

### 300mA LDO REGULATOR

NO. EA-236-141222

#### OUTLINE

The RP114x Series are CMOS-based voltage regulator ICs with high output voltage accuracy, low supply current, low dropout, and high ripple rejection. Each of these voltage regulator ICs consists of a voltage reference unit, an error amplifier, resistors for setting output voltage, a short current limit circuit, a chip enable circuit, and so on.

RP114x features a minimum input voltage from 1.4V and the output voltage, which can be set from 0.8V to 3.6V (in 0.1V step). The output voltage of these ICs is internally fixed.

These ICs perform with low dropout voltage due to built-in transistor with low ON resistance. Low supply current and a chip enable function prolong the battery life of each system. The ripple rejection, line transient response and load transient response of the RP114x Series are excellent, thus these ICs are very suitable for the power supply for hand-held communication equipment.

Since the packages for these ICs are DFN(PLP)1010-4, SC-88A, SOT-23-5, therefore high density mounting of the ICs on boards is possible.

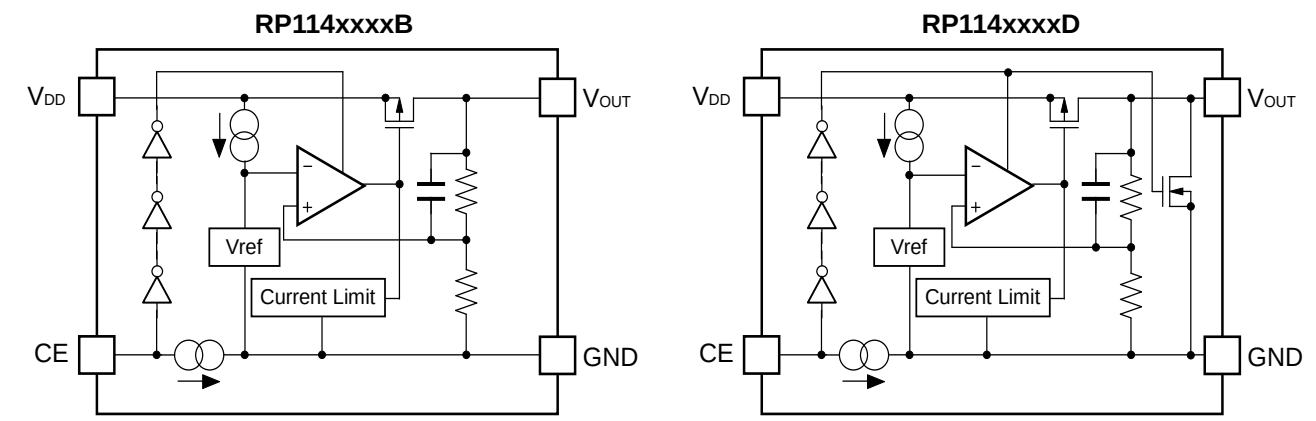
#### FEATURES

- Supply Current ..... Typ. 50 $\mu$ A
- Standby Current ..... Typ. 0.1 $\mu$ A
- Input Voltage Range ..... 1.4V to 5.25V
- Output Voltage Range ..... 0.8V to 3.6V (0.1V steps)  
(For other voltages, please refer to *Mark Specification Table*).
- Output Voltage Accuracy .....  $\pm 1.0\%$  ( $V_{SET} > 2.0V$ ,  $T_{opt} = 25^{\circ}C$ )
- Temperature-Drift Coefficient of Output Voltage ..... Typ.  $\pm 80ppm/^{\circ}C$
- Dropout Voltage ..... Typ. 0.25V ( $I_{OUT} = 300mA$ ,  $V_{SET} = 2.8V$ )
- Ripple Rejection ..... Typ. 75dB ( $f = 1kHz$ )
- Line Regulation ..... Typ. 0.02%/V
- Packages ..... DFN(PLP)1010-4, SC-88A, SOT-23-5
- Built-in Fold Back Protection Circuit ..... Typ. 60mA (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.

**BLOCK DIAGRAMS**



**SELECTION GUIDE**

The set output voltage, the auto discharge function, and the package type for the ICs are user-selectable options.

| Product Name        | Package        | Quantity per Reel | Pb Free | Halogen Free |
|---------------------|----------------|-------------------|---------|--------------|
| RP114Kxx1*(y)-TR    | DFN(PLP)1010-4 | 10,000 pcs        | Yes     | Yes          |
| RP114Qxx2*(y)-TR-FE | SC-88A         | 3,000 pcs         | Yes     | Yes          |
| RP114Nxx1*(y)-TR-FE | SOT-23-5       | 3,000 pcs         | Yes     | Yes          |

xx: Specify the set output voltage within the range of 0.8 V (08) to 3.6 V (36) in 0.1 V step.

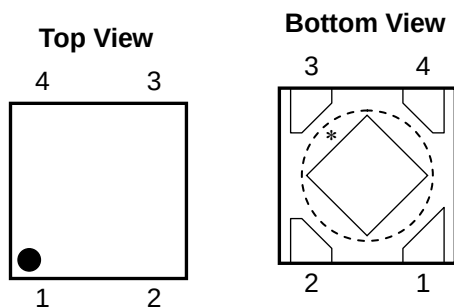
(y): If the output voltage includes the 3rd digit, indicate the digit of 0.01V.  
 (1.05 V, 1.15 V, 1.25 V, 1.35 V, 1.75 V, 1.85 V, 2.85 V, 3.45 V)  
 Ex. If the output voltage is 1.25V, RP114K121\*5-TR  
 If the output voltage is 1.85V, RP114K181\*5-TR

\*: Specify a combination of the CE pin polarity and the auto-discharge function.  
 (B) "H" Active, without Auto-Discharge function  
 (D) "H" Active, with Auto-Discharge function

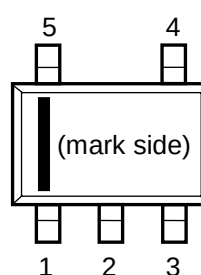
Auto-Discharge function quickly lowers the output voltage to 0V by releasing the electrical charge in the external capacitor when the chip enable signal is switched from the active mode to the standby mode.

## PIN DESCRIPTIONS

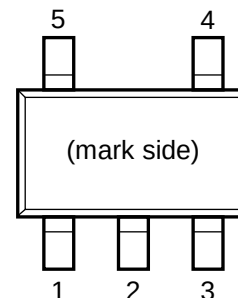
### • DFN(PLP)1010-4



### • SC-88A



### • SOT-23-5



### • DFN(PLP)1010-4

| 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.

### • SC-88A

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

### • 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                   |

## 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                      | 400                    | mA                 |
| $P_D$     | Power Dissipation (DFN(PLP)1010-4)* | 400                    | mW                 |
|           | Power Dissipation (SC-88A)*         | 380                    |                    |
|           | Power Dissipation (SOT-23-5)*       | 420                    |                    |
| $T_{opt}$ | Operating Temperature Range         | $-40$ to $85$          | $^{\circ}\text{C}$ |
| $T_{stg}$ | Storage Temperature Range           | $-55$ to $125$         | $^{\circ}\text{C}$ |

\*) 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.

### 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.

## ELECTRICAL CHARACTERISTICS

### • RP114x

$V_{IN}=V_{SET}+1.0V$  ( $V_{SET} > 1.5V$ ),  $V_{IN}=2.5V$  ( $V_{SET} \leq 1.5V$ ),  $I_{OUT}=1mA$ ,  $C_{IN}=C_{OUT}=1.0\mu F$ , unless otherwise noted.

$V_{SET}$  is Set Output Voltage.

The specifications in   are guaranteed by design engineering at  $-40^{\circ}C \leq T_a \leq 85^{\circ}C$ .

### RP114xxxxB/D

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

| Symbol                            | Item                                          | Conditions                                                                                                         | Min.                                                              | Typ.                                                                | Max.                                                                | Unit             |
|-----------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|------------------|
| $V_{OUT}$                         | Output Voltage                                | $T_a=25^{\circ}C$                                                                                                  | $V_{SET} > 2.0V$                                                  | $\times 0.99$                                                       | $\times 1.01$                                                       | V                |
|                                   |                                               |                                                                                                                    | $V_{SET} \leq 2.0V$                                               | -20                                                                 | +20                                                                 | mV               |
|                                   |                                               | $-40^{\circ}C \leq T_a \leq 85^{\circ}C$                                                                           | $V_{SET} > 2.0V$                                                  | <span style="border: 1px solid black; padding: 0 2px;">×0.97</span> | <span style="border: 1px solid black; padding: 0 2px;">×1.03</span> | V                |
|                                   |                                               |                                                                                                                    | $V_{SET} \leq 2.0V$                                               | <span style="border: 1px solid black; padding: 0 2px;">-60</span>   | <span style="border: 1px solid black; padding: 0 2px;">+60</span>   | mV               |
| $I_{OUT}$                         | Output Current                                |                                                                                                                    | <span style="border: 1px solid black; padding: 0 2px;">300</span> |                                                                     |                                                                     | mA               |
| $\Delta V_{OUT} / \Delta I_{OUT}$ | Load Regulation                               | $1mA \leq I_{OUT} \leq 300mA$                                                                                      |                                                                   | 15                                                                  | <span style="border: 1px solid black; padding: 0 2px;">40</span>    | mV               |
| $V_{DIF}$                         | Dropout Voltage                               | Please refer to <i>Dropout Voltage</i> shown on the next page.                                                     |                                                                   |                                                                     |                                                                     |                  |
| $I_{SS}$                          | Supply Current                                | $I_{OUT} = 0mA$                                                                                                    |                                                                   | 50                                                                  | <span style="border: 1px solid black; padding: 0 2px;">75</span>    | $\mu A$          |
| $I_{standby}$                     | Standby Current                               | $V_{CE} = 0V$                                                                                                      |                                                                   | 0.1                                                                 | 1.0                                                                 | $\mu A$          |
| $\Delta V_{OUT} / \Delta V_{IN}$  | Line Regulation                               | $V_{SET}+0.5V \leq V_{IN} \leq 5.25V$<br>( $V_{IN} \geq 1.4V$ )                                                    |                                                                   | 0.02                                                                | <span style="border: 1px solid black; padding: 0 2px;">0.10</span>  | %/V              |
| RR                                | Ripple Rejection                              | $f=1kHz$<br>Ripple 0.2Vp-p<br>$V_{IN}=V_{SET}+1V$<br>$I_{OUT}=30mA$<br>(When $V_{SET} \leq 2.0V$ , $V_{IN}=3.0V$ ) |                                                                   | 75                                                                  |                                                                     | dB               |
| $V_{IN}$                          | Input Voltage <sup>*2</sup>                   |                                                                                                                    | <span style="border: 1px solid black; padding: 0 2px;">1.4</span> |                                                                     | <span style="border: 1px solid black; padding: 0 2px;">5.25</span>  | V                |
| $\Delta V_{OUT} / \Delta T_a$     | Output Voltage Temperature Coefficient        | $-40^{\circ}C \leq T_a \leq 85^{\circ}C$                                                                           |                                                                   | $\pm 80$                                                            |                                                                     | ppm/ $^{\circ}C$ |
| $I_{SC}$                          | Short Current Limit                           | $V_{OUT}=0V$                                                                                                       |                                                                   | 60                                                                  |                                                                     | mA               |
| $I_{PD}$                          | CE Pull-down Current                          |                                                                                                                    |                                                                   | 0.3                                                                 | <span style="border: 1px solid black; padding: 0 2px;">0.6</span>   | $\mu A$          |
| $V_{CEH}$                         | CE Input Voltage "H"                          |                                                                                                                    | <span style="border: 1px solid black; padding: 0 2px;">1.0</span> |                                                                     |                                                                     | V                |
| $V_{CEL}$                         | CE Input Voltage "L"                          |                                                                                                                    |                                                                   |                                                                     | <span style="border: 1px solid black; padding: 0 2px;">0.4</span>   | V                |
| en                                | Output Noise                                  | BW=10Hz to 100kHz<br>$I_{OUT}=30mA$                                                                                |                                                                   | 75                                                                  |                                                                     | $\mu V_{rms}$    |
| $R_{LOW}$                         | LOW Output Nch On Resistance (D version only) | $V_{IN}=4.0V$<br>$V_{CE}=0V$                                                                                       |                                                                   | 50                                                                  |                                                                     | $\Omega$         |

All test items listed under *Electrical Characteristics* are done under the pulse load condition ( $T_j \approx T_a=25^{\circ}C$ ) except for Output Noise, Ripple Rejection, and Output Voltage Temperature Coefficient.

<sup>\*2</sup> The maximum input voltage listed under *Electrical Characteristics* is 5.25V. If, for any reason the input voltage exceeds 5.25V, it has to be no more than 5.5V with 500hrs of the total operating time.

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**RP114x**

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NO. EA-236-141222

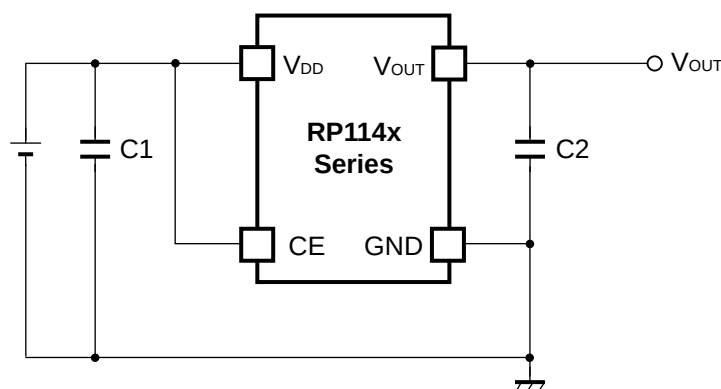
The specifications in   are guaranteed by design engineering at  $-40^{\circ}\text{C} \leq T_a \leq 85^{\circ}\text{C}$ .

**Dropout Voltage by Set Output Voltage**

(Ta=25°C)

| Set Output Voltage<br>$V_{\text{SET}}$ (V) | Dropout Voltage $V_{\text{DIF}}$ (V) |       |                                                                     |
|--------------------------------------------|--------------------------------------|-------|---------------------------------------------------------------------|
|                                            | Condition                            | Typ.  | Max.                                                                |
| $V_{\text{SET}}=0.8$                       | $I_{\text{OUT}}=300\text{mA}$        | 0.560 | <span style="border: 1px solid black; padding: 0 5px;">0.720</span> |
| $V_{\text{SET}}=0.9$                       |                                      | 0.510 | <span style="border: 1px solid black; padding: 0 5px;">0.650</span> |
| $1.0 \leq V_{\text{SET}} < 1.2$            |                                      | 0.460 | <span style="border: 1px solid black; padding: 0 5px;">0.590</span> |
| $1.2 \leq V_{\text{SET}} < 1.4$            |                                      | 0.390 | <span style="border: 1px solid black; padding: 0 5px;">0.500</span> |
| $1.4 \leq V_{\text{SET}} < 1.7$            |                                      | 0.350 | <span style="border: 1px solid black; padding: 0 5px;">0.440</span> |
| $1.7 \leq V_{\text{SET}} < 2.1$            |                                      | 0.300 | <span style="border: 1px solid black; padding: 0 5px;">0.390</span> |
| $2.1 \leq V_{\text{SET}} < 2.5$            |                                      | 0.260 | <span style="border: 1px solid black; padding: 0 5px;">0.340</span> |
| $2.5 \leq V_{\text{SET}} < 3.0$            |                                      | 0.250 | <span style="border: 1px solid black; padding: 0 5px;">0.300</span> |
| $3.0 \leq V_{\text{SET}} \leq 3.6$         |                                      | 0.220 | <span style="border: 1px solid black; padding: 0 5px;">0.290</span> |

## TYPICAL APPLICATIONS



(External Components)

C2 Ceramic 1.0 $\mu$ F MURATA: GRM155B31A105KE15

## 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 1.0 $\mu$ F or more and good ESR (Equivalent Series Resistance).

(Note: If additional ceramic capacitors are connected with parallel to the output pin with an output capacitor for phase compensation, the operation might be unstable. Because of this, test these ICs with as same external components as ones to be used on the PCB.)

### PCB Layout

Make  $V_{DD}$  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 1.0 $\mu$ F or more between  $V_{DD}$  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.

PACKAGE INFORMATION

Power Dissipation (DFN(PLP)1010-4)

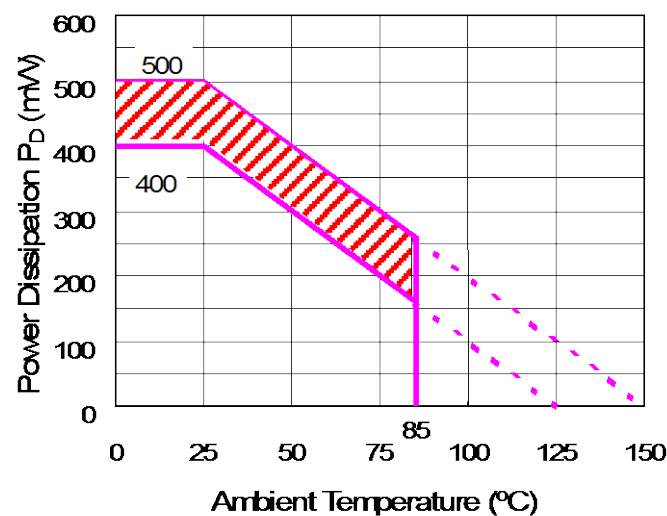
Power Dissipation (P<sub>D</sub>) depends on conditions of mounting on board. This specification is based on the Measurement Conditions below.

Measurement Conditions

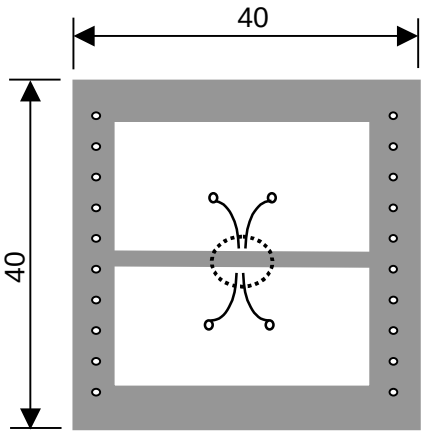
|                  |                                               |
|------------------|-----------------------------------------------|
|                  | Standard Land Pattern                         |
| Environment      | Mounting on Board (Wind Velocity=0m/s)        |
| Board Material   | Glass Cloth Epoxy Plastic (Double-sided)      |
| Board Dimensions | 40mm x 40mm x 1.6mm                           |
| Copper Ratio     | Top-side: Approx. 50%, Back-side: Approx. 50% |
| Through-hole     | φ 0.54mm x 24pcs                              |

Measurement Result (Ta=25°C)

|                    |                                             |
|--------------------|---------------------------------------------|
|                    | Standard Land Pattern                       |
| Power Dissipation  | 400mW (Tjmax=125°C)<br>500mW (Tjmax=150°C)  |
| Thermal Resistance | θja=(125-25°C)/0.4W=250 °C/W<br>θjc=67 °C/W |



Power Dissipation



Measurement Board Pattern

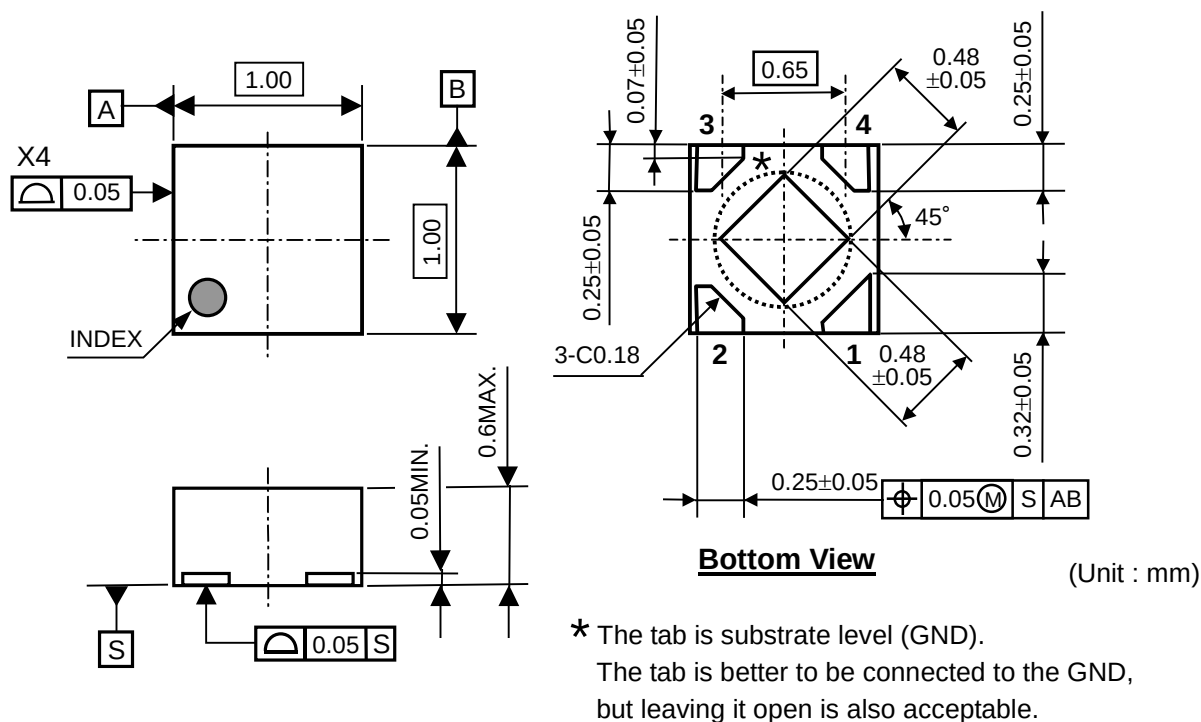
○ IC Mount Area (Unit: mm)

Note: The above graph shows the power dissipation of the package based on Tjmax=125°C and Tjmax=150°C. Operating the IC within the shaded area in the graph might have an influence on its lifetime.  
Operating time must be within the time limit described in the table below.

|                |                                           |
|----------------|-------------------------------------------|
| Operating Time | Estimated Years<br>(Operating 4 hrs/ day) |
| 13,000 hours   | 9 Years                                   |

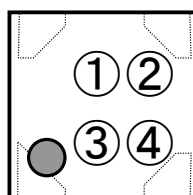


# Package Dimensions (DFN(PLP)1010-4)



# Mark Specification (DFN(PLP)1010-4)

- ①②: Product Code .....Please refer to RP114K Mark Specification Table.
- ③④: Lot Number .....Alphanumeric Serial Number



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**RP114x**

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NO. EA-236-141222

**Mark Specification Table (DFN(PLP)1010-4)****RP114Kxx1B**

| Product Name | ①②         | V <sub>SET</sub> |
|--------------|------------|------------------|
| RP114K081B   | <b>L 0</b> | 0.8V             |
| RP114K091B   | <b>L 1</b> | 0.9V             |
| RP114K101B   | <b>L 2</b> | 1.0V             |
| RP114K111B   | <b>L 3</b> | 1.1V             |
| RP114K121B   | <b>L 4</b> | 1.2V             |
| RP114K131B   | <b>L 5</b> | 1.3V             |
| RP114K141B   | <b>L 6</b> | 1.4V             |
| RP114K151B   | <b>L 7</b> | 1.5V             |
| RP114K161B   | <b>L 8</b> | 1.6V             |
| RP114K171B   | <b>L 9</b> | 1.7V             |
| RP114K181B   | <b>M 0</b> | 1.8V             |
| RP114K191B   | <b>M 1</b> | 1.9V             |
| RP114K201B   | <b>M 2</b> | 2.0V             |
| RP114K211B   | <b>M 3</b> | 2.1V             |
| RP114K221B   | <b>M 4</b> | 2.2V             |
| RP114K231B   | <b>M 5</b> | 2.3V             |
| RP114K241B   | <b>M 6</b> | 2.4V             |
| RP114K251B   | <b>M 7</b> | 2.5V             |
| RP114K261B   | <b>M 8</b> | 2.6V             |
| RP114K271B   | <b>M 9</b> | 2.7V             |
| RP114K281B   | <b>N 0</b> | 2.8V             |
| RP114K291B   | <b>N 1</b> | 2.9V             |
| RP114K301B   | <b>N 2</b> | 3.0V             |
| RP114K311B   | <b>N 3</b> | 3.1V             |
| RP114K321B   | <b>N 4</b> | 3.2V             |
| RP114K331B   | <b>N 5</b> | 3.3V             |
| RP114K341B   | <b>N 6</b> | 3.4V             |
| RP114K351B   | <b>N 7</b> | 3.5V             |
| RP114K361B   | <b>N 8</b> | 3.6V             |
| RP114K121B5  | <b>N 9</b> | 1.25V            |
| RP114K181B5  | <b>P 0</b> | 1.85V            |
| RP114K281B5  | <b>P 1</b> | 2.85V            |
| RP114K341B5  | <b>P 2</b> | 3.45V            |
| RP114K101B5  | <b>P 3</b> | 1.05V            |
| RP114K171B5  | <b>P 4</b> | 1.75V            |
| RP114K111B5  | <b>P 5</b> | 1.15V            |
| RP114K131B5  | <b>P 6</b> | 1.35V            |

**RP114Kxx1D**

| Product Name | ①②         | V <sub>SET</sub> |
|--------------|------------|------------------|
| RP114K081D   | <b>Q 0</b> | 0.8V             |
| RP114K091D   | <b>Q 1</b> | 0.9V             |
| RP114K101D   | <b>Q 2</b> | 1.0V             |
| RP114K111D   | <b>Q 3</b> | 1.1V             |
| RP114K121D   | <b>Q 4</b> | 1.2V             |
| RP114K131D   | <b>Q 5</b> | 1.3V             |
| RP114K141D   | <b>Q 6</b> | 1.4V             |
| RP114K151D   | <b>Q 7</b> | 1.5V             |
| RP114K161D   | <b>Q 8</b> | 1.6V             |
| RP114K171D   | <b>Q 9</b> | 1.7V             |
| RP114K181D   | <b>R 0</b> | 1.8V             |
| RP114K191D   | <b>R 1</b> | 1.9V             |
| RP114K201D   | <b>R 2</b> | 2.0V             |
| RP114K211D   | <b>R 3</b> | 2.1V             |
| RP114K221D   | <b>R 4</b> | 2.2V             |
| RP114K231D   | <b>R 5</b> | 2.3V             |
| RP114K241D   | <b>R 6</b> | 2.4V             |
| RP114K251D   | <b>R 7</b> | 2.5V             |
| RP114K261D   | <b>R 8</b> | 2.6V             |
| RP114K271D   | <b>R 9</b> | 2.7V             |
| RP114K281D   | <b>S 0</b> | 2.8V             |
| RP114K291D   | <b>S 1</b> | 2.9V             |
| RP114K301D   | <b>S 2</b> | 3.0V             |
| RP114K311D   | <b>S 3</b> | 3.1V             |
| RP114K321D   | <b>S 4</b> | 3.2V             |
| RP114K331D   | <b>S 5</b> | 3.3V             |
| RP114K341D   | <b>S 6</b> | 3.4V             |
| RP114K351D   | <b>S 7</b> | 3.5V             |
| RP114K361D   | <b>S 8</b> | 3.6V             |
| RP114K121D5  | <b>S 9</b> | 1.25V            |
| RP114K181D5  | <b>T 0</b> | 1.85V            |
| RP114K281D5  | <b>T 1</b> | 2.85V            |
| RP114K341D5  | <b>T 2</b> | 3.45V            |
| RP114K101D5  | <b>T 3</b> | 1.05V            |
| RP114K171D5  | <b>T 4</b> | 1.75V            |
| RP114K111D5  | <b>T 5</b> | 1.15V            |
| RP114K131D5  | <b>T 6</b> | 1.35V            |

## Power Dissipation (SC-88A)

Power Dissipation ( $P_D$ ) depends on conditions of mounting on board. This specification is based on the Measurement Conditions below.

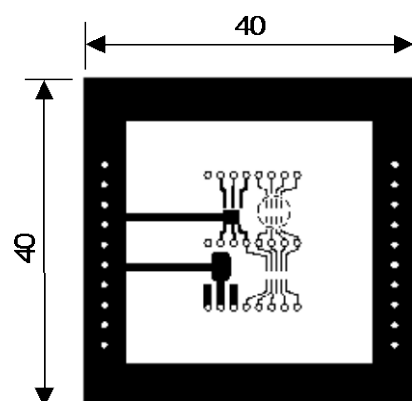
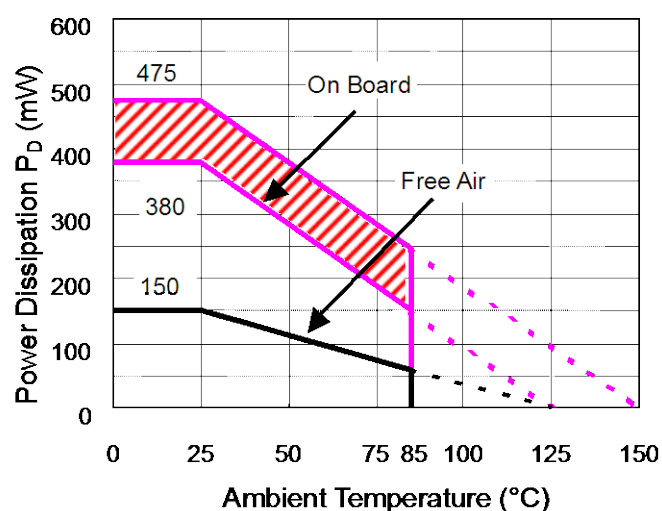
### Measurement Conditions

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

### Measurement Result

( $T_a=25^{\circ}\text{C}$ ,  $T_{j\text{max}}=125^{\circ}\text{C}$ )

|                    | Standard Land Pattern                                                     | Free Air                                                                  |
|--------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Power Dissipation  | 380mW                                                                     | 150mW                                                                     |
| Thermal Resistance | $\theta_{ja}=(125-25^{\circ}\text{C})/0.38\text{W}=263^{\circ}\text{C/W}$ | $\theta_{ja}=(125-25^{\circ}\text{C})/0.15\text{W}=667^{\circ}\text{C/W}$ |
|                    | $\theta_{jc}=75^{\circ}\text{C/W}$                                        | -                                                                         |



Measurement Board Pattern

○ IC Mount Area (Unit: mm)

### Power Dissipation

Note: The above graph shows the power dissipation of the package based on  $T_{j\text{max}}=125^{\circ}\text{C}$  and  $T_{j\text{max}}=150^{\circ}\text{C}$ .

Operating the IC within the shaded area in the graph might have an influence on its lifetime.

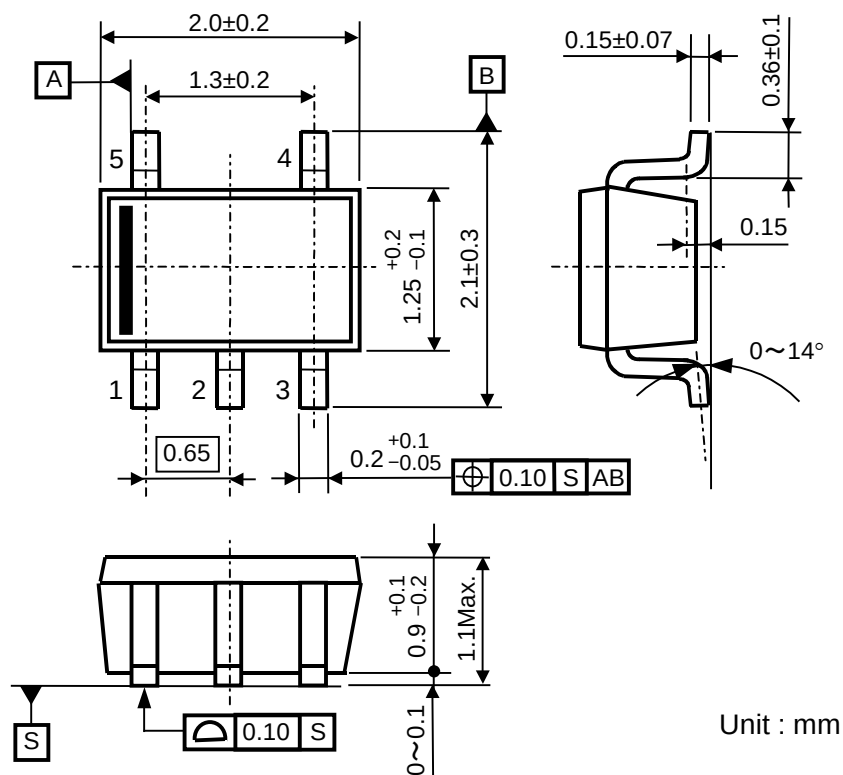
Operating time must be within the time limit described in the table below.

| Operating Time | Estimated Years<br>(Operating 4 hrs/ day) |
|----------------|-------------------------------------------|
| 13,000 hours   | 9 Years                                   |

## RP114x

NO. EA-236-141222

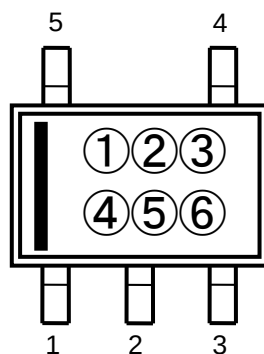
### Package Dimensions (SC-88A)



### Mark Specification (SC-88A)

①②③④: Product Code .. **Please refer to RP114Q Mark Specification Table.**

⑤⑥: Lot Number .... Alphanumeric Serial Number



**Mark Specification Table (SC-88A)**
**RP114Qxx2B**

| Product Name | ①②③④           | V <sub>SET</sub> |
|--------------|----------------|------------------|
| RP114Q082B   | <b>A G 0 8</b> | 0.8V             |
| RP114Q092B   | <b>A G 0 9</b> | 0.9V             |
| RP114Q102B   | <b>A G 1 0</b> | 1.0V             |
| RP114Q112B   | <b>A G 1 1</b> | 1.1V             |
| RP114Q122B   | <b>A G 1 2</b> | 1.2V             |
| RP114Q132B   | <b>A G 1 3</b> | 1.3V             |
| RP114Q142B   | <b>A G 1 4</b> | 1.4V             |
| RP114Q152B   | <b>A G 1 5</b> | 1.5V             |
| RP114Q162B   | <b>A G 1 6</b> | 1.6V             |
| RP114Q172B   | <b>A G 1 7</b> | 1.7V             |
| RP114Q182B   | <b>A G 1 8</b> | 1.8V             |
| RP114Q192B   | <b>A G 1 9</b> | 1.9V             |
| RP114Q202B   | <b>A G 2 0</b> | 2.0V             |
| RP114Q212B   | <b>A G 2 1</b> | 2.1V             |
| RP114Q222B   | <b>A G 2 2</b> | 2.2V             |
| RP114Q232B   | <b>A G 2 3</b> | 2.3V             |
| RP114Q242B   | <b>A G 2 4</b> | 2.4V             |
| RP114Q252B   | <b>A G 2 5</b> | 2.5V             |
| RP114Q262B   | <b>A G 2 6</b> | 2.6V             |
| RP114Q272B   | <b>A G 2 7</b> | 2.7V             |
| RP114Q282B   | <b>A G 2 8</b> | 2.8V             |
| RP114Q292B   | <b>A G 2 9</b> | 2.9V             |
| RP114Q302B   | <b>A G 3 0</b> | 3.0V             |
| RP114Q312B   | <b>A G 3 1</b> | 3.1V             |
| RP114Q322B   | <b>A G 3 2</b> | 3.2V             |
| RP114Q332B   | <b>A G 3 3</b> | 3.3V             |
| RP114Q342B   | <b>A G 3 4</b> | 3.4V             |
| RP114Q352B   | <b>A G 3 5</b> | 3.5V             |
| RP114Q362B   | <b>A G 3 6</b> | 3.6V             |
| RP114Q122B5  | <b>A G 3 7</b> | 1.25V            |
| RP114Q182B5  | <b>A G 3 8</b> | 1.85V            |
| RP114Q282B5  | <b>A G 3 9</b> | 2.85V            |
| RP114Q342B5  | <b>A G 4 0</b> | 3.45V            |
| RP114Q102B5  | <b>A G 4 1</b> | 1.05V            |

**RP114Qxx2D**

| Product Name | ①②③④           | V <sub>SET</sub> |
|--------------|----------------|------------------|
| RP114Q082D   | <b>A H 0 8</b> | 0.8V             |
| RP114Q092D   | <b>A H 0 9</b> | 0.9V             |
| RP114Q102D   | <b>A H 1 0</b> | 1.0V             |
| RP114Q112D   | <b>A H 1 1</b> | 1.1V             |
| RP114Q122D   | <b>A H 1 2</b> | 1.2V             |
| RP114Q132D   | <b>A H 1 3</b> | 1.3V             |
| RP114Q142D   | <b>A H 1 4</b> | 1.4V             |
| RP114Q152D   | <b>A H 1 5</b> | 1.5V             |
| RP114Q162D   | <b>A H 1 6</b> | 1.6V             |
| RP114Q172D   | <b>A H 1 7</b> | 1.7V             |
| RP114Q182D   | <b>A H 1 8</b> | 1.8V             |
| RP114Q192D   | <b>A H 1 9</b> | 1.9V             |
| RP114Q202D   | <b>A H 2 0</b> | 2.0V             |
| RP114Q212D   | <b>A H 2 1</b> | 2.1V             |
| RP114Q222D   | <b>A H 2 2</b> | 2.2V             |
| RP114Q232D   | <b>A H 2 3</b> | 2.3V             |
| RP114Q242D   | <b>A H 2 4</b> | 2.4V             |
| RP114Q252D   | <b>A H 2 5</b> | 2.5V             |
| RP114Q262D   | <b>A H 2 6</b> | 2.6V             |
| RP114Q272D   | <b>A H 2 7</b> | 2.7V             |
| RP114Q282D   | <b>A H 2 8</b> | 2.8V             |
| RP114Q292D   | <b>A H 2 9</b> | 2.9V             |
| RP114Q302D   | <b>A H 3 0</b> | 3.0V             |
| RP114Q312D   | <b>A H 3 1</b> | 3.1V             |
| RP114Q322D   | <b>A H 3 2</b> | 3.2V             |
| RP114Q332D   | <b>A H 3 3</b> | 3.3V             |
| RP114Q342D   | <b>A H 3 4</b> | 3.4V             |
| RP114Q352D   | <b>A H 3 5</b> | 3.5V             |
| RP114Q362D   | <b>A H 3 6</b> | 3.6V             |
| RP114Q122D5  | <b>A H 3 7</b> | 1.25V            |
| RP114Q182D5  | <b>A H 3 8</b> | 1.85V            |
| RP114Q282D5  | <b>A H 3 9</b> | 2.85V            |
| RP114Q342D5  | <b>A H 4 0</b> | 3.45V            |
| RP114Q102D5  | <b>A H 4 1</b> | 1.05V            |

Power Dissipation (SOT-23-5)

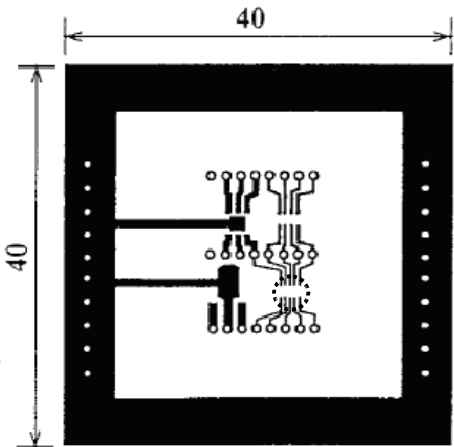
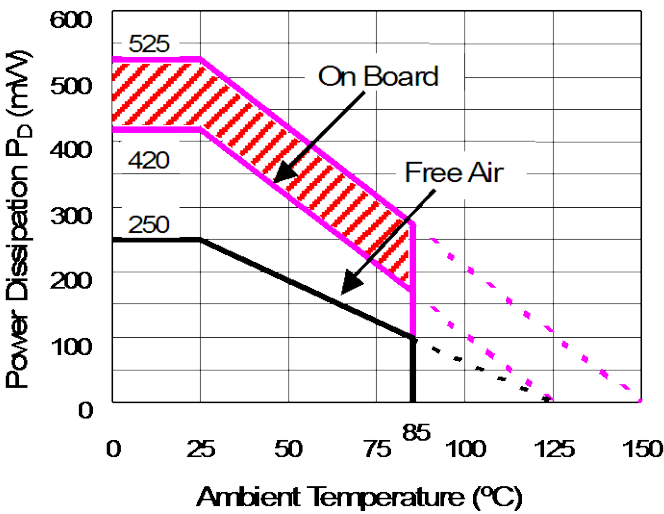
Power Dissipation (P<sub>D</sub>) depends on conditions of mounting on board. This specification is based on the Measurement Conditions below. (Power Dissipation (SOT-23-5) is substitution of SOT-23-6.)

Measurement Conditions

|                  | Standard Land Pattern                         |
|------------------|-----------------------------------------------|
| Environment      | Mounting on Board (Wind Velocity=0m/s)        |
| Board Material   | Glass Cloth Epoxy Plastic (Double-sided)      |
| Board Dimensions | 40mm x 40mm x 1.6mm                           |
| Copper Ratio     | Top-side: Approx. 50%, Back-side: Approx. 50% |
| Through-holes    | φ 0.5mm x 44pcs                               |

Measurement Result (Ta=25°C)

|                    | Standard 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             |



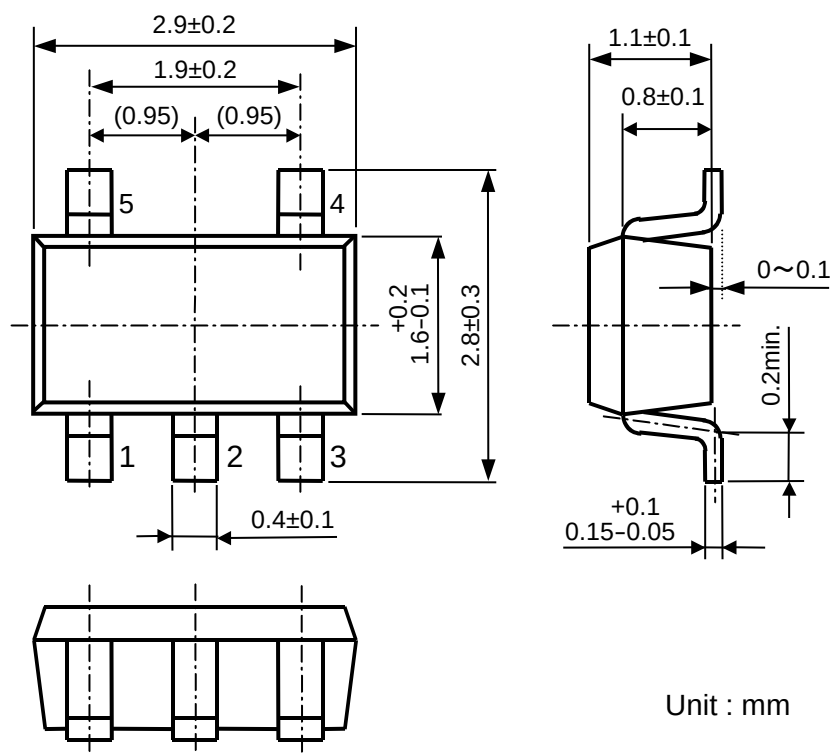
Measurement Board Pattern

○ IC Mount Area (Unit: mm)

Note: The above graph shows the power dissipation of the package based on Tjmax=125°C and Tjmax=150°C. Operating the IC within the shaded area in the graph might have an influence on its lifetime. Operating time must be within the time limit described in the table below.

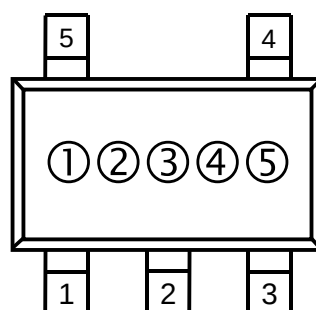
| Operating Time | Estimated Years<br>(Operating 4 hrs/ day) |
|----------------|-------------------------------------------|
| 13,000 hours   | 9 Years                                   |

# Package Dimensions (SOT-23-5)



# Mark Specification (SOT-23-5)

- ①②③: Product Code .....**Please refer to RP114N Mark Specification Table.**  
 ④⑤: Lot Number .....Alphanumeric Serial Number



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**RP114x**

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NO. EA-236-141222

**Mark Specification Table (SOT-23-5)****RP114Nxx1B**

| Product Name | ①②③   | V <sub>SET</sub> |
|--------------|-------|------------------|
| RP114N081B   | Q A A | 0.8V             |
| RP114N091B   | Q A B | 0.9V             |
| RP114N101B   | Q A C | 1.0V             |
| RP114N111B   | Q A D | 1.1V             |
| RP114N121B   | Q A E | 1.2V             |
| RP114N131B   | Q A F | 1.3V             |
| RP114N141B   | Q A G | 1.4V             |
| RP114N151B   | Q A H | 1.5V             |
| RP114N161B   | Q A J | 1.6V             |
| RP114N171B   | Q A K | 1.7V             |
| RP114N181B   | Q A L | 1.8V             |
| RP114N191B   | Q A M | 1.9V             |
| RP114N201B   | Q A N | 2.0V             |
| RP114N211B   | Q A P | 2.1V             |
| RP114N221B   | Q A Q | 2.2V             |
| RP114N231B   | Q A R | 2.3V             |
| RP114N241B   | Q A S | 2.4V             |
| RP114N251B   | Q A T | 2.5V             |
| RP114N261B   | Q A U | 2.6V             |
| RP114N271B   | Q A V | 2.7V             |
| RP114N281B   | Q A W | 2.8V             |
| RP114N291B   | Q A X | 2.9V             |
| RP114N301B   | Q A Y | 3.0V             |
| RP114N311B   | Q A Z | 3.1V             |
| RP114N321B   | R A A | 3.2V             |
| RP114N331B   | R A B | 3.3V             |
| RP114N341B   | R A C | 3.4V             |
| RP114N351B   | R A D | 3.5V             |
| RP114N361B   | R A E | 3.6V             |
| RP114N121B5  | R A F | 1.25V            |
| RP114N181B5  | R A G | 1.85V            |
| RP114N281B5  | R A H | 2.85V            |
| RP114N341B5  | R A J | 3.45V            |
| RP114N101B5  | R A K | 1.05V            |

**RP114Nxx1D**

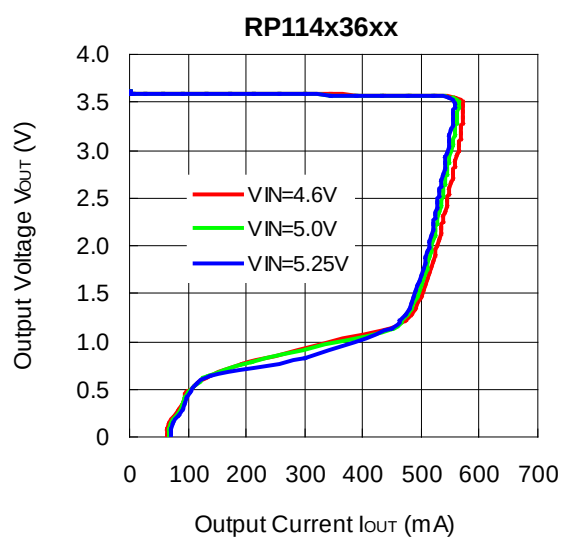
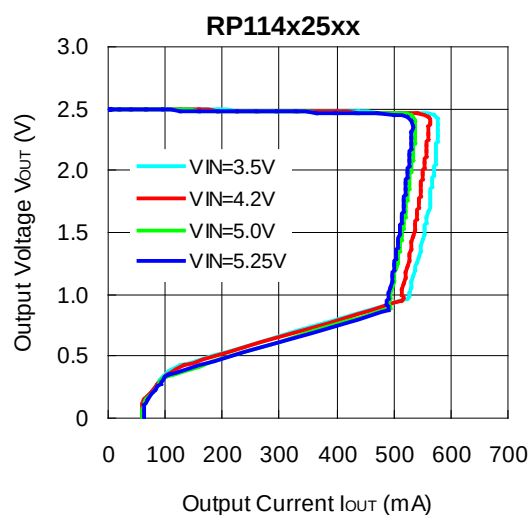
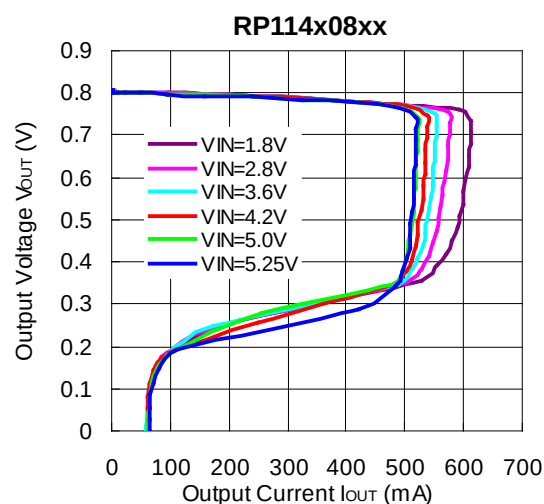
| Product Name | ①②③   | V <sub>SET</sub> |
|--------------|-------|------------------|
| RP114N081D   | Q B A | 0.8V             |
| RP114N091D   | Q B B | 0.9V             |
| RP114N101D   | Q B C | 1.0V             |
| RP114N111D   | Q B D | 1.1V             |
| RP114N121D   | Q B E | 1.2V             |
| RP114N131D   | Q B F | 1.3V             |
| RP114N141D   | Q B G | 1.4V             |
| RP114N151D   | Q B H | 1.5V             |
| RP114N161D   | Q B J | 1.6V             |
| RP114N171D   | Q B K | 1.7V             |
| RP114N181D   | Q B L | 1.8V             |
| RP114N191D   | Q B M | 1.9V             |
| RP114N201D   | Q B N | 2.0V             |
| RP114N211D   | Q B P | 2.1V             |
| RP114N221D   | Q B Q | 2.2V             |
| RP114N231D   | Q B R | 2.3V             |
| RP114N241D   | Q B S | 2.4V             |
| RP114N251D   | Q B T | 2.5V             |
| RP114N261D   | Q B U | 2.6V             |
| RP114N271D   | Q B V | 2.7V             |
| RP114N281D   | Q B W | 2.8V             |
| RP114N291D   | Q B X | 2.9V             |
| RP114N301D   | Q B Y | 3.0V             |
| RP114N311D   | Q B Z | 3.1V             |
| RP114N321D   | R B A | 3.2V             |
| RP114N331D   | R B B | 3.3V             |
| RP114N341D   | R B C | 3.4V             |
| RP114N351D   | R B D | 3.5V             |
| RP114N361D   | R B E | 3.6V             |
| RP114N121D5  | R B F | 1.25V            |
| RP114N181D5  | R B G | 1.85V            |
| RP114N281D5  | R B H | 2.85V            |
| RP114N341D5  | R B J | 3.45V            |
| RP114N101D5  | R B K | 1.05V            |



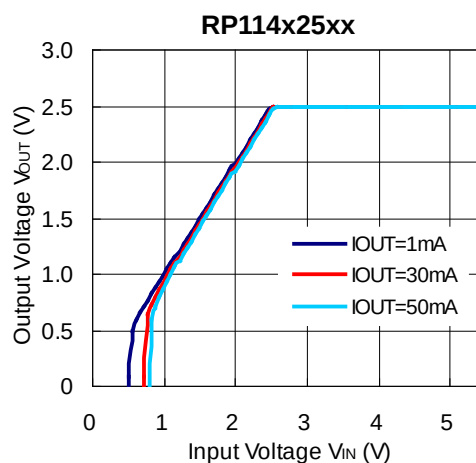
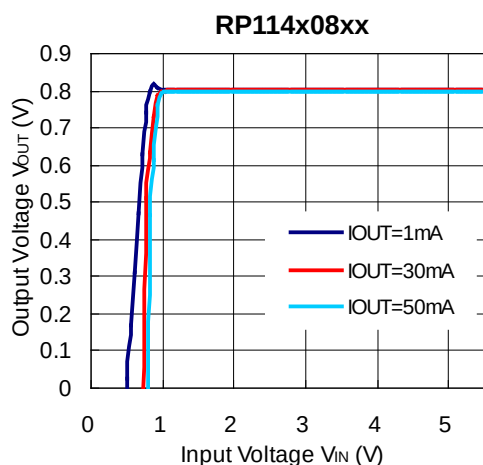
## TYPICAL CHARACTERISTICS

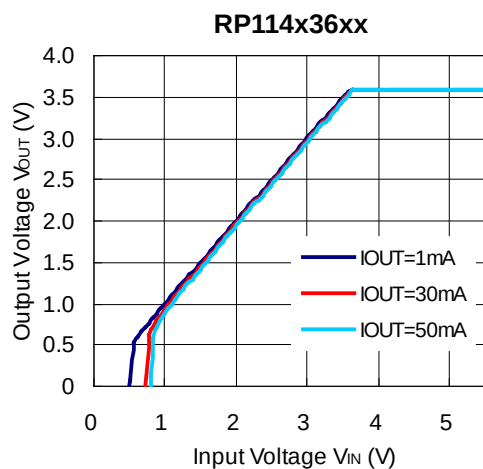
Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

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

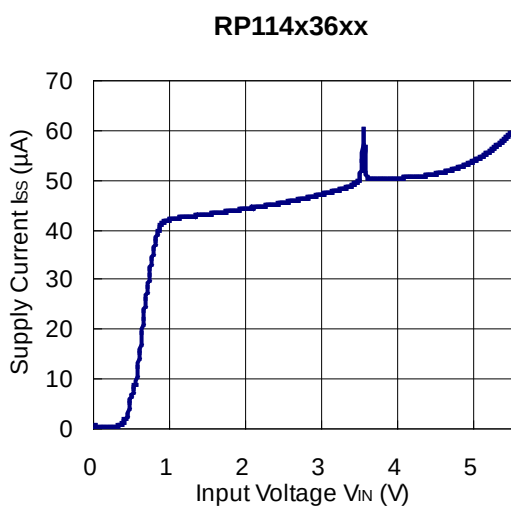
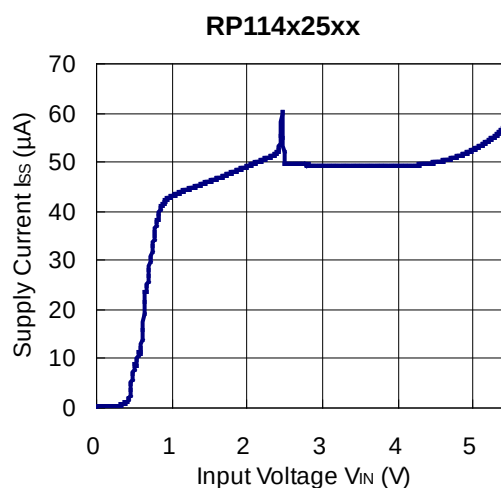
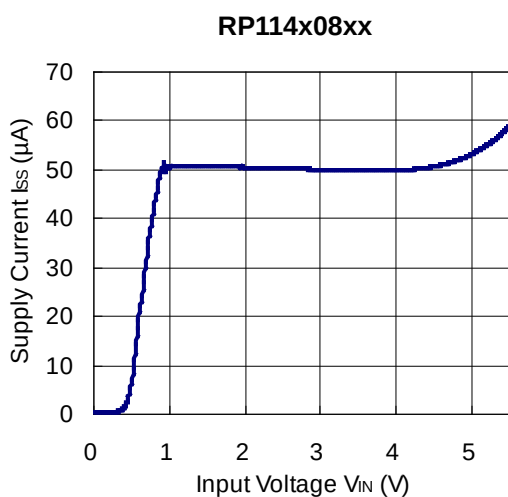


### 2) Output Voltage vs. Input Voltage ( $C_1=1.0\mu\text{F}$ , $C_2=1.0\mu\text{F}$ , $T_{\text{opt}}=25^\circ\text{C}$ )

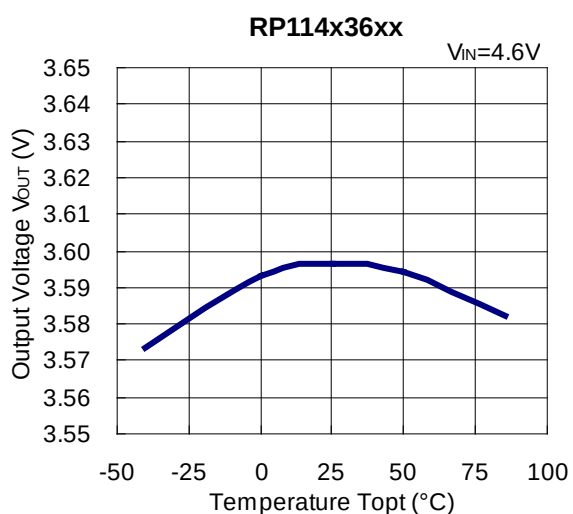
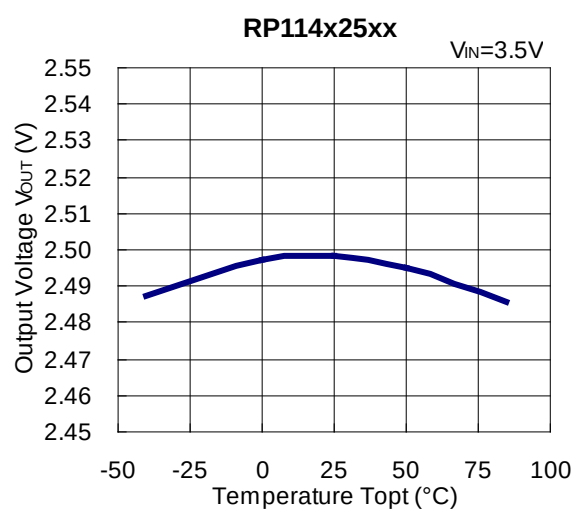
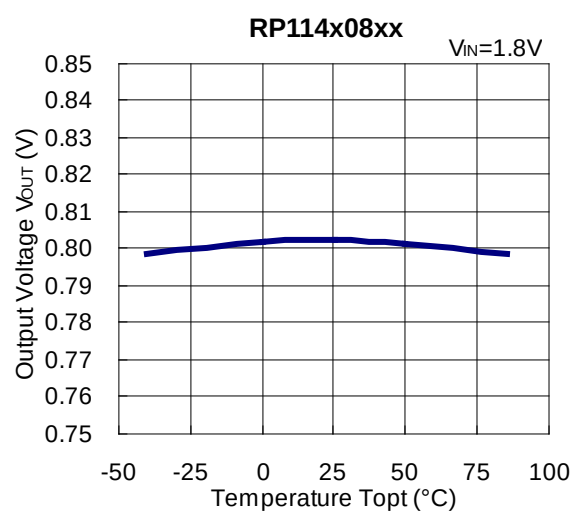




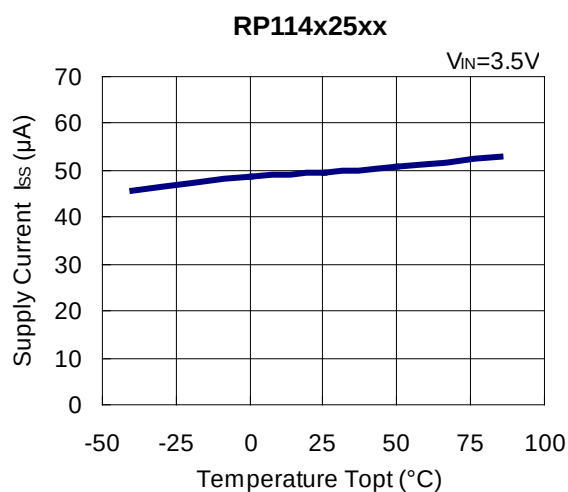
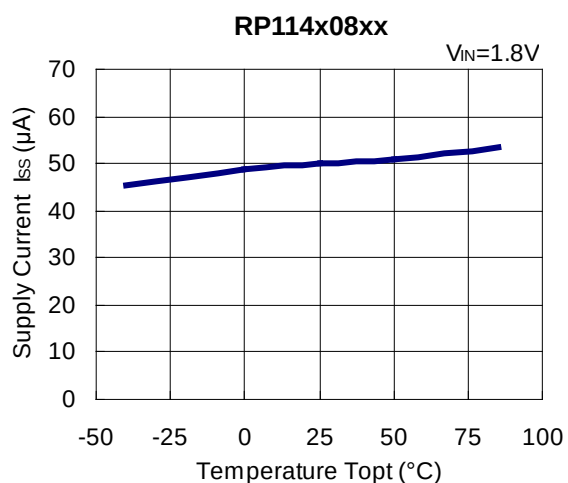
### 3) Supply Current vs. Input Voltage ( $C1=1.0\mu\text{F}$ , $C2=1.0\mu\text{F}$ , $T_{opt}=25^\circ\text{C}$ )

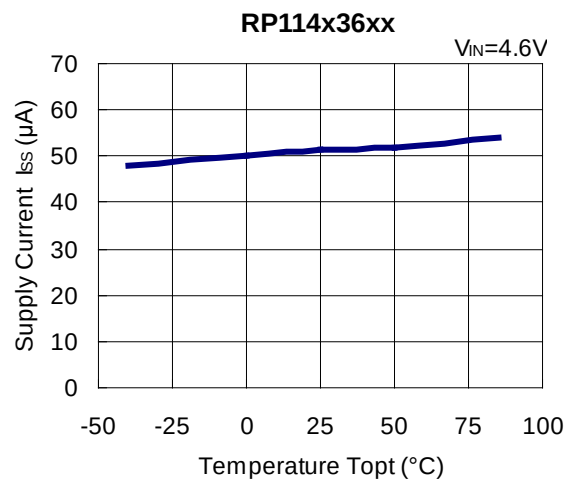


#### 4) Output Voltage vs. Temperature (C1=1.0μF, C2=1.0μF, I<sub>OUT</sub>=1mA)

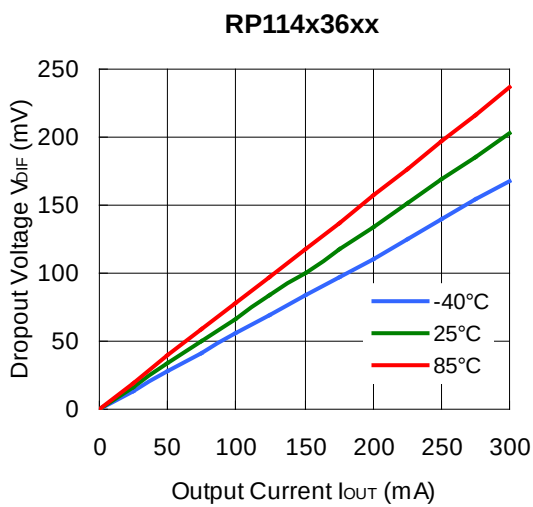
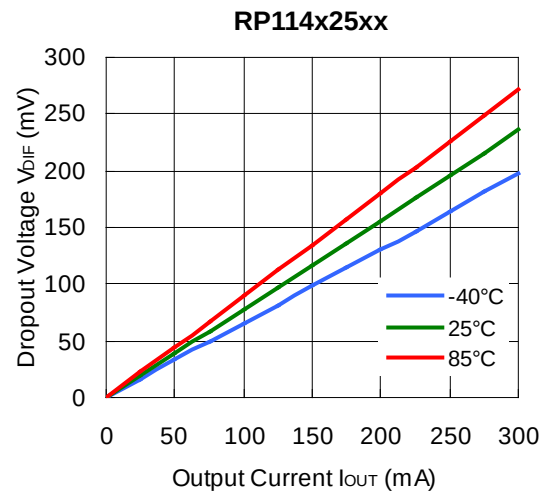
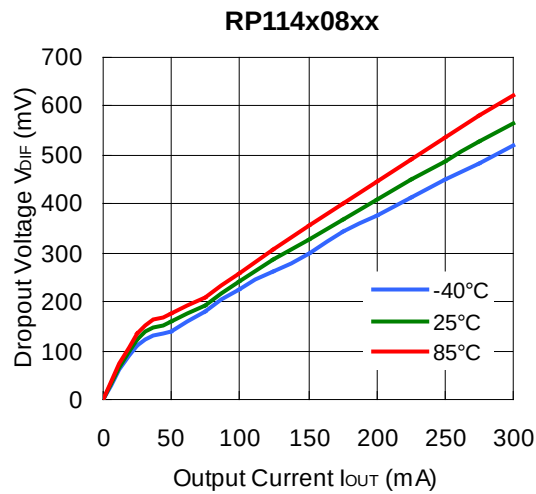


#### 5) Supply Current vs. Temperature (C1=1.0μF, C2=1.0μF, I<sub>OUT</sub>=0mA)

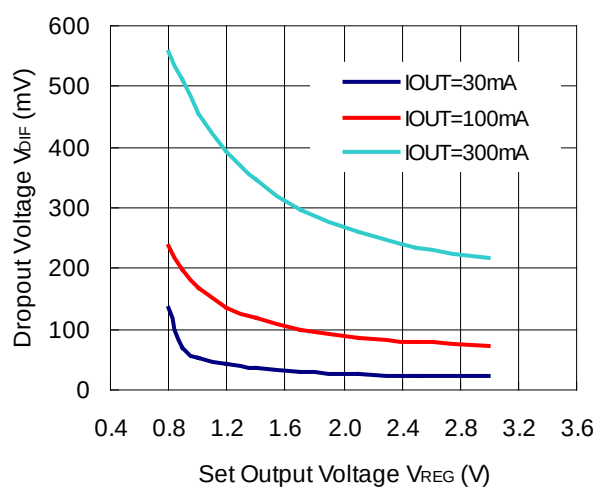




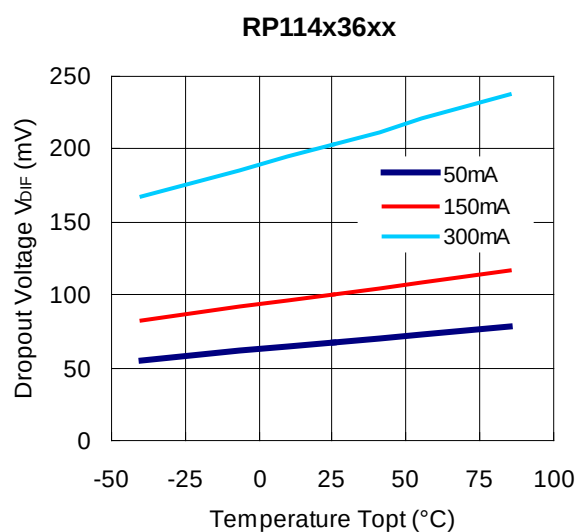
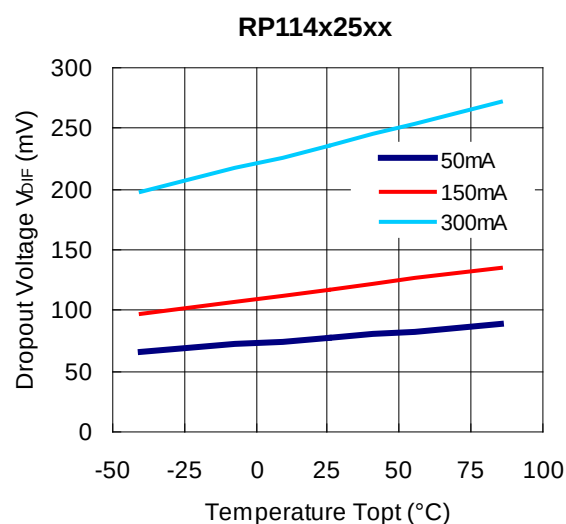
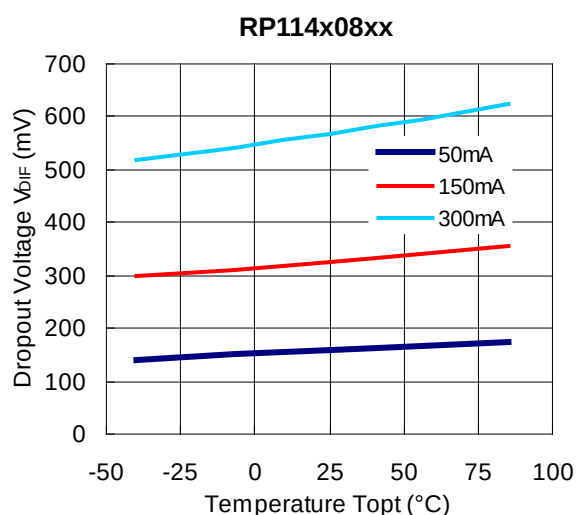
6) Dropout Voltage vs. Output Current ( $C1=1.0\mu F$ ,  $C2=1.0\mu F$ )



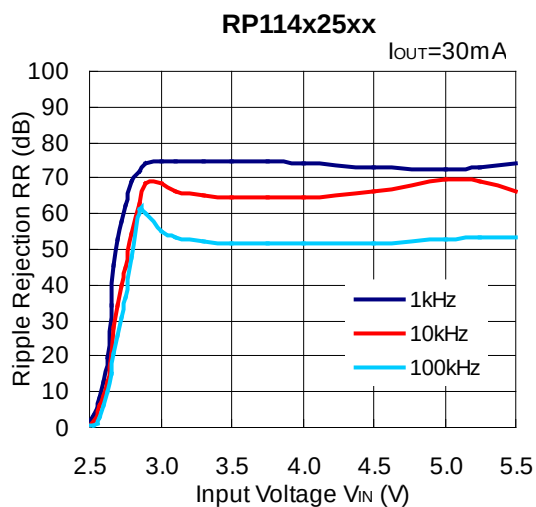
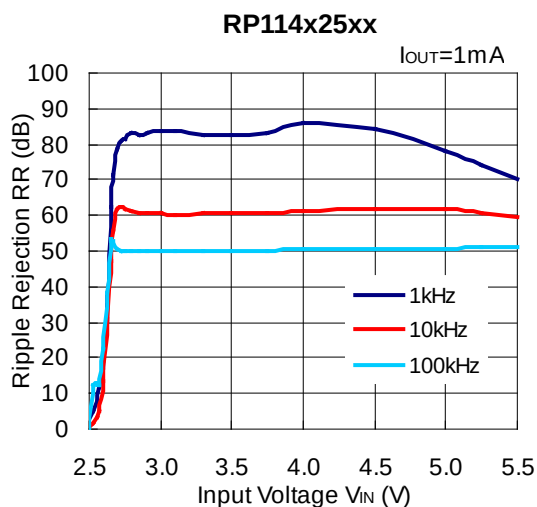
# 7) Dropout Voltage vs. Set Output Voltage (C1=1.0μF, C2=1.0μF, T<sub>opt</sub>=25°C)



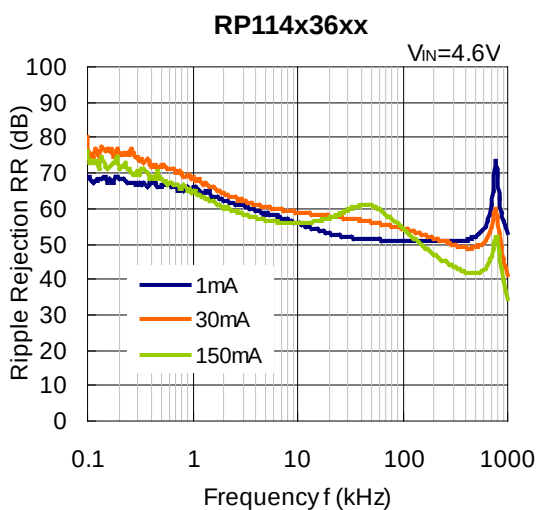
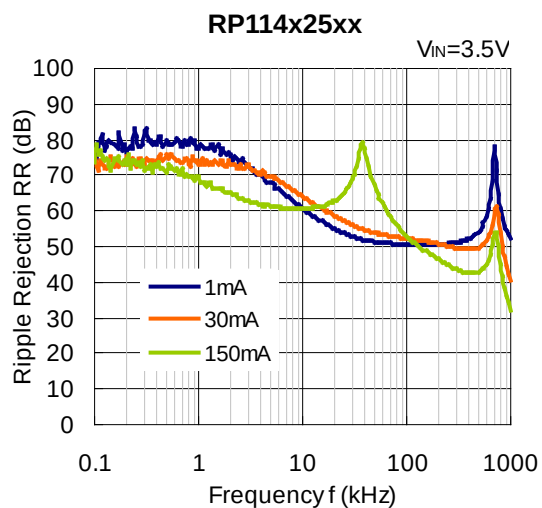
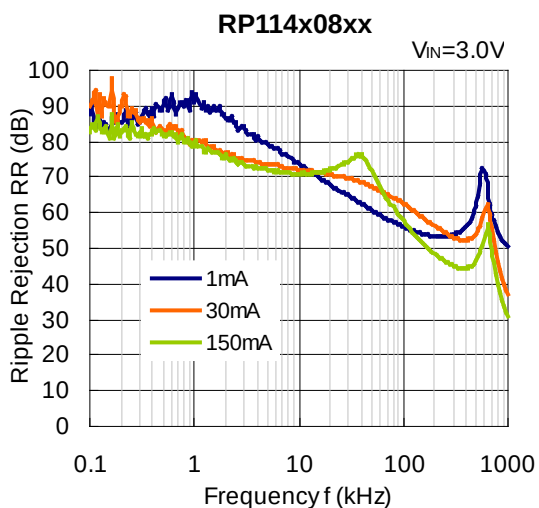
# 8) Dropout Voltage vs. Temperature (C1=none, C2=1.0μF)



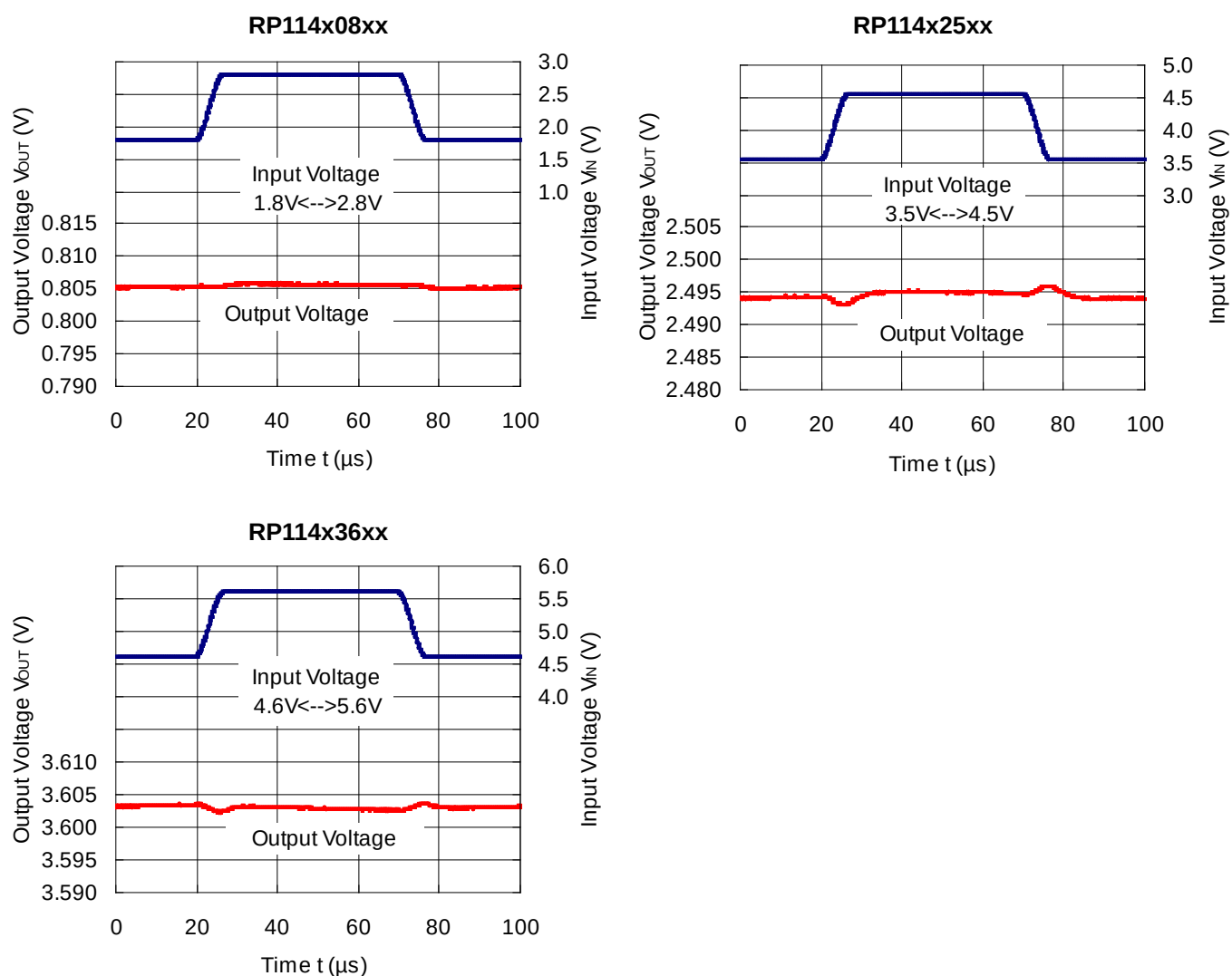
**9) Ripple Rejection vs. Input Voltage (C1=none, C2=1.0μF, Ripple=0.2Vp-p, T<sub>opt</sub>=25°C)**



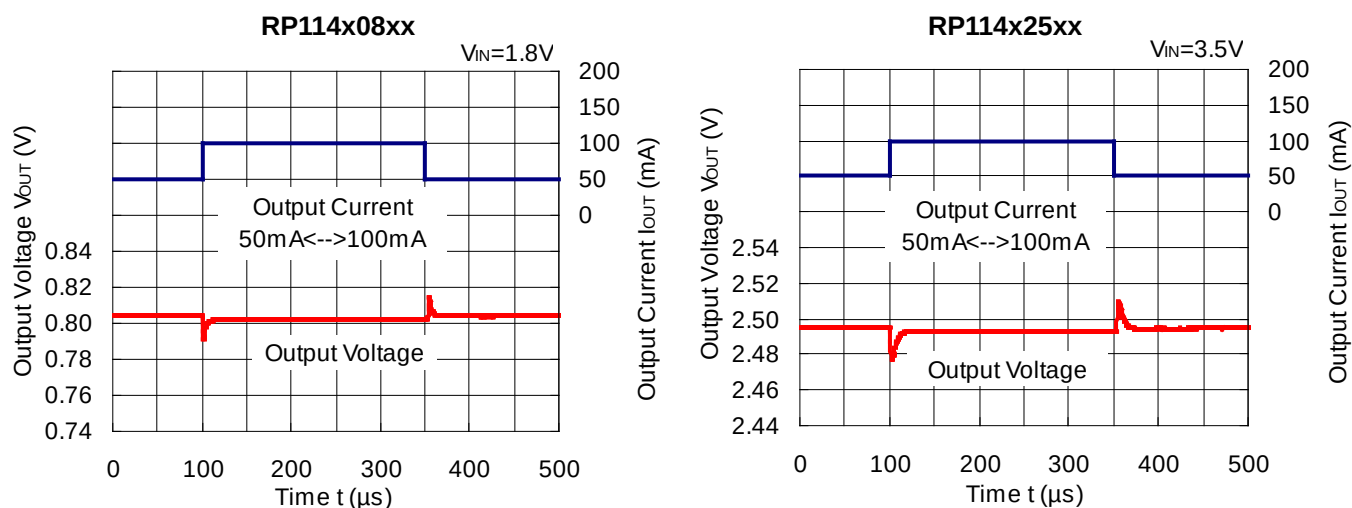
**10) Ripple Rejection vs. Frequency (C1=none, C2=1.0μF, T<sub>opt</sub>=25°C)**



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

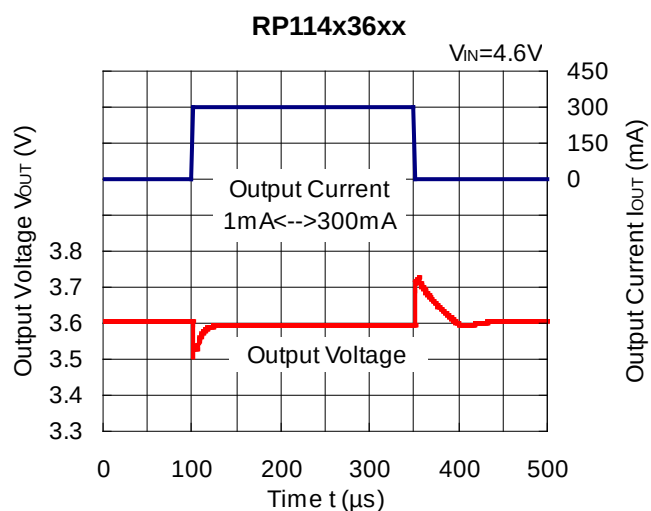
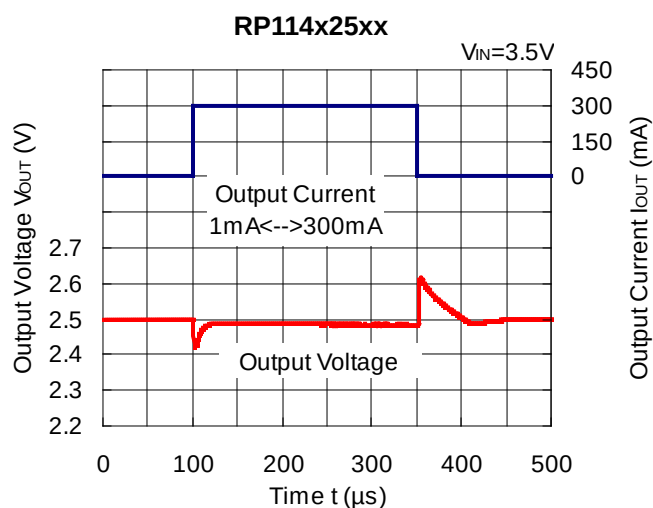
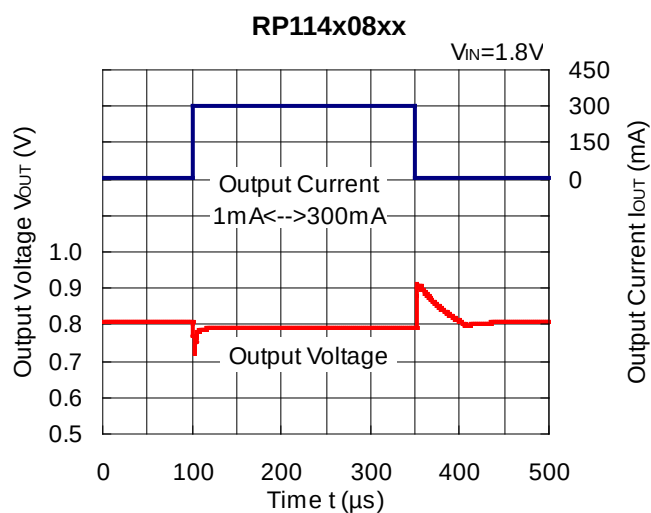
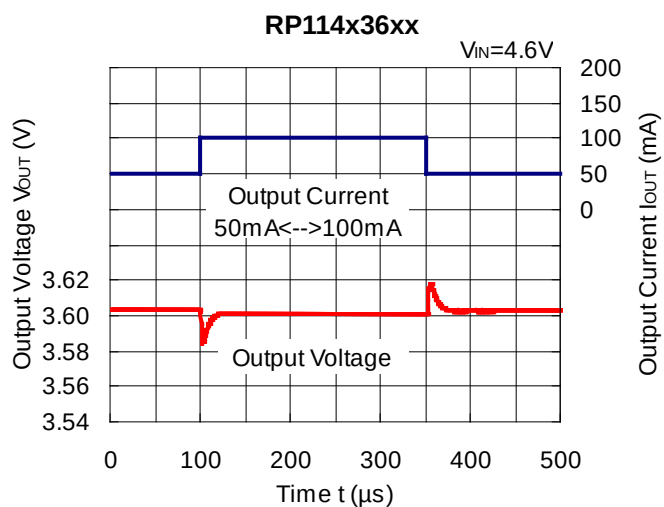


# 12) Load Transient Response ( $C_1=1.0\mu\text{F}$ , $C_2=1.0\mu\text{F}$ , $t_r=t_f=0.5\mu\text{s}$ , $T_{opt}=25^\circ\text{C}$ )



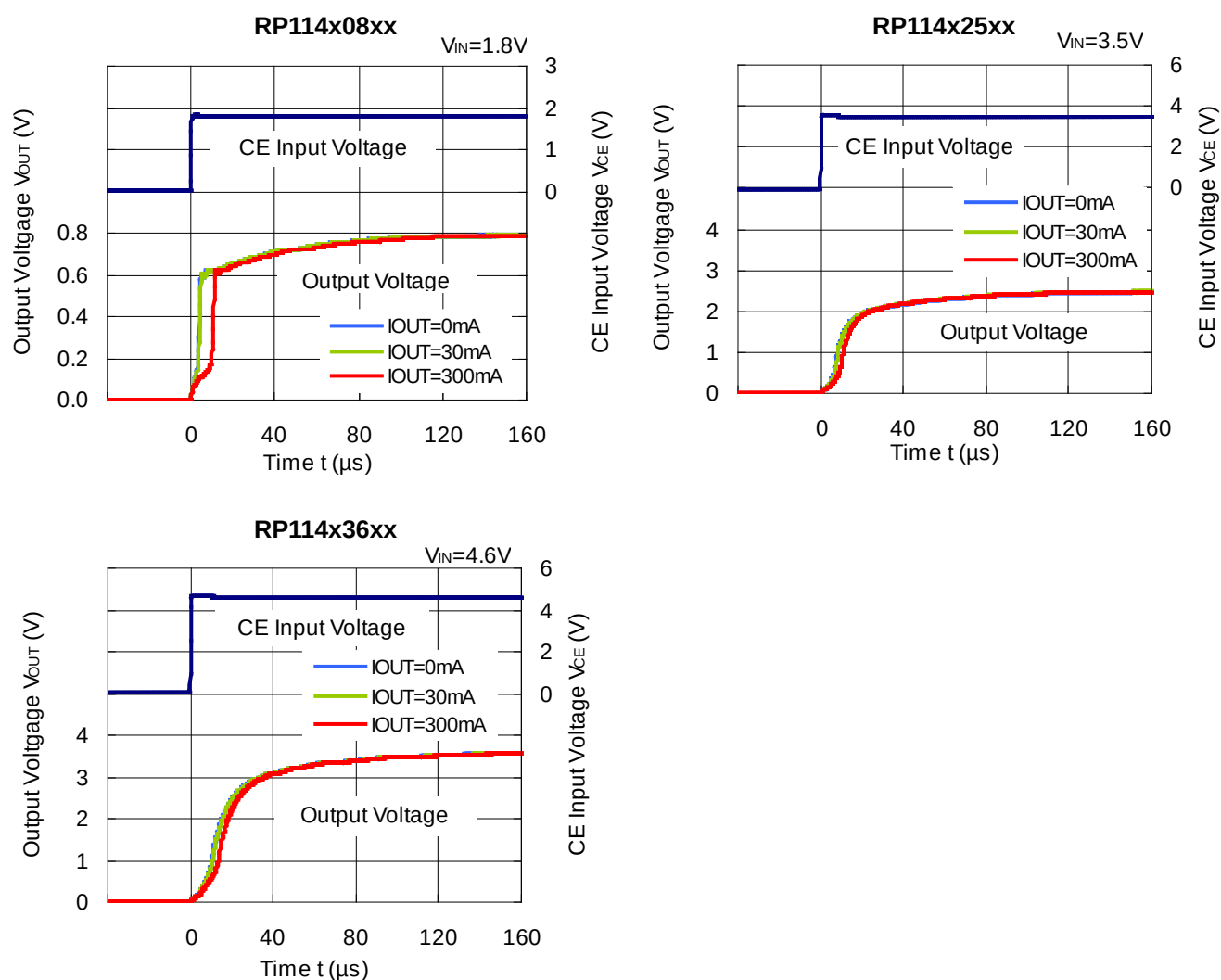
## RP114x

NO. EA-236-141222

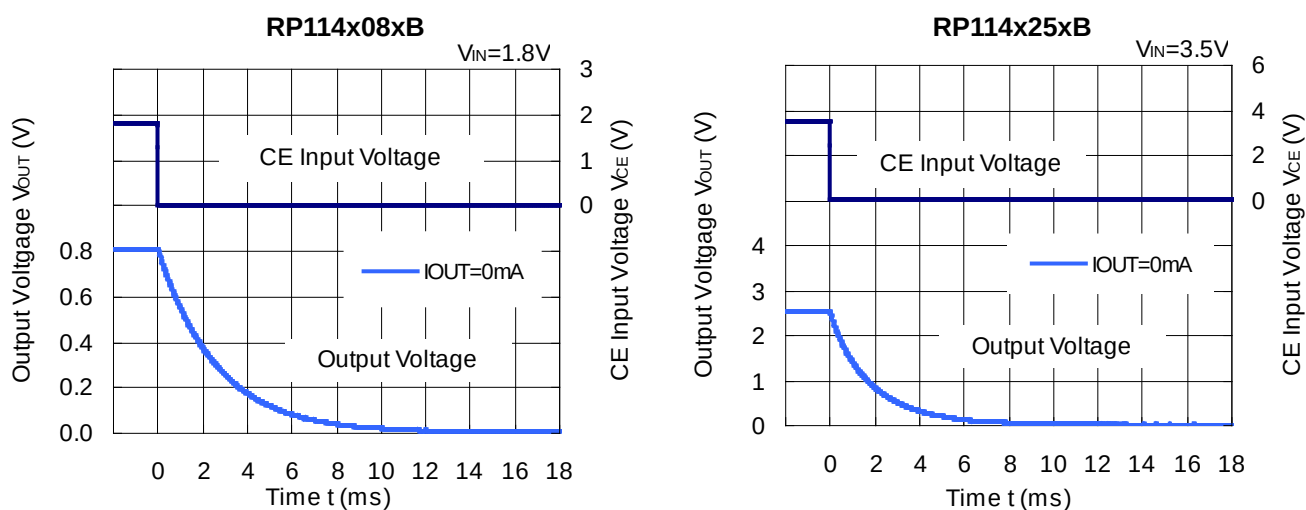




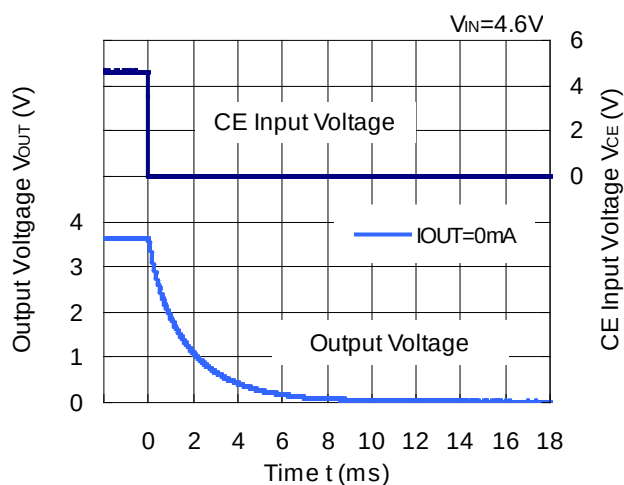
### 13) Turn On Speed with CE pin ( $C_1=1.0\mu\text{F}$ , $C_2=1.0\mu\text{F}$ , $T_{\text{opt}}=25^\circ\text{C}$ )



### 14) Turn Off Speed with CE pin (B version) ( $C_1=1.0\mu\text{F}$ , $C_2=1.0\mu\text{F}$ , $T_{\text{opt}}=25^\circ\text{C}$ )

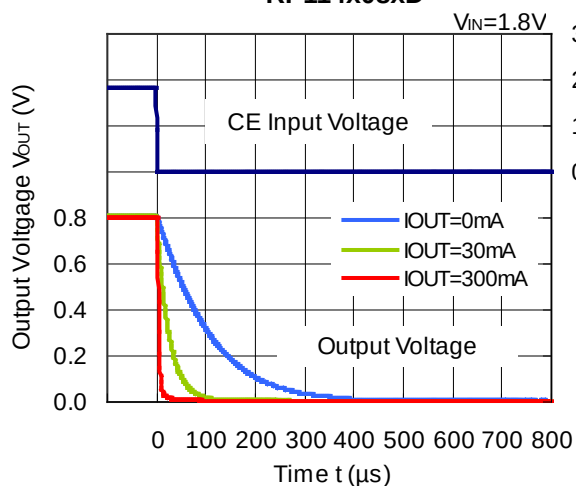


RP114x36xB

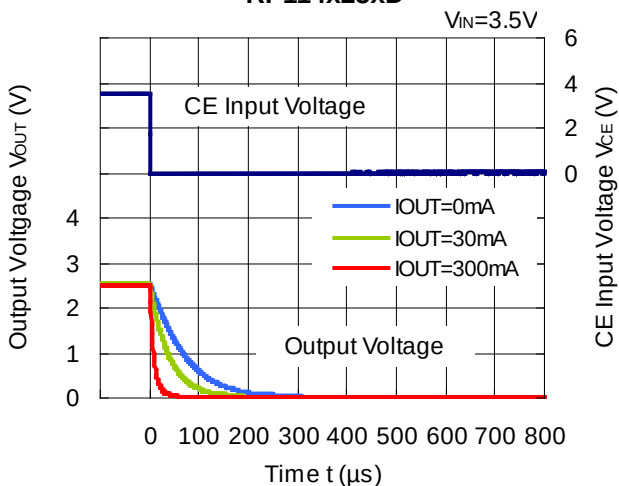


15) Turn Off Speed with CE pin (D version) ( $C1=1.0\mu F$ ,  $C2=1.0\mu F$ ,  $T_{opt}=25^{\circ}C$ )

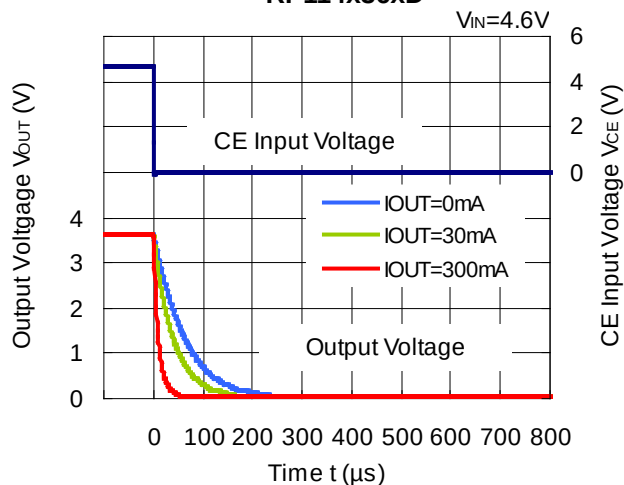
RP114x08xD



RP114x25xD



RP114x36xD



## 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.

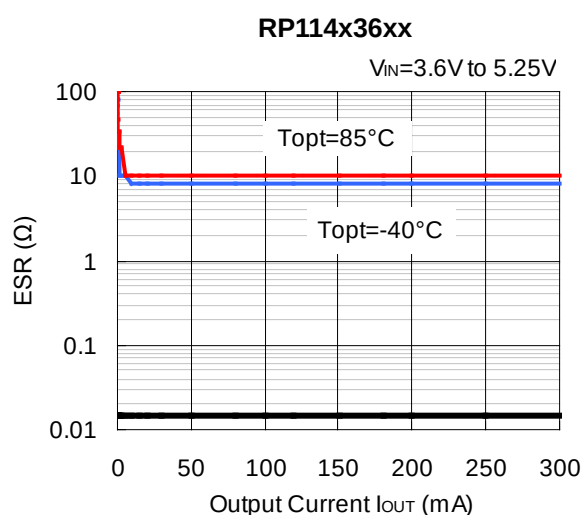
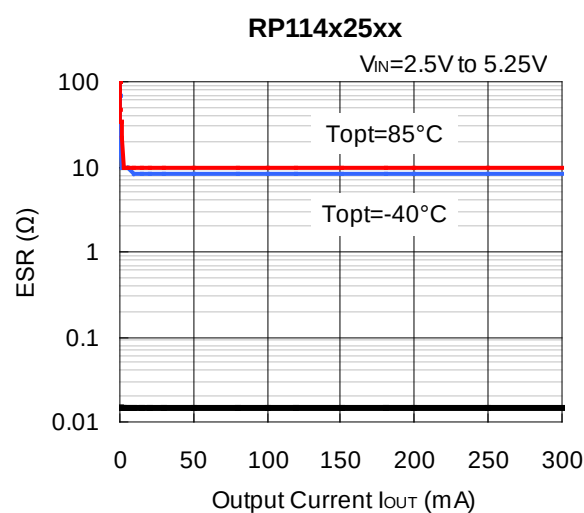
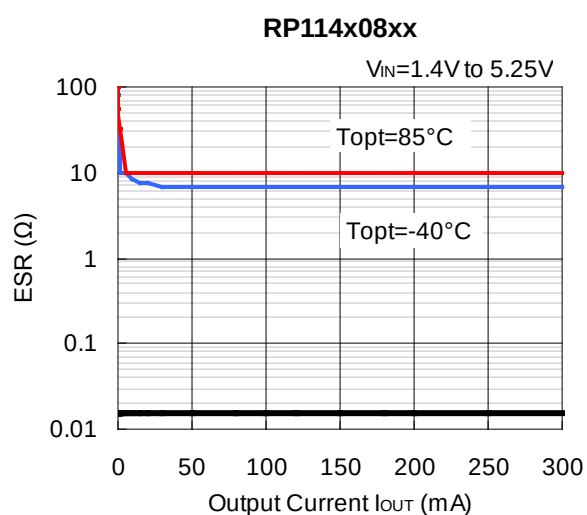
The conditions when the white noise level is under  $40\mu\text{V}$  (Avg.) are marked as the hatched area in the graph.

### Measurement conditions

Frequency Band: 10Hz to 2MHz

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

C1, C2 :  $1.0\mu\text{F}$





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