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.

TO-92

SOT89-3

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
HX79L05ACPKRG	SOT89-3	79L05	REEL	1000pcs/reel
HX79L06ACPKRG	SOT89-3	79L06	REEL	1000pcs/reel
HX79L08ACPKRG	SOT89-3	79L08	REEL	1000pcs/reel
HX79L09ACPKRG	SOT89-3	79L09	REEL	1000pcs/reel
HX79L12ACPKRG	SOT89-3	79L12	REEL	1000pcs/reel
HX79L15ACPKRG	SOT89-3	79L15	REEL	1000pcs/reel
HX79L18ACPKRG	SOT89-3	79L18	REEL	1000pcs/reel
HX79L24ACPKRG	SOT89-3	79L24	REEL	1000pcs/reel

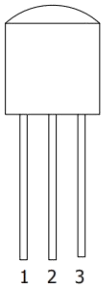
Absolute Maximum Ratings

CHARACTERISTIC		SYMBOL	MIN.	MAX.	UNIT
Input Voltage	HX79L05A ~ HX79L09A	V_{IN}	-	-30	V
	HX79L12A ~ HX79L18A		-	-35	
	HX79L24A		-	-40	
Maximum Power Dissipation at T_A = 25°C / TO-92		P_{DMax}	-	0.770	W
Thermal Resistance Junction-To-Ambient / TO-92		θ_{JA}	-	162	℃/W
Lead Temperature (Soldering, 10 sec)		T_{SOL}	-	260	℃
Storage Temperature Range		T_{STG}	-65	150	℃
Operating Junction Temperature Range		T_{JOPR}	0	150	℃

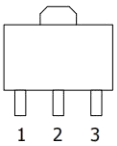
Recommended Operating Conditions

CHARACTERISTIC		SYMBOL	MIN.	MAX.	UNIT
Input Voltage	HX79L05A	V_{IN}	-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		Io	-	100	mA
Operating Virtual Junction Temperature		T_J	0	125	℃

PIN CONFIGURATION



TO-92

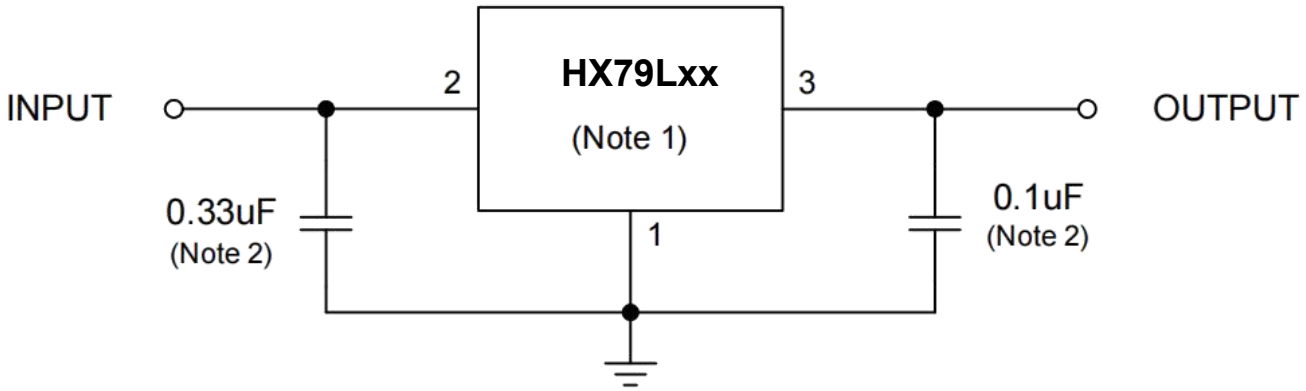


SOT-89

PIN DESCRIPTION

Pin No.	TO-92 / SOT89-3 LEAD	
	Name	Function
1	GND	Ground
2	V_{IN}	Input Voltage
3	V_{OUT}	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, Io = 40mA (Unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	VOUT		25℃	-4.8	-5	-5.2	V
		1mA ≤ Io ≤ 40mA -7V ≤ V_{IN} ≤ 20V	0℃ ~125℃	-4.75	-5	-5.25	
		1mA ≤ Io ≤ 70mA		-4.75	-5	-5.25	
Line Regulation	ΔVLINE	-7V ≤ V_{IN} ≤ -20V	25℃		32	150	mV
		-8V ≤ V_{IN} ≤ -20V			26	100	
Load Regulation	ΔVLOAD	1mA ≤ Io ≤ 100mA	25℃		15	60	mV
		1mA ≤ Io ≤ 40mA			8	30	
Bias Current	I_B		25℃		3.8	6	mA
			125℃			5.5	
Bias Current Change	ΔI_B	-8V ≤ V_{IN} ≤ -20V	0℃ ~125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		42		uV
Ripple Rejection	RR	-8V ≤ V_{IN} ≤ -18V, f=120Hz	25℃	41	49		dB
Dropout Voltage	V_D		25℃		1.7		V

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

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-5.76	-6	-6.24	V
		1mA ≤ Io ≤ 40mA -8V ≤ V_{IN} ≤ -21V	0℃ ~125℃	-5.7	-6	-6.3	
		1mA ≤ Io ≤ 70mA		-5.7	-6	-6.3	
Line Regulation	ΔV_{LINE}	-8V ≤ V_{IN} ≤ -21V	25℃		50	150	mV
		-9V ≤ V_{IN} ≤ -21V			45	110	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		12	70	mV
		1mA ≤ Io ≤ 40mA			5.5	35	
Bias Current	I_B		25℃			6	mA
			125℃			5.5	
Bias Current Change	ΔI_B	-9V ≤ V_{IN} ≤ -21V	0℃ ~125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		50		uV
Ripple Rejection	RR	-9V ≤ V_{IN} ≤ -19V, f=120Hz	25℃	39	47		dB
Dropout Voltage	V_D		25℃		1.7		V

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

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	VOUT		25℃	-7.7	-8	-8.3	V
		1mA ≤ Io ≤ 40mA -10.5V ≤ V_{IN} ≤ -23V	0℃ ~125℃	-7.6	-8	-8.4	
		1mA ≤ Io ≤ 70mA		-7.6	-8	-8.4	
Line Regulation	ΔVLINE	-10.5V ≤ V_{IN} ≤ -23V	25℃		20	175	mV
		-11V ≤ V_{IN} ≤ -23V			12	125	
Load Regulation	ΔVLOAD	1mA ≤ Io ≤ 100mA	25℃		18	80	mV
		1mA ≤ Io ≤ 40mA			9	42	
Bias Current	I_B		25℃			6.5	mA
			125℃			6	
Bias Current Change	ΔI_B	-11V ≤ V_{IN} ≤ -23V	0℃ ~125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		60		uV
Ripple Rejection	RR	-12V ≤ V_{IN} ≤ -23V,f=120Hz	25℃	42	49		dB
Dropout Voltage	V_D		25℃		1.7		V

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

PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-8.64	-9	-9.36	V
		1mA ≤ Io ≤ 40mA -11V ≤ V_{IN} ≤ -24V	0℃ ~125℃	-8.55	9	-9.45	
		1mA ≤ Io ≤ 70mA		-8.55	9	-9.45	
Line Regulation	ΔV_{LINE}	-11V ≤ V_{IN} ≤ -24V	25℃		80	200	mV
		-12V ≤ V_{IN} ≤ -24V			20	160	
Load Regulation	ΔV_{LOAD}	1mA ≤ Io ≤ 100mA	25℃		17	90	mV
		1mA ≤ Io ≤ 40mA			8	45	
Bias Current	I_B		25℃		3.8	6.5	mA
			125℃			6	
Bias Current Change	ΔI_B	-12V ≤ V_{IN} ≤ -24V	0℃ ~125℃			1.5	mA
		1mA ≤ Io ≤ 40mA				0.1	
Output Noise Voltage	V_N	10Hz ≤ f ≤ 100kHz	25℃		64		uV
Ripple Rejection	RR	-8V ≤ V_{IN} ≤ -18V,f=120Hz	25℃	35	43		dB
Dropout Voltage	V_D		25℃		1.7		V

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

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

HX79L15A (At specified virtual junction temperature, VIN =-23V, Io = 40mA (Unless otherwise noted)

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

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

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

HX79L24A (At specified virtual junction temperature, VIN =-32V, Io = 40mA (Unless otherwise noted)

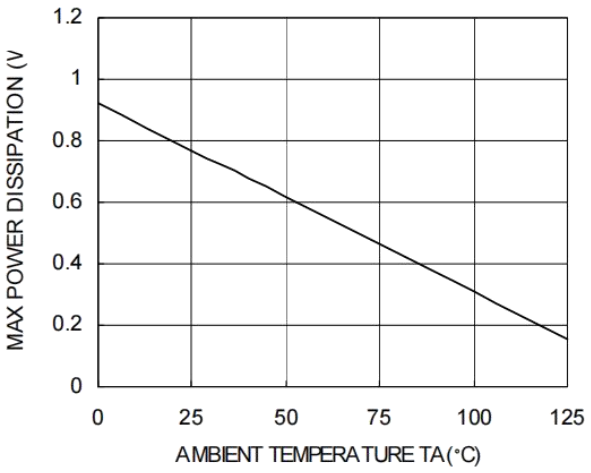
PARAMETER	SYMBOL	TEST CONDITION(Note 1)		MIN.	TYP.	MAX.	UNIT
Output Voltage(Note 2)	V_{OUT}		25℃	-23	-24	-25	V
		1mA ≤ Io ≤ 40mA -27V ≤ V_{IN} ≤ -38V	0℃ ~125℃	-22.8	-24	-25.2	
		1mA ≤ Io ≤ 70mA		-22.8	-24	-25.2	
Line Regulation	ΔV_{LINE}	-27V ≤ V_{IN} ≤ -38V	25℃		95	480	mV
		-28V ≤ V_{IN} ≤ -38V			78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

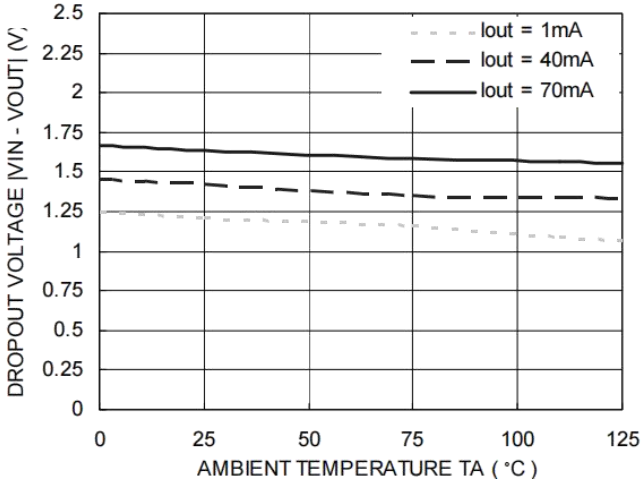
All characteristics are measured with a 0.33uF capacitor across the input and a 0.1uF capacitor across the output.

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

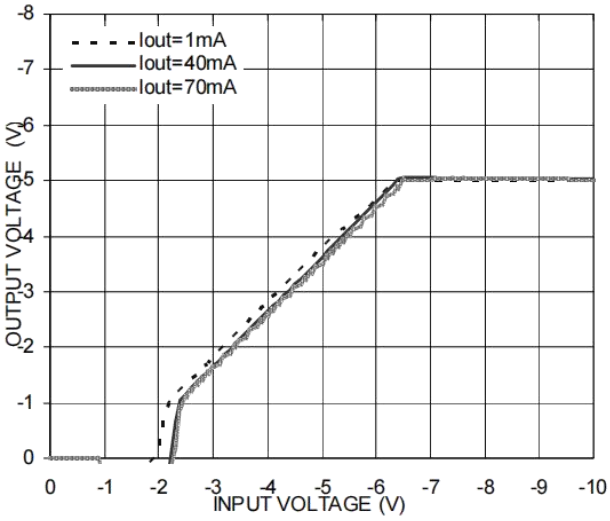
TYPICAL OPERATING CHARACTERISTICS



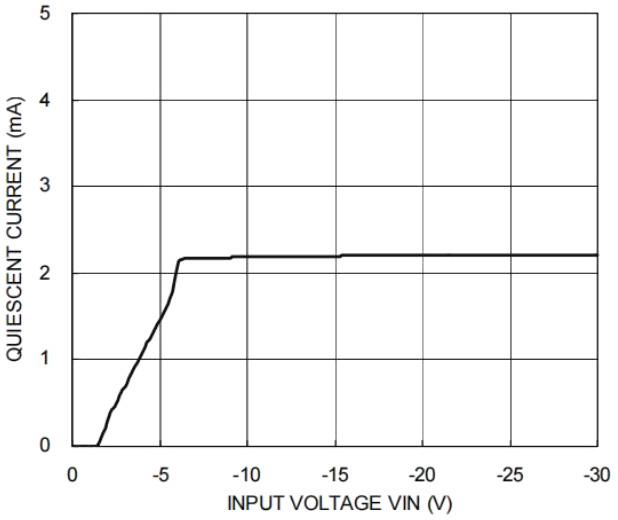
Power Dissipation vs. Ambient Temperature, TO-92



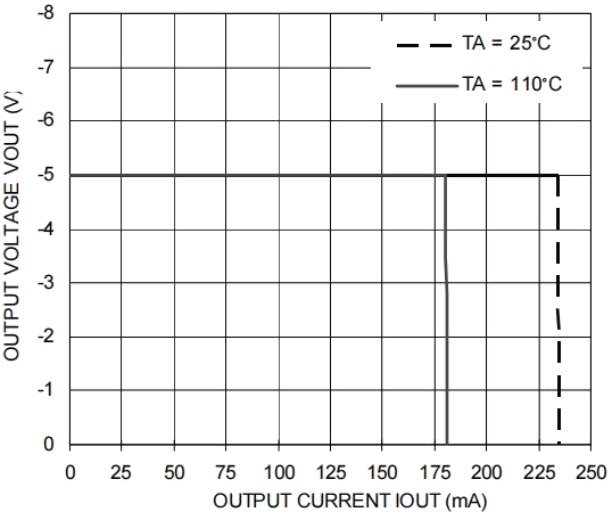
Dropout Voltage vs. Ambient Temperature



Output Voltage vs. Input Voltage



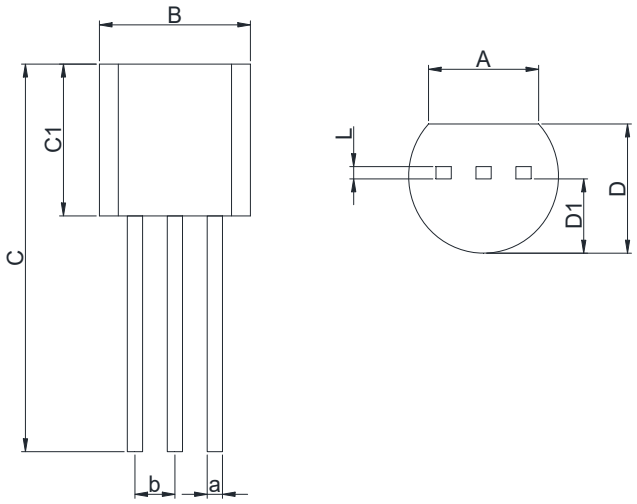
Quiescent Current vs. Input Voltage



Output Voltage vs. Output Current

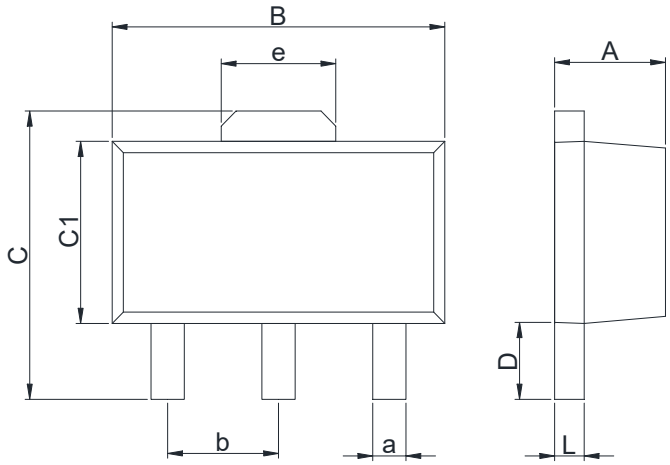
封装外型尺寸

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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