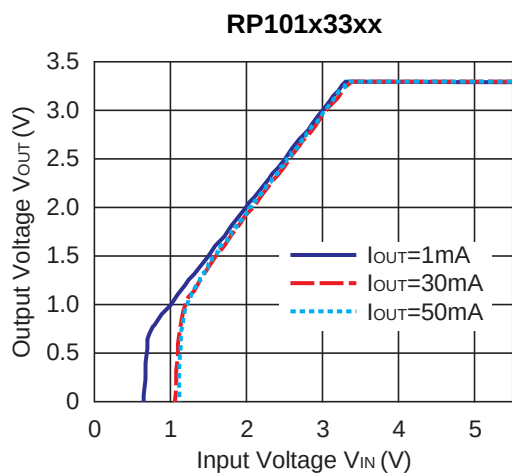
### 1) Output Voltage vs. Output Current ( $C_1=1.0\mu\text{F}$ , $C_2=1.0\mu\text{F}$ , $T_{\text{opt}}=25^\circ\text{C}$ )



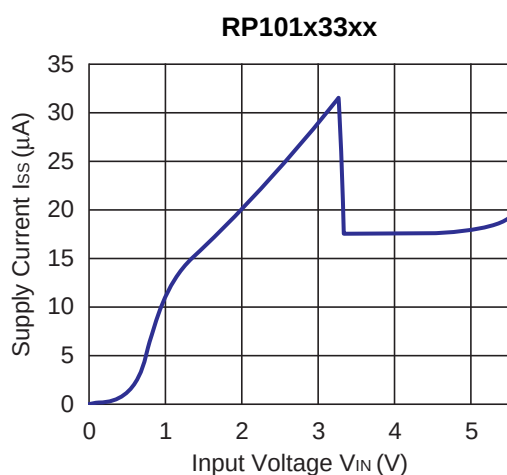
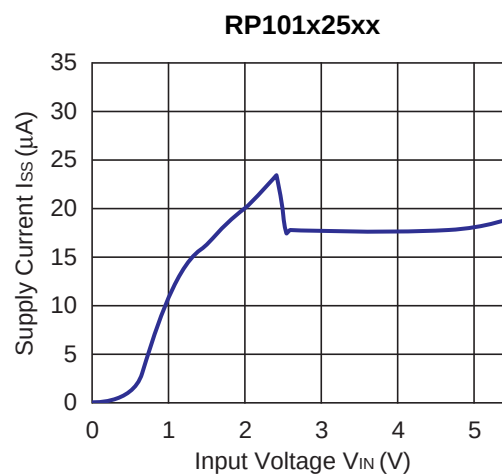
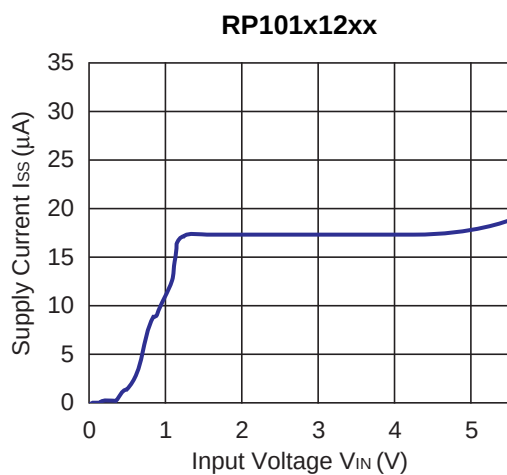
### 2) Output Voltage vs. Input Voltage ( $C_1=1.0\mu\text{F}$ , $C_2=1.0\mu\text{F}$ , $T_{\text{opt}}=25^\circ\text{C}$ )







### 3) Supply Current vs. Input Voltage ( $C1=1.0\mu\text{F}$ , $C2=1.0\mu\text{F}$ , $T_{opt}=25^{\circ}\text{C}$ )



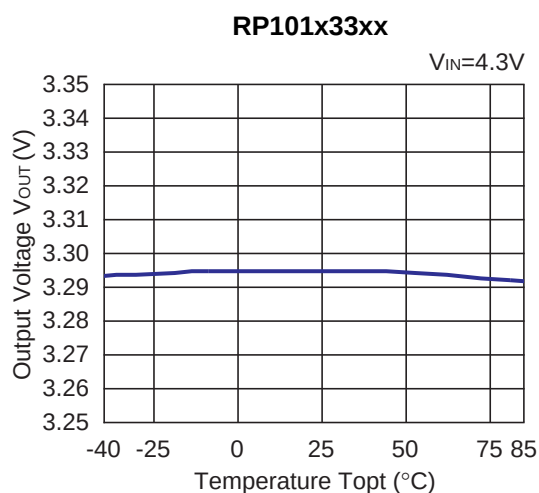
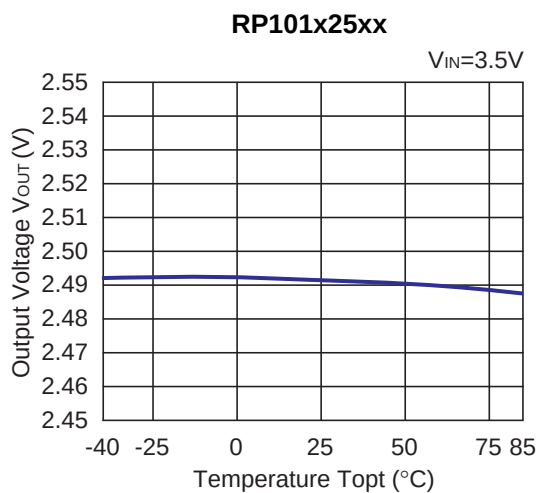
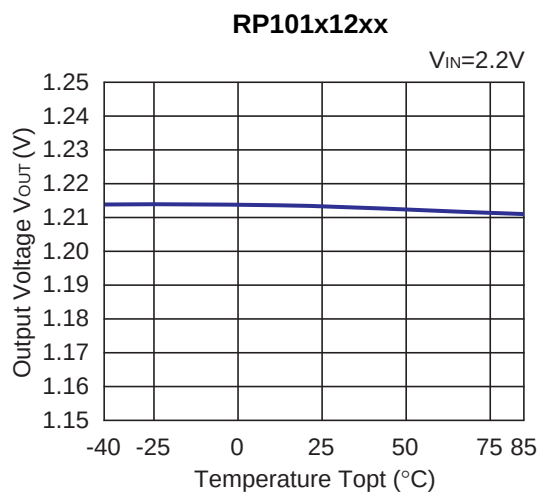
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## RP101x

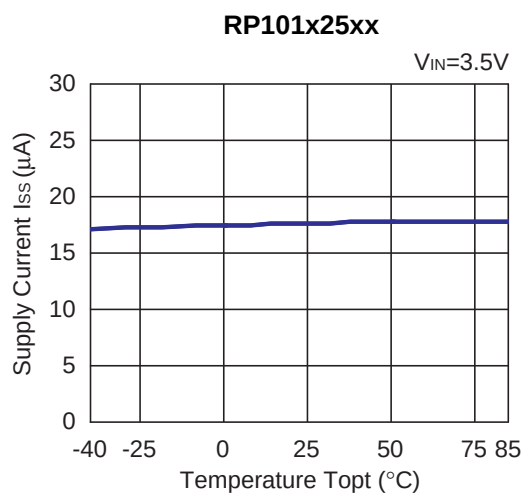
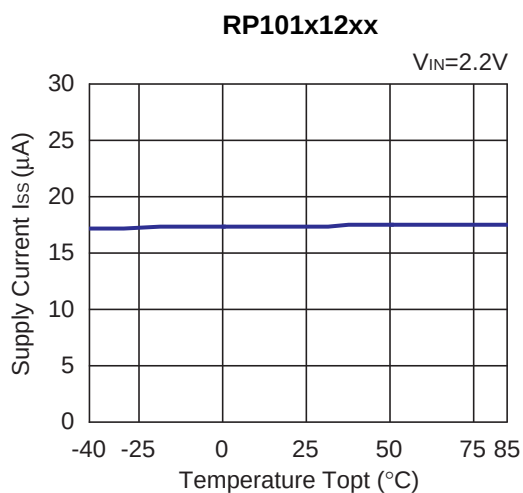
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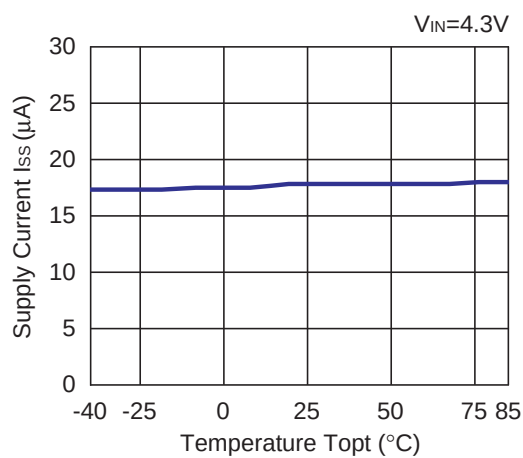
### 4) Output Voltage vs. Temperature ( $C_1=1.0\mu\text{F}$ , $C_2=1.0\mu\text{F}$ , $I_{\text{OUT}}=1\text{mA}$ )



### 5) Supply Current vs. Temperature ( $C_1=1.0\mu\text{F}$ , $C_2=1.0\mu\text{F}$ , $I_{\text{OUT}}=0\text{mA}$ )

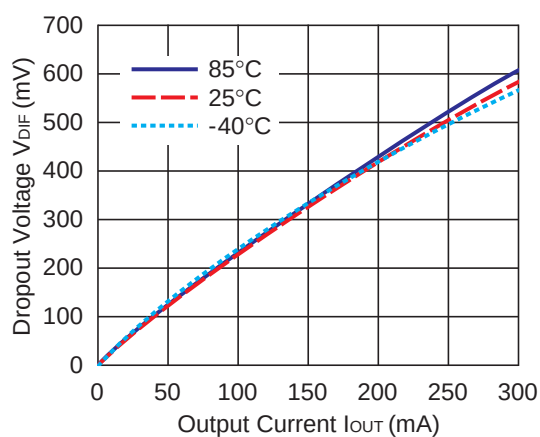


RP101x33xx

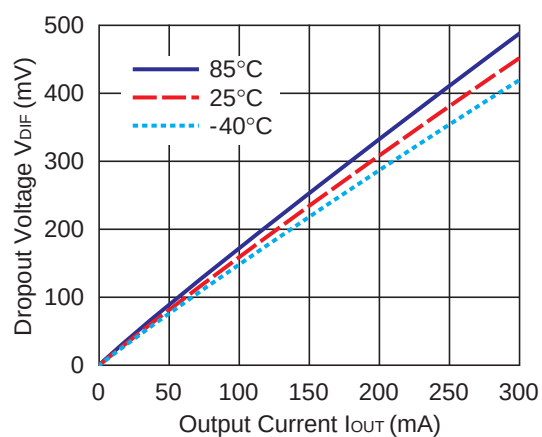


## 6) Dropout Voltage vs. Output Current ( $C1=1.0\mu F$ , $C2=1.0\mu F$ )

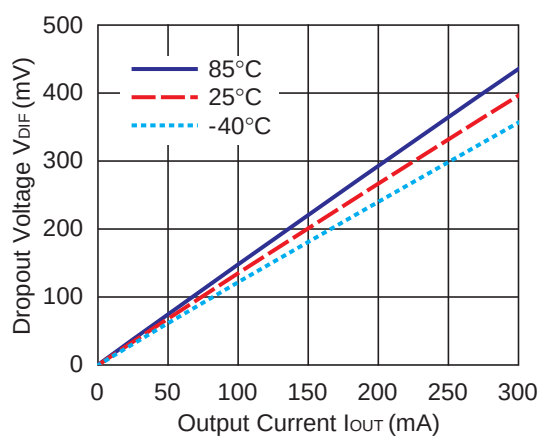
RP101x12xx



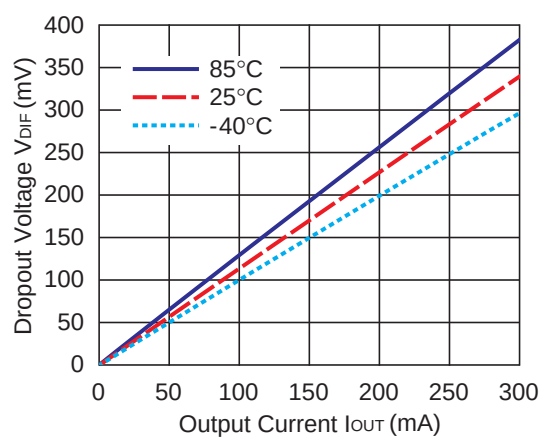
RP101x15xx



RP101x17xx

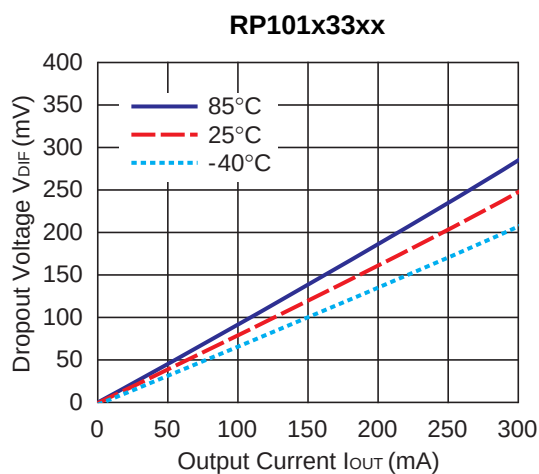
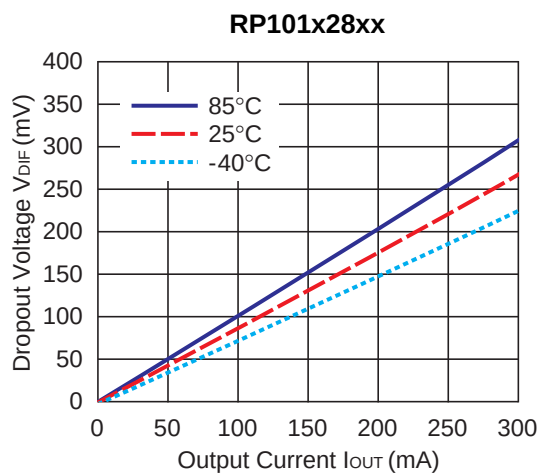
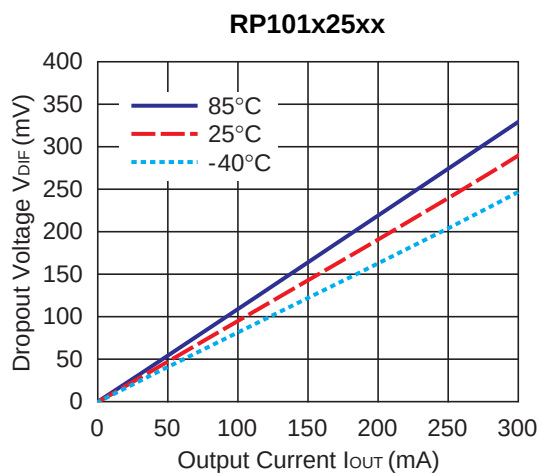


RP101x20xx

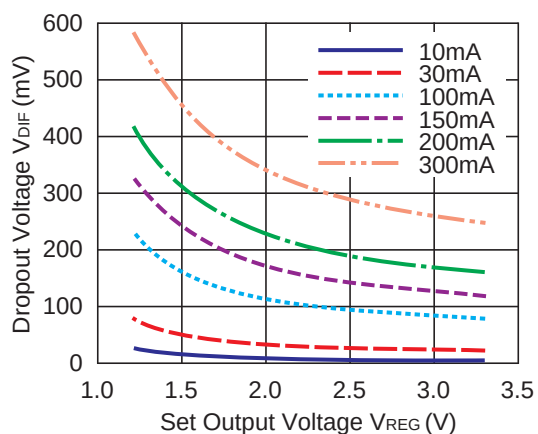


## RP101x

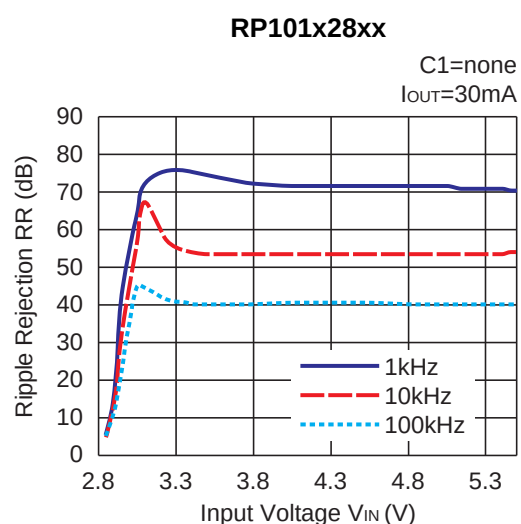
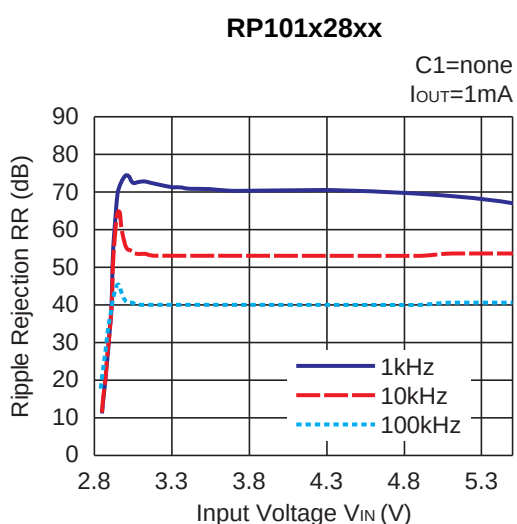
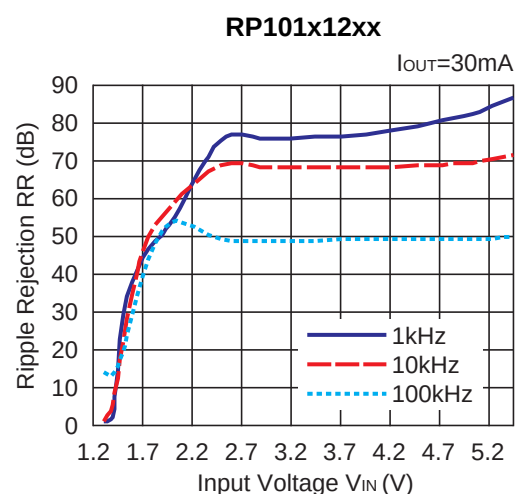
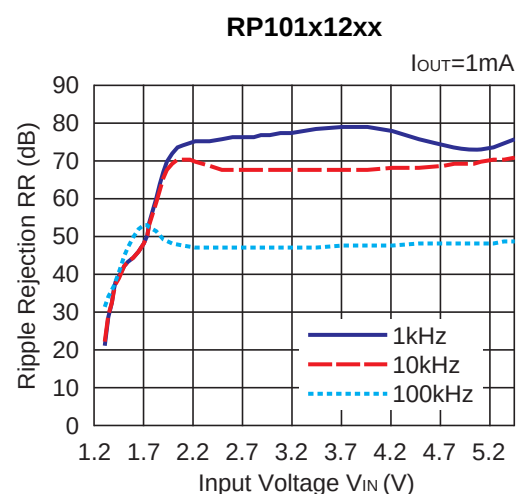
NO.EA-167-160425



### 7) Dropout Voltage vs. Set Output Voltage ( $C_1=1.0\mu\text{F}$ , $C_2=1.0\mu\text{F}$ , $T_{opt}=25^\circ\text{C}$ )



# 8) Ripple Rejection vs. Input Bias Voltage (C1=none, C2=1.0μF, Ripple=0.2Vp-p, T<sub>opt</sub>=25°C)



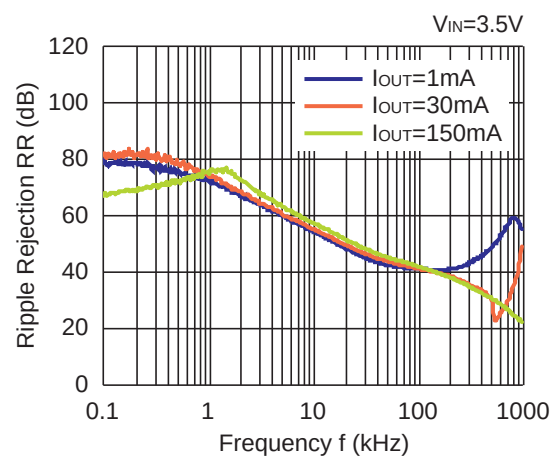
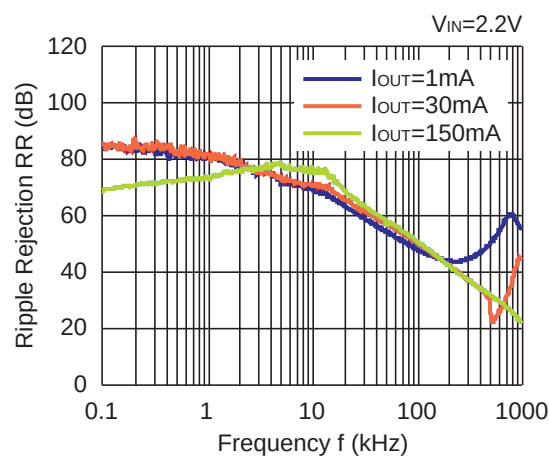
# 9) Ripple Rejection vs. Frequency (C1=none, C2=1.0μF, Ripple=0.2Vp-p)

RP101x12xx

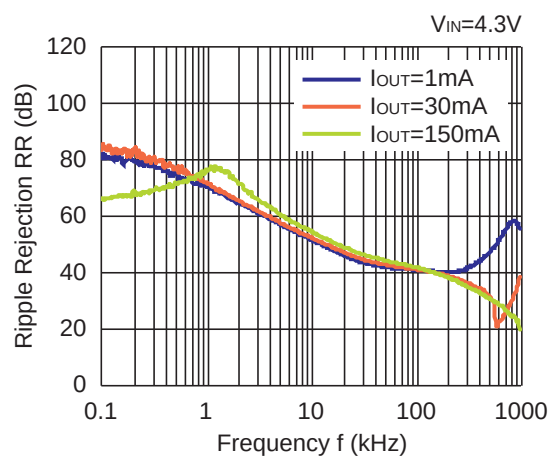
RP101x25xx

**RP101x**

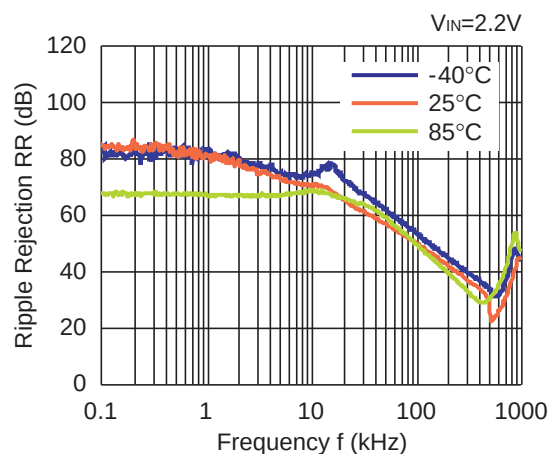
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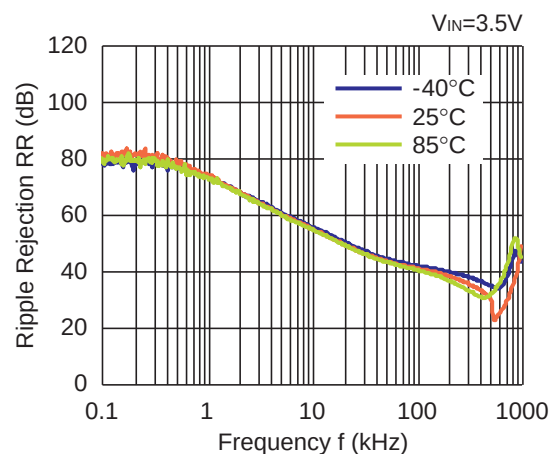
RP101x33xx



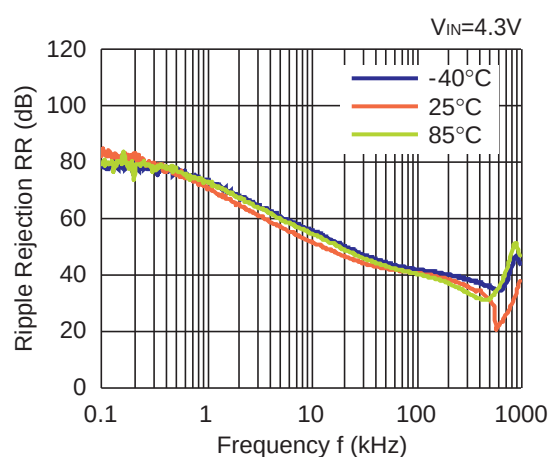
RP101x12xx



RP101x25xx



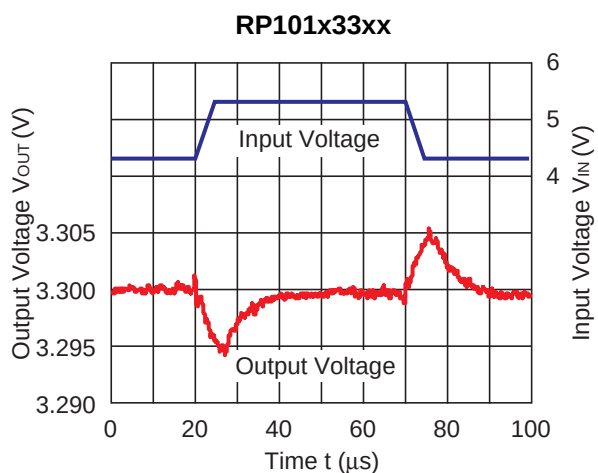
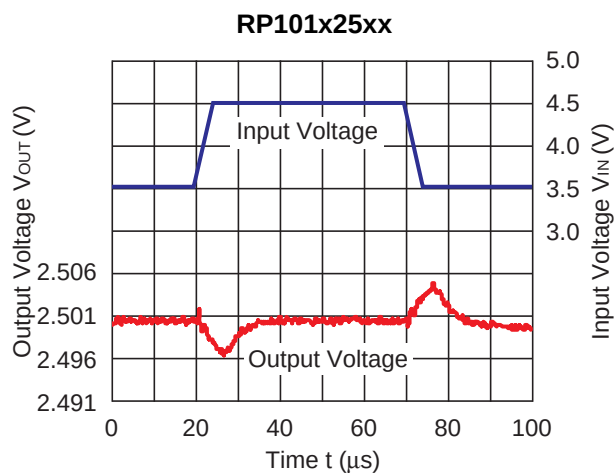
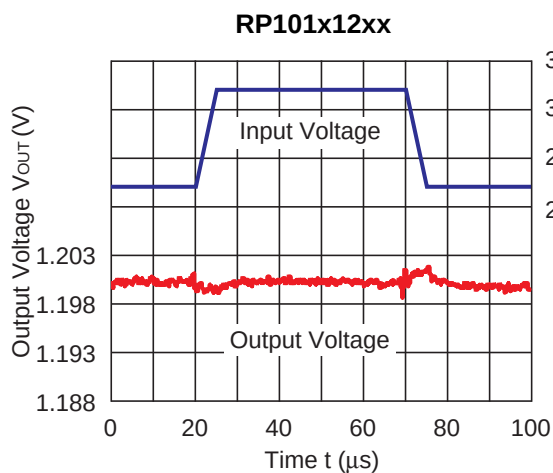
RP101x33xx



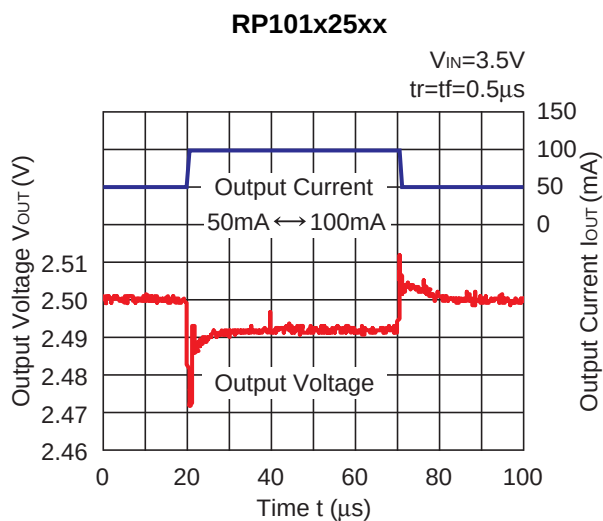
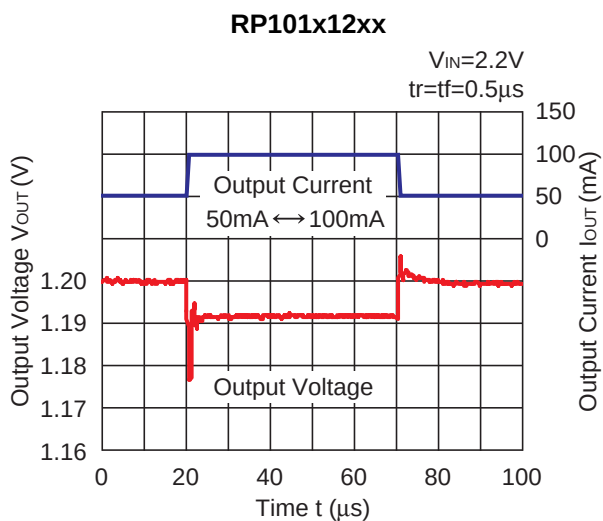
## RP101x

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### 10) Input Transient Response ( $I_{OUT}=30\text{mA}$ , $t_r=t_f=5\mu\text{s}$ , $T_{opt}=25^\circ\text{C}$ )

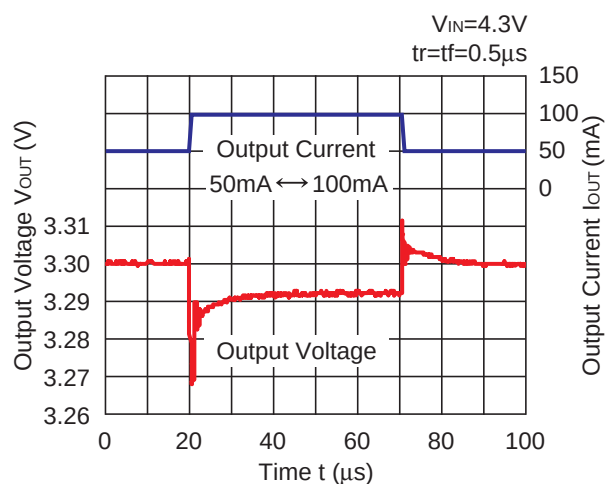


### 11) Load Transient Response ( $C_2=1.0\mu\text{F}$ , $T_{opt}=25^\circ\text{C}$ )

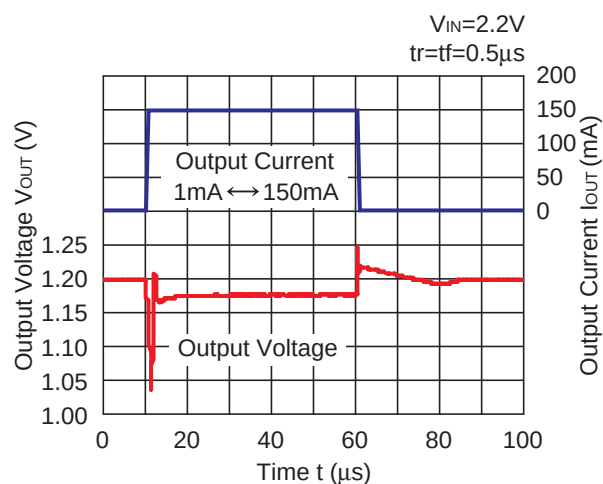




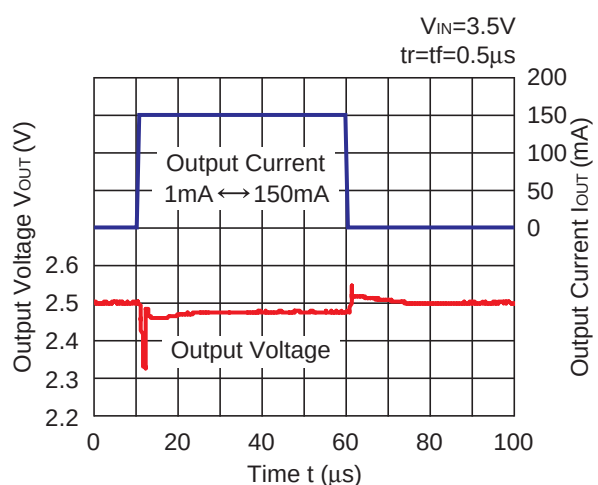
RP101x33xx



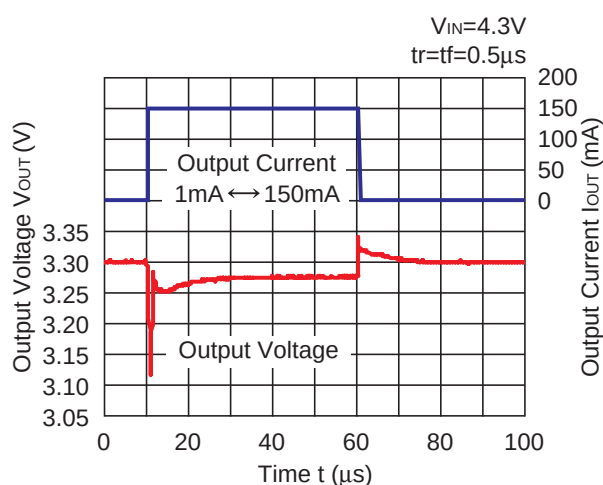
RP101x12xx



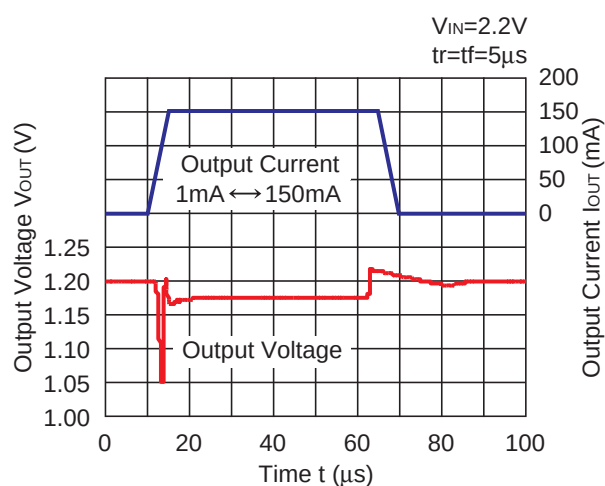
RP101x25xx



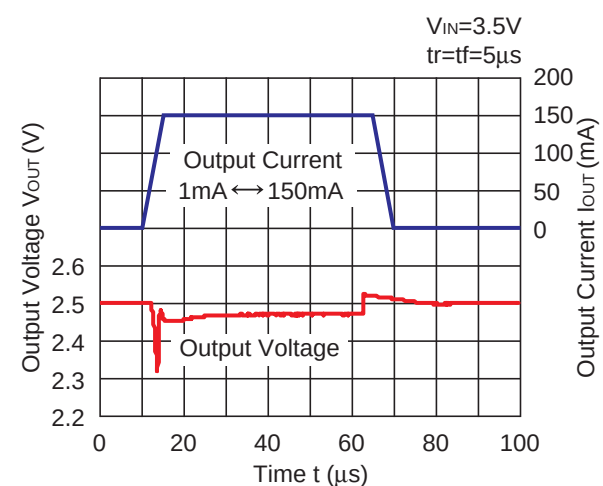
RP101x33xx



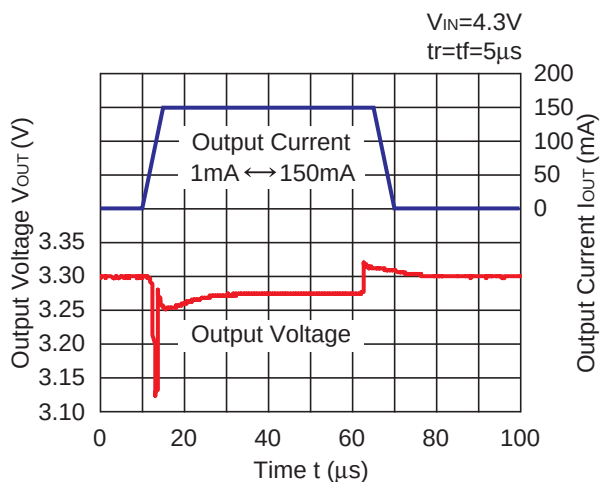
RP101x12xx



RP101x25xx

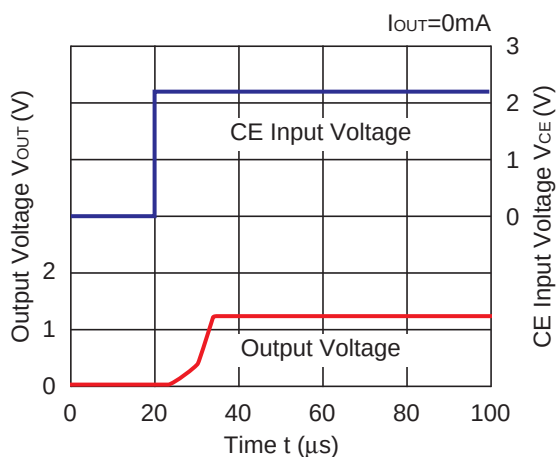


**RP101x33xx**

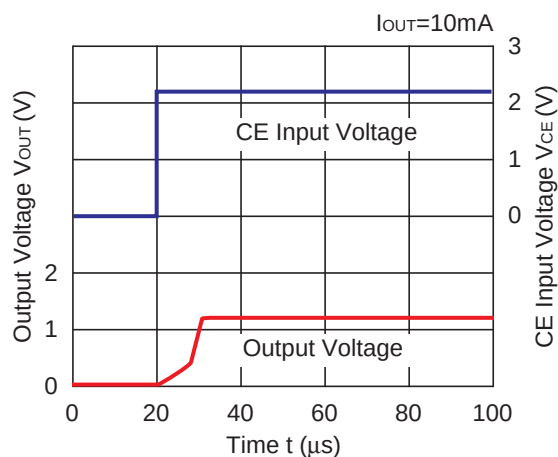


**12) Turn On Speed with CE pin ( $C1=1.0\mu F$ ,  $C2=1.0\mu F$ ,  $T_{opt}=25^{\circ}C$ )**

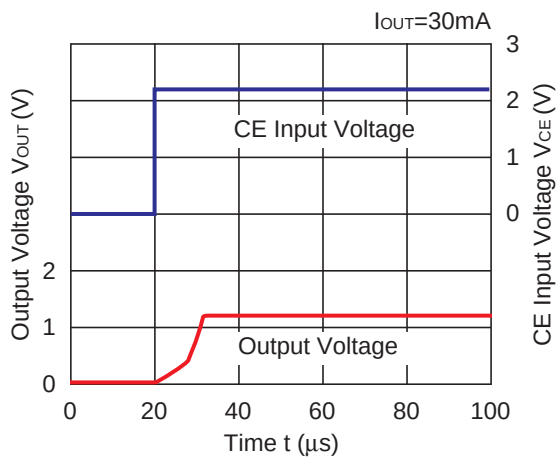
**RP101x12xx**



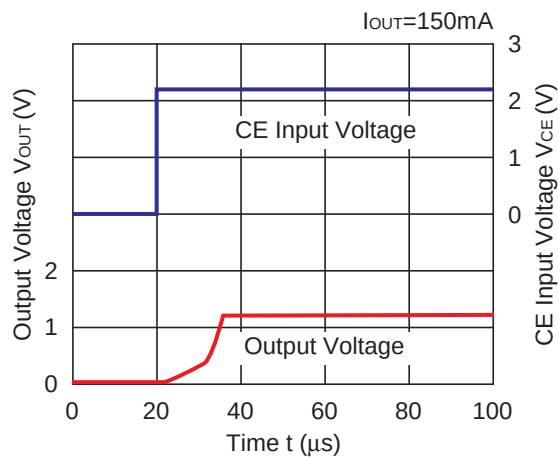
**RP101x12xx**

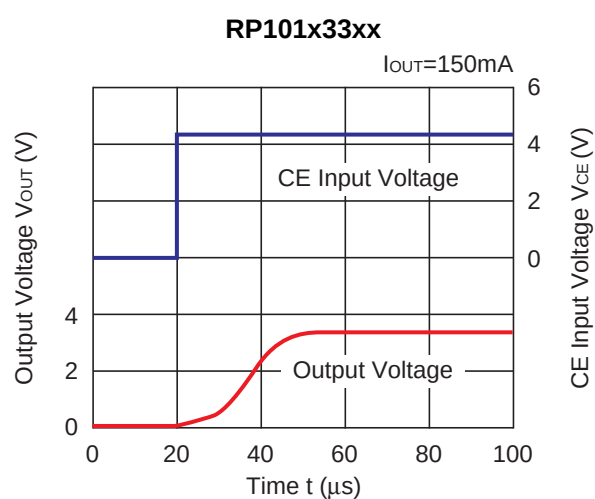
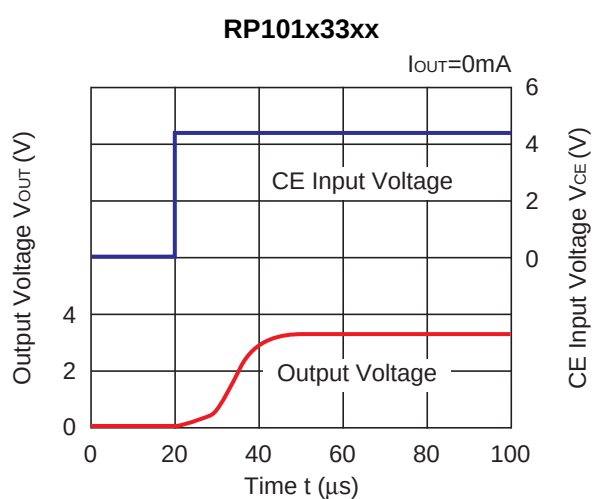
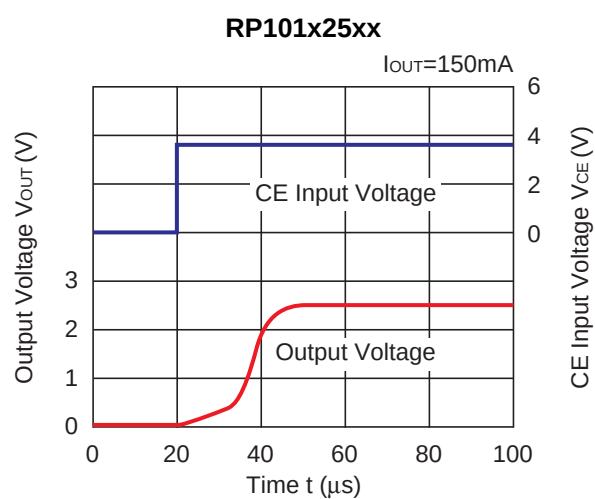
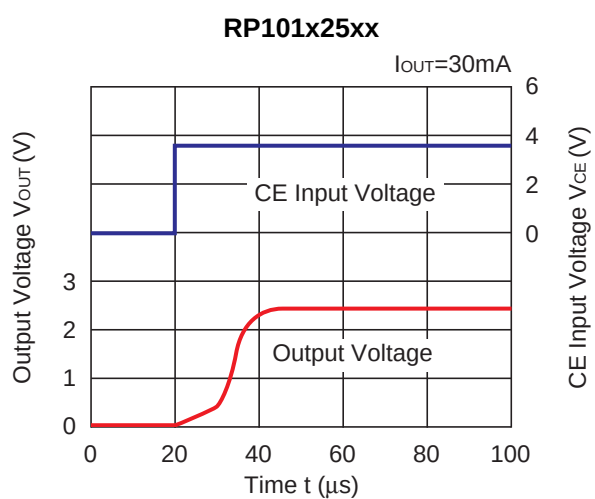
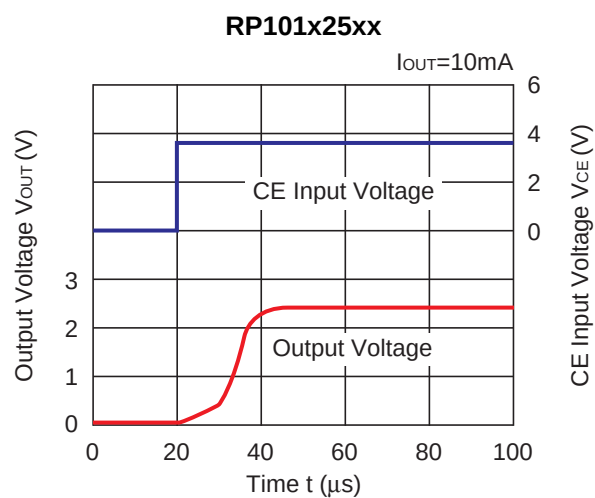
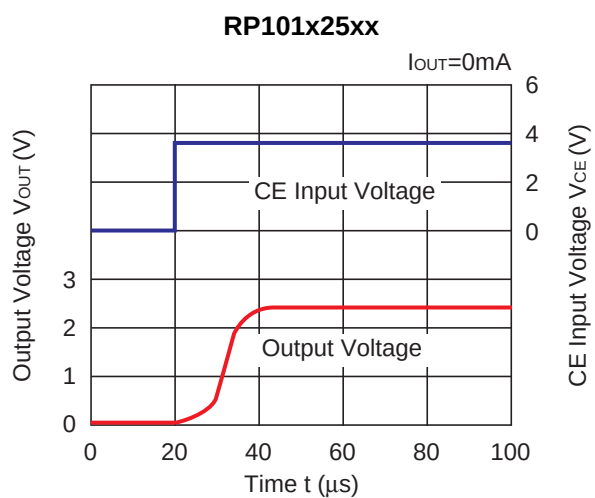


**RP101x12xx**

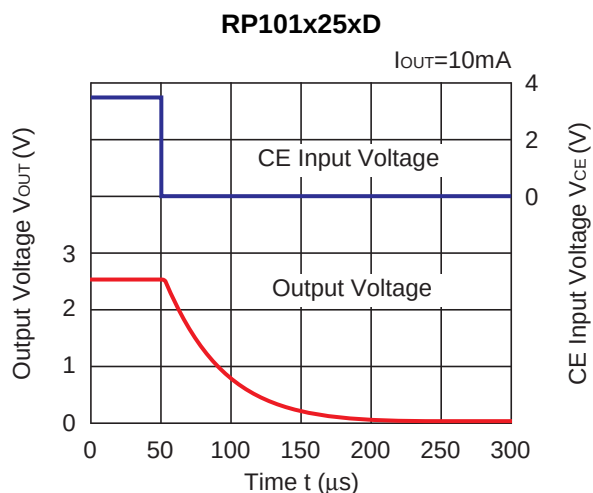
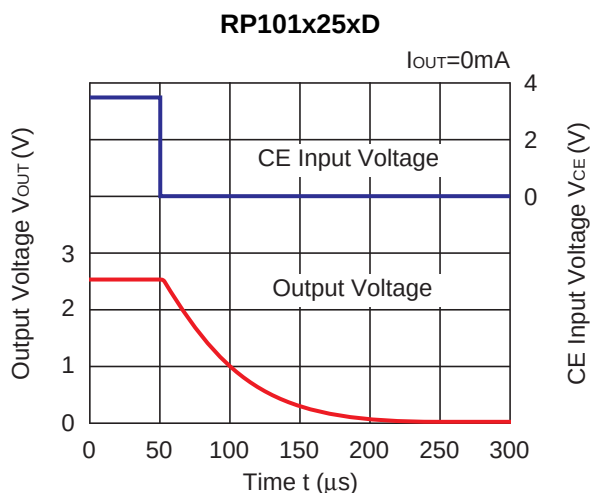
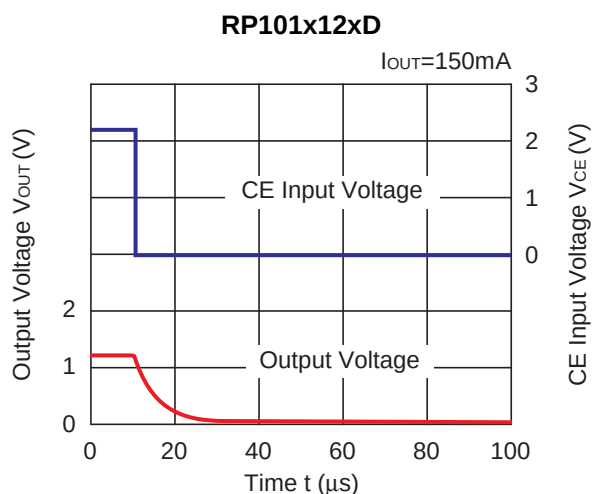
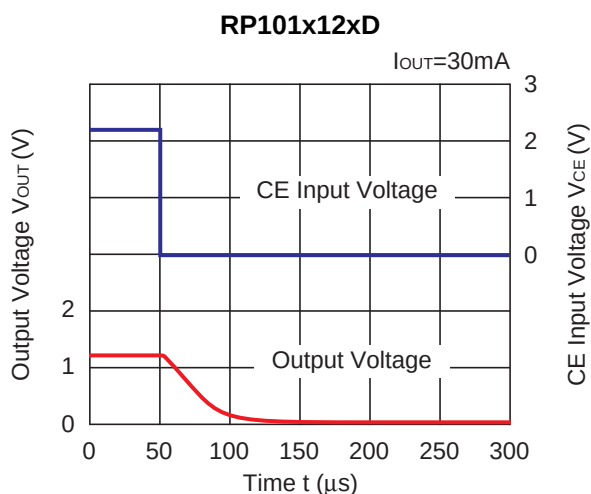
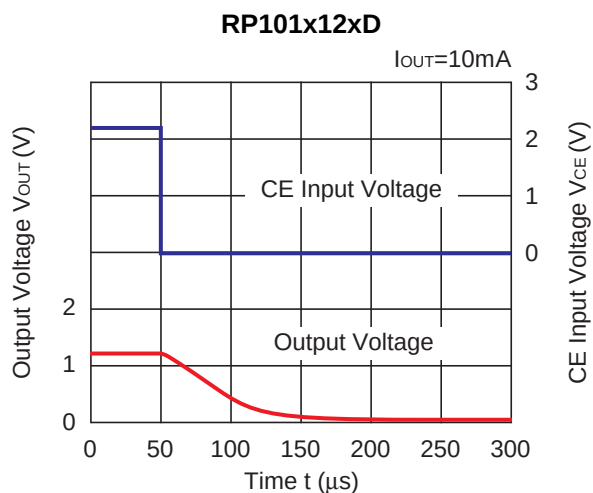
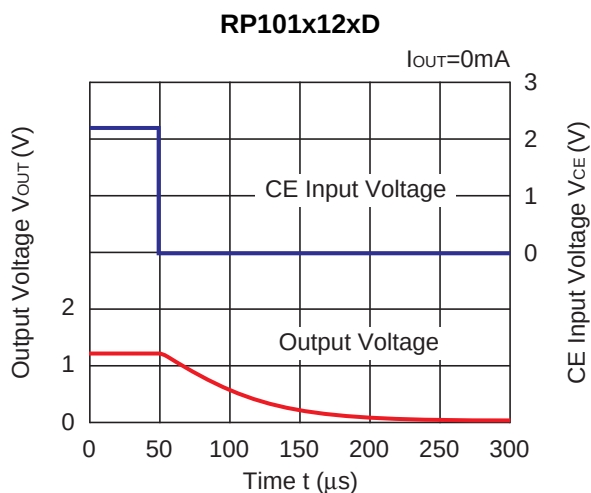


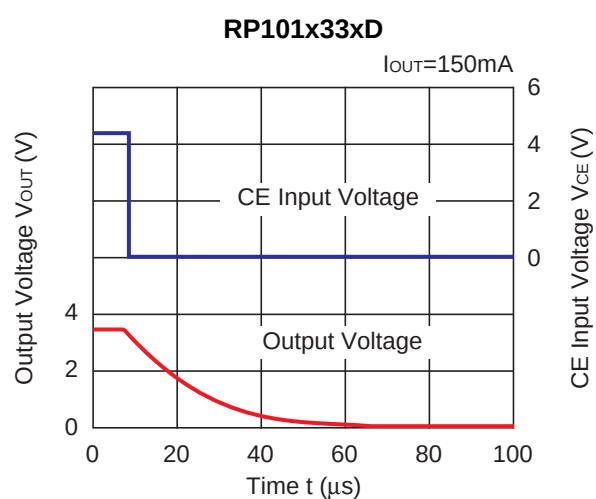
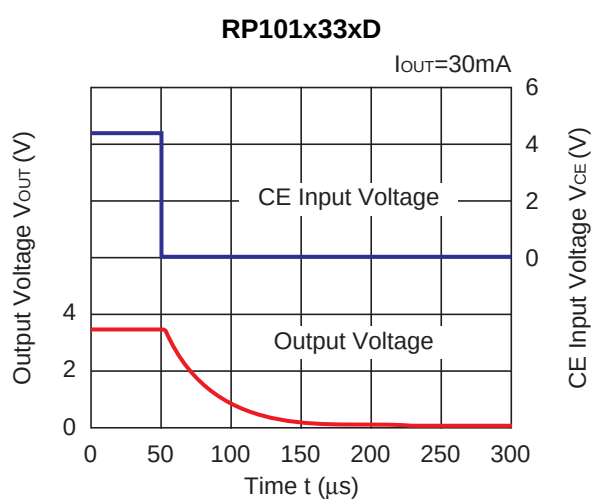
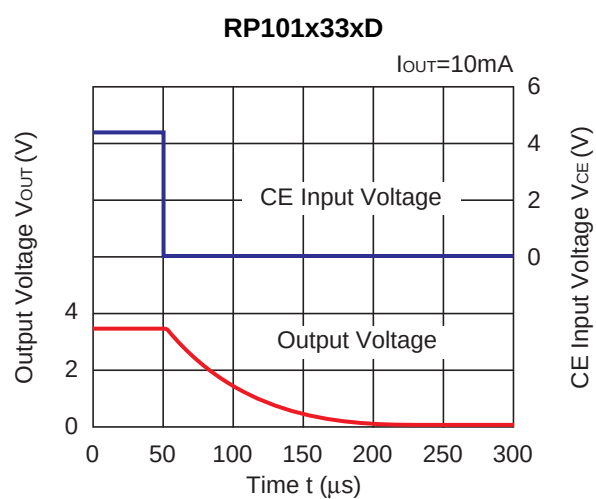
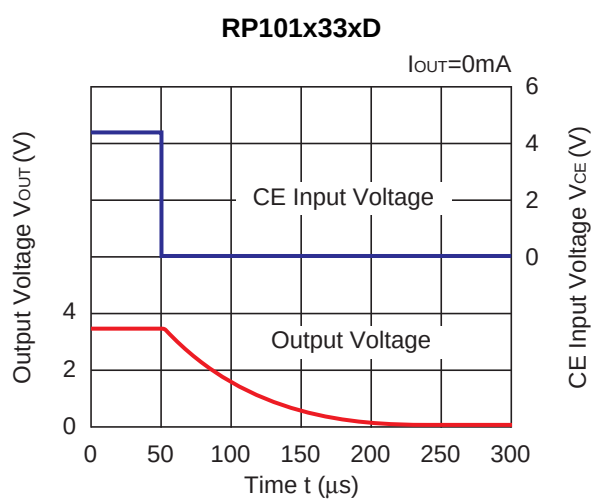
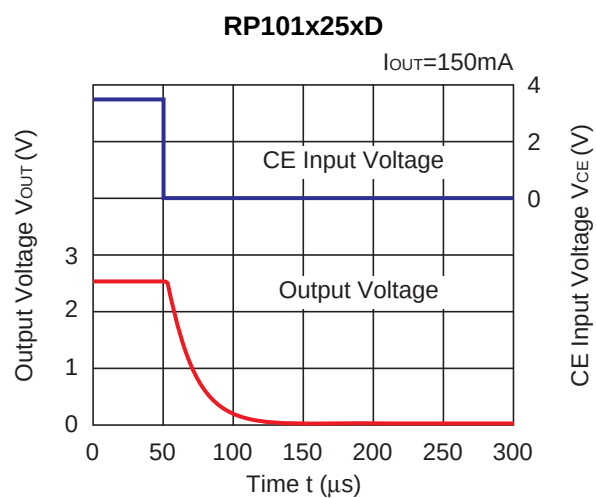
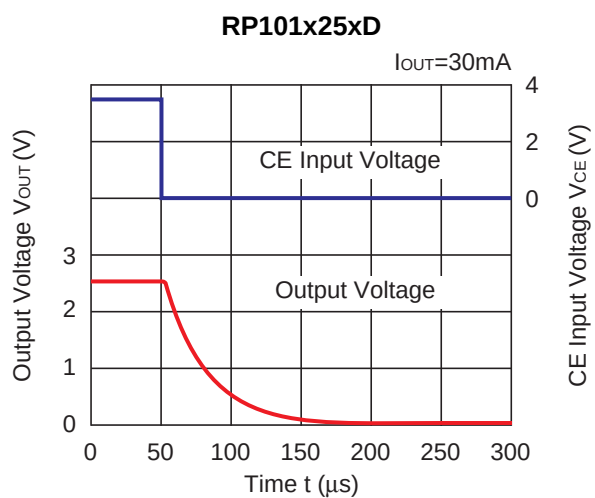
**RP101x12xx**





13) Turn Off Speed with CE pin (D Version) ( $C_1=1.0\mu\text{F}$ ,  $C_2=1.0\mu\text{F}$ ,  $T_{\text{opt}}=25^\circ\text{C}$ )



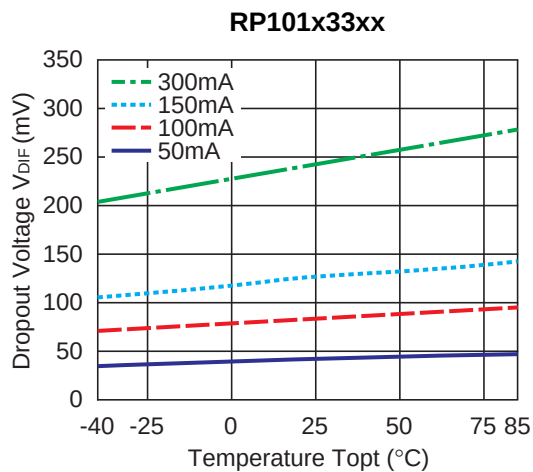
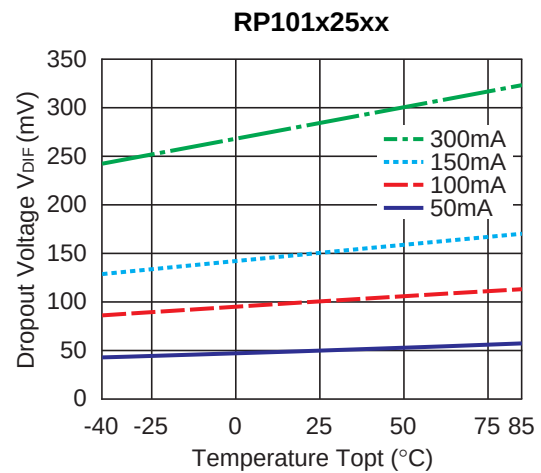
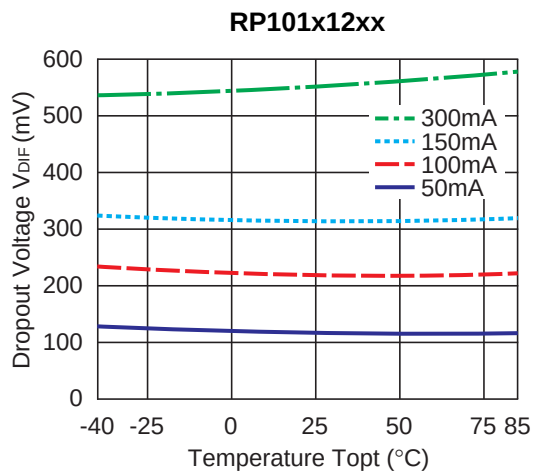
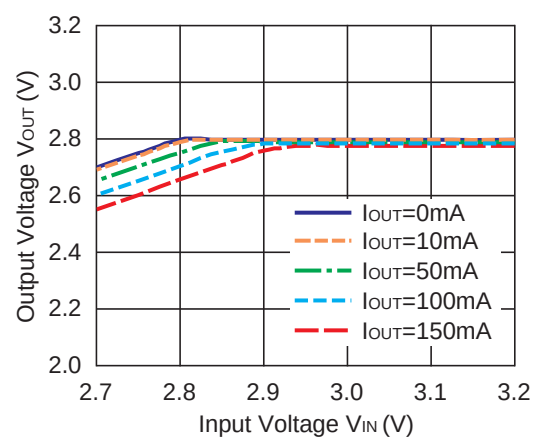


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**RP101x**

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NO.EA-167-160425

**14) Dropout Voltage vs. Temperature ( $C1=1.0\mu F$ ,  $C2=1.0\mu F$ )****15) Output Voltage vs. Input Voltage ( $C1=1.0\mu F$ ,  $C2=1.0\mu F$ )**

## ESR vs. Output Current

When using these ICs, consider the following points:

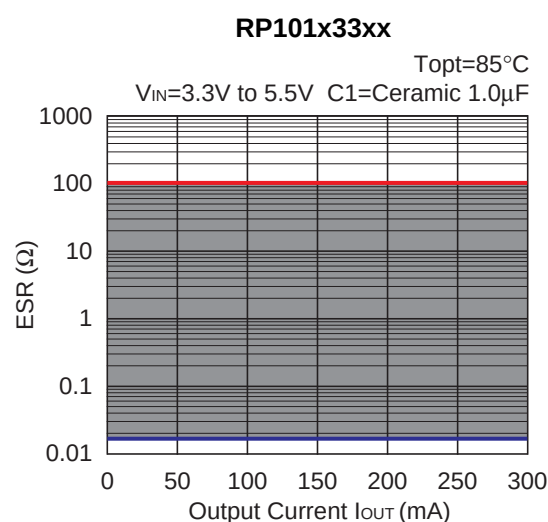
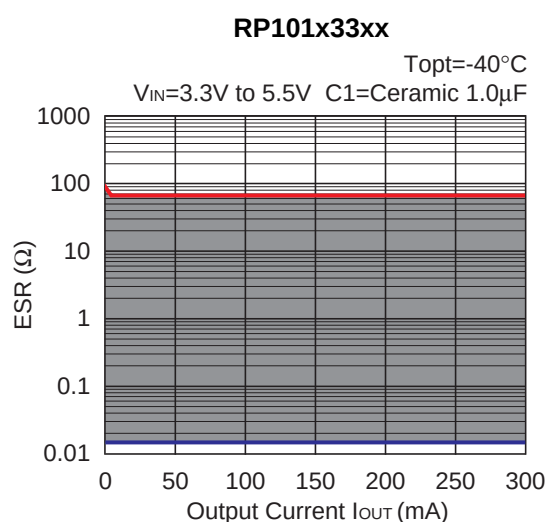
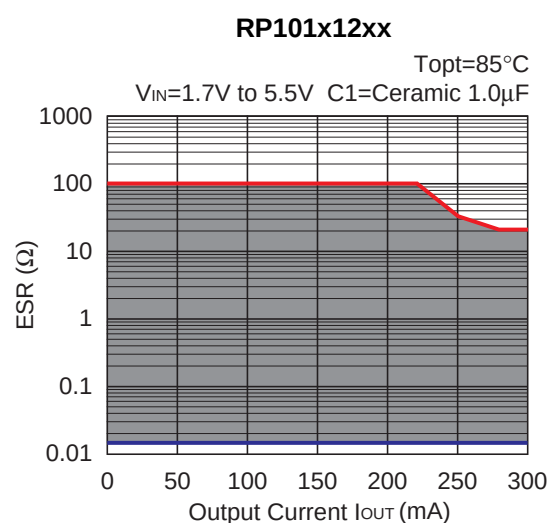
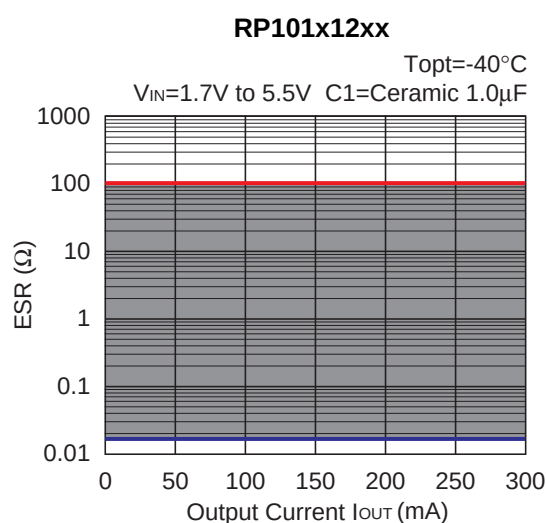
The relations between  $I_{OUT}$  (Output Current) and ESR of an output capacitor are shown below.

The conditions when the white noise level is under  $40\mu V$  (Avg.) are marked as the hatched area in the graph.

### Measurement conditions

Frequency Band : 10Hz to 2MHz

Temperature :  $-40^{\circ}C$  to  $85^{\circ}C$



PACKAGE INFORMATION

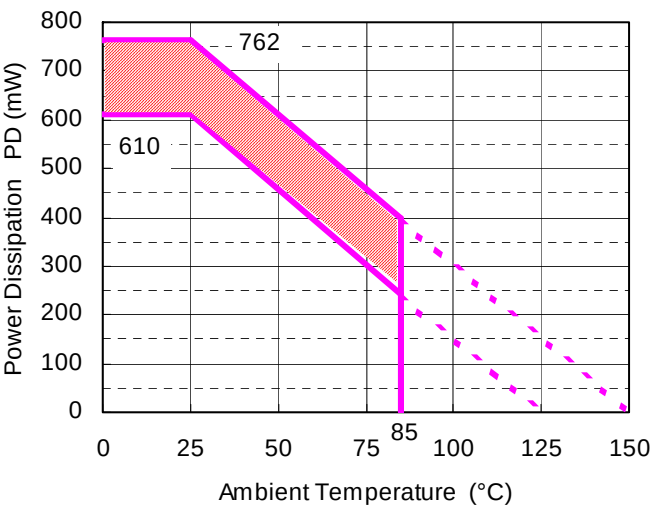
**Power Dissipation (DFN(PLP)1612-4)**  
Power Dissipation (P<sub>D</sub>) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

Measurement Conditions

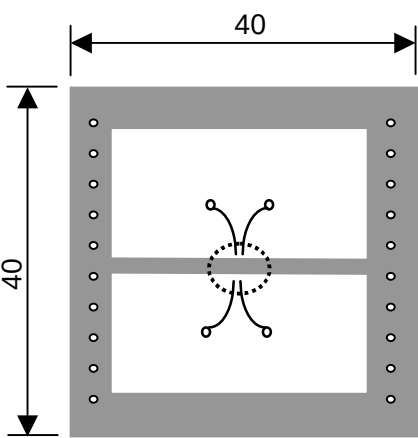
|                  |                                               |
|------------------|-----------------------------------------------|
|                  | Standard Test Land Pattern                    |
| Environment      | Mounting on Board (Wind velocity=0m/s)        |
| Board Material   | Glass cloth epoxy plastic (Double sided)      |
| Board Dimensions | 40mm*40mm*1.6mm                               |
| Copper Ratio     | Top side: Approx. 50%, Back side: Approx. 50% |
| Through-holes    | φ 0.54mm * 24pcs                              |

Measurement Result (Ta=25°C)

|                    |                                                 |
|--------------------|-------------------------------------------------|
|                    | Standard Test Land Pattern                      |
| Power Dissipation  | 610mW (Tjmax=125°C)<br>762mW(Tjmax=150°C)       |
| Thermal Resistance | θja = (125-25°C)/0.61W= 164°C/W<br>θjc = 48°C/W |



Power Dissipation



Measurent Board Pattern

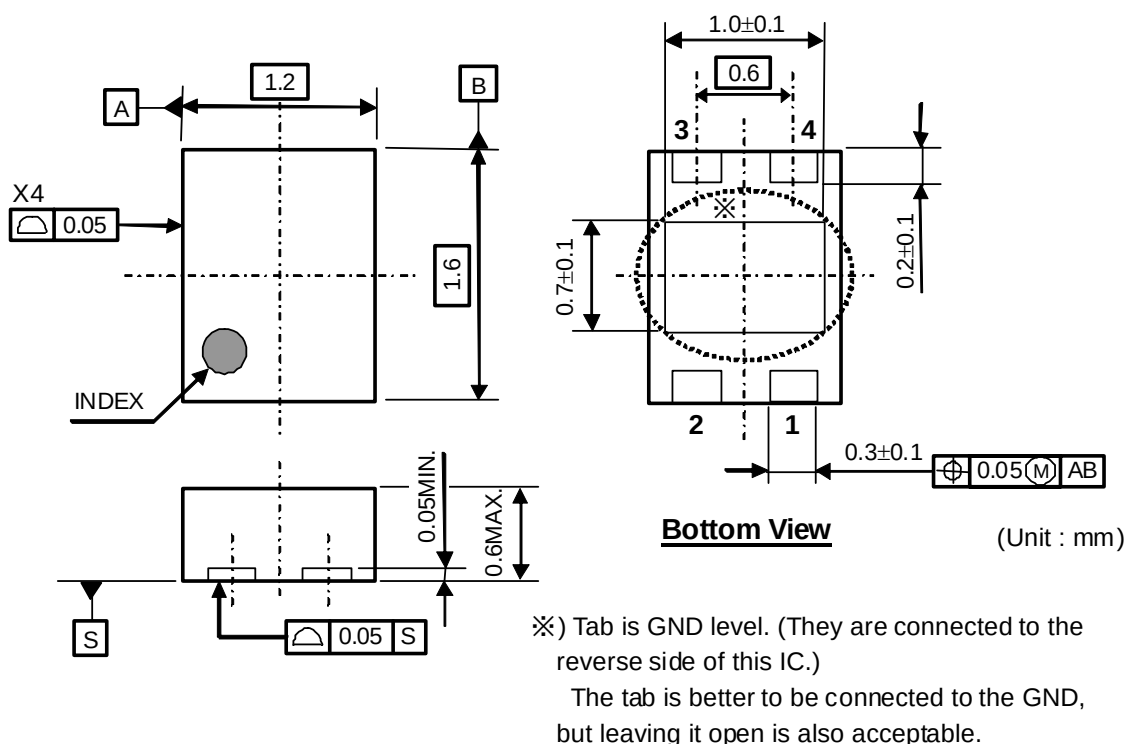
 IC Mount Area Unit : mm

\*The above graph shows the Power Dissipation of the package based on Tjmax=125°C and Tjmax=150°C. Operating the IC in the shaded area in the graph might have an influence it's lifetime. Operating time must be within the time limit described in the table below, in case of operating in the shaded area.

|                |                                               |
|----------------|-----------------------------------------------|
| Operating Time | Estimated years<br>(Operating four hours/day) |
| 13,000 hours   | 9years                                        |

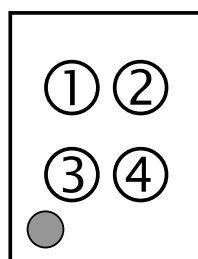


# Package Dimensions (DFN(PLP)1612-4)



# Mark Specification (DFN(PLP)1612-4)

- ①② : Product Code ... **Please refer to the RP101Kxx1x Series Mark Specification Table.**
- ③④ : Lot Number ... Alphanumeric Serial Number



## RP101Kxx1x Series Mark Specification Table

PKG: DFN(PLP)1612-4

**RP101Kxx1B**

| Part Number | ①②        | Vset  |
|-------------|-----------|-------|
| RP101K121B  | <b>3A</b> | 1.2V  |
| RP101K131B  | <b>3B</b> | 1.3V  |
| RP101K151B  | <b>3C</b> | 1.5V  |
| RP101K181B  | <b>3D</b> | 1.8V  |
| RP101K181B5 | <b>3E</b> | 1.85V |
| RP101K191B  | <b>3F</b> | 1.9V  |
| RP101K201B  | <b>3G</b> | 2.0V  |
| RP101K251B  | <b>3H</b> | 2.5V  |
| RP101K261B  | <b>3J</b> | 2.6V  |
| RP101K271B  | <b>3K</b> | 2.7V  |
| RP101K281B  | <b>3L</b> | 2.8V  |
| RP101K281B5 | <b>3M</b> | 2.85V |
| RP101K291B  | <b>3N</b> | 2.9V  |
| RP101K301B  | <b>3P</b> | 3.0V  |
| RP101K311B  | <b>3Q</b> | 3.1V  |
| RP101K331B  | <b>3R</b> | 3.3V  |
| RP101K211B  | <b>3S</b> | 2.1V  |
| RP101K231B  | <b>3T</b> | 2.3V  |
| RP101K241B  | <b>3U</b> | 2.4V  |
| RP101K321B  | <b>3V</b> | 3.2V  |
| RP101K221B  | <b>3W</b> | 2.2V  |

**RP101Kxx1D**

| Part Number | ①②        | Vset  |
|-------------|-----------|-------|
| RP101K121D  | <b>4A</b> | 1.2V  |
| RP101K131D  | <b>4B</b> | 1.3V  |
| RP101K151D  | <b>4C</b> | 1.5V  |
| RP101K181D  | <b>4D</b> | 1.8V  |
| RP101K181D5 | <b>4E</b> | 1.85V |
| RP101K191D  | <b>4F</b> | 1.9V  |
| RP101K201D  | <b>4G</b> | 2.0V  |
| RP101K251D  | <b>4H</b> | 2.5V  |
| RP101K261D  | <b>4J</b> | 2.6V  |
| RP101K271D  | <b>4K</b> | 2.7V  |
| RP101K281D  | <b>4L</b> | 2.8V  |
| RP101K281D5 | <b>4M</b> | 2.85V |
| RP101K291D  | <b>4N</b> | 2.9V  |
| RP101K301D  | <b>4P</b> | 3.0V  |
| RP101K311D  | <b>4Q</b> | 3.1V  |
| RP101K331D  | <b>4R</b> | 3.3V  |
| RP101K211D  | <b>4S</b> | 2.1V  |
| RP101K231D  | <b>4T</b> | 2.3V  |
| RP101K241D  | <b>4U</b> | 2.4V  |
| RP101K321D  | <b>4V</b> | 3.2V  |
| RP101K221D  | <b>4W</b> | 2.2V  |

# Power Dissipation (DFN(PLP)1612-4B)

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 Test 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-holes    | $\phi$ 0.54mm * 24pcs                         |

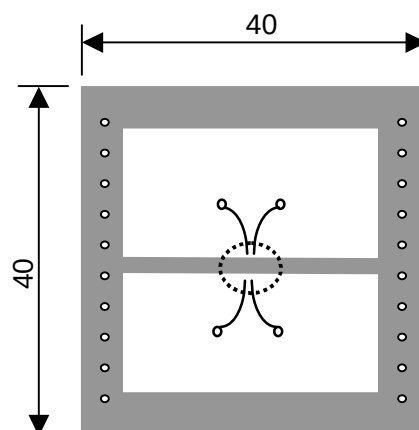
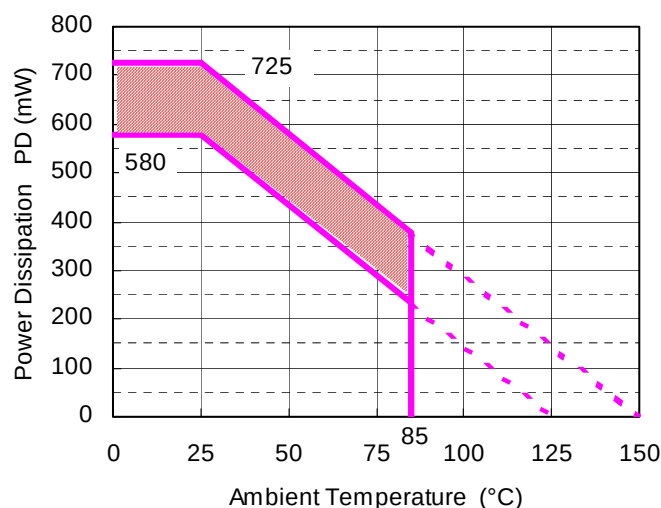
## Measurement Result

( $T_a=25^{\circ}\text{C}$ )

|                    | Standard Test Land Pattern                                                                                              |
|--------------------|-------------------------------------------------------------------------------------------------------------------------|
| Power Dissipation  | 580mW ( $T_{jmax}=125^{\circ}\text{C}$ )<br>725mW ( $T_{jmax}=150^{\circ}\text{C}$ )                                    |
| Thermal Resistance | $\theta_{ja} = (125-25^{\circ}\text{C}) / 0.58\text{W} = 172^{\circ}\text{C/W}$<br>$\theta_{jc} = 51^{\circ}\text{C/W}$ |

Power Dissipation

Measurent Board Pattern

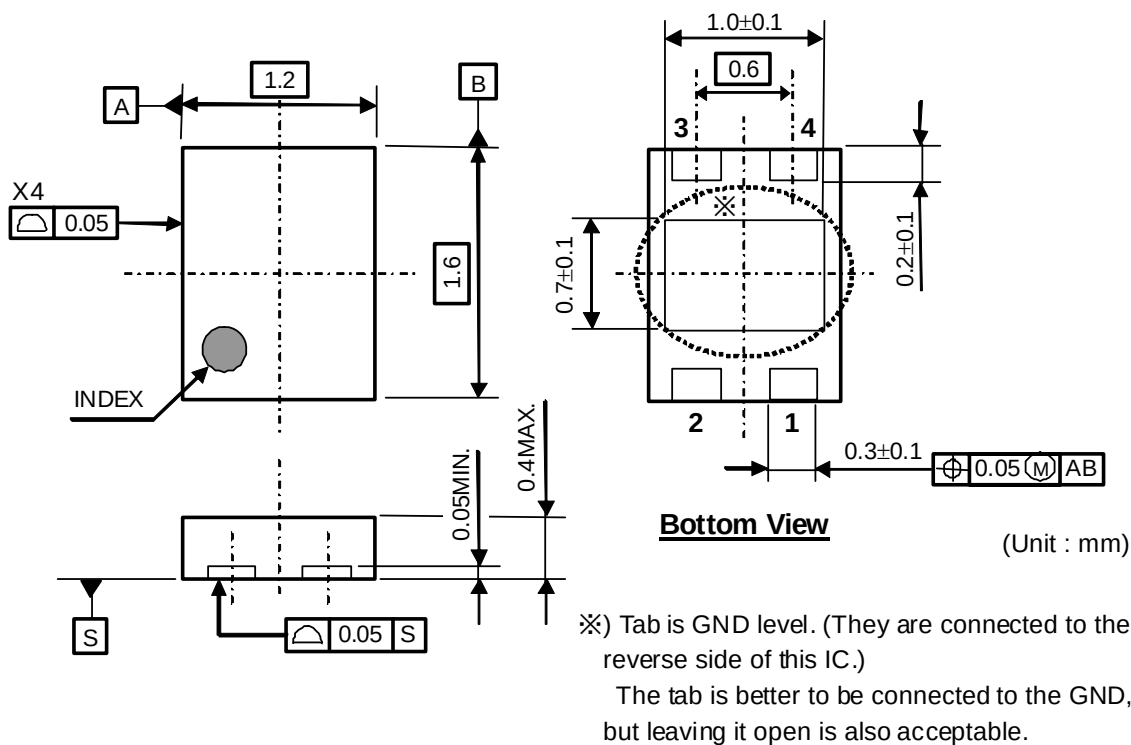


 IC Mount Area Unit : mm

\*The above graph shows the Power Dissipation of the package based on  $T_{jmax}=125^{\circ}\text{C}$  and  $T_{jmax}=150^{\circ}\text{C}$ . Operating the IC in the shaded area in the graph might have an influence it's lifetime. Operating time must be within the time limit described in the table below, in case of operating in the shaded area.

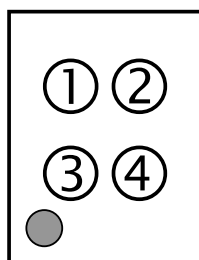
| Operating Time | Estimated years<br>(Operating four hours/day) |
|----------------|-----------------------------------------------|
| 13,000 hours   | 9years                                        |

Package Dimensions (DFN(PLP)1612-4B)



Mark Specification (DFN(PLP)1612-4B)

- ①② : Product Code ... **Please refer to the RP101Kxx2x Series Mark Specification Table.**
- ③④ : Lot Number ... Alphanumeric Serial Number



## RP101Kxx2x Series Mark Specification Table

PKG: DFN(PLP)1612-4B

**RP101Kxx2B**

| Part Number | ①②        | Vset  |
|-------------|-----------|-------|
| RP101K122B  | <b>5A</b> | 1.2V  |
| RP101K132B  | <b>5B</b> | 1.3V  |
| RP101K152B  | <b>5C</b> | 1.5V  |
| RP101K182B  | <b>5D</b> | 1.8V  |
| RP101K182B5 | <b>5E</b> | 1.85V |
| RP101K192B  | <b>5F</b> | 1.9V  |
| RP101K202B  | <b>5G</b> | 2.0V  |
| RP101K252B  | <b>5H</b> | 2.5V  |
| RP101K262B  | <b>5J</b> | 2.6V  |
| RP101K272B  | <b>5K</b> | 2.7V  |
| RP101K282B  | <b>5L</b> | 2.8V  |
| RP101K282B5 | <b>5M</b> | 2.85V |
| RP101K292B  | <b>5N</b> | 2.9V  |
| RP101K302B  | <b>5P</b> | 3.0V  |
| RP101K312B  | <b>5Q</b> | 3.1V  |
| RP101K332B  | <b>5R</b> | 3.3V  |
| RP101K212B  | <b>5S</b> | 2.1V  |
| RP101K232B  | <b>5T</b> | 2.3V  |
| RP101K242B  | <b>5U</b> | 2.4V  |
| RP101K322B  | <b>5V</b> | 3.2V  |
| RP101K222B  | <b>5W</b> | 2.2V  |

**RP101Kxx2D**

| Part Number | ①②        | Vset  |
|-------------|-----------|-------|
| RP101K122D  | <b>6A</b> | 1.2V  |
| RP101K132D  | <b>6B</b> | 1.3V  |
| RP101K152D  | <b>6C</b> | 1.5V  |
| RP101K182D  | <b>6D</b> | 1.8V  |
| RP101K182D5 | <b>6E</b> | 1.85V |
| RP101K1921D | <b>6F</b> | 1.9V  |
| RP101K202D  | <b>6G</b> | 2.0V  |
| RP101K252D  | <b>6H</b> | 2.5V  |
| RP101K262D  | <b>6J</b> | 2.6V  |
| RP101K272D  | <b>6K</b> | 2.7V  |
| RP101K282D  | <b>6L</b> | 2.8V  |
| RP101K282D5 | <b>6M</b> | 2.85V |
| RP101K292D  | <b>6N</b> | 2.9V  |
| RP101K302D  | <b>6P</b> | 3.0V  |
| RP101K312D  | <b>6Q</b> | 3.1V  |
| RP101K332D  | <b>6R</b> | 3.3V  |
| RP101K212D  | <b>6S</b> | 2.1V  |
| RP101K232D  | <b>6T</b> | 2.3V  |
| RP101K242D  | <b>6U</b> | 2.4V  |
| RP101K322D  | <b>6V</b> | 3.2V  |
| RP101K222D  | <b>6W</b> | 2.2V  |

Power Dissipation (SOT-23-5)

Power Dissipation (P<sub>D</sub>) 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.)

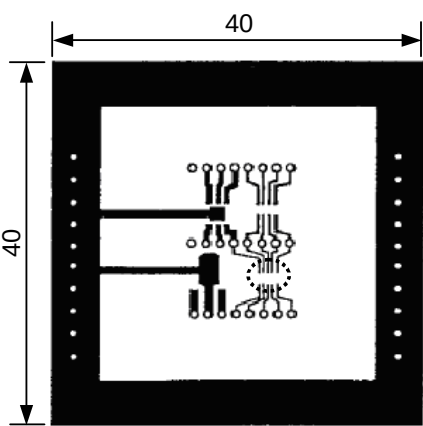
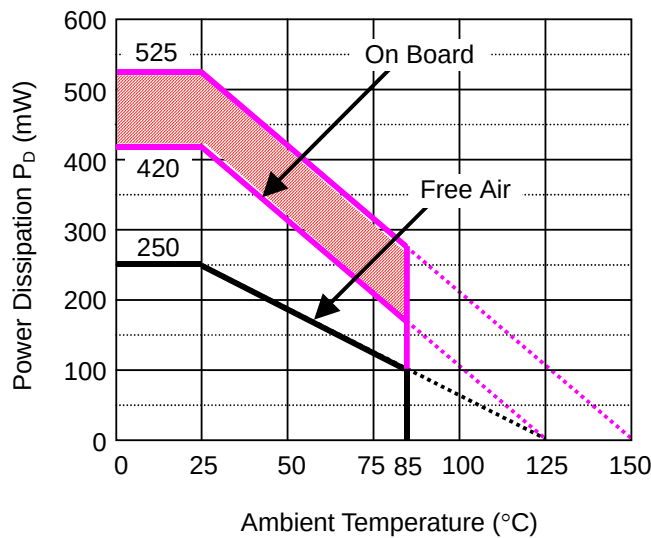
Measurement Conditions

|                  |                                               |
|------------------|-----------------------------------------------|
|                  | Standard Test 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-holes    | φ 0.5mm * 44pcs                               |

Measurement Result

(Ta=25°C)

|                    |                                          |                    |
|--------------------|------------------------------------------|--------------------|
|                    | Standard Test Land Pattern               | Free Air           |
| Power Dissipation  | 420mW(Tjmax=125°C)<br>525mW(Tjmax=150°C) | 250mW(Tjmax=125°C) |
| Thermal Resistance | θja = (125-25°C)/0.42W= 238°C/W          | 400°C/W            |



Measurement Board Pattern

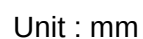
○ IC Mount Area (Unit: mm)

Power Dissipation

\*The above graph shows the Power Dissipation of the package based on Tjmax=125°C and Tjmax=150°C. Operating the IC in the shaded area in the graph might have an influence it's lifetime. Operating time must be within the time limit described in the table below, in case of operating in the shaded area.

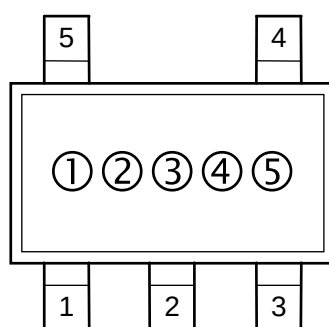
|                |                                               |
|----------------|-----------------------------------------------|
| Operating Time | Estimated years<br>(Operating four hours/day) |
| 9,000 hours    | 6years                                        |

### Package Dimensions (SOT-23-5)



### Mark Specification (SOT-23-5)

- ①②③ : Product Code ... **Please refer to the RP101N Series Mark Specification Table.**  
④⑤ : Lot Number ... Alphanumeric Serial Number



## RP101N Series Mark Specification Table

PKG: SOT-23-5

**RP101NxxxB**

| Part Number | ①②③        | Vset  |
|-------------|------------|-------|
| RP101N121B  | <b>70A</b> | 1.2V  |
| RP101N131B  | <b>70B</b> | 1.3V  |
| RP101N151B  | <b>70C</b> | 1.5V  |
| RP101N181B  | <b>70D</b> | 1.8V  |
| RP101N181B5 | <b>70E</b> | 1.85V |
| RP101N191B  | <b>70F</b> | 1.9V  |
| RP101N201B  | <b>70G</b> | 2.0V  |
| RP101N251B  | <b>70H</b> | 2.5V  |
| RP101N261B  | <b>70J</b> | 2.6V  |
| RP101N271B  | <b>70K</b> | 2.7V  |
| RP101N281B  | <b>70L</b> | 2.8V  |
| RP101N281B5 | <b>70M</b> | 2.85V |
| RP101N291B  | <b>70N</b> | 2.9V  |
| RP101N301B  | <b>70P</b> | 3.0V  |
| RP101N311B  | <b>70Q</b> | 3.1V  |
| RP101N331B  | <b>70R</b> | 3.3V  |
| RP101N211B  | <b>70S</b> | 2.1V  |
| RP101N231B  | <b>70T</b> | 2.3V  |
| RP101N241B  | <b>70U</b> | 2.4V  |
| RP101N321B  | <b>70V</b> | 3.2V  |
| RP101N221B  | <b>70W</b> | 2.2V  |

**RP101NxxxD**

| Part Number | ①②③        | Vset  |
|-------------|------------|-------|
| RP101N121D  | <b>71A</b> | 1.2V  |
| RP101N131D  | <b>71B</b> | 1.3V  |
| RP101N151D  | <b>71C</b> | 1.5V  |
| RP101N181D  | <b>71D</b> | 1.8V  |
| RP101N181D5 | <b>71E</b> | 1.85V |
| RP101N191D  | <b>71F</b> | 1.9V  |
| RP101N201D  | <b>71G</b> | 2.0V  |
| RP101N251D  | <b>71H</b> | 2.5V  |
| RP101N261D  | <b>71J</b> | 2.6V  |
| RP101N271D  | <b>71K</b> | 2.7V  |
| RP101N281D  | <b>71L</b> | 2.8V  |
| RP101N281D5 | <b>71M</b> | 2.85V |
| RP101N291D  | <b>71N</b> | 2.9V  |
| RP101N301D  | <b>71P</b> | 3.0V  |
| RP101N311D  | <b>71Q</b> | 3.1V  |
| RP101N331D  | <b>71R</b> | 3.3V  |
| RP101N211D  | <b>71S</b> | 2.1V  |
| RP101N231D  | <b>71T</b> | 2.3V  |
| RP101N241D  | <b>71U</b> | 2.4V  |
| RP101N321D  | <b>71V</b> | 3.2V  |
| RP101N221D  | <b>71W</b> | 2.2V  |





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