



## RP131x SERIES

### LOW ON RESISTANCE / LOW VOLTAGE 1A LDO

NO.EA-174-240417

## OUTLINE

The RP131x Series are voltage-regulators with a built-in low ON-resistance transistor and output current is 1A capability. These ICs are capable of the low input voltage (Min.1.6V) and also the minimum output voltage can be set from 0.8V. (The output voltage is fixed in the IC.)

Each of these ICs consists of a voltage reference unit, an error amplifier, a resistor net for setting output voltage, a chip enable circuit, current limit circuits for over-current and short, and a thermal-shutdown circuit.

A standby mode with ultra low supply current can be realized with the chip enable function.

The packages for these ICs are DFN1616-6B and DFN(PL)1820-6 which are suitable for high density mounting of the ICs on boards. SOT-89-5, HSOP-6J and TO-252-5-P2 with high power dissipation are also available.

## FEATURES

- Output Current ..... Min. 1A
- Supply Current..... Typ. 65 $\mu$ A
- Standby Current ..... Typ. 0.15 $\mu$ A
- Input Voltage Range ..... 1.6V to 6.5V
- Output Voltage Range ..... 0.8V to 5.5V <sup>(1)</sup>(0.1V steps)
- Dropout Voltage..... Typ. 0.5V ( $V_{OUT}=2.8V$ ,  $I_{OUT}=1A$ )
- Ripple Rejection ..... Typ. 70dB ( $f=1kHz$ ,  $V_{OUT}=2.8V$ )
- Output Voltage Accuracy.....  $\pm 1.0\%$
- Temperature-Drift Coefficient of Output Voltage..... Typ.  $\pm 100ppm/^{\circ}C$
- Line Regulation..... Typ. 0.05%/V
- Load Regulation ..... Typ. 20mV at  $I_{OUT}=300mA$ , Typ. 80mV at  $I_{OUT}=1A$
- Packages ..... DFN1616-6B, DFN(PL)1820-6, SOT-89-5, HSOP-6J, TO-252-5-P2
- Built-in Inrush current limit circuit ..... Typ. 500mA
- Built-in Fold-Back Protection Circuit ..... Typ. 250mA (Current at short mode)
- Built-in Thermal Shutdown Circuit ..... Thermal Shutdown Temperature ; Typ. 165 $^{\circ}C$   
Released Temperature ; Typ. 135 $^{\circ}C$
- Built-in Auto Discharge Function ..... D version
- Ceramic capacitors are recommended to be used with this IC..... 2.2 $\mu$ F or more ( $V_{OUT}\leq 3.6V$ )  
4.7 $\mu$ F or more ( $V_{OUT}>3.6V$ )

## APPLICATIONS

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

<sup>(1)</sup> For other voltages, please refer to MARK INFORMATION.

## 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 |
|------------------|---------------|-------------------|---------|--------------|
| RP131Lxx1*-TR    | DFN1616-6B    | 5,000 pcs         | Yes     | Yes          |
| RP131Kxx1*-TR    | DFN(PL)1820-6 | 5,000 pcs         | Yes     | Yes          |
| RP131Hxx1*-T1-FE | SOT-89-5      | 1,000 pcs         | Yes     | Yes          |
| RP131Sxx1*-E2-FE | HSOP-6J       | 1,000 pcs         | Yes     | Yes          |
| RP131Jxx1*-T1-FE | TO-252-5-P2   | 3,000 pcs         | Yes     | Yes          |

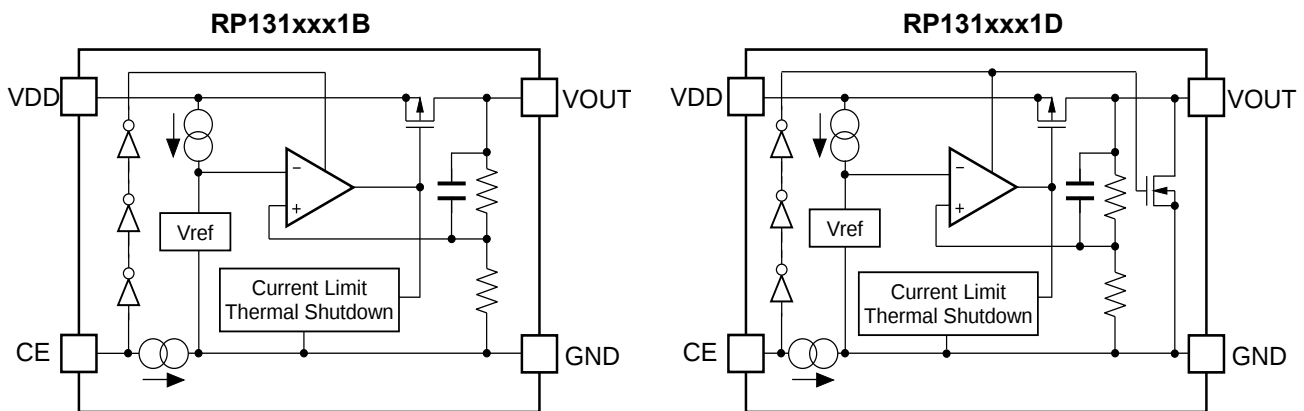
xx : The output voltage can be designated in the range from 0.8V(08) to 5.5V(55) in 0.1V steps.  
(For other voltages, please refer to MARK INFORMATION.)

\* : The auto discharge function at off state are options as follows.<sup>(1)</sup>

(B) without auto discharge function at off state

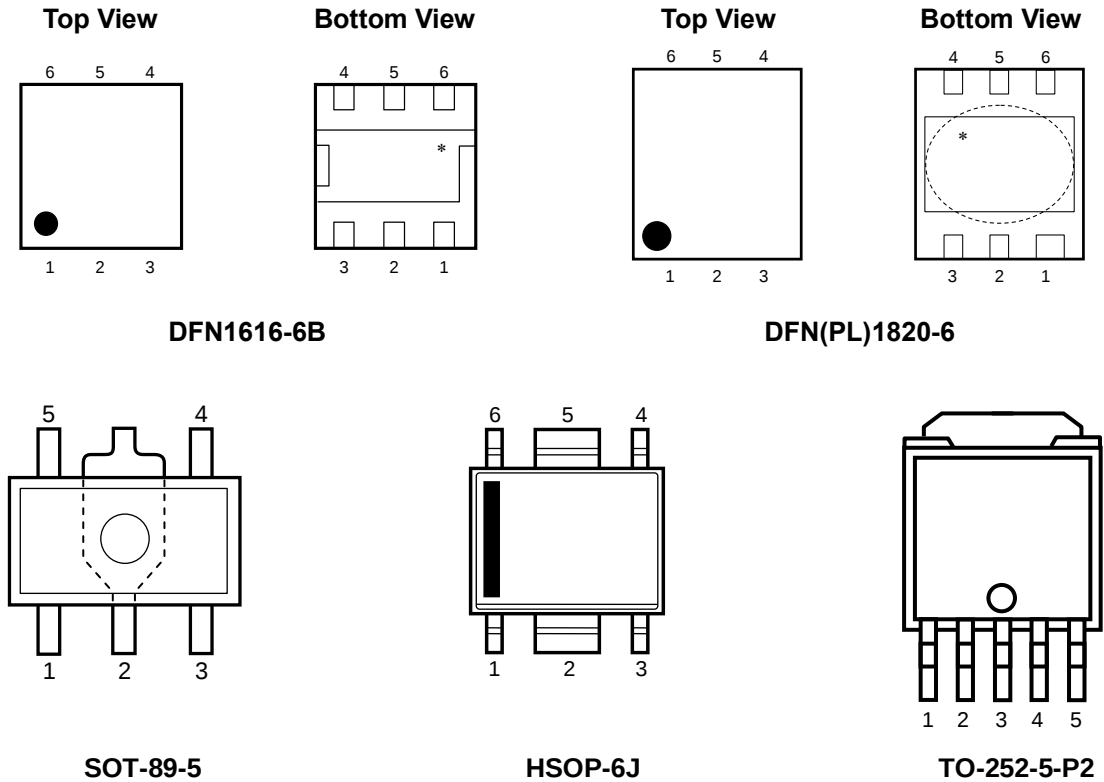
(D) with auto discharge function at off state

## BLOCK DIAGRAMS



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

## PIN DESCRIPTIONS



\*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.

### RP131L (DFN1616-6B) Pin Description

| Pin No. | Symbol | Pin Description              |
|---------|--------|------------------------------|
| 1       | VOUT   | Output Pin <sup>(1)</sup>    |
| 2       | VOUT   | Output Pin <sup>(1)</sup>    |
| 3       | GND    | Ground Pin                   |
| 4       | CE     | Chip Enable Pin ("H" Active) |
| 5       | VDD    | Input Pin <sup>(1)</sup>     |
| 6       | VDD    | Input Pin <sup>(1)</sup>     |

<sup>(1)</sup> When you use this IC, please make sure be wired with 1pin with 2pin and 5pin with 6pin.

**RP131K (DFN(PL)1820-6) Pin Description**

| Pin No. | Symbol | Pin Description              |
|---------|--------|------------------------------|
| 1       | VOUT   | Output Pin <sup>(1)</sup>    |
| 2       | VOUT   | Output Pin <sup>(1)</sup>    |
| 3       | GND    | Ground Pin                   |
| 4       | CE     | Chip Enable Pin ("H" Active) |
| 5       | VDD    | Input Pin <sup>(1)</sup>     |
| 6       | VDD    | Input Pin <sup>(1)</sup>     |

**RP131H (SOT-89-5) Pin Description**

| Pin No. | Symbol | Pin Description              |
|---------|--------|------------------------------|
| 1       | NC     | No Connection                |
| 2       | GND    | Ground Pin                   |
| 3       | CE     | Chip Enable Pin ("H" Active) |
| 4       | VDD    | Input Pin                    |
| 5       | VOUT   | Output Pin                   |

**RP131S (HSOP-6J) Pin Description**

| Pin No. | Symbol | Pin Description              |
|---------|--------|------------------------------|
| 1       | VOUT   | Output Pin                   |
| 2       | GND    | Ground Pin <sup>(2)</sup>    |
| 3       | NC     | No Connection                |
| 4       | CE     | Chip Enable Pin ("H" Active) |
| 5       | GND    | Ground Pin <sup>(2)</sup>    |
| 6       | VDD    | Input Pin                    |

**RP131J (TO-252-5-P2) Pin Description**

| Pin No. | Symbol | Pin Description              |
|---------|--------|------------------------------|
| 1       | VOUT   | Output Pin                   |
| 2       | GND    | Ground Pin <sup>(3)</sup>    |
| 3       | GND    | Ground Pin <sup>(3)</sup>    |
| 4       | CE     | Chip Enable Pin ("H" Active) |
| 5       | VDD    | Input Pin                    |

<sup>(1)</sup> When you use this IC, please make sure be wired with 1pin with 2pin and 5pin with 6pin.

<sup>(2)</sup> When you use this IC, please make sure be wired with 2pin and 5pin.

<sup>(3)</sup> When you use this IC, please make sure be wired with 2pin and 3pin.

## ABSOLUTE MAXIMUM RATINGS

| Symbol    | Item                             |               | Rating               | Unit |
|-----------|----------------------------------|---------------|----------------------|------|
| $V_{IN}$  | Input Voltage                    |               | 7.0                  | V    |
| $V_{CE}$  | Input Voltage (CE Pin)           |               | -0.3 to 7.0          | V    |
| $V_{OUT}$ | Output Voltage                   |               | -0.3 to $V_{IN}+0.3$ | V    |
| $P_D$     | Power Dissipation <sup>(1)</sup> | DFN1616-6B    | 2400                 | mW   |
|           |                                  | DFN(PL)1820-6 | 2200                 |      |
|           |                                  | SOT-89-5      | 2600                 |      |
|           |                                  | HSOP-6J       | 2700                 |      |
|           |                                  | TO-252-5-P2   | 3800                 |      |
| $T_j$     | Junction Temperature Range       |               | -40 to 125           | °C   |
| $T_{stg}$ | Storage Temperature Range        |               | -55 to 125           | °C   |

### ABSOLUTE MAXIMUM RATINGS

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

## RECOMMENDED OPERATING CONDITIONS

| Symbol   | Item                        | Rating     | Unit |
|----------|-----------------------------|------------|------|
| $V_{IN}$ | Input Voltage               | 1.6 to 6.5 | V    |
| $T_a$    | Operating Temperature Range | -40 to 85  | °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 when they are used over such ratings 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

$V_{IN} = \text{Set } V_{OUT} + 1V, I_{OUT} = 1mA$

The specification in   is checked and guaranteed by design engineering at  $-40^{\circ}C \leq T_a \leq 85^{\circ}C$ , unless otherwise noted.

### RP131xxx1B/D

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

| Symbol                               | Item                                            | Conditions                                                                              |                        | Min.   | Typ. | Max.   | Unit    |
|--------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------|--------|------|--------|---------|
| V <sub>OUT</sub>                     | Output Voltage                                  | T <sub>a</sub> = 25°C                                                                   | V <sub>OUT</sub> >1.5V | ×0.99  |      | ×1.01  | V       |
|                                      |                                                 |                                                                                         | V <sub>OUT</sub> ≤1.5V | −15    |      | 15     | mV      |
|                                      |                                                 | −40°C ≤ T <sub>a</sub> ≤ 85°C                                                           | V <sub>OUT</sub> >1.5V | ×0.974 |      | ×1.018 | V       |
|                                      |                                                 |                                                                                         | V <sub>OUT</sub> ≤1.5V | −40    |      | 27     | mV      |
| ΔV <sub>OUT</sub> /ΔI <sub>OUT</sub> | Load Regulation                                 | 0.1mA ≤ I <sub>OUT</sub> ≤ 300mA                                                        |                        |        | 20   | 40     | mV      |
|                                      |                                                 | 0.1mA ≤ I <sub>OUT</sub> ≤ 1A                                                           |                        |        | 80   | 120    |         |
| V <sub>DIF</sub>                     | Dropout Voltage                                 | Refer to the following table                                                            |                        |        |      |        |         |
| I <sub>SS</sub>                      | Supply Current                                  | I <sub>OUT</sub> =0mA (V <sub>IN</sub> =6.5V)                                           |                        |        | 65   | 90     | μA      |
| I <sub>standby</sub>                 | Standby Current                                 | V <sub>CE</sub> =0V, V <sub>IN</sub> =6.5V                                              |                        |        | 0.15 | 0.60   | μA      |
| ΔV <sub>OUT</sub> /ΔV <sub>IN</sub>  | Line Regulation                                 | Set V <sub>OUT</sub> +0.5V ≤ V <sub>IN</sub> ≤ 6.5V<br>*However, V <sub>IN</sub> ≥ 1.6V |                        |        | 0.05 | 0.1    | %/V     |
| RR                                   | Ripple Rejection                                | f=1kHz<br>Ripple 0.2Vp-p<br>I <sub>OUT</sub> =100mA                                     | V <sub>OUT</sub> ≤3.3V |        | 70   |        | dB      |
|                                      |                                                 |                                                                                         | V <sub>OUT</sub> >3.3V |        | 60   |        |         |
| V <sub>IN</sub>                      | Input Voltage                                   |                                                                                         |                        | 1.6    |      | 6.5    | V       |
| I <sub>LIM</sub>                     | Output Current Limit                            |                                                                                         |                        | 1      |      |        | A       |
| ΔV <sub>OUT</sub> /ΔT <sub>a</sub>   | Output Voltage Temperature Coefficient          | −40°C≤T <sub>a</sub> ≤85°C                                                              |                        |        | ±100 |        | ppm /°C |
| I <sub>SC</sub>                      | Short Current Limit                             | V <sub>OUT</sub> =0V                                                                    |                        |        | 250  |        | mA      |
| I <sub>PD</sub>                      | CE Pull-down Current                            |                                                                                         |                        |        | 0.3  |        | μA      |
| V <sub>CEH</sub>                     | CE Input Voltage "H"                            |                                                                                         |                        | 1.0    |      |        | V       |
| V <sub>CEL</sub>                     | CE Input Voltage "L"                            |                                                                                         |                        |        |      | 0.4    | V       |
| en                                   | Output Noise                                    | BW=10Hz to 100kHz, I <sub>OUT</sub> =1mA                                                |                        |        | 45   |        | μVrms   |
| T <sub>TSD</sub>                     | Thermal Shutdown Temperature                    | Junction Temperature                                                                    |                        |        | 165  |        | °C      |
| T <sub>TSR</sub>                     | Thermal Shutdown Released Temperature           | Junction Temperature                                                                    |                        |        | 135  |        | °C      |
| R <sub>LOW</sub>                     | Low Output Nch Tr. ON Resistance (of D version) | V <sub>IN</sub> =4.0V, V <sub>CE</sub> =0V                                              |                        |        | 30   |        | Ω       |

All test items listed under Electrical Characteristics are done under the pulse load condition ( $T_j \approx T_a = 25^{\circ}C$ ) except for Output Noise, Ripple Rejection, Output Voltage Temperature Coefficient, Dropout Voltage at 1A Output Current and Thermal Shutdown items.

The specification in ☐ is checked and guaranteed by design engineering at  $-40^{\circ}\text{C} \leq T_a \leq 85^{\circ}\text{C}$ , unless otherwise noted.

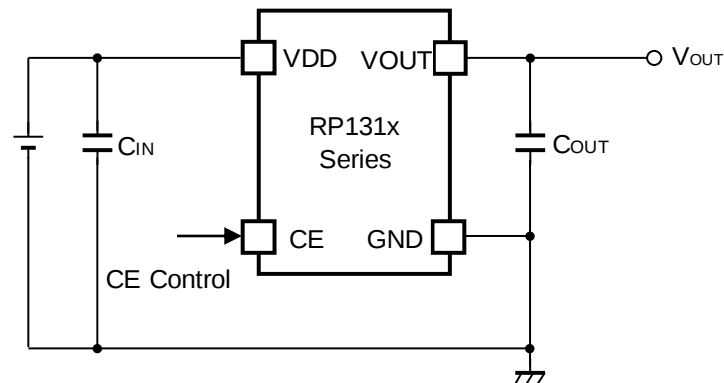
**Dropout Voltage**

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

| Output Voltage<br>$V_{\text{OUT}}$ (V) | Dropout Voltage $V_{\text{DIF}}$ (V) |       |                                |                            |       |                                |
|----------------------------------------|--------------------------------------|-------|--------------------------------|----------------------------|-------|--------------------------------|
|                                        | Condition                            | Typ.  | Max.                           | Condition                  | Typ.  | Max.                           |
| $0.8 \leq V_{\text{OUT}} < 0.9$        | $I_{\text{OUT}}=300\text{mA}$        | 0.600 | <input type="checkbox"/> 0.780 | $I_{\text{OUT}}=1\text{A}$ | 1.100 | <input type="checkbox"/> 1.650 |
| $0.9 \leq V_{\text{OUT}} < 1.0$        |                                      | 0.550 | <input type="checkbox"/> 0.690 |                            | 1.050 | <input type="checkbox"/> 1.500 |
| $1.0 \leq V_{\text{OUT}} < 1.1$        |                                      | 0.450 | <input type="checkbox"/> 0.610 |                            | 1.000 | <input type="checkbox"/> 1.450 |
| $1.1 \leq V_{\text{OUT}} < 1.2$        |                                      | 0.340 | <input type="checkbox"/> 0.540 |                            | 0.930 | <input type="checkbox"/> 1.420 |
| $1.2 \leq V_{\text{OUT}} < 1.5$        |                                      | 0.290 | <input type="checkbox"/> 0.500 |                            | 0.900 | <input type="checkbox"/> 1.380 |
| $1.5 \leq V_{\text{OUT}} < 2.6$        |                                      | 0.230 | <input type="checkbox"/> 0.310 |                            | 0.700 | <input type="checkbox"/> 1.100 |
| $2.6 \leq V_{\text{OUT}} < 3.3$        |                                      | 0.150 | <input type="checkbox"/> 0.180 |                            | 0.500 | <input type="checkbox"/> 0.750 |
| $3.3 \leq V_{\text{OUT}} \leq 5.5$     |                                      | 0.140 | <input type="checkbox"/> 0.170 |                            | 0.450 | <input type="checkbox"/> 0.650 |

## APPLICATION INFORMATION

### Typical Application Circuits



### Recommendation value of the external capacitors

| $V_{OUT}$           | Capacitors |                                 |                    |
|---------------------|------------|---------------------------------|--------------------|
| $V_{OUT} \leq 3.6V$ | $C_{IN}$   | Kyocera 2.2 $\mu$ F (size:1005) | [CM05X5R225M06AB]  |
|                     | $C_{OUT}$  | Kyocera 2.2 $\mu$ F (size:1608) | [CM105X5R225K06AB] |
| $V_{OUT} > 3.6V$    | $C_{IN}$   | Kyocera 2.2 $\mu$ F (size:1608) | [CM105X5R225K06AB] |
|                     | $C_{OUT}$  | Kyocera 4.7 $\mu$ F (size:1608) | [CM105X5R475M06AB] |

### Technical Notes on the External Components

When using this IC, consider following points:

#### Phase Compensation

In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, use a capacitor  $C_{OUT}$  with good frequency characteristics and ESR (Equivalent Series Resistance).

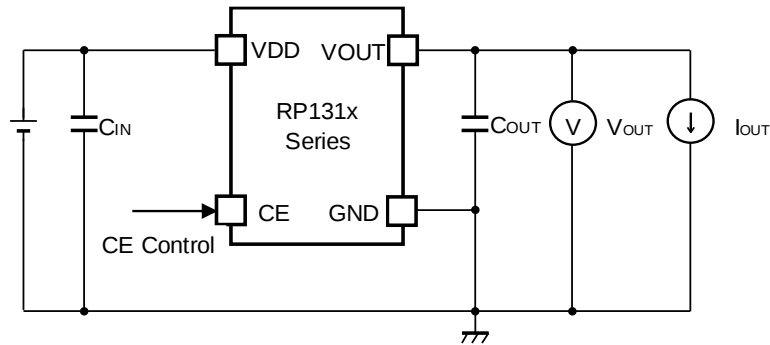
If a tantalum capacitor is used, and its ESR of  $C_{OUT}$  is large, the loop oscillation may result. Because of this, select  $C_{OUT}$  carefully considering its frequency characteristics.

#### PCB Layout

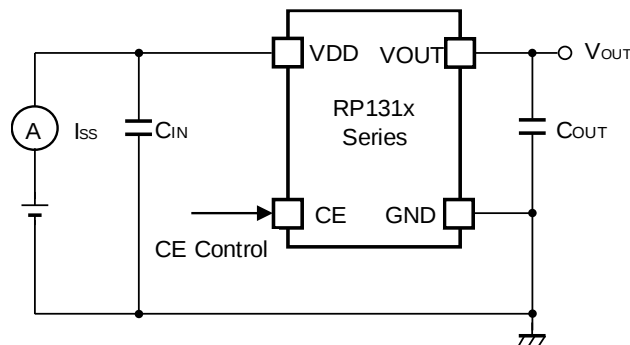
Make VDD and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a capacitor  $C_{IN}$  between VDD and GND pin with a capacitance value as "Recommendation value of the external capacitors" above or more, and as close as possible to the pins.

Set external components, especially the output capacitor  $C_{OUT}$ , as close as possible to the ICs, and make wiring as short as possible.

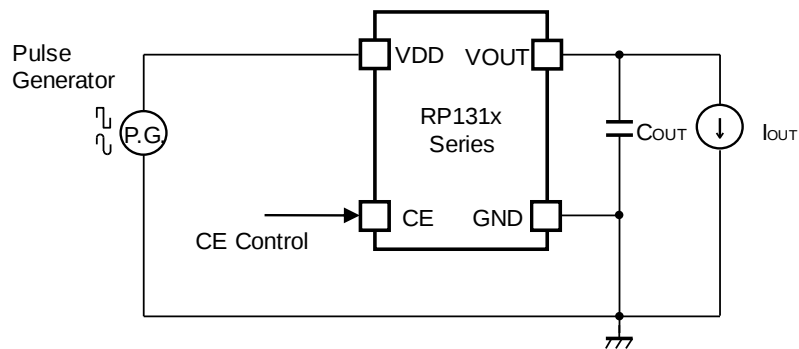
## TEST CIRCUITS



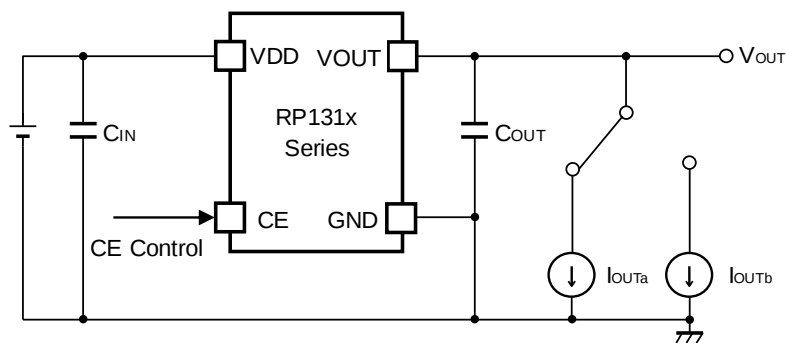
**Basic Test Circuit**



**Test Circuit for Supply Current**



**Test Circuit for Ripple Rejection**



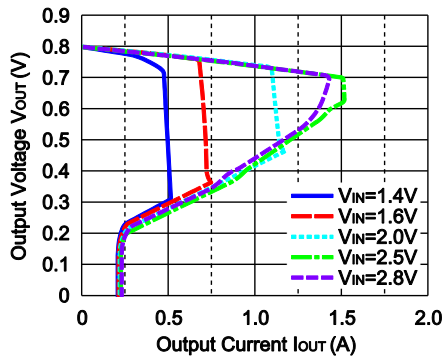
**Test Circuit for Load Transient Response**

## TYPICAL CHARACTERISTICS

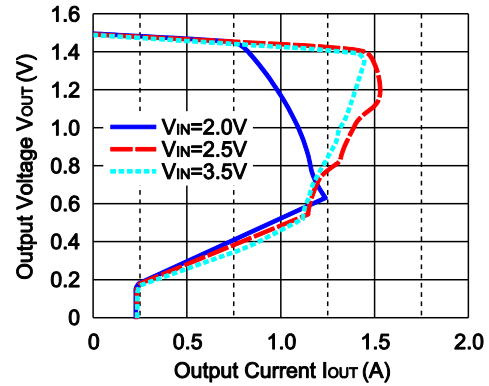
Typical Characteristics are intended to be used as reference data; they are not guaranteed.

### 1) Output Voltage vs. Output Current ( $T_a = 25^\circ\text{C}$ )

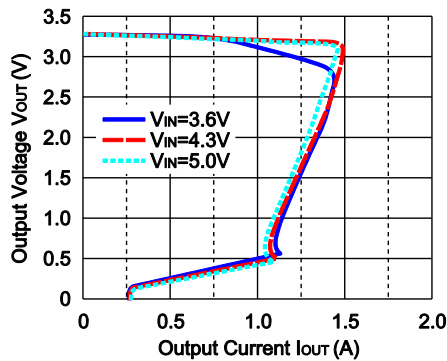
RP131x081x



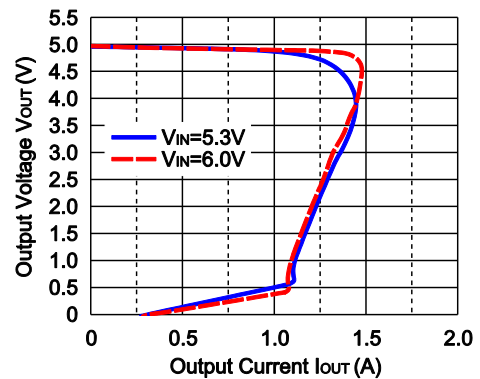
RP131x151x



RP131x331x

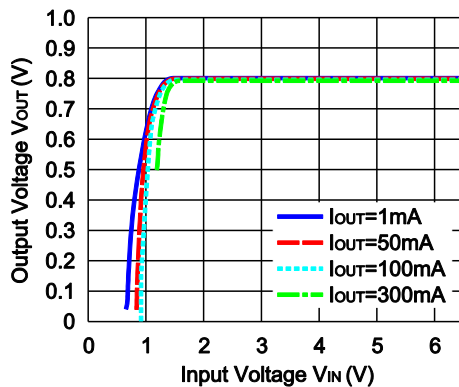


RP131x501x

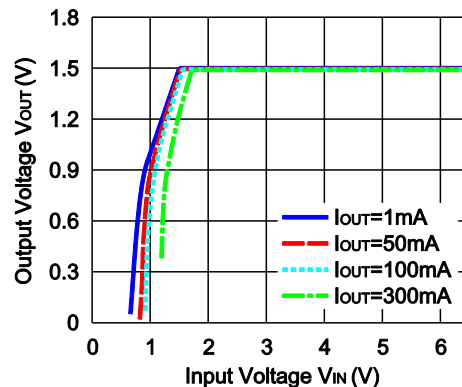


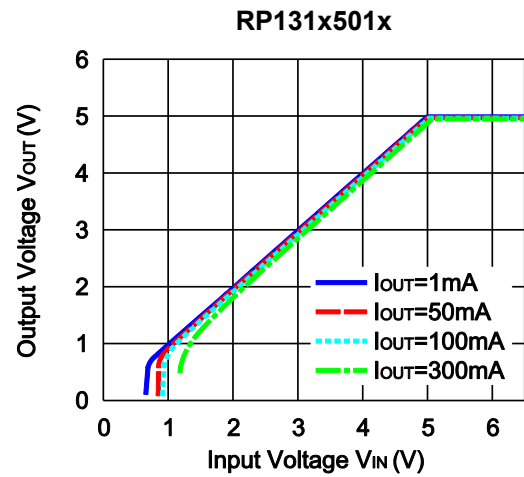
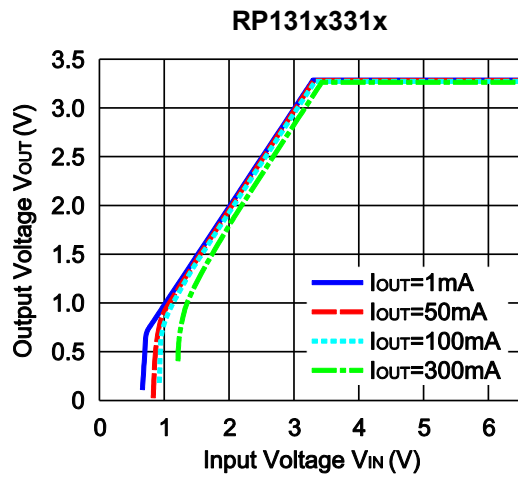
### 2) Output Voltage vs. Input Voltage ( $T_a = 25^\circ\text{C}$ )

RP131x081x

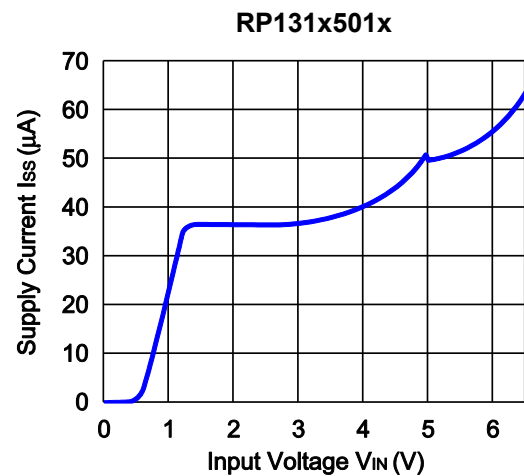
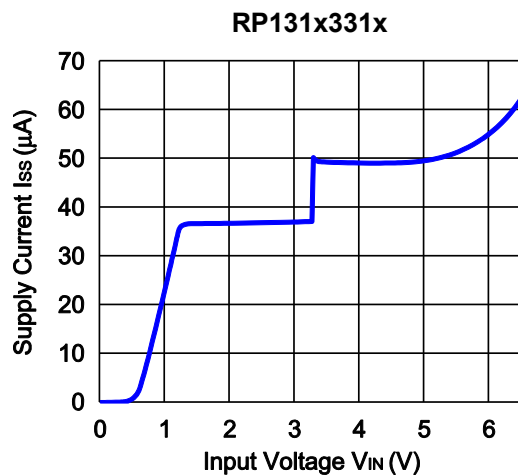
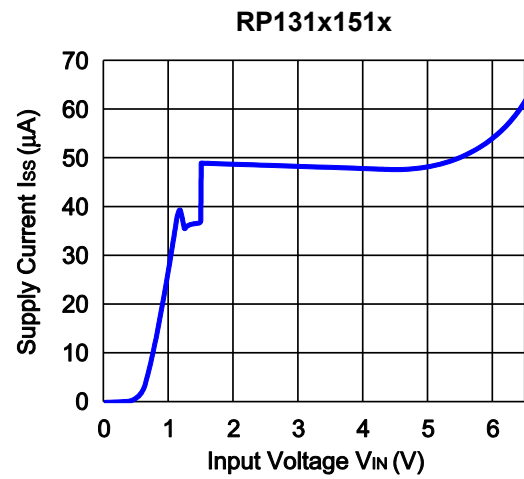
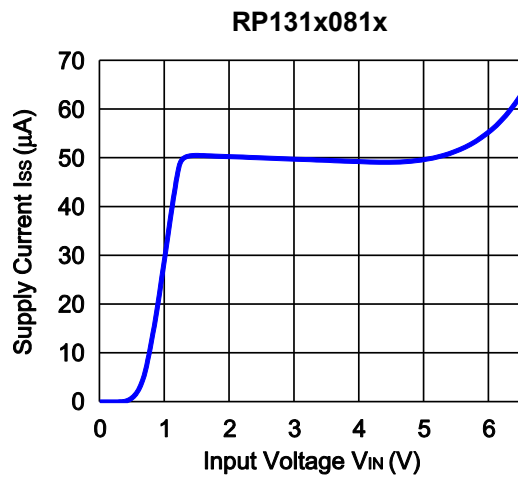


RP131x151x

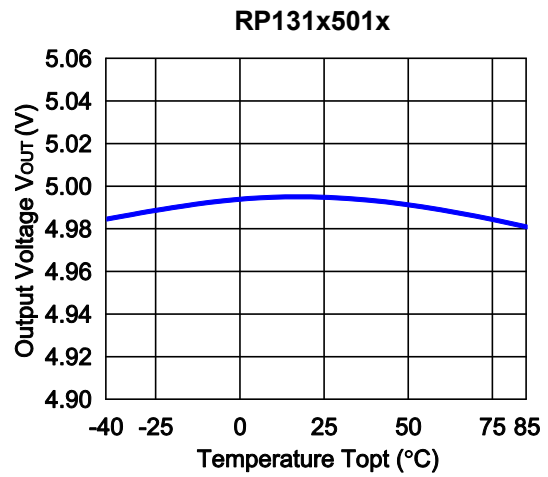
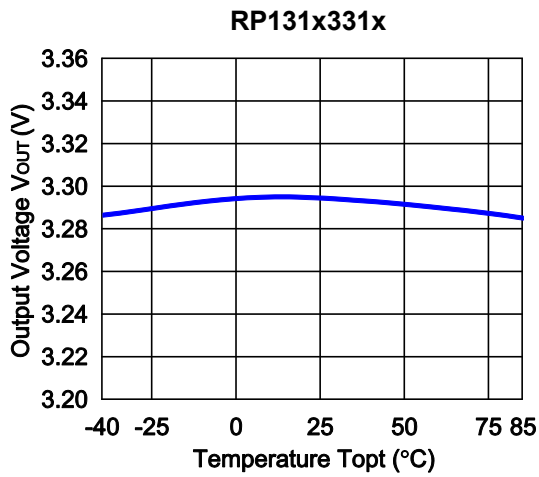
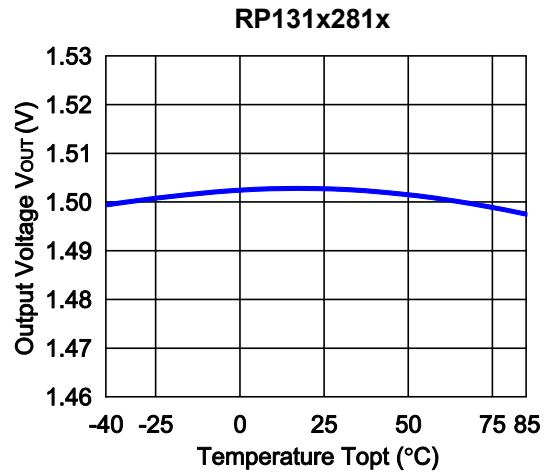
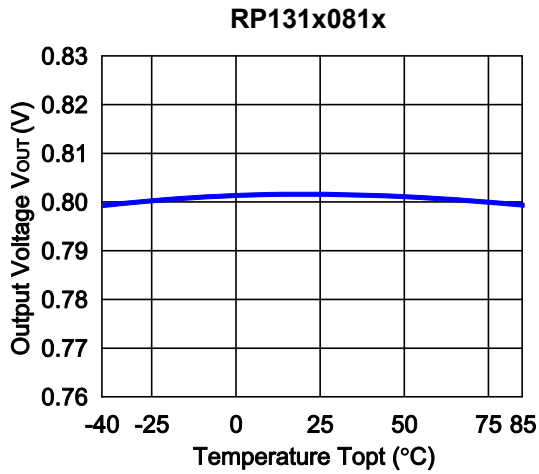




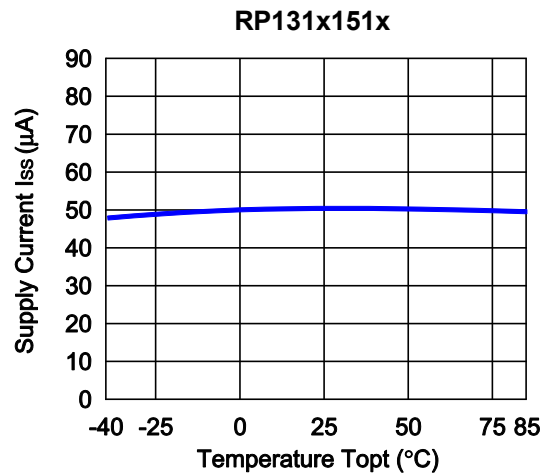
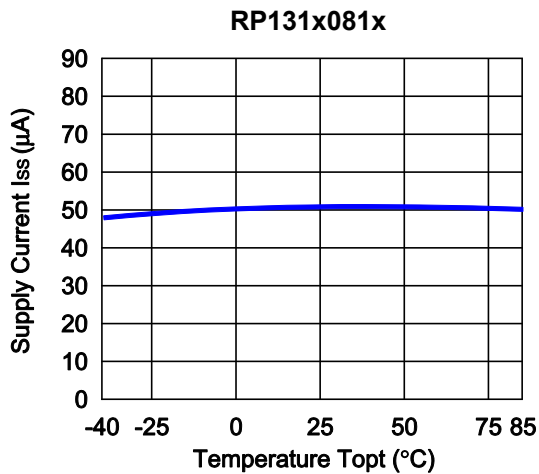
### 3) Supply Current vs. Input Voltage ( $T_a=25^\circ\text{C}$ )

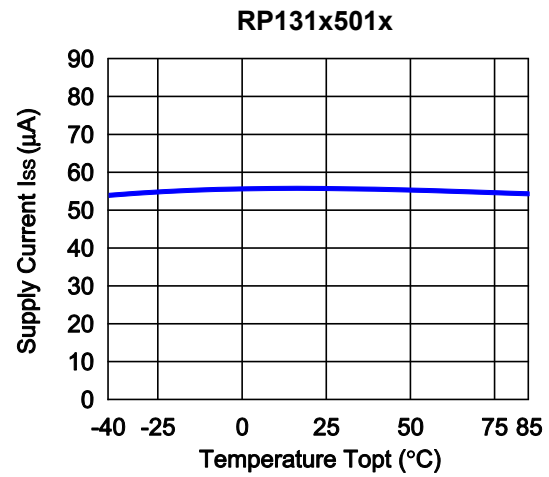
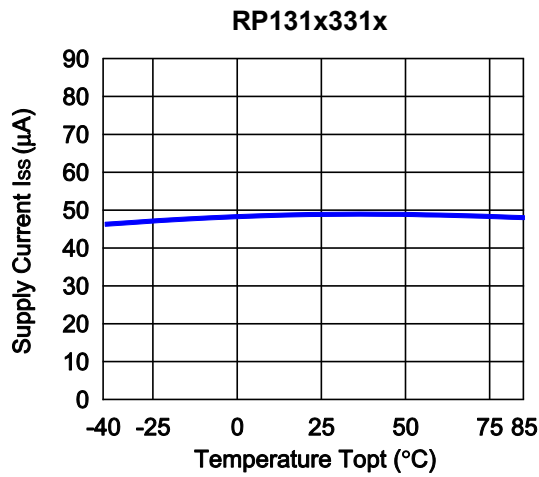


#### 4) Output Voltage vs. Temperature

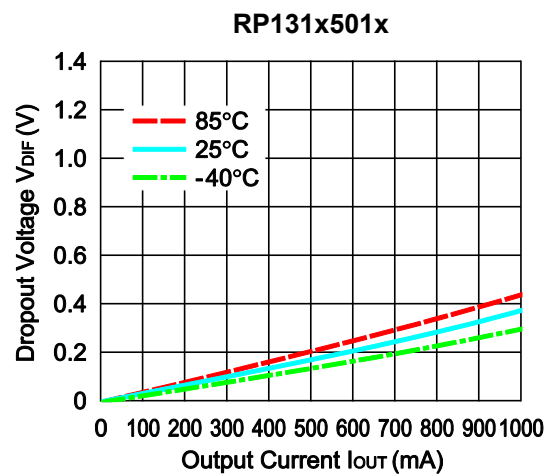
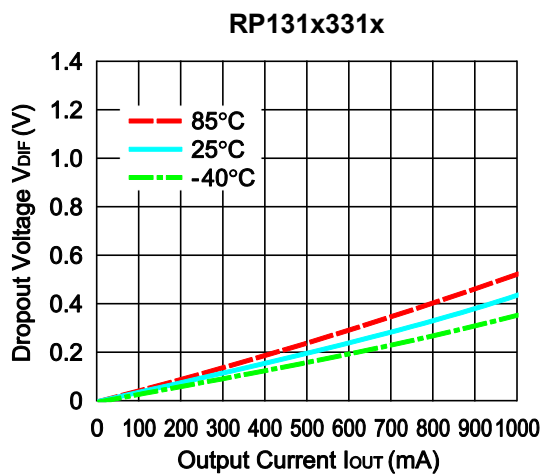
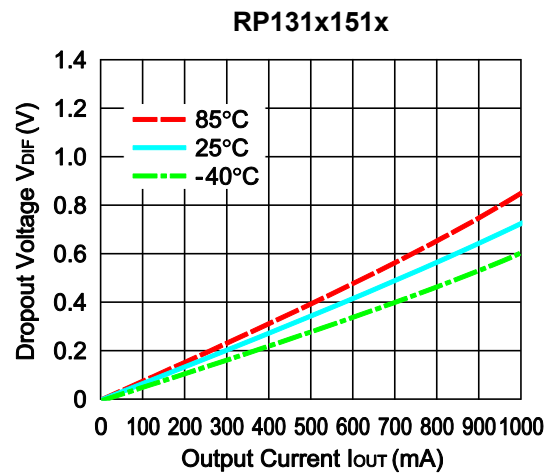
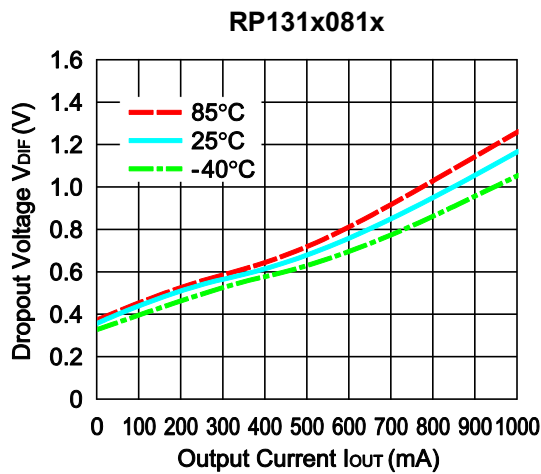


#### 5) Supply Current vs. Temperature

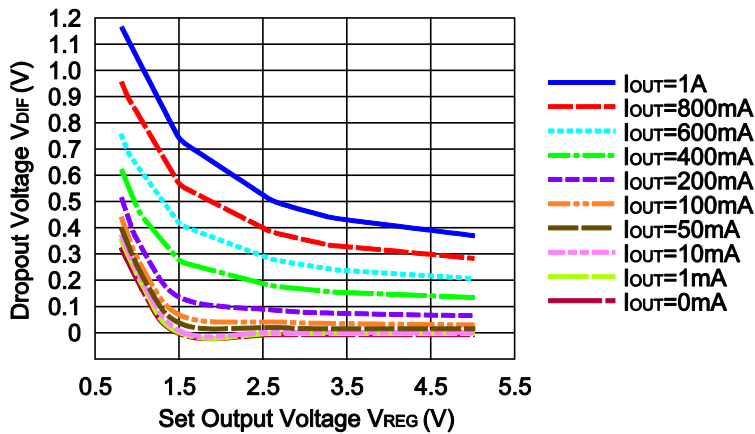




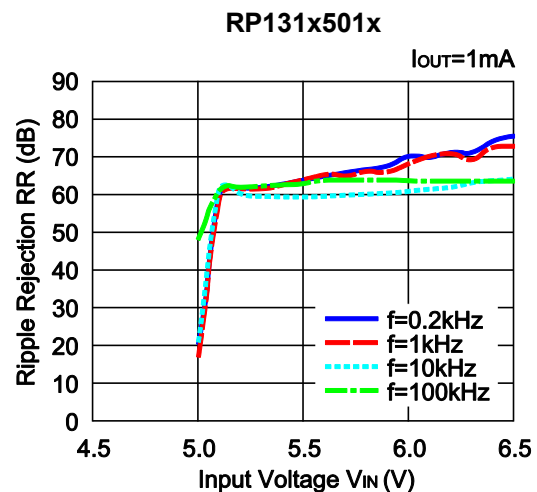
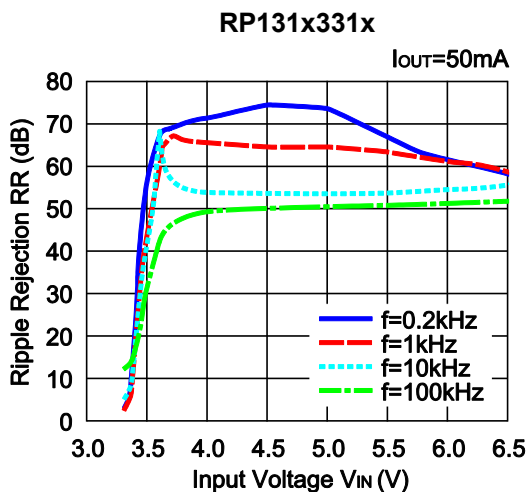
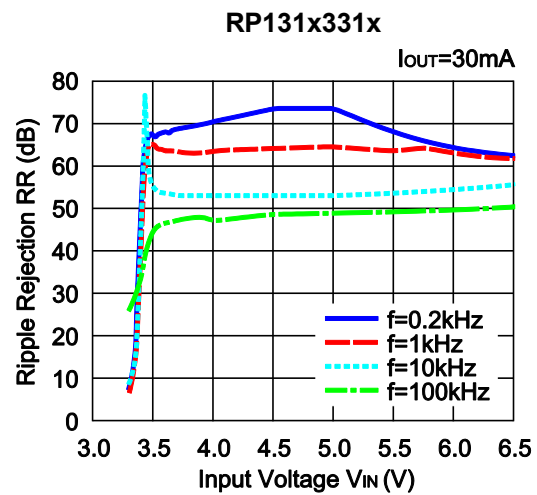
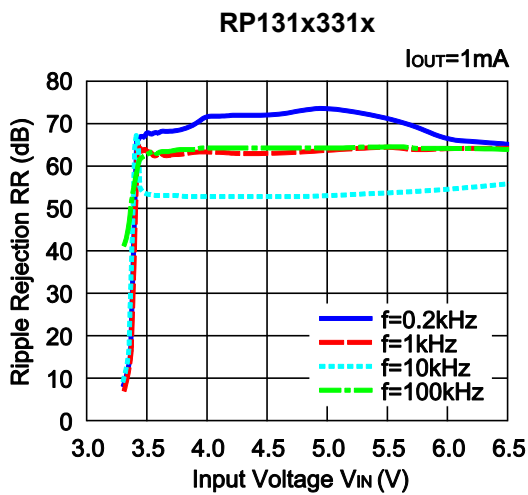
## 6) Dropout Voltage vs. Output Current

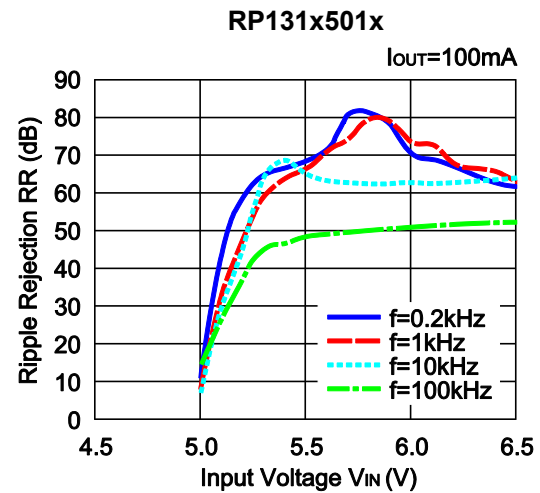
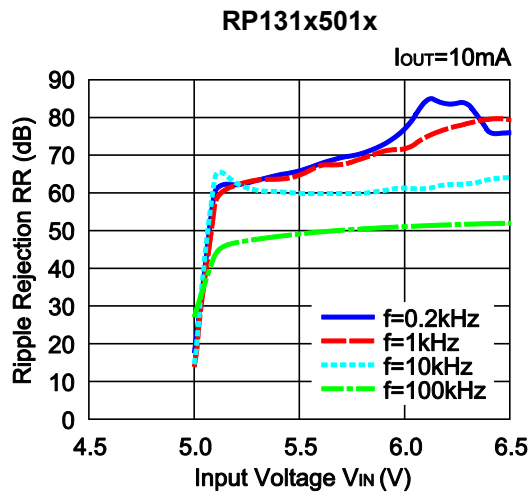


## 7) Dropout Voltage vs. Set Output Voltage

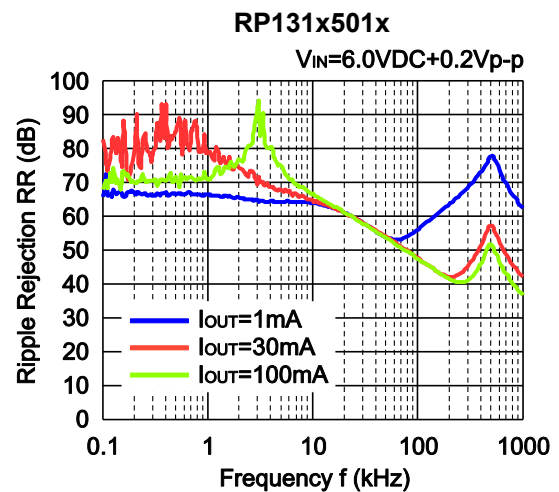
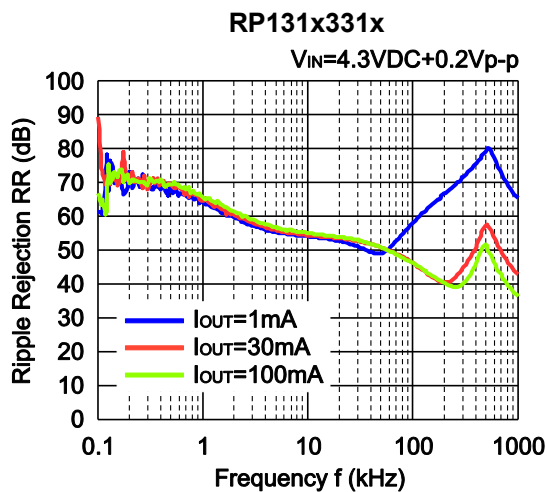
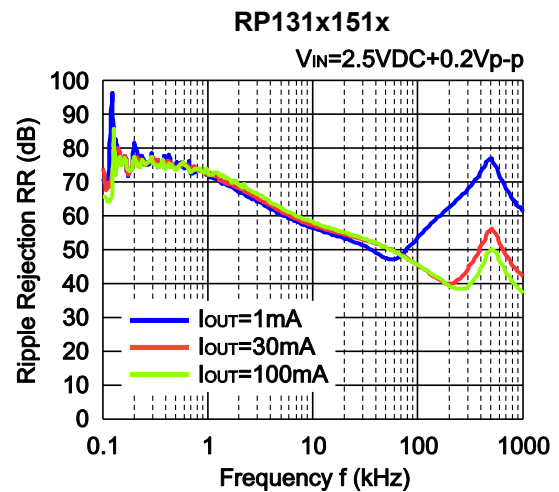
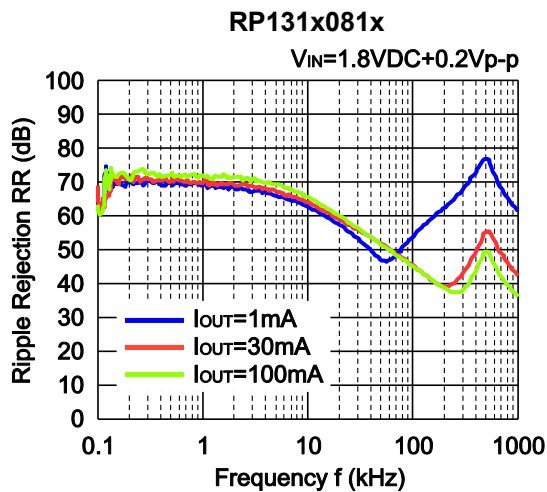


## 8) Ripple Rejection vs. Input Bias Voltage ( $C_{IN}$ =none, $C_{OUT}$ =Ceramic $1.0\mu F$ , Ripple=0.2Vp-p, $T_a=25^\circ C$ )

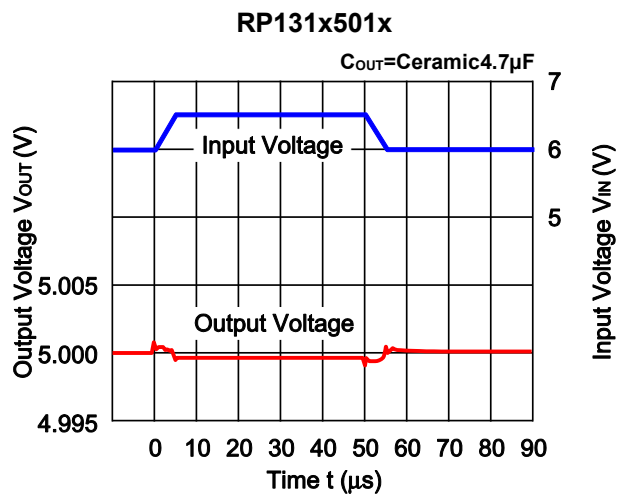
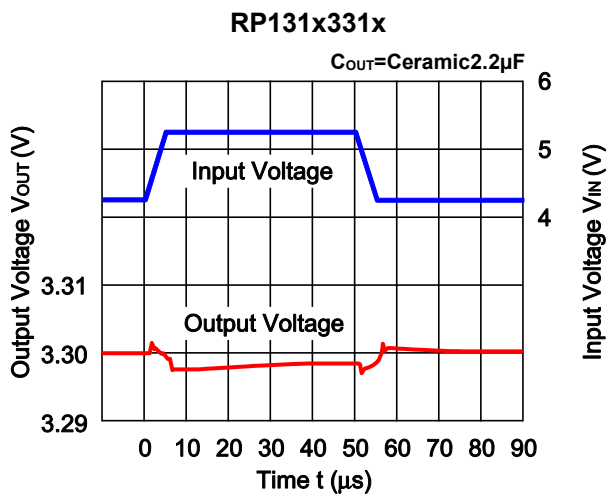
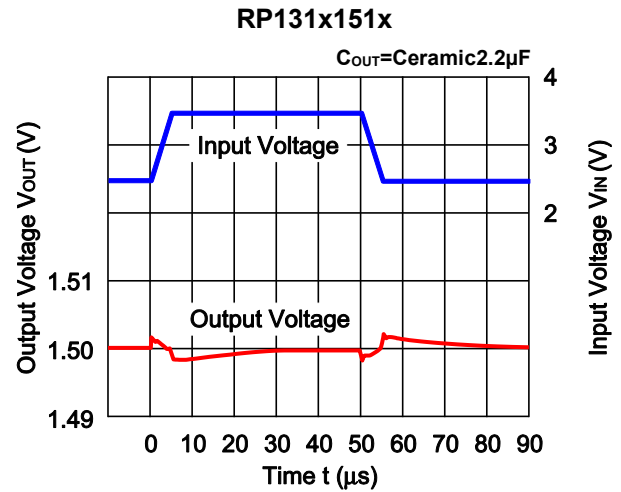
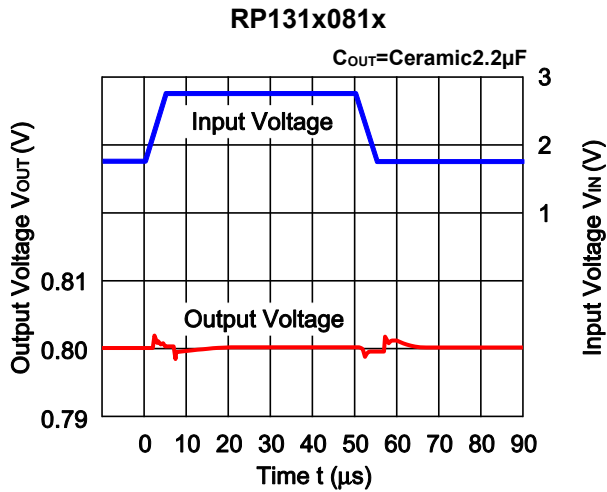




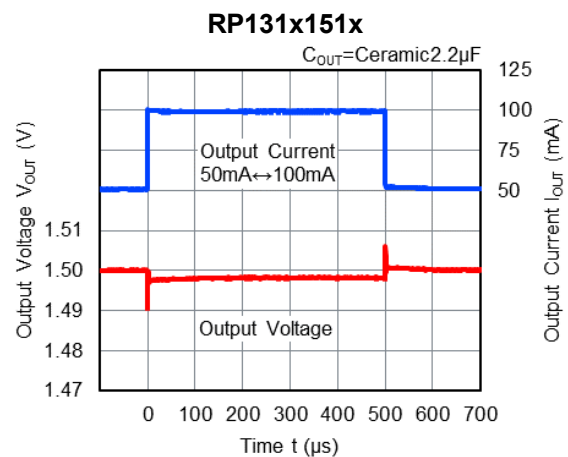
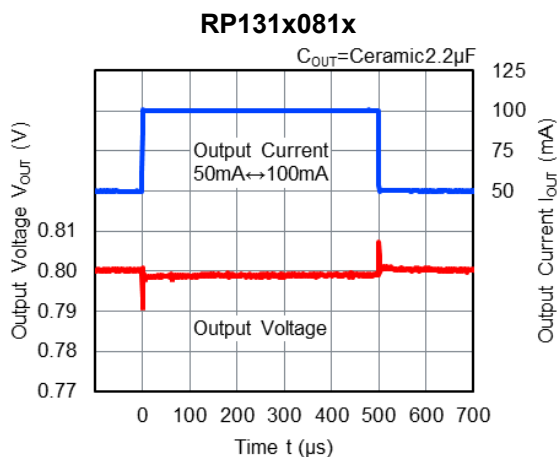
9) Ripple Rejection vs. Frequency ( $C_{IN}$ =none,  $C_{OUT}$ =Ceramic 4.7 $\mu F$ ,  $T_a=25^{\circ}C$ )

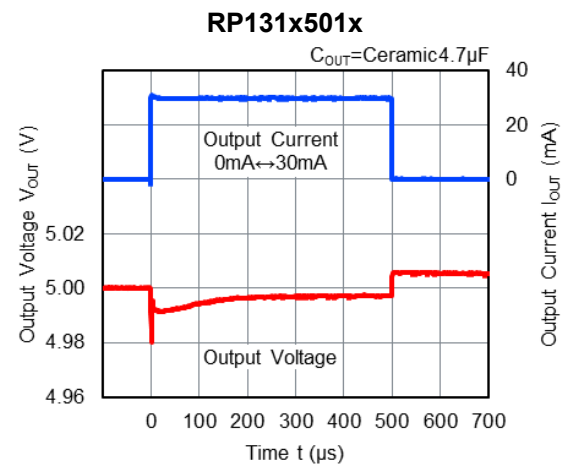
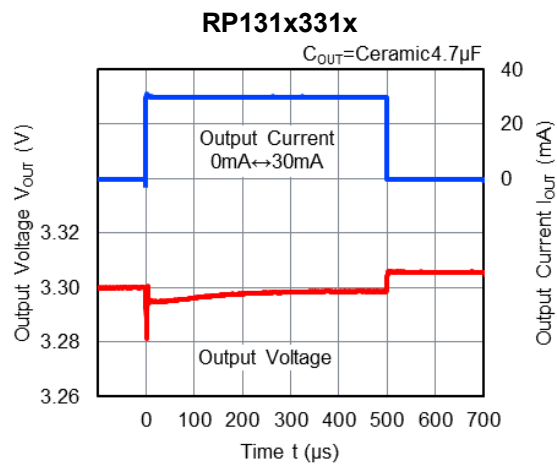
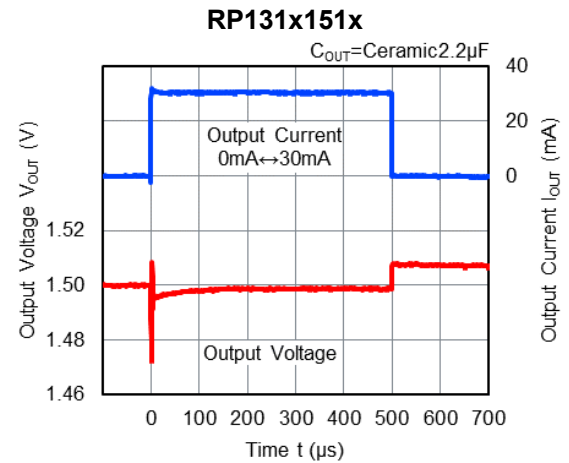
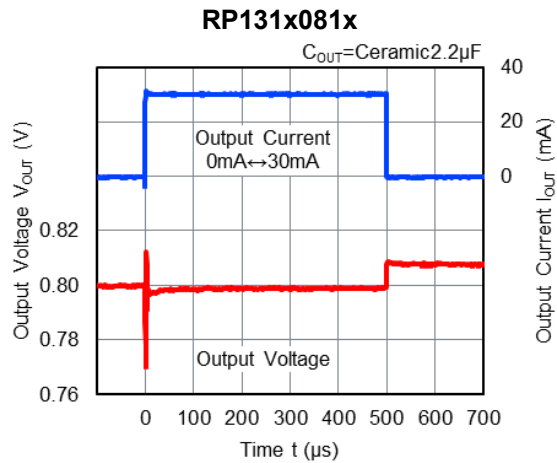
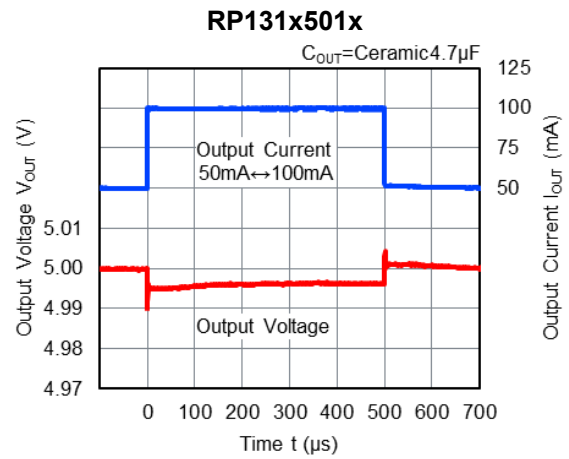
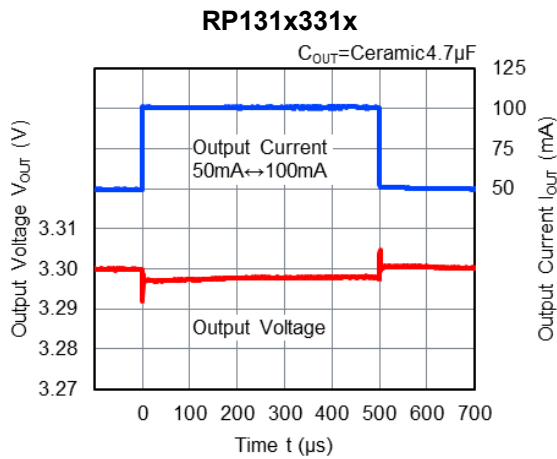


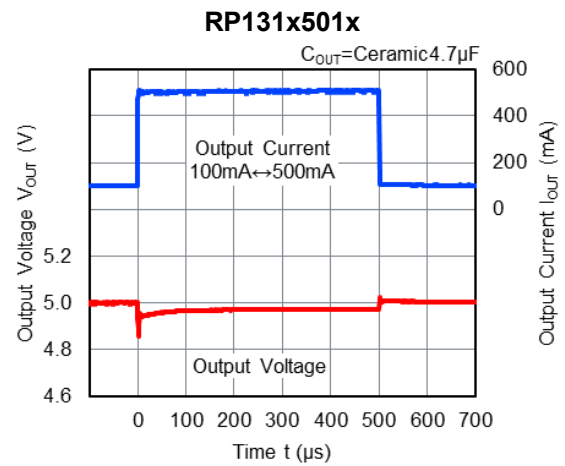
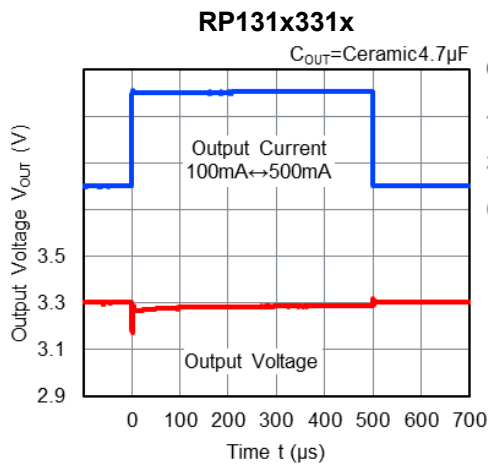
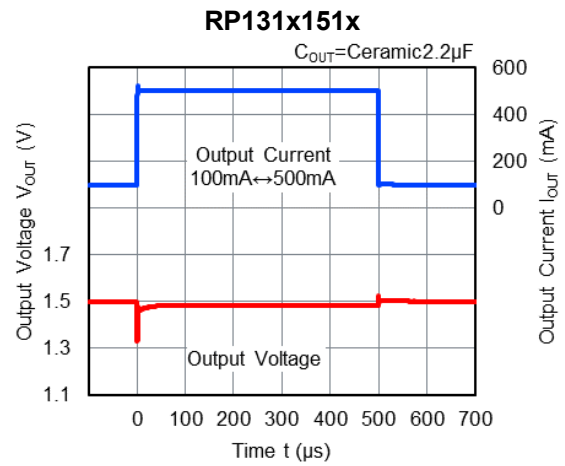
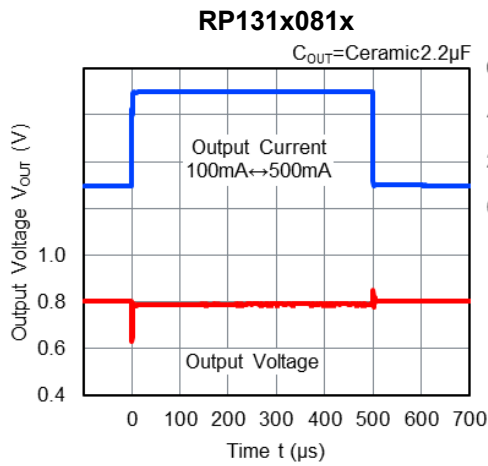
10) Input Transient Response ( $I_{OUT}=100\text{mA}$ ,  $t_r=t_f=5\mu\text{s}$ ,  $C_{IN}=\text{none}$ ,  $T_a=25^\circ\text{C}$ )



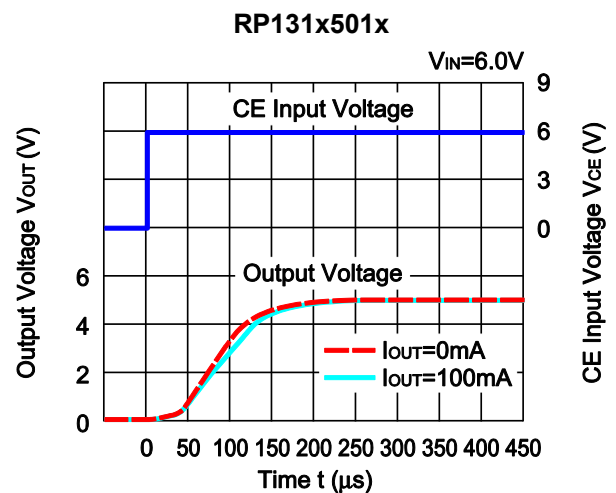
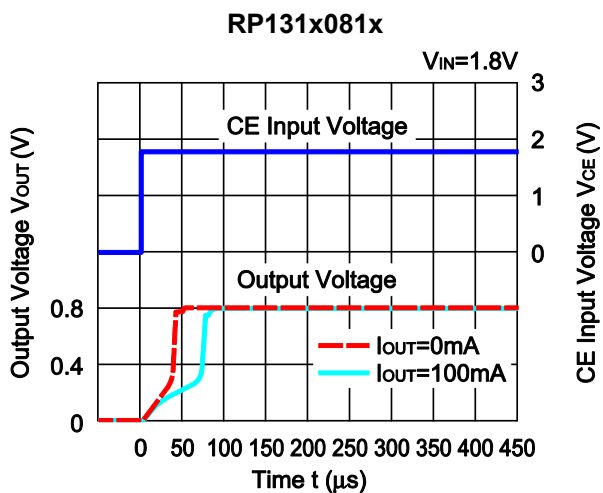
11) Load Transient Response ( $t_r=t_f=0.5\mu\text{s}$ ,  $C_{IN}=\text{Ceramic } 2.2\mu\text{F}$ ,  $V_{IN}=V_{OUT}+1.0\text{V}$ ,  $T_a=25^\circ\text{C}$ )



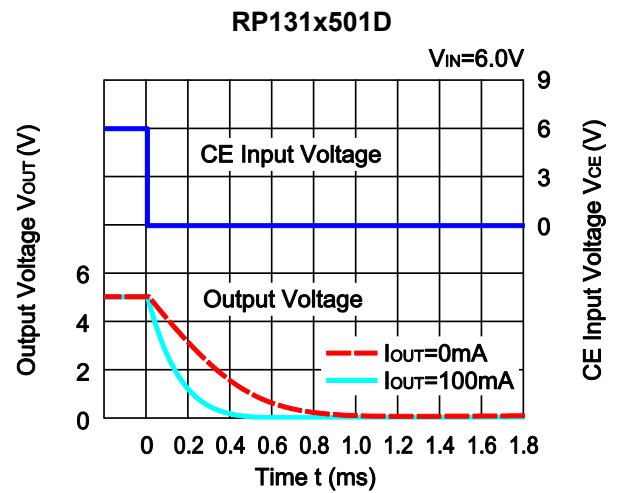
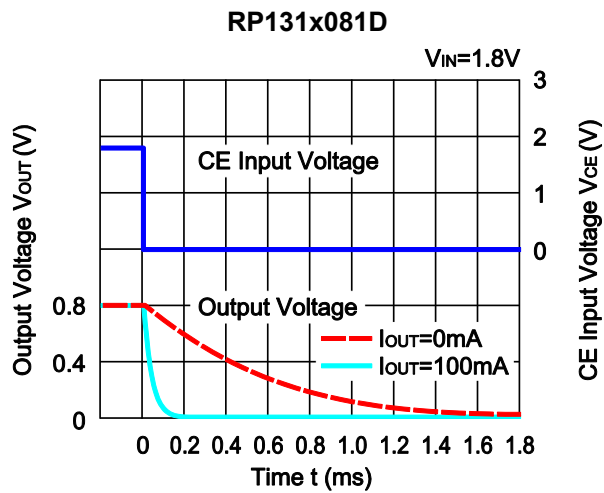




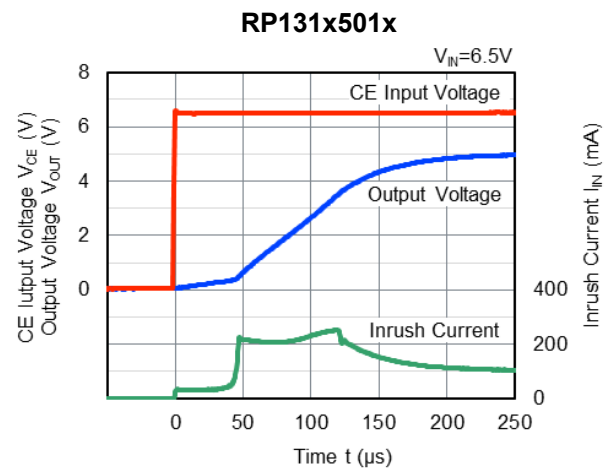
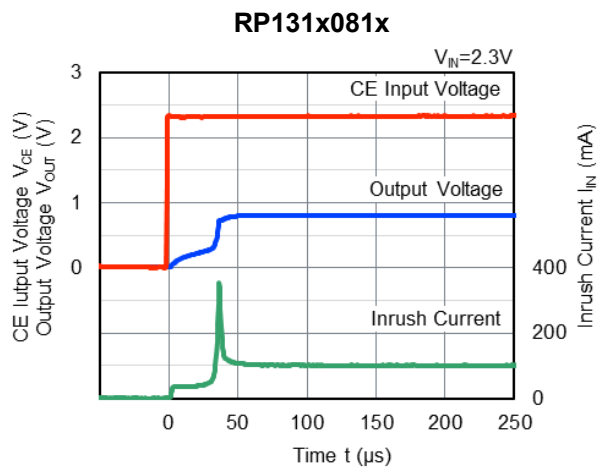
**12) Turn On Speed with CE pin (C<sub>IN</sub>=Ceramic 2.2μF, C<sub>OUT</sub>=Ceramic 4.7μF, Ta=25°C)**



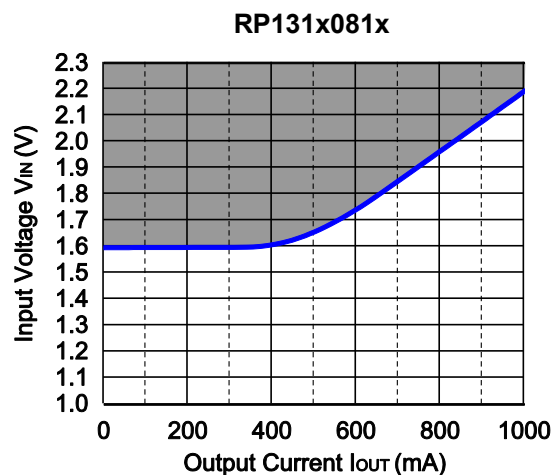
13) Turn Off Speed with CE pin (D Version) ( $C_{IN}$ =Ceramic 2.2 $\mu$ F,  $C_{OUT}$ =Ceramic 4.7 $\mu$ F,  $T_a$ =25°C)



14) Inrush Current at turning on ( $C_{IN}$ =Ceramic 2.2 $\mu$ F,  $C_{OUT}$ =Ceramic 4.7 $\mu$ F,  $T_a$ =25°C)



15) Minimum Operating Voltage



Hatched area is available for 0.8V output.

## 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 3MHz

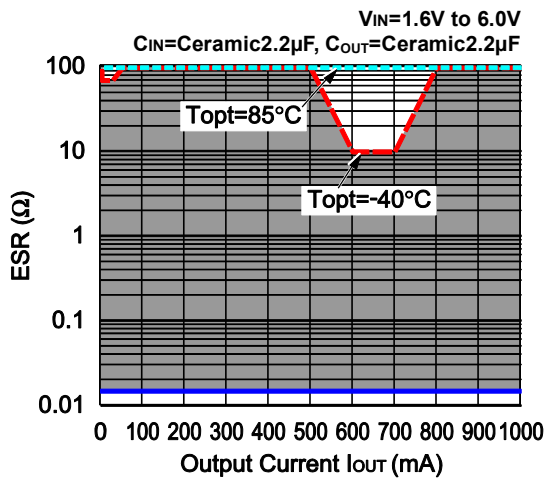
Temperature :  $-40^{\circ}C$  to  $85^{\circ}C$

$C_{IN}$  :  $2.2\mu F$  (Kyocera, CM05X5R225M04AD)

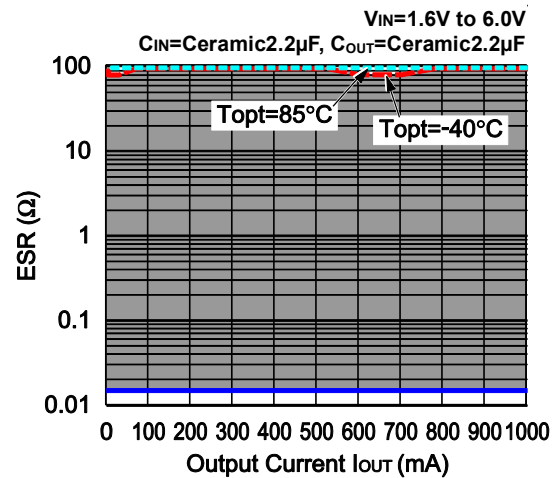
$C_{OUT}$  :  $2.2\mu F$  (Kyocera, CM105X5R225K06AE)

$4.7\mu F$  (Kyocera, CM105X5R475M06AB)

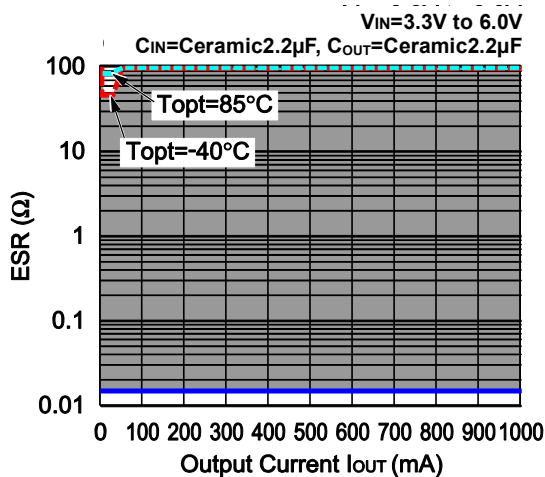
RP131x081x



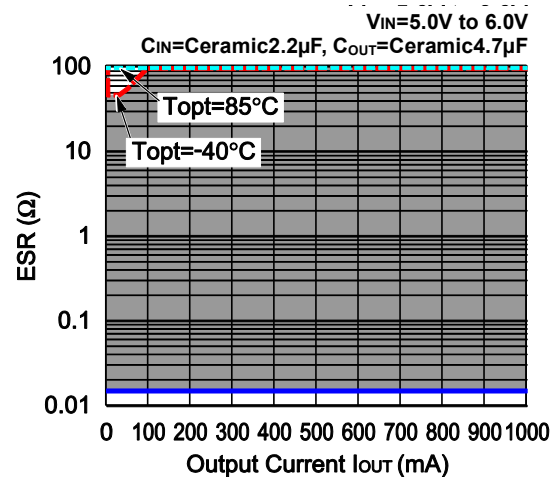
RP131x151x



RP131x331x

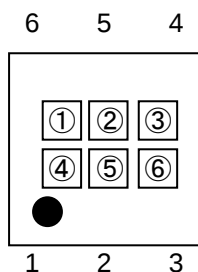


RP131x501x



## RP131L SERIES MARK SPECIFICATION

### • DFN1616-6B



① to ④ : Product Code (Refer to Part Number vs. Product Code)

⑤, ⑥ : Lot Number

### • Part Number vs. Product Code

RP131Lxx1B Series

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131L081B  | C            | B | 0 | 1 |
| RP131L091B  | C            | B | 0 | 2 |
| RP131L101B  | C            | B | 0 | 3 |
| RP131L111B  | C            | B | 0 | 4 |
| RP131L121B  | C            | B | 0 | 5 |
| RP131L131B  | C            | B | 0 | 7 |
| RP131L141B  | C            | B | 0 | 8 |
| RP131L151B  | C            | B | 0 | 9 |
| RP131L161B  | C            | B | 1 | 0 |
| RP131L171B  | C            | B | 1 | 1 |
| RP131L181B  | C            | B | 1 | 2 |
| RP131L191B  | C            | B | 1 | 4 |
| RP131L201B  | C            | B | 1 | 5 |
| RP131L211B  | C            | B | 1 | 6 |
| RP131L221B  | C            | B | 1 | 7 |
| RP131L231B  | C            | B | 1 | 8 |
| RP131L241B  | C            | B | 1 | 9 |
| RP131L251B  | C            | B | 2 | 0 |
| RP131L261B  | C            | B | 2 | 1 |
| RP131L271B  | C            | B | 2 | 2 |
| RP131L281B  | C            | B | 2 | 3 |
| RP131L291B  | C            | B | 2 | 5 |

RP131Lxx1D Series

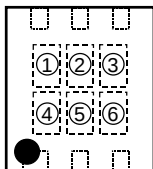
| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131L081D  | C            | C | 0 | 1 |
| RP131L091D  | C            | C | 0 | 2 |
| RP131L101D  | C            | C | 0 | 3 |
| RP131L111D  | C            | C | 0 | 4 |
| RP131L121D  | C            | C | 0 | 5 |
| RP131L131D  | C            | C | 0 | 7 |
| RP131L141D  | C            | C | 0 | 8 |
| RP131L151D  | C            | C | 0 | 9 |
| RP131L161D  | C            | C | 1 | 0 |
| RP131L171D  | C            | C | 1 | 1 |
| RP131L181D  | C            | C | 1 | 2 |
| RP131L191D  | C            | C | 1 | 4 |
| RP131L201D  | C            | C | 1 | 5 |
| RP131L211D  | C            | C | 1 | 6 |
| RP131L221D  | C            | C | 1 | 7 |
| RP131L231D  | C            | C | 1 | 8 |
| RP131L241D  | C            | C | 1 | 9 |
| RP131L251D  | C            | C | 2 | 0 |
| RP131L261D  | C            | C | 2 | 1 |
| RP131L271D  | C            | C | 2 | 2 |
| RP131L281D  | C            | C | 2 | 3 |
| RP131L291D  | C            | C | 2 | 5 |

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131L301B  | C            | B | 2 | 6 |
| RP131L311B  | C            | B | 2 | 7 |
| RP131L321B  | C            | B | 2 | 8 |
| RP131L331B  | C            | B | 2 | 9 |
| RP131L341B  | C            | B | 3 | 0 |
| RP131L351B  | C            | B | 3 | 1 |
| RP131L361B  | C            | B | 3 | 2 |
| RP131L371B  | C            | B | 3 | 3 |
| RP131L381B  | C            | B | 3 | 4 |
| RP131L391B  | C            | B | 3 | 5 |
| RP131L401B  | C            | B | 3 | 6 |
| RP131L411B  | C            | B | 3 | 7 |
| RP131L421B  | C            | B | 3 | 8 |
| RP131L431B  | C            | B | 3 | 9 |
| RP131L441B  | C            | B | 4 | 0 |
| RP131L451B  | C            | B | 4 | 1 |
| RP131L461B  | C            | B | 4 | 2 |
| RP131L471B  | C            | B | 4 | 3 |
| RP131L481B  | C            | B | 4 | 4 |
| RP131L491B  | C            | B | 4 | 5 |
| RP131L501B  | C            | B | 4 | 6 |
| RP131L511B  | C            | B | 4 | 8 |
| RP131L521B  | C            | B | 4 | 9 |
| RP131L531B  | C            | B | 5 | 0 |
| RP131L541B  | C            | B | 5 | 1 |
| RP131L551B  | C            | B | 5 | 2 |
| RP131L101B5 | C            | B | 4 | 7 |
| RP131L121B5 | C            | B | 0 | 6 |
| RP131L181B5 | C            | B | 1 | 3 |
| RP131L281B5 | C            | B | 2 | 4 |

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131L301D  | C            | C | 2 | 6 |
| RP131L311D  | C            | C | 2 | 7 |
| RP131L321D  | C            | C | 2 | 8 |
| RP131L331D  | C            | C | 2 | 9 |
| RP131L341D  | C            | C | 3 | 0 |
| RP131L351D  | C            | C | 3 | 1 |
| RP131L361D  | C            | C | 3 | 2 |
| RP131L371D  | C            | C | 3 | 3 |
| RP131L381D  | C            | C | 3 | 4 |
| RP131L391D  | C            | C | 3 | 5 |
| RP131L401D  | C            | C | 3 | 6 |
| RP131L411D  | C            | C | 3 | 7 |
| RP131L421D  | C            | C | 3 | 8 |
| RP131L431D  | C            | C | 3 | 9 |
| RP131L441D  | C            | C | 4 | 0 |
| RP131L451D  | C            | C | 4 | 1 |
| RP131L461D  | C            | C | 4 | 2 |
| RP131L471D  | C            | C | 4 | 3 |
| RP131L481D  | C            | C | 4 | 4 |
| RP131L491D  | C            | C | 4 | 5 |
| RP131L501D  | C            | C | 4 | 6 |
| RP131L511D  | C            | C | 4 | 8 |
| RP131L521D  | C            | C | 4 | 9 |
| RP131L531D  | C            | C | 5 | 0 |
| RP131L541D  | C            | C | 5 | 1 |
| RP131L551D  | C            | C | 5 | 2 |
| RP131L101D5 | C            | C | 4 | 7 |
| RP131L121D5 | C            | C | 0 | 6 |
| RP131L181D5 | C            | C | 1 | 3 |
| RP131L281D5 | C            | C | 2 | 4 |

## RP131K SERIES MARK SPECIFICATION

### • DFN(PL)1820-6



① to ④ : Product Code (Refer to Part Number vs. Product Code)

⑤, ⑥ : Lot Number

### • Part Number vs. Product Code

RP131Kxx1B Series

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131K081B  | A            | M | 0 | 1 |
| RP131K091B  | A            | M | 0 | 2 |
| RP131K101B  | A            | M | 0 | 3 |
| RP131K111B  | A            | M | 0 | 4 |
| RP131K121B  | A            | M | 0 | 5 |
| RP131K131B  | A            | M | 0 | 7 |
| RP131K141B  | A            | M | 0 | 8 |
| RP131K151B  | A            | M | 0 | 9 |
| RP131K161B  | A            | M | 1 | 0 |
| RP131K171B  | A            | M | 1 | 1 |
| RP131K181B  | A            | M | 1 | 2 |
| RP131K191B  | A            | M | 1 | 4 |
| RP131K201B  | A            | M | 1 | 5 |
| RP131K211B  | A            | M | 1 | 6 |
| RP131K221B  | A            | M | 1 | 7 |
| RP131K231B  | A            | M | 1 | 8 |
| RP131K241B  | A            | M | 1 | 9 |
| RP131K251B  | A            | M | 2 | 0 |
| RP131K261B  | A            | M | 2 | 1 |
| RP131K271B  | A            | M | 2 | 2 |
| RP131K281B  | A            | M | 2 | 3 |
| RP131K291B  | A            | M | 2 | 5 |

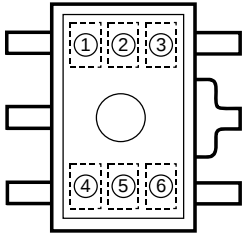
RP131Kxx1D Series

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131K081D  | A            | N | 0 | 1 |
| RP131K091D  | A            | N | 0 | 2 |
| RP131K101D  | A            | N | 0 | 3 |
| RP131K111D  | A            | N | 0 | 4 |
| RP131K121D  | A            | N | 0 | 5 |
| RP131K131D  | A            | N | 0 | 7 |
| RP131K141D  | A            | N | 0 | 8 |
| RP131K151D  | A            | N | 0 | 9 |
| RP131K161D  | A            | N | 1 | 0 |
| RP131K171D  | A            | N | 1 | 1 |
| RP131K181D  | A            | N | 1 | 2 |
| RP131K191D  | A            | N | 1 | 4 |
| RP131K201D  | A            | N | 1 | 5 |
| RP131K211D  | A            | N | 1 | 6 |
| RP131K221D  | A            | N | 1 | 7 |
| RP131K231D  | A            | N | 1 | 8 |
| RP131K241D  | A            | N | 1 | 9 |
| RP131K251D  | A            | N | 2 | 0 |
| RP131K261D  | A            | N | 2 | 1 |
| RP131K271D  | A            | N | 2 | 2 |
| RP131K281D  | A            | N | 2 | 3 |
| RP131K291D  | A            | N | 2 | 5 |

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131K301D  | A            | N | 2 | 6 |
| RP131K311D  | A            | N | 2 | 7 |
| RP131K321D  | A            | N | 2 | 8 |
| RP131K331D  | A            | N | 2 | 9 |
| RP131K341D  | A            | N | 3 | 0 |
| RP131K351D  | A            | N | 3 | 1 |
| RP131K361D  | A            | N | 3 | 2 |
| RP131K371D  | A            | N | 3 | 3 |
| RP131K381D  | A            | N | 3 | 4 |
| RP131K391D  | A            | N | 3 | 5 |
| RP131K401D  | A            | N | 3 | 6 |
| RP131K411D  | A            | N | 3 | 7 |
| RP131K421D  | A            | N | 3 | 8 |
| RP131K431D  | A            | N | 3 | 9 |
| RP131K441D  | A            | N | 4 | 0 |
| RP131K451D  | A            | N | 4 | 1 |
| RP131K461D  | A            | N | 4 | 2 |
| RP131K471D  | A            | N | 4 | 3 |
| RP131K481D  | A            | N | 4 | 4 |
| RP131K491D  | A            | N | 4 | 5 |
| RP131K501D  | A            | N | 4 | 6 |
| RP131K511D  | A            | N | 4 | 9 |
| RP131K521D  | A            | N | 5 | 0 |
| RP131K531D  | A            | N | 5 | 1 |
| RP131K541D  | A            | N | 5 | 2 |
| RP131K551D  | A            | N | 4 | 8 |
| RP131K101D5 | A            | N | 4 | 7 |
| RP131K121D5 | A            | N | 0 | 6 |
| RP131K181D5 | A            | N | 1 | 3 |
| RP131K281D5 | A            | N | 2 | 4 |

## RP131H SERIES MARK SPECIFICATION

### ● SOT-89-5



① to ④ : Product Code (Refer to Part Number vs. Product Code)

⑤, ⑥ : Lot Number

### ● Part Number vs. Product Code

#### RP131Hxx1B Series

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131H081B  | U            | 0 | 8 | B |
| RP131H091B  | U            | 0 | 9 | B |
| RP131H101B  | U            | 1 | 0 | B |
| RP131H111B  | U            | 1 | 1 | B |
| RP131H121B  | U            | 1 | 2 | B |
| RP131H131B  | U            | 1 | 3 | B |
| RP131H141B  | U            | 1 | 4 | B |
| RP131H151B  | U            | 1 | 5 | B |
| RP131H161B  | U            | 1 | 6 | B |
| RP131H171B  | U            | 1 | 7 | B |
| RP131H181B  | U            | 1 | 8 | B |
| RP131H191B  | U            | 1 | 9 | B |
| RP131H201B  | U            | 2 | 0 | B |
| RP131H211B  | U            | 2 | 1 | B |
| RP131H221B  | U            | 2 | 2 | B |
| RP131H231B  | U            | 2 | 3 | B |
| RP131H241B  | U            | 2 | 4 | B |
| RP131H251B  | U            | 2 | 5 | B |
| RP131H261B  | U            | 2 | 6 | B |
| RP131H271B  | U            | 2 | 7 | B |
| RP131H281B  | U            | 2 | 8 | B |
| RP131H291B  | U            | 2 | 9 | B |
| RP131H301B  | U            | 3 | 0 | B |
| RP131H311B  | U            | 3 | 1 | B |
| RP131H321B  | U            | 3 | 2 | B |
| RP131H331B  | U            | 3 | 3 | B |
| RP131H341B  | U            | 3 | 4 | B |
| RP131H351B  | U            | 3 | 5 | B |
| RP131H361B  | U            | 3 | 6 | B |
| RP131H371B  | U            | 3 | 7 | B |
| RP131H381B  | U            | 3 | 8 | B |
| RP131H391B  | U            | 3 | 9 | B |

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131H401B  | U            | 4 | 0 | B |
| RP131H411B  | U            | 4 | 1 | B |
| RP131H421B  | U            | 4 | 2 | B |
| RP131H431B  | U            | 4 | 3 | B |
| RP131H441B  | U            | 4 | 4 | B |
| RP131H451B  | U            | 4 | 5 | B |
| RP131H461B  | U            | 4 | 6 | B |
| RP131H471B  | U            | 4 | 7 | B |
| RP131H481B  | U            | 4 | 8 | B |
| RP131H491B  | U            | 4 | 9 | B |
| RP131H501B  | U            | 5 | 0 | B |
| RP131H511B  | U            | 5 | 1 | B |
| RP131H521B  | U            | 5 | 2 | B |
| RP131H531B  | U            | 5 | 3 | B |
| RP131H541B  | U            | 5 | 4 | B |
| RP131H551B  | U            | 5 | 5 | B |
| RP131H101B5 | U            | 0 | 4 | B |
| RP131H121B5 | U            | 0 | 1 | B |
| RP131H181B5 | U            | 0 | 2 | B |
| RP131H281B5 | U            | 0 | 3 | B |

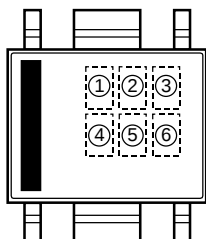
#### RP131Hxx1D Series

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131H081D  | U            | 0 | 8 | D |
| RP131H091D  | U            | 0 | 9 | D |
| RP131H101D  | U            | 1 | 0 | D |
| RP131H111D  | U            | 1 | 1 | D |
| RP131H121D  | U            | 1 | 2 | D |
| RP131H131D  | U            | 1 | 3 | D |
| RP131H141D  | U            | 1 | 4 | D |
| RP131H151D  | U            | 1 | 5 | D |
| RP131H161D  | U            | 1 | 6 | D |
| RP131H171D  | U            | 1 | 7 | D |
| RP131H181D  | U            | 1 | 8 | D |
| RP131H191D  | U            | 1 | 9 | D |
| RP131H201D  | U            | 2 | 0 | D |
| RP131H211D  | U            | 2 | 1 | D |
| RP131H221D  | U            | 2 | 2 | D |
| RP131H231D  | U            | 2 | 3 | D |
| RP131H241D  | U            | 2 | 4 | D |
| RP131H251D  | U            | 2 | 5 | D |
| RP131H261D  | U            | 2 | 6 | D |
| RP131H271D  | U            | 2 | 7 | D |
| RP131H281D  | U            | 2 | 8 | D |
| RP131H291D  | U            | 2 | 9 | D |
| RP131H301D  | U            | 3 | 0 | D |
| RP131H311D  | U            | 3 | 1 | D |
| RP131H321D  | U            | 3 | 2 | D |
| RP131H331D  | U            | 3 | 3 | D |
| RP131H341D  | U            | 3 | 4 | D |
| RP131H351D  | U            | 3 | 5 | D |
| RP131H361D  | U            | 3 | 6 | D |
| RP131H371D  | U            | 3 | 7 | D |
| RP131H381D  | U            | 3 | 8 | D |
| RP131H391D  | U            | 3 | 9 | D |

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131H401D  | U            | 4 | 0 | D |
| RP131H411D  | U            | 4 | 1 | D |
| RP131H421D  | U            | 4 | 2 | D |
| RP131H431D  | U            | 4 | 3 | D |
| RP131H441D  | U            | 4 | 4 | D |
| RP131H451D  | U            | 4 | 5 | D |
| RP131H461D  | U            | 4 | 6 | D |
| RP131H471D  | U            | 4 | 7 | D |
| RP131H481D  | U            | 4 | 8 | D |
| RP131H491D  | U            | 4 | 9 | D |
| RP131H501D  | U            | 5 | 0 | D |
| RP131H511D  | U            | 5 | 1 | D |
| RP131H521D  | U            | 5 | 2 | D |
| RP131H531D  | U            | 5 | 3 | D |
| RP131H541D  | U            | 5 | 4 | D |
| RP131H551D  | U            | 5 | 5 | D |
| RP131H101D5 | U            | 0 | 4 | D |
| RP131H121D5 | U            | 0 | 1 | D |
| RP131H181D5 | U            | 0 | 2 | D |
| RP131H281D5 | U            | 0 | 3 | D |

## RP131S SERIES MARK SPECIFICATION

### ● HSOP-6J



① to ④ : Product Code (Refer to Part Number vs. Product Code)

⑤, ⑥ : Lot Number

### ● Part Number vs. Product Code

#### RP131Sxx1B Series

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131S081B  | G            | 0 | 8 | B |
| RP131S091B  | G            | 0 | 9 | B |
| RP131S101B  | G            | 1 | 0 | B |
| RP131S111B  | G            | 1 | 1 | B |
| RP131S121B  | G            | 1 | 2 | B |
| RP131S131B  | G            | 1 | 3 | B |
| RP131S141B  | G            | 1 | 4 | B |
| RP131S151B  | G            | 1 | 5 | B |
| RP131S161B  | G            | 1 | 6 | B |
| RP131S171B  | G            | 1 | 7 | B |
| RP131S181B  | G            | 1 | 8 | B |
| RP131S191B  | G            | 1 | 9 | B |
| RP131S201B  | G            | 2 | 0 | B |
| RP131S211B  | G            | 2 | 1 | B |
| RP131S221B  | G            | 2 | 2 | B |
| RP131S231B  | G            | 2 | 3 | B |
| RP131S241B  | G            | 2 | 4 | B |
| RP131S251B  | G            | 2 | 5 | B |
| RP131S261B  | G            | 2 | 6 | B |
| RP131S271B  | G            | 2 | 7 | B |
| RP131S281B  | G            | 2 | 8 | B |
| RP131S291B  | G            | 2 | 9 | B |
| RP131S301B  | G            | 3 | 0 | B |
| RP131S311B  | G            | 3 | 1 | B |
| RP131S321B  | G            | 3 | 2 | B |
| RP131S331B  | G            | 3 | 3 | B |
| RP131S341B  | G            | 3 | 4 | B |
| RP131S351B  | G            | 3 | 5 | B |
| RP131S361B  | G            | 3 | 6 | B |
| RP131S371B  | G            | 3 | 7 | B |
| RP131S381B  | G            | 3 | 8 | B |
| RP131S391B  | G            | 3 | 9 | B |

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131S401B  | G            | 4 | 0 | B |
| RP131S411B  | G            | 4 | 1 | B |
| RP131S421B  | G            | 4 | 2 | B |
| RP131S431B  | G            | 4 | 3 | B |
| RP131S441B  | G            | 4 | 4 | B |
| RP131S451B  | G            | 4 | 5 | B |
| RP131S461B  | G            | 4 | 6 | B |
| RP131S471B  | G            | 4 | 7 | B |
| RP131S481B  | G            | 4 | 8 | B |
| RP131S491B  | G            | 4 | 9 | B |
| RP131S501B  | G            | 5 | 0 | B |
| RP131S511B  | G            | 5 | 1 | B |
| RP131S521B  | G            | 5 | 2 | B |
| RP131S531B  | G            | 5 | 3 | B |
| RP131S541B  | G            | 5 | 4 | B |
| RP131S551B  | G            | 5 | 5 | B |
| RP131S101B5 | G            | 0 | 4 | B |
| RP131S121B5 | G            | 0 | 1 | B |
| RP131S181B5 | G            | 0 | 2 | B |
| RP131S281B5 | G            | 0 | 3 | B |

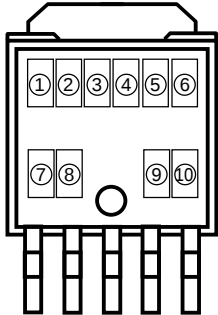
#### RP131Sxx1D Series

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131S081D  | G            | 0 | 8 | D |
| RP131S091D  | G            | 0 | 9 | D |
| RP131S101D  | G            | 1 | 0 | D |
| RP131S111D  | G            | 1 | 1 | D |
| RP131S121D  | G            | 1 | 2 | D |
| RP131S131D  | G            | 1 | 3 | D |
| RP131S141D  | G            | 1 | 4 | D |
| RP131S151D  | G            | 1 | 5 | D |
| RP131S161D  | G            | 1 | 6 | D |
| RP131S171D  | G            | 1 | 7 | D |
| RP131S181D  | G            | 1 | 8 | D |
| RP131S191D  | G            | 1 | 9 | D |
| RP131S201D  | G            | 2 | 0 | D |
| RP131S211D  | G            | 2 | 1 | D |
| RP131S221D  | G            | 2 | 2 | D |
| RP131S231D  | G            | 2 | 3 | D |
| RP131S241D  | G            | 2 | 4 | D |
| RP131S251D  | G            | 2 | 5 | D |
| RP131S261D  | G            | 2 | 6 | D |
| RP131S271D  | G            | 2 | 7 | D |
| RP131S281D  | G            | 2 | 8 | D |
| RP131S291D  | G            | 2 | 9 | D |
| RP131S301D  | G            | 3 | 0 | D |
| RP131S311D  | G            | 3 | 1 | D |
| RP131S321D  | G            | 3 | 2 | D |
| RP131S331D  | G            | 3 | 3 | D |
| RP131S341D  | G            | 3 | 4 | D |
| RP131S351D  | G            | 3 | 5 | D |
| RP131S361D  | G            | 3 | 6 | D |
| RP131S371D  | G            | 3 | 7 | D |
| RP131S381D  | G            | 3 | 8 | D |
| RP131S391D  | G            | 3 | 9 | D |

| Part Number | Product Code |   |   |   |
|-------------|--------------|---|---|---|
|             | ①            | ② | ③ | ④ |
| RP131S401D  | G            | 4 | 0 | D |
| RP131S411D  | G            | 4 | 1 | D |
| RP131S421D  | G            | 4 | 2 | D |
| RP131S431D  | G            | 4 | 3 | D |
| RP131S441D  | G            | 4 | 4 | D |
| RP131S451D  | G            | 4 | 5 | D |
| RP131S461D  | G            | 4 | 6 | D |
| RP131S471D  | G            | 4 | 7 | D |
| RP131S481D  | G            | 4 | 8 | D |
| RP131S491D  | G            | 4 | 9 | D |
| RP131S501D  | G            | 5 | 0 | D |
| RP131S511D  | G            | 5 | 1 | D |
| RP131S521D  | G            | 5 | 2 | D |
| RP131S531D  | G            | 5 | 3 | D |
| RP131S541D  | G            | 5 | 4 | D |
| RP131S551D  | G            | 5 | 5 | D |
| RP131S101D5 | G            | 0 | 4 | D |
| RP131S121D5 | G            | 0 | 1 | D |
| RP131S181D5 | G            | 0 | 2 | D |
| RP131S281D5 | G            | 0 | 3 | D |

## RP131J SERIES MARK SPECIFICATION

### ● TO-252-5-P2



① to ⑧ : Product Code (Refer to Part Number vs. Product Code)

⑨, ⑩ : Lot Number

### ● Part Number vs. Product Code

#### RP131Jxx1B Series

| Part Number | Product Code |   |   |   |   |   |   |   |
|-------------|--------------|---|---|---|---|---|---|---|
|             | ①            | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
| RP131J081B  | D            | 1 | J | 0 | 8 | 1 | B |   |
| RP131J091B  | D            | 1 | J | 0 | 9 | 1 | B |   |
| RP131J101B  | D            | 1 | J | 1 | 0 | 1 | B |   |
| RP131J111B  | D            | 1 | J | 1 | 1 | 1 | B |   |
| RP131J121B  | D            | 1 | J | 1 | 2 | 1 | B |   |
| RP131J131B  | D            | 1 | J | 1 | 3 | 1 | B |   |
| RP131J141B  | D            | 1 | J | 1 | 4 | 1 | B |   |
| RP131J151B  | D            | 1 | J | 1 | 5 | 1 | B |   |
| RP131J161B  | D            | 1 | J | 1 | 6 | 1 | B |   |
| RP131J171B  | D            | 1 | J | 1 | 7 | 1 | B |   |
| RP131J181B  | D            | 1 | J | 1 | 8 | 1 | B |   |
| RP131J191B  | D            | 1 | J | 1 | 9 | 1 | B |   |
| RP131J201B  | D            | 1 | J | 2 | 0 | 1 | B |   |
| RP131J211B  | D            | 1 | J | 2 | 1 | 1 | B |   |
| RP131J221B  | D            | 1 | J | 2 | 2 | 1 | B |   |
| RP131J231B  | D            | 1 | J | 2 | 3 | 1 | B |   |
| RP131J241B  | D            | 1 | J | 2 | 4 | 1 | B |   |
| RP131J251B  | D            | 1 | J | 2 | 5 | 1 | B |   |
| RP131J261B  | D            | 1 | J | 2 | 6 | 1 | B |   |
| RP131J271B  | D            | 1 | J | 2 | 7 | 1 | B |   |
| RP131J281B  | D            | 1 | J | 2 | 8 | 1 | B |   |
| RP131J291B  | D            | 1 | J | 2 | 9 | 1 | B |   |
| RP131J301B  | D            | 1 | J | 3 | 0 | 1 | B |   |
| RP131J311B  | D            | 1 | J | 3 | 1 | 1 | B |   |
| RP131J321B  | D            | 1 | J | 3 | 2 | 1 | B |   |
| RP131J331B  | D            | 1 | J | 3 | 3 | 1 | B |   |
| RP131J341B  | D            | 1 | J | 3 | 4 | 1 | B |   |
| RP131J351B  | D            | 1 | J | 3 | 5 | 1 | B |   |
| RP131J361B  | D            | 1 | J | 3 | 6 | 1 | B |   |
| RP131J371B  | D            | 1 | J | 3 | 7 | 1 | B |   |
| RP131J381B  | D            | 1 | J | 3 | 8 | 1 | B |   |
| RP131J391B  | D            | 1 | J | 3 | 9 | 1 | B |   |
| RP131J401B  | D            | 1 | J | 4 | 0 | 1 | B |   |
| RP131J411B  | D            | 1 | J | 4 | 1 | 1 | B |   |
| RP131J421B  | D            | 1 | J | 4 | 2 | 1 | B |   |
| RP131J431B  | D            | 1 | J | 4 | 3 | 1 | B |   |
| RP131J441B  | D            | 1 | J | 4 | 4 | 1 | B |   |
| RP131J451B  | D            | 1 | J | 4 | 5 | 1 | B |   |
| RP131J461B  | D            | 1 | J | 4 | 6 | 1 | B |   |

| Part Number | Product Code |   |   |   |   |   |   |   |
|-------------|--------------|---|---|---|---|---|---|---|
|             | ①            | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
| RP131J471B  | D            | 1 | J | 4 | 7 | 1 | B |   |
| RP131J481B  | D            | 1 | J | 4 | 8 | 1 | B |   |
| RP131J491B  | D            | 1 | J | 4 | 9 | 1 | B |   |
| RP131J501B  | D            | 1 | J | 5 | 0 | 1 | B |   |
| RP131J511B  | D            | 1 | J | 5 | 1 | 1 | B |   |
| RP131J521B  | D            | 1 | J | 5 | 2 | 1 | B |   |
| RP131J531B  | D            | 1 | J | 5 | 3 | 1 | B |   |
| RP131J541B  | D            | 1 | J | 5 | 4 | 1 | B |   |
| RP131J551B  | D            | 1 | J | 5 | 5 | 1 | B |   |
| RP131J101B5 | D            | 1 | J | 1 | 0 | 1 | B | 5 |
| RP131J121B5 | D            | 1 | J | 1 | 2 | 1 | B | 5 |
| RP131J181B5 | D            | 1 | J | 1 | 8 | 1 | B | 5 |
| RP131J281B5 | D            | 1 | J | 2 | 8 | 1 | B | 5 |

#### RP131Jxx1D Series

| Part Number | Product Code |   |   |   |   |   |   |   |
|-------------|--------------|---|---|---|---|---|---|---|
|             | ①            | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
| RP131J081D  | D            | 1 | J | 0 | 8 | 1 | D |   |
| RP131J091D  | D            | 1 | J | 0 | 9 | 1 | D |   |
| RP131J101D  | D            | 1 | J | 1 | 0 | 1 | D |   |
| RP131J111D  | D            | 1 | J | 1 | 1 | 1 | D |   |
| RP131J121D  | D            | 1 | J | 1 | 2 | 1 | D |   |
| RP131J131D  | D            | 1 | J | 1 | 3 | 1 | D |   |
| RP131J141D  | D            | 1 | J | 1 | 4 | 1 | D |   |
| RP131J151D  | D            | 1 | J | 1 | 5 | 1 | D |   |
| RP131J161D  | D            | 1 | J | 1 | 6 | 1 | D |   |
| RP131J171D  | D            | 1 | J | 1 | 7 | 1 | D |   |
| RP131J181D  | D            | 1 | J | 1 | 8 | 1 | D |   |
| RP131J191D  | D            | 1 | J | 1 | 9 | 1 | D |   |
| RP131J201D  | D            | 1 | J | 2 | 0 | 1 | D |   |
| RP131J211D  | D            | 1 | J | 2 | 1 | 1 | D |   |
| RP131J221D  | D            | 1 | J | 2 | 2 | 1 | D |   |
| RP131J231D  | D            | 1 | J | 2 | 3 | 1 | D |   |
| RP131J241D  | D            | 1 | J | 2 | 4 | 1 | D |   |
| RP131J251D  | D            | 1 | J | 2 | 5 | 1 | D |   |
| RP131J261D  | D            | 1 | J | 2 | 6 | 1 | D |   |
| RP131J271D  | D            | 1 | J | 2 | 7 | 1 | D |   |
| RP131J281D  | D            | 1 | J | 2 | 8 | 1 | D |   |
| RP131J291D  | D            | 1 | J | 2 | 9 | 1 | D |   |

| Part Number | Product Code |   |   |   |   |   |   |   |
|-------------|--------------|---|---|---|---|---|---|---|
|             | ①            | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
| RP131J301D  | D            | 1 | J | 3 | 0 | 1 | D |   |
| RP131J311D  | D            | 1 | J | 3 | 1 | 1 | D |   |
| RP131J321D  | D            | 1 | J | 3 | 2 | 1 | D |   |
| RP131J331D  | D            | 1 | J | 3 | 3 | 1 | D |   |
| RP131J341D  | D            | 1 | J | 3 | 4 | 1 | D |   |
| RP131J351D  | D            | 1 | J | 3 | 5 | 1 | D |   |
| RP131J361D  | D            | 1 | J | 3 | 6 | 1 | D |   |
| RP131J371D  | D            | 1 | J | 3 | 7 | 1 | D |   |
| RP131J381D  | D            | 1 | J | 3 | 8 | 1 | D |   |
| RP131J391D  | D            | 1 | J | 3 | 9 | 1 | D |   |
| RP131J401D  | D            | 1 | J | 4 | 0 | 1 | D |   |
| RP131J411D  | D            | 1 | J | 4 | 1 | 1 | D |   |
| RP131J421D  | D            | 1 | J | 4 | 2 | 1 | D |   |
| RP131J431D  | D            | 1 | J | 4 | 3 | 1 | D |   |
| RP131J441D  | D            | 1 | J | 4 | 4 | 1 | D |   |
| RP131J451D  | D            | 1 | J | 4 | 5 | 1 | D |   |
| RP131J461D  | D            | 1 | J | 4 | 6 | 1 | D |   |
| RP131J471D  | D            | 1 | J | 4 | 7 | 1 | D |   |
| RP131J481D  | D            | 1 | J | 4 | 8 | 1 | D |   |
| RP131J491D  | D            | 1 | J | 4 | 9 | 1 | D |   |
| RP131J501D  | D            | 1 | J | 5 | 0 | 1 | D |   |
| RP131J511D  | D            | 1 | J | 5 | 1 | 1 | D |   |
| RP131J521D  | D            | 1 | J | 5 | 2 | 1 | D |   |
| RP131J531D  | D            | 1 | J | 5 | 3 | 1 | D |   |
| RP131J541D  | D            | 1 | J | 5 | 4 | 1 | D |   |
| RP131J551D  | D            | 1 | J | 5 | 5 | 1 | D |   |
| RP131J101D5 | D            | 1 | J | 1 | 0 | 1 | D | 5 |
| RP131J121D5 | D            | 1 | J | 1 | 2 | 1 | D | 5 |
| RP131J181D5 | D            | 1 | J | 1 | 8 | 1 | D | 5 |
| RP131J281D5 | D            | 1 | J | 2 | 8 | 1 | D | 5 |

## POWER DISSIPATION

## DFN1616-6B

PD-DFN1616-6B-(85125150)-JE-B

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.

### 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 0.2 mm × 25 pcs                                                                                                                                                                            |

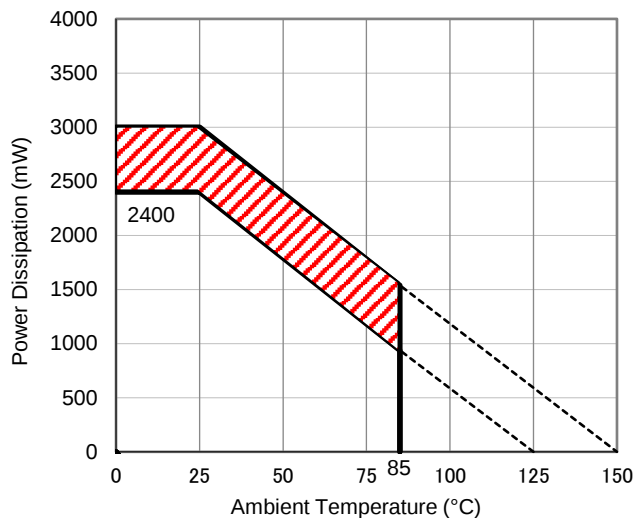
### Measurement Result

(Ta = 25°C, Tjmax = 125°C)

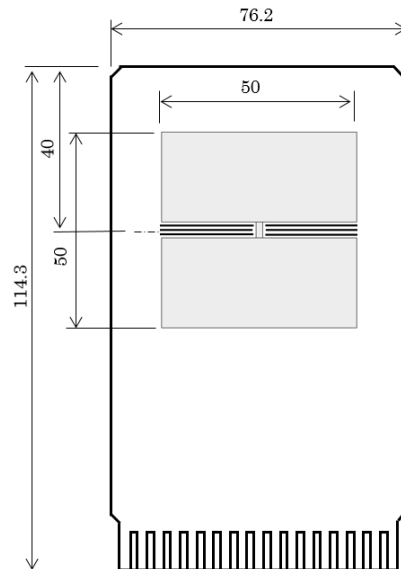
| Item                                     | Measurement Result |
|------------------------------------------|--------------------|
| Power Dissipation                        | 2400 mW            |
| Thermal Resistance (θja)                 | θja = 41°C/W       |
| Thermal Characterization Parameter (ψjt) | ψjt = 11°C/W       |

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

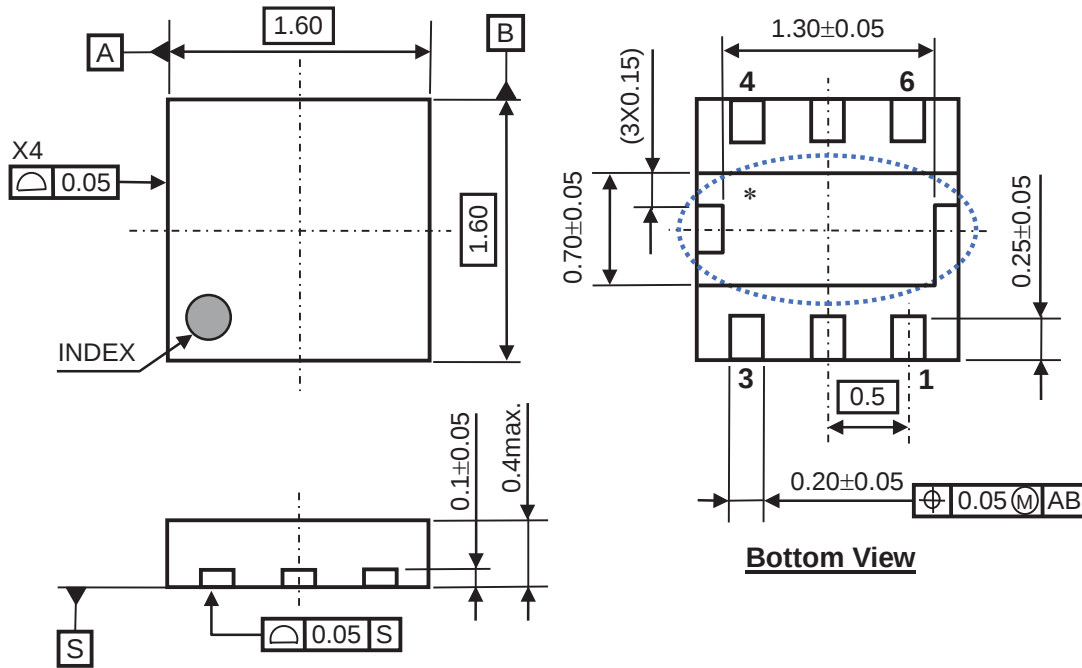
The above graph shows the power dissipation of the package at Tjmax = 125°C and Tjmax = 150°C. Operating the device in the hatched range might have a negative influence on its lifetime. The total hours of use and the total years of use must be limited as follows:

|                    |                                  |
|--------------------|----------------------------------|
| Total Hours of Use | Total Years of Use (4 hours/day) |
| 13,000 hours       | 9 years                          |

## PACKAGE DIMENSIONS

## DFN1616-6B

Ver. A



DFN1616-6B Package Dimensions (Unit: mm)

\* The tab on the bottom of the package shown by blue circle is a substrate potential (GND). It is recommended that this tab be connected to the ground plane pin on the board but it is possible to leave the tab floating.

## POWER DISSIPATION

## DFN(PL)1820-6

PD-DFN(PL)1820-6-(85125150)-JE-B

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.

### 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 0.2 mm × 36 pcs                                                                                                                                                                            |

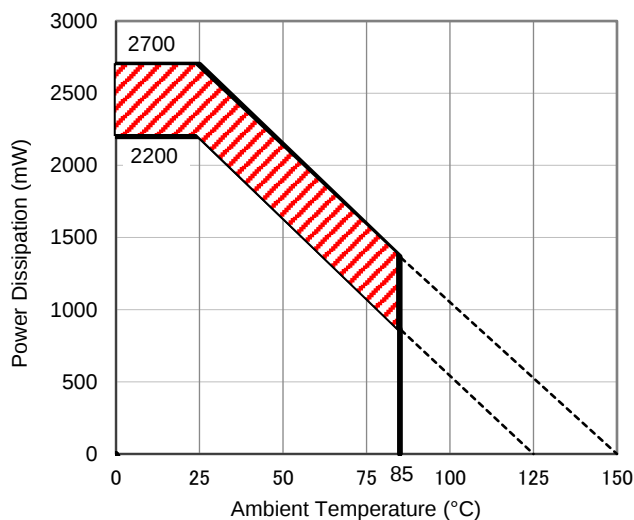
### Measurement Result

(Ta = 25°C, Tjmax = 125°C)

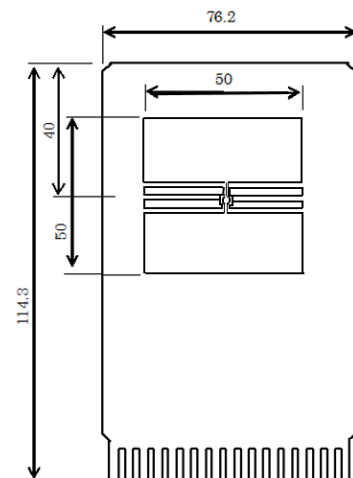
| Item                                     | Measurement Result |
|------------------------------------------|--------------------|
| Power Dissipation                        | 2200 mW            |
| Thermal Resistance (θja)                 | θja = 45°C/W       |
| Thermal Characterization Parameter (ψjt) | ψjt = 18°C/W       |

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

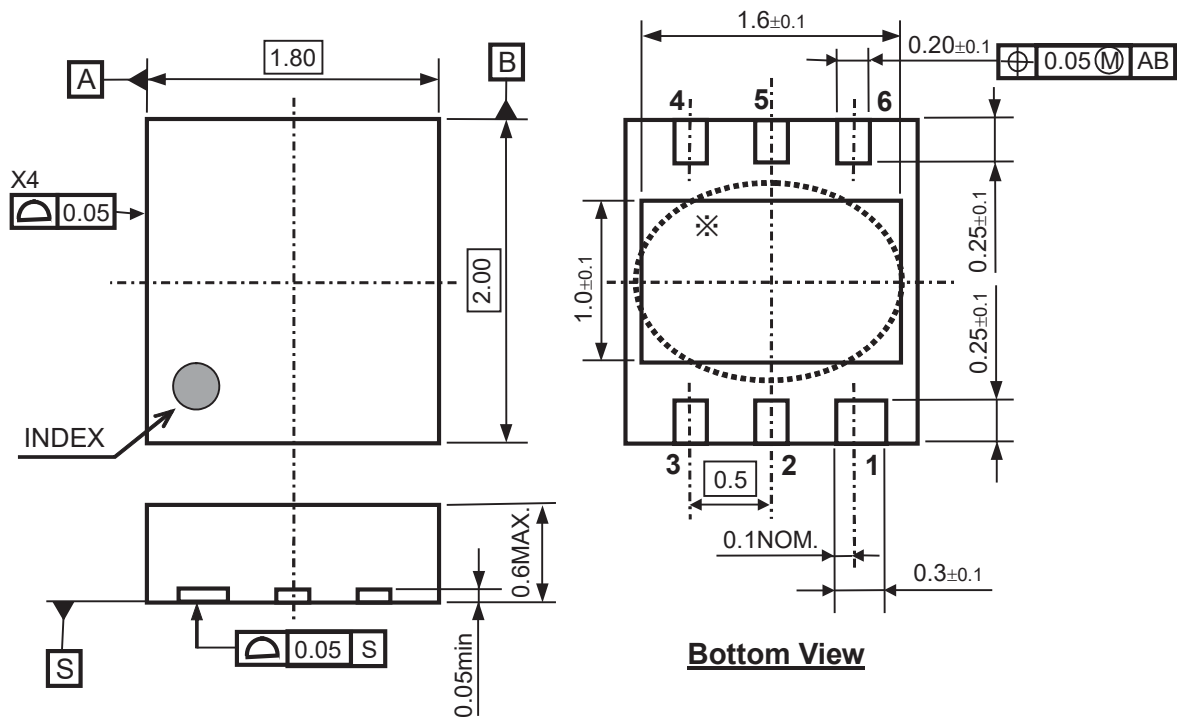
The above graph shows the power dissipation of the package at Tjmax = 125°C and Tjmax = 150°C. Operating the device in the hatched range might have a negative influence on its lifetime. The total hours of use and the total years of use must be limited as follows:

| Total Hours of Use | Total Years of Use (4 hours/day) |
|--------------------|----------------------------------|
| 13,000 hours       | 9 years                          |

## PACKAGE DIMENSIONS

**DFN(PL)1820-6**

Ver. A



### DFN(PL)1820-6 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.

## POWER DISSIPATION

## SOT-89-5

Ver. A

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

### Measurement Conditions

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

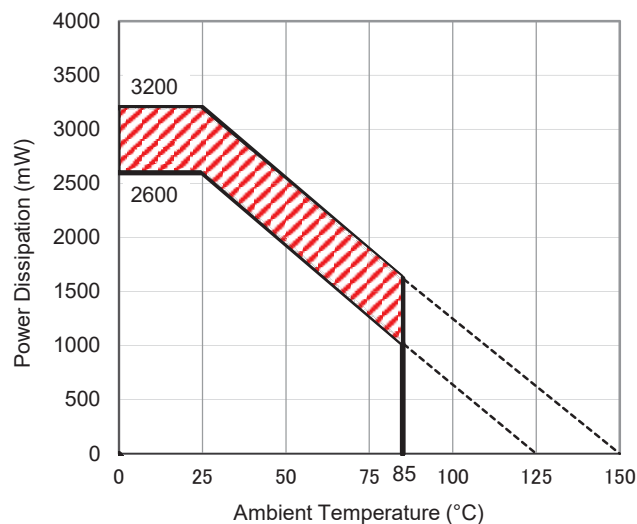
### Measurement Result

(Ta = 25°C, Tjmax = 125°C)

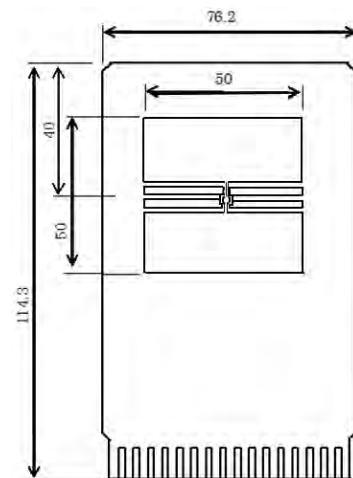
| Item                                     | Measurement Result |
|------------------------------------------|--------------------|
| Power Dissipation                        | 2600 mW            |
| Thermal Resistance (θja)                 | θja = 38°C/W       |
| Thermal Characterization Parameter (ψjt) | ψjt = 13°C/W       |

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

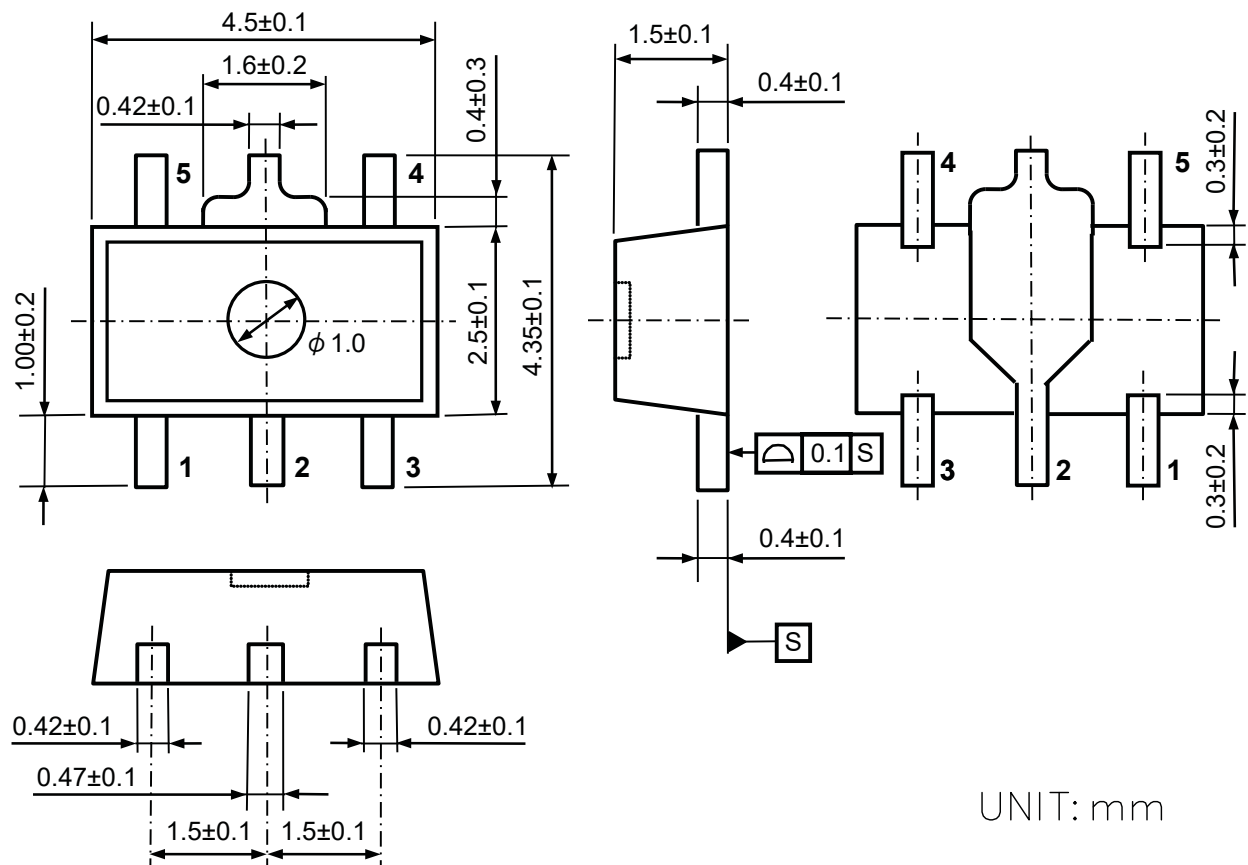
The above graph shows the power dissipation of the package at Tjmax = 125°C and Tjmax = 150°C. Operating the device in the hatched range might have a negative influence on its lifetime. The total hours of use and the total years of use must be limited as follows:

| Total Hours of Use | Total Years of Use (4 hours/day) |
|--------------------|----------------------------------|
| 13,000 hours       | 9 years                          |

## PACKAGE DIMENSIONS

**SOT-89-5**

Ver. A



### SOT-89-5 Package Dimensions

## POWER DISSIPATION

## HSOP-6J

Ver. A

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

### Measurement Conditions

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

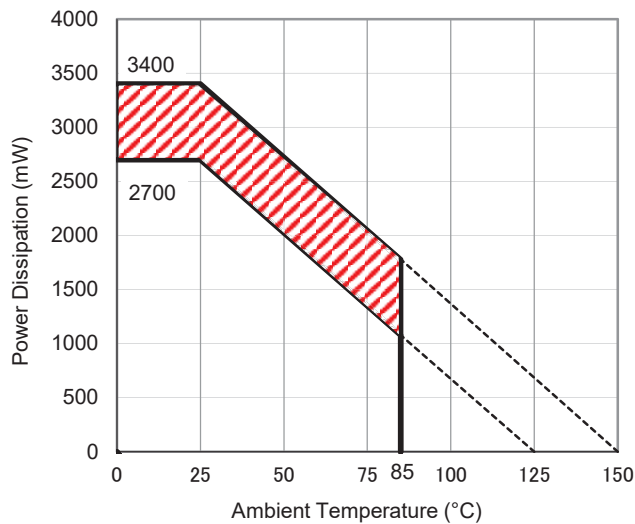
### Measurement Result

(Ta = 25°C, Tjmax = 125°C)

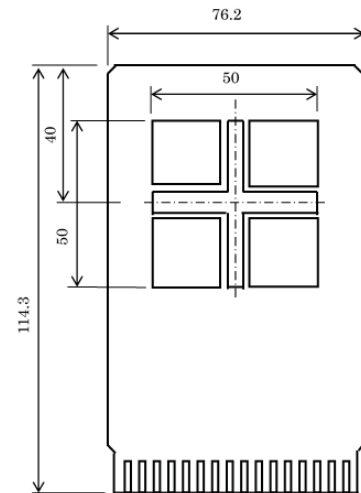
| Item                                               | Measurement Result                   |
|----------------------------------------------------|--------------------------------------|
| Power Dissipation                                  | 2700 mW                              |
| Thermal Resistance ( $\theta_{ja}$ )               | $\theta_{ja} = 37^{\circ}\text{C/W}$ |
| Thermal Characterization Parameter ( $\psi_{jt}$ ) | $\psi_{jt} = 7^{\circ}\text{C/W}$    |

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

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



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

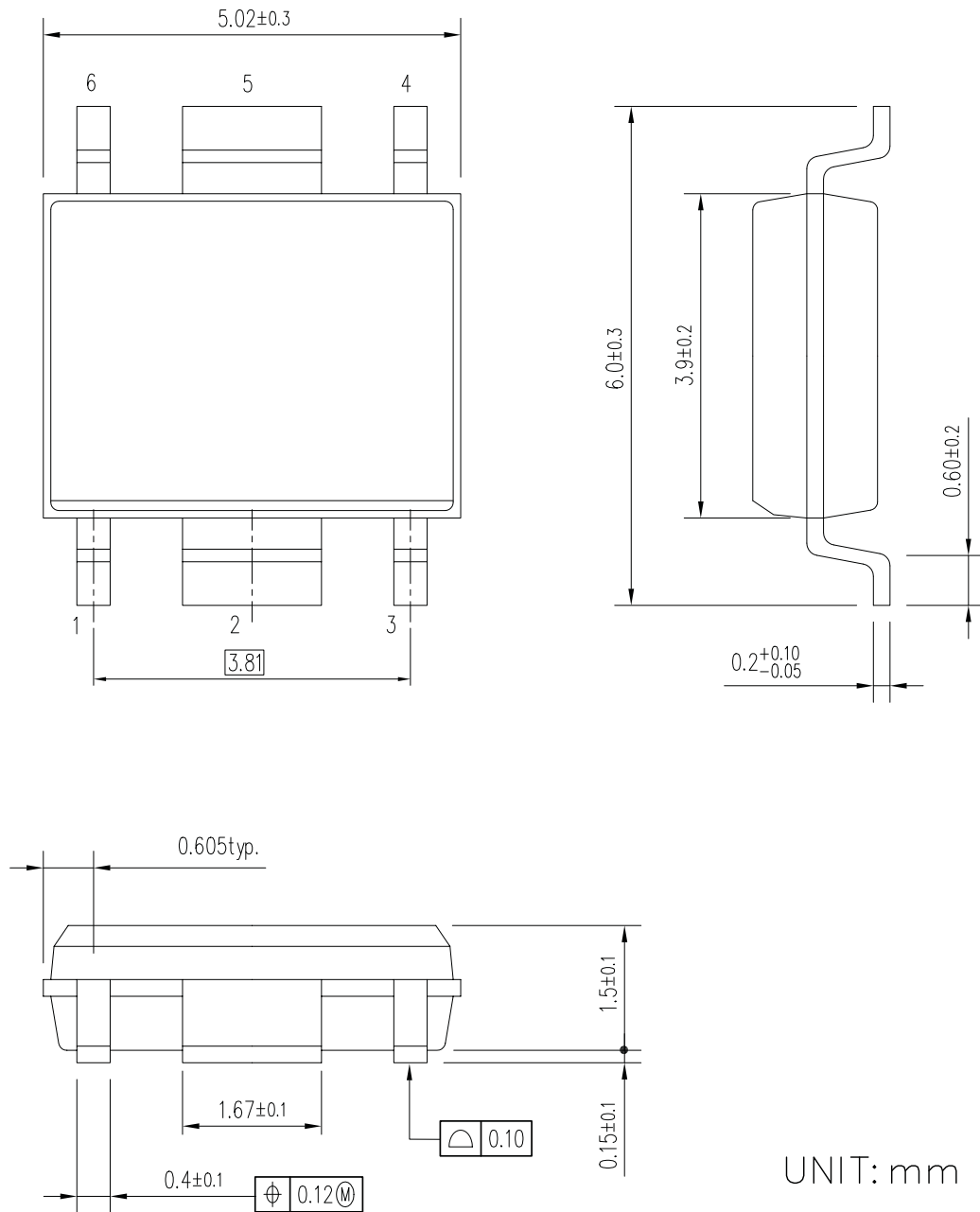
The above graph shows the power dissipation of the package at Tjmax = 125°C and Tjmax = 150°C. Operating the device in the hatched range might have a negative influence on its lifetime. The total hours of use and the total years of use must be limited as follows:

| Total Hours of Use | Total Years of Use (4 hours/day) |
|--------------------|----------------------------------|
| 13,000 hours       | 9 years                          |

## PACKAGE DIMENSIONS

## HSOP-6J

Ver. A



HSOP-6J Package Dimensions

## POWER DISSIPATION

## TO-252-5

Ver. B

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 0.4mm × 30pcs                                                                                                                                                                              |

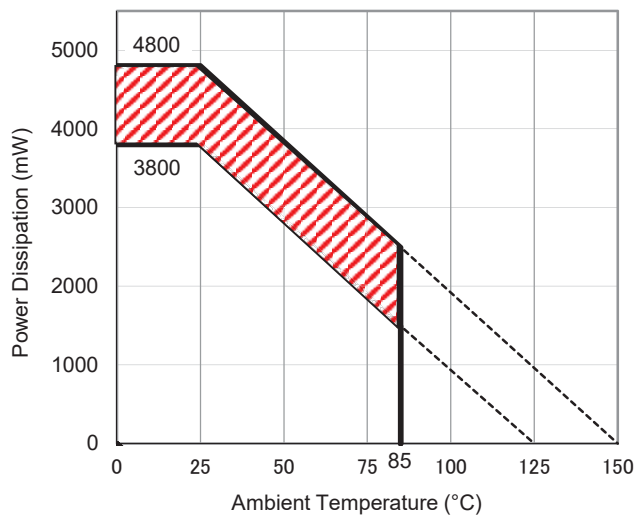
### Measurement Result

(Ta = 25°C, Tjmax = 125°C)

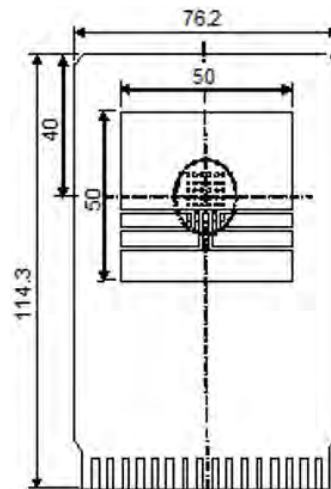
| Item                                     | Measurement Result |
|------------------------------------------|--------------------|
| Power Dissipation                        | 3800 mW            |
| Thermal Resistance (θja)                 | θja = 26°C/W       |
| Thermal Characterization Parameter (ψjt) | ψjt = 7°C/W        |

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

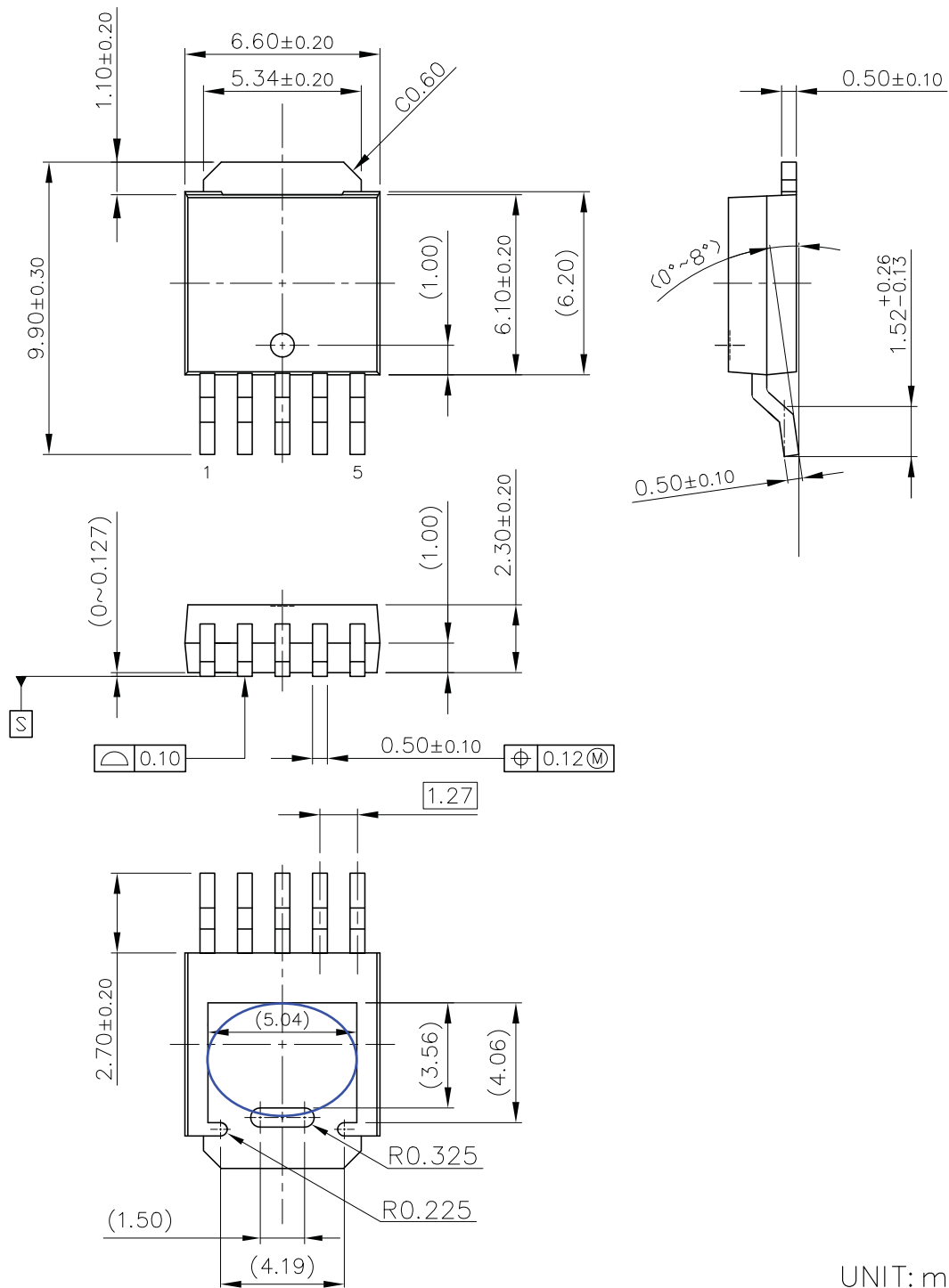
The above graph shows the power dissipation of the package at Tjmax = 125°C and Tjmax = 150°C. Operating the device in the hatched range might have a negative influence on its lifetime. The total hours of use and the total years of use must be limited as follows:

| Total Hours of Use | Total Years of Use (4 hours/day) |
|--------------------|----------------------------------|
| 13,000 hours       | 9 years                          |

## PACKAGE DIMENSIONS

## TO-252-5-P2

Ver. A



UNIT: mm

### TO-252-5-P2 Package Dimensions

\* The tab on the bottom of the package shown by blue circle is a substrate potential (GND). It is recommended that this tab be connected to the ground plane on the board but it is possible to leave the tab floating.

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In the case of a product purchased through an authorized distributor or directly from us, the warranty period for this product shall be one (1) year after delivery to your company. For defective products that occurred during this period, we will take the quality warranty measures described in section 8-2. However, if there is an agreement on the warranty period in the basic transaction agreement, quality assurance agreement, delivery specifications, etc., it shall be followed.
  - 8-2. **Quality Warranty Remedies**  
When it has been proved defective due to manufacturing factors as a result of defect analysis by us, we will either deliver a substitute for the defective product or refund the purchase price of the defective product.  
Note that such delivery or refund is sole and exclusive remedies to your company for the defective product.
  - 8-3. **Remedies after Quality Warranty Period**  
With respect to any defect of this product found after the quality warranty period, the defect will be analyzed by us. On the basis of the defect analysis results, the scope and amounts of damage shall be determined by mutual agreement of both parties. Then we will deal with upper limit in Section 8-2. This provision is not intended to limit any legal rights of your company.
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12. Warning for handling Gallium and Arsenic (GaAs) products (Applying to GaAs MMIC, Photo Reflector). These products use Gallium (Ga) and Arsenic (As) which are specified as poisonous chemicals by law. For the prevention of a hazard, do not burn, destroy, or process chemically to make them as gas or power. When the product is disposed of, please follow the related regulation and do not mix this with general industrial waste or household waste.
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