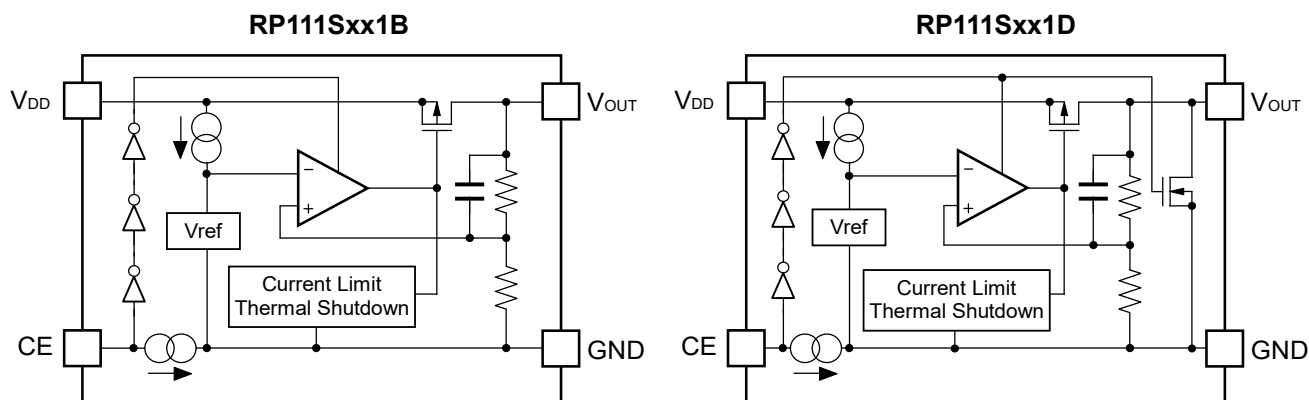
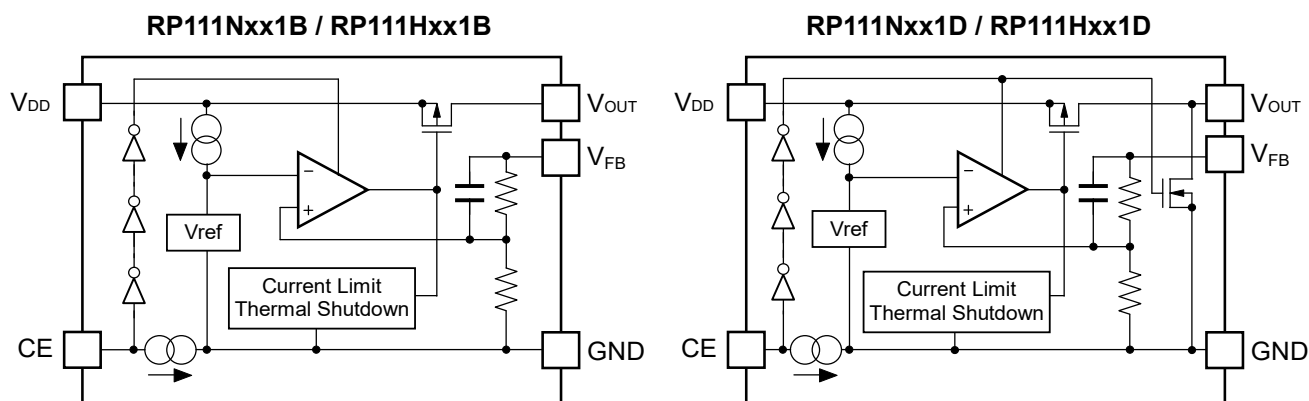


## BLOCK DIAGRAMS

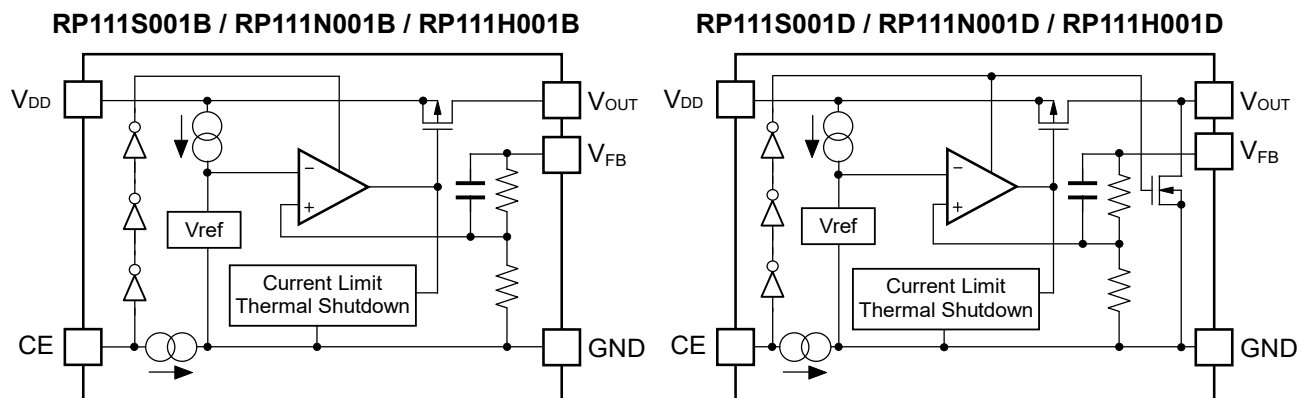
### Internally Fixed Output Voltage (HSOP-6J)



### Internally Fixed Output Voltage (SOT-23-5/ SOT-89-5)



### Externally Adjustable Output Voltage (HSOP-6J/ SOT-23-5/ SOT-89-5)



## SELECTION GUIDE

The set output voltage, auto-discharge function<sup>\*1</sup>, and package type for the IC are user-selectable.

| Product Name     | Package  | Quantity per Reel | Pb Free | Halogen Free |
|------------------|----------|-------------------|---------|--------------|
| RP111Nxx1*-TR-#E | SOT-23-5 | 3,000 pcs         | Yes     | Yes          |
| RP111N001*-TR-#E |          |                   |         |              |
| RP111Hxx1*-T1-#E | SOT-89-5 | 1,000 pcs         | Yes     | Yes          |
| RP111H001*-T1-#E |          |                   |         |              |
| RP111Sxx1*-E2-#E | HSOP-6J  | 1,000 pcs         | Yes     | Yes          |
| RP111S001*-E2-#E |          |                   |         |              |

RP111x001B/D: Adjustable with external resistor

xx: Specify the set output voltage ( $V_{SET}$ )

0.7 V (07), 1.1 V (11), 1.2 V (12), 1.5 V (15), 1.8 V (18), 2.5 V (25), 2.8 V (28), 2.9 V (29),  
3.0 V (30), 3.3 V (33), 3.4 V (34)

2.85 V: RP111x281\*5

Contact Ricoh sales representatives for other voltages.

\*: Specify the auto-discharge function at off state

(B) Active-high, without auto discharge function at off state

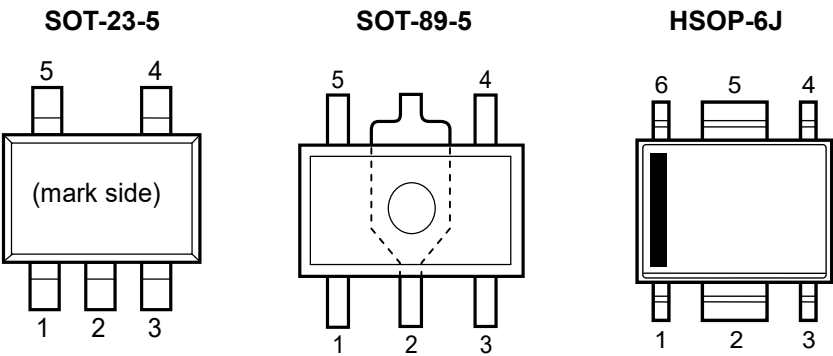
(D) Active-high, with auto discharge function at off state

#: Specify Automotive Class Code

|   | Operating<br>Temperature Range | Guaranteed Specs<br>Temperature Range | Screening                |
|---|--------------------------------|---------------------------------------|--------------------------|
| A | -40°C to 105°C                 | 25°C                                  | High Temperature         |
| J | -40°C to 105°C                 | -40°C to 105°C                        | High and Low Temperature |

<sup>\*1</sup> Auto-discharge function quickly lowers the output voltage to 0 V 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



SOT-23-5

| Pin No. | Symbol           | Description                   |
|---------|------------------|-------------------------------|
| 1       | V <sub>DD</sub>  | Input Pin                     |
| 2       | GND              | Ground Pin                    |
| 3       | CE               | Chip Enable Pin (Active-high) |
| 4       | V <sub>FB</sub>  | Feed Back Pin                 |
| 5       | V <sub>OUT</sub> | Output Pin                    |

The V<sub>OUT</sub> pin should be connected to the V<sub>FB</sub> pin when using RP111x as an internal fixed output voltage type. In case of using this device as an external adjustable type, refer to *Adjustable Output Voltage Type Setting* for detailed information.

SOT-89-5

| Pin No. | Symbol           | Description                   |
|---------|------------------|-------------------------------|
| 1       | V <sub>FB</sub>  | Feed Back Pin                 |
| 2       | GND              | Ground Pin                    |
| 3       | CE               | Chip Enable Pin (Active-high) |
| 4       | V <sub>DD</sub>  | Input Pin                     |
| 5       | V <sub>OUT</sub> | Output Pin                    |

The V<sub>OUT</sub> pin should be connected to the V<sub>FB</sub> pin when using RP111x as an internal fixed output voltage type. In case of using this device as an external adjustable type, refer to *Adjustable Output Voltage Type Setting* for detailed information.

HSOP-6J

| Pin No. | Symbol           | Description                                                   |
|---------|------------------|---------------------------------------------------------------|
| 1       | V <sub>OUT</sub> | Output Pin                                                    |
| 2       | GND              | Ground Pin                                                    |
| 3       | GND              | Ground Pin (Internal fixed output voltage type: RP111Sxx1B/D) |
|         | V <sub>FB</sub>  | Feed Back Pin (Adjustable output voltage type: RP111S001B/D)  |
| 4       | CE               | Chip Enable Pin                                               |
| 5       | GND              | Ground Pin                                                    |
| 6       | V <sub>DD</sub>  | Input Pin                                                     |

In case of using this device as an external adjustable type, refer to *Adjustable Output Voltage Type Setting* for detailed information.

## ABSOLUTE MAXIMUM RATINGS

| Symbol    | Item                                               |          | Rating                 | Unit |
|-----------|----------------------------------------------------|----------|------------------------|------|
| $V_{IN}$  | Input Voltage                                      |          | −0.3 to 6.0            | V    |
| $V_{CE}$  | Input Voltage (CE Pin)                             |          | −0.3 to 6.0            | V    |
| $V_{OUT}$ | Output Voltage                                     |          | −0.3 to $V_{IN} + 0.3$ | V    |
| $I_{OUT}$ | Output Current                                     |          | 510                    | mA   |
| $P_D$     | Power Dissipation* <sup>1</sup><br>(JEDEC STD. 51) | SOT-23-5 | 830                    | mW   |
|           |                                                    | SOT-89-5 | 3200                   |      |
|           |                                                    | HSOP-6J  | 3400                   |      |
| $T_j$     | Junction Temperature                               |          | −40 to 150             | °C   |
| $T_{stg}$ | Storage Temperature                                |          | −55 to 150             | °C   |

\*<sup>1</sup> Refer to *PACKAGE INFORMATION* for detailed information.

### ABSOLUTE MAXIMUM RATINGS

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

## RECOMMENDED OPERATING CONDITIONS

| Symbol   | Item                         | Rating      | Unit |
|----------|------------------------------|-------------|------|
| $V_{IN}$ | Input Voltage * <sup>2</sup> | 1.4 to 5.25 | V    |
| $T_a$    | Operating Temperature        | −40 to 105  | °C   |

\*<sup>2</sup> In case of exceeding the maximum Input Voltage of 5.25 V, the device must be operated on condition that the Input Voltage is up to 5.5 V and the total operating time is within 500 hrs.

### RECOMMENDED OPERATING CONDITIONS

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 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

 $V_{IN} = V_{SET} + 1.0 \text{ V}$  ( $V_{SET} > 1.5 \text{ V}$ ),  $V_{IN} = 2.5 \text{ V}$  ( $V_{SET} \leq 1.5 \text{ V}$ ),  $I_{OUT} = 1 \text{ mA}$ ,

 $C_{IN} = C_{OUT} = 1.0 \mu\text{F}$ , unless otherwise noted.

The specifications surrounded by   are guaranteed by design engineering at  $-40^\circ\text{C} \leq T_a \leq 105^\circ\text{C}$ .

**RP111xxx1D/B (-AE) (Fixed Output Voltage Type)**

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

| Symbol                          | Item                                                  | Conditions                                                                                  | Min.                                                              | Typ.                                                                  | Max.                                                                  | Unit             |
|---------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|------------------|
| $V_{OUT}$                       | Output voltage                                        | $T_a = 25^\circ\text{C}$                                                                    | $V_{SET} \geq 1.8 \text{ V}$                                      | $\times 0.992$                                                        | $\times 1.008$                                                        | V                |
|                                 |                                                       |                                                                                             | $V_{SET} < 1.8 \text{ V}$                                         | -18                                                                   | 18                                                                    | mV               |
|                                 |                                                       | $-40^\circ\text{C} \leq T_a \leq 105^\circ\text{C}$                                         | $V_{SET} \geq 1.8 \text{ V}$                                      | <span style="border: 1px solid black; padding: 0 2px;">x 0.985</span> | <span style="border: 1px solid black; padding: 0 2px;">x 1.015</span> | V                |
|                                 |                                                       |                                                                                             | $V_{SET} < 1.8 \text{ V}$                                         | <span style="border: 1px solid black; padding: 0 2px;">-55</span>     | <span style="border: 1px solid black; padding: 0 2px;">50</span>      | mV               |
| $I_{OUT}$                       | Output Current                                        |                                                                                             | <span style="border: 1px solid black; padding: 0 2px;">500</span> |                                                                       |                                                                       | mA               |
| $\Delta V_{OUT}/\Delta I_{OUT}$ | Load regulation                                       | $1 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$                                             |                                                                   | 1                                                                     | <span style="border: 1px solid black; padding: 0 2px;">20</span>      | mV               |
| $V_{TRLD}$                      | Load Transient Response                               | $I_{OUT}: 1 \text{ mA} \leftrightarrow 250 \text{ mA}$<br>( $t_r = t_f = 0.5 \mu\text{s}$ ) | $C_{OUT} = 1 \mu\text{F}$                                         | -75<br>+45                                                            |                                                                       | mV               |
|                                 |                                                       |                                                                                             | $C_{OUT} = 2.2 \mu\text{F}$                                       | -55<br>+35                                                            |                                                                       |                  |
|                                 |                                                       | $I_{OUT}: 1 \text{ mA} \leftrightarrow 250 \text{ mA}$<br>( $t_r = t_f = 5 \mu\text{s}$ )   | $C_{OUT} = 1 \mu\text{F}$                                         | -20<br>+15                                                            |                                                                       |                  |
| $V_{DIF}$                       | Dropout Voltage                                       | Refer to the <i>Dropout Voltage</i>                                                         |                                                                   |                                                                       |                                                                       |                  |
| $I_{SS}$                        | Supply Current                                        | $I_{OUT} = 0 \text{ mA}$                                                                    |                                                                   | 80                                                                    | <span style="border: 1px solid black; padding: 0 2px;">125</span>     | $\mu\text{A}$    |
| $I_{standby}$                   | Standby Current                                       | $V_{CE} = 0 \text{ V}$                                                                      |                                                                   | 0.1                                                                   | <span style="border: 1px solid black; padding: 0 2px;">7.0</span>     | $\mu\text{A}$    |
| $\Delta V_{OUT}/\Delta V_{IN}$  | Line regulation                                       | $V_{SET} + 0.5 \text{ V} \leq V_{IN} \leq 5.25 \text{ V}$ ,<br>$V_{IN} \geq 1.4 \text{ V}$  |                                                                   | 0.02                                                                  | <span style="border: 1px solid black; padding: 0 2px;">0.10</span>    | %/V              |
| $I_{SC}$                        | Short Current Limit                                   | $V_{OUT} = 0 \text{ V}$                                                                     |                                                                   | 50                                                                    |                                                                       | mA               |
| $I_{PD}$                        | CE Pull-down Current                                  |                                                                                             |                                                                   | 0.3                                                                   | <span style="border: 1px solid black; padding: 0 2px;">0.6</span>     | $\mu\text{A}$    |
| $V_{CEH}$                       | 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                |
| $T_{TSD}$                       | Thermal Shutdown Detection Temperature                | Junction Temperature                                                                        |                                                                   | 165                                                                   |                                                                       | $^\circ\text{C}$ |
| $T_{TSR}$                       | Thermal Shutdown Released Temperature                 | Junction Temperature                                                                        |                                                                   | 100                                                                   |                                                                       | $^\circ\text{C}$ |
| $R_{LOW}$                       | LOW output Nch Tr. ON Resistance<br>(RP111xxx1D only) | $V_{IN} = 4.0 \text{ V}$ , $V_{CE} = 0 \text{ V}$                                           |                                                                   | 60                                                                    |                                                                       | $\Omega$         |

All test items listed under Electrical Characteristics are done under the pulse load condition ( $T_j \approx T_a = 25^\circ\text{C}$ ) except for Load Transient Response.

The specifications surrounded by   are guaranteed by design engineering at  $-40^{\circ}\text{C} \leq T_a \leq 105^{\circ}\text{C}$ .

**RP111xxx1D/B (-AE) (Fixed Output Voltage Type) Dropout Voltage**

(Ta = 25°C)

| Output Voltage<br>V <sub>OUT</sub> (V) | Dropout Voltage V <sub>DIF</sub> (V) |      |                                                                    |
|----------------------------------------|--------------------------------------|------|--------------------------------------------------------------------|
|                                        | Condition                            | Typ. | Max.                                                               |
| $0.7 \leq V_{\text{SET}} < 0.8$        | I <sub>OUT</sub> = 500 mA            | 0.58 | <span style="border: 1px solid black; padding: 0 2px;">0.88</span> |
| $0.8 \leq V_{\text{SET}} < 0.9$        |                                      | 0.52 | <span style="border: 1px solid black; padding: 0 2px;">0.80</span> |
| $0.9 \leq V_{\text{SET}} < 1.0$        |                                      | 0.45 | <span style="border: 1px solid black; padding: 0 2px;">0.70</span> |
| $1.0 \leq V_{\text{SET}} < 1.2$        |                                      | 0.42 | <span style="border: 1px solid black; padding: 0 2px;">0.64</span> |
| $1.2 \leq V_{\text{SET}} < 1.4$        |                                      | 0.35 | <span style="border: 1px solid black; padding: 0 2px;">0.53</span> |
| $1.4 \leq V_{\text{SET}} < 1.8$        |                                      | 0.31 | <span style="border: 1px solid black; padding: 0 2px;">0.48</span> |
| $1.8 \leq V_{\text{SET}} < 2.1$        |                                      | 0.27 | <span style="border: 1px solid black; padding: 0 2px;">0.44</span> |
| $2.1 \leq V_{\text{SET}} < 2.5$        |                                      | 0.25 | <span style="border: 1px solid black; padding: 0 2px;">0.38</span> |
| $2.5 \leq V_{\text{SET}} < 3.0$        |                                      | 0.23 | <span style="border: 1px solid black; padding: 0 2px;">0.34</span> |
| $3.0 \leq V_{\text{SET}} \leq 3.6$     |                                      | 0.22 | <span style="border: 1px solid black; padding: 0 2px;">0.32</span> |

**RP111x**

NO.EC-241-200630

 $V_{IN} = 2.5\text{ V}$ ,  $I_{OUT} = 1\text{ mA}$ ,  $C_{IN} = C_{OUT} = 1.0\text{ }\mu\text{F}$ , unless otherwise noted.The specifications surrounded by   are guaranteed by design engineering at  $-40^{\circ}\text{C} \leq T_a \leq 105^{\circ}\text{C}$ .**RP111x001D/B (-AE) (Adjustable Output Voltage Type)**

(Ta = 25°C)

All test items listed under Electrical Characteristics are done under the pulse load condition ( $T_j \approx T_a = 25^{\circ}\text{C}$ ) except for Load Transient Response.

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

**RP111xxx1D/B (-JE) (Fixed Output Voltage Type)**( $-40^\circ\text{C} \leq T_a \leq 105^\circ\text{C}$ )

| Symbol                          | Item                                                  | Conditions                                                                                  | Min.                         | Typ.       | Max.    | Unit             |
|---------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------|------------|---------|------------------|
| $V_{OUT}$                       | Output voltage                                        | $T_a = 25^\circ\text{C}$                                                                    | $V_{SET} \geq 1.8 \text{ V}$ | x 0.992    | x 1.008 | V                |
|                                 |                                                       |                                                                                             | $V_{SET} < 1.8 \text{ V}$    | -18        | 18      | mV               |
|                                 |                                                       | $-40^\circ\text{C} \leq T_a \leq 105^\circ\text{C}$                                         | $V_{SET} \geq 1.8 \text{ V}$ | x 0.985    | x 1.015 | V                |
|                                 |                                                       |                                                                                             | $V_{SET} < 1.8 \text{ V}$    | -55        | 50      | mV               |
| $I_{OUT}$                       | Output Current                                        |                                                                                             | 500                          |            |         | mA               |
| $\Delta V_{OUT}/\Delta I_{OUT}$ | Load regulation                                       | $1 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$                                             |                              | 1          | 20      | mV               |
| $V_{TRLD}$                      | Load Transient Response                               | $I_{OUT}: 1 \text{ mA} \leftrightarrow 250 \text{ mA}$<br>( $t_r = t_f = 0.5 \mu\text{s}$ ) | $C_{OUT} = 1 \mu\text{F}$    | -75<br>+45 |         | mV               |
|                                 |                                                       |                                                                                             | $C_{OUT} = 2.2 \mu\text{F}$  | -55<br>+35 |         |                  |
|                                 |                                                       | $I_{OUT}: 1 \text{ mA} \leftrightarrow 250 \text{ mA}$<br>( $t_r = t_f = 5 \mu\text{s}$ )   | $C_{OUT} = 1 \mu\text{F}$    | -20<br>+15 |         |                  |
|                                 |                                                       |                                                                                             |                              |            |         |                  |
| $V_{DIF}$                       | Dropout Voltage                                       | Refer to the <i>Dropout Voltage</i>                                                         |                              |            |         |                  |
| $I_{SS}$                        | Supply Current                                        | $I_{OUT} = 0 \text{ mA}$                                                                    |                              | 80         | 125     | $\mu\text{A}$    |
| $I_{standby}$                   | Standby Current                                       | $V_{CE} = 0 \text{ V}$                                                                      |                              | 0.1        | 7.0     | $\mu\text{A}$    |
| $\Delta V_{OUT}/\Delta V_{IN}$  | Line regulation                                       | $V_{SET} + 0.5 \text{ V} \leq V_{IN} \leq 5.25 \text{ V}$ ,<br>$V_{IN} \geq 1.4 \text{ V}$  |                              | 0.02       | 0.10    | %/V              |
| $I_{SC}$                        | Short Current Limit                                   | $V_{OUT} = 0 \text{ V}$                                                                     |                              | 50         |         | mA               |
| $I_{PD}$                        | CE Pull-down Current                                  |                                                                                             |                              | 0.3        | 0.6     | $\mu\text{A}$    |
| $V_{CEH}$                       | CE Input Voltage "H"                                  |                                                                                             | 1.0                          |            |         | V                |
| $V_{CEL}$                       | CE Input Voltage "L"                                  |                                                                                             |                              |            | 0.4     | V                |
| $T_{TSD}$                       | Thermal Shutdown Detection Temperature                | Junction Temperature                                                                        |                              | 165        |         | $^\circ\text{C}$ |
| $T_{TSR}$                       | Thermal Shutdown Released Temperature                 | Junction Temperature                                                                        |                              | 100        |         | $^\circ\text{C}$ |
| $R_{LOW}$                       | LOW output Nch Tr. ON Resistance<br>(RP111xxx1D only) | $V_{IN} = 4.0 \text{ V}$ , $V_{CE} = 0 \text{ V}$                                           |                              | 60         |         | $\Omega$         |

All test items listed under Electrical Characteristics are done under the pulse load condition ( $T_j \approx T_a = 25^\circ\text{C}$ ) except for Load Transient Response.

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**RP111x**NO.EC-241-200630

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**RP111xxx1D/B (-JE) (Fixed Output Voltage Type) Dropout Voltage**

(-40°C ≤ Ta ≤ 105°C)

| Output Voltage<br>V <sub>OUT</sub> (V) | Dropout Voltage V <sub>DIF</sub> (V) |      |      |
|----------------------------------------|--------------------------------------|------|------|
|                                        | Condition                            | Typ. | Max. |
| $0.7 \leq V_{SET} < 0.8$               | I <sub>OUT</sub> = 500 mA            | 0.58 | 0.88 |
| $0.8 \leq V_{SET} < 0.9$               |                                      | 0.52 | 0.80 |
| $0.9 \leq V_{SET} < 1.0$               |                                      | 0.45 | 0.70 |
| $1.0 \leq V_{SET} < 1.2$               |                                      | 0.42 | 0.64 |
| $1.2 \leq V_{SET} < 1.4$               |                                      | 0.35 | 0.53 |
| $1.4 \leq V_{SET} < 1.8$               |                                      | 0.31 | 0.48 |
| $1.8 \leq V_{SET} < 2.1$               |                                      | 0.27 | 0.44 |
| $2.1 \leq V_{SET} < 2.5$               |                                      | 0.25 | 0.38 |
| $2.5 \leq V_{SET} < 3.0$               |                                      | 0.23 | 0.34 |
| $3.0 \leq V_{SET} \leq 3.6$            |                                      | 0.22 | 0.32 |

$V_{IN} = 2.5 \text{ V}$ ,  $I_{OUT} = 1 \text{ mA}$ ,  $C_{IN} = C_{OUT} = 1.0 \mu\text{F}$ , unless otherwise noted.

**RP111x001D/B (-JE) (Adjustable Output Voltage Type)**

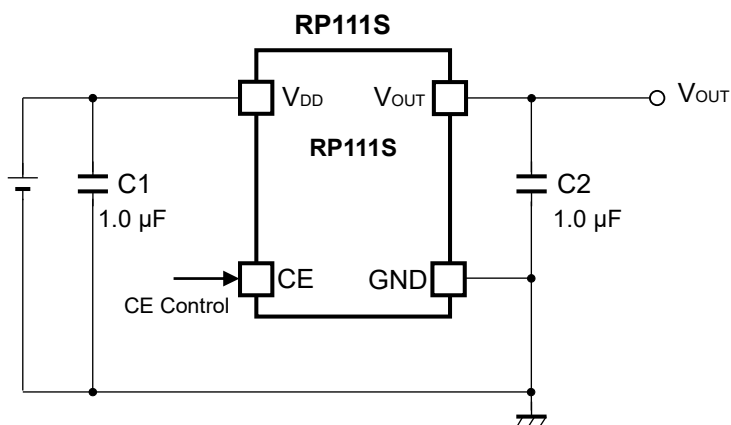
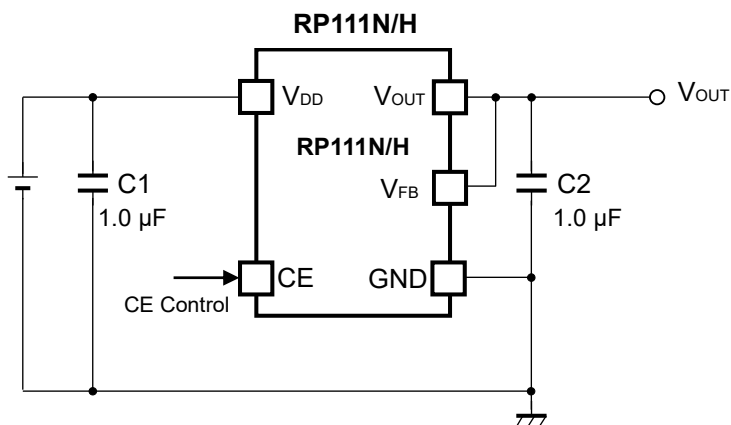
( $-40^{\circ}\text{C} \leq T_a \leq 105^{\circ}\text{C}$ )

| Symbol                          | Item                                   | Conditions                                                                                  |                             | Min.  | Typ.       | Max.  | Unit               |  |
|---------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------|-------|------------|-------|--------------------|--|
| $V_{FB}$                        | Feedback pin output voltage            | $T_a = 25^{\circ}\text{C}$                                                                  | $V_{OUT} = V_{FB}$          | 0.682 | 0.700      | 0.718 | V                  |  |
|                                 |                                        | $-40^{\circ}\text{C} \leq T_a \leq 105^{\circ}\text{C}$                                     |                             | 0.645 |            | 0.750 |                    |  |
| $V_{OUT}$                       | Adjustable Output Voltage Range        |                                                                                             |                             | 0.7   |            | 3.6   | V                  |  |
| $I_{OUT}$                       | Output Current                         |                                                                                             |                             | 500   |            |       | mA                 |  |
| $\Delta V_{OUT}/\Delta I_{OUT}$ | Load regulation                        | $1 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$                                             |                             |       | 1          | 20    | mV                 |  |
| $V_{TRLD}$                      | Load Transient Response                | $I_{OUT}: 1 \text{ mA} \leftrightarrow 250 \text{ mA}$<br>( $t_r = t_f = 0.5 \mu\text{s}$ ) | $C_{OUT} = 1 \mu\text{F}$   |       | -75<br>+45 |       | mV                 |  |
|                                 |                                        |                                                                                             | $C_{OUT} = 2.2 \mu\text{F}$ |       | -55<br>+35 |       |                    |  |
|                                 |                                        | $I_{OUT}: 1 \text{ mA} \leftrightarrow 250 \text{ mA}$<br>( $t_r = t_f = 5 \mu\text{s}$ )   | $C_{OUT} = 1 \mu\text{F}$   |       | -20<br>+15 |       |                    |  |
| $V_{DIF}$                       | Dropout Voltage                        | $V_{OUT} = V_{FB}$                                                                          | $I_{OUT} = 500 \text{ mA}$  |       |            | 0.88  | V                  |  |
| $I_{SS}$                        | Supply Current                         | $I_{OUT} = 0 \text{ mA}$                                                                    |                             |       | 80         | 125   | $\mu\text{A}$      |  |
| $I_{standby}$                   | Standby Current                        | $V_{CE} = 0 \text{ V}$                                                                      |                             |       | 0.1        | 7.0   | $\mu\text{A}$      |  |
| $\Delta V_{OUT}/\Delta V_{IN}$  | Line regulation                        | $V_{OUT} = V_{FB}$ , $1.4 \text{ V} \leq V_{IN} \leq 5.25 \text{ V}$                        |                             |       | 0.02       | 0.10  | %/V                |  |
| $I_{SC}$                        | Short Current Limit                    | $V_{OUT} = V_{FB} = 0 \text{ V}$                                                            |                             |       | 50         |       | mA                 |  |
| $I_{PD}$                        | CE Pull-down Current                   |                                                                                             |                             |       | 0.3        | 0.6   | $\mu\text{A}$      |  |
| $V_{CEH}$                       | CE Input Voltage "H"                   |                                                                                             |                             | 1.0   |            |       | V                  |  |
| $V_{CEL}$                       | CE Input Voltage "L"                   |                                                                                             |                             |       |            | 0.4   | V                  |  |
| $T_{TSD}$                       | Thermal Shutdown Detection Temperature | Junction Temperature                                                                        |                             |       | 165        |       | $^{\circ}\text{C}$ |  |
| $T_{TSR}$                       | Thermal Shutdown Released Temperature  | Junction Temperature                                                                        |                             |       | 100        |       | $^{\circ}\text{C}$ |  |

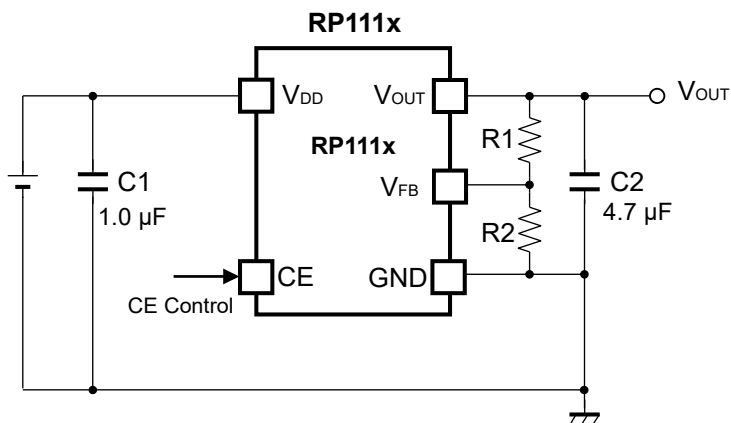
All test items listed under Electrical Characteristics are done under the pulse load condition ( $T_j \approx T_a = 25^{\circ}\text{C}$ ) except for Load Transient Response.

## TYPICAL APPLICATIONS

### Internally Fixed Output Voltage



### Externally Adjustable Output Voltage



## TECHNICAL NOTES

### Phase Compensation

In this device, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, use a 1.0  $\mu\text{F}$  or more capacitor C2.

In case of using a tantalum capacitor, and its ESR is large, the output may be unstable. Therefore, select C2 carefully considering its frequency characteristics.

When using the Adjustable Output Voltage Type, set 4.7  $\mu\text{F}$  or more of the output capacitor C2 as close as possible to the device, and make wiring as short as possible.

### PCB Layout

Make  $V_{\text{DD}}$  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  $\mu\text{F}$  or more between  $V_{\text{DD}}$  and GND pin, and as close as possible to the pins.

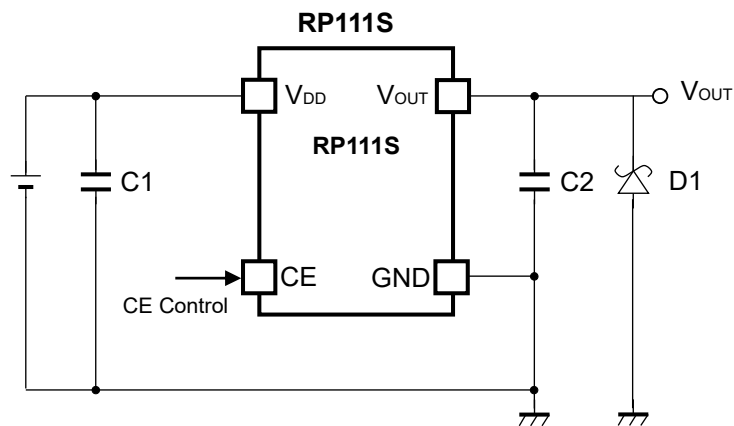
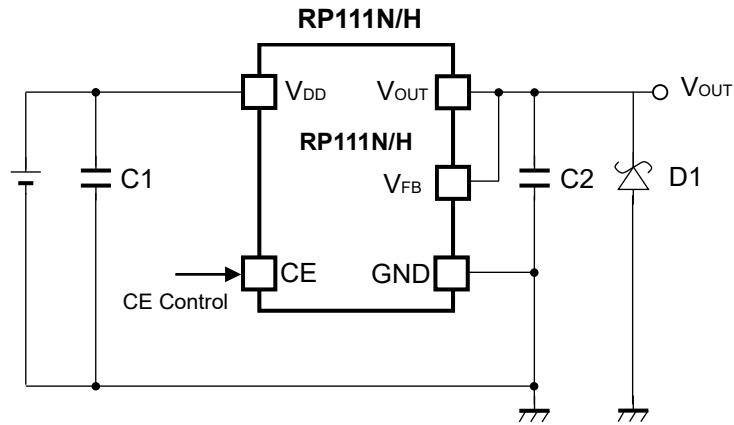
Set external components, especially the output capacitor C2, as close as possible to the device, and make wiring as short as possible (Refer to *TYPICAL APPLICATIONS*).

### Transient Response

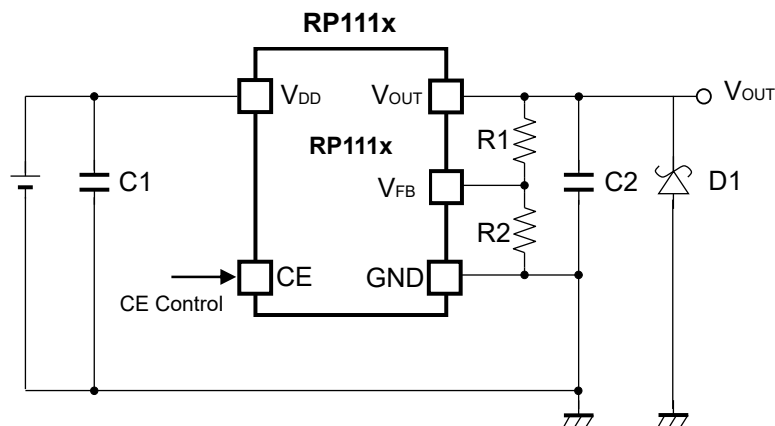
When using the Adjustable Output Voltage Type, the transient response could be affected by the external resistors. Evaluate the circuit taking the actual conditions of use into account.

## TYPICAL APPLICATION FOR IC CHIP BREAKDOWN PREVENTION

### Internally Fixed Output Voltage



### Externally Adjustable Output Voltage



When a sudden surge of electrical current travels along the V<sub>OUT</sub> pin and GND due to a short-circuit, electrical resonance of a circuit involving an output capacitor (C2) and a short circuit inductor generates a negative voltage and may damage the device or the load devices. Connecting a schottky diode (D1) between the V<sub>OUT</sub> pin and GND has the effect of preventing damage to them.

## ADJUSTABLE OUTPUT VOLTAGE SETTING

### Output Voltage Setting

RP111x is capable of adjusting the output voltage by using the external divider resistors.

If the  $V_{FB}$  voltage fixed in the device is described as  $setV_{FB}$ , the output voltage can be set by using the following formulas.

$$I_1 = I_{IC} + I_2 \dots\dots\dots (1)$$

$$I_2 = setV_{FB} / R_2 \dots\dots\dots (2)$$

Thus,

$$I_1 = I_{IC} + setV_{FB} / R_2 \dots\dots\dots (3)$$

Therefore,

$$V_{OUT} = setV_{FB} + R_1 \times I_1 \dots\dots\dots (4)$$

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

$$\begin{aligned} V_{OUT} &= setV_{FB} + R_1 \times (I_{IC} + setV_{FB} / R_2) \\ &= setV_{FB} \times (1 + R_1/R_2) + R_1 \times I_{IC} \dots\dots\dots (5) \end{aligned}$$

In formula (5),  $R_1 \times I_{IC}$  is the error-causing factor in  $V_{OUT}$ .

As for  $I_{IC}$ ,

$$I_{IC} = setV_{FB} / R_{IC} \dots\dots\dots (6)$$

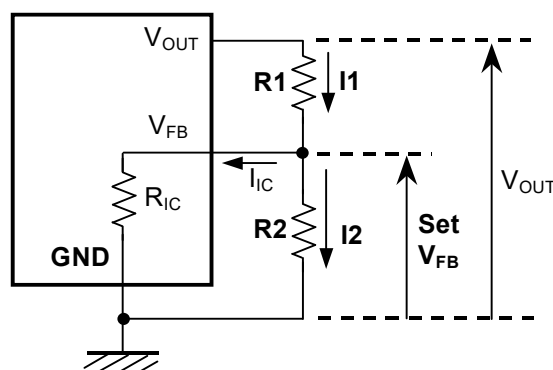
Therefore, the error-causing factor  $R_1 \times I_{IC}$  can be described as follows.

$$\begin{aligned} R_1 \times I_{IC} &= R_1 \times setV_{FB} / R_{IC} \\ &= setV_{FB} \times R_1 / R_{IC} \dots\dots\dots (7) \end{aligned}$$

For better accuracy, choosing  $R_1 (<<R_{IC})$  reduces this error.

Without the error-causing factor  $R_1 \times I_{IC}$ , the output voltage can be calculated by the following formula.

$$V_{OUT} = setV_{FB} \times ((R_1 + R_2) / R_2) \dots\dots\dots (8)$$



The output voltage of the externally adjustable output voltage type should be set to 3.6 V or less.

The resistance of  $R_2$  should be 16 k $\Omega$  or less.

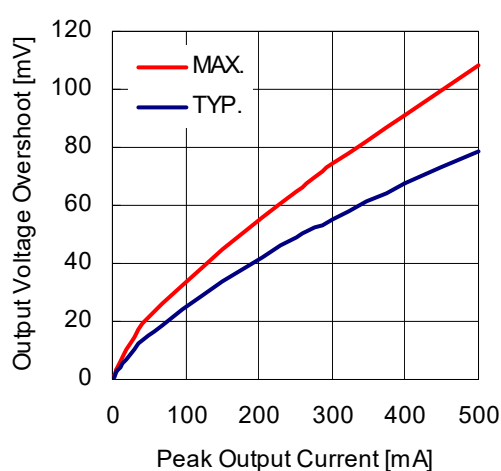
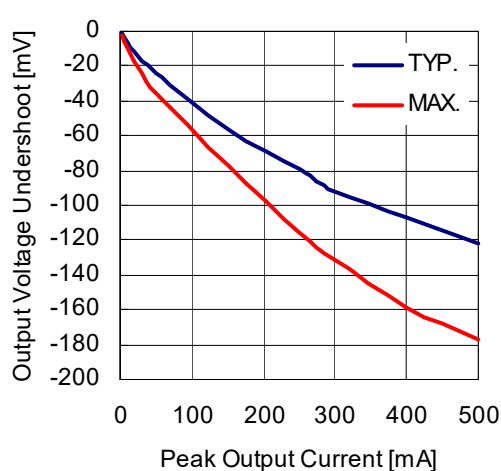
## TRANSIENT RESPONSE

The RP111x has been improved in overall output voltage characteristics including temperature and transient response. The load transient response indicated under the Electrical Characteristics is guaranteed by design based on the condition when  $I_{OUT}$  changes from 1 mA to 250 mA or 250 mA to 1 mA. The output voltage variations under the other load conditions, the characteristic examples are shown below.

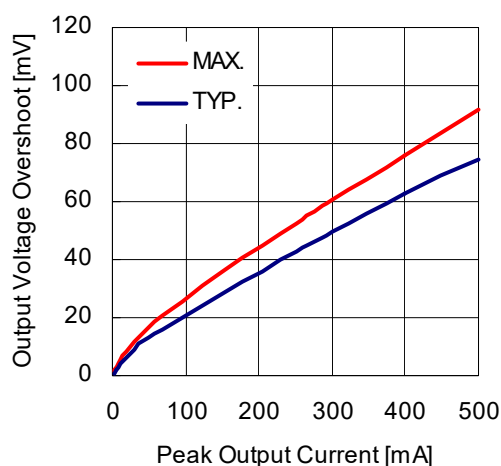
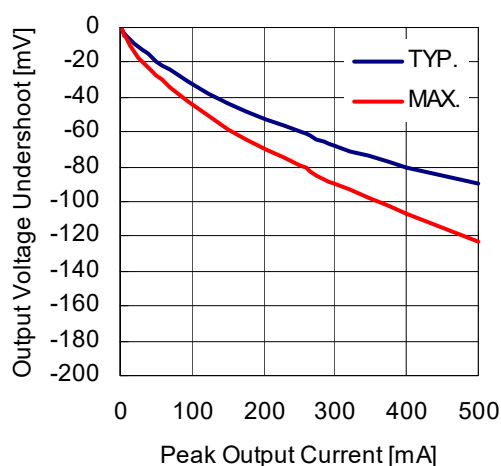
### RP111x151x

$V_{IN} = 2.5 \text{ V}$ ,  $-40^{\circ}\text{C} \leq T_a \leq 85^{\circ}\text{C}$

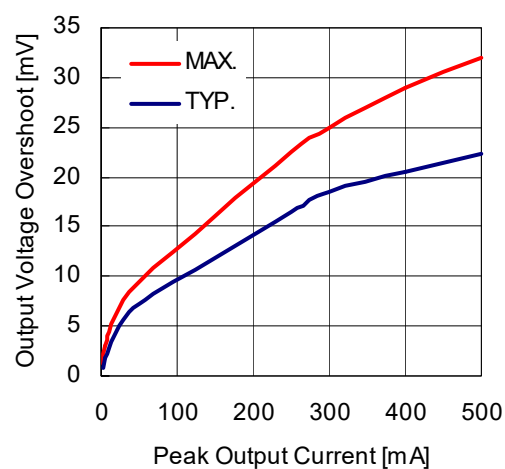
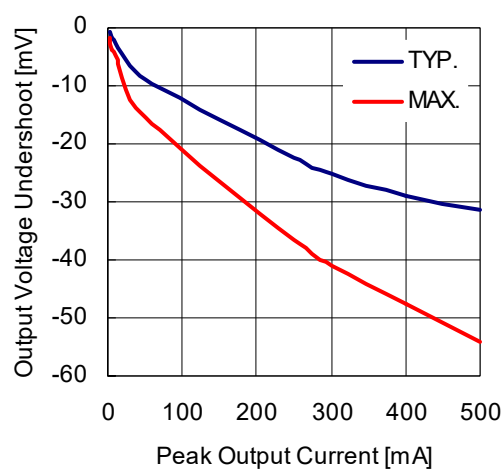
$C_{IN} = 1.0 \mu\text{F}$ ,  $C_{OUT} = 1.0 \mu\text{F}$ ,  $I_{OUT} = 1 \text{ mA} \leftrightarrow$  Peak Output Current



$C_{IN} = 1.0 \mu\text{F}$ ,  $C_{OUT} = 2.2 \mu\text{F}$ ,  $I_{OUT} = 1 \text{ mA} \leftrightarrow$  Peak Output Current



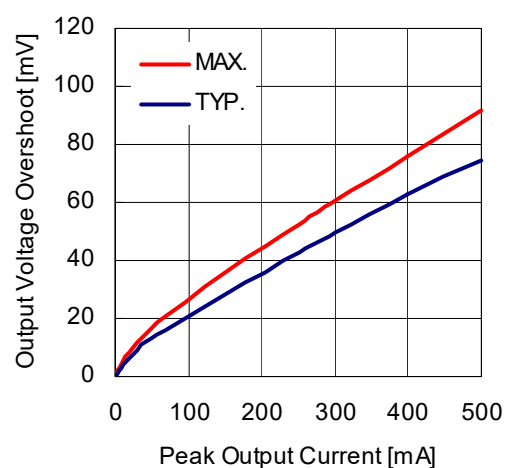
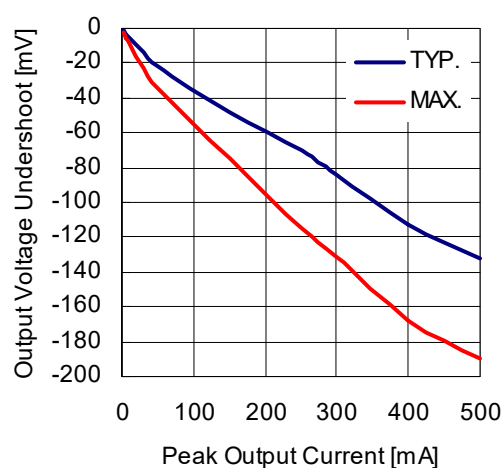
$C_{IN} = 1.0 \mu F$ ,  $C_{OUT} = 1.0 \mu F$ ,  $I_{OUT} = 1 \text{ mA} \leftrightarrow$  Peak Output Current



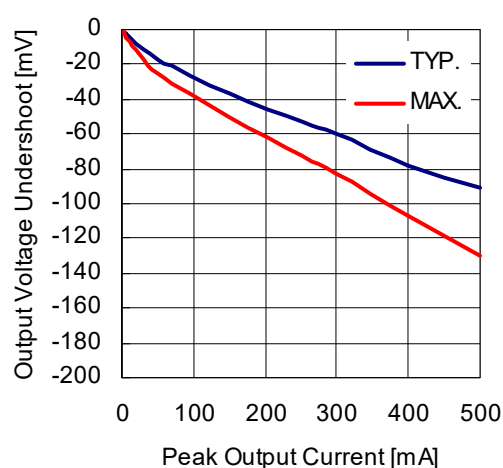
### RP111x281x

$V_{IN} = 3.8 \text{ V}$ ,  $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$

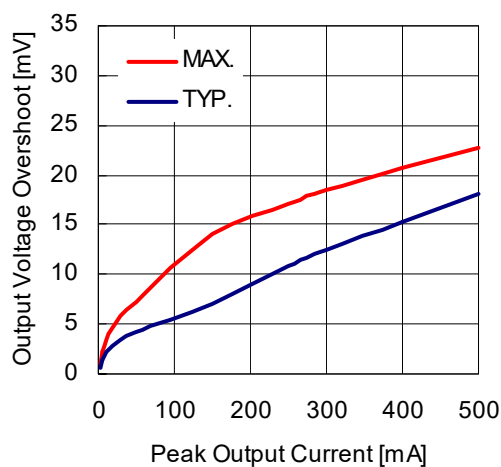
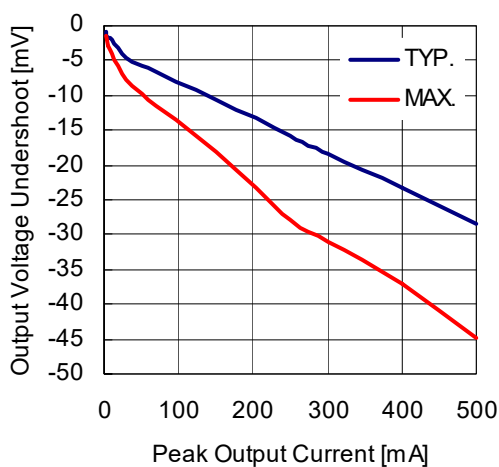
$C_{IN} = 1.0 \mu F$ ,  $C_{OUT} = 1.0 \mu F$ ,  $I_{OUT} = 1 \text{ mA} \leftrightarrow$  Peak Output Current



$C_{IN} = 1.0 \mu F$ ,  $C_{OUT} = 2.2 \mu F$ ,  $I_{OUT} = 1 \text{ mA} \leftrightarrow$  Peak Output Current

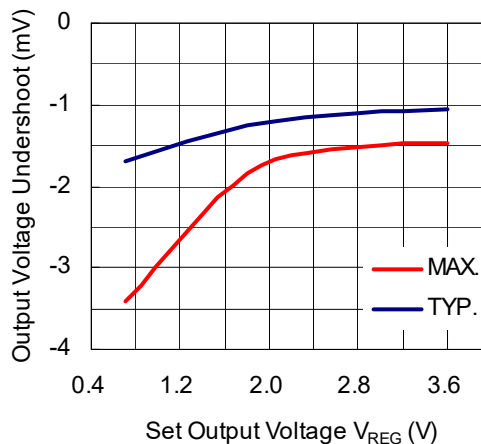
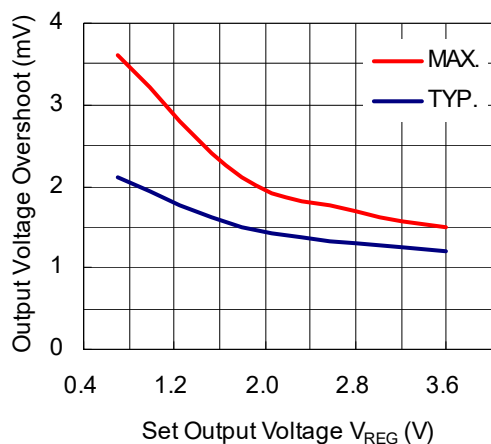


$C_{IN} = 1.0 \mu F$ ,  $C_{OUT} = 1.0 \mu F$ ,  $I_{OUT} = 1 \text{ mA} \leftrightarrow$  Peak Output Current



Input Transient Response has the output voltage dependency. Please refer to the characteristic examples below.

$V_{IN}$ :  $V_{SET} + 0.5 \text{ V} \leftrightarrow V_{SET} + 1.5 \text{ V}$  ( $t_r = t_f = 5.0 \mu s$ ),  $V_{IN} \geq 1.4 \text{ V}$ ,  
 $C_{OUT} = 1.0 \mu F$ ,  $I_{OUT} = 30 \text{ mA}$



The graphs shown above are reference data.

For the better transient response, a capacitor with higher capacitance is recommended and the wire impedance of GND and  $V_{OUT}$  should be minimized as possible.

The transient response characteristics depend on the external parts and PCB layout. Therefore, the operating conditions for the transient response in the application should be considered and evaluation is necessary.

## PACKAGE INFORMATION

### P POWER DISSIPATION (SOT-23-5)

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

#### Measurement Conditions

| Item             | Measurement Conditions                                                                                                                                                                       |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environment      | Mounting on Board (Wind Velocity = 0 m/s)                                                                                                                                                    |
| Board Material   | Glass Cloth Epoxy Plastic (Four-Layer Board)                                                                                                                                                 |
| Board Dimensions | 76.2 mm × 114.3 mm × 0.8 mm                                                                                                                                                                  |
| Copper Ratio     | Outer Layer (First Layer): Less than 95% of 50 mm Square<br>Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square<br>Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square |
| Through-holes    | φ 0.3 mm × 7 pcs                                                                                                                                                                             |

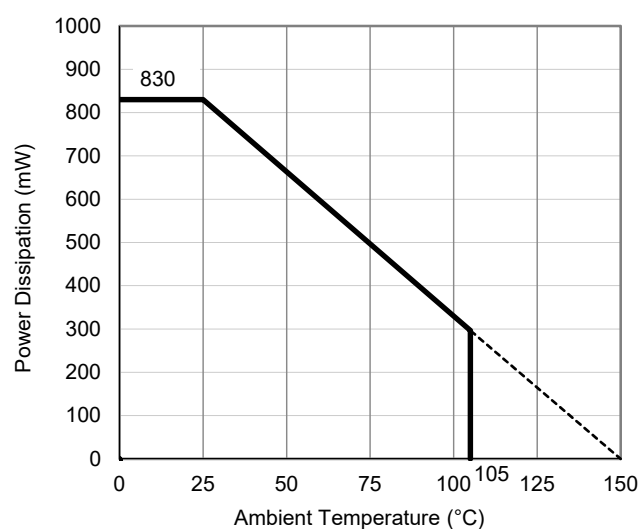
#### Measurement Result

(Ta = 25°C, Tjmax = 150°C)

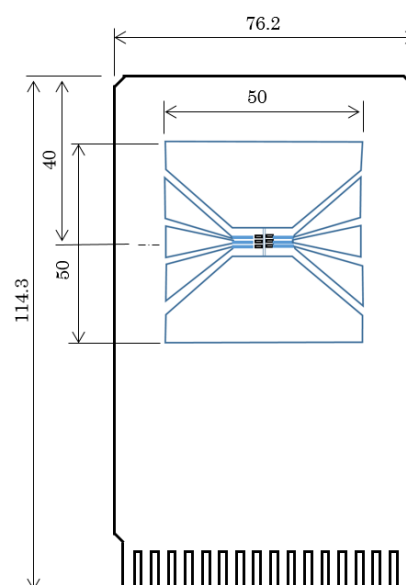
| Item                                               | Measurement Result                    |
|----------------------------------------------------|---------------------------------------|
| Power Dissipation                                  | 830 mW                                |
| Thermal Resistance ( $\theta_{ja}$ )               | $\theta_{ja} = 150^{\circ}\text{C/W}$ |
| Thermal Characterization Parameter ( $\psi_{jt}$ ) | $\psi_{jt} = 51^{\circ}\text{C/W}$    |

$\theta_{ja}$ : Junction-to-Ambient Thermal Resistance

$\psi_{jt}$ : Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



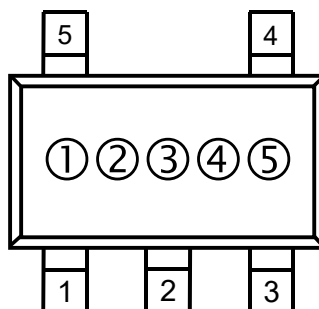
Measurement Board Pattern



## MARK SPECIFICATION (SOT-23-5)

①②③: Product Code ... **Refer to MARK SPECIFICATION TABLE (SOT-23-5)**

④⑤: Lot Number ... Alphanumeric Serial Number



## NOTICE

There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact RICOH sales or our distributor before attempting to use AOI.

## MARK SPECIFICATION TABLE (SOT-23-5)

## RP111Nxx1B

| Product Name | ① | ② | ③ | V <sub>SET</sub> |
|--------------|---|---|---|------------------|
| RP111N071B   | H | 0 | 7 | 0.7 V            |
| RP111N111B   | H | 1 | 1 | 1.1 V            |
| RP111N121B   | H | 1 | 2 | 1.2 V            |
| RP111N151B   | H | 1 | 5 | 1.5 V            |
| RP111N181B   | H | 1 | 8 | 1.8 V            |
| RP111N251B   | H | 2 | 5 | 2.5 V            |
| RP111N281B   | H | 2 | 8 | 2.8 V            |
| RP111N281B5  | H | 4 | 0 | 2.85 V           |
| RP111N291B   | H | 2 | 9 | 2.9 V            |
| RP111N301B   | H | 3 | 0 | 3.0 V            |
| RP111N331B   | H | 3 | 3 | 3.3 V            |
| RP111N341B   | H | 3 | 4 | 3.4 V            |

## RP111Nxx1D

| Product Name | ① | ② | ③ | V <sub>SET</sub> |
|--------------|---|---|---|------------------|
| RP111N071D   | J | 0 | 7 | 0.7 V            |
| RP111N111D   | J | 1 | 1 | 1.1 V            |
| RP111N121D   | J | 1 | 2 | 1.2 V            |
| RP111N151D   | J | 1 | 5 | 1.5 V            |
| RP111N181D   | J | 1 | 8 | 1.8 V            |
| RP111N251D   | J | 2 | 5 | 2.5 V            |
| RP111N281D   | J | 2 | 8 | 2.8 V            |
| RP111N281D5  | J | 4 | 0 | 2.85 V           |
| RP111N291D   | J | 2 | 9 | 2.9 V            |
| RP111N301D   | J | 3 | 0 | 3.0 V            |
| RP111N331D   | J | 3 | 3 | 3.3 V            |
| RP111N341D   | J | 3 | 4 | 3.4 V            |

## RP111N001B (Adjustable Output Voltage Type)

| Product Name | ① | ② | ③ | V <sub>SET</sub> |
|--------------|---|---|---|------------------|
| RP111N001B   | H | 0 | 0 | -                |

## RP111N001D (Adjustable Output Voltage Type)

| Product Name | ① | ② | ③ | V <sub>SET</sub> |
|--------------|---|---|---|------------------|
| RP111N001D   | J | 0 | 0 | -                |

RP111x

NO.EC-241-200630

POWER DISSIPATION (SOT-89-5)

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

Measurement Conditions

| Item             | Measurement Conditions                                                                                                                                                                       |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environment      | Mounting on Board (Wind Velocity = 0 m/s)                                                                                                                                                    |
| Board Material   | Glass Cloth Epoxy Plastic (Four-Layer Board)                                                                                                                                                 |
| Board Dimensions | 76.2 mm × 114.3 mm × 0.8 mm                                                                                                                                                                  |
| Copper Ratio     | Outer Layer (First Layer): Less than 95% of 50 mm Square<br>Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square<br>Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square |
| Through-holes    | φ 0.3 mm × 13 pcs                                                                                                                                                                            |

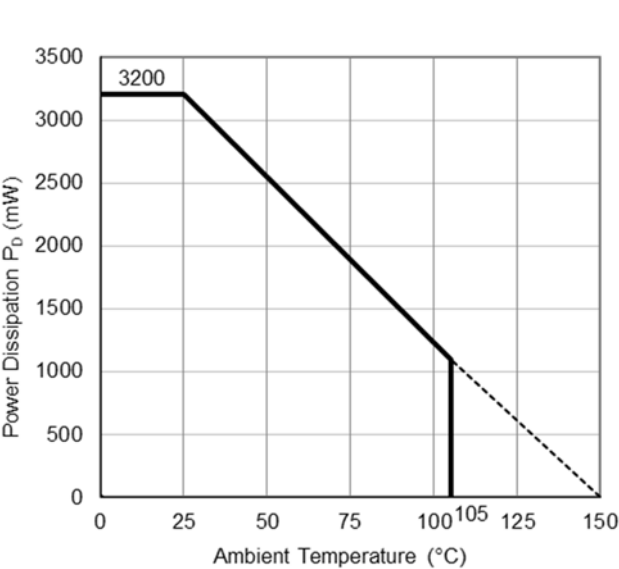
Measurement Result

(Ta = 25°C, Tjmax = 150°C)

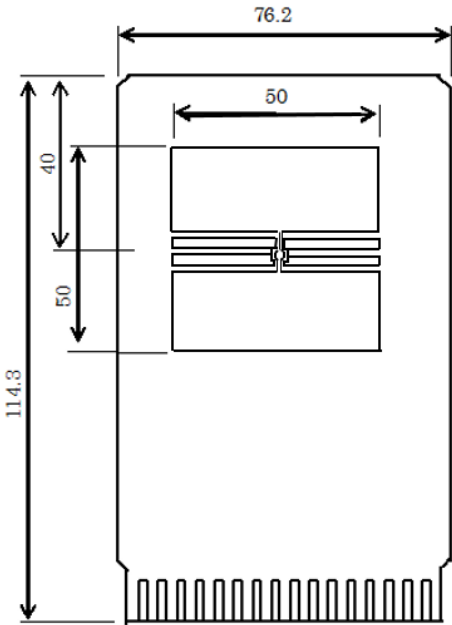
| Item                                     | Measurement Result |
|------------------------------------------|--------------------|
| Power Dissipation                        | 3200 mW            |
| Thermal Resistance (θja)                 | θja = 38°C/W       |
| Thermal Characterization Parameter (ψjt) | ψjt = 13°C/W       |

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern



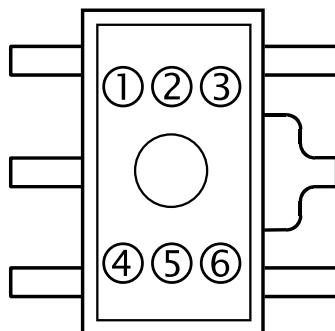
## RP111x

NO.EC-241-200630

### MARK SPECIFICATION (SOT-89-5)

①②③④: Product Code ... **Refer to MARK SPECIFICATION TABLE (SOT-89-5)**

⑤⑥: Lot Number ... Alphanumeric Serial Number



#### NOTICE

There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact RICOH sales or our distributor before attempting to use AOI.

### MARK SPECIFICATION TABLE (SOT-89-5)

#### RP111Hxx1B

| Product Name | ① ② ③ ④ | V <sub>SET</sub> |
|--------------|---------|------------------|
| RP111H071B   | A 0 7 B | 0.7 V            |
| RP111H111B   | A 1 1 B | 1.1 V            |
| RP111H121B   | A 1 2 B | 1.2 V            |
| RP111H151B   | A 1 5 B | 1.5 V            |
| RP111H181B   | A 1 8 B | 1.8 V            |
| RP111H251B   | A 2 5 B | 2.5 V            |
| RP111H281B   | A 2 8 B | 2.8 V            |
| RP111H281B5  | A 4 0 B | 2.85 V           |
| RP111H291B   | A 2 9 B | 2.9 V            |
| RP111H301B   | A 3 0 B | 3.0 V            |
| RP111H331B   | A 3 3 B | 3.3 V            |
| RP111H341B   | A 3 4 B | 3.4 V            |

#### RP111Hxx1D

| Product Name | ① ② ③ ④ | V <sub>SET</sub> |
|--------------|---------|------------------|
| RP111H071D   | A 0 7 D | 0.7 V            |
| RP111H111D   | A 1 1 D | 1.1 V            |
| RP111H121D   | A 1 2 D | 1.2 V            |
| RP111H151D   | A 1 5 D | 1.5 V            |
| RP111H181D   | A 1 8 D | 1.8 V            |
| RP111H251D   | A 2 5 D | 2.5 V            |
| RP111H281D   | A 2 8 D | 2.8 V            |
| RP111H281D5  | A 4 0 D | 2.85 V           |
| RP111H291D   | A 2 9 D | 2.9 V            |
| RP111H301D   | A 3 0 D | 3.0 V            |
| RP111H331D   | A 3 3 D | 3.3 V            |
| RP111H341D   | A 3 4 D | 3.4 V            |

#### RP111H001B (Adjustable Output Voltage Type)

| Product Name | ① ② ③ ④ | V <sub>SET</sub> |
|--------------|---------|------------------|
| RP111H001B   | A 0 0 B | -                |

#### RP111H001D (Adjustable Output Voltage Type)

| Product Name | ① ② ③ ④ | V <sub>SET</sub> |
|--------------|---------|------------------|
| RP111H001D   | A 0 0 D | -                |

## POWER DISSIPATION (HSOP-6J)

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

### Measurement Conditions

| Item             | Measurement Conditions                                                                                                                                                                       |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environment      | Mounting on Board (Wind Velocity = 0 m/s)                                                                                                                                                    |
| Board Material   | Glass Cloth Epoxy Plastic (Four-Layer Board)                                                                                                                                                 |
| Board Dimensions | 76.2 mm × 114.3 mm × 0.8 mm                                                                                                                                                                  |
| Copper Ratio     | Outer Layer (First Layer): Less than 95% of 50 mm Square<br>Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square<br>Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square |
| Through-holes    | φ 0.3 mm × 28 pcs                                                                                                                                                                            |

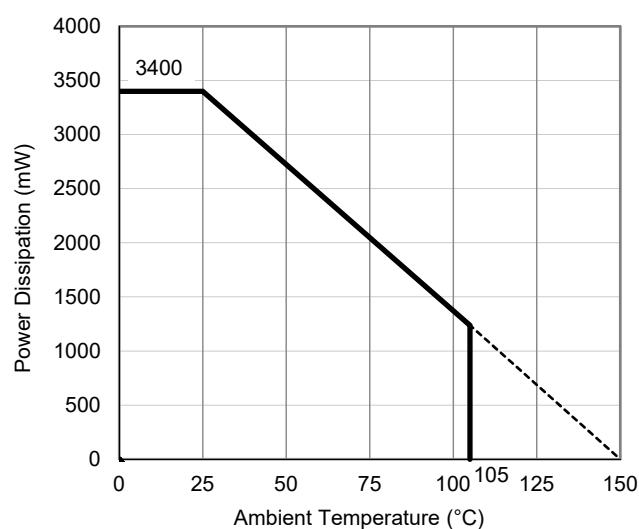
### Measurement Result

(Ta = 25°C, Tjmax = 150°C)

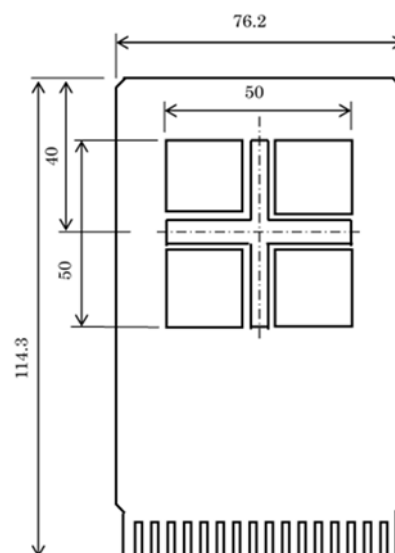
| Item                                               | Measurement Result                   |
|----------------------------------------------------|--------------------------------------|
| Power Dissipation                                  | 3400 mW                              |
| Thermal Resistance ( $\theta_{ja}$ )               | $\theta_{ja} = 37^{\circ}\text{C/W}$ |
| Thermal Characterization Parameter ( $\psi_{jt}$ ) | $\psi_{jt} = 7^{\circ}\text{C/W}$    |

$\theta_{ja}$ : Junction-to-Ambient Thermal Resistance

$\psi_{jt}$ : Junction-to-Top Thermal Characterization Parameter

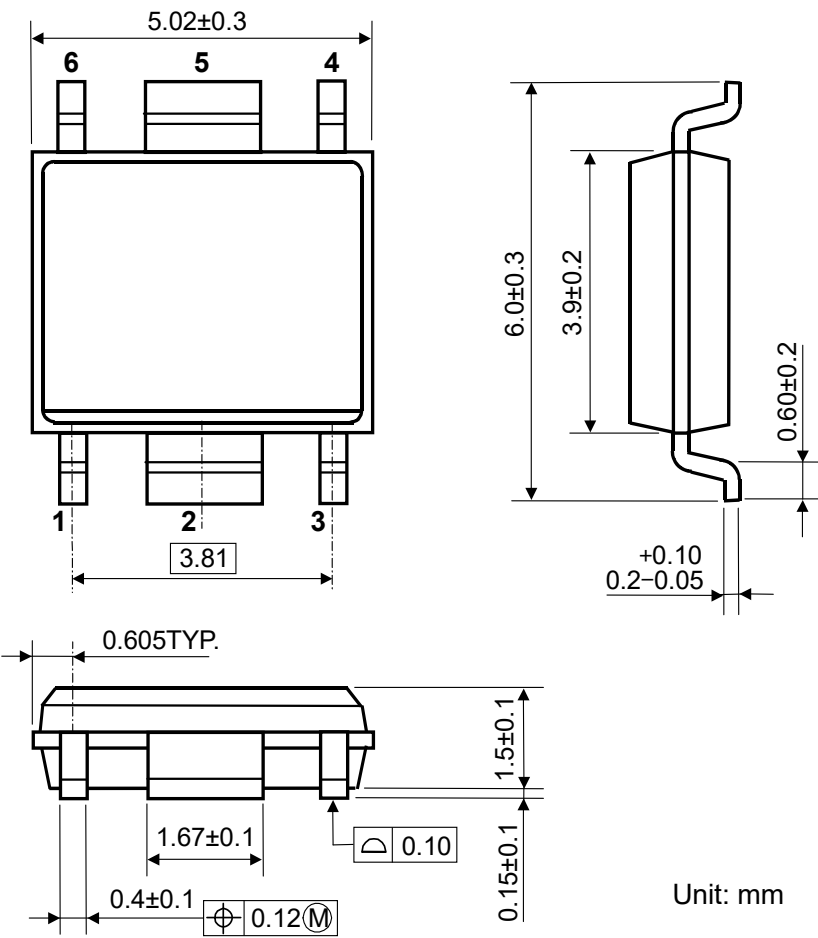


Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

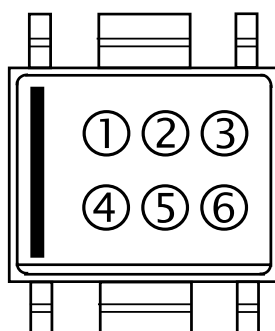
PACKAGE DIMENSIONS (HSOP-6J)



## MARK SPECIFICATION (HSOP-6J)

①②③④: Product Code ... **Refer to MARK SPECIFICATION TABLE (HSOP-6J)**

⑤⑥: Lot Number ... Alphanumeric Serial Number



### NOTICE

There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact RICOH sales or our distributor before attempting to use AOI.

## MARK SPECIFICATION TABLE (HSOP-6J)

### RP111Sxx1B

| Product Name | ① ② ③ ④ | V <sub>SET</sub> |
|--------------|---------|------------------|
| RP111S071B   | C 0 7 B | 0.7 V            |
| RP111S111B   | C 1 1 B | 1.1 V            |
| RP111S121B   | C 1 2 B | 1.2 V            |
| RP111S151B   | C 1 5 B | 1.5 V            |
| RP111S181B   | C 1 8 B | 1.8 V            |
| RP111S251B   | C 2 5 B | 2.5 V            |
| RP111S281B   | C 2 8 B | 2.8 V            |
| RP111S281B5  | C 4 0 B | 2.85 V           |
| RP111S291B   | C 2 9 B | 2.9 V            |
| RP111S301B   | C 3 0 B | 3.0 V            |
| RP111S331B   | C 3 3 B | 3.3 V            |
| RP111S341B   | C 3 4 B | 3.4 V            |

### RP111Sxx1D

| Product Name | ① ② ③ ④ | V <sub>SET</sub> |
|--------------|---------|------------------|
| RP111S071D   | C 0 7 D | 0.7 V            |
| RP111S111D   | C 1 1 D | 1.1 V            |
| RP111S121D   | C 1 2 D | 1.2 V            |
| RP111S151D   | C 1 5 D | 1.5 V            |
| RP111S181D   | C 1 8 D | 1.8 V            |
| RP111S251D   | C 2 5 D | 2.5 V            |
| RP111S281D   | C 2 8 D | 2.8 V            |
| RP111S281D5  | C 4 0 D | 2.85 V           |
| RP111S291D   | C 2 9 D | 2.9 V            |
| RP111S301D   | C 3 0 D | 3.0 V            |
| RP111S331D   | C 3 3 D | 3.3 V            |
| RP111S341D   | C 3 4 D | 3.4 V            |

### RP111S001B (Adjustable Output Voltage Type)

| Product Name | ① ② ③ ④ | V <sub>SET</sub> |
|--------------|---------|------------------|
| RP111S001B   | C 0 0 B | -                |

### RP111S001D (Adjustable Output Voltage Type)

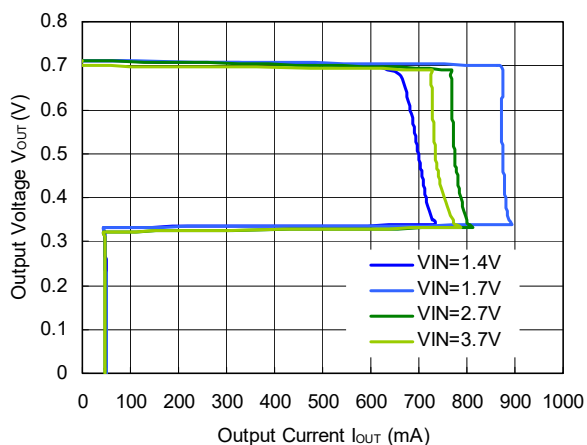
| Product Name | ① ② ③ ④ | V <sub>SET</sub> |
|--------------|---------|------------------|
| RP111S001D   | C 0 0 D | -                |

## TYPICAL CHARACTERISTICS

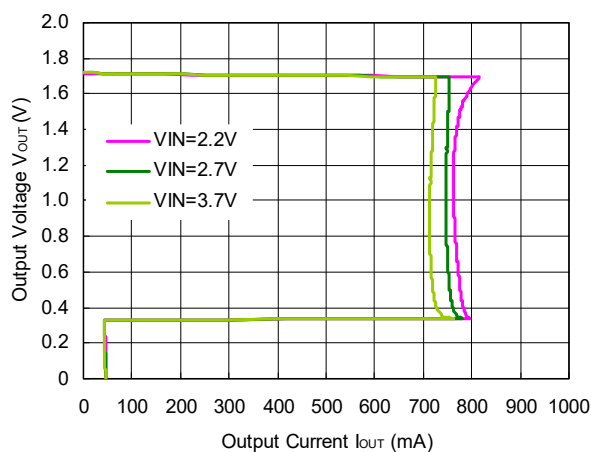
Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

### 1) Output Voltage vs. Output Current (C1 = Ceramic 1.0 $\mu$ F, C2 = Ceramic 1.0 $\mu$ F, Ta = 25°C)

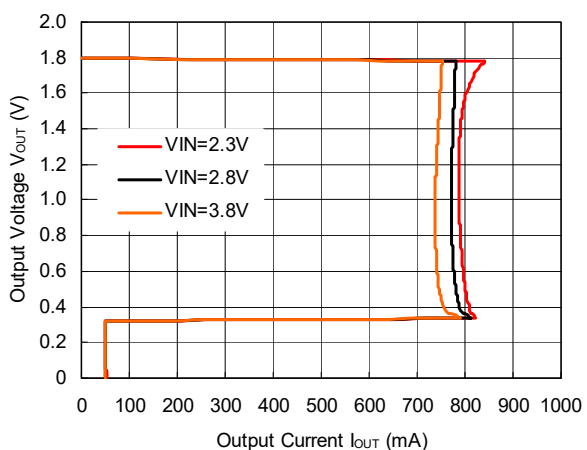
RP111x071x



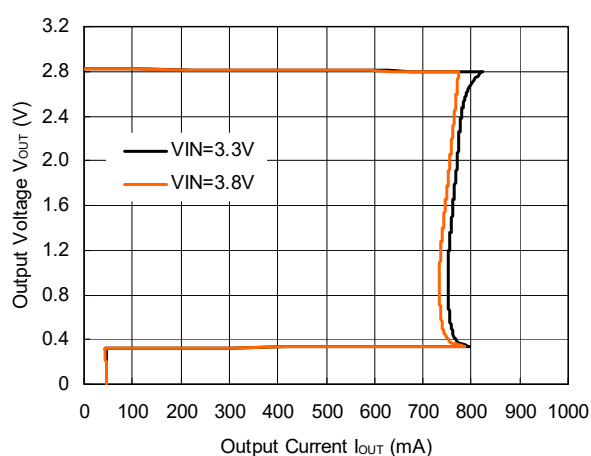
RP111x171x



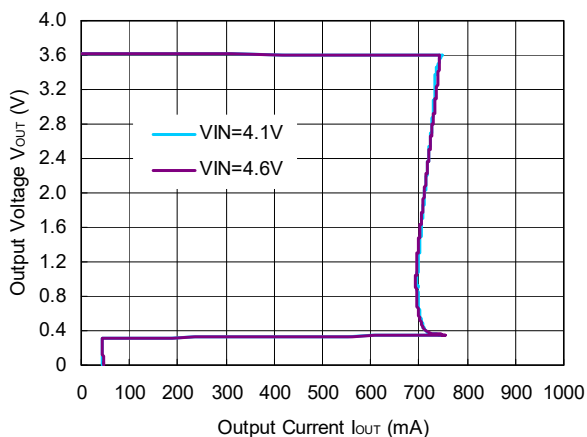
RP111x181x



RP111x281x

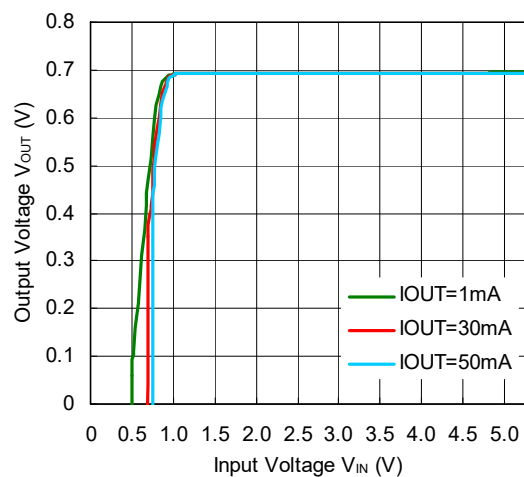


RP111x361x

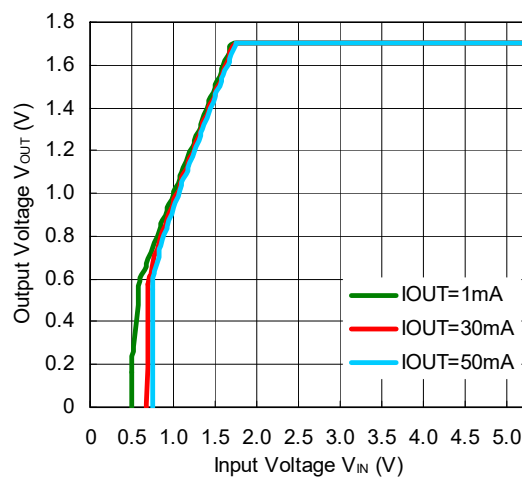


2) Output Voltage vs. Input Voltage (C1 = Ceramic 1.0  $\mu$ F, C2 = Ceramic 1.0  $\mu$ F, Ta = 25°C)

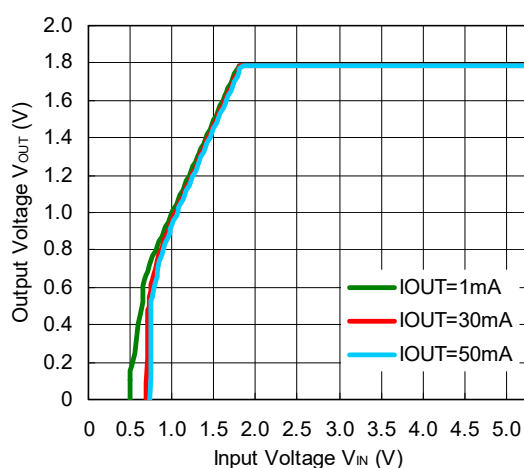
RP111x071x



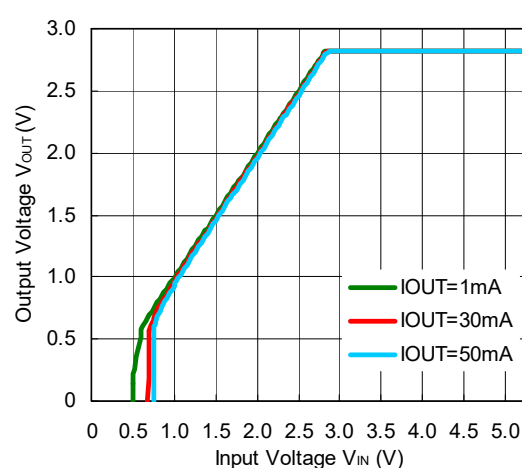
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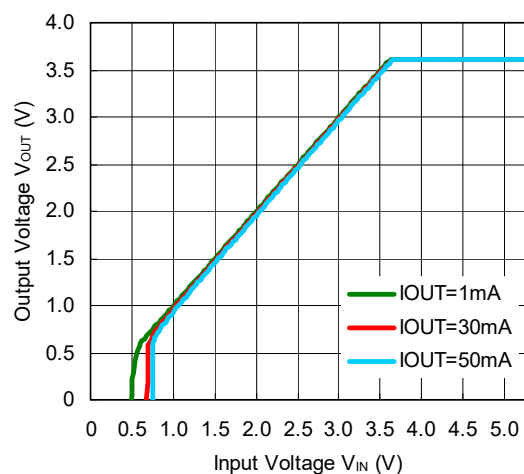
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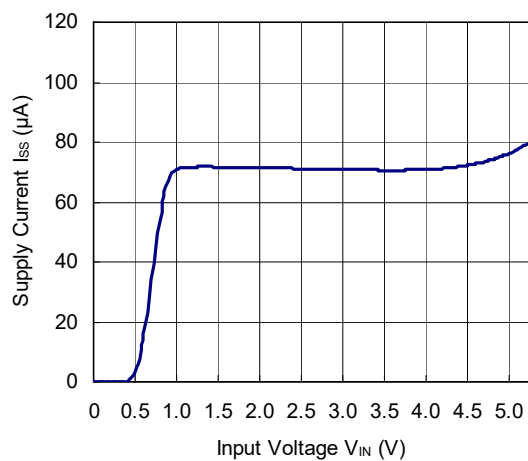
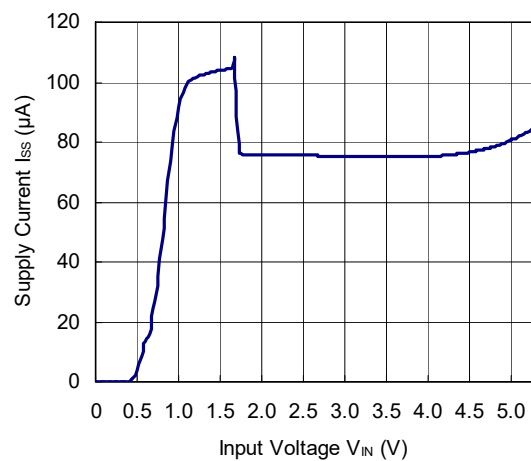
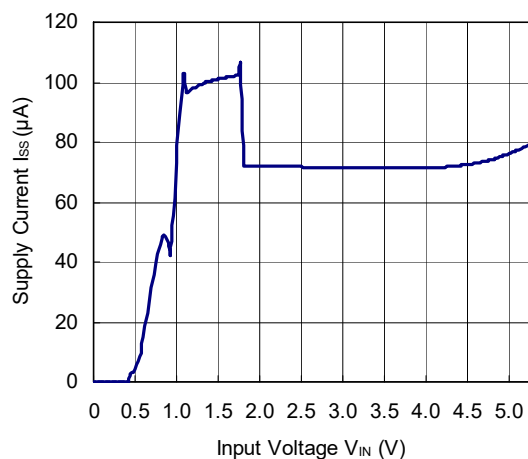
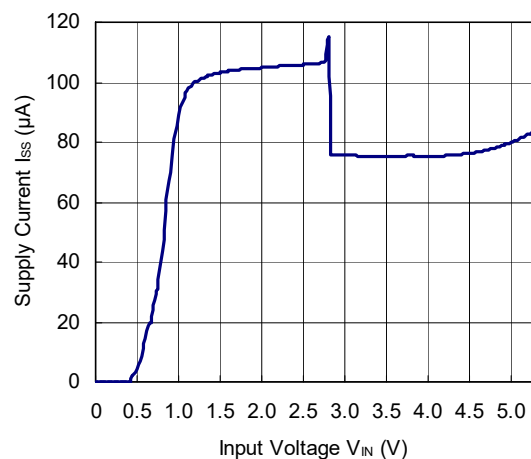
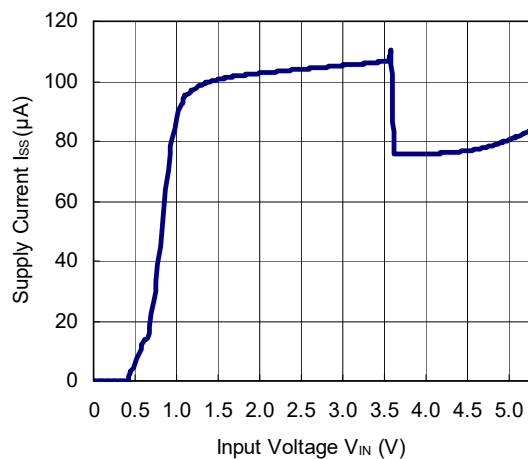


RP111x281x



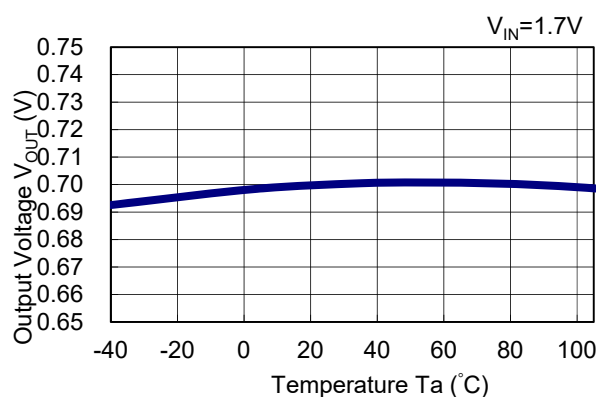
RP111x361x



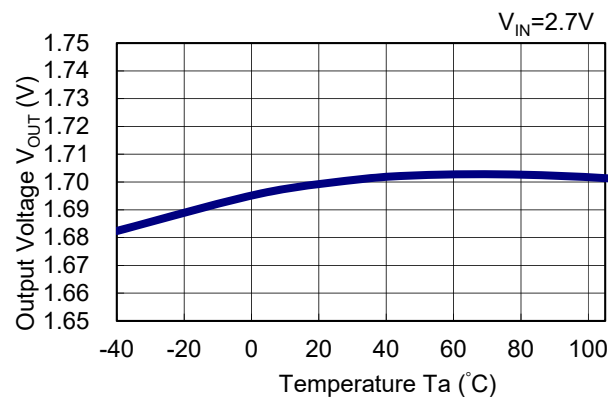
**3) Supply Current vs. Input Voltage (C1 = Ceramic 1.0  $\mu$ F, C2 = Ceramic 1.0  $\mu$ F, Ta = 25°C)****RP111x071x****RP111x171x****RP111x181x****RP111x281x****RP111x361x**

4) Output Voltage vs. Temperature (C1 = Ceramic 1.0  $\mu$ F, C2 = Ceramic 1.0  $\mu$ F,  $I_{OUT} = 1$  mA)

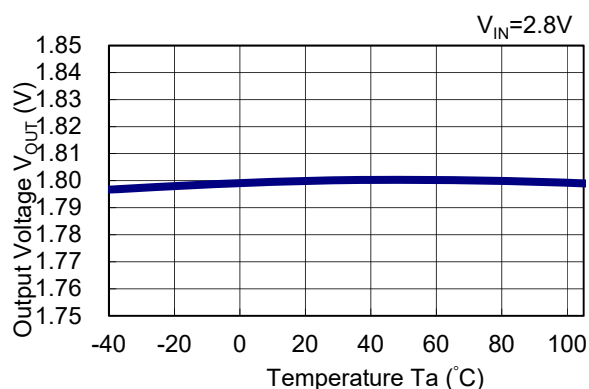
RP111x071x



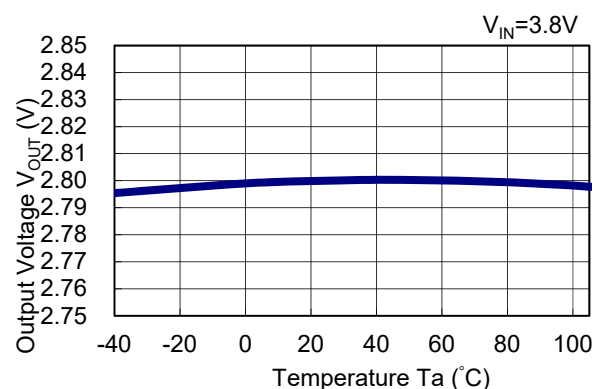
RP111x171x



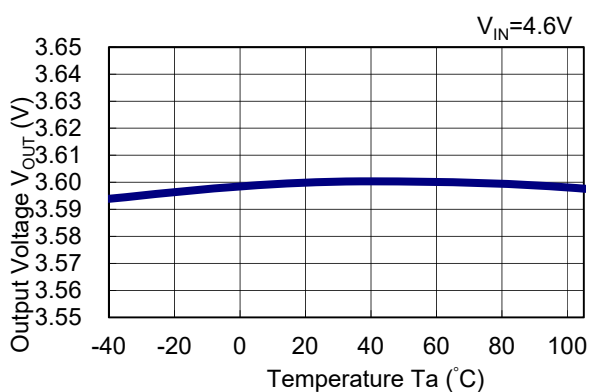
RP111x181x



RP111x281x



RP111x361x

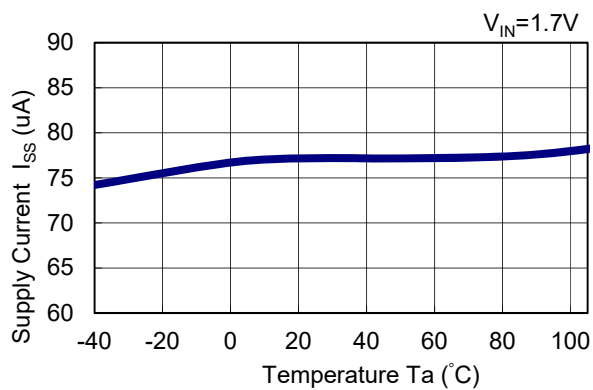


## RP111x

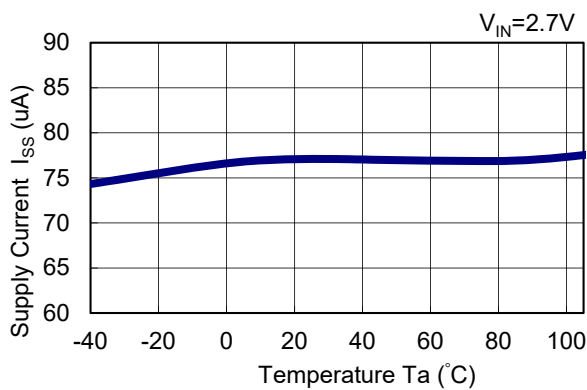
NO.EC-241-200630

### 5) Supply Current vs. Temperature (C1 = Ceramic 1.0 $\mu$ F, C2 = Ceramic 1.0 $\mu$ F, $I_{OUT} = 0$ mA)

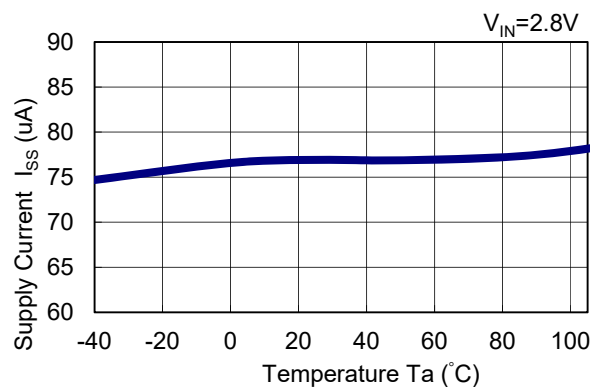
RP111x071x



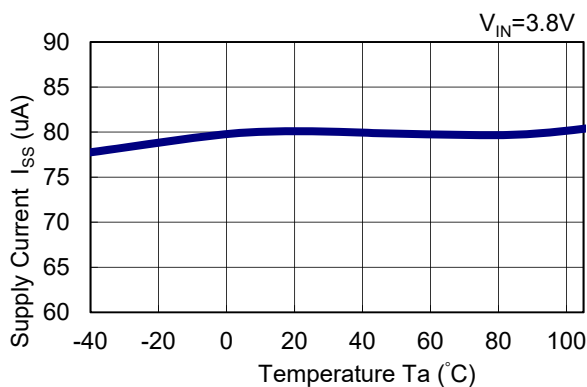
RP111x171x



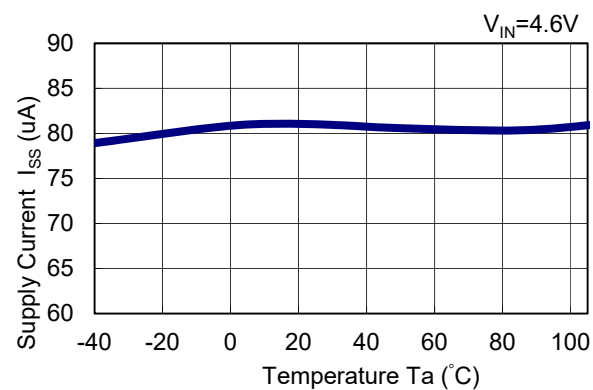
RP111x181x



RP111x281x

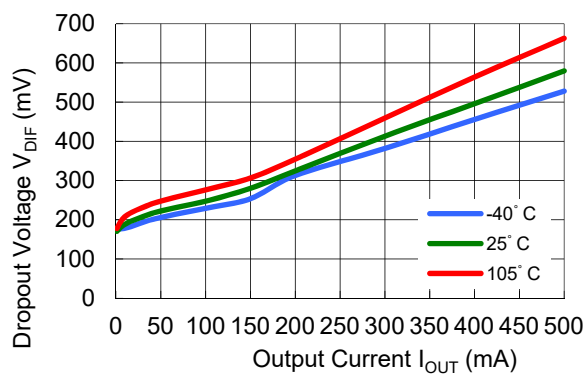


RP111x361x

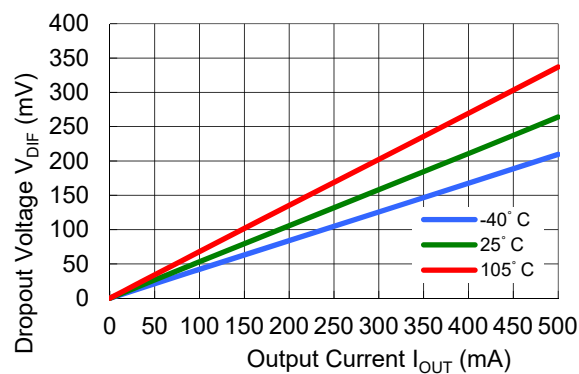


6) Dropout Voltage vs. Output Current (C1 = Ceramic 1.0  $\mu$ F, C2 = Ceramic 1.0  $\mu$ F)

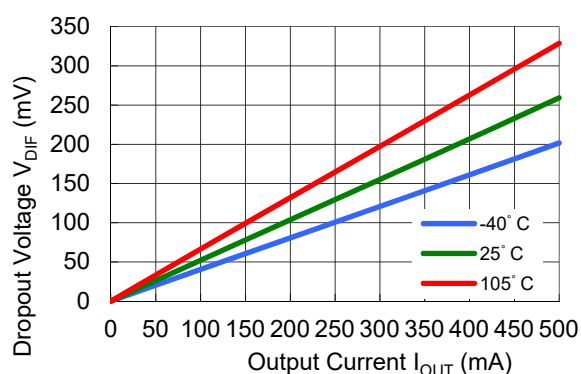
RP111x071x



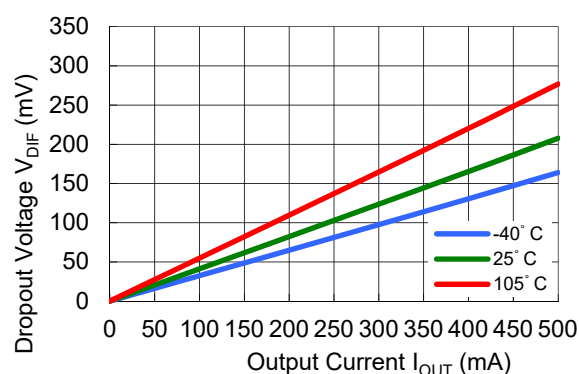
RP111x171x



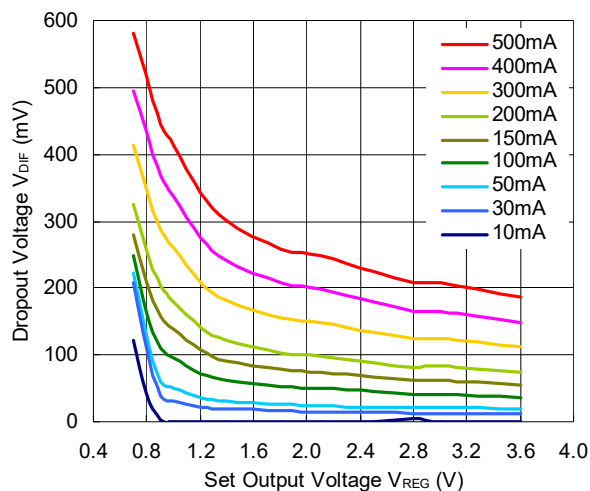
RP111x181x



RP111x281x

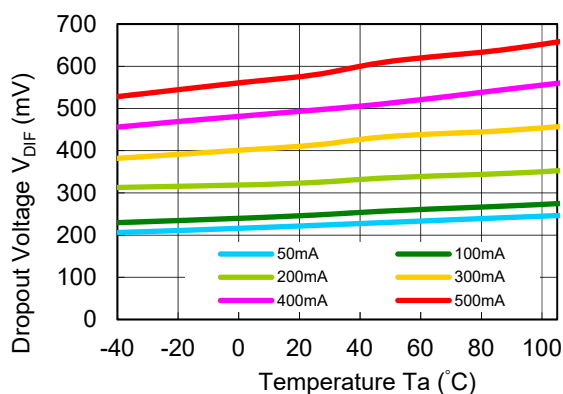


**7) Dropout Voltage vs. Set Output Voltage (C1= Ceramic 1.0  $\mu$ F, C2 = Ceramic 1.0  $\mu$ F, Ta = 25°C)**

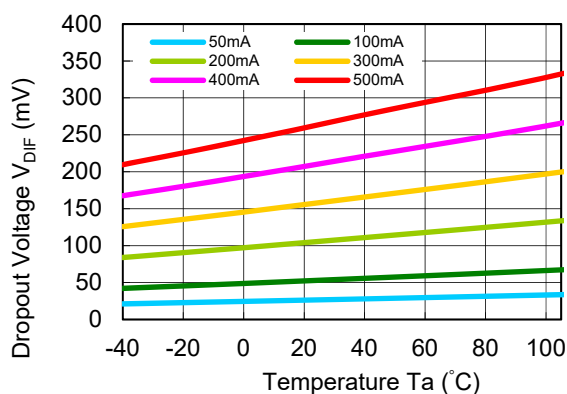


**8) Dropout Voltage vs. Temperature (C1 = Ceramic 1.0  $\mu$ F, C2 = Ceramic 1.0  $\mu$ F)**

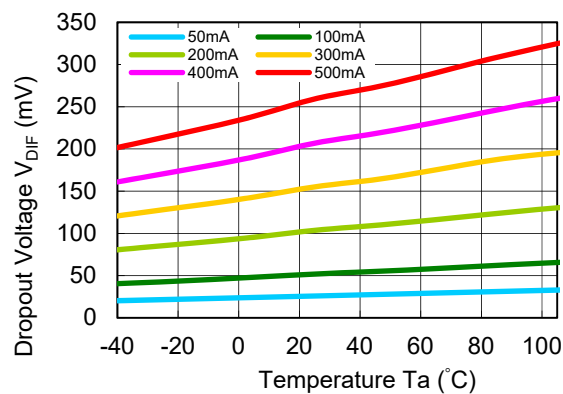
**RP111x071x**



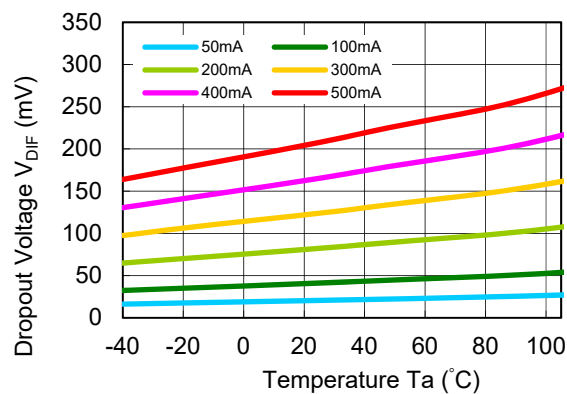
**RP111x171xx**



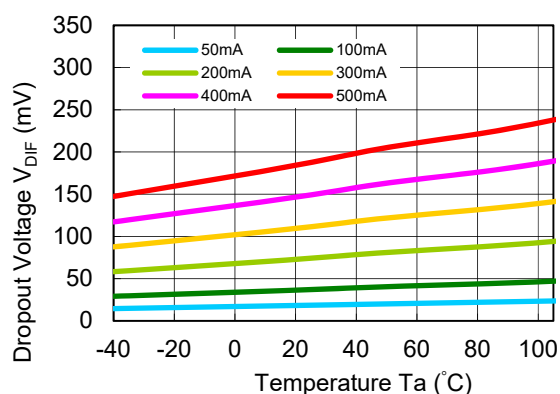
**RP111x181x**



**RP111x281x**

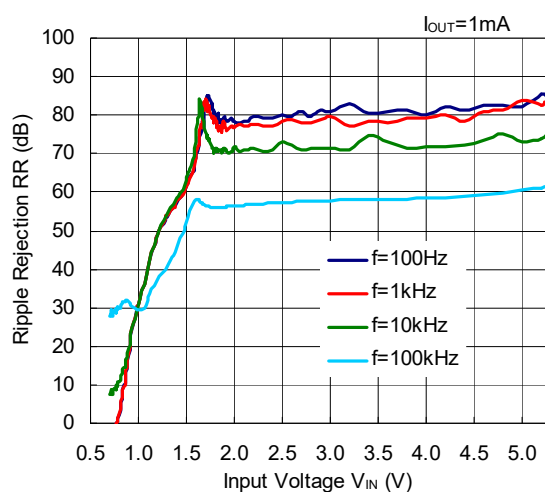


### RP111x361x

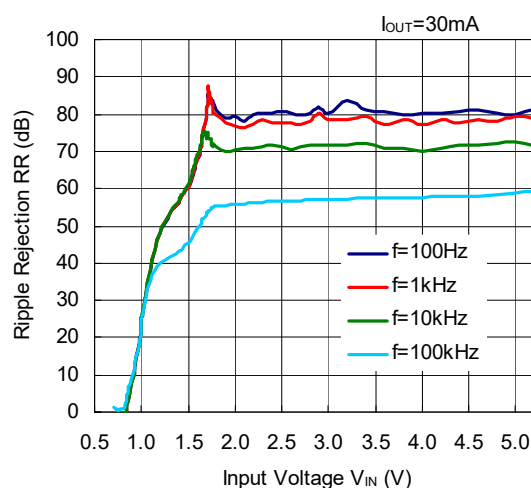


### 9) Ripple Rejection vs. Input Voltage ( $C_1$ = none, $C_2$ = Ceramic 1.0 $\mu$ F, Ripple = 0.2 V p-p, $T_a$ = 25°C)

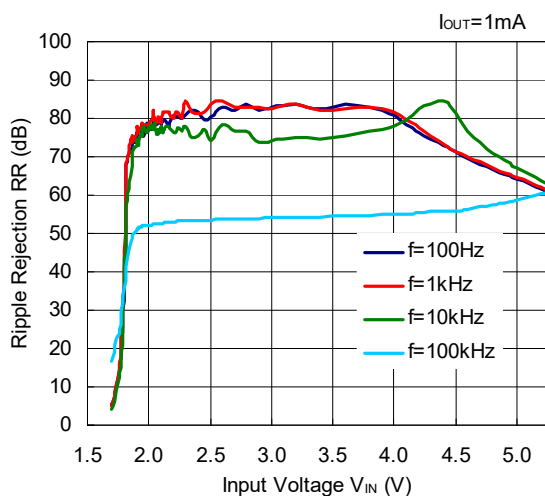
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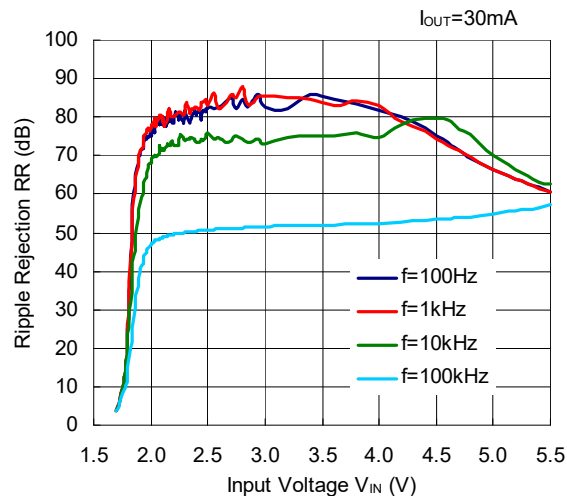
#### RP111x071x



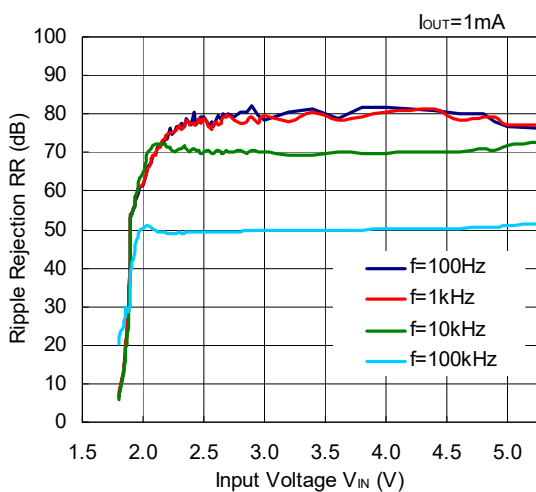
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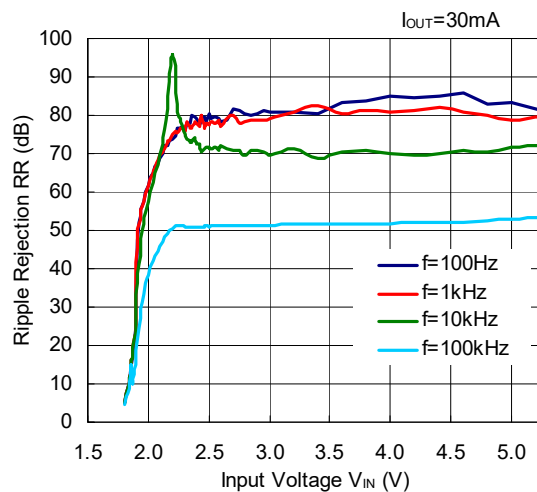
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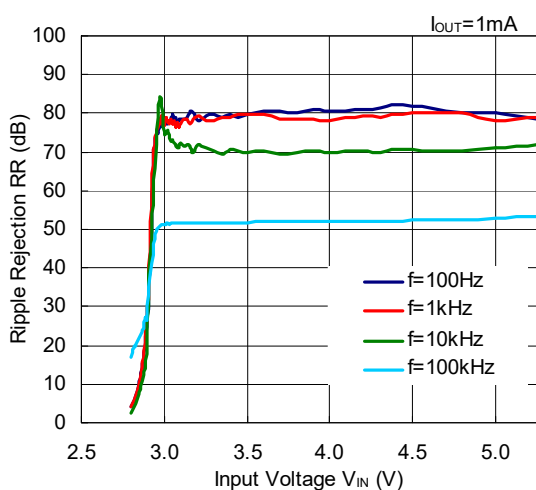
**RP111x181x**



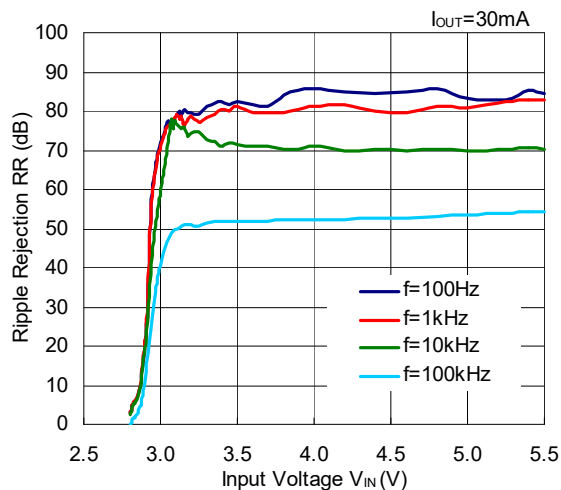
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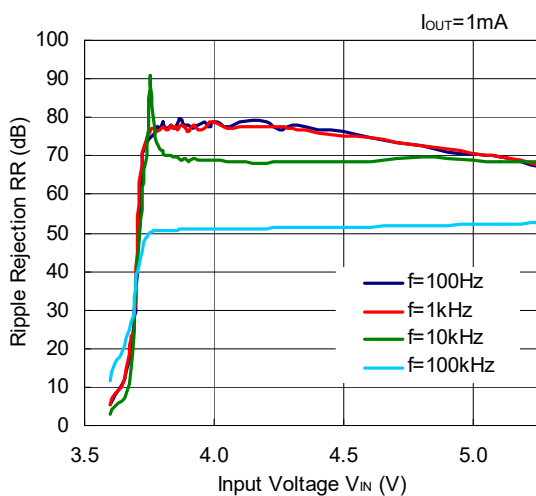
**RP111x281x**



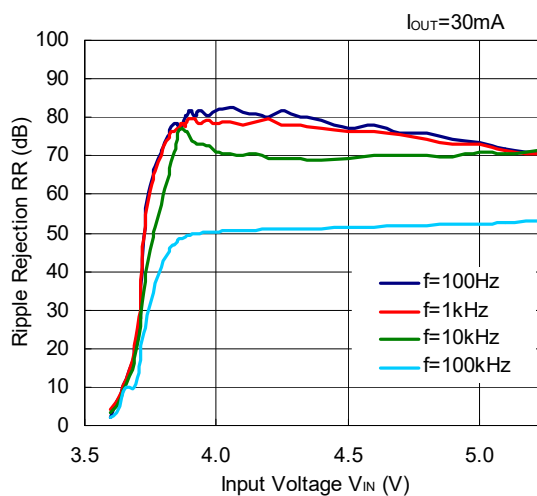
**RP111x281x**



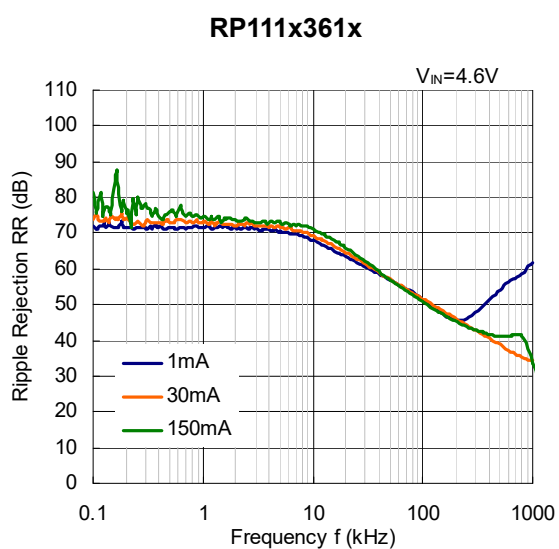
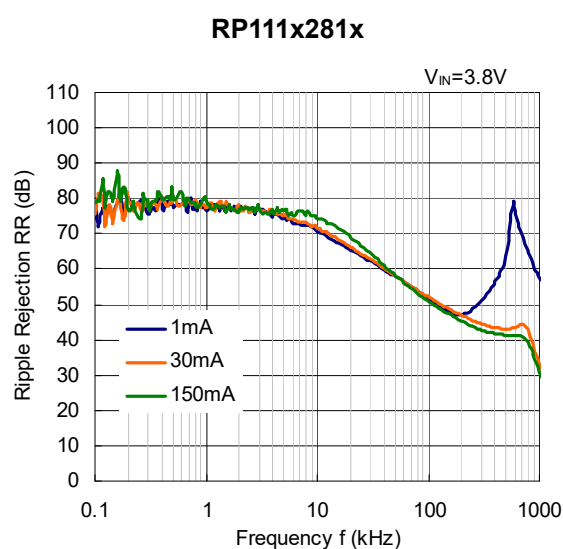
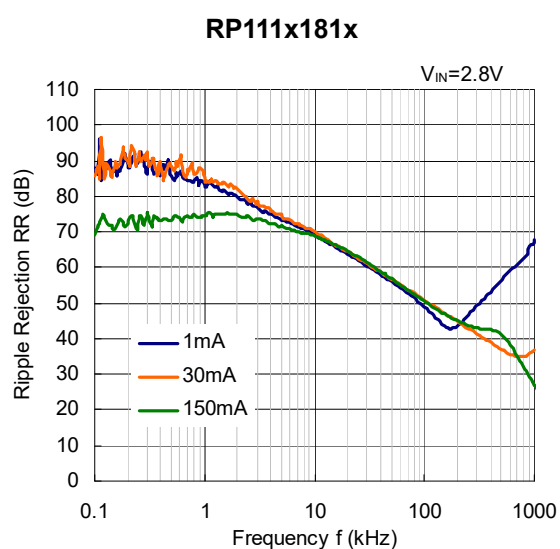
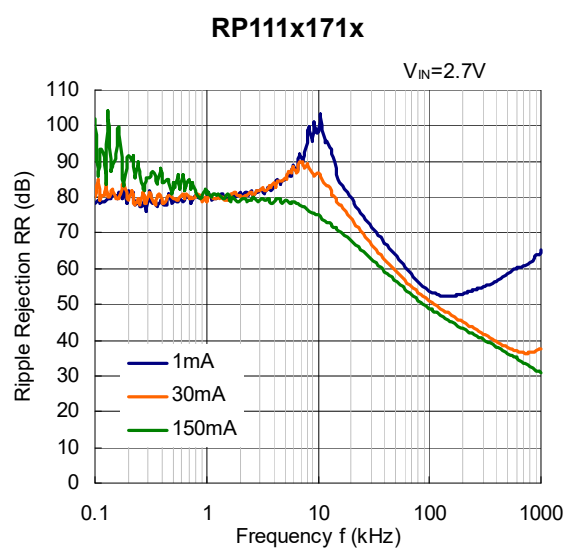
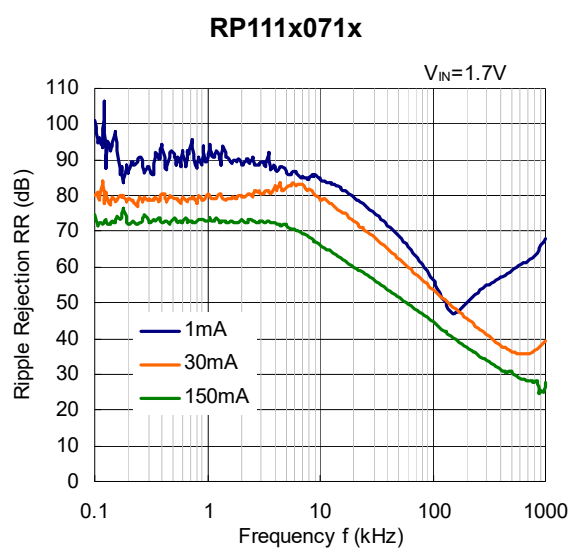
**RP111x361x**



**RP111x361x**

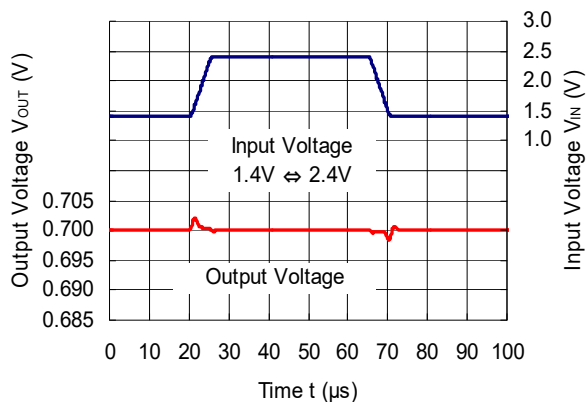


10) Ripple Rejection vs. Frequency (C1 = none, C2 = Ceramic 1.0  $\mu$ F, Ripple = 0.2 Vp-p, Ta = 25°C)

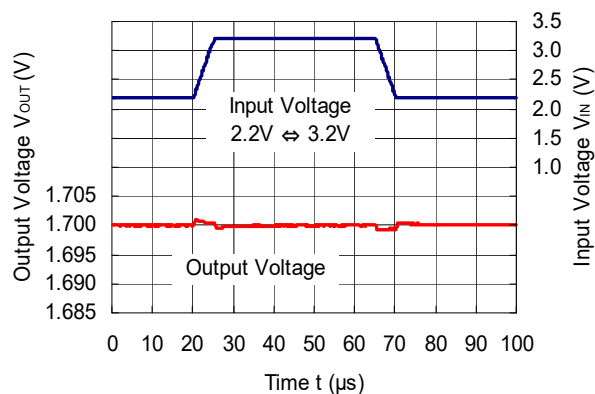


**11) Input Transient Response (C1= none, C2 = Ceramic 1.0  $\mu$ F,  $I_{OUT}$  = 30 mA,  $t_r = t_f = 5 \mu$ s,  $T_a = 25^\circ$ C)**

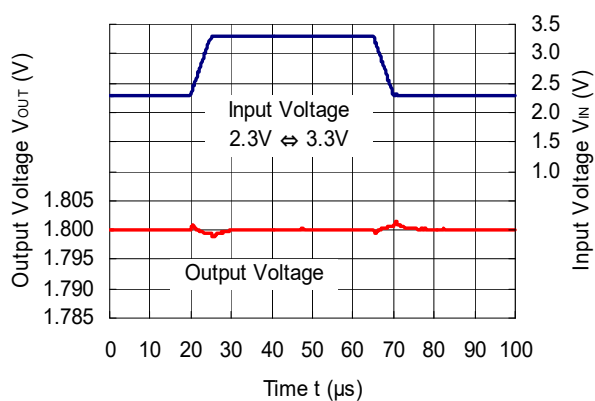
**RP111x071x**



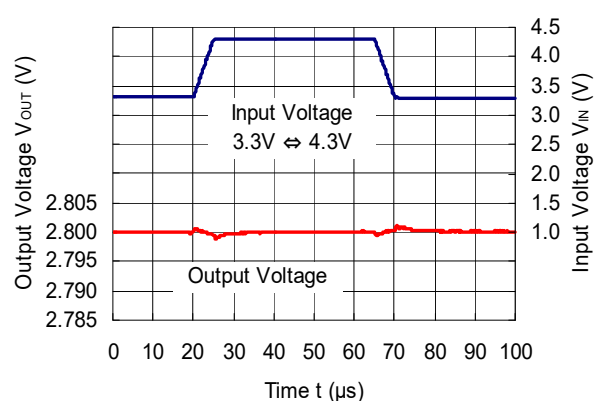
**RP111x171x**



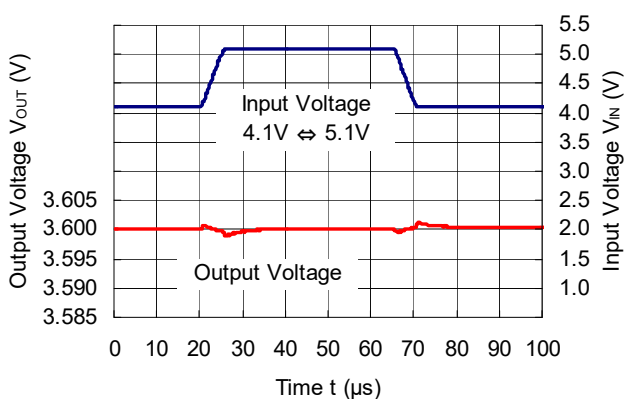
**RP111x181x**



**RP111x281x**

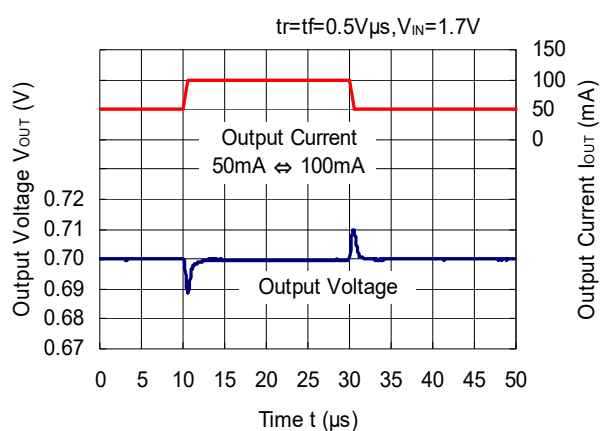


**RP111x361x**

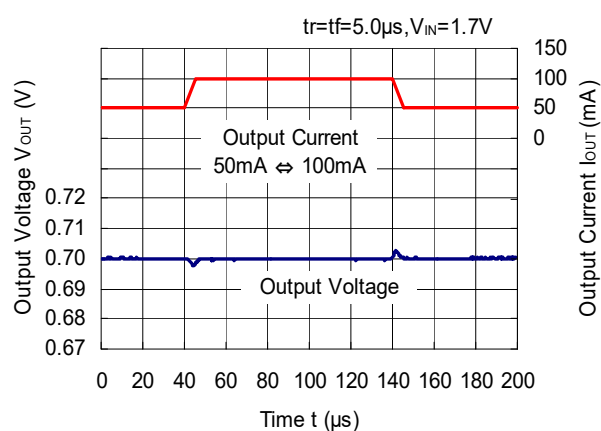


12) Load Transient Response (C1 = Ceramic 1.0  $\mu$ F, C2 = Ceramic 1.0  $\mu$ F, Ta = 25°C)

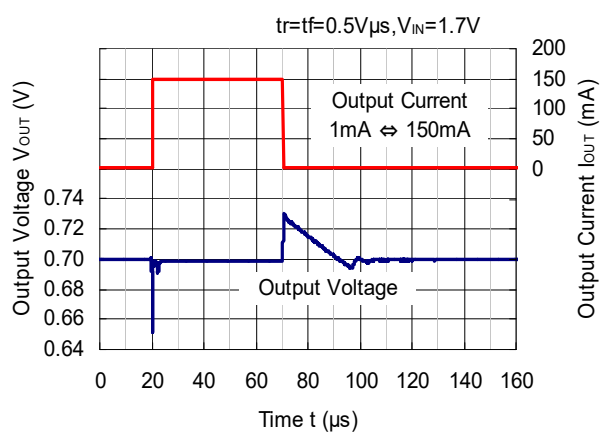
RP111x071x



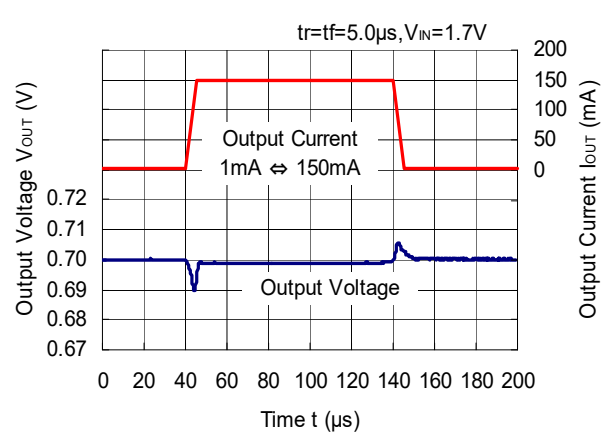
RP111x071x



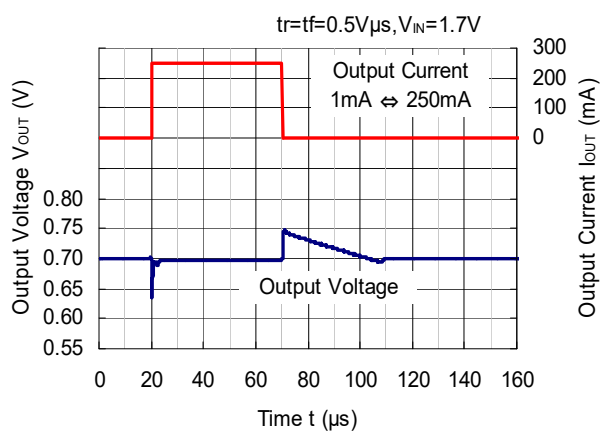
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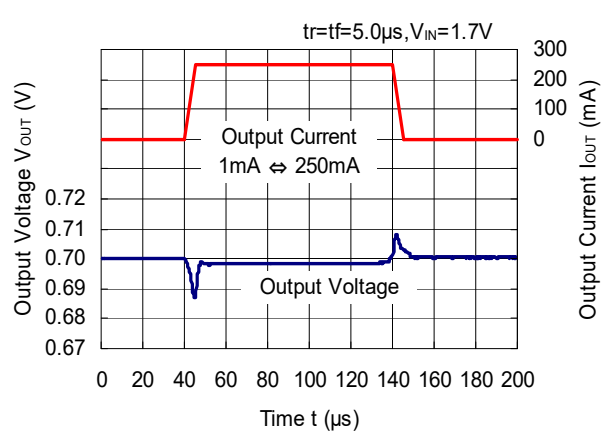
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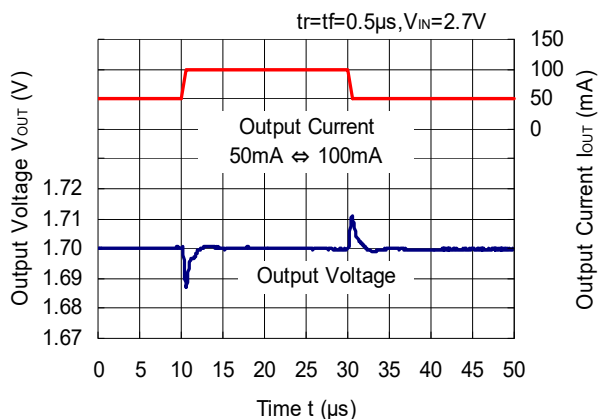
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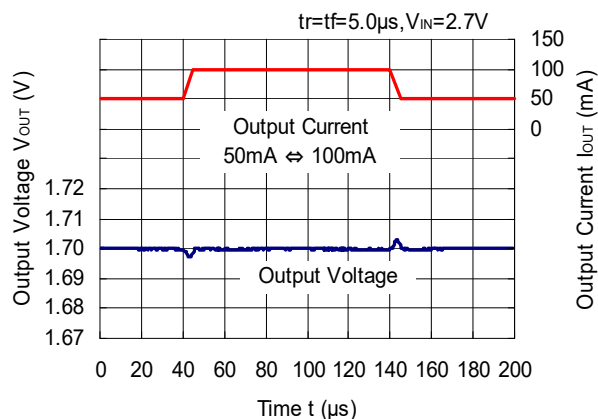
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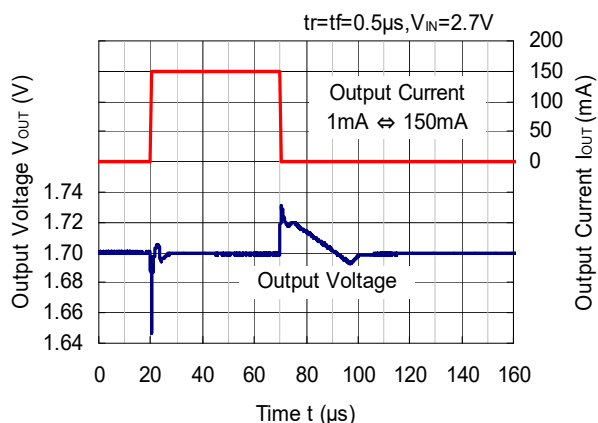
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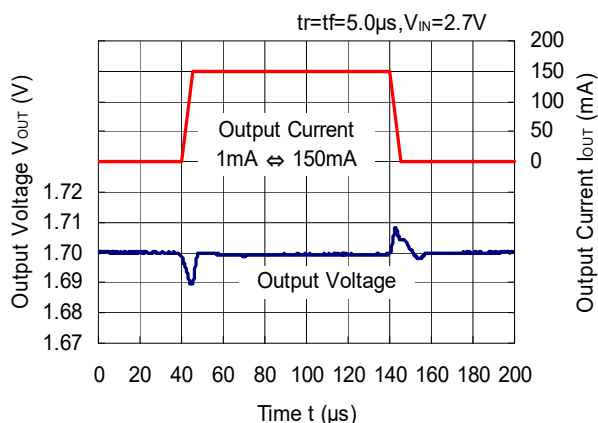
**RP111x171x**



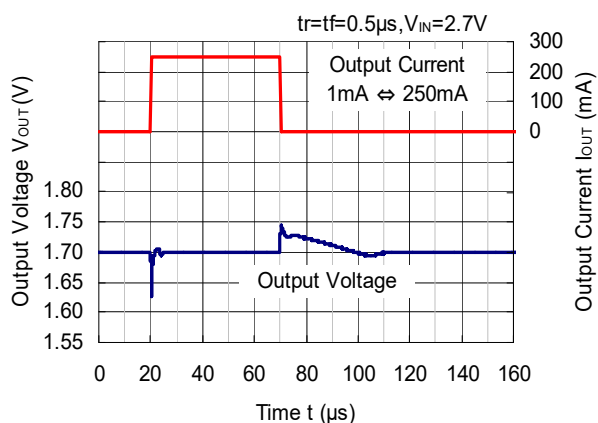
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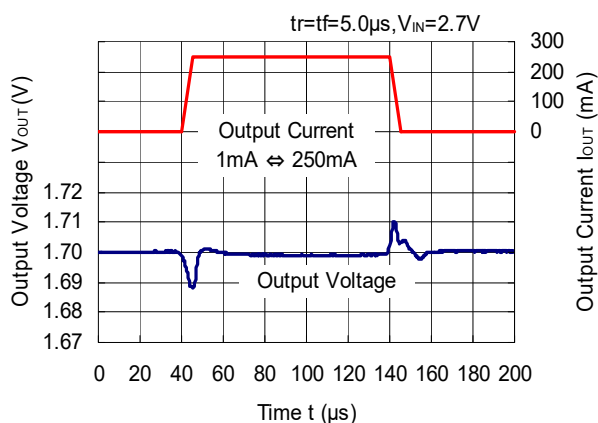
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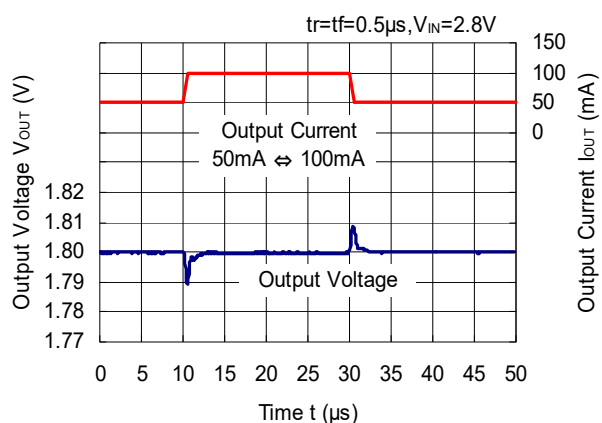
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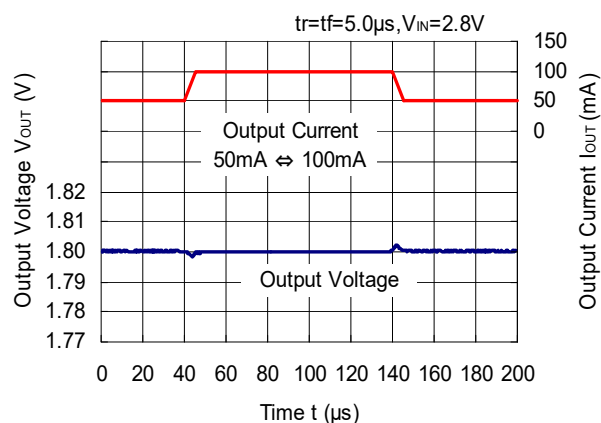
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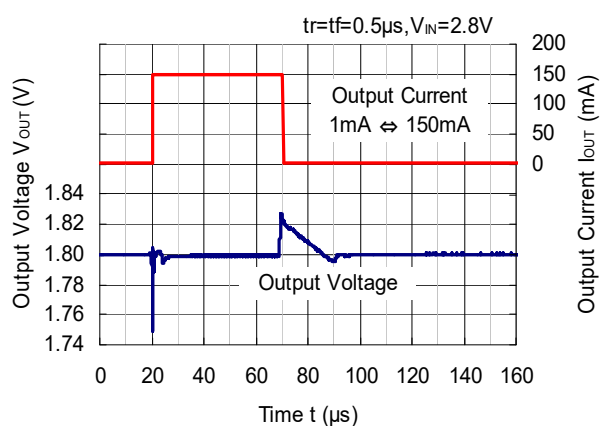
RP111x181x



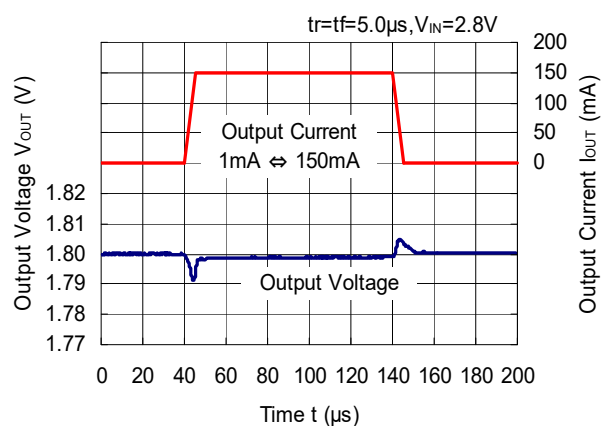
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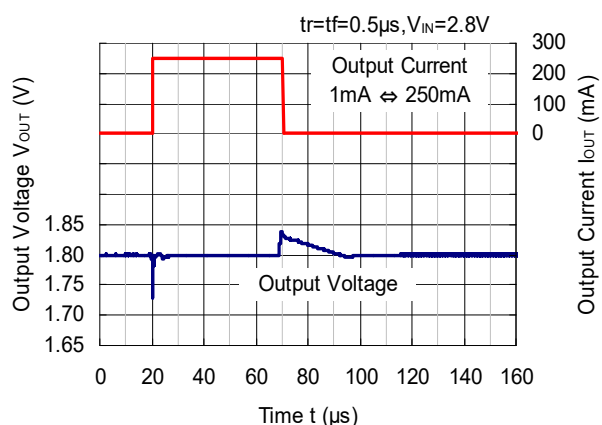
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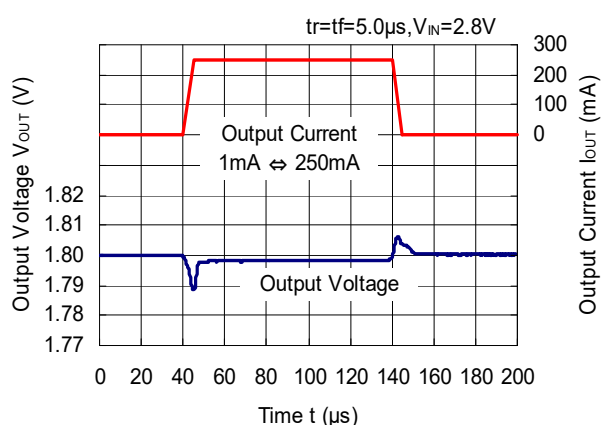
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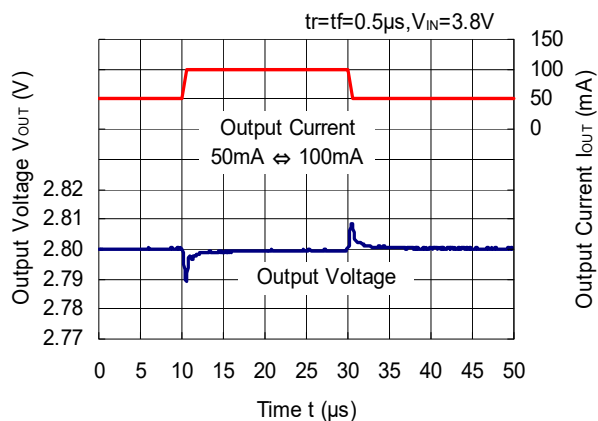
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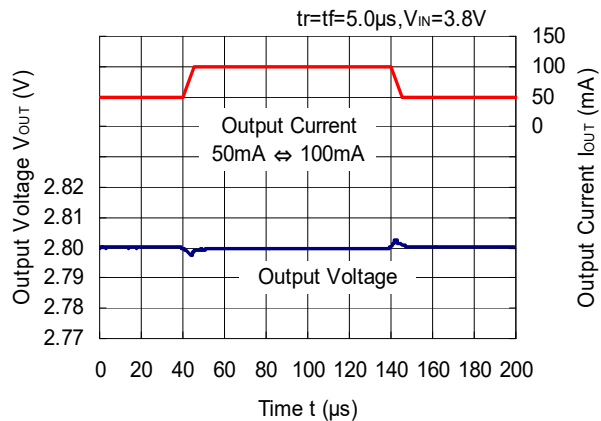
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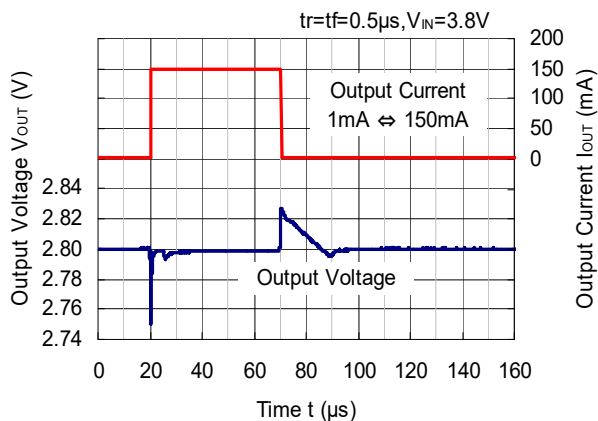
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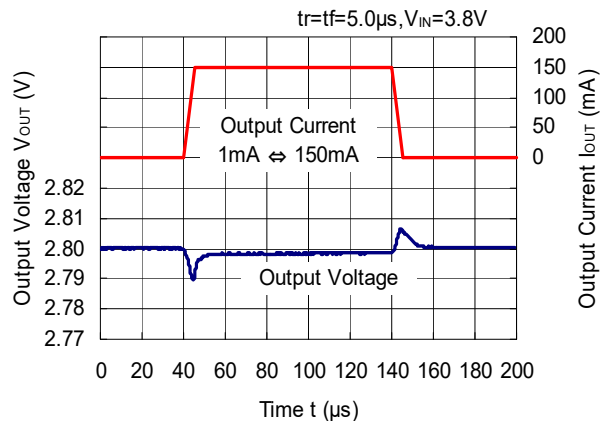
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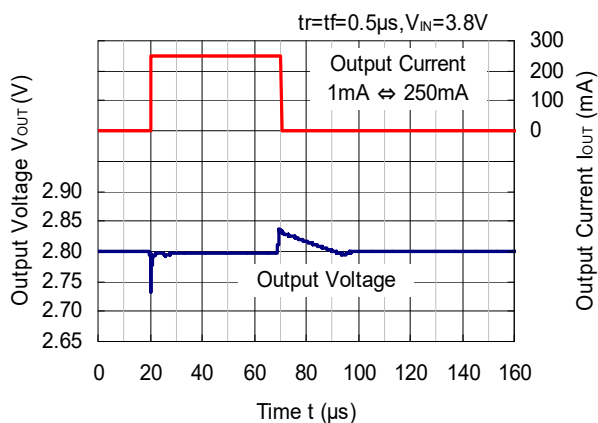
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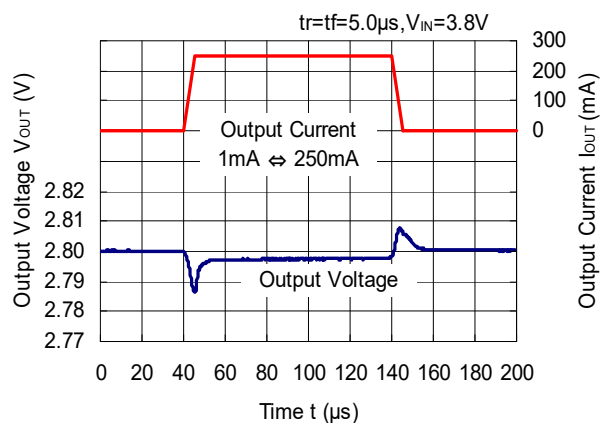
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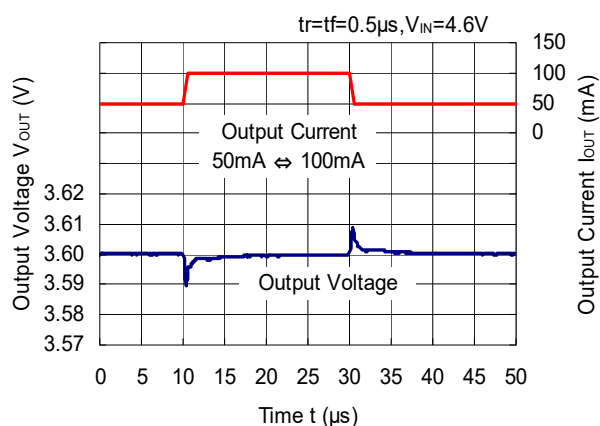
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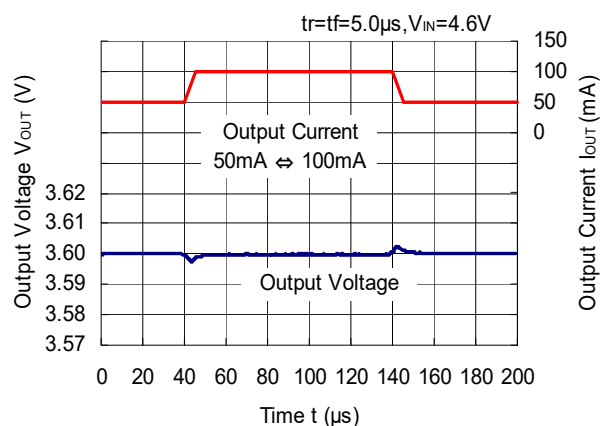
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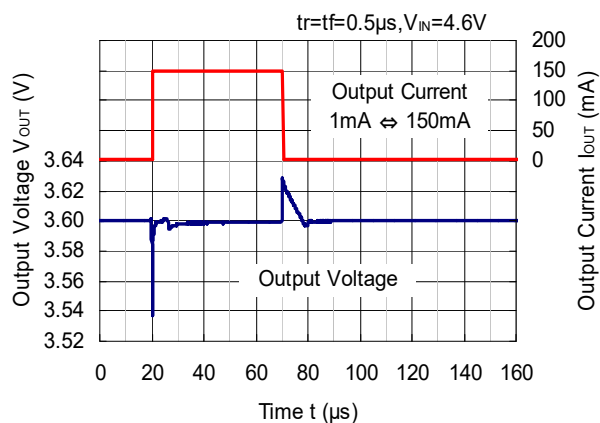
RP111x361x



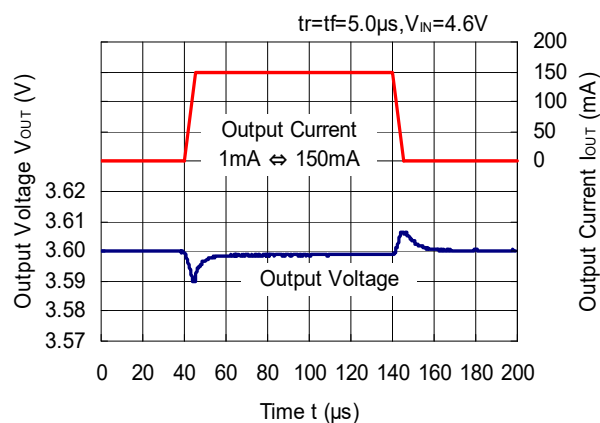
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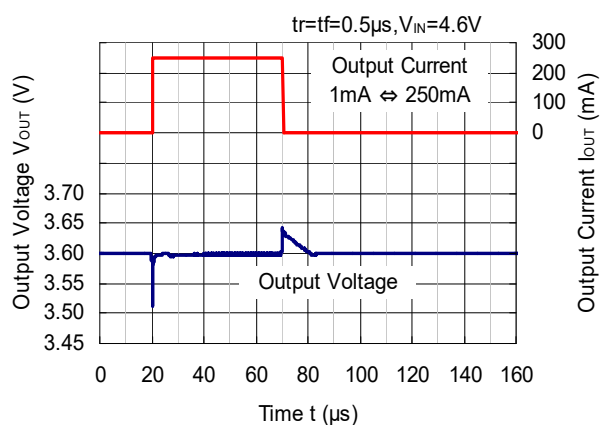
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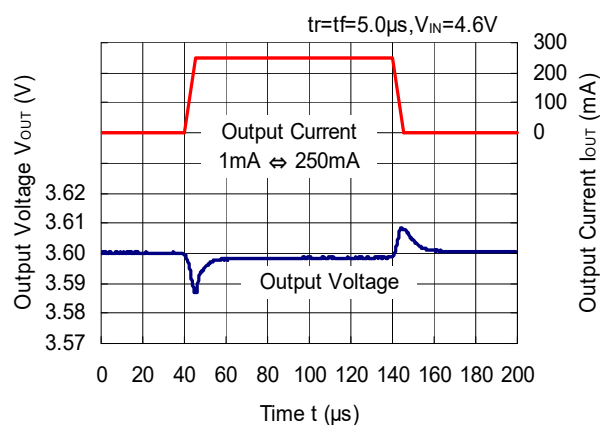
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RP111x361x

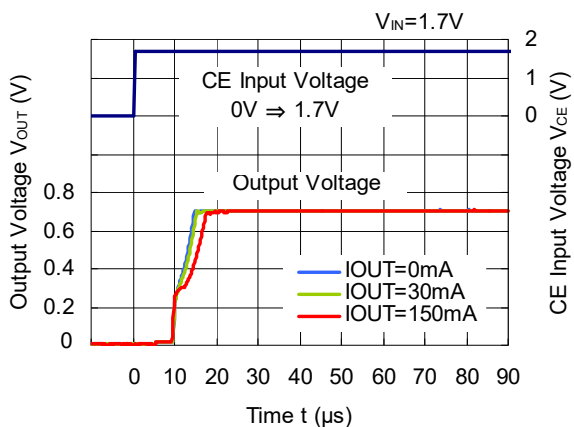


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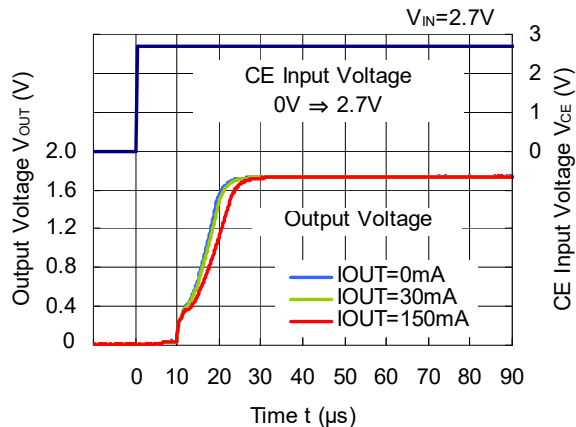


**13) Turn on Speed with CE pin (C1 = Ceramic 1.0  $\mu$ F, C2 = Ceramic 1.0  $\mu$ F, Ta = 25°C)**

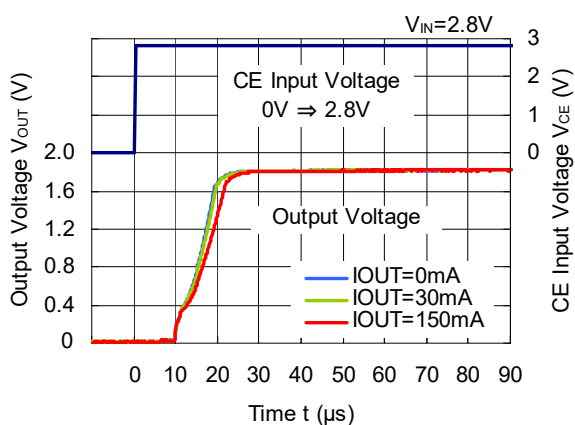
**RP111x071x**



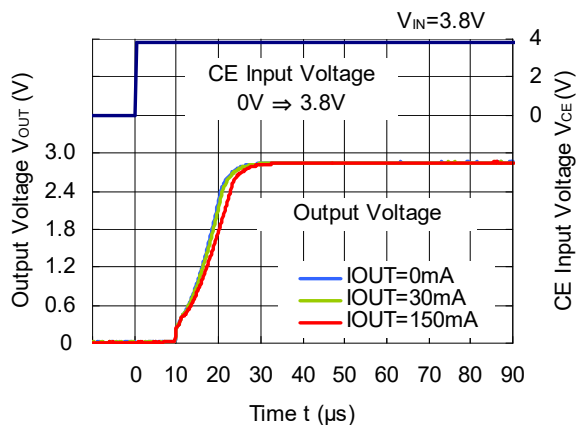
**RP111x171x**



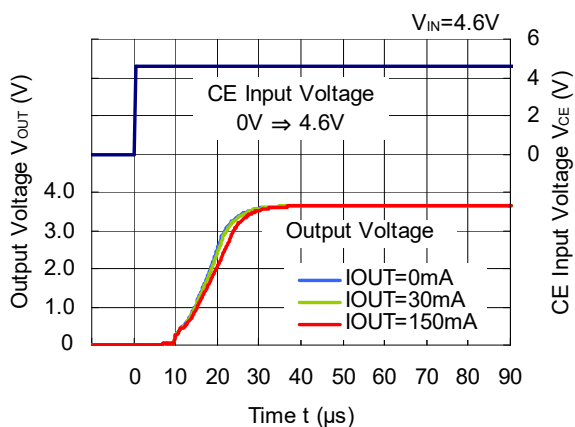
**RP111x181x**



**RP111x281x**

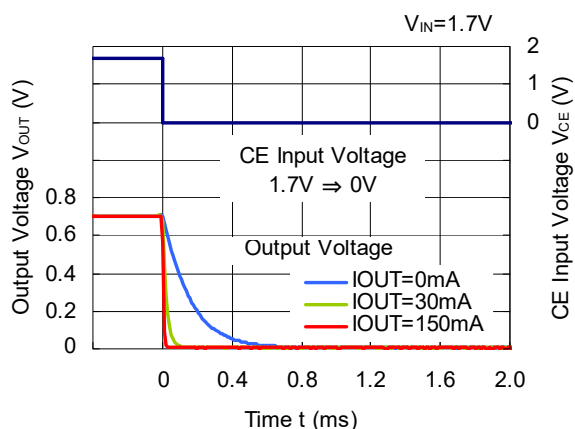


**RP111x361**

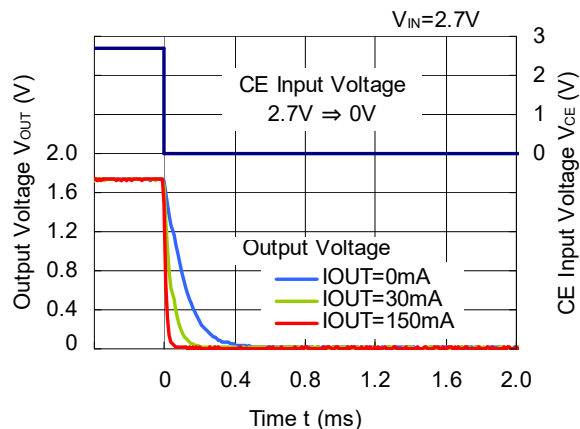


14) Turn off Speed with CE pin (C1 = Ceramic 1.0  $\mu$ F, C2 = Ceramic 1.0  $\mu$ F, Ta = 25°C)

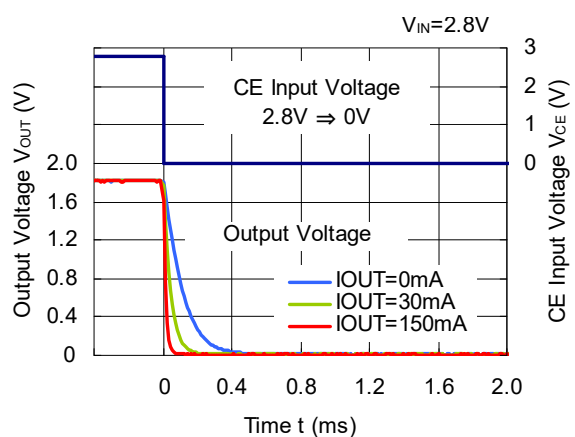
RP111x071D



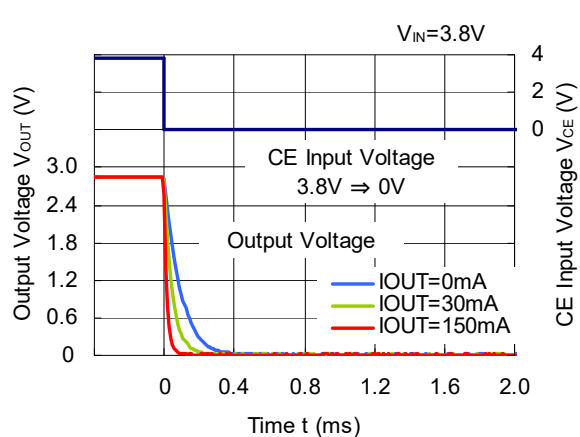
RP111x171D



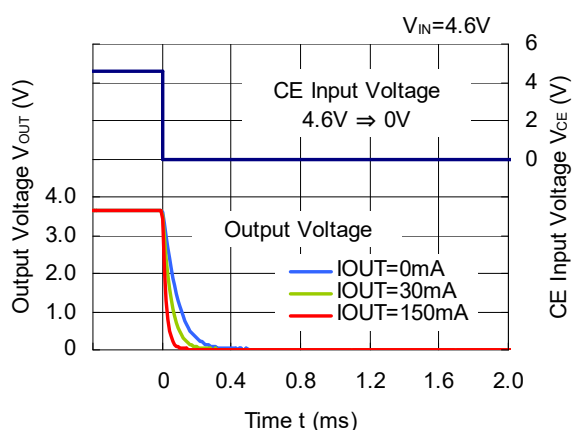
RP111x181D



RP111x281D

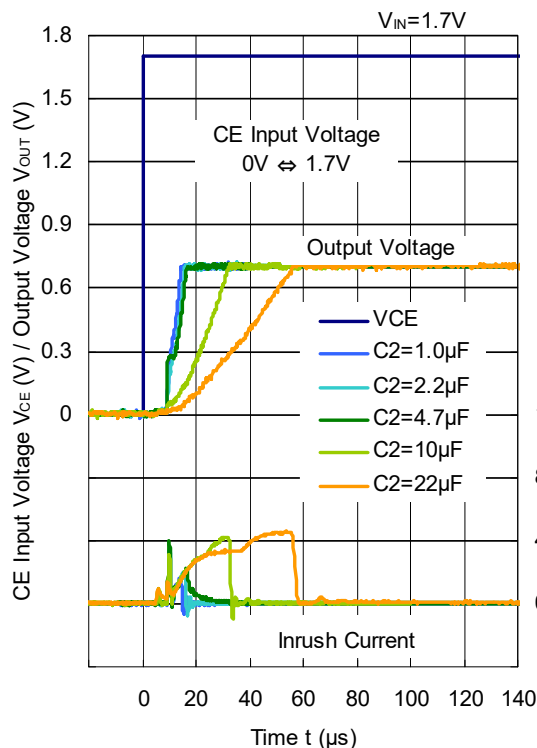


RP111x361D

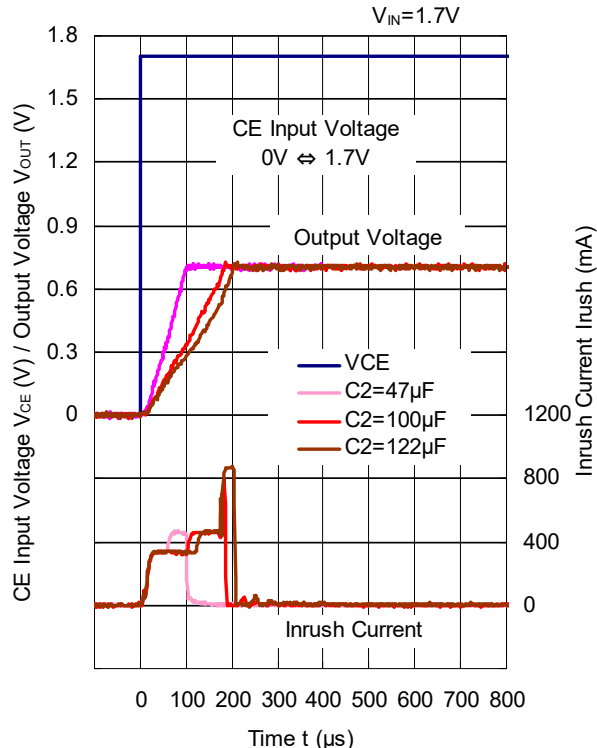


15) Inrush Current (C1 = Ceramic 1.0  $\mu$ F,  $I_{out} = 0$  mA,  $T_a = 25^\circ\text{C}$ )

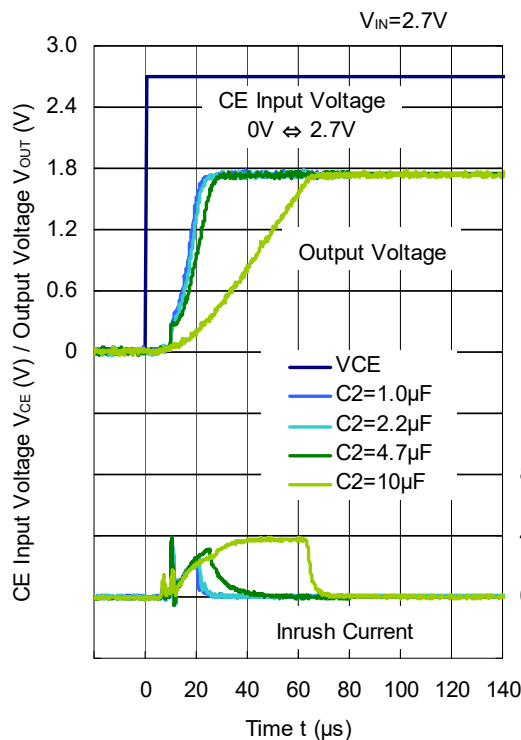
RP111x071x



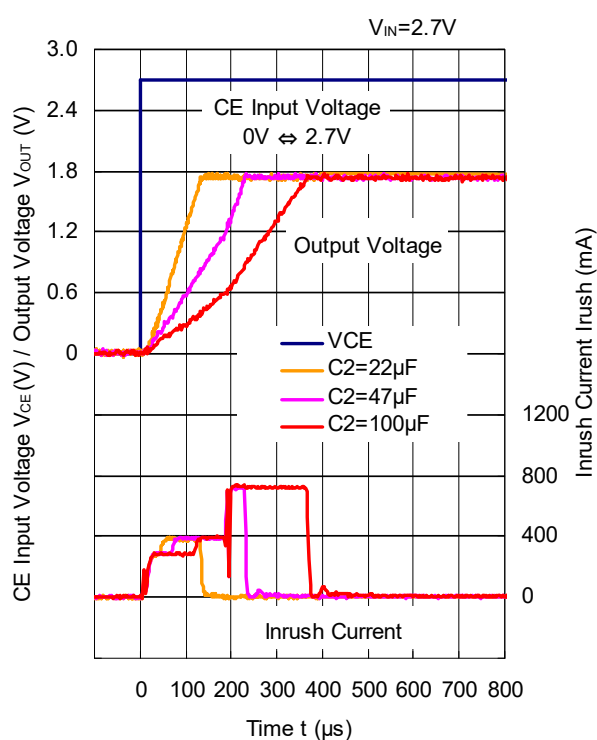
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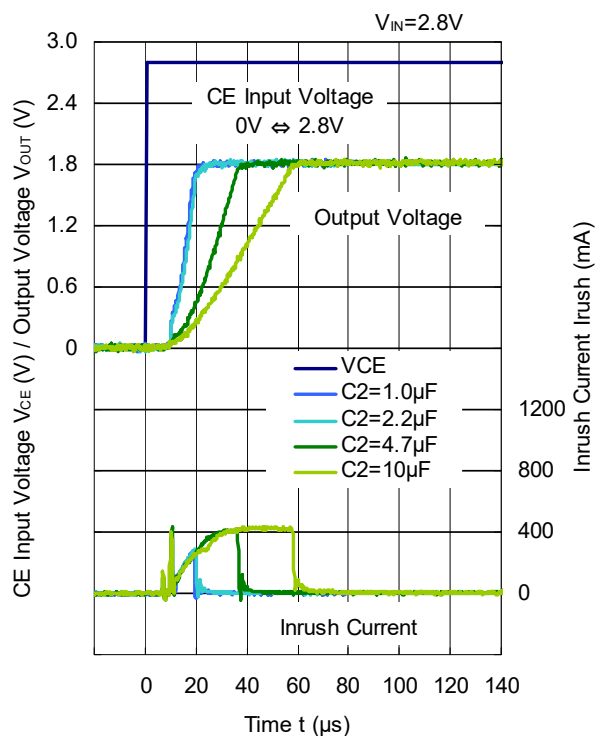
RP111x171x



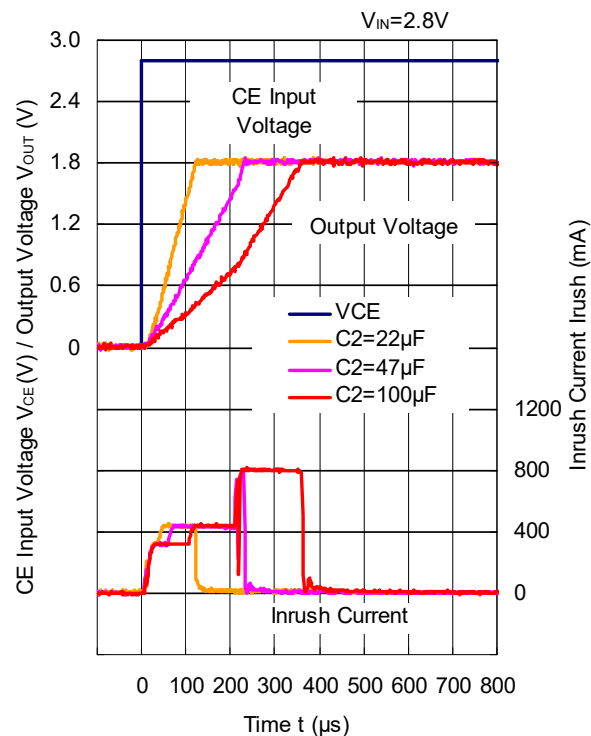
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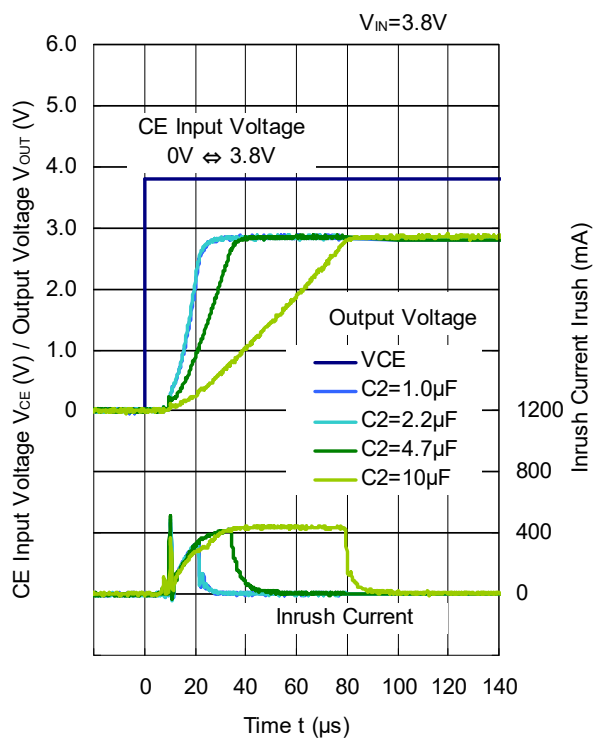
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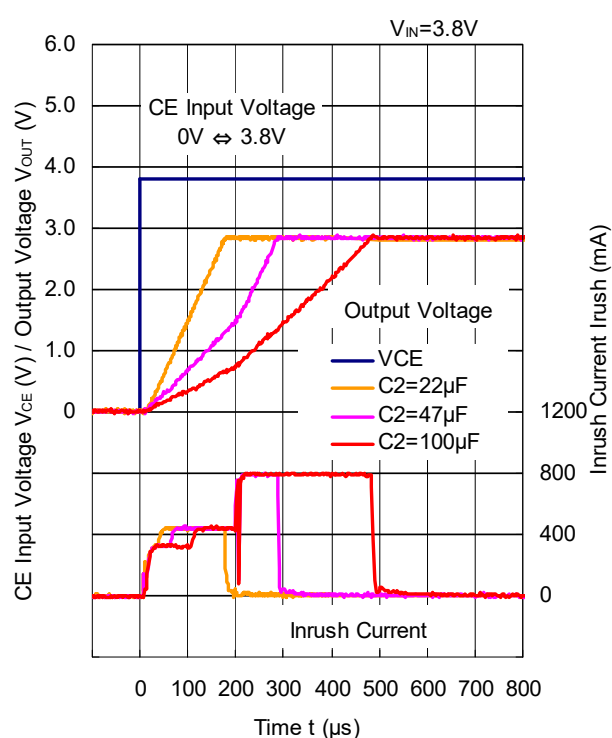
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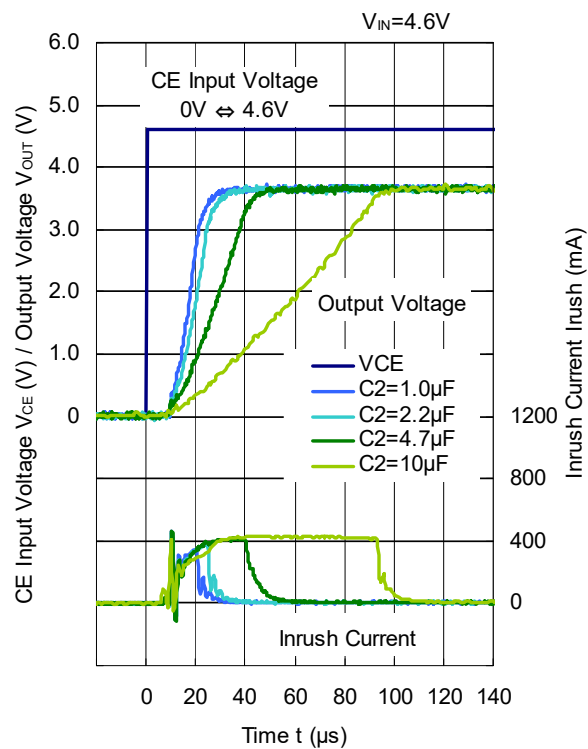
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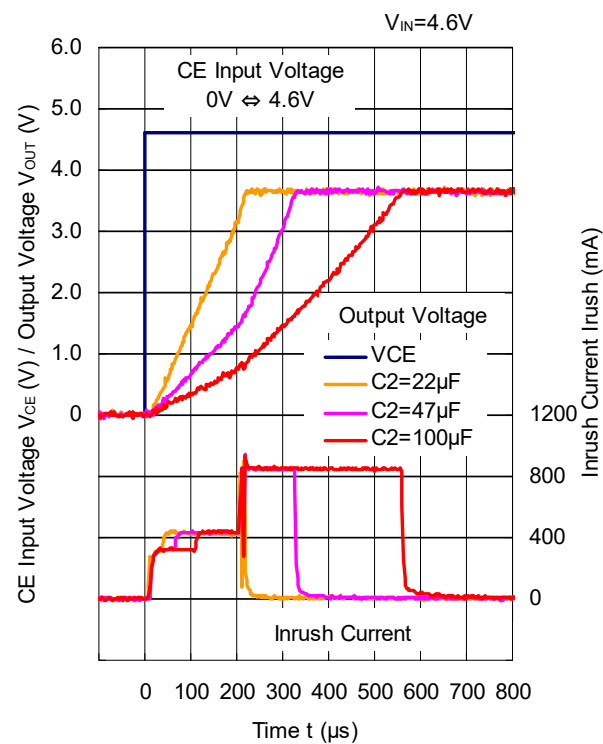
RP111x281x



RP111x361x



RP111x361x



Measurement Components of Typical Characteristics

| Symbol | Capacitance | Test item                 | Manufacture | Parts number      |
|--------|-------------|---------------------------|-------------|-------------------|
| C1     | 1.0 $\mu F$ | All                       | Murata      | GRM155B31A105KE15 |
| C2     | 1.0 $\mu F$ | All except Inrush Current | Murata      | GRM155B31A105KE15 |

## 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.

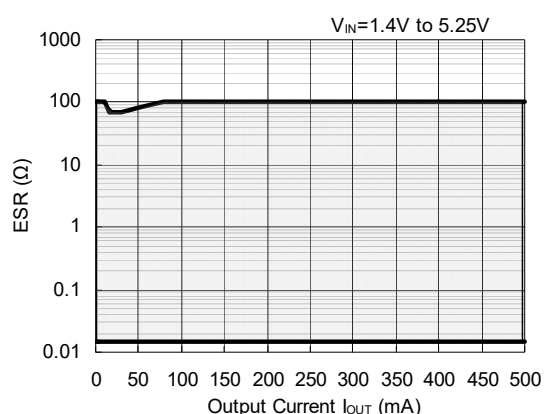
### Measurement Conditions

Frequency Band : 10 Hz to 2 MHz

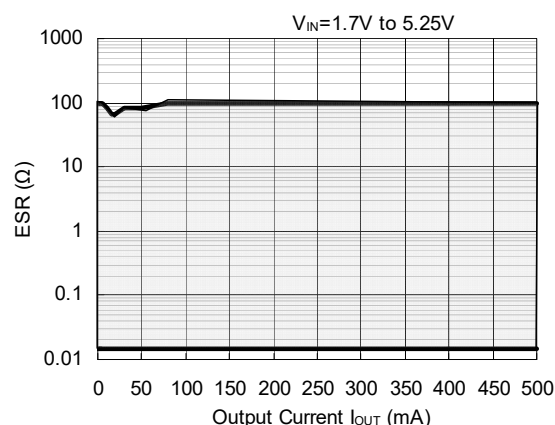
Temperature :  $-40^{\circ}C$  to  $85^{\circ}C$

C1, C2 : 1.0  $\mu F$  or more

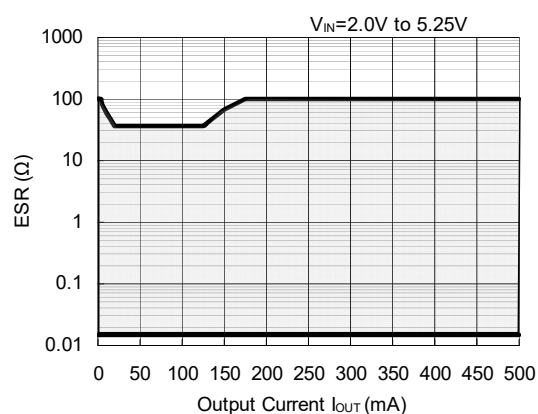
**RP111x071x**



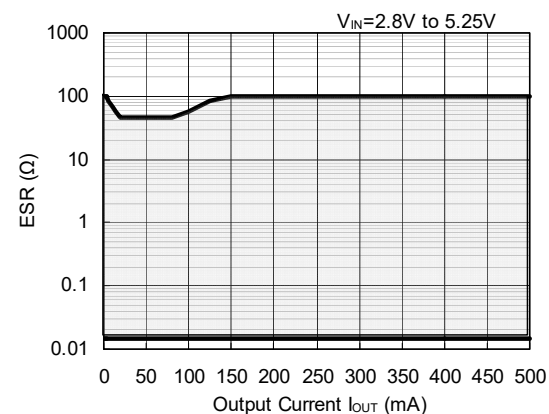
**RP111x171x**



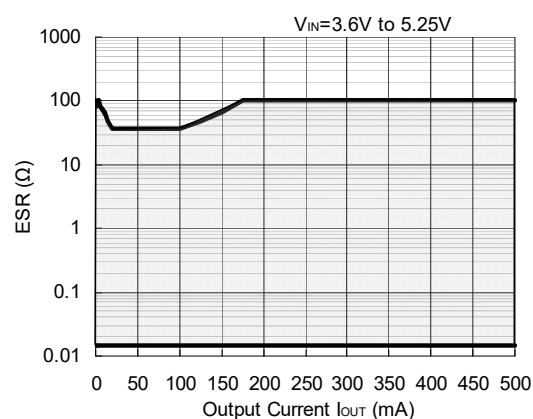
**RP111x181x**



**RP111x281x**



**RP111x361x**





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