XC62K Series

Negative Voltage Regulators

■GENERAL DESCRIPTION

The XC62K series are highly precise, low power consumption, negative voltage regulators, manufactured using CMOS and laser trimming technologies. The series achieves high output currents with small input-output voltage differentials, and consists of a high precision voltage reference, an error correction circuit, and an output driver with current limitation.

SOT-23 (150mW), SOT-89 (500mW), USP-6B (100mW) and TO-92 (300mW) packages are available.

■APPLICATIONS

●Battery powered equipment

●Portable & cellular phones

●Various portable equipment

●Power supply for GaAs applications

■FEATURES

Dropout Voltage : 0.12V@50mA (V_{OUT}=-5.0V)
: 0.38V@100mA

Maximum Output Current : 100mA (within MAX. power dissipation, V_{OUT}= -5.0V)

Output Voltage Range : -2.1V ~ -6.0V (0.1V increments)
-5.0, -4.0, -3.0V, -2.5V standard
(All other voltages are semi-custom)

Highly Accurate : Setting output voltage ±2%
(±1% for semi-custom products)

Low Power Consumption : 3.0μA @ V_{OUT}= -5.0V (TYP.)

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

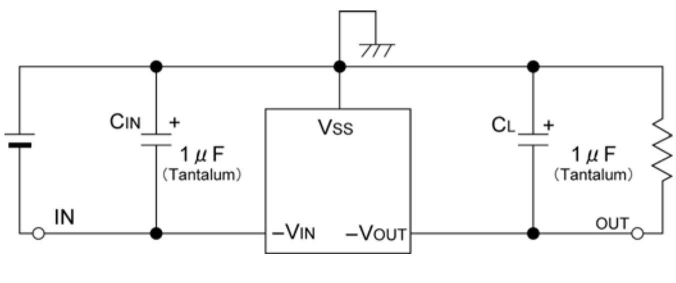
Line Regulation : 0.1%/V (TYP.)

CMOS Low Power Consumption

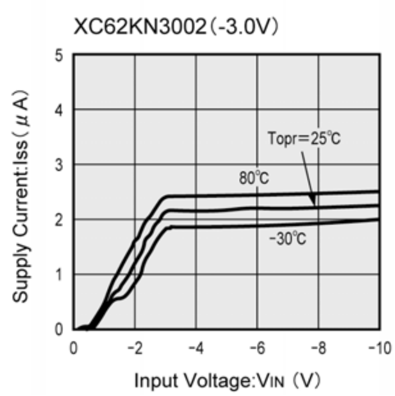
Packages : SOT-23
SOT-89
TO-92
USP-6B

Environmentally Friendly : EU RoHS Compliant, Pb Free

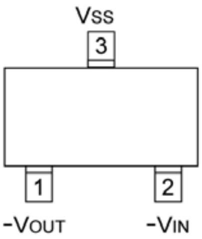
■TYPICAL APPLICATION CIRCUIT



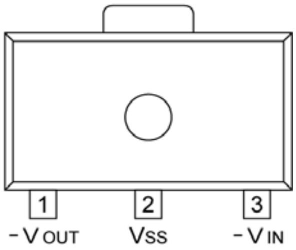
■ TYPICAL PERFORMANCE CHARACTERISTICS



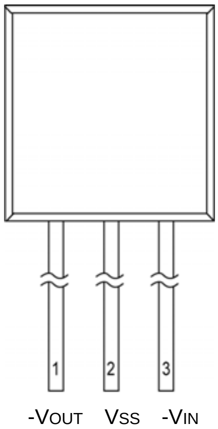
■PIN CONFIGURATION



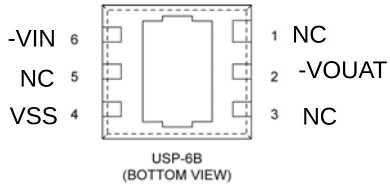
SOT-23
(TOP VIEW)



SOT-89
(TOP VIEW)



TO-92
(SIDE VIEW)



*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 VSS pin.

■PIN ASSIGNMENT

PIN NUMBER			PIN NAME	FUNCTION
SOT-23	SOT-89/TO-92	USP-6B		
2	3	6	-VIN	Power Supply Input
3	2	4	VSS	Ground
1	1	2	-VOUT	Output
-	-	1.3.5	NC	No Connection

■PRODUCT CLASSIFICATION

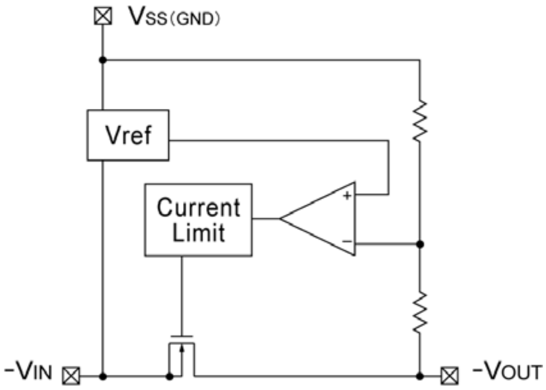
●Ordering Information

XC62K①②③④⑤⑥⑦-⑧ (*1)

MARK	DESCRIPTION	SYMBOL	DESCRIPTION
①	Polarity of Output Voltage	N	Negative
②③	Output Voltage	21 ~ 60	e.g. VOUT – 2.1V → ②=2, ③=1 VOUT – 6.0V → ②=6, ③=0
④	Temperature Characteristics	0	± 100ppm (TYP.)
⑤	Output Voltage Accuracy	1	± 1% (Semi-custom)
		2	± 2%
⑥⑦-⑧	Packages Taping Type (*2)	MR	SOT-23
		MR-G	SOT-23
		PR	SOT-89
		PR-G	SOT-89
		TH	TO-92:Paper type
		TH-G	TO-92:Paper type
		TB	TO-92:Bag type
		TB-G	TO-92:Bag type
		DR	USP-6B
		DR-G	USP-6B

(*1) The “-G” suffix indicates that the products are Halogen and Antimony free as well as being fully RoHS compliant.
(*2) The device orientation is fixed in its embossed tape pocket. For reverse orientation, please contact your local Torex sales office or representative. (Standard orientation: ⑥R-⑧, Reverse orientation: ⑥L-⑧)

■BLOCK DIAGRAM



■ABSOLUTE MAXIMUM RATINGS

Ta=25℃

PARAMETER		SYMBOL	RATINGS	UNITS
Input Voltage		V_{IN}	-12.0	V
Output Current		I_{OUT}	200	mA
Output Voltage		V_{OUT}	$-V_{DD}$-0.3~V_{IN}+0.3	V
Power Dissipation	SOT-23	Pd	150	mW
	SOT-89		500	
	TO-92		300	
	USP-6B		100	
Operating Temperature Range		Topr	-40 ~ +85	℃
Storage Temperature Range		Tstg	-40 ~ +125	℃

Note: Please ensure that I_{OUT} is less than Pd/(V_{OUT}-V_{IN}).

■ELECTRICAL CHARACTERISTICS

XC62KN5002 VOUT(T)=-5.0V Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Output Voltage (*2)	VOUT(E)	IOUT=20mA VIN=-6.0V	x 0.98 -4.90	VOUT(T) -5.00	x 1.02 -5.10	V	2
Maximum Output Current	IOUT max	VIN=-6.0V, VOUT(E)≧-4.5V	100	-	-	mA	4
Load Regulation	△VOUT	VIN=6.0V 1mA≦IOUT≦50mA	-	40	80	mV	4
Dropout Voltage (*3)	Vdif	IOUT=50mA	-	120	300	mV	3
		IOUT=100mA	-	380	600		
Supply Current	ISS	VIN=-6.0V	-	3.0	7.0	μA	1
Line Regulation	△VOUT / △VIN・VOUT	IOUT=20mA -6.0V≦VIN≦-10.0V	-	0.1	0.3	%V	3
Input Voltage	VIN	-	-	-	-10.0	V	-
Output Voltage Temperature Characteristics	△VOUT / △VIN・VOUT	IOUT=20mA -30℃≦Topr≦80℃	-	±100	-	ppm/℃	-

XC62KN4002 VOUT(T)=-4.0V Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Output Voltage (*2)	VOUT(E)	IOUT=20mA VIN=-5.0V	x 0.98 -3.92	VOUT(T) -4.00	x 1.02 -4.08	V	2
Maximum Output Current	IOUT max	VIN=-5.0V, VOUT(E)≧-3.6V	80	-	-	mA	4
Load Regulation	△VOUT	VIN=-5.0V 1mA≦IOUT≦45mA	-	40	80	mV	4
Dropout Voltage (*3)	Vdif	IOUT=45mA	-	120	300	mV	3
		IOUT=90mA	-	380	600		
Supply Current	ISS	VIN=-5.0V	-	3.0	6.5	μA	1
Line Regulation	△VOUT / △VIN・VOUT	IOUT=20mA -5.0V≦VIN≦-10.0V	-	0.1	0.3	%V	3
Input Voltage	VIN	-	-	-	-10.0	V	-
Output Voltage Temperature Characteristics	△VOUT / △VIN・VOUT	IOUT=20mA -30℃≦Topr≦80℃	-	±100	-	ppm/℃	-

NOTE:

*1: VOUT(T)=Specified output voltage

*2: VOUT(E)=Effective output voltage (i.e. the output voltage when "VOUT(T) -1.0V" is provided at the VIN pin while maintaining a certain IOUT value).

*3: Vdif = {VIN1 - VOUT1}

*4: VOUT1 =A voltage equal to 98% of the output voltage whenever an amply stabilized IOUT {VOUT(T) -1.0V} is input.

*5: VIN1=The input voltage when a voltage equal to 98% of VOUT(E) appears. (Input voltage is gradually decreased.)

*6: IOUTMAX=Please ensure that output current is within the values given for power dissipation.

■ELECTRICAL CHARACTERISTICS (Continued)

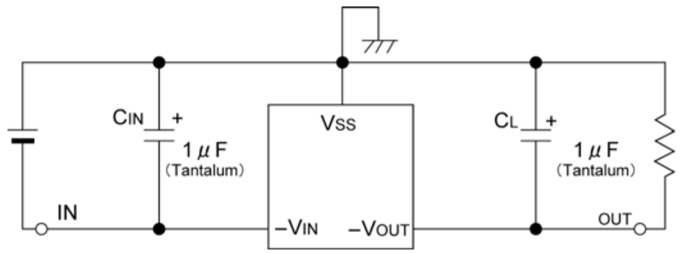
XC62KN3002 VOUT(T)=-3.0V

Ta=25℃

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Output Voltage (*2)	VOUT(E)	IOUT=20mA VIN=-4.0V	x 0.98 -2.94	VOUT(T) -3.00	x 1.02 -3.06	V	2
MAX. Output Current	IOUT max	VIN=-4.0V, VOUT(E)≧-2.7V	60	-	-	mA	4
Load Regulation	△VOUT	VIN=-4.0V 1mA≦IOUT≦40mA	-	40	80	mV	4
Dropout Voltage	Vdif	IOUT=40mA	-	120	300	mV	3
		IOUT=80mA	-	380	600		
Supply Current	ISS	VIN=4.0V	-	2.5	6.0	μA	1
Line Regulation	△VOUT / △VIN・VOUT	IOUT=20mA -4.0V≦VIN≦-10.0V	-	0.1	0.3	%V	3
Input Voltage	VIN	-	-	-	-10.0	V	-
Output Voltage Temperature Characteristics	△VOUT / △VIN・VOUT	IOUT=20mA -30℃≦Topr≦80℃	-	±100	-	ppm/℃	-

NOTE:
*1: VOUT(T)=Specified output voltage
*2: VOUT(E)=Effective output voltage (i.e. the output voltage when "VOUT(T) -1.0V" is provided at the VIN pin while maintaining a certain IOUT value).
*3: Vdif = {VIN1 - VOUT1}
*4: VOUT1 =A voltage equal to 98% of the output voltage whenever an amply stabilized IOUT {VOUT(T) -1.0V} is input.
*5: VIN1=The input voltage when a voltage equal to 98% of VOUT(E) appears. (Input voltage is gradually decreased.)
*6: IOUTMAX=Please ensure that output current is within the values given for power dissipation.

■TYPICAL APPLICATION CIRCUIT

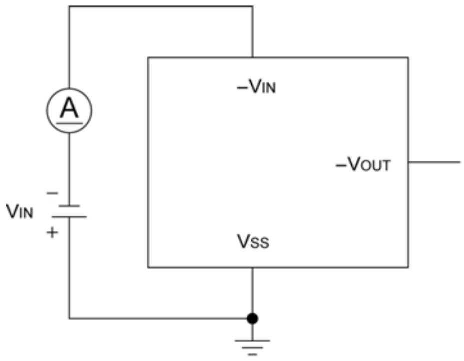


■NOTES ON USE

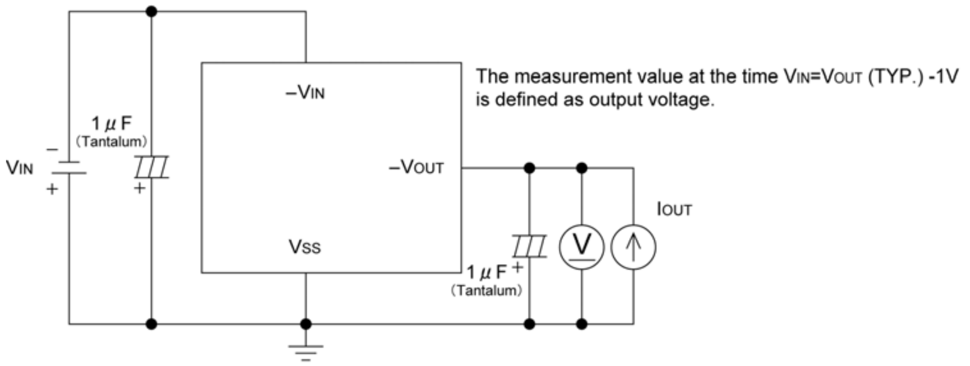
Please ensure that values for input capacitance, CIN and out capacitance, CL, are more than 1μF (Tantalum).

■TEST CIRCUITS

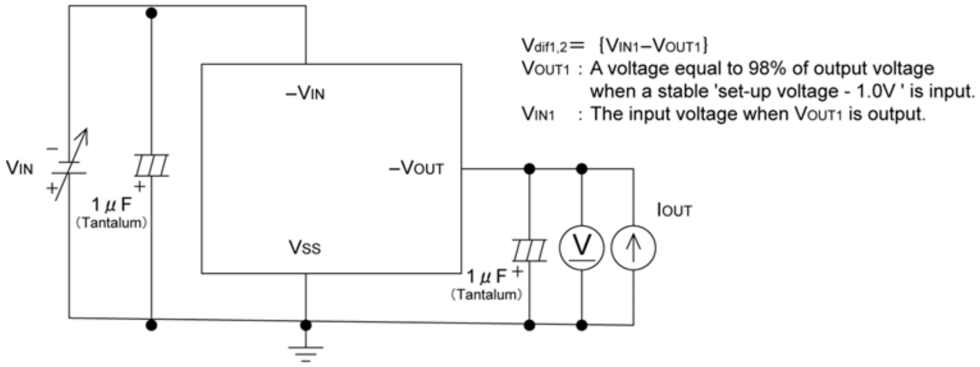
Circuit 1. Supply Current



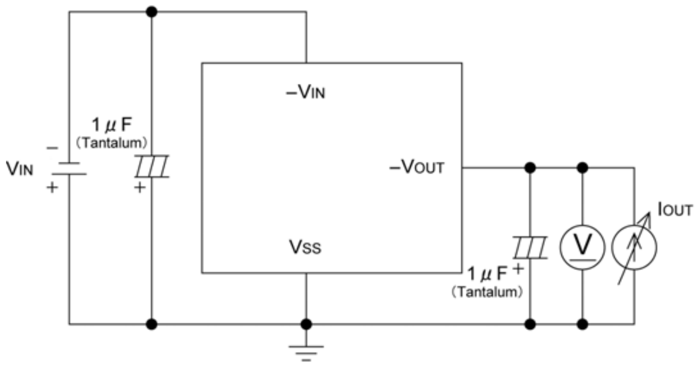
Circuit 2. Output Voltage



Circuit 3. Line Regulation Dropout Voltage



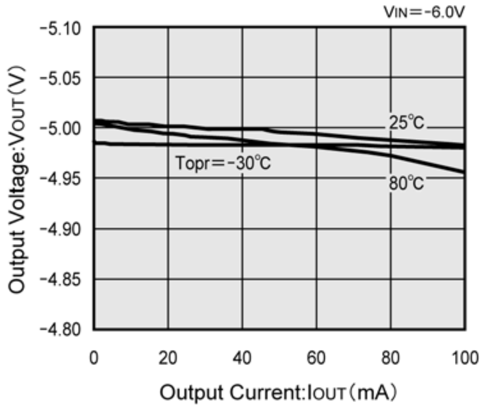
Circuit 4. Load Regulation, Maximum Output Current



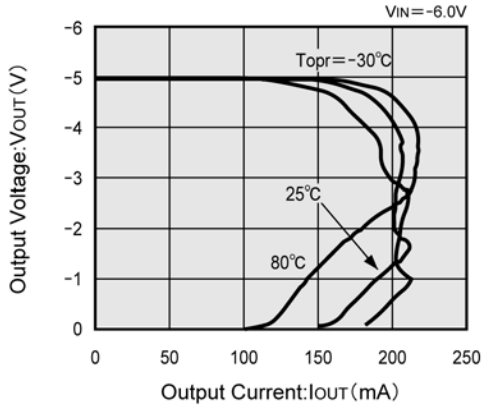
■TYPICAL PERFORMANCE CHARACTERISTICS

(1) Output Voltage vs. Output Current

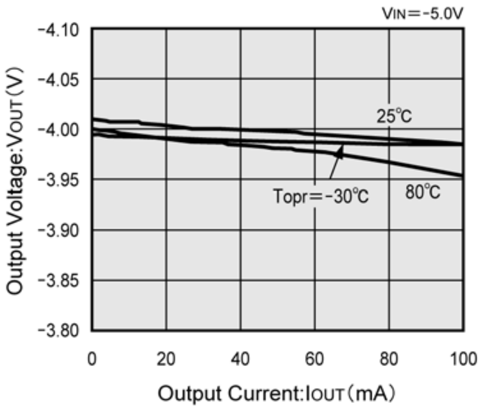
XC62KN5002(-5.0V)



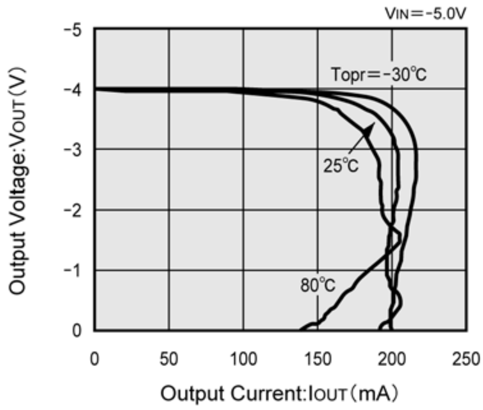
XC62KN5002(-5.0V)



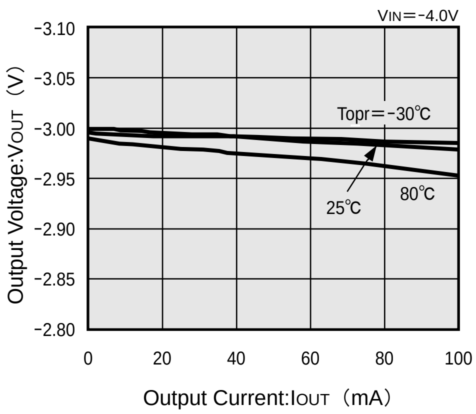
XC62KN4002(-4.0V)



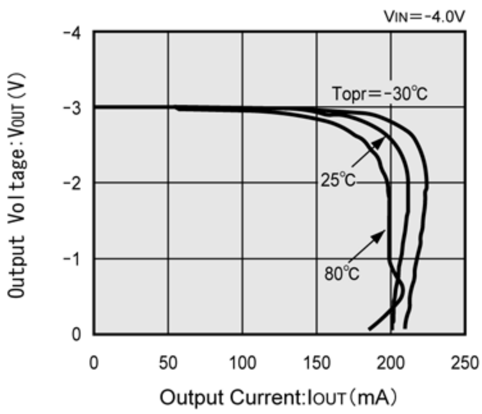
XC62KN4002(-4.0V)



XC62KN3002 (-3.0V)

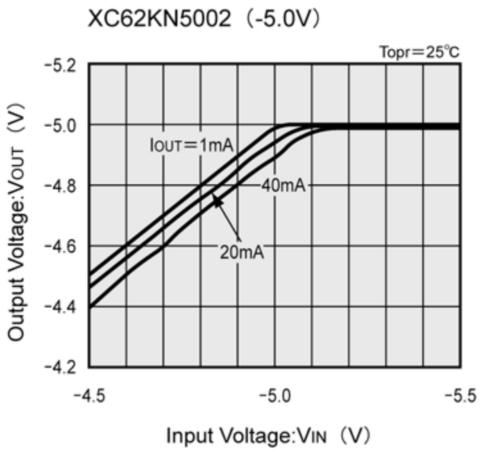


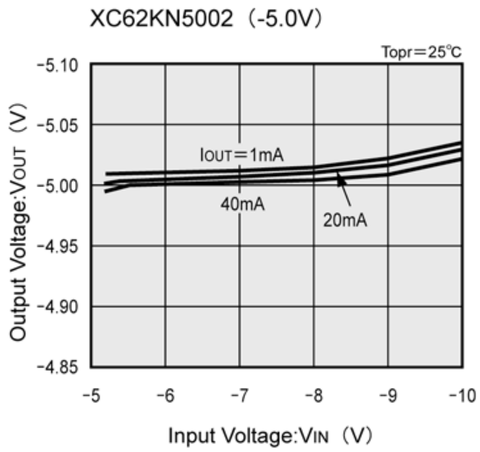
XC62KN3002(-3.0V)

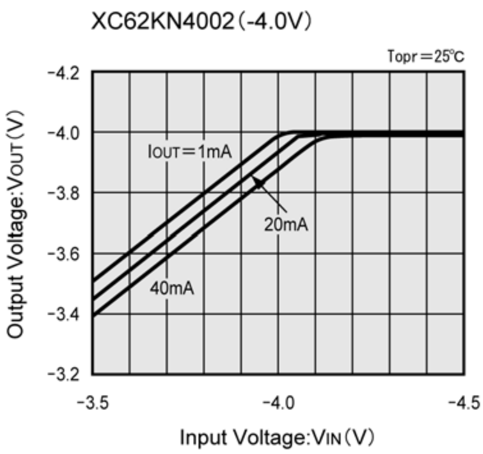


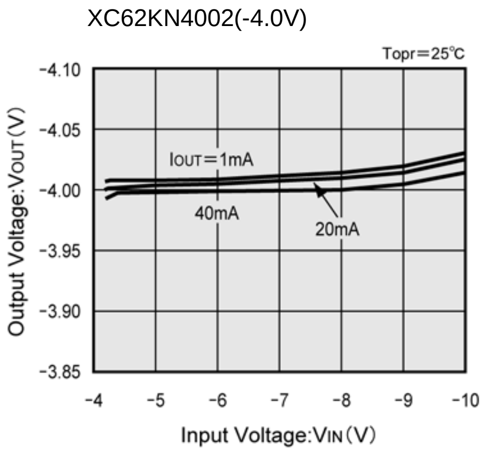
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

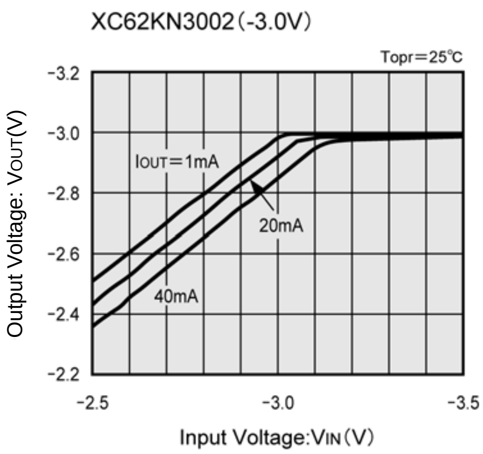
(2) Output Voltage vs. Input Voltage

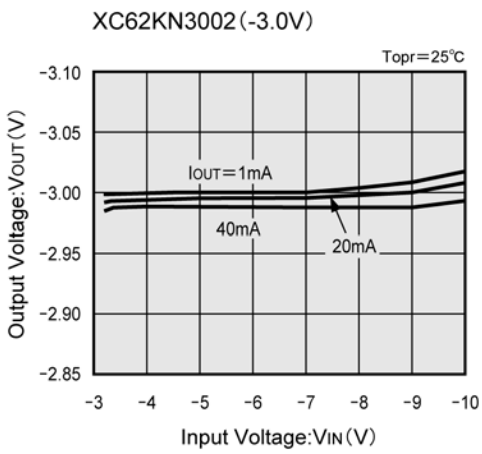








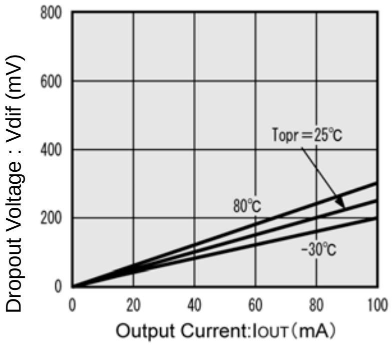




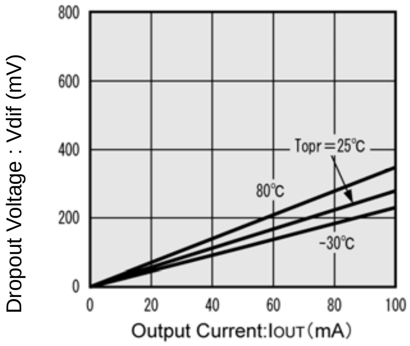
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(3) Dropout Voltage vs. Output Current

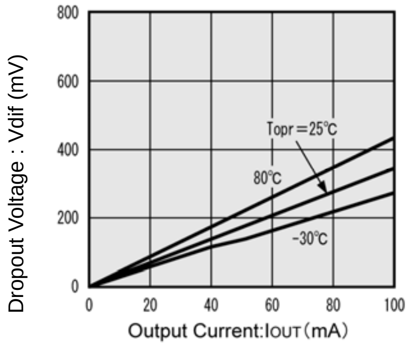
XC62KN5002(-5.0V)



XC62KN4002(-4.0V)

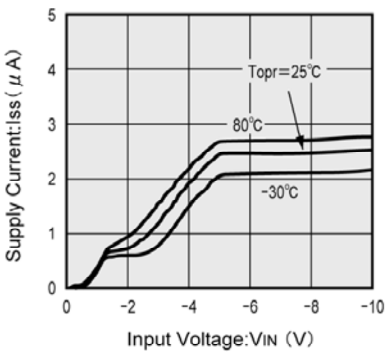


XC62KN3002(-3.0V)

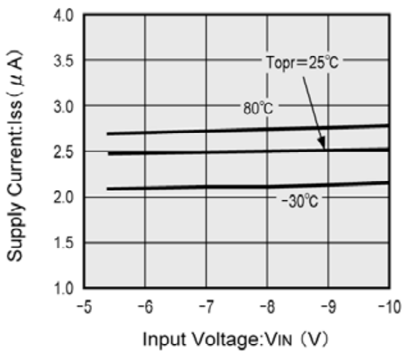


(4) Supply Current vs. Input Voltage

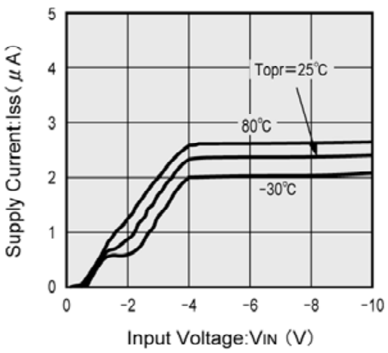
XC62KN5002(-5.0V)



XC62KN5002(-5.0V)



XC62KN4002(-4.0V)



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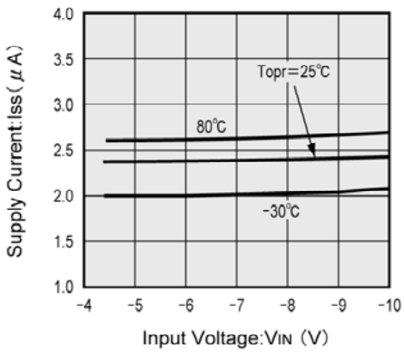

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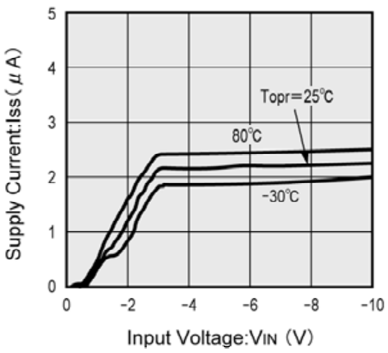

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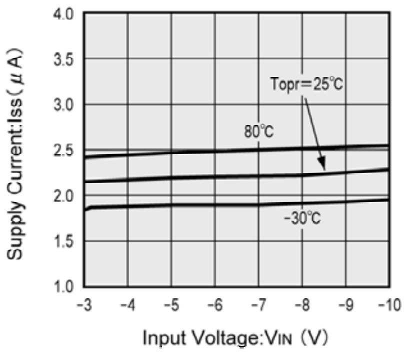
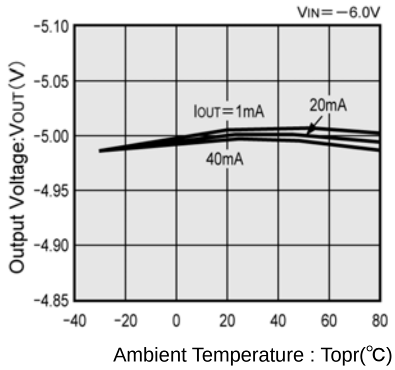


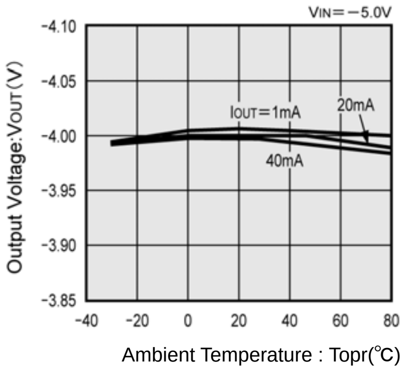
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(5) Output Voltage vs. Ambient Temperature

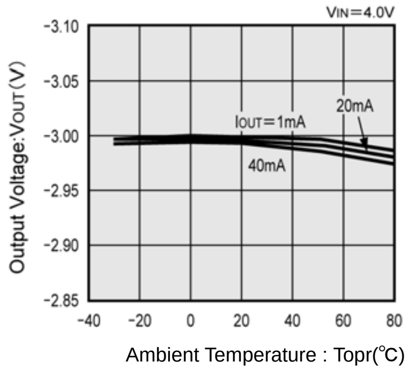
XC62KN5002(-5.0V)



XC62KN4002(-4.0V)

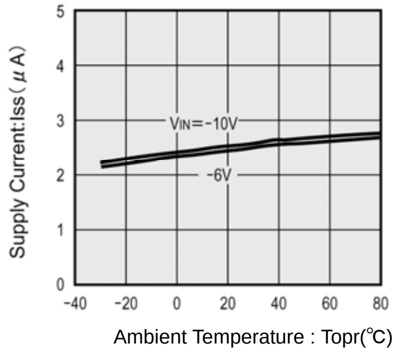


XC62KN3002(-3.0V)

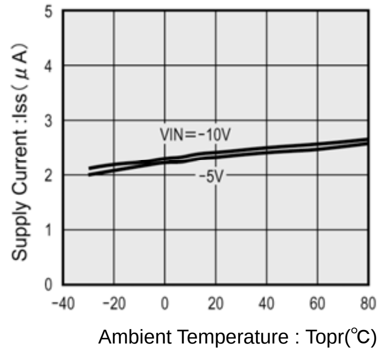


(6) Supply Current vs. Ambient Temperature

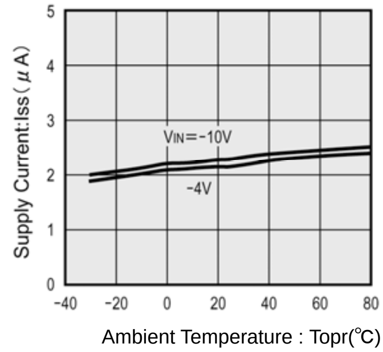
XC62KN5002(-5.0V)



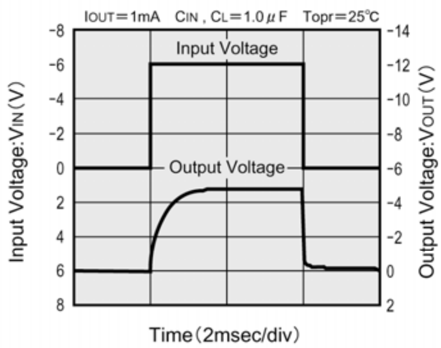
XC62KN4002(-4.0V)

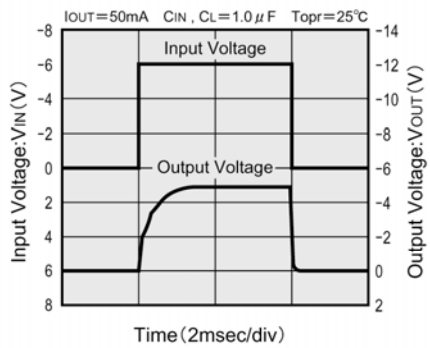


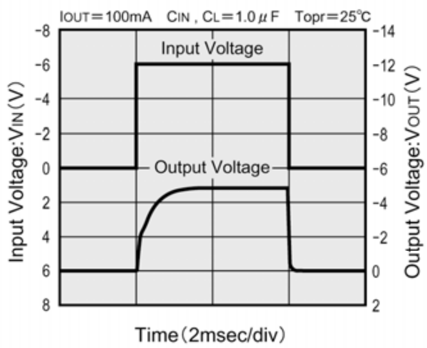
XC62KN3002(-3.0V)



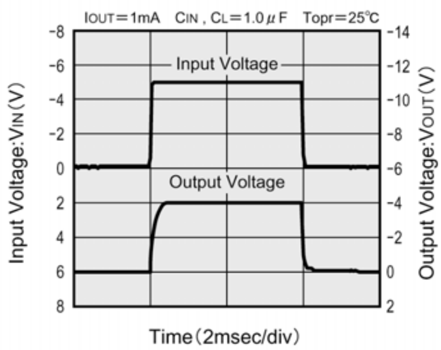
(7) Input Transient Response 1



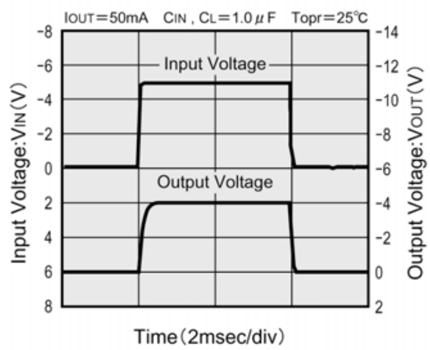




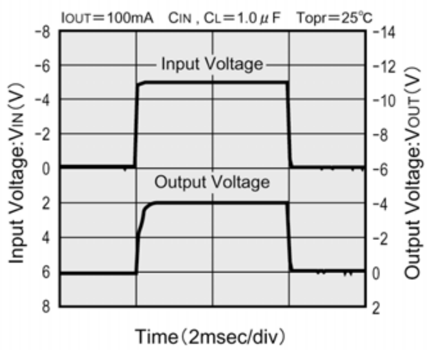
XC62KN4002(-4.0V)



XC62KN4002(-4.0V)



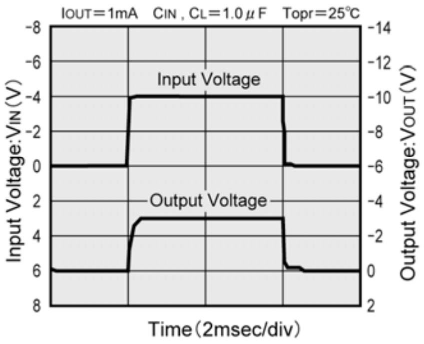
XC62KN4002(-4.0V)



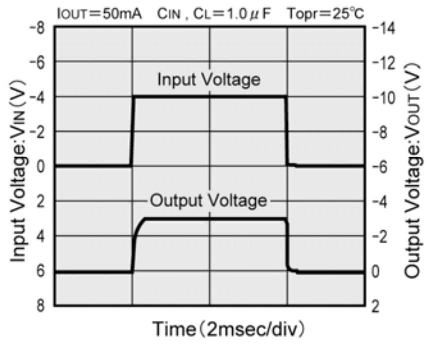
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(7) Input Transient Response 1

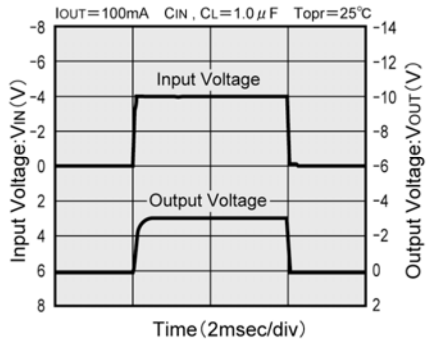
XC62KN3002 (-3.0V)



XC62KN3002 (-3.0V)

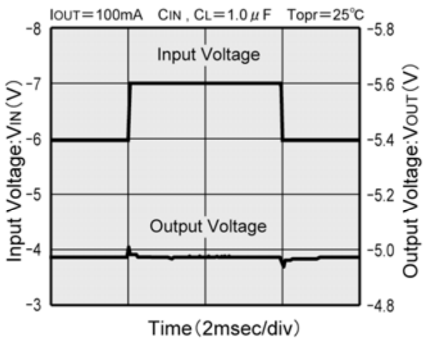


XC62KN3002 (-3.0V)

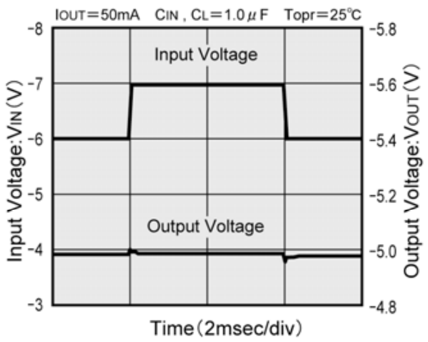


(8) Input Transient Response 2

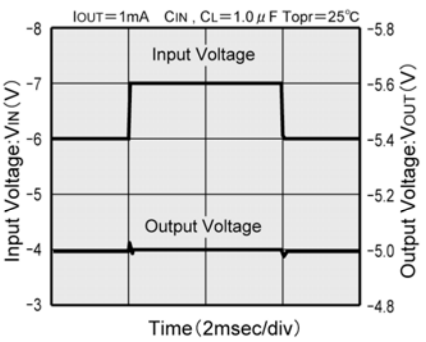
XC62KN5002 (-5.0V)



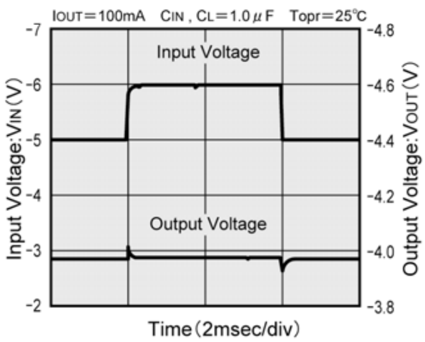
XC62KN5002 (-5.0V)



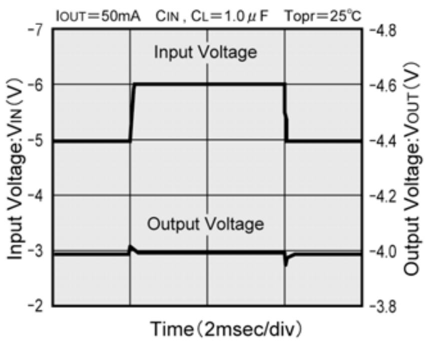
XC62KN5002 (-5.0V)



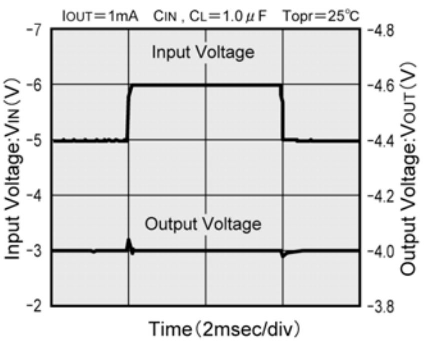
XC62KN4002 (-4.0V)



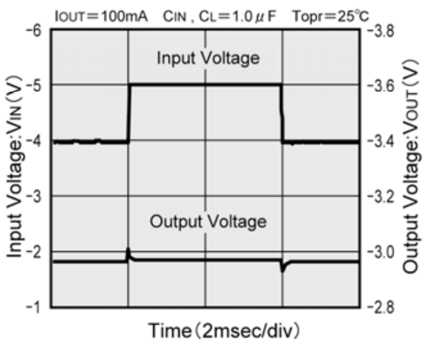
XC62KN4002 (-4.0V)



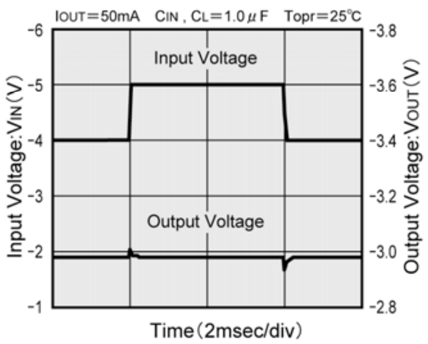
XC62KN4002 (-4.0V)



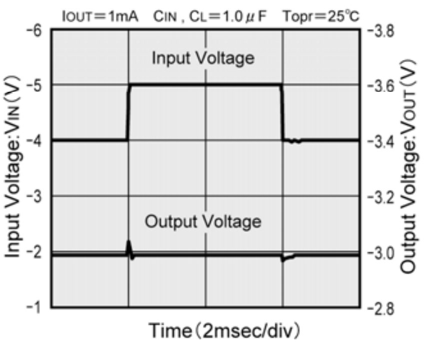
XC62KN3002 (-3.0V)



XC62KN3002 (-3.0V)

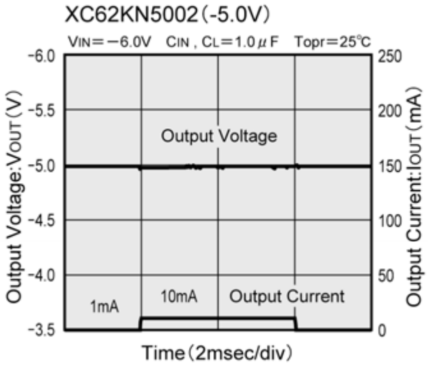


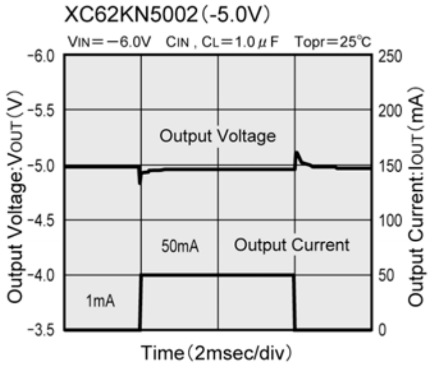
XC62KN3002 (-3.0V)

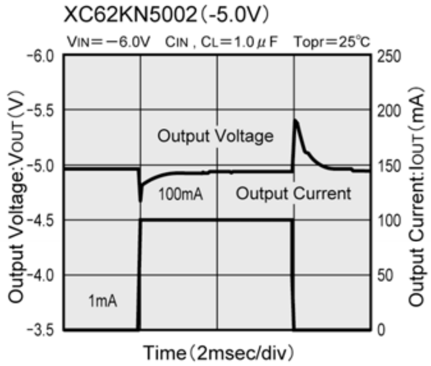


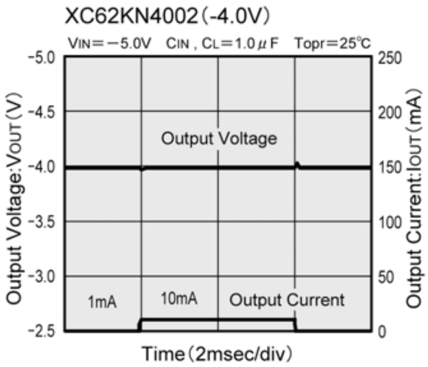
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

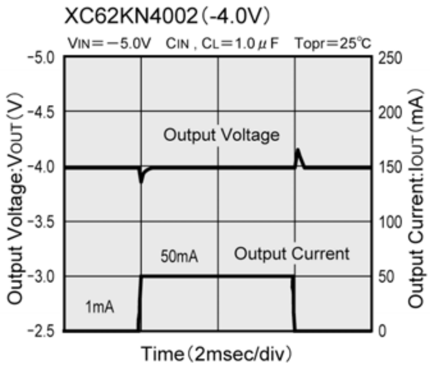
(9) Load Transient Response

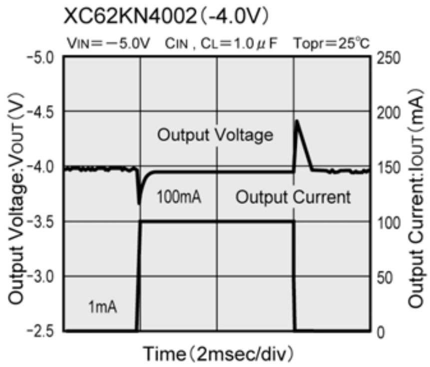


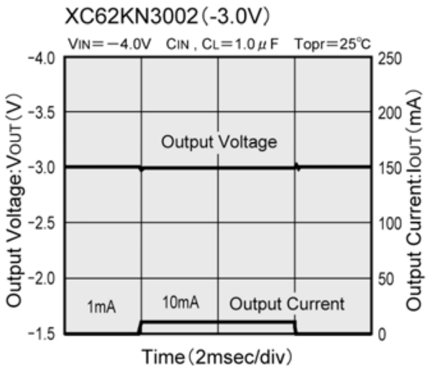


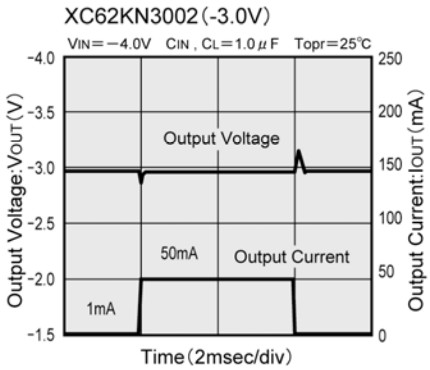


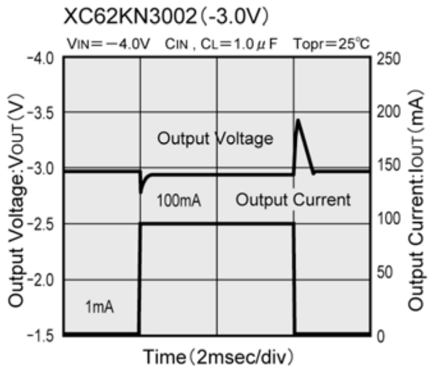




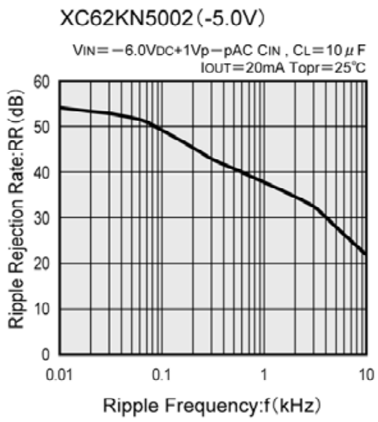


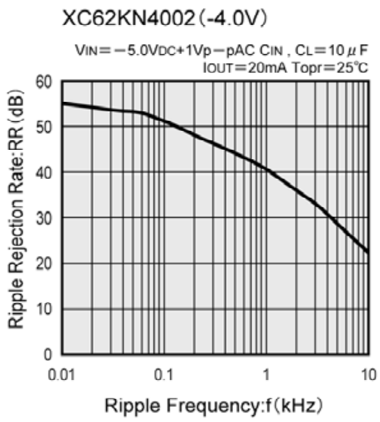


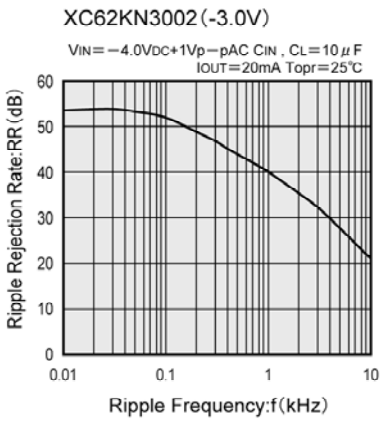




(10) Ripple Rejection Rate



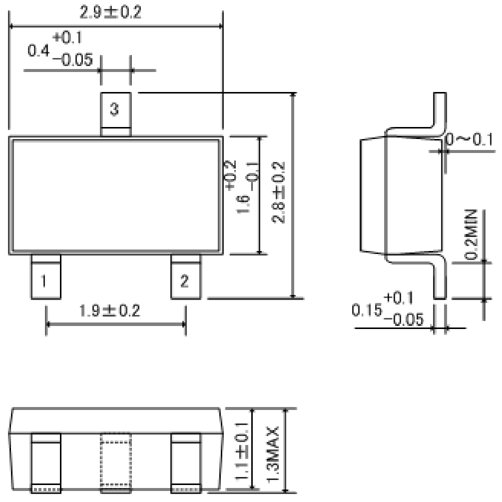




■PACKAGING INFORMATION

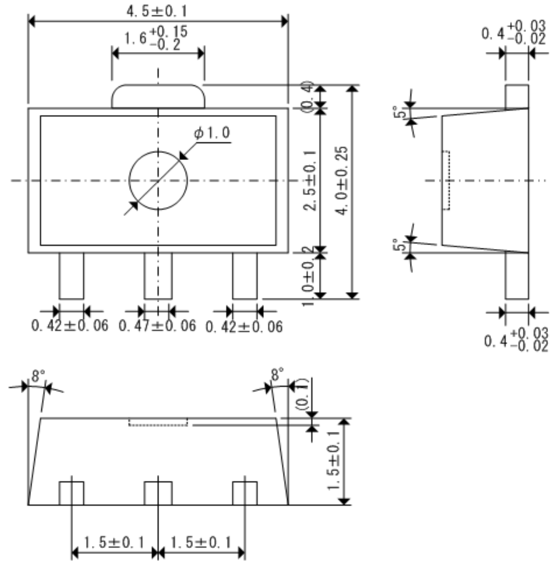
●SOT-23

Unit : mm



●SOT-89

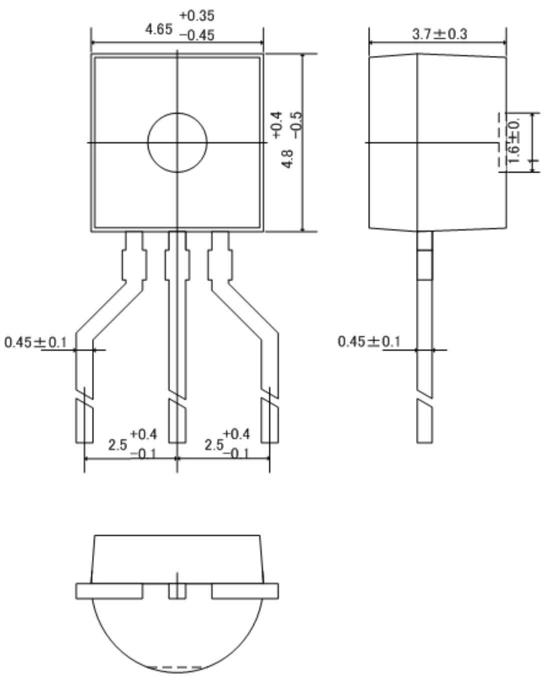
Unit : mm



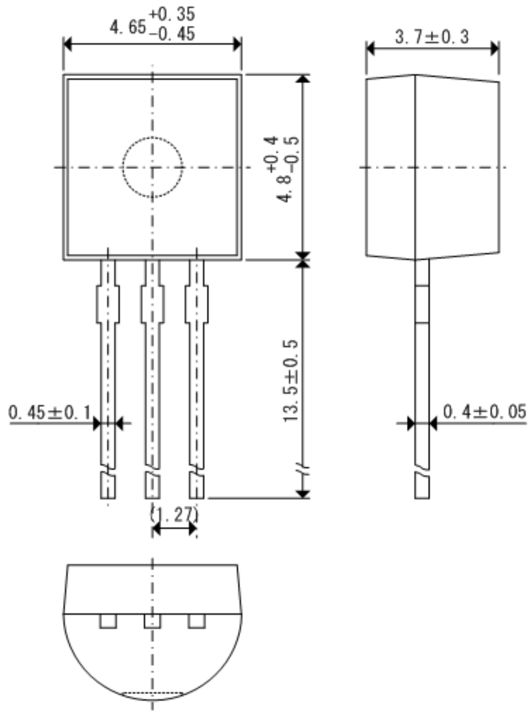
●TO-92

Unit : mm

Paper type



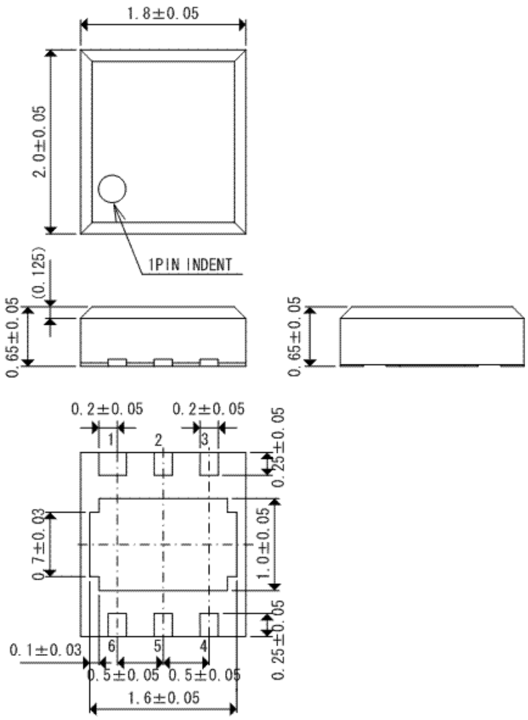
Bag



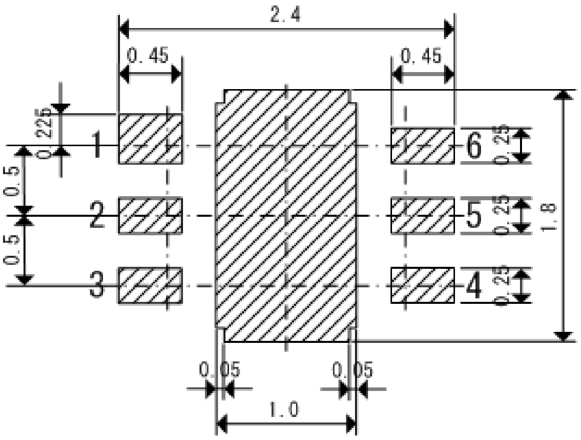
■PACKAGING INFORMATION (Continued)

●USP-6B

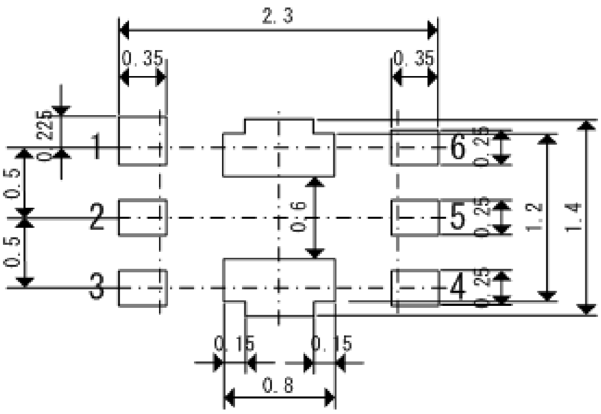
Unit : mm



●USP-6B Reference Pattern Layout

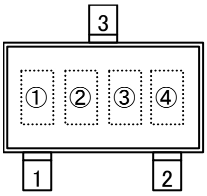


●USP-6B Reference Metal Mask Design

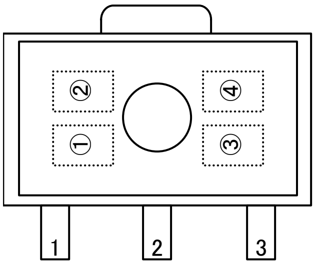


■ MARKING RULE

●SOT-23, SOT-89



SOT-23
(TOP VIEW)



SOT-89
(TOP VIEW)

① represents integral number of output voltage

MARK	VOLTAGE (V)	MARK	VOLTAGE (V)
2	2.X	5	5.X
3	3.X	6	6.X
4	4.X		

② represents decimal number of output voltage

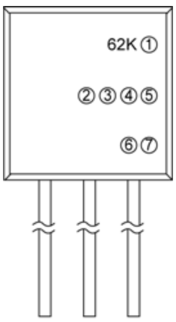
MARK	VOLTAGE (V)	MARK	VOLTAGE (V)
A	x.0	F	x.5
B	x.1	H	x.6
C	x.2	K	x7
D	x.3	L	x.8
E	x.4	M	x.9

③ represents polarity of output voltage

MARK	POLARITY
5	Negative

④ represents production lot number
0 to 9, A to Z repeated, reverse character 0 to 9, A to Z repeated
(G, I, J, O, Q, W excluded)

●TO-92



TO-92
(SIDE VIEW)

① represents polarity of output voltage

MARK	OUTPUT CONFIGURATION
N	− (Negative)

②③ represents output voltage (ex.)

MARK		VOLTAGE (V)
②	③	
3	3	3.3
5	0	5.0

④ represents temperature characteristics

MARK	TEMPERATURE CHARACTERISTICS
0	±100 ppm (TYP.)

⑤ represents output voltage accuracy

MARK	OUTPUT VOLTAGE ACCURACY
1	Within ±1% (semi-custom)
2	Within ±2%

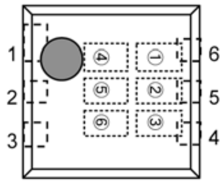
⑥ represents least significant digit of production year (ex.)

MARK	PRODUCTION YEAR
3	2003
4	2004

⑦ represents production lot number
0 to 9, A to Z repeated (G, I, J, O, Q, W excluded)

■ MARKING RULE (Continued)

●USP-6B



USP-6B
(TOP VIEW)

① represents production series

MARK	PRODUCT SERIES
K	XC62KNxx0xDx

② represents polarity of output voltage

MARK	POLARITY	PRODUCT SERIES
N	－(Negative)	XC62KNxx0xDx

③④ represents output voltage (ex.)

MARK		VOLTAGE (V)	PRODUCT SERIES
③	④		
3	3	3.3	XC62KN330xDx
5	0	5.0	XC62KN500xDx

⑤ represents temperature characteristics

MARK	TEMPERATURE CHARACTERISTICS	PRODUCT SERIES
0	± 100 ppm (TYP.)	XC62KNxx0xDx

⑥ represents production lot number

0 to 9, A to Z repeated (G, I, J, O, Q, W excluded)

Note: No character inversion used.

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