MC79LXXA/LM79LXXA

3-Terminal 0.1A Negative Voltage Regulator

Features

- Output Current up to 100mA
- No External Components
- Internal Thermal Over Load Protection
- Internal Short Circuit Current Limiting
- Output Voltage Offered in ±5% Tolerance
- Output Voltage of -5V, -8V, -12V, -15V, -18V, -24V

Description

These regulators employ internal current limiting and thermal shutdown, making them essentially indestructible.

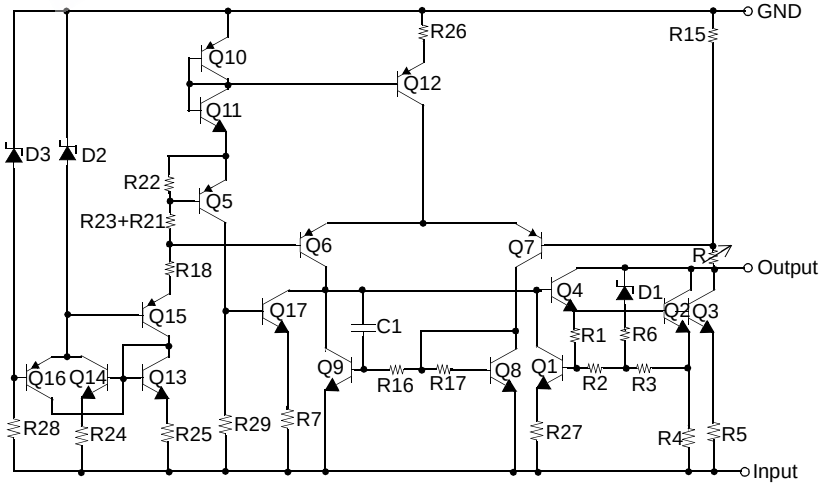
TO-92 **SOT-89**

1.GND 2.Input 3.Output

8-SOP

1. Output 2.3.6.7. Input 5. GND 4.8. NC

Internal Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input Voltage (for V_O = -5V to -8V) (for V_O = -12V to -18V) (for V_O = -24V)	V_I	-30 -35 -40	V
Operating Temperature Range	T_{OPR}	0 ~ +125	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Electrical Characteristics(MC79L05A/LM79L05A)

(V_I = -10V, I_O = 40mA, C_I = 0.33µF, C_O = 0.1µF, 0°C ≤T_J ≤ +125°C, unless otherwise specified)

Parameter		Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage		V_O	T_J = +25°C		-4.8	-5.0	-5.2	V
Line Regulation (Note1)		ΔV_O	T_J =+25°C	-7.0V ≥ V_I ≥ -20V	-	15	150	mV
				-8V ≥ V_I ≥ -20V	-	-	100	mV
Load Regulation (Note1)		ΔV_O	T_J =+25°C	1.0mA ≤ I_O ≤ 100mA	-	20	60	mV
				1.0mA ≤ I_O ≤ 40mA	-	10	30	mV
Output Voltage		V_O	-7.0V ≥ V_I ≥ -20V, 1.0mA ≤ I_O ≤ 40mA		-4.75	-	-5.25	V
			V_I = -10V, 1.0mA ≤ I_O ≤ 70mA		-4.75	-	-5.25	V
Quiescent Current		I_Q	T_J =+25°C		-	2.0	5.5	mA
			T_J = +125°C		-	-	6.0	
Quiescent Current Change	With Line	ΔI_Q	-8V ≥ V_I ≥ -20V		-	-	1.5	mA
	With Load	ΔI_Q	1.0mA ≤ I_O ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		V_N	T_A = +25°C,10Hz ≤ f ≤ 100kHz		-	30	-	µV
Ripple Rejection		RR	f = 120Hz, -8V ≥ V_I ≥ -18V T_J = +25°C		41	60	-	dB
Dropout Voltage		V_D	T_J = +25°C		-	1.7	-	V

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics (MC79L08A) (Continued)

(V_I = -14V, I_O = 40mA, C_I = 0.33µF, C_O = 0.1µF, 0°C ≤T_J ≤ +125°C, unless otherwise specified)

Parameter		Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage		V_O	T_J = +25°C		-7.7	-8.0	-8.3	V
Line Regulation(Note1)		ΔV_O	T_J = +25°C	-10.3V ≥ V_I ≥ -23V	-	-	175	mV
				-12V ≥ V_I ≥ -23V	-	-	125	mV
Load Regulation (Note1)		ΔV_O	T_J = +25°C	1.0mA ≤ I_O ≤ 100mA	-	-	80	mV
				1.0mA ≤ I_O ≤ 40mA	-	-	40	mV
Output Voltage		V_O	-10.3V ≥ V_I ≥ -23V, 1.0mA ≤ I_O ≤ 40mA		-7.6	-	-8.4	V
			V_I = -14V, 1.0mA ≤ I_O ≤ 70mA		-7.6	-	-8.4	
Quiescent Current		I_q	T_j = +25°C		-	-	6.0	mA
			T_j = +125°C		-	-	5.5	
Quiescent Current Change	With Line	ΔI_Q	-11.7V ≥ V_I ≥ -23V		-	-	1.5	mA
	With Load		1.0mA ≤ I_O ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		V_N	T_j = +25°C,10Hz ≤ f ≤ 100kHz		-	50	-	µV
Ripple Rejection		RR	f = 120Hz, -11V ≥ V_I ≥ -21V T_j = +25°C		39	55	-	dB
Dropout Voltage		V_D	T_j = +25°C		-	1.7	-	V

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics(MC79L12A) (Continued)

(V_I = -19V, I_O = 40mA, C_I = 0.33µF, C_O = 0.1µF, 0°C ≤T_J ≤ +125°C, unless otherwise specified)

Parameter		Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage		V_O	T_J = +25°C		-11.5	-12.0	-12.5	V
Line Regulation (Note1)		ΔV_O	T_J = +25°C	-14.5V ≥ V_I ≥ -27V	-	-	250	mV
				-16V ≥ V_I ≥ -27V	-	-	200	mV
Load Regulation (Note1)		ΔV_O	T_J = +25°C	1.0mA ≤ I_O ≤ 100mA	-	-	100	mV
				1.0mA ≤ I_O ≤ 40mA	-	-	50	mV
Output Voltage		V_O	-14.5V > V_I > -27V, 1.0mA ≤ I_O ≤ 40mA		-11.4	-	-12.6	V
			V_I = -19V, 1.0mA ≤ I_O ≤ 70mA		-11.4	-	-12.6	V
Quiescent Current		I_Q	T_J = +25°C		-	-	6.0	mA
			T_J = +125°C		-	-	6.5	
Quiescent Current Change	With Line	ΔI_Q	-16V ≥ V_I ≥ -27V		-	-	1.5	mA
	With Load	ΔI_Q	1.0mA ≤ I_O ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		V_N	T_A = +25°C,10Hz ≤ f ≤ 100kHz		-	80	-	µV
Ripple Rejection		RR	f = 120Hz, -15V≥ V_I ≥ -25V T_J = +25°C		37	42	-	dB
Dropout Voltage		V_D	T_J = +25°C		-	1.7	-	V

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics(MC79L15A) (Continued)

(V_I = -23V, I_O = 40mA, C_I = 0.33µF, C_O = 0.1µF, 0°C ≤T_J ≤ +125°C, unless otherwise specified)

Parameter		Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage		V_O	T_J = +25°C		-14.4	-15.0	-15.6	V
Line Regulation (Note1)		ΔV_O	T_J = +25°C	-17.5V ≥ V_I ≥ -30V	-	-	300	mV
				-20V ≥ V_I ≥ -30V	-	-	250	mV
Load Regulation (Note1)		ΔV_O	T_J = +25°C	1.0mA ≤ I_O ≤ 100mA	-	-	150	mV
				1.0mA ≤ I_O ≤ 40mA	-	-	75	mV
Output Voltage		V_O	-17.5V ≥ V_I ≥ -30V, 1.0mA ≤ I_O ≤ 40mA		-14.25	-	-15.75	V
			V_I = -23V, 1.0mA ≤ I_O ≤ 70mA		-14.25	-	-15.75	V
Quiescent Current		I_Q	T_J = +25°C		-	-	6.0	mA
			T_J = +125°C		-	-	6.5	
Quiescent Current Change	With Line	ΔI_Q	-20V ≥ V_I ≥ -30V		-	-	1.5	mA
	With Load	ΔI_Q	1.0mA ≤ I_O ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		V_N	T_A = +25°C,10Hz ≤ f ≤ 100kHz		-	90	-	µV
Ripple Rejection		RR	f = 120Hz, -18.5V ≥ V_I ≥ -28.5V T_J = +25°C		34	39	-	dB
Dropout Voltage		V_D	T_J = +25°C		-	1.7	-	V

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics(MC79L18A) (Continued)

(V_I = -27V, I_O = 40mA, C_I = 0.33µF, C_O = 0.1µF, 0°C ≤T_J ≤ +125°C, unless otherwise specified)

Parameter		Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage		V_O	T_J = +25°C		-17.3	-18.0	-18.7	V
Line Regulation (Note1)		ΔV_O	T_J = +25°C	-20.7V ≥ V_I ≥ -33V	-	-	325	mV
				-21V ≥ V_I ≥ -33V	-	-	275	mV
Load Regulation (Note1)		ΔV_O	T_J = +25°C	1.0mA ≤ I_O ≤ 100mA	-	-	170	mV
				1.0mA ≤ I_O ≤ 40mA	-	-	85	mV
Output Voltage		V_O	-20.7V > V_I > -33V, 1.0mA ≤ I_O ≤ 40mA		-17.1	-	-18.9	V
			V_I = -27V, 1.0mA ≤ I_O ≤ 70mA		-17.1	-	-18.9	V
Quiescent Current		I_Q	T_J = +25°C		-	-	6.5	mA
			T_J = +125°C		-	-	6.0	
Quiescent Current Change	With Line	ΔI_Q	-21V ≥ V_I ≥ -33V		-	-	1.5	mA
	With Load	ΔI_Q	1.0mA ≤ I_O ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		V_N	T_A =+25°C,10Hz ≤ f ≤ 100kHz		-	150	-	µV
Ripple Rejection		RR	f = 120Hz, -23V ≥ V_I ≥ -33V T_J = +25°C		33	48	-	dB
Dropout Voltage		V_D	T_J = +25°C		-	1.7	-	V

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Electrical Characteristics(MC79L24A) (Continued)

(V_I = -33V, I_O = 40mA, C_I = 0.33µF, C_O = 0.1µF, 0°C ≤T_J ≤ +125°C, unless otherwise specified)

Parameter		Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage		V_O	T_J = +25°C		-23	-24	-25	V
Line Regulation (Note1)		ΔV_O	T_J = +25°C	-27V ≥ V_I ≥ -38V	-	-	350	mV
				-28V ≥ V_I ≥ -38V	-	-	300	mV
Load Regulation (Note1)		ΔV_O	T_J = +25°C	1.0mA ≤ I_O ≤ 100mA	-	-	200	mV
				1.0mA ≤ I_O ≤ 40mA	-	-	100	mV
Output Voltage		V_O	-27V ≥ V_I ≥ -38V, 1.0mA ≤ I_O ≤ 40mA		-22.8	-	-25.2	V
			V_I = -33V, 1.0mA ≤ I_O ≤ 70mA		-22.8	-	-25.2	V
Quiescent Current		I_Q	T_J = +25°C		-	-	6.5	mA
			T_J = +125°C		-	-	6.0	
Quiescent Current Change	With Line	ΔI_Q	-28V ≥ V_I ≥ -38V		-	-	1.5	mA
	With Load	ΔI_Q	1.0mA ≤ I_O ≤ 40mA		-	-	0.1	mA
Output Noise Voltage		V_N	T_A = +25°C,10Hz ≤ f ≤ 100kHz		-	200	-	µV
Ripple Rejection		RR	f = 120Hz, -29V ≥ V_I ≥ -35V T_J = +25°C		31	47	-	dB
Dropout Voltage		V_D	T_J = +25°C		-	1.7	-	V

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Typical Application

Design Considerations

The MC79LXXA/LM79LXXA Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition. Internal Short Circuit Protection that limits the maximum current the circuit will pass. In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. An input bypass capacitor should be selected to provide good high frequency characteristics to insure stable operation under all load conditions. A 0.33µF or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulator's input terminals. Normally good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead. Bypassing the output is also recommended.

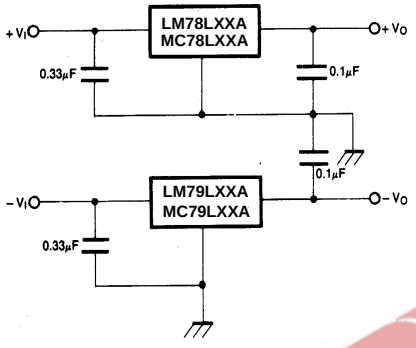


Figure 1. Positive And Negative Regulator

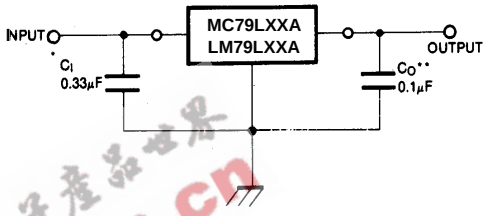


Figure 2. Typical Application

A common ground is required between the Input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.

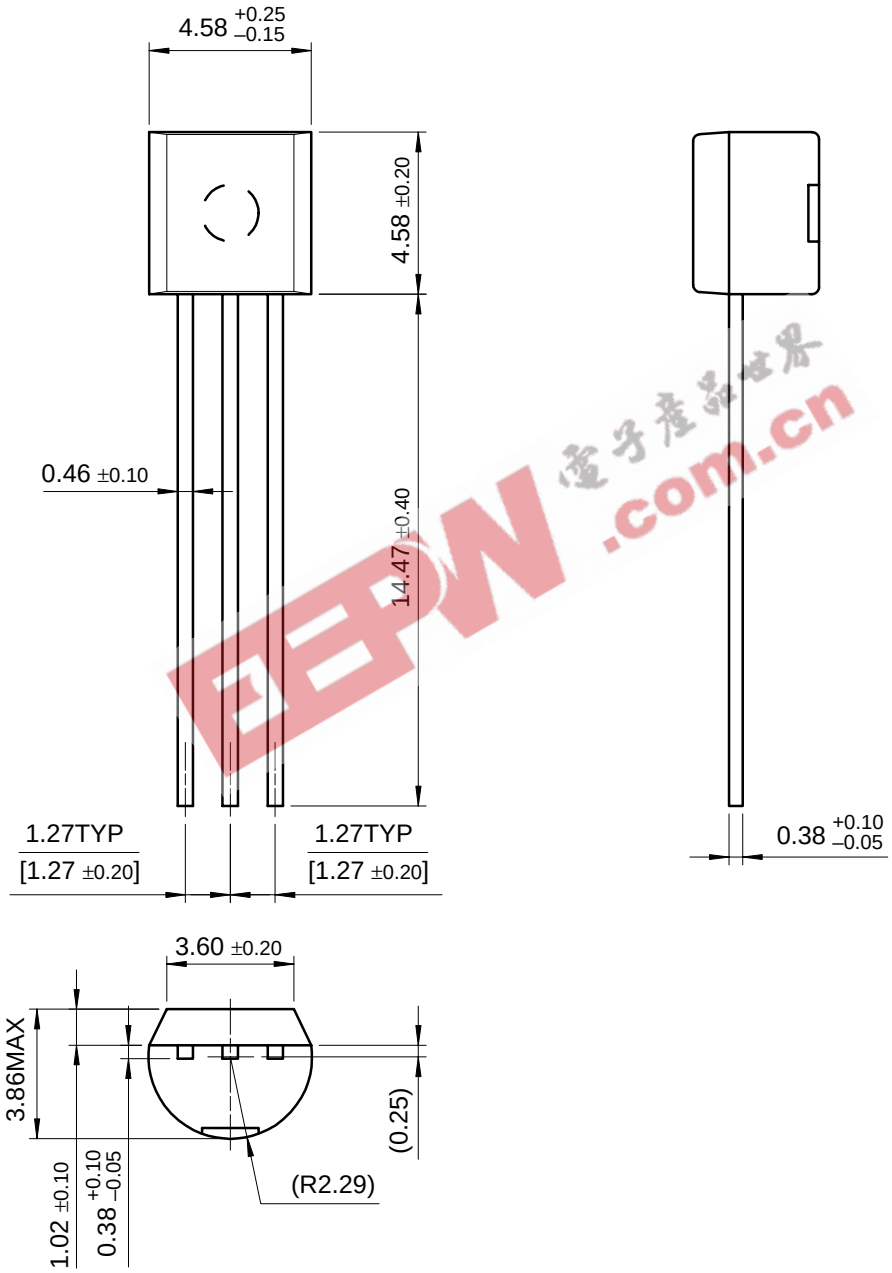
* C_1 is required if regulator is located an appreciable distance from power supply filter.
* C_O improves stability and transient response.

Mechanical Dimensions

Package

Dimensions in millimeters

TO-92

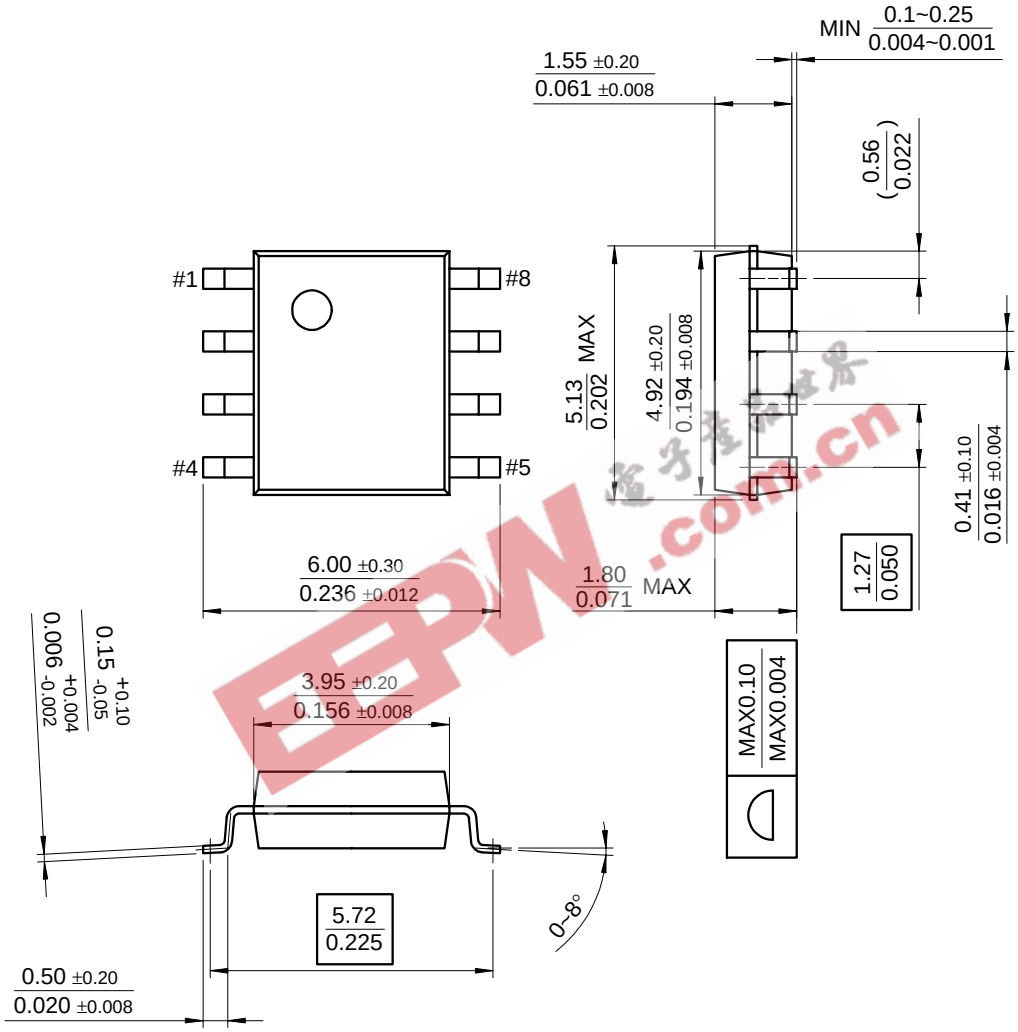


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

8-SOP

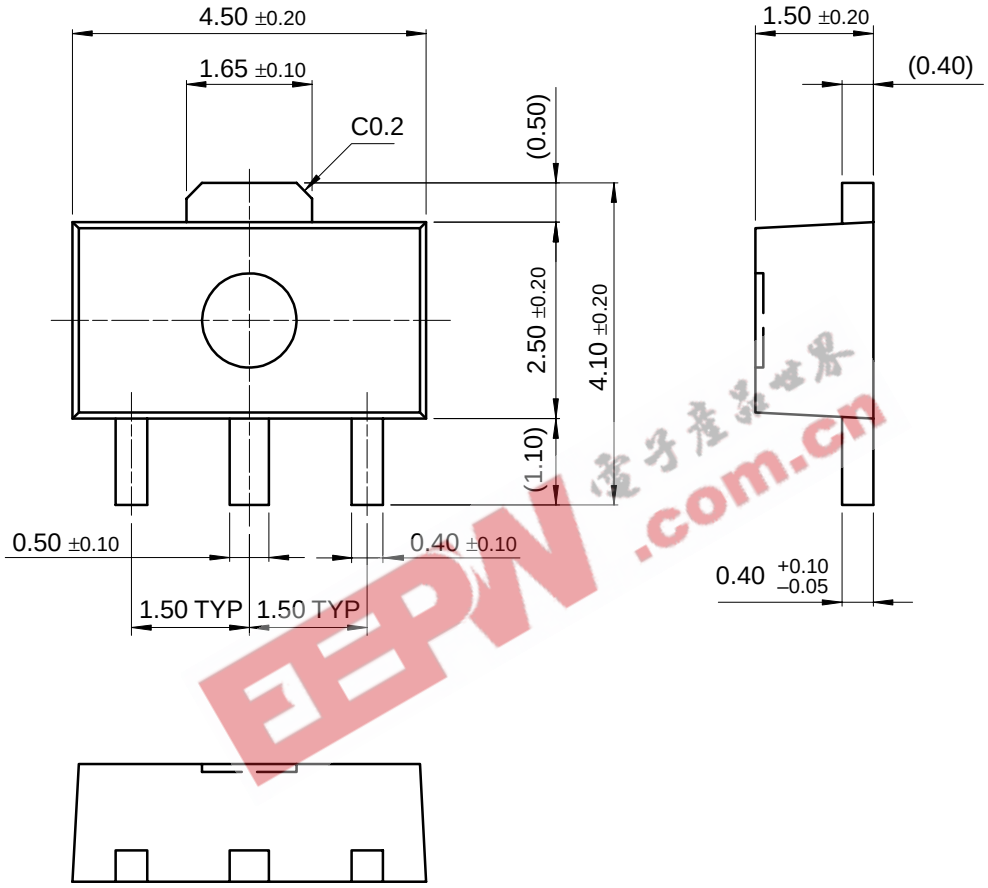


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

SOT-89



Ordering Information

Product Number	Package	Operating Temperature
LM79L05ACZ	TO-92	0 ~ +125°C

Product Number	Package	Operating Temperature
MC79L05ACP	TO-92	0 ~ +125°C
MC79L08ACP		
MC79L12ACP		
MC79L15ACP		
MC79L18ACP		
MC79L24ACP		
MC79L05ACD	8-SOP	
MC79L15ACD		
MC79L05ACH	SOT-89	