

### Good Transient Response Low Voltage 500mA LDO

NO.EA-241-150204

#### OUTLINE

The RP111x Series are CMOS-based LDO regulators featuring 500mA output current. The input voltage is as low as 1.4V and the output voltage can be set from 0.7V. Due to a built-in  $0.46\Omega$  (at  $V_{OUT}=2.8V$ ) on-resistor, RP111x can provide a low dropout voltage. RP111x also features an excellent line transient response, ripple rejection at 75dB, and low noise. The output voltage accuracy is as high as  $\pm 0.8\%$  and the temperature drift coefficient of output voltage is low at  $\pm 30\text{ppm}/^\circ\text{C}$ . The accuracy of the output voltage of RP111x includes the temperature characteristics and the load transient response has been improved. The typ. and max value of under/overshoot for various output current are shown in the typical characteristics in the datasheet, therefore the accuracy of the output voltage estimation will be easy on the actual operating cases.

In addition to a fold-back protection circuit built into conventional regulators, RP111x contains a thermal shutdown circuit and an inrush current limit circuit. SOT-23-5 and SOT-89-5 packages, a 1.2mm square DFN1212-6 package are available.

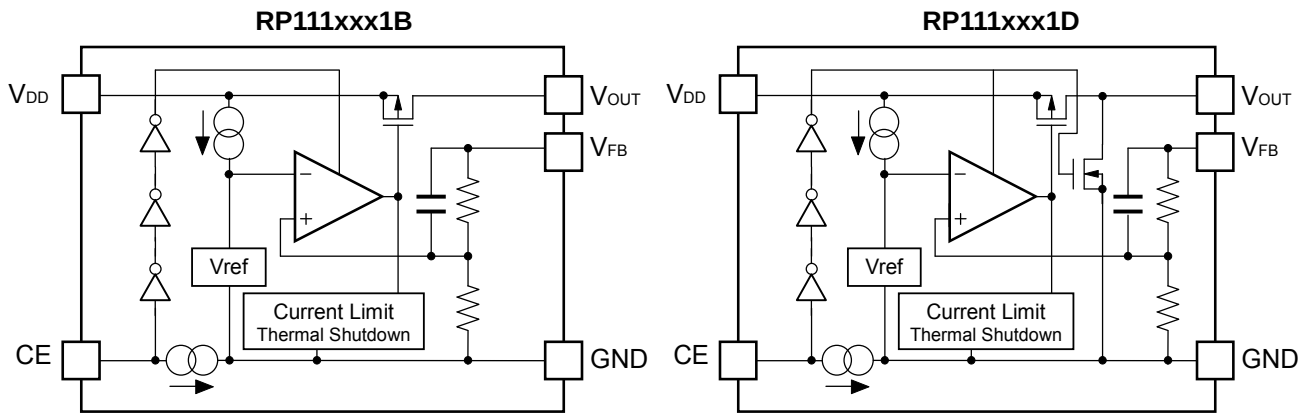
#### FEATURES

- Supply Current.....Typ.  $80\mu\text{A}$
- Standby Current.....Typ.  $0.1\mu\text{A}$
- Dropout Voltage .....Typ.  $0.23V$  ( $I_{OUT}=500\text{mA}$ ,  $V_{OUT}=2.5V$ )
- Ripple Rejection.....Typ. 75dB ( $f=1\text{kHz}$ )  
Typ. 70dB ( $f=10\text{kHz}$ )
- Output Voltage Accuracy..... $\pm 0.8\%$  ( $V_{OUT} \geq 1.8V$ )
- Output Voltage Temperature Coefficient.....Typ.  $\pm 30\text{ppm}/^\circ\text{C}$  ( $V_{OUT} \geq 1.8V$ )
- Line Regulation .....Typ.  $0.02\%/V$
- Packages .....DFN1212-6, SOT-23-5, SOT-89-5,
- Input Voltage Range .....1.4V to 5.25V
- Output Voltage Range.....0.7V to 3.6V (0.1V steps)  
(For other voltages, please refer to MARK INFORMATION.)
- Built-in Foldback Protection Circuit.....Typ. 50mA (Current at short mode)
- Thermal Shutdown Temperature..... $165^\circ\text{C}$
- Inrush Current Limit .....Typ. 400mA (for 180 $\mu\text{s}$  after start-up)
- Ceramic capacitors are recommended to be used with this IC .....1.0 $\mu\text{F}$  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 equipments.
- Power source for electrical home appliances.

BLOCK DIAGRAMS



SELECTION GUIDE

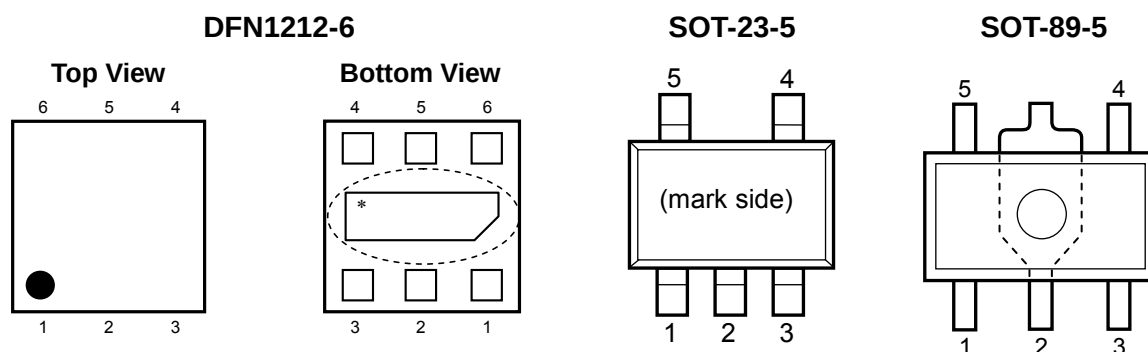
The output voltage, auto discharge function, package for the ICs can be selected at the user’s request.

| Product Name     | Package   | Quantity per Reel | Pb Free | Halogen Free |
|------------------|-----------|-------------------|---------|--------------|
| RP111Lxx1*-TR    | DFN1212-6 | 5,000 pcs         | Yes     | Yes          |
| RP111Nxx1*-TR-FE | SOT-23-5  | 3,000 pcs         | Yes     | Yes          |
| RP111Hxx1*-T1-FE | SOT-89-5  | 1,000 pcs         | Yes     | Yes          |

xxx: The output voltage can be designated in the range of 0.7V (07) to 3.6V (36) in 0.1V steps.  
(For other voltages, please refer to MARK INFORMATION.)

\* : Auto discharge function at off state are options as follows.  
(B) without auto discharge function at off state  
(D) with auto discharge function at off state

## PIN CONFIGURATIONS



## PIN DESCRIPTIONS

### • DFN1212-6

| Pin No. | Symbol    | Description                  |
|---------|-----------|------------------------------|
| 1       | $V_{OUT}$ | Output Pin                   |
| 2       | $V_{FB}$  | Feed Back Pin                |
| 3       | GND       | Ground Pin                   |
| 4       | CE        | Chip Enable Pin ("H" Active) |
| 5       | NC        | No connection                |
| 6       | $V_{DD}$  | Input Pin                    |

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

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

### • SOT-23-5

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

### • SOT-89-5

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

Under normal conditions, please connect the  $V_{OUT}$  pin to the  $V_{FB}$  pin. However, in the case of using the Adjustable Output Voltage Type, please follow the "Notes on the Adjustable Output Voltage Type Settings".

**ABSOLUTE MAXIMUM RATINGS**

| Symbol    | Item                           | Rating               | Unit |
|-----------|--------------------------------|----------------------|------|
| $V_{IN}$  | Input Voltage                  | 6.0                  | V    |
| $V_{CE}$  | Input Voltage (CE Pin)         | -0.3~6.0             | V    |
| $V_{OUT}$ | Output Voltage                 | -0.3 to $V_{IN}+0.3$ | V    |
| $I_{OUT}$ | Output Current                 | 510                  | mA   |
| $P_D$     | Power Dissipation (DFN1212-6)* | 600                  | mW   |
|           | Power Dissipation (SOT-23-5)*  | 420                  |      |
|           | Power Dissipation (SOT-89-5)*  | 900                  |      |
| $T_{opt}$ | Operating Temperature Range    | -40 to 85            | °C   |
| $T_{stg}$ | Storage Temperature Range      | -55 to 125           | °C   |

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

**ABSOLUTE MAXIMUM RATINGS**

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

## ELECTRICAL CHARACTERISTICS

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

The specifications surrounded by   are guaranteed by Design Engineering at  $-40^{\circ}C \leq T_{opt} \leq 85^{\circ}C$ .

● RP111xxx1B/D

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

| Symbol                               | Item                                      | Conditions                                                                                                                                      |                         | Min.   | Typ.                    | Max.   | Unit       |
|--------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------|-------------------------|--------|------------|
| V <sub>OUT</sub>                     | Output Voltage                            | T <sub>opt</sub> =25°C                                                                                                                          | V <sub>OUT</sub> ≥ 1.8V | ×0.992 |                         | ×1.008 | V          |
|                                      |                                           |                                                                                                                                                 | V <sub>OUT</sub> < 1.8V | −18    |                         | +18    | mV         |
|                                      |                                           | −40°C ≤ T <sub>opt</sub> ≤ 85°C                                                                                                                 | V <sub>OUT</sub> ≥ 1.8V | ×0.985 |                         | ×1.015 | V          |
|                                      |                                           |                                                                                                                                                 | V <sub>OUT</sub> < 1.8V | −55    |                         | 50     | mV         |
| I <sub>OUT</sub>                     | Output Current                            |                                                                                                                                                 |                         | 500    |                         |        | mA         |
| ΔV <sub>OUT</sub> /ΔI <sub>OUT</sub> | Load Regulation                           | 1mA ≤ I <sub>OUT</sub> ≤ 500mA                                                                                                                  |                         |        | 1                       | 20     | mV         |
| V <sub>TRLD</sub>                    | Load Transient Response                   | I <sub>OUT</sub> :1mA⇔250mA<br>(tr=tf=0.5μs)                                                                                                    | C <sub>OUT</sub> =1μF   |        | −75<br>+45              |        | mV         |
|                                      |                                           |                                                                                                                                                 | C <sub>OUT</sub> =2.2μF |        | −55<br>+35              |        |            |
|                                      |                                           | I <sub>OUT</sub> 1mA⇔250mA<br>(tr=tf=5.0μs)                                                                                                     | C <sub>OUT</sub> =1μF   |        | −20<br>+15              |        |            |
| V <sub>DIF</sub>                     | Dropout Voltage                           | Please refer to “Dropout Voltage”.                                                                                                              |                         |        |                         |        |            |
| I <sub>SS</sub>                      | Supply Current                            | I <sub>OUT</sub> =0mA                                                                                                                           |                         |        | 80                      | 125    | μA         |
| I <sub>standby</sub>                 | Standby Current                           | V <sub>CE</sub> =0V                                                                                                                             |                         |        | 0.1                     | 1.0    | μA         |
| ΔV <sub>OUT</sub> /ΔV <sub>IN</sub>  | Line Regulation                           | Set V <sub>OUT</sub> +0.5V ≤ V <sub>IN</sub> ≤ 5.25V,<br>V <sub>IN</sub> ≥ 1.4V                                                                 |                         |        | 0.02                    | 0.10   | %/V        |
| V <sub>TRLN</sub>                    | Input Transient Response                  | V <sub>IN</sub> : Set V <sub>OUT</sub> +0.5V⇔<br>Set V <sub>OUT</sub> +1.5V(tr=tf=5.0μs),<br>V <sub>IN</sub> ≥ 1.4V,I <sub>OUT</sub> =30mA      |                         |        | −1.5<br>+1.5            |        | mV         |
| RR                                   | Ripple Rejection                          | f=1kHz,Ripple0.2Vp-p,<br>V <sub>IN</sub> =Set V <sub>OUT</sub> +1.0V,I <sub>OUT</sub> =30mA<br>(V <sub>OUT</sub> ≤ 2.0V, V <sub>IN</sub> =3.0V) |                         |        | 75                      |        | dB         |
| V <sub>IN</sub>                      | Input Voltage*                            |                                                                                                                                                 |                         | 1.4    |                         | 5.25   | V          |
| ΔV <sub>OUT</sub> /ΔT <sub>opt</sub> | Output Voltage<br>Temperature Coefficient | 40°C ≤ T <sub>opt</sub> ≤ 85°C                                                                                                                  | V <sub>OUT</sub> ≥ 1.8V |        | ±30                     |        | ppm<br>/°C |
|                                      |                                           |                                                                                                                                                 | V <sub>OUT</sub> < 1.8V |        | ±100                    |        |            |
| I <sub>SC</sub>                      | Short Current Limit                       | V <sub>OUT</sub> =0V                                                                                                                            |                         |        | 50                      |        | mA         |
| I <sub>PD</sub>                      | CE Pull-down Current                      |                                                                                                                                                 |                         |        | 0.3                     | 0.6    | μA         |
| V <sub>CEH</sub>                     | CE Input Voltage "H"                      |                                                                                                                                                 |                         | 1.0    |                         |        | V          |
| V <sub>CEL</sub>                     | CE Input Voltage "L"                      |                                                                                                                                                 |                         |        |                         | 0.4    | V          |
| T <sub>TSD</sub>                     | Thermal Shutdown Temperature              | Junction Temperature                                                                                                                            |                         |        | 165                     |        | °C         |
| T <sub>TSR</sub>                     | Thermal Shutdown Released Temperature     | Junction Temperature                                                                                                                            |                         |        | 100                     |        |            |
| en                                   | Output Noise                              | BW=10Hz~100kHz                                                                                                                                  | V <sub>OUT</sub> ≥ 1.8V |        | 20×<br>V <sub>OUT</sub> |        | μVrms      |
|                                      |                                           |                                                                                                                                                 | V <sub>OUT</sub> < 1.8V |        | 40×<br>V <sub>OUT</sub> |        |            |

## ELECTRICAL CHARACTERISTICS

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

The specifications surrounded by   are guaranteed by Design Engineering at  $-40^{\circ}C \leq T_{opt} \leq 85^{\circ}C$ .

### • RP111xxx1B/D

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

| Symbol    | Item                                                  | Conditions                      | Min. | Typ. | Max. | Unit     |
|-----------|-------------------------------------------------------|---------------------------------|------|------|------|----------|
| $R_{LOW}$ | Low Output Nch Tr.<br>ON Resistance<br>(of D version) | $V_{IN} = 4.0V$ , $V_{CE} = 0V$ |      | 60   |      | $\Omega$ |

All of units are tested and specified under load conditions such that  $T_j \approx T_{opt} = 25^{\circ}C$  except for Output Voltage Temperature Coefficient, Load Transient Response, Input Transient Response, Output Noise and Ripple Rejection.

\*) When Input Voltage is 5.5V, the total operational time must be within 500hrs.

### • Dropout Voltage

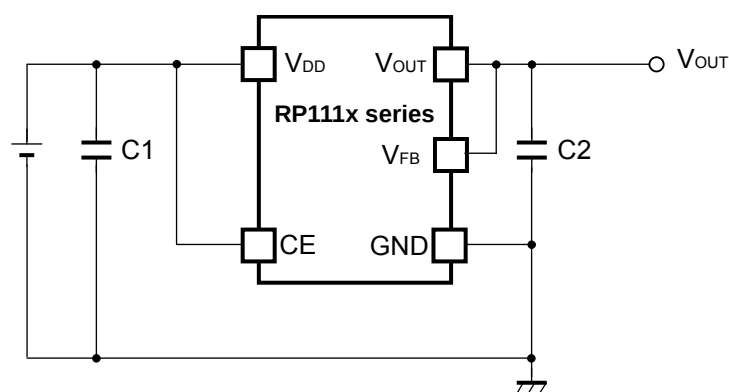
$T_{opt} = 25^{\circ}C$

| Output Voltage<br>$V_{OUT}$ (V) | Dropout Voltage $V_{DIF}$ (V) |      |                                                                    |
|---------------------------------|-------------------------------|------|--------------------------------------------------------------------|
|                                 | Condition                     | Typ. | Max.                                                               |
| $0.7 \leq V_{OUT} < 0.8$        | $I_{OUT} = 500mA$             | 0.58 | <span style="border: 1px solid black; padding: 0 2px;">0.88</span> |
| $0.8 \leq V_{OUT} < 0.9$        |                               | 0.52 | <span style="border: 1px solid black; padding: 0 2px;">0.80</span> |
| $0.9 \leq V_{OUT} < 1.0$        |                               | 0.45 | <span style="border: 1px solid black; padding: 0 2px;">0.70</span> |
| $1.0 \leq V_{OUT} < 1.2$        |                               | 0.42 | <span style="border: 1px solid black; padding: 0 2px;">0.64</span> |
| $1.2 \leq V_{OUT} < 1.4$        |                               | 0.35 | <span style="border: 1px solid black; padding: 0 2px;">0.53</span> |
| $1.4 \leq V_{OUT} < 1.8$        |                               | 0.31 | <span style="border: 1px solid black; padding: 0 2px;">0.48</span> |
| $1.8 \leq V_{OUT} < 2.1$        |                               | 0.27 | <span style="border: 1px solid black; padding: 0 2px;">0.41</span> |
| $2.1 \leq V_{OUT} < 2.5$        |                               | 0.25 | <span style="border: 1px solid black; padding: 0 2px;">0.38</span> |
| $2.5 \leq V_{OUT} < 3.0$        |                               | 0.23 | <span style="border: 1px solid black; padding: 0 2px;">0.34</span> |
| $3.0 \leq V_{OUT} \leq 3.6$     |                               | 0.22 | <span style="border: 1px solid black; padding: 0 2px;">0.32</span> |

### RECOMMENDED OPERATING CONDITIONS (ELECTRICAL CHARACTERISTICS)

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

## TYPICAL APPLICATIONS



External Parts Example:

C1, C2: Ceramic Capacitor 1.0 $\mu$ F, Murata, GRM155B31A105KE15

Under normal conditions, please connect the V<sub>OUT</sub> pin to the V<sub>FB</sub> pin. However, in the case of using the Adjustable Output Voltage Type, please follow the "Notes on the Adjustable Output Voltage Type Settings".

## TECHNICAL NOTES

### 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 1.0 $\mu$ F or more capacitor C2.

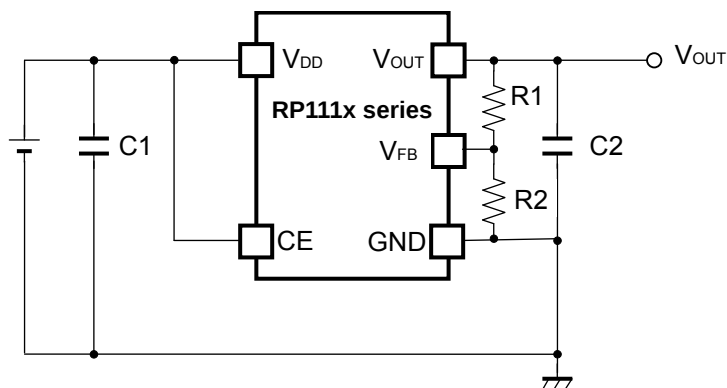
In case of using a tantalum capacitor, the output may be unstable due to inappropriate ESR. Therefore, the full range of operating conditions for the capacitor in the application should be considered.

### PCB Layout

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

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

## TYPICAL APPLICATIONS for Adjustable Output Voltage Type



Please set 3.6V or less for the Adjustable Output Voltage Type. Also, please use 16k $\Omega$  or less for  $R2$  resistor.

### Phase Compensation

Similar to the Fixed Output Voltage Type, Phase compensation is made for the Adjustable Output Voltage Type for securing stable operation even if the load current is varied. For this purpose, use a 4.7 $\mu$ F or more capacitor  $C2$  between  $V_{OUT}$  pin and GND pin, and as close as possible to the pins.

### 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.

### 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.

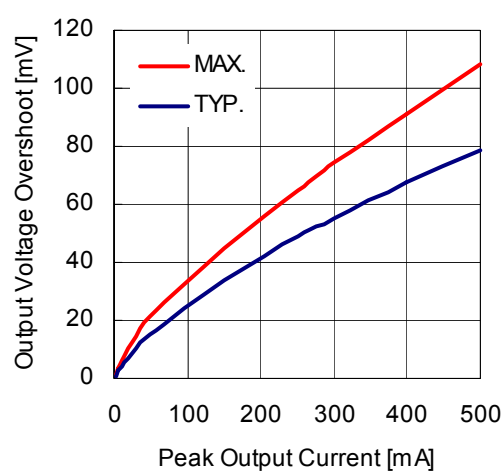
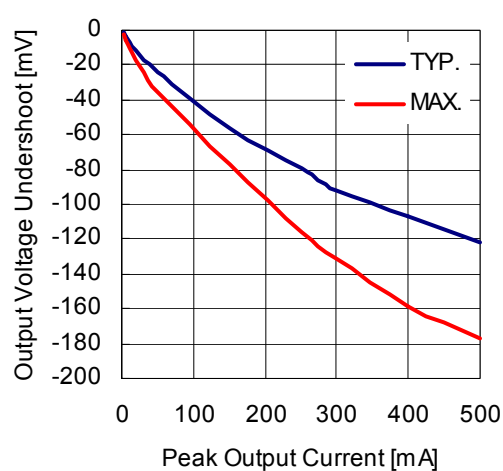
## TRANSIENT RESPONSE

The RP111x Series have 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 1mA to 250mA or 250mA to 1mA. The output voltage variations under the other load conditions, the characteristic examples are shown below.

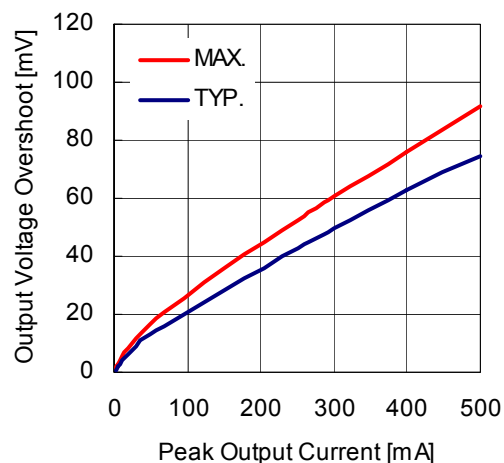
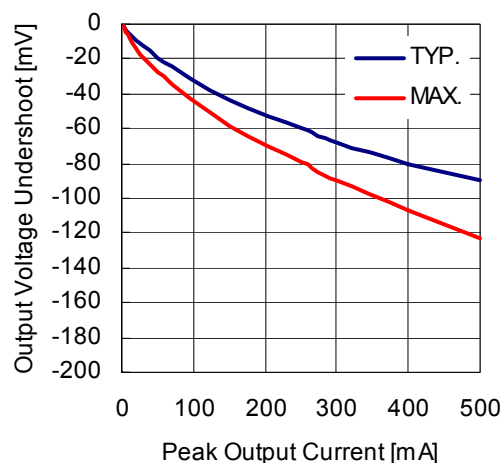
### RP111x151x

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

$C_{IN}=1.0\mu F$ ,  $C_{OUT}=1.0\mu F$ ,  $I_{OUT}=1mA \leftrightarrow$  Peak Output Current ( $t_r=t_f=0.5\mu s$ )



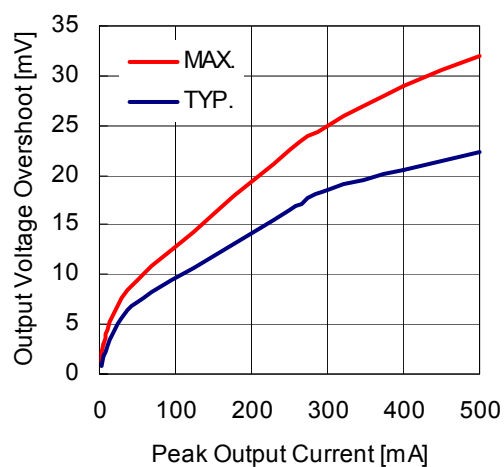
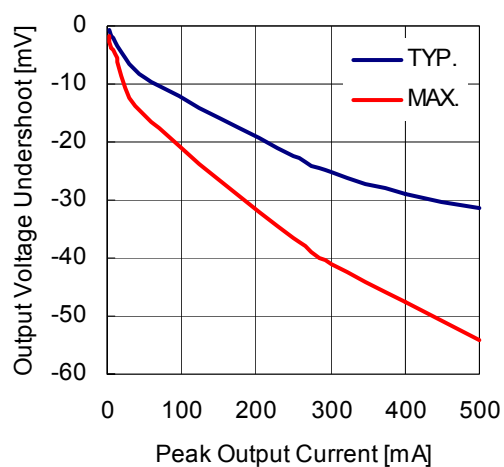
$C_{IN}=1.0\mu F$ ,  $C_{OUT}=2.2\mu F$ ,  $I_{OUT}=1mA \leftrightarrow$  Peak Output Current ( $t_r=t_f=0.5\mu s$ )



## RP111x

NO.EA-241-150204

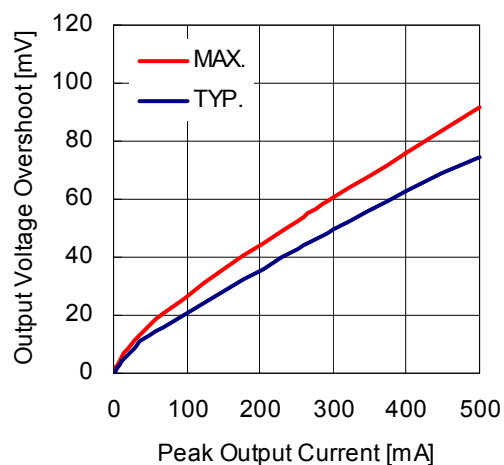
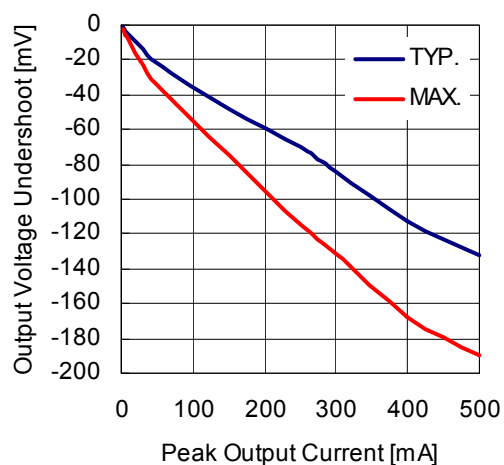
$C_{IN}=1.0\mu F$ ,  $C_{OUT}=1.0\mu F$ ,  $I_{OUT}=1mA \Leftrightarrow$  Peak Output Current ( $t_r=t_f=5.0\mu s$ )



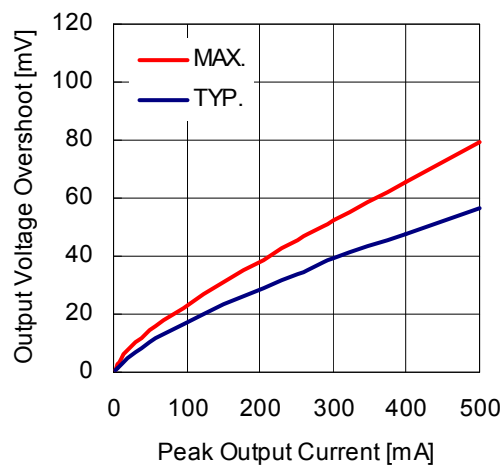
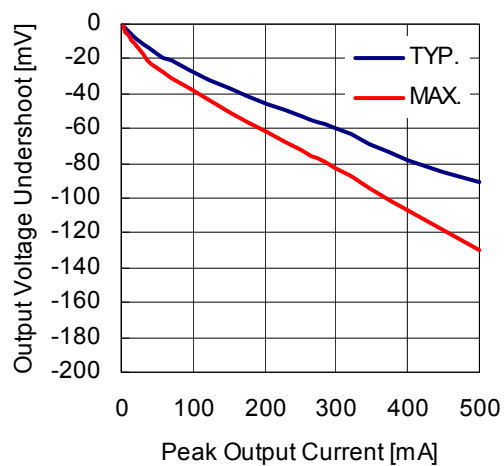
## RP111x281x

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

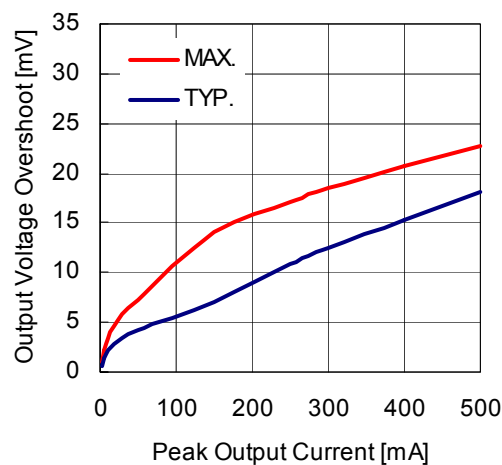
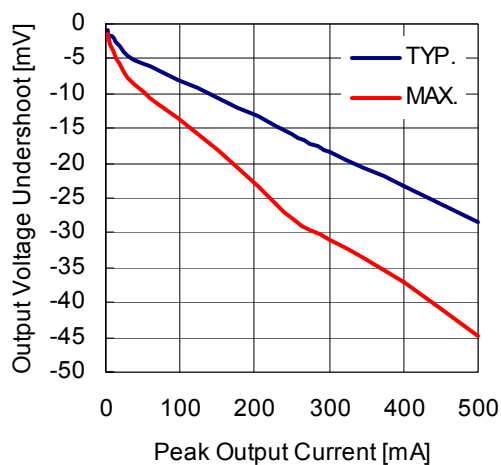
$C_{IN}=1.0\mu F$ ,  $C_{OUT}=1.0\mu F$ ,  $I_{OUT}=1mA \Leftrightarrow$  Peak Output Current ( $t_r=t_f=0.5\mu s$ )



$C_{IN}=1.0\mu F$ ,  $C_{OUT}=2.2\mu F$ ,  $I_{OUT}=1mA \Leftrightarrow$  Peak Output Current ( $t_r=t_f=0.5\mu s$ )

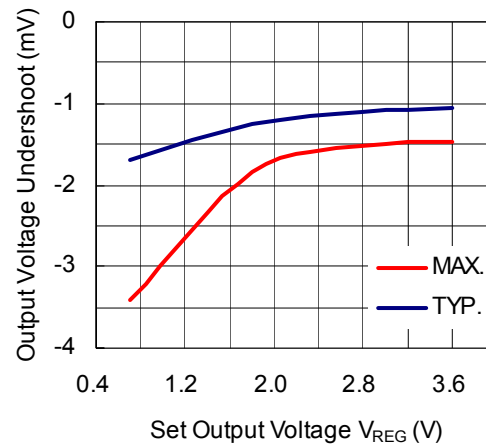
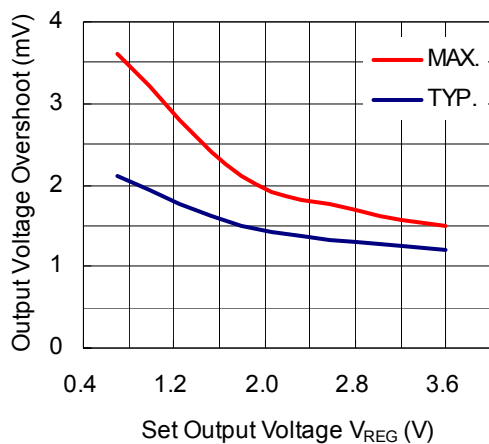


$C_{IN}=1.0\mu F$ ,  $C_{OUT}=1.0\mu F$ ,  $I_{OUT}=1mA \Leftrightarrow$  Peak Output Current ( $t_r=t_f=5.0\mu s$ )



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

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



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

• Power Dissipation (DFN1212-6)

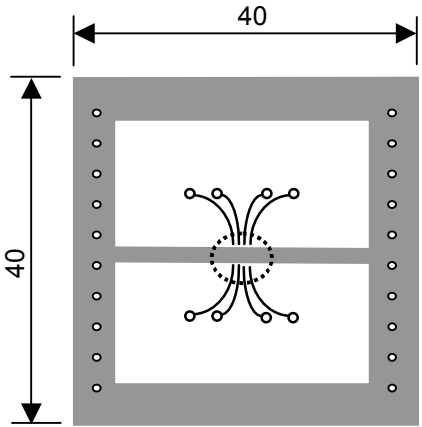
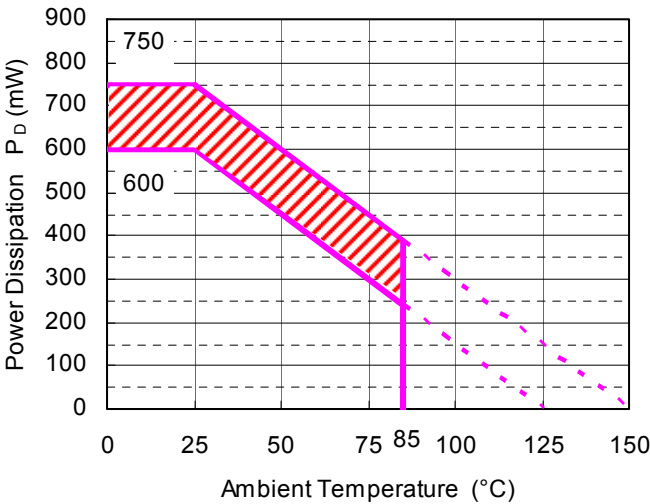
Power Dissipation (P<sub>D</sub>) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

Measurement Conditions

|                  |                                               |
|------------------|-----------------------------------------------|
|                  | Standard Test Land Pattern                    |
| Environment      | Mounting on Board (Wind velocity=0m/s)        |
| Board Material   | Glass cloth epoxy plastic (Double-sided)      |
| Board Dimensions | 40mm x 40mm x 1.6mm                           |
| Copper Ratio     | Top side: Approx. 50%, Back side: Approx. 50% |
| Through-holes    | φ 0.5mm x 28pcs                               |

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

|                    |                                                                                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------|
|                    | Standard Test Land Pattern                                                                                     |
| Power Dissipation  | 600mW (Tjmax=125°C)<br>750mW (Tjmax=150°C)                                                                     |
| Thermal Resistance | $\theta_{ja}=(125-25^{\circ}\text{C})/0.6\text{W}=167^{\circ}\text{C/W}$<br>$\theta_{jc}=30^{\circ}\text{C/W}$ |



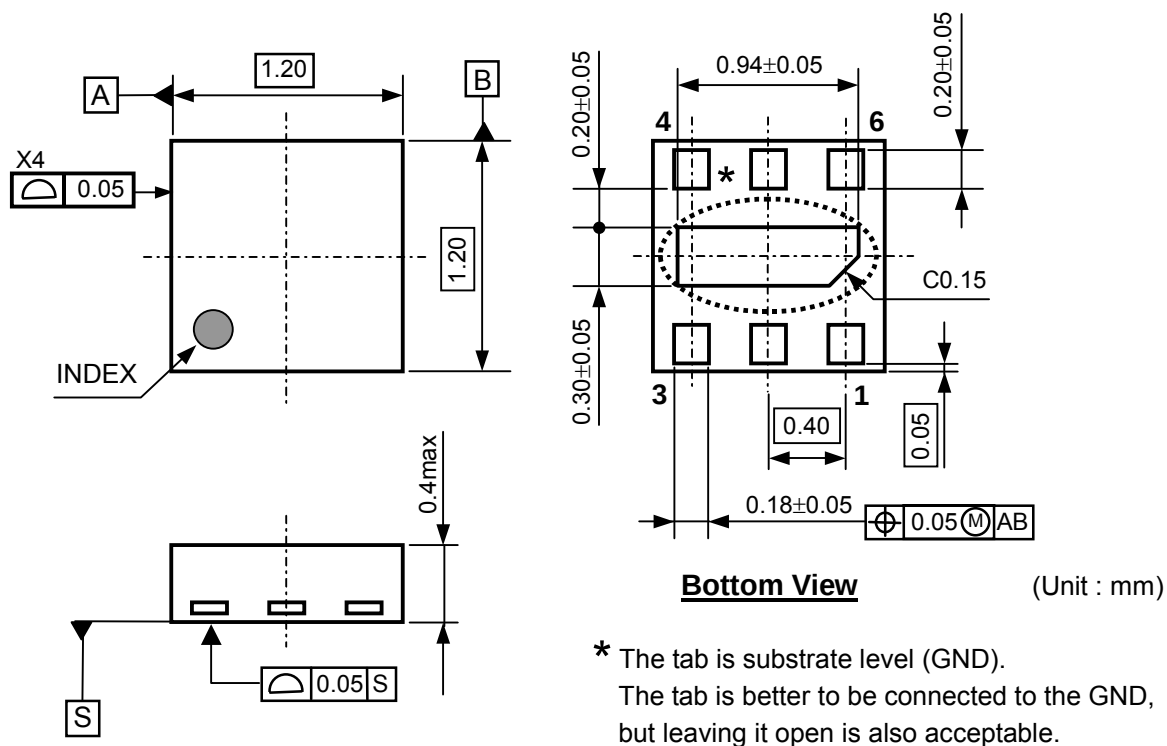
Measurement Board Pattern

 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.

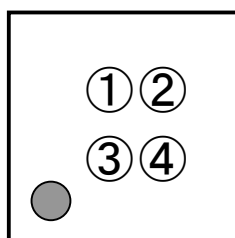
|                |                                           |
|----------------|-------------------------------------------|
| Operating Time | Estimated Years<br>(Operating 4 hrs/ day) |
| 13,000 hours   | 9 Years                                   |

• Package Dimensions (DFN1212-6)



• Mark Specification (DFN1212-6)

- ①②: Product Code ...Refer to "RP111L Series Mark Specification Table (DFN1212-6)".
- ③④: Lot Number ... Alphanumeric Serial Number



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**RP111x**

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NO.EA-241-150204

● **RP111L Series Mark Specification Table (DFN1212-6)****RP111Lxx1B**

| Product Name | ①②        | Vset  |
|--------------|-----------|-------|
| RP111L071B   | <b>7A</b> | 0.7V  |
| RP111L071B5  | <b>7B</b> | 0.75V |
| RP111L081B   | <b>7C</b> | 0.8V  |
| RP111L091B   | <b>7D</b> | 0.9V  |
| RP111L101B   | <b>7E</b> | 1.0V  |
| RP111L111B   | <b>7F</b> | 1.1V  |
| RP111L121B   | <b>7G</b> | 1.2V  |
| RP111L121B5  | <b>7H</b> | 1.25V |
| RP111L131B   | <b>7J</b> | 1.3V  |
| RP111L141B   | <b>7K</b> | 1.4V  |
| RP111L151B   | <b>7L</b> | 1.5V  |
| RP111L161B   | <b>7M</b> | 1.6V  |
| RP111L171B   | <b>7N</b> | 1.7V  |
| RP111L181B   | <b>7P</b> | 1.8V  |
| RP111L181B5  | <b>7Q</b> | 1.85V |
| RP111L191B   | <b>7R</b> | 1.9V  |
| RP111L201B   | <b>7S</b> | 2.0V  |
| RP111L211B   | <b>7T</b> | 2.1V  |
| RP111L221B   | <b>7U</b> | 2.2V  |
| RP111L231B   | <b>7V</b> | 2.3V  |
| RP111L241B   | <b>7W</b> | 2.4V  |
| RP111L251B   | <b>7X</b> | 2.5V  |
| RP111L261B   | <b>7Y</b> | 2.6V  |
| RP111L271B   | <b>7Z</b> | 2.7V  |
| RP111L281B   | <b>8A</b> | 2.8V  |
| RP111L281B5  | <b>8B</b> | 2.85V |
| RP111L291B   | <b>8C</b> | 2.9V  |
| RP111L301B   | <b>8D</b> | 3.0V  |
| RP111L311B   | <b>8E</b> | 3.1V  |
| RP111L321B   | <b>8F</b> | 3.2V  |
| RP111L331B   | <b>8G</b> | 3.3V  |
| RP111L341B   | <b>8H</b> | 3.4V  |
| RP111L351B   | <b>8J</b> | 3.5V  |
| RP111L361B   | <b>8K</b> | 3.6V  |
| RP111L101B5  | <b>8L</b> | 1.05V |

**RP111Lxx1D**

| Product Name | ①②        | Vset  |
|--------------|-----------|-------|
| RP111L071D   | <b>9A</b> | 0.7V  |
| RP111L071D5  | <b>9B</b> | 0.75V |
| RP111L081D   | <b>9C</b> | 0.8V  |
| RP111L091D   | <b>9D</b> | 0.9V  |
| RP111L101D   | <b>9E</b> | 1.0V  |
| RP111L111D   | <b>9F</b> | 1.1V  |
| RP111L121D   | <b>9G</b> | 1.2V  |
| RP111L121D5  | <b>9H</b> | 1.25V |
| RP111L131D   | <b>9J</b> | 1.3V  |
| RP111L141D   | <b>9K</b> | 1.4V  |
| RP111L151D   | <b>9L</b> | 1.5V  |
| RP111L161D   | <b>9M</b> | 1.6V  |
| RP111L171D   | <b>9N</b> | 1.7V  |
| RP111L181D   | <b>9P</b> | 1.8V  |
| RP111L181D5  | <b>9Q</b> | 1.85V |
| RP111L191D   | <b>9R</b> | 1.9V  |
| RP111L201D   | <b>9S</b> | 2.0V  |
| RP111L211D   | <b>9T</b> | 2.1V  |
| RP111L221D   | <b>9U</b> | 2.2V  |
| RP111L231D   | <b>9V</b> | 2.3V  |
| RP111L241D   | <b>9W</b> | 2.4V  |
| RP111L251D   | <b>9X</b> | 2.5V  |
| RP111L261D   | <b>9Y</b> | 2.6V  |
| RP111L271D   | <b>9Z</b> | 2.7V  |
| RP111L281D   | <b>0A</b> | 2.8V  |
| RP111L281D5  | <b>0B</b> | 2.85V |
| RP111L291D   | <b>0C</b> | 2.9V  |
| RP111L301D   | <b>0D</b> | 3.0V  |
| RP111L311D   | <b>0E</b> | 3.1V  |
| RP111L321D   | <b>0F</b> | 3.2V  |
| RP111L331D   | <b>0G</b> | 3.3V  |
| RP111L341D   | <b>0H</b> | 3.4V  |
| RP111L351D   | <b>0J</b> | 3.5V  |
| RP111L361D   | <b>0K</b> | 3.6V  |
| RP111L101D5  | <b>0L</b> | 1.05V |

# • Power Dissipation (SOT-23-5)

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

(Power Dissipation (SOT-23-5) is substitution of SOT-23-6.)

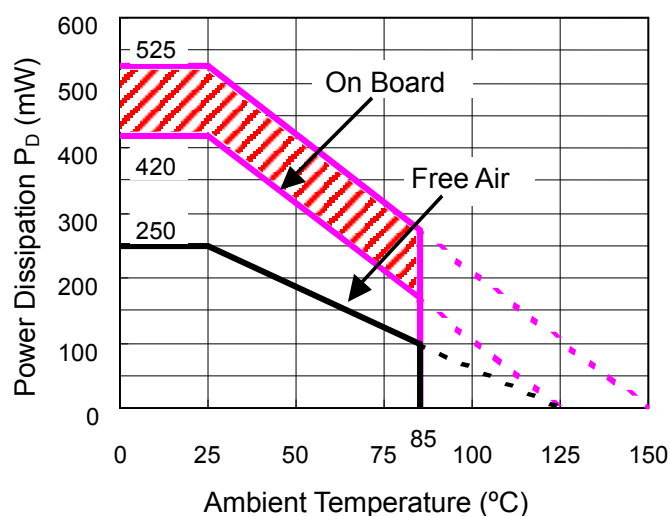
## Measurement Conditions

|                  | Standard Test 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    | $\phi$ 0.5mm x 44pcs                          |

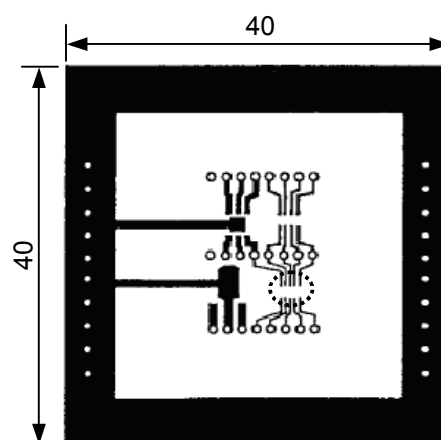
## Measurement Result

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

|                    | Standard Land Pattern                                                                              | Free Air                                        |
|--------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Power Dissipation  | 420mW ( $T_{j\text{max}}=125^{\circ}\text{C}$ )<br>525mW ( $T_{j\text{max}}=150^{\circ}\text{C}$ ) | 250mW ( $T_{j\text{max}}=125^{\circ}\text{C}$ ) |
| Thermal Resistance | $\theta_{ja}=(125-25^{\circ}\text{C})/0.42\text{W}=238^{\circ}\text{C/W}$                          | $400^{\circ}\text{C/W}$                         |



Power Dissipation



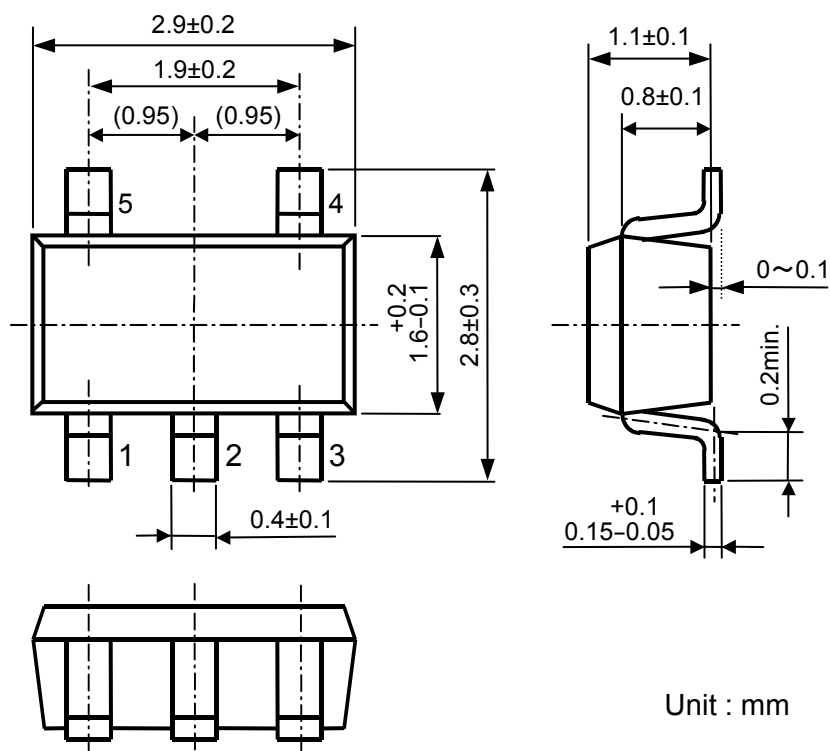
Measurement Board Pattern

 IC Mount Area (Unit: mm)

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

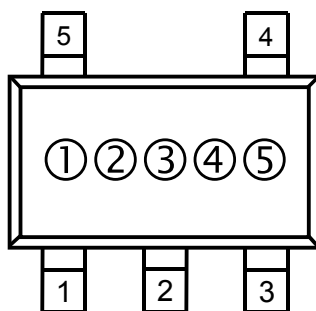
• Package Dimensions (SOT-23-5)



• Mark Specification (SOT-23-5)

①②③: Product Code ... Refer to "RP111N Series Mark Specification Table".

④⑤ : Lot Number ... Alphanumeric Serial Number.



● RP111N Series Mark Specification Table (SOT-23-5)

RP111Nxx1B

| Product Name | ①②③ | Vset  |
|--------------|-----|-------|
| RP111N071B   | H07 | 0.7V  |
| RP111N081B   | H08 | 0.8V  |
| RP111N091B   | H09 | 0.9V  |
| RP111N101B   | H10 | 1.0V  |
| RP111N111B   | H11 | 1.1V  |
| RP111N121B   | H12 | 1.2V  |
| RP111N131B   | H13 | 1.3V  |
| RP111N141B   | H14 | 1.4V  |
| RP111N151B   | H15 | 1.5V  |
| RP111N161B   | H16 | 1.6V  |
| RP111N171B   | H17 | 1.7V  |
| RP111N181B   | H18 | 1.8V  |
| RP111N191B   | H19 | 1.9V  |
| RP111N201B   | H20 | 2.0V  |
| RP111N211B   | H21 | 2.1V  |
| RP111N221B   | H22 | 2.2V  |
| RP111N231B   | H23 | 2.3V  |
| RP111N241B   | H24 | 2.4V  |
| RP111N251B   | H25 | 2.5V  |
| RP111N261B   | H26 | 2.6V  |
| RP111N271B   | H27 | 2.7V  |
| RP111N281B   | H28 | 2.8V  |
| RP111N291B   | H29 | 2.9V  |
| RP111N301B   | H30 | 3.0V  |
| RP111N311B   | H31 | 3.1V  |
| RP111N321B   | H32 | 3.2V  |
| RP111N331B   | H33 | 3.3V  |
| RP111N341B   | H34 | 3.4V  |
| RP111N351B   | H35 | 3.5V  |
| RP111N361B   | H36 | 3.6V  |
| RP111N071B5  | H37 | 0.75V |
| RP111N121B5  | H38 | 1.25V |
| RP111N181B5  | H39 | 1.85V |
| RP111N281B5  | H40 | 2.85V |
| RP111N101B5  | H41 | 1.05V |

RP111Nxx1D

| Product Name | ①②③ | Vset  |
|--------------|-----|-------|
| RP111N071D   | J07 | 0.7V  |
| RP111N081D   | J08 | 0.8V  |
| RP111N091D   | J09 | 0.9V  |
| RP111N101D   | J10 | 1.0V  |
| RP111N111D   | J11 | 1.1V  |
| RP111N121D   | J12 | 1.2V  |
| RP111N131D   | J13 | 1.3V  |
| RP111N141D   | J14 | 1.4V  |
| RP111N151D   | J15 | 1.5V  |
| RP111N161D   | J16 | 1.6V  |
| RP111N171D   | J17 | 1.7V  |
| RP111N181D   | J18 | 1.8V  |
| RP111N191D   | J19 | 1.9V  |
| RP111N201D   | J20 | 2.0V  |
| RP111N211D   | J21 | 2.1V  |
| RP111N221D   | J22 | 2.2V  |
| RP111N231D   | J23 | 2.3V  |
| RP111N241D   | J24 | 2.4V  |
| RP111N251D   | J25 | 2.5V  |
| RP111N261D   | J26 | 2.6V  |
| RP111N271D   | J27 | 2.7V  |
| RP111N281D   | J28 | 2.8V  |
| RP111N291D   | J29 | 2.9V  |
| RP111N301D   | J30 | 3.0V  |
| RP111N311D   | J31 | 3.1V  |
| RP111N321D   | J32 | 3.2V  |
| RP111N331D   | J33 | 3.3V  |
| RP111N341D   | J34 | 3.4V  |
| RP111N351D   | J35 | 3.5V  |
| RP111N361D   | J36 | 3.6V  |
| RP111N071D5  | J37 | 0.75V |
| RP111N121D5  | J38 | 1.25V |
| RP111N181D5  | J39 | 1.85V |
| RP111N281D5  | J40 | 2.85V |
| RP111N101D5  | J41 | 1.05V |

# **• Power Dissipation (SOT-89-5)**

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

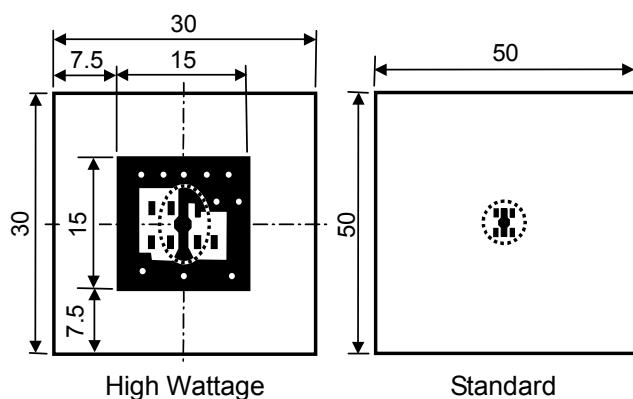
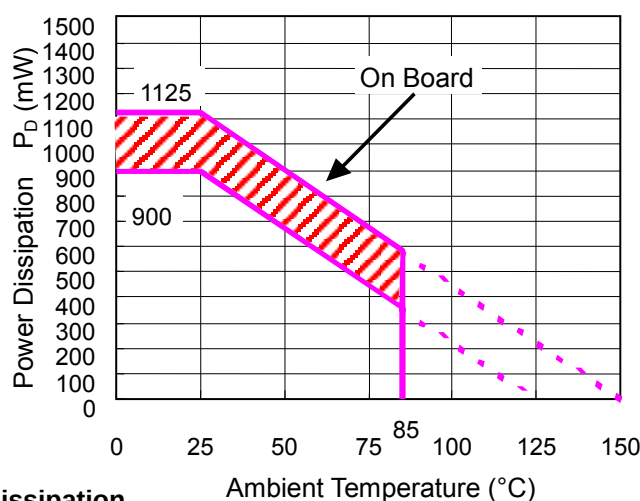
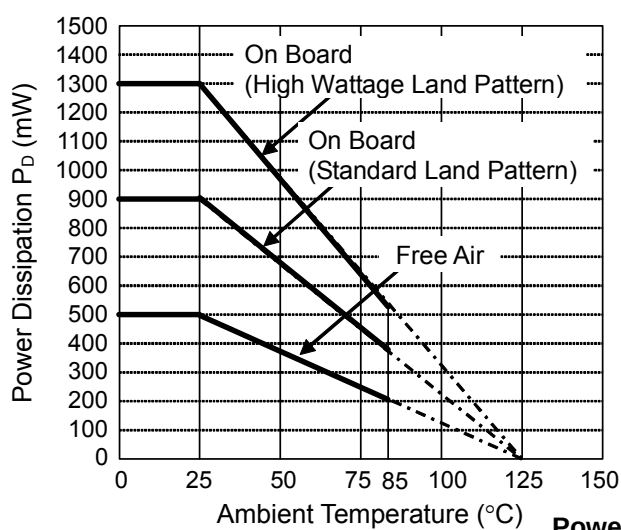
## **Measurement Conditions**

|                  | High Wattage Land Pattern                      | Standard Land Pattern                          |
|------------------|------------------------------------------------|------------------------------------------------|
| Environment      | Mounting on Board (Wind Velocity=0m/s)         | Mounting on Board (Wind Velocity=0m/s)         |
| Board Material   | Glass Cloth Epoxy Plastic (Double-sided)       | Glass Cloth Epoxy Plastic (Double-sided)       |
| Board Dimensions | 30mm x 30mm x 1.6mm                            | 50mm x 50mm x 1.6mm                            |
| Copper Ratio     | Topside: Approx. 20%<br>Backside: Approx. 100% | Topside: Approx. 10%<br>Backside: Approx. 100% |
| Through-hole     | $\phi 0.85\text{mm} \times 10\text{pcs}$       | -                                              |

## **Measurement Result**

(Ta=25°C)

|                    | High Wattage Land Pattern | Standard Land Pattern                                                               | Free Air |
|--------------------|---------------------------|-------------------------------------------------------------------------------------|----------|
| Power Dissipation  | 1300mW                    | 900mW ( $T_{j\max}=125^\circ\text{C}$ )<br>1125mW ( $T_{j\max}=150^\circ\text{C}$ ) | 500mW    |
| Thermal Resistance | 77°C/W                    | 111°C/W                                                                             | 200°C/W  |

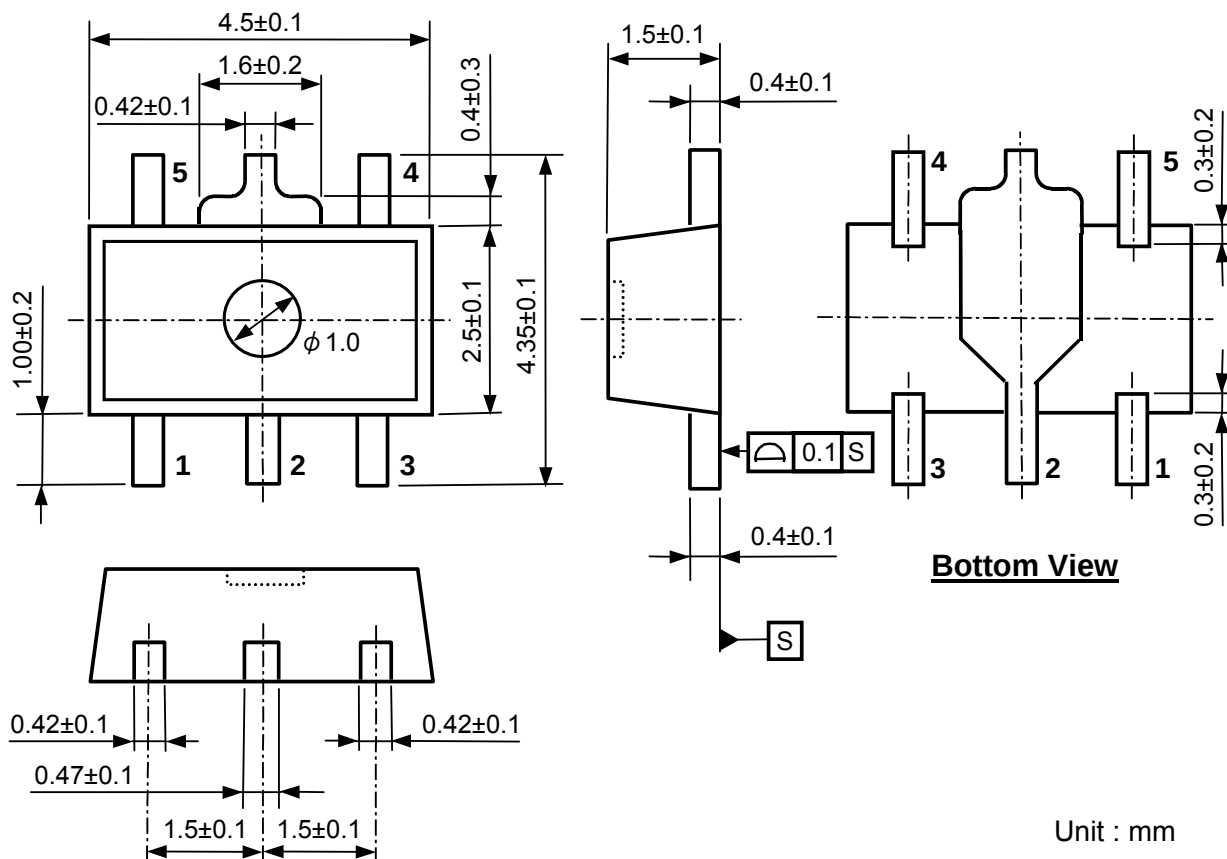


**Note:** The above graph shows the power dissipation of the package based on  $T_{j\max}=125^\circ\text{C}$  and  $T_{j\max}=150^\circ\text{C}$ . Operating the IC within the shaded area in the graph might have an influence on its lifetime. Operating time must be within the time limit described in the table below.

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

IC Mount Area Unit: mm

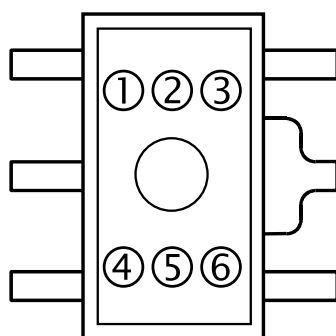
# Package Dimensions (SOT-89-5)



## Mark Specification (SOT-89-5)

①②③④: Product Code ...Refer to "RP111H Series Mark Specification Table".

⑤⑥ : Lot Number ... Alphanumeric Serial Number



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**RP111x**NO.EA-241-150204

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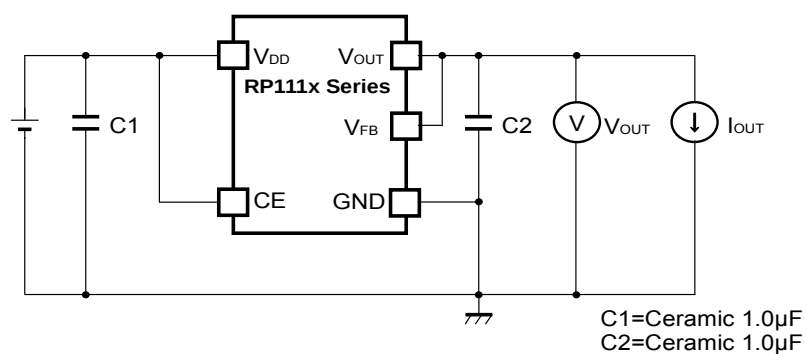
**RP111H Series Mark Specification Table (SOT-89-5)****RP111Hxx1B**

| Product Name | ①②③④        | Vset  |
|--------------|-------------|-------|
| RP111H071B   | <b>A07B</b> | 0.7V  |
| RP111H081B   | <b>A08B</b> | 0.8V  |
| RP111H091B   | <b>A09B</b> | 0.9V  |
| RP111H101B   | <b>A10B</b> | 1.0V  |
| RP111H111B   | <b>A11B</b> | 1.1V  |
| RP111H121B   | <b>A12B</b> | 1.2V  |
| RP111H131B   | <b>A13B</b> | 1.3V  |
| RP111H141B   | <b>A14B</b> | 1.4V  |
| RP111H151B   | <b>A15B</b> | 1.5V  |
| RP111H161B   | <b>A16B</b> | 1.6V  |
| RP111H171B   | <b>A17B</b> | 1.7V  |
| RP111H181B   | <b>A18B</b> | 1.8V  |
| RP111H191B   | <b>A19B</b> | 1.9V  |
| RP111H201B   | <b>A20B</b> | 2.0V  |
| RP111H211B   | <b>A21B</b> | 2.1V  |
| RP111H221B   | <b>A22B</b> | 2.2V  |
| RP111H231B   | <b>A23B</b> | 2.3V  |
| RP111H241B   | <b>A24B</b> | 2.4V  |
| RP111H251B   | <b>A25B</b> | 2.5V  |
| RP111H261B   | <b>A26B</b> | 2.6V  |
| RP111H271B   | <b>A27B</b> | 2.7V  |
| RP111H281B   | <b>A28B</b> | 2.8V  |
| RP111H291B   | <b>A29B</b> | 2.9V  |
| RP111H301B   | <b>A30B</b> | 3.0V  |
| RP111H311B   | <b>A31B</b> | 3.1V  |
| RP111H321B   | <b>A32B</b> | 3.2V  |
| RP111H331B   | <b>A33B</b> | 3.3V  |
| RP111H341B   | <b>A34B</b> | 3.4V  |
| RP111H351B   | <b>A35B</b> | 3.5V  |
| RP111H361B   | <b>A36B</b> | 3.6V  |
| RP111H071B5  | <b>A37B</b> | 0.75V |
| RP111H121B5  | <b>A38B</b> | 1.25V |
| RP111H181B5  | <b>A39B</b> | 1.85V |
| RP111H281B5  | <b>A40B</b> | 2.85V |
| RP111H101B5  | <b>A41B</b> | 1.05V |

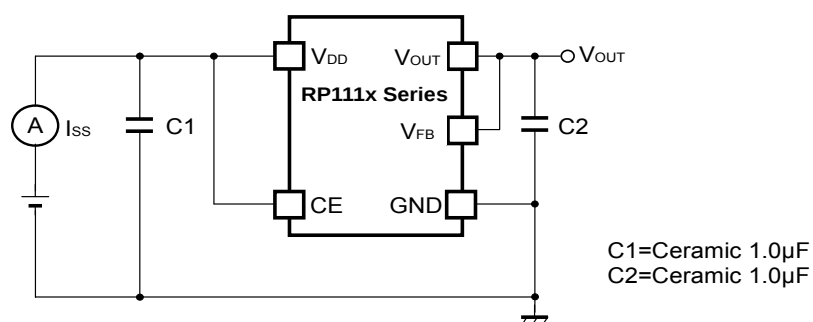
**RP111Hxx1D**

| Product Name | ①②③④        | Vset  |
|--------------|-------------|-------|
| RP111H071D   | <b>A07D</b> | 0.7V  |
| RP111H081D   | <b>A08D</b> | 0.8V  |
| RP111H091D   | <b>A09D</b> | 0.9V  |
| RP111H101D   | <b>A10D</b> | 1.0V  |
| RP111H111D   | <b>A11D</b> | 1.1V  |
| RP111H121D   | <b>A12D</b> | 1.2V  |
| RP111H131D   | <b>A13D</b> | 1.3V  |
| RP111H141D   | <b>A14D</b> | 1.4V  |
| RP111H151D   | <b>A15D</b> | 1.5V  |
| RP111H161D   | <b>A16D</b> | 1.6V  |
| RP111H171D   | <b>A17D</b> | 1.7V  |
| RP111H181D   | <b>A18D</b> | 1.8V  |
| RP111H191D   | <b>A19D</b> | 1.9V  |
| RP111H201D   | <b>A20D</b> | 2.0V  |
| RP111H211D   | <b>A21D</b> | 2.1V  |
| RP111H221D   | <b>A22D</b> | 2.2V  |
| RP111H231D   | <b>A23D</b> | 2.3V  |
| RP111H241D   | <b>A24D</b> | 2.4V  |
| RP111H251D   | <b>A25D</b> | 2.5V  |
| RP111H261D   | <b>A26D</b> | 2.6V  |
| RP111H271D   | <b>A27D</b> | 2.7V  |
| RP111H281D   | <b>A28D</b> | 2.8V  |
| RP111H291D   | <b>A29D</b> | 2.9V  |
| RP111H301D   | <b>A30D</b> | 3.0V  |
| RP111H311D   | <b>A31D</b> | 3.1V  |
| RP111H321D   | <b>A32D</b> | 3.2V  |
| RP111H331D   | <b>A33D</b> | 3.3V  |
| RP111H341D   | <b>A34D</b> | 3.4V  |
| RP111H351D   | <b>A35D</b> | 3.5V  |
| RP111H361D   | <b>A36D</b> | 3.6V  |
| RP111H071D5  | <b>A37D</b> | 0.75V |
| RP111H121D5  | <b>A38D</b> | 1.25V |
| RP111H181D5  | <b>A39D</b> | 1.85V |
| RP111H281D5  | <b>A40D</b> | 2.85V |
| RP111H101D5  | <b>A41D</b> | 1.05V |

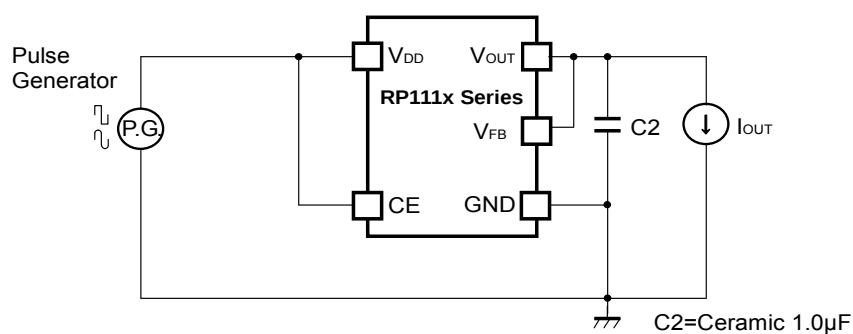
## TEST CIRCUIT



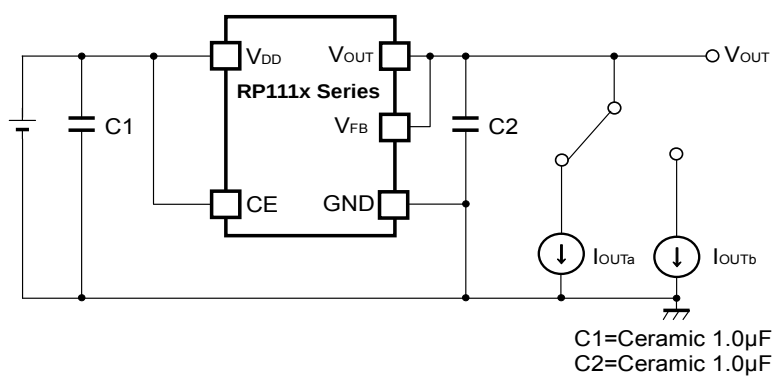
Basic Test Circuit



Test Circuit for Supply Current



Test Circuit for Ripple Rejection

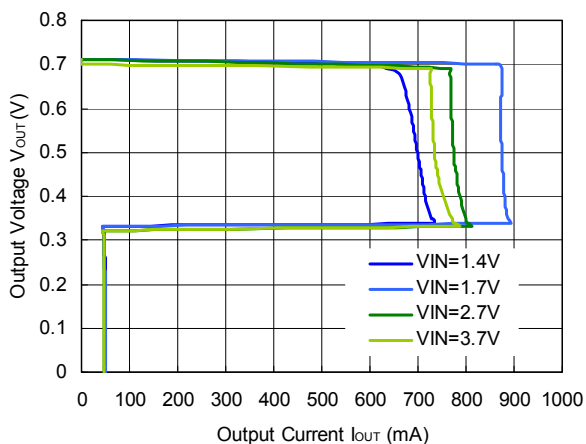


Test Circuit for Load Transient Response

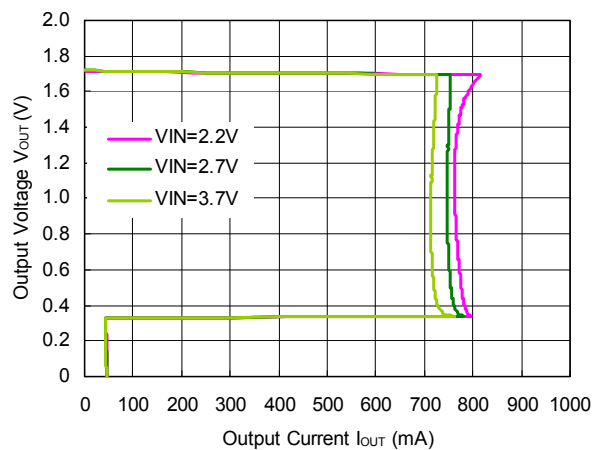
## TYPICAL CHARACTERISTICS

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

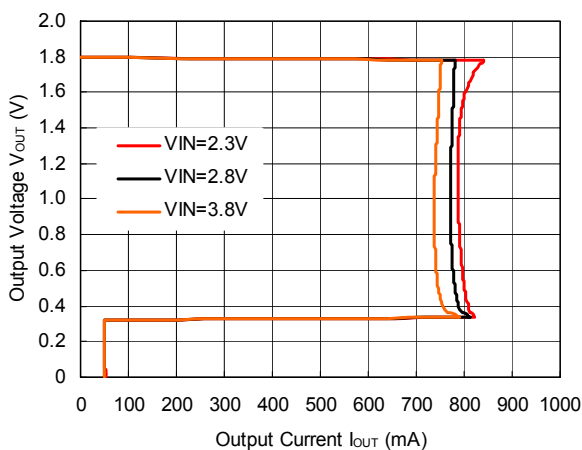
RP111x071x



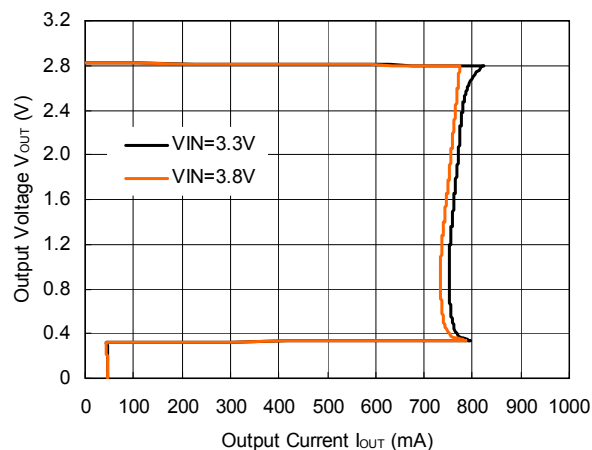
RP111x171x



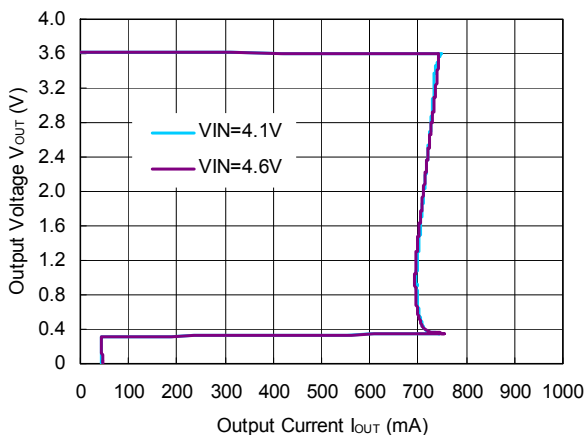
RP111x181x



RP111x281x

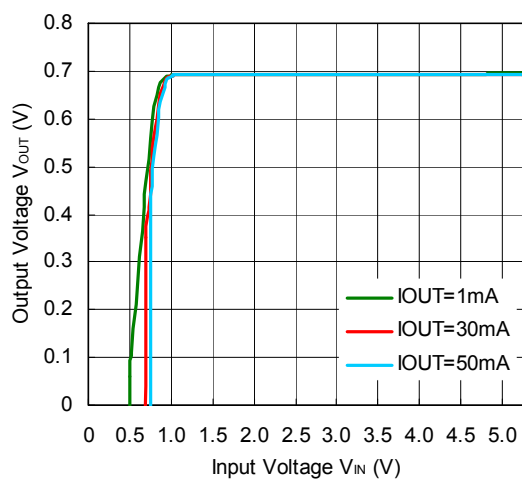


RP111x361x

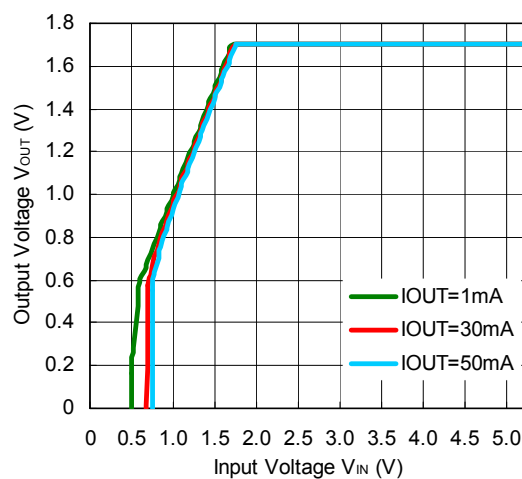


2) Output Voltage vs. Input Voltage (C1=Ceramic 1.0 $\mu$ F, C2=Ceramic 1.0 $\mu$ F, T<sub>opt</sub>=25°C)

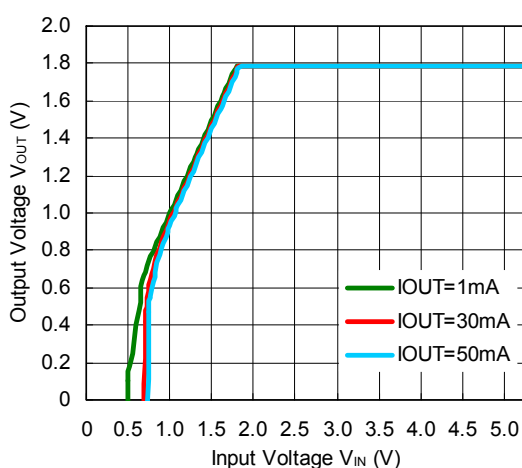
RP111x071x



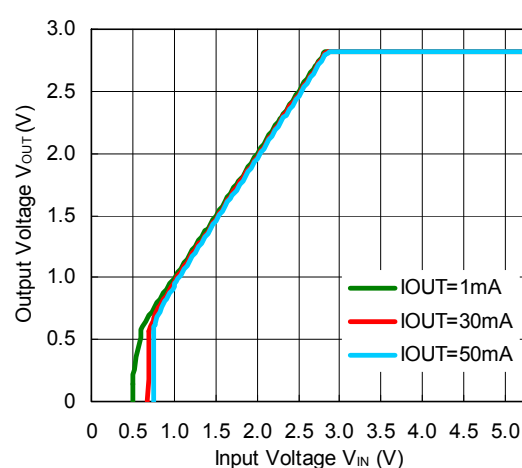
RP111x171x



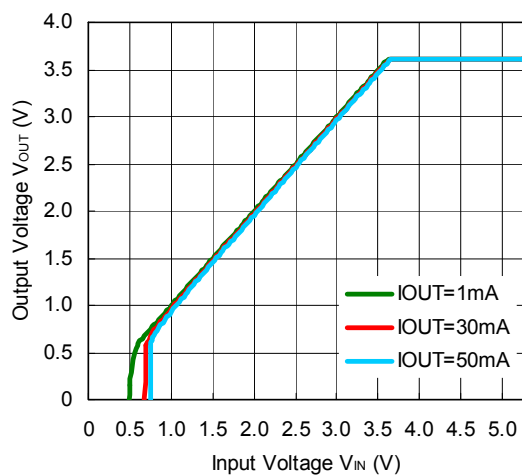
RP111x181x

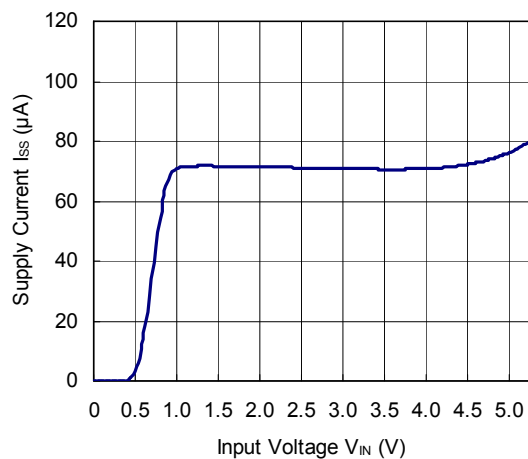
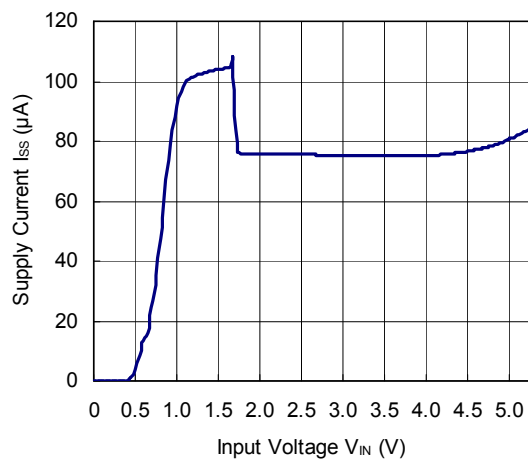
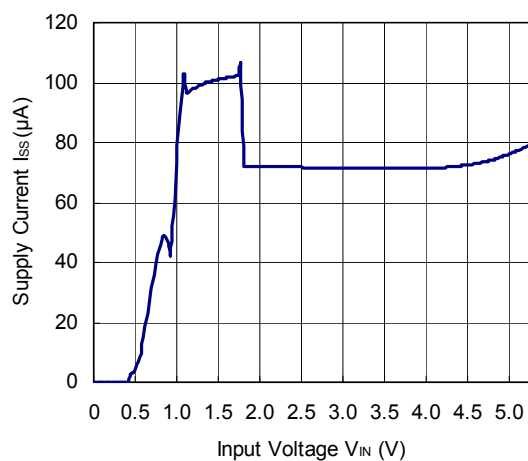
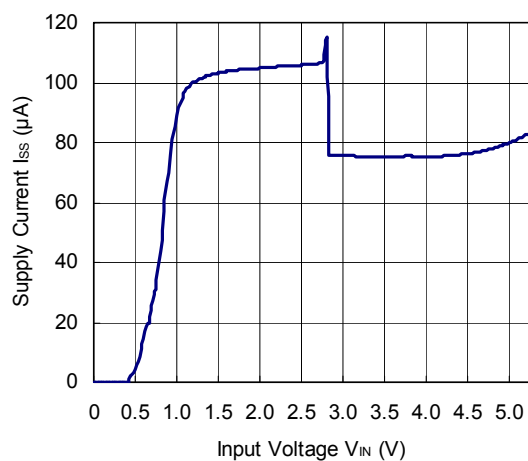
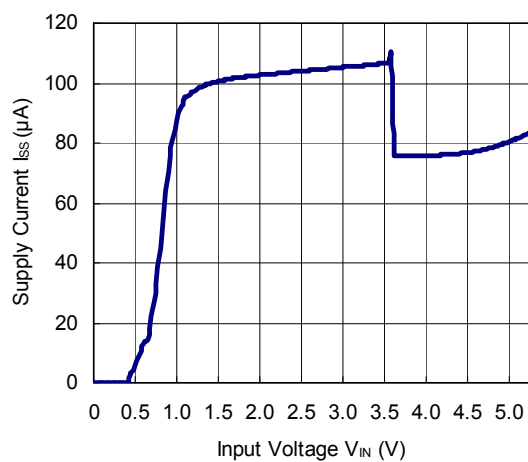


RP111x281x



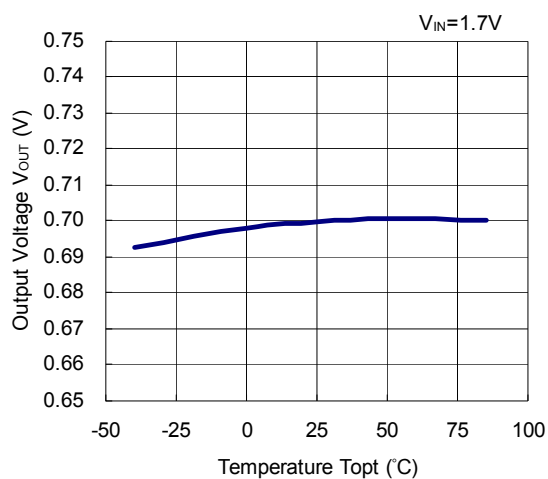
RP111x361x



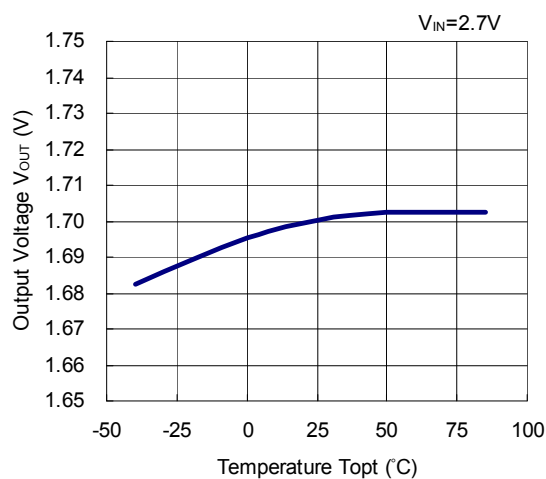
**3) Supply Current vs. Input Voltage (C1=Ceramic 1.0 $\mu$ F, C2=Ceramic 1.0 $\mu$ F, T<sub>opt</sub>=25°C)****RP111x071x****RP111x171x****RP111x181x****RP111x281x****RP111x361x**

4) Output Voltage vs. Temperature (C1=Ceramic 1.0 $\mu$ F, C2=Ceramic 1.0 $\mu$ F, I<sub>OUT</sub>=1mA)

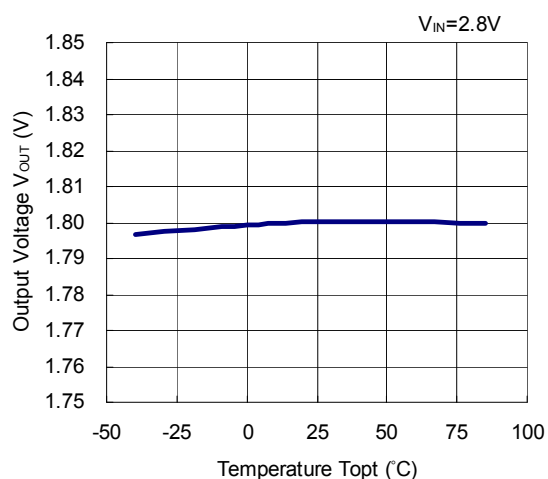
RP111x071x



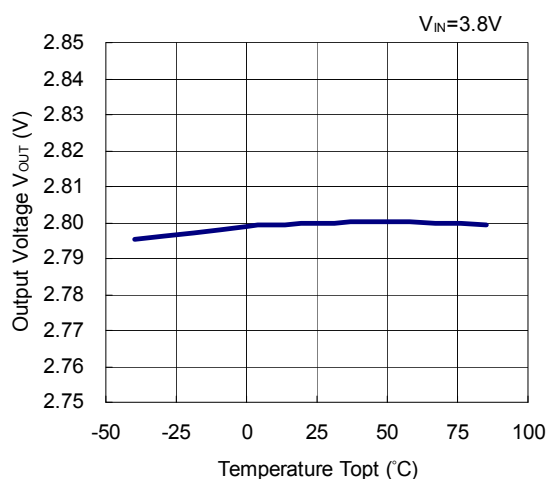
RP111x171x



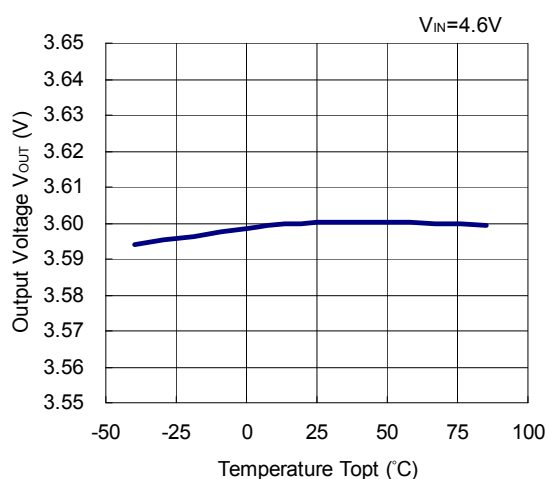
RP111x181x

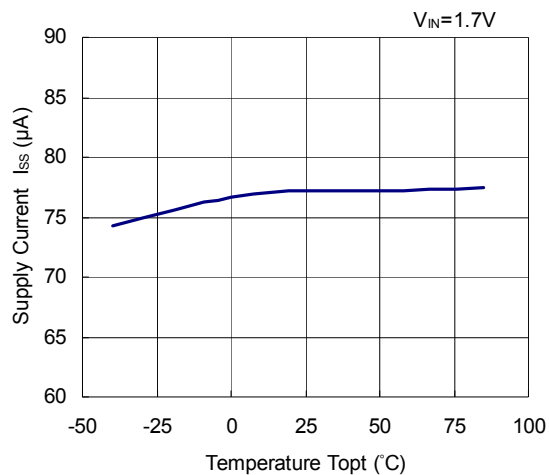
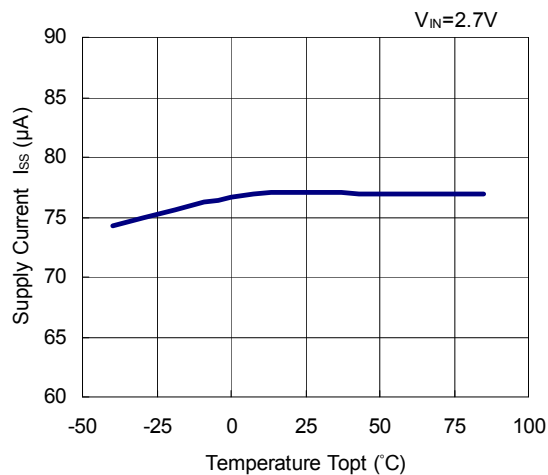
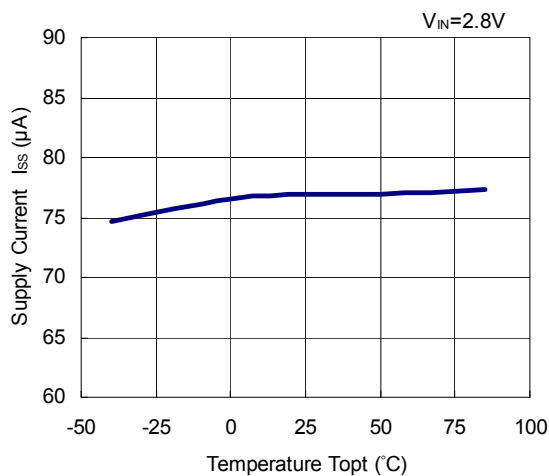
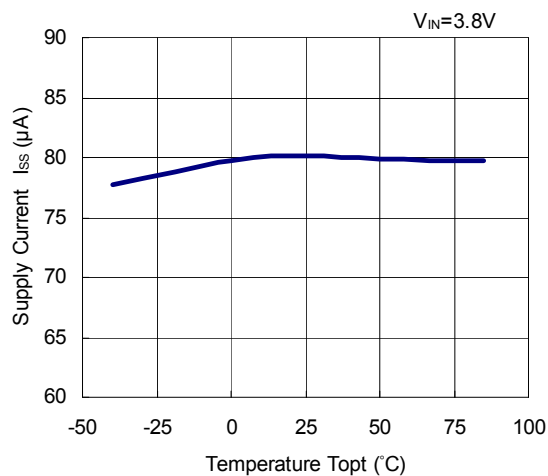
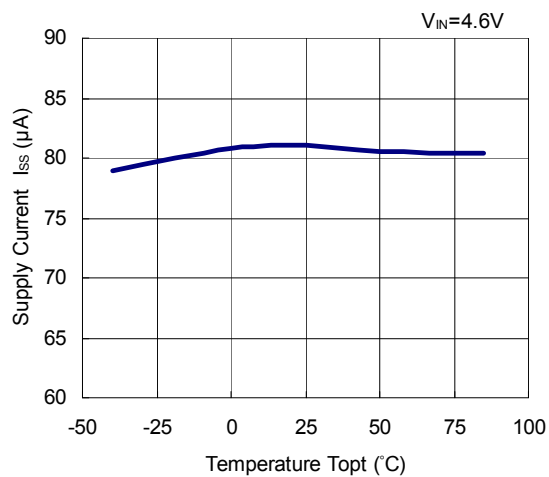


RP111x281x



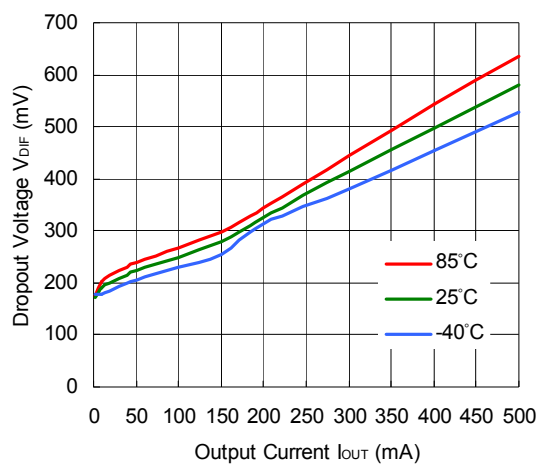
RP111x361x



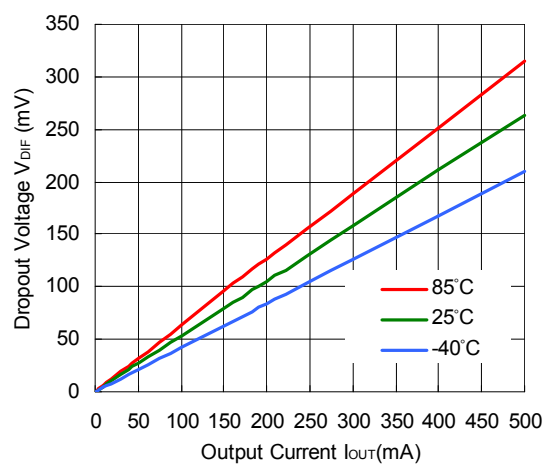
**5) Supply Current vs. Temperature (C1=Ceramic 1.0 $\mu$ F, C2=Ceramic 1.0 $\mu$ F, I<sub>OUT</sub>=0mA)****RP111x071x****RP111x171x****RP111x181x****RP111x281x****RP111x361x**

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

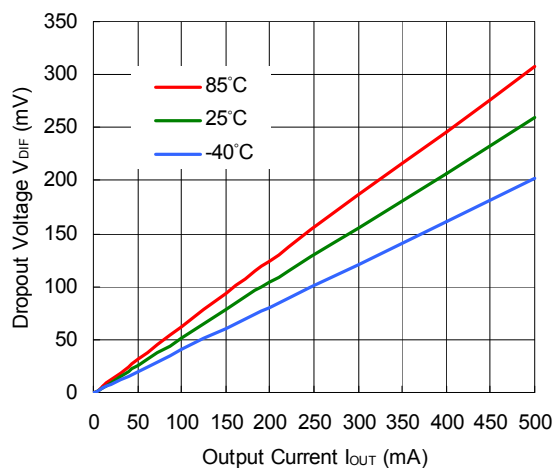
RP111x071x



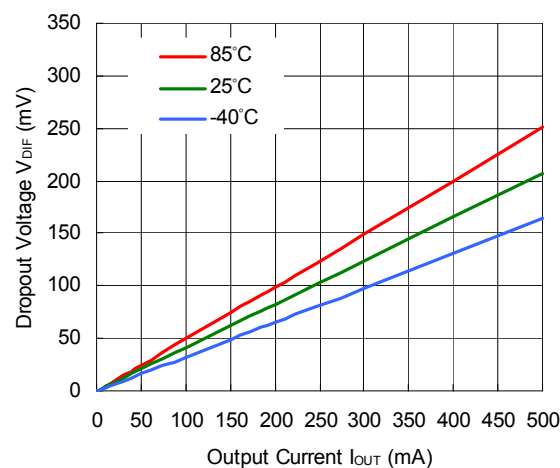
RP111x171x



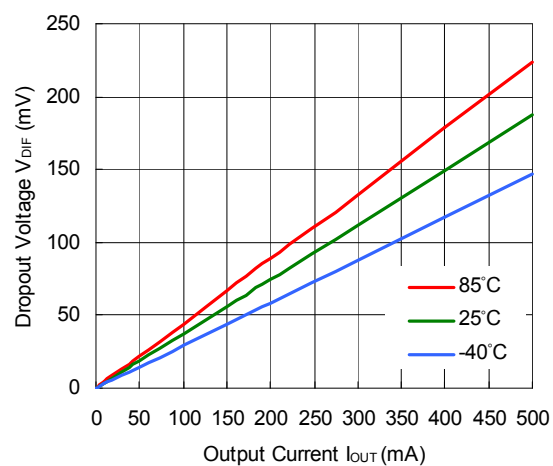
RP111x181x



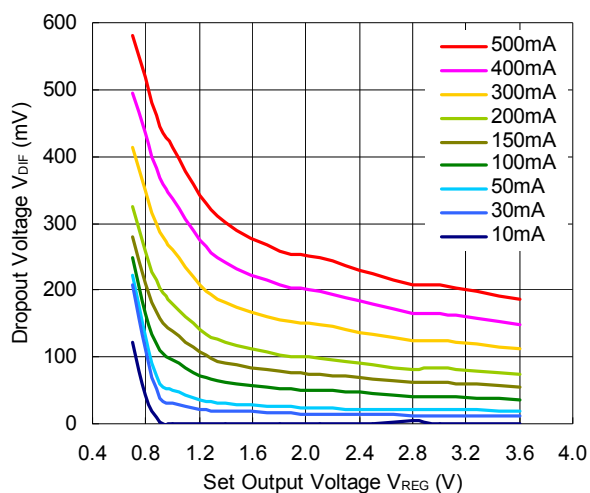
RP111x281x



RP111x361x

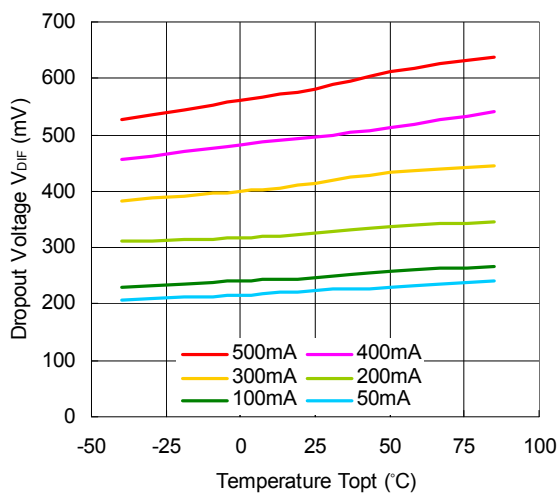


**7) Dropout Voltage vs. Set Output Voltage (C1=Ceramic 1.0μF, C2=Ceramic 1.0μF, T<sub>opt</sub>=25°C)**

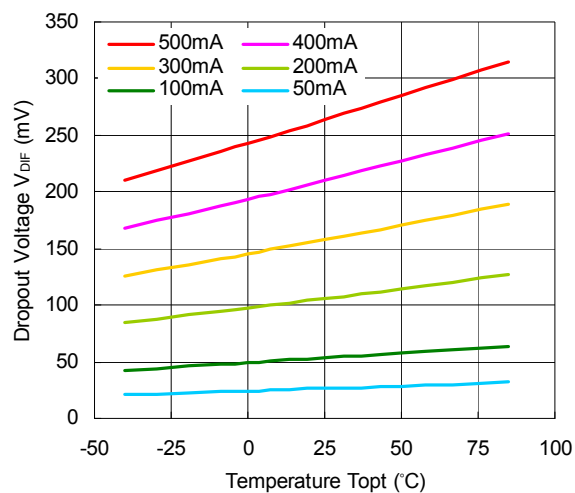


**8) Dropout Voltage vs. Temperature (C1=Ceramic 1.0μF, C2=Ceramic 1.0μF)**

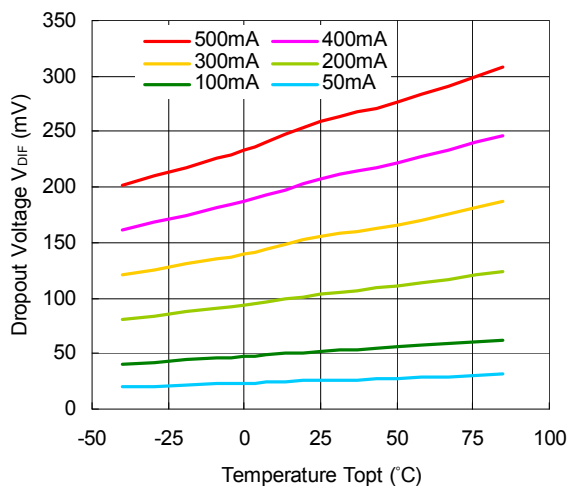
**RP111x071x**



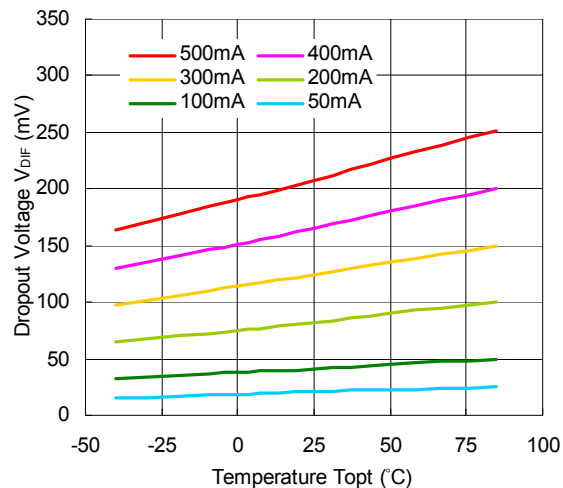
**RP111x171xx**



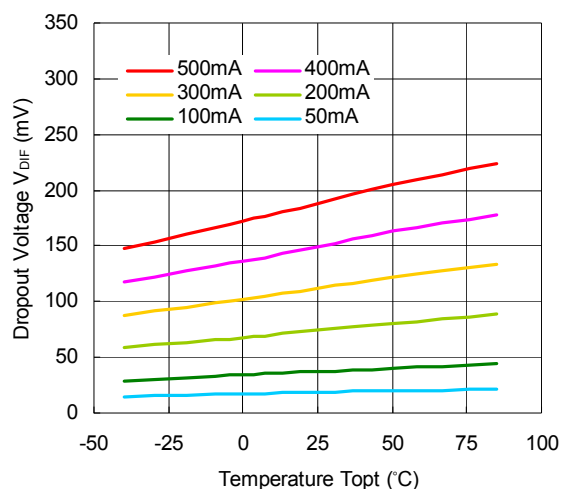
**RP111x181x**



**RP111x281x**

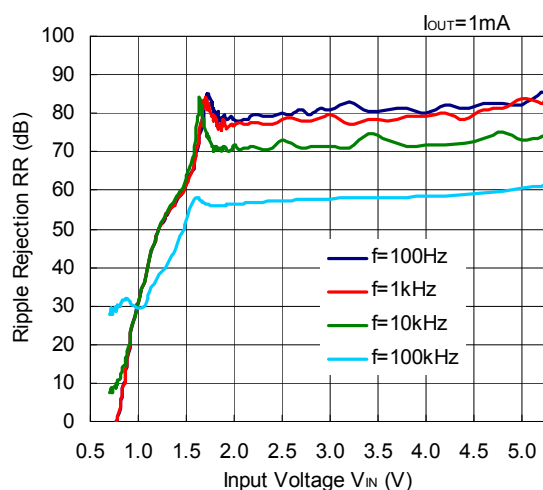


RP111x361x

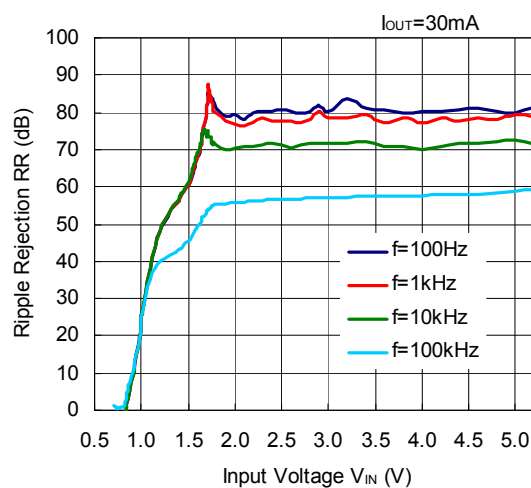


9) Ripple Rejection vs. Input Voltage (C1=none, C2=Ceramic 1.0μF, Ripple=0.2Vp-p, T<sub>opt</sub>=25°C)

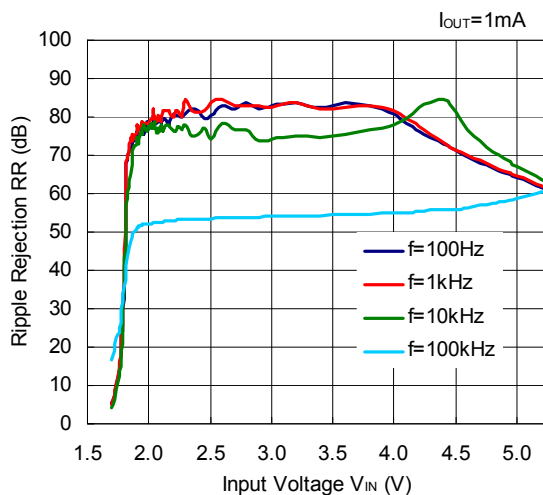
RP111x071x



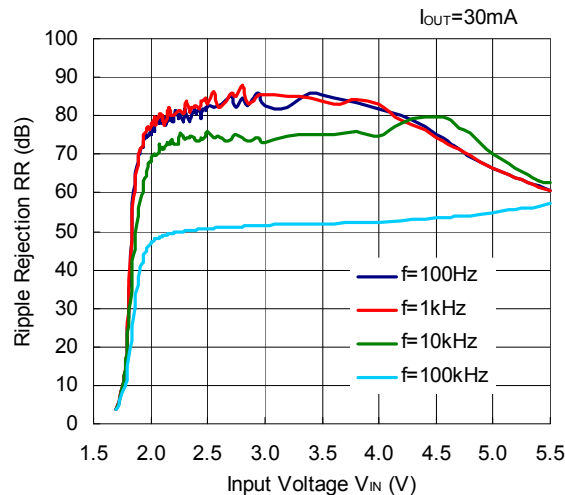
RP111x071x



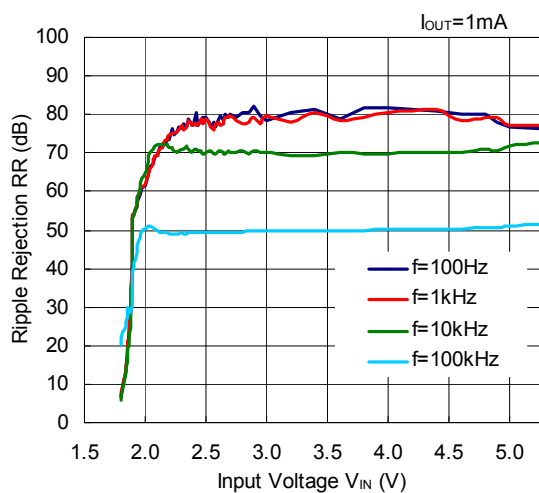
RP111x171x



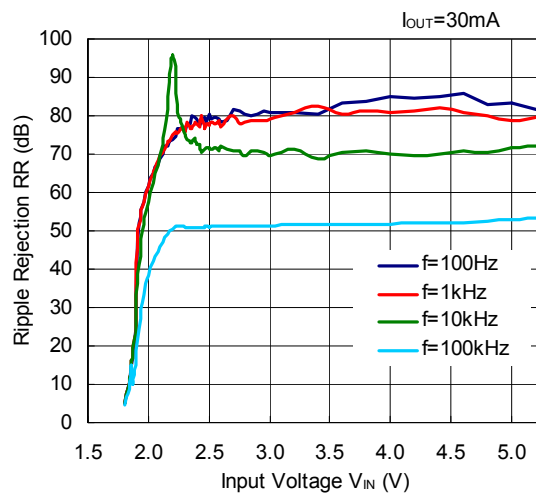
RP111x171x



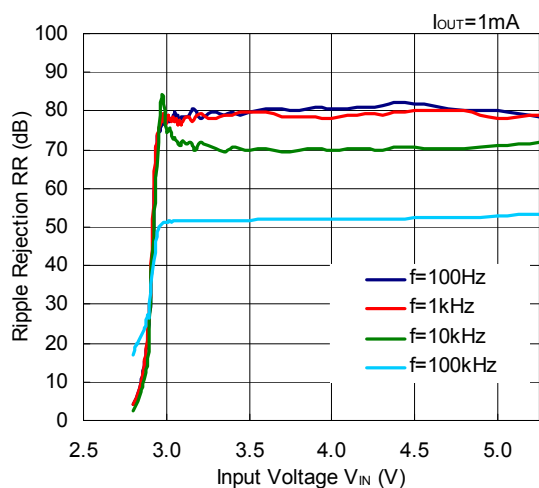
**RP111x181x**



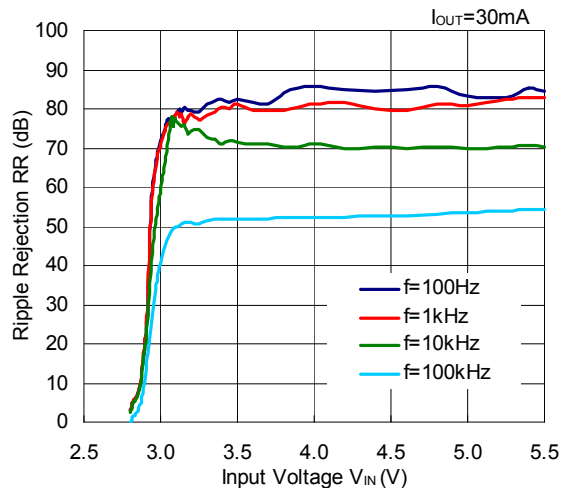
**RP111x181x**



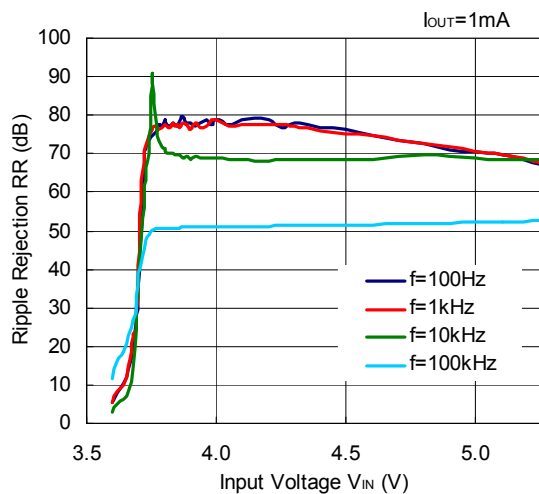
**RP111x281x**



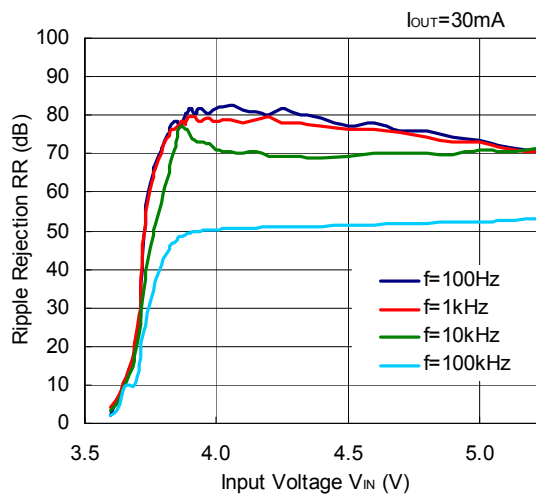
**RP111x281x**



**RP111x361x**

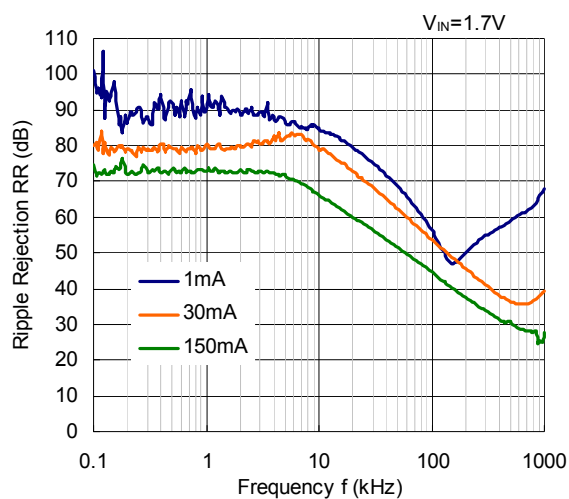


**RP111x361x**

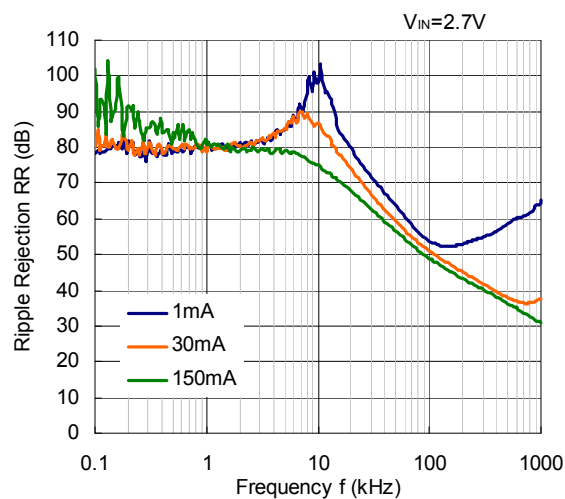


10) Ripple Rejection vs. Frequency (C1=none, C2=Ceramic 1.0 $\mu$ F, Ripple=0.2Vp-p, T<sub>opt</sub>=25°C)

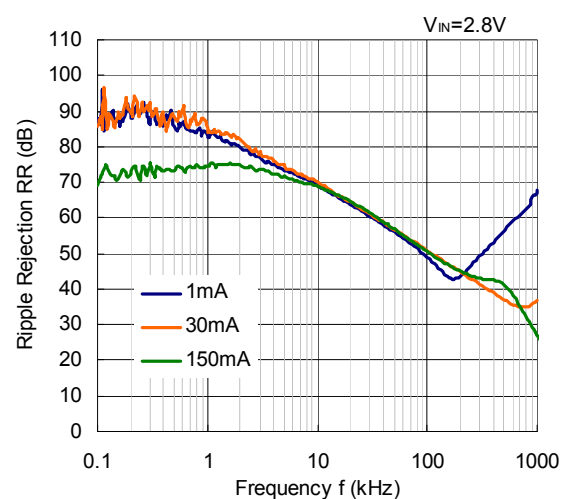
RP111x071x



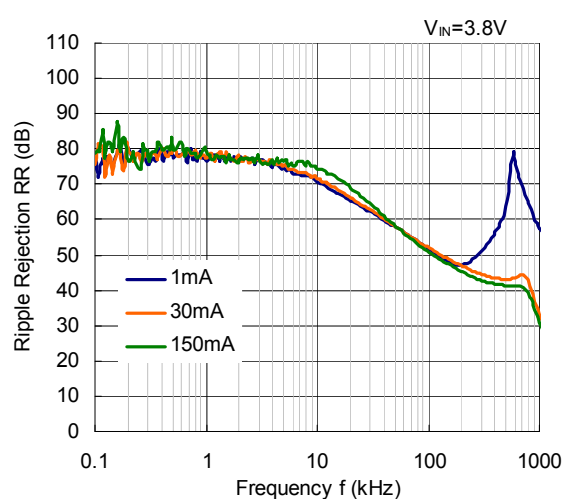
RP111x171x



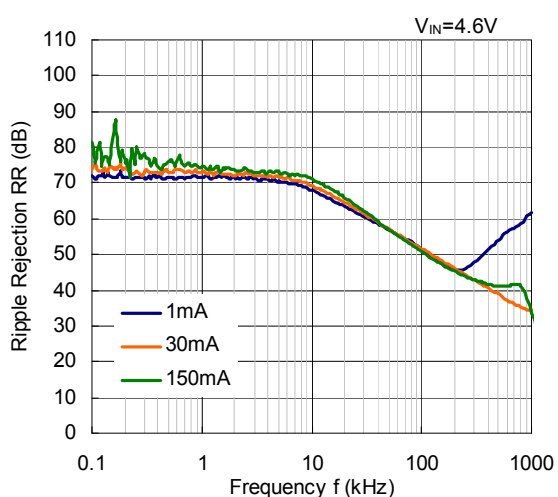
RP111x181x



RP111x281x

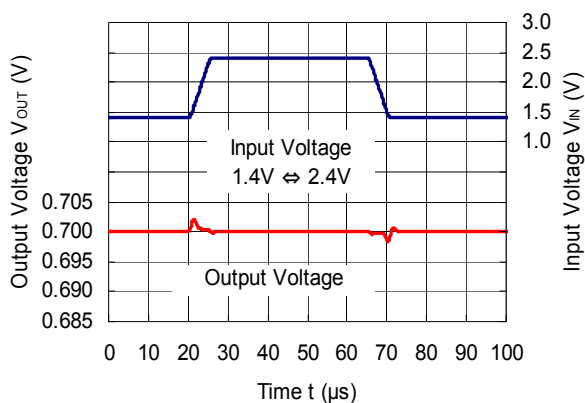


RP111x361x

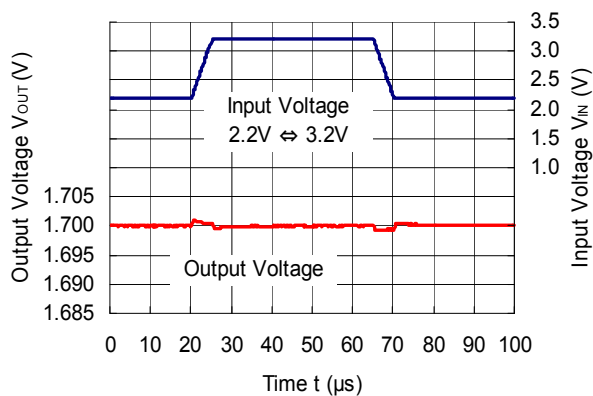


**11) Input Transient Response (C1=none, C2=Ceramic 1.0μF, I<sub>OUT</sub>=30mA, tr=tf=5μs, T<sub>opt</sub>=25°C)**

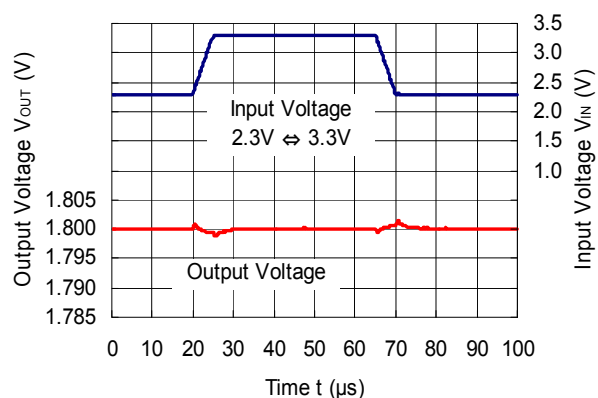
**RP111x071x**



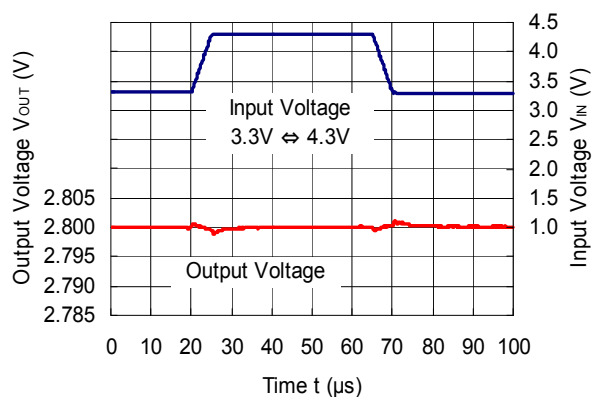
**RP111x171x**



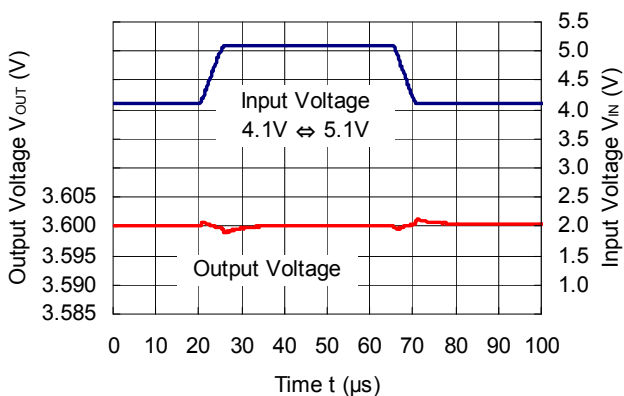
**RP111x181x**



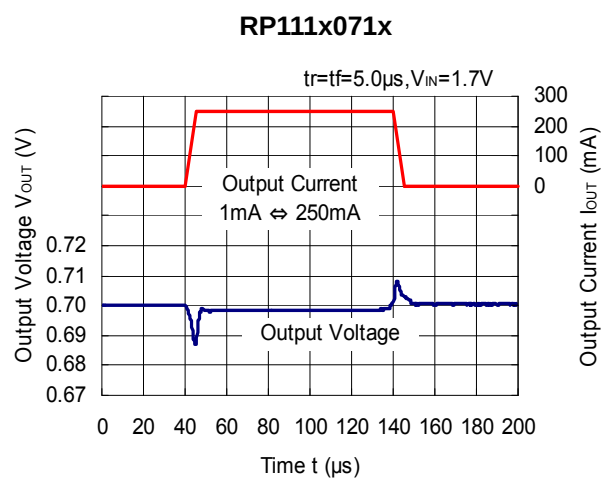
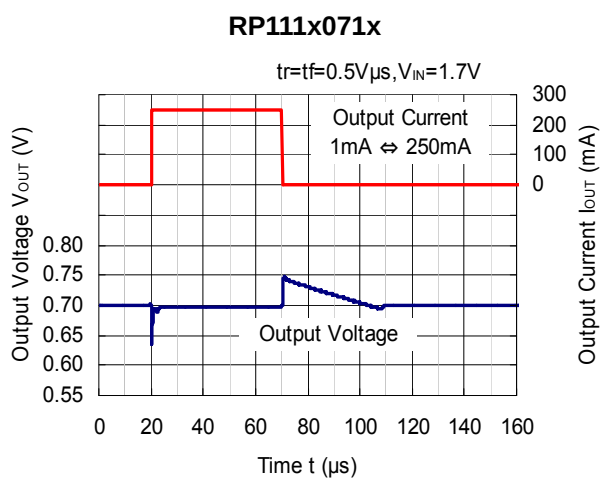
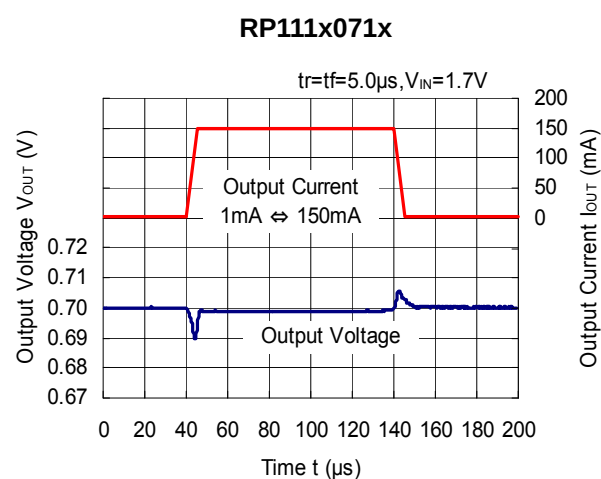
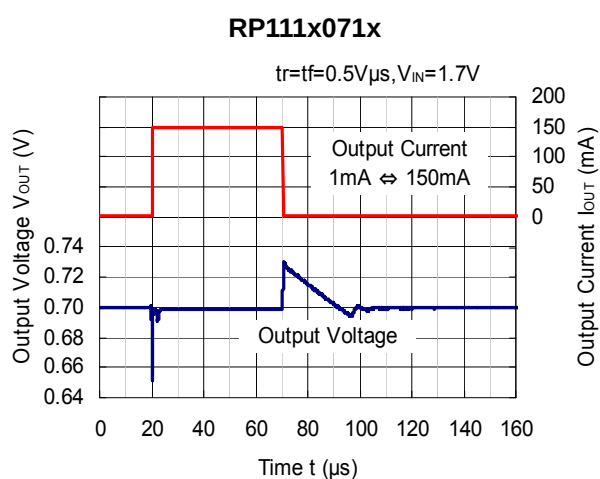
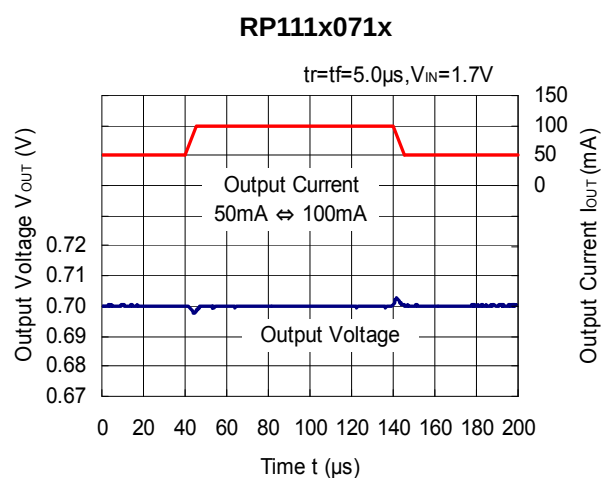
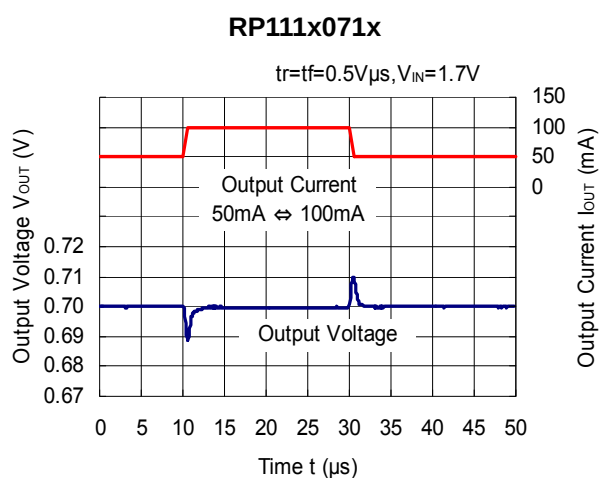
**RP111x281x**



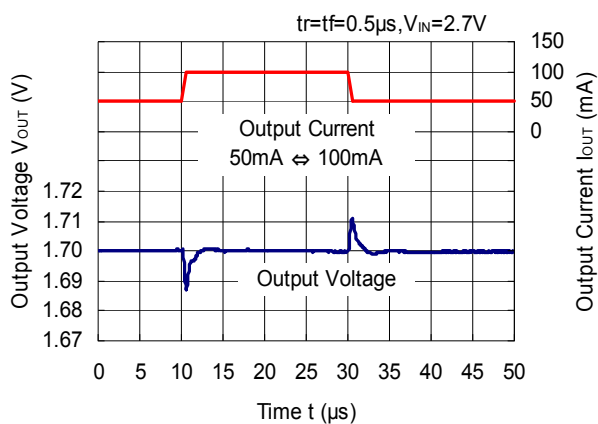
**RP111x361x**



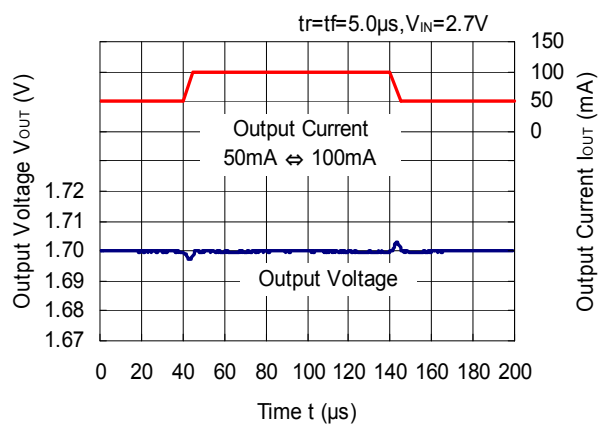
## 12) Load Transient Response ( $C_1$ =Ceramic $1.0\mu\text{F}$ , $C_2$ =Ceramic $1.0\mu\text{F}$ , $T_{\text{opt}}=25^\circ\text{C}$ )



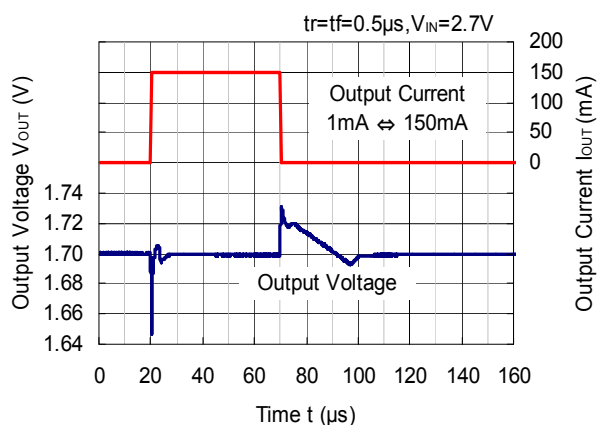
RP111x171x



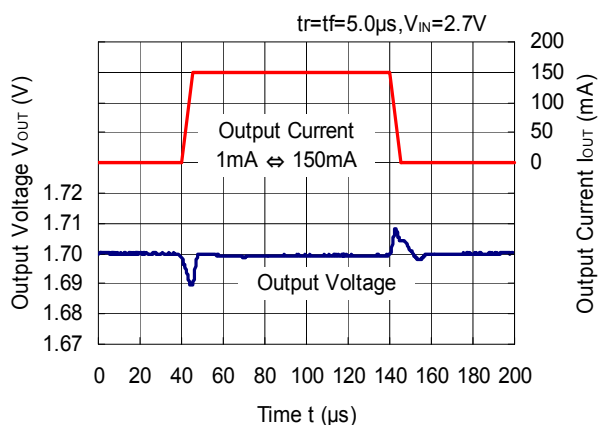
RP111x171x



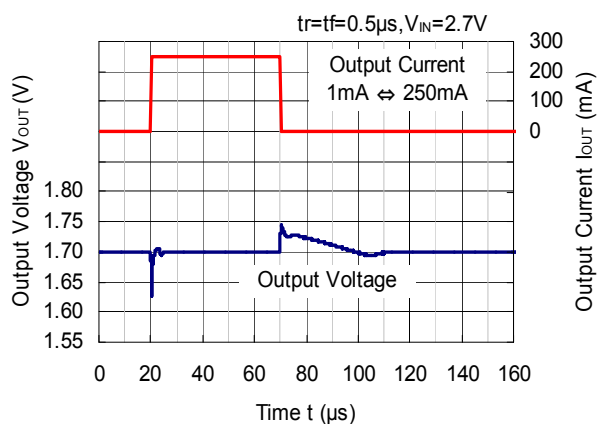
RP111x171x



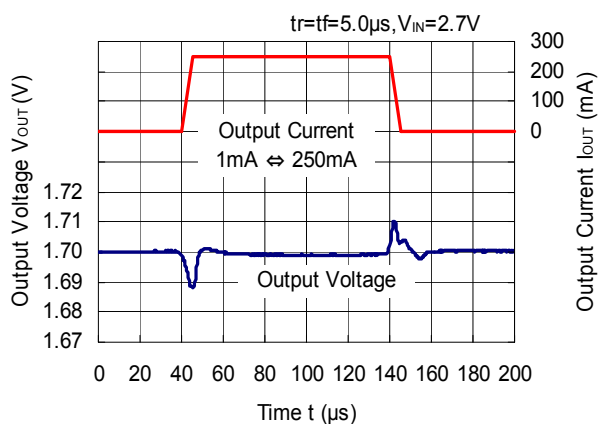
RP111x171x



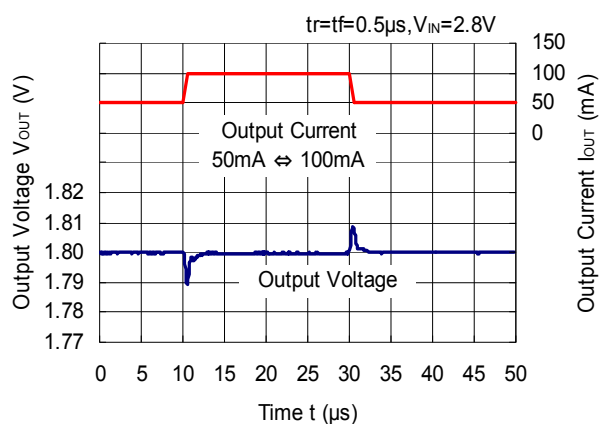
RP111x171x



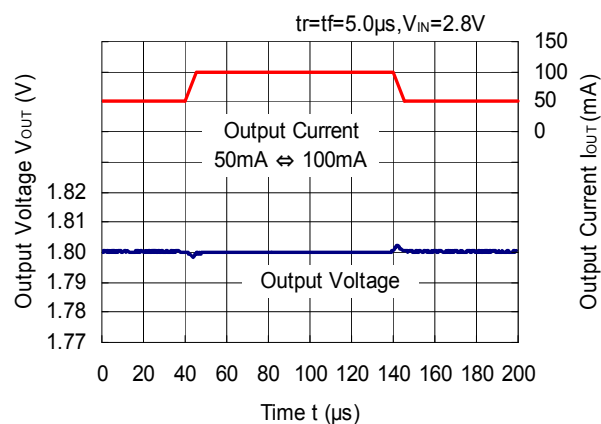
RP111x171x



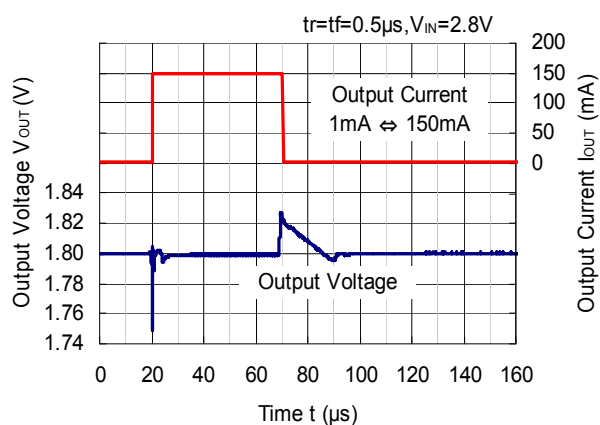
RP111x181x



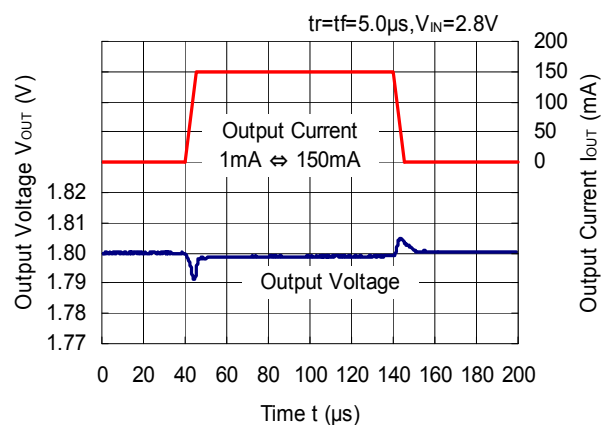
RP111x181x



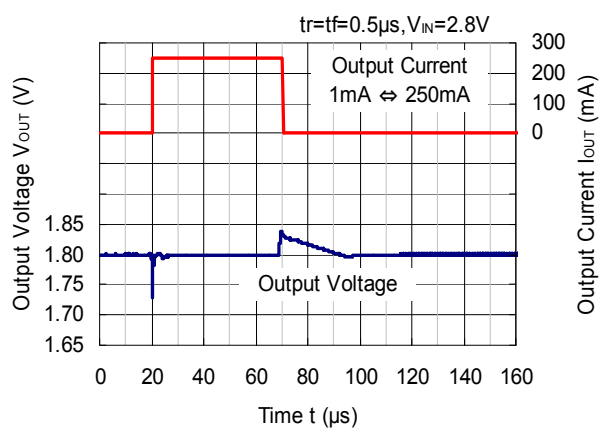
RP111x181x



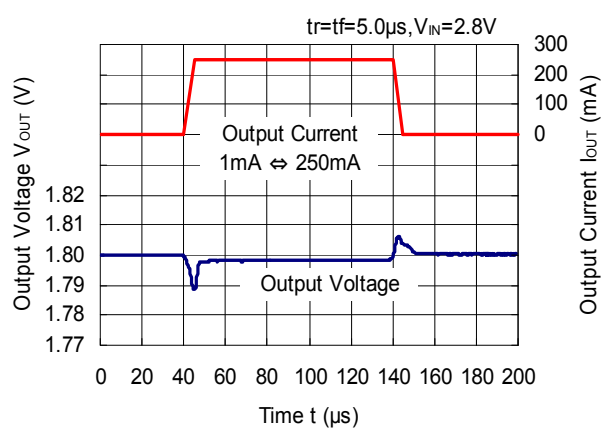
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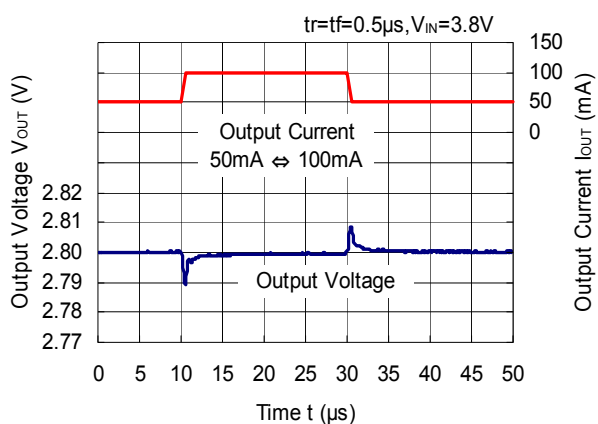
RP111x181x



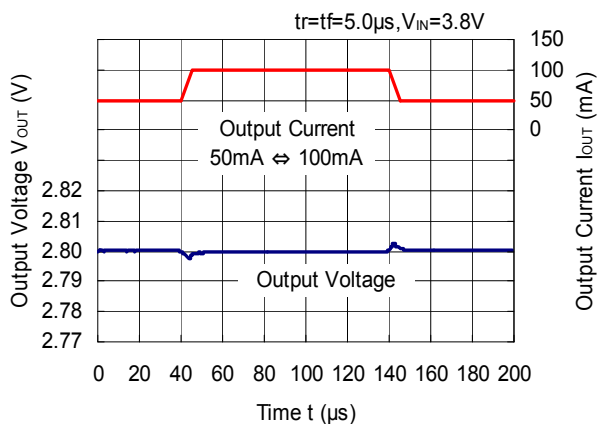
RP111x181x



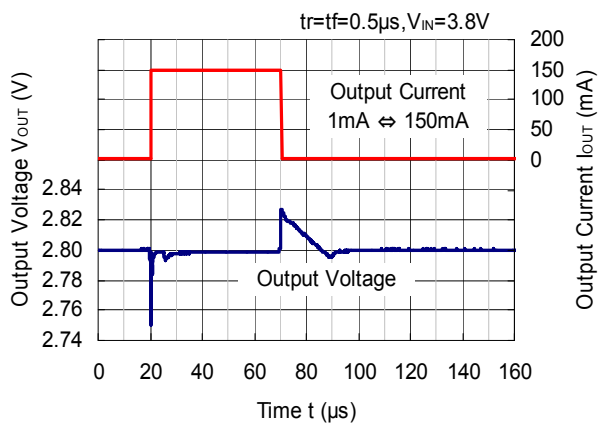
RP111x281x



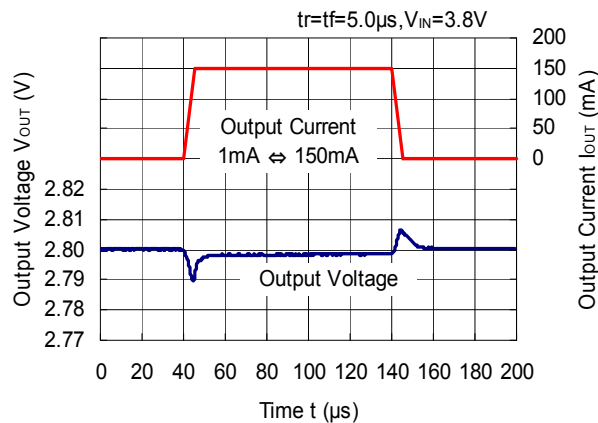
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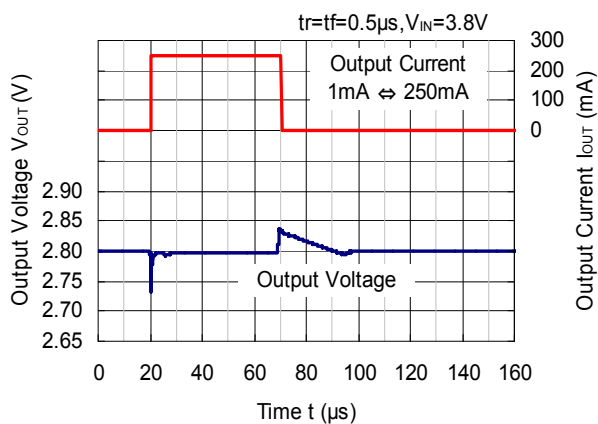
RP111x281x



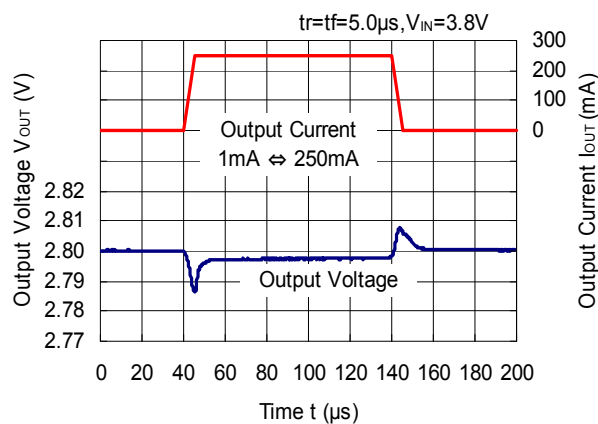
RP111x281x



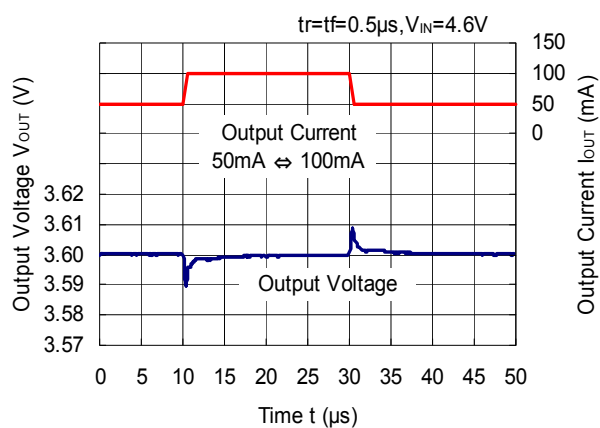
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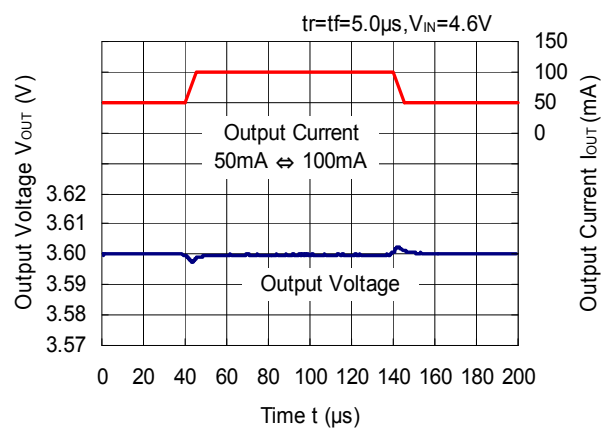
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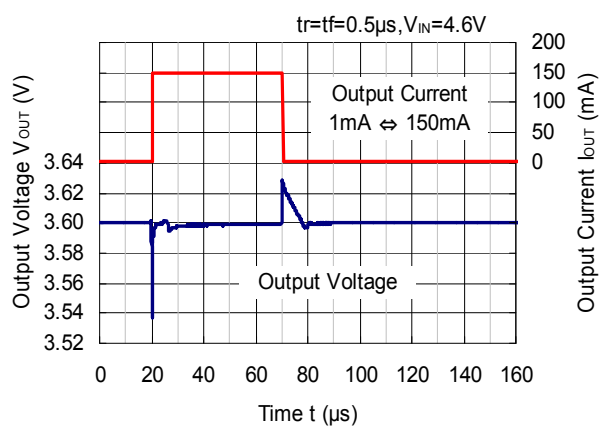
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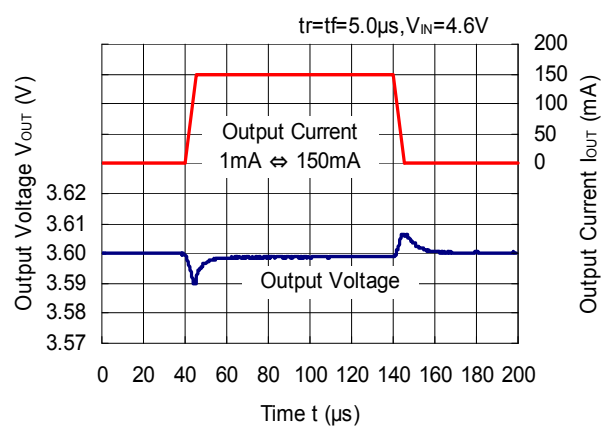
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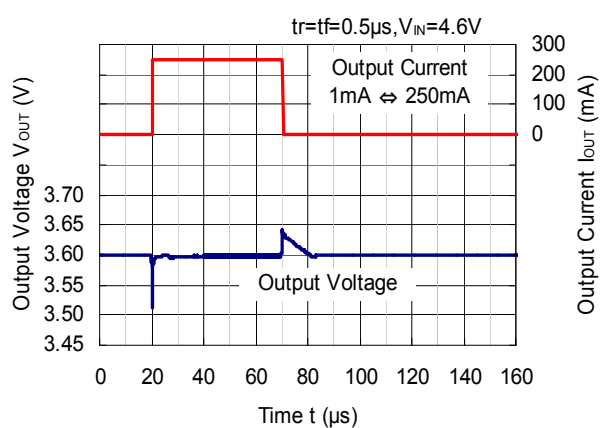
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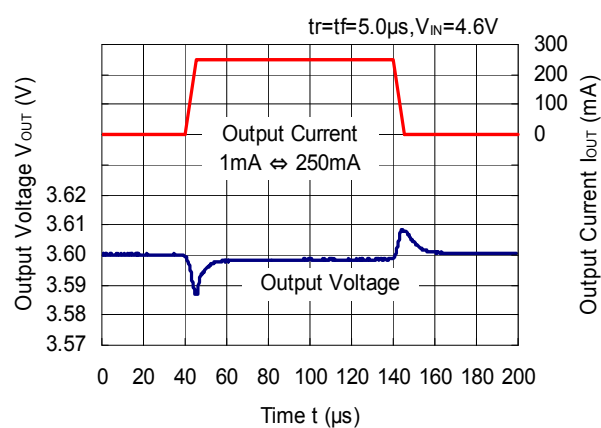
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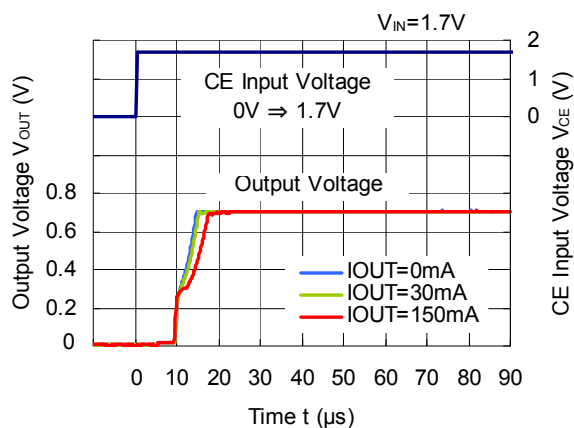


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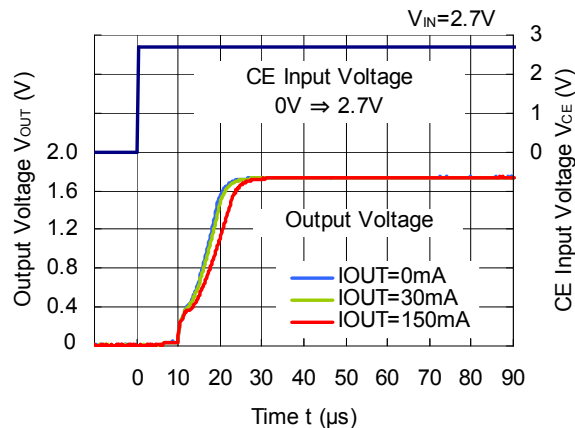


**13) Turn on Speed with CE pin (C1=Ceramic 1.0μF, C2=Ceramic 1.0μF, T<sub>opt</sub>=25°C)**

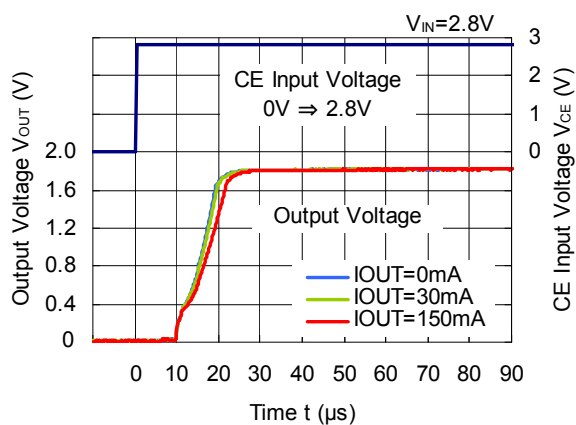
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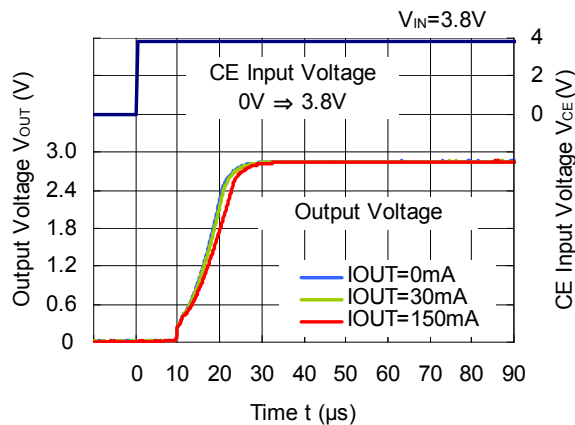
**RP111x171x**



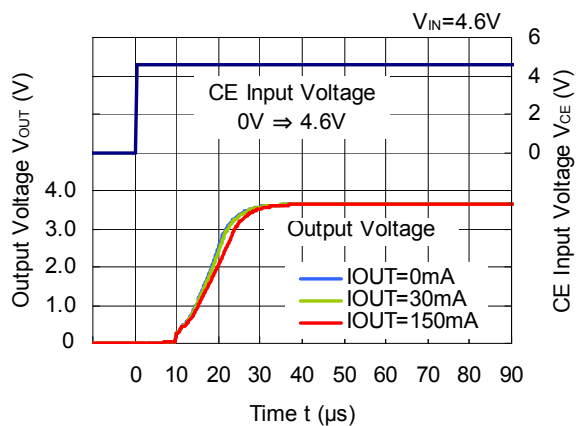
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**RP111x281x**

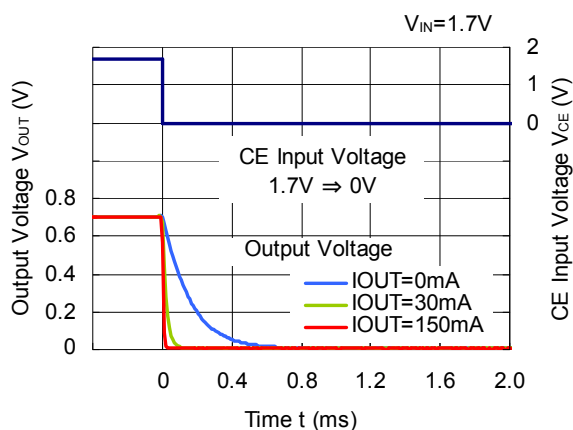


**RP111x361**

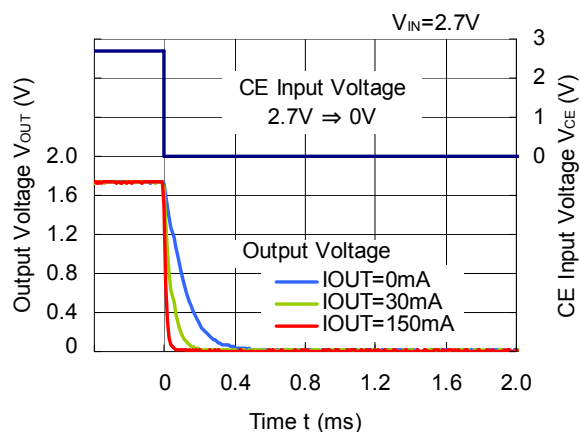


14) Turn off Speed with CE pin (C1=Ceramic 1.0 $\mu$ F, C2=Ceramic 1.0 $\mu$ F, T<sub>opt</sub>=25°C)

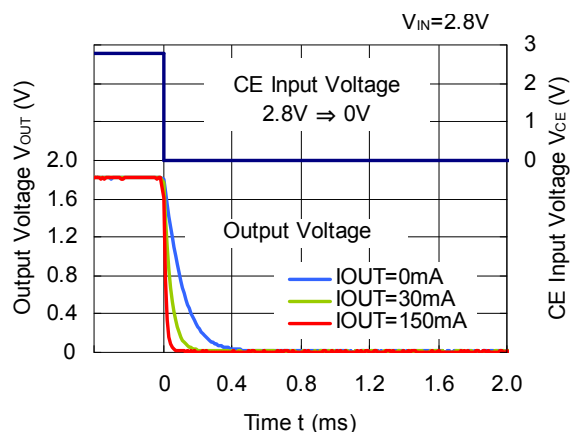
RP111x071D



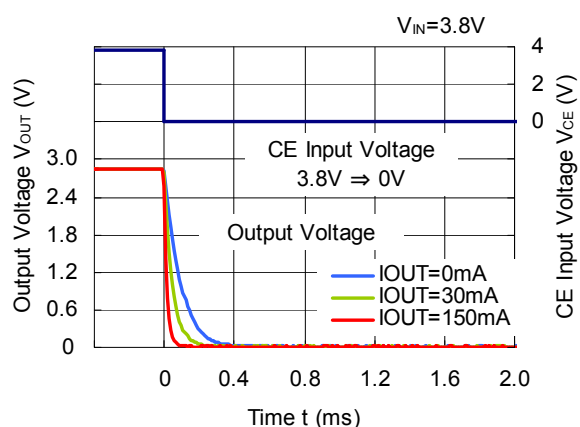
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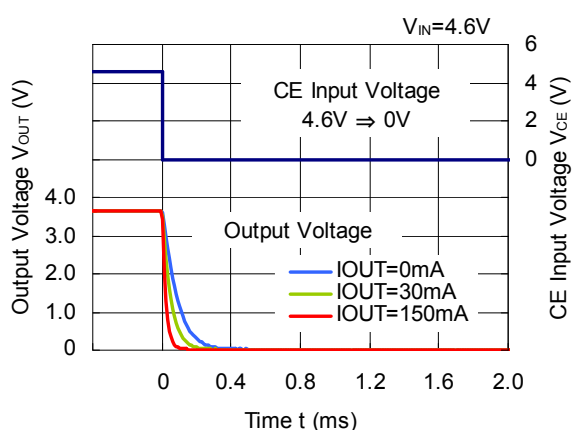
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RP111x281D

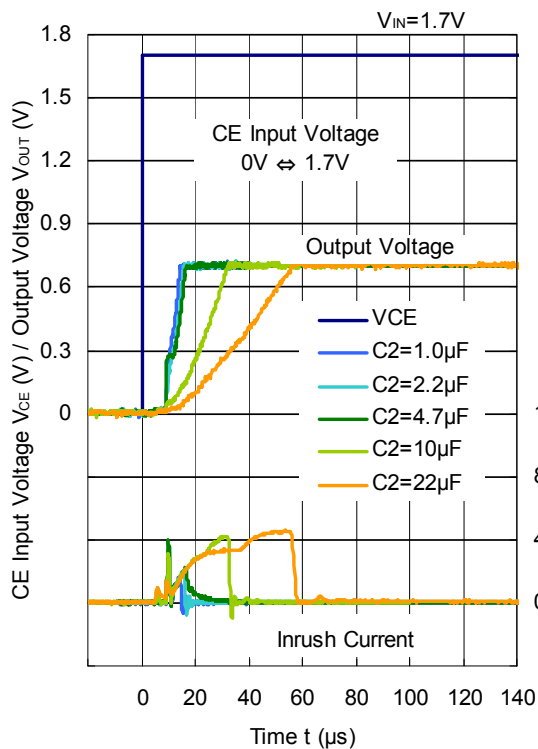


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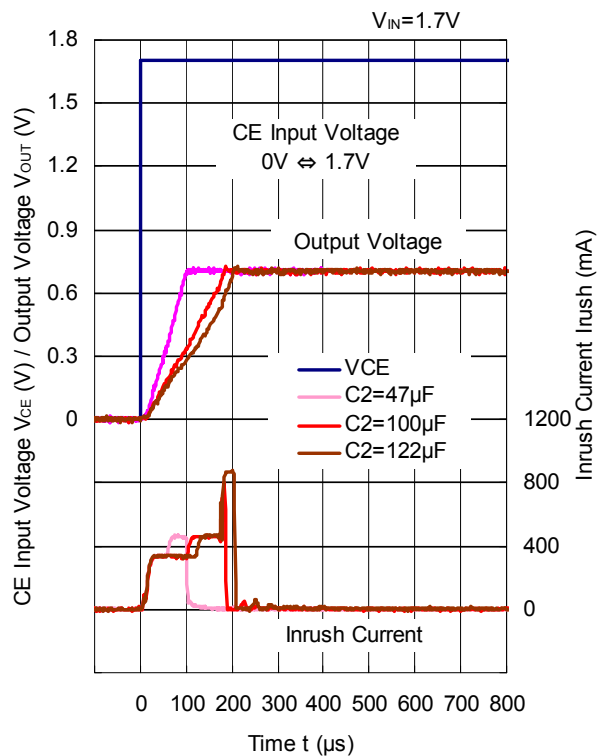


15) Inrush Current ( $C_1$ =Ceramic  $1.0\mu\text{F}$ ,  $I_{\text{OUT}}=0\text{mA}$ ,  $T_{\text{opt}}=25^\circ\text{C}$ )

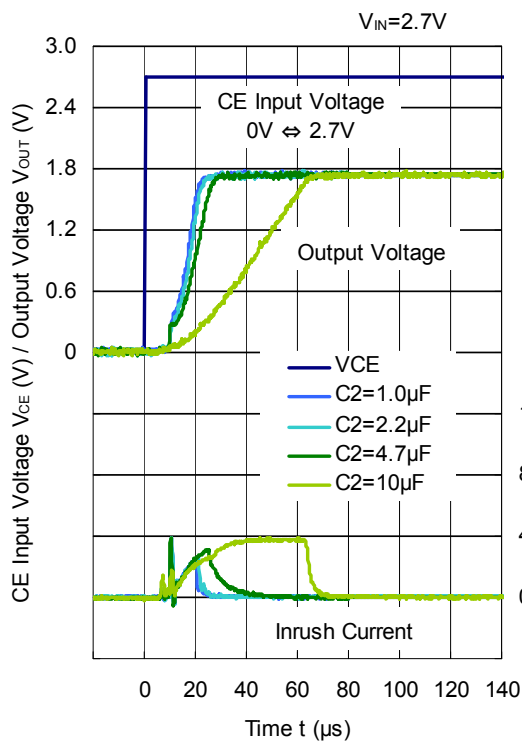
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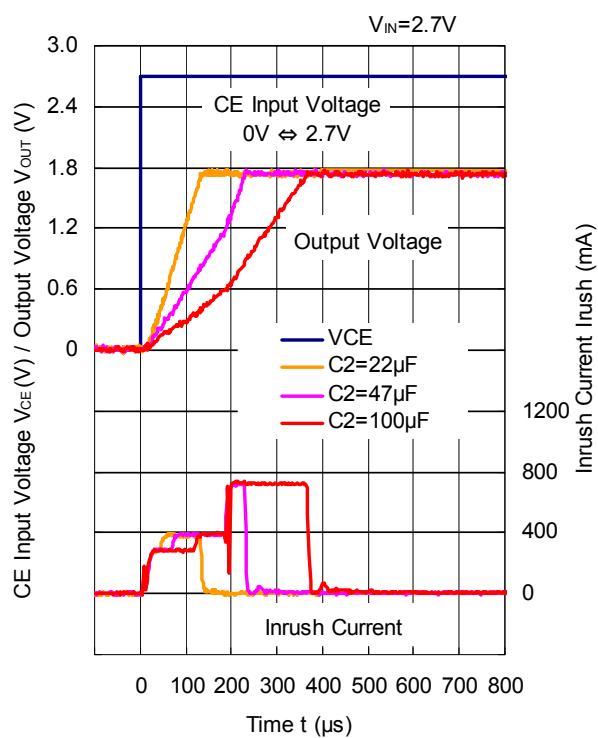
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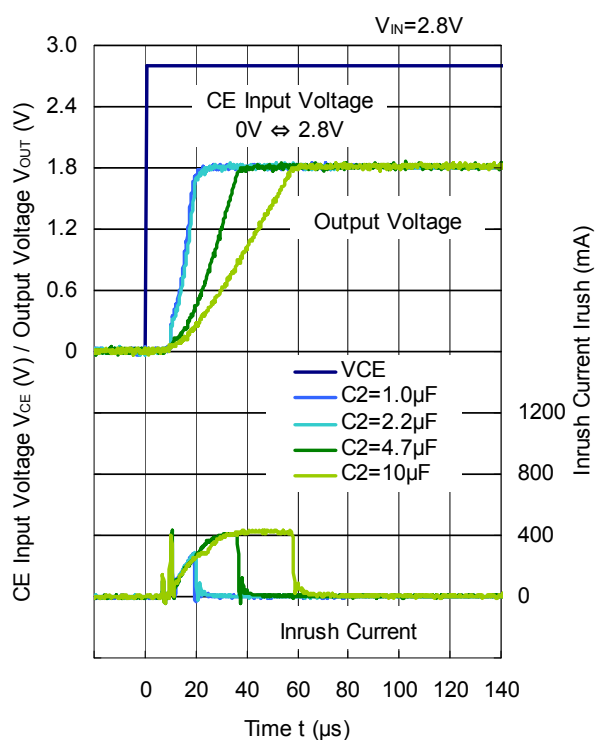
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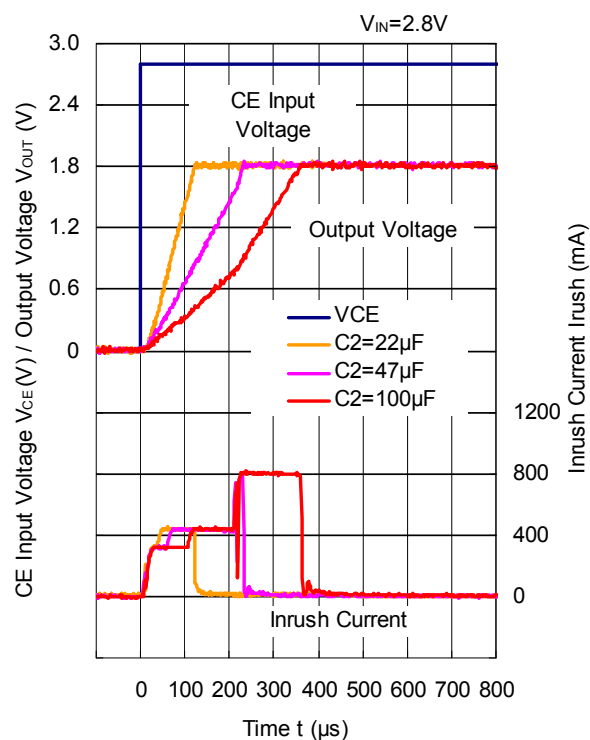
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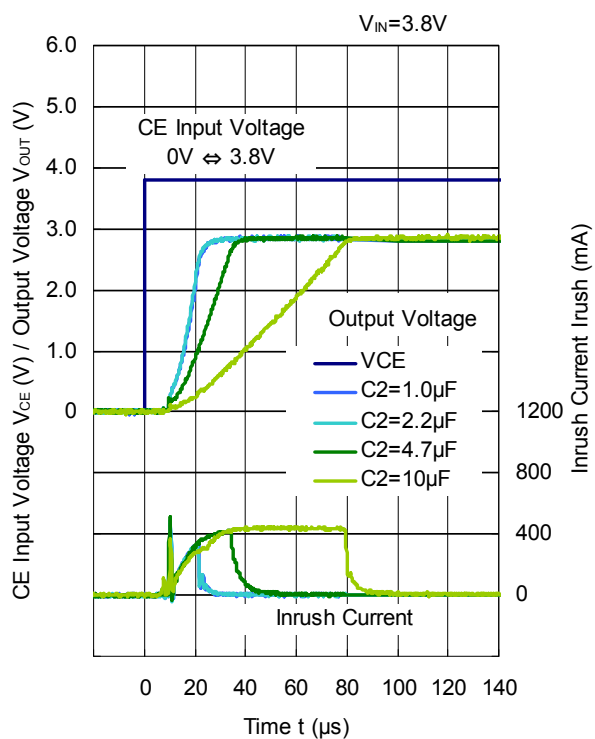
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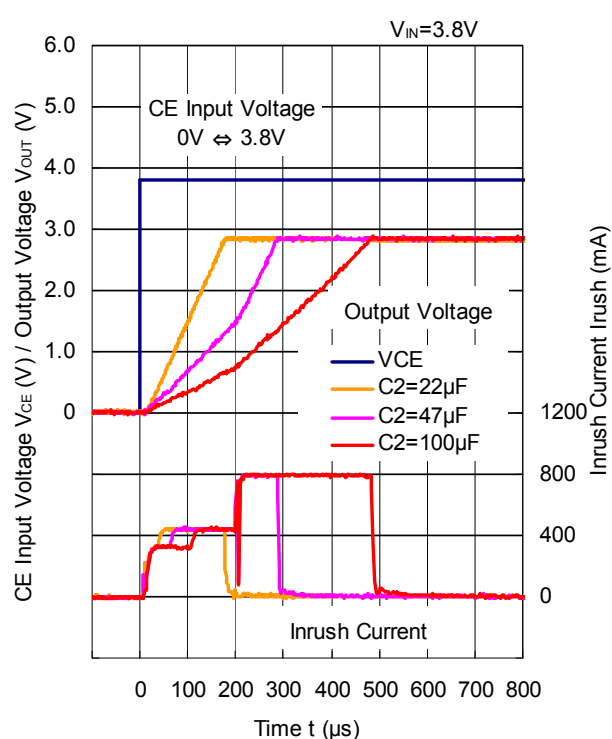
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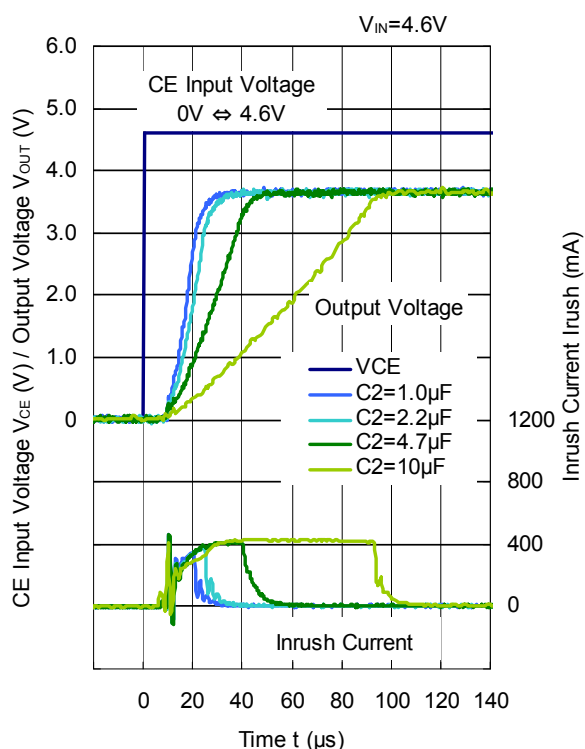
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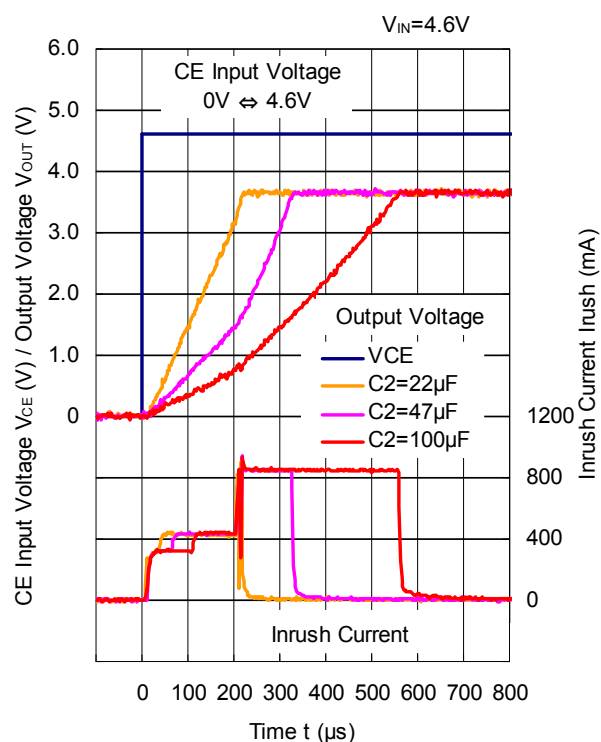
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RP111x361x



RP111x361x



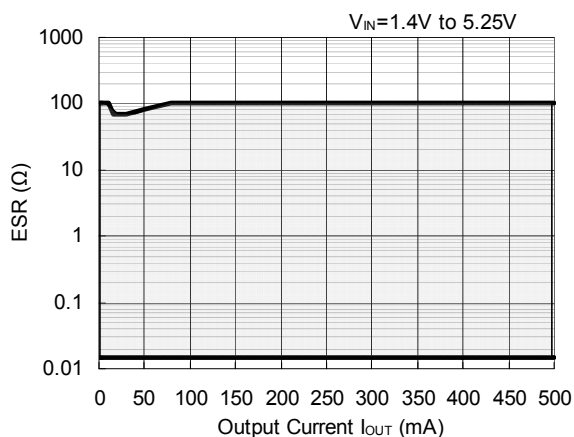
## ESR vs. Output Current

When using these ICs, consider the following points: The relations between  $I_{OUT}$  (Output Current) and ESR of an output capacitor are shown below. The conditions when the white noise level is under  $40\mu$ V (Avg.) are marked as the hatched area in the graph.

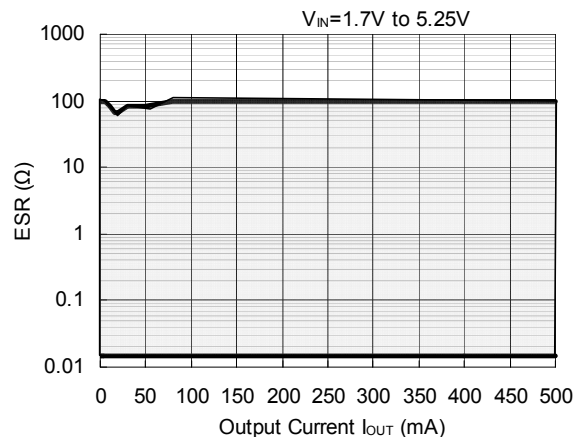
### Measurement Conditions

Frequency Band : 10Hz to 2MHz  
 Temperature :  $-40^{\circ}$  C to  $85^{\circ}$  C  
 $C1, C2$  :  $1.0\mu$ F or more

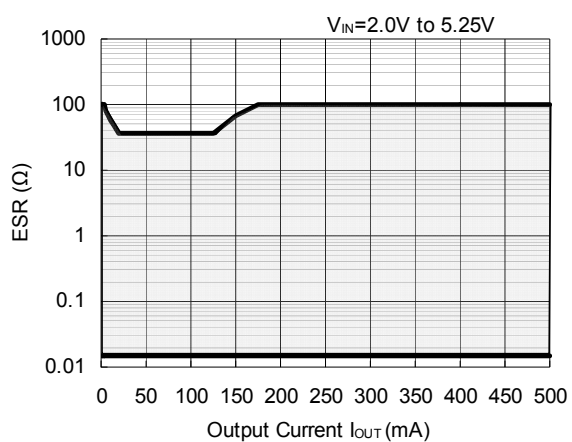
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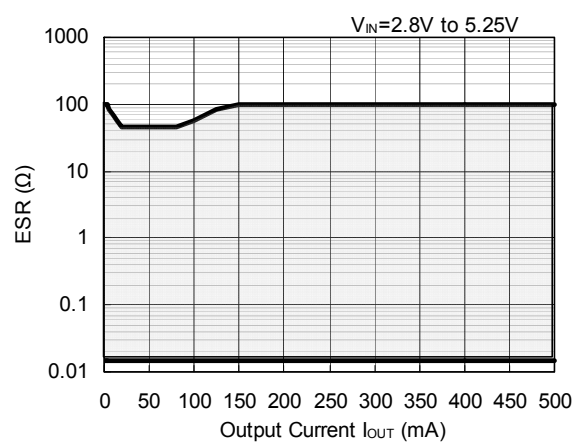
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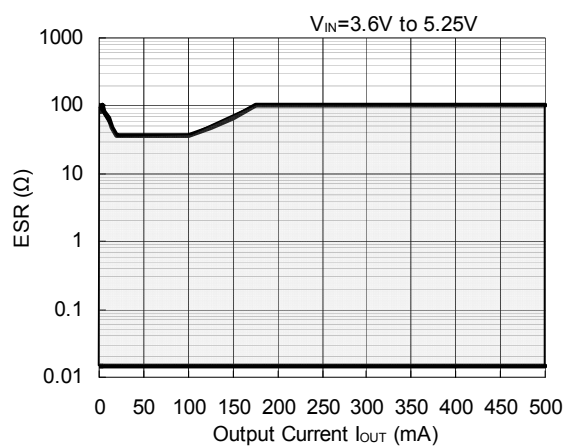
RP111x181x



RP111x281x



RP111x361x





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