

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

# RICOH

## RP170x SERIES

---

### 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 $\mu$ 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 $\mu$ A
- Standby Mode ..... Typ. 0.1 $\mu$ 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 $\mu$ 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

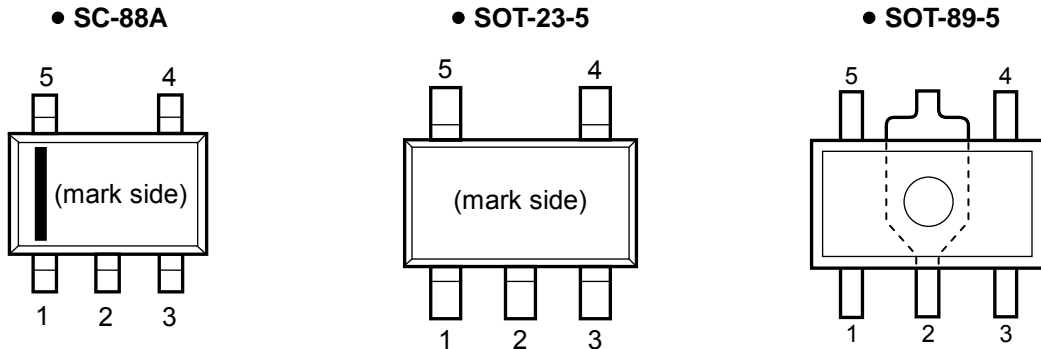
The output voltage, auto discharge function, and package for the ICs can be selected at the user's request.

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 <sub>OUT</sub>	Output Pin
5	V <sub>DD</sub>	Input Pin

### • SOT-23-5

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

### • SOT-89-5

Pin No	Symbol	Pin Description
1	V <sub>OUT</sub>	Output Pin
2	GND	Ground Pin
3	CE	Chip Enable Pin ("H" Active)
4	NC	No Connection
5	V <sub>DD</sub>	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<sub>IN</sub>=Set V<sub>OUT</sub>+1V, I<sub>OUT</sub>=1mA, unless otherwise noted.□ values indicate -40°C ≤ T<sub>opt</sub> ≤ 85°C, unless otherwise noted.T<sub>opt</sub>=25°C

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

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

## RP170x

NO.EA-205-160425

## TYPICAL APPLICATION



(External Components)

C2 1.0 $\mu$ 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 $\mu$ F or more and good ESR (Equivalent Series Resistance).

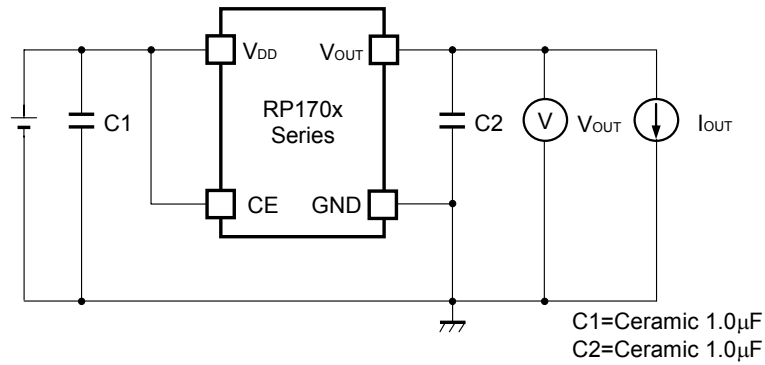
(Note: If additional ceramic capacitors are connected with parallel to the output pin with an output capacitor for phase compensation, the operation might be unstable. Because of this, test these ICs with as same external components as ones to be used on the PCB.)

### PCB Layout

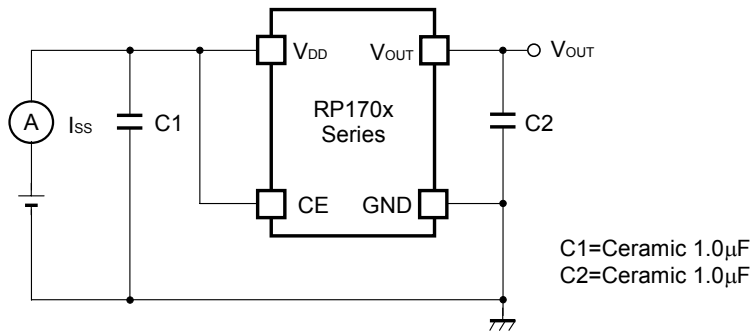
Make  $V_{DD}$  and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a capacitor C1 with a capacitance value as much as 1.0 $\mu$ F or more between  $V_{DD}$  and GND pin, and as close as possible to the pins.

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

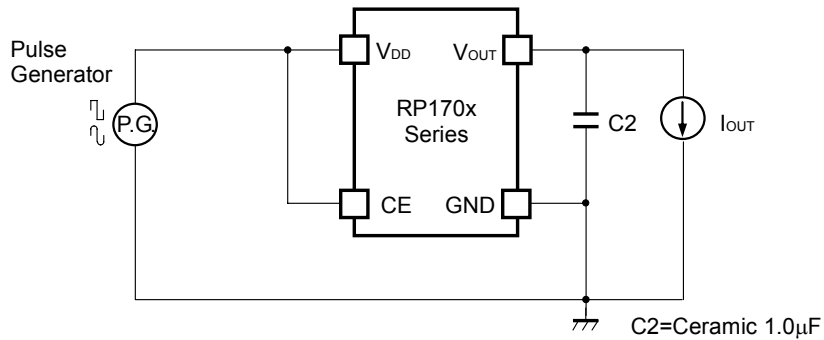
## TEST CIRCUITS



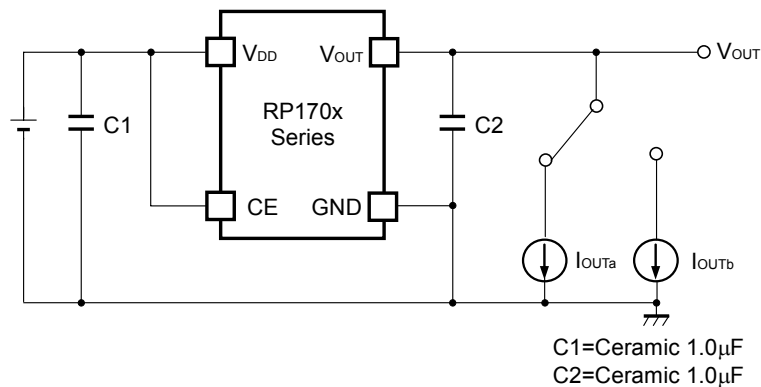
Basic Test Circuit



Test Circuit for Supply Current



Test Circuit for Ripple Rejection



Test Circuit for Load Transient Response

**RP170x**

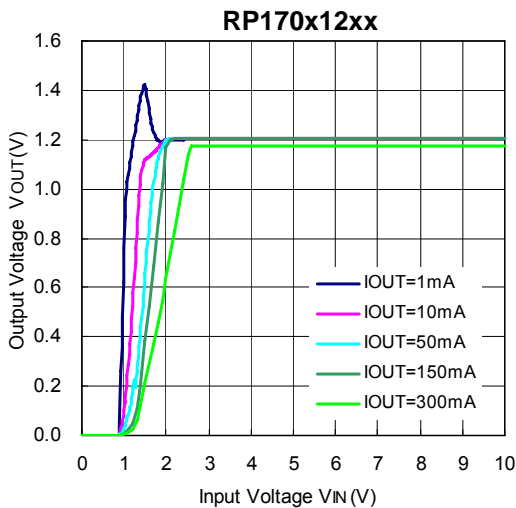
NO.EA-205-160425

**TYPICAL CHARACTERISTICS**

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



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

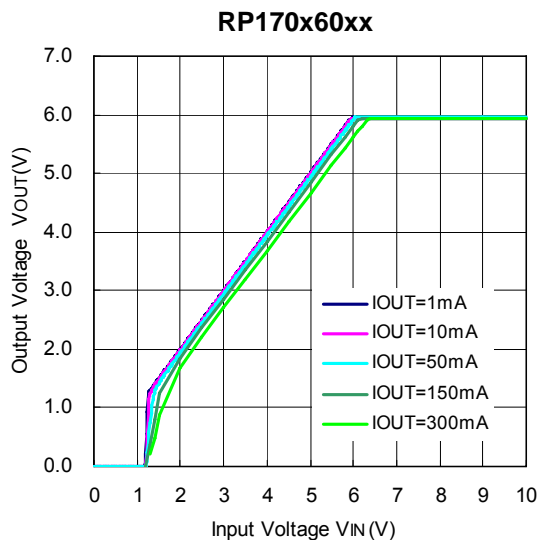




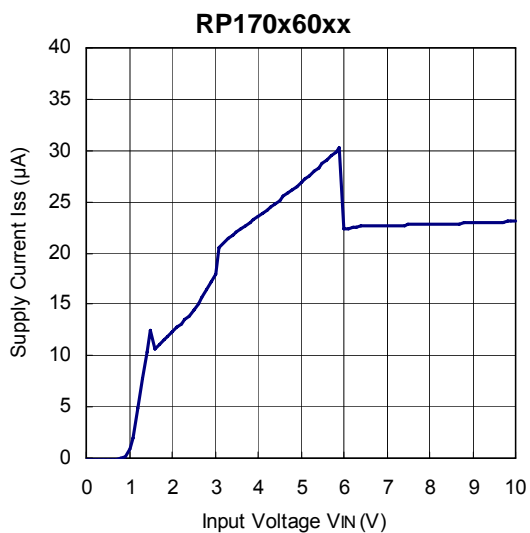
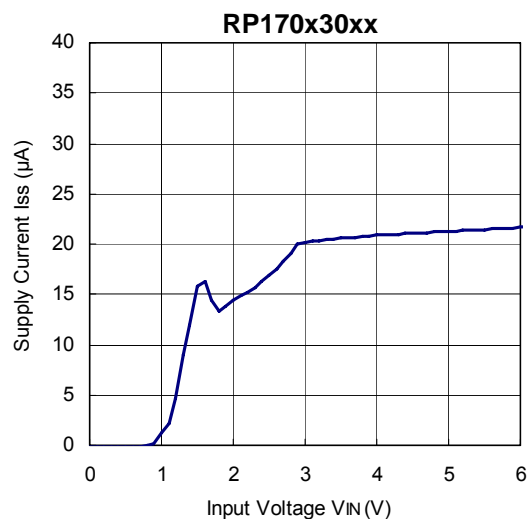
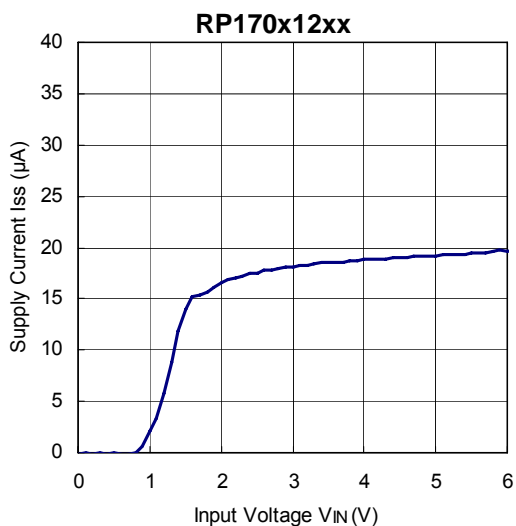
\* RP170Q (SC-88A) is the discontinued product as of April, 2016.

RP170x

NO.EA-205-160425



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



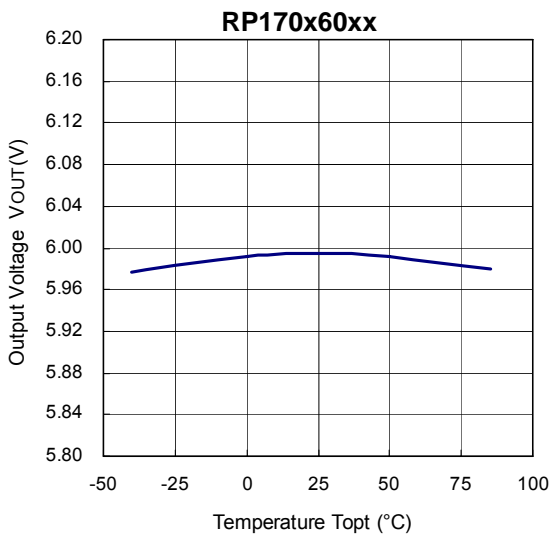
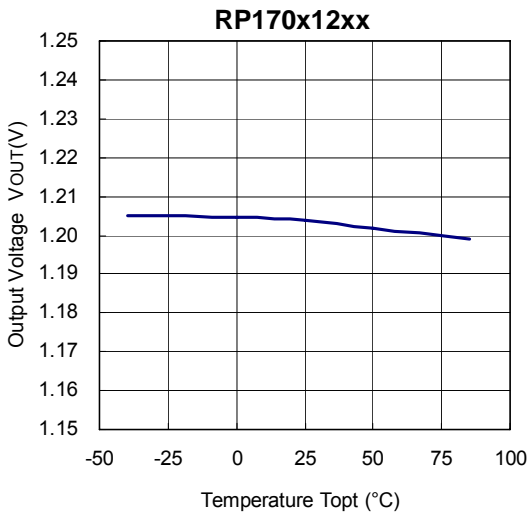
## RP170x

NO.EA-205-160425

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

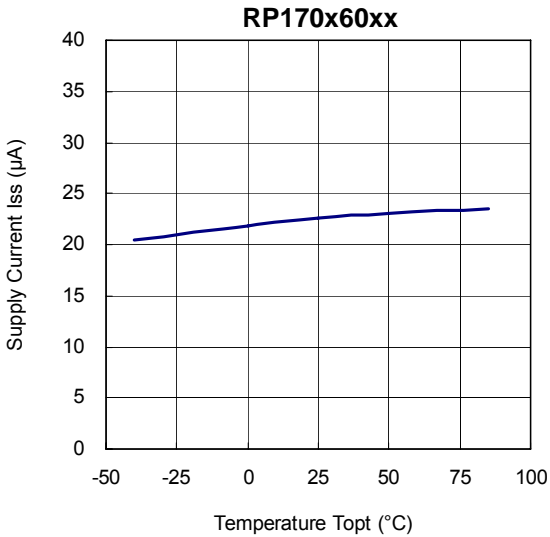
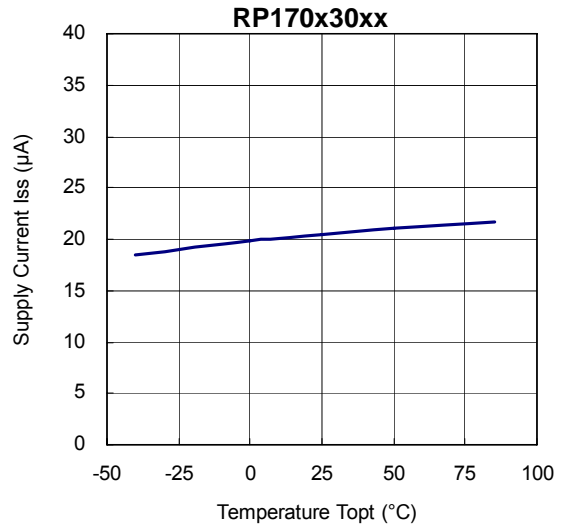
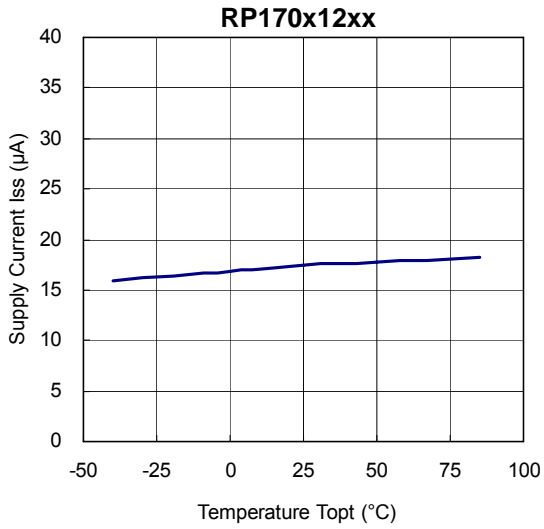


### 5) Output Voltage vs. Temperature

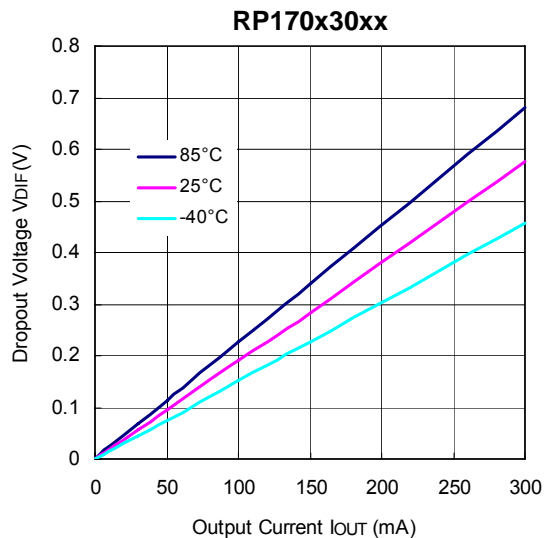
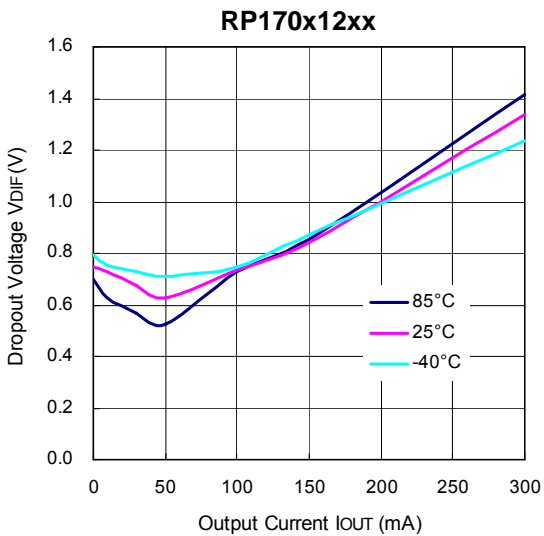


\* RP170Q (SC-88A) is the discontinued product as of April, 2016.

### 6) Supply Current vs. Temperature

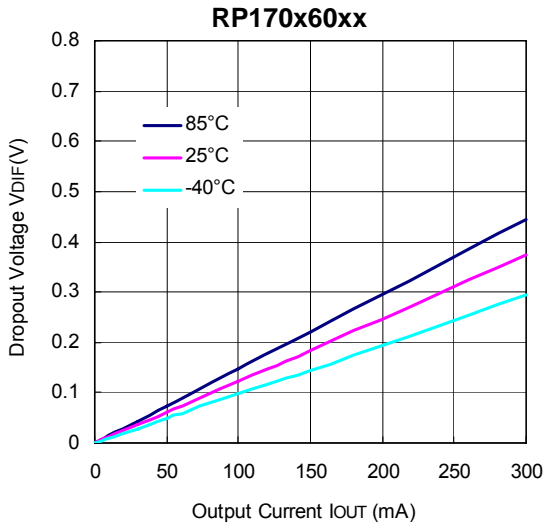


### 7) Dropout Voltage vs. Output Current



**RP170x**

NO.EA-205-160425



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

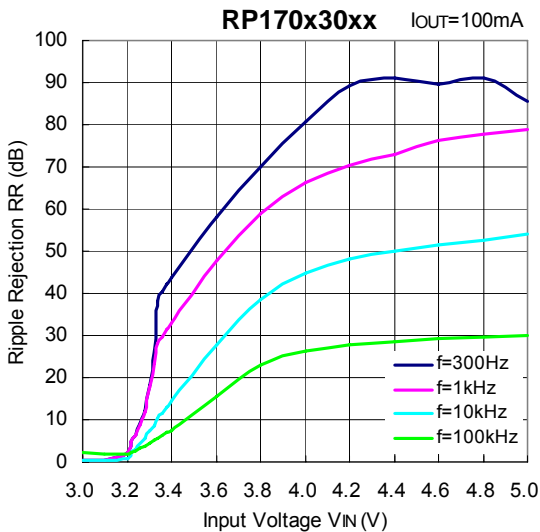
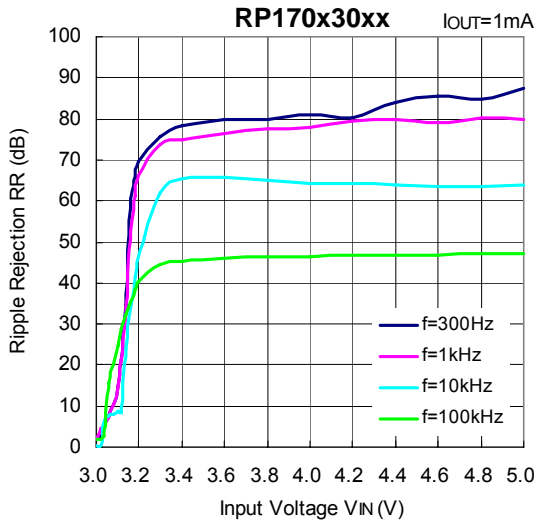


**9) Minimum Operating Voltage**

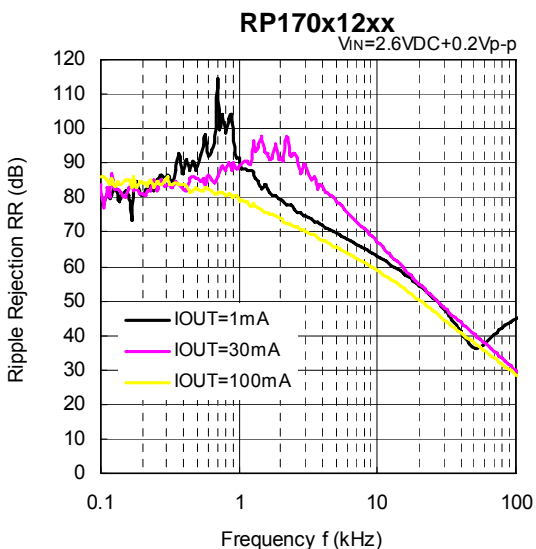


Hatched area is available for 1.2V output

10) Ripple Rejection vs. Input Bias Voltage (C1=none, C2=Ceramic 1.0 $\mu$ F, Ripple=0.2Vp-p, T<sub>opt</sub>=25°C)

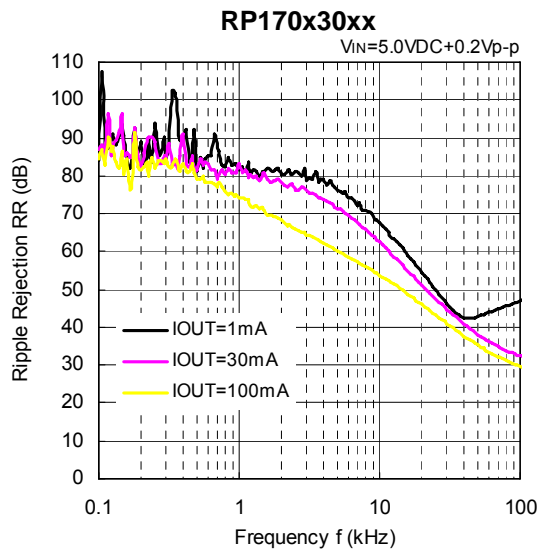
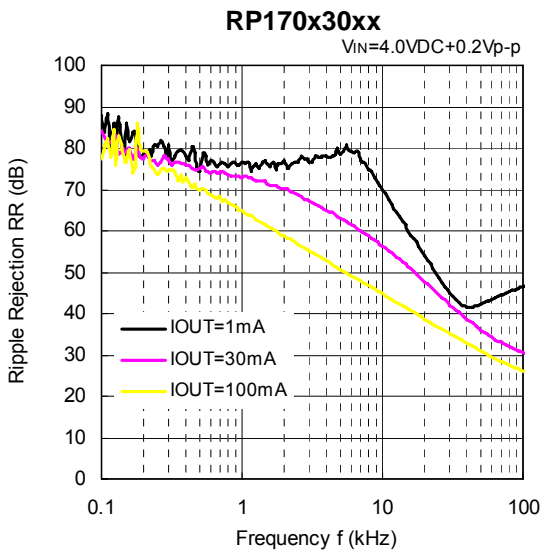


11) Ripple Rejection vs. Frequency (C1=none, C2=Ceramic 1.0 $\mu$ F, T<sub>opt</sub>=25°C)

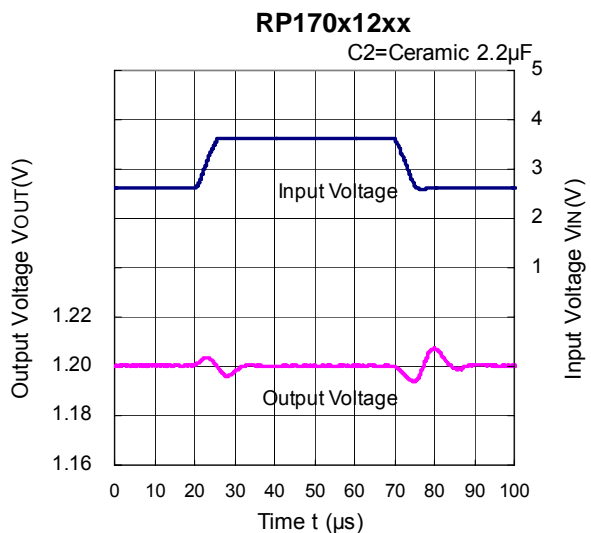
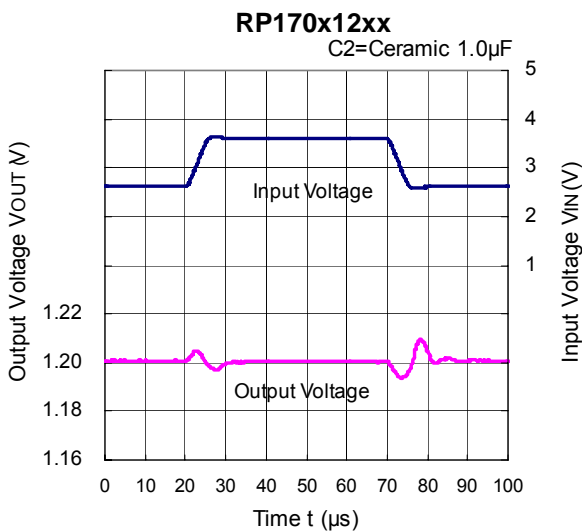


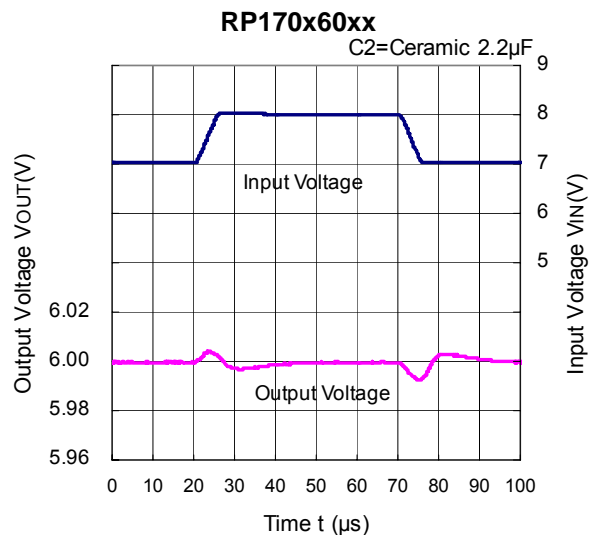
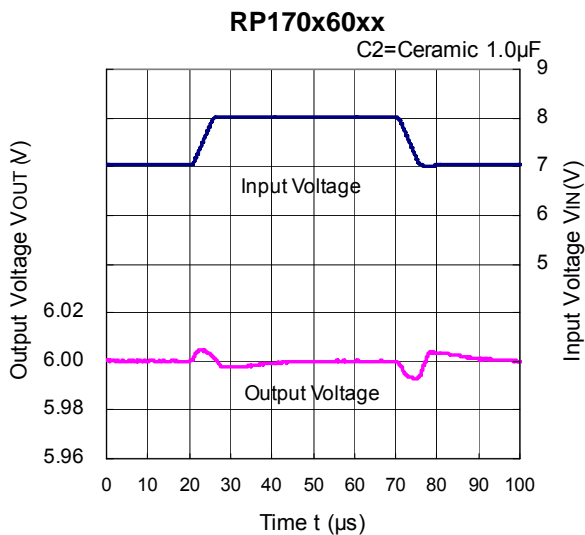
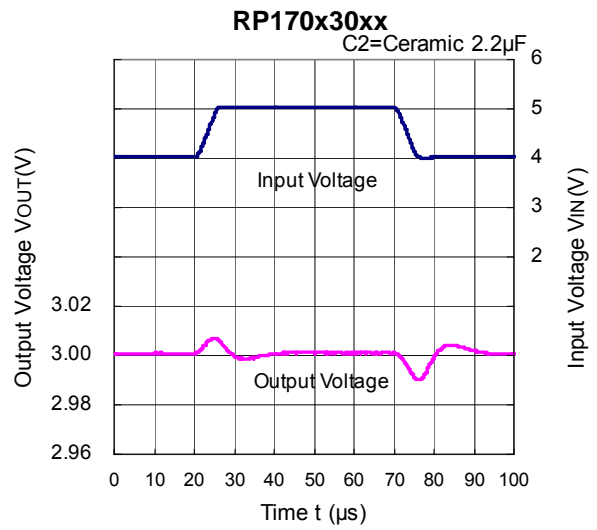
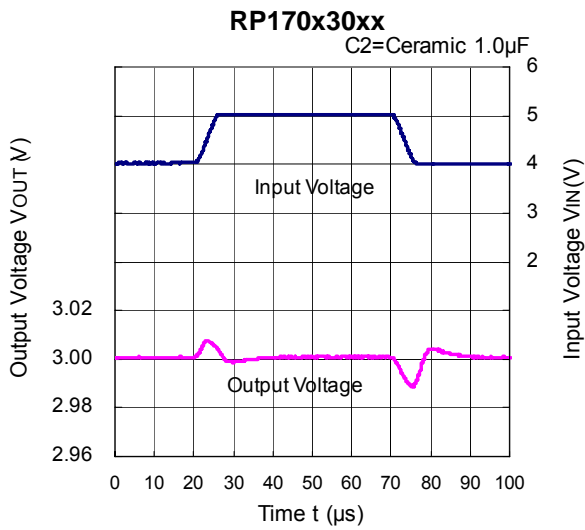
**RP170x**

NO.EA-205-160425

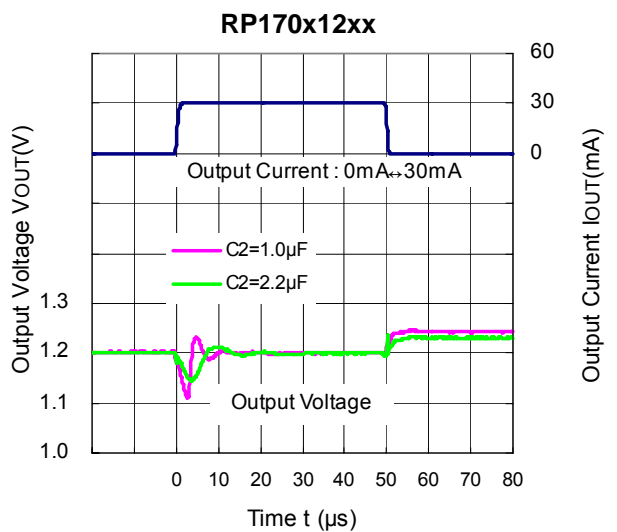


**12) Input Transient Response (C1=none, IOUT=30mA, tr=tf=5μs, Topt=25°C)**



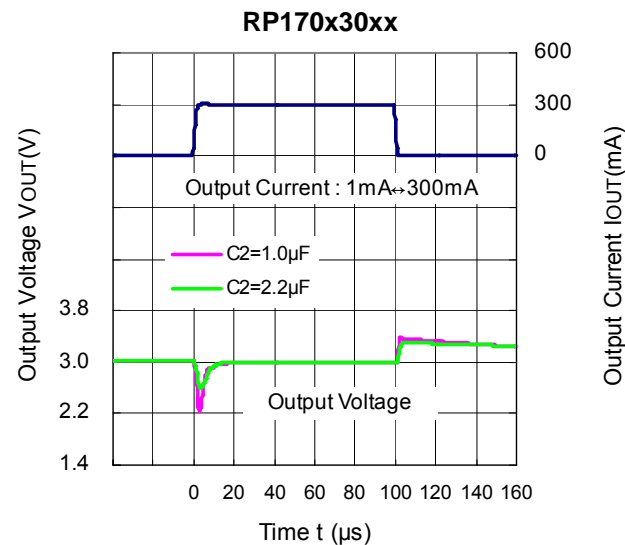
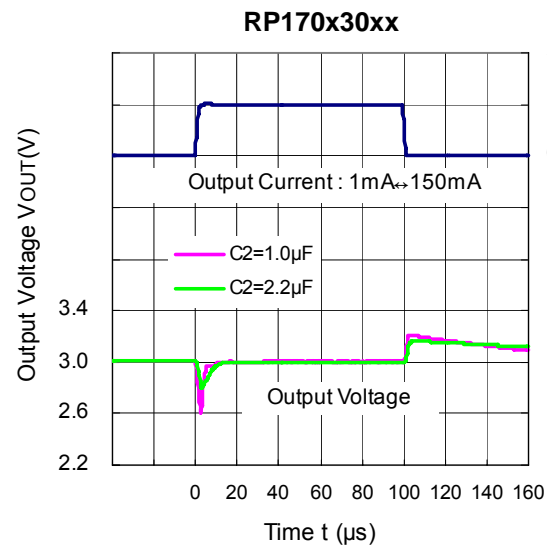
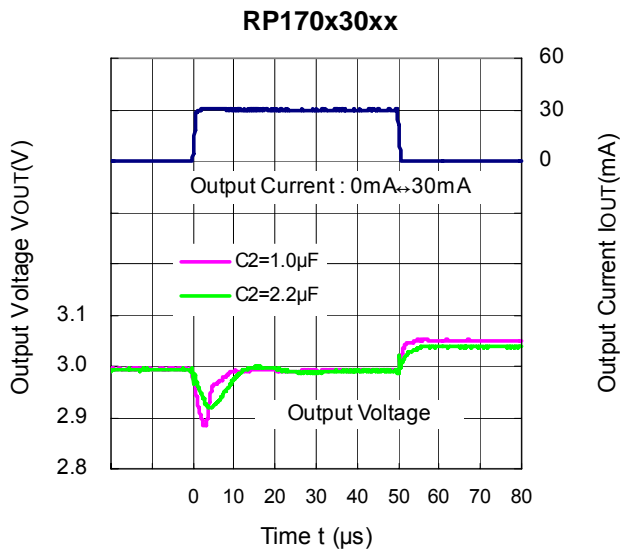
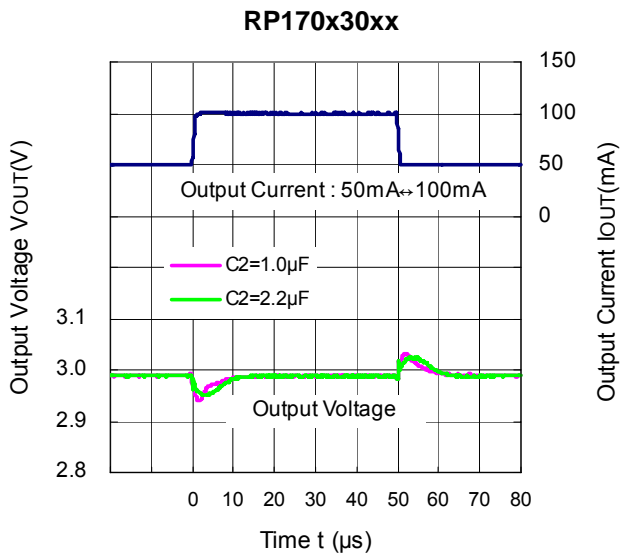
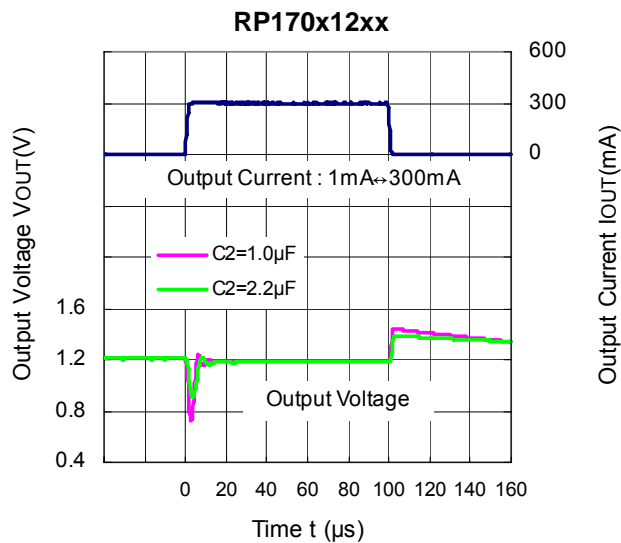
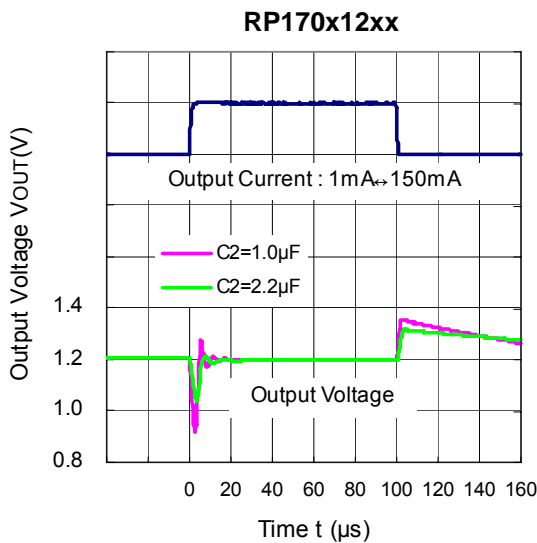


**13) Load Transient Response (C1=Ceramic 1.0 $\mu$ F,  $t_r=t_f=500ns$ ,  $T_{opt}=25^\circ C$ )**

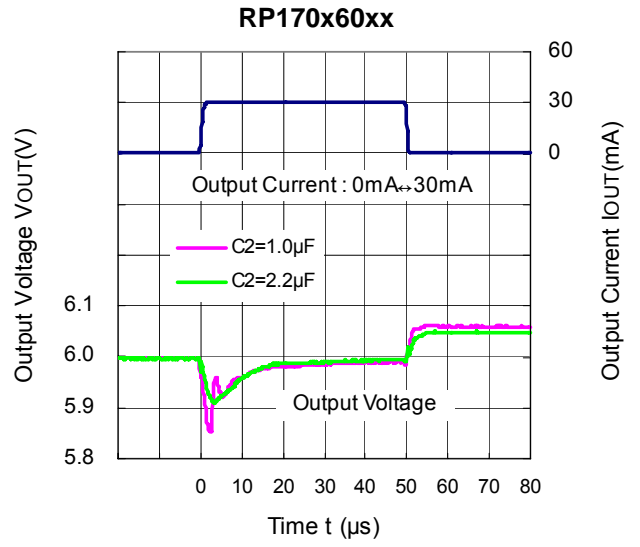
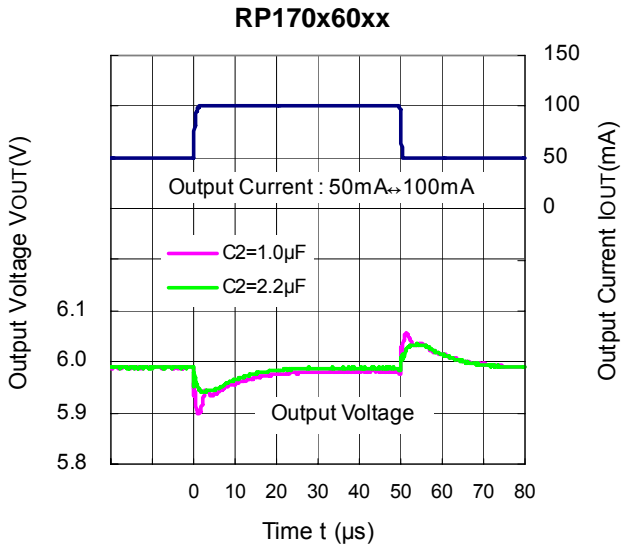


**RP170x**

NO.EA-205-160425





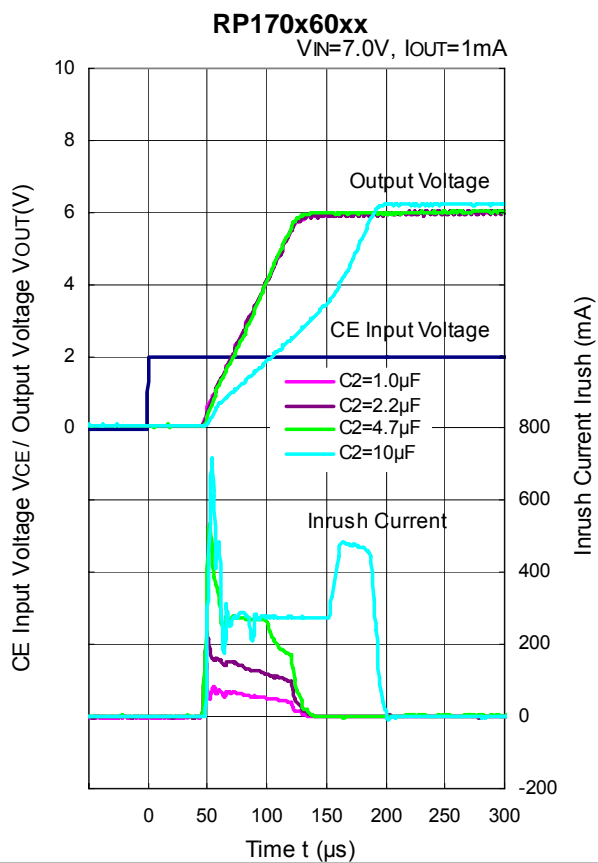
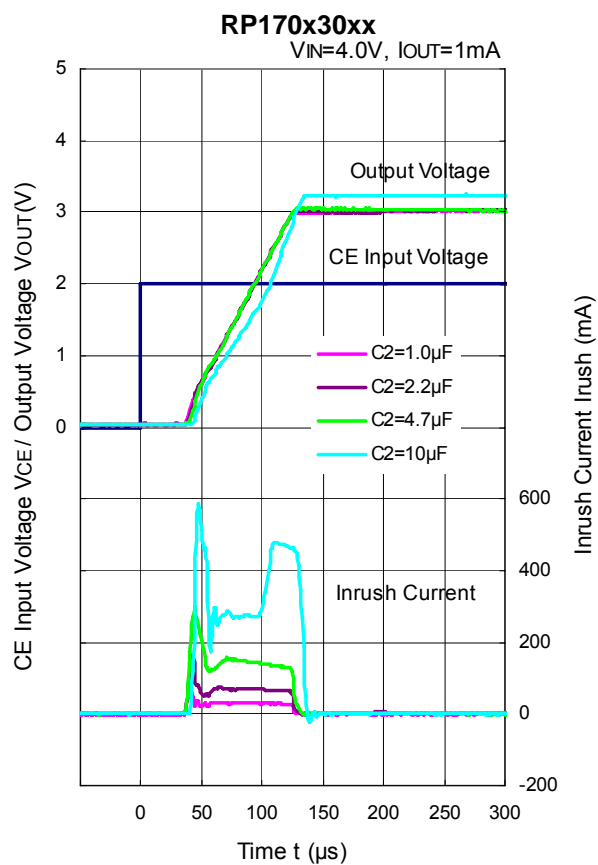
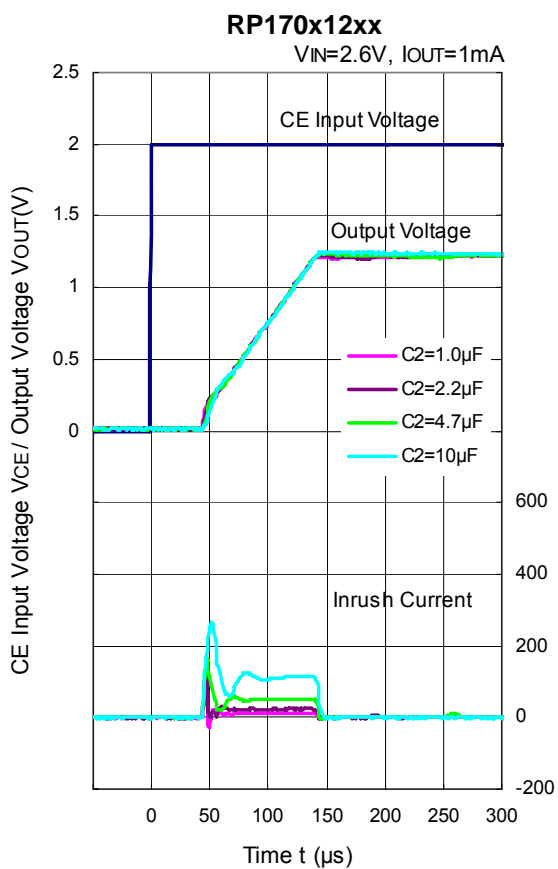


**RP170x**

NO.EA-205-160425

**14) Turn On Speed with CE pin (C1=Ceramic 1.0μF, T<sub>opt</sub>=25°C)**



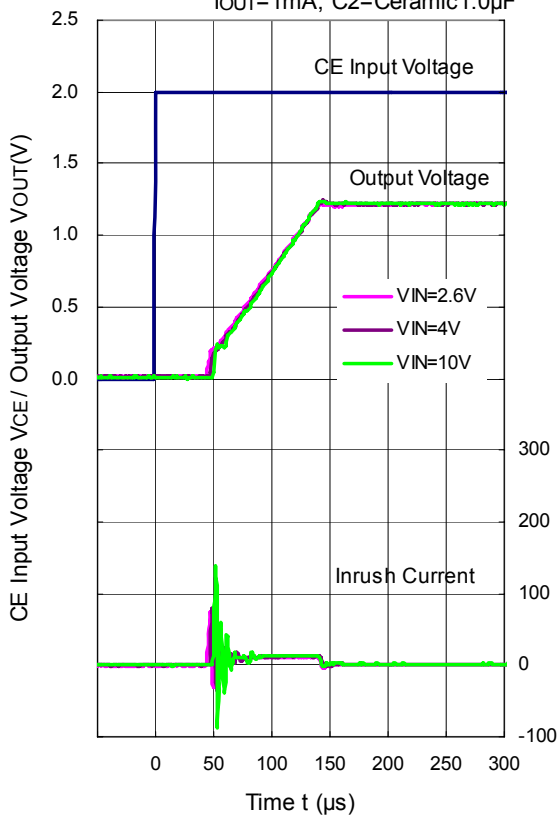


**RP170x**

NO.EA-205-160425

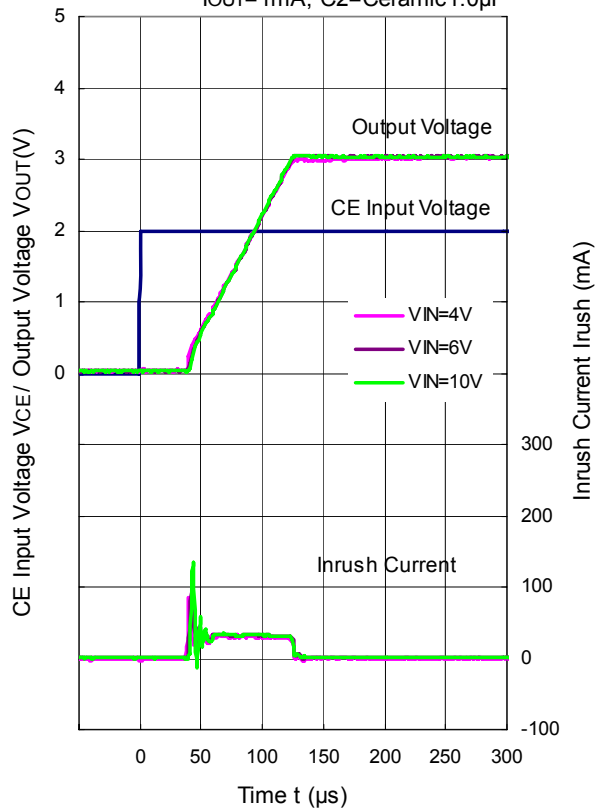
**RP170x12xx**

I<sub>OUT</sub>=1mA, C<sub>2</sub>=Ceramic1.0μF



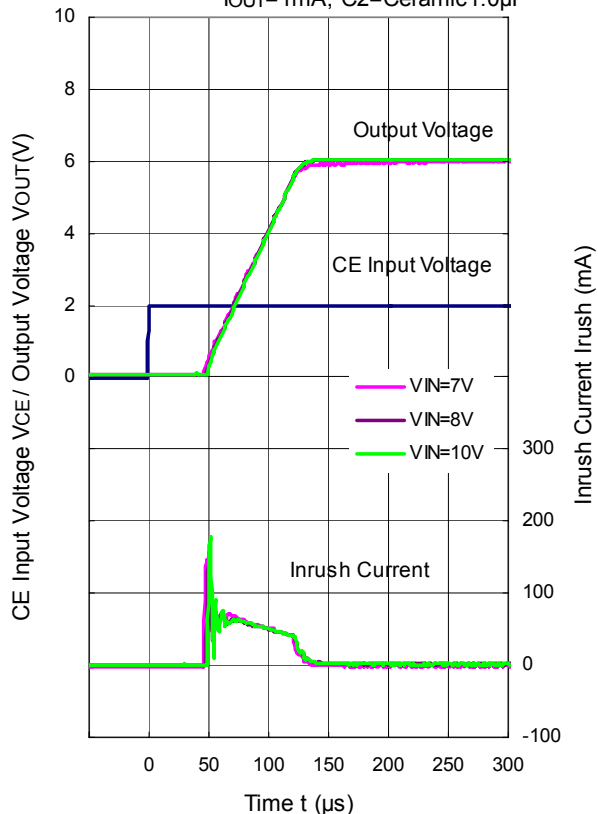
**RP170x30xx**

I<sub>OUT</sub>=1mA, C<sub>2</sub>=Ceramic1.0μF

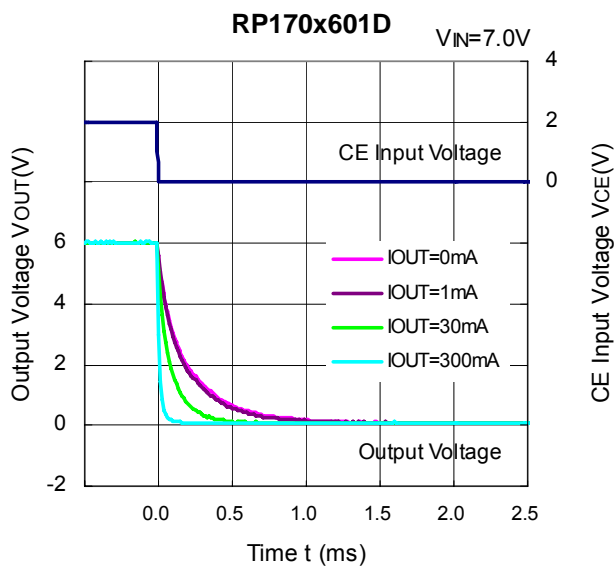


**RP170x60xx**

I<sub>OUT</sub>=1mA, C<sub>2</sub>=Ceramic1.0μF



15) Turn Off Speed with CE pin (D Version) (C1=Ceramic 1.0 $\mu$ F, T<sub>opt</sub>=25°C)



## RP170x

NO.EA-205-160425

### ESR vs. Output Current

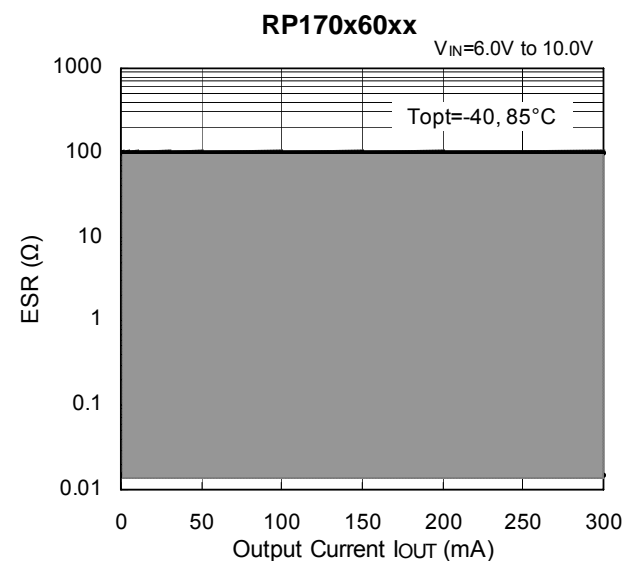
Ceramic type output capacitor is recommended for this series; however, the other output capacitors with low ESR also can be used. The relations between  $I_{OUT}$  (Output Current) and ESR of an output capacitor are shown below. The conditions when the white noise level is under  $40\mu\text{V}$  (Avg.)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

#### Measurement conditions

Frequency Band : 10Hz to 2MHz

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

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;

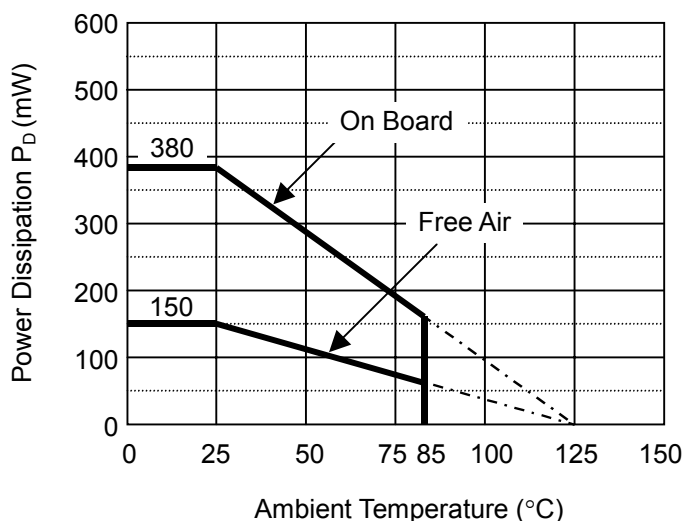
#### Measurement Conditions

	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

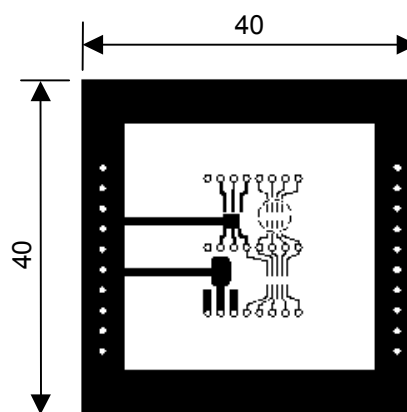
#### Measurement Result

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

	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

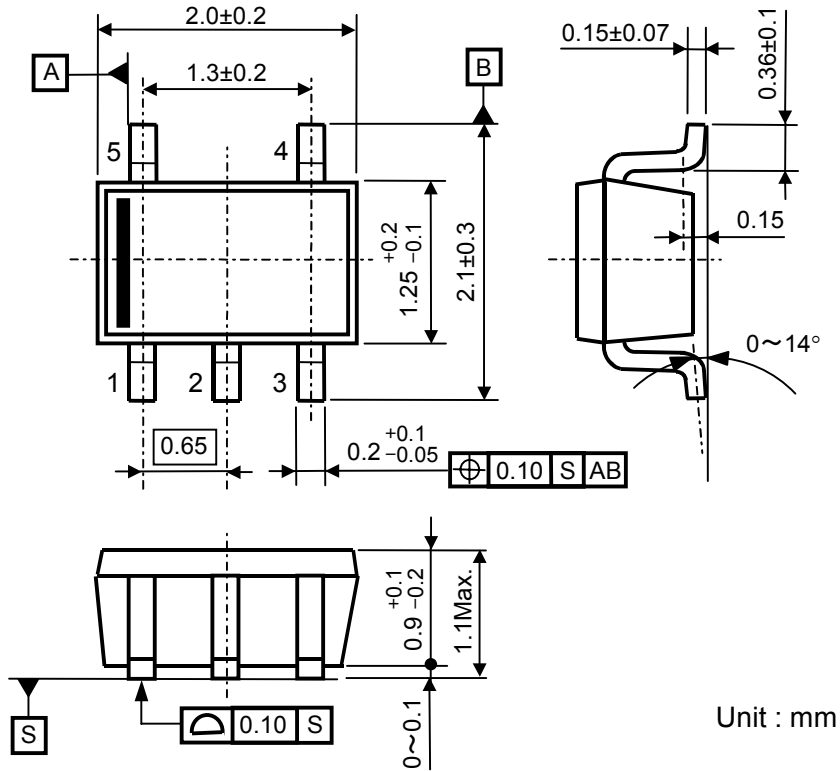
○ IC Mount Area (Unit : mm)

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

**RP170x**

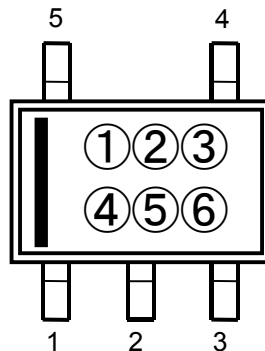
NO.EA-205-160425

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

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

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

### RP170Qxx2D

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

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

Product Name	①②③④	Vset
RP170Q512D	<b>AB43</b>	5.1V
RP170Q522D	<b>AB44</b>	5.2V
RP170Q532D	<b>AB45</b>	5.3V
RP170Q542D	<b>AB46</b>	5.4V
RP170Q552D	<b>AB47</b>	5.5V
RP170Q562D	<b>AB48</b>	5.6V
RP170Q572D	<b>AB49</b>	5.7V
RP170Q582D	<b>AB50</b>	5.8V
RP170Q592D	<b>AB51</b>	5.9V
RP170Q602D	<b>AB52</b>	6.0V
RP170Q122D5	<b>AB02</b>	1.25V
RP170Q182D5	<b>AB09</b>	1.85V
RP170Q282D5	<b>AB20</b>	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	$\phi$ 0.5mm x 44pcs

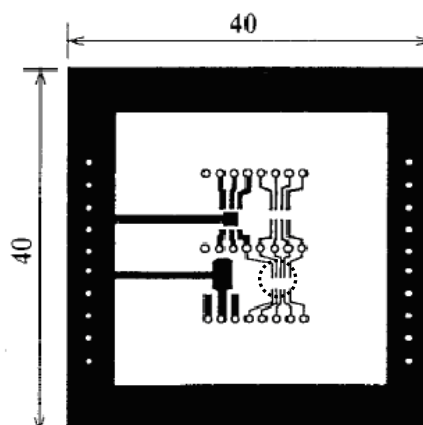
#### Measurement Result

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

	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

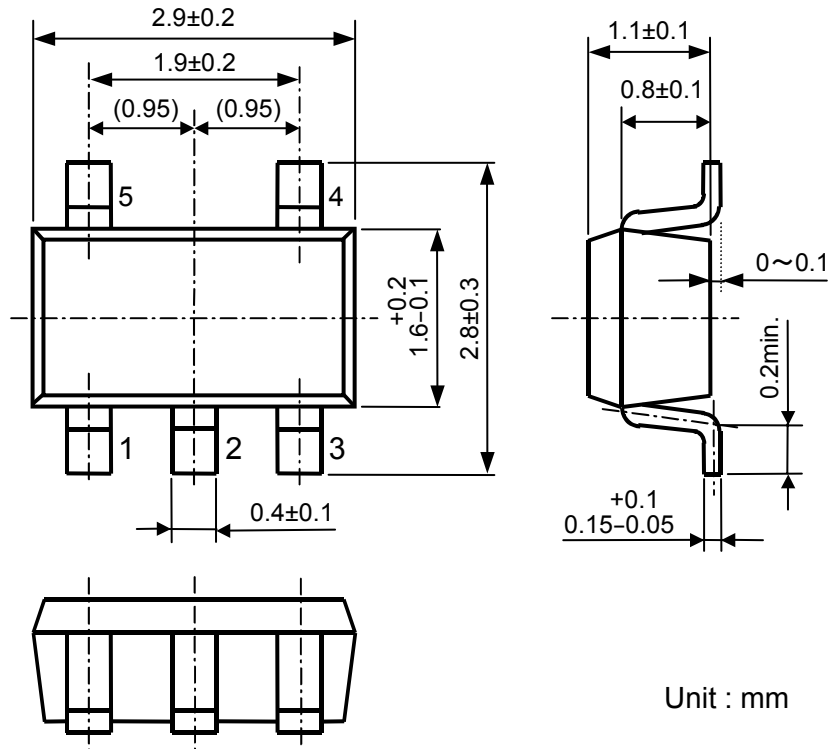
○ IC Mount Area (Unit: mm)

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

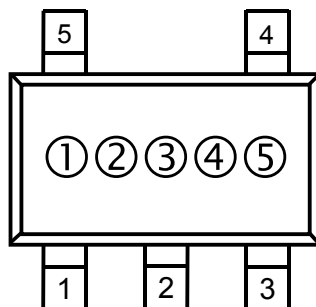
● Package Dimensions (SOT-23-5)



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

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

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

### RP170Nxx1D

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

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

Product Name	①②③	Vset
RP170N511D	<b>GBU</b>	5.1V
RP170N521D	<b>GBV</b>	5.2V
RP170N531D	<b>GBW</b>	5.3V
RP170N541D	<b>GBX</b>	5.4V
RP170N551D	<b>GBY</b>	5.5V
RP170N561D	<b>GBZ</b>	5.6V
RP170N571D	<b>HBA</b>	5.7V
RP170N581D	<b>HBB</b>	5.8V
RP170N591D	<b>HBC</b>	5.9V
RP170N601D	<b>HBD</b>	6.0V
RP170N121D5	<b>FBB</b>	1.25V
RP170N181D5	<b>FBJ</b>	1.85V
RP170N281D5	<b>FBV</b>	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	$\phi 0.85\text{mm} * 10\text{pcs}$	-

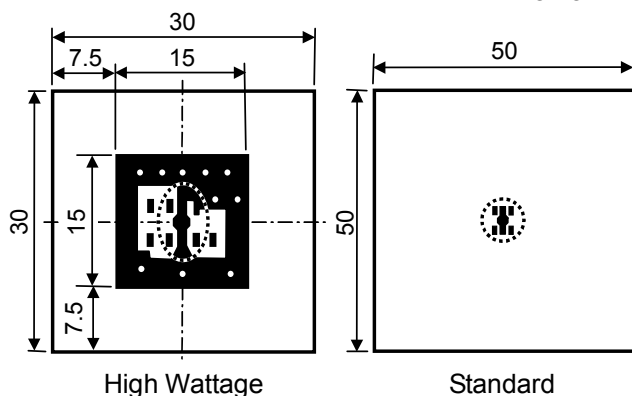
Measurement Result

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

	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	$77^\circ\text{C/W}$	$111^\circ\text{C/W}$	$200^\circ\text{C/W}$



**Power Dissipation**



**Measurement Board Pattern**

○ IC Mount Area Unit: mm

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

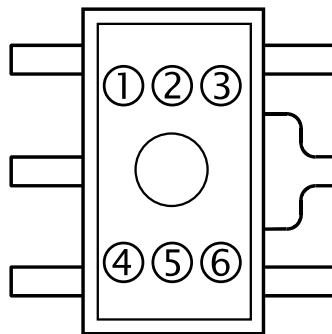
NO.EA-205-160425

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

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

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

### RP170Hxx1D

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

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

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

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

#### Sales & Support Offices

##### **RICOH ELECTRONIC DEVICES CO., LTD.**

**Higashi-Shinagawa Office (International Sales)**  
3-32-3, Higashi-Shinagawa, Shinagawa-ku, Tokyo 140-8655, Japan  
Phone: +81-3-5479-2857 Fax: +81-3-5479-0502

##### **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 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:

[RP170N421D-TR-FE](#) [RP170N281D-TR-FE](#) [RP170H501D-T1-FE](#) [RP170N281B-TR-FE](#) [RP170N401B-TR-FE](#)  
[RP170N321B-TR-FE](#) [RP170N321D-TR-FE](#)



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.