
300mA 10V INPUT LDO REGULATOR

NO.EA-205-160425

OUTLINE

The RP170x Series are CMOS-based LDO regulators featuring 300mA output current. Because of the 10V maximum input voltage, RP170x can be used in 2 cell lithium-ion battery powered portable appliances and besides a portable equipment. The supply current is Typ. 23 μ A though an excellent response characteristics.

The output voltage range from 1.2V is possible. The output voltage accuracy and temperature-drift coefficient of output voltage of the RP170x Series are excellent.

RP170x has a fold-back protection circuit and a thermal shutdown circuit. Moreover, a standby mode with ultra low supply current can be realized with the chip enable function.

SC-88A, SOT-23-5 and SOT-89-5 with high power dissipation packages are available.

FEATURES

- Supply Current Typ. 23 μ A
- Standby Mode Typ. 0.1 μ A
- Dropout Voltage..... Typ. 0.20V ($I_{OUT}=100\text{mA}$, $V_{OUT}=3.0\text{V}$)
Typ. 0.77V ($I_{OUT}=300\text{mA}$, $V_{OUT}=2.8\text{V}$)
- Ripple Rejection Typ. 70dB ($f=1\text{kHz}$)
- Temperature-Drift Coefficient of Output Voltage Typ. $\pm 80\text{ppm}/^\circ\text{C}$
- Line Regulation Typ. 0.02%/V
- Output Voltage Accuracy $\pm 1.0\%$
- Packages..... SC-88A, SOT-23-5, SOT-89-5
- Input Voltage Range 2.6V to 10.0V
- Output Voltage Range 1.2V to 6.0V (0.1V steps)
(For other voltages, please refer to MARK INFORMATIONS.)
- Built-in Fold Back Protection Circuit..... Typ. 40mA (Current at short mode)
- Built-in Thermal Shutdown Circuit..... Shutdown Temperature at 165 $^\circ\text{C}$
- Built-in Constant Slope Circuit (Soft-start Function)
- Ceramic capacitors are recommended to be used with this IC 1.0 μ F or more

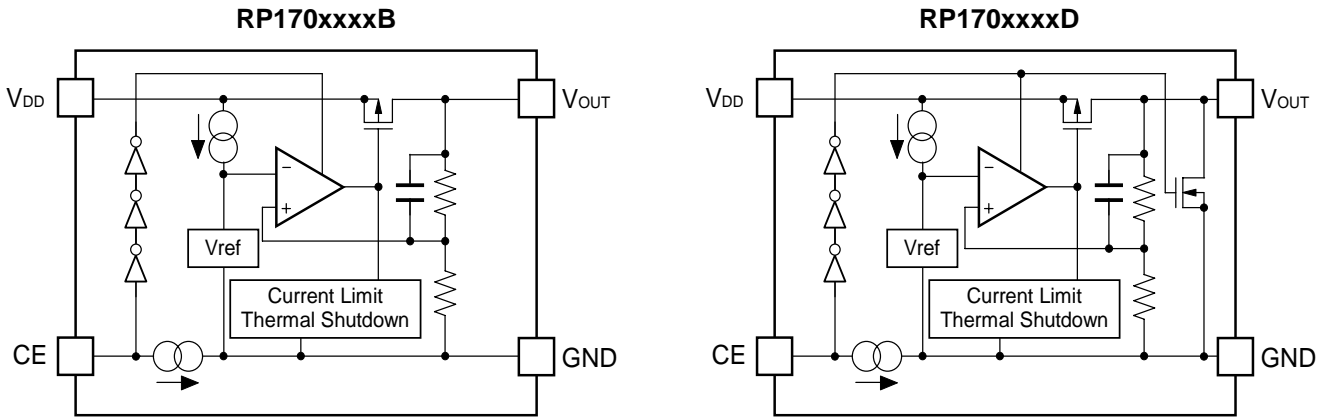
APPLICATIONS

- 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.

RP170x

NO.EA-205-160425

BLOCK DIAGRAMS



SELECTION GUIDE

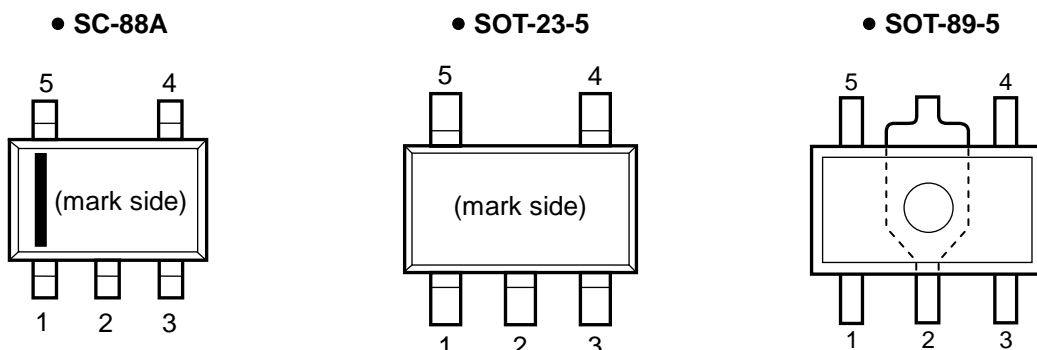
The output voltage, auto discharge function, and package for the ICs can be selected at the user's request.

Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
RP170Qxx2*-TR-FE	SC-88A	3,000 pcs	Yes	Yes
RP170Nxx1*-TR-FE	SOT-23-5	3,000 pcs	Yes	Yes
RP170Hxx1*-T1-FE	SOT-89-5	1,000 pcs	Yes	Yes

xx: The output voltage can be designated in the range from 1.2V(12) to 6.0V(60) in 0.1V steps.
(For other voltages, please refer to MARK INFORMATIONS.)

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

PIN CONFIGURATIONS



PIN DESCRIPTIONS

• SC-88A

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

• SOT-23-5

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

• SOT-89-5

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

* RP170Q (SC-88A) is the discontinued product as of April, 2016.

RP170x

NO.EA-205-160425

ABSOLUTE MAXIMUM RATINGS

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	12	V
V_{CE}	Input Voltage (CE Pin)	12	V
V_{OUT}	Output Voltage	-0.3 to $V_{IN}+0.3$	V
I_{OUT}	Output Current	330	mA
P_D	Power Dissipation* (SC-88A)	380	mW
	Power Dissipation* (SOT-23-5)	420	
	Power Dissipation* (SOT-89-5)	900	
T_{opt}	Operating Temperature Range	-40 to 85	°C
T_{stg}	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.

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.

ELECTRICAL CHARACTERISTICS

• RP170xxxxB/D

V_{IN} =Set $V_{OUT}+1V$, $I_{OUT}=1mA$, unless otherwise noted.

□ values indicate $-40^{\circ}C \leq T_{opt} \leq 85^{\circ}C$, unless otherwise noted.

$T_{opt}=25^{\circ}C$

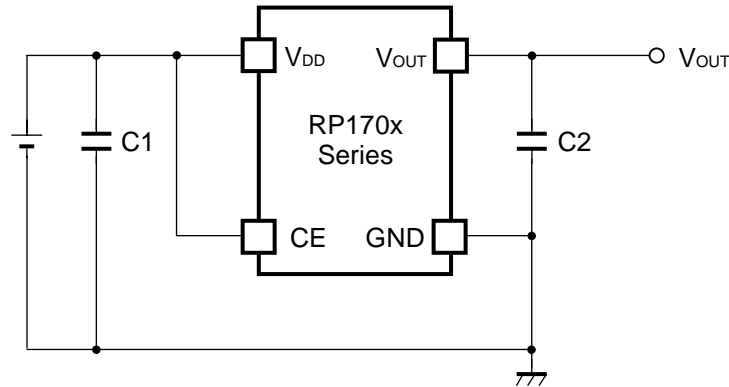
Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	$T_{opt}=25^{\circ}C$	$V_{OUT} > 1.5V$	$\times 0.99$	$\times 1.01$	V
			$V_{OUT} \leq 1.5V$	-15	+15	mV
		$-40^{\circ}C \leq T_{opt} \leq 85^{\circ}C$	$V_{OUT} > 1.5V$	$\times 0.974$	$\times 1.023$	V
			$V_{OUT} \leq 1.5V$	-40	+35	mV
I_{OUT}	Output Current		300		mA	
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	$0.1mA \leq I_{OUT} \leq 300mA$		10	70	mV
V_{DIF}	Dropout Voltage	$I_{OUT}=300mA$	$1.2V \leq V_{OUT} < 1.3V$	1.400	1.800	V
			$1.3V \leq V_{OUT} < 1.5V$	1.350	1.750	
			$1.5V \leq V_{OUT} < 1.8V$	1.200	1.550	
			$1.8V \leq V_{OUT} < 2.3V$	0.980	1.300	
			$2.3V \leq V_{OUT} < 3.0V$	0.770	1.080	
			$3.0V \leq V_{OUT} < 4.0V$	0.600	0.850	
			$4.0V \leq V_{OUT} \leq 6.0V$	0.500	0.750	
I_{SS}	Supply Current	$I_{OUT}=0mA$		23	40	μA
$I_{standby}$	Standby Current	$V_{IN}=10.0V$, $V_{CE}=GND$		0.1	1.0	μA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	Set $V_{OUT}+0.5V \leq V_{IN} \leq 10.0V$ (In case that $V_{OUT} \leq 2.1V$, $2.6V \leq V_{IN} \leq 10.0V$)		0.02	0.2	%/V
RR	Ripple Rejection	$f=1kHz$, Ripple $0.2Vp-p$, $I_{OUT}=30mA$ (In case that $V_{OUT} < 2.0V$, $V_{IN}=3.0V$)		70		dB
V_{IN}	Input Voltage		2.6		10	V
$\Delta V_{OUT}/\Delta T_{opt}$	Output Voltage Temperature Coefficient	$-40^{\circ}C \leq T_{opt} \leq 85^{\circ}C$		± 80		ppm/ $^{\circ}C$
I_{SC}	Short Current Limit	$V_{OUT}=0V$		40		mA
I_{PD}	CE Pull-down Current			0.30		μA
V_{CEH}	CE Input Voltage "H"		1.7			V
V_{CEL}	CE Input Voltage "L"				0.8	V
T_{TSD}	Thermal Shutdown Temperature	Junction Temperature		165		$^{\circ}C$
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature		110		$^{\circ}C$
en	Output Noise	BW=10Hz to 100kHz		100		μV_{rms}
R_{LOW}	Low Output Nch Tr. ON Resistance (of D version)	$V_{IN}=7.0V$ $V_{CE}=0V$		250		Ω

All of unit are tested and specified under load conditions such that $T_j \approx T_{opt}=25^{\circ}C$ except for Output Noise, Ripple Rejection, Output Voltage Temperature Coefficient and Thermal Shutdown.

RP170x

NO.EA-205-160425

TYPICAL APPLICATION



(External Components)

C2 1.0 μ F MURATA: GRM155B31A105KE15

TECHNICAL NOTES

When using these ICs, consider the following points:

Phase Compensation

In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, use a capacitor C2 with 1.0 μ F or more and good ESR (Equivalent Series Resistance).

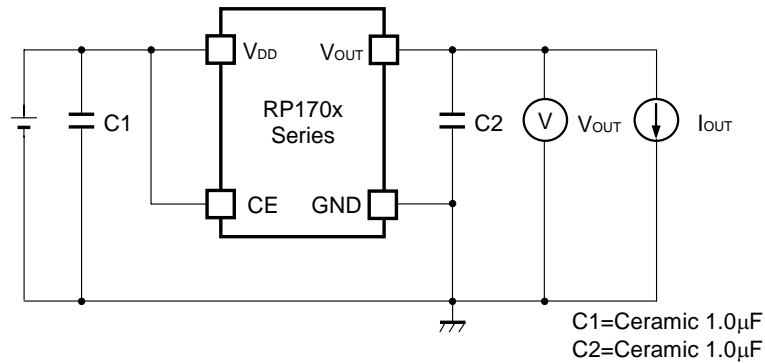
(Note: If additional ceramic capacitors are connected with parallel to the output pin with an output capacitor for phase compensation, the operation might be unstable. Because of this, test these ICs with as same external components as ones to be used on the PCB.)

PCB Layout

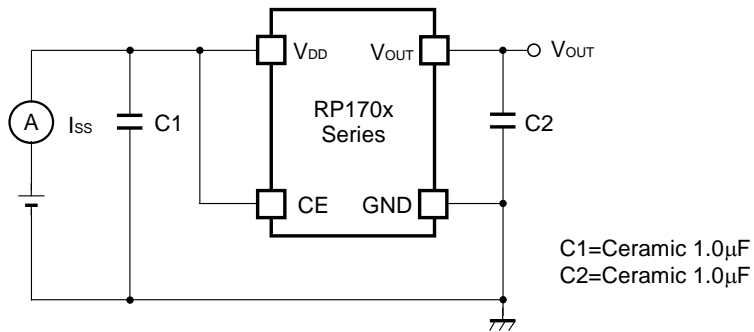
Make V_{DD} and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a capacitor C1 with a capacitance value as much as 1.0 μ F or more between V_{DD} and GND pin, and as close as possible to the pins.

Set external components, especially the output capacitor C2, as close as possible to the ICs, and make wiring as short as possible.

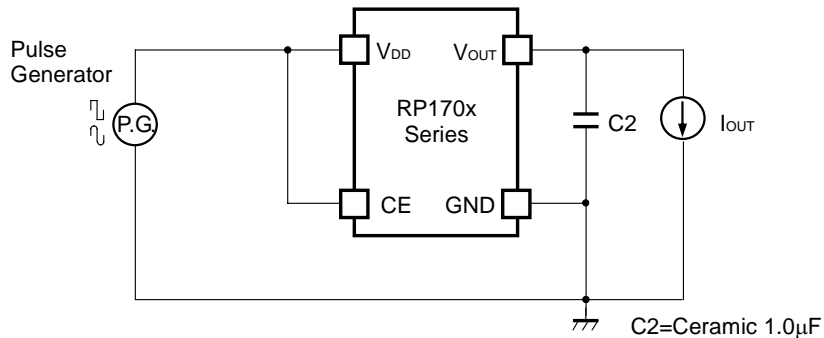
TEST CIRCUITS



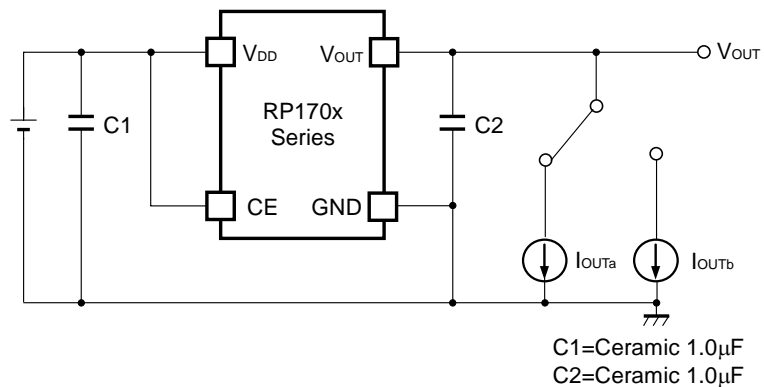
Basic Test Circuit



Test Circuit for Supply Current



Test Circuit for Ripple Rejection



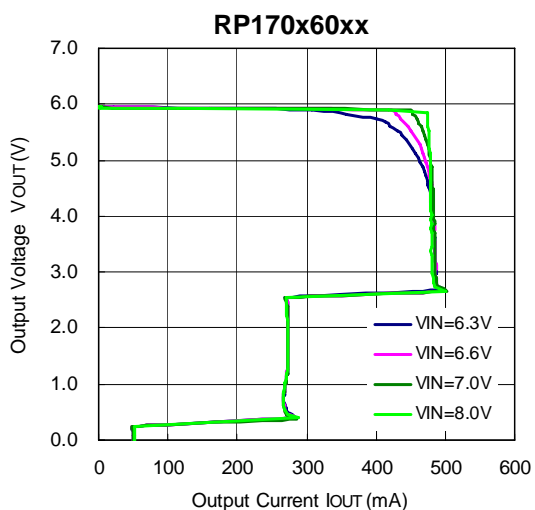
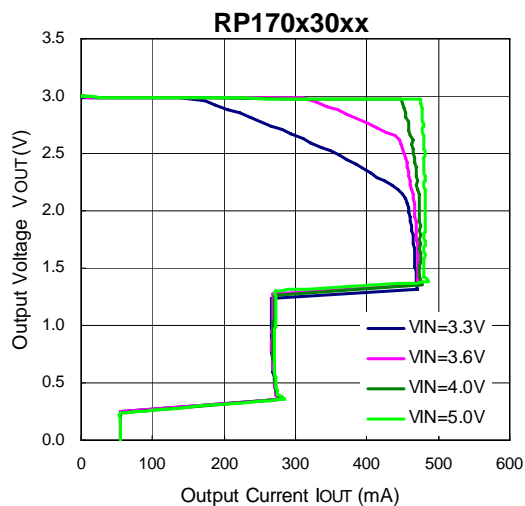
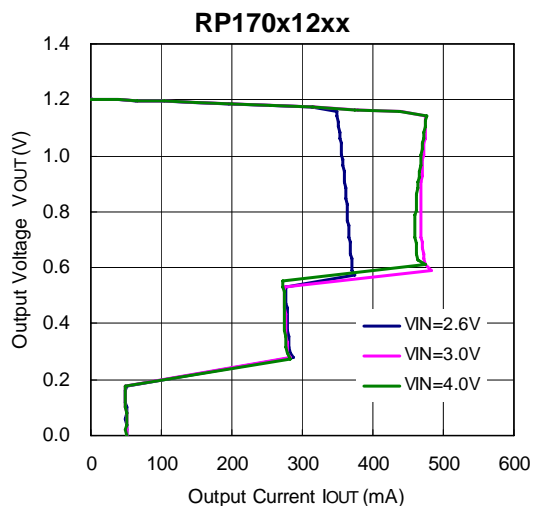
Test Circuit for Load Transient Response

RP170x

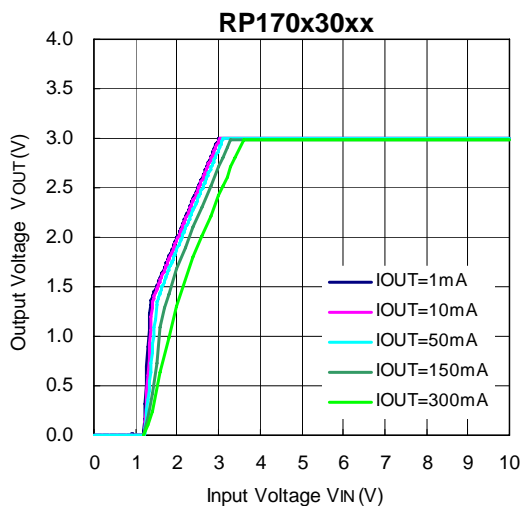
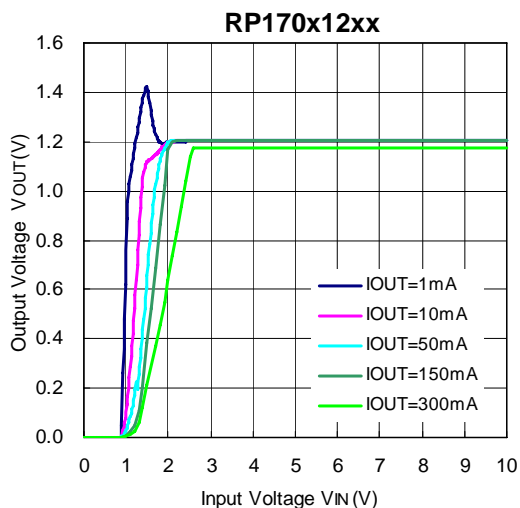
NO.EA-205-160425

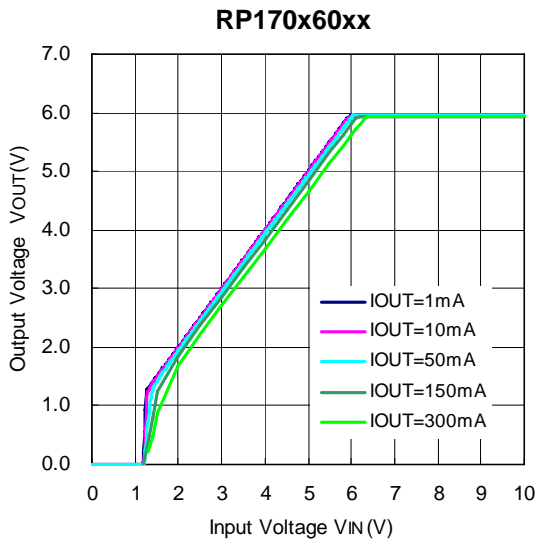
TYPICAL CHARACTERISTICS

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

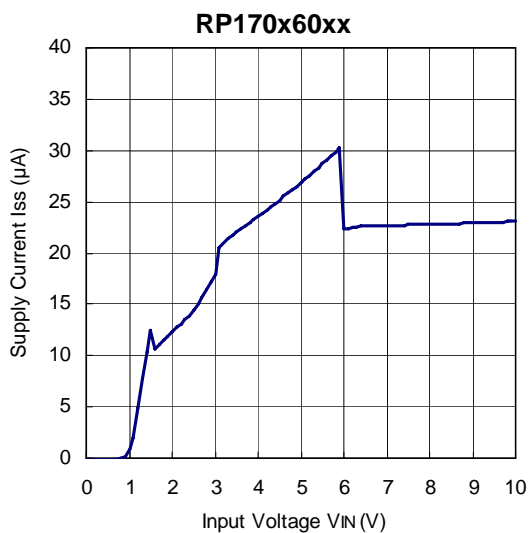
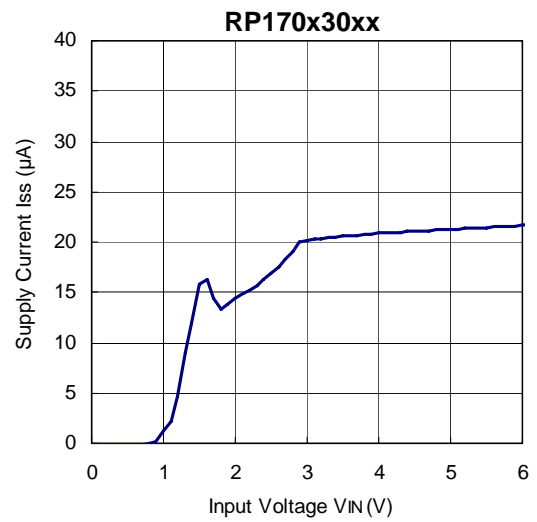
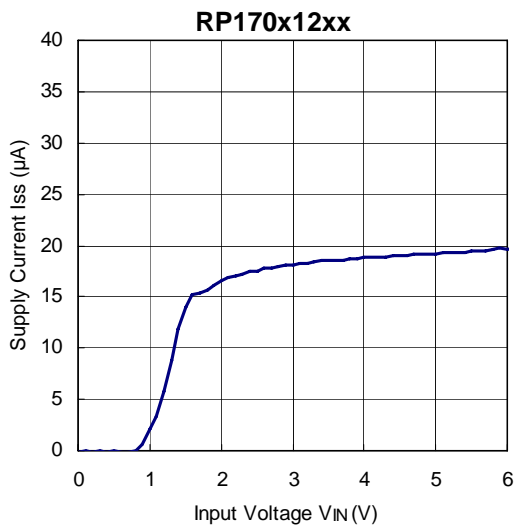


2) Output Voltage vs. Input Voltage ($T_{opt}=25^{\circ}\text{C}$)





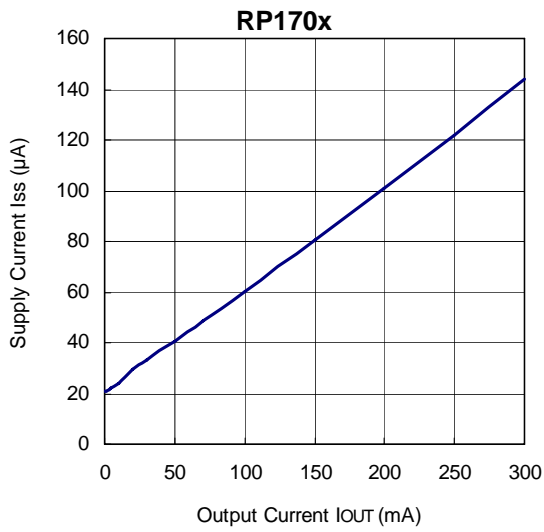
3) Supply Current vs. Input Voltage ($T_{opt}=25^{\circ}\text{C}$)



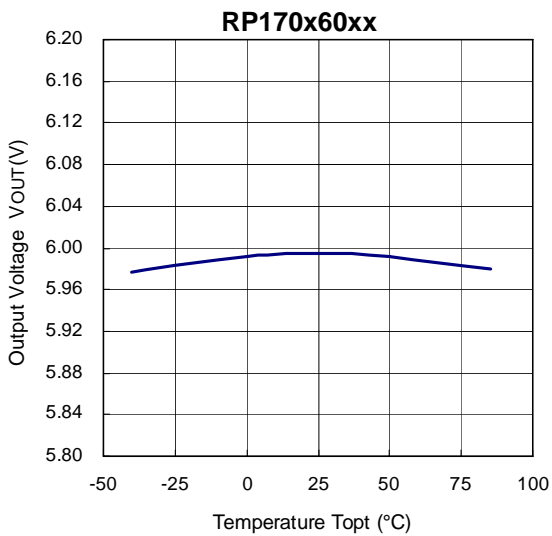
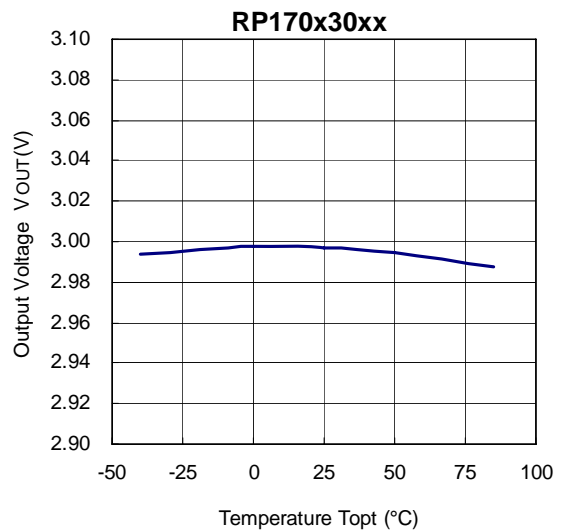
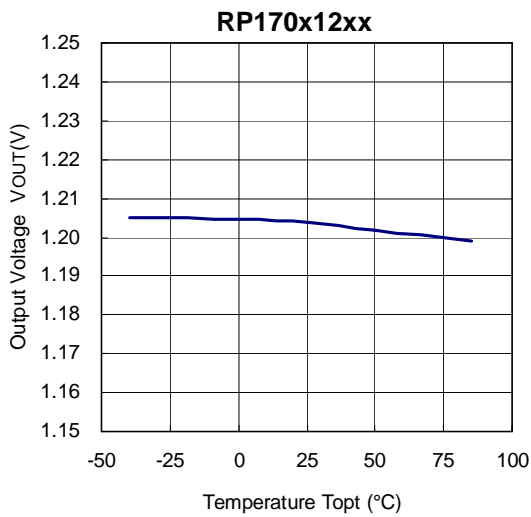
RP170x

NO.EA-205-160425

4) Supply Current vs. Output Current (T_{opt}=25°C)



5) Output Voltage vs. Temperature

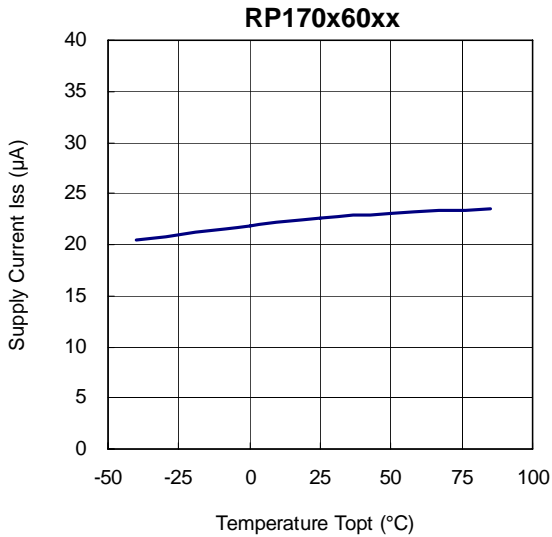
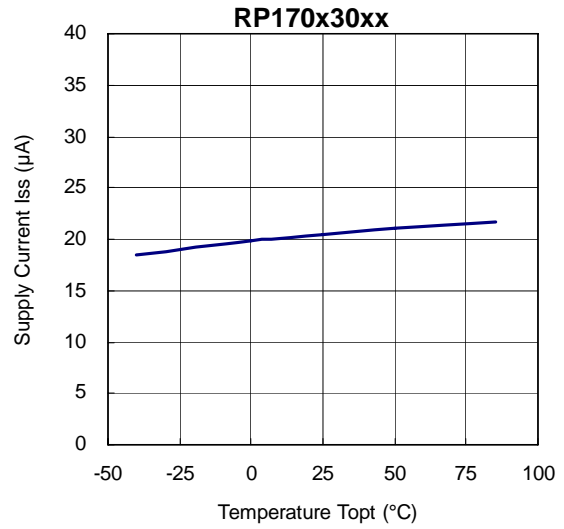
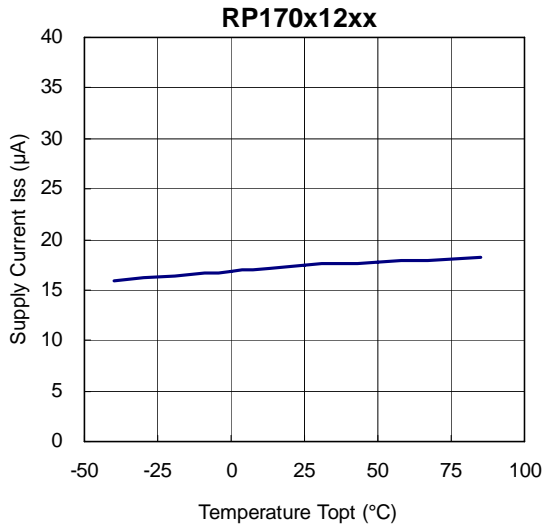


* RP170Q (SC-88A) is the discontinued product as of April, 2016.

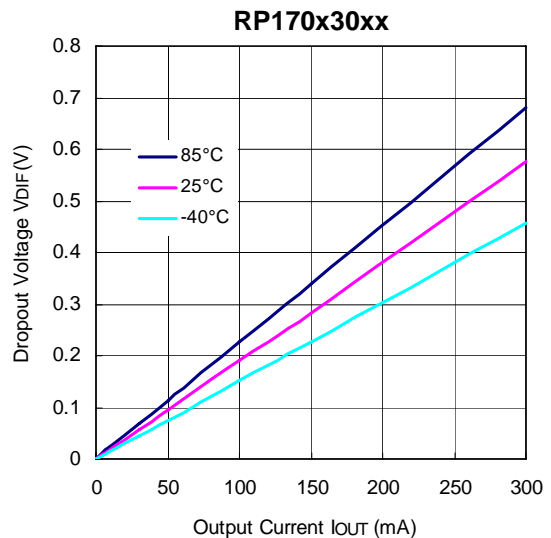
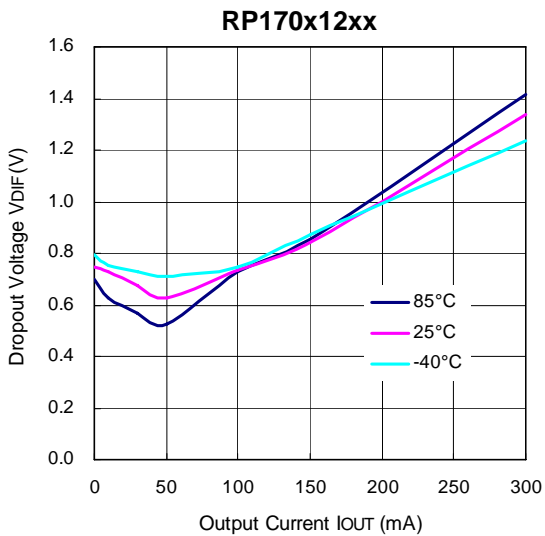
RP170x

NO.EA-205-160425

6) Supply Current vs. Temperature

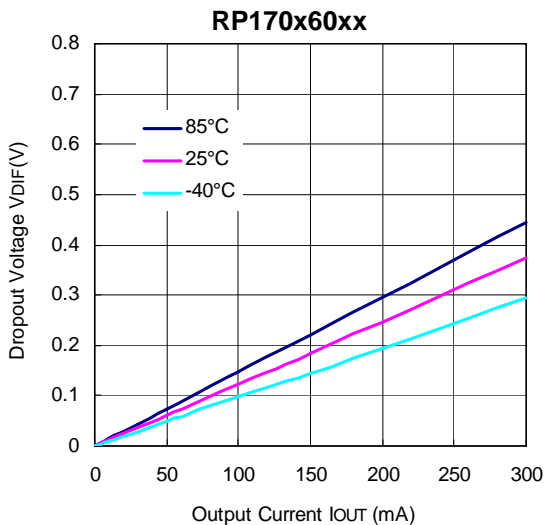


7) Dropout Voltage vs. Output Current

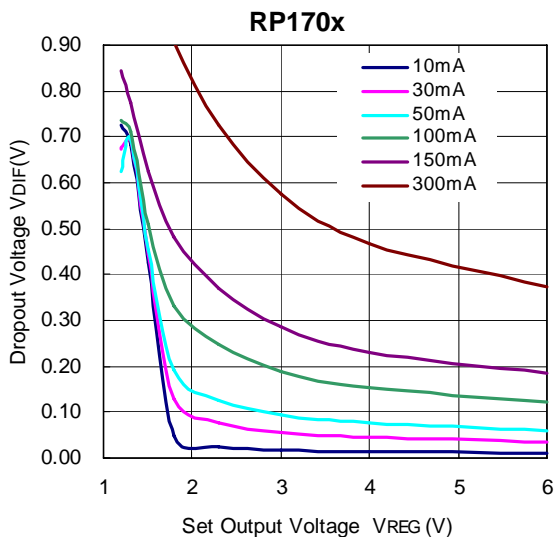


RP170x

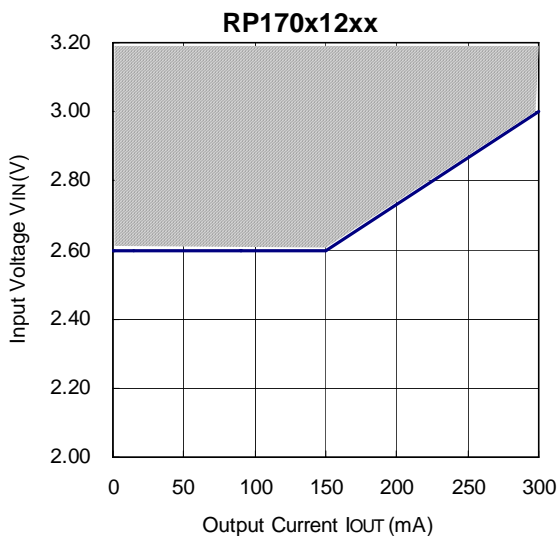
NO.EA-205-160425



8) Dropout Voltage vs. Set Output Voltage ($T_{opt}=25^{\circ}\text{C}$)

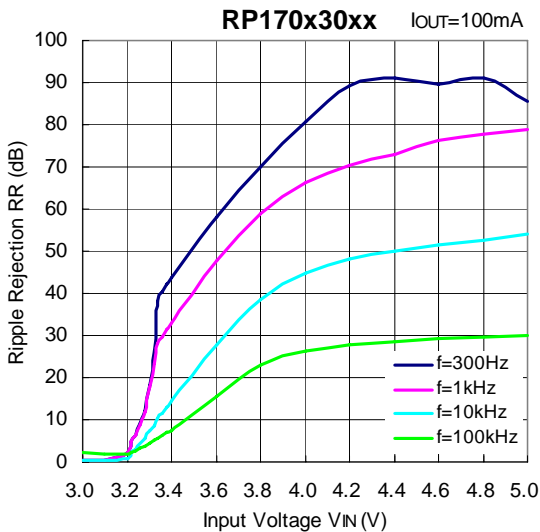
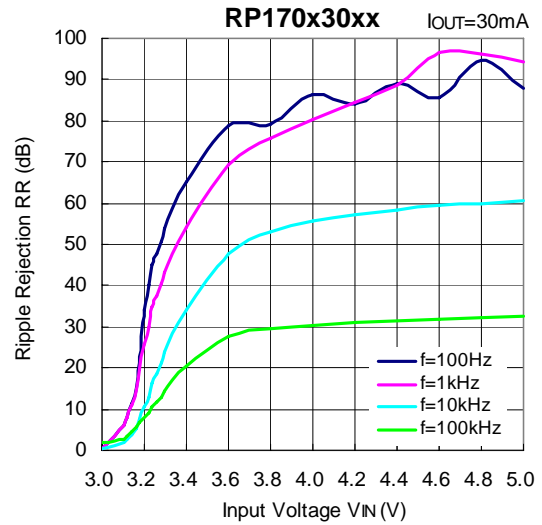
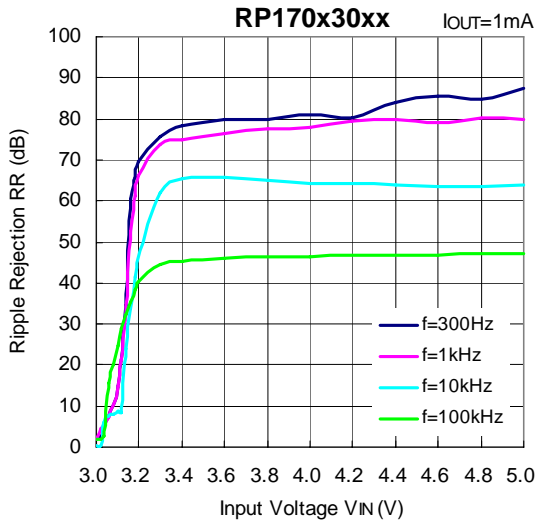


9) Minimum Operating Voltage

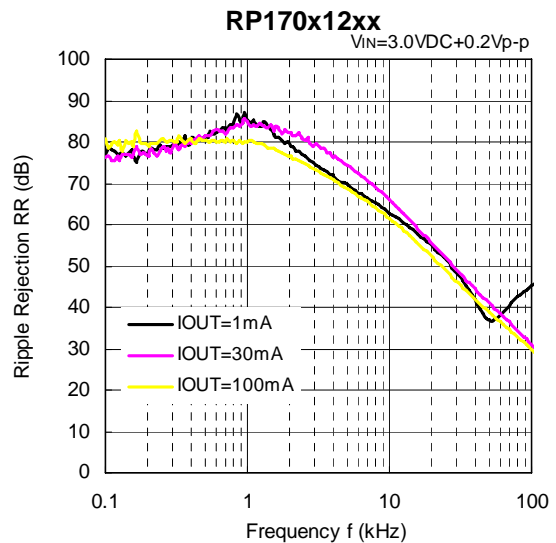
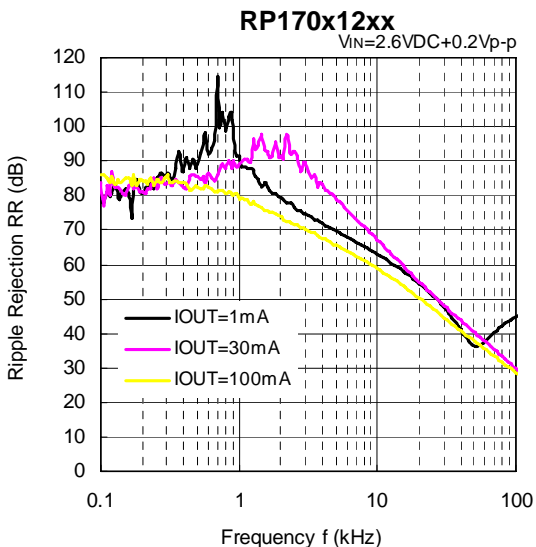


Hatched area is available for 1.2V output

10) Ripple Rejection vs. Input Bias Voltage (C1=none, C2=Ceramic 1.0μF, Ripple=0.2Vp-p, T_{opt}=25°C)

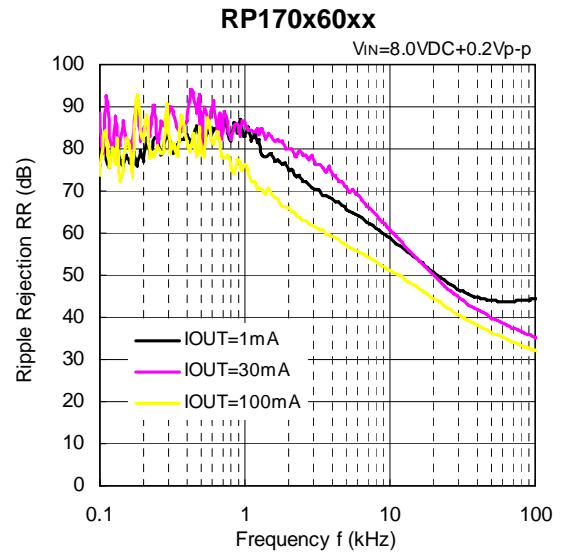
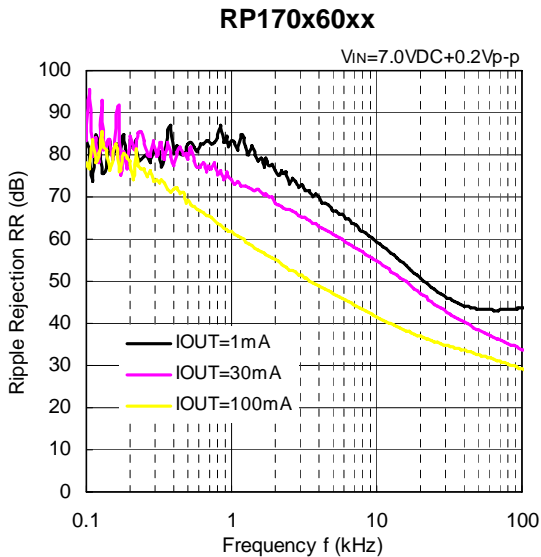
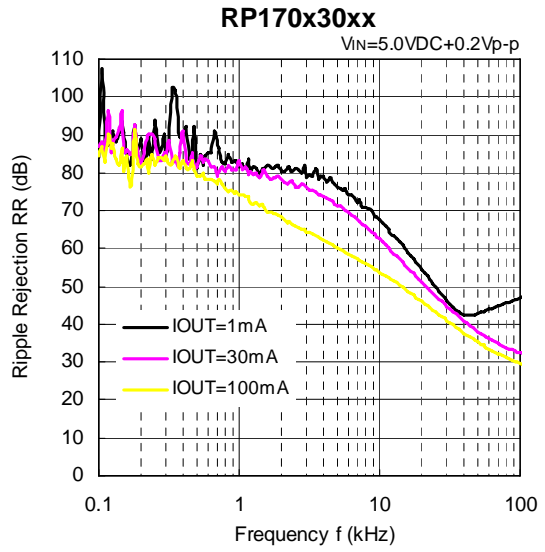
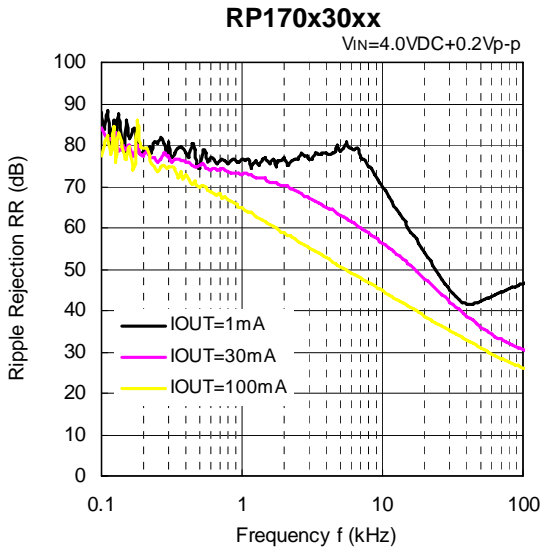


11) Ripple Rejection vs. Frequency (C1=none, C2=Ceramic 1.0μF, T_{opt}=25°C)

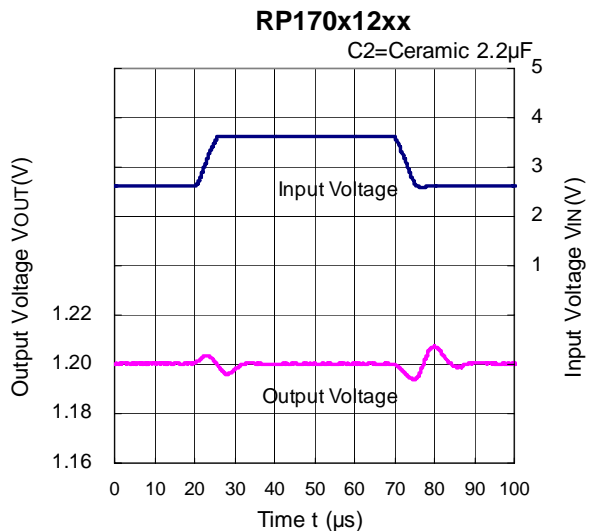
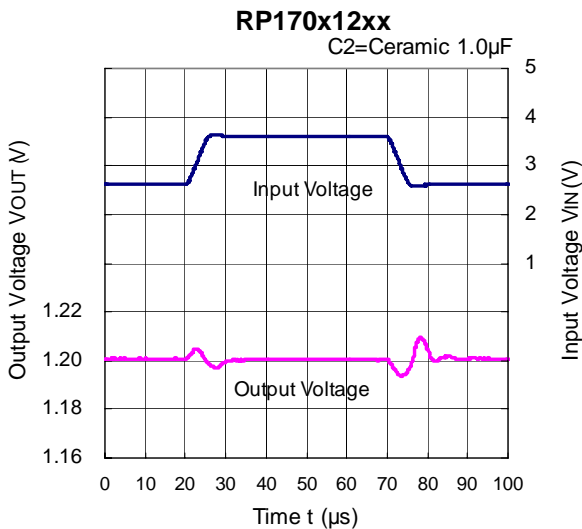


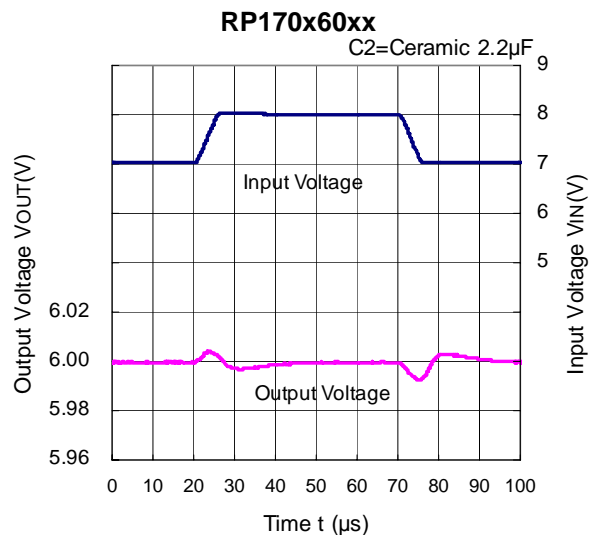
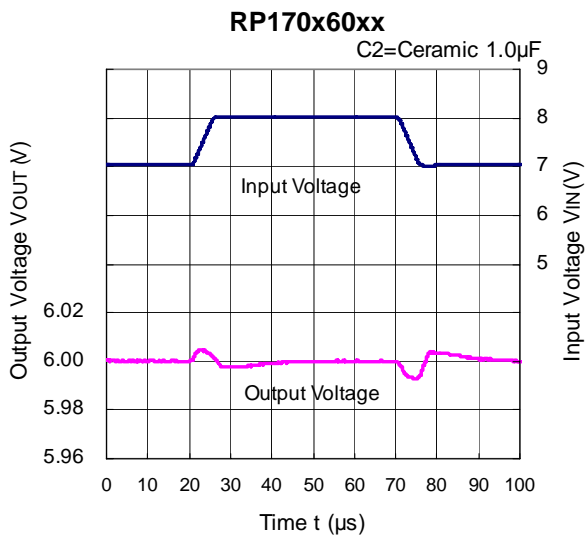
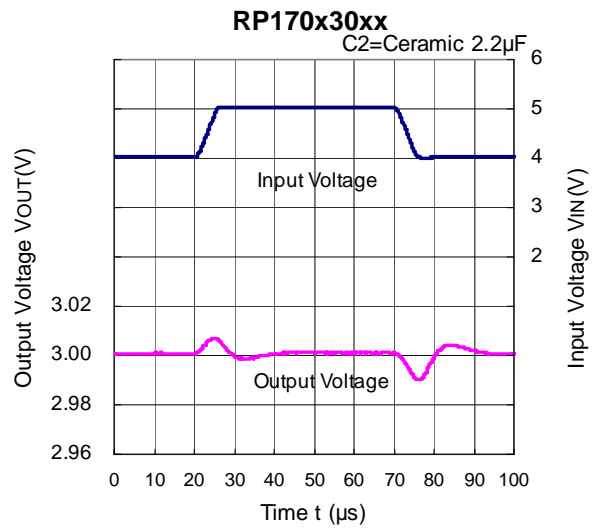
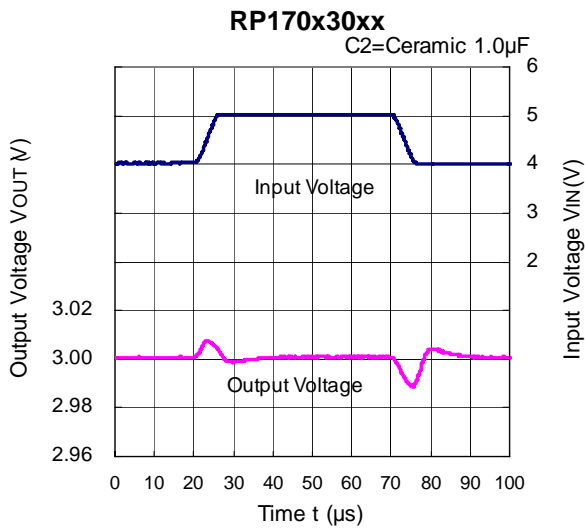
RP170x

NO.EA-205-160425

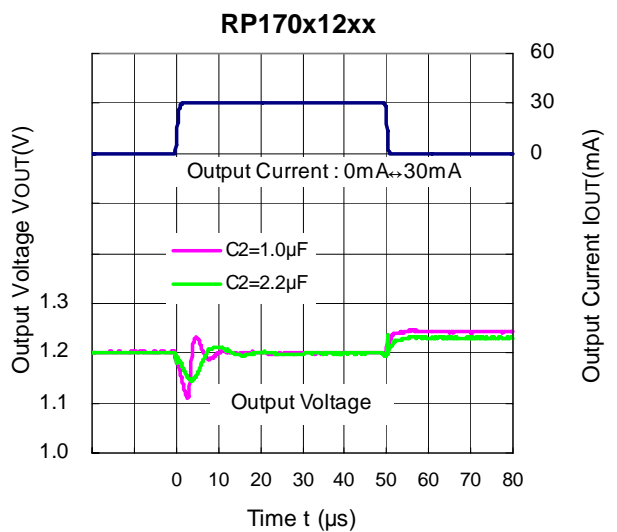
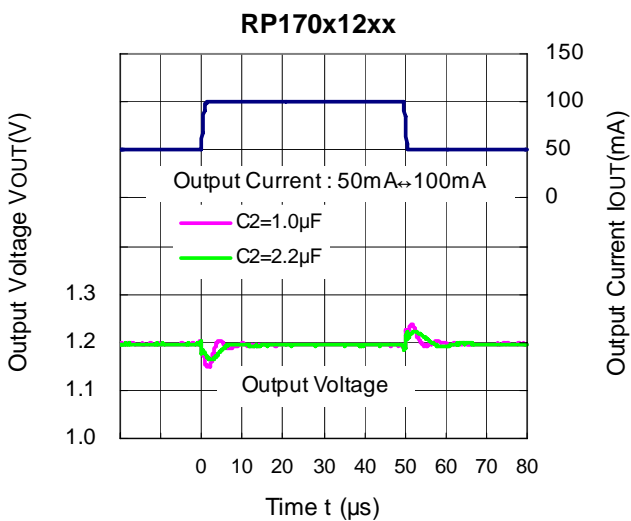


12) Input Transient Response (C1=none, IOUT=30mA, tr=tf=5μs, Topt=25°C)



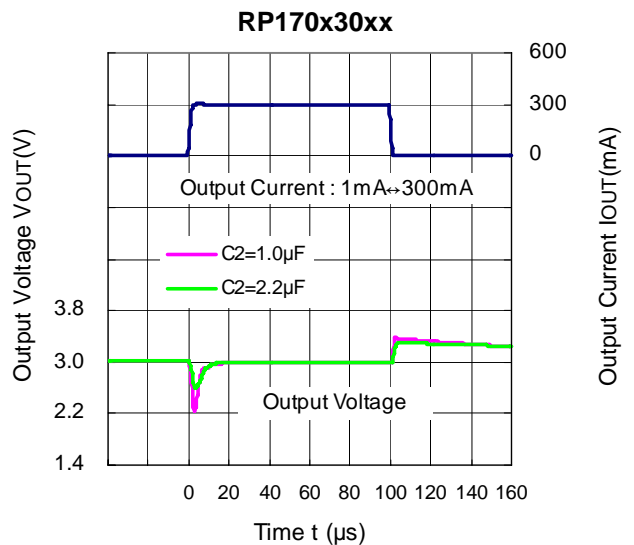
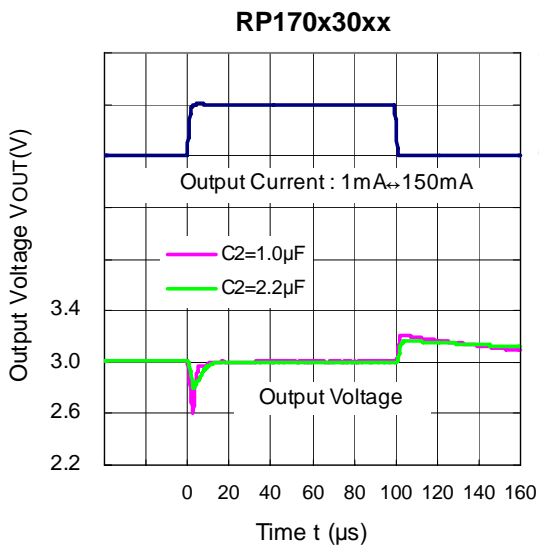
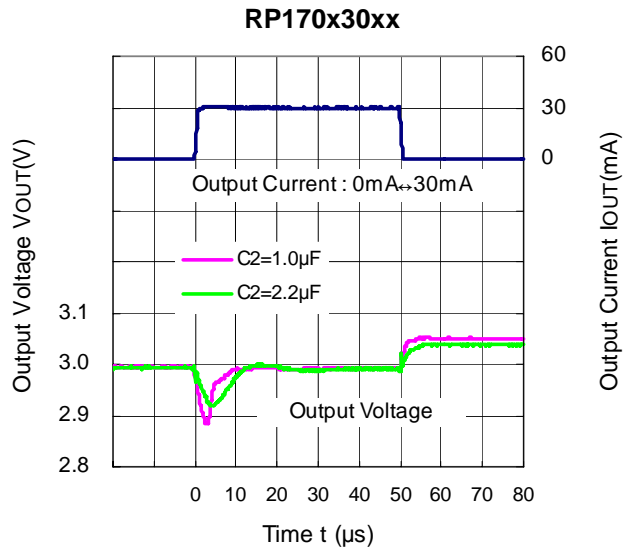
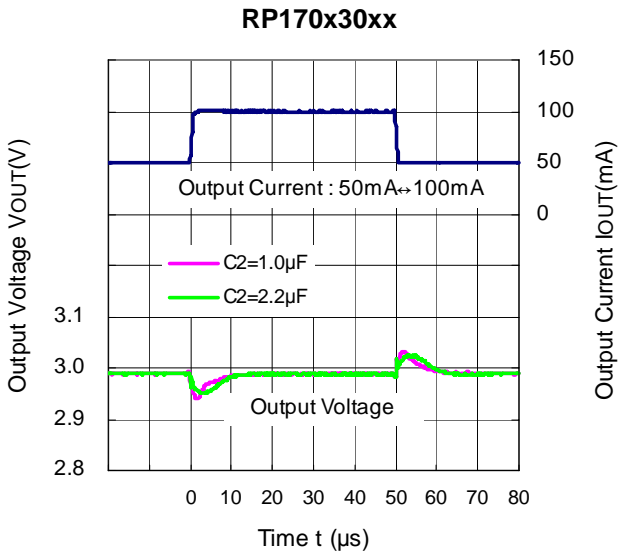
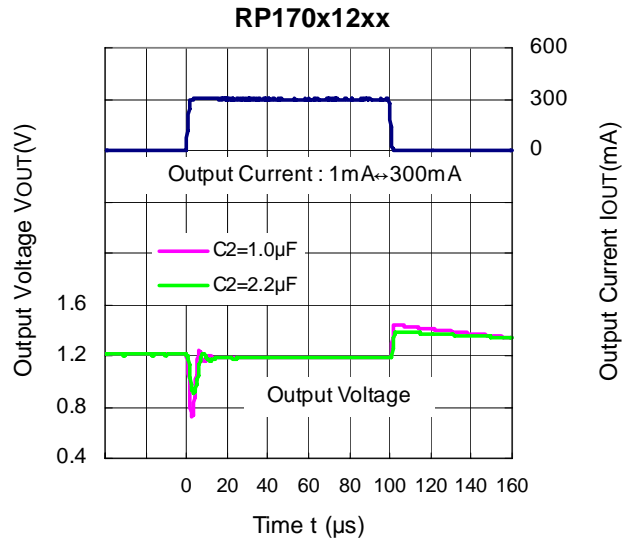
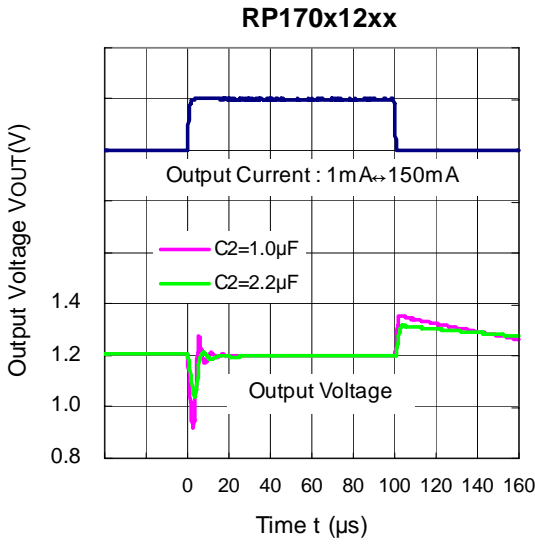


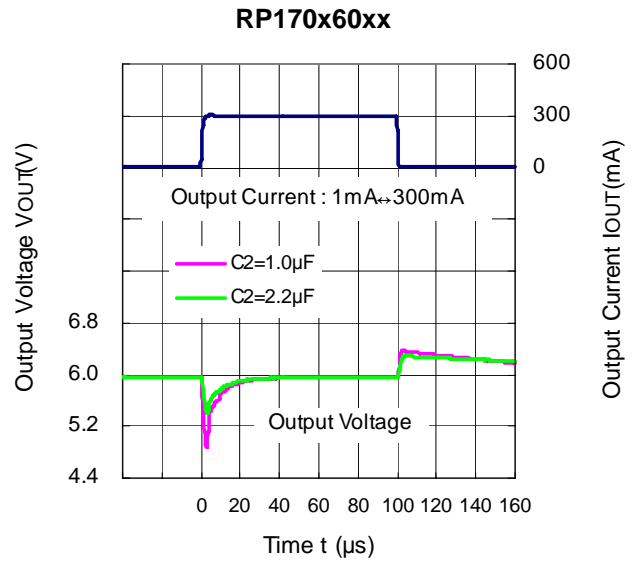
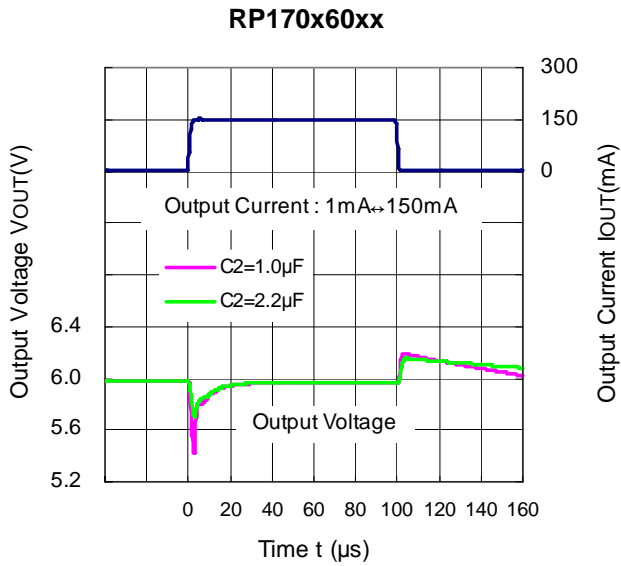
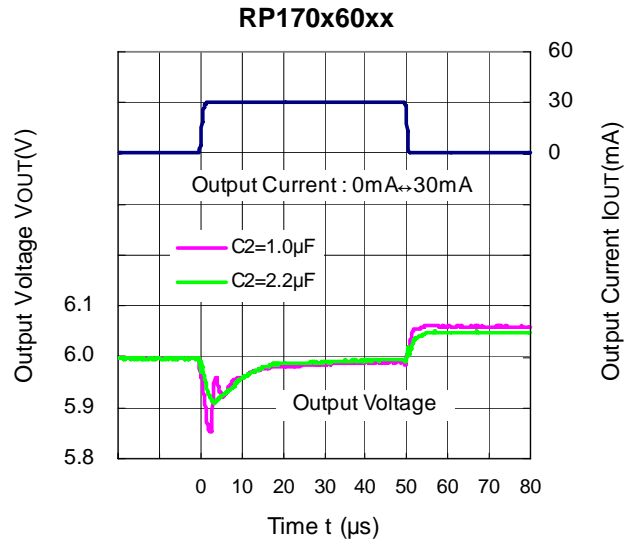
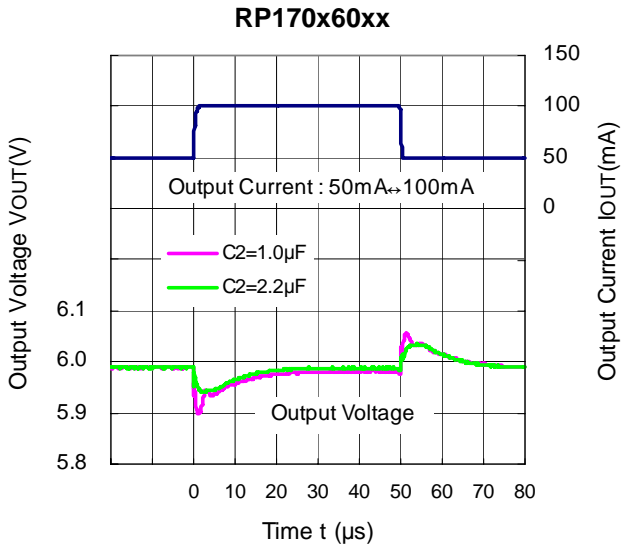
13) Load Transient Response (C1=Ceramic 1.0 μ F, $t_r=t_f=500ns$, $T_{opt}=25^{\circ}C$)



RP170x

NO.EA-205-160425

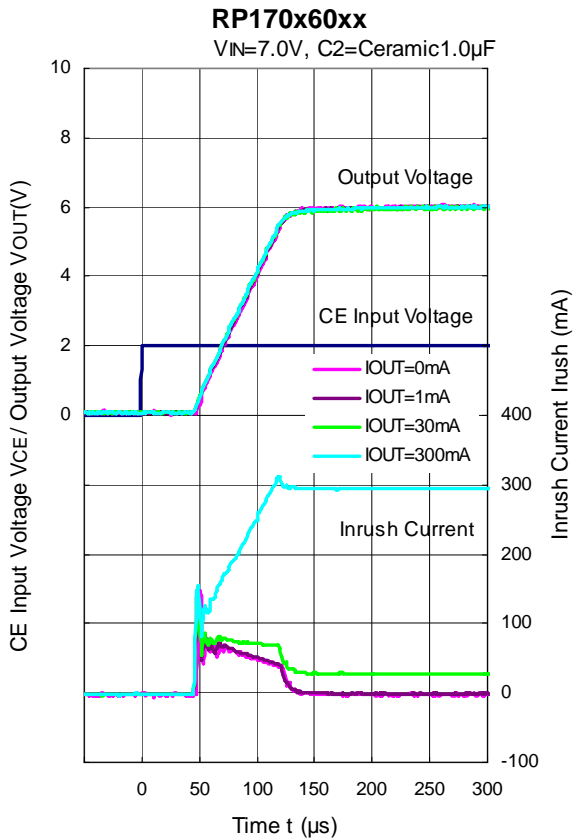
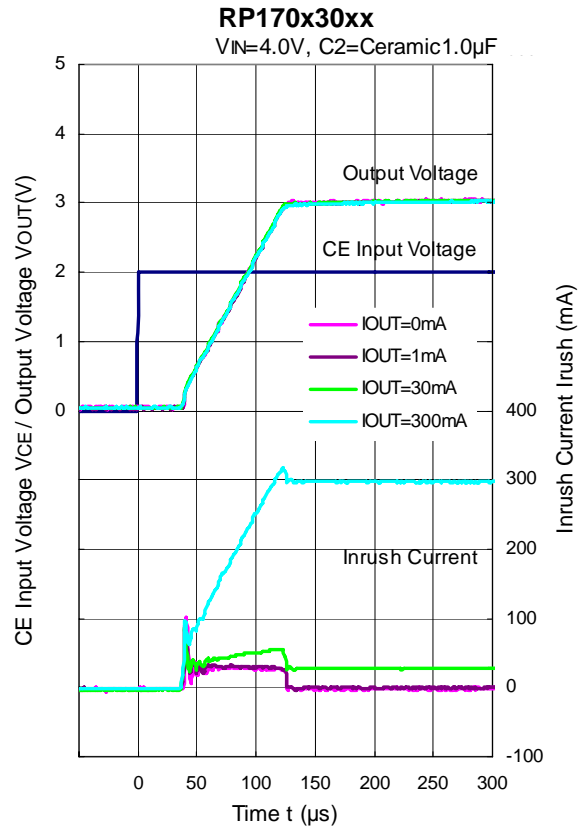
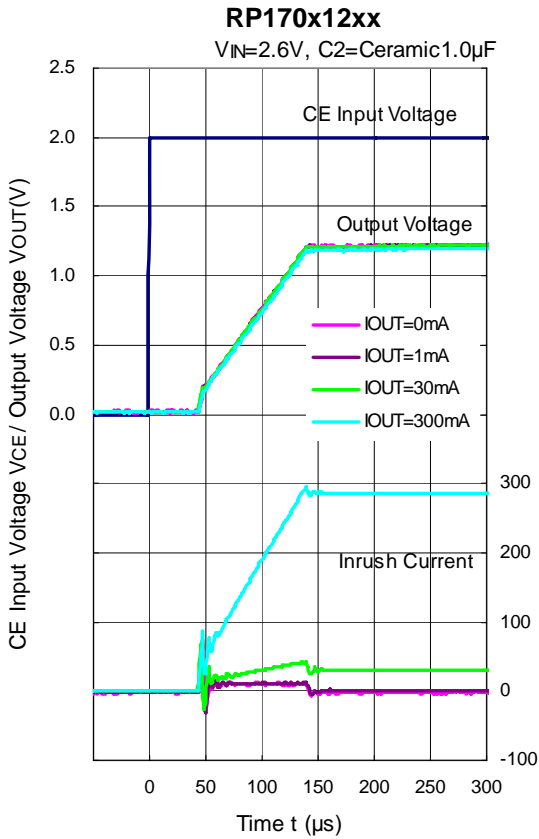


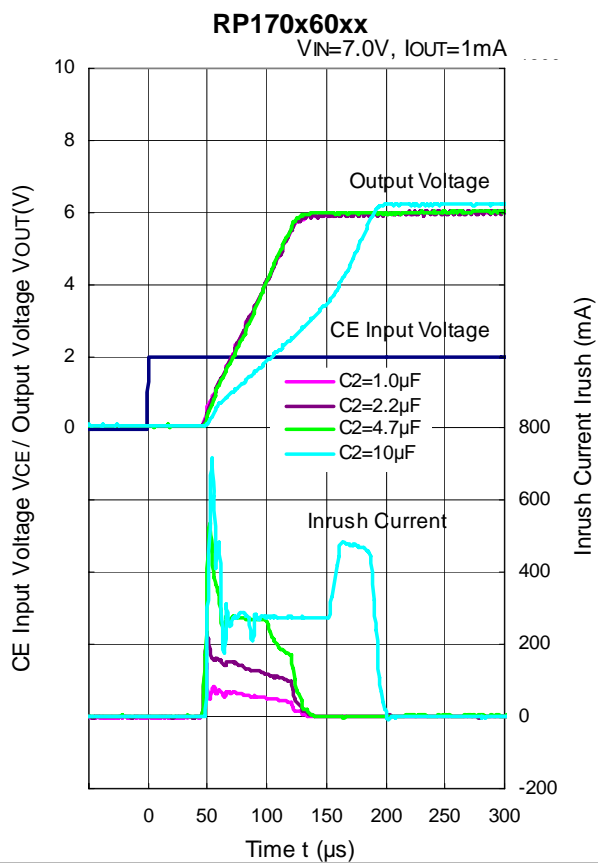
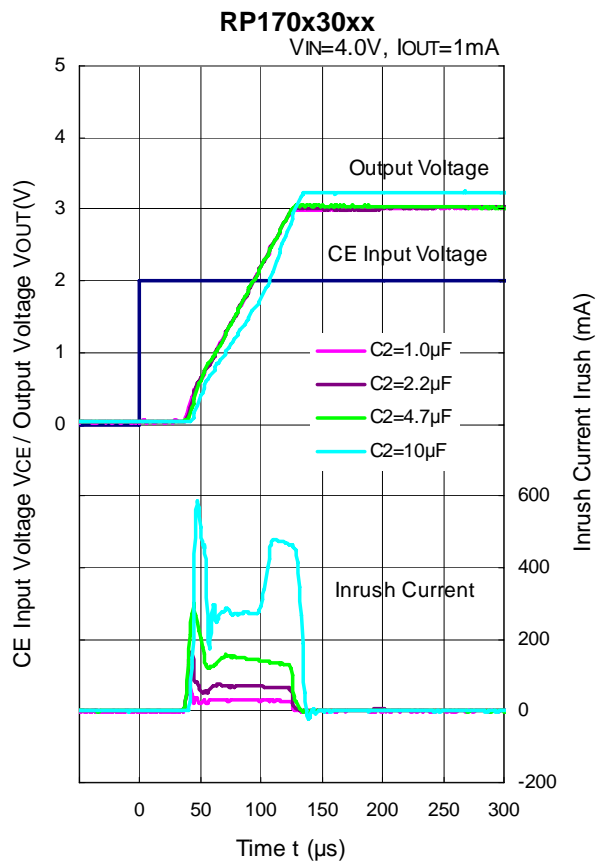
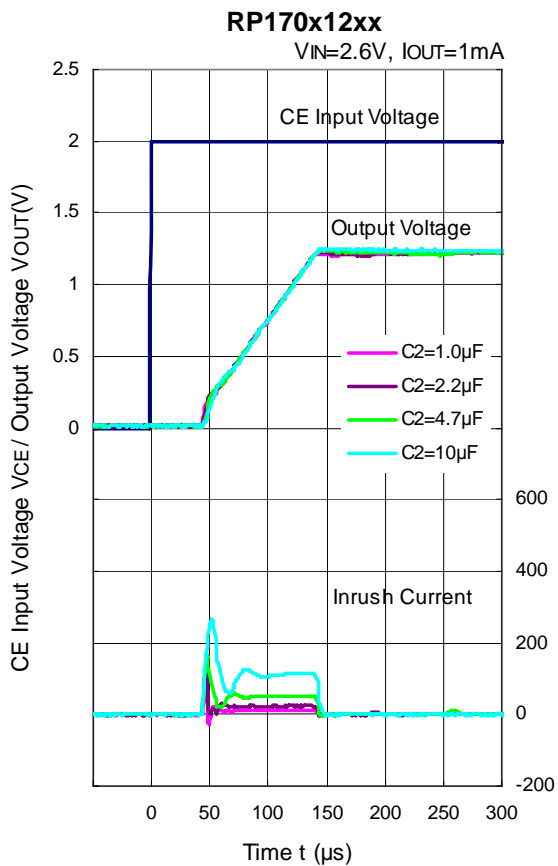


RP170x

NO.EA-205-160425

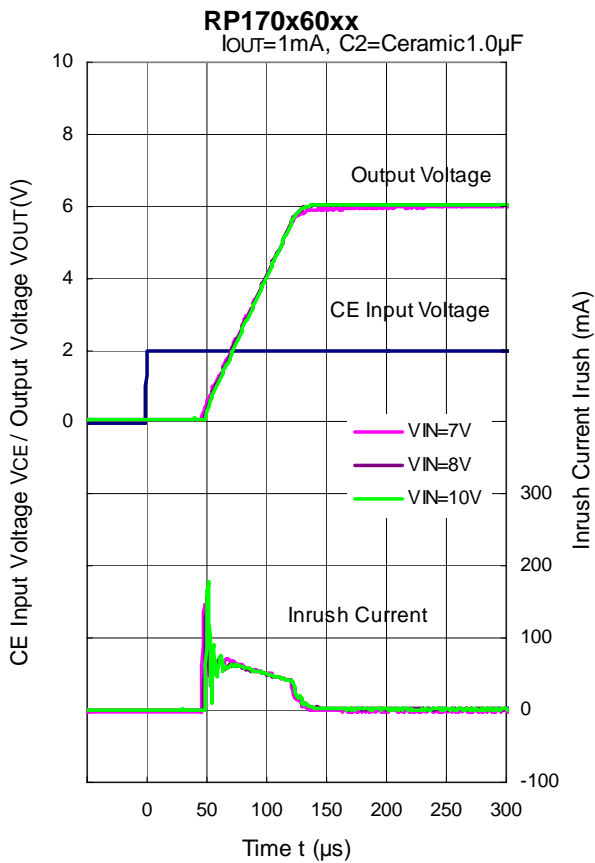
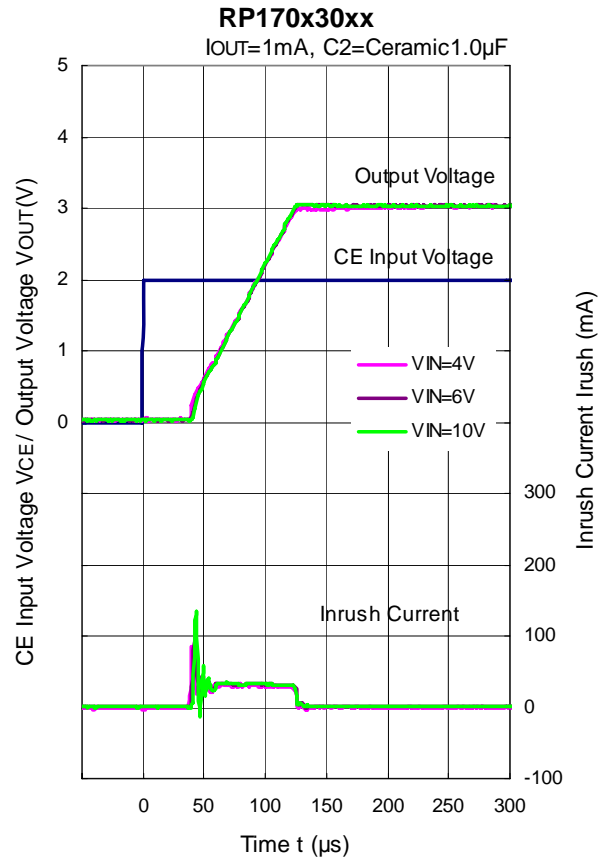
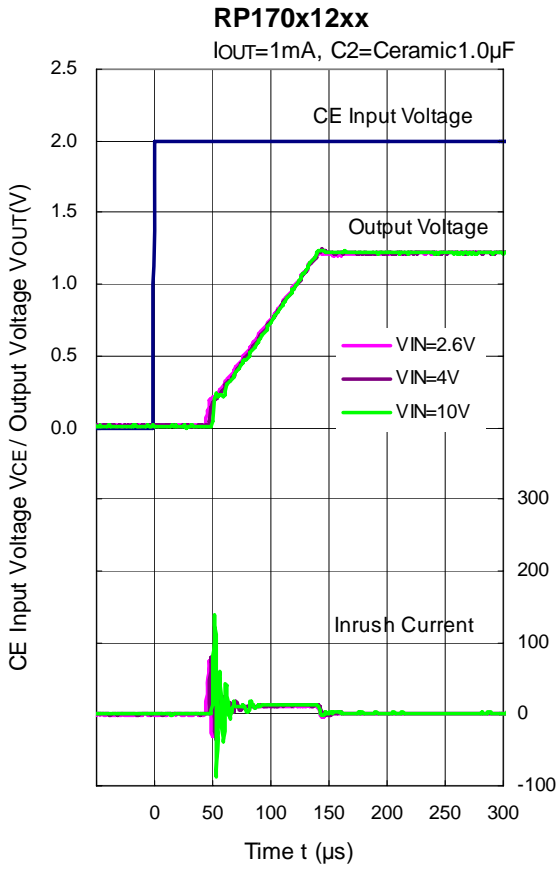
14) Turn On Speed with CE pin (C1=Ceramic 1.0μF, T_{opt}=25°C)



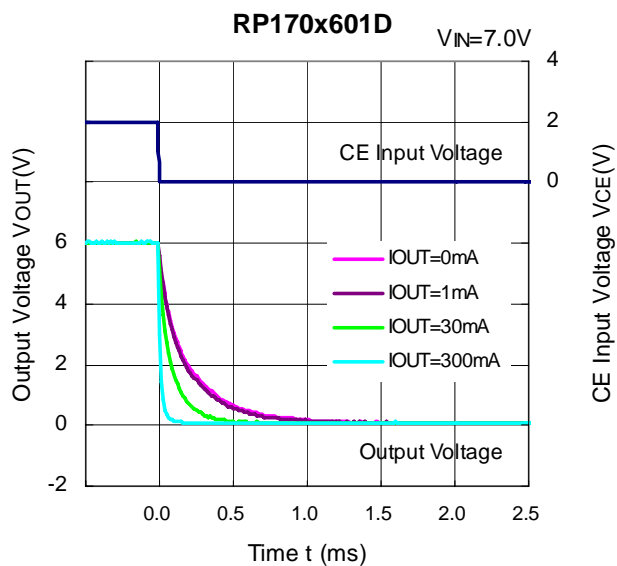
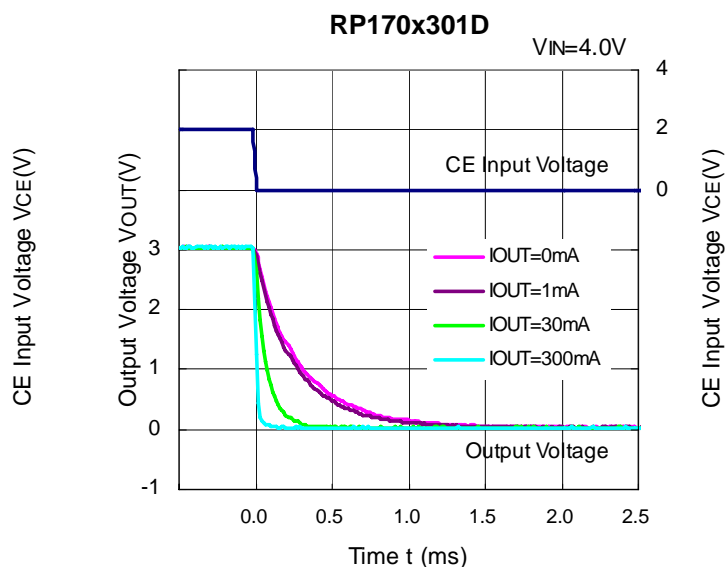
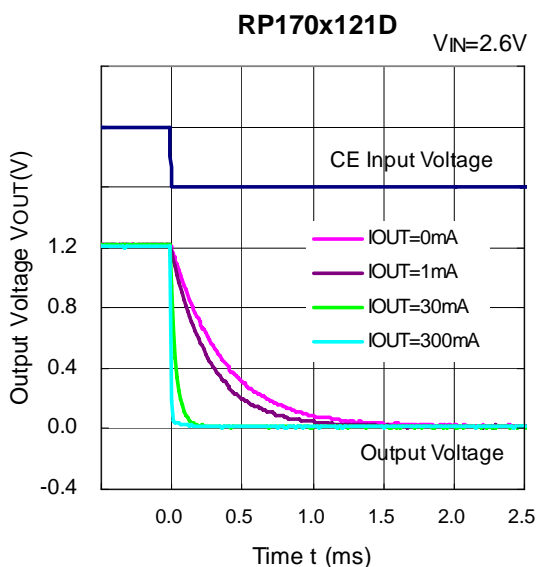


RP170x

NO.EA-205-160425



15) Turn Off Speed with CE pin (D Version) (C1=Ceramic 1.0 μ F, T_{opt}=25°C)



RP170x

NO.EA-205-160425

ESR vs. Output Current

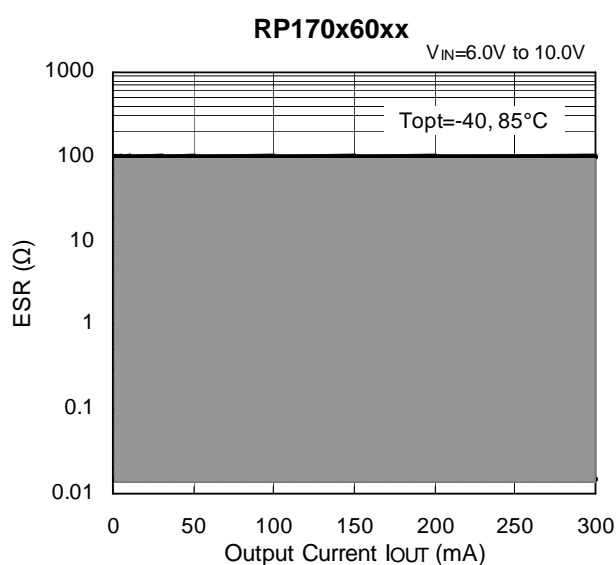
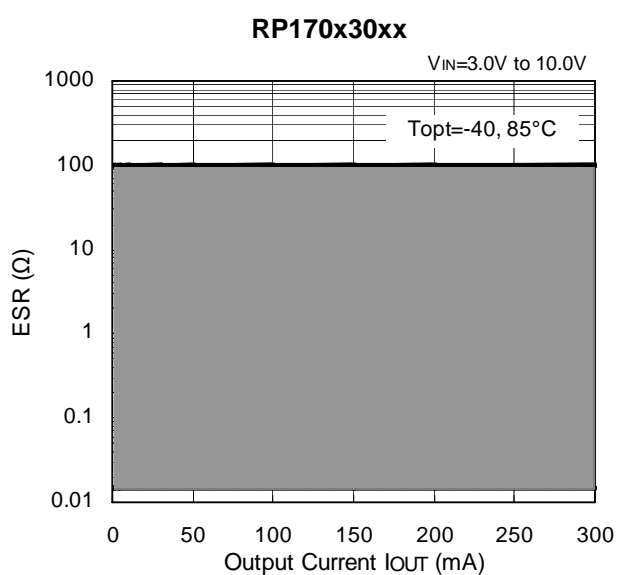
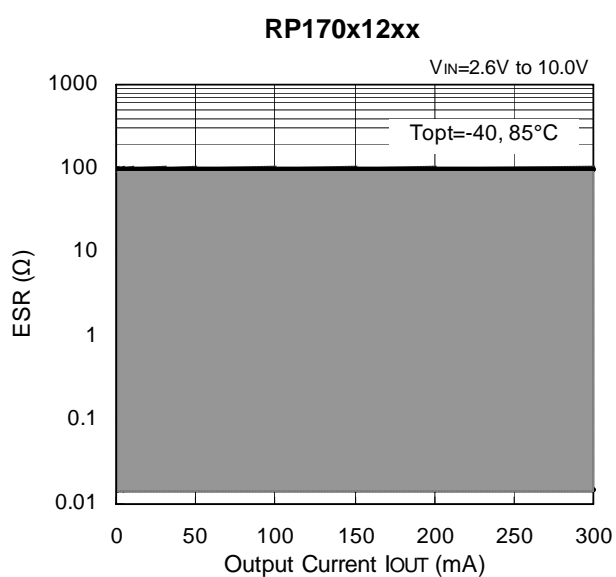
Ceramic type output capacitor is recommended for this series; however, the other output capacitors with low ESR also can be used. The relations between I_{OUT} (Output Current) and ESR of an output capacitor are shown below. The conditions when the white noise level is under $40\mu\text{V}$ (Avg.) are marked as the hatched area in the graph.

Measurement conditions

Frequency Band : 10Hz to 2MHz

Temperature : -40°C to 85°C

C1, C2 : Ceramic $1.0\mu\text{F}$ (Murata GRM155B31A105KE)



PACKAGE INFORMATION

• Power Dissipation (SC-88A)

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

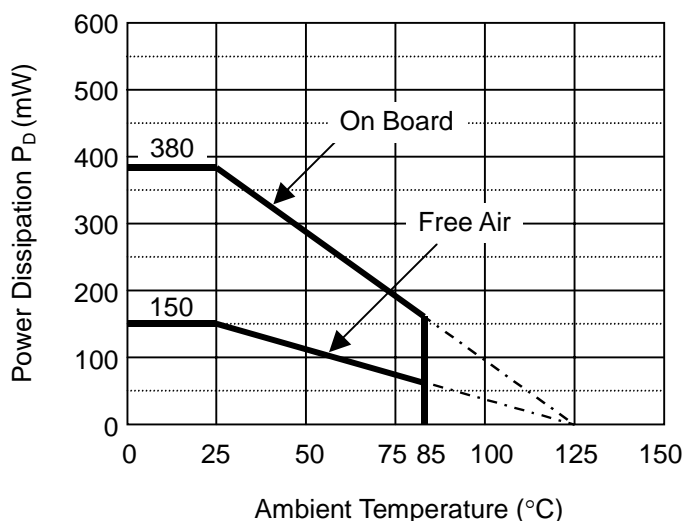
Measurement Conditions

	Standard Land Pattern
Environment	Mounting on Board (Wind velocity=0m/s)
Board Material	Glass cloth epoxy plastic (Double Layers)
Board Dimensions	40mm × 40mm × 1.6mm
Copper Ratio	Top side: Approx. 50%, Back side: Approx. 50%
Through-hole	φ0.5mm × 44pcs

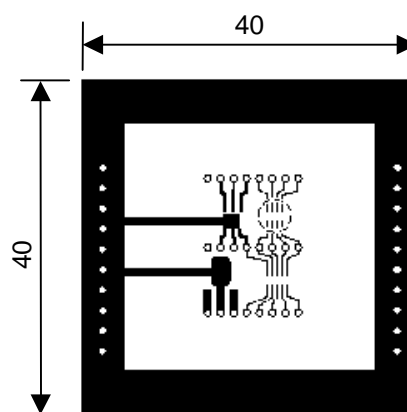
Measurement Result

($T_a=25^\circ\text{C}$, $T_{j\text{max}}=125^\circ\text{C}$)

	Standard Land Pattern	Free Air
Power Dissipation	380mW	150mW
Thermal Resistance	$\theta_{ja}=(125-25^\circ\text{C})/0.38\text{W}=263^\circ\text{C/W}$ $\theta_{jc}=75^\circ\text{C/W}$	$\theta_{ja}=(125-25^\circ\text{C})/0.15\text{W}=667^\circ\text{C/W}$ -



Power Dissipation



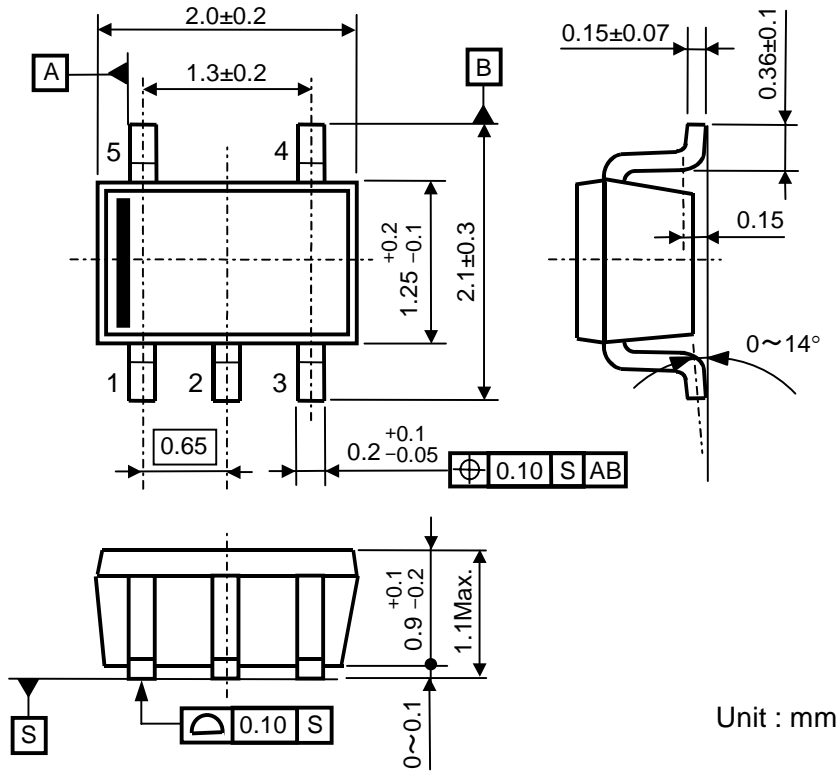
Measurement Board Pattern

○ IC Mount Area (Unit : mm)

RP170x

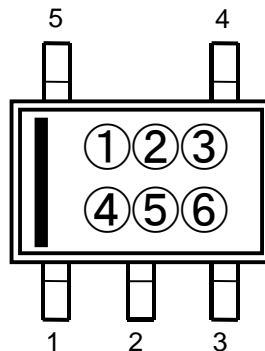
NO.EA-205-160425

● **Package Dimensions (SC-88A)**



● **Mark Specification (SC-88A)**

- ①②③④ : Product Code.....Refer to the marking list table
- ⑤⑥ : Lot No.Alphanumeric serial number.



* RP170Q (SC-88A) is the discontinued product as of April, 2016.

RP170x

NO.EA-205-160425

RP170Q Series marking list table

PKG: SC-88A (Non-promotion)

RP170Qxx2B

Product Name	①②③④	Vset
RP170Q122B	AA01	1.2V
RP170Q132B	AA03	1.3V
RP170Q142B	AA04	1.4V
RP170Q152B	AA05	1.5V
RP170Q162B	AA06	1.6V
RP170Q172B	AA07	1.7V
RP170Q182B	AA08	1.8V
RP170Q192B	AA10	1.9V
RP170Q202B	AA11	2.0V
RP170Q212B	AA12	2.1V
RP170Q222B	AA13	2.2V
RP170Q232B	AA14	2.3V
RP170Q242B	AA15	2.4V
RP170Q252B	AA16	2.5V
RP170Q262B	AA17	2.6V
RP170Q272B	AA18	2.7V
RP170Q282B	AA19	2.8V
RP170Q292B	AA21	2.9V
RP170Q302B	AA22	3.0V

Product Name	①②③④	Vset
RP170Q312B	AA23	3.1V
RP170Q322B	AA24	3.2V
RP170Q332B	AA25	3.3V
RP170Q342B	AA26	3.4V
RP170Q352B	AA27	3.5V
RP170Q362B	AA28	3.6V
RP170Q372B	AA29	3.7V
RP170Q382B	AA30	3.8V
RP170Q392B	AA31	3.9V
RP170Q402B	AA32	4.0V
RP170Q412B	AA33	4.1V
RP170Q422B	AA34	4.2V
RP170Q432B	AA35	4.3V
RP170Q442B	AA36	4.4V
RP170Q452B	AA37	4.5V
RP170Q462B	AA38	4.6V
RP170Q472B	AA39	4.7V
RP170Q482B	AA40	4.8V
RP170Q492B	AA41	4.9V
RP170Q502B	AA42	5.0V

Product Name	①②③④	Vset
RP170Q512B	AA43	5.1V
RP170Q522B	AA44	5.2V
RP170Q532B	AA45	5.3V
RP170Q542B	AA46	5.4V
RP170Q552B	AA47	5.5V
RP170Q562B	AA48	5.6V
RP170Q572B	AA49	5.7V
RP170Q582B	AA50	5.8V
RP170Q592B	AA51	5.9V
RP170Q602B	AA52	6.0V
RP170Q122B5	AA02	1.25V
RP170Q182B5	AA09	1.85V
RP170Q282B5	AA20	2.85V

RP170Qxx2D

Product Name	①②③④	Vset
RP170Q122D	AB01	1.2V
RP170Q132D	AB03	1.3V
RP170Q142D	AB04	1.4V
RP170Q152D	AB05	1.5V
RP170Q162D	AB06	1.6V
RP170Q172D	AB07	1.7V
RP170Q182D	AB08	1.8V
RP170Q192D	AB10	1.9V
RP170Q202D	AB11	2.0V
RP170Q212D	AB12	2.1V
RP170Q222D	AB13	2.2V
RP170Q232D	AB14	2.3V
RP170Q242D	AB15	2.4V
RP170Q252D	AB16	2.5V
RP170Q262D	AB17	2.6V
RP170Q272D	AB18	2.7V
RP170Q282D	AB19	2.8V
RP170Q292D	AB21	2.9V
RP170Q302D	AB22	3.0V

Product Name	①②③④	Vset
RP170Q312D	AB23	3.1V
RP170Q322D	AB24	3.2V
RP170Q332D	AB25	3.3V
RP170Q342D	AB26	3.4V
RP170Q352D	AB27	3.5V
RP170Q362D	AB28	3.6V
RP170Q372D	AB29	3.7V
RP170Q382D	AB30	3.8V
RP170Q392D	AB31	3.9V
RP170Q402D	AB32	4.0V
RP170Q412D	AB33	4.1V
RP170Q422D	AB34	4.2V
RP170Q432D	AB35	4.3V
RP170Q442D	AB36	4.4V
RP170Q452D	AB37	4.5V
RP170Q462D	AB38	4.6V
RP170Q472D	AB39	4.7V
RP170Q482D	AB40	4.8V
RP170Q492D	AB41	4.9V
RP170Q502D	AB42	5.0V

Product Name	①②③④	Vset
RP170Q512D	AB43	5.1V
RP170Q522D	AB44	5.2V
RP170Q532D	AB45	5.3V
RP170Q542D	AB46	5.4V
RP170Q552D	AB47	5.5V
RP170Q562D	AB48	5.6V
RP170Q572D	AB49	5.7V
RP170Q582D	AB50	5.8V
RP170Q592D	AB51	5.9V
RP170Q602D	AB52	6.0V
RP170Q122D5	AB02	1.25V
RP170Q182D5	AB09	1.85V
RP170Q282D5	AB20	2.85V

* RP170Q (SC-88A) is the discontinued product as of April, 2016.

RP170x

NO.EA-205-160425

• Power Dissipation (SOT-23-5)

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

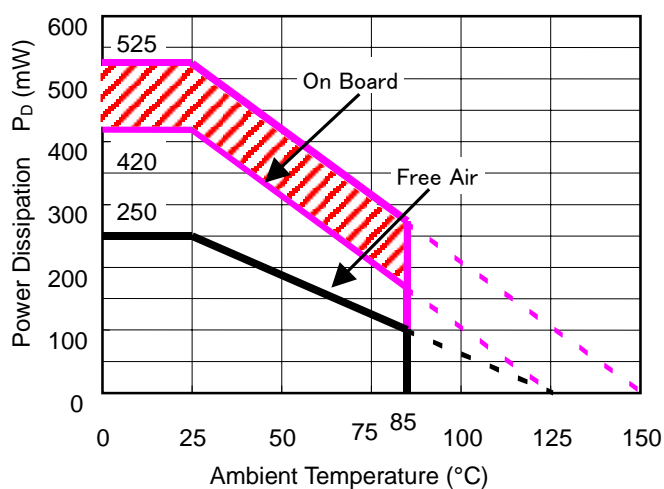
Measurement Conditions

	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

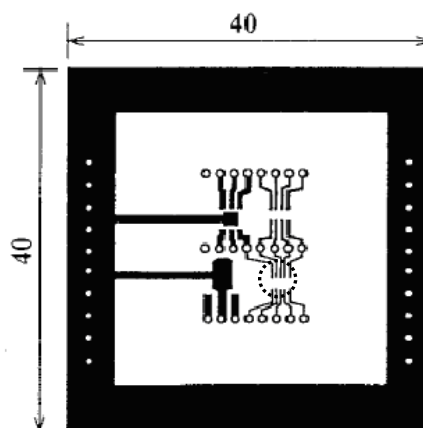
Measurement Result

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

	Standard Land Pattern	Free Air
Power Dissipation	420mW ($T_{jmax}=125^\circ\text{C}$) 525mW ($T_{jmax}=150^\circ\text{C}$)	250mW ($T_{jmax}=125^\circ\text{C}$)
Thermal Resistance	$\theta_{ja} = (125-25^\circ\text{C})/0.42\text{W} = 238^\circ\text{C/W}$	400 $^\circ\text{C/W}$



Power Dissipation



Measurement Board Pattern

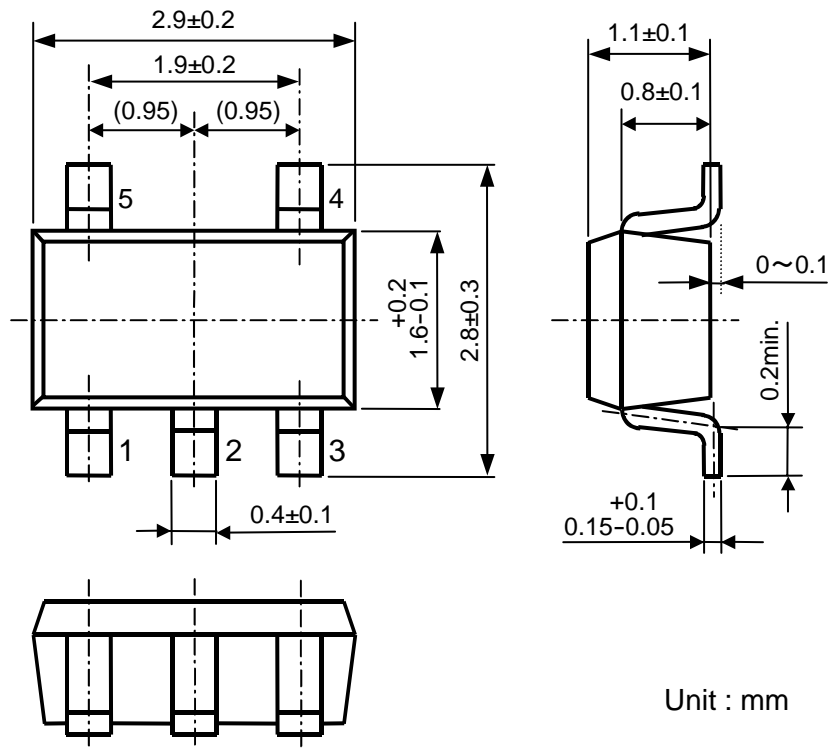
○ IC Mount Area (Unit: mm)

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

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

Operating Time	Estimated years (Operating 4 hours/day)
9,000 hours	6 years

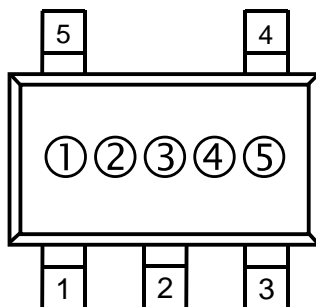
● Package Dimensions (SOT-23-5)



● Mark Specification (SOT-23-5)

①②③: Product Code ... Refer to the marking list table

④⑤: Lot No. ... Alphanumeric Serial Number



* RP170Q (SC-88A) is the discontinued product as of April, 2016.

RP170x

NO.EA-205-160425

RP170N Series marking list table

PKG: SOT-23-5

RP170Nxx1B

Product Name	①②③	Vset
RP170N121B	FAA	1.2V
RP170N131B	FAC	1.3V
RP170N141B	FAD	1.4V
RP170N151B	FAE	1.5V
RP170N161B	FAF	1.6V
RP170N171B	FAG	1.7V
RP170N181B	FAH	1.8V
RP170N191B	FAK	1.9V
RP170N201B	FAL	2.0V
RP170N211B	FAM	2.1V
RP170N221B	FAN	2.2V
RP170N231B	FAP	2.3V
RP170N241B	FAQ	2.4V
RP170N251B	FAR	2.5V
RP170N261B	FAS	2.6V
RP170N271B	FAT	2.7V
RP170N281B	FAU	2.8V
RP170N291B	FAW	2.9V
RP170N301B	FAX	3.0V

Product Name	①②③	Vset
RP170N311B	FAY	3.1V
RP170N321B	FAZ	3.2V
RP170N331B	GAA	3.3V
RP170N341B	GAB	3.4V
RP170N351B	GAC	3.5V
RP170N361B	GAD	3.6V
RP170N371B	GAE	3.7V
RP170N381B	GAF	3.8V
RP170N391B	GAG	3.9V
RP170N401B	GAH	4.0V
RP170N411B	GAJ	4.1V
RP170N421B	GAK	4.2V
RP170N431B	GAL	4.3V
RP170N441B	GAM	4.4V
RP170N451B	GAN	4.5V
RP170N461B	GAP	4.6V
RP170N471B	GAQ	4.7V
RP170N481B	GAR	4.8V
RP170N491B	GAS	4.9V
RP170N501B	GAT	5.0V

Product Name	①②③	Vset
RP170N511B	GAU	5.1V
RP170N521B	GAV	5.2V
RP170N531B	GAW	5.3V
RP170N541B	GAX	5.4V
RP170N551B	GAY	5.5V
RP170N561B	GAZ	5.6V
RP170N571B	HAA	5.7V
RP170N581B	HAB	5.8V
RP170N591B	HAC	5.9V
RP170N601B	HAD	6.0V
RP170N121B5	FAB	1.25V
RP170N181B5	FAJ	1.85V
RP170N281B5	FAV	2.85V

RP170Nxx1D

Product Name	①②③	Vset
RP170N121D	FBA	1.2V
RP170N131D	FBC	1.3V
RP170N141D	FBD	1.4V
RP170N151D	FBE	1.5V
RP170N161D	FBF	1.6V
RP170N171D	FBG	1.7V
RP170N181D	FBH	1.8V
RP170N191D	FBK	1.9V
RP170N201D	FBL	2.0V
RP170N211D	FBM	2.1V
RP170N221D	FBN	2.2V
RP170N231D	FBP	2.3V
RP170N241D	FBQ	2.4V
RP170N251D	FBR	2.5V
RP170N261D	FBS	2.6V
RP170N271D	FBT	2.7V
RP170N281D	FBU	2.8V
RP170N291D	FBW	2.9V
RP170N301D	FBX	3.0V

Product Name	①②③	Vset
RP170N311D	FBY	3.1V
RP170N321D	FBZ	3.2V
RP170N331D	GBA	3.3V
RP170N341D	GBB	3.4V
RP170N351D	GBC	3.5V
RP170N361D	GBD	3.6V
RP170N371D	GBE	3.7V
RP170N381D	GBF	3.8V
RP170N391D	GBG	3.9V
RP170N401D	GBH	4.0V
RP170N411D	GBJ	4.1V
RP170N421D	GBK	4.2V
RP170N431D	GBL	4.3V
RP170N441D	GBM	4.4V
RP170N451D	GBN	4.5V
RP170N461D	GBP	4.6V
RP170N471D	GBQ	4.7V
RP170N481D	GBR	4.8V
RP170N491D	GBS	4.9V
RP170N501D	GBT	5.0V

Product Name	①②③	Vset
RP170N511D	GBU	5.1V
RP170N521D	GBV	5.2V
RP170N531D	GBW	5.3V
RP170N541D	GBX	5.4V
RP170N551D	GBY	5.5V
RP170N561D	GBZ	5.6V
RP170N571D	HBA	5.7V
RP170N581D	HBB	5.8V
RP170N591D	HBC	5.9V
RP170N601D	HBD	6.0V
RP170N121D5	FBB	1.25V
RP170N181D5	FBJ	1.85V
RP170N281D5	FBV	2.85V

* RP170Q (SC-88A) is the discontinued product as of April, 2016.

RP170x

NO.EA-205-160425

● **Power Dissipation (SOT-89-5)**

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

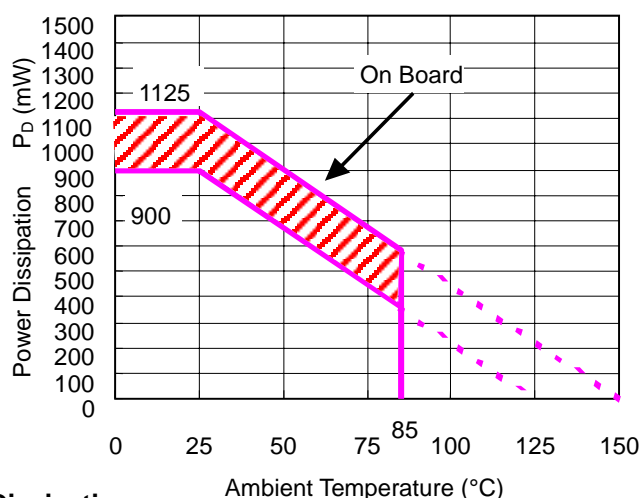
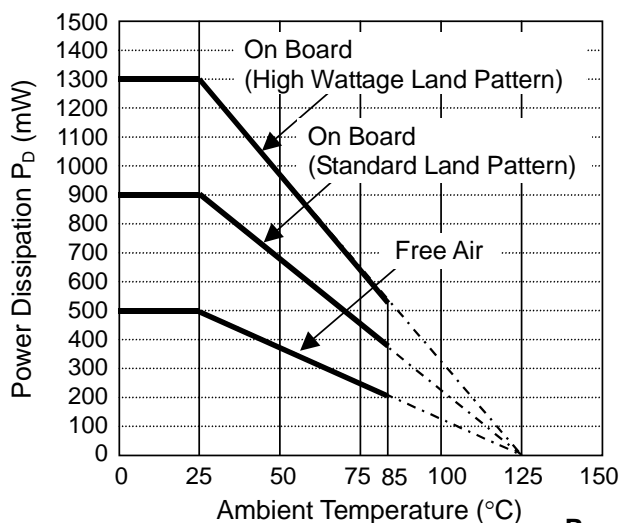
Measurement Conditions

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

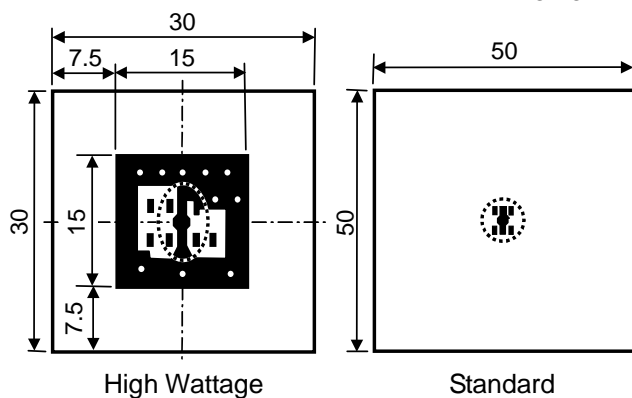
Measurement Result

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

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



Power Dissipation



Measurement Board Pattern

○ IC Mount Area Unit: mm

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

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

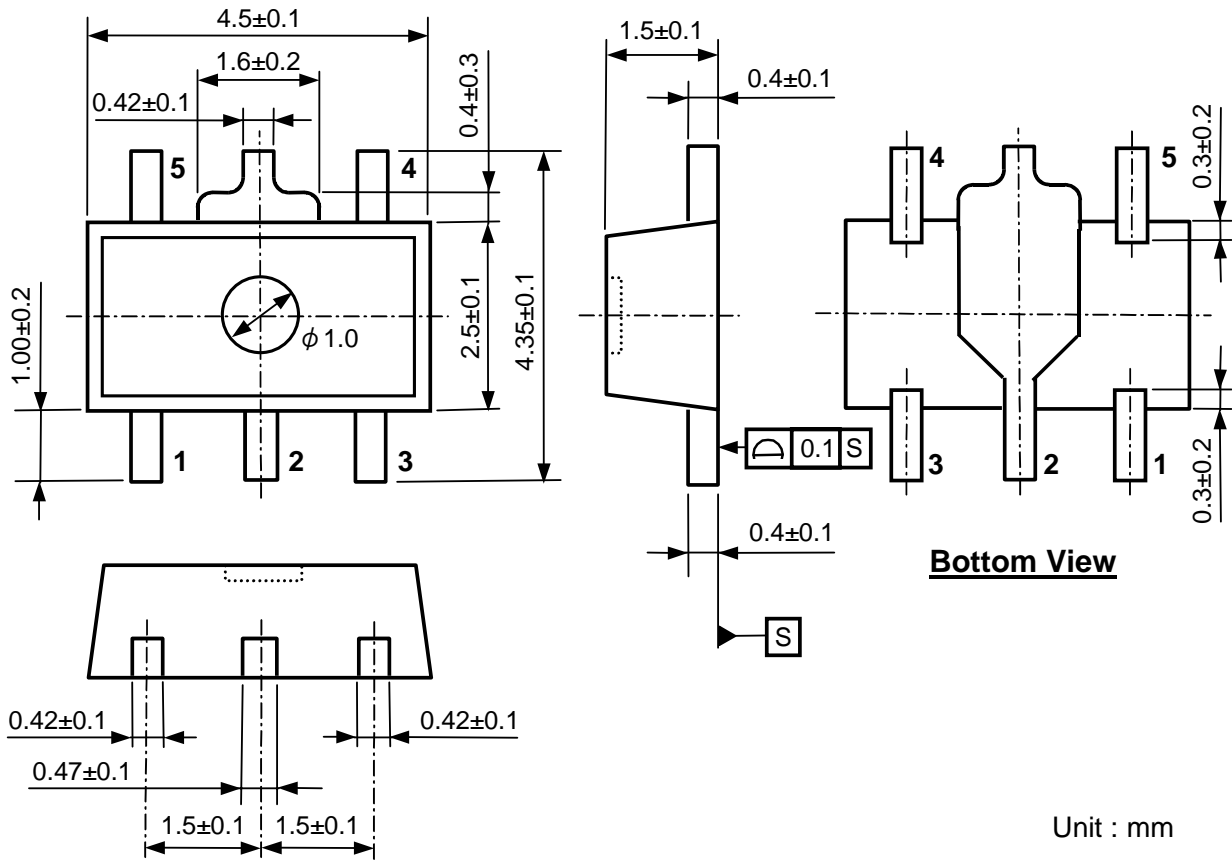
Operating time must be within the time limit described in the table below, in case of operating in the shaded area.

Operating Time	Estimated years (Operating four hours/day)
9,000 hours	6years

RP170x

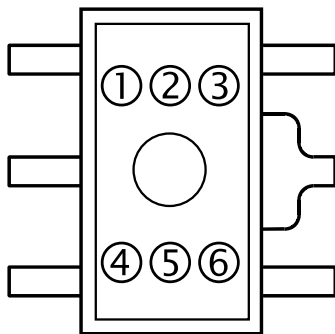
NO.EA-205-160425

● **Package Dimensions (SOT-89-5)**



● **Mark Specification (SOT-89-5)**

- ①②③④ : Product Code.....Refer to the mark list table
- ⑤⑥ : Lot No.Alphanumeric serial number.



* RP170Q (SC-88A) is the discontinued product as of April, 2016.

RP170x

NO.EA-205-160425

RP170H Series marking list table

PKG: SOT-89-5

RP170Hxx1B

Product Name	①②③④	Vset
RP170H121B	Y12B	1.2V
RP170H131B	Y13B	1.3V
RP170H141B	Y14B	1.4V
RP170H151B	Y15B	1.5V
RP170H161B	Y16B	1.6V
RP170H171B	Y17B	1.7V
RP170H181B	Y18B	1.8V
RP170H191B	Y19B	1.9V
RP170H201B	Y20B	2.0V
RP170H211B	Y21B	2.1V
RP170H221B	Y22B	2.2V
RP170H231B	Y23B	2.3V
RP170H241B	Y24B	2.4V
RP170H251B	Y25B	2.5V
RP170H261B	Y26B	2.6V
RP170H271B	Y27B	2.7V
RP170H281B	Y28B	2.8V
RP170H291B	Y29B	2.9V
RP170H301B	Y30B	3.0V

Product Name	①②③④	Vset
RP170H311B	Y31B	3.1V
RP170H321B	Y32B	3.2V
RP170H331B	Y33B	3.3V
RP170H341B	Y34B	3.4V
RP170H351B	Y35B	3.5V
RP170H361B	Y36B	3.6V
RP170H371B	Y37B	3.7V
RP170H381B	Y38B	3.8V
RP170H391B	Y39B	3.9V
RP170H401B	Y40B	4.0V
RP170H411B	Y41B	4.1V
RP170H421B	Y42B	4.2V
RP170H431B	Y43B	4.3V
RP170H441B	Y44B	4.4V
RP170H451B	Y45B	4.5V
RP170H461B	Y46B	4.6V
RP170H471B	Y47B	4.7V
RP170H481B	Y48B	4.8V
RP170H491B	Y49B	4.9V
RP170H501B	Y50B	5.0V

Product Name	①②③④	Vset
RP170H511B	Y51B	5.1V
RP170H521B	Y52B	5.2V
RP170H531B	Y53B	5.3V
RP170H541B	Y54B	5.4V
RP170H551B	Y55B	5.5V
RP170H561B	Y56B	5.6V
RP170H571B	Y57B	5.7V
RP170H581B	Y58B	5.8V
RP170H591B	Y59B	5.9V
RP170H601B	Y60B	6.0V
RP170H121B5	Y01B	1.25V
RP170H181B5	Y02B	1.85V
RP170H281B5	Y03B	2.85V

RP170Hxx1D

Product Name	①②③④	Vset
RP170H121D	Y12D	1.2V
RP170H131D	Y13D	1.3V
RP170H141D	Y14D	1.4V
RP170H151D	Y15D	1.5V
RP170H161D	Y16D	1.6V
RP170H171D	Y17D	1.7V
RP170H181D	Y18D	1.8V
RP170H191D	Y19D	1.9V
RP170H201D	Y20D	2.0V
RP170H211D	Y21D	2.1V
RP170H221D	Y22D	2.2V
RP170H231D	Y23D	2.3V
RP170H241D	Y24D	2.4V
RP170H251D	Y25D	2.5V
RP170H261D	Y26D	2.6V
RP170H271D	Y27D	2.7V
RP170H281D	Y28D	2.8V
RP170H291D	Y29D	2.9V
RP170H301D	Y30D	3.0V

Product Name	①②③④	Vset
RP170H311D	Y31D	3.1V
RP170H321D	Y32D	3.2V
RP170H331D	Y33D	3.3V
RP170H341D	Y34D	3.4V
RP170H351D	Y35D	3.5V
RP170H361D	Y36D	3.6V
RP170H371D	Y37D	3.7V
RP170H381D	Y38D	3.8V
RP170H391D	Y39D	3.9V
RP170H401D	Y40D	4.0V
RP170H411D	Y41D	4.1V
RP170H421D	Y42D	4.2V
RP170H431D	Y43D	4.3V
RP170H441D	Y44D	4.4V
RP170H451D	Y45D	4.5V
RP170H461D	Y46D	4.6V
RP170H471D	Y47D	4.7V
RP170H481D	Y48D	4.8V
RP170H491D	Y49D	4.9V
RP170H501D	Y50D	5.0V

Product Name	①②③④	Vset
RP170H511D	Y51D	5.1V
RP170H521D	Y52D	5.2V
RP170H531D	Y53D	5.3V
RP170H541D	Y54D	5.4V
RP170H551D	Y55D	5.5V
RP170H561D	Y56D	5.6V
RP170H571D	Y57D	5.7V
RP170H581D	Y58D	5.8V
RP170H591D	Y59D	5.9V
RP170H601D	Y60D	6.0V
RP170H121D5	Y01D	1.25V
RP170H181D5	Y02D	1.85V
RP170H281D5	Y03D	2.85V



1. The products and the product specifications described in this document are subject to change or discontinuation of production without notice for reasons such as improvement. Therefore, before deciding to use the products, please refer to Ricoh sales representatives for the latest information thereon.
2. The materials in this document may not be copied or otherwise reproduced in whole or in part without prior written consent of Ricoh.
3. Please be sure to take any necessary formalities under relevant laws or regulations before exporting or otherwise taking out of your country the products or the technical information described herein.
4. The technical information described in this document shows typical characteristics of and example application circuits for the products. The release of such information is not to be construed as a warranty of or a grant of license under Ricoh's or any third party's intellectual property rights or any other rights.
5. The products listed in this document are intended and designed for use as general electronic components in standard applications (office equipment, telecommunication equipment, measuring instruments, consumer electronic products, amusement equipment etc.). Those customers intending to use a product in an application requiring extreme quality and reliability, for example, in a highly specific application where the failure or misoperation of the product could result in human injury or death (aircraft, spacevehicle, nuclear reactor control system, traffic control system, automotive and transportation equipment, combustion equipment, safety devices, life support system etc.) should first contact us.
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.



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.

RICOH RICOH ELECTRONIC DEVICES CO., LTD.

<https://www.e-devices.ricoh.co.jp/en/>

Sales & Support Offices

Ricoh Electronic Devices Co., Ltd.

Shin-Yokohama Office (International Sales)

2-3, Shin-Yokohama 3-chome, Kohoku-ku, Yokohama-shi, Kanagawa, 222-8530, Japan
Phone: +81-50-3814-7687 Fax: +81-45-474-0074

Ricoh Americas Holdings, Inc.

675 Campbell Technology Parkway, Suite 200 Campbell, CA 95008, U.S.A.
Phone: +1-408-610-3105

Ricoh Europe (Netherlands) B.V.

Semiconductor Support Centre

Prof. W.H. Keesomlaan 1, 1183 DJ Amstelveen, The Netherlands
Phone: +31-20-5474-309

Ricoh International B.V. - German Branch

Semiconductor Sales and Support Centre

Oberrather Strasse 6, 40472 Düsseldorf, Germany
Phone: +49-211-6546-0

Ricoh Electronic Devices Korea Co., Ltd.

3F, Haesung Bldg, 504, Teheran-ro, Gangnam-gu, Seoul, 135-725, Korea
Phone: +82-2-2135-5700 Fax: +82-2-2051-5713

Ricoh Electronic Devices Shanghai Co., Ltd.

Room 403, No.2 Building, No.690 Bibo Road, Pu Dong New District, Shanghai 201203,
People's Republic of China
Phone: +86-21-5027-3200 Fax: +86-21-5027-3299

Ricoh Electronic Devices Shanghai Co., Ltd.

Shenzhen Branch

1205, Block D (Jinlong Building), Kingkey 100, Hongbao Road, Luohu District,
Shenzhen, China
Phone: +86-755-8348-7600 Ext 225

Ricoh Electronic Devices Co., Ltd.

Taipei office

Room 109, 10F-1, No.51, Hengyang Rd., Taipei City, Taiwan (R.O.C.)
Phone: +886-2-2313-1621/1622 Fax: +886-2-2313-1623

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Ricoh Electronics:

[RP170N501B-TR-FE](#) [RP170H251D-T1-FE](#) [RP170N501D-TR-FE](#) [RP170N251B-TR-FE](#) [RP170N601D-TR-FE](#)
[RP170H151B-T1-FE](#) [RP170H181D-T1-FE](#) [RP170H501B-T1-FE](#) [RP170N451D-TR-FE](#) [RP170N181D-TR-FE](#)
[RP170N301D-TR-FE](#) [RP170N331B-TR-FE](#) [RP170N331D-TR-FE](#) [RP170H181B-T1-FE](#) [RP170H121B-T1-FE](#)
[RP170N181B-TR-FE](#) [RP170N301B-TR-FE](#) [RP170H331D-T1-FE](#) [RP170H331B-T1-FE](#) [RP170H301B-T1-FE](#)
[RP170H121D-T1-FE](#) [RP170N251D-TR-FE](#) [RP170N121B-TR-FE](#) [RP170N121D-TR-FE](#)