

- ◆ CMOS Low Power Consumption
- ◆ Small Input-Output Voltage Differential:
0.18V at 60mA, 0.58V at 160mA
- ◆ Maximum Output Current: 165mA ($V_{OUT}=3.0V$)
- ◆ Highly Accurate: $\pm 2\%$ ($\pm 1\%$)
- ◆ Output Voltage Range: 2.0V~6.0V
- ◆ Stand-by Supply Current: 0.1 μ A ($V_{OUT}=3.0V$)
- ◆ SOT-25/SOT-89-5 Package

General Description

The XC62H series are highly precise, low power consumption, positive voltage regulators, manufactured using CMOS and laser trimming technologies. The series consists of a high precision voltage reference, an error correction circuit, and an output driver with current limitation. By way of the CE function, with output turned off, the series enters stand-by. In the stand-by mode, power consumption is greatly reduced. SOT-25 (150mW) and SOT-89-5 (500mW) packages are available. In relation to the CE function, as well as the positive logic XC62HR series, a negative logic XC62HP series (custom) is also available.

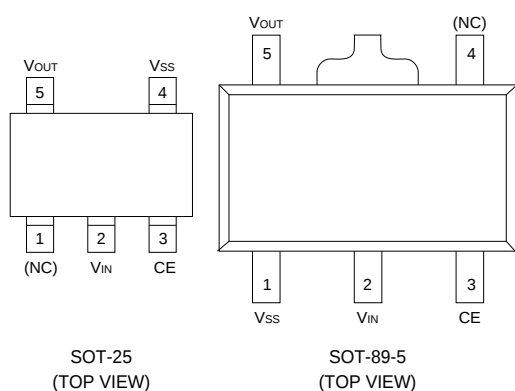
Applications

- Battery Powered Equipment
- Voltage supplies for cellular phones
- Cameras and Video Recorders
- Palmtops

Features

- Max. Output Current:** 165mA (within max. power dissipation, $V_{OUT}=3.0V$)
- Output Voltage Range:** 2.0V ~ 6.0V in 0.1V increments
(1.1V to 1.9V semi-custom)
- Highly Accurate:** Set-up Voltage $\pm 2\%$ ($\pm 1\%$ for semi-custom products)
- Low power consumption:** TYP 3.0 μ A ($V_{OUT}=3.0$, Output enabled)
TYP 0.1 μ A (Output disabled)
- Output voltage temperature characteristics:** TYP ± 100 ppm/ $^{\circ}$ C
- Input stability:** TYP 0.2%/V
- Ultra small package:** SOT-25 (150mW) mini-mold
SOT-89-5 (500mW) mini-power mold

Pin Configuration



Pin Assignment

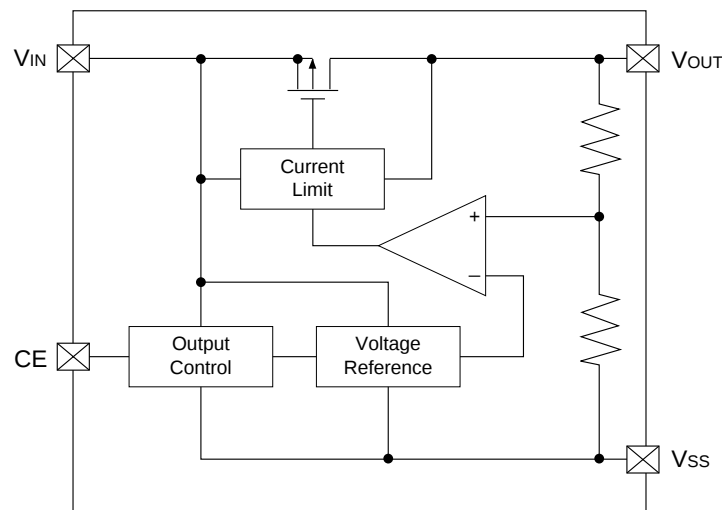
PIN NUMBER		PIN NAME	FUNCTION
SOT-25	SOT-89-5		
1	4	(NC)	No Connection
2	2	V _{IN}	Supply Voltage Input
3	3	CE	Chip Enable
4	1	V _{SS}	Ground
5	5	V _{OUT}	Regulated Output Voltage

Function

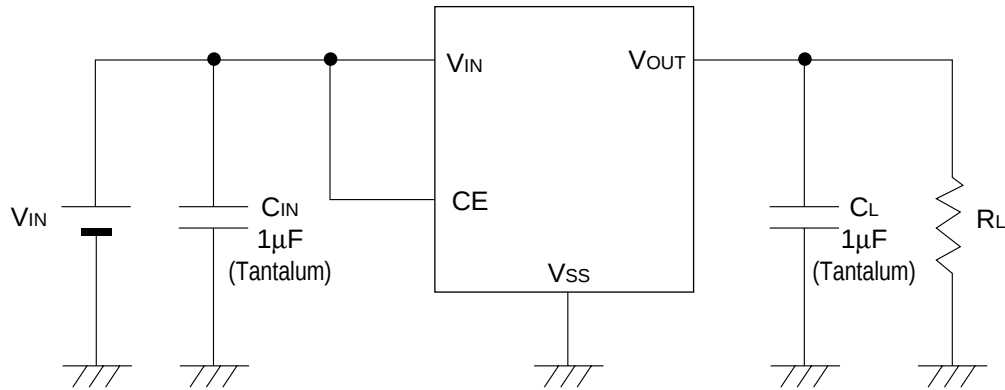
SERIES	CE	VOLTAGE OUTPUT
XC62HR	H	ON
	L	OFF
XC62HP	H	OFF
	L	ON

H=High, L=Low

Block Diagram

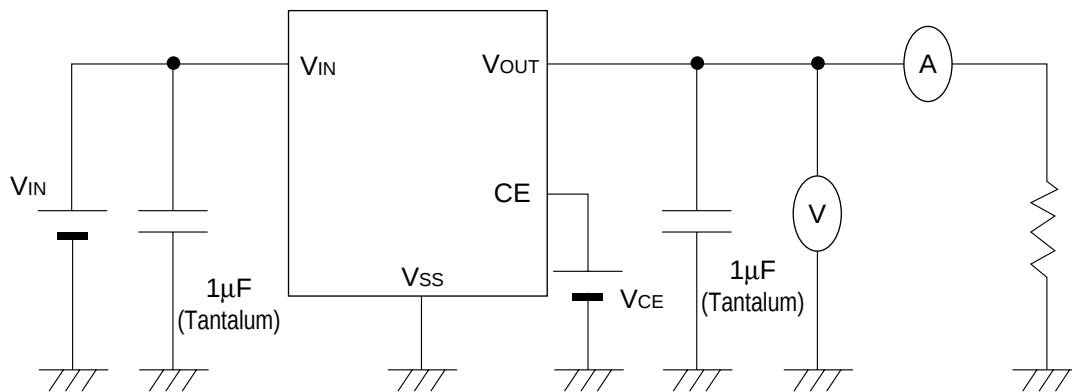


Standard Circuit



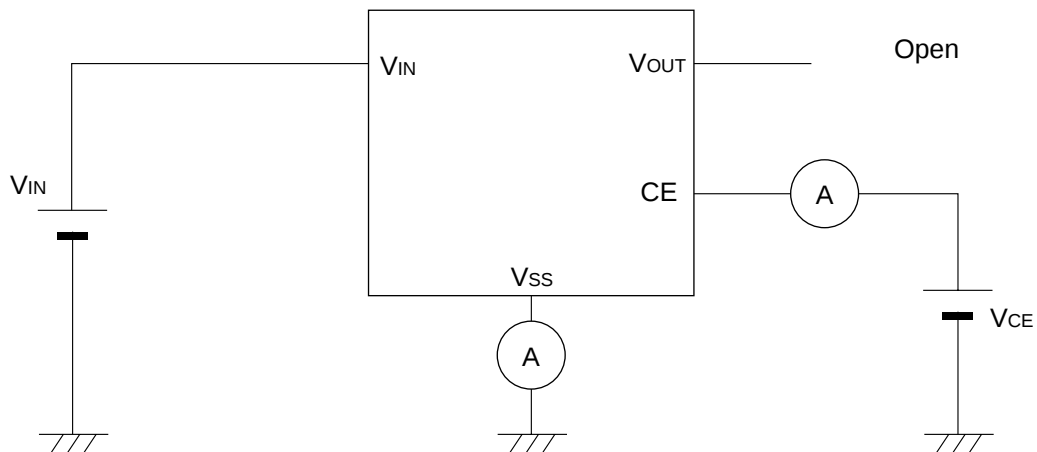
Typical Application Circuit

Circuit 1



Typical Application Circuit

Circuit 2



Absolute Maximum Ratings

Ta=25°C

PARAMETER	SYMBOL	RATINGS	UNITS
Input Voltage	V _{IN}	12	V
Output Current	I _{OUT}	500	mA
Output Voltage	V _{OUT}	V _{SS} -0.3 ~ V _{IN} +0.3	V
CE Input Voltage	V _{CE}	V _{SS} -0.3 ~ V _{IN} +0.3	V
Continuous Total Power Dissipation	SOT-25	P _d	150
	SOT-89-5	P _d	500
			mW
Operating Ambient Temperature	T _{opr}	-30 ~ +80	°C
Storage Temperature	T _{stg}	-40 ~ +25	°C

Note: I_{OUT} must be less than P_d / (V_{IN}-V_{OUT}).

Electrical Characteristics

XC62HR2002 V_{OUT}(T)=2.0V(Note1)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	V _{OUT} (E) (Note2)	I _{OUT} =40mA V _{IN} =3.0V	1.960	2.000	2.040	V	1
Maximum Output Current	I _{OUT} max	V _{IN} =3.0V, V _{OUT} (E) ≥ 1.8V	115			mA	1
Load Stability	ΔV _{OUT}	V _{IN} =3.0V 1mA ≤ I _{OUT} ≤ 60mA		45	90	mV	1
Input -Output Voltage Differential (Note3)	V _{dif1}	I _{OUT} =40mA		180	360	mV	1
	V _{dif2}	I _{OUT} =100mA		580	880	mV	1
Supply Current1	I _{SS1}	V _{IN} =V _{CE} =3.0V		2.9	7.9	μA	2
Supply Current2	I _{SS2}	V _{IN} =3.0V, V _{CE} =V _{SS}			0.1	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	I _{OUT} =40mA 3.0V ≤ V _{IN} ≤ 10.0V		0.2	0.3	%/V	1
Input Voltage	V _{IN}				10.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	I _{OUT} =40mA -30°C ≤ T _{opr} ≤ 80°C		±100		ppm/°C	1
CE "High" Voltage	V _{CEH}		1.5			V	1
CE "Low" Voltage	V _{CEL}				0.25	V	1
CE "High" Current	I _{CEH}	V _{CE} =V _{IN}			5.0	μA	2
CE "Low" Current	I _{CEL}	V _{CE} =V _{SS}	-0.2	-0.05	0	μA	2

Note: 1. V_{OUT}(T)=Specified Output Voltage .
 2. V_{OUT}(E)=Effective Output Voltage (i.e. the output voltage when "V_{OUT}(T)+1.0V" is provided at the V_{IN} pin while maintaining a certain I_{OUT} value).
 3. V_{dif}= {V_{IN1} (Note5)-V_{OUT1} (Note4)}
 4. V_{OUT1}= A voltage equal to 98% of the Output Voltage whenever an amply stabilised I_{OUT} {V_{OUT}(T)+1.0V} is input.
 5. V_{IN1}= The Input Voltage when V_{OUT1} appears as Input Voltage is gradually decreased.

Electrical Characteristics

XC62HR3002 $V_{OUT}(T)=3.0V$ (Note1) $T_a=25^{\circ}C$

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	$V_{OUT}(E)$ (Note2)	$I_{OUT}=40mA$ $V_{IN}=4.0V$	2.940	3.000	3.060	V	1
Maximum Output Current	$I_{OUT\ max}$	$V_{IN}=4.0V, V_{OUT}(E) \geq 2.7V$	165			mA	1
Load Stability	ΔV_{OUT}	$V_{IN}=4.0V$ $1mA \leq I_{OUT} \leq 80mA$		45	90	mV	1
Input -Output Voltage Differential (Note3)	V_{dif1}	$I_{OUT}=60mA$		180	360	mV	1
	V_{dif2}	$I_{OUT}=160mA$		580	880	mV	1
Supply Current1	I_{SS1}	$V_{IN}=V_{CE}=4.0V$		3.0	8.0	μA	2
Supply Current2	I_{SS2}	$V_{IN}=4.0V, V_{CE}=V_{SS}$			0.1	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT}=40mA$ $4.0V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V	1
Input Voltage	V_{IN}				10.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT}=40mA$ $-30^{\circ}C \leq T_{opr} \leq 80^{\circ}C$		± 100		ppm/ $^{\circ}C$	1
CE "High" Voltage	V_{CEH}		1.5			V	1
CE "Low" Voltage	V_{CEL}				0.25	V	1
CE "High" Current	I_{CEH}	$V_{CE}=V_{IN}$			5.0	μA	2
CE "Low" Current	I_{CEL}	$V_{CE}=V_{SS}$	-0.2	-0.05	0	μA	2

XC62HR4002 $V_{OUT}(T)=4.0V$ (Note1) $T_a=25^{\circ}C$

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	$V_{OUT}(E)$ (Note2)	$I_{OUT}=40mA$ $V_{IN}=5.0V$	3.920	4.000	4.080	V	1
Maximum Output Current	$I_{OUT\ max}$	$V_{IN}=5.0V, V_{OUT}(E) \geq 3.6V$	200			mA	1
Load Stability	ΔV_{OUT}	$V_{IN}=5.0V$ $1mA \leq I_{OUT} \leq 100mA$		45	90	mV	1
Input -Output Voltage Differential (Note3)	V_{dif1}	$I_{OUT}=80mA$		170	340	mV	1
	V_{dif2}	$I_{OUT}=180mA$		560	840	mV	1
Supply Current1	I_{SS1}	$V_{IN}=V_{CE}=5.0V$		3.1	8.1	μA	2
Supply Current2	I_{SS2}	$V_{IN}=5.0V, V_{CE}=V_{SS}$			0.1	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT}=40mA$ $5.0V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V	1
Input Voltage	V_{IN}				10.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT}=40mA$ $-30^{\circ}C \leq T_{opr} \leq 80^{\circ}C$		± 100		ppm/ $^{\circ}C$	1
CE "High" Voltage	V_{CEH}		1.5			V	1
CE "Low" Voltage	V_{CEL}				0.25	V	1
CE "High" Current	I_{CEH}	$V_{CE}=V_{IN}$			5.0	μA	2
CE "Low" Current	I_{CEL}	$V_{CE}=V_{SS}$	-0.2	-0.05	0	μA	2

- Note:
1. $V_{OUT}(T)$ =Specified Output Voltage .
 2. $V_{OUT}(E)$ =Effective Output Voltage (i.e. the output voltage when " $V_{OUT}(T)+1.0V$ " is provided at the V_{IN} pin while maintaining a certain I_{OUT} value).
 3. $V_{dif} = \{V_{IN1} (Note5) - V_{OUT1} (Note4)\}$
 4. V_{OUT1} = A voltage equal to 98% of the Output Voltage whenever an amply stabilised I_{OUT} ($V_{OUT}(T)+1.0V$) is input.
 5. V_{IN1} = The Input Voltage when V_{OUT1} appears as Input Voltage is gradually decreased.
 6. Semi-custom.

Electrical Characteristics

XC62HR5002 $V_{OUT}(T)=5.0V$ (Note1)

$T_a=25^{\circ}C$

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	CIRCUIT
Output Voltage	$V_{OUT}(E)$ (Note2)	$I_{OUT}=40mA$ $V_{IN}=6.0V$	4.900	5.000	5.100	V	1
Maximum Output Current	$I_{OUT\ max}$	$V_{IN}=6.0V, V_{OUT}(E) \geq 4.5V$	220			mA	1
Load Stability	ΔV_{OUT}	$V_{IN}=6.0V$ $1mA \leq I_{OUT} \leq 100mA$		40	80	mV	1
Input -Output Voltage Differential (Note3)	V_{dif1}	$I_{OUT}=100mA$		165	320	mV	1
	V_{dif2}	$I_{OUT}=200mA$		540	820	mV	1
Supply Current1	I_{SS1}	$V_{IN}=V_{CE}=6.0V$		3.1	8.1	μA	2
Supply Current2	I_{SS2}	$V_{IN}=6.0V, V_{CE}=V_{SS}$			0.1	μA	2
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT}=40mA$ $6.0V \leq V_{IN} \leq 10.0V$		0.2	0.3	%/V	1
Input Voltage	V_{IN}				10.0	V	—
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT}=40mA$ $-30^{\circ}C \leq T_{opr} \leq 80^{\circ}C$		± 100		ppm/ $^{\circ}C$	1
CE "High" Voltage	V_{CEH}		1.5			V	1
CE "Low" Voltage	V_{CEL}				0.25	V	1
CE "High" Current	I_{CEH}	$V_{CE}=V_{IN}$			5.0	μA	2
CE "Low" Current	I_{CEL}	$V_{CE}=V_{SS}$	-0.2	-0.05	0	μA	2

Note: 1. $V_{OUT}(T)$ =Specified Output Voltage .
 2. $V_{OUT}(E)$ =Effective Output Voltage (i.e. the output voltage when " $V_{OUT}(T)+1.0V$ " is provided at the V_{IN} pin while maintaining a ceratain I_{OUT} value).
 3. $V_{dif} = \{V_{IN1} \text{ (Note5)} - V_{OUT1} \text{ (Note4)}\}$
 4. V_{OUT1} = A voltage equal to 98% of the Output Voltage whenever an amply stabilised I_{OUT} $\{V_{OUT}(T)+1.0V\}$ is input.
 5. V_{IN1} = The Input Voltage when V_{OUT1} appears as Input Voltage is gradually decreased.
 6. Semi-custom.

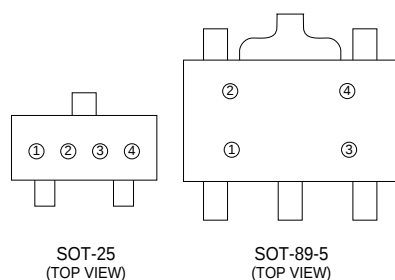
Ordering Information

XC62Hxxxxxx

↑ ↑ ↑ ↑ ↑ ↑
a b c d e f

DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
a	True Logic Level at CE Pin: R=Positive P=Negative(Custom)	e	Package Type M=SOT-25 P=SOT-89-5
b	Output Voltage 30=3.0V 50=5.0V	f	Device Orientation R=Embossed Tape (Orientation of Device:Right) L=Embossed Tape (Orientation of Device:Left)
c	0		
d	Output Voltage Accuracy: 1=±1.0%(Semi-custom) 2=±2.0%		

Marking



① Represents the integer of the Output Voltage

R TYPE POSITIVE VOLTAGE LOGIC SYMBOL	VOLTAGE(V)	P TYPE NEGATIVE VOLTAGE LOGIC SYMBOL	VOLTAGE(V)
0	0.②	$\bar{0}$	0.②
1	1.②	$\bar{1}$	1.②
2	2.②	$\bar{2}$	2.②
3	3.②	$\bar{3}$	3.②
4	4.②	$\bar{4}$	4.②
5	5.②	$\bar{5}$	5.②
6	6.②	$\bar{6}$	6.②
7	7.②	$\bar{7}$	7.②
8	8.②	$\bar{8}$	8.②
9	9.②	$\bar{9}$	9.②

② Represents the decimal point of the Output Voltage

SYMBOL	VOLTAGE(V)	SYMBOL	VOLTAGE(V)
0	①.0	$\bar{0}$	①.0
1	①.1	$\bar{1}$	①.1
2	①.2	$\bar{2}$	①.2
3	①.3	$\bar{3}$	①.3
4	①.4	$\bar{4}$	①.4
5	①.5	$\bar{5}$	①.5
6	①.6	$\bar{6}$	①.6
7	①.7	$\bar{7}$	①.7
8	①.8	$\bar{8}$	①.8
9	①.9	$\bar{9}$	①.9

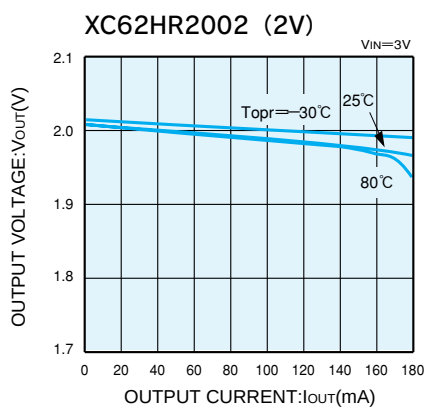
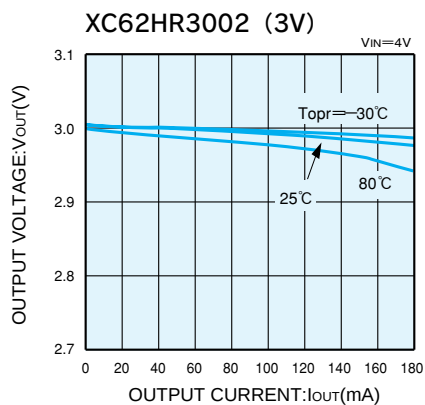
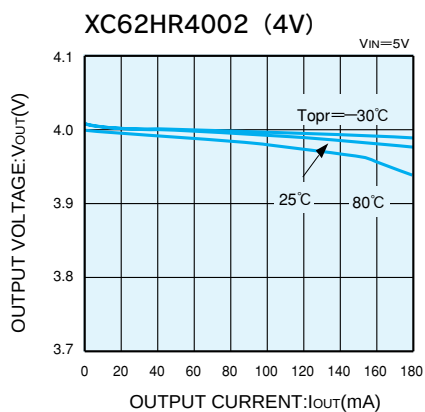
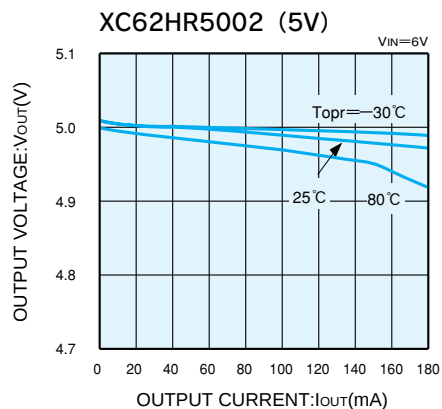
③ Based on internal standards

SYMBOL
-

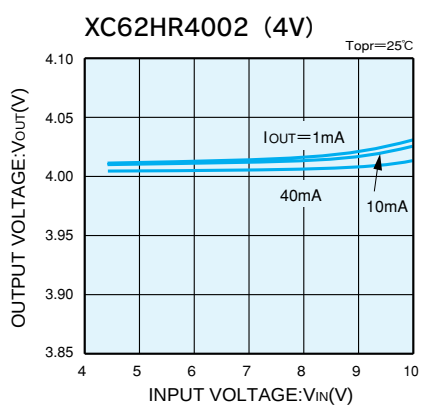
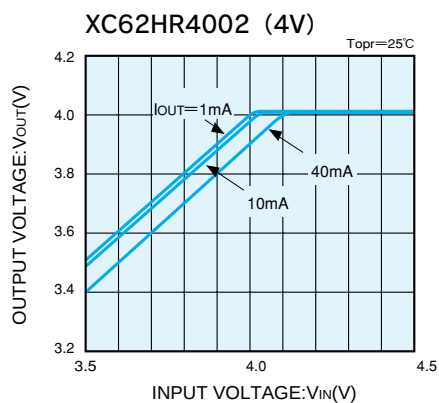
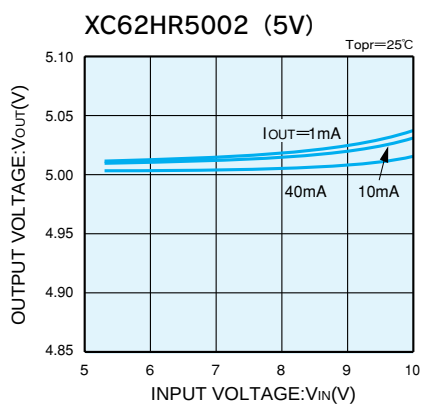
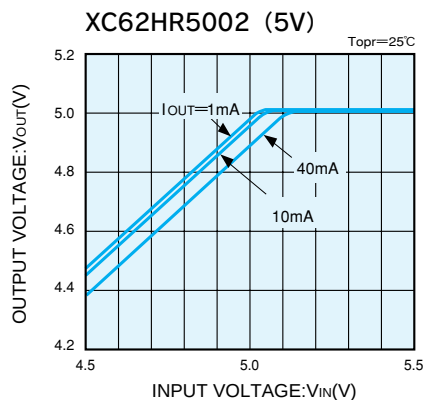
④ Represents the assembly lot no. 0-9,A-Z repeated (G, I, J, O, Q, W excepted)

XC62H Electrical Characteristics

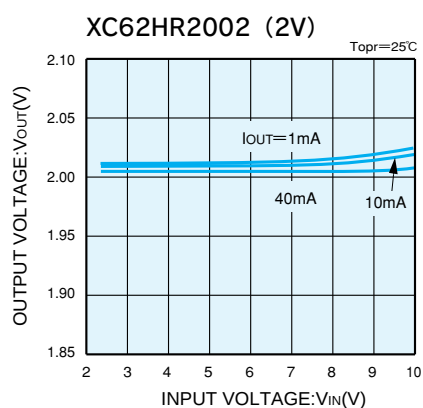
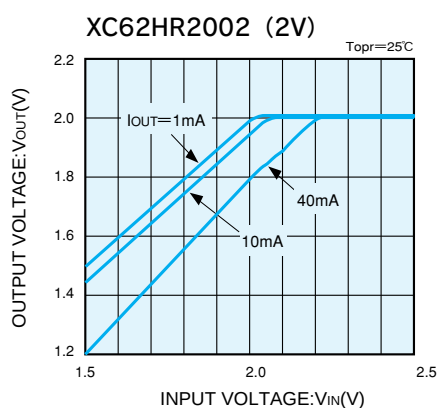
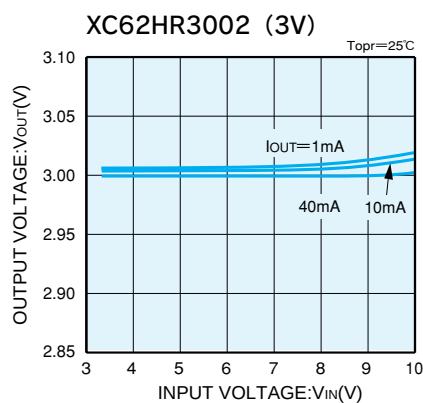
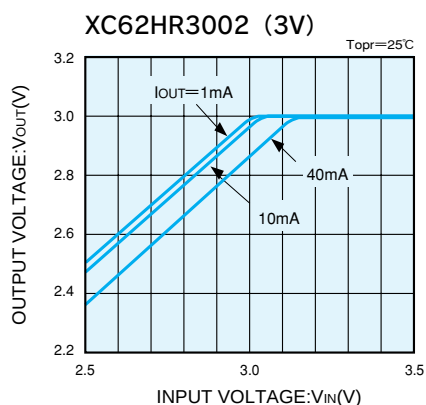
(1) OUTPUT VOLTAGE vs. OUTPUT CURRENT



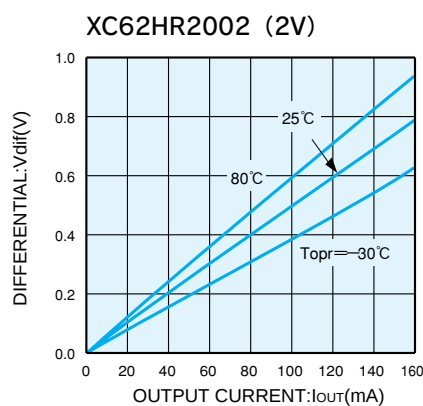
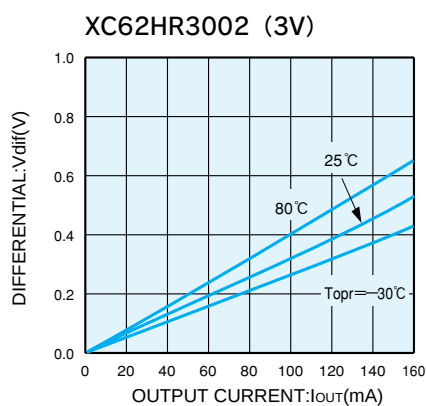
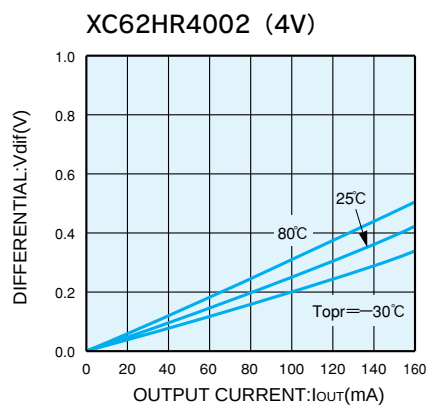
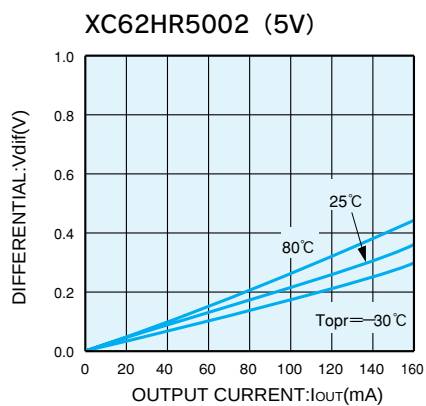
(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE



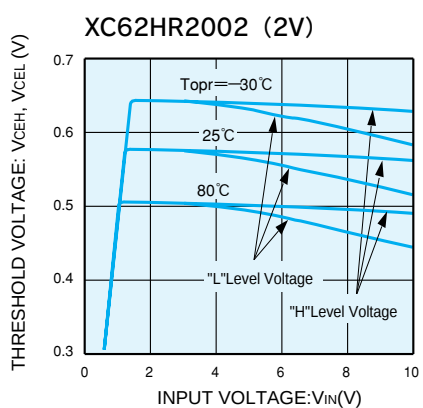
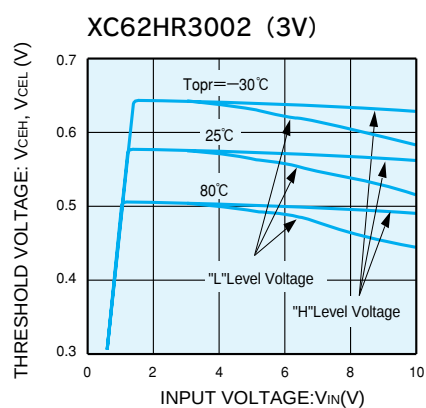
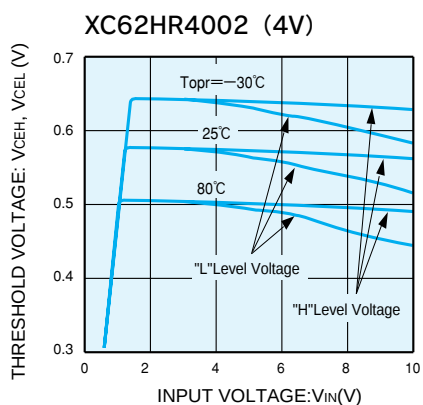
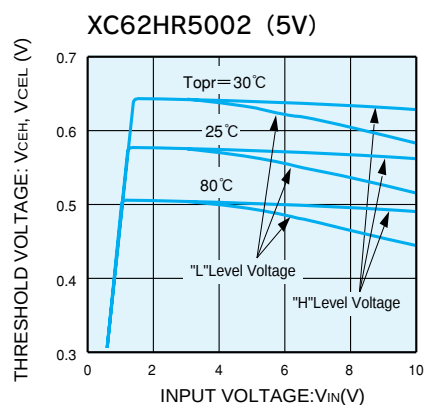
(2) OUTPUT VOLTAGE vs. INPUT VOLTAGE (CONTINUED)



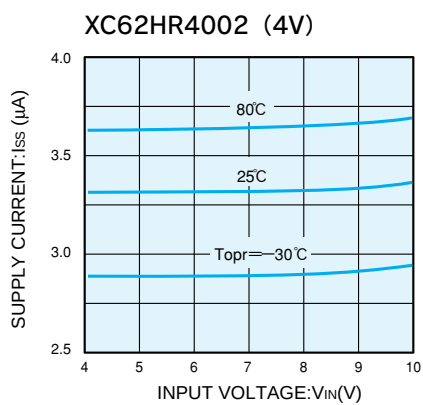
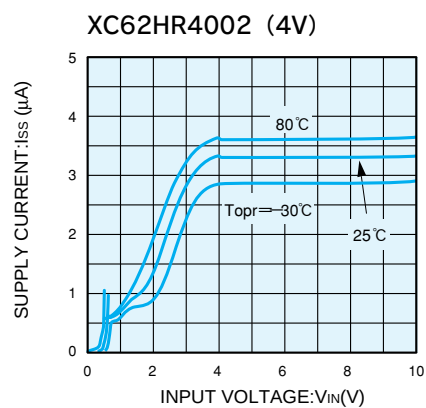
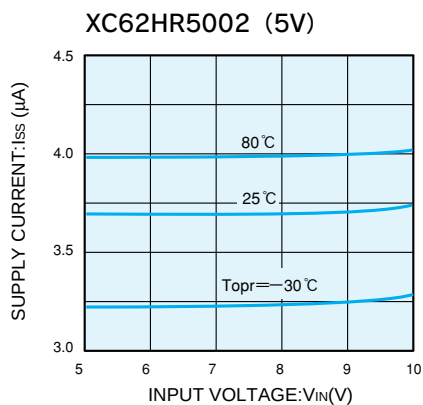
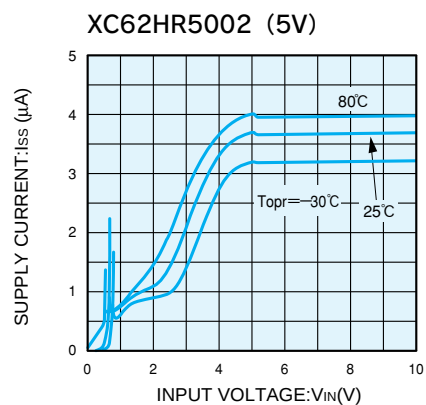
(3) INPUT/OUTPUT VOLTAGE DIFFERENTIAL vs. OUTPUT CURRENT



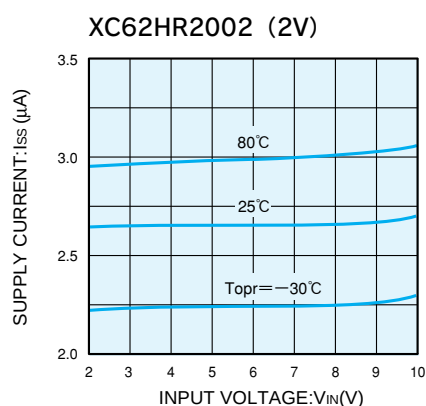
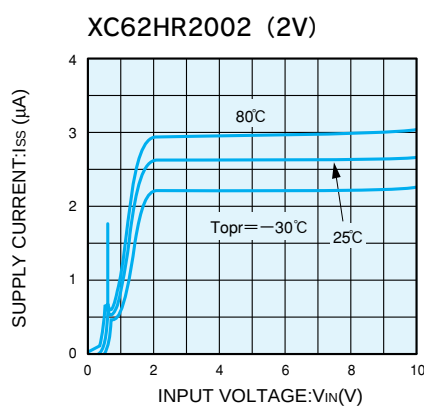
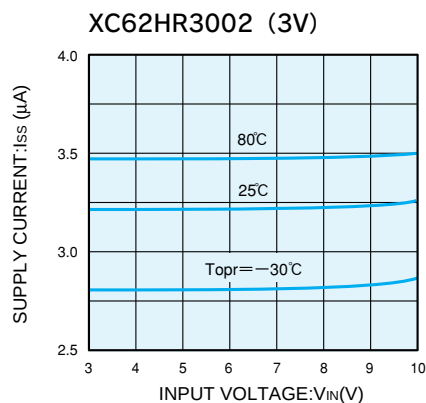
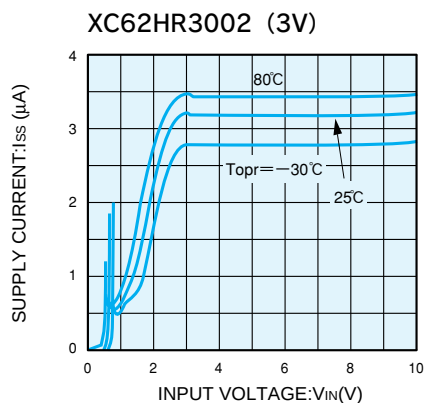
(4) CE PIN THRESHOLD VOLTAGE vs. INPUT VOLTAGE



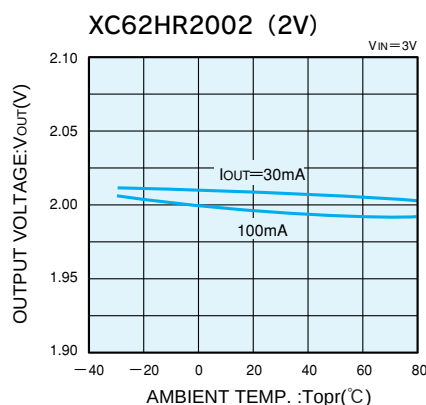
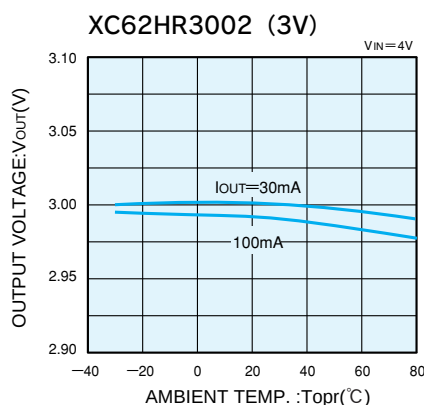
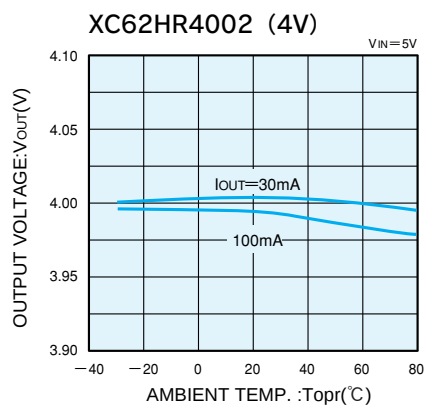
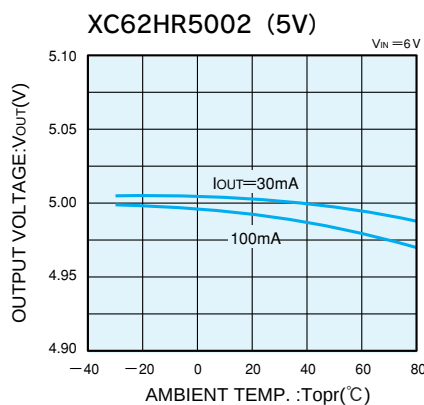
(5) SUPPLY CURRENT vs. INPUT VOLTAGE



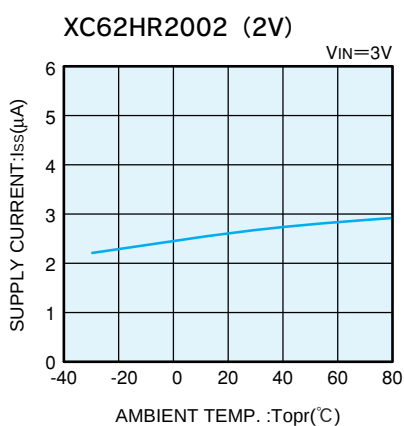
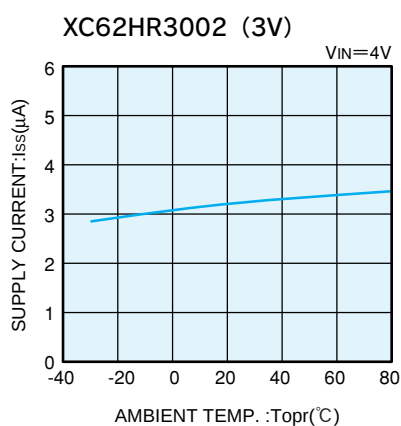
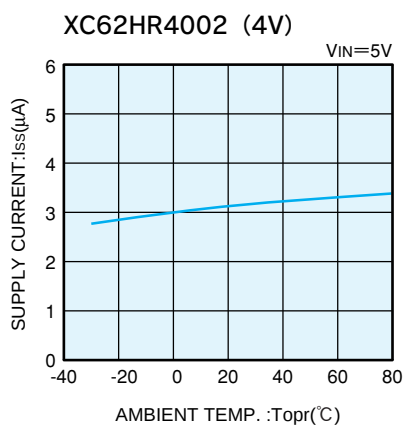
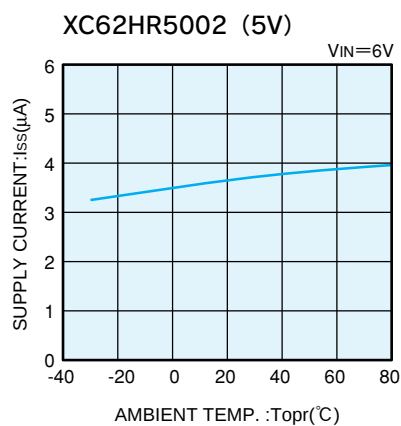
(5) SUPPLY CURRENT vs. INPUT VOLTAGE (CONTINUED)



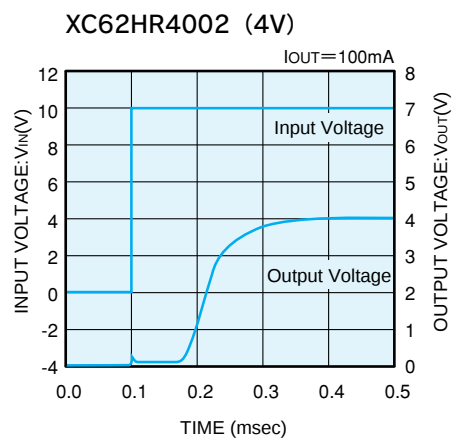
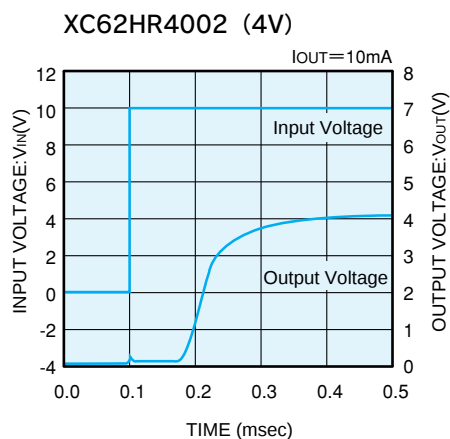
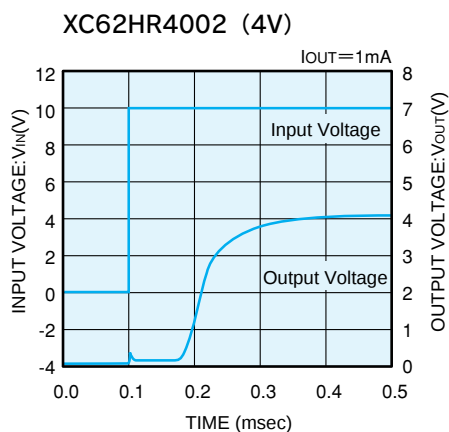
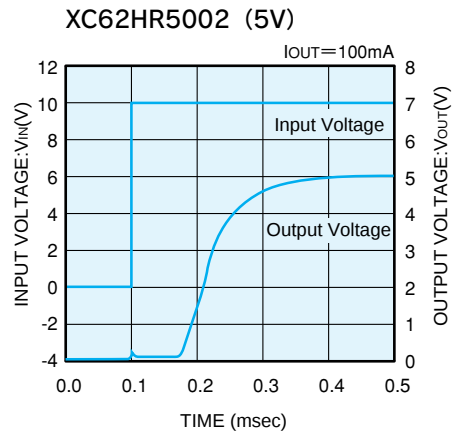
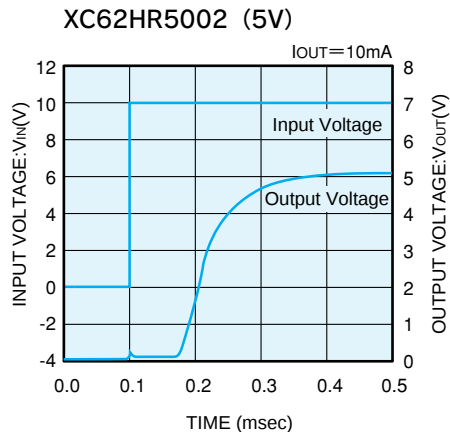
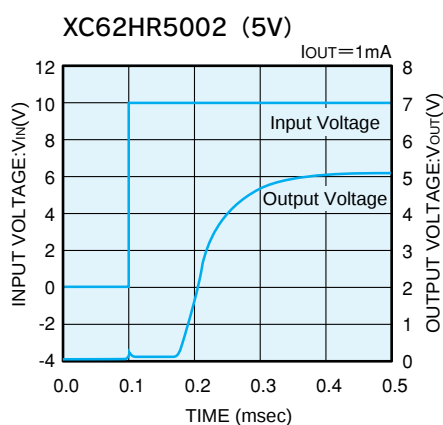
(6) OUTPUT VOLTAGE vs. AMBIENT TEMPERATURE



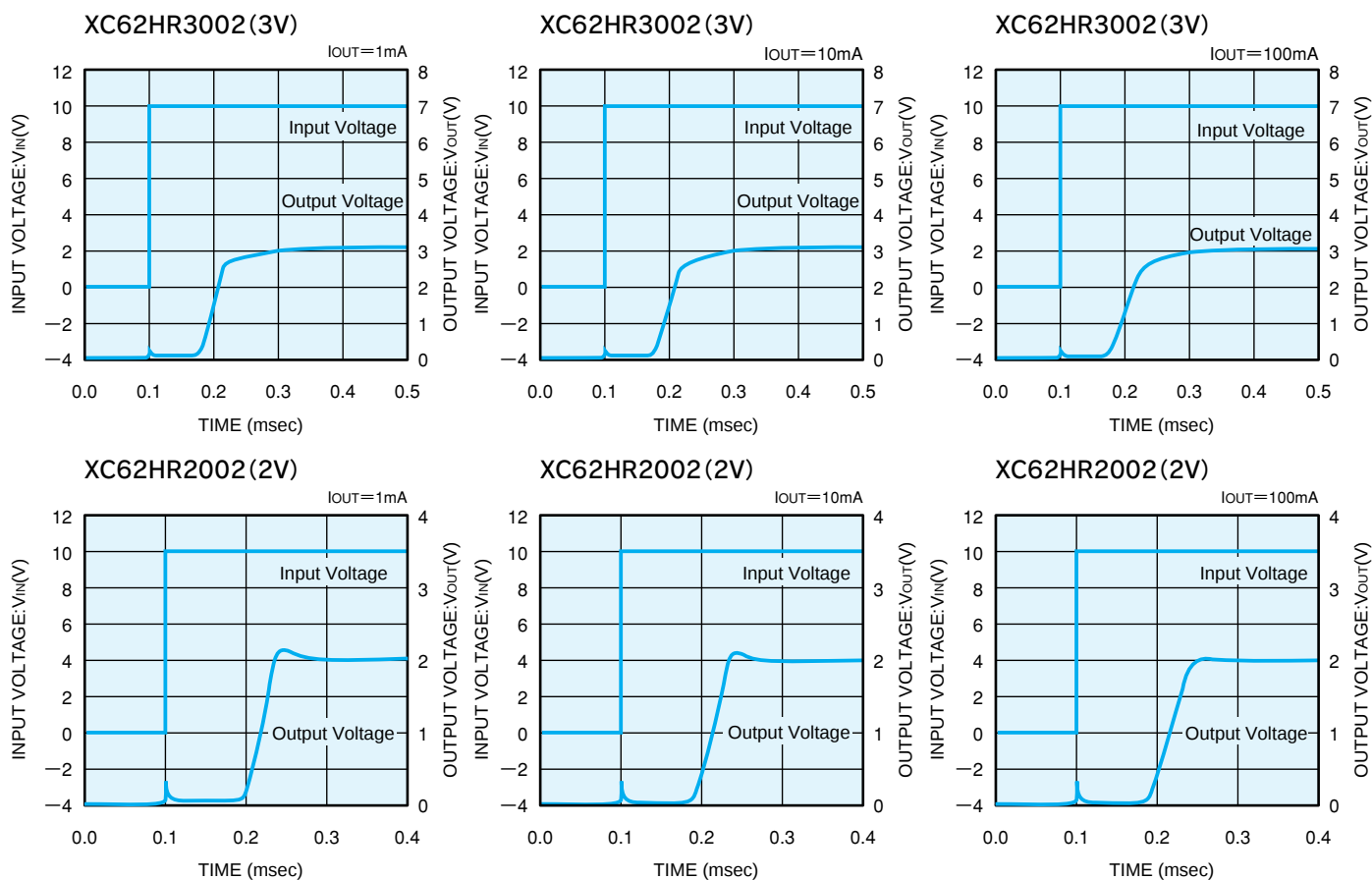
(7) SUPPLY CURRENT vs. AMBIENT TEMPERATURE



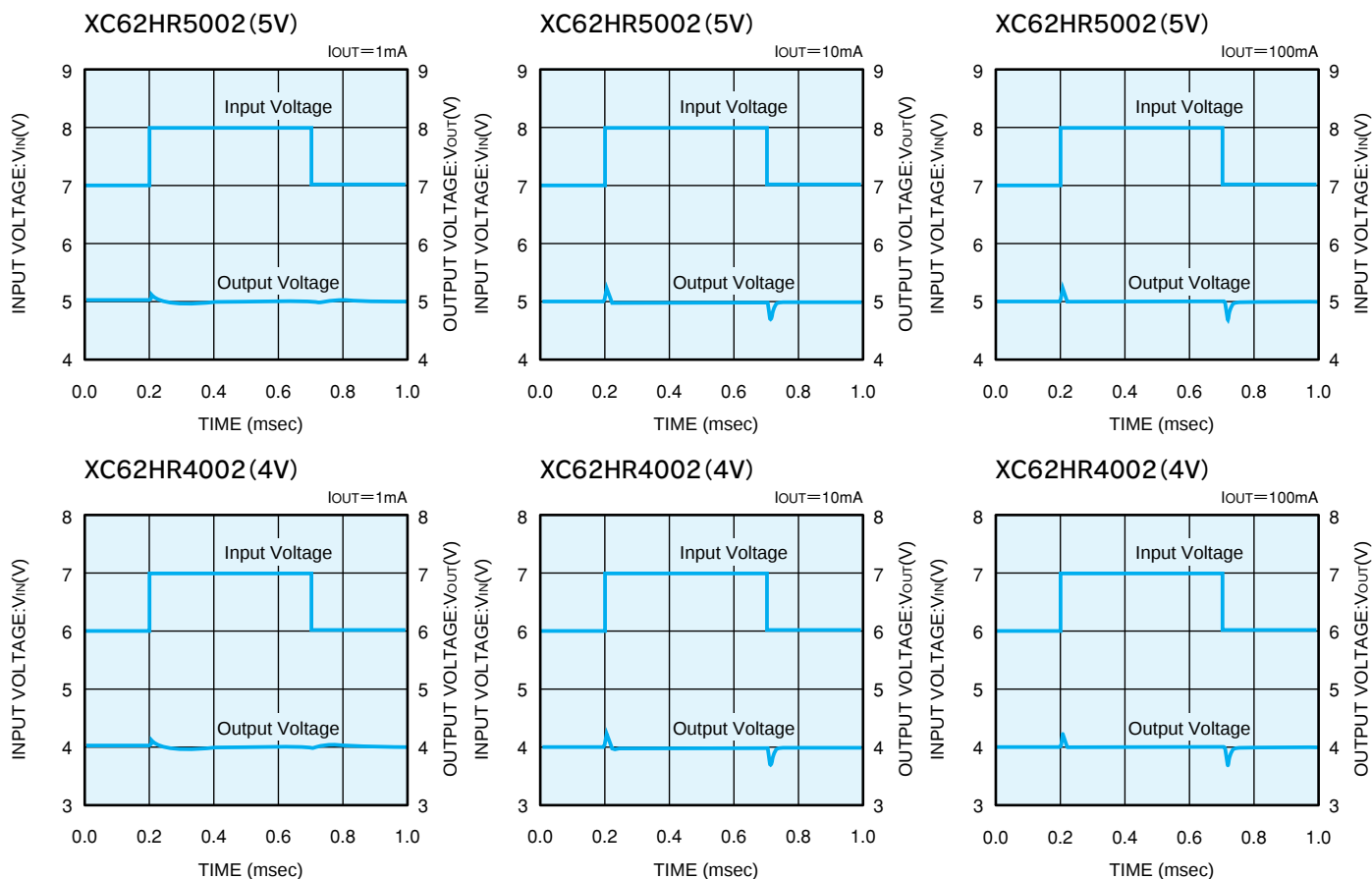
(8) INPUT TRANSIENT RESPONSE 1



(8) INPUT TRANSIENT RESPONSE 1 (CONTINUED)

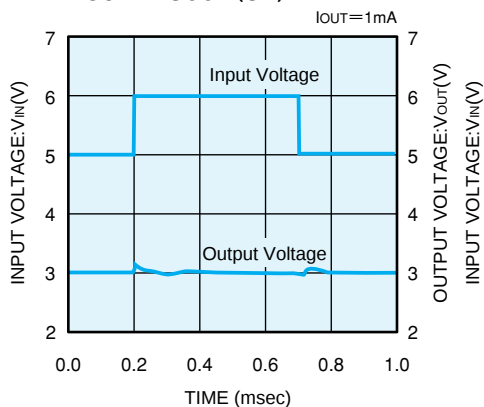


(9) INPUT TRANSIENT RESPONSE 2

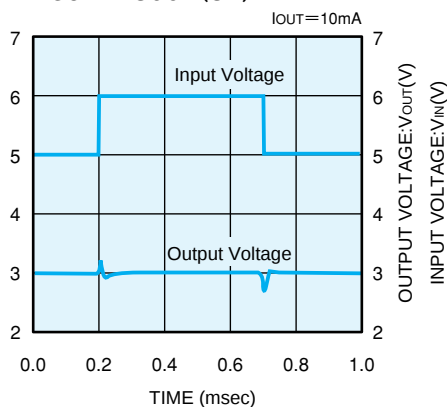


(9) INPUT TRANSIENT RESPONSE 2 (CONTINUED)

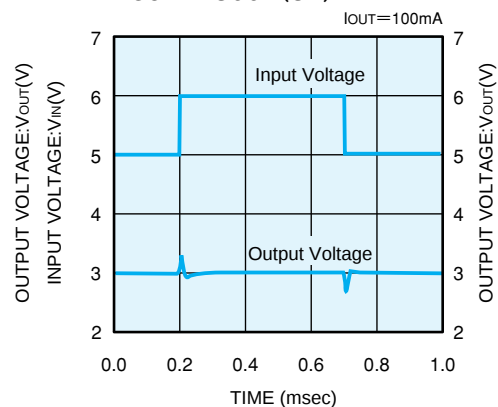
XC62HR3002 (3V)



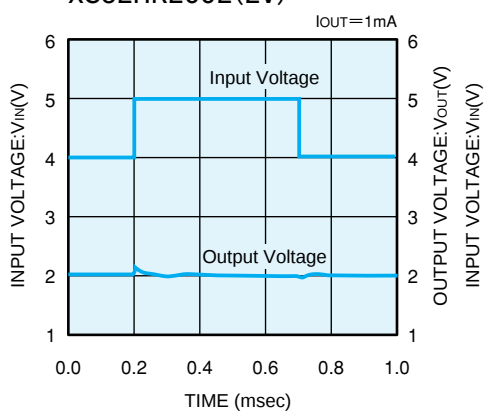
XC62HR3002 (3V)



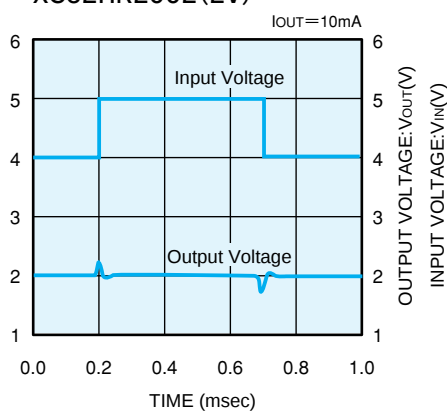
XC62HR3002 (3V)



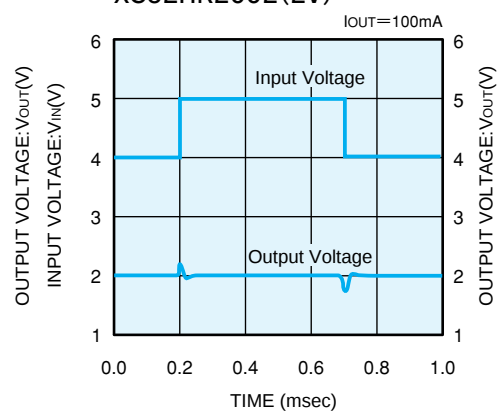
XC62HR2002 (2V)



XC62HR2002 (2V)

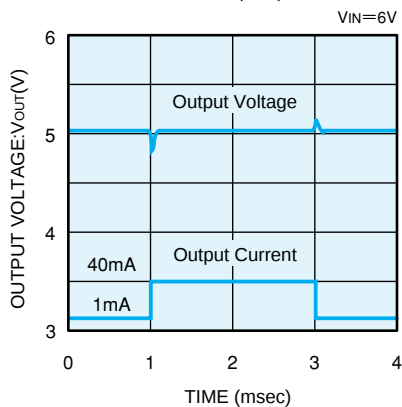


XC62HR2002 (2V)

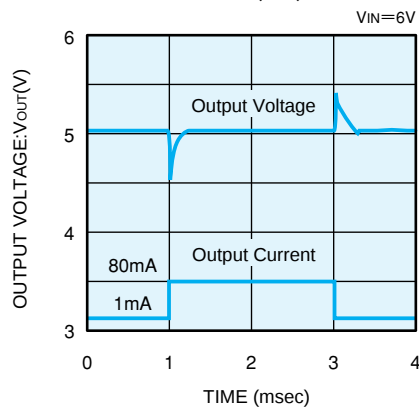


(10) LOAD TRANSIENT RESPONSE

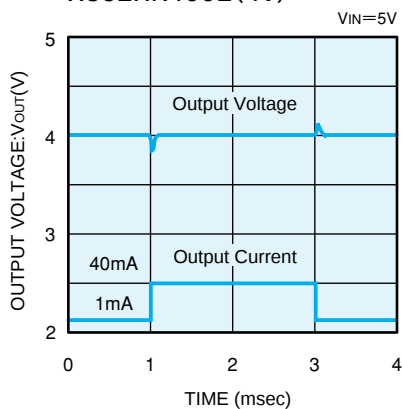
XC62HR5002 (5V)



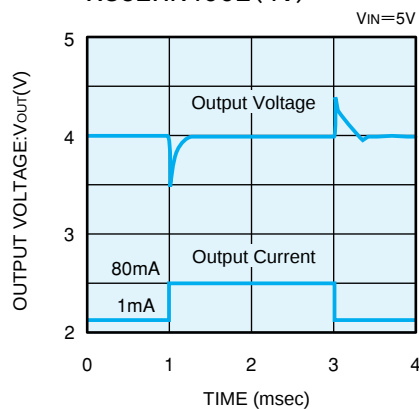
XC62HR5002 (5V)



XC62HR4002 (4V)

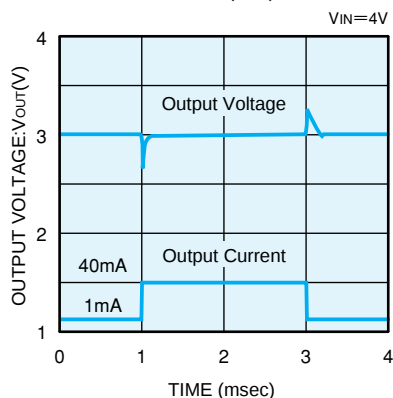


XC62HR4002 (4V)

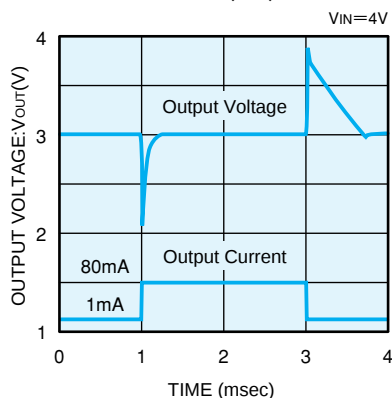


(10) LOAD TRANSIENT RESPONSE (CONTINUED)

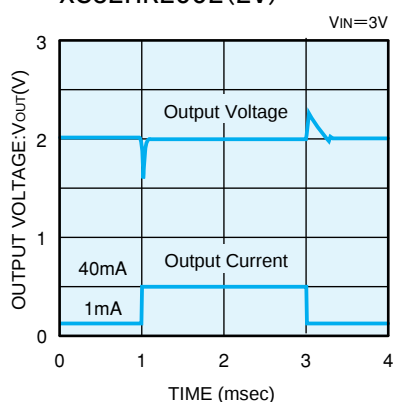
XC62HR3002 (3V)



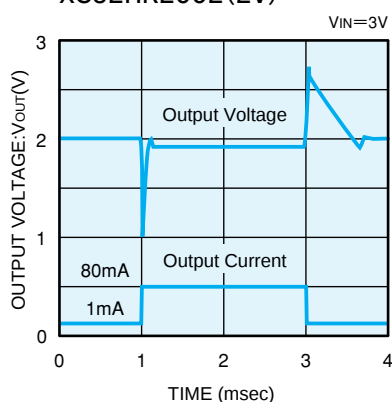
XC62HR3002 (3V)



XC62HR2002 (2V)

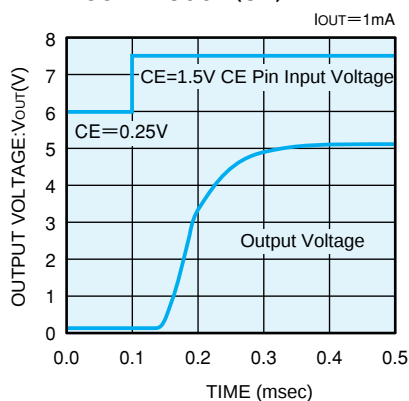


XC62HR2002 (2V)

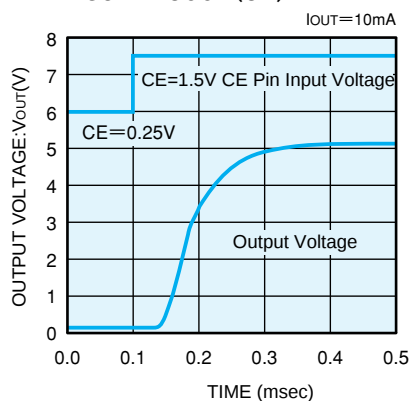


(11) CE PIN TRANSIENT RESPONSE

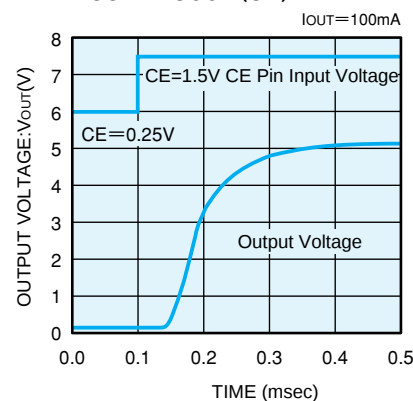
XC62HR5002 (5V)



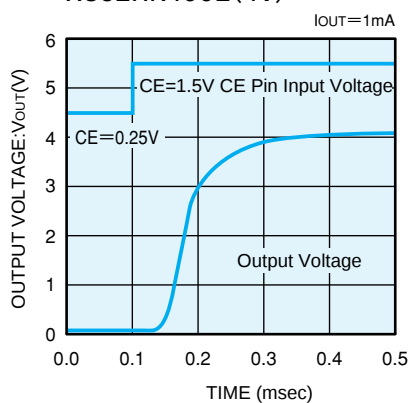
XC62HR5002 (5V)



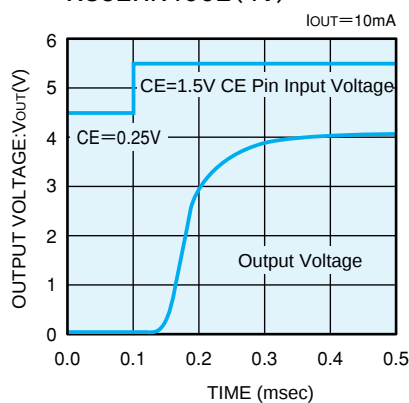
XC62HR5002 (5V)



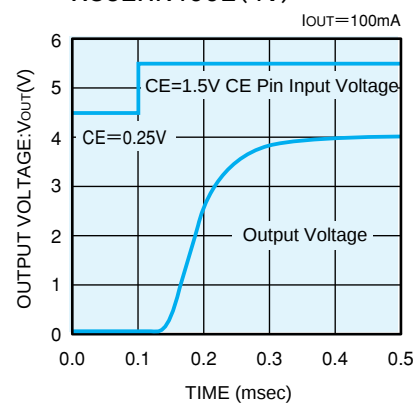
XC62HR4002 (4V)



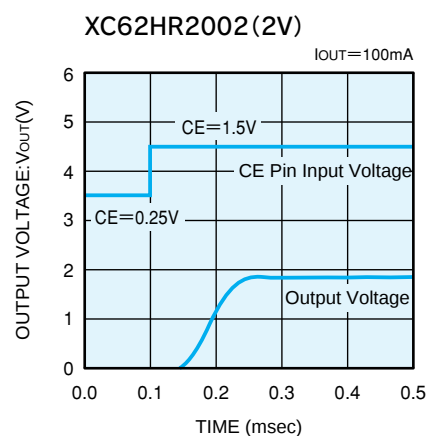
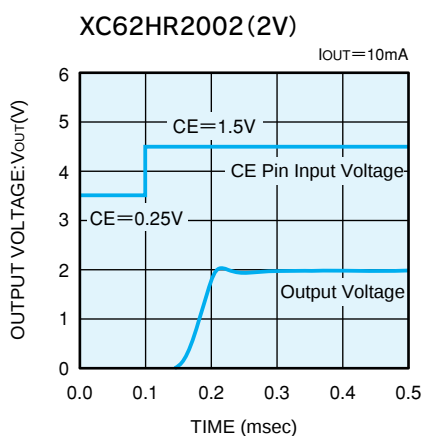
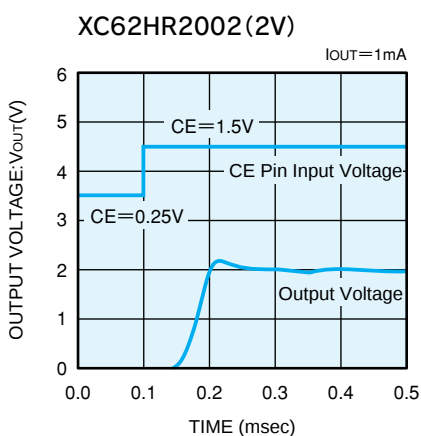
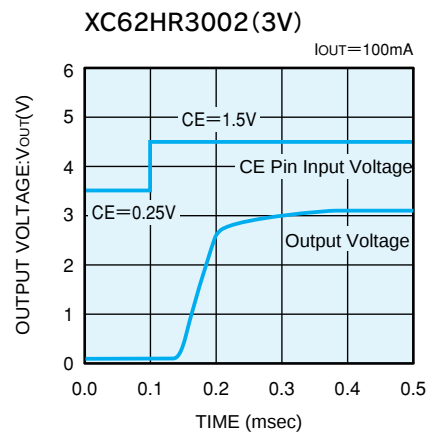
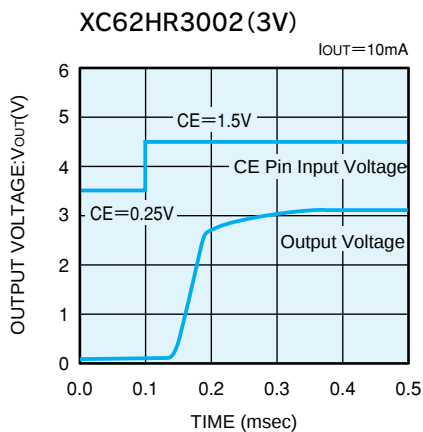
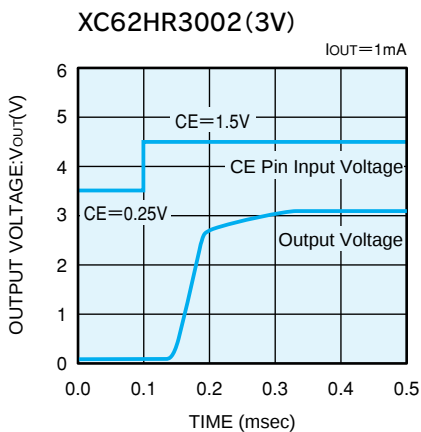
XC62HR4002 (4V)



XC62HR4002 (4V)



(11) CE PIN TRANSIENT RESPONSE (CONTINUED)



(12) RIPPLE REJECTION RATE

