*RP107N (SOT-23-5) is the limited product. As of March in 2018.

RICOH

RP107x SERIES

OUTPUT CAPACITOR-LESS/LOW VOLTAGE 200mA LDO REGULATOR

NO.EA-181-170424

OUTLINE

The RP107x Series are CMOS-based LDO regulators featuring 200mA output.

Since the output capacitor and noise bypass capacitor are able to be reduced and the packages are small DFN(PLP)1212-6, WLCSP-4-P5, and SC-88A, high density mounting on boards are possible. The input voltage (V_{IN}) is as low as Min.1.4V and the output voltage can be set from 1.0V.

Supply current is as low as 9.5μA compared to existing lines. The CE pin can switch the regulator to standby mode.

FEATURES

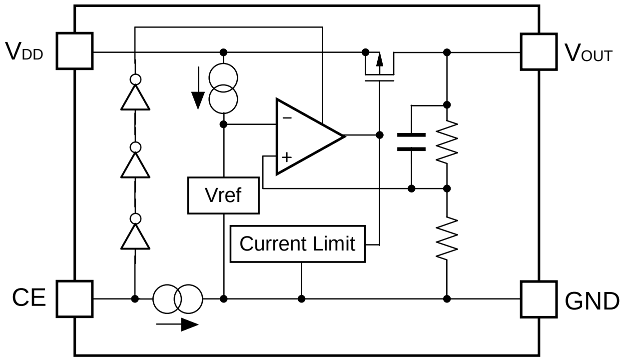
- Supply Current ....Typ. 9.5μA
- Standby Mode ....Typ. 0.1μA
- Dropout Voltage...Typ. 0.27V (I_{OUT}=200mA, V_{OUT}=3.0V)
- Ripple Rejection ....Typ. 70dB (f=1kHz, V_{OUT}≤1.2V)
  Typ. 65dB (f=1kHz, 1.2V<V_{OUT}<2.2V)
  Typ. 60dB (f=1kHz, V_{OUT}≥2.2V)
- Temperature-Drift Coefficient of Output Voltage ....Typ. ±100ppm/°C
- Line Regulation ....Typ. 0.02%/V
- Output Voltage Accuracy...±1.0%
- Packages..WLCSP-4-P5, DFN(PLP)1212-6, SC-88A, SOT-23-5
- Input Voltage Range..1.4V to 5.25V
- Output Voltage Range...1.0V to 4.2V (0.1V steps)
  (For other voltages, please refer to MARK INFORMATIONS.)
- Built-in Fold Back Protection Circuit............................Typ. 50mA (Current at short mode)
- Output capacitor free and noise bypass capacitor free

APPLICATIONS

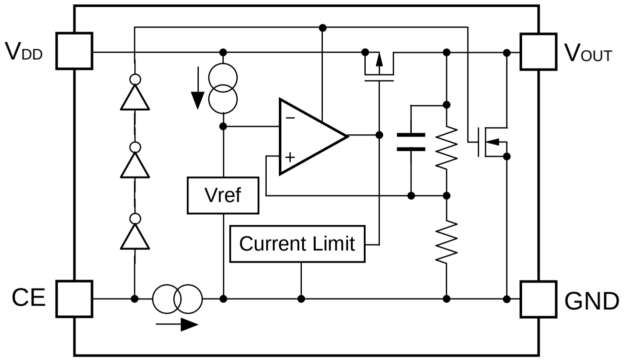
- Power source for portable communication equipment.
- Power source for electrical appliances such as cameras, VCRs and camcorders.
- Power source for battery-powered equipment.
- Power source for home appliances.

BLOCK DIAGRAMS

RP107xxxxB



RP107xxxxD



SELECTION GUIDE

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

Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
RP107Zxx1∗(y)-TR-F	WLCSP-4-P5	5,000 pcs	Yes	Yes
RP107Kxx1∗(y)-TR	DFN(PLP)1212-6	5,000 pcs	Yes	Yes
RP107Qxx2∗(y)-TR-FE	SC-88A	3,000 pcs	Yes	Yes
RP107Nxx1∗(y)-TR-FE	SOT-23-5	3,000 pcs	Yes	Yes

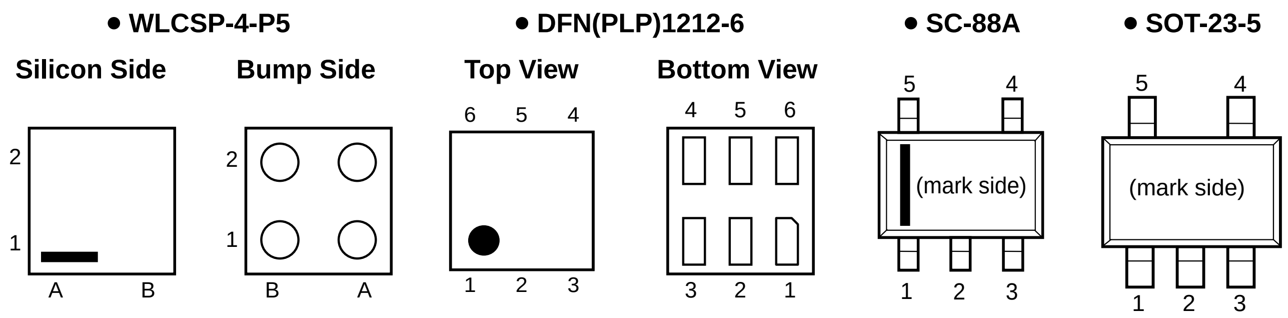
xx: The output voltage (V_{OUT}) can be designated in the range from 1.0V to 4.2V in 0.1V steps.

(y): If the output voltage includes the 3rd digit, indicate the digit of 0.01V.
1.25V: RP107x12x∗5
1.85V: RP107x18x∗5
2.85V: RP107x28x∗5

∗: Select (B) without auto-discharge function or (D) with auto-discharge function.

[*1] Auto-discharge function quickly lowers the output voltage to 0V by releasing the electrical charge accumulated in the external capacitor when the chip enable signal is switched from the active mode to the standby mode.

PIN CONFIGURATIONS



PIN DESCRIPTIONS

● **WLCSP-4-P5**

Pin No	Symbol	Pin Description
A1	V_{DD}	Input Pin
A2	V_{OUT}	Output Pin
B1	CE	Chip Enable Pin
B2	GND	Ground Pin

● **DFN(PLP)1212-6**

Pin No	Symbol	Pin Description
1	NC	No Connection
2	GND	Ground Pin
3	CE	Chip Enable Pin
4	V_{DD}	Input Pin
5	NC	No Connection
6	V_{OUT}	Output Pin

● **SC-88A**

Pin No	Symbol	Pin Description
1	CE	Chip Enable Pin
2 *	NC	No Connection
3	GND	Ground Pin
4	V_{OUT}	Output Pin
5	V_{DD}	Input Pin

* Pin No. 2 is connected to the bottom of the IC. It is recommended that the pin be connected to the ground plane on the board, or otherwise be left floating so that there is no contact with other potentials.

- **SOT-23-5**

Pin No	Symbol	Pin Description
1	V_{DD}	Input Pin
2	GND	Ground Pin
3	CE	Chip Enable Pin
4	NC	No Connection
5	V_{OUT}	Output Pin

ABSOLUTE MAXIMUM RATINGS

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	6.0	V
V_{CE}	Input Voltage (CE Pin)	–0.3 to 6.0	V
V_{OUT}	Output Voltage	–0.3 to V_{IN}+0.3	V
I_{OUT}	Output Current	400	mA
P_D	Power Dissipation* (WLCSP-4-P5)	278	mW
	Power Dissipation* (DFN(PLP)1212-6)	400	
	Power Dissipation* (SC-88A)	380	
	Power Dissipation* (SOT-23-5)	420	
Topt	Operating Temperature Range	–40 to 85	°C
Tstg	Storage Temperature Range	–55 to 125	°C

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

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

ELECTRICAL CHARACTERISTICS

- **RP107xxxxB/D**

V_{IN} = V_{SET}[*3] + 1.0V, I_{OUT} = 1mA, C_{IN} = C_{OUT} = 0.1μF, unless otherwise noted.

The specifications surrounded by [ ] are guaranteed by Design Engineering at - 40°C ≤ Ta ≤ 85ºC.

RP107x Series (Ta = 25°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	Ta=25°C	V_{SET} > 2.0V	x 0.990		x 1.010	V
			V_{SET} ≤ 2.0V	-20		+20	mV
		-40°C ≤ Ta ≤ 85°C	V_{SET} > 2.0V	[x 0.980]		[x 1.015]	V
			V_{SET} ≤ 2.0V	[-40]		[+30]	mV
I_{OUT}	Output Current			[200]			mA
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	1mA ≤ I_{OUT} ≤ 200mA			25	[50]	mV
V_{DIF}	Dropout Voltage	Refer to *Dropout Voltage Specifications*.					
I_{SS}	Supply Current (I_{OUT}=0mA)	I_{OUT} = 0mA			9.5	[25]	μA
Istandby	Standby Current	V_{CE} = GND			0.1	3.0	μA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	V_{SET} + 0.5V ≤ V_{IN} ≤ 5V I_{OUT} = 1mA			±0.02	[±0.20]	%/V
RR	Ripple Rejection	f = 1kHz (V_{OUT} ≤ 1.2V) f = 1kHz (1.2V < V_{OUT} < 2.2V) f = 1kHz (V_{OUT} ≤ 2.2V) Ripple 0.2Vp-p V_{IN} = V_{SET} + 1.0V I_{OUT} = 30mA Note: When V_{OUT} ≤ 1.2V, V_{IN} = 2.2V.			70 65 60		dB
V_{IN}	Input Voltage			[1.4]		[5.25]	V
$\Delta V_{OUT}/\Delta Ta$	Output Voltage Temperature Coefficient	-40°C ≤ Ta ≤ 85°C			±100		ppm /°C
I_{SC}	Short Current Limit	V_{OUT} = 0V			50		mA
I_{CEPD}	CE Pull-down Current				0.1		μA
V_{CEH}	CE Input Voltage "H"			[1.0]			V
V_{CEL}	CE Input Voltage "L"					[0.4]	V
R_{LOW}	Auto-discharge Nch ON Resistance (D version only)	V_{IN} = 4.0V V_{CE} = 0V			30		Ω

All test items listed under *[7] Electrical Characteristics* are done under the pulse load condition (Tj ≈ Ta = 25ºC) except for Ripple Rejection and Output Voltage Temperature Coefficient.

*3 V_{SET} = Set Output Voltage

The specifications surrounded by [ ] are guaranteed by Design Engineering at - 40°C ≤ Ta ≤ 85ºC.

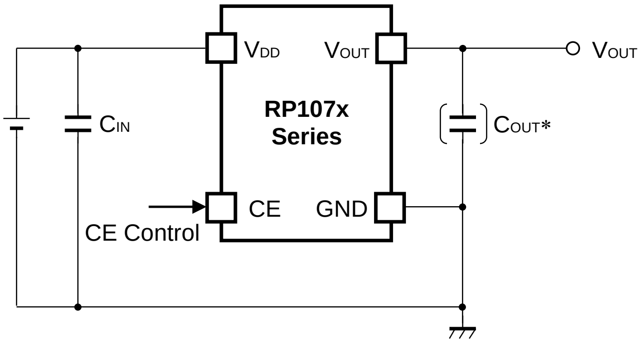
Dropout Voltage Specifications (ta=25°C)

Output Voltage V_{SET} (V)	Dropout Voltage V_{DIF} (V)		
	Condition	Typ.	Max.
$1.0 \leq V_{SET} < 1.1$	I_{OUT} = 200mA	0.64	0.92
$1.1 \leq V_{SET} < 1.2$		0.59	0.84
$1.2 \leq V_{SET} < 1.5$		0.55	0.76
$1.5 \leq V_{SET} < 2.0$		0.44	0.60
$2.0 \leq V_{SET} < 2.6$		0.35	0.49
$2.6 \leq V_{SET}$		0.27	0.36

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



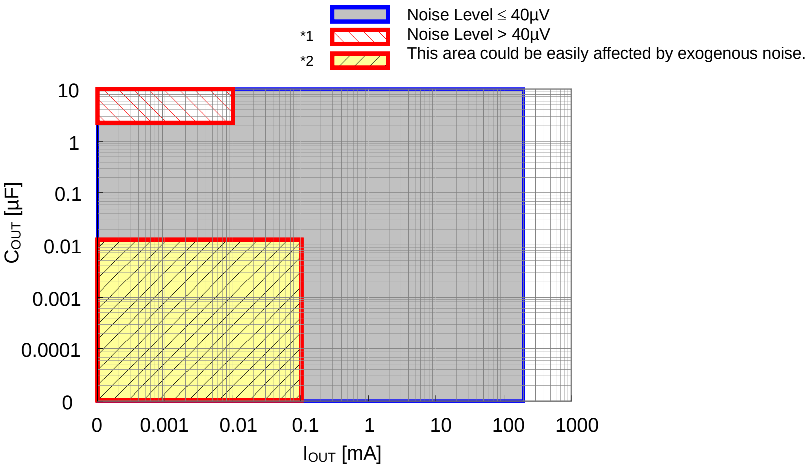
TECHNICAL NOTES

When using the RP107x Series, please note the following points.

*Phase Compensation

The RP107x Series are using an output capacitor as phase compensation to ensure a stable operation even if the output load fluctuates. To reduce the output voltage fluctuation, it is imperative that a 0.1µF to 10µF output capacitor be used. When doing so, please note the following three points.

1. <u>If the output capacitor is 2.2µF or more and the output current is 0.01mA or less*1</u>, the noise level may increase beyond 40µV, therefore, it is imperative that the stability of operation including the frequency characteristics be evaluated.
2. <u>If the output capacitor is 0.01µF or less and the output current is 0.1mA or less*2</u>, the exogenous noise occurred in the other circuits may give some impacts on the noise level, therefore it is imperative that the enough measures be taken such as to make GND lowered.
   As for 1 and 2, please refer to the chart of the External Capacitor vs. Output Voltage.



External Capacitor vs. Output Voltage

3. In case of using a tantalum capacitor, the output may oscillate if the effective series resistance (ESR) is high, therefore, it is imperative that the ESR vs. Frequency be considered.

PCB Layout

If the impedances of V_{DD} and GND lines are high, the ICs may pick up noise or may cause unstable operation when the current flows. Therefore, make V_{DD} and GND the lowest possible. Also, place a 0.1µF or more C_{IN} capacitor between V_{DD} pin and GND pin as close as possible to each other.

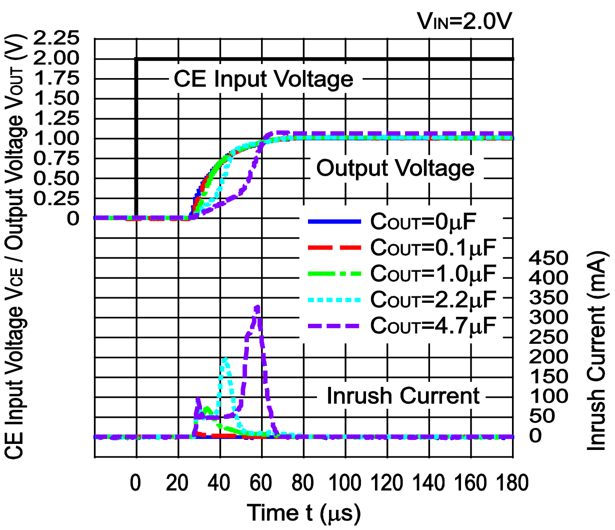
CONSTANT SLOPE CIRCUITS

The RP107x Series is equipped with a constant slope circuit as a soft-start circuit, which allows the output voltage to start up gradually when the CE is turned on.The constant slope circuit minimizes the inrush current at the start-up and also prevents the overshoot of the output voltage.The capacitor to create the start-up slope is built in the IC that does not require any external components. The start-up time and the start-up slope angle are fixed inside the IC.

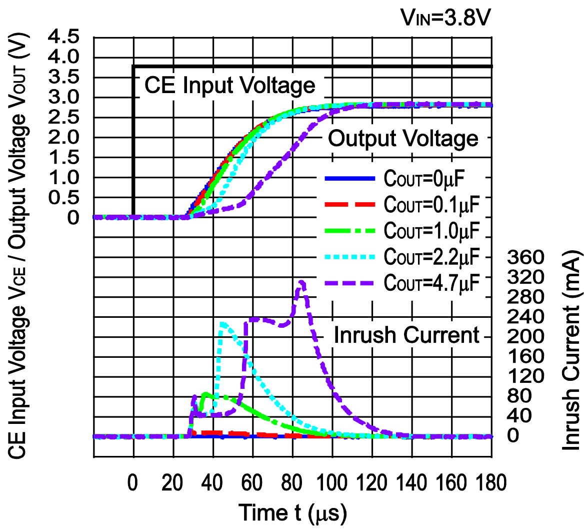
If the capacitance of the external output capacitor (C_{OUT}) becomes more than the certain capacitance, the output current limit circuit minimizes the incoming current of the output capacitor at the start-up. As a result, the start-up time becomes longer and the start-up slope angle becomes more gentle. As "Inrush Current Characteristics Example" below shows, if the C_{OUT} is less than 2.2µF, the constant slope circuit easily starts to function at the start-up, likewise, if the C_{OUT} is over 4.7µF, the output current limit circuit easily starts to function at the start-up. The boundary point of using these two circuits is inversely proportional to the output voltage. If the output voltage is higher, the output current limit circuit easily starts to function even if the C_{OUT} capacitance is small. For more details, please refer to the graph 15 of "Inrush Current Characteristics Example".

Inrush Current Characteristics Example (C1=0.1µF, Topt=25°C)

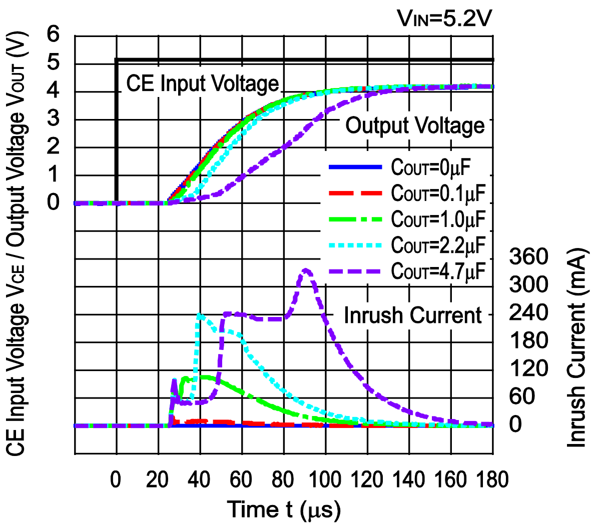
RP107x101xB/D



RP107x281xB/D



RP107x421xB/D



PACKAGE INFORMATION

● Power Dissipation (WLCSP-4-P5)

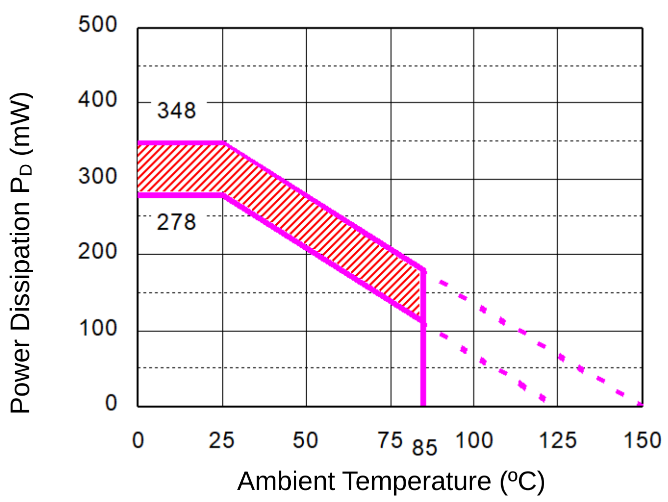
Power Dissipation (P_D) depends on conditions of mounting on board. This specification is based on the Measurement Conditions below.

Measurement Conditions

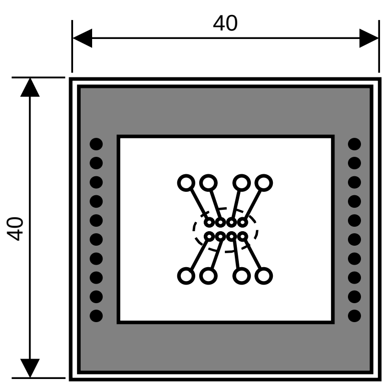
	Standard Land Pattern
Environment	Mounting on Board (Wind Velocity=0m/s)
Board Material	Glass Cloth Epoxy Plastic (Double-sided)
Board Dimensions	40mm x 40mm x 1.6mm
Copper Ratio	Topside: Approx. 50%, Backside: Approx. 50%
Through-hole	ϕ 0.5mm x 28pcs

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

	Standard Land Pattern
Power Dissipation	278mW
Thermal Resistance	θja=(125−25°C)/0.278W=360ºC/W
	θjc= 46°C/W



Power Dissipation



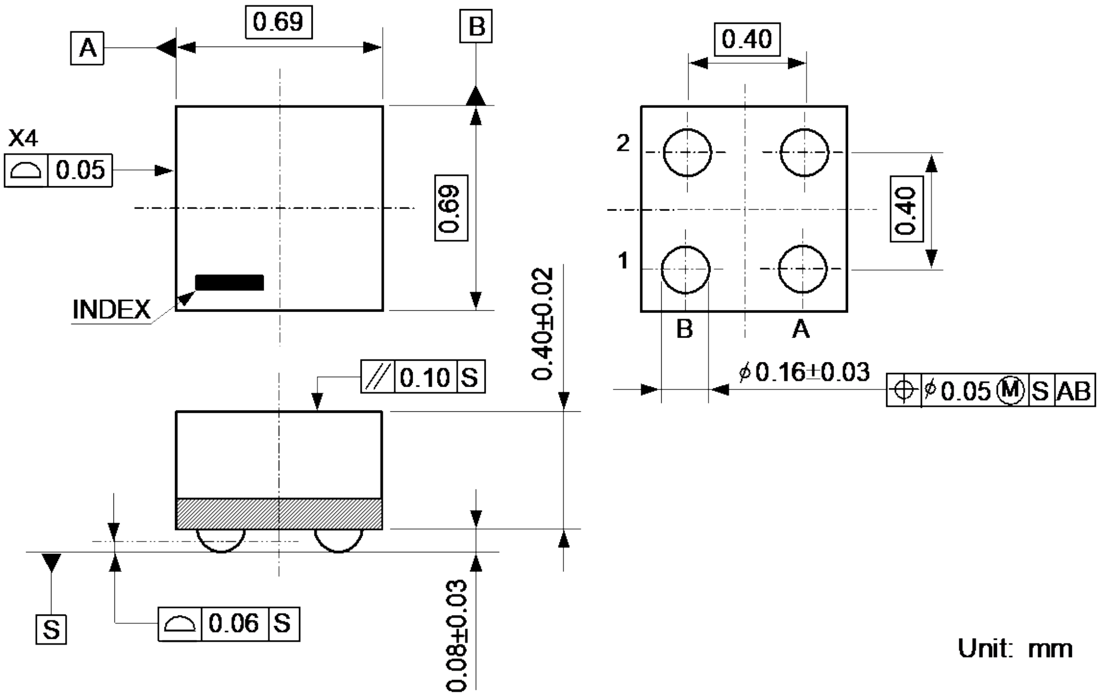
Measurement Board Pattern

IC Mount Area (Unit: mm)

The above graph shows the Power Dissipation of the WLCSP-4-P5 package based on Tjmax=125ºC and Tjmax=150ºC. Operating the ICs within the shaded area in the graph might have an influence on the lifetime of the ICs. Operating time must be within the time limit described in the table below.

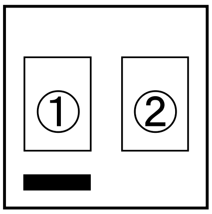
Operating Time	**Estimated Years (Operating 4 hrs/ day)**
13,000 Hours	9 Years

- **Package Dimensions (WLCSP-4-P5)**



- **Mark Specification (WLCSP-4-P5)**

①②: Lot Number … Alphanumeric Serial Number



- **RP107Z Series Mark Specification Table (WLCSP-4-P5)**

RP107ZxxxB

Product Name	V_{SET}
RP107Z101B	1.0V
RP107Z111B	1.1V
RP107Z121B	1.2V
RP107Z131B	1.3V
RP107Z141B	1.4V
RP107Z151B	1.5V
RP107Z161B	1.6V
RP107Z171B	1.7V
RP107Z181B	1.8V
RP107Z191B	1.9V
RP107Z201B	2.0V
RP107Z211B	2.1V
RP107Z221B	2.2V
RP107Z231B	2.3V
RP107Z241B	2.4V
RP107Z251B	2.5V
RP107Z261B	2.6V
RP107Z271B	2.7V
RP107Z281B	2.8V
RP107Z291B	2.9V
RP107Z301B	3.0V
RP107Z311B	3.1V
RP107Z321B	3.2V
RP107Z331B	3.3V
RP107Z341B	3.4V
RP107Z351B	3.5V
RP107Z361B	3.6V
RP107Z371B	3.7V
RP107Z381B	3.8V
RP107Z391B	3.9V
RP107Z401B	4.0V
RP107Z411B	4.1V
RP107Z421B	4.2V
RP107Z121B5	1.25V
RP107Z181B5	1.85V
RP107Z281B5	2.85V

RP107ZxxxD

Product Name	V_{SET}
RP107Z101D	1.0V
RP107Z111D	1.1V
RP107Z121D	1.2V
RP107Z131D	1.3V
RP107Z141D	1.4V
RP107Z151D	1.5V
RP107Z161D	1.6V
RP107Z171D	1.7V
RP107Z181D	1.8V
RP107Z191D	1.9V
RP107Z201D	2.0V
RP107Z211D	2.1V
RP107Z221D	2.2V
RP107Z231D	2.3V
RP107Z241D	2.4V
RP107Z251D	2.5V
RP107Z261D	2.6V
RP107Z271D	2.7V
RP107Z281D	2.8V
RP107Z291D	2.9V
RP107Z301D	3.0V
RP107Z311D	3.1V
RP107Z321D	3.2V
RP107Z331D	3.3V
RP107Z341D	3.4V
RP107Z351D	3.5V
RP107Z361D	3.6V
RP107Z371D	3.7V
RP107Z381D	3.8V
RP107Z391D	3.9V
RP107Z401D	4.0V
RP107Z411D	4.1V
RP107Z421D	4.2V
RP107Z121D5	1.25V
RP107Z181D5	1.85V
RP107Z281D5	2.85V

- **Power Dissipation (DFN(PLP)1212-6)**

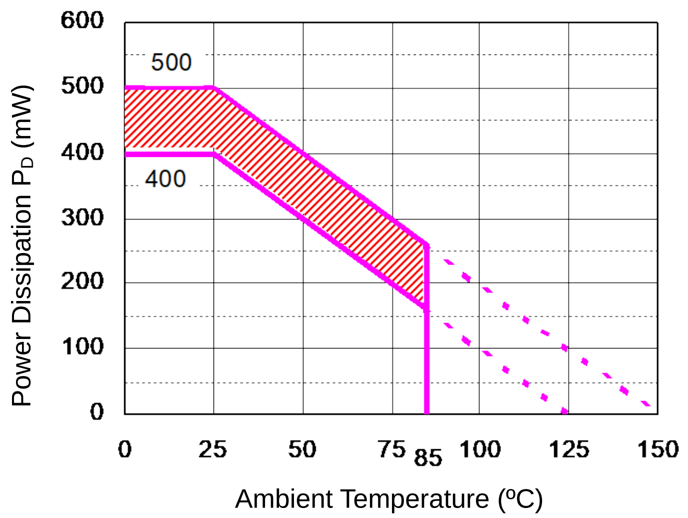
Power Dissipation (P_D) depends on conditions of mounting on board. This specification is based on the Measurement Conditions below.

Measurement Conditions

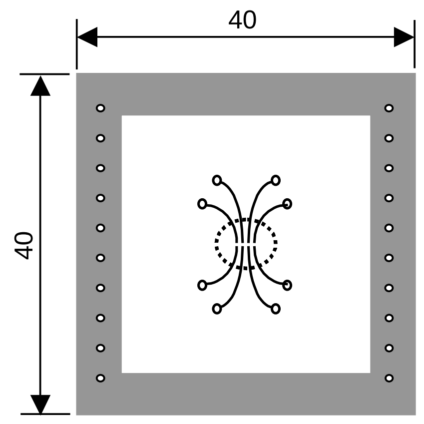
	Standard Land Pattern
Environment	Mounting on Board (Wind Velocity=0m/s)
Board Material	Glass Cloth Epoxy Plastic (Double-sided)
Board Dimensions	40mm x 40mm x 1.6mm
Copper Ratio	Topside: Approx. 50%, Backside: Approx. 50%
Through-holes	ϕ 0.54mm x 28pcs

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

	Standard Land Pattern
Power Dissipation	400mW
Thermal Resistance	θja = (125-25°C)/0.4W= 250°C/W
	θ jc=67 °C/W



Power Dissipation



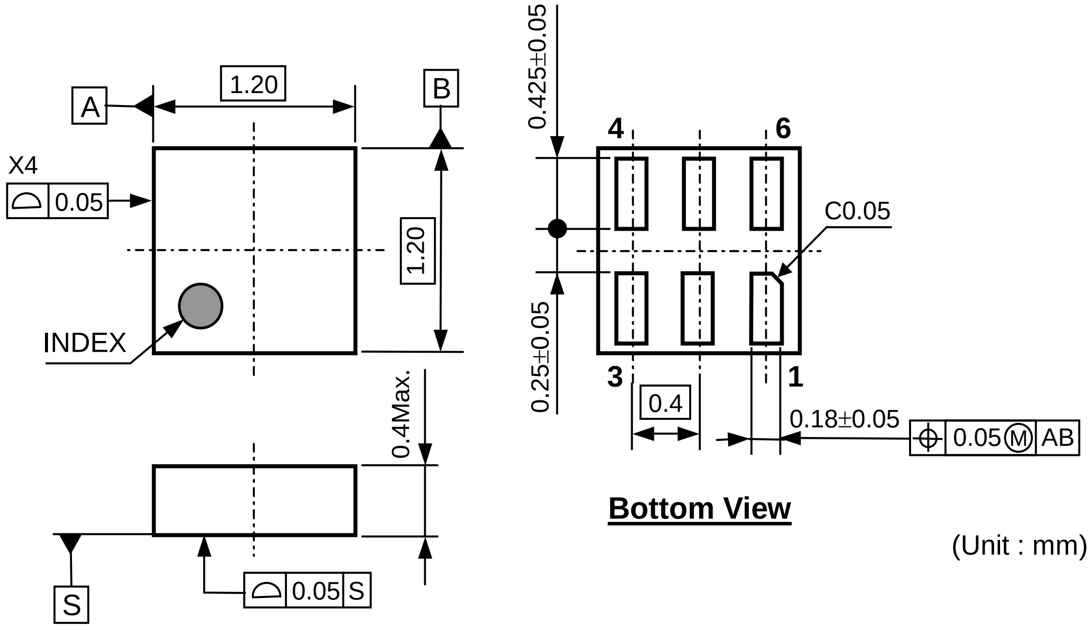
Measurement Board Pattern

IC Mount Area (Unit: mm)

The above graph shows the Power Dissipation of the DFN(PLP)1212-6 package based on Tjmax=125ºC and Tjmax=150ºC. Operating the ICs within the shaded area in the graph might have an influence on the lifetime of the ICs. Operating time must be within the time limit described in the table below.

Operating Time	Estimated Years (Operating 4 hrs/ day)
13,000 Hours	9 Years

- **Package Dimensions (DFN(PLP)1212-6)**



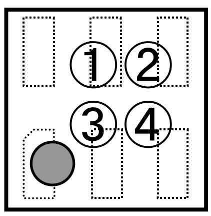
Bottom View

(Unit : mm)

- **Mark Specification (DFN(PLP)1212-6)**

①②: Product Code … **Refer to *RP107K Series Mark Specification Table.***

③④: Lot Number … Alphanumeric Serial Number



● RP107K Series Mark Specification Table (DFN(PLP)1212-6)

RP107KxxxB

Product Name	①②	V_{SET}
RP107K101B	**J A**	1.0V
RP107K111B	**J B**	1.1V
RP107K121B	**J C**	1.2V
RP107K131B	**J D**	1.3V
RP107K141B	**J E**	1.4V
RP107K151B	**J F**	1.5V
RP107K161B	**J G**	1.6V
RP107K171B	**J H**	1.7V
RP107K181B	**J J**	1.8V
RP107K191B	**J K**	1.9V
RP107K201B	**J L**	2.0V
RP107K211B	**J M**	2.1V
RP107K221B	**J N**	2.2V
RP107K231B	**J P**	2.3V
RP107K241B	**J Q**	2.4V
RP107K251B	**J R**	2.5V
RP107K261B	**J A**	2.6V
RP107K271B	**J T**	2.7V
RP107K281B	**J U**	2.8V
RP107K291B	**J V**	2.9V
RP107K301B	**J W**	3.0V
RP107K311B	**J X**	3.1V
RP107K321B	**J Y**	3.2V
RP107K331B	**J Z**	3.3V
RP107K341B	**K A**	3.4V
RP107K351B	**K B**	3.5V
RP107K361B	**K C**	3.6V
RP107K371B	**K D**	3.7V
RP107K381B	**K E**	3.8V
RP107K391B	**K F**	3.9V
RP107K401B	**K G**	4.0V
RP107K411B	**K H**	4.1V
RP107K421B	**K J**	4.2V
RP107K121B5	**K K**	1.25V
RP107K181B5	**K L**	1.85V
RP107K281B5	**K M**	2.85V

RP107KxxxD

Product Name	①②	V_{SET}
RP107K101D	**L A**	1.0V
RP107K111D	**L B**	1.1V
RP107K121D	**L C**	1.2V
RP107K131D	**L D**	1.3V
RP107K141D	**L E**	1.4V
RP107K151D	**L F**	1.5V
RP107K161D	**L G**	1.6V
RP107K171D	**L H**	1.7V
RP107K181D	**L J**	1.8V
RP107K191D	**L K**	1.9V
RP107K201D	**L L**	2.0V
RP107K211D	**L M**	2.1V
RP107K221D	**L N**	2.2V
RP107K231D	**L P**	2.3V
RP107K241D	**L Q**	2.4V
RP107K251D	**L R**	2.5V
RP107K261D	**L A**	2.6V
RP107K271D	**L T**	2.7V
RP107K281D	**L U**	2.8V
RP107K291D	**L V**	2.9V
RP107K301D	**L W**	3.0V
RP107K311D	**L X**	3.1V
RP107K321D	**L Y**	3.2V
RP107K331D	**L Z**	3.3V
RP107K341D	**M A**	3.4V
RP107K351D	**M B**	3.5V
RP107K361D	**M C**	3.6V
RP107K371D	**M D**	3.7V
RP107K381D	**M E**	3.8V
RP107K391D	**M F**	3.9V
RP107K401D	**M G**	4.0V
RP107K411D	**M H**	4.1V
RP107K421D	**M J**	4.2V
RP107K121D5	**M K**	1.25V
RP107K181D5	**M L**	1.85V
RP107K281D5	**M M**	2.85V

- **Power Dissipation (SC-88A)**

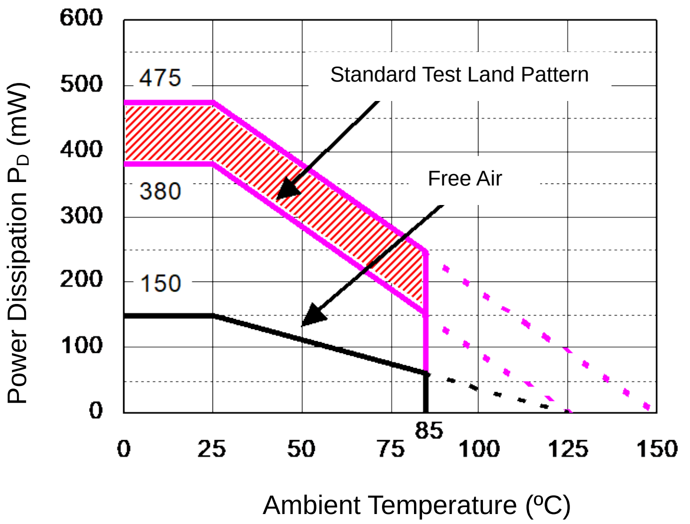
Power Dissipation (P_D) depends on conditions of mounting on board. This specification is based on the Measurement Conditions below.

Measurement Conditions

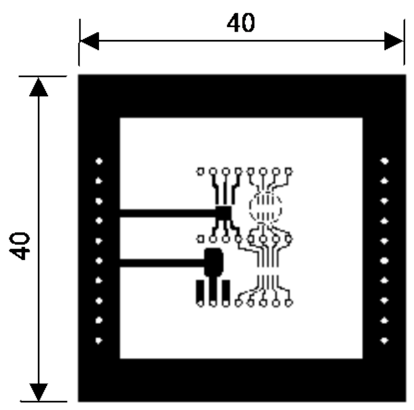
	Standard Land Pattern
Environment	Mounting on Board (Wind Velocity=0m/s)
Board Material	Glass Cloth Epoxy Plastic (Double-sided)
Board Dimensions	40mm x 40mm x 1.6mm
Copper Ratio	Topside: Approx. 50%, Backside: Approx. 50%
Through-hole	ϕ0.5mm x 44pcs

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

	Standard Land Pattern	Free Air
Power Dissipation	380mW	150mW
Thermal Resistance	θja=(125-25°C)/0.38W=263°C/W	θja=(125-25°C)/0.15W=667°C/W
	θjc=75°C/W	-



Power Dissipation



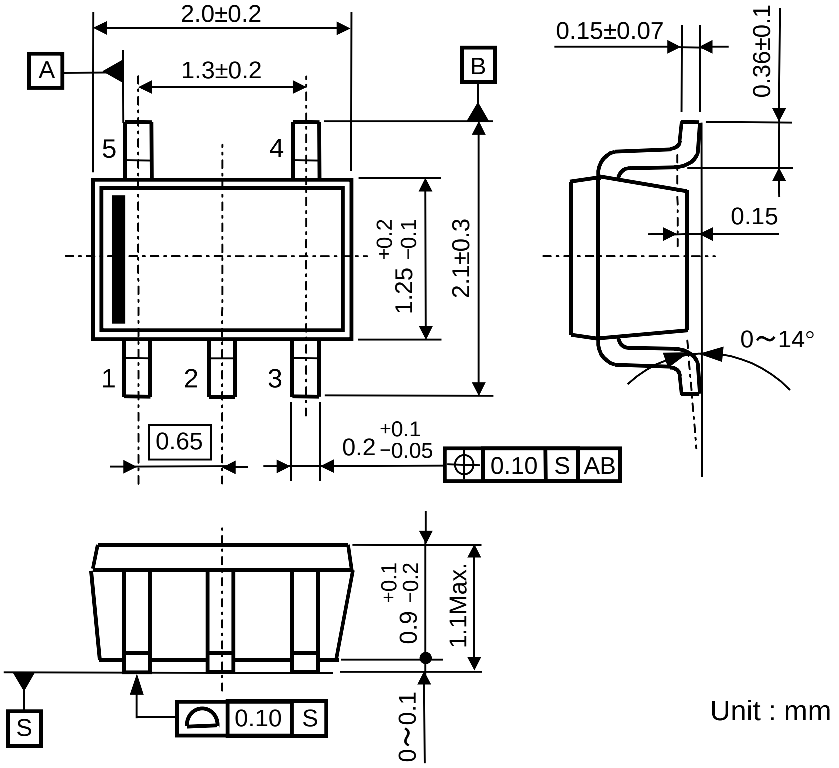
Measurement Board Pattern

IC Mount Area (Unit: mm)

The above graph shows the Power Dissipation of the SC-88A package based on Tjmax=125ºC and Tjmax=150ºC. Operating the ICs within the shaded area in the graph might have an influence on the lifetime of the ICs. Operating time must be within the time limit described in the table below.

Operating Time	Estimated Years (Operating 4 hrs/ day)
13,000 Hours	9 Years

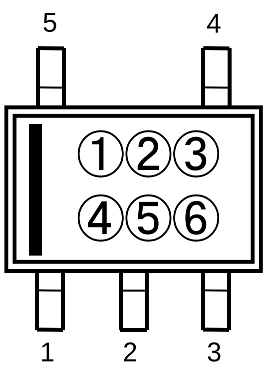
- **Package Dimensions (SC-88A)**



- **Mark Specification (SC-88A)**

①②③④: Product Code … **Refer to *RP107Q Series Mark Specification Table*.**

⑤⑥: Lot Number … Alphanumeric Serial Number



- **RP107Q Series Mark Specification Table (SC-88A)**

RP107QxxxB

Product Name	①②③④	V_{SET}
RP107Q101B	**N 0 1 0**	1.0V
RP107Q111B	**N 0 1 1**	1.1V
RP107Q121B	**N 0 1 2**	1.2V
RP107Q131B	**N 0 1 3**	1.3V
RP107Q141B	**N 0 1 4**	1.4V
RP107Q151B	**N 0 1 5**	1.5V
RP107Q161B	**N 0 1 6**	1.6V
RP107Q171B	**N 0 1 7**	1.7V
RP107Q181B	**N 0 1 8**	1.8V
RP107Q191B	**N 0 1 9**	1.9V
RP107Q201B	**N 0 2 0**	2.0V
RP107Q211B	**N 0 2 1**	2.1V
RP107Q221B	**N 0 2 2**	2.2V
RP107Q231B	**N 0 2 3**	2.3V
RP107Q241B	**N 0 2 4**	2.4V
RP107Q251B	**N 0 2 5**	2.5V
RP107Q261B	**N 0 2 6**	2.6V
RP107Q271B	**N 0 2 7**	2.7V
RP107Q281B	**N 0 2 8**	2.8V
RP107Q291B	**N 0 2 9**	2.9V
RP107Q301B	**N 0 3 0**	3.0V
RP107Q311B	**N 0 3 1**	3.1V
RP107Q321B	**N 0 3 2**	3.2V
RP107Q331B	**N 0 3 3**	3.3V
RP107Q341B	**N 0 3 4**	3.4V
RP107Q351B	**N 0 3 5**	3.5V
RP107Q361B	**N 0 3 6**	3.6V
RP107Q371B	**N 0 3 7**	3.7V
RP107Q381B	**N 0 3 8**	3.8V
RP107Q391B	**N 0 3 9**	3.9V
RP107Q401B	**N 0 4 0**	4.0V
RP107Q411B	**N 0 4 1**	4.1V
RP107Q421B	**N 0 4 2**	4.2V
RP107Q121B5	**N 0 4 3**	1.25V
RP107Q181B5	**N 0 4 4**	1.85V
RP107Q281B5	**N 0 4 5**	2.85V

RP107QxxxD

Product Name	①②③④	V_{SET}
RP107Q101D	**P 0 1 0**	1.0V
RP107Q111D	**P 0 1 1**	1.1V
RP107Q121D	**P 0 1 2**	1.2V
RP107Q131D	**P 0 1 3**	1.3V
RP107Q141D	**P 0 1 4**	1.4V
RP107Q151D	**P 0 1 5**	1.5V
RP107Q161D	**P 0 1 6**	1.6V
RP107Q171D	**P 0 1 7**	1.7V
RP107Q181D	**P 0 1 8**	1.8V
RP107Q191D	**P 0 1 9**	1.9V
RP107Q201D	**P 0 2 0**	2.0V
RP107Q211D	**P 0 2 1**	2.1V
RP107Q221D	**P 0 2 2**	2.2V
RP107Q231D	**P 0 2 3**	2.3V
RP107Q241D	**P 0 2 4**	2.4V
RP107Q251D	**P 0 2 5**	2.5V
RP107Q261D	**P 0 2 6**	2.6V
RP107Q271D	**P 0 2 7**	2.7V
RP107Q281D	**P 0 2 8**	2.8V
RP107Q291D	**P 0 2 9**	2.9V
RP107Q301D	**P 0 3 0**	3.0V
RP107Q311D	**P 0 3 1**	3.1V
RP107Q321D	**P 0 3 2**	3.2V
RP107Q331D	**P 0 3 3**	3.3V
RP107Q341D	**P 0 3 4**	3.4V
RP107Q351D	**P 0 3 5**	3.5V
RP107Q361D	**P 0 3 6**	3.6V
RP107Q371D	**P 0 3 7**	3.7V
RP107Q381D	**P 0 3 8**	3.8V
RP107Q391D	**P 0 3 9**	3.9V
RP107Q401D	**P 0 4 0**	4.0V
RP107Q411D	**P 0 4 1**	4.1V
RP107Q421D	**P 0 4 2**	4.2V
RP107Q121D5	**P 0 4 3**	1.25V
RP107Q181D5	**P 0 4 4**	1.85V
RP107Q281D5	**P 0 4 5**	2.85V

● Power Dissipation (SOT-23-5)

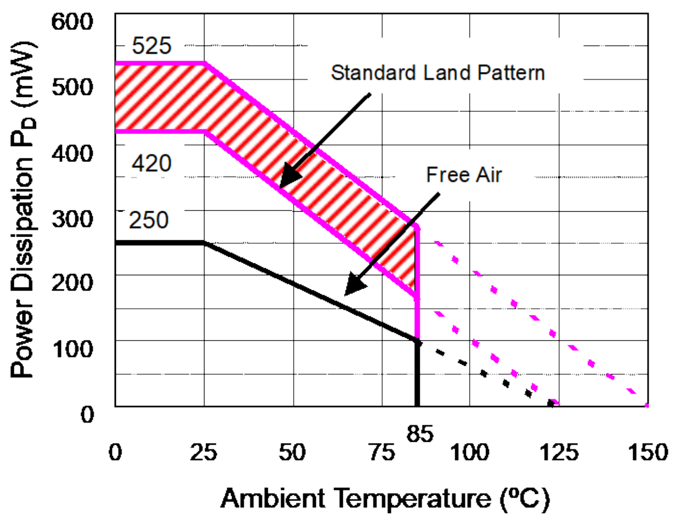
Power Dissipation (P_D) depends on conditions of mounting on board. This specification is based on the Measurement Conditions below. (Power Dissipation (SOT-23-5) is substitution of SOT-23-6.)

Measurement Conditions:

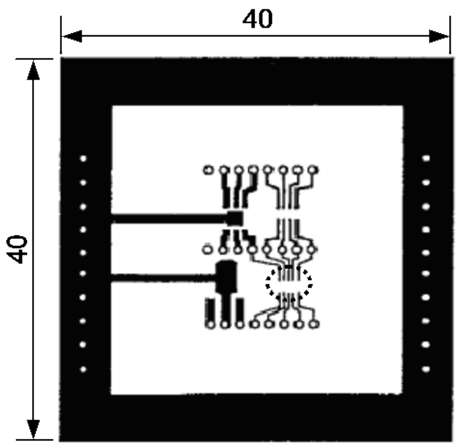
	Standard Land Pattern
Environment	Mounting on Board (Wind Velocity=0m/s)
Board Material	Glass Cloth Epoxy Plastic (Double-sided)
Board Dimensions	40mm x 40mm x 1.6mm
Copper Ratio	Topside: Approx. 50%, Backside: Approx. 50%
Through-holes	ϕ 0.5mm x 44pcs

Measurement Results: (Ta=25°C, Tjmax=125°C)

	Standard Land Pattern	Free Air
Power Dissipation	420mW	250mW
Thermal Resistance	θja=(125-25°C)/0.42W=238°C/W	400°C/W



Power Dissipation



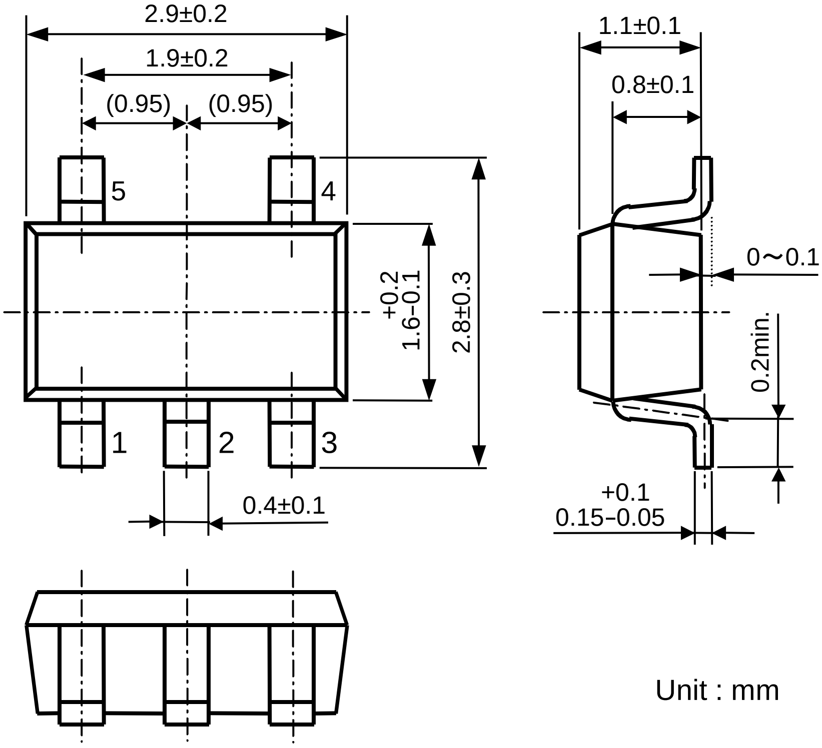
Measurement Board Pattern

IC Mount Area (Unit: mm)

The above graph shows the Power Dissipation of the SOT-23-5 package based on Tjmax=125°C and Tjmax=150°C. Operating the ICs within the shaded area in the graph might have an influence on the lifetime of the ICs. Operating time must be within the time limit described in the table below.

Operating Time	Estimated Years (Operating 4 hrs/ day)
9,000 Hours	6 Years

- **Package Dimensions (SOT-23-5)**

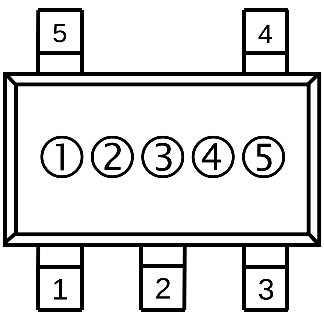


Unit : mm

- **Mark Specification (SOT-23-5)**

①②③: Product Code … **Refer to *RP107N Series Mark Specification Table.***

④⑤: Lot Number … Alphanumeric Serial Number



RP107N Series Mark Specification Table (SOT-23-5)

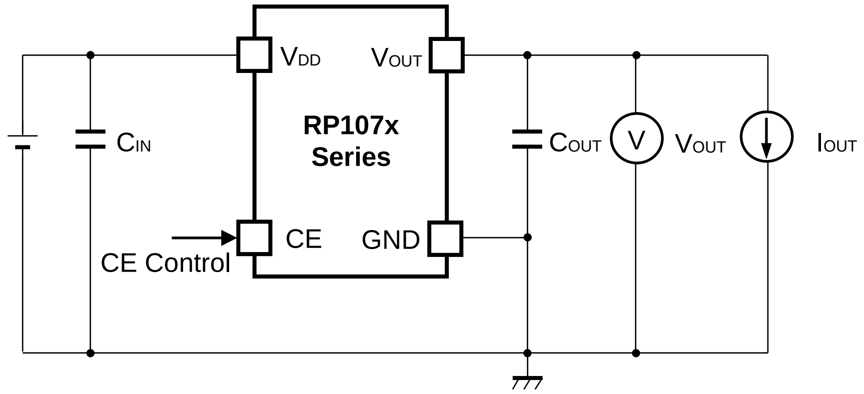
RP107NxxxB

Product Name	①②③	V_{SET}
RP107N101B	A A A	1.0V
RP107N111B	A A B	1.1V
RP107N121B	A A C	1.2V
RP107N131B	A A D	1.3V
RP107N141B	A A E	1.4V
RP107N151B	A A F	1.5V
RP107N161B	A A G	1.6V
RP107N171B	A A H	1.7V
RP107N181B	A A J	1.8V
RP107N191B	A A K	1.9V
RP107N201B	A A L	2.0V
RP107N211B	A A M	2.1V
RP107N221B	A A N	2.2V
RP107N231B	A A P	2.3V
RP107N241B	A A Q	2.4V
RP107N251B	A A R	2.5V
RP107N261B	A A S	2.6V
RP107N271B	A A T	2.7V
RP107N281B	A A U	2.8V
RP107N291B	A A V	2.9V
RP107N301B	A A W	3.0V
RP107N311B	A A X	3.1V
RP107N321B	A A Y	3.2V
RP107N331B	A A Z	3.3V
RP107N341B	B A A	3.4V
RP107N351B	B A B	3.5V
RP107N361B	B A C	3.6V
RP107N371B	B A D	3.7V
RP107N381B	B A E	3.8V
RP107N391B	B A F	3.9V
RP107N401B	B A G	4.0V
RP107N411B	B A H	4.1V
RP107N421B	B A J	4.2V
RP107N121B5	B A K	1.25V
RP107N181B5	B A L	1.85V
RP107N281B5	B A M	2.85V

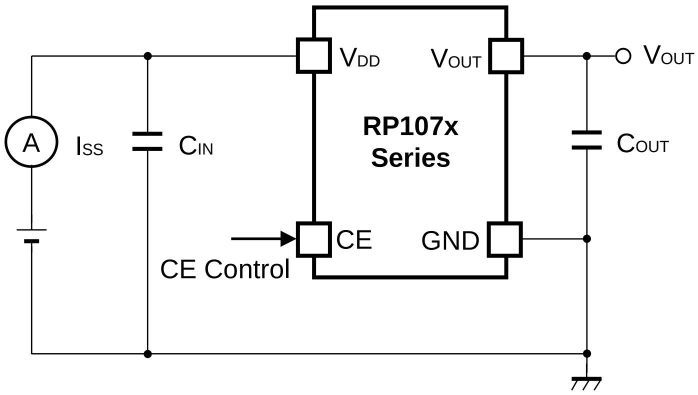
RP107NxxxD

Product Name	①②③	V_{SET}
RP107N101D	A B A	1.0V
RP107N111D	A B B	1.1V
RP107N121D	A B C	1.2V
RP107N131D	A B D	1.3V
RP107N141D	A B E	1.4V
RP107N151D	A B F	1.5V
RP107N161D	A B G	1.6V
RP107N171D	A B H	1.7V
RP107N181D	A B J	1.8V
RP107N191D	A B K	1.9V
RP107N201D	A B L	2.0V
RP107N211D	A B M	2.1V
RP107N221D	A B N	2.2V
RP107N231D	A B P	2.3V
RP107N241D	A B Q	2.4V
RP107N251D	A B R	2.5V
RP107N261D	A B S	2.6V
RP107N271D	A B T	2.7V
RP107N281D	A B U	2.8V
RP107N291D	A B V	2.9V
RP107N301D	A B W	3.0V
RP107N311D	A B X	3.1V
RP107N321D	A B Y	3.2V
RP107N331D	A B Z	3.3V
RP107N341D	B B A	3.4V
RP107N351D	B B B	3.5V
RP107N361D	B B C	3.6V
RP107N371D	B B D	3.7V
RP107N381D	B B E	3.8V
RP107N391D	B B F	3.9V
RP107N401D	B B G	4.0V
RP107N411D	B B H	4.1V
RP107N421D	B B J	4.2V
RP107N121D5	B B K	1.25V
RP107N181D5	B B L	1.85V
RP107N281D5	B B M	2.85V

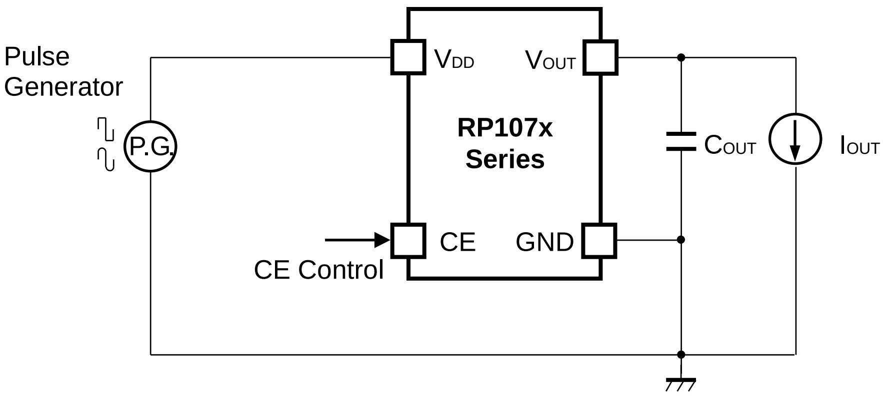
TEST CIRCUITS



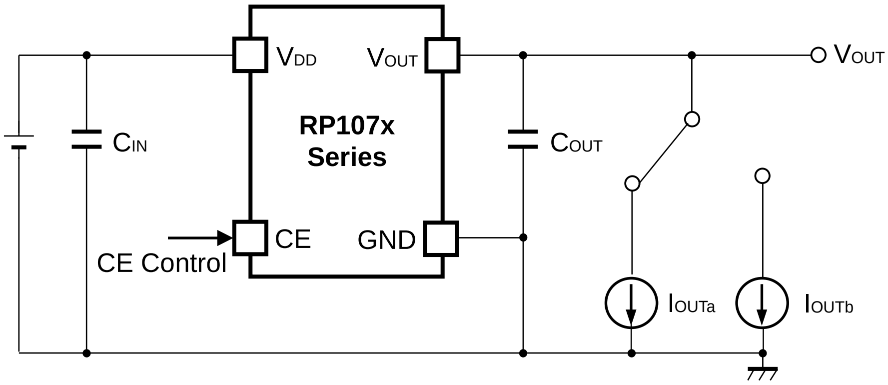
Basic Test Circuit



Test Circuit for Supply Current



Test Circuit for Ripple Rejection

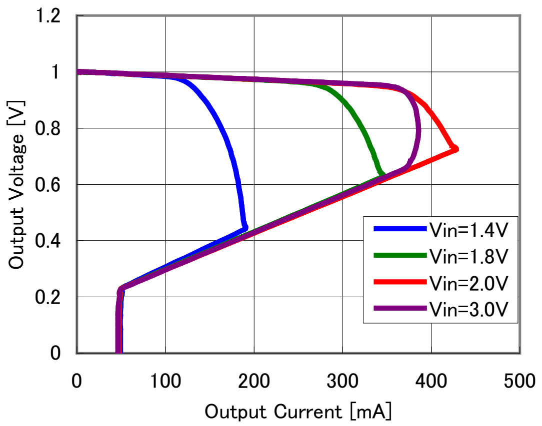


Test Circuit for Load Transient Response

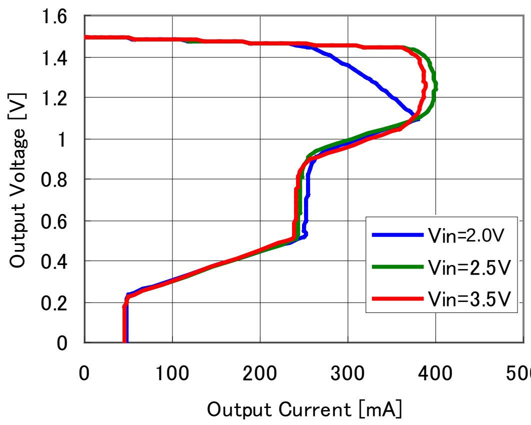
TYPICAL CHARACTERISTICS

1) Output Voltage vs. Output Current (CIN=0.1µF, Topt=25°C)

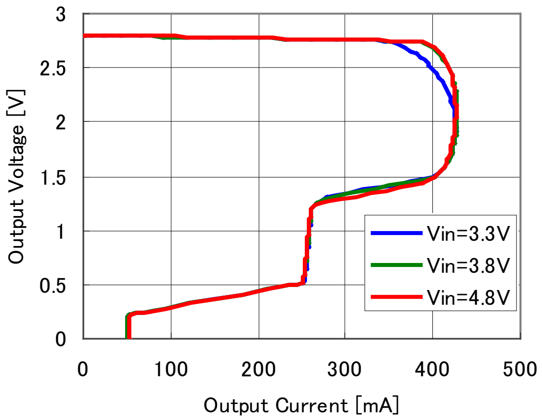
RP107x101x



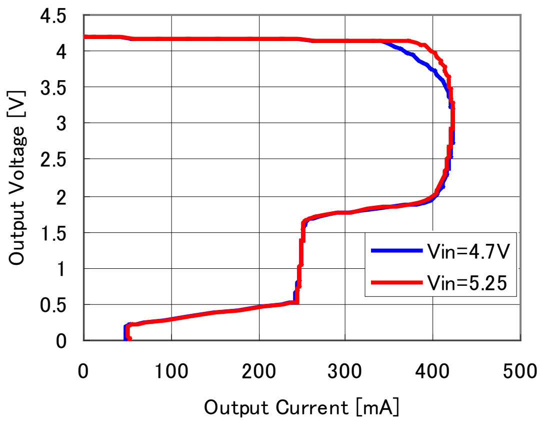
RP107x151x



RP107x281x

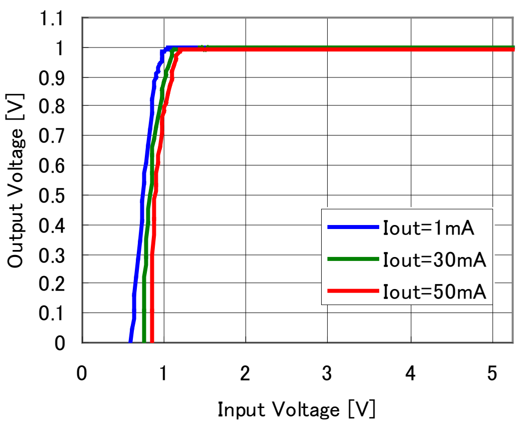


RP107x421x



2) Output Voltage vs. Input Voltage (CIN=0.1µF, Topt=25°C)

RP107x101x



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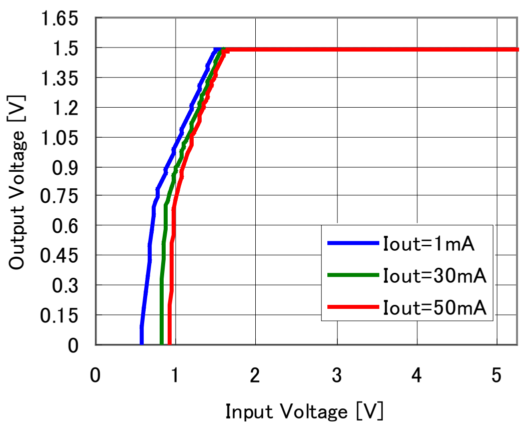

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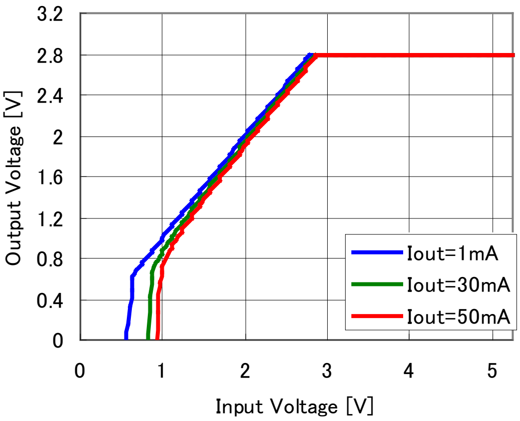
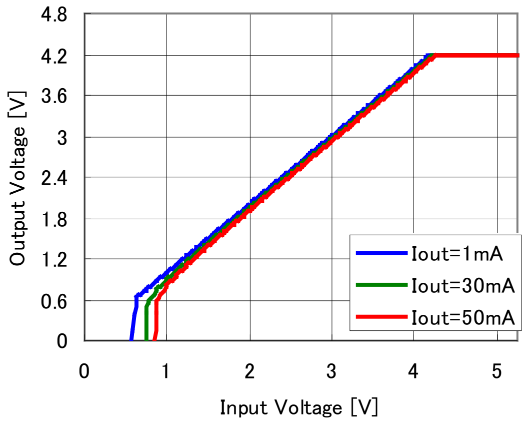
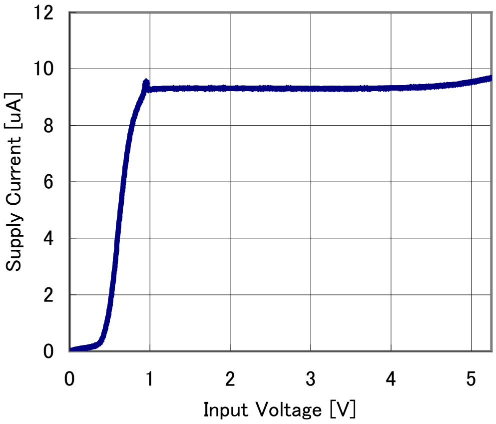


RP107x421x

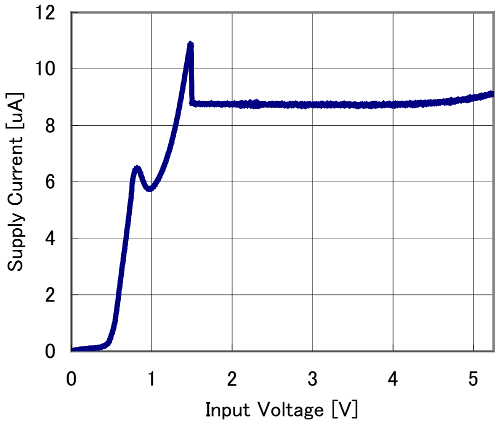


3) Supply Current vs. Input Voltage (C_{IN}=0.1µF, T_{opt}=25°C)

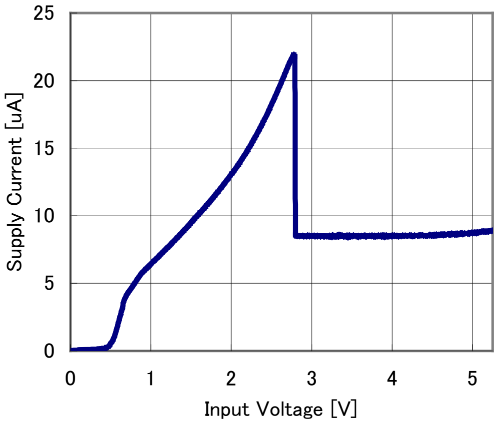
RP107x101x



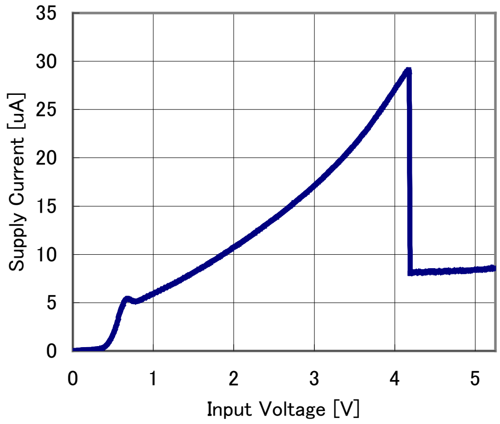
RP107x151x



RP107x281x

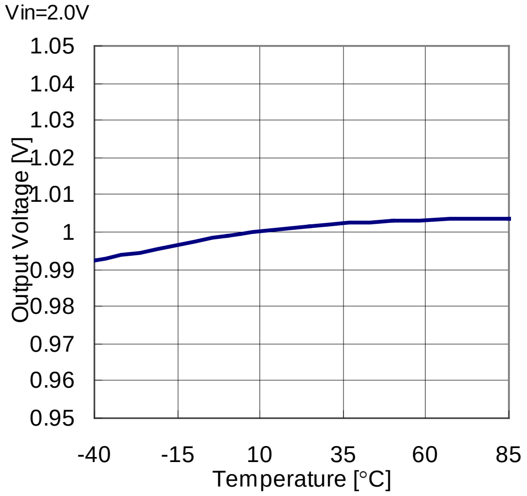


RP107x421x

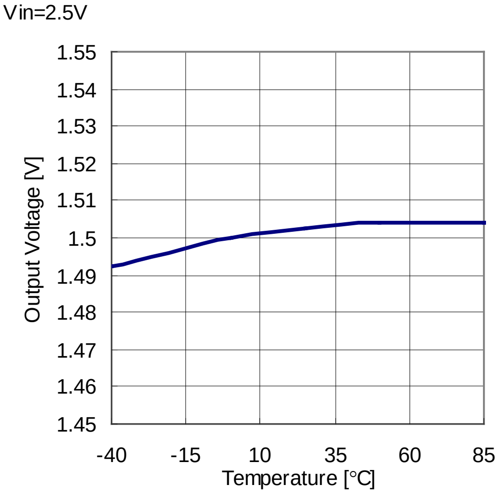


4) Output Voltage vs. Temperature (C_{IN}=0.1µF, I_{OUT}=1mA)

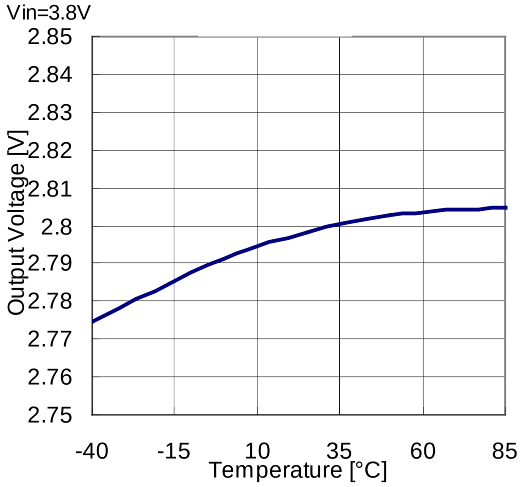
RP107x101x



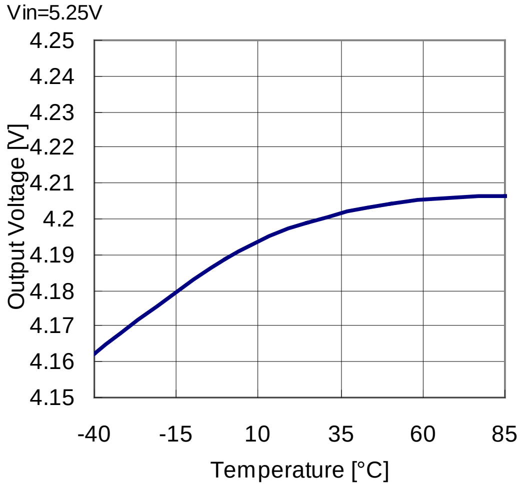
RP107x151x



RP107x281x

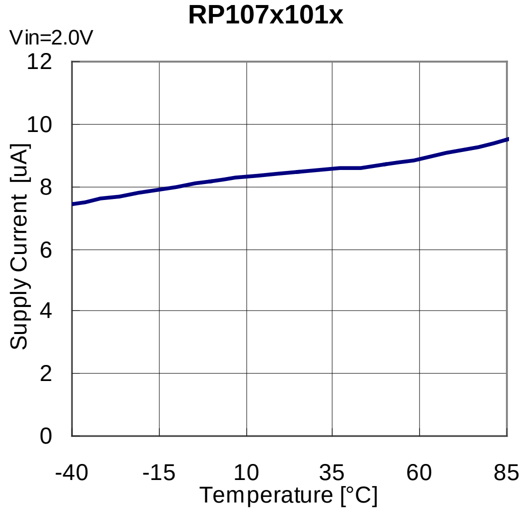


RP107x421x

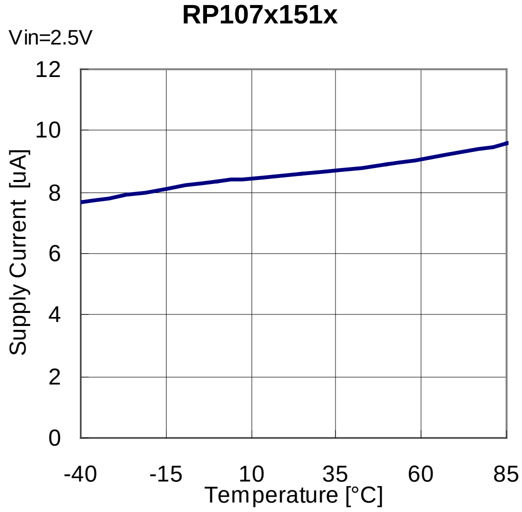


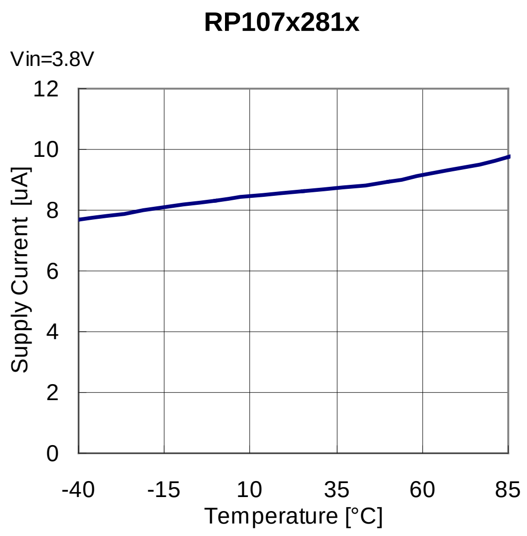
5) Supply Current vs. Temperature (C_{IN}=0.1µF, I_{OUT}=0mA)

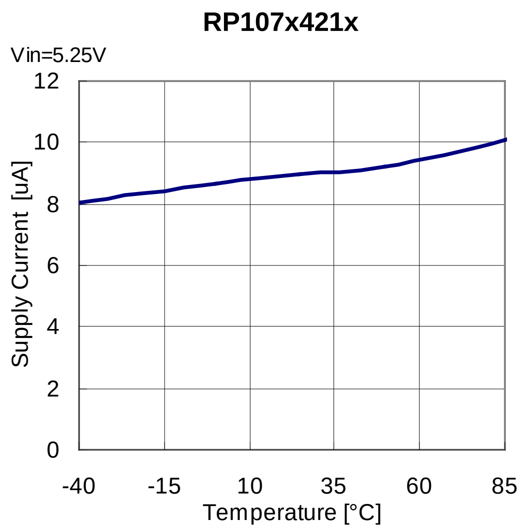
RP107x101x



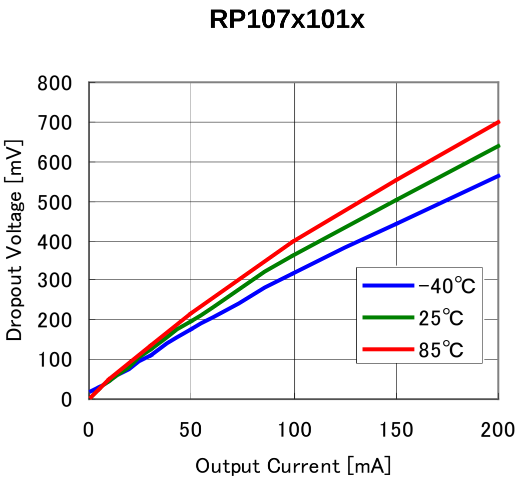
RP107x151x

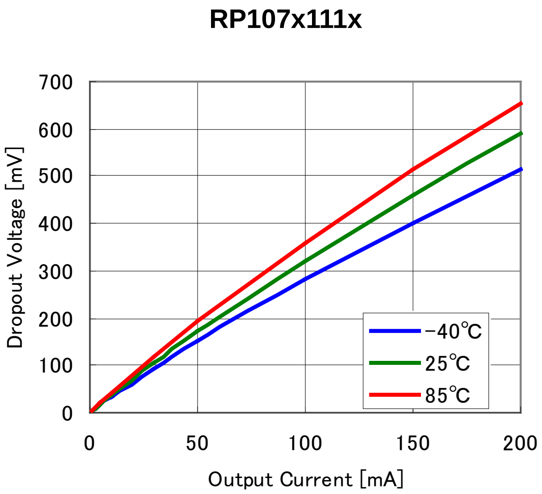


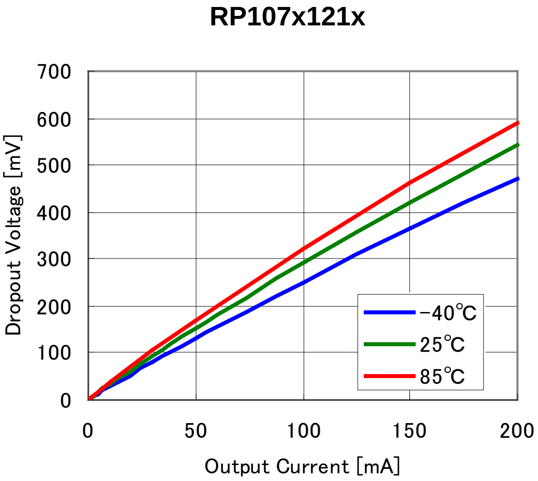


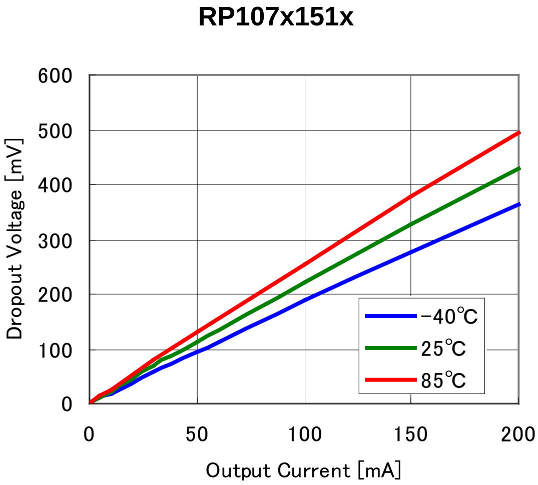


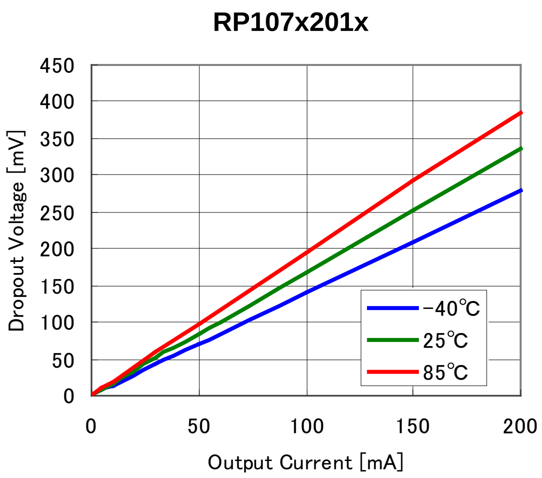
6) Dropout Voltage vs. Output Current (C_{IN}=0.1µF)

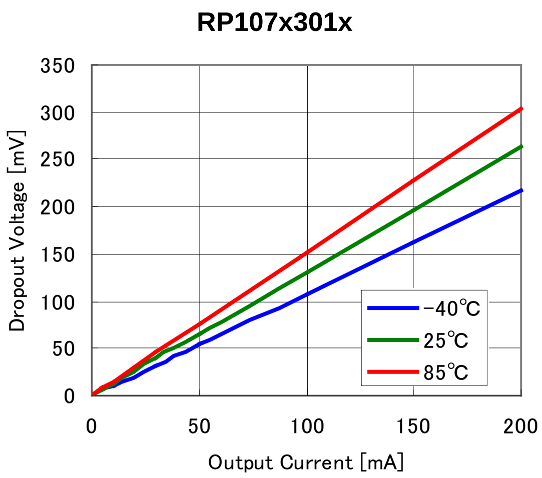


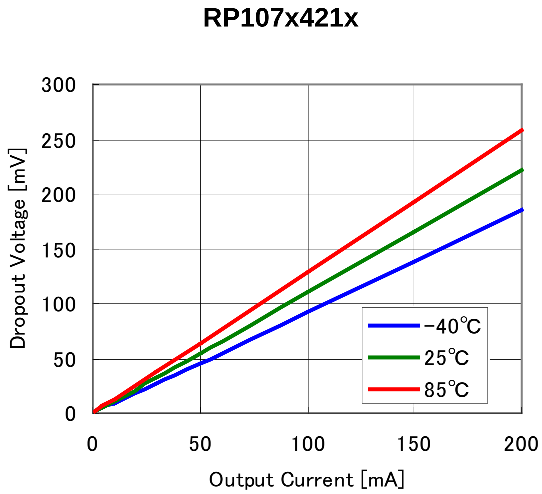




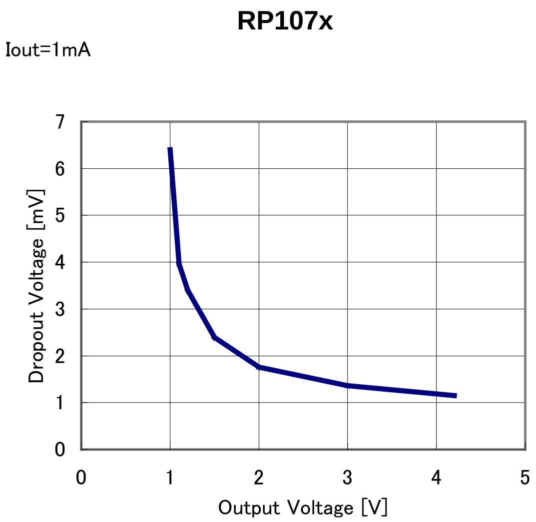


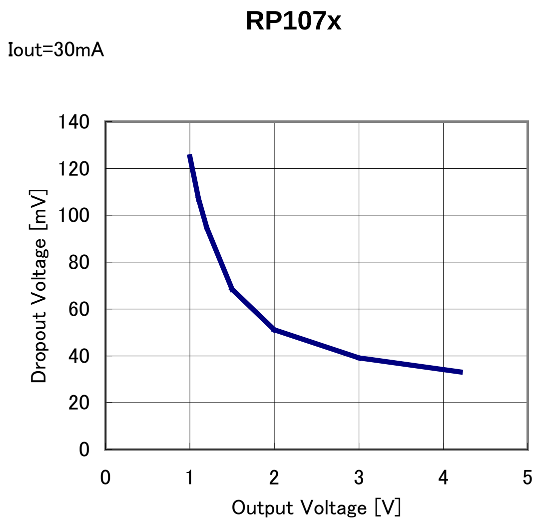




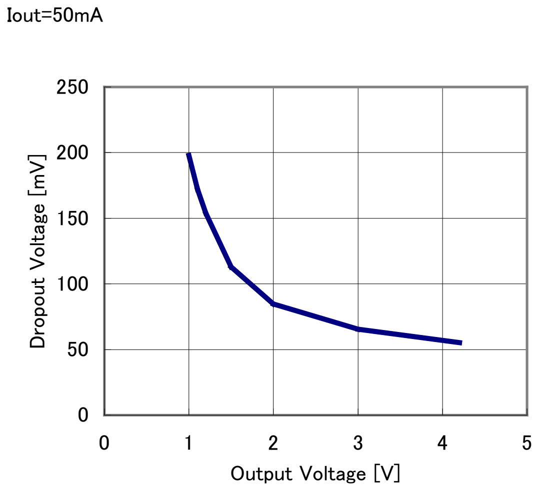


7) Dropout Voltage vs. Set Output Voltage (C_{IN}=0.1µF)

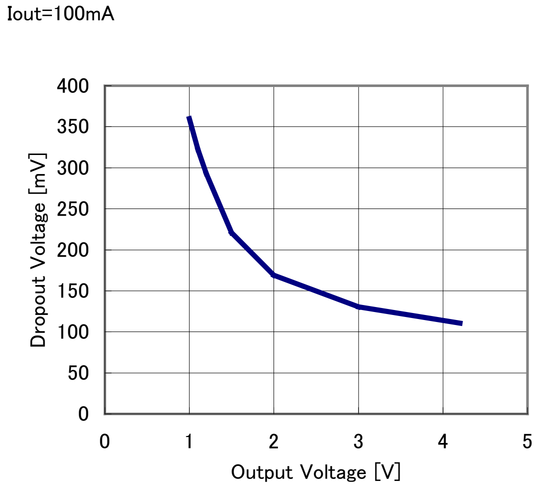




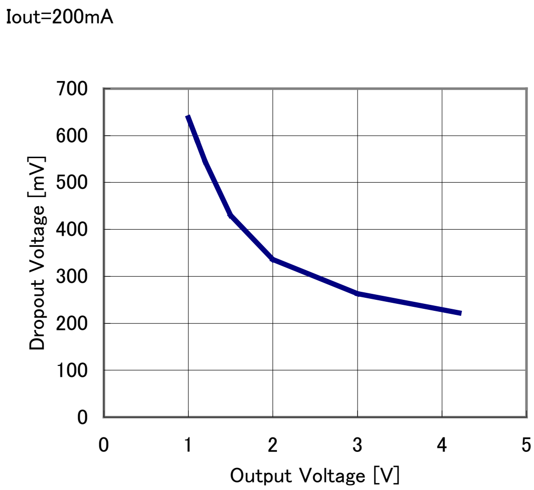
RP107x



RP107x

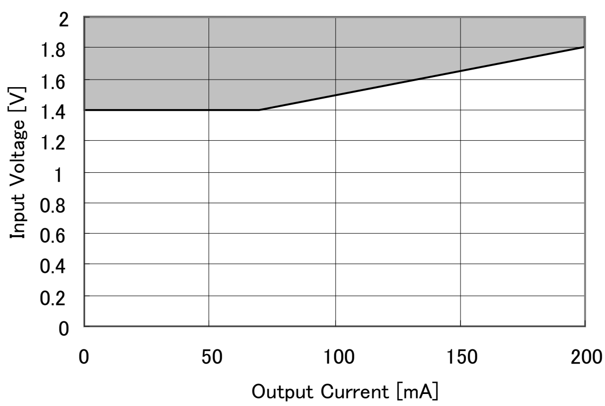


RP107x



8) Minimum Operating Voltage (C_{IN}=0.1μF)

RP107x101x

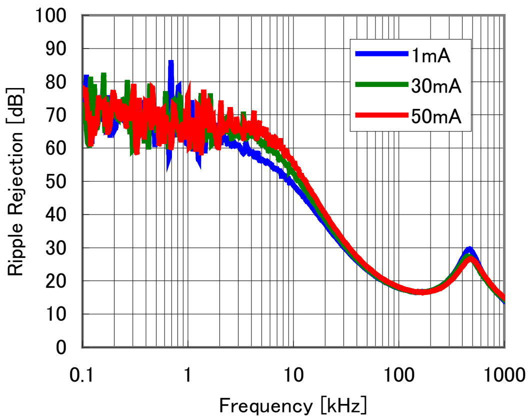


Hatched area is avaiable
for 1.0V output

9) Ripple Rejection vs. Frequency (C_{IN}=none, T_{opt}=25°C)

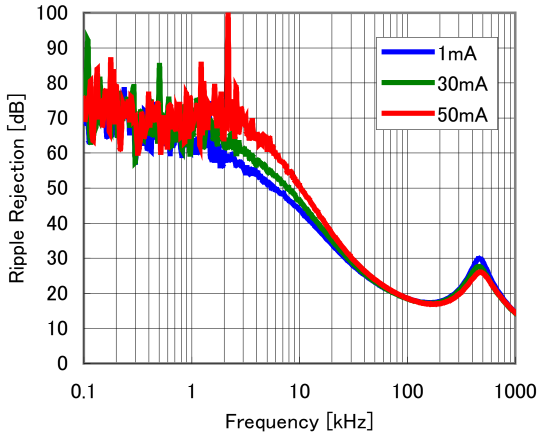
RP107x101x

Vin=2.0V+0.2Vp-p Cout=none



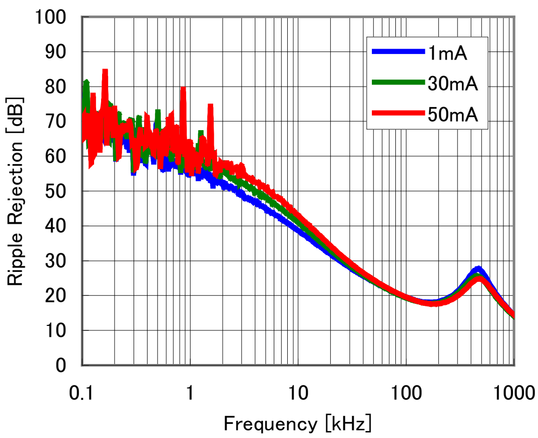
RP107x151x

Vin=2.5V+0.2Vp-p Cout=none



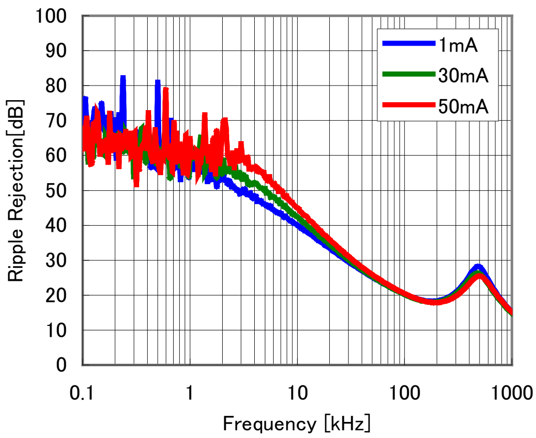
RP107x281x

Vin=3.8V+0.2Vp-p Cout=none



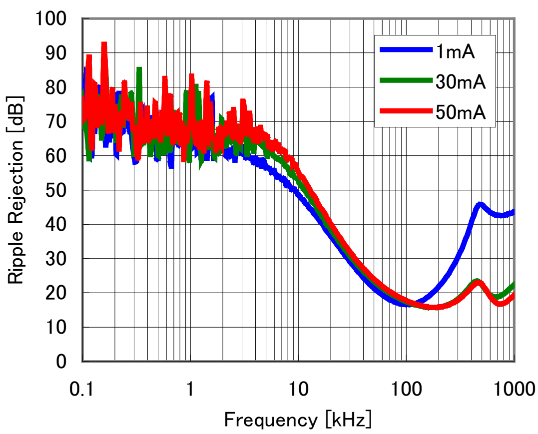
RP107x421x

Vin=5.2V+0.2Vp-p Cout=none



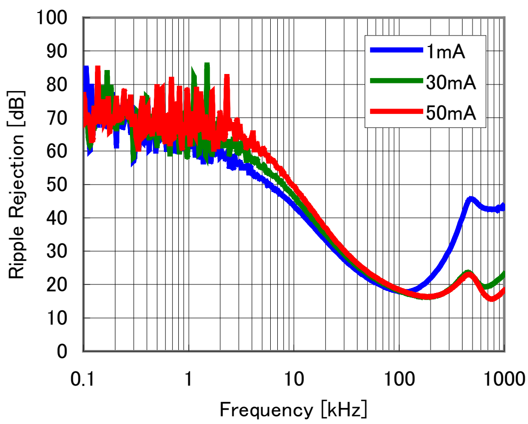
RP107x101x

Vin=2.0V+0.2Vp-p Cout=0.1uF

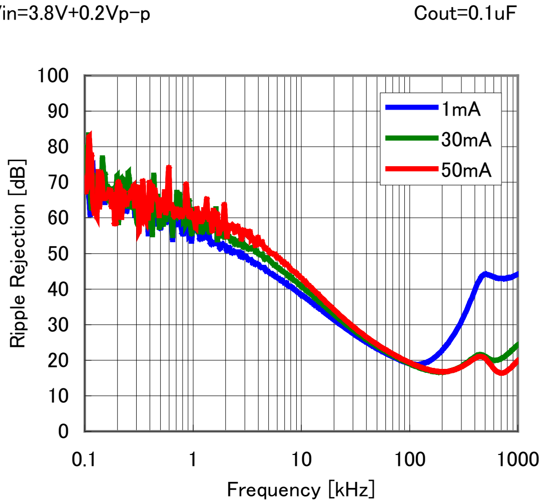


RP107x151x

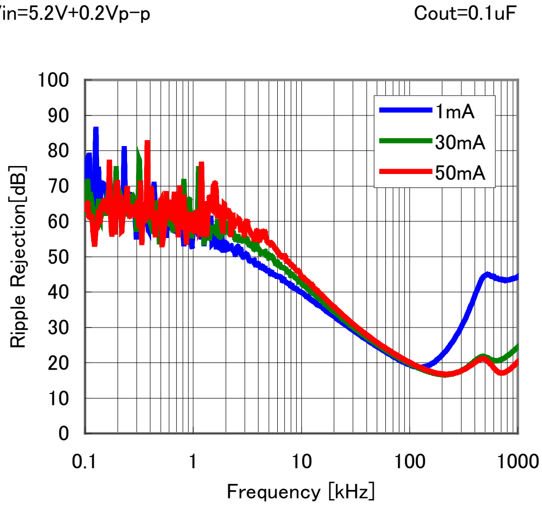
Vin=2.5V+0.2Vp-p Cout=0.1uF



RP107x281x

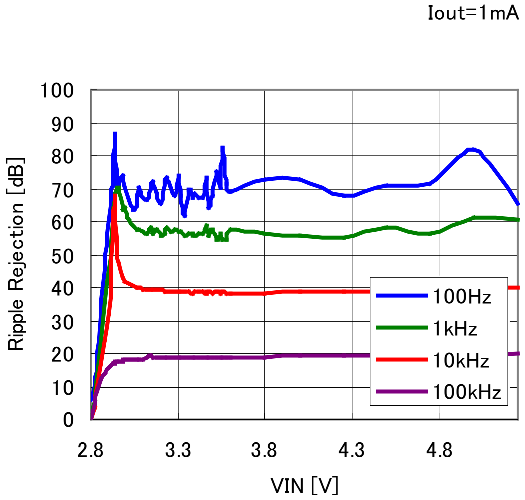


RP107x421x

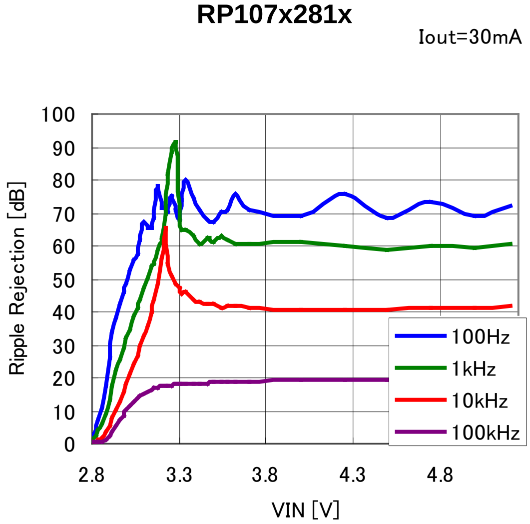


10) Ripple Rejection vs. Input Bias Voltage (C_{OUT}=0.1μF, Ripple=0.2Vp-p, T_{opt}=25°C)

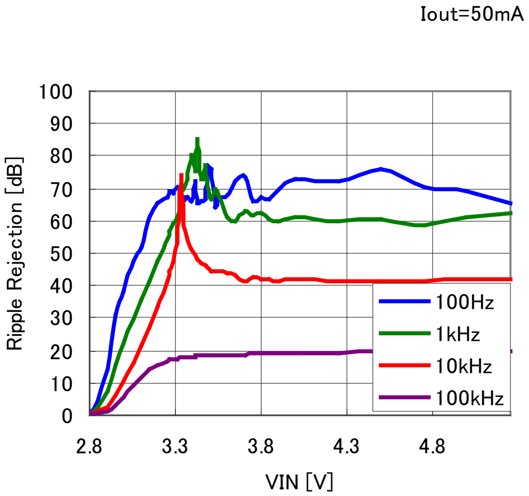
RP107x281x



RP107x281x



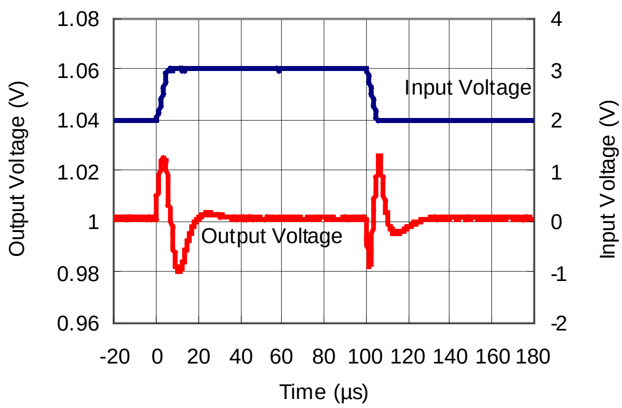
RP107x281x



11) Input Transient Response (C_{IN}=none, I_{OUT}=30mA, tr=tf=5μs, Topt=25°C)

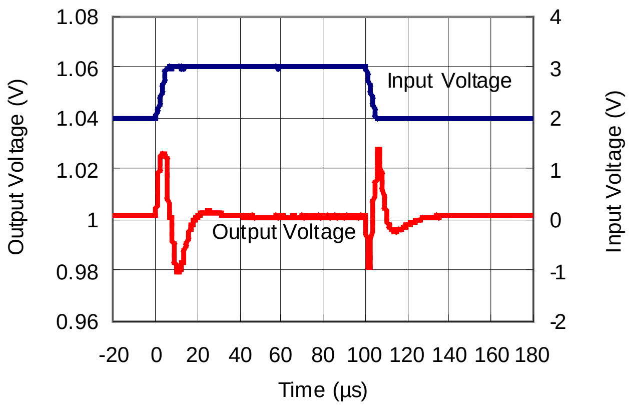
RP107x101x

Vin:2V⇔3V Cout=none



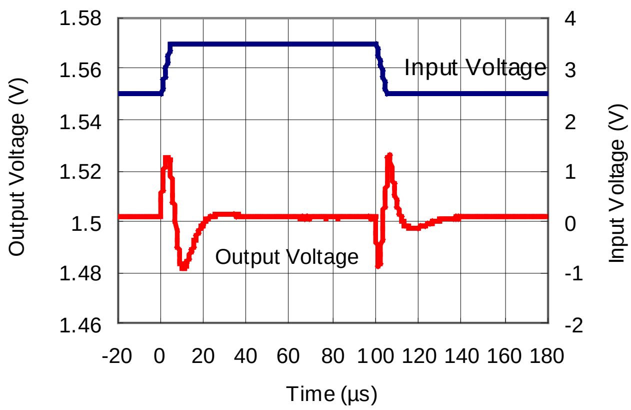
RP107x101x

Vin:2V⇔3V Cout=Ceramic 0.1uF



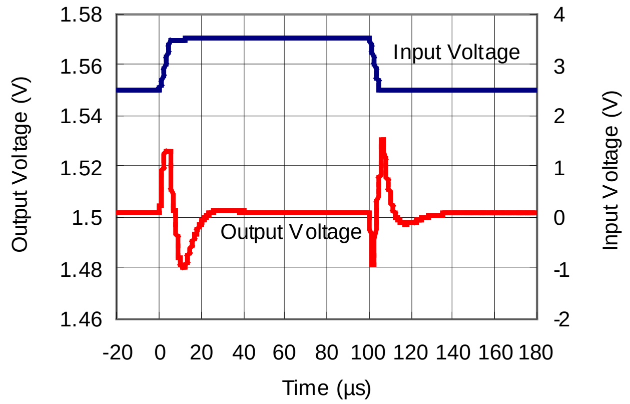
RP107x151x

Vin:2.5V⇔3.5V Cout=none



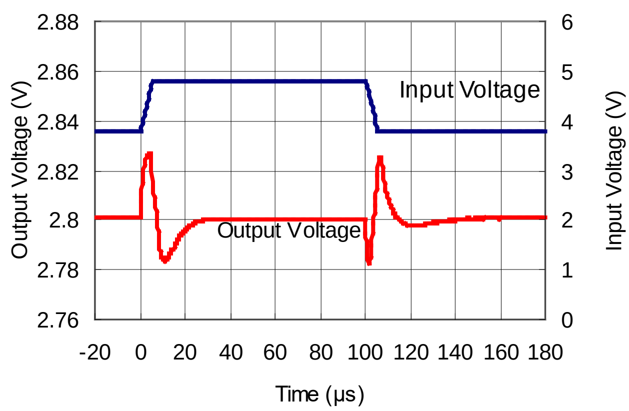
RP107x151x

Vin:2.5V⇔3.5V Cout=Ceramic 0.1μF



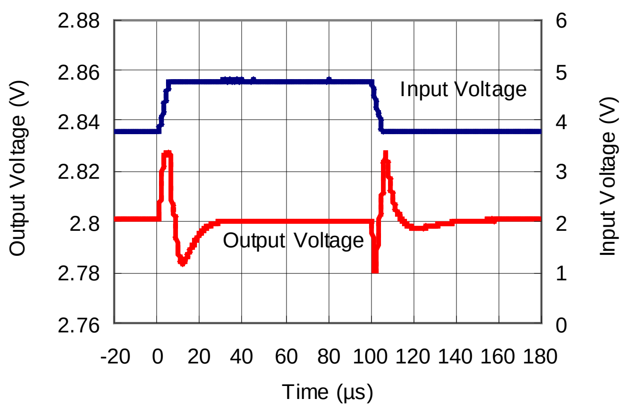
RP107x281x

Vin:3.8V⇔4.8V Cout=none



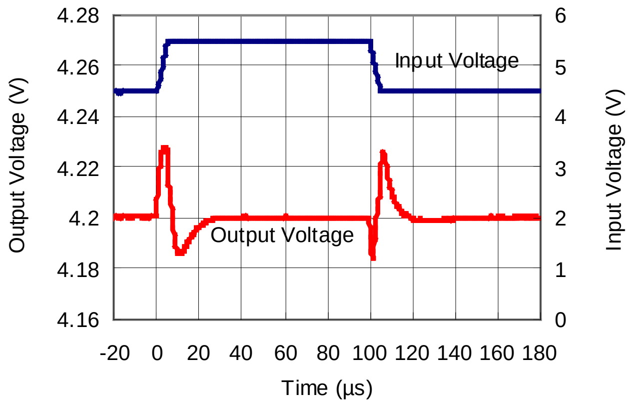
RP107x281x

Vin:3.8V⇔4.8V Cout=Ceramic 0.1μF



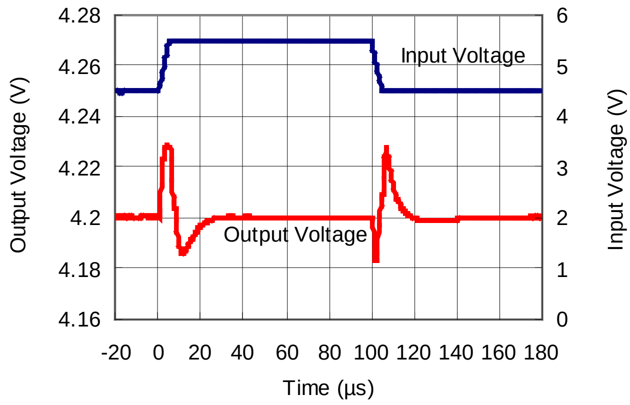
RP107x421x

Vin:4.5V⇔5.5V Cout=none



RP107x421x

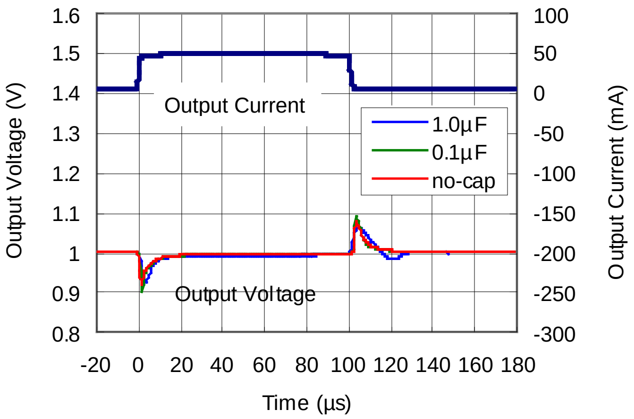
Vin:4.5V⇔5.5V Cout=Ceramic 0.1μF



12) Load Transient Response (C_{IN}=0.1μF, Topt=25°C)

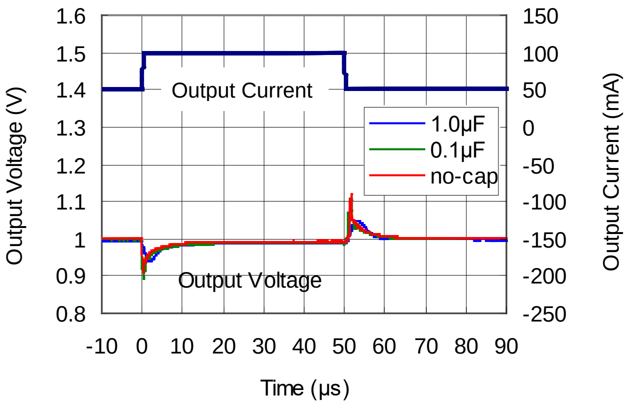
RP107x101x

Tr=Tf: 2μs
Iout : 5mA⇔50mA



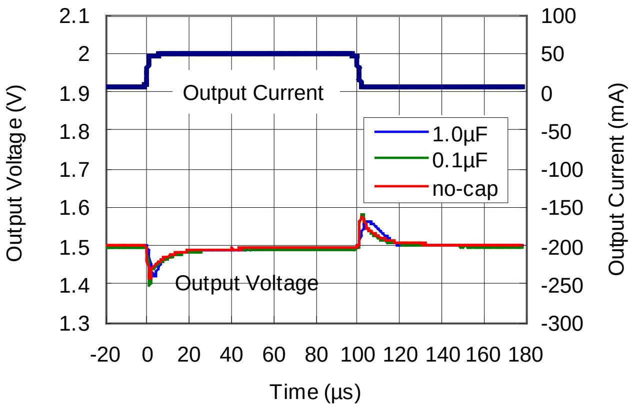
RP107x101x

Tr=Tf : 0.5μs
Iout : 50mA⇔100mA



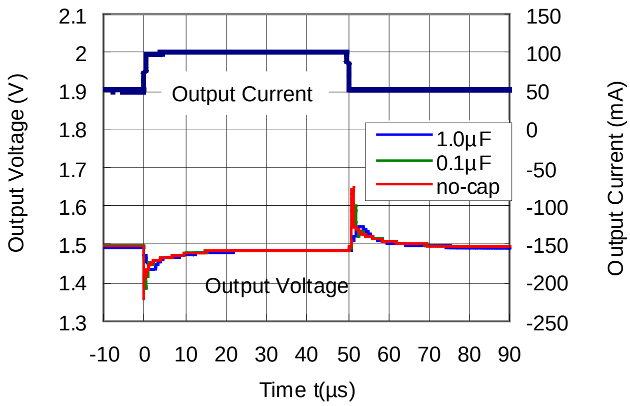
RP107x151x

Tr=Tf: 2μs
Iout : 5mA⇔50mA

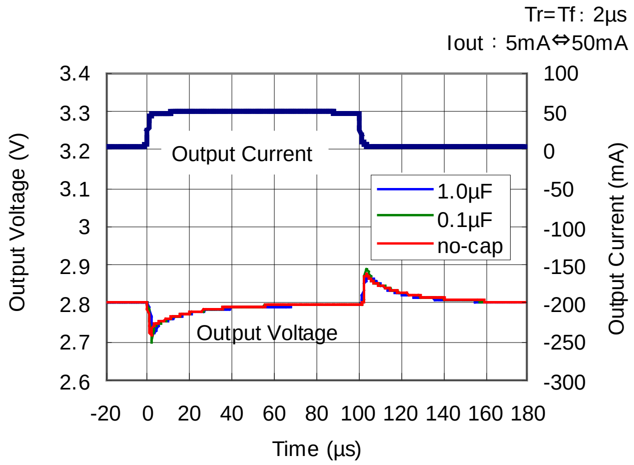


RP107x151x

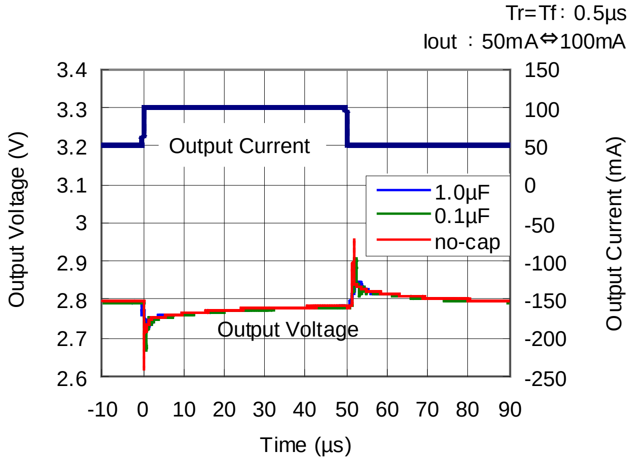
Tr=Tf : 0.5μs
Iout : 50mA⇔100mA



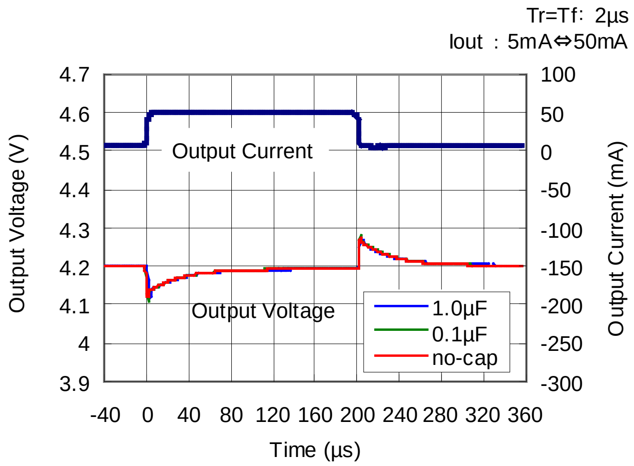
RP107x281x



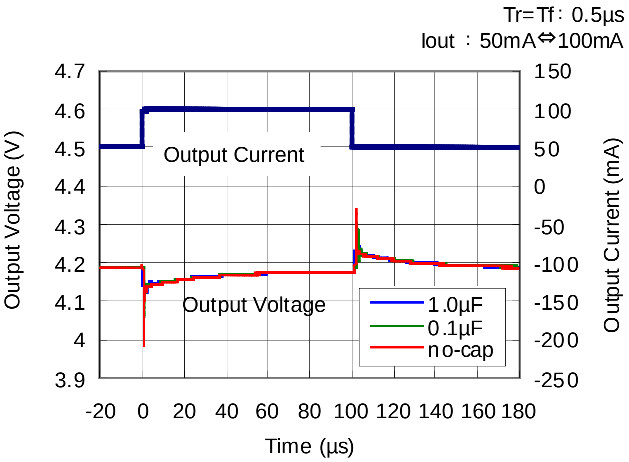
RP107x281x



RP107x421x

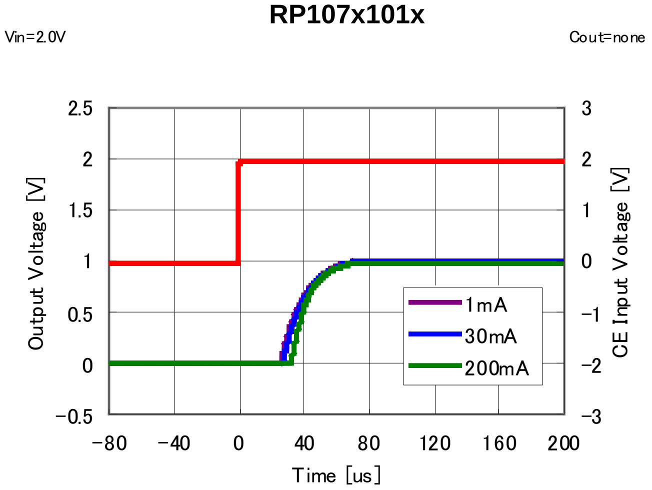


RP107x421x

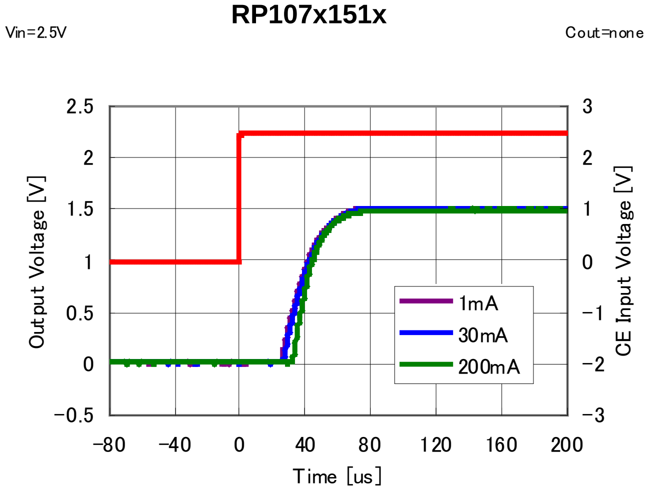


13) Turn On Speed with CE pin (C_{IN}=0.1µF, Topt=25°C)

RP107x101x

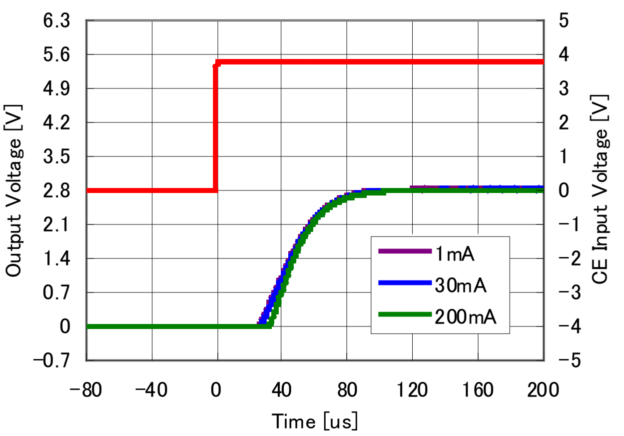


RP107x151x



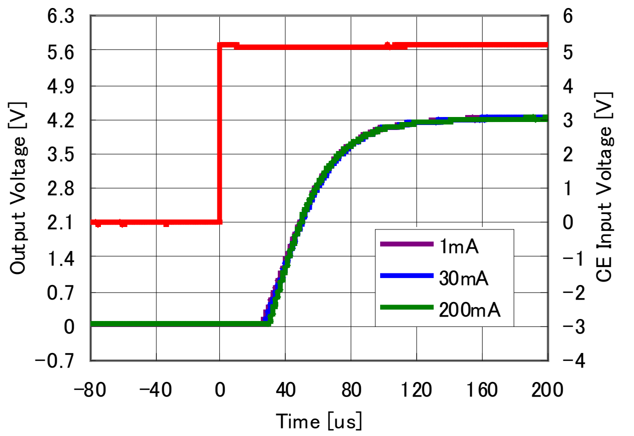
RP107x281x

Vin=3.8V Cout=none



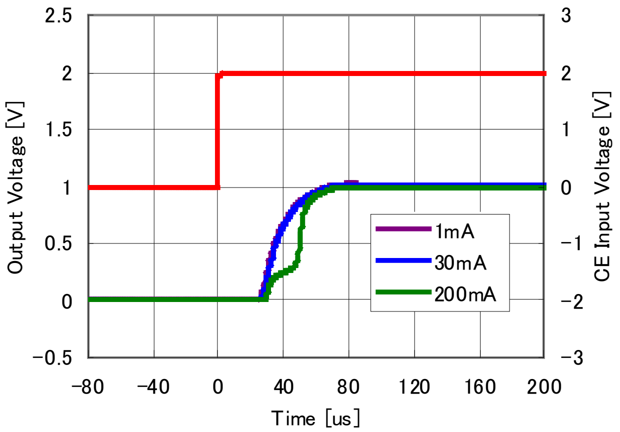
RP107x421x

Vin=5.2V Cout=none



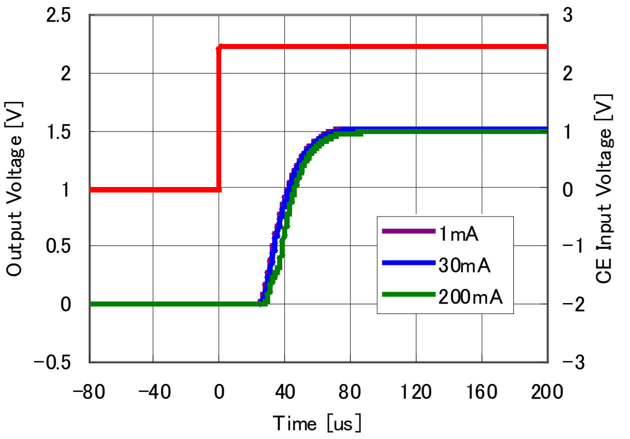
RP107x101x

Vin=2.0V Cout=1uF



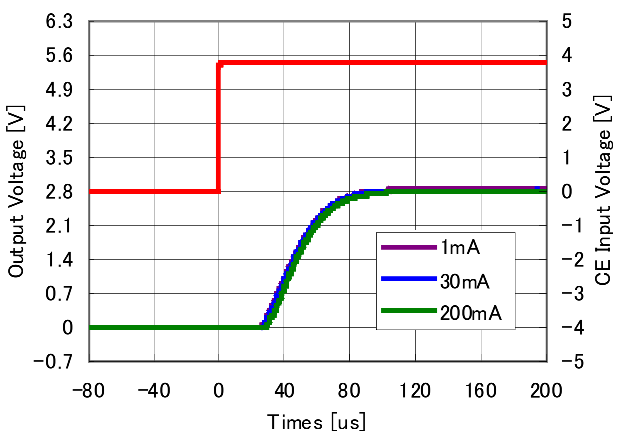
RP107x151x

Vin=2.5V Cout=1uF



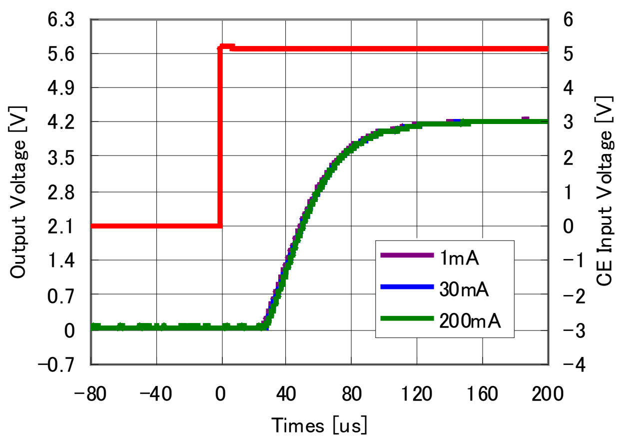
RP107x281x

Vin=3.8V Cout=1uF



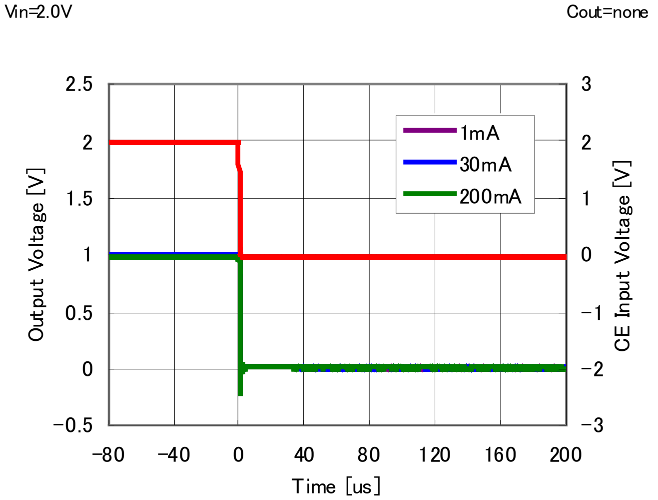
RP107x421x

Vin=5.2V Cout=1uF

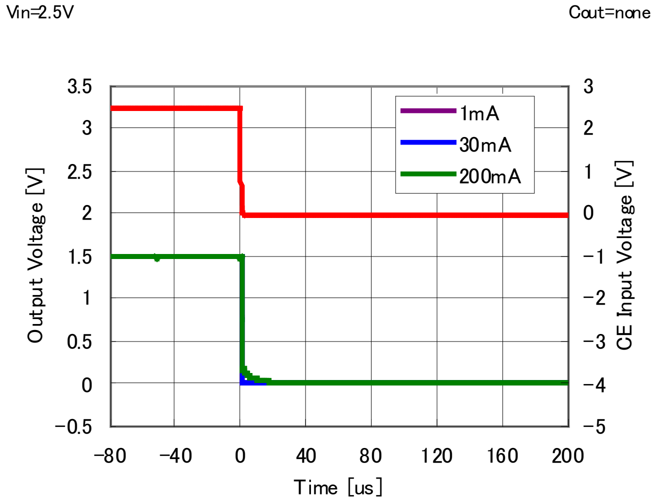


14) Turn Off Speed with CE pin (D Version) (C_{IN}=0.1μF, Topt=25°C)

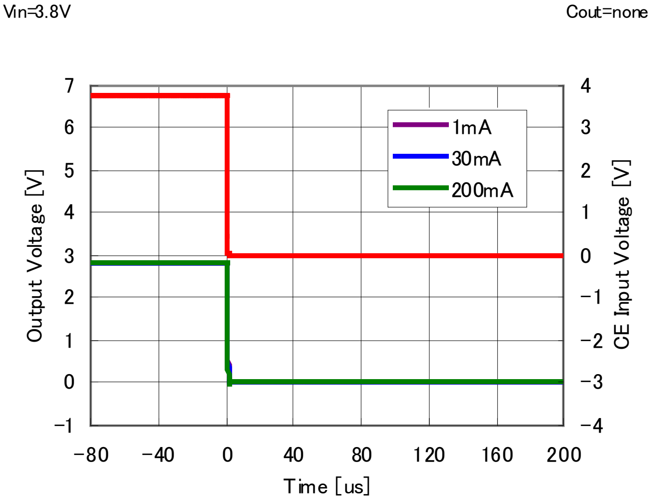
RP107x101D



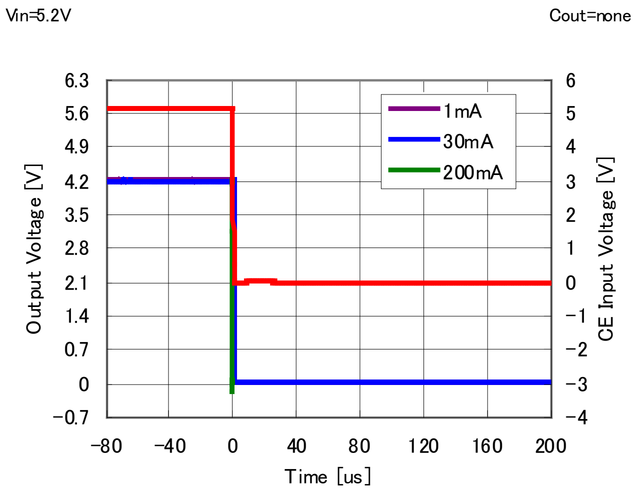
RP107x151D



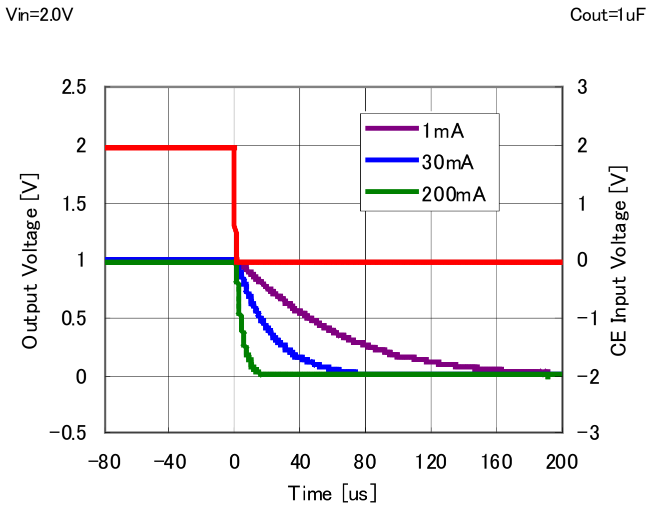
RP107x281D



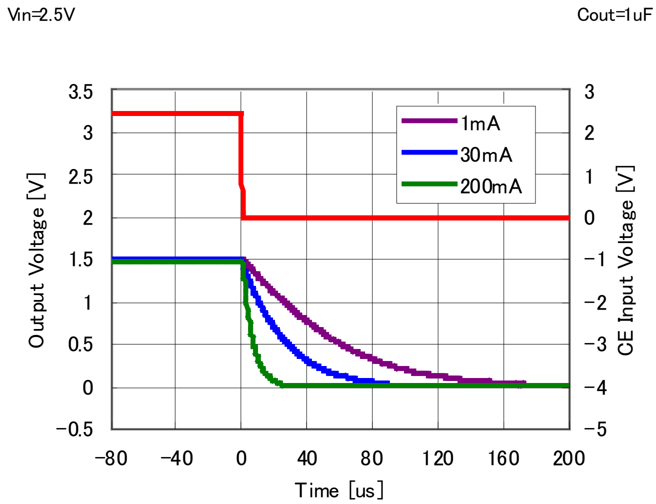
RP107x421D

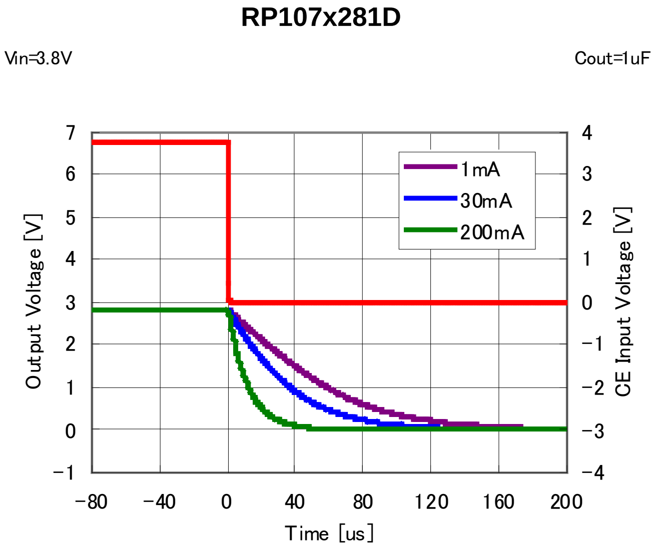


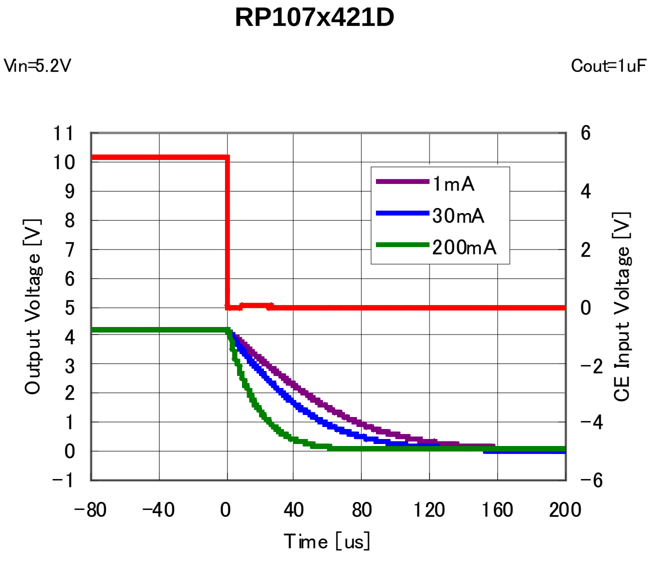
RP107x101D



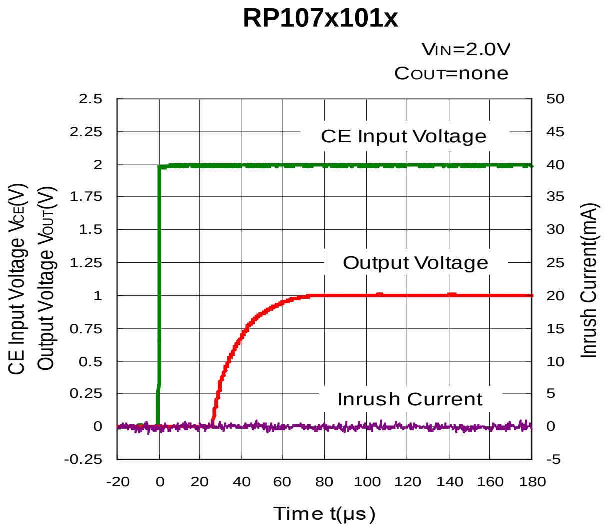
RP107x151D

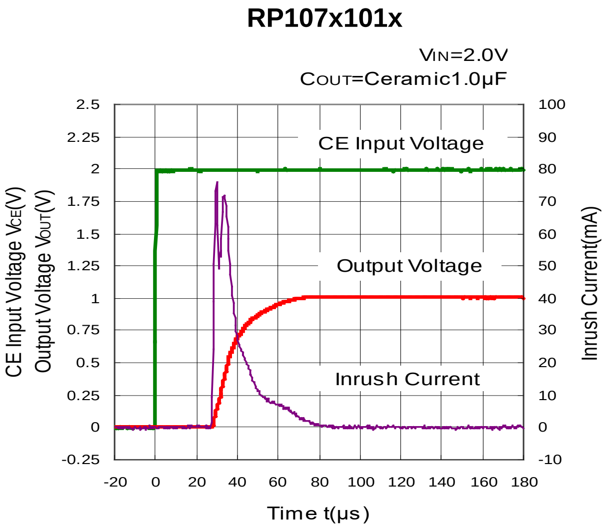


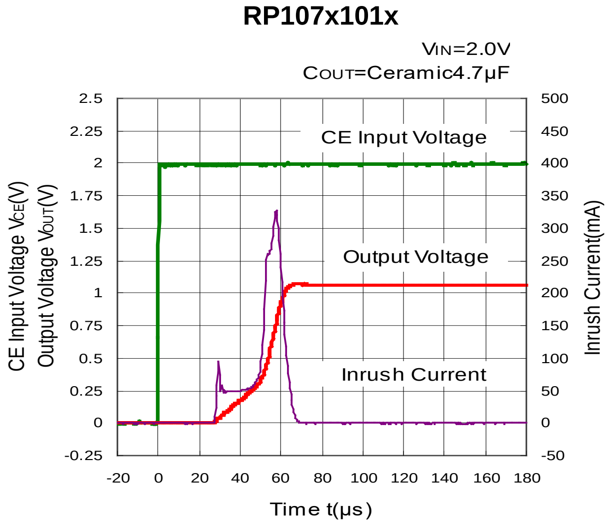


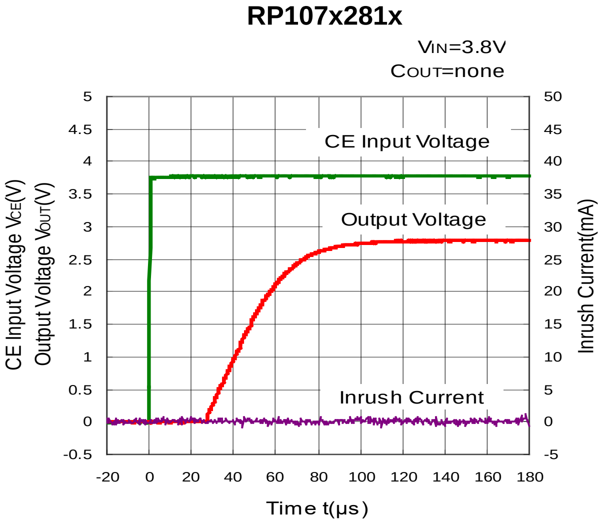


15) Inrush Current (C_{IN}=0.1µF, Topt=25°C)



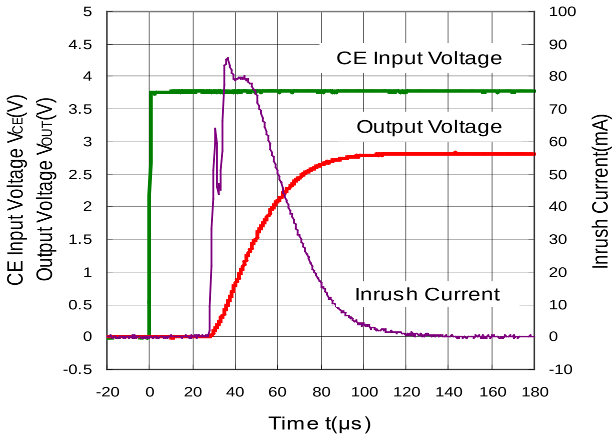






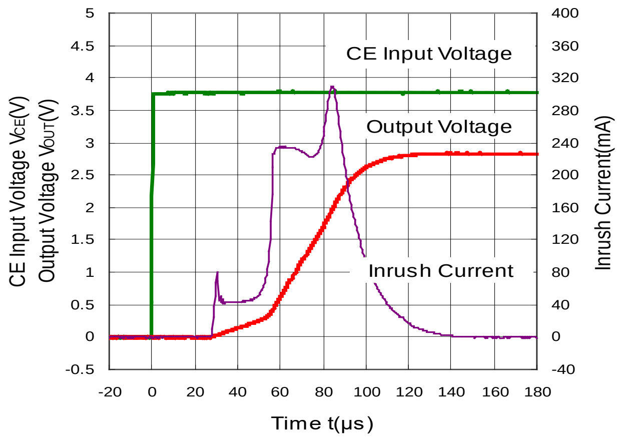
RP107x281x

V_{IN}=3.8V
C_{OUT}=Ceramic1.0μF



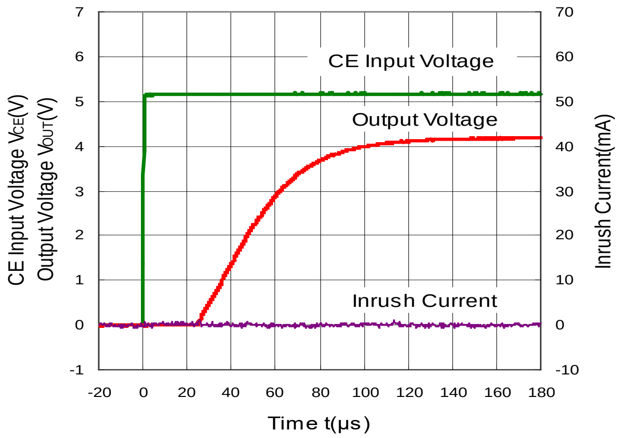
RP107x281x

V_{IN}=3.8V
C_{OUT}=Ceramic4.7μF



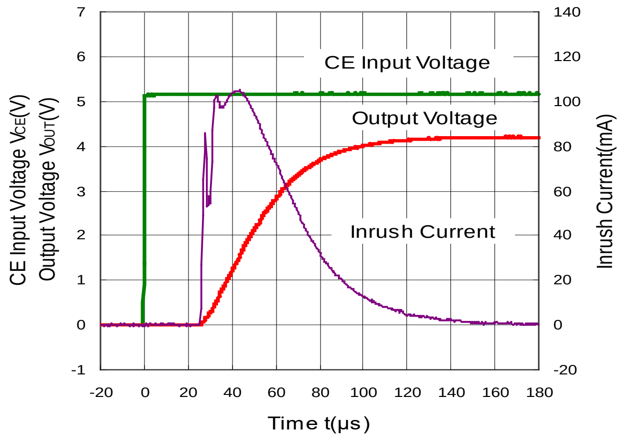
RP107x421x

V_{IN}=5.2V
C_{OUT}=none



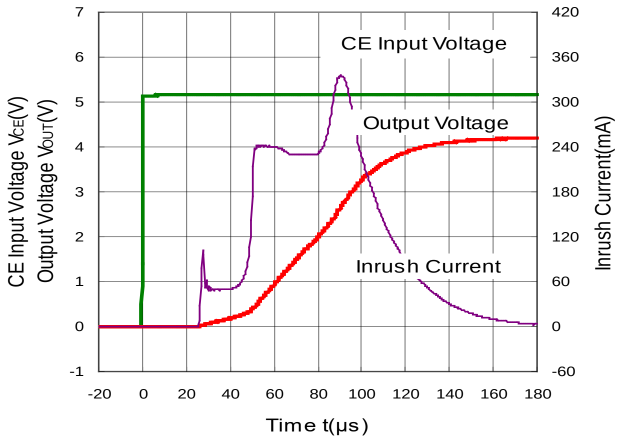
RP107x421x

V_{IN}=5.2V
C_{OUT}=Ceramic1.0μF



RP107x421x

V_{IN}=5.2V
C_{OUT}=Ceramic4.7μF



ESR vs. Output Current

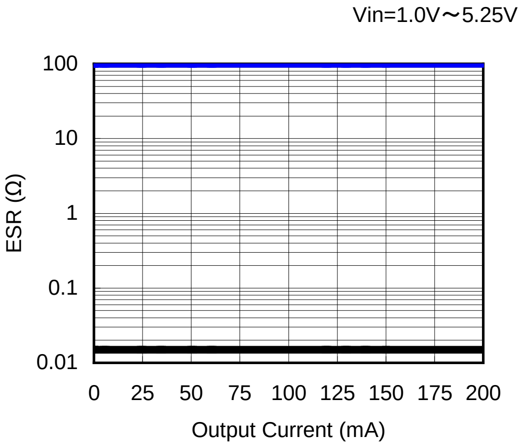
When using these ICs, consider the following points:

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

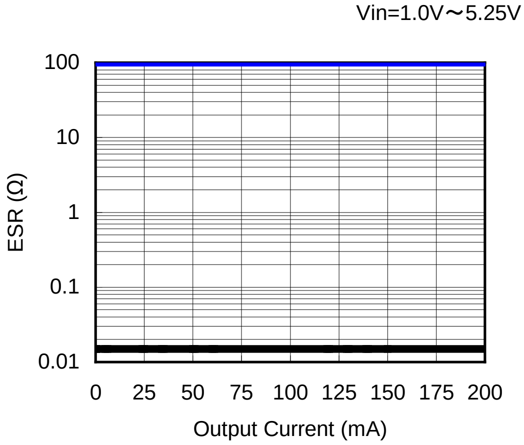
Measurement conditions

Frequency Band : 10Hz to 2MHz
Temperature : –40°C to 85°C
C_{IN}, C_{OUT} : Ceramic 0.1μF

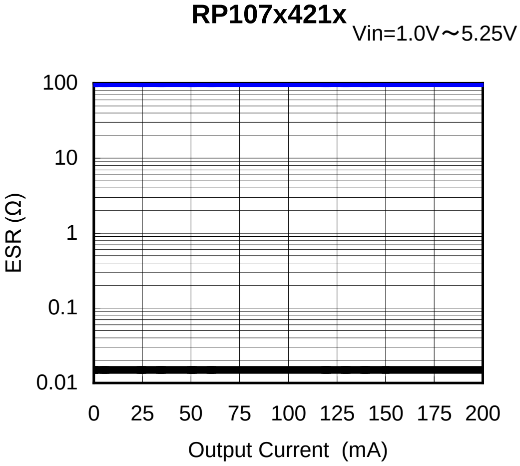
RP107x101x



RP107x281x



RP107x421x



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6. We are making our continuous effort to improve the quality and reliability of our products, but semiconductor products are likely to fail with certain probability. In order to prevent any injury to persons or damages to property resulting from such failure, customers should be careful enough to incorporate safety measures in their design, such as redundancy feature, fire containment feature and fail-safe feature. We do not assume any liability or responsibility for any loss or damage arising from misuse or inappropriate use of the products.
7. Anti-radiation design is not implemented in the products described in this document.
8. The X-ray exposure can influence functions and characteristics of the products. Confirm the product functions and characteristics in the evaluation stage.
9. WLCSP products should be used in light shielded environments. The light exposure can influence functions and characteristics of the products under operation or storage.
10. There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact Ricoh sales or our distributor before attempting to use AOI.
11. Please contact Ricoh sales representatives should you have any questions or comments concerning the products or the technical information.

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Ricoh is committed to reducing the environmental loading materials in electrical devices with a view to contributing to the protection of human health and the environment.
Ricoh has been providing RoHS compliant products since April 1, 2006 and Halogen-free products since April 1, 2012.

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