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 home appliances and Notebook PC.

SELECTION GUIDE

The output voltage, the auto discharge function(1), and the package type for the IC can be selected at the user's request.

Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
RP132K001∗-TR	DFN(PLP)1820-6	5,000 pcs	Yes	Yes
RP132Kxx1∗-TR				
RP132H001#-T1-FE	SOT-89-5	1,000 pcs	Yes	Yes
RP132Hxx1#-T1-FE				
RP132S001#-E2-FE	HSOP-6J	1,000 pcs	Yes	Yes
RP132Sxx1∗-E2-FE				
RP132J001#-T1-FE	TO-252-5-P2	3,000 pcs	Yes	Yes
RP132Jxx1#-T1-FE				

RP132x001x is the adjustable output voltage type.
xx: The output voltage can be designated in the range from 0.8V(08) to 5.5V(55) in 0.1V step.

∗: The combination of the auto discharge function and delay pin (for setting inrush current limit time) are as follows.
B: without auto discharge function
D: with auto discharge function
E: without auto discharge function, with delay pin (for setting inrush current limit time)
F: with auto discharge function and delay pin (for setting inrush current limit time)

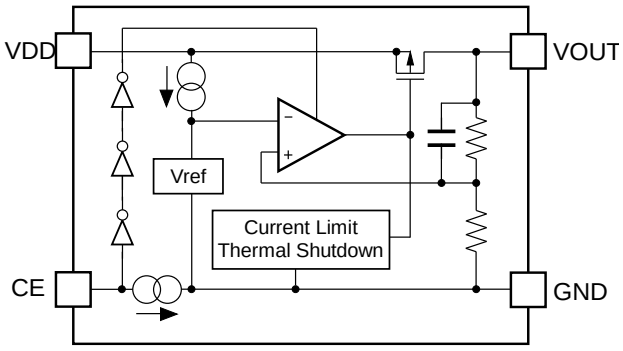
#: The auto discharge function at off state are options as follows.
B: without auto discharge function at off state
D: with auto discharge function at off state

(1) 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.

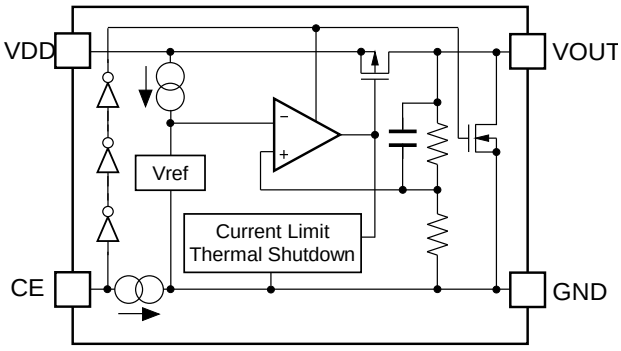
BLOCK DIAGRAMS

- **Fixed Output Voltage Type（HSOP-6J / SOT89-5）**

RP132Sxx1B / RP132Hxx1B

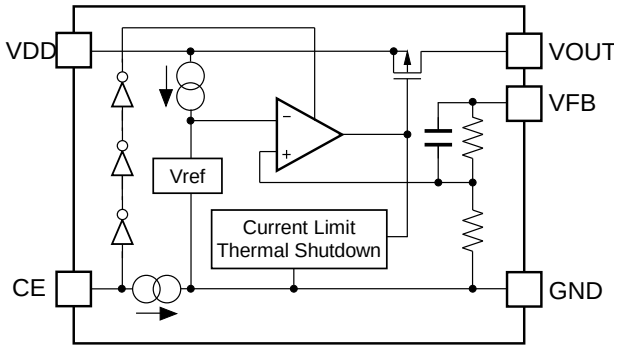


RP132Sxx1D / RP132Hxx1D

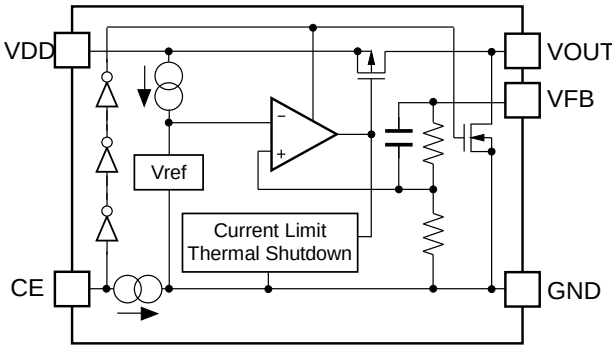


- **Fixed Output Voltage Type（TO-252-5-P2 / DFN(PLP)1820-6）**

RP132Jxx1B / RP132Kxx1B

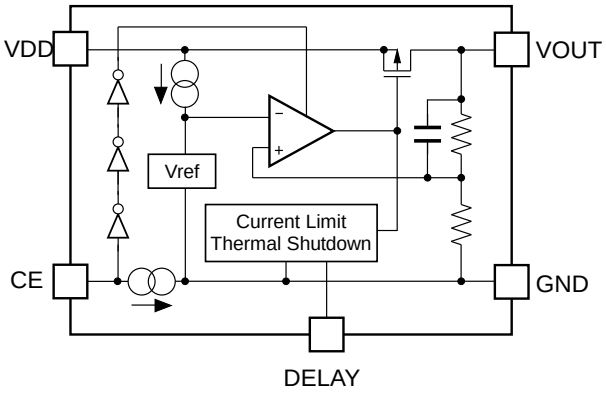


RP132Jxx1D / RP132Kxx1D

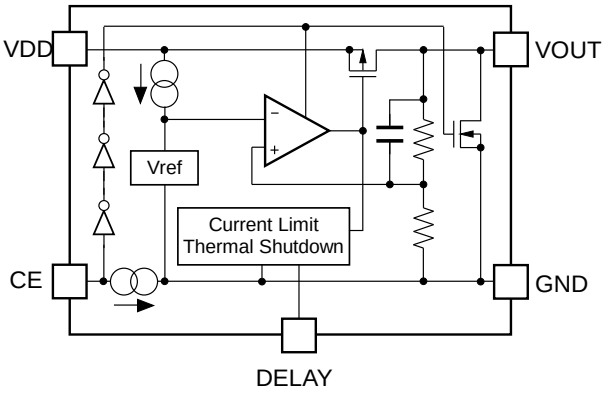


- **Fixed Output Voltage Type with DELAY pin（HSOP-6J）**

RP132Sxx1E

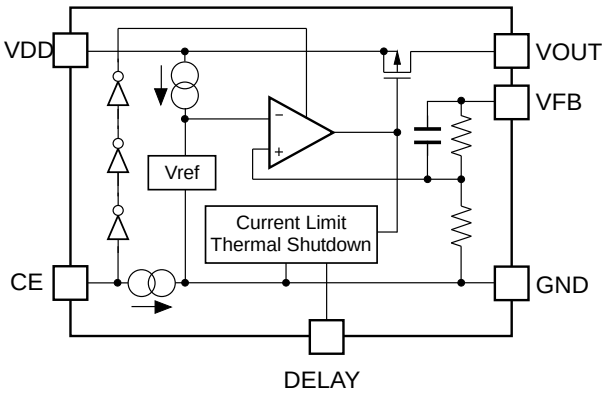


RP132Sxx1F

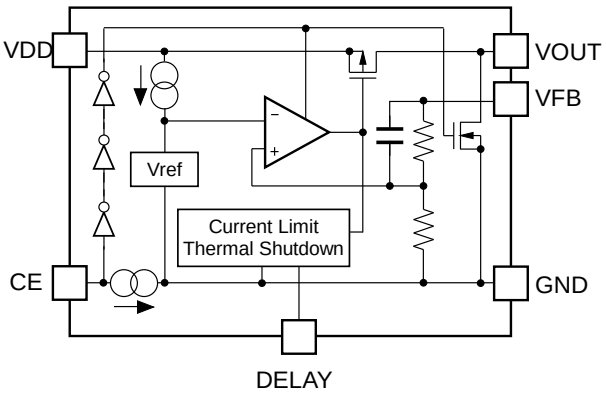


- **Fixed Output Voltage Type with DELAY pin（DFN(PLP)1820-6）**

RP132Kxx1E

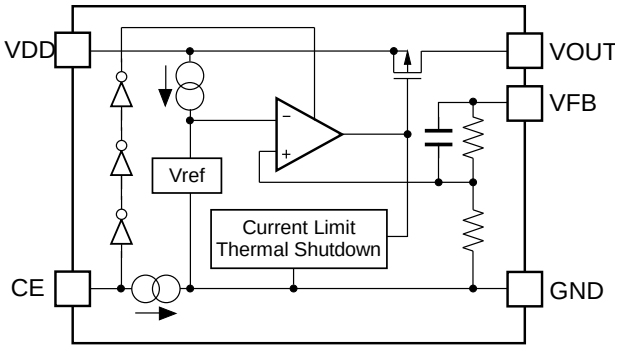


RP132Kxx1F

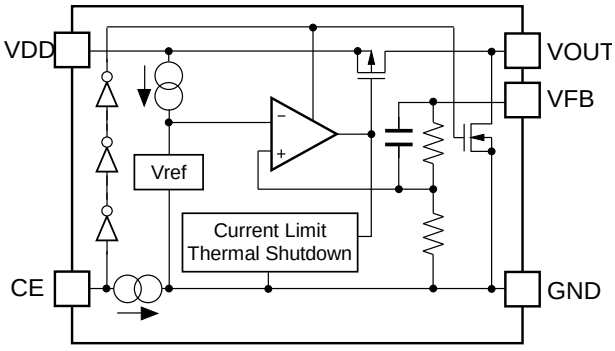


- **Adjustable Output Voltage Type（HSOP-6J / SOT-89-5 / TO-252-5-P2 /DFN(PLP)1820-6）**

RP132S001B / RP132H001B / RP132J001B / RP132K001B

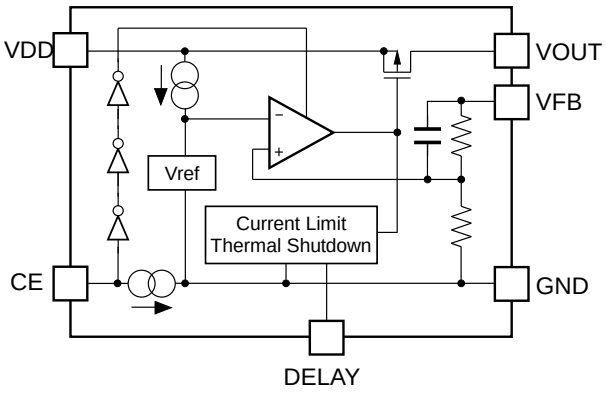


RP132S001D / RP132H001D / RP132J001D / RP132K001D

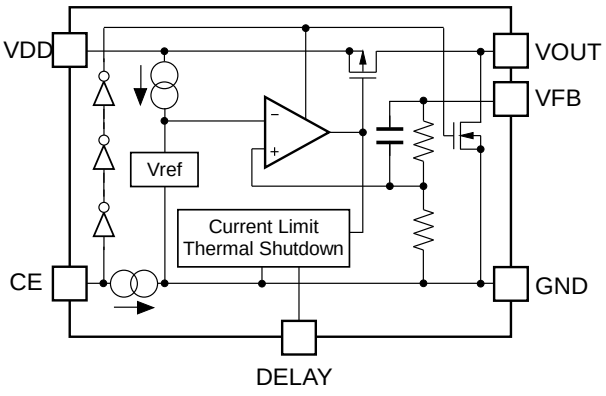


- **Adjustable Output Voltage Type with DELAY pin（DFN(PLP)1820-6）**

RP132K001E

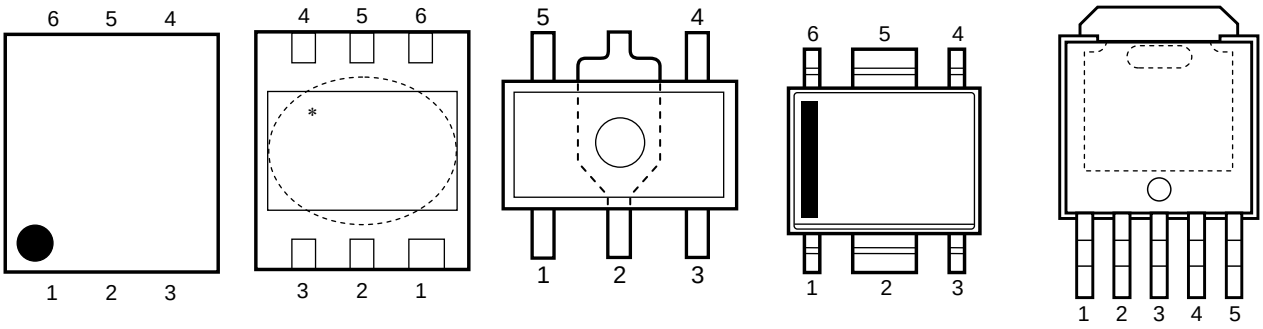


RP132K001F



PIN DESCRIPTIONS

Top View **Bottom View**



RP132K (DFN(PLP)1820-6) **RP132H (SOT-89-5)** **RP132S (HSOP-6J)** **RP132J (TO-252-5-P2)**

RP132K[1] (DFN(PLP)1820-6) Pin Description

Pin No.	Symbol	Pin Description
1	VOUT	Output Pin[2]
2	VFB	Feed Back Pin[2]
3	GND	Ground Pin
4	CE	Chip Enable Pin ("H" Active)
5	NC	No Connection (RP132K001B/D, RP132Kxx1B/D)
	DELAY	Delay Pin for setting inrush current limit time (RP132K001E/F, RP132Kxx1E/F)
6	VDD	Input Pin

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

[1] When using Adjustable Output Voltage Type (RP132K001x), please follow "Notes on the Adjustable Output Voltage Type Settings".
[2] When using Fixed Output Voltage Type(RP132Kxx1x), the VOUT pin and the VFB pin should be connected.

RP132H[1] (SOT-89-5) Pin Description

Pin No.	Symbol	Pin Description
1	CE	Chip Enable Pin ("H" Active) (RP132Hxx1B/D)
	VFB	Feed Back Pin (RP132H001B/D)
2	GND	Ground Pin
3	NC	No Connection (RP132Hxx1B/D)
	CE	Chip Enable Pin ("H" Active) (RP132H001B/D)
4	VDD	Input Pin
5	VOUT	Output Pin

RP132S[1] (HSOP-6J) Pin Description

Pin No.	Symbol	Pin Description
1	VOUT	Output Pin
2	GND	Ground Pin[2]
3	NC	No Connection (RP132Sxx1B/D)
	VFB	Feed Back Pin (RP132S001B/D)
	DELAY	Delay Pin for setting inrush current limit time (RP132Sxx1E/F)
4	CE	Chip Enable Pin ("H" Active)
5	GND	Ground Pin[2]
6	VDD	Input Pin

RP132J[1] (TO-252-5-P2) Pin Description

Pin No.	Symbol	Pin Description
1	CE	Chip Enable Pin ("H" Active)
2	VDD	Input Pin
3	GND	Ground Pin
4	VOUT	Output Pin[3]
5	VFB	Feed Back Pin[3]

∗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.

[1] When using Adjstable Output Voltage Type (RP132x001x), please follow "Notes on Adjustable Output Voltage Type Settings".
[2] GND pins must be wired each other when mounted on boards.
[3] When using Fixed Output Voltage Type(RP132Jxx1x),VOUT pin and VFB pin should be connected.

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_{FB}	Input Voltage (VFB Pin)		−0.3 to 7.0	V
V_{OUT}	Output Voltage		−0.3 to V_{IN}+0.3	V
P_D	Power Dissipation(1)	DFN(PLP)1820-6, JEDEC STD.51-7	2200	mW
		SOT-89-5, JEDEC STD.51-7	2600	
		HSOP-6J, JEDEC STD.51-7	2700	
		TO-252-5-P2, JEDEC STD.51-7	3800	
Tj	Junction Temperature Range		−40 to 125	°C
Tstg	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 are not assured.

RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	1.4 to 6.5	V
Ta	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.

(1) Refer to *POWER DISSIPATION* for detailed information.

ELECTRICAL CHARACTERISTICS

V_{IN}=Set V_{OUT}+1.0V, I_{OUT}=1mA, C_{IN}=2.2µF, C_{OUT}=2.2µF (V_{OUT} ≤ 3.6V) / 4.7µF(V_{OUT} > 3.6V)
The specification in ☐ is checked and guaranteed by design engineering at −40°C ≤ Ta ≤ 85°C, unless otherwise noted.

RP132xxx1B/D(Fixed Output Voltage Type) /
RP132S/Kxx1E/F(Fixed Output Voltage Type with DELAY pin) (Ta = 25°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	Ta = 25°C	V_{OUT} > 1.5V	×0.99		×1.01	V
			V_{OUT} ≤ 1.5V	−15		15	mV
		−40°C ≤ Ta ≤ 85°C	V_{OUT} > 1.5V	☐×0.981		×1.019☐	V
			V_{OUT} ≤ 1.5V	☐−29		29☐	mV
I_{LIM}	Output Current Limit			☐1			A
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	0.1mA ≤ I_{OUT} ≤ 300mA			3	20☐	mV
		0.1mA ≤ I_{OUT} ≤ 1A			5	60☐	
V_{DIF}	Dropout Voltage	Refer to the following "Dropout Voltage"					
I_{SS}	Supply Current	I_{OUT}=0mA (V_{IN}=6.5V)			65	85☐	µA
Istandby	Standby Current	V_{CE}=0V, V_{IN}=6.5V			0.15	0.60	µA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	Set V_{OUT}+0.5V ≤ V_{IN} ≤ 6.5V ∗ However, V_{IN} ≥1.6V			0.05	0.10☐	%/V
R_R	Ripple Rejection	f=1kHz Ripple 0.2Vp-p I_{OUT}=100mA	V_{OUT} ≤ 3.3V		70		dB
			V_{OUT} > 3.3V		60		
V_{IN}	Input Voltage			☐1.4		6.5☐	V
I_{SC}	Short Current Limit	V_{OUT}=0V			250		mA
I_{PD}	CE Pull-down Current				0.3	0.7☐	µA
V_{CEH}	CE Input Voltage "H"			☐1.0			V
V_{CEL}	CE Input Voltage "L"					0.4☐	V
en	Output Noise	BW=10Hz to 100kHz			70		µVrms
T_{TSD}	Thermal Shutdown Temperature	Junction Temperature			165		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature			95		°C
R_{LOW}	Low Output Nch Tr. ON Resistance (D/F version)	V_{IN}=4.0V, V_{CE}=0V			50		Ω
I_{DELAY}	DELAY pin Current (DELAY pin version)	V_{IN}=4.0V		☐0.7	1.2	1.7☐	µA

All test items listed under Electrical Characteristics are done under the pulse load condition (Tj≈Ta=25ºC) except Output Noise, Ripple Rejection, Dropout Voltage at 1A Output Current and Load Regulation and Thermal Shutdown.

The specification in ☐ is checked and guaranteed by design engineering at −40°C ≤ Ta ≤ 85°C, unless otherwise noted.

Dropout Voltage **(Ta = 25°C)**

Output Voltage V_{OUT} (V)	Dropout Voltage V_{DIF} (V)					
	Condition	Typ.	Max.	Condition	Typ.	Max.
0.8 ≤ V_{OUT} < 0.9	I_{OUT}=300mA	0.67	0.89	I_{OUT}=1A	1.20	1.54
0.9 ≤ V_{OUT} < 1.0		0.59	0.82		1.10	1.46
1.0 ≤ V_{OUT} < 1.1		0.51	0.73		1.05	1.39
1.1 ≤ V_{OUT} < 1.2		0.42	0.63		0.96	1.31
1.2 ≤ V_{OUT} < 1.5		0.36	0.54		0.90	1.23
1.5 ≤ V_{OUT} < 2.6		0.24	0.33		0.78	1.05
2.6 ≤ V_{OUT} < 3.3		0.15	0.21		0.52	0.72
3.3 ≤ V_{OUT} ≤ 5.5		0.13	0.18		0.46	0.68

V_{IN}=Set V_{OUT}+1.0V, I_{OUT}=1mA, C_{IN}=2.2µF, C_{OUT}=2.2µF, V_{OUT} ≤ 3.6V, 4.7µF V_{OUT} > 3.6V
The specification in ☐ is checked and guaranteed by design engineering at −40°C ≤ Ta ≤ 85°C, unless otherwise noted.

RP132x001B/D(Adjustable Output Voltage Type) /
RP132K001E/F(Adjustable Output Voltage Type with DELAY pin) (Ta = 25°C)

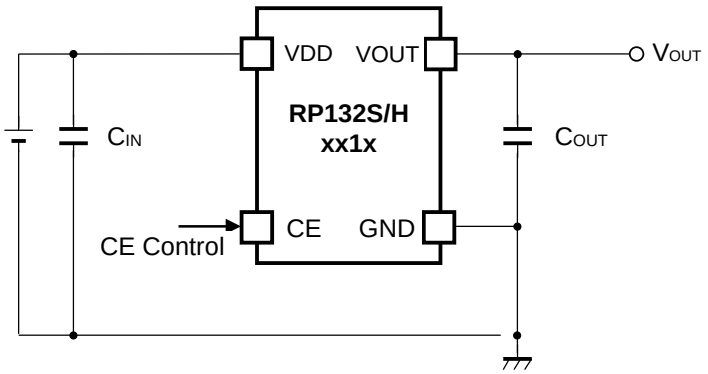
Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
V_{FB}	Feedback Voltage	Ta =25°C	$V_{OUT}=V_{FB}$	0.785	0.800	0.815	V
		−40°C ≤ Ta ≤ 85°C		☐ 0.771		☐ 0.829	
V_{OUT}	Output Voltage Adjusting Range			0.8		5.5	V
I_{LIM}	Output Current Limit	$V_{OUT}=V_{FB}$		☐ 1			A
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	0.1mA ≤ I_{OUT} ≤ 300mA			3	☐ 20	mV
		0.1mA ≤ I_{OUT} ≤ 1A			5	☐ 60	
V_{DIF}	Dropout Voltage	$V_{OUT}=V_{FB}$	I_{OUT}=300mA		0.67	☐ 0.89	V
			I_{OUT}=1A		1.20	☐ 1.54	
ISS	Supply Current	$V_{OUT}=V_{FB}$, I_{OUT}=0mA (V_{IN}=6.5V)			65	☐ 85	µA
Istandby	Standby Current	V_{CE}=0V, V_{IN}=6.5V			0.15	0.60	µA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	$V_{OUT}=V_{FB}$, 1.6V ≤ V_{IN} ≤ 6.5V			0.05	☐ 0.10	%/V
R_R	Ripple Rejection	f=1kHz, Ripple 0.2Vp-p, I_{OUT}=100mA	$V_{OUT}=V_{FB}$		70		dB
V_{IN}	Input Voltage			☐ 1.4		☐ 6.5	V
I_{SC}	Short Current Limit	$V_{OUT}=V_{FB}$ =0V			250		mA
I_{PD}	CE Pull-down Current				0.3	☐ 0.7	µA
V_{CEH}	CE Input Voltage "H"			☐ 1.0			V
V_{CEL}	CE Input Voltage "L"					☐ 0.4	V
en	Output Noise	BW=10Hz to 100kHz			70		µVrms
T_{TSD}	Thermal Shutdown Temperature	Junction Temperature			165		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature			95		°C
R_{LOW}	Low Output Nch Tr. ON Resistance (D/F version)	V_{IN}=4.0V, V_{CE}=0V			50		Ω
I_{DELAY}	DELAY pin Current (DELAY pin version)	V_{IN}=4.0V		☐ 0.7	1.2	☐ 1.7	µA

All test items listed under Electrical Characteristics are done under the pulse load condition (Tj≈Ta=25ºC) except Output Noise, Ripple Rejection, Dropout Voltage at 1A Output Current and Load Regulation and Thermal Shutdown.

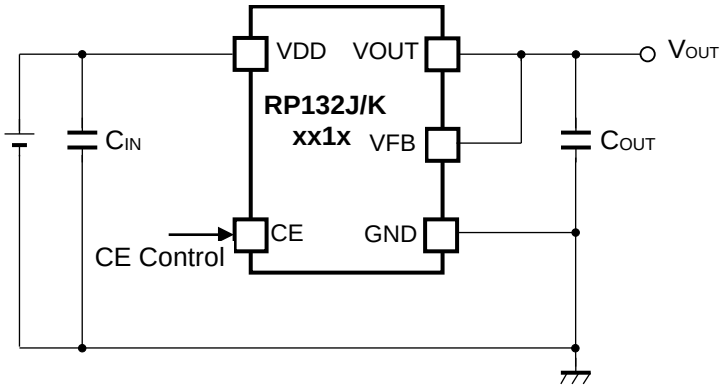
APPLICATION INFORMATION

Typical Application Circuits

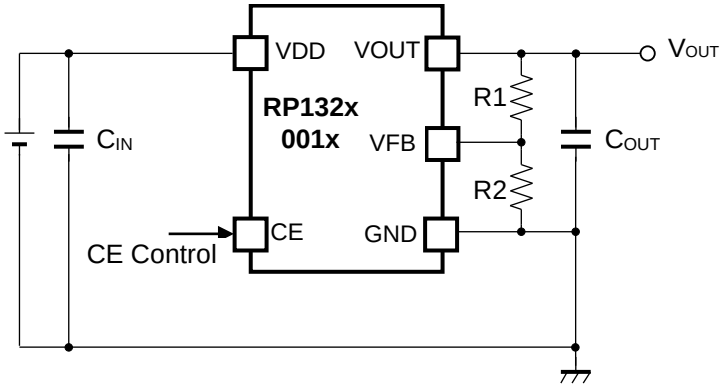
Fixed Output Voltage Type (HSOP-6J/ SOT89-5)



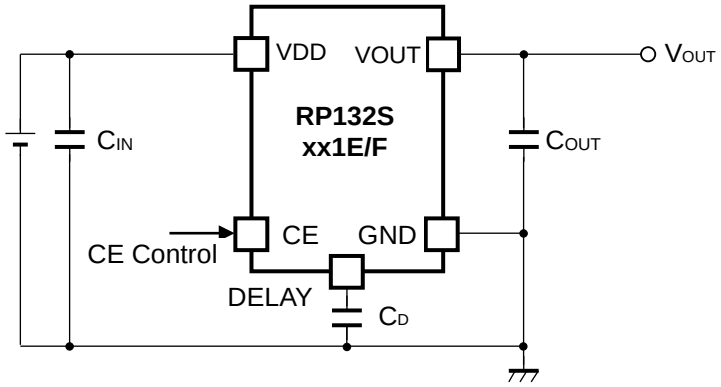
Fixed Output Voltage Type (TO-252-5-P2/ DFN(PLP)1820-6)



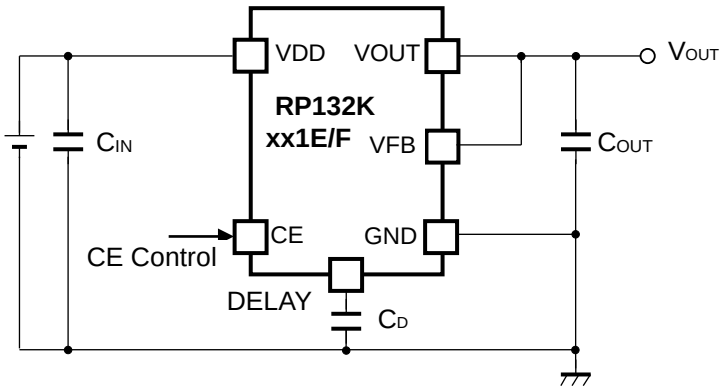
Adjustable Output Voltage Type (HSOP-6J / SOT89-5/ TO-252-5-P2 / DFN(PLP)1820-6）



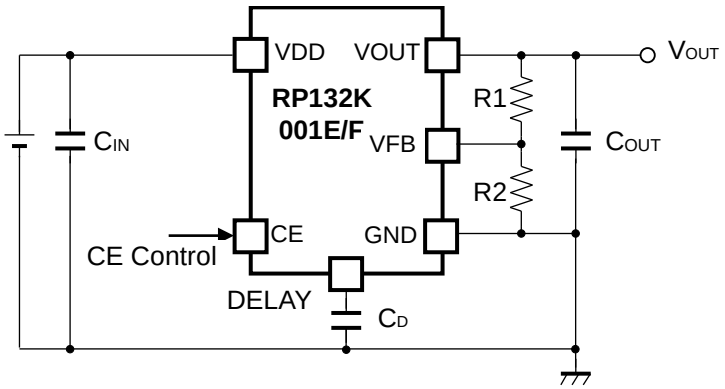
Fixed Output Voltage Type with DELAY pin (HSOP-6J)



Fixed Output Voltage Type with DELAY pin (DFN(PLP)1820-6)



Adjustable Output Voltage Type with DELAY pin (DFN(PLP)1820-6)



Recommended External Components

V_{OUT}	Capacitors		
$V_{OUT} \leq 3.6V$	C_{IN} (C1)	Kyocera 2.2μF (size:1005)	[CM05X5R225M06A]
	C_{OUT} (C2)	Kyocera 2.2μF (size:1608)	[CM105X5R225K06AB]
$V_{OUT} > 3.6V$	C_{IN} (C1)	Kyocera 2.2μF (size:1005)	[CM05X5R225K06A]
	C_{OUT} (C2)	Kyocera 4.7μF (size:1608)	[CM105X5R475M06AB]

Please refer to "Technical Notes on Adjustable Output Voltage Type" when using R1 and R2 as output capacitors. Also refer to "Inrush Current Limit Time Settings" concerning with C_D.

Technical Notes on the External Components

When using this IC, consider the following points:

Phase Compensation

In this IC, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, use a 4.7μF or more capacitor C_{OUT} between V_{OUT} pin and GND pin, and as close as possible to the pins.

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

PCB Layout

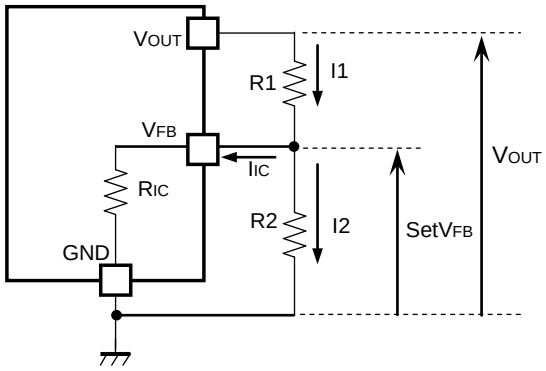
Make V_{DD} and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a 2.2 μF or more capacitor C_{IN} between V_{DD} and GND pin with a capacitance value as "Recommendation value of the external capacitors" above or more, and as close as possible to the pins.

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

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

Output Voltage Setting Method (Adjustable Output Voltage Type)

RP132x081x can be adjusted the output voltage up to 5.5V by using the external divider resistors. Also, please use 16kΩ or less for R2 resistor. If the V_{FB} voltage is described as setV_{FB}, the output voltage can be set by using the following equations. SetV_{FB} is equal to 0.8V. The V_{OUT} pin of RP132x081x should be connected to the V_{FB} pin.



$I1 = I_{IC} + I2$ ..... (1)

$I2 = setV_{FB} / R2$ ..... (2)

Thus,

$I1 = I_{IC} + setV_{FB} / R2$ ..... (3)

Therefore,

$V_{OUT} = setV_{FB} \times R1 \times I1$ ..... (4)

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

$V_{OUT} = setV_{FB} + R1(I_{IC} + setV_{FB} / R2)$

$= setV_{FB} \times (1+R1/ R2) + R1 \times I_{IC}$ ..... (5)

In Equation (5), R1x I_{IC} is the error-causing factor in V_{OUT}.

As for I_{IC},

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

Therefore, the error-causing factor R1x I_{IC} can be described as follows.

$R1 \times I_{IC} = R1 \times setV_{FB} / R_{IC}$

$= setV_{FB} \times R1 / R_{IC}$ ..... (7)

For better accuracy, choosing R1 ($<<R_{IC}$) reduces this error.

Without the error-causing factor R1x I_{IC}, the output voltage can be calculated by the following equation

$V_{OUT} = setV_{FB} \times ((R1 + R2) / R2)$ ..... (8)

R_{IC} of RP132x is approximately Typ.1.3MΩ (Ta=25°C, this value is guaranteed by design.). The value could be affected by the temperature, therefore evaluate the circuit taking the actual conditions of use into account.

Inrush Current Limit Time Settings

The RP132xSeries include the circuit which can limit the inrush current at start-up to 500mA or less. The current limit time of B/D version is fixed internally as approximately Typ.500µs. On the other hand, the current limit times of E/F versions are adjustable by controlling the DELAY pin value, which is the capacitance value connected between DLEAY pin and GND pin. The relation between Inrush Current Limit Time (t_D[s]) and the DELAY pin capacitance (C_D[F]) can be described in the following equation.

$$t_D=(C_D+70\times10^{-12})\times0.525\times10^6$$

When not using C_D on E/F versions, DELAY pin should be open. In this case, C_D=0 is applied to the above equation and as a result, 37μs can be obtained. That means, when using C_D on E/F versions, the inrush current limit time will be more than 37μs. Please note that during the inrush current limit time, the load current cannot be more than the limited current.

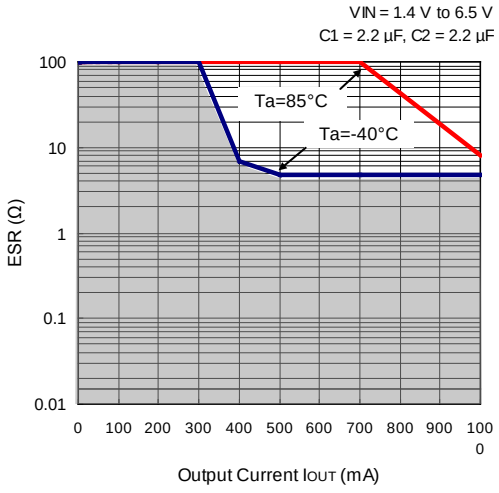
ESR vs. Output Current

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 40μV (Avg.) are marked as the hatched area in the graph.

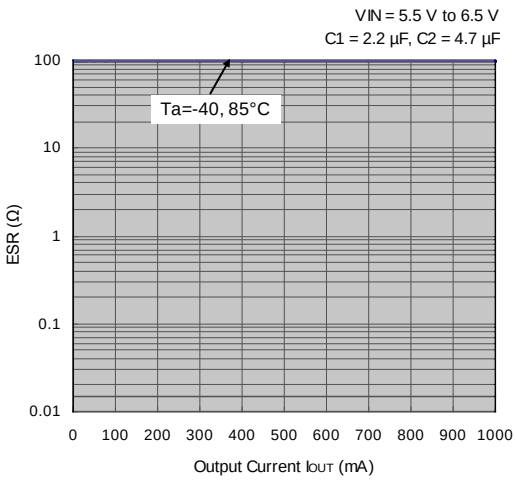
Measurement Conditions

Frequency Band : 10Hz to 2MHz
Temperature : −40°C to 85°C
Hatched Area : Noise level is under 40μVms (Avg.)
C_{IN} (C1) : 2.2μF (Kyocera CM05X5R225M06A)
C_{OUT} (C2) : 2.2μF (V_{OUT} = 0.8V, Kyocera CM105X5R225K06AB)
4.7μF (V_{OUT} = 5.5V, Kyocera CM105X5R475M06AB)

RP132x081x



RP132x551x

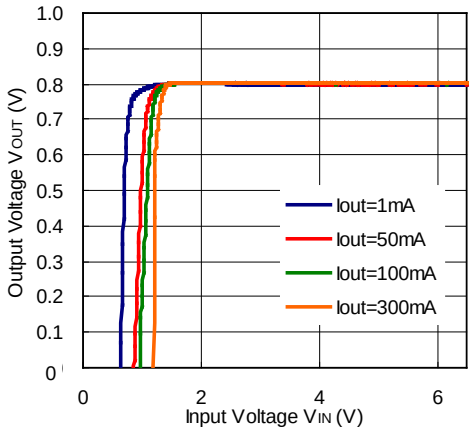


TYPICAL CHARACTERISTICS

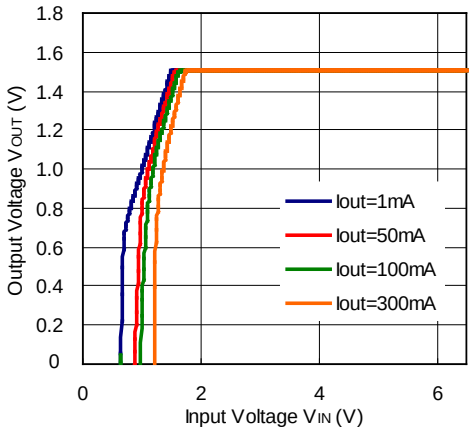
Typical Characteristics are intended to be used as reference data; they are not guaranteed.

1) Output Voltage vs. Input Voltage (Ta=25°C)

RP132x081x



RP132x151x



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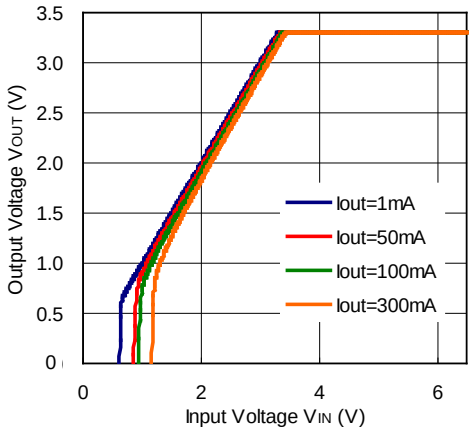

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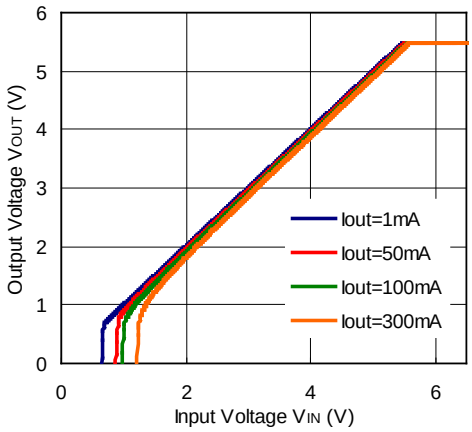
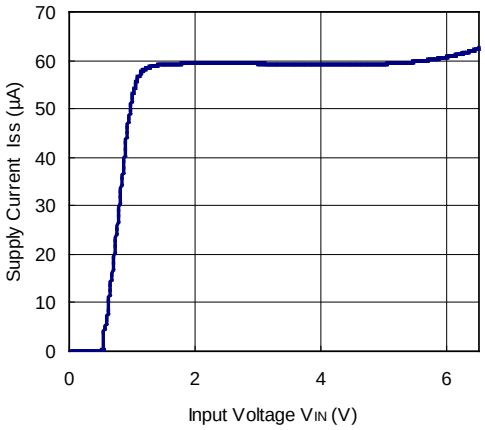
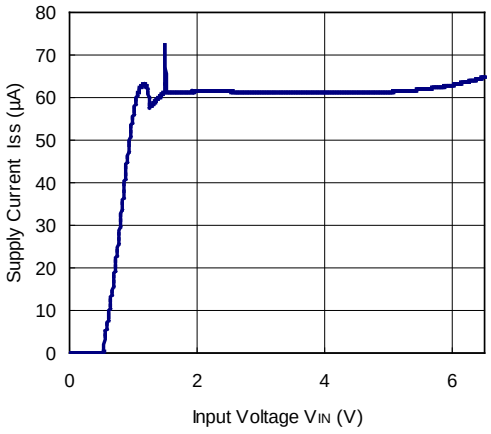


2) Supply Current vs. Input Voltage (Ta=25°C)

RP13x081x



RP132x151x



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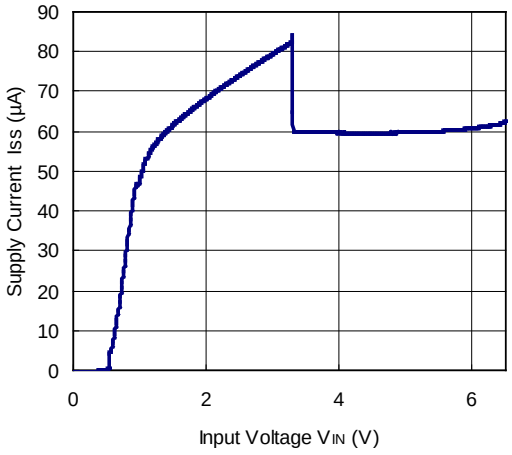
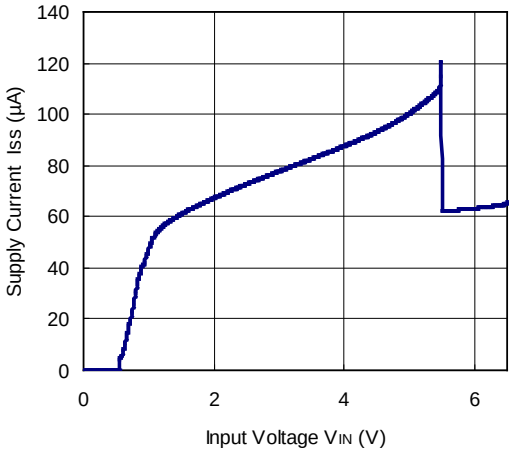
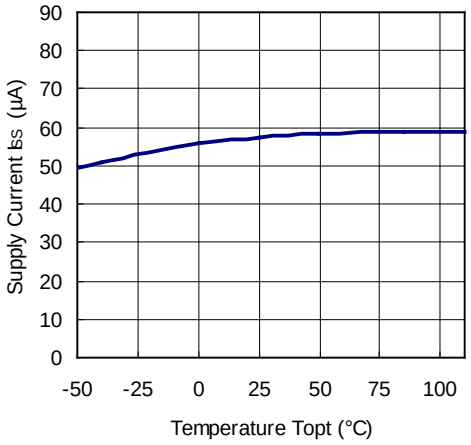


RP132x551x

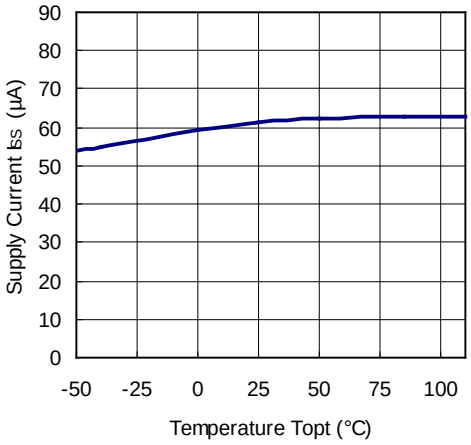


3) Supply Current vs. Temperature

RP132x081x



RP132x151x



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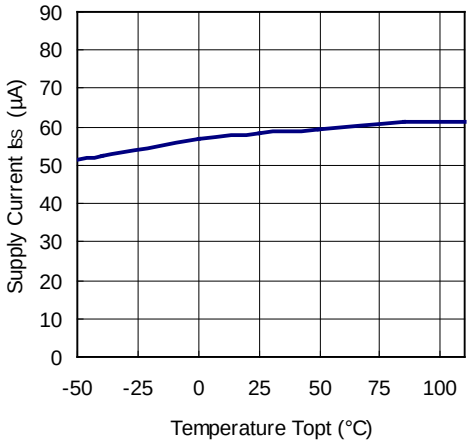
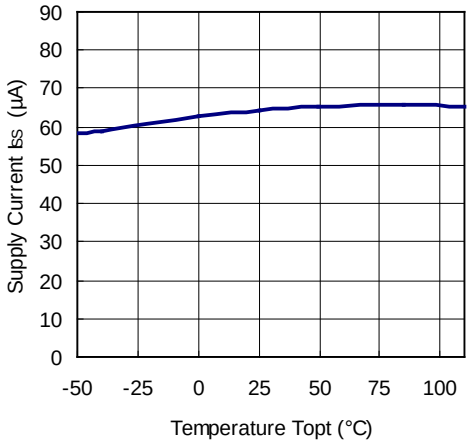
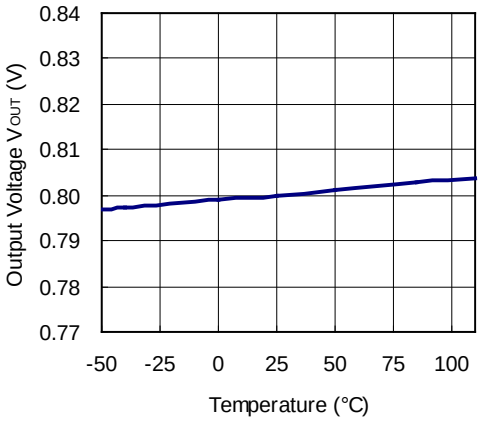


RP132x551x



4) Output Voltage vs. Temperature

RP132x081x



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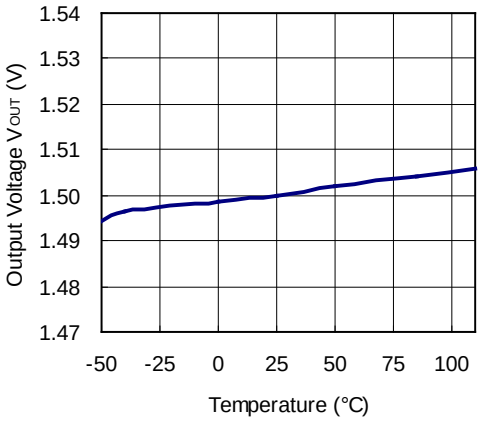

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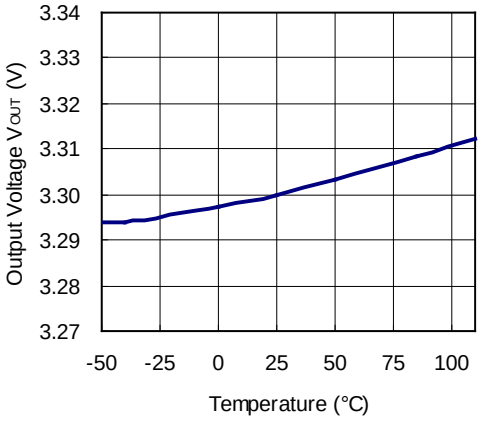
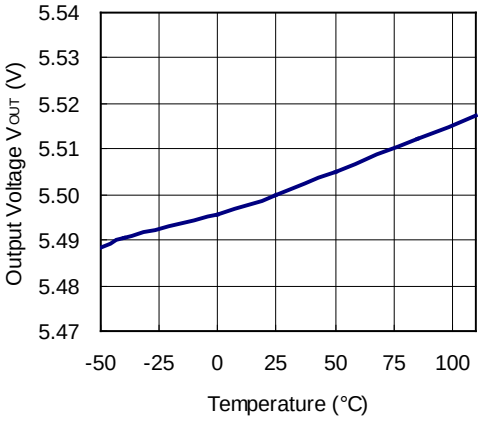
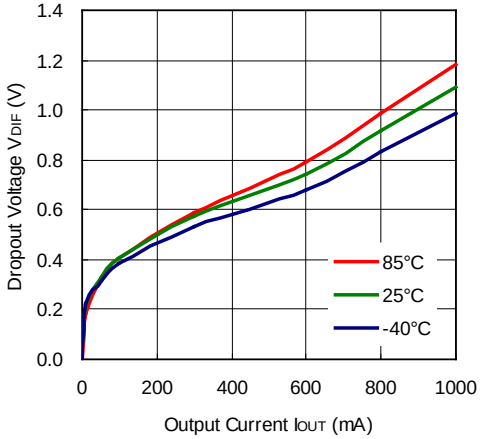


RP132x551x

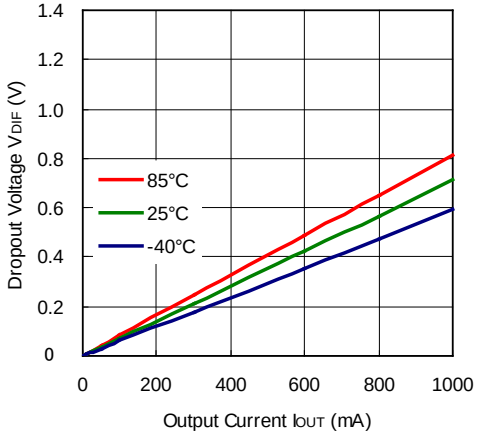


5) Dropout Voltage vs. Output Current

RP132x081x



RP132x151x



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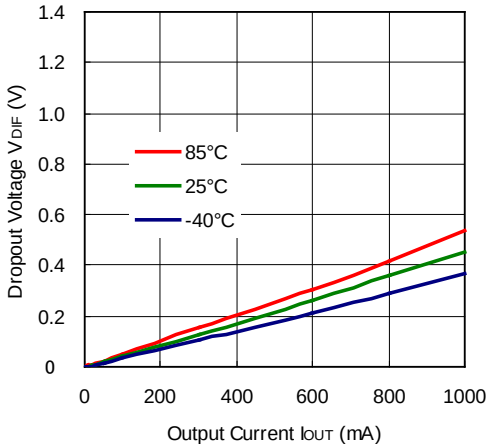

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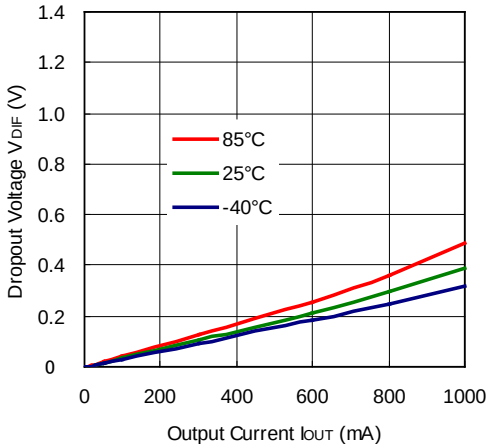
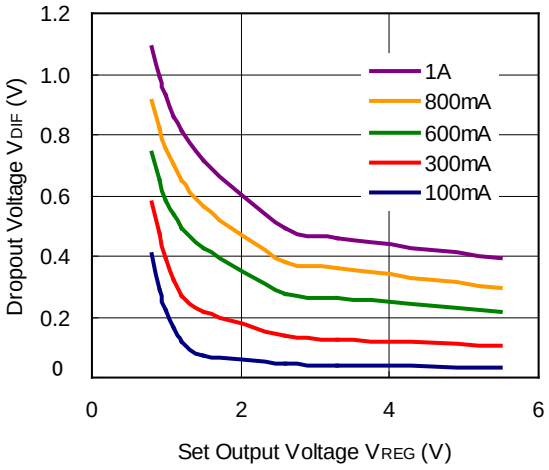
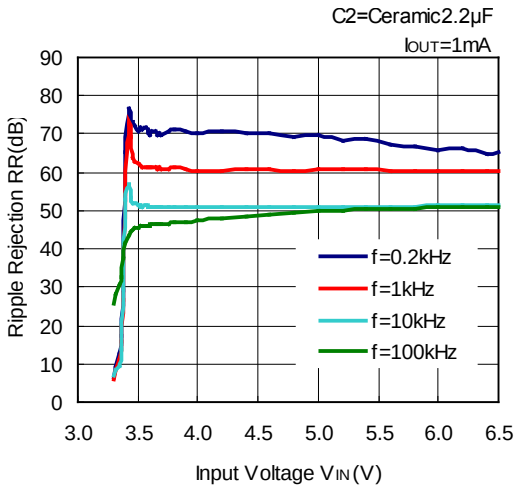


6) Dropout Voltage vs. Set Output Voltage

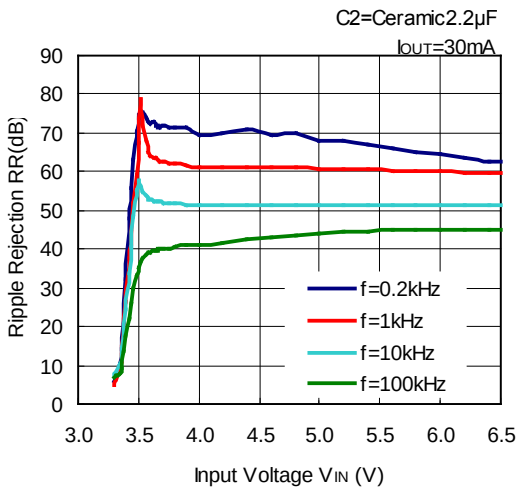


7) Ripple Rejection vs. Input Voltage (C_{IN}=none, Ripple=0.2Vp-p, Ta=25°C)

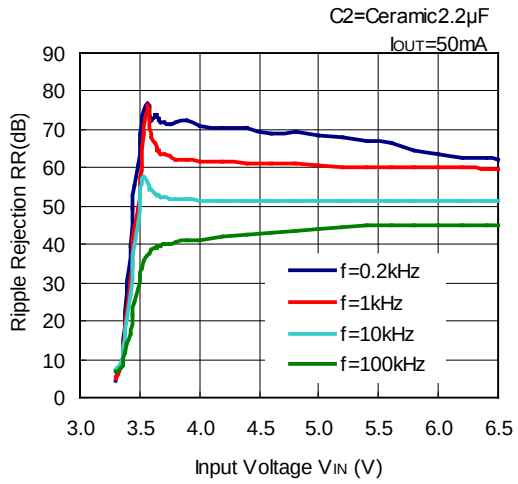
RP132x331x



RP132x331x



RP132x331x



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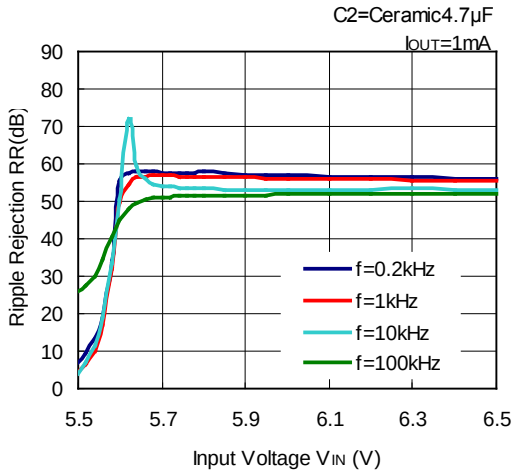
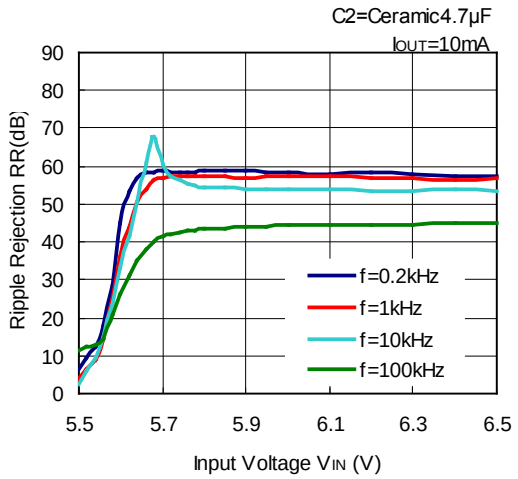


RP132x551x



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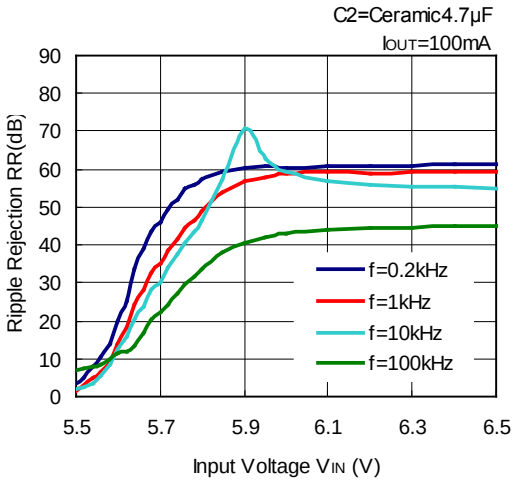
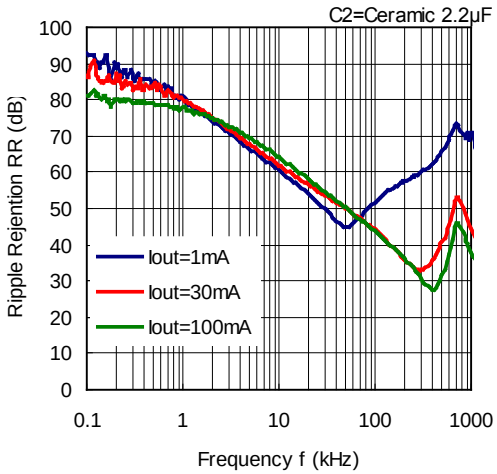
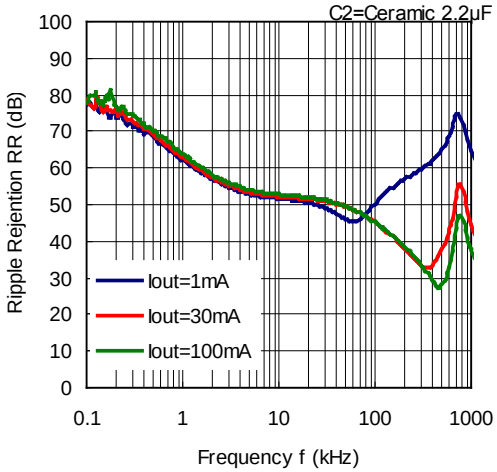


8) Ripple Rejection vs. Frequency (C_{IN} =none, Ta=25°C)

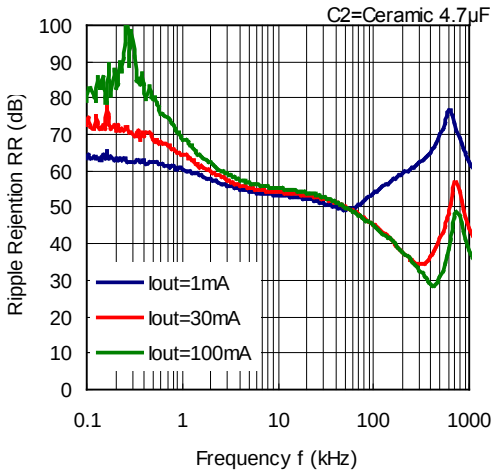
RP132x081x



RP132x331x

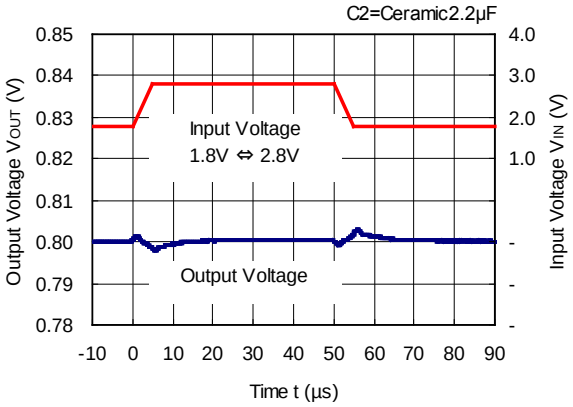


RP132x551x

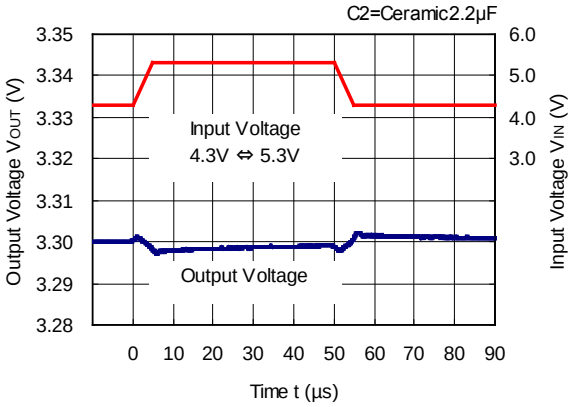


9) Input Transient Response (C_{IN} =none, I_{OUT}=100mA, tr=tf=5µs, Ta=25°C)

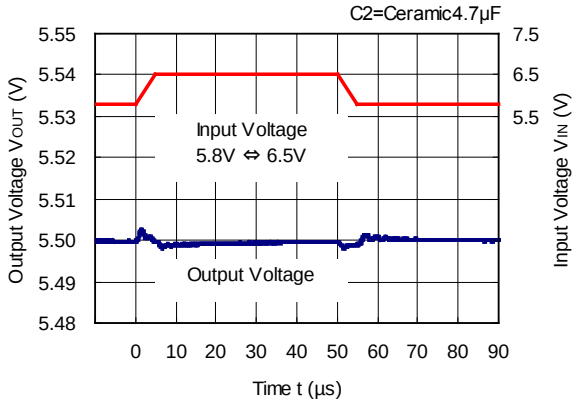
RP132x081x



RP132x331x

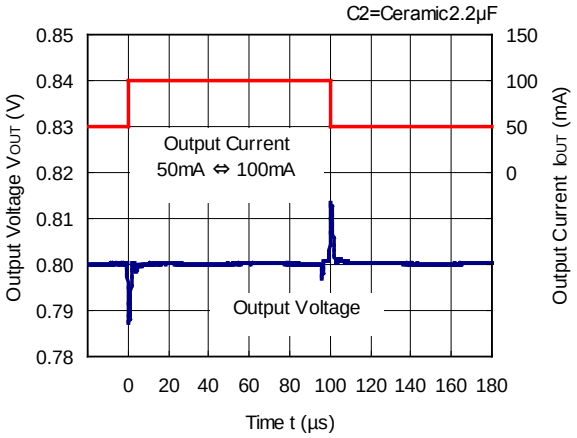


RP132x551x



10) Load Transient Response (V_{IN}=V_{OUT}+1.0V, C_{IN} =Ceramic 2.2µF, tr=tf=0.5µs, Ta=25°C)

RP132x081x



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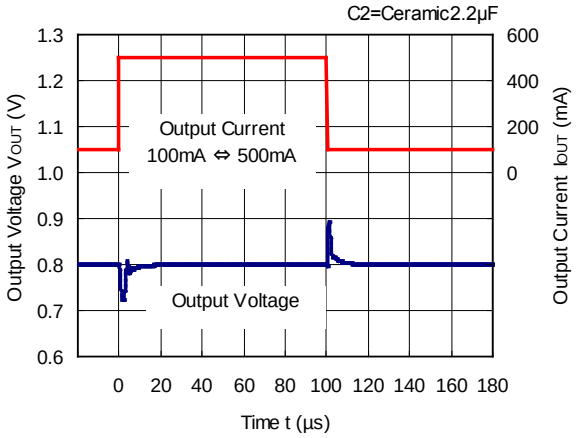

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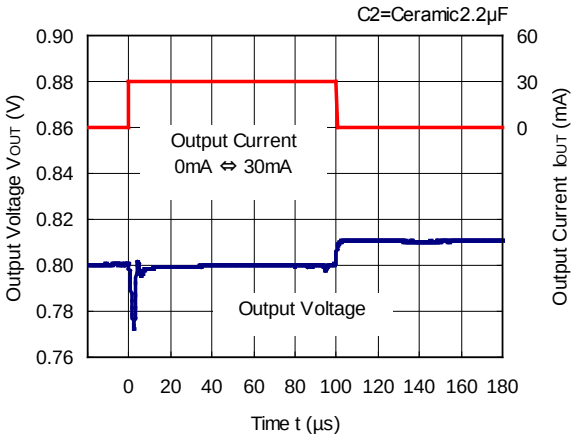
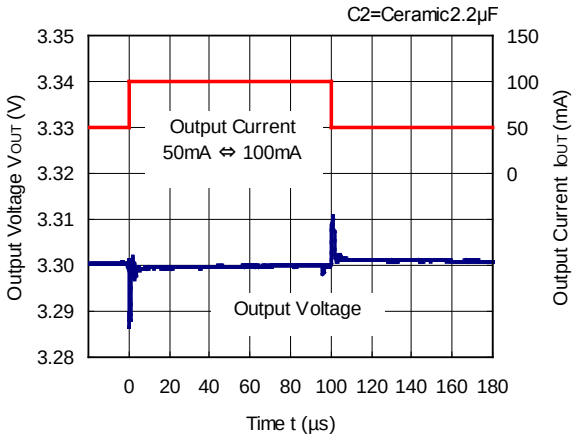


RP132x331x



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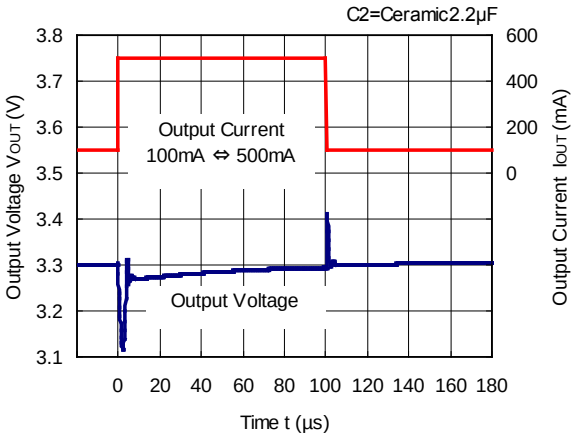
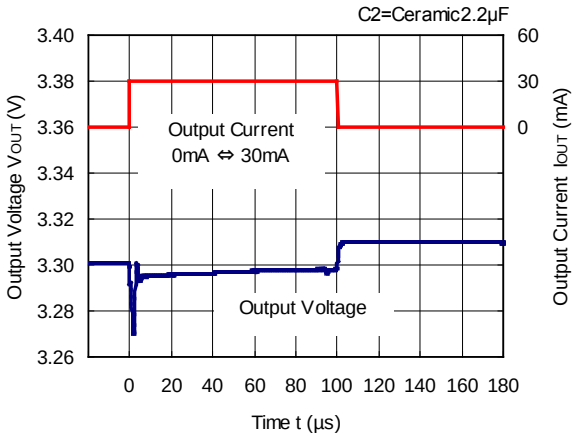
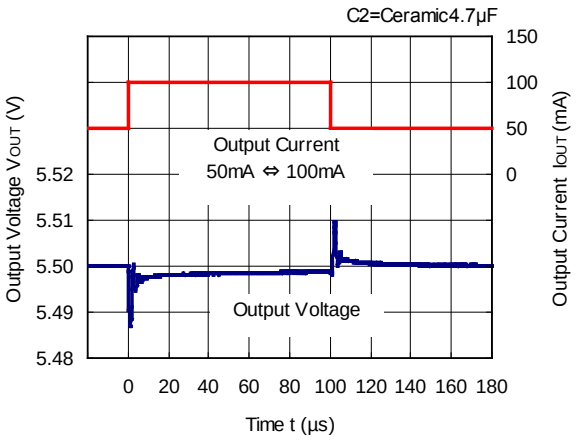


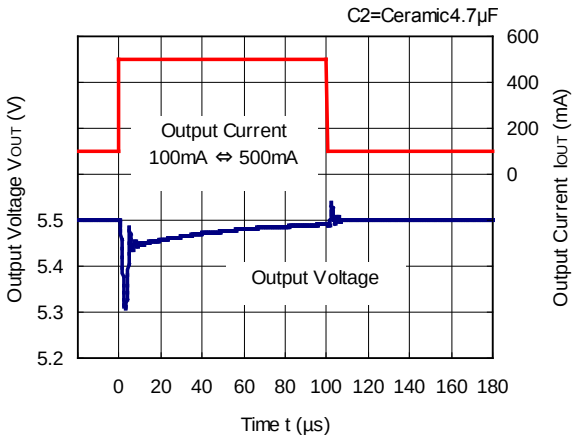
RP132x331x



RP132x551x



RP132x551x



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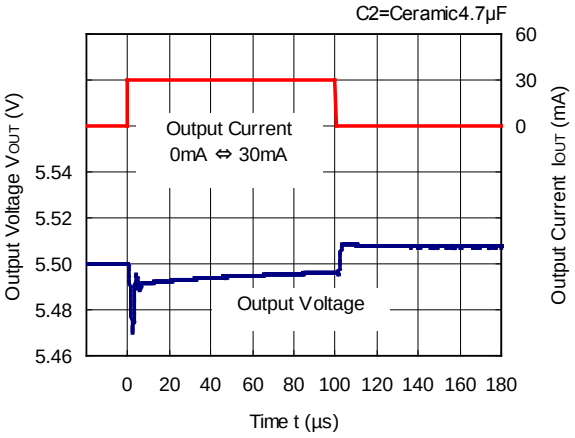
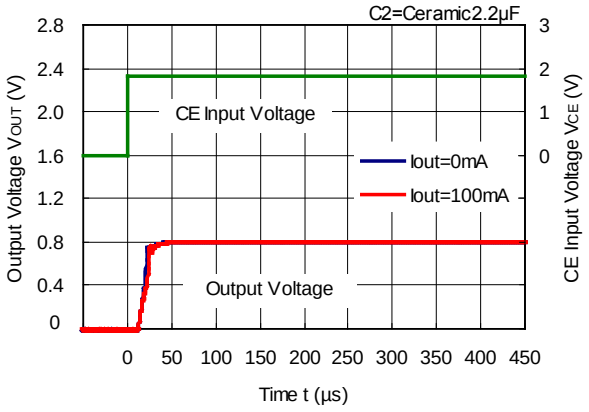
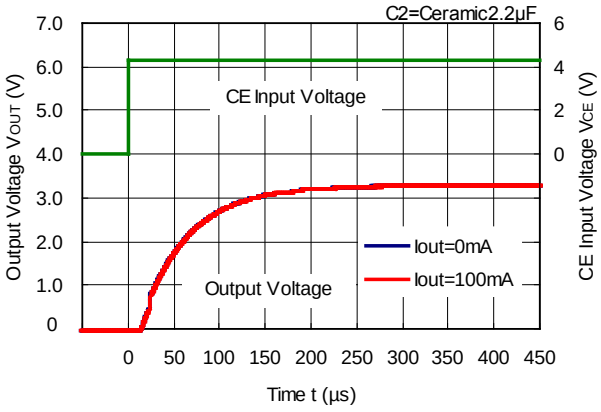


11) Turn on Speed with CE pin (C_{IN} =Ceramic 2.2µF, Ta=25°C)

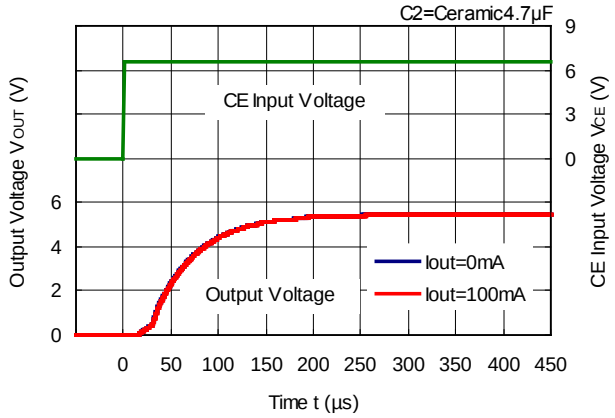
RP132x081x



RP132x331x

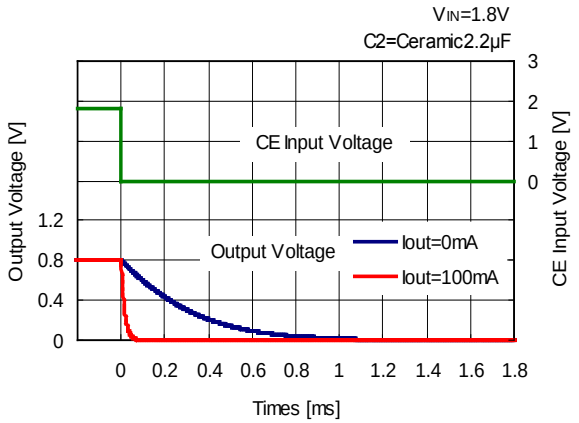


RP132x551x

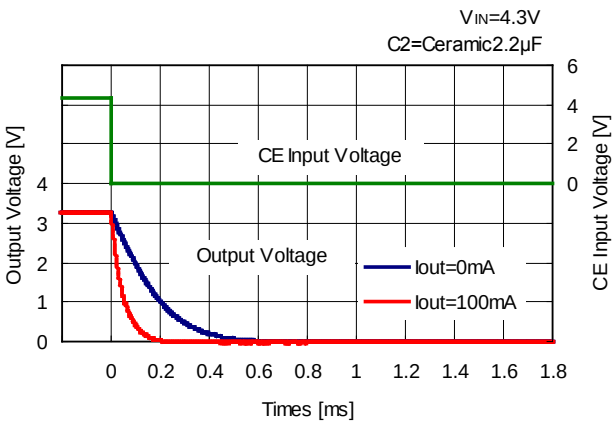


12) Turn off Speed with CE pin (D version) (C_{IN} =Ceramic 2.2µF, Ta=25°C)

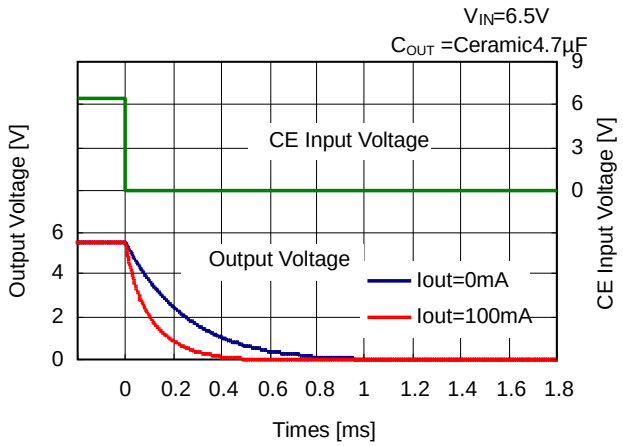
RP132x081D



RP132x331D

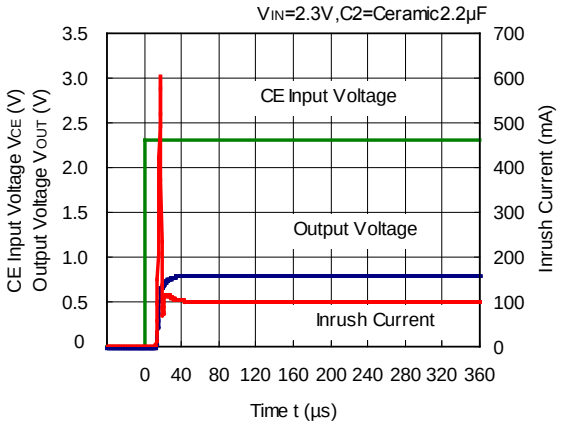


RP132x551D

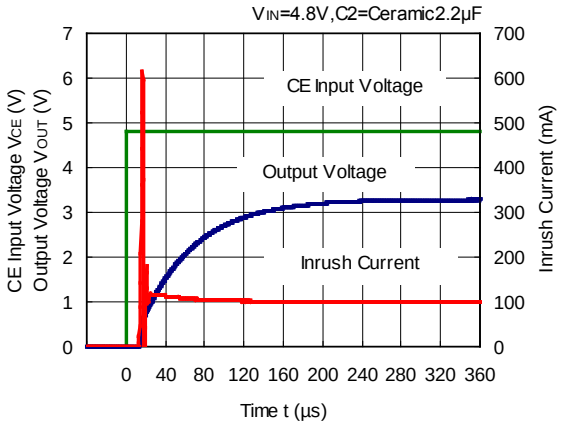


13) Inrush Current (C_{IN} =Ceramic 2.2µF, I_{OUT}=100mA, Ta=25°C)

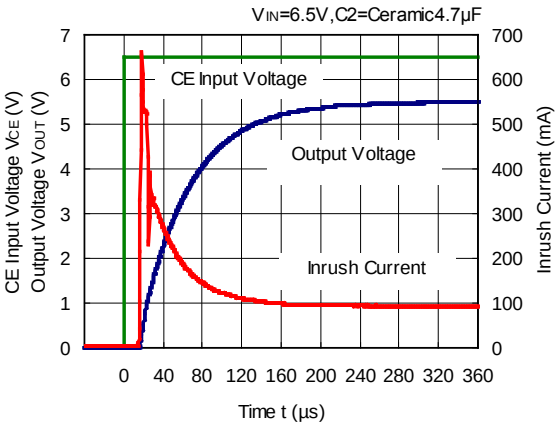
RP132x081x



RP132x331x

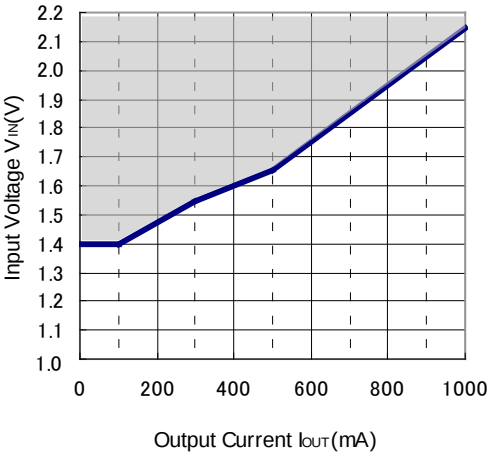


RP132x551x



14) Minimum Operating Voltage

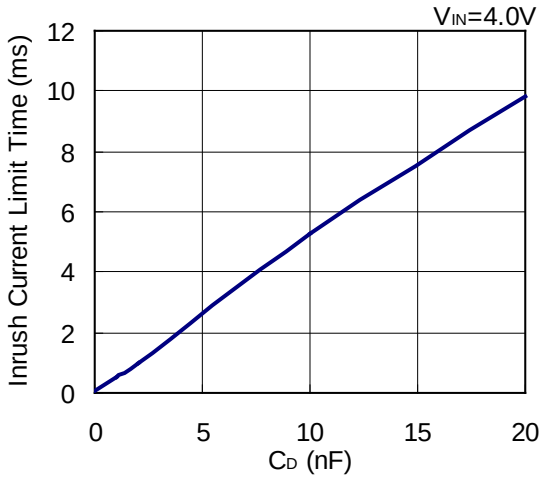
RP132x081x



The operation rage that can output 0.8V is shown by the hatched area in the graph.

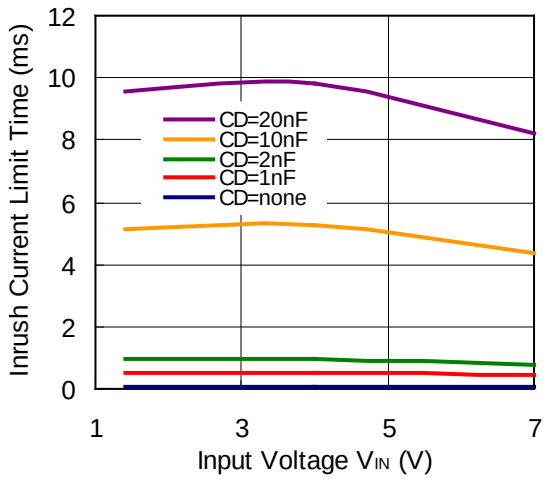
15) Inrush Current Limit Time vs. C_D Capacitance (E / F Version)

RP132x081x



16) Inrush Current Limit Time vs. Input Voltage (E / F Version)

RP132x081x



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

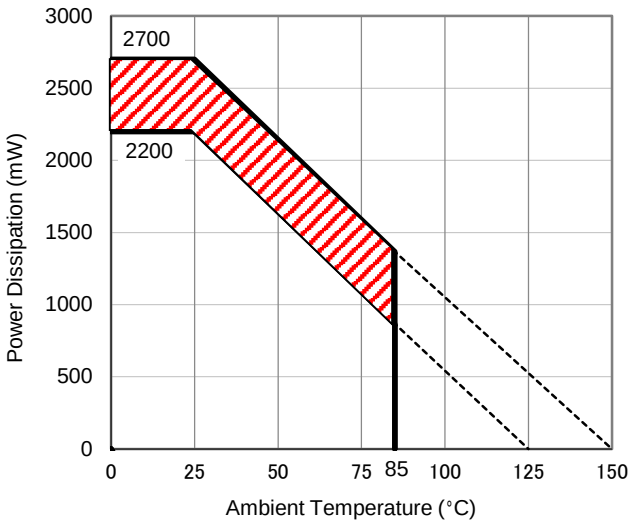
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square
Through-holes	ϕ 0.2 mm × 34 pcs

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

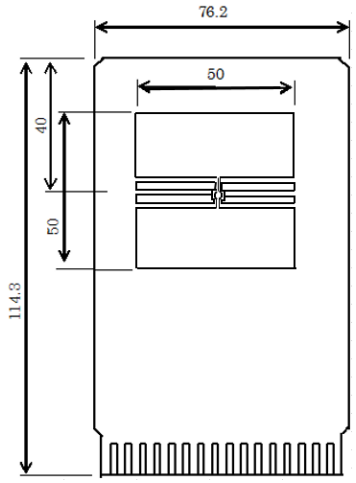
Item	Measurement Result
Power Dissipation	2200 mW
Thermal Resistance (θja)	θja = 45°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 18°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



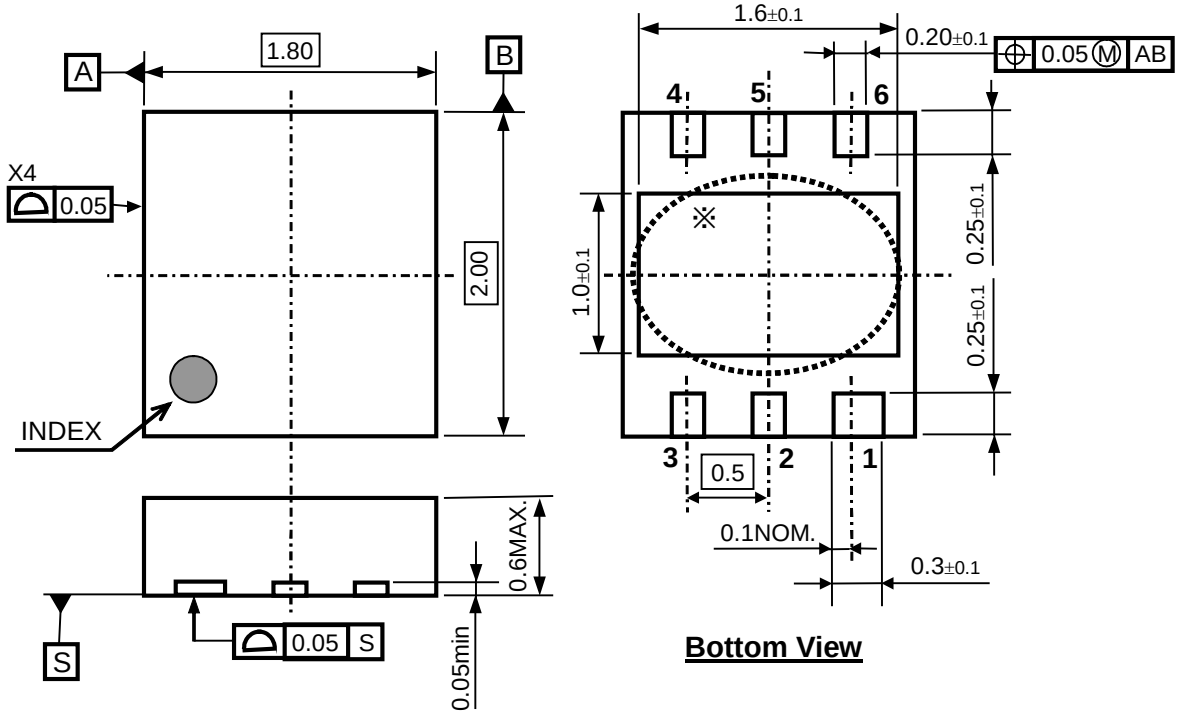
Measurement Board Pattern

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

RICOH

Ver. A



DFN(PLP)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.

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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

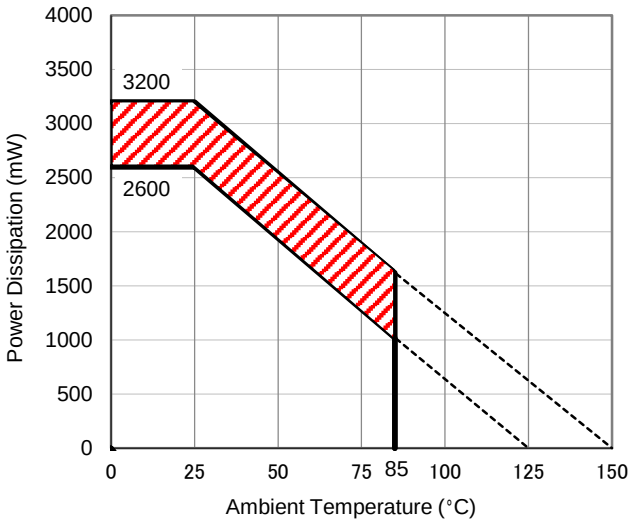
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx.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

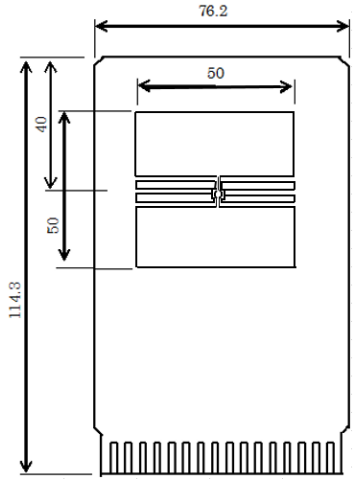
Item	Measurement Result
Power Dissipation	2600 mW
Thermal Resistance (θja)	θja = 38°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 13°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



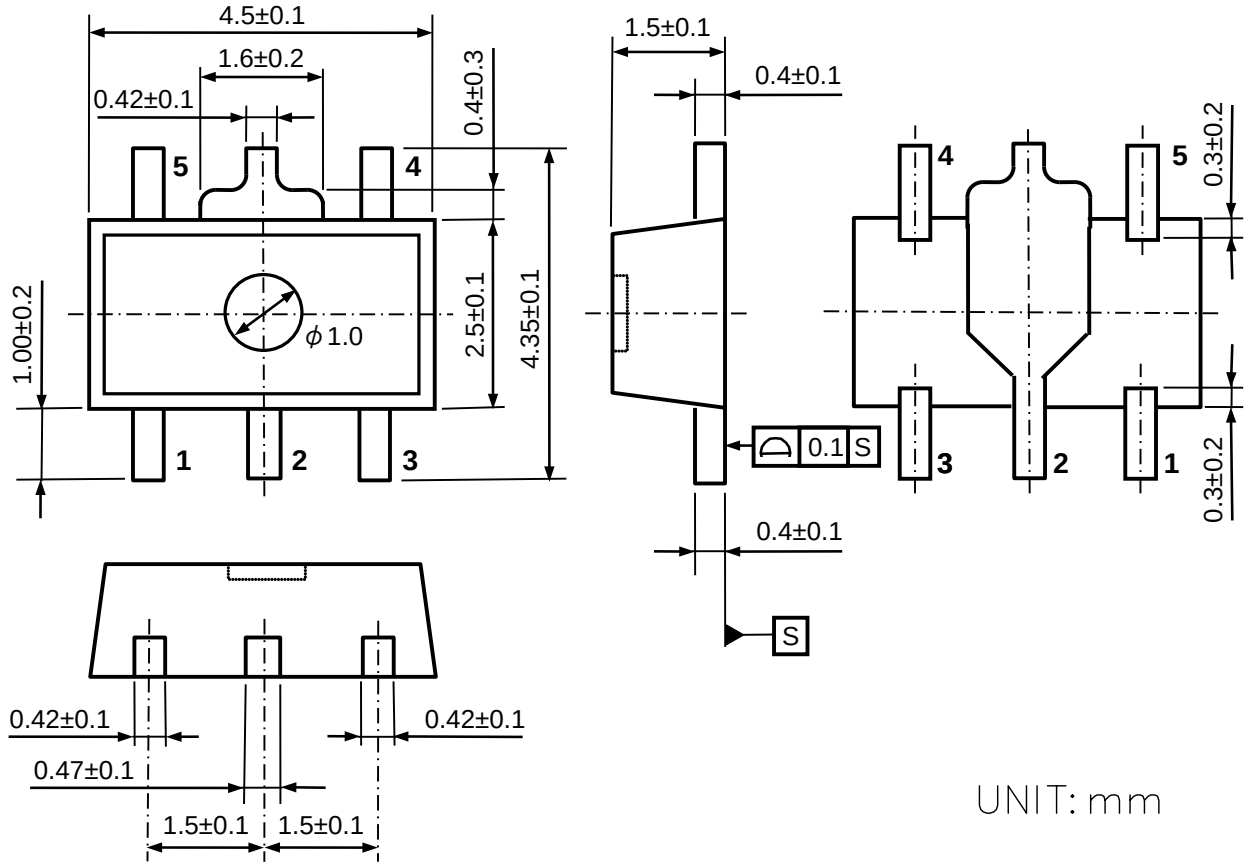
Power Dissipation vs. Ambient Temperature



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



SOT-89-5 Package Dimensions

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

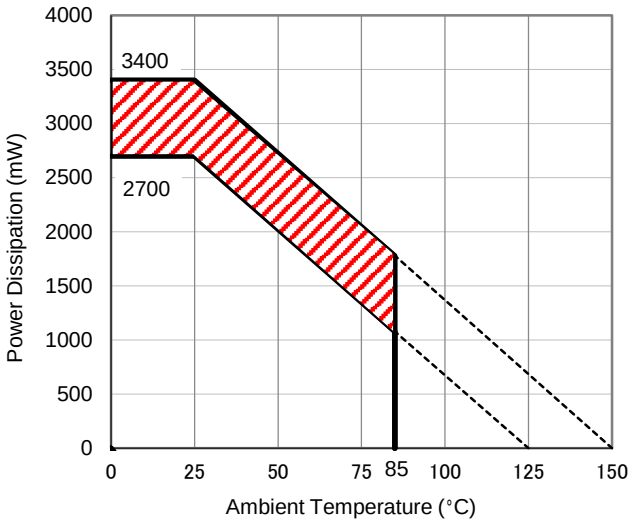
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx.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

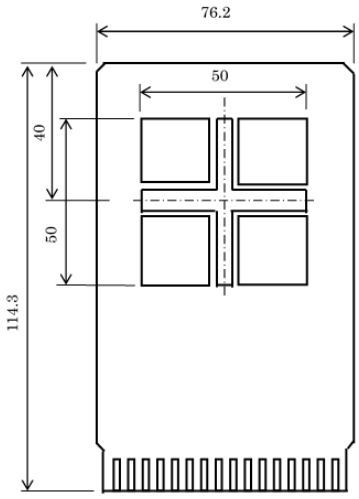
Item	Measurement Result
Power Dissipation	2700 mW
Thermal Resistance (θja)	θja = 37°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 7°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



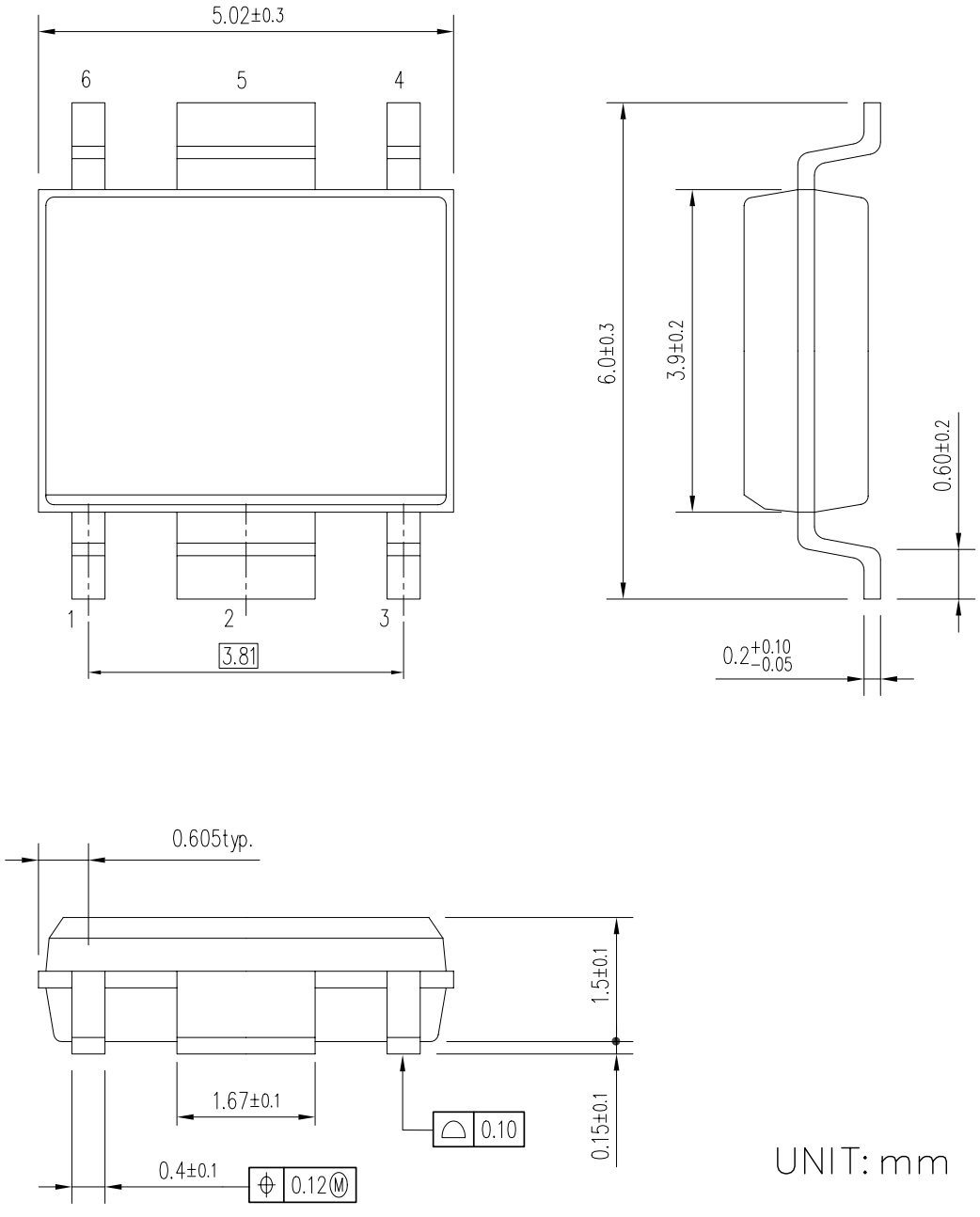
Power Dissipation vs. Ambient Temperature



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



HSOP-6J Package Dimensions

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.

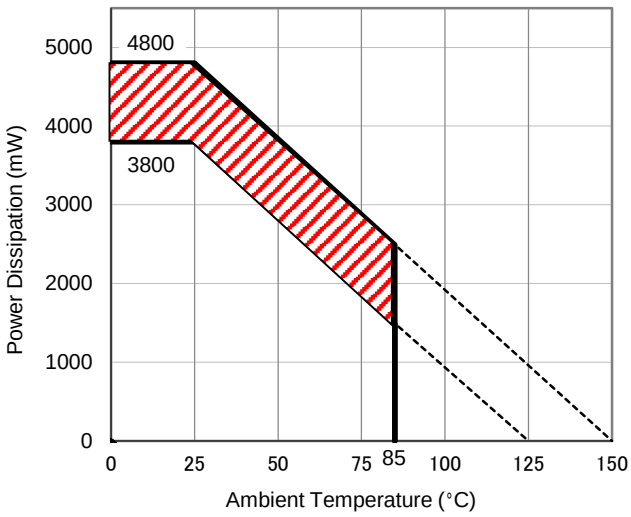
Measurement Conditions

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 Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square
Through-holes	ϕ 0.3 mm × 21 pcs

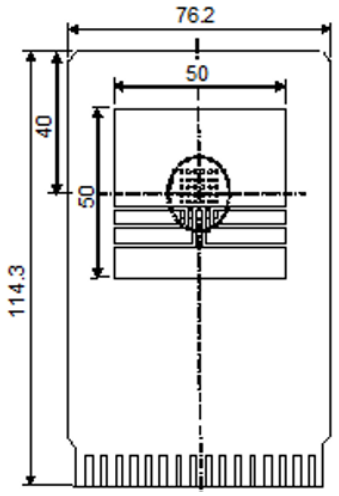
Measurement Result (Ta = 25°C, Tjmax = 125°C)

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

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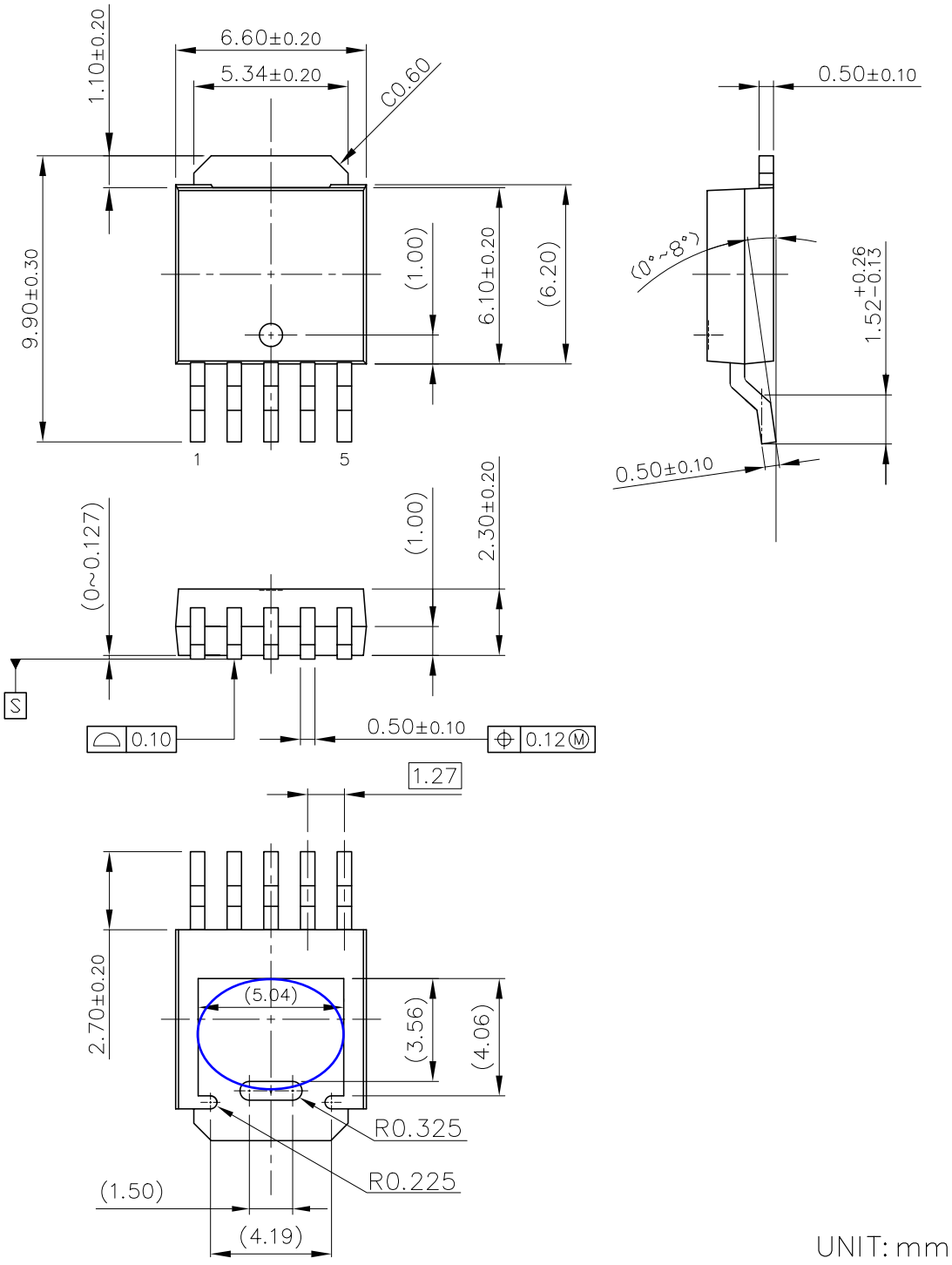
Ver. A



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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