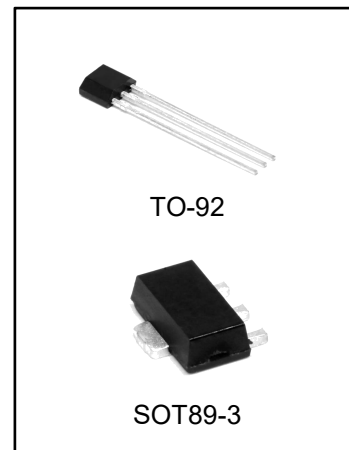


## 3-TERMINAL 0.1A NEGATIVE VOLTAGE REGULATOR

### DESCRIPTION

This series of fixed-voltage monolithic integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power-pass elements to make high current voltage regulators.

Each of these regulators can deliver up to 100mA of output current. The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload. When used as a replacement for a zener diode-resistor combination, an effective improvement in output impedance can be obtained together with lower-bias current.



### FEATURES

- Output Current Up to 100mA
- No External Components
- Internal Thermal Overload Protection
- Internal Short-Circuit Limiting
- Output Voltage of -5V, -6V, -8V, -9V, -12V, -15V, -18V and -24V.
- Moisture Sensitivity Level 3

### ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
HX79L05ACLPG	TO-92	79L05	BAG	1000pcs/box
HX79L06ACLPG	TO-92	79L06	BAG	1000pcs/box
HX79L08ACLPG	TO-92	79L08	BAG	1000pcs/box
HX79L09ACLPG	TO-92	79L09	BAG	1000pcs/box
HX79L12ACLPG	TO-92	79L12	BAG	1000pcs/box
HX79L15ACLPG	TO-92	79L15	BAG	1000pcs/box
HX79L18ACLPG	TO-92	79L18	BAG	1000pcs/box
HX79L24ACLPG	TO-92	79L24	BAG	1000pcs/box
HX79L05ACPARG	SOT89-3	79L05	REEL	1000pcs/reel
HX79L06ACPARG	SOT89-3	79L06	REEL	1000pcs/reel
HX79L08ACPARG	SOT89-3	79L08	REEL	1000pcs/reel
HX79L09ACPARG	SOT89-3	79L09	REEL	1000pcs/reel
HX79L12ACPARG	SOT89-3	79L12	REEL	1000pcs/reel
HX79L15ACPARG	SOT89-3	79L15	REEL	1000pcs/reel
HX79L18ACPARG	SOT89-3	79L18	REEL	1000pcs/reel
HX79L24ACPARG	SOT89-3	79L24	REEL	1000pcs/reel

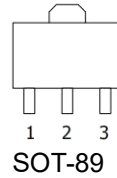
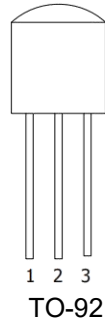
## Absolute Maximum Ratings

CHARACTERISTIC		SYMBOL	MIN.	MAX.	UNIT
Input Voltage	HX79L05A ~ HX79L09A	VIN	-	-30	V
	HX79L12A ~ HX79L18A		-	-35	
	HX79L24A		-	-40	
Maximum Power Dissipation at T <sub>A</sub> = 25°C / TO-92		PDMax	-	0.770	W
Thermal Resistance Junction-To-Ambient / TO-92		θJA	-	162	°C/W
Lead Temperature (Soldering, 10 sec)		TSOL	-	260	°C
Storage Temperature Range		TSTG	-65	150	°C
Operating Junction Temperature Range		TJOPR	0	150	°C

## Recommended Operating Conditions

CHARACTERISTIC		SYMBOL	MIN.	MAX.	UNIT
Input Voltage	HX79L05A	VIN	-7	-20	V
	HX79L06A		-8	-20	
	HX79L08A		-10.5	-23	
	HX79L09A		-11.5	-24	
	HX79L12A		-14.5	-27	
	HX79L15A		-17.5	-30	
	HX79L18A		-20.5	-33	
	HX79L24A		-27	-38	
Output Current		I <sub>o</sub>	-	100	mA
Operating Virtual Junction Temperature		T <sub>J</sub>	0	125	°C

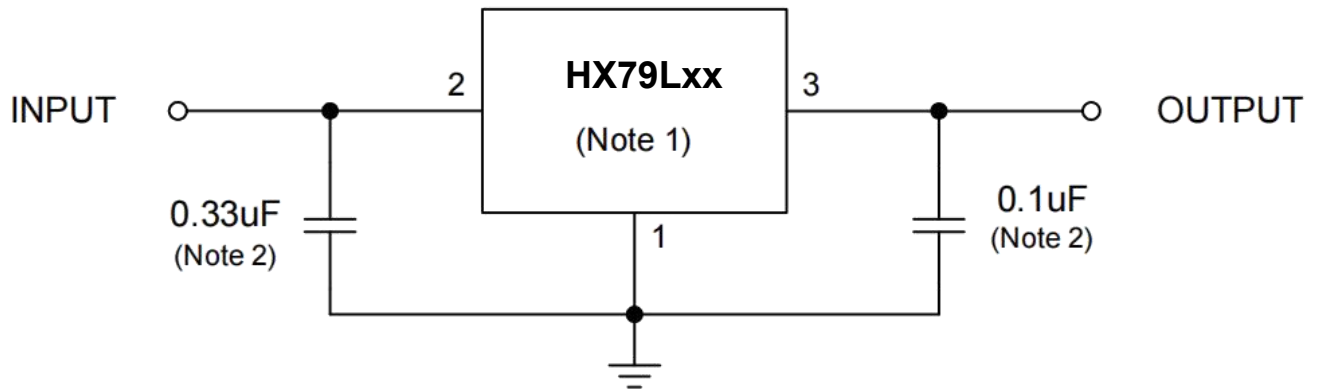
## PIN CONFIGURATION



## PIN DESCRIPTION

Pin No.	TO-92 / SOT89-3 LEAD	
	Name	Function
1	GND	Ground
2	VIN	Input Voltage
3	VOUT	Output Voltage

## TYPICAL APPLICATION



Note 1. To specify an output voltage, substitute voltage for "XX".

Note 2. Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

**ELECTRICAL CHARACTERISTICS**
**HX79L05A** (At specified virtual junction temperature,  $V_{IN} = -10V$ ,  $I_o = 40mA$  (Unless otherwise noted))

PARAMETER	SYMBOL	TEST CONDITION <sup>(Note 1)</sup>	MIN.	TYP.	MAX.	UNIT	
Output Voltage <sup>(Note 2)</sup>	V <sub>OUT</sub>		25°C	-4.8	-5	-5.2	V
		1mA ≤ I <sub>o</sub> ≤ 40mA -7V ≤ V <sub>IN</sub> ≤ 20V	0°C ~125°C	-4.75	-5	-5.25	
		1mA ≤ I <sub>o</sub> ≤ 70mA		-4.75	-5	-5.25	
Line Regulation	ΔV <sub>LINE</sub>	-7V ≤ V <sub>IN</sub> ≤ -20V	25°C		32	150	mV
		-8V ≤ V <sub>IN</sub> ≤ -20V			26	100	
Load Regulation	ΔV <sub>LOAD</sub>	1mA ≤ I <sub>o</sub> ≤ 100mA	25°C		15	60	mV
		1mA ≤ I <sub>o</sub> ≤ 40mA			8	30	
Bias Current	I <sub>B</sub>		25°C		3.8	6	mA
			125°C			5.5	
Bias Current Change	ΔI <sub>B</sub>	-8V ≤ V <sub>IN</sub> ≤ -20V	0°C ~125°C			1.5	mA
		1mA ≤ I <sub>o</sub> ≤ 40mA				0.1	
Output Noise Voltage	V <sub>N</sub>	10Hz ≤ f ≤ 100kHz	25°C		42		uV
Ripple Rejection	RR	-8V ≤ V <sub>IN</sub> ≤ -18V, f=120Hz	25°C	41	49		dB
Dropout Voltage	V <sub>D</sub>		25°C		1.7		V

**HX79L06A** (At specified virtual junction temperature,  $V_{IN} = -11V$ ,  $I_o = 40mA$  (Unless otherwise noted))

PARAMETER	SYMBOL	TEST CONDITION <sup>(Note 1)</sup>	MIN.	TYP.	MAX.	UNIT	
Output Voltage <sup>(Note 2)</sup>	V <sub>OUT</sub>		25°C	-5.76	-6	-6.24	V
		1mA ≤ I <sub>o</sub> ≤ 40mA -8V ≤ V <sub>IN</sub> ≤ -21V	0°C ~125°C	-5.7	-6	-6.3	
		1mA ≤ I <sub>o</sub> ≤ 70mA		-5.7	-6	-6.3	
Line Regulation	ΔV <sub>LINE</sub>	-8V ≤ V <sub>IN</sub> ≤ -21V	25°C		50	150	mV
		-9V ≤ V <sub>IN</sub> ≤ -21V			45	110	
Load Regulation	ΔV <sub>LOAD</sub>	1mA ≤ I <sub>o</sub> ≤ 100mA	25°C		12	70	mV
		1mA ≤ I <sub>o</sub> ≤ 40mA			5.5	35	
Bias Current	I <sub>B</sub>		25°C			6	mA
			125°C			5.5	
Bias Current Change	ΔI <sub>B</sub>	-9V ≤ V <sub>IN</sub> ≤ -21V	0°C ~125°C			1.5	mA
		1mA ≤ I <sub>o</sub> ≤ 40mA				0.1	
Output Noise Voltage	V <sub>N</sub>	10Hz ≤ f ≤ 100kHz	25°C		50		uV
Ripple Rejection	RR	-9V ≤ V <sub>IN</sub> ≤ -19V, f=120Hz	25°C	39	47		dB
Dropout Voltage	V <sub>D</sub>		25°C		1.7		V

**HX79L08A** (At specified virtual junction temperature,  $V_{IN} = -14V$ ,  $I_o = 40mA$  (Unless otherwise noted))

PARAMETER	SYMBOL	TEST CONDITION <sup>(Note 1)</sup>	MIN.	TYP.	MAX.	UNIT	
Output Voltage <sup>(Note 2)</sup>	V <sub>OUT</sub>		25°C	-7.7	-8	-8.3	V
		1mA ≤ I <sub>o</sub> ≤ 40mA -10.5V ≤ V <sub>IN</sub> ≤ -23V	0°C ~125°C	-7.6	-8	-8.4	
		1mA ≤ I <sub>o</sub> ≤ 70mA		-7.6	-8	-8.4	
Line Regulation	ΔV <sub>LINE</sub>	-10.5V ≤ V <sub>IN</sub> ≤ -23V	25°C		20	175	mV
		-11V ≤ V <sub>IN</sub> ≤ -23V			12	125	
Load Regulation	ΔV <sub>LOAD</sub>	1mA ≤ I <sub>o</sub> ≤ 100mA	25°C		18	80	mV
		1mA ≤ I <sub>o</sub> ≤ 40mA			9	42	
Bias Current	I <sub>B</sub>		25°C			6.5	mA
			125°C			6	
Bias Current Change	ΔI <sub>B</sub>	-11V ≤ V <sub>IN</sub> ≤ -23V	0°C ~125°C			1.5	mA
		1mA ≤ I <sub>o</sub> ≤ 40mA				0.1	
Output Noise Voltage	V <sub>N</sub>	10Hz ≤ f ≤ 100kHz	25°C		60	uV	
Ripple Rejection	RR	-12V ≤ V <sub>IN</sub> ≤ -23V, f=120Hz	25°C	42	49	dB	
Dropout Voltage	V <sub>D</sub>		25°C		1.7	V	

**HX79L09A** (At specified virtual junction temperature,  $V_{IN} = -15V$ ,  $I_o = 40mA$  (Unless otherwise noted))

PARAMETER	SYMBOL	TEST CONDITION <sup>(Note 1)</sup>	MIN.	TYP.	MAX.	UNIT	
Output Voltage <sup>(Note 2)</sup>	V <sub>OUT</sub>		25°C	-8.64	-9	-9.36	V
		1mA ≤ I <sub>o</sub> ≤ 40mA -11V ≤ V <sub>IN</sub> ≤ -24V	0°C ~125°C	-8.55	9	-9.45	
		1mA ≤ I <sub>o</sub> ≤ 70mA		-8.55	9	-9.45	
Line Regulation	ΔV <sub>LINE</sub>	-11V ≤ V <sub>IN</sub> ≤ -24V	25°C		80	200	mV
		-12V ≤ V <sub>IN</sub> ≤ -24V			20	160	
Load Regulation	ΔV <sub>LOAD</sub>	1mA ≤ I <sub>o</sub> ≤ 100mA	25°C		17	90	mV
		1mA ≤ I <sub>o</sub> ≤ 40mA			8	45	
Bias Current	I <sub>B</sub>		25°C		3.8	6.5	mA
			125°C			6	
Bias Current Change	ΔI <sub>B</sub>	-12V ≤ V <sub>IN</sub> ≤ -24V	0°C ~125°C			1.5	mA
		1mA ≤ I <sub>o</sub> ≤ 40mA				0.1	
Output Noise Voltage	V <sub>N</sub>	10Hz ≤ f ≤ 100kHz	25°C		64	uV	
Ripple Rejection	RR	-8V ≤ V <sub>IN</sub> ≤ -18V, f=120Hz	25°C	35	43	dB	
Dropout Voltage	V <sub>D</sub>		25°C		1.7	V	

**HX79L12A** (At specified virtual junction temperature,  $V_{IN} = -19V$ ,  $I_o = 40mA$  (Unless otherwise noted))

PARAMETER	SYMBOL	TEST CONDITION <sup>(Note 1)</sup>	MIN.	TYP.	MAX.	UNIT	
Output Voltage <sup>(Note 2)</sup>	$V_{OUT}$		25°C	-11.5	-12	-12.5	V
		$1mA \leq I_o \leq 40mA$ $-14.5V \leq V_{IN} \leq -27V$	0°C ~125°C	-11.4	-12	-12.6	
		$1mA \leq I_o \leq 70mA$		-11.4	-12	-12.6	
Line Regulation	$\Delta V_{LINE}$	$-14.5V \leq V_{IN} \leq -27V$	25°C		50	250	mV
		$-16V \leq V_{IN} \leq -27V$			40	200	
Load Regulation	$\Delta V_{LOAD}$	$1mA \leq I_o \leq 100mA$	25°C		24	100	mV
		$1mA \leq I_o \leq 40mA$			15	50	
Bias Current	$I_B$		25°C			6.5	mA
			125°C			6	
Bias Current Change	$\Delta I_B$	$-16V \leq V_{IN} \leq -27V$	0°C ~125°C			1.5	mA
		$1mA \leq I_o \leq 40mA$				0.1	
Output Noise Voltage	$V_N$	10Hz ≤ f ≤ 100kHz	25°C		70		μV
Ripple Rejection	RR	$-15V \leq V_{IN} \leq -25V, f=120Hz$	25°C	37	42		dB
Dropout Voltage	$V_D$		25°C		1.7		V

**HX79L15A** (At specified virtual junction temperature,  $V_{IN} = -23V$ ,  $I_o = 40mA$  (Unless otherwise noted))

PARAMETER	SYMBOL	TEST CONDITION <sup>(Note 1)</sup>	MIN.	TYP.	MAX.	UNIT	
Output Voltage <sup>(Note 2)</sup>	$V_{OUT}$		25°C	-14.4	-15	-15.6	V
		$1mA \leq I_o \leq 40mA$ $-17.5V \leq V_{IN} \leq -30V$	0°C ~125°C	-14.25	-15	-15.75	
		$1mA \leq I_o \leq 70mA$		-14.25	-15	-15.75	
Line Regulation	$\Delta V_{LINE}$	$-17.5V \leq V_{IN} \leq -30V$	25°C		65	300	mV
		$-27V \leq V_{IN} \leq -30V$			58	250	
Load Regulation	$\Delta V_{LOAD}$	$1mA \leq I_o \leq 100mA$	25°C		25	150	mV
		$1mA \leq I_o \leq 40mA$			15	75	
Bias Current	$I_B$		25°C		4.2	6.5	mA
			125°C			6	
Bias Current Change	$\Delta I_B$	$-20V \leq V_{IN} \leq -30V$	0°C ~125°C			1.5	mA
		$1mA \leq I_o \leq 40mA$				0.1	
Output Noise Voltage	$V_N$	10Hz ≤ f ≤ 100kHz	25°C		82		μV
Ripple Rejection	RR	$-18.5V \leq V_{IN} \leq -28.5V, f=120Hz$	25°C	37	44		dB
Dropout Voltage	$V_D$		25°C		1.7		V

**HX79L18A** (At specified virtual junction temperature,  $V_{IN} = -26V$ ,  $I_o = 40mA$  (Unless otherwise noted))

PARAMETER	SYMBOL	TEST CONDITION <sup>(Note 1)</sup>	MIN.	TYP.	MAX.	UNIT	
Output Voltage <sup>(Note 2)</sup>	$V_{OUT}$		25°C	-17.3	-18	-18.7	V
		$1mA \leq I_o \leq 40mA$ $-20.5V \leq V_{IN} \leq -33V$	0°C ~125°C	-17.1	-18	-18.9	
		$1mA \leq I_o \leq 70mA$		-17.1	-18	-18.9	
Line Regulation	$\Delta V_{LINE}$	$-20.7V \leq V_{IN} \leq -33V$	25°C		70	360	mV
		$-21V \leq V_{IN} \leq -33V$			64	300	
Load Regulation	$\Delta V_{LOAD}$	$1mA \leq I_o \leq 100mA$	25°C		27	180	mV
		$1mA \leq I_o \leq 40mA$			19	90	
Bias Current	$I_B$		25°C		4.7	6.5	mA
			125°C			6	
Bias Current Change	$\Delta I_B$	$-21V \leq V_{IN} \leq -33V$	0°C ~125°C			1.5	mA
		$1mA \leq I_o \leq 40mA$				0.1	
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	25°C		82		uV
Ripple Rejection	RR	$-23V \leq V_{IN} \leq -33V, f=120Hz$	25°C	32	36		dB
Dropout Voltage	$V_D$		25°C		1.7		V

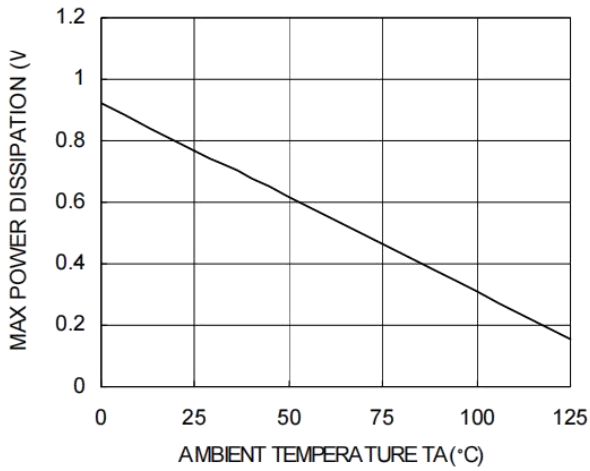
**HX79L24A** (At specified virtual junction temperature,  $V_{IN} = -32V$ ,  $I_o = 40mA$  (Unless otherwise noted))

PARAMETER	SYMBOL	TEST CONDITION <sup>(Note 1)</sup>	MIN.	TYP.	MAX.	UNIT	
Output Voltage <sup>(Note 2)</sup>	$V_{OUT}$		25°C	-23	-24	-25	V
		$1mA \leq I_o \leq 40mA$ $-27V \leq V_{IN} \leq -38V$	0°C ~125°C	-22.8	-24	-25.2	
		$1mA \leq I_o \leq 70mA$		-22.8	-24	-25.2	
Line Regulation	$\Delta V_{LINE}$	$-27V \leq V_{IN} \leq -38V$	25°C		95	480	mV
		$-28V \leq V_{IN} \leq -38V$			78	400	
Load Regulation	$\Delta V_{LOAD}$	$1mA \leq I_o \leq 100mA$	25°C		41	240	mV
		$1mA \leq I_o \leq 40mA$			28	120	
Bias Current	$I_B$		25°C		4.8	6.5	mA
			125°C			6	
Bias Current Change	$\Delta I_B$	$-21V \leq V_{IN} \leq -38V$	0°C ~125°C			1.5	mA
		$1mA \leq I_o \leq 40mA$				0.1	
Output Noise Voltage	$V_N$	$10Hz \leq f \leq 100kHz$	25°C		82		uV
Ripple Rejection	RR	$-29V \leq V_{IN} \leq -35V, f=120Hz$	25°C	30	33		dB
Dropout Voltage	$V_D$		25°C		1.7		V

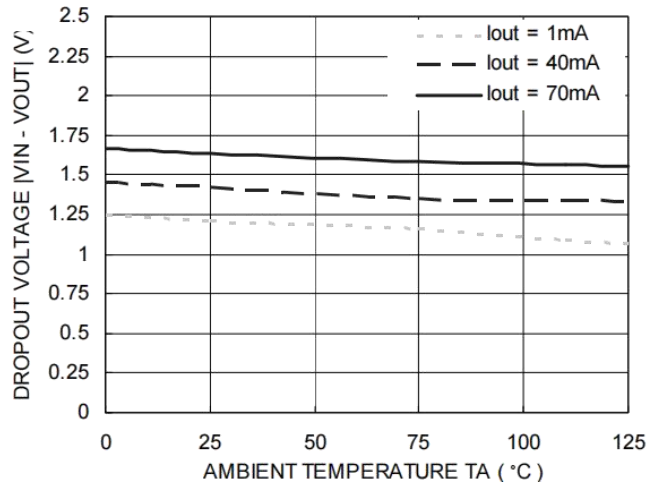
Note 1. Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

All characteristics are measured with a 0.33uF capacitor across the input and a 0.1uF capacitor across the output.

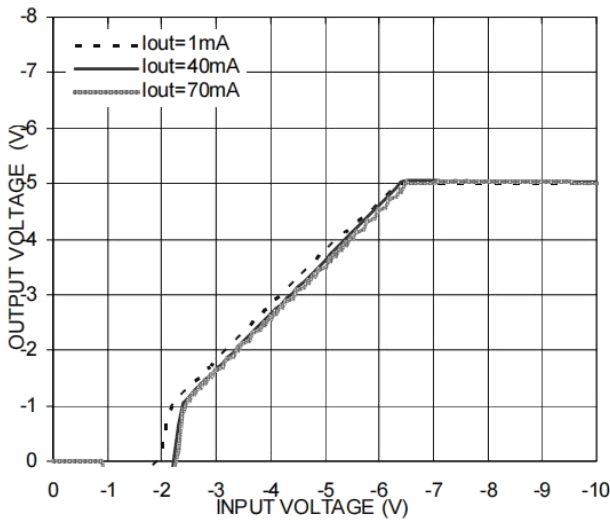
Note 2. This specification applies only for DC power dissipation permitted by absolute maximum ratings.

**TYPICAL OPERATING CHARACTERISTICS**


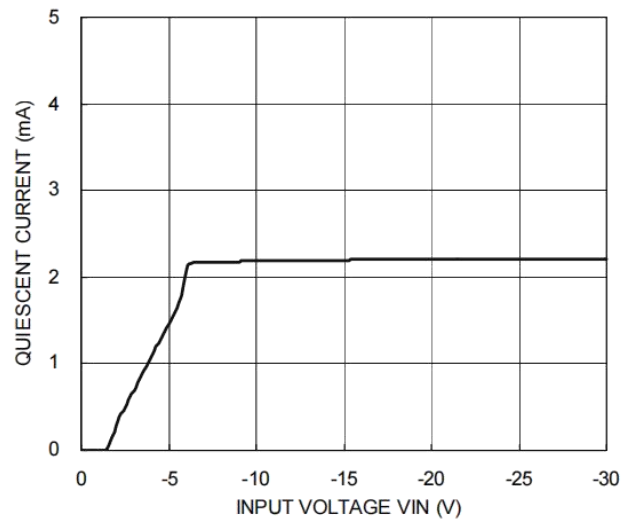
Power Dissipation vs. Ambient Temperature, TO-92



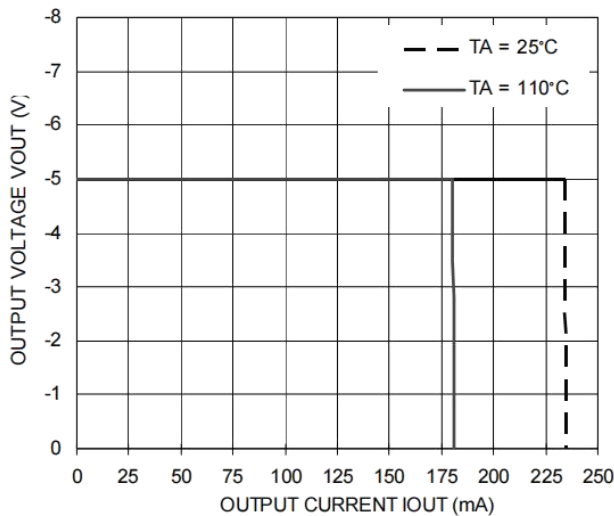
Dropout Voltage vs. Ambient Temperature



Output Voltage vs. Input Voltage



Quiescent Current vs. Input Voltage

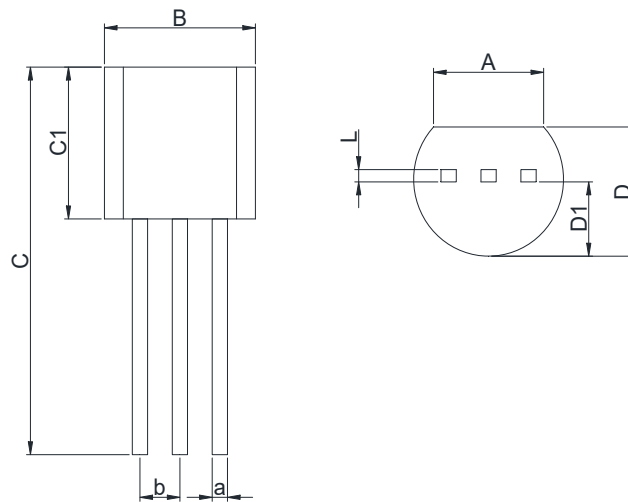


Output Voltage vs. Output Current



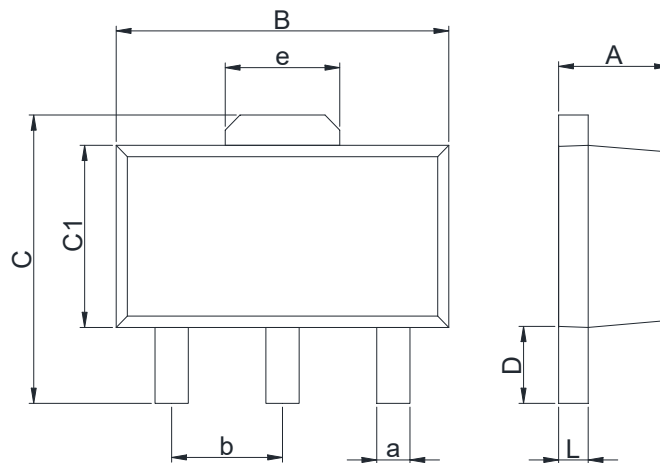
**封装外型尺寸**

TO-92


**Dimensions In Millimeters(TO-92)**

Symbol:	A	B	C	C1	D	D1	L	a	b
Min:	3.43	4.44	11.2	4.32	3.17	2.03	0.33	0.40	1.27BSC
Max:	3.83	5.21	12.7	5.34	4.19	2.67	0.42	0.52	

SOT89-3


**Dimensions In Millimeters(SOT89-3)**

Symbol:	A	B	C	C1	D	L	a	b	e
Min:	1.400	4.400	3.940	2.300	0900	0.350	0.450BSC	1.500BSC	1.550BSC
Max:	1.600	4.600	4.250	2.600	1.200	0.440			

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