

## LOW ON RESISTANCE / LOW VOLTAGE 1A LDO

NO.EA-174-160426

### 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(PLP)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 (0.1V steps)  
(For other voltages, please refer to MARK INFORMATIONS.)
- 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(PLP)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 ( $V_{OUT}> 3.6V$ )

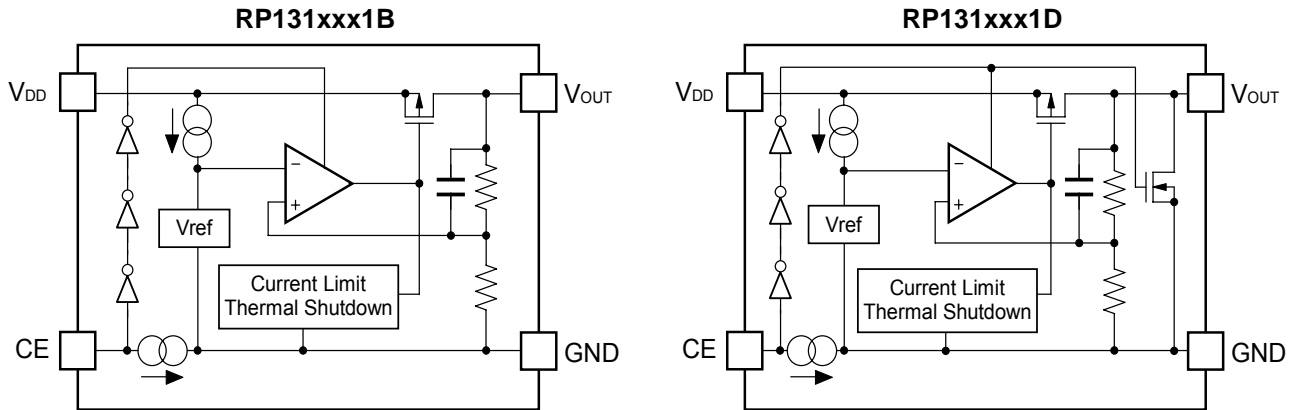
### APPLICATIONS

- 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.

# RP131x

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## BLOCK DIAGRAMS



## SELECTION GUIDE

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

| Product Name     | Package        | Quantity per Reel | Pb Free | Halogen Free |
|------------------|----------------|-------------------|---------|--------------|
| RP131Lxx1*-TR    | DFN1616-6B     | 5,000 pcs         | Yes     | Yes          |
| RP131Kxx1*-TR    | DFN(PLP)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 INFORMATIONS.)

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

## PIN CONFIGURATIONS

● DFN1616-6B



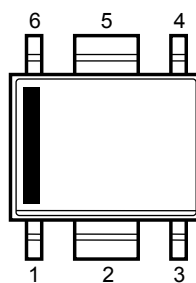
● DFN(PLP)1820-6



● SOT-89-5



● HSOP-6J



● TO-252-5-P2



## PIN DESCRIPTIONS

● DFN1616-6B

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

\*1) 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.

\*2) When you use this IC, please make sure be wired with 1pin with 2pin and 5pin with 6pin.

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**RP131x**

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**• DFN(PLP)1820-6**

| Pin No. | Symbol           | Pin Description              |
|---------|------------------|------------------------------|
| 1       | V <sub>OUT</sub> | Output Pin*2                 |
| 2       | V <sub>OUT</sub> | Output Pin*2                 |
| 3       | GND              | Ground Pin                   |
| 4       | CE               | Chip Enable Pin ("H" Active) |
| 5       | V <sub>DD</sub>  | Input Pin*2                  |
| 6       | V <sub>DD</sub>  | Input Pin*2                  |

\*1) 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.

\*2) When you use this IC, please make sure be wired with 1pin with 2pin and 5pin with 6pin.

**• SOT-89-5**

| Pin No. | Symbol           | Pin Description              |
|---------|------------------|------------------------------|
| 1       | NC               | No Connection                |
| 2       | GND              | Ground Pin                   |
| 3       | CE               | Chip Enable Pin ("H" Active) |
| 4       | V <sub>DD</sub>  | Input Pin                    |
| 5       | V <sub>OUT</sub> | Output Pin                   |

**• HSOP-6J**

| Pin No. | Symbol           | Pin Description              |
|---------|------------------|------------------------------|
| 1       | V <sub>OUT</sub> | Output Pin                   |
| 2       | GND              | Ground Pin*3                 |
| 3       | NC               | No Connection                |
| 4       | CE               | Chip Enable Pin ("H" Active) |
| 5       | GND              | Ground Pin*3                 |
| 6       | V <sub>DD</sub>  | Input Pin                    |

\*3) When you use this IC, please make sure be wired with 2pin and 5pin.

**• TO-252-5-P2**

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

\*4) When you use this IC, please make sure be wired with 2pin and 3pin.

## ABSOLUTE MAXIMUM RATINGS

| Symbol           | Item                                | Rating                       | Unit |
|------------------|-------------------------------------|------------------------------|------|
| V <sub>IN</sub>  | Input Voltage                       | 7.0                          | V    |
| V <sub>CE</sub>  | Input Voltage (CE Pin)              | -0.3 to 7.0                  | V    |
| V <sub>OUT</sub> | Output Voltage                      | -0.3 to V <sub>IN</sub> +0.3 | V    |
| P <sub>D</sub>   | Power Dissipation (DFN1616-6B)*     | 640                          | mW   |
|                  | Power Dissipation (DFN(PLP)1820-6)* | 880                          |      |
|                  | Power Dissipation (SOT-89-5)*       | 900                          |      |
|                  | Power Dissipation (HSOP-6J)*        | 1700                         |      |
|                  | Power Dissipation (TO-252-5-P2)*    | 1900                         |      |
| T <sub>opt</sub> | Operating Temperature Range         | -40 to 85                    | °C   |
| T <sub>stg</sub> | Storage Temperature Range           | -55 to 125                   | °C   |

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

### ABSOLUTE MAXIMUM RATINGS

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the life time and safety for both device and system using the device in the field.

The functional operation at or over these absolute maximum ratings is not assured.

**RP131x**

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**ELECTRICAL CHARACTERISTICS** $V_{IN} = \text{Set } V_{OUT} + 1V, I_{OUT} = 1mA$ The specification in   is checked and guaranteed by design engineering at  $-40^{\circ}\text{C} \leq T_{opt} \leq 85^{\circ}\text{C}$ , unless otherwise noted.● **RP131xxx1B/D** $T_{opt} = 25^{\circ}\text{C}$ 

| Symbol                                  | Item  | Conditions   | Min.  | Typ.  | Max.  | Unit  |    |
|---|---|--|---|---|---|---|----|
| $V_{OUT}$                               | Output Voltage                                  | $T_{opt} = 25^{\circ}\text{C}$   | $V_{OUT} > 1.5V$  | $\times 0.99$   |   | $\times 1.01$   | V  |
|   |   |  | $V_{OUT} \leq 1.5V$   | -15   |   | 15  | mV |
|   |   | $-40^{\circ}\text{C} \leq T_{opt} \leq 85^{\circ}\text{C}$                 | $V_{OUT} > 1.5V$  | <span style="border: 1px solid black; padding: 0 2px;"><math>\times 0.974</math></span> |   | <span style="border: 1px solid black; padding: 0 2px;"><math>\times 1.018</math></span> | V  |
|   |   |  | $V_{OUT} \leq 1.5V$   | <span style="border: 1px solid black; padding: 0 2px;">-40</span>                       |   | <span style="border: 1px solid black; padding: 0 2px;">27</span>                        | mV |
| $\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ | Load Regulation                                 | $0.1mA \leq I_{OUT} \leq 300mA$  |   | 20  | <span style="border: 1px solid black; padding: 0 2px;">40</span>  | mV  |    |
|   |   | $0.1mA \leq I_{OUT} \leq 1A$   |   | 80  | <span style="border: 1px solid black; padding: 0 2px;">120</span> |   |    |
| $V_{DIF}$                               | Dropout Voltage                                 | Refer to the following table   |   |   |   |   |    |
| $I_{SS}$                                | Supply Current                                  | $I_{OUT} = 0mA$ ( $V_{IN} = 6.5V$ )  |   | 65  | <span style="border: 1px solid black; padding: 0 2px;">90</span>  | $\mu A$   |    |
| $I_{standby}$                           | Standby Current                                 | $V_{CE} = 0V, V_{IN} = 6.5V$   |   | 0.15  | 0.60  | $\mu A$   |    |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN}}$  | Line Regulation                                 | Set $V_{OUT} + 0.5V \leq V_{IN} \leq 6.5V$<br>*However, $V_{IN} \geq 1.6V$ |   | 0.05  | <span style="border: 1px solid black; padding: 0 2px;">0.1</span> | %/V   |    |
| RR                                      | Ripple Rejection                                | $f = 1kHz$<br>Ripple 0.2Vp-p<br>$I_{OUT} = 100mA$                          | $V_{OUT} \leq 3.3V$   |   | 70  | dB  |    |
|   |   |  | $V_{OUT} > 3.3V$  |   | 60  |   |    |
| $V_{IN}$                                | Input Voltage                                   |  | <span style="border: 1px solid black; padding: 0 2px;">1.6</span> |   | <span style="border: 1px solid black; padding: 0 2px;">6.5</span> | V   |    |
| $\frac{\Delta V_{OUT}}{\Delta T_{opt}}$ | Output Voltage Temperature Coefficient          | $-40^{\circ}\text{C} \leq T_{opt} \leq 85^{\circ}\text{C}$                 |   | $\pm 100$   |   | ppm/ $^{\circ}\text{C}$   |    |
| $I_{LIM}$                               | Output Current Limit                            |  | <span style="border: 1px solid black; padding: 0 2px;">1</span>   |   |   | A   |    |
| $I_{SC}$                                | Short Current Limit                             | $V_{OUT} = 0V$   |   | 250   |   | mA  |    |
| $I_{PD}$                                | CE Pull-down Current                            |  |   | 0.3   |   | $\mu A$   |    |
| $V_{CEH}$                               | CE Input Voltage "H"                            |  | <span style="border: 1px solid black; padding: 0 2px;">1.0</span> |   |   | V   |    |
| $V_{CEL}$                               | CE Input Voltage "L"                            |  |   |   | <span style="border: 1px solid black; padding: 0 2px;">0.4</span> | V   |    |
| en                                      | Output Noise                                    | $BW = 10Hz \text{ to } 100kHz, I_{OUT} = 1mA$                              |   | 45  |   | $\mu V_{rms}$   |    |
| $T_{TSD}$                               | Thermal Shutdown Temperature                    | Junction Temperature   |   | 165   |   | $^{\circ}\text{C}$  |    |
| $T_{TSR}$                               | Thermal Shutdown Released Temperature           | Junction Temperature   |   | 135   |   | $^{\circ}\text{C}$  |    |
| $R_{LOW}$                               | Low Output Nch Tr. ON Resistance (of D version) | $V_{IN} = 4.0V, V_{CE} = 0V$   |   | 30  |   | $\Omega$  |    |

The specification in   is checked and guaranteed by design engineering at  $-40^{\circ}\text{C} \leq T_{opt} \leq 85^{\circ}\text{C}$ , unless otherwise noted.All of unit are tested and specified under load conditions such that  $T_j \approx T_{opt} = 25^{\circ}\text{C}$  except for Output Noise, Ripple Rejection, Output Voltage Temperature Coefficient, Dropout Voltage at 1A Output Current and Thermal Shutdown items.

• Dropout Voltage by Output Voltage

T<sub>opt</sub>=25°C

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

The specification in  is checked and guaranteed by design engineering at -40°C ≤ T<sub>opt</sub> ≤ 85°C, unless otherwise noted.

All of unit are tested and specified under load conditions such that T<sub>j</sub> ≈ T<sub>opt</sub> = 25°C except for Output Noise, Ripple Rejection, Output Voltage Temperature Coefficient, Dropout Voltage at 1A Output Current and Thermal Shutdown items.

**RECOMMENDED OPERATING CONDITIONS (ELECTRICAL CHARACTERISTICS)**

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

And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

## TYPICAL APPLICATION



Recommendation value of the external capacitors

| $V_{OUT}$           | Capacitors |  |
|---------------------|------------|--|
| $V_{OUT} \leq 3.6V$ | C1         | Kyocera 2.2 $\mu$ F (size:1005) [CM05X5R225M06AB]  |
|                     | C2         | Kyocera 2.2 $\mu$ F (size:1608) [CM105X5R225K06AB] |
| $V_{OUT} > 3.6V$    | C1         | Kyocera 2.2 $\mu$ F (size:1608) [CM105X5R225K06AB] |
|                     | C2         | Kyocera 4.7 $\mu$ F (size:1608) [CM105X5R475M06AB] |

## TECHNICAL NOTES

When using these ICs, consider the following points:

### Phase Compensation

In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, use a capacitor C2 with good frequency characteristics and ESR (Equivalent Series Resistance).

If a tantalum capacitor is used, and its ESR of C2 is large, the loop oscillation may result. Because of this, select C2 carefully considering its frequency characteristics.

### PCB Layout

Make  $V_{DD}$  and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a capacitor C1 between  $V_{DD}$  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 C2, as close as possible to the ICs, and make wiring as short as possible.



## TEST CIRCUITS



**Basic Test Circuit**



**Test Circuit for Supply Current**



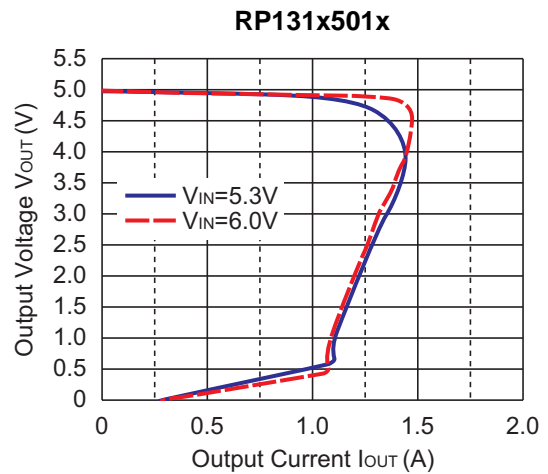
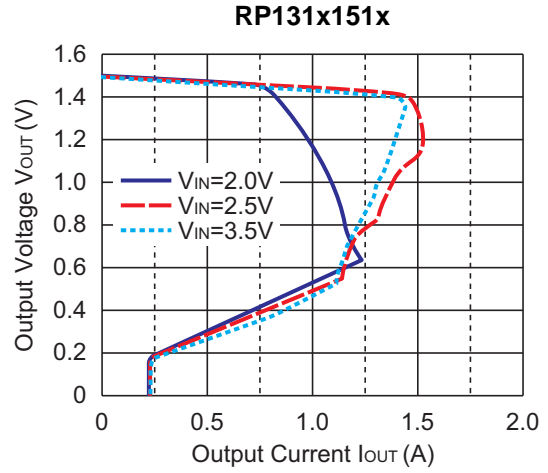
**Test Circuit for Ripple Rejection**



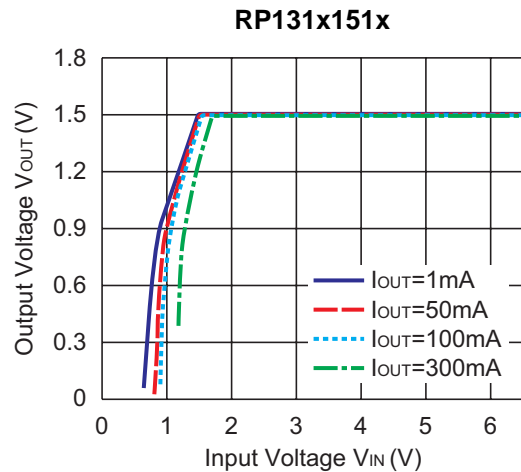
**Test Circuit for Load Transient Response**

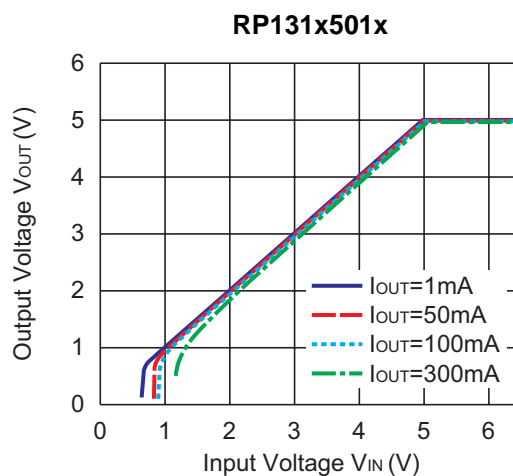
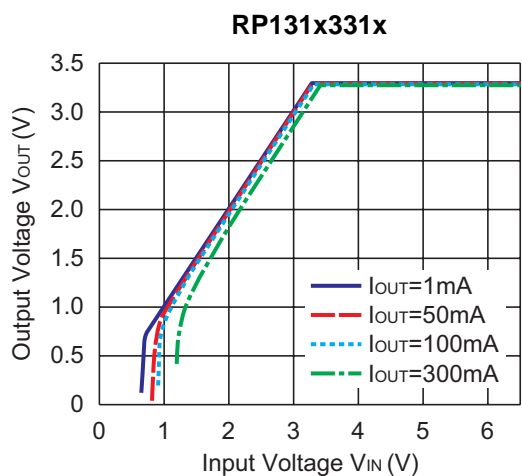
## TYPICAL CHARACTERISTICS

### 1) Output Voltage vs. Output Current (T<sub>opt</sub>=25°C)

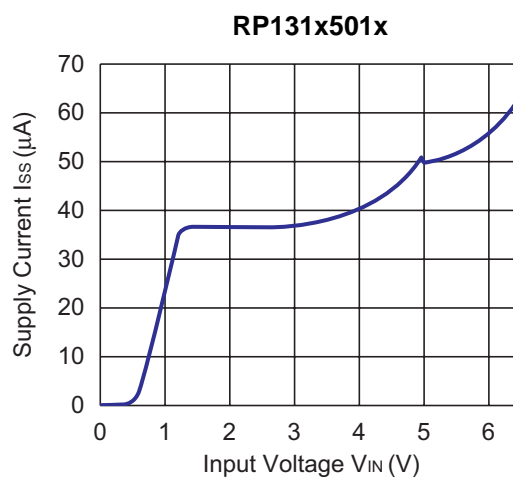
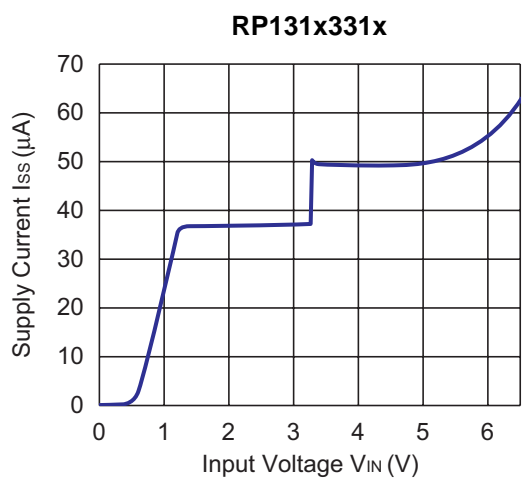
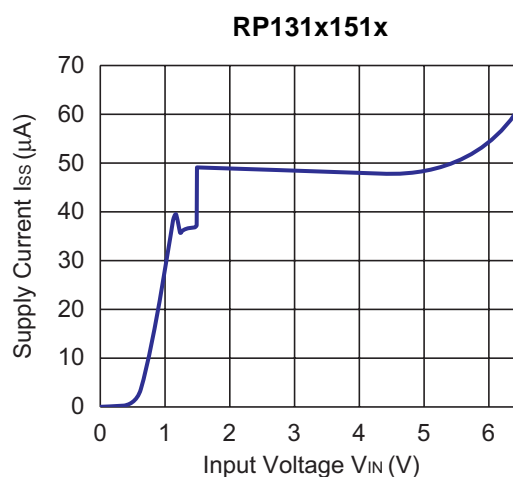
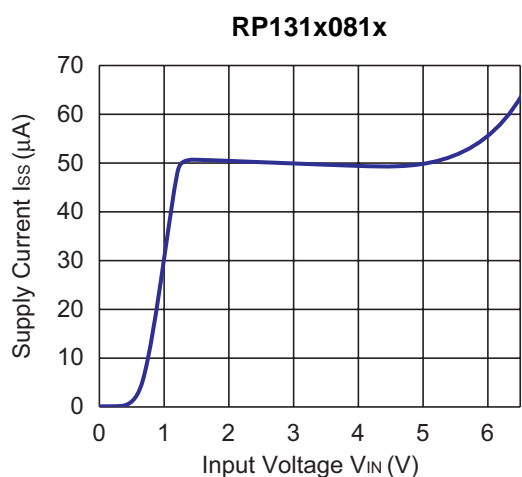


### 2) Output Voltage vs. Input Voltage (T<sub>opt</sub>=25°C)





**3) Supply Current vs. Input Voltage (Topt=25°C)**



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## RP131x

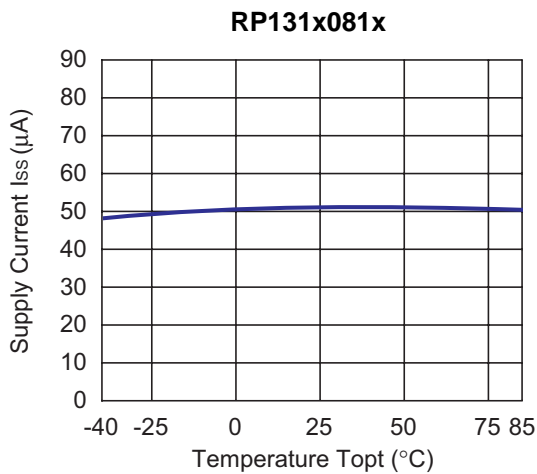
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### 4) Output Voltage vs. Temperature



### 5) Supply Current vs. Temperature



RP131x331x



RP131x501x



6) Dropout Voltage vs. Output Current

RP131x081x



RP131x151x



RP131x331x



RP131x501x



# RP131x

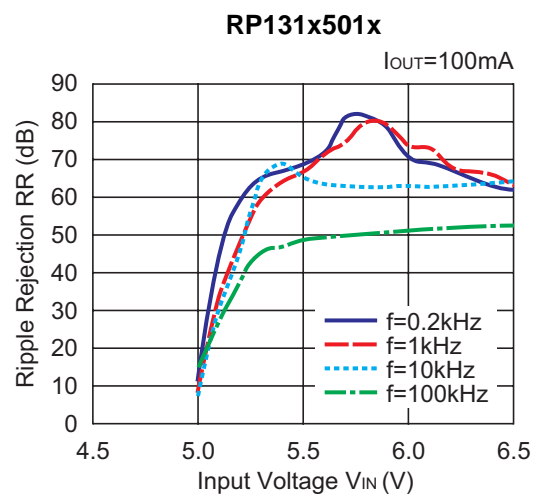
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## 7) Dropout Voltage vs. Set Output Voltage

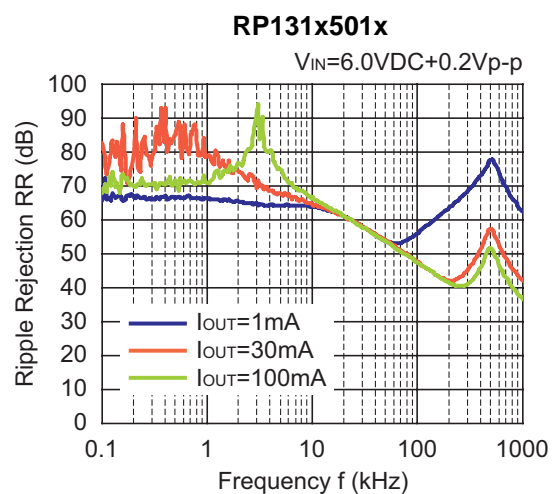
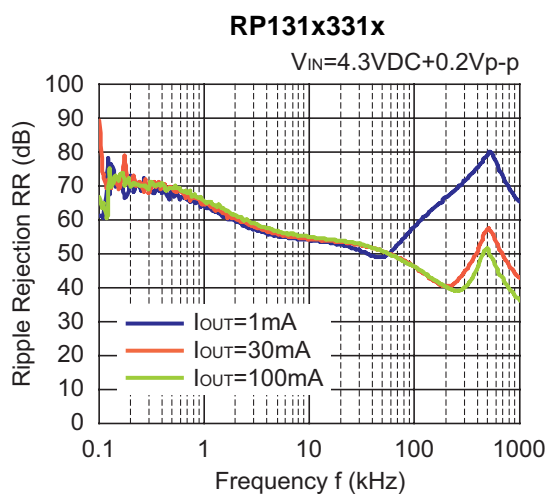
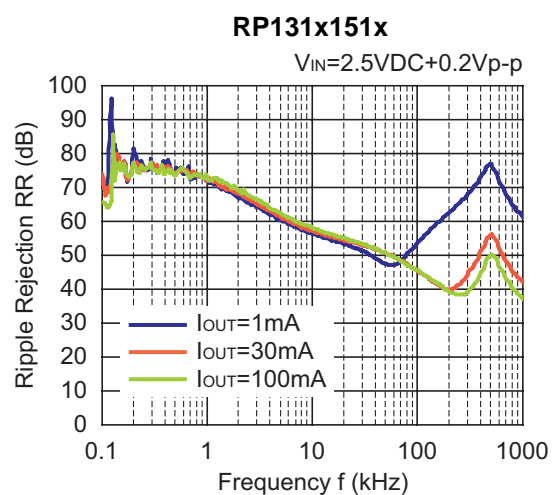
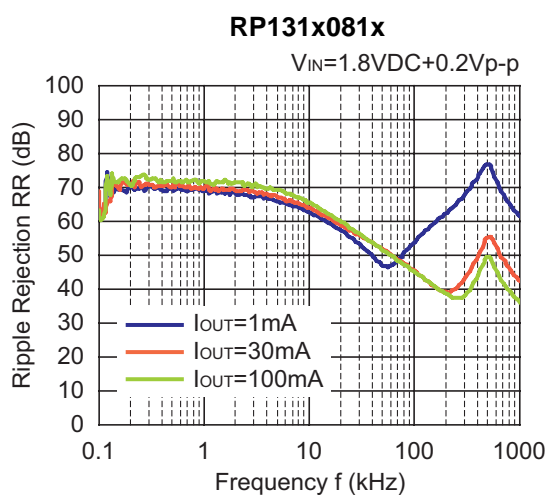


## 8) Ripple Rejection vs. Input Bias Voltage ( $C1=none, C2=Ceramic\ 1.0\mu F, Ripple=0.2V_{pp}, T_{opt}=25^{\circ}C$ )





9) Ripple Rejection vs. Frequency ( $C1=none$ ,  $C2=Ceramic\ 4.7\mu F$ ,  $T_{opt}=25^{\circ}C$ )



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## 10) Input Transient Response ( $I_{OUT}=100\text{mA}$ , $t_r=t_f=5\mu\text{s}$ , $C_1=\text{none}$ , $T_{opt}=25^\circ\text{C}$ )



## 11) Load Transient Response ( $t_r=t_f=0.5\mu\text{s}$ , $C_1=\text{Ceramic } 2.2\mu\text{F}$ , $V_{IN}=V_{OUT}+1.0\text{V}$ , $T_{opt}=25^\circ\text{C}$ )





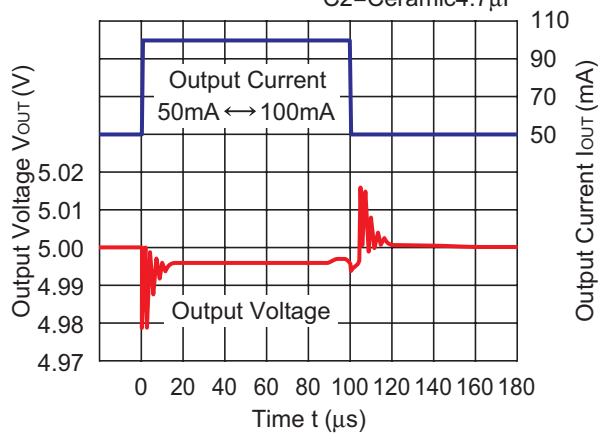
**RP131x331x**

C2=Ceramic4.7 $\mu$ F



**RP131x501x**

C2=Ceramic4.7 $\mu$ F



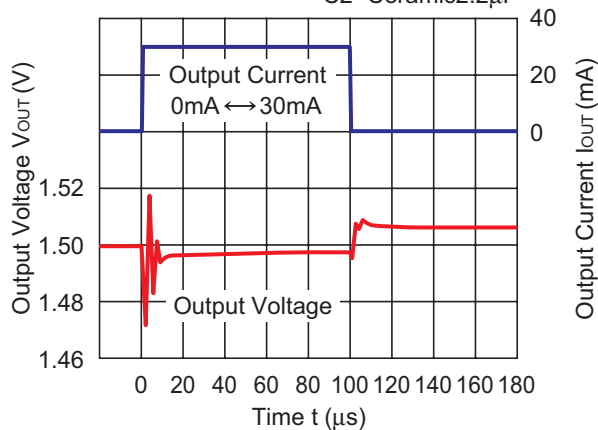
**RP131x081x**

C2=Ceramic2.2 $\mu$ F



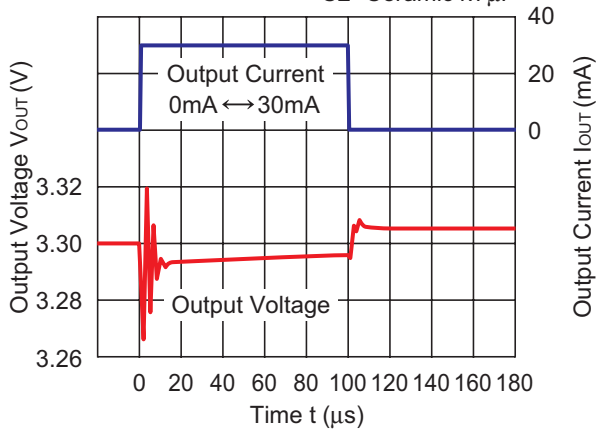
**RP131x151x**

C2=Ceramic2.2 $\mu$ F



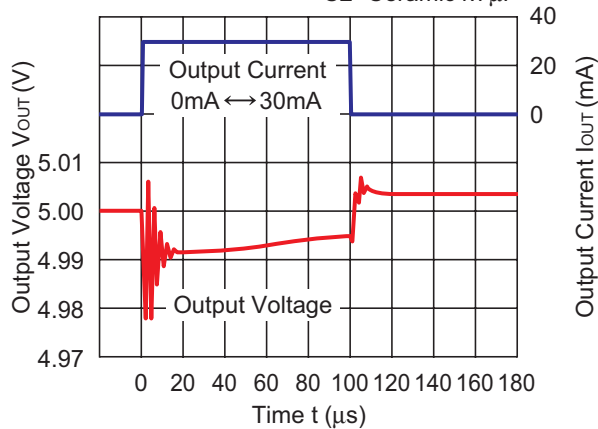
**RP131x331x**

C2=Ceramic4.7 $\mu$ F



**RP131x501x**

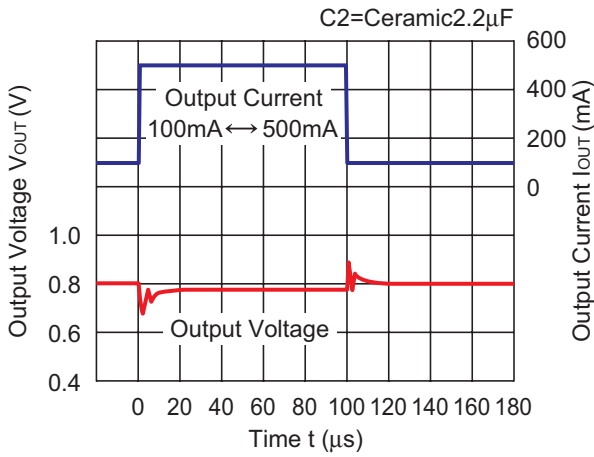
C2=Ceramic4.7 $\mu$ F



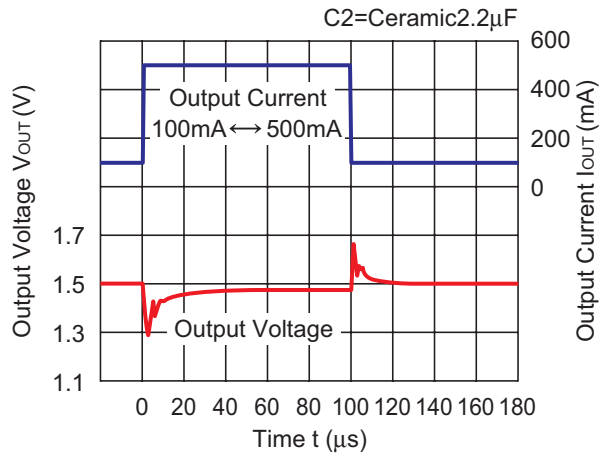
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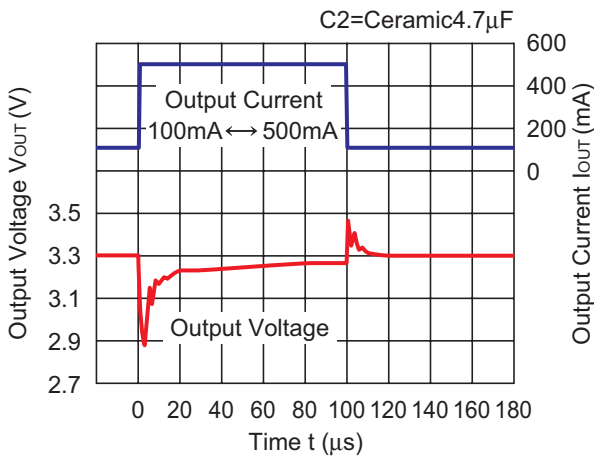
### RP131x081x



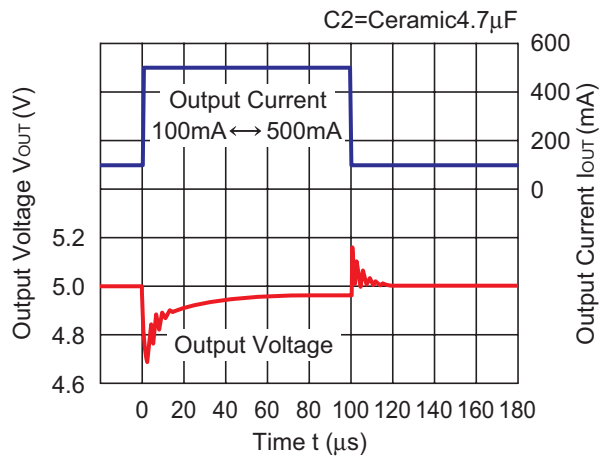
### RP131x151x



### RP131x331x

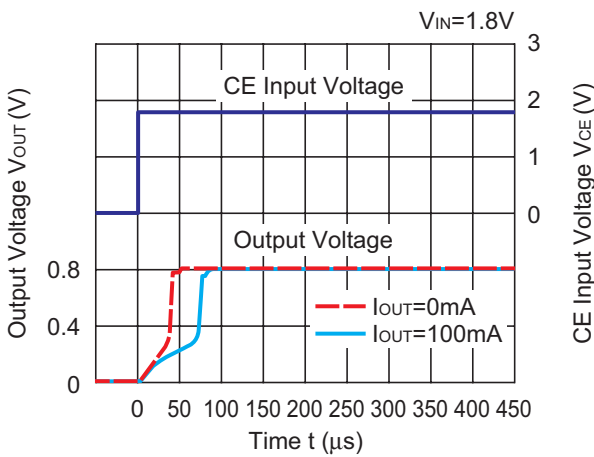


### RP131x501x

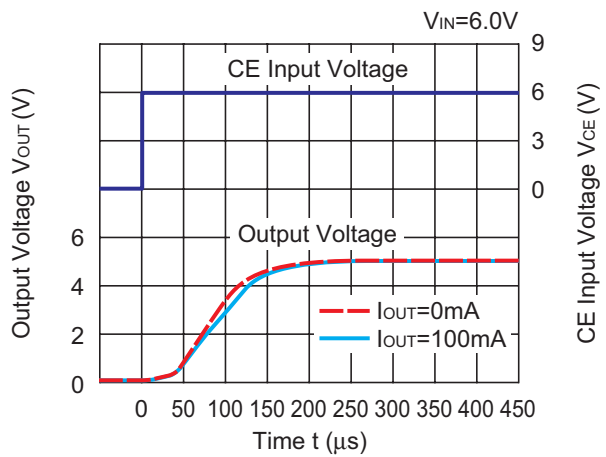


## 12) Turn On Speed with CE pin (C1=Ceramic 2.2 $\mu$ F, C2=Ceramic 4.7 $\mu$ F, T<sub>opt</sub>=25 $^{\circ}$ C)

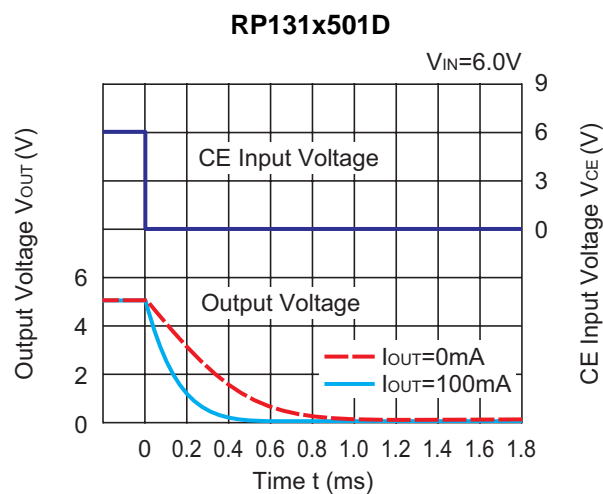
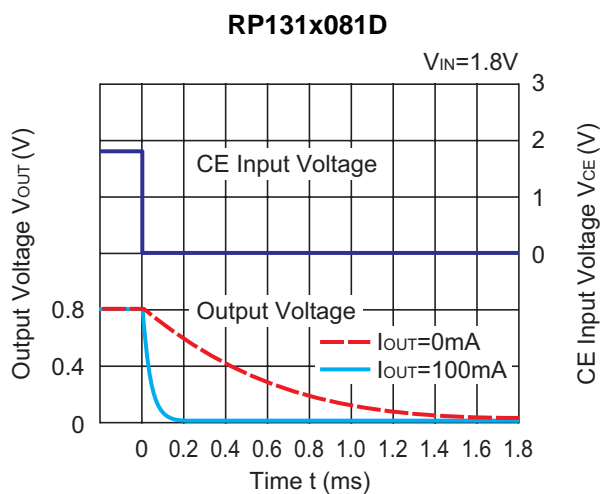
### RP131x081x



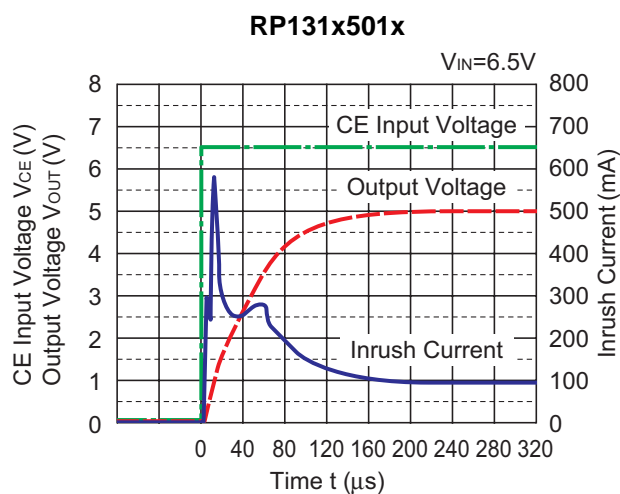
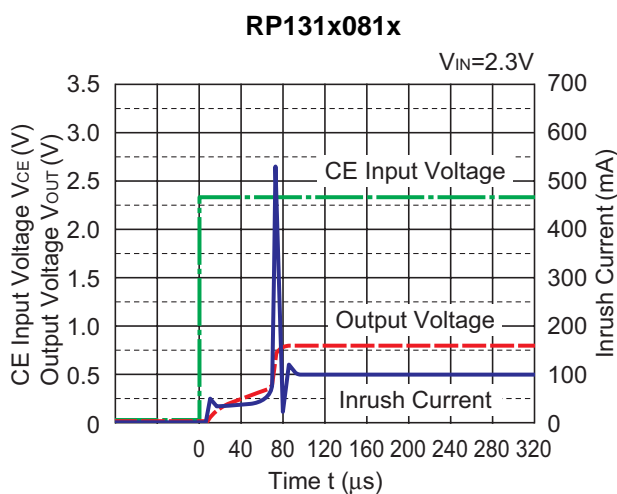
### RP131x501x



13) Turn Off Speed with CE pin (D Version) (C1=Ceramic 2.2μF, C2=Ceramic 4.7μF, T<sub>opt</sub>=25°C)



14) Inrush Current at turning on (C1=Ceramic 2.2μF, C2=Ceramic 4.7μF, T<sub>opt</sub>=25°C)



15) Minimum Operating Voltage



Hatched area is available for 0.8V output.

## RP131x

NO.EA-174-160426

### ESR vs. Output Current

When using these ICs, consider the following points:

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

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

#### Measurement conditions

Frequency Band : 10Hz to 3MHz

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

C1 :  $2.2\mu\text{F}$  (Kyocera, CM05X5R225M04AD)

C2 :  $2.2\mu\text{F}$  (Kyocera, CM105X5R225K06AE)

$4.7\mu\text{F}$  (Kyocera, CM105X5R475M06AB)



## PACKAGE INFORMATION

### Power Dissipation (DFN1616-6B)

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

\* Measurement Conditions

|                  |   |
|------------------|---|
|                  | Standard Test Land Pattern                    |
| Environment      | Mounting on Board (Wind velocity=0m/s)        |
| Board Material   | Glass cloth epoxy plastic (Double-sided)      |
| Board Dimensions | 40mm*40mm*1.6mm                               |
| Copper Ratio     | Top side: Approx. 50%, Back side: Approx. 50% |
| Through-holes    | $\phi$ 0.5mm * 32pcs                          |

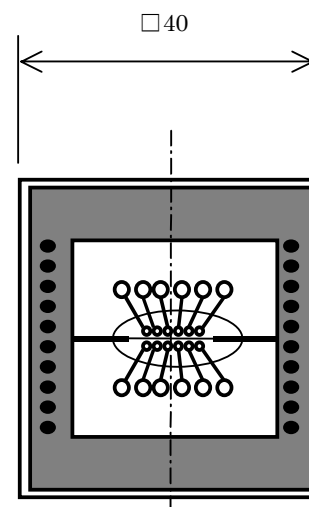
Measurement Result

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

|                    |   |
|--------------------|---|
|                    | Standard Test Land Pattern  |
| Power Dissipation  | 640mW ( $T_{jmax}=125^\circ\text{C}$ )<br>820mW ( $T_{jmax}=150^\circ\text{C}$ )                                |
| Thermal Resistance | $\theta_{ja} = (125-25^\circ\text{C})/0.64\text{W} = 156^\circ\text{C/W}$<br>$\theta_{jc} = 23^\circ\text{C/W}$ |



**Power Dissipation**



**Measurement Board Pattern**

IC Mount Area (Unit: mm)

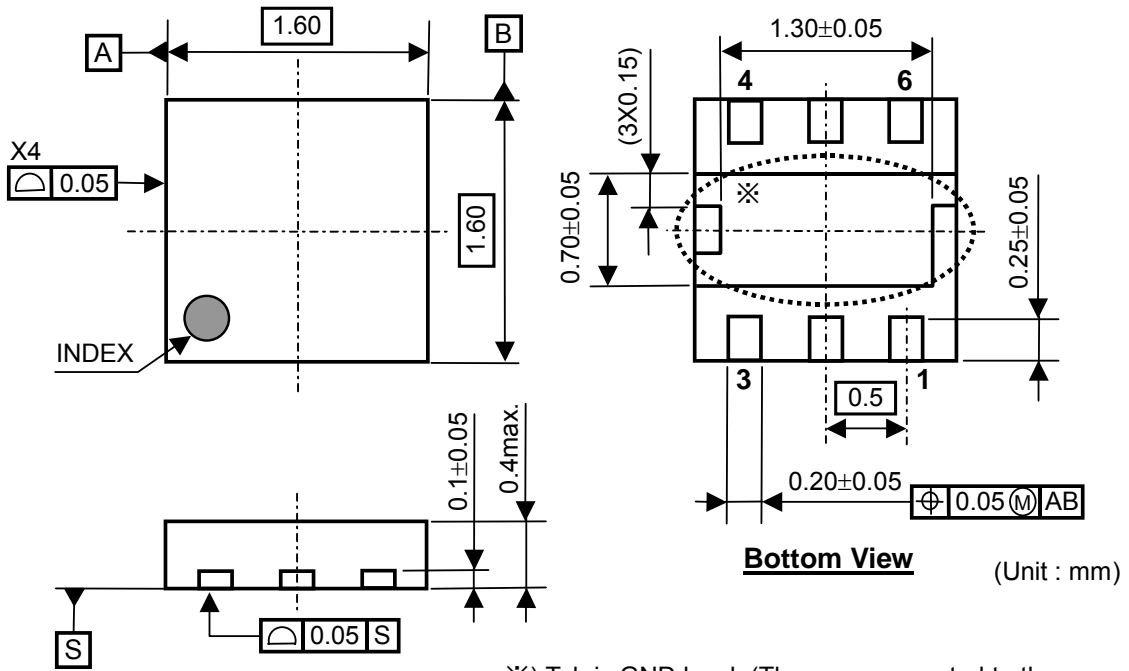
The above graph shows the Power Dissipation of the package based on  $T_{jmax}=125^\circ\text{C}$  and  $T_{jmax}=150^\circ\text{C}$ . Operating the IC in the shaded area in the graph might have an influence it's lifetime. Operating time must be within the time limit described in the table below, in case of operating in the shaded area.

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

# RP131x

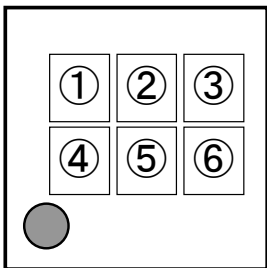
NO.EA-174-160426

## Package Dimensions (DFN1616-6B)



※) 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.

## Mark Specifications (DFN1616-6B)



①②③④: Product Code ... Refer to RP131L Series Mark Specification Table.

⑤⑥: Lot Number ... Alphanumeric Serial Number

## RP131L Series Mark Specification Table

PKG: DFN1616-6B

### RP131Lxx1B

| Part Number | ①②③④         | Vset  |
|-------------|--------------|-------|
| RP131L081B  | <b>CB 01</b> | 0.8V  |
| RP131L091B  | <b>CB 02</b> | 0.9V  |
| RP131L101B  | <b>CB 03</b> | 1.0V  |
| RP131L111B  | <b>CB 04</b> | 1.1V  |
| RP131L121B  | <b>CB 05</b> | 1.2V  |
| RP131L121B5 | <b>CB 06</b> | 1.25V |
| RP131L131B  | <b>CB 07</b> | 1.3V  |
| RP131L141B  | <b>CB 08</b> | 1.4V  |
| RP131L151B  | <b>CB 09</b> | 1.5V  |
| RP131L161B  | <b>CB 10</b> | 1.6V  |
| RP131L171B  | <b>CB 11</b> | 1.7V  |
| RP131L181B  | <b>CB 12</b> | 1.8V  |
| RP131L181B5 | <b>CB 13</b> | 1.85V |
| RP131L191B  | <b>CB 14</b> | 1.9V  |
| RP131L201B  | <b>CB 15</b> | 2.0V  |
| RP131L211B  | <b>CB 16</b> | 2.1V  |
| RP131L221B  | <b>CB 17</b> | 2.2V  |
| RP131L231B  | <b>CB 18</b> | 2.3V  |
| RP131L241B  | <b>CB 19</b> | 2.4V  |
| RP131L251B  | <b>CB 20</b> | 2.5V  |
| RP131L261B  | <b>CB 21</b> | 2.6V  |
| RP131L271B  | <b>CB 22</b> | 2.7V  |
| RP131L281B  | <b>CB 23</b> | 2.8V  |
| RP131L281B5 | <b>CB 24</b> | 2.85V |
| RP131L291B  | <b>CB 25</b> | 2.9V  |
| RP131L301B  | <b>CB 26</b> | 3.0V  |
| RP131L311B  | <b>CB 27</b> | 3.1V  |
| RP131L321B  | <b>CB 28</b> | 3.2V  |
| RP131L331B  | <b>CB 29</b> | 3.3V  |
| RP131L341B  | <b>CB 30</b> | 3.4V  |
| RP131L351B  | <b>CB 31</b> | 3.5V  |
| RP131L361B  | <b>CB 32</b> | 3.6V  |
| RP131L371B  | <b>CB 33</b> | 3.7V  |
| RP131L381B  | <b>CB 34</b> | 3.8V  |
| RP131L391B  | <b>CB 35</b> | 3.9V  |
| RP131L401B  | <b>CB 36</b> | 4.0V  |
| RP131L411B  | <b>CB 37</b> | 4.1V  |
| RP131L421B  | <b>CB 38</b> | 4.2V  |
| RP131L431B  | <b>CB 39</b> | 4.3V  |
| RP131L441B  | <b>CB 40</b> | 4.4V  |
| RP131L451B  | <b>CB 41</b> | 4.5V  |
| RP131L461B  | <b>CB 42</b> | 4.6V  |
| RP131L471B  | <b>CB 43</b> | 4.7V  |
| RP131L481B  | <b>CB 44</b> | 4.8V  |
| RP131L491B  | <b>CB 45</b> | 4.9V  |
| RP131L501B  | <b>CB 46</b> | 5.0V  |
| RP131L101B5 | <b>CB 47</b> | 1.05V |
| RP131L511B  | <b>CB 48</b> | 5.1V  |
| RP131L521B  | <b>CB 49</b> | 5.2V  |
| RP131L531B  | <b>CB 50</b> | 5.3V  |
| RP131L541B  | <b>CB 51</b> | 5.4V  |
| RP131L551B  | <b>CB 52</b> | 5.5V  |

### RP131Lxx1D

| Part Number | ①②③④         | Vset  |
|-------------|--------------|-------|
| RP131L081D  | <b>CC 01</b> | 0.8V  |
| RP131L091D  | <b>CC 02</b> | 0.9V  |
| RP131L101D  | <b>CC 03</b> | 1.0V  |
| RP131L111D  | <b>CC 04</b> | 1.1V  |
| RP131L121D  | <b>CC 05</b> | 1.2V  |
| RP131L121D5 | <b>CC 06</b> | 1.25V |
| RP131L131D  | <b>CC 07</b> | 1.3V  |
| RP131L141D  | <b>CC 08</b> | 1.4V  |
| RP131L151D  | <b>CC 09</b> | 1.5V  |
| RP131L161D  | <b>CC 10</b> | 1.6V  |
| RP131L171D  | <b>CC 11</b> | 1.7V  |
| RP131L181D  | <b>CC 12</b> | 1.8V  |
| RP131L181D5 | <b>CC 13</b> | 1.85V |
| RP131L191D  | <b>CC 14</b> | 1.9V  |
| RP131L201D  | <b>CC 15</b> | 2.0V  |
| RP131L211D  | <b>CC 16</b> | 2.1V  |
| RP131L221D  | <b>CC 17</b> | 2.2V  |
| RP131L231D  | <b>CC 18</b> | 2.3V  |
| RP131L241D  | <b>CC 19</b> | 2.4V  |
| RP131L251D  | <b>CC 20</b> | 2.5V  |
| RP131L261D  | <b>CC 21</b> | 2.6V  |
| RP131L271D  | <b>CC 22</b> | 2.7V  |
| RP131L281D  | <b>CC 23</b> | 2.8V  |
| RP131L281D5 | <b>CC 24</b> | 2.85V |
| RP131L291D  | <b>CC 25</b> | 2.9V  |
| RP131L301D  | <b>CC 26</b> | 3.0V  |
| RP131L311D  | <b>CC 27</b> | 3.1V  |
| RP131L321D  | <b>CC 28</b> | 3.2V  |
| RP131L331D  | <b>CC 29</b> | 3.3V  |
| RP131L341D  | <b>CC 30</b> | 3.4V  |
| RP131L351D  | <b>CC 31</b> | 3.5V  |
| RP131L361D  | <b>CC 32</b> | 3.6V  |
| RP131L371D  | <b>CC 33</b> | 3.7V  |
| RP131L381D  | <b>CC 34</b> | 3.8V  |
| RP131L391D  | <b>CC 35</b> | 3.9V  |
| RP131L401D  | <b>CC 36</b> | 4.0V  |
| RP131L411D  | <b>CC 37</b> | 4.1V  |
| RP131L421D  | <b>CC 38</b> | 4.2V  |
| RP131L431D  | <b>CC 39</b> | 4.3V  |
| RP131L441D  | <b>CC 40</b> | 4.4V  |
| RP131L451D  | <b>CC 41</b> | 4.5V  |
| RP131L461D  | <b>CC 42</b> | 4.6V  |
| RP131L471D  | <b>CC 43</b> | 4.7V  |
| RP131L481D  | <b>CC 44</b> | 4.8V  |
| RP131L491D  | <b>CC 45</b> | 4.9V  |
| RP131L501D  | <b>CC 46</b> | 5.0V  |
| RP131L101D5 | <b>CC 47</b> | 1.05V |
| RP131L511D  | <b>CC 48</b> | 5.1V  |
| RP131L521D  | <b>CC 49</b> | 5.2V  |
| RP131L531D  | <b>CC 50</b> | 5.3V  |
| RP131L541D  | <b>CC 51</b> | 5.4V  |
| RP131L551D  | <b>CC 52</b> | 5.5V  |

# RP131x

NO.EA-174-160426

## Power Dissipation (DFN(PLP)1820-6)

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

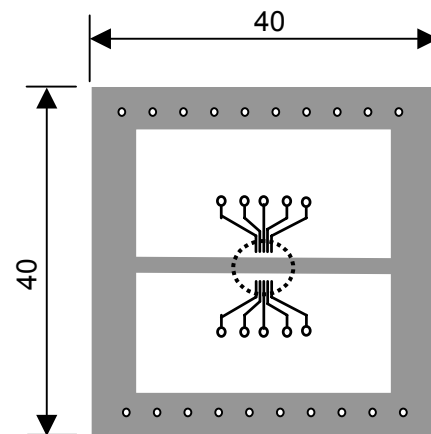
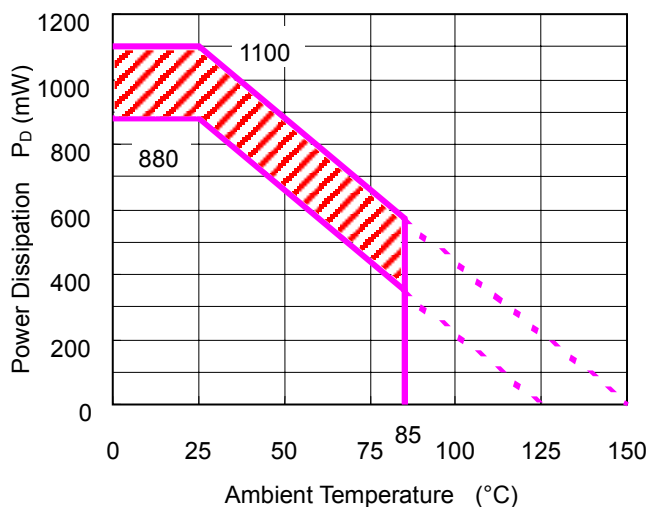
### Measurement Conditions

|                  | Standard Land Pattern                         |
|------------------|---|
| Environment      | Mounting on Board (Wind velocity=0m/s)        |
| Board Material   | Glass cloth epoxy plastic (Double-sided)      |
| Board Dimensions | 40mm * 40mm * 1.6mm                           |
| Copper Ratio     | Top side: Approx. 50%, Back side: Approx. 50% |
| Through-hole     | $\phi 0.54\text{mm} * 30\text{pcs}$           |

### Measurement Result

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

|                    | Standard Land Pattern   |
|--------------------|---|
| Power Dissipation  | 880mW( $T_{j\text{max}}=125^\circ\text{C}$ )<br>1100mW( $T_{j\text{max}}=150^\circ\text{C}$ ) |
| Thermal Resistance | $\theta_{ja}=(125 - 25^\circ\text{C})/0.88\text{W}=114^\circ\text{C/W}$                       |



Measurement Board Pattern

○ IC Mount Area Unit: mm

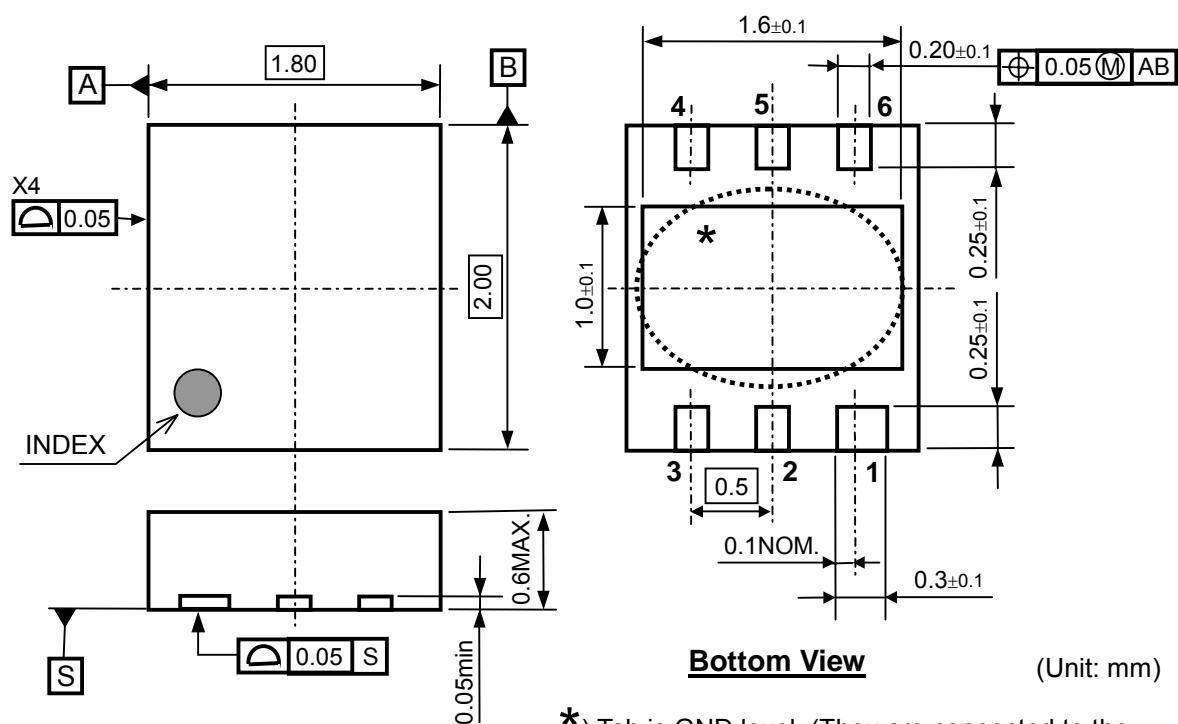
- The above graph shows the Power Dissipation of the package based on  $T_{j\text{max}}=125^\circ\text{C}$  and  $T_{j\text{max}}=150^\circ\text{C}$ . Operating the IC in the shaded area in the graph might have an influence it's lifetime.

Operating time must be within the time limit described in the table below, in case of operating in the shaded area.

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



Package Dimensions (DFN(PLP)1820-6)

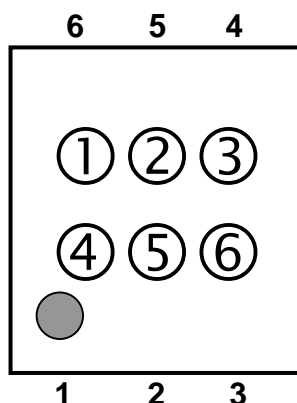


\* ) Tab is GND level. (They are connected to the reverse side of this IC.)  
The tab is better to be connected to the GND, but leaving it open is also acceptable.

Mark Specifications (DFN(PLP)1820-6)

①②③④: Product Code ... Refer to RP131K Series Mark Specification Table.

⑤⑥: Lot Number ... Alphanumeric Serial Number



## RP131K Series Mark Specification Table

PKG: DFN(PLP)1820-6

**RP131Kxx1B**

| Part Number | ①②③④         | Vset  |
|-------------|--------------|-------|
| RP131K081B  | <b>AM 01</b> | 0.8V  |
| RP131K091B  | <b>AM 02</b> | 0.9V  |
| RP131K101B  | <b>AM 03</b> | 1.0V  |
| RP131K111B  | <b>AM 04</b> | 1.1V  |
| RP131K121B  | <b>AM 05</b> | 1.2V  |
| RP131K121B5 | <b>AM 06</b> | 1.25V |
| RP131K131B  | <b>AM 07</b> | 1.3V  |
| RP131K141B  | <b>AM 08</b> | 1.4V  |
| RP131K151B  | <b>AM 09</b> | 1.5V  |
| RP131K161B  | <b>AM 10</b> | 1.6V  |
| RP131K171B  | <b>AM 11</b> | 1.7V  |
| RP131K181B  | <b>AM 12</b> | 1.8V  |
| RP131K181B5 | <b>AM 13</b> | 1.85V |
| RP131K191B  | <b>AM 14</b> | 1.9V  |
| RP131K201B  | <b>AM 15</b> | 2.0V  |
| RP131K211B  | <b>AM 16</b> | 2.1V  |
| RP131K221B  | <b>AM 17</b> | 2.2V  |
| RP131K231B  | <b>AM 18</b> | 2.3V  |
| RP131K241B  | <b>AM 19</b> | 2.4V  |
| RP131K251B  | <b>AM 20</b> | 2.5V  |
| RP131K261B  | <b>AM 21</b> | 2.6V  |
| RP131K271B  | <b>AM 22</b> | 2.7V  |
| RP131K281B  | <b>AM 23</b> | 2.8V  |
| RP131K281B5 | <b>AM 24</b> | 2.85V |
| RP131K291B  | <b>AM 25</b> | 2.9V  |
| RP131K301B  | <b>AM 26</b> | 3.0V  |
| RP131K311B  | <b>AM 27</b> | 3.1V  |
| RP131K321B  | <b>AM 28</b> | 3.2V  |
| RP131K331B  | <b>AM 29</b> | 3.3V  |
| RP131K341B  | <b>AM 30</b> | 3.4V  |
| RP131K351B  | <b>AM 31</b> | 3.5V  |
| RP131K361B  | <b>AM 32</b> | 3.6V  |
| RP131K371B  | <b>AM 33</b> | 3.7V  |
| RP131K381B  | <b>AM 34</b> | 3.8V  |
| RP131K391B  | <b>AM 35</b> | 3.9V  |
| RP131K401B  | <b>AM 36</b> | 4.0V  |
| RP131K411B  | <b>AM 37</b> | 4.1V  |
| RP131K421B  | <b>AM 38</b> | 4.2V  |
| RP131K431B  | <b>AM 39</b> | 4.3V  |
| RP131K441B  | <b>AM 40</b> | 4.4V  |
| RP131K451B  | <b>AM 41</b> | 4.5V  |
| RP131K461B  | <b>AM 42</b> | 4.6V  |
| RP131K471B  | <b>AM 43</b> | 4.7V  |
| RP131K481B  | <b>AM 44</b> | 4.8V  |
| RP131K491B  | <b>AM 45</b> | 4.9V  |
| RP131K501B  | <b>AM 46</b> | 5.0V  |
| RP131K101B5 | <b>AM 47</b> | 1.05V |
| RP131K551B  | <b>AM 48</b> | 5.5V  |
| RP131K511B  | <b>AM 49</b> | 5.1V  |
| RP131K521B  | <b>AM 50</b> | 5.2V  |
| RP131K531B  | <b>AM 51</b> | 5.3V  |
| RP131K541B  | <b>AM 52</b> | 5.4V  |

**RP131Kxx1D**

| Part Number | ①②③④         | Vset  |
|-------------|--------------|-------|
| RP131K081D  | <b>AN 01</b> | 0.8V  |
| RP131K091D  | <b>AN 02</b> | 0.9V  |
| RP131K101D  | <b>AN 03</b> | 1.0V  |
| RP131K111D  | <b>AN 04</b> | 1.1V  |
| RP131K121D  | <b>AN 05</b> | 1.2V  |
| RP131K121D5 | <b>AN 06</b> | 1.25V |
| RP131K131D  | <b>AN 07</b> | 1.3V  |
| RP131K141D  | <b>AN 08</b> | 1.4V  |
| RP131K151D  | <b>AN 09</b> | 1.5V  |
| RP131K161D  | <b>AN 10</b> | 1.6V  |
| RP131K171D  | <b>AN 11</b> | 1.7V  |
| RP131K181D  | <b>AN 12</b> | 1.8V  |
| RP131K181D5 | <b>AN 13</b> | 1.85V |
| RP131K191D  | <b>AN 14</b> | 1.9V  |
| RP131K201D  | <b>AN 15</b> | 2.0V  |
| RP131K211D  | <b>AN 16</b> | 2.1V  |
| RP131K221D  | <b>AN 17</b> | 2.2V  |
| RP131K231D  | <b>AN 18</b> | 2.3V  |
| RP131K241D  | <b>AN 19</b> | 2.4V  |
| RP131K251D  | <b>AN 20</b> | 2.5V  |
| RP131K261D  | <b>AN 21</b> | 2.6V  |
| RP131K271D  | <b>AN 22</b> | 2.7V  |
| RP131K281D  | <b>AN 23</b> | 2.8V  |
| RP131K281D5 | <b>AN 24</b> | 2.85V |
| RP131K291D  | <b>AN 25</b> | 2.9V  |
| RP131K301D  | <b>AN 26</b> | 3.0V  |
| RP131K311D  | <b>AN 27</b> | 3.1V  |
| RP131K321D  | <b>AN 28</b> | 3.2V  |
| RP131K331D  | <b>AN 29</b> | 3.3V  |
| RP131K341D  | <b>AN 30</b> | 3.4V  |
| RP131K351D  | <b>AN 31</b> | 3.5V  |
| RP131K361D  | <b>AN 32</b> | 3.6V  |
| RP131K371D  | <b>AN 33</b> | 3.7V  |
| RP131K381D  | <b>AN 34</b> | 3.8V  |
| RP131K391D  | <b>AN 35</b> | 3.9V  |
| RP131K401D  | <b>AN 36</b> | 4.0V  |
| RP131K411D  | <b>AN 37</b> | 4.1V  |
| RP131K421D  | <b>AN 38</b> | 4.2V  |
| RP131K431D  | <b>AN 39</b> | 4.3V  |
| RP131K441D  | <b>AN 40</b> | 4.4V  |
| RP131K451D  | <b>AN 41</b> | 4.5V  |
| RP131K461D  | <b>AN 42</b> | 4.6V  |
| RP131K471D  | <b>AN 43</b> | 4.7V  |
| RP131K481D  | <b>AN 44</b> | 4.8V  |
| RP131K491D  | <b>AN 45</b> | 4.9V  |
| RP131K501D  | <b>AN 46</b> | 5.0V  |
| RP131K101D5 | <b>AN 47</b> | 1.05V |
| RP131K551D  | <b>AN 48</b> | 5.5V  |
| RP131K511D  | <b>AN 49</b> | 5.1V  |
| RP131K521D  | <b>AN 50</b> | 5.2V  |
| RP131K531D  | <b>AN 51</b> | 5.3V  |
| RP131K541D  | <b>AN 52</b> | 5.4V  |

**Power Dissipation (SOT-89-5)**

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

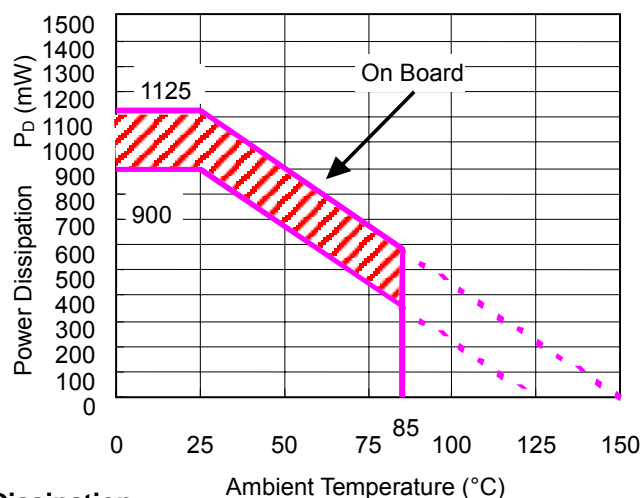
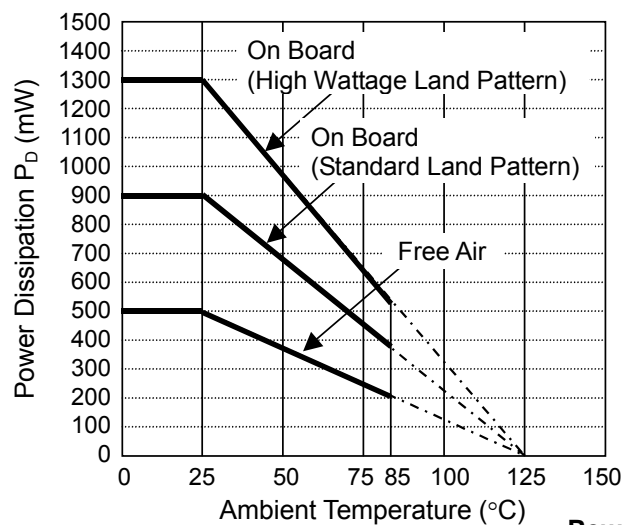
**Measurement Conditions**

|                  | High Wottage Land Pattern                        | Standard Land Pattern                            |
|------------------|--|--|
| Environment      | Mounting on Board (Wind velocity=0m/s)           | Mounting on Board (Wind velocity=0m/s)           |
| Board Material   | Glass cloth epoxy plastic (Double-sided)         | Glass cloth epoxy plastic (Double-sided)         |
| Board Dimensions | 30mm * 30mm * 1.6mm                              | 50mm * 50mm * 1.6mm                              |
| Copper Ratio     | Top side: Approx. 20%<br>Back side: Approx. 100% | Top side: Approx. 10%<br>Back side: Approx. 100% |
| Through-hole     | $\phi$ 0.85mm * 10pcs                            | -  |

**Measurement Result**

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

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



**Power Dissipation**



**Measurement Board Pattern**

○ IC Mount Area Unit: mm

- The above graph shows the Power Dissipation of the package based on  $T_{j\max}=125^\circ\text{C}$  and  $T_{j\max}=150^\circ\text{C}$ .

Operating the IC in the shaded area in the graph might have an influence it's lifetime.

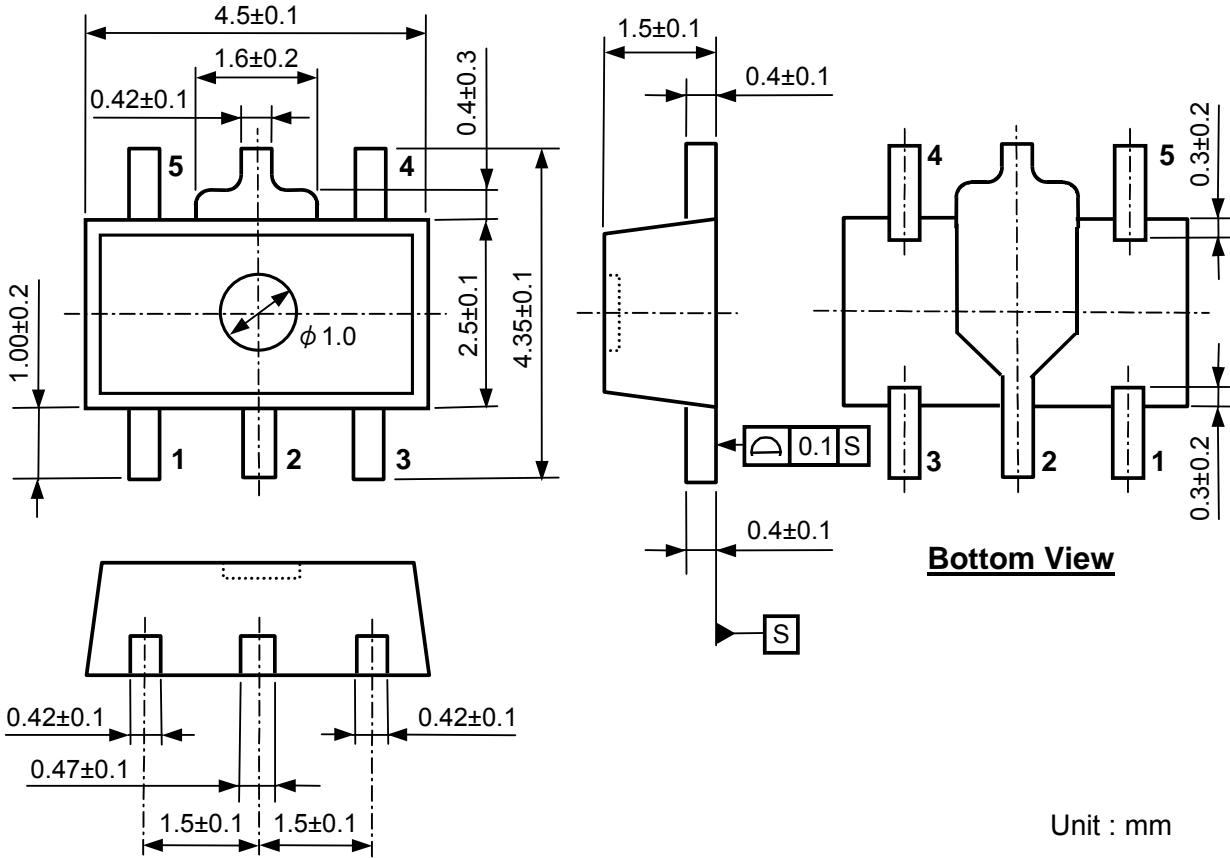
Operating time must be within the time limit described in the table below, in case of operating in the shaded area.

| Operating Time | Estimated years<br>(Operating four hours/day) |
|----------------|---|
| 4,500 hours    | 3years  |

**RP131x**

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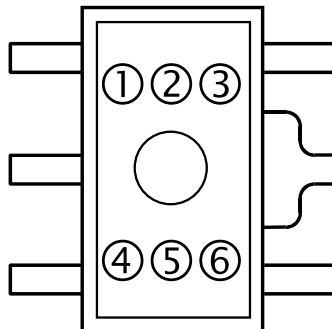
**Package Dimensions (SOT-89-5)**



**Mark Specifications (SOT-89-5)**

①②③④: Product Code ... Refer to RP131H Series Mark Specification Table.

⑤⑥: Lot Number ... Alphanumeric Serial Number



## RP131H Series Mark Specification Table

PKG: SOT-89-5

### RP131Hxx1B

| Part Number | ①②③④           | Vset  |
|-------------|----------------|-------|
| RP131H081B  | <b>U 0 8 B</b> | 0.8V  |
| RP131H091B  | <b>U 0 9 B</b> | 0.9V  |
| RP131H101B  | <b>U 1 0 B</b> | 1.0V  |
| RP131H111B  | <b>U 1 1 B</b> | 1.1V  |
| RP131H121B  | <b>U 1 2 B</b> | 1.2V  |
| RP131H131B  | <b>U 1 3 B</b> | 1.3V  |
| RP131H141B  | <b>U 1 4 B</b> | 1.4V  |
| RP131H151B  | <b>U 1 5 B</b> | 1.5V  |
| RP131H161B  | <b>U 1 6 B</b> | 1.6V  |
| RP131H171B  | <b>U 1 7 B</b> | 1.7V  |
| RP131H181B  | <b>U 1 8 B</b> | 1.8V  |
| RP131H191B  | <b>U 1 9 B</b> | 1.9V  |
| RP131H201B  | <b>U 2 0 B</b> | 2.0V  |
| RP131H211B  | <b>U 2 1 B</b> | 2.1V  |
| RP131H221B  | <b>U 2 2 B</b> | 2.2V  |
| RP131H231B  | <b>U 2 3 B</b> | 2.3V  |
| RP131H241B  | <b>U 2 4 B</b> | 2.4V  |
| RP131H251B  | <b>U 2 5 B</b> | 2.5V  |
| RP131H261B  | <b>U 2 6 B</b> | 2.6V  |
| RP131H271B  | <b>U 2 7 B</b> | 2.7V  |
| RP131H281B  | <b>U 2 8 B</b> | 2.8V  |
| RP131H291B  | <b>U 2 9 B</b> | 2.9V  |
| RP131H301B  | <b>U 3 0 B</b> | 3.0V  |
| RP131H311B  | <b>U 3 1 B</b> | 3.1V  |
| RP131H321B  | <b>U 3 2 B</b> | 3.2V  |
| RP131H331B  | <b>U 3 3 B</b> | 3.3V  |
| RP131H341B  | <b>U 3 4 B</b> | 3.4V  |
| RP131H351B  | <b>U 3 5 B</b> | 3.5V  |
| RP131H361B  | <b>U 3 6 B</b> | 3.6V  |
| RP131H371B  | <b>U 3 7 B</b> | 3.7V  |
| RP131H381B  | <b>U 3 8 B</b> | 3.8V  |
| RP131H391B  | <b>U 3 9 B</b> | 3.9V  |
| RP131H401B  | <b>U 4 0 B</b> | 4.0V  |
| RP131H411B  | <b>U 4 1 B</b> | 4.1V  |
| RP131H421B  | <b>U 4 2 B</b> | 4.2V  |
| RP131H431B  | <b>U 4 3 B</b> | 4.3V  |
| RP131H441B  | <b>U 4 4 B</b> | 4.4V  |
| RP131H451B  | <b>U 4 5 B</b> | 4.5V  |
| RP131H461B  | <b>U 4 6 B</b> | 4.6V  |
| RP131H471B  | <b>U 4 7 B</b> | 4.7V  |
| RP131H481B  | <b>U 4 8 B</b> | 4.8V  |
| RP131H491B  | <b>U 4 9 B</b> | 4.9V  |
| RP131H501B  | <b>U 5 0 B</b> | 5.0V  |
| RP131H511B  | <b>U 5 1 B</b> | 5.1V  |
| RP131H521B  | <b>U 5 2 B</b> | 5.2V  |
| RP131H531B  | <b>U 5 3 B</b> | 5.3V  |
| RP131H541B  | <b>U 5 4 B</b> | 5.4V  |
| RP131H551B  | <b>U 5 5 B</b> | 5.5V  |
| RP131H121B5 | <b>U 0 1 B</b> | 1.25V |
| RP131H181B5 | <b>U 0 2 B</b> | 1.85V |
| RP131H281B5 | <b>U 0 3 B</b> | 2.85V |
| RP131H101B5 | <b>U 0 4 B</b> | 1.05V |

### RP131Hxx1D

| Part Number | ①②③④           | Vset  |
|-------------|----------------|-------|
| RP131H081D  | <b>U 0 8 D</b> | 0.8V  |
| RP131H091D  | <b>U 0 9 D</b> | 0.9V  |
| RP131H101D  | <b>U 1 0 D</b> | 1.0V  |
| RP131H111D  | <b>U 1 1 D</b> | 1.1V  |
| RP131H121D  | <b>U 1 2 D</b> | 1.2V  |
| RP131H131D  | <b>U 1 3 D</b> | 1.3V  |
| RP131H141D  | <b>U 1 4 D</b> | 1.4V  |
| RP131H151D  | <b>U 1 5 D</b> | 1.5V  |
| RP131H161D  | <b>U 1 6 D</b> | 1.6V  |
| RP131H171D  | <b>U 1 7 D</b> | 1.7V  |
| RP131H181D  | <b>U 1 8 D</b> | 1.8V  |
| RP131H191D  | <b>U 1 9 D</b> | 1.9V  |
| RP131H201D  | <b>U 2 0 D</b> | 2.0V  |
| RP131H211D  | <b>U 2 1 D</b> | 2.1V  |
| RP131H221D  | <b>U 2 2 D</b> | 2.2V  |
| RP131H231D  | <b>U 2 3 D</b> | 2.3V  |
| RP131H241D  | <b>U 2 4 D</b> | 2.4V  |
| RP131H251D  | <b>U 2 5 D</b> | 2.5V  |
| RP131H261D  | <b>U 2 6 D</b> | 2.6V  |
| RP131H271D  | <b>U 2 7 D</b> | 2.7V  |
| RP131H281D  | <b>U 2 8 D</b> | 2.8V  |
| RP131H291D  | <b>U 2 9 D</b> | 2.9V  |
| RP131H301D  | <b>U 3 0 D</b> | 3.0V  |
| RP131H311D  | <b>U 3 1 D</b> | 3.1V  |
| RP131H321D  | <b>U 3 2 D</b> | 3.2V  |
| RP131H331D  | <b>U 3 3 D</b> | 3.3V  |
| RP131H341D  | <b>U 3 4 D</b> | 3.4V  |
| RP131H351D  | <b>U 3 5 D</b> | 3.5V  |
| RP131H361D  | <b>U 3 6 D</b> | 3.6V  |
| RP131H371D  | <b>U 3 7 D</b> | 3.7V  |
| RP131H381D  | <b>U 3 8 D</b> | 3.8V  |
| RP131H391D  | <b>U 3 9 D</b> | 3.9V  |
| RP131H401D  | <b>U 4 0 D</b> | 4.0V  |
| RP131H411D  | <b>U 4 1 D</b> | 4.1V  |
| RP131H421D  | <b>U 4 2 D</b> | 4.2V  |
| RP131H431D  | <b>U 4 3 D</b> | 4.3V  |
| RP131H441D  | <b>U 4 4 D</b> | 4.4V  |
| RP131H451D  | <b>U 4 5 D</b> | 4.5V  |
| RP131H461D  | <b>U 4 6 D</b> | 4.6V  |
| RP131H471D  | <b>U 4 7 D</b> | 4.7V  |
| RP131H481D  | <b>U 4 8 D</b> | 4.8V  |
| RP131H491D  | <b>U 4 9 D</b> | 4.9V  |
| RP131H501D  | <b>U 5 0 D</b> | 5.0V  |
| RP131H511D  | <b>U 5 1 D</b> | 5.1V  |
| RP131H521D  | <b>U 5 2 D</b> | 5.2V  |
| RP131H531D  | <b>U 5 3 D</b> | 5.3V  |
| RP131H541D  | <b>U 5 4 D</b> | 5.4V  |
| RP131H551D  | <b>U 5 5 D</b> | 5.5V  |
| RP131H121D5 | <b>U 0 1 D</b> | 1.25V |
| RP131H181D5 | <b>U 0 2 D</b> | 1.85V |
| RP131H281D5 | <b>U 0 3 D</b> | 2.85V |
| RP131H101D5 | <b>U 0 4 D</b> | 1.05V |

# RP131x

NO.EA-174-160426

## Power Dissipation (HSOP-6J)

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

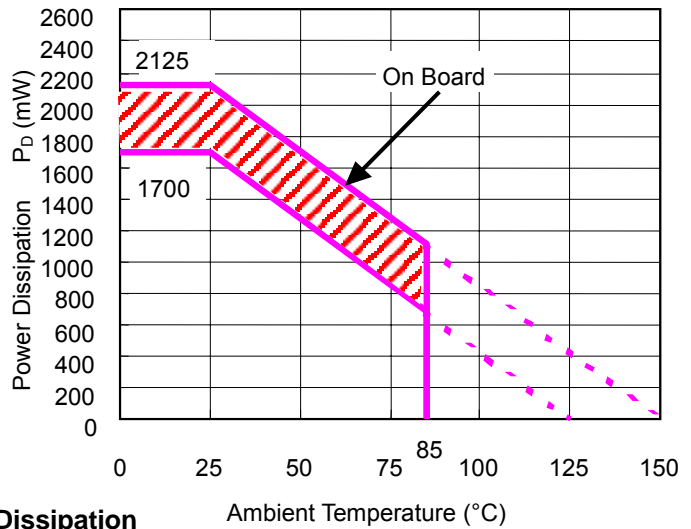
### Measurement Conditions

|                  | High Wattage Land Pattern                | Standard Land Pattern                    |
|------------------|--|--|
| Environment      | Mounting on Board (Wind velocity=0m/s)   | Mounting on Board (Wind velocity=0m/s)   |
| Board Material   | Glass cloth epoxy plastic (Double-sided) | Glass cloth epoxy plastic (Double-sided) |
| Board Dimensions | 50mm * 50mm * 1.6mm                      | 50mm * 50mm * 1.6mm                      |
| Copper Ratio     | 90%                                      | 50%                                      |
| Through-hole     | $\phi 0.5\text{mm} * 44\text{pcs}$       | $\phi 0.5\text{mm} * 44\text{pcs}$       |

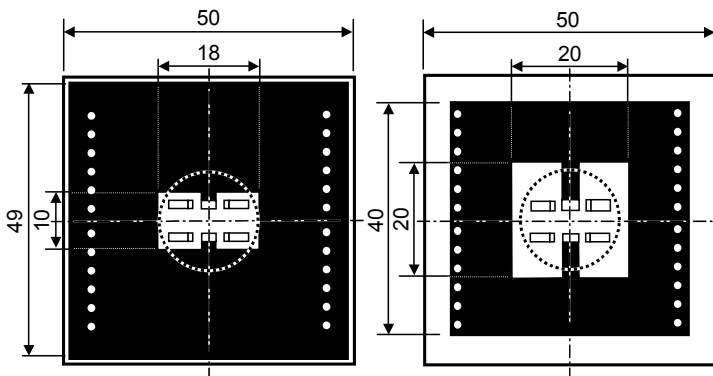
### Measurement Result

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

|                    | High Wattage Land Pattern | Standard Land Pattern  | Free Air              |
|--------------------|---------------------------|--|-----------------------|
| Power Dissipation  | 2000mW                    | 1700mW ( $T_{j\text{max}}=125^\circ\text{C}$ )<br>2125mW ( $T_{j\text{max}}=150^\circ\text{C}$ ) | 540mW                 |
| Thermal Resistance | $50^\circ\text{C/W}$      | $59^\circ\text{C/W}$   | $185^\circ\text{C/W}$ |



### Power Dissipation



High Wattage

Standard

Measurement Board Pattern

○ IC Mount Area Unit: mm

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

|                |
|----------------|
| Operating Time |
| 1,500 hours    |

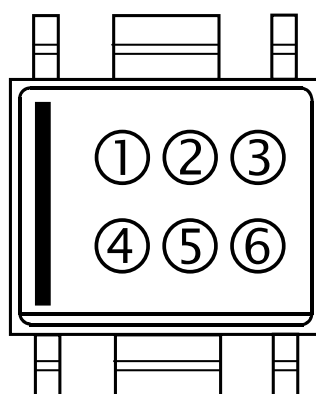
Package Dimensions (HSOP-6J)



Mark Specifications (HSOP-6J)

①②③④: Product Code ... Refer to RP131S Series Mark Specification Table.

⑤⑥: Lot Number ... Alphanumeric Serial Number



## RP131S Series Mark Specification Table

PKG: HSOP-6J

**RP131Sxx1B**

| Part Number | ①②③④           | Vset  |
|-------------|----------------|-------|
| RP131S081B  | <b>G 0 8 B</b> | 0.8V  |
| RP131S091B  | <b>G 0 9 B</b> | 0.9V  |
| RP131S101B  | <b>G 1 0 B</b> | 1.0V  |
| RP131S111B  | <b>G 1 1 B</b> | 1.1V  |
| RP131S121B  | <b>G 1 2 B</b> | 1.2V  |
| RP131S131B  | <b>G 1 3 B</b> | 1.3V  |
| RP131S141B  | <b>G 1 4 B</b> | 1.4V  |
| RP131S151B  | <b>G 1 5 B</b> | 1.5V  |
| RP131S161B  | <b>G 1 6 B</b> | 1.6V  |
| RP131S171B  | <b>G 1 7 B</b> | 1.7V  |
| RP131S181B  | <b>G 1 8 B</b> | 1.8V  |
| RP131S191B  | <b>G 1 9 B</b> | 1.9V  |
| RP131S201B  | <b>G 2 0 B</b> | 2.0V  |
| RP131S211B  | <b>G 2 1 B</b> | 2.1V  |
| RP131S221B  | <b>G 2 2 B</b> | 2.2V  |
| RP131S231B  | <b>G 2 3 B</b> | 2.3V  |
| RP131S241B  | <b>G 2 4 B</b> | 2.4V  |
| RP131S251B  | <b>G 2 5 B</b> | 2.5V  |
| RP131S261B  | <b>G 2 6 B</b> | 2.6V  |
| RP131S271B  | <b>G 2 7 B</b> | 2.7V  |
| RP131S281B  | <b>G 2 8 B</b> | 2.8V  |
| RP131S291B  | <b>G 2 9 B</b> | 2.9V  |
| RP131S301B  | <b>G 3 0 B</b> | 3.0V  |
| RP131S311B  | <b>G 3 1 B</b> | 3.1V  |
| RP131S321B  | <b>G 3 2 B</b> | 3.2V  |
| RP131S331B  | <b>G 3 3 B</b> | 3.3V  |
| RP131S341B  | <b>G 3 4 B</b> | 3.4V  |
| RP131S351B  | <b>G 3 5 B</b> | 3.5V  |
| RP131S361B  | <b>G 3 6 B</b> | 3.6V  |
| RP131S371B  | <b>G 3 7 B</b> | 3.7V  |
| RP131S381B  | <b>G 3 8 B</b> | 3.8V  |
| RP131S391B  | <b>G 3 9 B</b> | 3.9V  |
| RP131S401B  | <b>G 4 0 B</b> | 4.0V  |
| RP131S411B  | <b>G 4 1 B</b> | 4.1V  |
| RP131S421B  | <b>G 4 2 B</b> | 4.2V  |
| RP131S431B  | <b>G 4 3 B</b> | 4.3V  |
| RP131S441B  | <b>G 4 4 B</b> | 4.4V  |
| RP131S451B  | <b>G 4 5 B</b> | 4.5V  |
| RP131S461B  | <b>G 4 6 B</b> | 4.6V  |
| RP131S471B  | <b>G 4 7 B</b> | 4.7V  |
| RP131S481B  | <b>G 4 8 B</b> | 4.8V  |
| RP131S491B  | <b>G 4 9 B</b> | 4.9V  |
| RP131S501B  | <b>G 5 0 B</b> | 5.0V  |
| RP131S511B  | <b>G 5 1 B</b> | 5.1V  |
| RP131S521B  | <b>G 5 2 B</b> | 5.2V  |
| RP131S531B  | <b>G 5 3 B</b> | 5.3V  |
| RP131S541B  | <b>G 5 4 B</b> | 5.4V  |
| RP131S551B  | <b>G 5 5 B</b> | 5.5V  |
| RP131S121B5 | <b>G 0 1 B</b> | 1.25V |
| RP131S181B5 | <b>G 0 2 B</b> | 1.85V |
| RP131S281B5 | <b>G 0 3 B</b> | 2.85V |
| RP131S101B5 | <b>G 0 4 B</b> | 1.05V |

**RP131Sxx1D**

| Part Number | ①②③④           | Vset  |
|-------------|----------------|-------|
| RP131S081D  | <b>G 0 8 D</b> | 0.8V  |
| RP131S091D  | <b>G 0 9 D</b> | 0.9V  |
| RP131S101D  | <b>G 1 0 D</b> | 1.0V  |
| RP131S111D  | <b>G 1 1 D</b> | 1.1V  |
| RP131S121D  | <b>G 1 2 D</b> | 1.2V  |
| RP131S131D  | <b>G 1 3 D</b> | 1.3V  |
| RP131S141D  | <b>G 1 4 D</b> | 1.4V  |
| RP131S151D  | <b>G 1 5 D</b> | 1.5V  |
| RP131S161D  | <b>G 1 6 D</b> | 1.6V  |
| RP131S171D  | <b>G 1 7 D</b> | 1.7V  |
| RP131S181D  | <b>G 1 8 D</b> | 1.8V  |
| RP131S191D  | <b>G 1 9 D</b> | 1.9V  |
| RP131S201D  | <b>G 2 0 D</b> | 2.0V  |
| RP131S211D  | <b>G 2 1 D</b> | 2.1V  |
| RP131S221D  | <b>G 2 2 D</b> | 2.2V  |
| RP131S231D  | <b>G 2 3 D</b> | 2.3V  |
| RP131S241D  | <b>G 2 4 D</b> | 2.4V  |
| RP131S251D  | <b>G 2 5 D</b> | 2.5V  |
| RP131S261D  | <b>G 2 6 D</b> | 2.6V  |
| RP131S271D  | <b>G 2 7 D</b> | 2.7V  |
| RP131S281D  | <b>G 2 8 D</b> | 2.8V  |
| RP131S291D  | <b>G 2 9 D</b> | 2.9V  |
| RP131S301D  | <b>G 3 0 D</b> | 3.0V  |
| RP131S311D  | <b>G 3 1 D</b> | 3.1V  |
| RP131S321D  | <b>G 3 2 D</b> | 3.2V  |
| RP131S331D  | <b>G 3 3 D</b> | 3.3V  |
| RP131S341D  | <b>G 3 4 D</b> | 3.4V  |
| RP131S351D  | <b>G 3 5 D</b> | 3.5V  |
| RP131S361D  | <b>G 3 6 D</b> | 3.6V  |
| RP131S371D  | <b>G 3 7 D</b> | 3.7V  |
| RP131S381D  | <b>G 3 8 D</b> | 3.8V  |
| RP131S391D  | <b>G 3 9 D</b> | 3.9V  |
| RP131S401D  | <b>G 4 0 D</b> | 4.0V  |
| RP131S411D  | <b>G 4 1 D</b> | 4.1V  |
| RP131S421D  | <b>G 4 2 D</b> | 4.2V  |
| RP131S431D  | <b>G 4 3 D</b> | 4.3V  |
| RP131S441D  | <b>G 4 4 D</b> | 4.4V  |
| RP131S451D  | <b>G 4 5 D</b> | 4.5V  |
| RP131S461D  | <b>G 4 6 D</b> | 4.6V  |
| RP131S471D  | <b>G 4 7 D</b> | 4.7V  |
| RP131S481D  | <b>G 4 8 D</b> | 4.8V  |
| RP131S491D  | <b>G 4 9 D</b> | 4.9V  |
| RP131S501D  | <b>G 5 0 D</b> | 5.0V  |
| RP131S511D  | <b>G 5 1 D</b> | 5.1V  |
| RP131S521D  | <b>G 5 2 D</b> | 5.2V  |
| RP131S531D  | <b>G 5 3 D</b> | 5.3V  |
| RP131S541D  | <b>G 5 4 D</b> | 5.4V  |
| RP131S551D  | <b>G 5 5 D</b> | 5.5V  |
| RP131S121D5 | <b>G 0 1 D</b> | 1.25V |
| RP131S181D5 | <b>G 0 2 D</b> | 1.85V |
| RP131S281D5 | <b>G 0 3 D</b> | 2.85V |
| RP131S101D5 | <b>G 0 4 D</b> | 1.05V |



**Power Dissipation (TO-252-5-P2)**

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

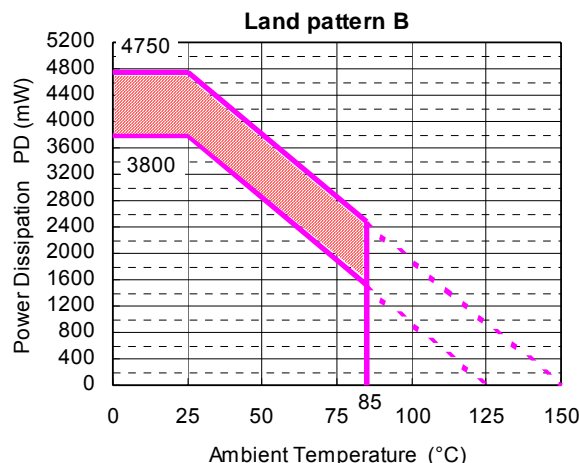
Measurement conditions

|                  | Land Pattern A                                   | Land Pattern B                                 |
|------------------|--|--|
| Environment      | Mounting on board (Wind velocity 0m/s)           | Mounting on board (Wind velocity 0m/s)         |
| Board Material   | Glass cloth epoxy plastic (Double-layers)        | Glass cloth epoxy plastic (Four-layers)        |
| Board Dimensions | 50mm * 50mm * 1.6mm                              | 76.2mm * 114.3mm * 0.8mm                       |
| Copper Ratio     | Top side: Approx. 50%,<br>Back side: Approx. 50% | Top, Back side: Approx. 96%,<br>2nd, 3rd: 100% |
| Through - hole   | $\phi$ 0.5mm * 24pcs                             | $\phi$ 0.4mm * 30pcs                           |

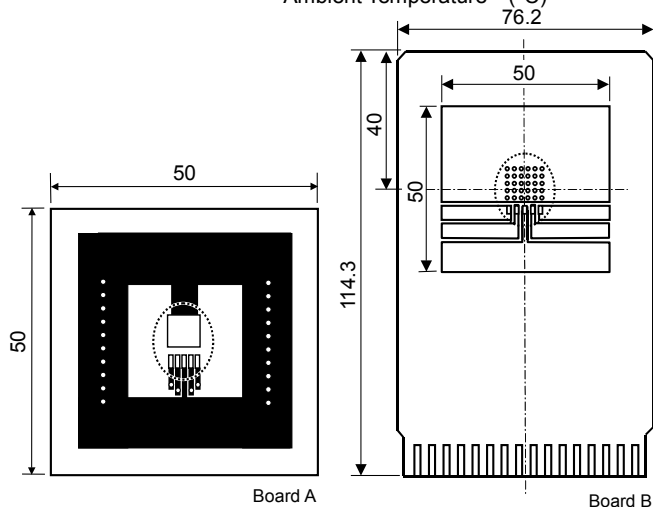
Measurement Results

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

|                    | Land pattern A  | Land pattern B   |
|--------------------|---|--|
| Power Dissipation  | 1900mW ( $T_{jmax}=125^\circ\text{C}$ )<br>2375mW ( $T_{jmax}=150^\circ\text{C}$ )                        | 3800mW ( $T_{jmax}=125^\circ\text{C}$ )<br>4750mW ( $T_{jmax}=150^\circ\text{C}$ )                         |
| Thermal Resistance | $\theta_{ja}=(125-25^\circ\text{C})/1.9\text{W}= 53^\circ\text{C/W}$<br>$\theta_{jc}= 17^\circ\text{C/W}$ | $\theta_{ja}= (125-25^\circ\text{C})/3.8\text{W} = 26^\circ\text{C/W}$<br>$\theta_{jc}= 7^\circ\text{C/W}$ |



**Power Dissipation**



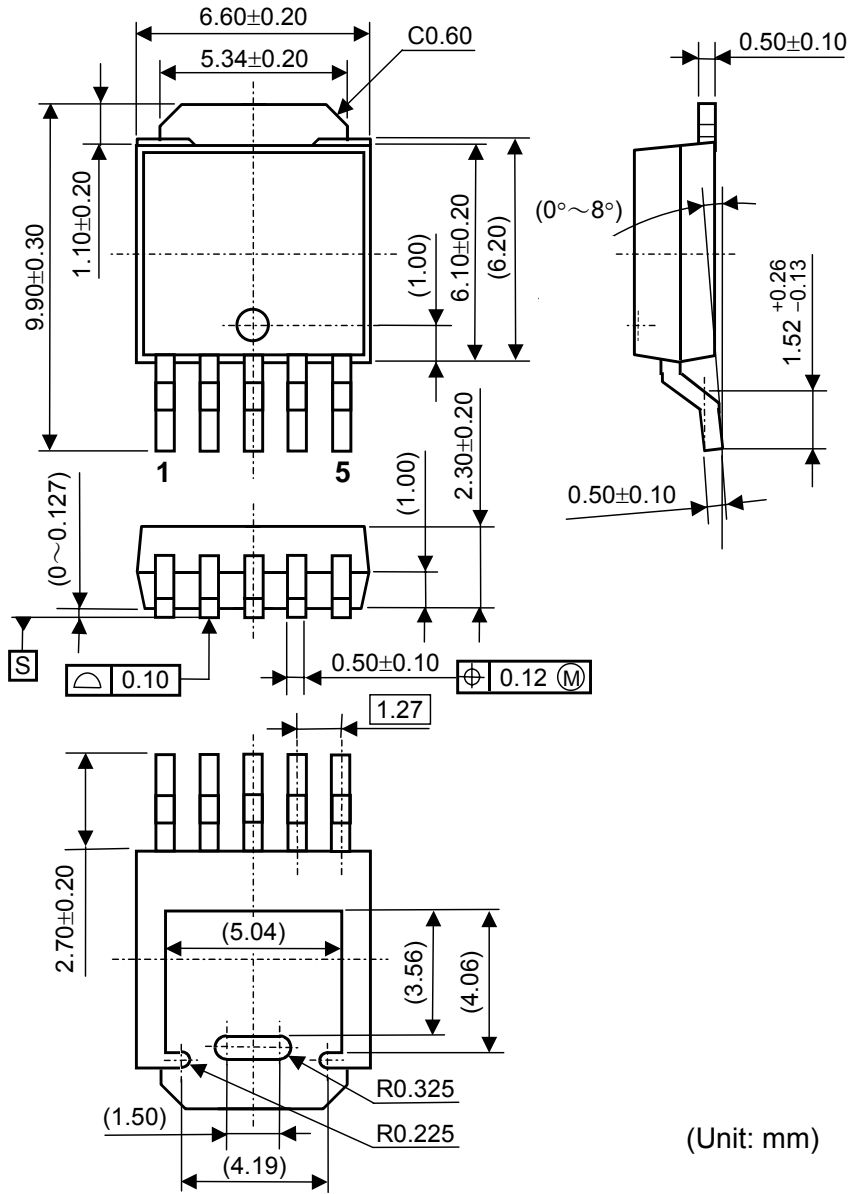
- The above graph shows the Power Dissipation of the package based on  $T_{jmax}=125^\circ\text{C}$  and  $T_{jmax}=150^\circ\text{C}$ . Operating the IC in the shaded area in the graph might have an influence it's lifetime. Operating time must be within the time limit described in the table below, in case of operating in the shaded area.

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

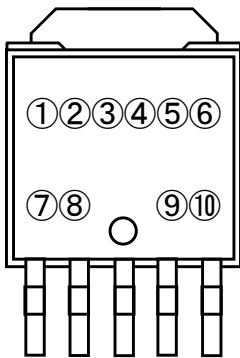
**RP131x**

NO.EA-174-160426

**Package Dimensions (TO-252-5-P2)**



**Mark Specifications (TO-252-5-P2)**



① ② ③ ④ ⑤ ⑥ ⑦ ⑧ : Refer to RP131J Series Mark Specification Table.

⑨ ⑩ : Lot Number ... Alphanumeric Serial Number

## RP131J Series Mark Specification Table

PKG: TO-252-5

### RP131Jxx1B

| Part Number | ①②③④⑤⑥⑦⑧        | Vset  |
|-------------|-----------------|-------|
| RP131J081B  | D 1 J 0 8 1 B   | 0.8V  |
| RP131J091B  | D 1 J 0 9 1 B   | 0.9V  |
| RP131J101B  | D 1 J 1 0 1 B   | 1.0V  |
| RP131J111B  | D 1 J 1 1 1 B   | 1.1V  |
| RP131J121B  | D 1 J 1 2 1 B   | 1.2V  |
| RP131J131B  | D 1 J 1 3 1 B   | 1.3V  |
| RP131J141B  | D 1 J 1 4 1 B   | 1.4V  |
| RP131J151B  | D 1 J 1 5 1 B   | 1.5V  |
| RP131J161B  | D 1 J 1 6 1 B   | 1.6V  |
| RP131J171B  | D 1 J 1 7 1 B   | 1.7V  |
| RP131J181B  | D 1 J 1 8 1 B   | 1.8V  |
| RP131J191B  | D 1 J 1 9 1 B   | 1.9V  |
| RP131J201B  | D 1 J 2 0 1 B   | 2.0V  |
| RP131J211B  | D 1 J 2 1 1 B   | 2.1V  |
| RP131J221B  | D 1 J 2 2 1 B   | 2.2V  |
| RP131J231B  | D 1 J 2 3 1 B   | 2.3V  |
| RP131J241B  | D 1 J 2 4 1 B   | 2.4V  |
| RP131J251B  | D 1 J 2 5 1 B   | 2.5V  |
| RP131J261B  | D 1 J 2 6 1 B   | 2.6V  |
| RP131J271B  | D 1 J 2 7 1 B   | 2.7V  |
| RP131J281B  | D 1 J 2 8 1 B   | 2.8V  |
| RP131J291B  | D 1 J 2 9 1 B   | 2.9V  |
| RP131J301B  | D 1 J 3 0 1 B   | 3.0V  |
| RP131J311B  | D 1 J 3 1 1 B   | 3.1V  |
| RP131J321B  | D 1 J 3 2 1 B   | 3.2V  |
| RP131J331B  | D 1 J 3 3 1 B   | 3.3V  |
| RP131J341B  | D 1 J 3 4 1 B   | 3.4V  |
| RP131J351B  | D 1 J 3 5 1 B   | 3.5V  |
| RP131J361B  | D 1 J 3 6 1 B   | 3.6V  |
| RP131J371B  | D 1 J 3 7 1 B   | 3.7V  |
| RP131J381B  | D 1 J 3 8 1 B   | 3.8V  |
| RP131J391B  | D 1 J 3 9 1 B   | 3.9V  |
| RP131J401B  | D 1 J 4 0 1 B   | 4.0V  |
| RP131J411B  | D 1 J 4 1 1 B   | 4.1V  |
| RP131J421B  | D 1 J 4 2 1 B   | 4.2V  |
| RP131J431B  | D 1 J 4 3 1 B   | 4.3V  |
| RP131J441B  | D 1 J 4 4 1 B   | 4.4V  |
| RP131J451B  | D 1 J 4 5 1 B   | 4.5V  |
| RP131J461B  | D 1 J 4 6 1 B   | 4.6V  |
| RP131J471B  | D 1 J 4 7 1 B   | 4.7V  |
| RP131J481B  | D 1 J 4 8 1 B   | 4.8V  |
| RP131J491B  | D 1 J 4 9 1 B   | 4.9V  |
| RP131J501B  | D 1 J 5 0 1 B   | 5.0V  |
| RP131J511B  | D 1 J 5 1 1 B   | 5.1V  |
| RP131J521B  | D 1 J 5 2 1 B   | 5.2V  |
| RP131J531B  | D 1 J 5 3 1 B   | 5.3V  |
| RP131J541B  | D 1 J 5 4 1 B   | 5.4V  |
| RP131J551B  | D 1 J 5 5 1 B   | 5.5V  |
| RP131J121B5 | D 1 J 1 2 1 B 5 | 1.25V |
| RP131J181B5 | D 1 J 1 8 1 B 5 | 1.85V |
| RP131J281B5 | D 1 J 2 8 1 B 5 | 2.85V |
| RP131J101B5 | D 1 J 1 0 1 B 5 | 1.05V |

### RP131Jxx1D

| Part Number | ①②③④⑤⑥⑦⑧        | Vset  |
|-------------|-----------------|-------|
| RP131J081D  | D 1 J 0 8 1 D   | 0.8V  |
| RP131J091D  | D 1 J 0 9 1 D   | 0.9V  |
| RP131J101D  | D 1 J 1 0 1 D   | 1.0V  |
| RP131J111D  | D 1 J 1 1 1 D   | 1.1V  |
| RP131J121D  | D 1 J 1 2 1 D   | 1.2V  |
| RP131J131D  | D 1 J 1 3 1 D   | 1.3V  |
| RP131J141D  | D 1 J 1 4 1 D   | 1.4V  |
| RP131J151D  | D 1 J 1 5 1 D   | 1.5V  |
| RP131J161D  | D 1 J 1 6 1 D   | 1.6V  |
| RP131J171D  | D 1 J 1 7 1 D   | 1.7V  |
| RP131J181D  | D 1 J 1 8 1 D   | 1.8V  |
| RP131J191D  | D 1 J 1 9 1 D   | 1.9V  |
| RP131J201D  | D 1 J 2 0 1 D   | 2.0V  |
| RP131J211D  | D 1 J 2 1 1 D   | 2.1V  |
| RP131J221D  | D 1 J 2 2 1 D   | 2.2V  |
| RP131J231D  | D 1 J 2 3 1 D   | 2.3V  |
| RP131J241D  | D 1 J 2 4 1 D   | 2.4V  |
| RP131J251D  | D 1 J 2 5 1 D   | 2.5V  |
| RP131J261D  | D 1 J 2 6 1 D   | 2.6V  |
| RP131J271D  | D 1 J 2 7 1 D   | 2.7V  |
| RP131J281D  | D 1 J 2 8 1 D   | 2.8V  |
| RP131J291D  | D 1 J 2 9 1 D   | 2.9V  |
| RP131J301D  | D 1 J 3 0 1 D   | 3.0V  |
| RP131J311D  | D 1 J 3 1 1 D   | 3.1V  |
| RP131J321D  | D 1 J 3 2 1 D   | 3.2V  |
| RP131J331D  | D 1 J 3 3 1 D   | 3.3V  |
| RP131J341D  | D 1 J 3 4 1 D   | 3.4V  |
| RP131J351D  | D 1 J 3 5 1 D   | 3.5V  |
| RP131J361D  | D 1 J 3 6 1 D   | 3.6V  |
| RP131J371D  | D 1 J 3 7 1 D   | 3.7V  |
| RP131J381D  | D 1 J 3 8 1 D   | 3.8V  |
| RP131J391D  | D 1 J 3 9 1 D   | 3.9V  |
| RP131J401D  | D 1 J 4 0 1 D   | 4.0V  |
| RP131J411D  | D 1 J 4 1 1 D   | 4.1V  |
| RP131J421D  | D 1 J 4 2 1 D   | 4.2V  |
| RP131J431D  | D 1 J 4 3 1 D   | 4.3V  |
| RP131J441D  | D 1 J 4 4 1 D   | 4.4V  |
| RP131J451D  | D 1 J 4 5 1 D   | 4.5V  |
| RP131J461D  | D 1 J 4 6 1 D   | 4.6V  |
| RP131J471D  | D 1 J 4 7 1 D   | 4.7V  |
| RP131J481D  | D 1 J 4 8 1 D   | 4.8V  |
| RP131J491D  | D 1 J 4 9 1 D   | 4.9V  |
| RP131J501D  | D 1 J 5 0 1 D   | 5.0V  |
| RP131J511D  | D 1 J 5 1 1 D   | 5.1V  |
| RP131J521D  | D 1 J 5 2 1 D   | 5.2V  |
| RP131J531D  | D 1 J 5 3 1 D   | 5.3V  |
| RP131J541D  | D 1 J 5 4 1 D   | 5.4V  |
| RP131J551D  | D 1 J 5 5 1 D   | 5.5V  |
| RP131J121D5 | D 1 J 1 2 1 D 5 | 1.25V |
| RP131J181D5 | D 1 J 1 8 1 D 5 | 1.85V |
| RP131J281D5 | D 1 J 2 8 1 D 5 | 2.85V |
| RP131J101D5 | D 1 J 1 0 1 D 5 | 1.05V |



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