XC62H Series

ETR0312_001

Positive Voltage Regulators (Output ON/OFF)

■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 standby. In the stand-by mode, power consumption is greatly reduced.

SOT-25 (150mW), SOT-89-5 (500mW) and USP-6B (100mW) 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, Video recorders
- ●Palmtops

■FEATURES

Maximum Output Current
: 165mA (within max.power dissipation, V_{OUT}=3.0V)

Output Voltage Range : 2.0V ~ 6.0V in 100mV increments (1.5V ~ 1.9V semi-custom)

Highly Accurate : Set-up Voltage ±2% (±1% for semi-custom products)

Low Power Consumption
: 3.0 μA (TYP.) (V_{OUT}=3.0, Output enabled)
: 0.1 μA (TYP.) (Output disabled)

Output Voltage Temperature Characteristics
: ±100ppm /℃ (TYP.)

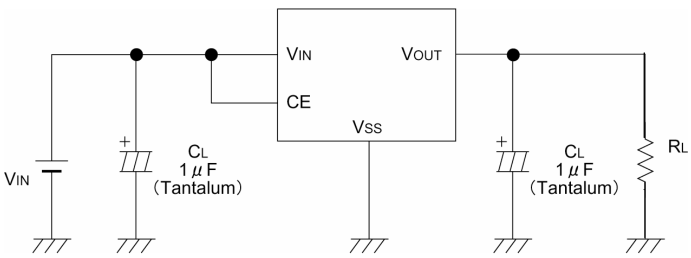
Line Regulation : 0.2% / V (TYP.)

CMOS Low Power Consumption

Small Dropout : 0.18V @ 60mA
: 0.58V @ 160mA

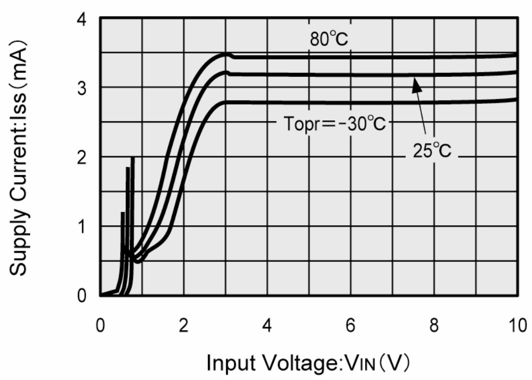
Ultra Small Packages : SOT-25 (150mW) mini-mold
SOT-89-5 (500mW) mini-power mold
USP-6B (100mW)

■TYPICAL APPLICATION CIRCUIT

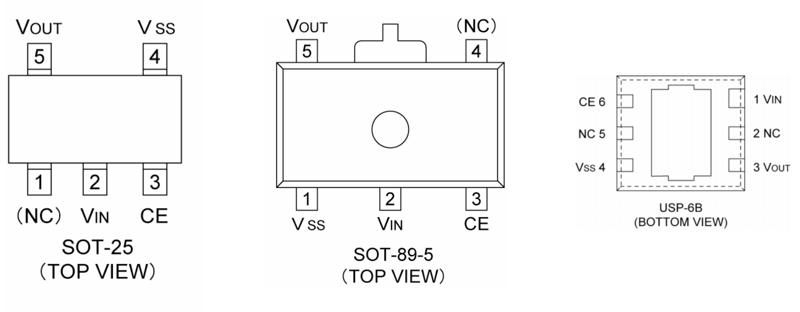


■TYPICAL PERFORMANCE CHARACTERISTICS

XC62HR3002(3V)



■PIN CONFIGURATION



*The dissipation pad for the USP-6B package should be solder-plated in recommended mount pattern and metal masking so as to enhance mounting strength and heat release. If the pad needs to be connected to other pins, it should be connected to the VIN pin.

■PIN ASSIGNMENT

PIN NUMBER			PIN NAME	FUNCTION
SOT-25	SOT-89-5	USP-6B		
1	4	2, 5	(NC)	No Connection
2	2	1	VIN	Supply Voltage Input
3	3	6	CE	Chip Enable
4	1	4	VSS	Ground
5	5	3	VOUT	Regulated Output Voltage

■FUNCTION

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

H = High level
L = Low level

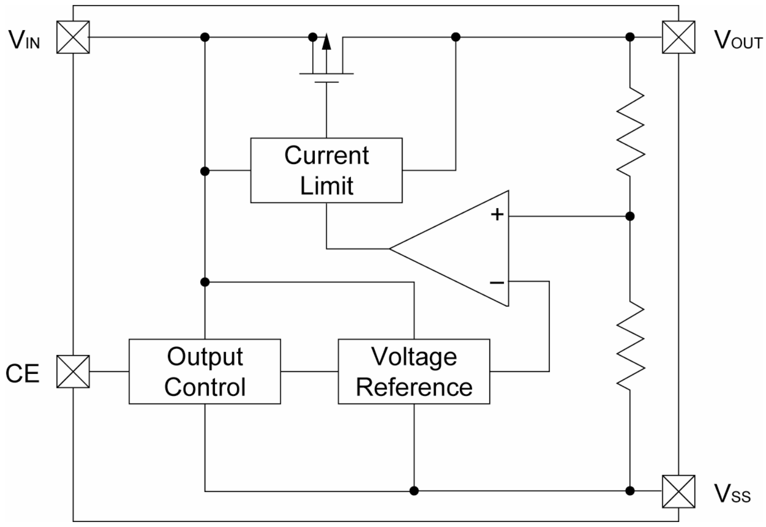
■PRODUCT CLASSIFICATION

●Ordering Information

XC62H①②③④⑤⑥⑦

DESIGNATOR	DESCRIPTION	SYMBOL	DESCRIPTION
①	CE Pin Logic	R	: Positive
		P	: Negative (Custom)
② ③	Output Voltage	20~60	:e.g. VOUT 3.0V → ②=3, ③=0 VOUT 5.0V → ②=5, ③=0
④	Temperature Characteristics	0	: ± 100ppm (TYP.)
⑤	Output Voltage Accuracy	1	: ± 1% (semi-custom)
		2	: ± 2%
⑥	Package Type	M	: SOT-23
		P	: SOT-89-5
		D	: USP-6B
⑦	Device Orientation	R	: Embossed tape, standard feed
		L	: Embossed tape, reverse feed

■BLOCK DIAGRAM



■ABSOLUTE MAXIMUM RATINGS

Ta=25℃

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		V_{IN}	12.0	V
Output Current		I_{OUT}	500	mA
Output Voltage		V_{OUT}	V_{SS} -0.3 ~ V_{IN} +1.3	V
CE Input Voltage		V_{CE}	V_{SS} -0.3 ~ V_{IN} +1.3	V
Power Dissipation	SOT-25	Pd	150	mW
	SOT-89-5		500	
	USP-6B		100	
Operating Temperature Range		Topr	-30 ~ +80	℃
Storage Temperature Range		Tstg	-40 ~ +25	℃

■ELECTRICAL CHARACTERISTICS

XC62HR2002 $V_{OUT(T)}$=2.0V (*1)

Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Output Voltage	$V_{OUT(E)}$ (*2)	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 Regulation	ΔV_{OUT}	V_{IN}=3.0V 1mA≦I_{OUT}≦60mA	-	45	90	mV	1
Dropout Voltage (*3)	Vdif1	I_{OUT}=40mA	-	180	360	mV	1
	Vdif2	I_{OUT}=100mA	-	580	880	mV	1
Supply Current 1	I_{SS1}	V_{IN}=V_{CE}=3.0V	-	2.9	7.9	μA	2
Supply Current 2	I_{SS2}	V_{IN}=3.0V, V_{CE}=V_{SS}	-		0.1	μA	2
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot \Delta V_{OUT}}$	I_{OUT}=40mA 3.0V≦V_{IN}≦10.0V	-	0.2	0.3	% / V	1
Input Voltage	ΔV_{IN}		-	-	10.0	V	-
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Topr \cdot \Delta V_{OUT}}$	I_{OUT}=40mA -30℃≦Topr≦80℃	-	±100	-	ppm / ℃	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}	-	-	0.1	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: Vdif= {V_{IN1} (*5)-V_{OUT1} (*4)}

*4: V_{OUT1}= A voltage equal to 98% of the output voltage whenever an amply stabilized 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 (Continued)

XC62HR3002 $V_{OUT(T)}$=3.0V (*1) Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Output Voltage	$V_{OUT\ (E)}$ (*2)	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, $V_{OUT(E)}$≧2.7V	165	-	-	mA	1
Load Regulation	△V_{OUT}	V_{IN}=4.0V 1mA≦I_{OUT}≦80mA	-	45	90	mV	1
Dropout Voltage (*3)	Vdif1	I_{OUT}=60mA	-	180	360	mV	1
	Vdif2	I_{OUT}=160mA	-	580	880	mV	1
Supply Current 1	I_{SS1}	V_{IN}=V_{CE}=4.0V	-	3.0	8.0	μA	2
Supply Current 2	I_{SS2}	V_{IN}=4.0V, V_{CE}=V_{SS}	-	-	0.1	μA	2
Line Regulation	△V_{OUT} / △V_{IN}・△V_{OUT}	I_{OUT}=40mA 4.0V≦V_{IN}≦10.0V	-	0.2	0.3	% / V	1
Input Voltage	△V_{IN}		-	-	10.0	V	-
Output Voltage Temperature Characteristics	△V_{OUT} / △Topr・△V_{OUT}	I_{OUT}=40mA -30℃≦Topr≦80℃	-	±100	-	ppm / ℃	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}	-	-	0.1	μA	2
CE "Low" Current	I_{CEL}	V_{CE}=V_{SS}	-0.2	-0.05	0	μA	2

XC62HR4002 $V_{OUT(T)}$=4.0V (*1) Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Output Voltage	$V_{OUT\ (E)}$ (*2)	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, $V_{OUT(E)}$≧3.6V	200	-	-	mA	1
Load Regulation	△V_{OUT}	V_{IN}=5.0V 1mA≦I_{OUT}≦100mA	-	45	90	mV	1
Dropout Voltage (*3)	Vdif1	I_{OUT}=80mA	-	170	340	mV	1
	Vdif2	I_{OUT}=180mA	-	560	840	mV	1
Supply Current 1	I_{SS1}	V_{IN}=V_{CE}=5.0V	-	3.1	8.1	μA	2
Supply Current 2	I_{SS2}	V_{IN}=5.0V, V_{CE}=V_{SS}	-	-	0.1	μA	2
Line Regulation	△V_{OUT} / △V_{IN}・△V_{OUT}	I_{OUT}=40mA 5.0V≦V_{IN}≦10.0V	-	0.2	0.3	% / V	1
Input Voltage	△V_{IN}		-	-	10.0	V	-
Output Voltage Temperature Characteristics	△V_{OUT} / △Topr・△V_{OUT}	I_{OUT}=40mA -30℃≦Topr≦80℃	-	±100	-	ppm / ℃	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}	-	-	0.1	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: Vdif= {V_{IN1} (*5)-V_{OUT1} (*4)}

*4: V_{OUT1}= A voltage equal to 98% of the output voltage whenever an amply stabilized 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 (Continued)

XC62HR5002 $V_{OUT(T)}$=5.0V (*1) Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Output Voltage	$V_{OUT (E)}$ (*2)	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, $V_{OUT(E)}$≧4.5V	220	-	-	mA	1
Load Regulation	△V_{OUT}	V_{IN}=6.0V 1mA≦I_{OUT}≦100mA	-	40	80	mV	1
Dropout Voltage (*3)	Vdif1	I_{OUT}=100mA	-	165	320	mV	1
	Vdif2	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
Line Regulation	△V_{OUT} / △V_{IN}・△V_{OUT}	I_{OUT}=40mA 6.0V≦V_{IN}≦10.0V	-	0.2	0.3	% / V	1
Input Voltage	△V_{IN}		-	-	10.0	V	-
Output Voltage Temperature Characteristics	△V_{OUT} / △Topr・△V_{OUT}	I_{OUT}=40mA -30℃≦Topr≦80℃	-	±100	-	ppm / ℃	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}	-	-	0.1	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 IOUT value).

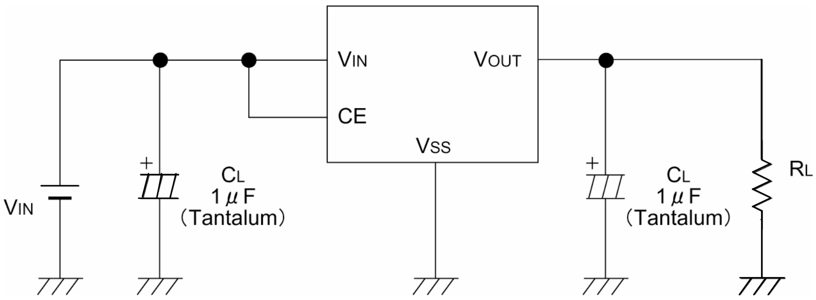
*3: Vdif= {V_{IN1} (*5)-V_{OUT1} (*4)}

*4: V_{OUT1}= A voltage equal to 98% of the output voltage whenever an amply stabilized IOUT {$V_{OUT(T)}$+1.0V} is input.

*5: V_{IN1}= The input voltage when V_{OUT1} appears as input voltage is gradually decreased.

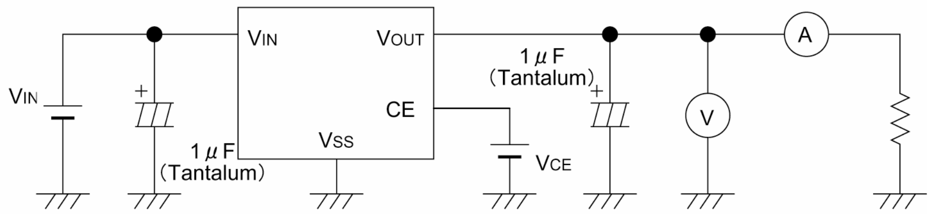
■TYPICAL APPLICATION CIRCUIT

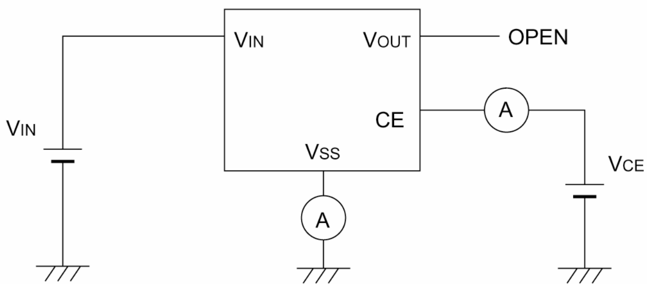
●Standard Circuit



■TEST CIRCUITS

Circuit 1

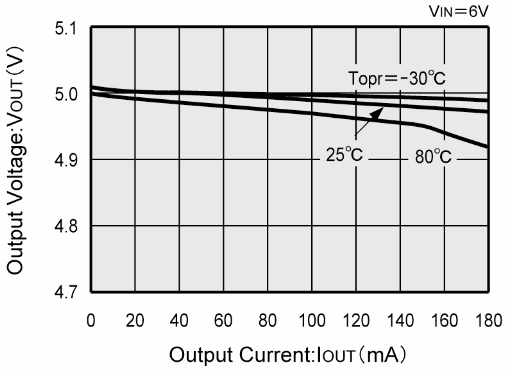




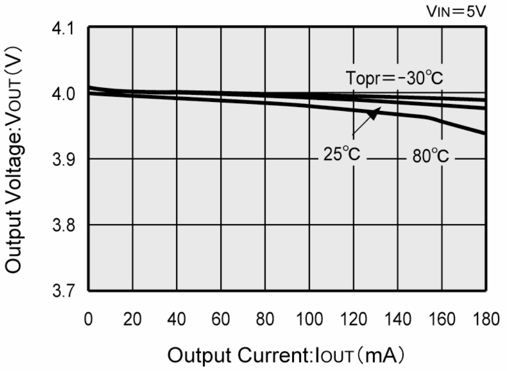
■TYPICAL PERFORMANCE CHARACTERISTICS

(1) Output Voltage vs. Output Current

XC62HR5002(5V)



XC62HR4002(4V)



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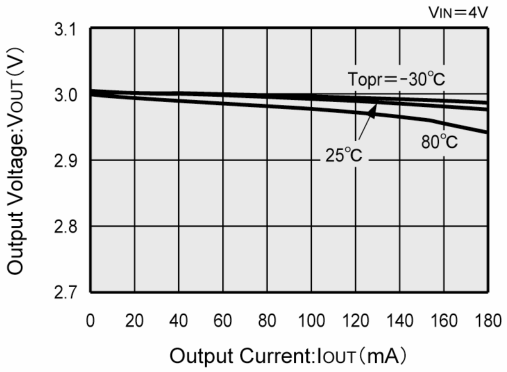
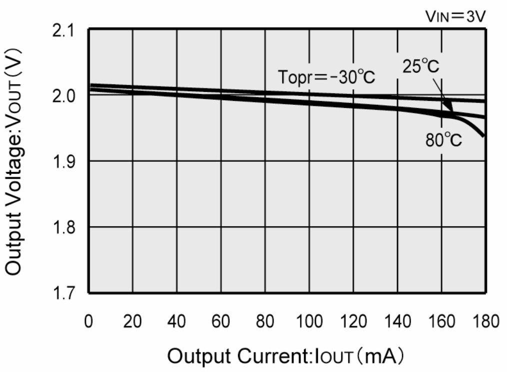
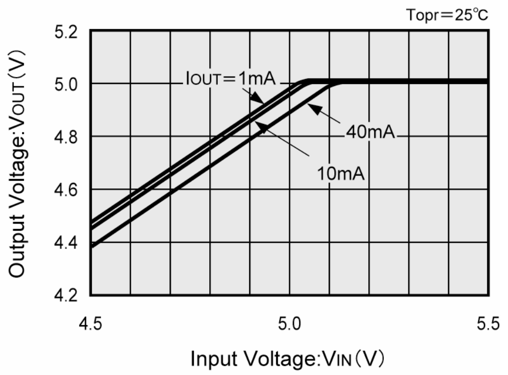


XC62HR2002(2V)



(2) Output Voltage vs. Input Voltage

XC62HR5002(5V)



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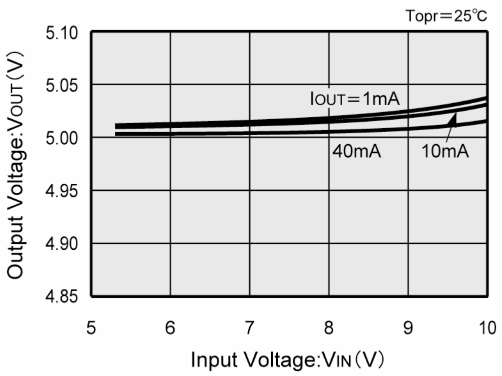

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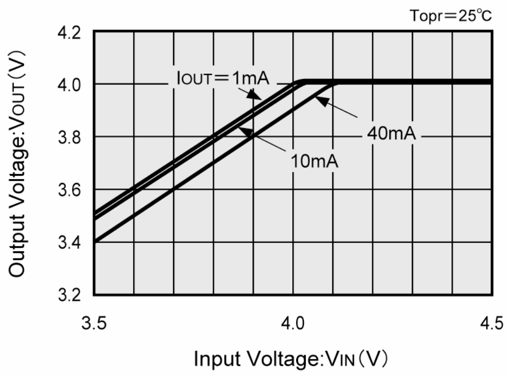

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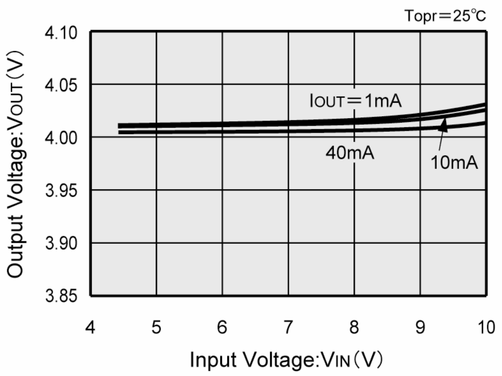
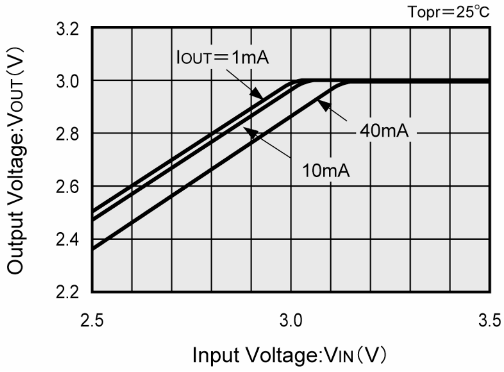


■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(2) Output Voltage vs. Input Voltage (Continued)

XC62HR3002(3V)



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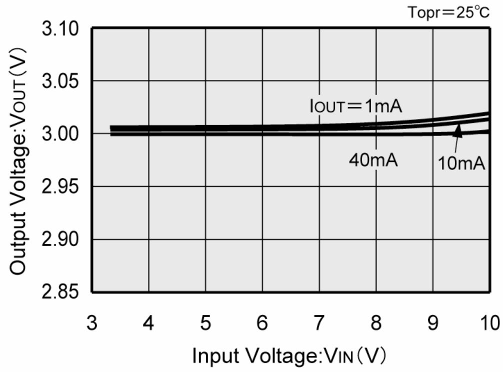

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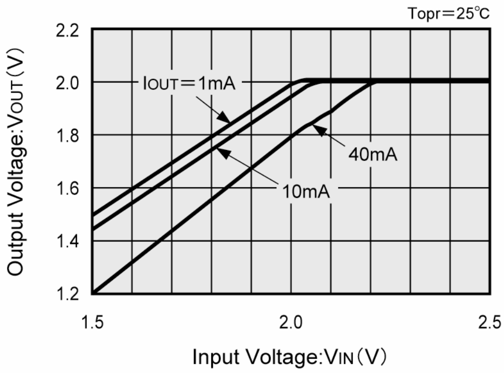
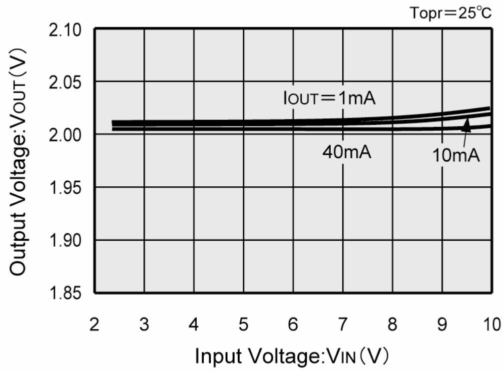
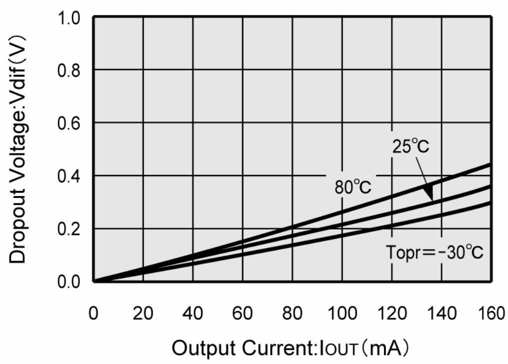


XC62HR2002(2V)



(3) Dropout Voltage vs. Output Current

XC62HR5002(5V)



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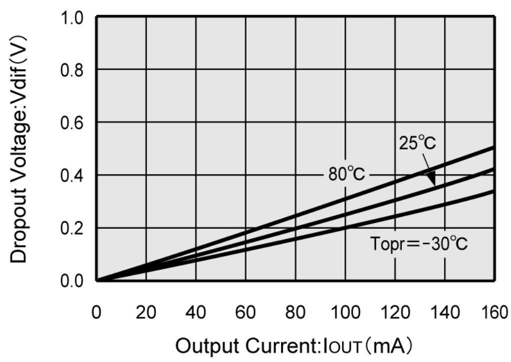

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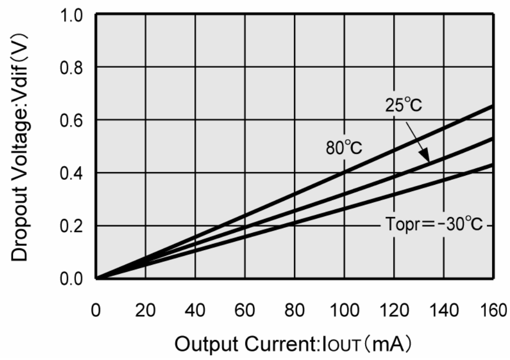
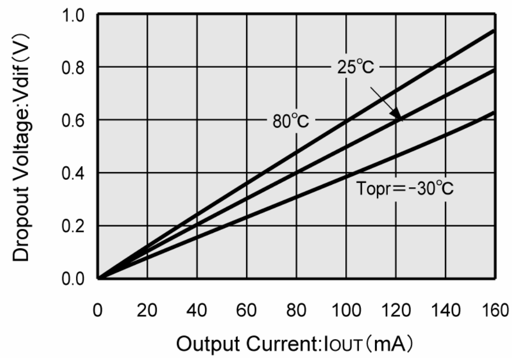
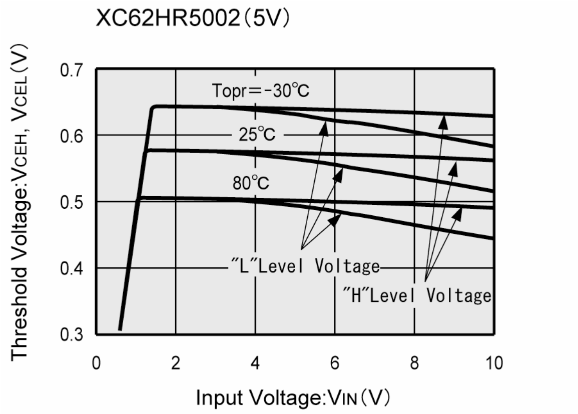


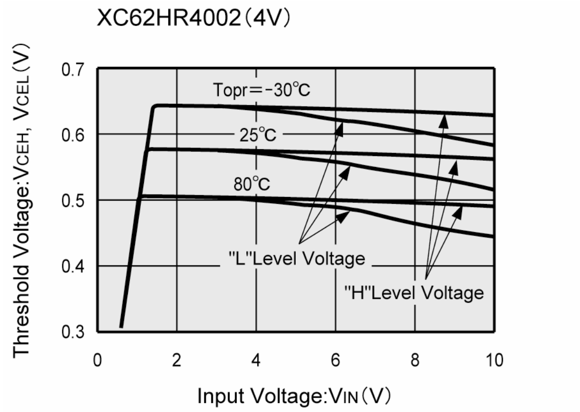
XC62HR2002(2V)

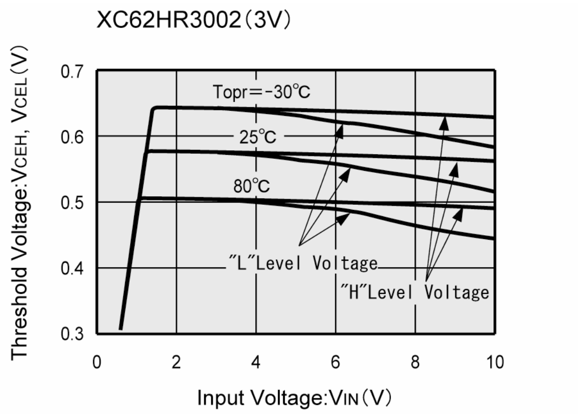


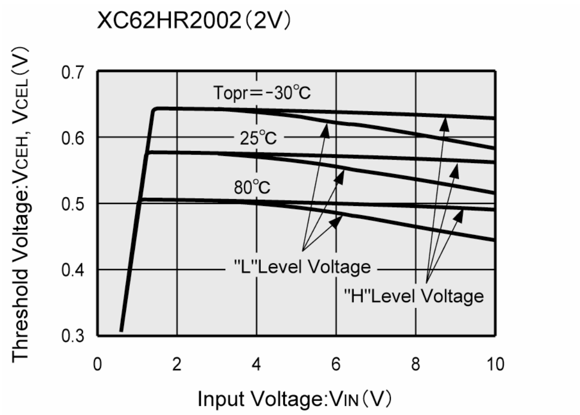
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(4) CE Pin Threshold Voltage vs. Input Voltage

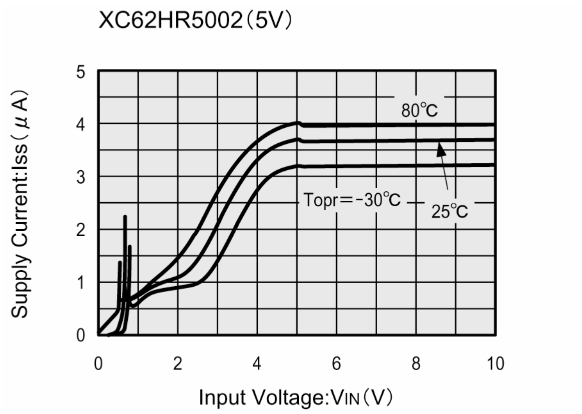


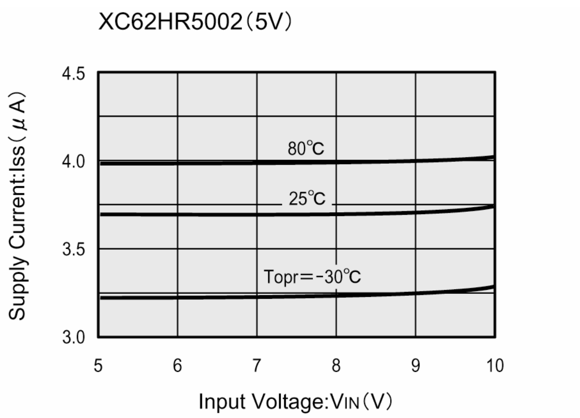


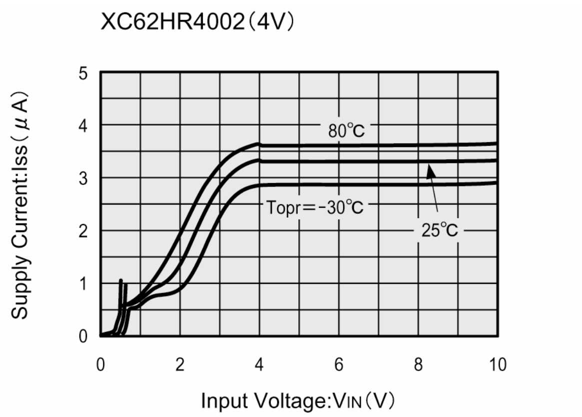


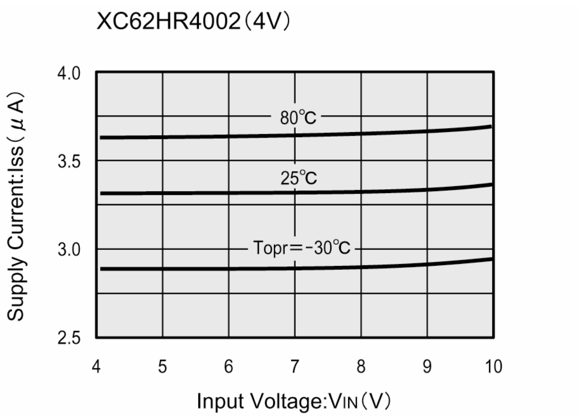


(5) Supply Current vs. Input Voltage





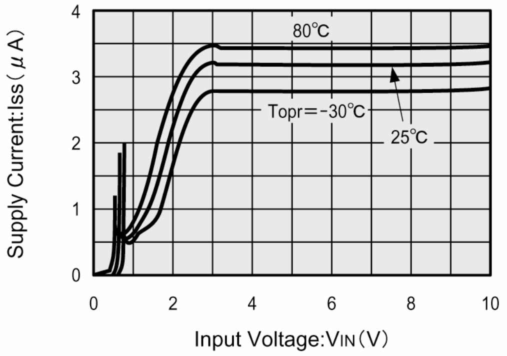




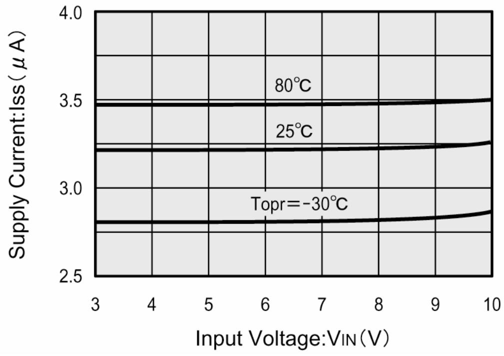
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(5) Supply Current vs. Input Voltage (Continued)

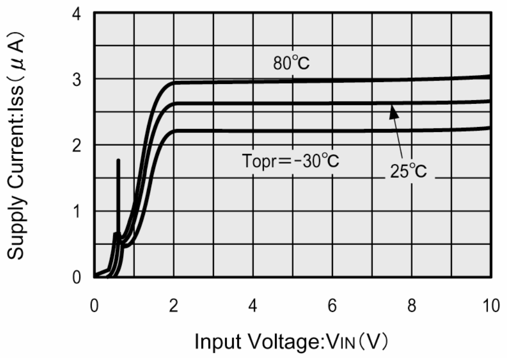
XC62HR3002(3V)



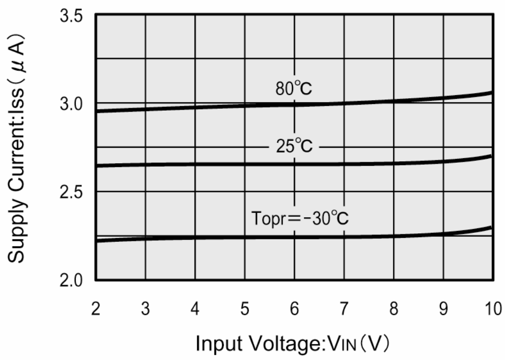
XC62HR3002(3V)



XC62HR2002(2V)

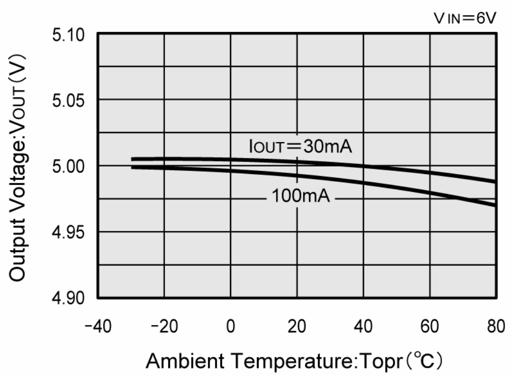


XC62HR2002(2V)

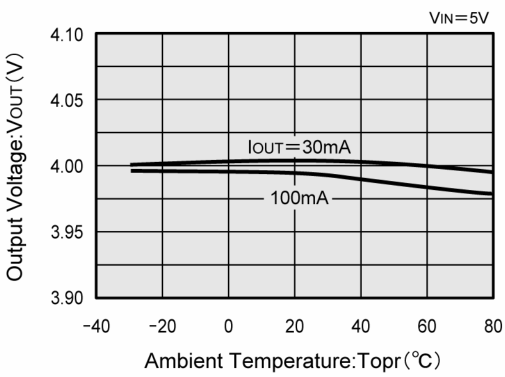


(6) Output Voltage vs. Ambient Temperature

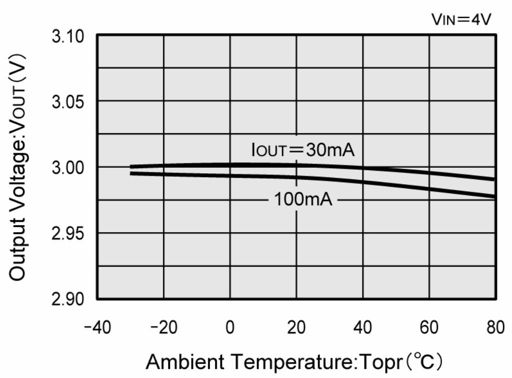
XC62HR5002(5V)



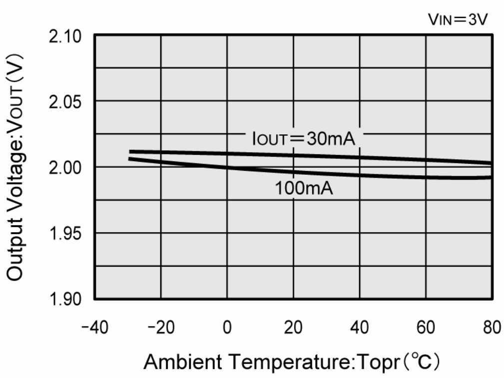
XC62HR4002(4V)



XC62HR3002(3V)



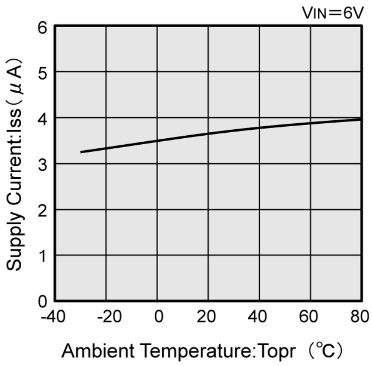
XC62HR2002(2V)



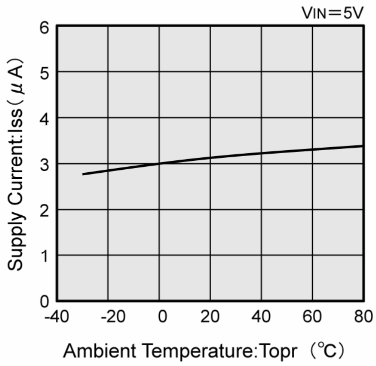
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(7) Supply Current vs. Ambient Temperature

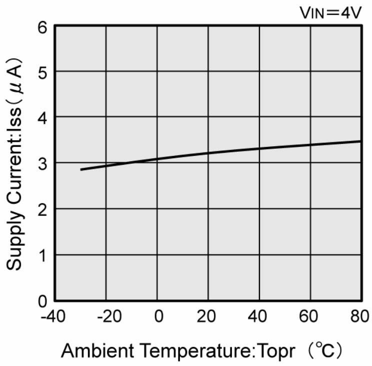
XC62HR5002（5V）



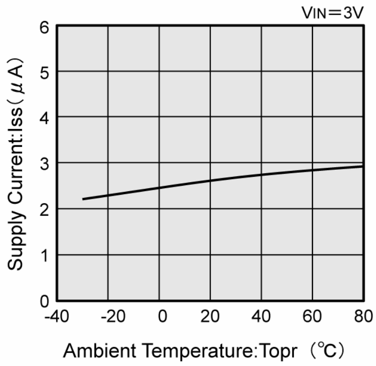
XC62HR4002（4V）



XC62HR3002（3V）

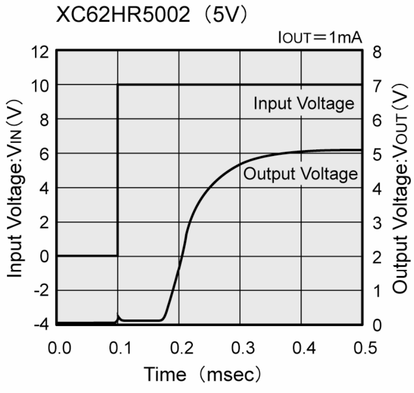


XC62HR2002（2V）

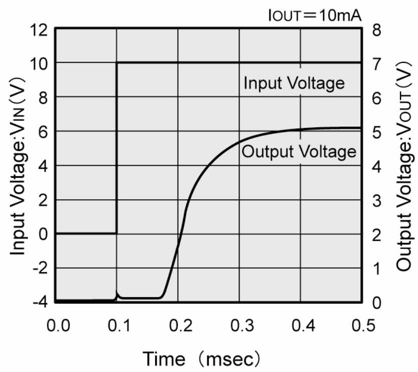


(8) Input Transient Response 1

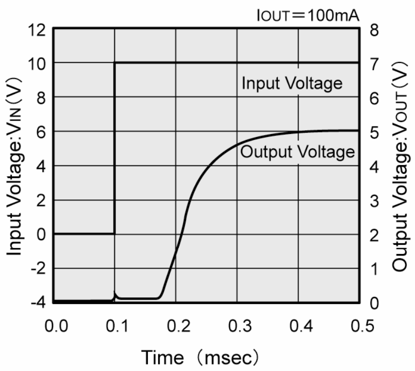
XC62HR5002（5V）



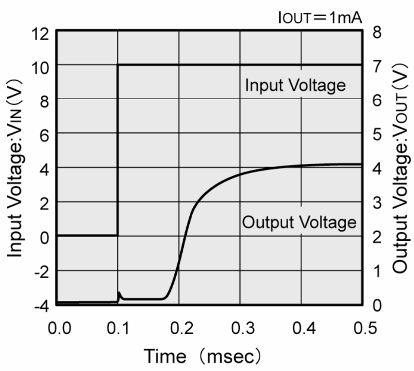
XC62HR5002（5V）



XC62HR5002（5V）



XC62HR4002（4V）



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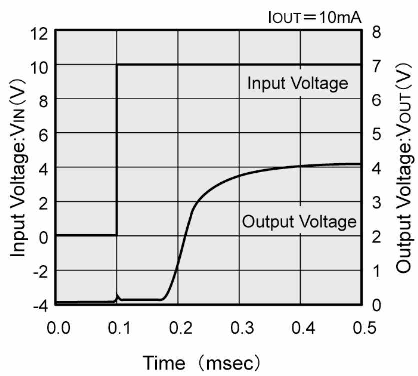
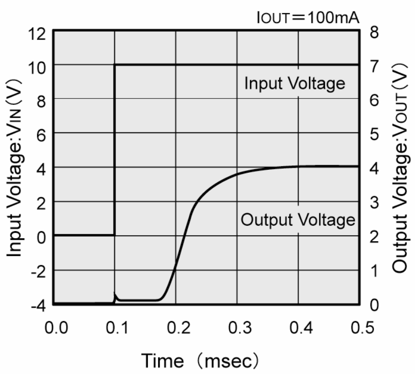
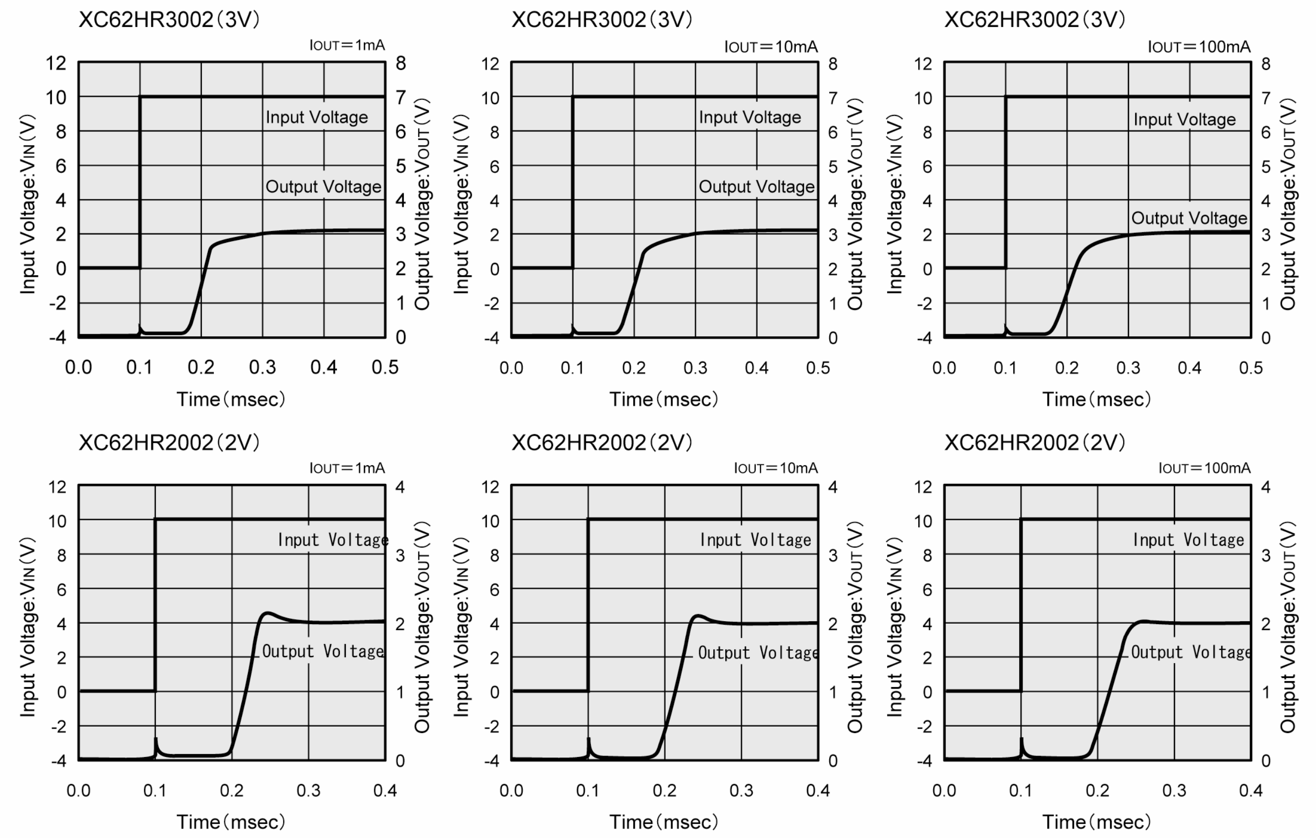


XC62HR4002（4V）

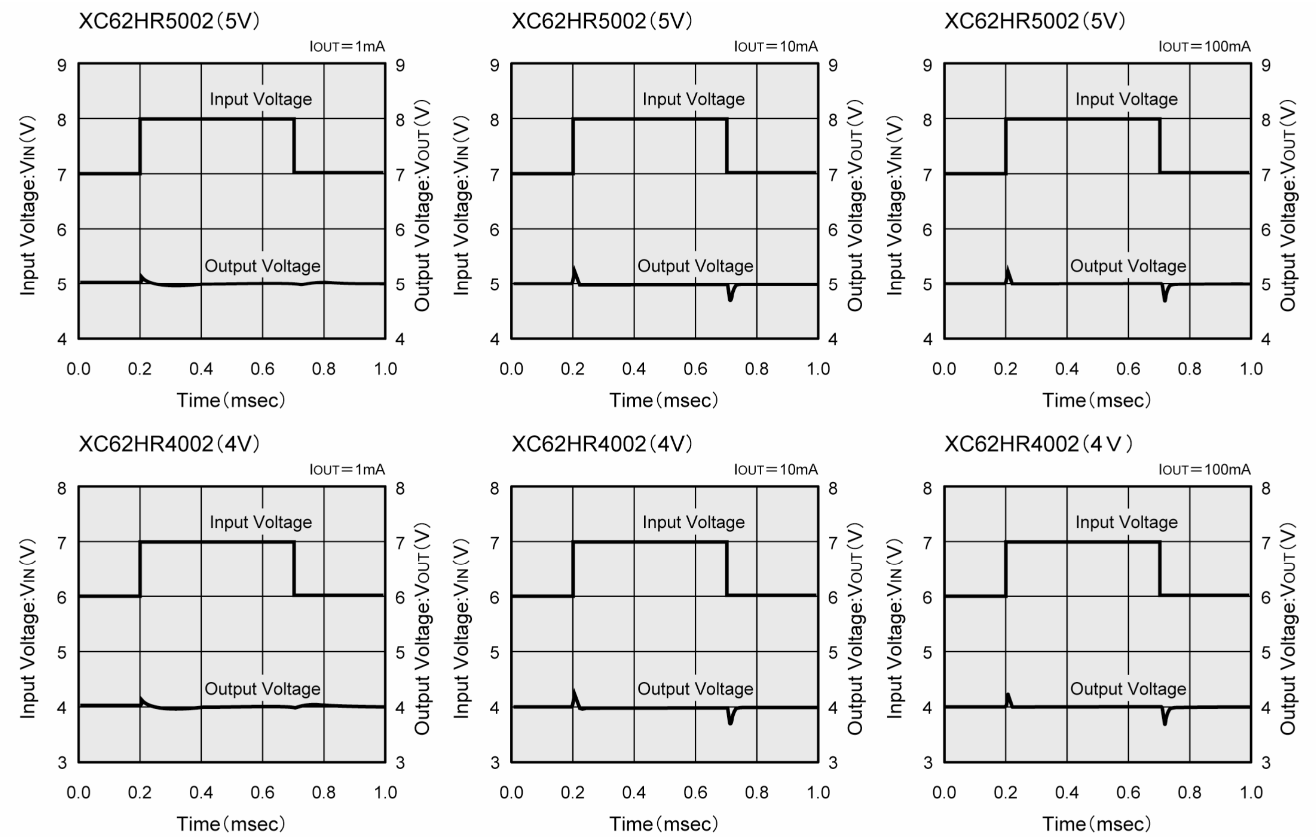


■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(8) Input Transient Response 1 (Continued)

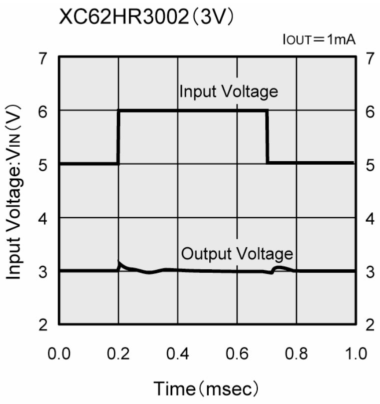


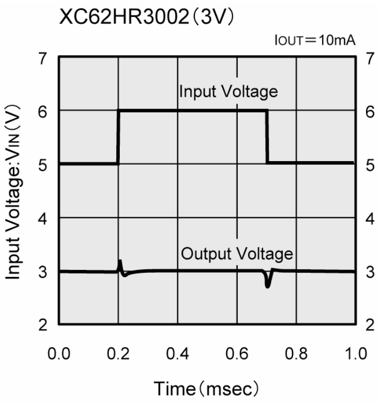
(9) Input Transient Response 2

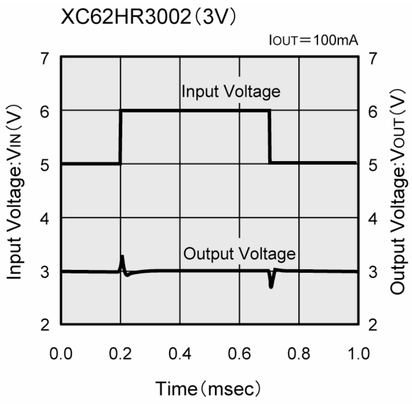


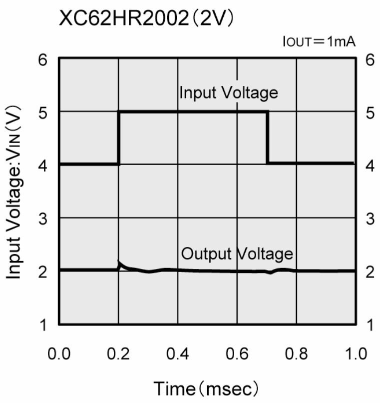
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

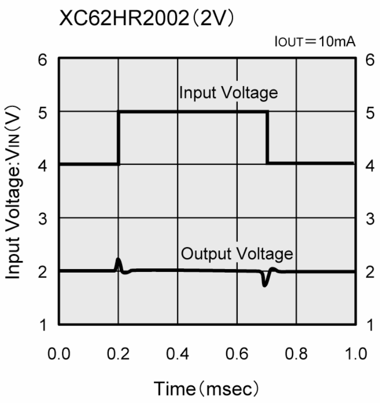
(9) Input Transient Response 2 (Continued)

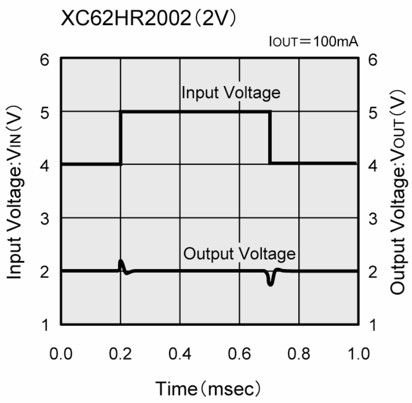




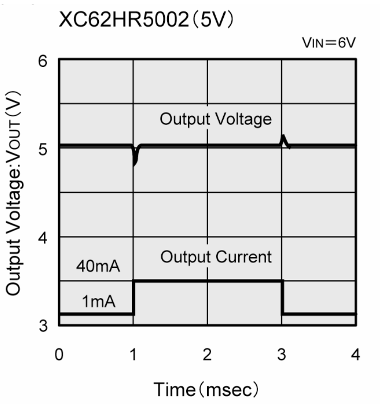


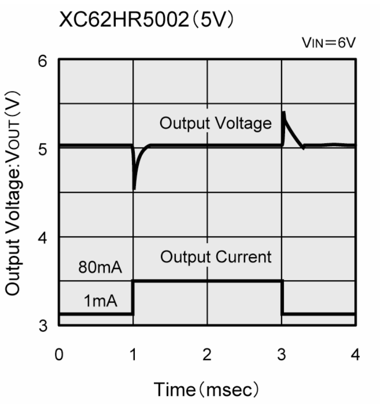


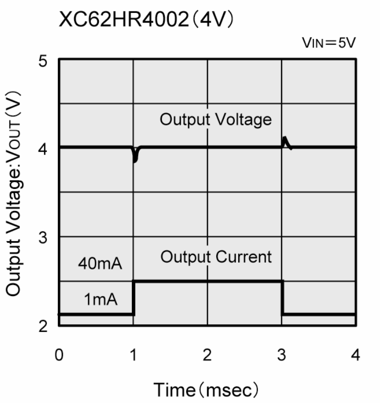


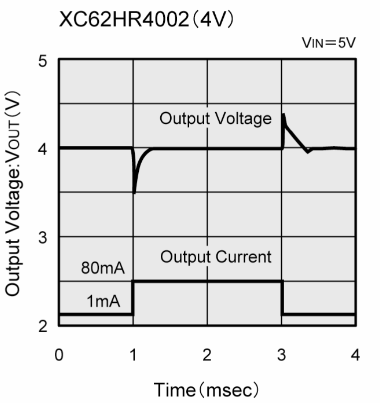


(10) Load Transient Response





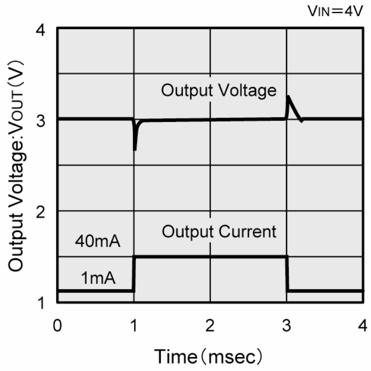




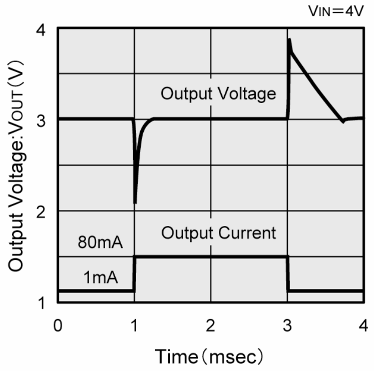
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(10) Load Transient Response (Continued)

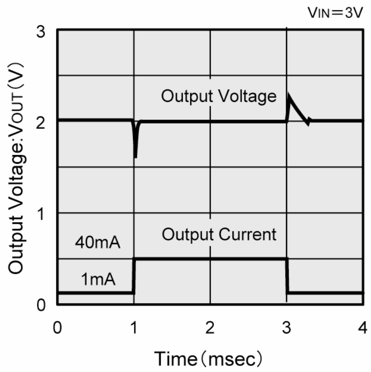
XC62HR3002(3V)



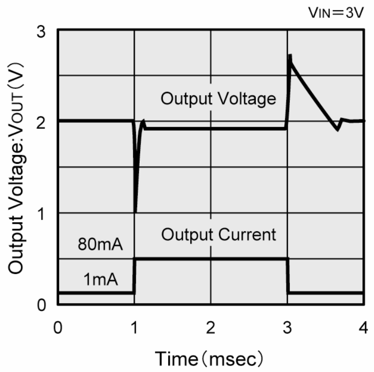
XC62HR3002(3V)



XC62HR2002(2V)

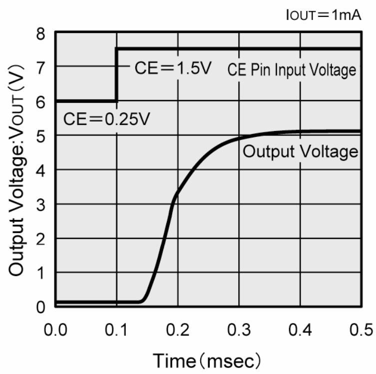


XC62HR2002(2V)

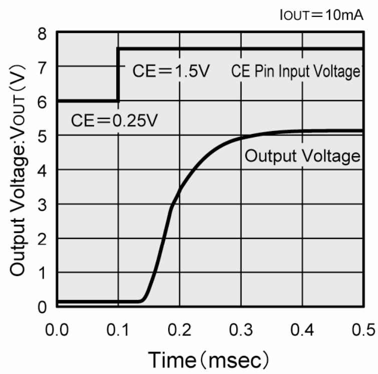


(11) CE Pin Transient Response

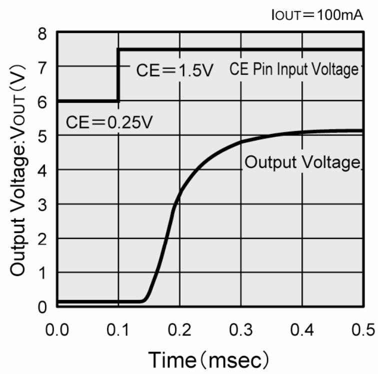
XC62HR5002(5V)



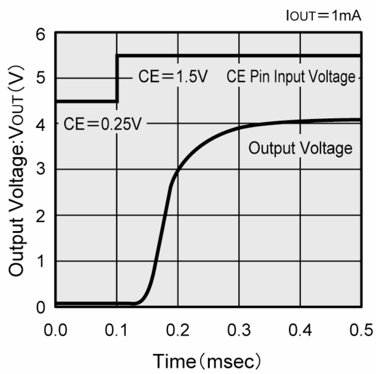
XC62HR5002(5V)



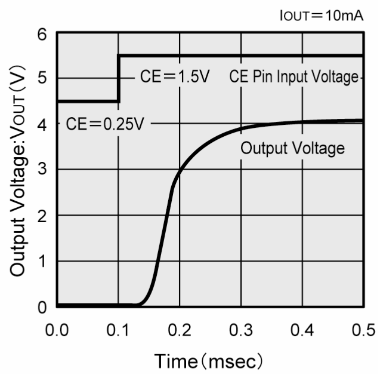
XC62HR5002(5V)



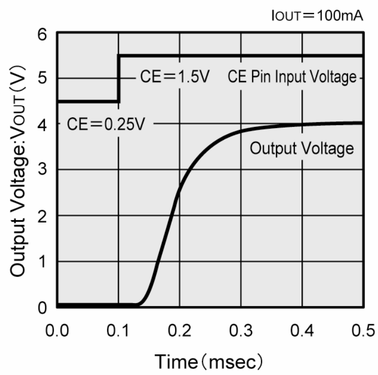
XC62HR4002(4V)



XC62HR4002(4V)

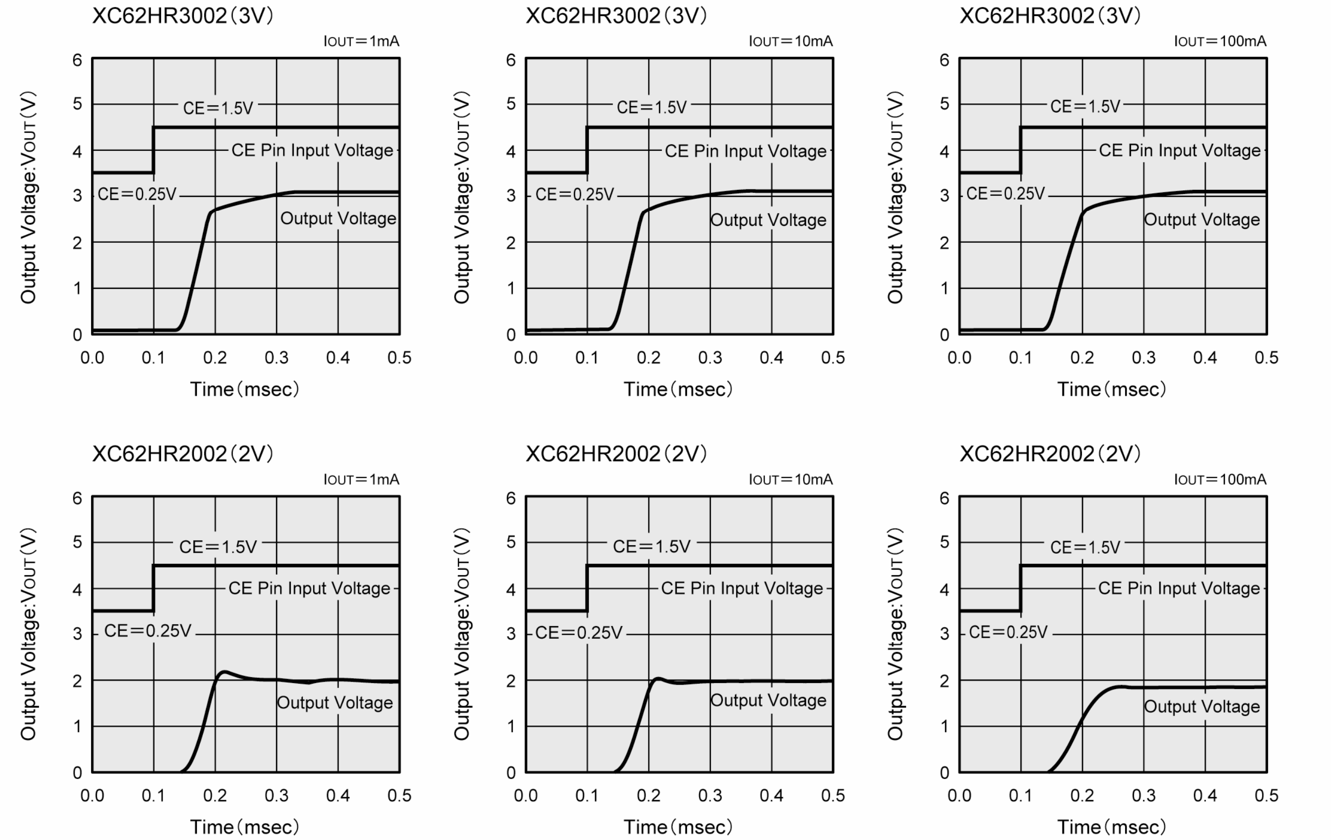


XC62HR4002(4V)

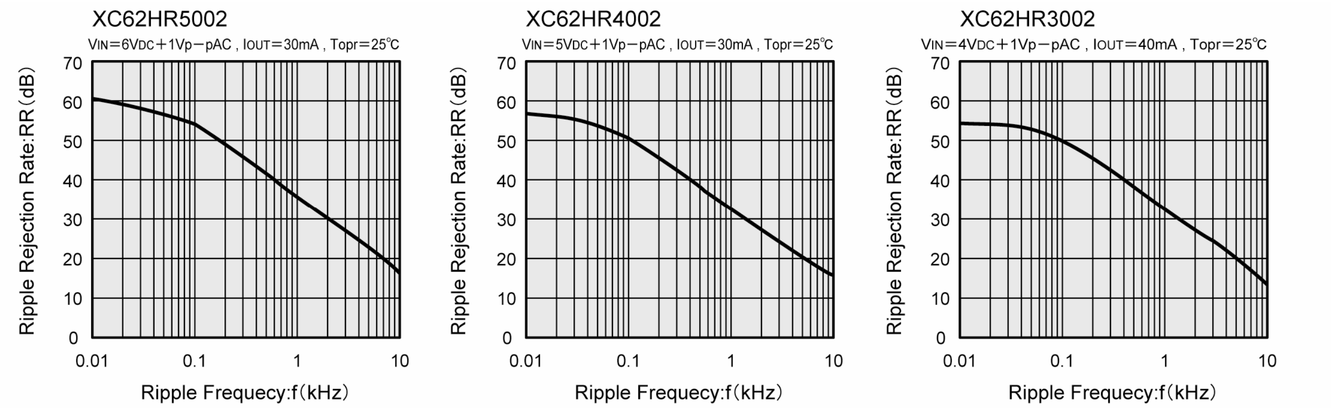


■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(11) CE Pin Transient Response (Continued)

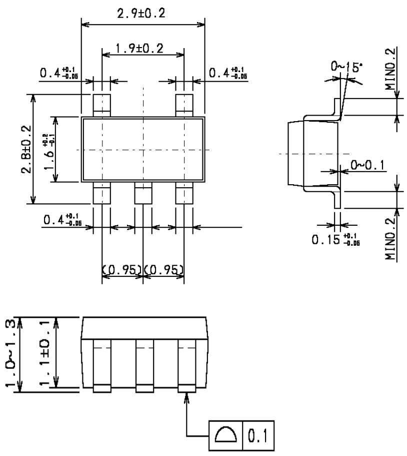


(12) Ripple Rejection Rate

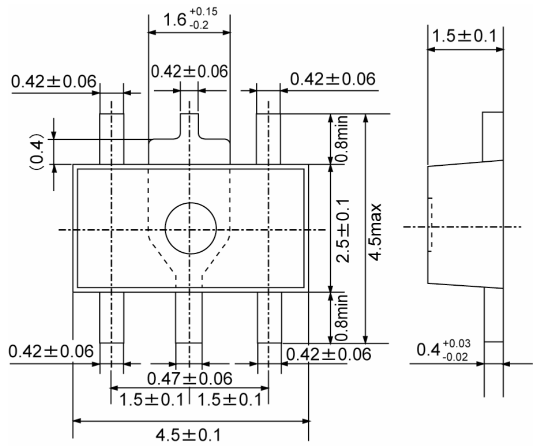


■PACKAGING INFORMATION

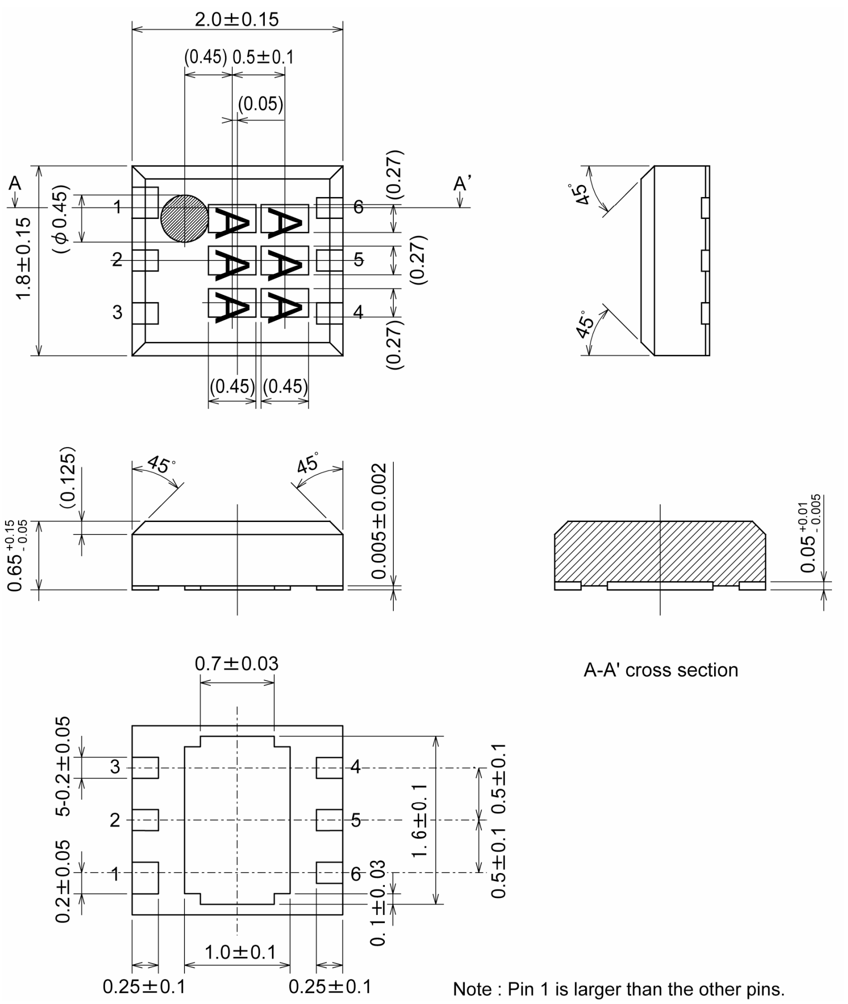
●SOT-25



●SOT-89-5



●USP-6B

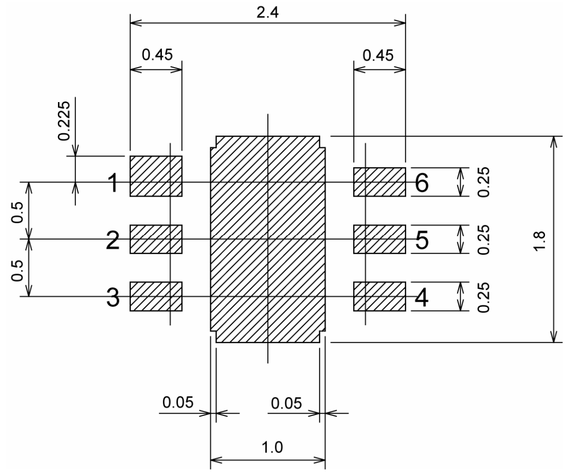


A-A' cross section

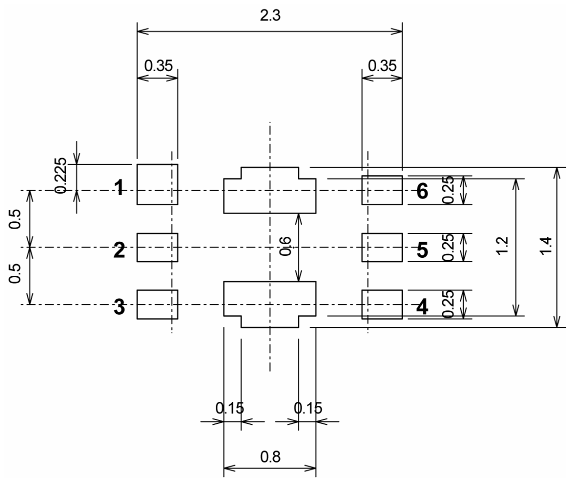
Note : Pin 1 is larger than the other pins.

■REFERENCE PATTERN LAYOUT DIMENSIONS

●USP-6B

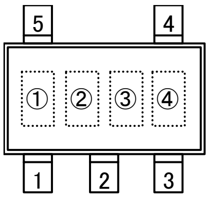


Note: Recommended metal mask design

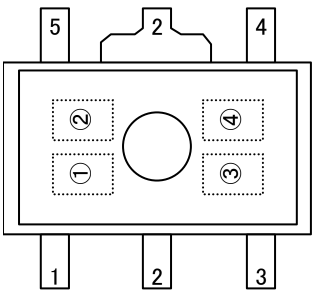


■ MARKING RULE

●SOT-25, SOT-89-5



SOT-25
(TOP VIEW)



SOT-89-5
(TOP VIEW)

① Represents integer of the output voltage

MARK	VOLTAGE (V)	MARK	VOLTAGE (V)
0	0.x	$\overline{0}$	0.x
1	1.x	$\overline{1}$	1.x
2	2.x	$\overline{2}$	2.x
3	3.x	$\overline{3}$	3.x
4	4.x	$\overline{4}$	4.x
5	5.x	$\overline{5}$	5.x
6	6.x	$\overline{6}$	6.x
7	7.x	$\overline{7}$	7.x
8	8.x	$\overline{8}$	8.x
9	9.x	$\overline{9}$	9.x

② Represents decimal number of the output voltage

MARK	VOLTAGE (V)	MARK	VOLTAGE (V)
0	x.0	$\overline{0}$	x.0
1	x.1	$\overline{1}$	x.1
2	x.2	$\overline{2}$	x.2
3	x.3	$\overline{3}$	x.3
4	x.4	$\overline{4}$	x.4
5	x.5	$\overline{5}$	x.5
6	x.6	$\overline{6}$	x.6
7	x.7	$\overline{7}$	x.7
8	x.8	$\overline{8}$	x.8
9	x.9	$\overline{9}$	x.9

③ Based on internal standards

④ Represents assembly lot number.
0 to 9, A to Z repeated (G, I, J, O, Q, W excepted)

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