

### 300 mA Small Dual LDO Regulator for Automotive Applications

No. EC-387-210715

## OUTLINE

The RP154x is a voltage regulator that provides high ripple rejection, low dropout voltage, high output voltage accuracy, and low supply current. The RP154x consists of a voltage reference unit, an error amplifier, resistors for setting output voltage, a short current limit circuit, and a chip enable circuit.

The RP154x is available in fixed output voltage options. Besides the low supply current by CMOS, the RP154x offers a low dropout voltage by built-in low ON resistance  $r_{DS(on)}$  as well as an extended battery life by a chip enable function. Compared with the existing CMOS-based regulators, the RP154x is further improved in ripple rejection, line transient response, and load transient response.

The RP154x is offered in a 6-pin SOT-23-6 package for a single input type and an 8-pin DFN2020-8 package for a dual input type. Both packages are equipped with two LDOs which can achieve high-density mounting.

## FEATURES

- Input Voltage Range (Maximum Rating) ..... 1.4 V to 5.25 V (6.0 V)
- Operating Temperature Range .....  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
- Supply Current..... Typ.  $50\text{ }\mu\text{A} \times 2$  (VR1 & VR2)
- Standby Current..... Typ.  $0.1\text{ }\mu\text{A} \times 2$  (VR1 & VR2)
- Output Voltage Range ..... 0.8 V to 3.7 V (0.1 V step)
- Output Voltage Accuracy .....  $\pm 1.0\%$  ( $V_{\text{SET}} > 2.0\text{ V}$ ,  $T_a = 25^{\circ}\text{C}$ )
- Temperature-Drift Coefficient of Output Voltage..... Typ.  $\pm 80\text{ ppm}/^{\circ}\text{C}$
- Dropout Voltage ..... Typ. 0.25 V ( $I_{\text{OUT}} = 300\text{ mA}$ ,  $V_{\text{SET}} = 2.5\text{ V}$ )
- Ripple Rejection..... Typ. 75 dB ( $f = 1\text{ kHz}$ )
- Line Regulation..... Typ. 0.02%/V
- Output Noise..... Typ. 75  $\mu\text{V}_{\text{rms}}$  (BW = 10 Hz to 100 kHz)
- Short-current Limit Circuit..... Typ. 60 mA
- Overcurrent Protection Circuit
- Ceramic Capacitor Compatible..... 1.0  $\mu\text{F}$  or more
- Packages ..... DFN2020-8, SOT-23-6

## APPLICATIONS

- Power source for car accessories including car audio equipment, car navigation system, and ETC system.

## SELECTION GUIDE

The set output voltage, the package, and the auto-discharge function <sup>(1)</sup> are user-selectable options.

### Selection Guide

| Product Name     | Package   | Quantity per Reel | Pb Free | Halogen Free |
|------------------|-----------|-------------------|---------|--------------|
| RP154L5xx*-TR-#  | DFN2020-8 | 3,000 pcs         | Yes     | Yes          |
| RP154N0xx*-TR-#E | SOT-23-6  | 3,000 pcs         | Yes     | Yes          |

5xx: The combination of set output voltage for each channel can be designated by serial numbers (from 501). The set output voltage for each channel can be set in the range from 0.8 V to 3.7 V in 0.1 V step.

0xx: The combination of set output voltage for each channel can be designated by serial numbers (from 001). The set output voltage for each channel can be set in the range from 0.8 V to 3.7 V in 0.1 V step.

\*: The auto-discharge function at off state are options as follows.

(A) Auto-discharge function not included, Active-high

(B) Auto-discharge function included, Active-high

#: Quality Class

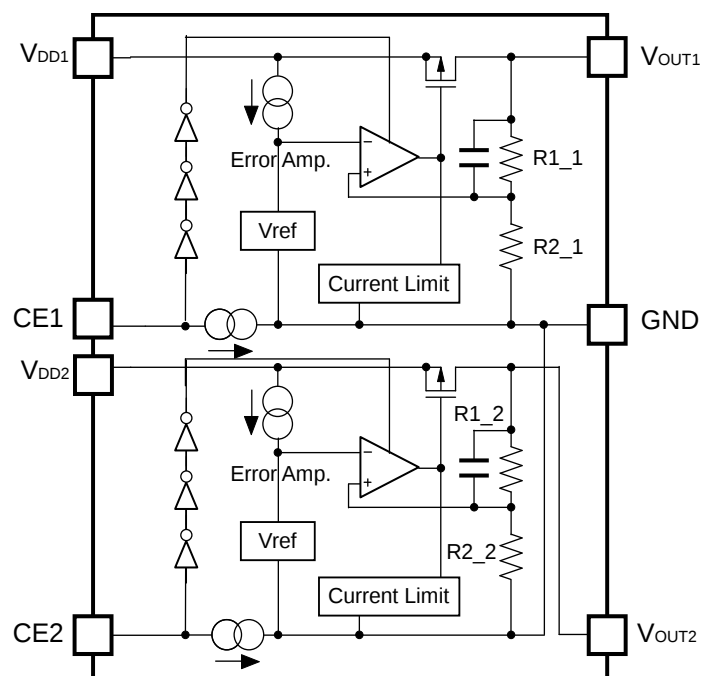
| # | Operating Temperature Range | Test Temperature |
|---|-----------------------------|------------------|
| A | -40°C to 105°C              | 25°C, High       |

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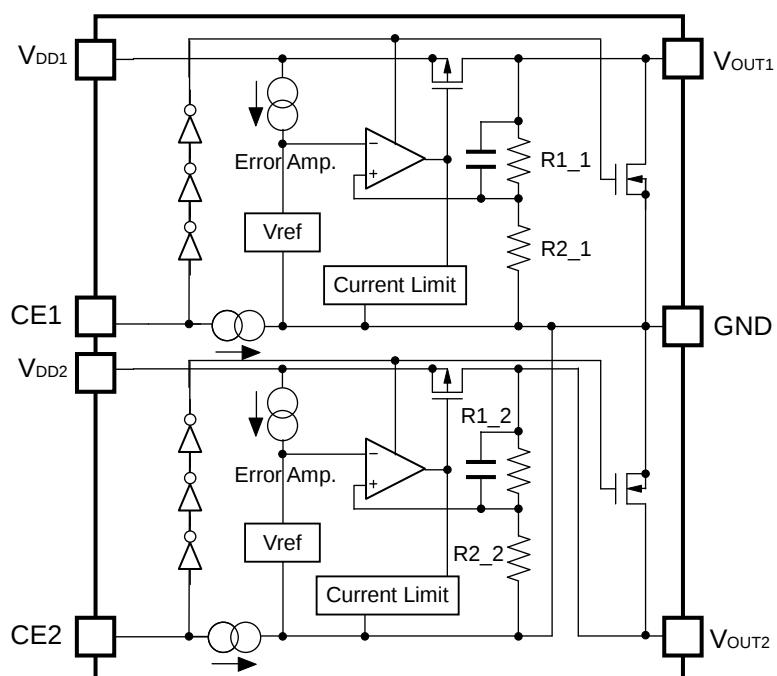
<sup>(1)</sup> Auto-discharge function quickly lowers the output voltage to 0 V by releasing the electrical charge accumulated in the external capacitor when the chip enable signal is switched from the active mode to the standby mode.

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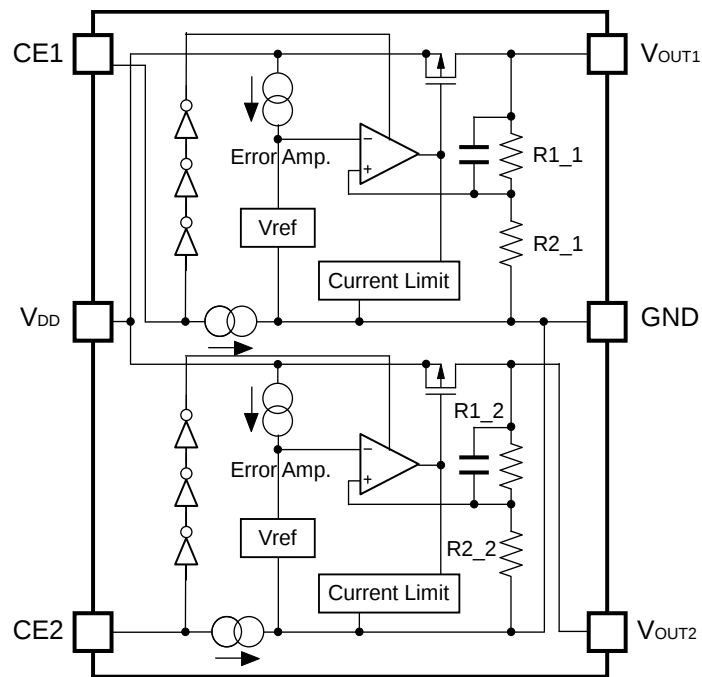
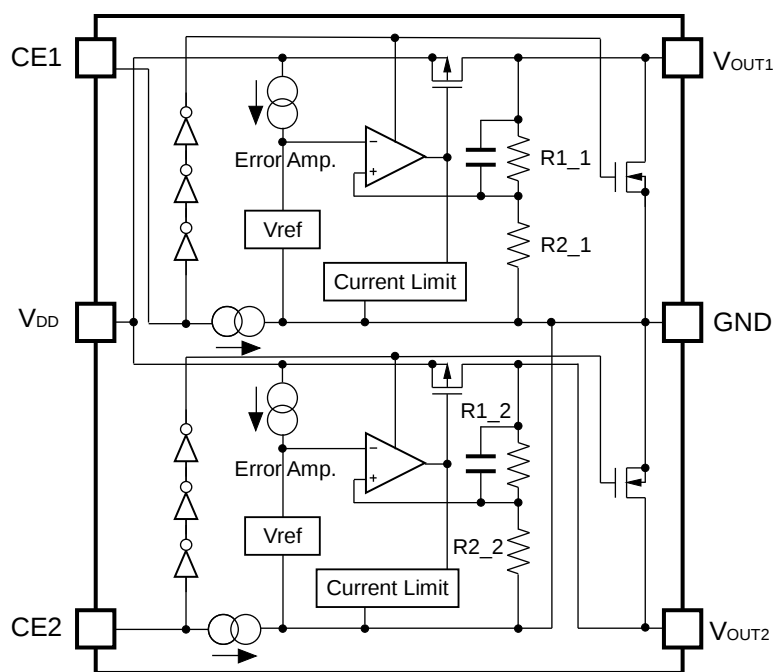
## BLOCK DIAGRAMS



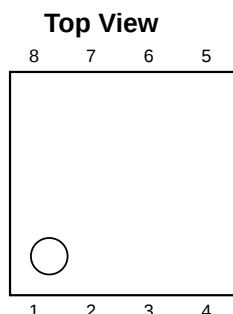
RP154LxxxA Block Diagram



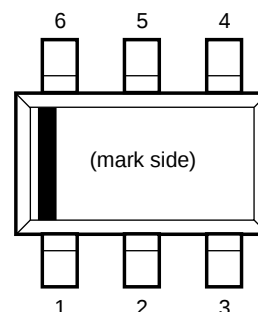
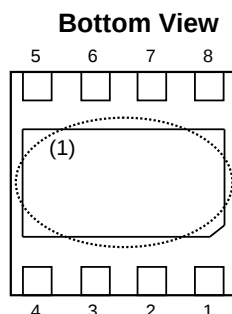
RP154LxxxB Block Diagram

**RP154NxxxA Block Diagram****RP154NxxxB Block Diagram**

## PIN DESCRIPTIONS



DFN2020-8 Pin Configuration



SOT-23-6 Pin Configuration

### DFN2020-8 Pin Description

| Pin No. | Symbol | Description                    |
|---------|--------|--------------------------------|
| 1       | GND    | Ground Pin <sup>(2)</sup>      |
| 2       | VOUT1  | Output Pin 1                   |
| 3       | VOUT2  | Output Pin 2                   |
| 4       | GND    | Ground Pin <sup>(2)</sup>      |
| 5       | CE2    | Chip Enable Pin 2, Active-high |
| 6       | VDD2   | Input Pin 2                    |
| 7       | VDD1   | Input Pin 1                    |
| 8       | CE1    | Chip Enable Pin 1, Active-high |

### SOT-23-6 Pin Description

| Pin No. | Symbol | Description                    |
|---------|--------|--------------------------------|
| 1       | CE1    | Chip Enable Pin 1, Active-high |
| 2       | VDD    | Input Pin                      |
| 3       | CE2    | Chip Enable Pin 2, Active-high |
| 4       | VOUT2  | Output Pin 2                   |
| 5       | GND    | Ground Pin                     |
| 6       | VOUT1  | Output Pin 1                   |

<sup>(1)</sup> 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.

<sup>(2)</sup> The GND pin must be wired together when it is mounted on board.

## ABSOLUTE MAXIMUM RATINGS

### Absolute Maximum Ratings

| Symbol               | Item                                                                    |           | Rating                 | Unit |
|----------------------|-------------------------------------------------------------------------|-----------|------------------------|------|
| $V_{IN}$             | Input Voltage                                                           |           | 6.0                    | V    |
| $V_{CE}$             | Input Voltage (CE Pin)                                                  |           | -0.3 to 6.0            | V    |
| $V_{OUT1}, V_{OUT2}$ | Output Voltage                                                          |           | -0.3 to $V_{IN} + 0.3$ | V    |
| $I_{OUT1}, I_{OUT2}$ | Output Current                                                          |           | 400                    | mA   |
| $P_D$                | Power Dissipation <sup>(1)</sup><br>(JEDEC STD. 51-7 Test Land Pattern) | DFN2020-8 | 3100                   | mW   |
|                      |                                                                         | SOT-23-6  | 830                    |      |
| $T_j$                | Junction Temperature Range                                              |           | -40 to 150             | °C   |
| $T_{stg}$            | Storage Temperature Range                                               |           | -55 to 150             | °C   |

#### ABSOLUTE MAXIMUM RATINGS

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

## RECOMMENDED OPERATING CONDITIONS

### Recommended Operating Conditions

| Symbol   | Item                        | Rating      | Unit |
|----------|-----------------------------|-------------|------|
| $V_{IN}$ | Input Voltage               | 1.4 to 5.25 | V    |
| $T_a$    | Operating Temperature Range | -40 to 105  | °C   |

#### 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.

<sup>(1)</sup> Refer to *POWER DISSIPATION* for detailed information.

## ELECTRICAL CHARACTERISTICS

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

The specification in    is checked and guaranteed by design engineering at  $-40^{\circ}\text{C} \leq T_a \leq 105^{\circ}\text{C}$ .

### VR1/VR2 Electrical Characteristics

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

| Symbol                          | Item                                                  | Conditions                                                                                | Min.                                                              | Typ.                                                                 | Max.                                                                | Unit          |
|---------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------|---------------|
| $V_{OUT}$                       | Output Voltage                                        | $T_a = 25^{\circ}\text{C}$                                                                | $V_{SET} > 2.0\text{ V}$                                          | x0.99                                                                | x1.01                                                               | V             |
|                                 |                                                       |                                                                                           | $V_{SET} \leq 2.0\text{ V}$                                       | -20                                                                  | 20                                                                  | mV            |
|                                 |                                                       | $-40^{\circ}\text{C} \leq T_a \leq 105^{\circ}\text{C}$                                   | $V_{SET} > 2.0\text{ V}$                                          | <span style="border: 1px solid black; padding: 0 2px;">x0.964</span> | <span style="border: 1px solid black; padding: 0 2px;">x1.03</span> | V             |
|                                 |                                                       |                                                                                           | $V_{SET} \leq 2.0\text{ V}$                                       | <span style="border: 1px solid black; padding: 0 2px;">-72</span>    | <span style="border: 1px solid black; padding: 0 2px;">60</span>    | mV            |
| $I_{LIM}$                       | Output Current Limit                                  |                                                                                           | <span style="border: 1px solid black; padding: 0 2px;">300</span> |                                                                      |                                                                     | mA            |
| $\Delta V_{OUT}/\Delta I_{OUT}$ | Load Regulation                                       | $1\text{ mA} \leq I_{OUT} \leq 300\text{ mA}$                                             |                                                                   | 15                                                                   | <span style="border: 1px solid black; padding: 0 2px;">40</span>    | mV            |
| $V_{DIF}$                       | Dropout Voltage                                       | Refer to <i>Dropout Voltage by Set Output Voltage</i> .                                   |                                                                   |                                                                      |                                                                     |               |
| $I_{SS}$                        | Supply Current                                        | $I_{OUT} = 0\text{ mA}$                                                                   |                                                                   | 50                                                                   | <span style="border: 1px solid black; padding: 0 2px;">90</span>    | $\mu\text{A}$ |
| $I_{standby}$                   | Standby Current                                       | $V_{CE} = 0\text{ V}$                                                                     |                                                                   | 0.1                                                                  | <span style="border: 1px solid black; padding: 0 2px;">4.5</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                                         | $V_{OUT} = 0\text{ V}$                                                                    |                                                                   | 60                                                                   | <span style="border: 1px solid black; padding: 0 2px;">120</span>   | 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             |
| $R_{LOW}$                       | Low Output Nch Tr.<br>ON Resistance<br>(of B version) | $V_{IN} = 4.0\text{ V}$ , $V_{CE} = 0\text{ V}$                                           |                                                                   | 50                                                                   |                                                                     | $\Omega$      |

### Dropout Voltage by Set Output Voltage

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

| Set Output Voltage<br>$V_{SET}\text{ (V)}$ | Dropout Voltage $V_{DIF}\text{ (V)}$ |      |                                                                    |
|--------------------------------------------|--------------------------------------|------|--------------------------------------------------------------------|
|                                            | Condition                            | Typ. | Max.                                                               |
| $V_{SET} = 0.8$                            | $I_{OUT} = 300\text{ mA}$            | 0.56 | <span style="border: 1px solid black; padding: 0 2px;">0.74</span> |
| $V_{SET} = 0.9$                            |                                      | 0.51 | <span style="border: 1px solid black; padding: 0 2px;">0.67</span> |
| $1.0 \leq V_{SET} < 1.2$                   |                                      | 0.46 | <span style="border: 1px solid black; padding: 0 2px;">0.61</span> |
| $1.2 \leq V_{SET} < 1.4$                   |                                      | 0.39 | <span style="border: 1px solid black; padding: 0 2px;">0.52</span> |
| $1.4 \leq V_{SET} < 1.7$                   |                                      | 0.35 | <span style="border: 1px solid black; padding: 0 2px;">0.46</span> |
| $1.7 \leq V_{SET} < 2.1$                   |                                      | 0.30 | <span style="border: 1px solid black; padding: 0 2px;">0.41</span> |
| $2.1 \leq V_{SET} < 2.5$                   |                                      | 0.26 | <span style="border: 1px solid black; padding: 0 2px;">0.36</span> |
| $2.5 \leq V_{SET} < 3.0$                   |                                      | 0.25 | <span style="border: 1px solid black; padding: 0 2px;">0.32</span> |
| $3.0 \leq V_{SET} \leq 3.7$                |                                      | 0.22 | <span style="border: 1px solid black; padding: 0 2px;">0.31</span> |

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**RP154x**

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No. EC-387-210715

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**RP154L5xxx Product-specific Electrical Characteristics**

| Product Name | VR1                                 |       |       |                                              |       |       |                       |      | VR2                                 |       |       |                                              |       |       |                       |      |
|--------------|-------------------------------------|-------|-------|----------------------------------------------|-------|-------|-----------------------|------|-------------------------------------|-------|-------|----------------------------------------------|-------|-------|-----------------------|------|
|              | V <sub>OUT</sub> [V]<br>(Ta = 25°C) |       |       | V <sub>OUT</sub> [V]<br>(-40°C ≤ Ta ≤ 105°C) |       |       | ΔV <sub>DIF</sub> [V] |      | V <sub>OUT</sub> [V]<br>(Ta = 25°C) |       |       | V <sub>OUT</sub> [V]<br>(-40°C ≤ Ta ≤ 105°C) |       |       | ΔV <sub>DIF</sub> [V] |      |
|              | Min.                                | Typ.  | Max.  | Min.                                         | Typ.  | Max.  | Typ.                  | Max. | Min.                                | Typ.  | Max.  | Min.                                         | Typ.  | Max.  | Typ.                  | Max. |
| RP154L502x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154L504x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154L505x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 |
| RP154L506x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154L510x   | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154L513x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154L514x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 |
| RP154L518x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154L521x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154L524x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154L525x   | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154L533x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 2.871                               | 2.900 | 2.929 | 2.796                                        | 2.900 | 2.987 | 0.25                  | 0.32 |
| RP154L536x   | 0.980                               | 1.000 | 1.020 | 0.928                                        | 1.000 | 1.060 | 0.46                  | 0.61 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154L537x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154L539x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154L552x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154L554x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 |
| RP154L561x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154L562x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 2.871                               | 2.900 | 2.929 | 2.796                                        | 2.900 | 2.987 | 0.25                  | 0.32 |
| RP154L563x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 |
| RP154L564x   | 1.080                               | 1.100 | 1.120 | 1.028                                        | 1.100 | 1.160 | 0.46                  | 0.61 | 2.871                               | 2.900 | 2.929 | 2.796                                        | 2.900 | 2.987 | 0.25                  | 0.32 |
| RP154L565x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154L566x   | 0.780                               | 0.800 | 0.820 | 0.728                                        | 0.800 | 0.860 | 0.56                  | 0.74 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154L567x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154L568x   | 1.280                               | 1.300 | 1.320 | 1.228                                        | 1.300 | 1.360 | 0.39                  | 0.52 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154L569x   | 1.680                               | 1.700 | 1.720 | 1.628                                        | 1.700 | 1.760 | 0.30                  | 0.41 | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 |
| RP154L570x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 1.280                               | 1.300 | 1.320 | 1.228                                        | 1.300 | 1.360 | 0.39                  | 0.52 |
| RP154L571x   | 1.080                               | 1.100 | 1.120 | 1.028                                        | 1.100 | 1.160 | 0.46                  | 0.61 | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 |

## RP154N0xxx Product-specific Electrical Characteristics

| Product Name | VR1                                 |       |       |                                              |       |       |                       |      | VR2                                 |       |       |                                              |       |       |                       |      |
|--------------|-------------------------------------|-------|-------|----------------------------------------------|-------|-------|-----------------------|------|-------------------------------------|-------|-------|----------------------------------------------|-------|-------|-----------------------|------|
|              | V <sub>OUT</sub> [V]<br>(Ta = 25°C) |       |       | V <sub>OUT</sub> [V]<br>(-40°C ≤ Ta ≤ 105°C) |       |       | ΔV <sub>DIF</sub> [V] |      | V <sub>OUT</sub> [V]<br>(Ta = 25°C) |       |       | V <sub>OUT</sub> [V]<br>(-40°C ≤ Ta ≤ 105°C) |       |       | ΔV <sub>DIF</sub> [V] |      |
|              | Min.                                | Typ.  | Max.  | Min.                                         | Typ.  | Max.  | Typ.                  | Max. | Min.                                | Typ.  | Max.  | Min.                                         | Typ.  | Max.  | Typ.                  | Max. |
| RP154N001x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154N002x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154N003x   | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154N004x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N005x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 |
| RP154N006x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N007x   | 2.822                               | 2.850 | 2.878 | 2.748                                        | 2.850 | 2.935 | 0.25                  | 0.32 | 2.822                               | 2.850 | 2.878 | 2.748                                        | 2.850 | 2.935 | 0.25                  | 0.32 |
| RP154N008x   | 2.822                               | 2.850 | 2.878 | 2.748                                        | 2.850 | 2.935 | 0.25                  | 0.32 | 2.574                               | 2.600 | 2.626 | 2.507                                        | 2.600 | 2.678 | 0.25                  | 0.32 |
| RP154N009x   | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154N010x   | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N011x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 |
| RP154N012x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 2.574                               | 2.600 | 2.626 | 2.507                                        | 2.600 | 2.678 | 0.25                  | 0.32 |
| RP154N013x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154N014x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 |
| RP154N015x   | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154N016x   | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154N017x   | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154N018x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N019x   | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 | 2.574                               | 2.600 | 2.626 | 2.507                                        | 2.600 | 2.678 | 0.25                  | 0.32 |
| RP154N020x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N021x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154N022x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 |
| RP154N023x   | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154N024x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154N025x   | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |

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**RP154x**

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No. EC-387-210715

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**RP154N0xxx Product-specific Electrical Characteristics**

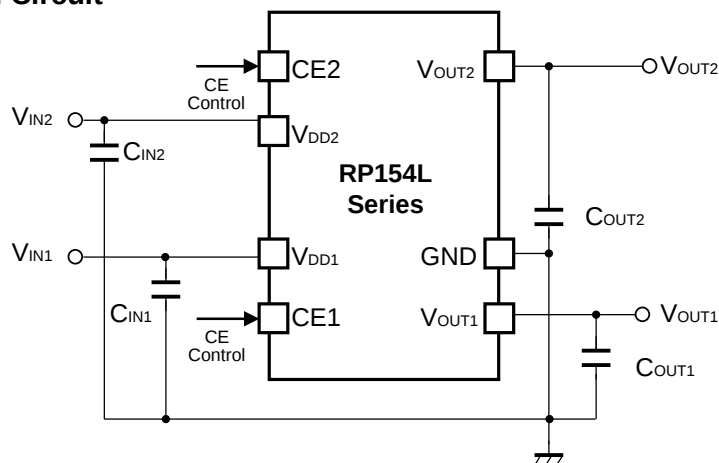
| Product Name | VR1                                 |       |       |                                              |       |       |                       |      | VR2                                 |       |       |                                              |       |       |                       |      |
|--------------|-------------------------------------|-------|-------|----------------------------------------------|-------|-------|-----------------------|------|-------------------------------------|-------|-------|----------------------------------------------|-------|-------|-----------------------|------|
|              | V <sub>OUT</sub> [V]<br>(Ta = 25°C) |       |       | V <sub>OUT</sub> [V]<br>(-40°C ≤ Ta ≤ 105°C) |       |       | ΔV <sub>DIF</sub> [V] |      | V <sub>OUT</sub> [V]<br>(Ta = 25°C) |       |       | V <sub>OUT</sub> [V]<br>(-40°C ≤ Ta ≤ 105°C) |       |       | ΔV <sub>DIF</sub> [V] |      |
|              | Min.                                | Typ.  | Max.  | Min.                                         | Typ.  | Max.  | Typ.                  | Max. | Min.                                | Typ.  | Max.  | Min.                                         | Typ.  | Max.  | Typ.                  | Max. |
| RP154N026x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 |
| RP154N027x   | 2.277                               | 2.300 | 2.323 | 2.218                                        | 2.300 | 2.369 | 0.26                  | 0.36 | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 |
| RP154N028x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 0.980                               | 1.000 | 1.020 | 0.928                                        | 1.000 | 1.060 | 0.46                  | 0.61 |
| RP154N029x   | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 |
| RP154N030x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 2.871                               | 2.900 | 2.929 | 2.796                                        | 2.900 | 2.987 | 0.25                  | 0.32 |
| RP154N031x   | 2.624                               | 2.650 | 2.676 | 2.555                                        | 2.650 | 2.729 | 0.25                  | 0.32 | 2.822                               | 2.850 | 2.878 | 2.748                                        | 2.850 | 2.935 | 0.25                  | 0.32 |
| RP154N032x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 2.822                               | 2.850 | 2.878 | 2.748                                        | 2.850 | 2.935 | 0.25                  | 0.32 |
| RP154N033x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 2.871                               | 2.900 | 2.929 | 2.796                                        | 2.900 | 2.987 | 0.25                  | 0.32 |
| RP154N034x   | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 |
| RP154N035x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 2.673                               | 2.700 | 2.727 | 2.603                                        | 2.700 | 2.781 | 0.25                  | 0.32 |
| RP154N036x   | 0.980                               | 1.000 | 1.020 | 0.928                                        | 1.000 | 1.060 | 0.46                  | 0.61 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N037x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154N038x   | 1.680                               | 1.700 | 1.720 | 1.628                                        | 1.700 | 1.760 | 0.30                  | 0.41 | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 |
| RP154N039x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154N040x   | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N041x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 2.673                               | 2.700 | 2.727 | 2.603                                        | 2.700 | 2.781 | 0.25                  | 0.32 |
| RP154N042x   | 2.673                               | 2.700 | 2.727 | 2.603                                        | 2.700 | 2.781 | 0.25                  | 0.32 | 2.673                               | 2.700 | 2.727 | 2.603                                        | 2.700 | 2.781 | 0.25                  | 0.32 |
| RP154N043x   | 2.871                               | 2.900 | 2.929 | 2.796                                        | 2.900 | 2.987 | 0.25                  | 0.32 | 2.871                               | 2.900 | 2.929 | 2.796                                        | 2.900 | 2.987 | 0.25                  | 0.32 |
| RP154N044x   | 1.680                               | 1.700 | 1.720 | 1.628                                        | 1.700 | 1.760 | 0.30                  | 0.41 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154N045x   | 1.730                               | 1.750 | 1.770 | 1.678                                        | 1.750 | 1.810 | 0.30                  | 0.41 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154N046x   | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 |
| RP154N047x   | 1.730                               | 1.750 | 1.770 | 1.678                                        | 1.750 | 1.810 | 0.30                  | 0.41 | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 |
| RP154N048x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 |
| RP154N049x   | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 |
| RP154N050x   | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 |

RP154N0xxx Product-specific Electrical Characteristics

| Product Name | VR1                                 |       |       |                                              |       |       |                       |      | VR2                                 |       |       |                                              |       |       |                       |      |
|--------------|-------------------------------------|-------|-------|----------------------------------------------|-------|-------|-----------------------|------|-------------------------------------|-------|-------|----------------------------------------------|-------|-------|-----------------------|------|
|              | V <sub>OUT</sub> [V]<br>(Ta = 25°C) |       |       | V <sub>OUT</sub> [V]<br>(-40°C ≤ Ta ≤ 105°C) |       |       | ΔV <sub>DIF</sub> [V] |      | V <sub>OUT</sub> [V]<br>(Ta = 25°C) |       |       | V <sub>OUT</sub> [V]<br>(-40°C ≤ Ta ≤ 105°C) |       |       | ΔV <sub>DIF</sub> [V] |      |
|              | Min.                                | Typ.  | Max.  | Min.                                         | Typ.  | Max.  | Typ.                  | Max. | Min.                                | Typ.  | Max.  | Min.                                         | Typ.  | Max.  | Typ.                  | Max. |
| RP154N051x   | 3.564                               | 3.600 | 3.636 | 3.471                                        | 3.600 | 3.708 | 0.22                  | 0.31 | 3.564                               | 3.600 | 3.636 | 3.471                                        | 3.600 | 3.708 | 0.22                  | 0.31 |
| RP154N052x   | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154N053x   | 2.822                               | 2.850 | 2.878 | 2.748                                        | 2.850 | 2.935 | 0.25                  | 0.32 | 3.069                               | 3.100 | 3.131 | 2.989                                        | 3.100 | 3.193 | 0.22                  | 0.31 |
| RP154N054x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 |
| RP154N055x   | 3.663                               | 3.700 | 3.737 | 3.567                                        | 3.700 | 3.811 | 0.22                  | 0.31 | 3.663                               | 3.700 | 3.737 | 3.567                                        | 3.700 | 3.811 | 0.22                  | 0.31 |
| RP154N056x   | 1.080                               | 1.100 | 1.120 | 1.028                                        | 1.100 | 1.160 | 0.46                  | 0.61 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N057x   | 1.080                               | 1.100 | 1.120 | 1.028                                        | 1.100 | 1.160 | 0.46                  | 0.61 | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 |
| RP154N058x   | 0.980                               | 1.000 | 1.020 | 0.928                                        | 1.000 | 1.060 | 0.46                  | 0.61 | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 |
| RP154N059x   | 0.880                               | 0.900 | 0.920 | 0.828                                        | 0.900 | 0.960 | 0.51                  | 0.67 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N060x   | 0.880                               | 0.900 | 0.920 | 0.828                                        | 0.900 | 0.960 | 0.51                  | 0.67 | 0.880                               | 0.900 | 0.920 | 0.828                                        | 0.900 | 0.960 | 0.51                  | 0.67 |
| RP154N061x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 2.970                               | 3.000 | 3.030 | 2.892                                        | 3.000 | 3.090 | 0.22                  | 0.31 |
| RP154N062x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 2.871                               | 2.900 | 2.929 | 2.796                                        | 2.900 | 2.987 | 0.25                  | 0.32 |
| RP154N063x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 |
| RP154N064x   | 1.080                               | 1.100 | 1.120 | 1.028                                        | 1.100 | 1.160 | 0.46                  | 0.61 | 2.871                               | 2.900 | 2.929 | 2.796                                        | 2.900 | 2.987 | 0.25                  | 0.32 |
| RP154N065x   | 2.772                               | 2.800 | 2.828 | 2.700                                        | 2.800 | 2.884 | 0.25                  | 0.32 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154N066x   | 0.780                               | 0.800 | 0.820 | 0.728                                        | 0.800 | 0.860 | 0.56                  | 0.74 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N067x   | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 | 2.475                               | 2.500 | 2.525 | 2.410                                        | 2.500 | 2.575 | 0.25                  | 0.32 |
| RP154N068x   | 1.280                               | 1.300 | 1.320 | 1.228                                        | 1.300 | 1.360 | 0.39                  | 0.52 | 1.780                               | 1.800 | 1.820 | 1.728                                        | 1.800 | 1.860 | 0.30                  | 0.41 |
| RP154N069x   | 1.680                               | 1.700 | 1.720 | 1.628                                        | 1.700 | 1.760 | 0.30                  | 0.41 | 1.480                               | 1.500 | 1.520 | 1.428                                        | 1.500 | 1.560 | 0.35                  | 0.46 |
| RP154N070x   | 1.180                               | 1.200 | 1.220 | 1.128                                        | 1.200 | 1.260 | 0.39                  | 0.52 | 1.280                               | 1.300 | 1.320 | 1.228                                        | 1.300 | 1.360 | 0.39                  | 0.52 |
| RP154N071x   | 1.080                               | 1.100 | 1.120 | 1.028                                        | 1.100 | 1.160 | 0.46                  | 0.61 | 3.267                               | 3.300 | 3.333 | 3.182                                        | 3.300 | 3.399 | 0.22                  | 0.31 |

## APPLICATION INFORMATION

### Typical Application Circuit

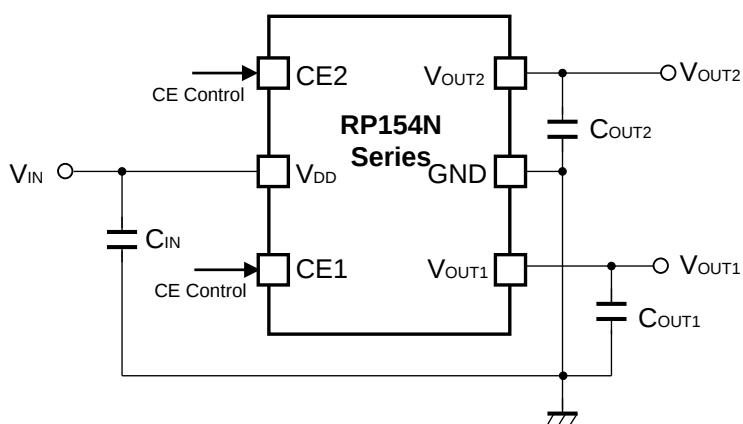


$C_{IN1} = C_{IN2} = C_{OUT1} = C_{OUT2} = \text{Ceramic } 1.0 \mu\text{F}$

**RP154LxxxA/B Typical Application Circuit**

### External Components

| Symbol               | Description                                                      |
|----------------------|------------------------------------------------------------------|
| $C_{OUT1}, C_{OUT2}$ | Ceramic Capacitor, 1.0 $\mu\text{F}$ , TDK: CGA3E1X7R1C105K080AC |



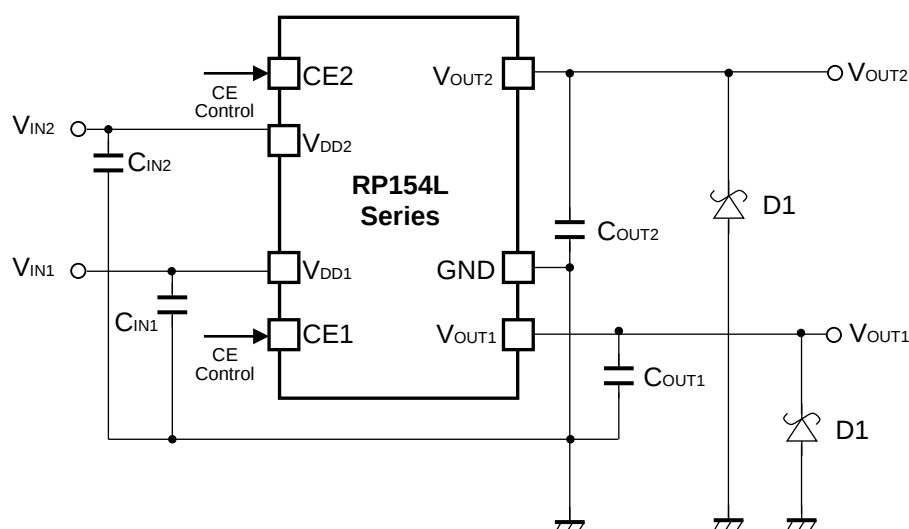
$C_{IN} = C_{OUT1} = C_{OUT2} = \text{Ceramic } 1.0 \mu\text{F}$

**RP154NxxxA/B Typical Application Circuit**

### External Components

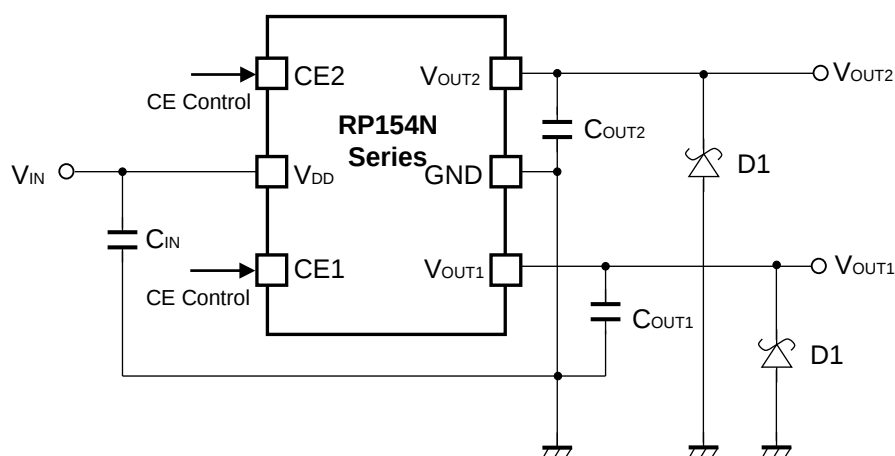
| Symbol               | Description                                                      |
|----------------------|------------------------------------------------------------------|
| $C_{OUT1}, C_{OUT2}$ | Ceramic Capacitor, 1.0 $\mu\text{F}$ , TDK: CGA3E1X7R1C105K080AC |

## Typical Application Circuit for IC Chip Breakdown Prevention



$C_{IN1} = C_{IN2} = C_{OUT1} = C_{OUT2} = \text{Ceramic } 1.0 \mu\text{F}$

## RP154LxxxA/B Typical Application Circuit for IC Chip Breakdown Prevention



$C_{IN} = C_{OUT1} = C_{OUT2} = \text{Ceramic } 1.0 \mu\text{F}$

## RP154NxxxA/B Typical Application Circuit for IC Chip Breakdown Prevention

When a sudden surge of electrical current travels along the VOUT 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 VOUT pin and GND has the effect of preventing damage to them.

## 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 capacitors (1.0  $\mu$ F or more) for  $C_{OUT1}$  and  $C_{OUT2}$  with good frequency characteristics and ESR (Equivalent Series Resistance).

Note: If additional ceramic capacitors are connected with parallel to the output pin with an output capacitor for phase compensation, the operation might be unstable. Because of this, test these ICs with as same external components as ones to be used on the PCB. If the tantalum capacitor is used and its ESR (equivalent series resistance) is too large, the output may be unstable, therefore, fully evaluation is necessary.

### PCB Layout

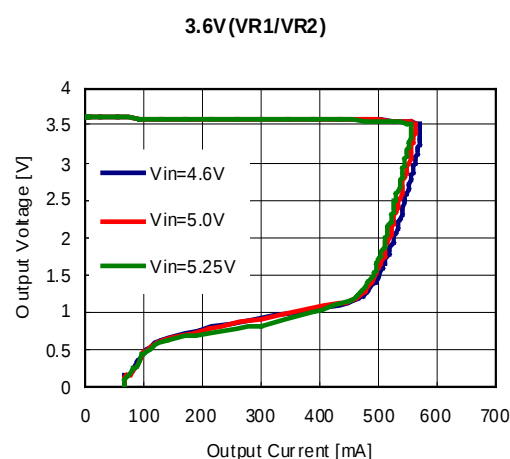
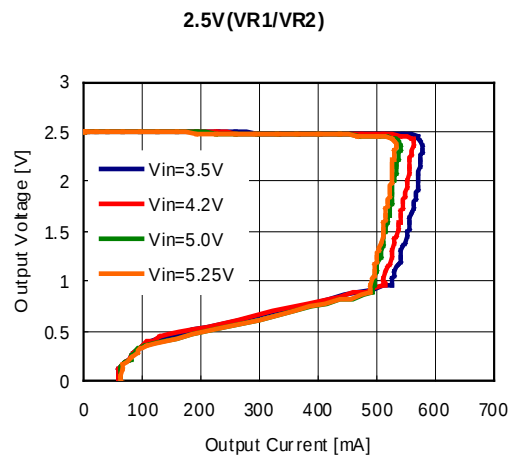
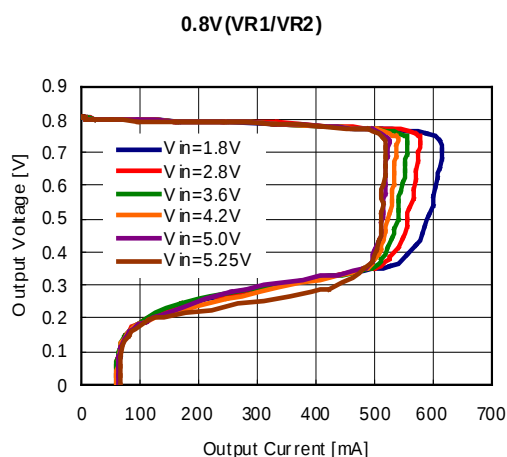
Make VDD and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect capacitors with a capacitance value as much as 1.0  $\mu$ F or more between VDD and GND pin, and as close as possible to the pins ( $C_{IN1}/C_{IN2}$ ).

Set external components, especially the output capacitors, as close as possible to the ICs, and make wiring as short as possible ( $C_{OUT1}/C_{OUT2}$ ).

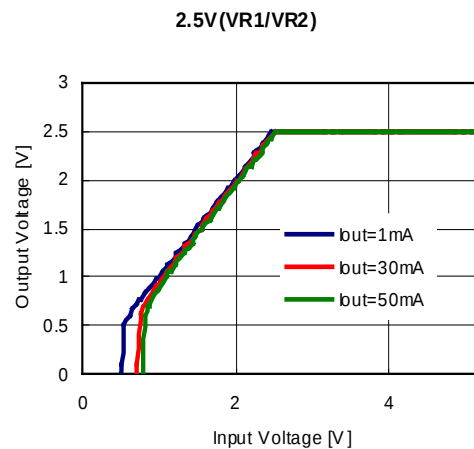
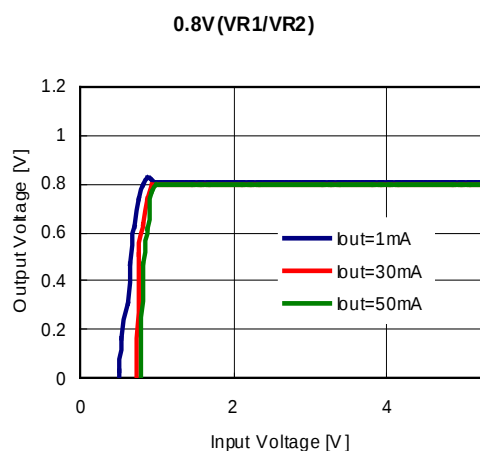
## TYPICAL CHARACTERISTICS

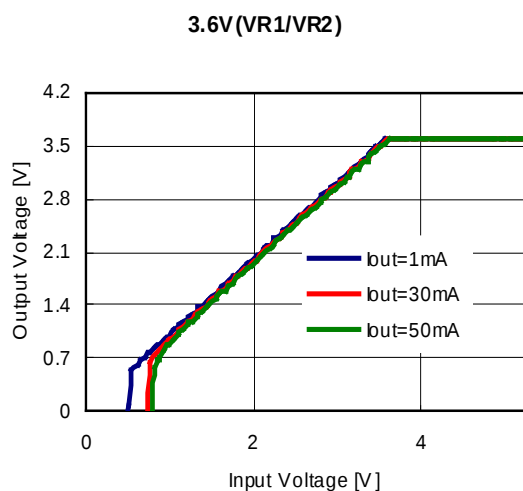
Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

### 1) Output Voltage vs. Output Current ( $C_{IN} = 1.0 \mu F$ , $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ , $T_a = 25^\circ C$ )

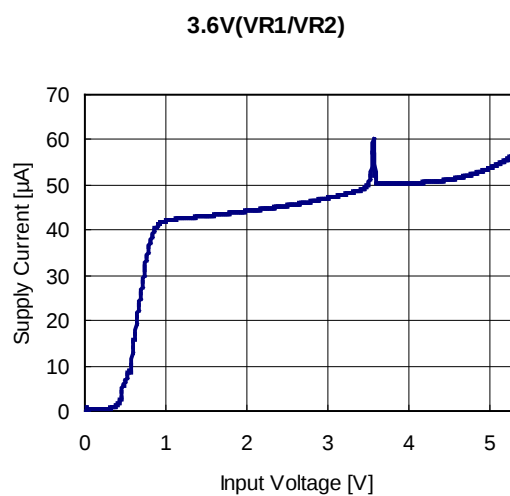
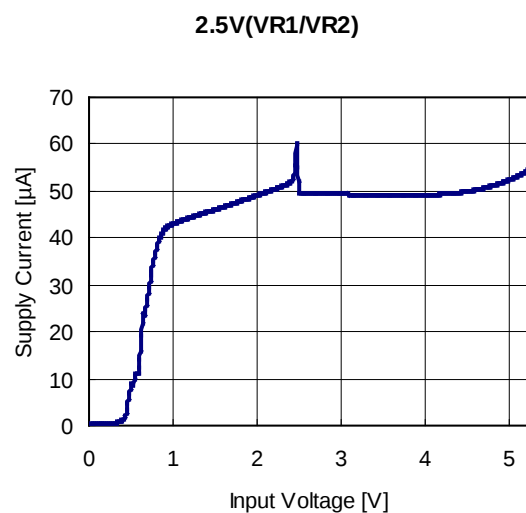
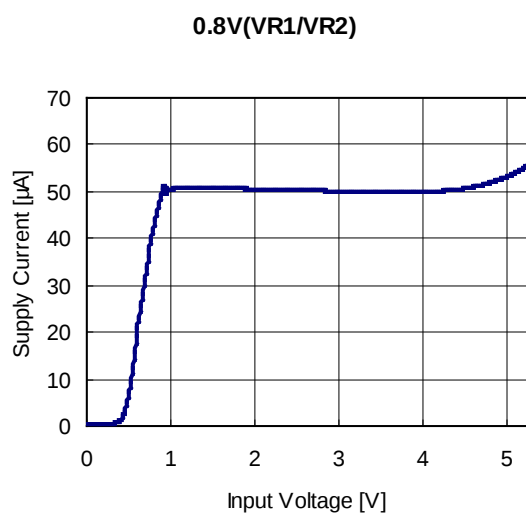


### 2) Output Voltage vs. Input Voltage ( $C_{IN} = 1.0 \mu F$ , $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ , $T_a = 25^\circ C$ )



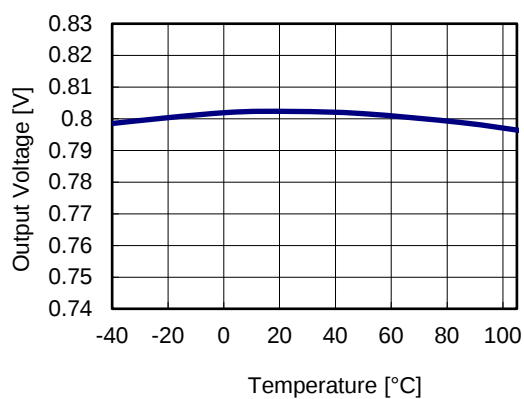


**3) Supply Current vs. Input Voltage ( $C_{IN} = 1.0 \mu F$ ,  $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ ,  $T_a = 25^\circ C$ )**

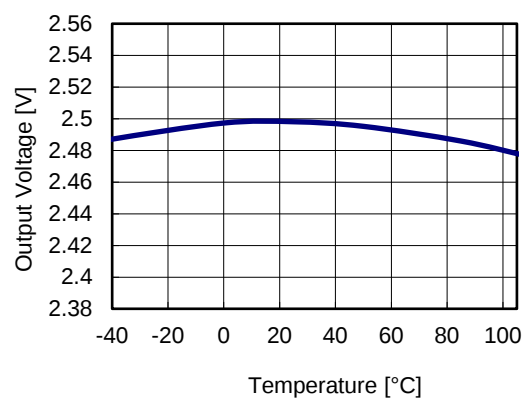


4) Output Voltage vs. Temperature ( $C_{IN} = 1.0 \mu F$ ,  $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ ,  $I_{OUT} = 5 \text{ mA}$ )

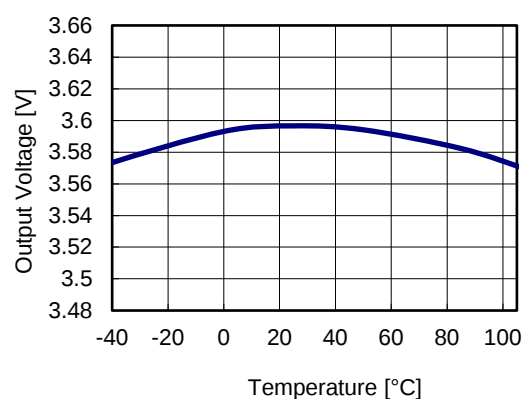
0.8V (VR1/VR2)



2.5V (VR1/VR2)

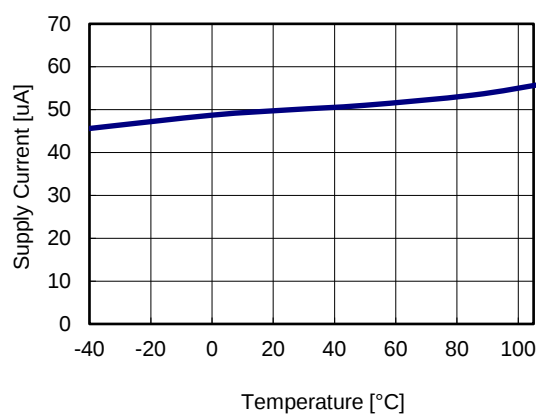


3.6V (VR1/VR2)

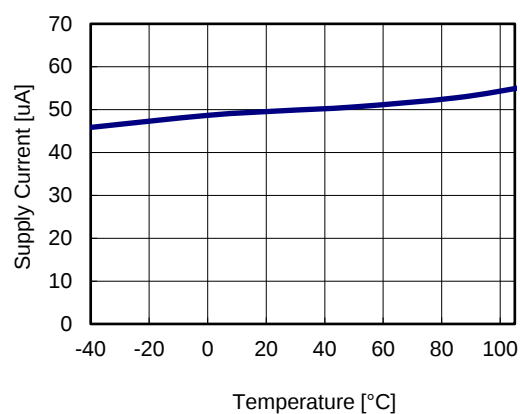


5) Supply Current vs. Temperature ( $C_{IN} = 1.0 \mu F$ ,  $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ )

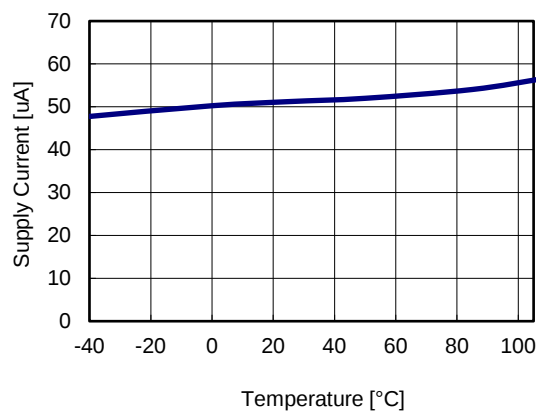
0.8V (VR1/VR2)



2.5V (VR1/VR2)

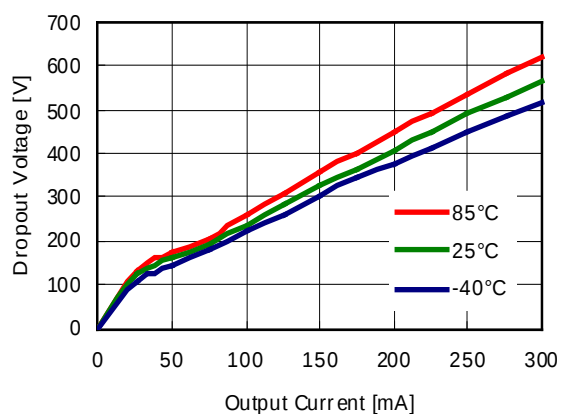


**3.6V (VR1/VR2)**

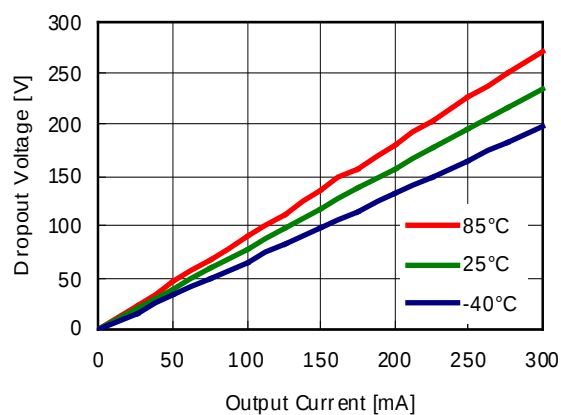


**6) Dropout Voltage vs. Output Current ( $C_{IN} = 1.0 \mu F$ ,  $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ )**

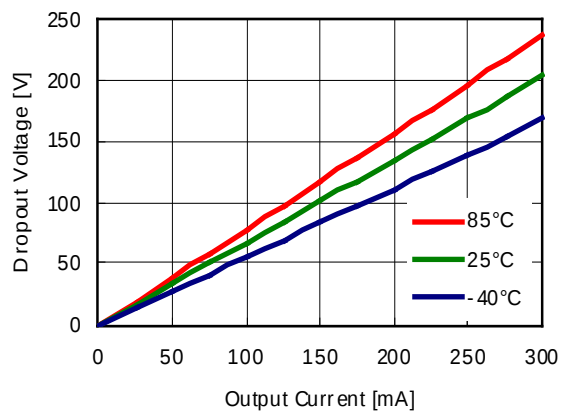
**0.8V (VR1/VR2)**



**2.5V (VR1/VR2)**

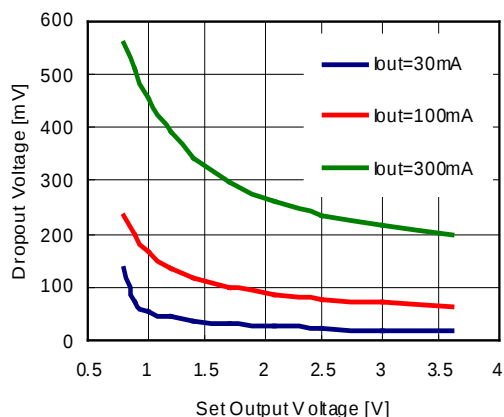


**3.6V (VR1/VR2)**



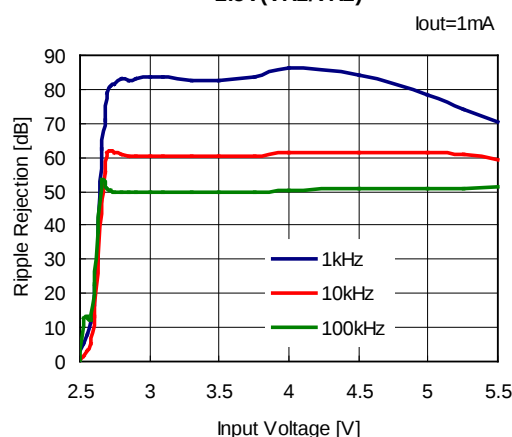
## 7) Dropout Voltage vs. Set Output Voltage

(VR1/VR2)

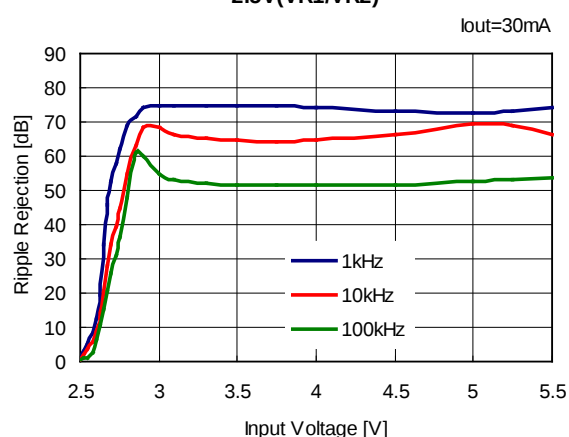


## 8) Ripple Rejection vs. Input Voltage ( $C_{IN} = \text{none}$ , $C_{OUT1} = C_{OUT2} = 1.0\text{ }\mu\text{F}$ , Ripple = 0.2 Vp-p, $T_a = 25^\circ\text{C}$ )

2.5V(VR1/VR2)

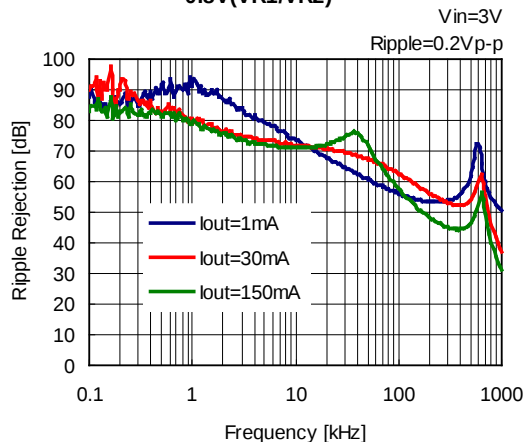


2.5V(VR1/VR2)

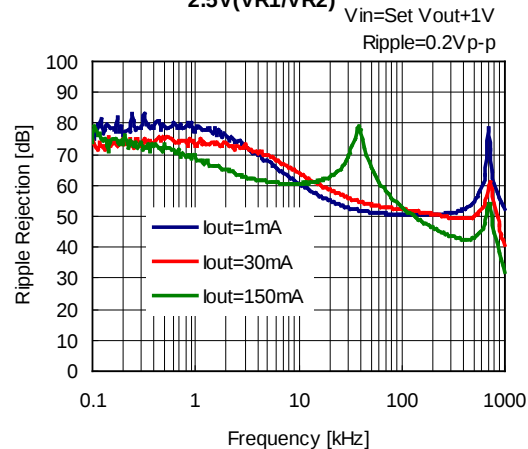


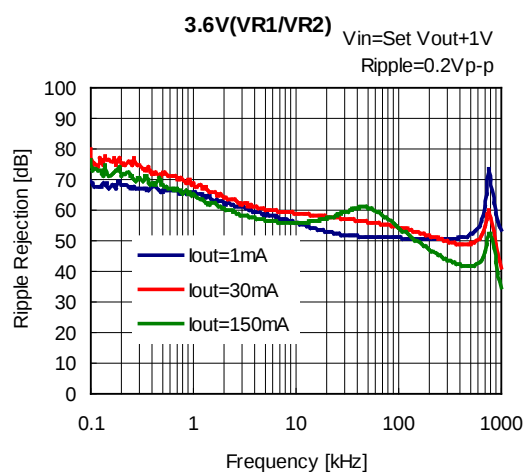
## 9) Ripple Rejection vs. Frequency ( $C_{IN} = \text{none}$ , $C_{OUT1} = C_{OUT2} = 1.0\text{ }\mu\text{F}$ , $T_a = 25^\circ\text{C}$ )

0.8V(VR1/VR2)

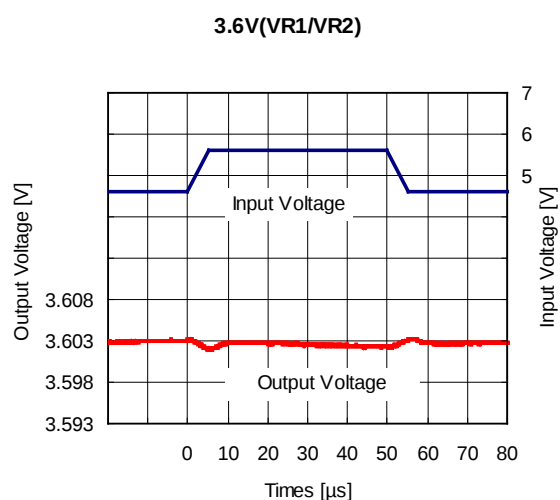
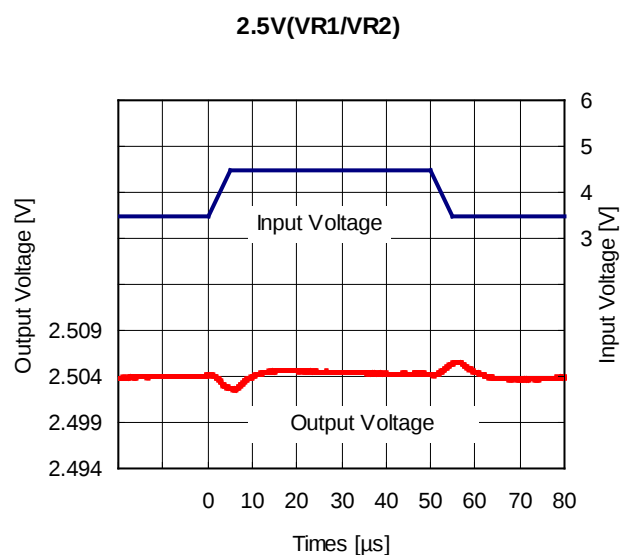
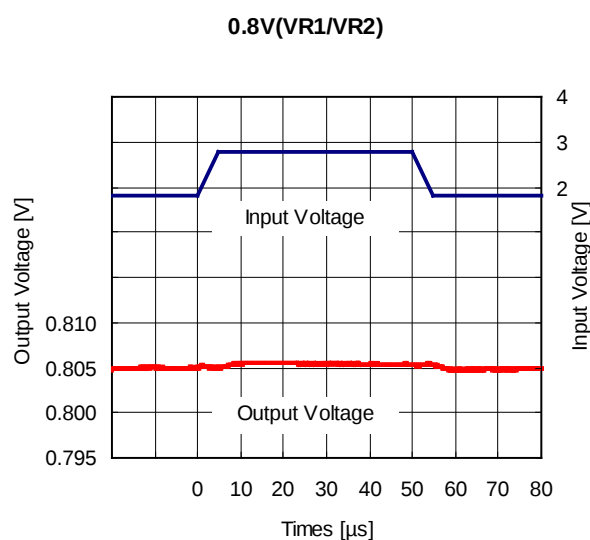


2.5V(VR1/VR2)

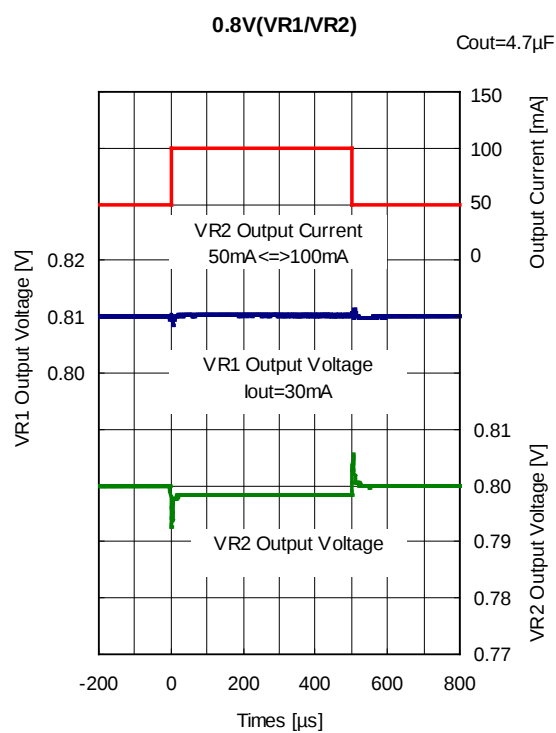
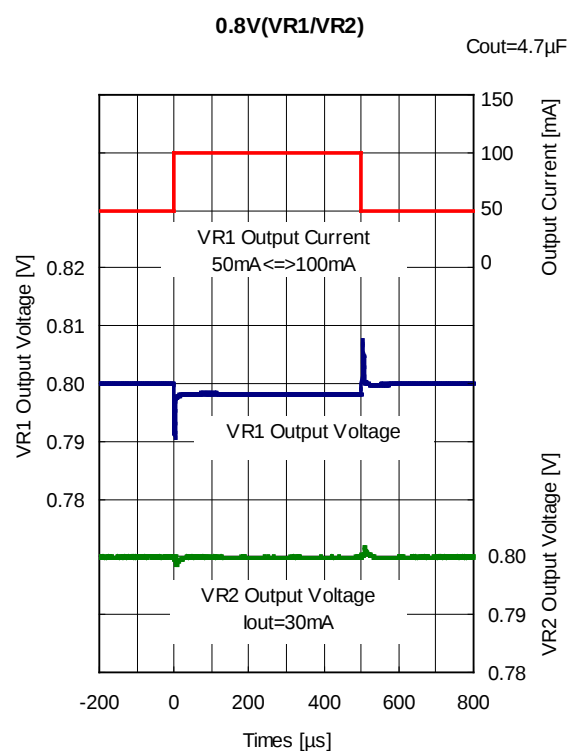
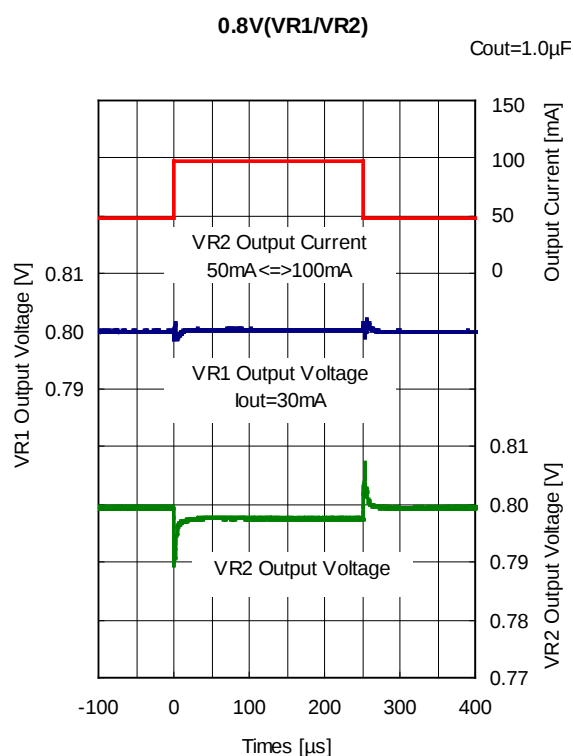
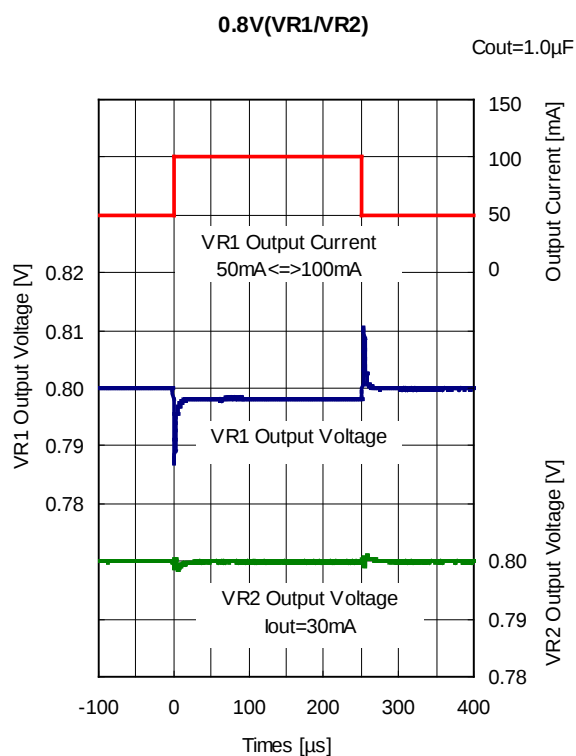


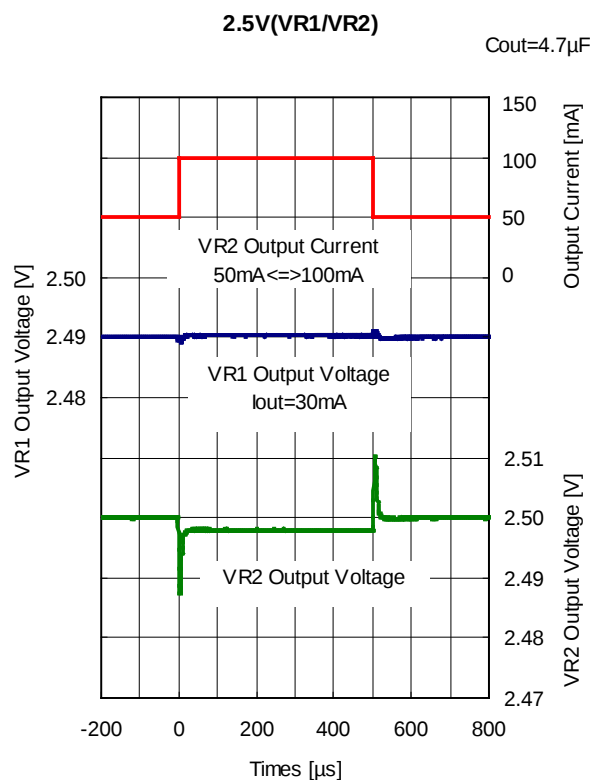
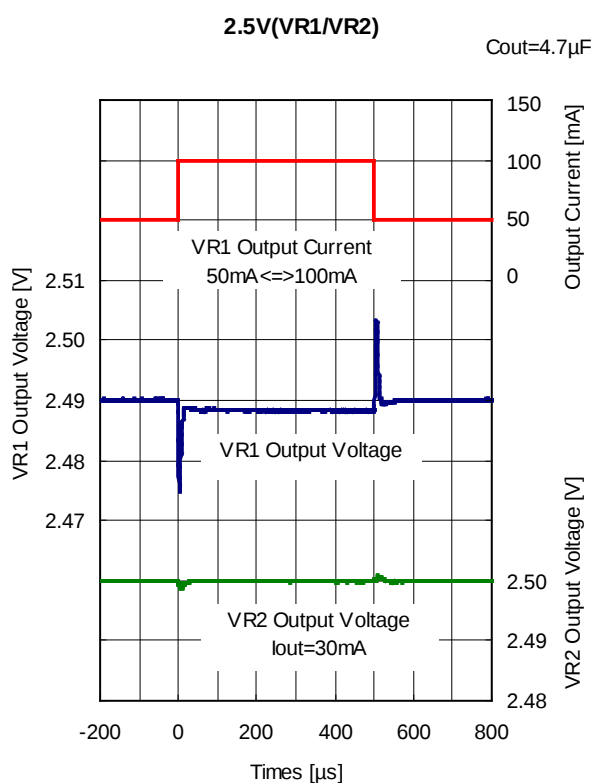
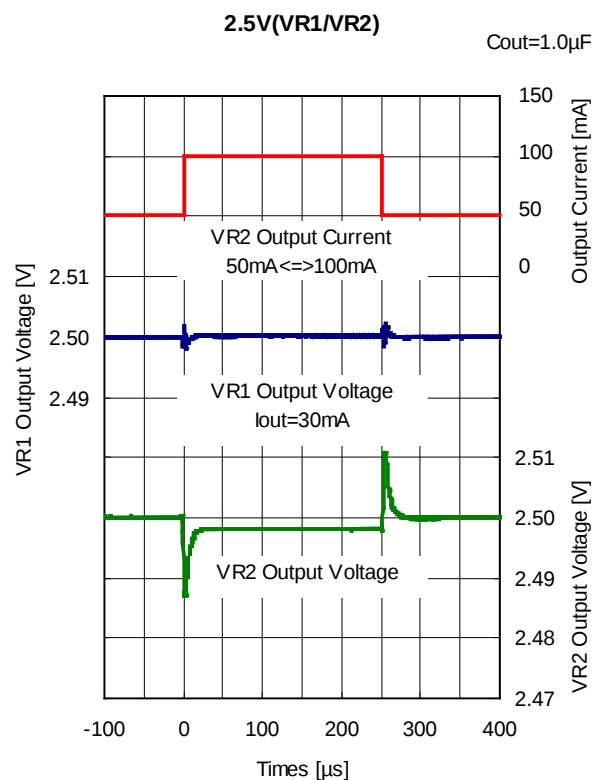
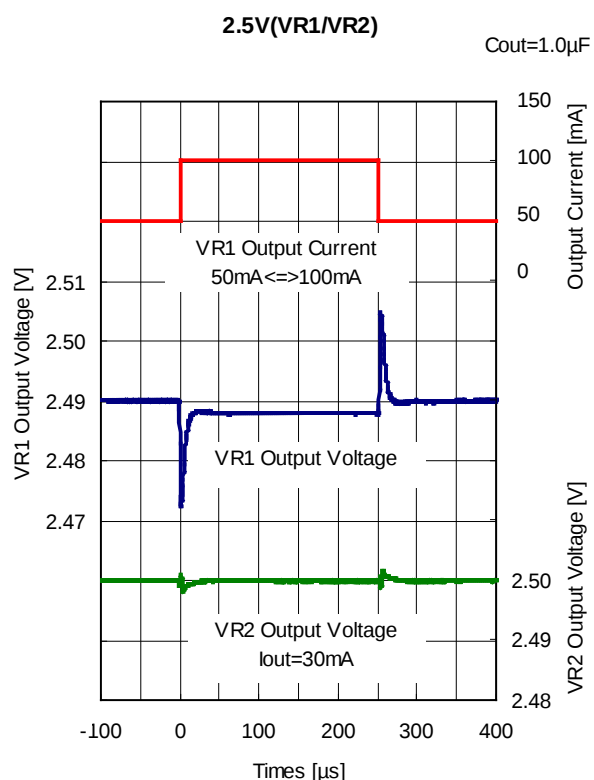


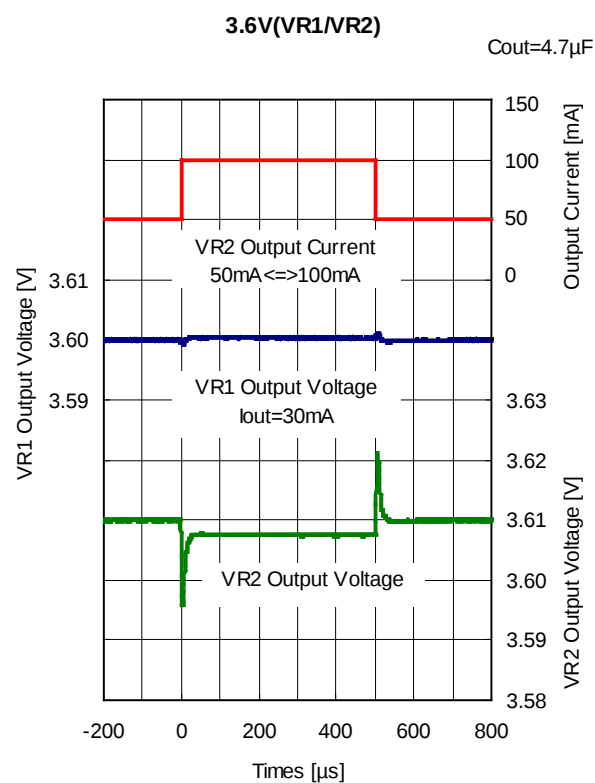
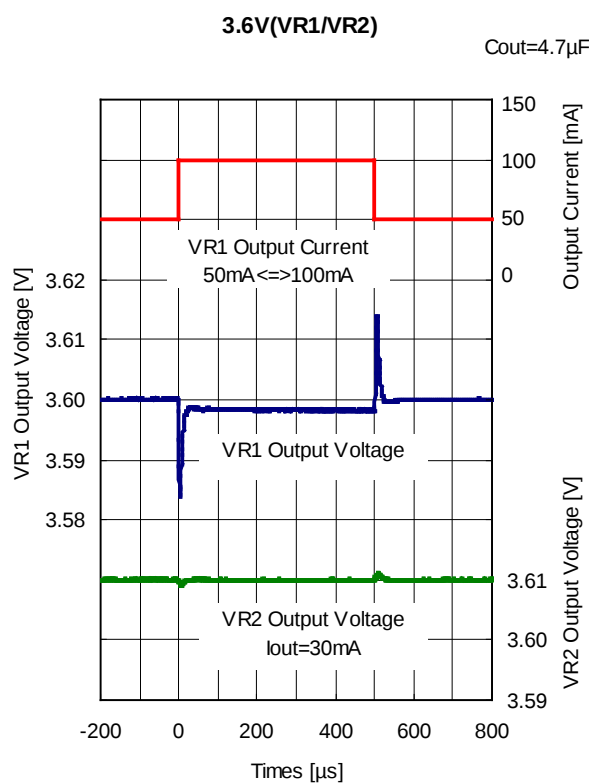
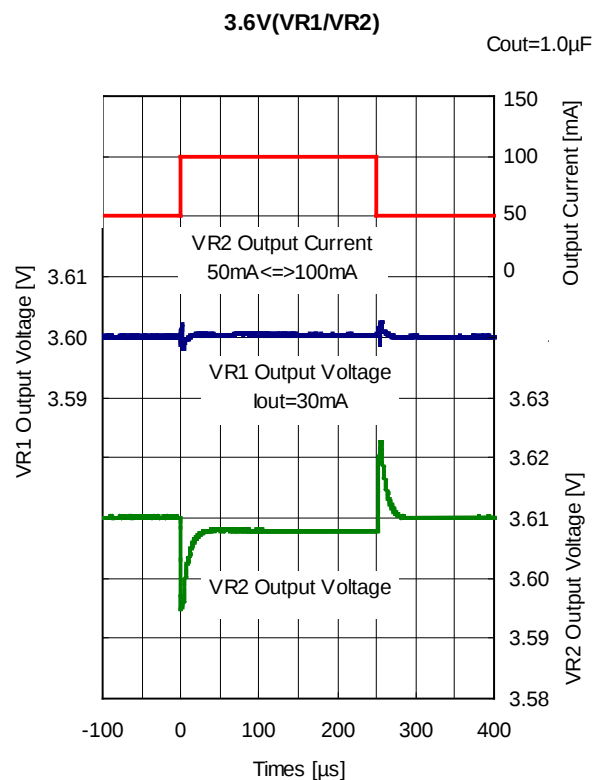
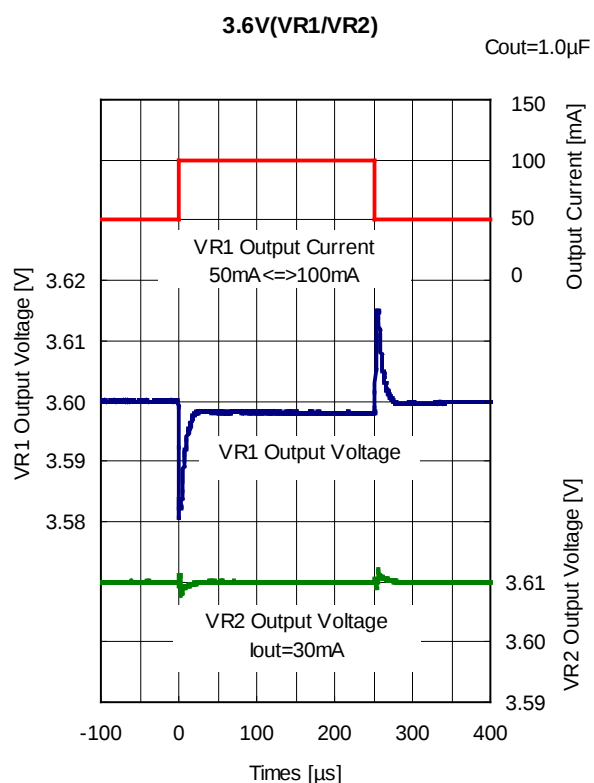
10) Input Transient Response ( $C_{IN} = \text{none}$ ,  $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ ,  $t_r = t_f = 5 \mu s$ ,  $T_a = 25^\circ C$ )

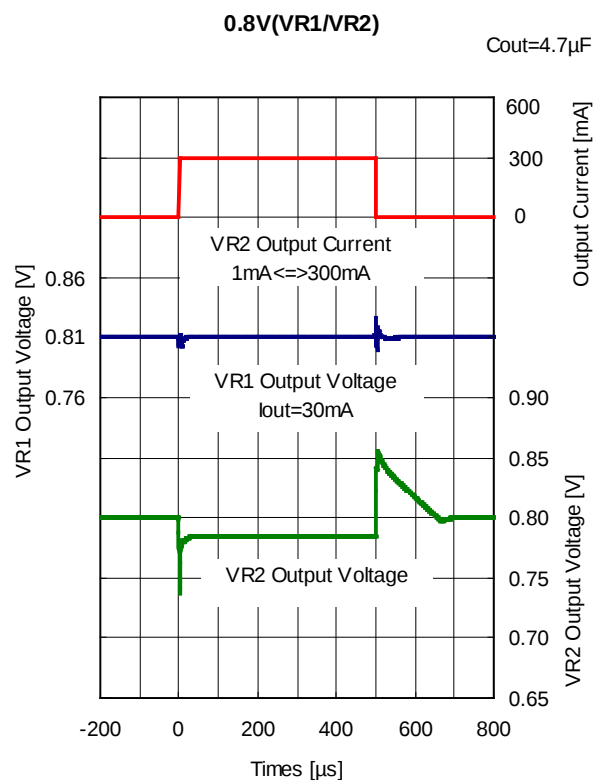
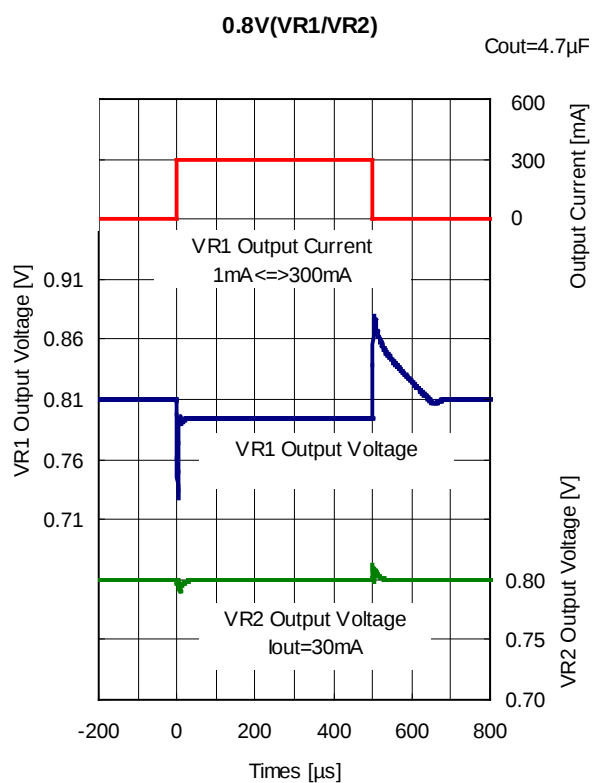
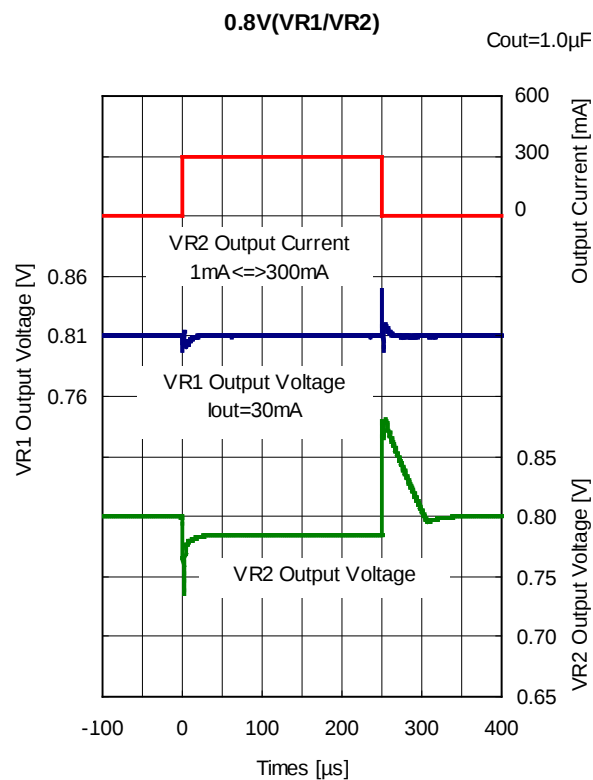
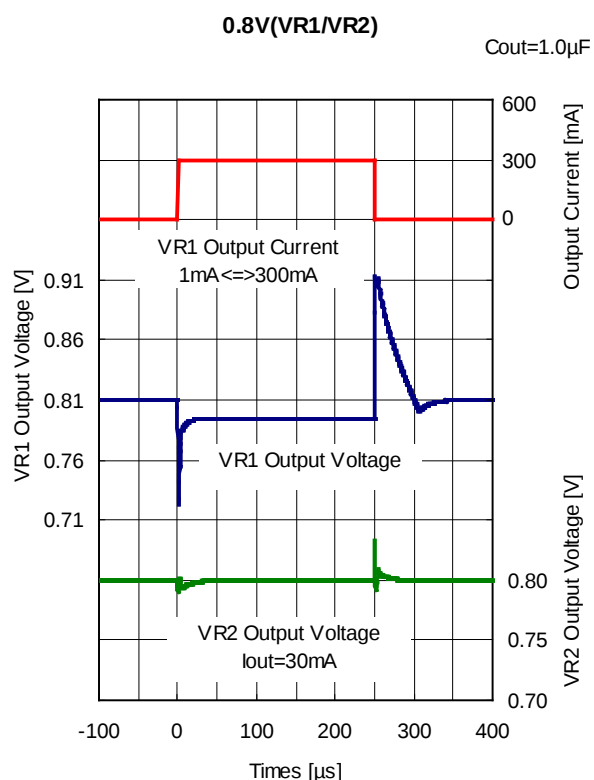


11) Load Transient Response ( $C_{IN} = 1.0 \mu F$ ,  $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ ,  $t_r = t_f = 0.5 \mu s$ ,  $T_a = 25^\circ C$ )



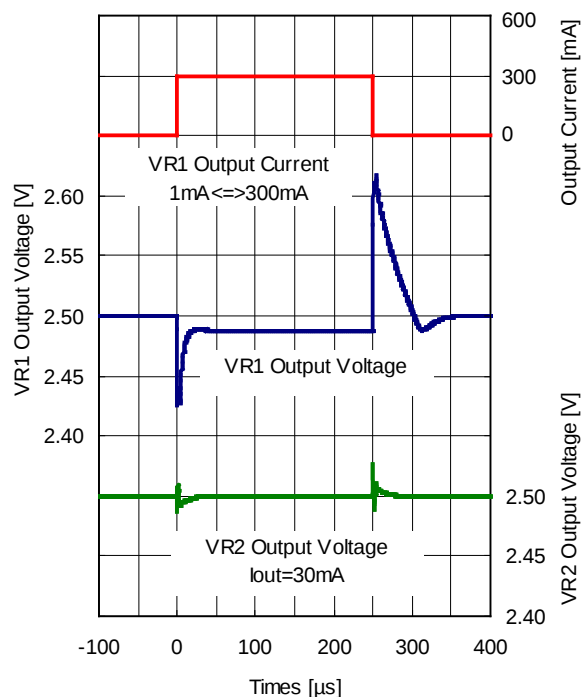






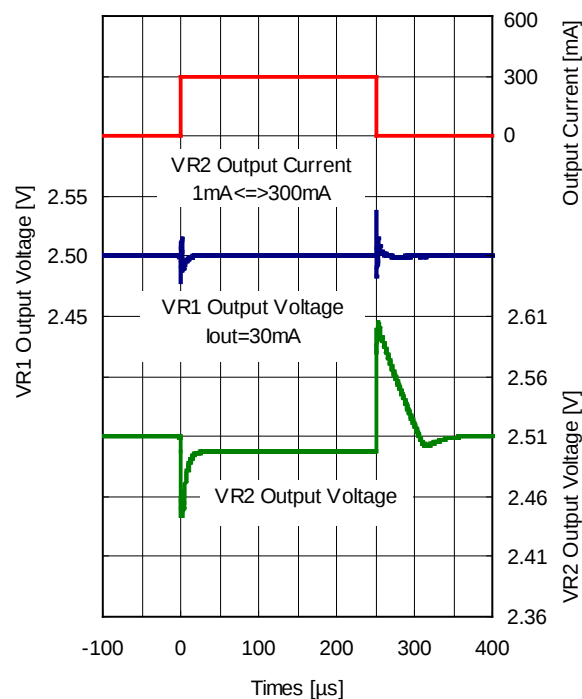
2.5V(VR1/VR2)

Cout=1.0μF



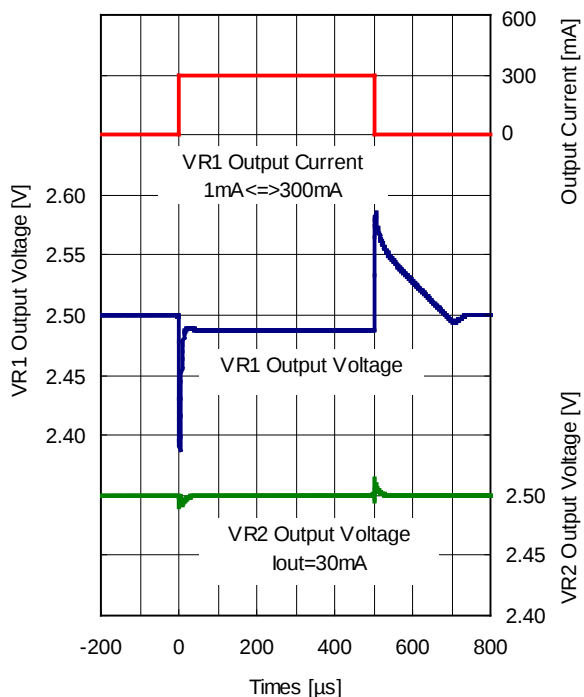
2.5V(VR1/VR2)

Cout=1.0μF



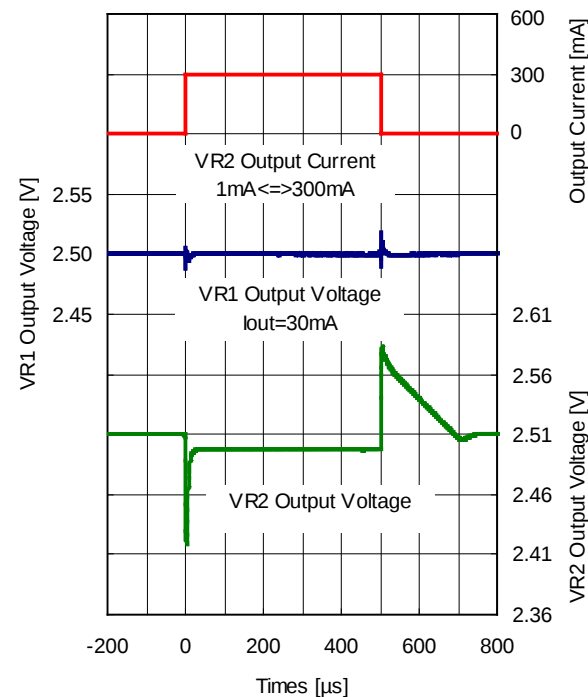
2.5V(VR1/VR2)

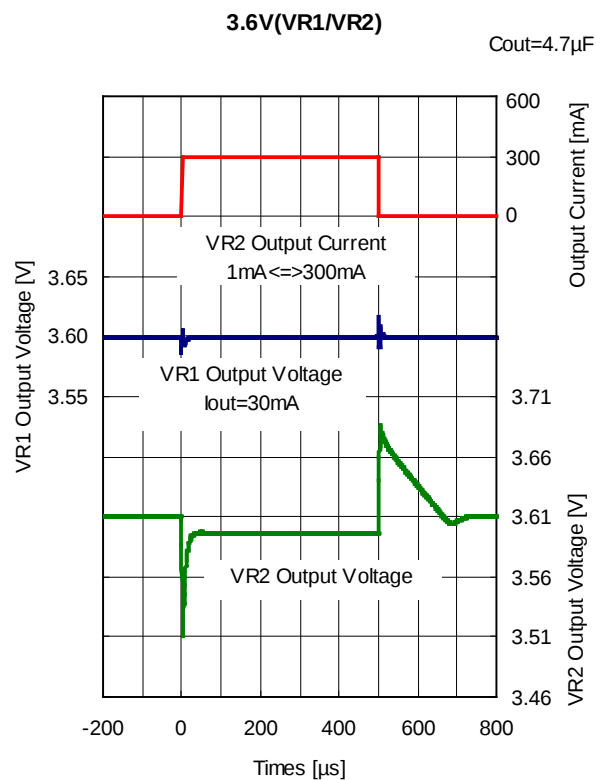
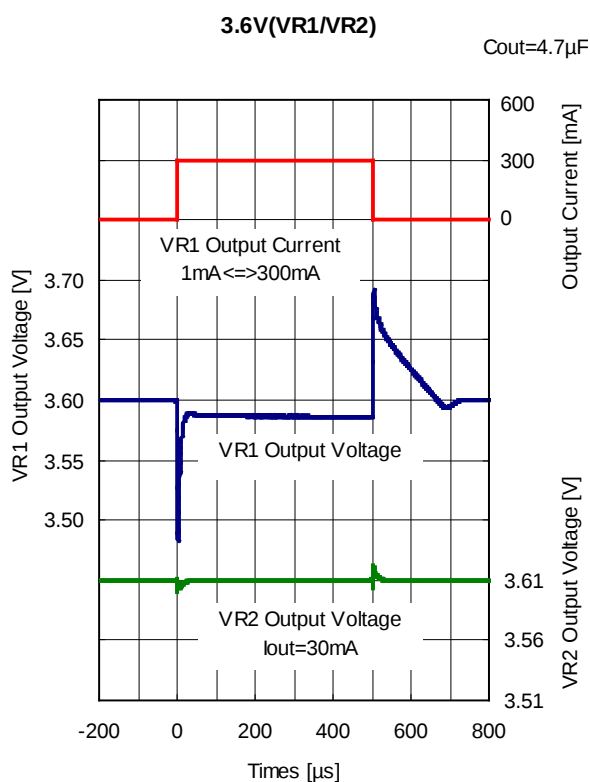
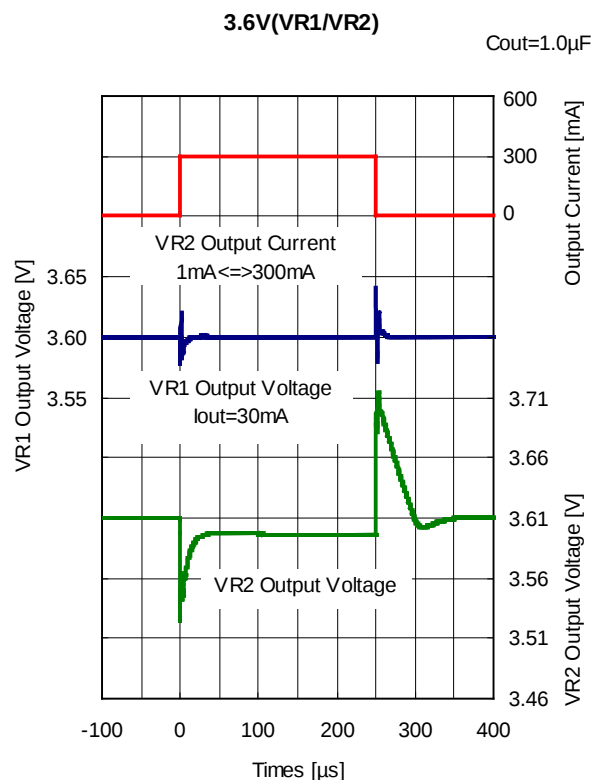
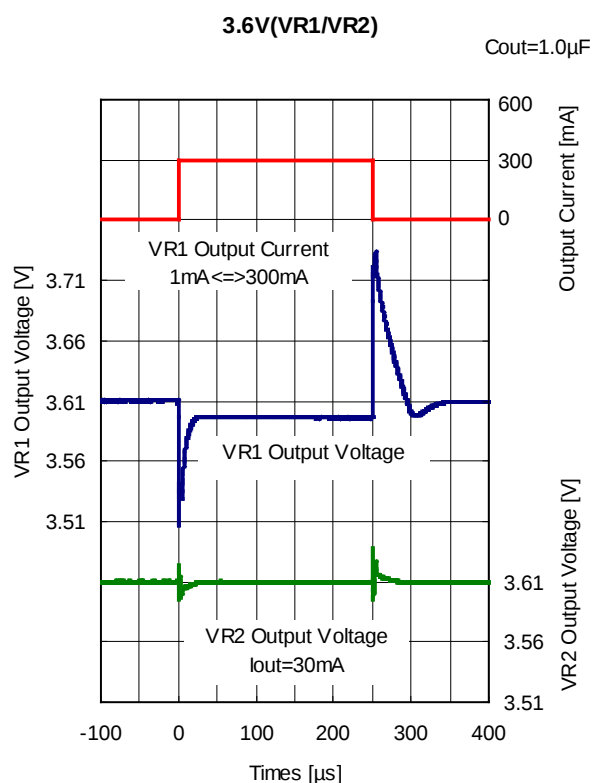
Cout=4.7μF



2.5V(VR1/VR2)

Cout=4.7μF

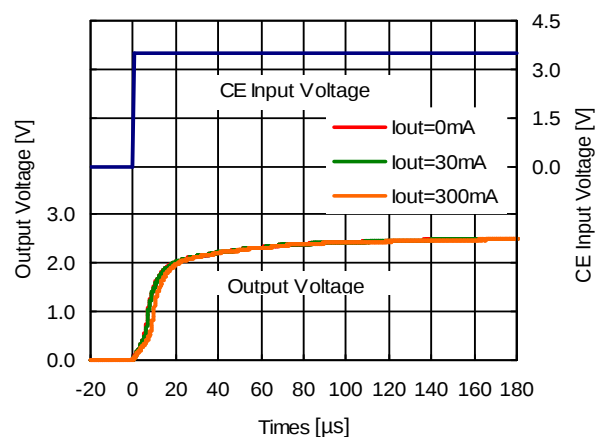
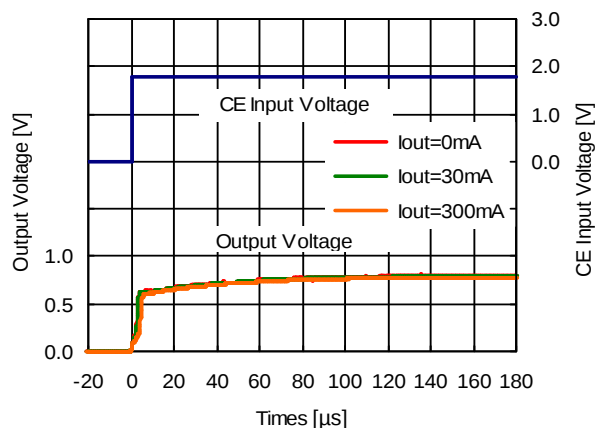




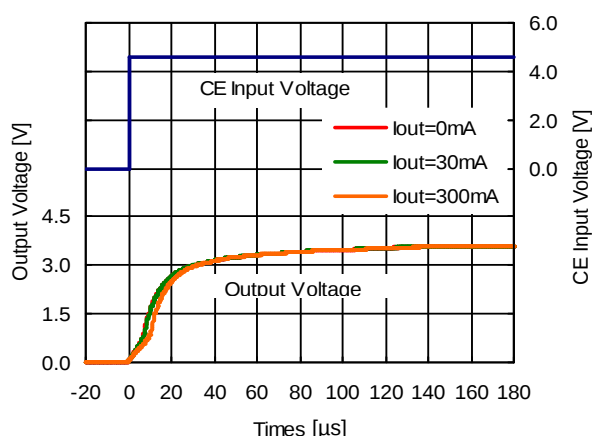
## 12) Turn On Speed with CE pin ( $C_{IN} = 1.0 \mu F$ , $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ , $T_a = 25^\circ C$ )

0.8V(VR1/VR2)

2.5V(VR1/VR2)



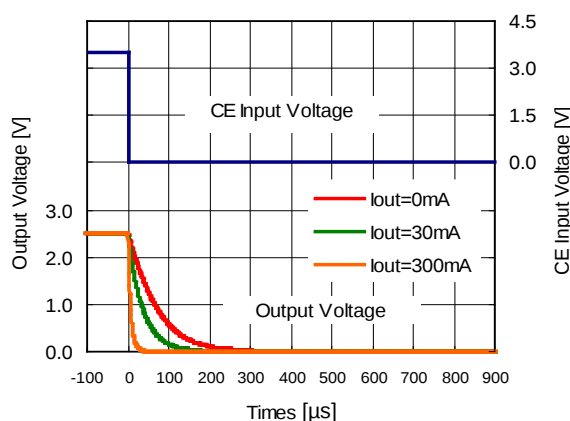
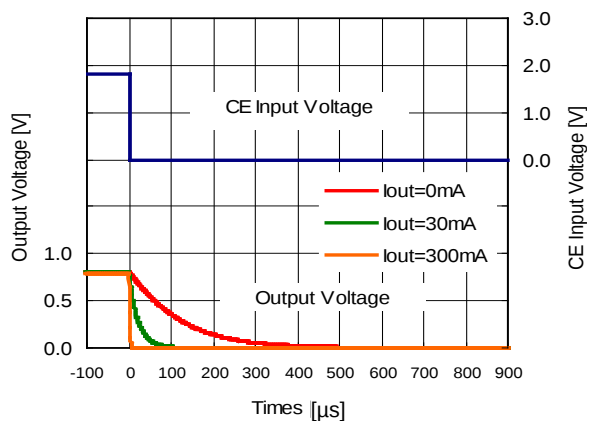
3.6V(VR1/VR2)

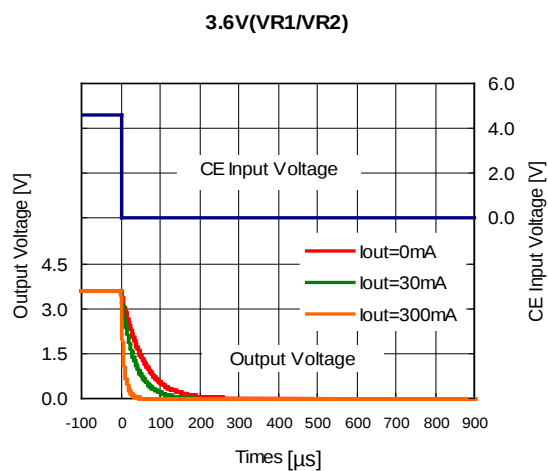


## 13) Turn Off Speed with CE pin (RP154xxxxB) ( $C_{IN} = 1.0 \mu F$ , $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ , $T_a = 25^\circ C$ )

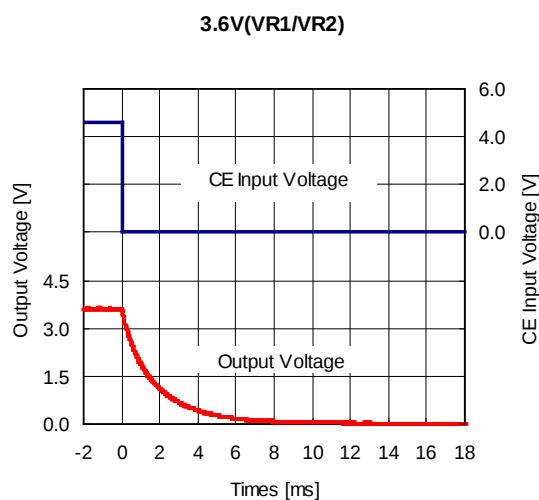
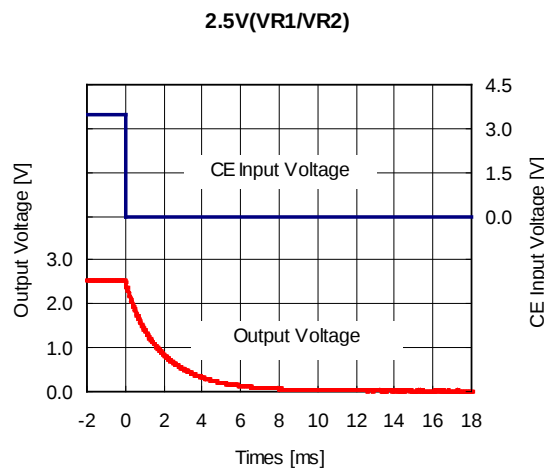
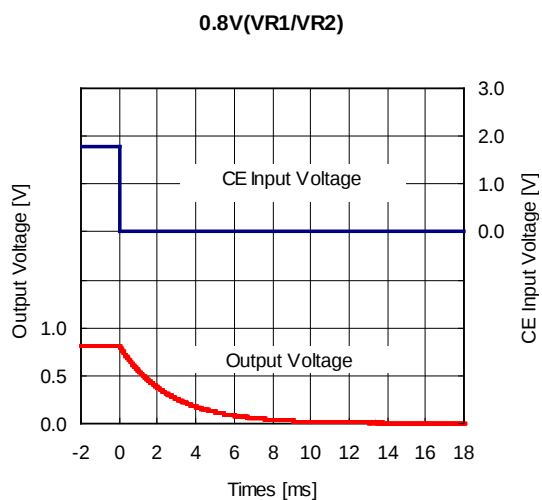
0.8V(VR1/VR2)

2.5V(VR1/VR2)





14) Turn Off Speed with CE pin (RP154xxxxA) ( $C_{IN} = 1.0 \mu F$ ,  $C_{OUT1} = C_{OUT2} = 1.0 \mu F$ ,  $I_{OUT} = 0 mA$ ,  $T_a = 25^\circ C$ )



## ESR vs. Output Current

When using these ICs, consider the following points:

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

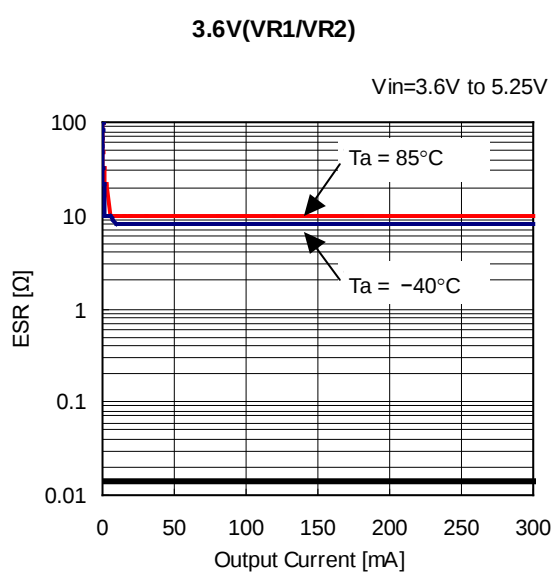
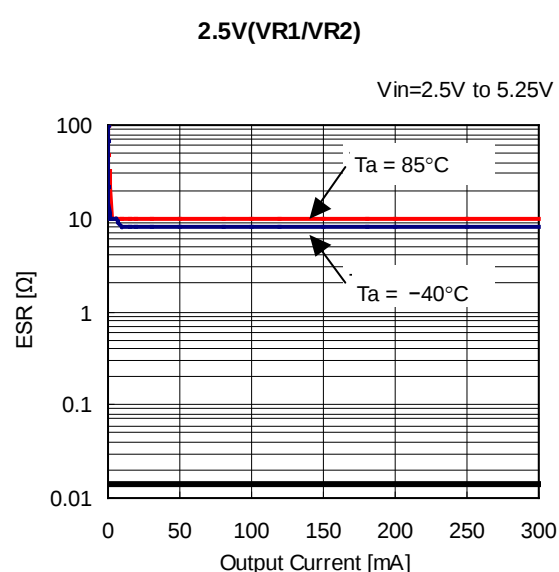
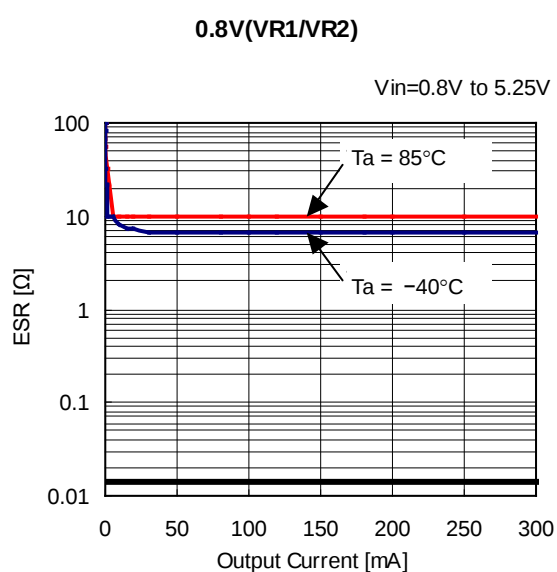
The conditions when the white noise level is under 40  $\mu\text{V}$  (Avg.) are marked as the hatched area in the graph.

### Measurement conditions

Frequency Band: 10 Hz to 2 MHz

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

$C_{IN}$ ,  $C_{OUT1}$ ,  $C_{OUT2}$ : 1.0  $\mu\text{F}$



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 × 23 pcs                                                                                                                                                                            |

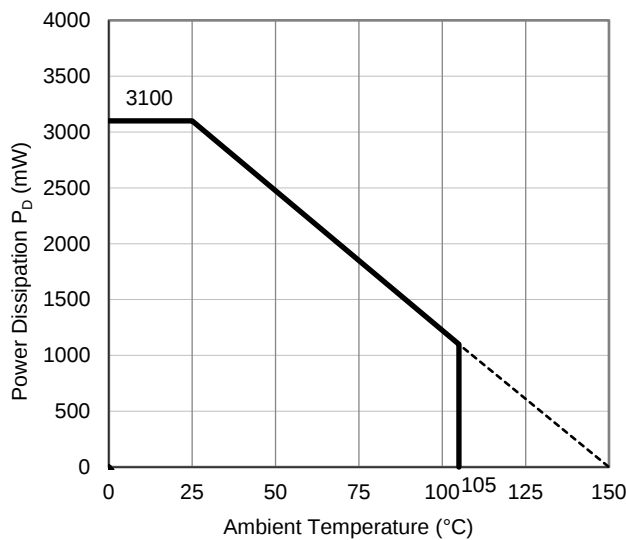
Measurement Result

(Ta = 25°C, Tjmax = 150°C)

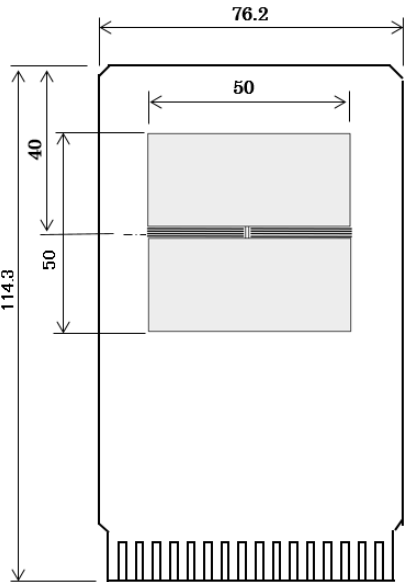
| Item                                     | Measurement Result |
|------------------------------------------|--------------------|
| Power Dissipation                        | 3100 mW            |
| Thermal Resistance (θja)                 | θja = 40°C/W       |
| Thermal Characterization Parameter (ψjt) | ψjt = 12°C/W       |

θja: Junction-to-Ambient Thermal Resistance

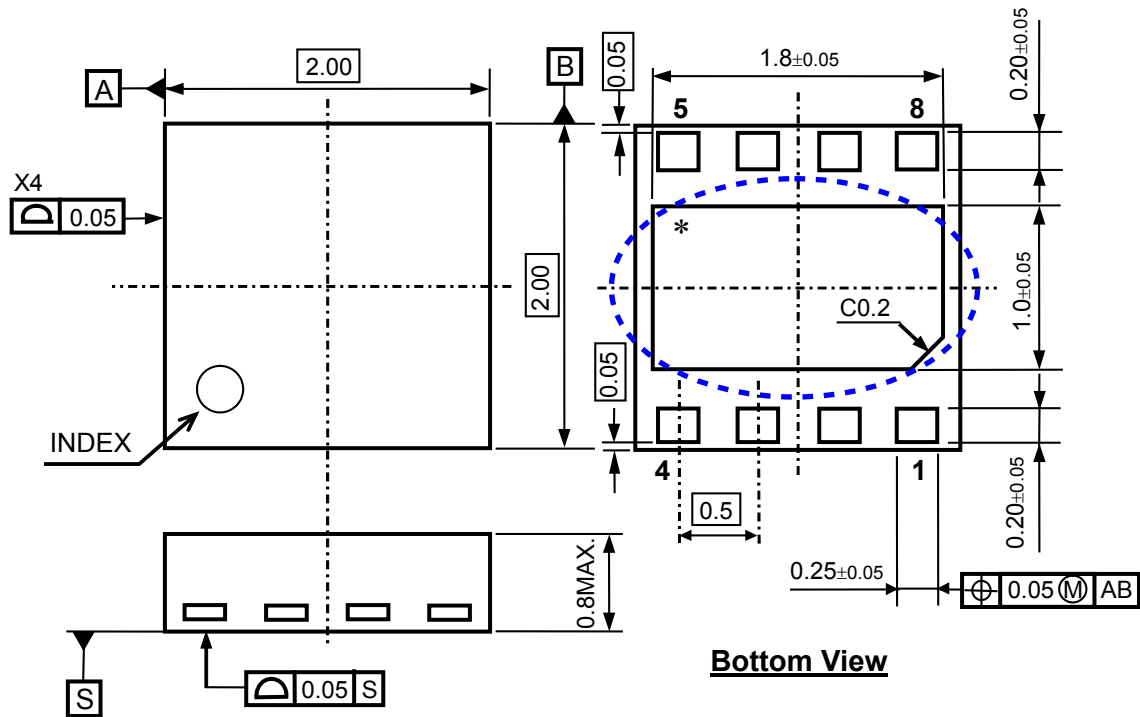
ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern



DFN2020-8 Package Dimensions (Unit: mm)

\* The tab on the bottom of the package is substrate level (GND). It is recommended that the tab be connected to the ground plane on the board, or otherwise be left floating.

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                                                                                                                                                                             |

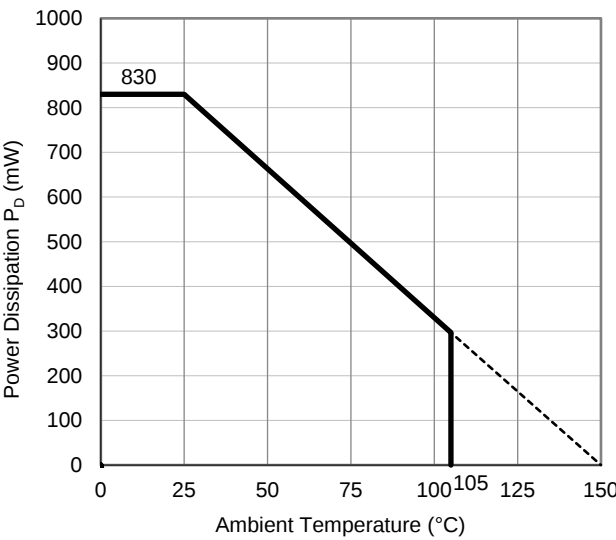
Measurement Result

(Ta = 25°C, Tjmax = 150°C)

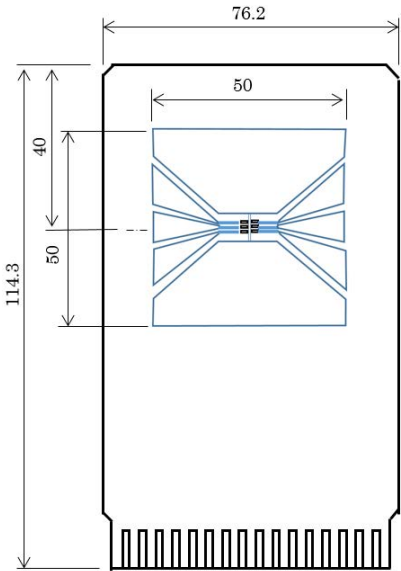
| Item                                     | Measurement Result |
|------------------------------------------|--------------------|
| Power Dissipation                        | 830 mW             |
| Thermal Resistance (θja)                 | θja = 150°C/W      |
| Thermal Characterization Parameter (ψjt) | ψjt = 51°C/W       |

θja: Junction-to-Ambient Thermal Resistance

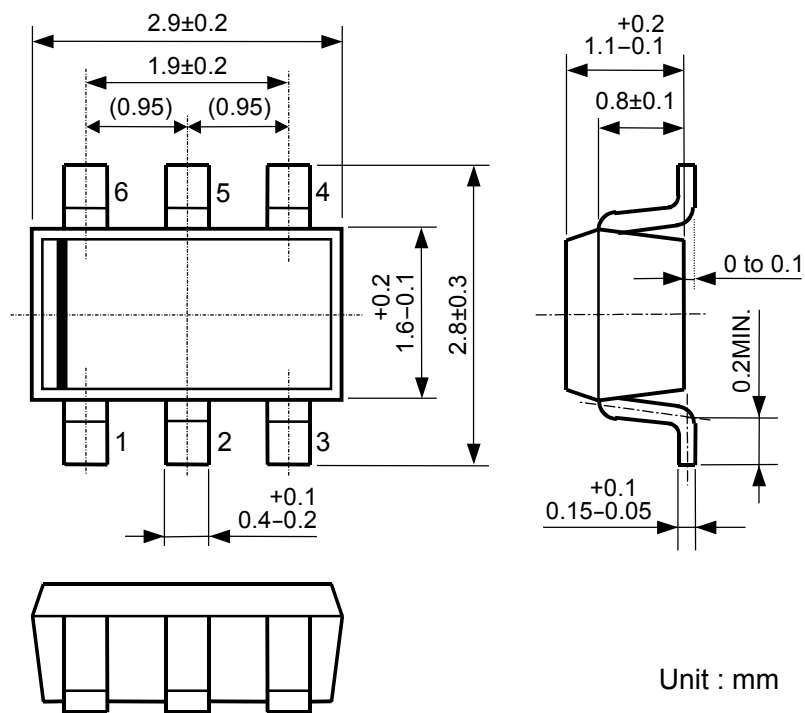
ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern



SOT-23-6 Package Dimensions



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