

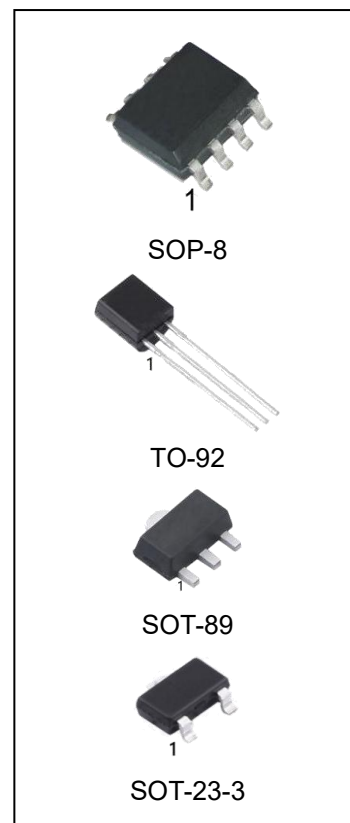
POSITIVE VOLTAGE REGULATORS

DESCRIPTION

The LM78LxxA series of three-terminal positive regulators employ internal current limiting and thermal shutdown, making them essentially indestructible. If adequate heat-sink is provided, they can deliver up to 100 mA output current. They are intended as fixed voltage regulators in a wide range of applications including local or 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. The LM78LxxA series used as Zener diode/resistor combination replacement, offers an effective output impedance improvement of typically two orders of magnitude, along with lower quiescent current and lower noise.

FEATURES

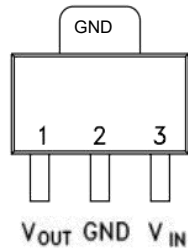
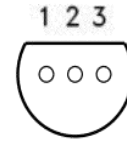
- Output current up to 100 mA
- Output voltages of 3.3V, 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, 20V, 24V.
- Thermal overload protection
- Short circuit protection
- No external components are required
- Available in either $\pm 5\%$



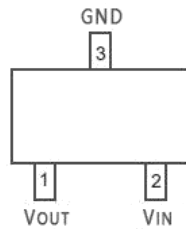
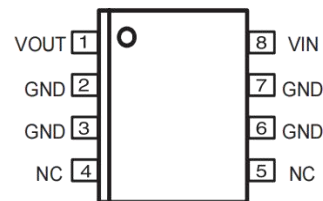
ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
LM78L33ACPKRG	SOT-89	78L33A	REEL	1000pcs/reel
LM78L05ACPKRG		78L05A	REEL	1000pcs/reel
LM78L06ACPKRG		78L06A	REEL	1000pcs/reel
LM78L08ACPKRG		78L08A	REEL	1000pcs/reel
LM78L09ACPKRG		78L09A	REEL	1000pcs/reel
LM78L10ACPKRG		78L10A	REEL	1000pcs/reel
LM78L12ACPKRG		78L12A	REEL	1000pcs/reel
LM78L15ACPKRG		78L15A	REEL	1000pcs/reel
LM78L18ACPKRG		78L18A	REEL	1000pcs/reel
LM78L20ACPKRG		78L20A	REEL	1000pcs/reel
LM78L24ACPKRG		78L24A	REEL	1000pcs/reel
LM78L33ACLPG	TO-92	78L33A	BAG	1000pcs/bag

LM78L05ACLPG		78L05A	BAG	1000pcs/bag
LM78L06ACLPG		78L06A	BAG	1000pcs/bag
LM78L08ACLPG		78L08A	BAG	1000pcs/bag
LM78L09ACLPG		78L09A	BAG	1000pcs/bag
LM78L10ACLPG		78L10A	BAG	1000pcs/bag
LM78L12ACLPG		78L12A	BAG	1000pcs/bag
LM78L15ACLPG		78L15A	BAG	1000pcs/bag
LM78L18ACLPG		78L18A	BAG	1000pcs/bag
LM78L20ACLPG		78L20A	BAG	1000pcs/bag
LM78L24ACLPG		78L24A	BAG	1000pcs/bag
LM78L33ACDRG	SOP-8	78L33AC	REEL	2500pcs/reel
LM78L05ACDRG		78L05AC	REEL	2500pcs/reel
LM78L06ACDRG		78L06AC	REEL	2500pcs/reel
LM78L08ACDRG		78L08AC	REEL	2500pcs/reel
LM78L09ACDRG		78L09AC	REEL	2500pcs/reel
LM78L10ACDRG		78L10AC	REEL	2500pcs/reel
LM78L12ACDRG		78L12AC	REEL	2500pcs/reel
LM78L15ACDRG		78L15AC	REEL	2500pcs/reel
LM78L18ACDRG		78L18AC	REEL	2500pcs/reel
LM78L20ACDRG		78L20AC	REEL	2500pcs/reel
LM78L24ACDRG		78L24AC	REEL	2500pcs/reel
LM78L33ACDRG4	SOP-8	78L33AC	REEL	4000pcs/reel
LM78L05ACDRG4		78L05AC	REEL	4000pcs/reel
LM78L06ACDRG4		78L06AC	REEL	4000pcs/reel
LM78L08ACDRG4		78L08AC	REEL	4000pcs/reel
LM78L09ACDRG4		78L09AC	REEL	4000pcs/reel
LM78L10ACDRG4		78L10AC	REEL	4000pcs/reel
LM78L12ACDRG4		78L12AC	REEL	4000pcs/reel
LM78L15ACDRG4		78L15AC	REEL	4000pcs/reel
LM78L18ACDRG4		78L18AC	REEL	4000pcs/reel
LM78L20ACDRG4		78L20AC	REEL	4000pcs/reel
LM78L24ACDRG4		78L24AC	REEL	4000pcs/reel
LM78L33ACDBZRG	SOT-23-3	78L33A	REEL	3000pcs/reel
LM78L05ACDBZRG		78L05A	REEL	3000pcs/reel
LM78L06ACDBZRG		78L06A	REEL	3000pcs/reel
LM78L08ACDBZRG		78L08A	REEL	3000pcs/reel
LM78L09ACDBZRG		78L09A	REEL	3000pcs/reel
LM78L10ACDBZRG		78L10A	REEL	3000pcs/reel
LM78L12ACDBZRG		78L12A	REEL	3000pcs/reel
LM78L15ACDBZRG		78L15A	REEL	3000pcs/reel
LM78L18ACDBZRG		78L18A	REEL	3000pcs/reel
LM78L20ACDBZRG		78L20A	REEL	3000pcs/reel
LM78L24ACDBZRG		78L24A	REEL	3000pcs/reel

CONNECTION DIAGRAM (top view)

SOT-89-3


PIN 1 = V_{OUT}
PIN 2 = GND
PIN 3 = V_{IN}

TO-92

SOT-23-3

SOP-8
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter ²		Value	Unit
V _I	DC Input Voltage	V _O = 3.3 to 10 V	30	V
		V _O = 12 to 15 V	35	
		V _O = 18 to 24 V	40	
I _O	Output Current		100	mA
P _{tot}	Power Dissipation		Internally Limited (*)	
T _L	Lead Temperature (Soldering, 10 seconds)		245	°C
T _{stg}	Storage Temperature Range		-40 to 150	°C
T _{op}	Operating Junction Temperature Range		0 to 70	°C

Note: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

ELECTRICAL CHARACTERISTICS OF LM78L33A

refer to the test circuits, $V_I = 8.3V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	3.168	3.3	3.432	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 5.3\text{ to }20\text{ V}$	3.135		3.465	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 8.3\text{ V}$	3.135		3.465	
V_O	Line Regulation	$V_I = 5.3\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$			150	mV
		$V_I = 6.3\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$			100	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			60	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			30	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
		$T_J = 125^\circ\text{C}$			5.5	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.2	mA
		$V_I = 6.3\text{ to }20\text{ V}$			1.5	
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		40		μV
SVR	Supply Voltage Rejection	$V_I = 6.3\text{ to }16.3\text{ V}$ $f = 120\text{Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	41	49		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L05A

refer to the test circuits, $V_I = 10V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	4.8	5	5.2	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 7\text{ to }20\text{ V}$	4.75		5.25	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 10\text{ V}$	4.75		5.25	
V_O	Line Regulation	$V_I = 7\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$			150	mV
		$V_I = 8\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$			100	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			60	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			30	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
		$T_J = 125^\circ\text{C}$			5.5	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 8\text{ to }20\text{ V}$			1.5	
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		40		μV
SVR	Supply Voltage Rejection	$V_I = 8\text{ to }18\text{ V}$ $f = 120\text{Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	41	49		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L06A

refer to the test circuits, $V_I = 12V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	5.76	6	6.24	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 8.5\text{ to }20\text{ V}$	5.7		6.3	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 12\text{ V}$	5.7		6.3	
V_O	Line Regulation	$V_I = 8.5\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$			150	mV
		$V_I = 9\text{ to }20\text{ V}$ $T_J = 25^\circ\text{C}$			100	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			60	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			30	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
		$T_J = 125^\circ\text{C}$			5.5	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 9\text{ to }20\text{ V}$			1.5	
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		50		μV
SVR	Supply Voltage Rejection	$V_I = 9\text{ to }20\text{ V}$ $f = 120\text{Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	39	46		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L08A

refer to the test circuits, $V_I = 14V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	7.68	8	8.32	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 10.5\text{ to }23\text{ V}$	7.6		8.4	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 14\text{ V}$	7.6		8.4	
V_O	Line Regulation	$V_I = 10.5\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$			175	mV
		$V_I = 11\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$			125	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			80	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			40	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
		$T_J = 125^\circ\text{C}$			5.5	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 11\text{ to }23\text{ V}$			1.5	
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		60		μV
SVR	Supply Voltage Rejection	$V_I = 12\text{ to }23\text{ V}$ $f = 120\text{Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	37	45		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L09A

refer to the test circuits, $V_I = 15V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	8.64	9	9.36	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 11.5\text{ to }23\text{ V}$	8.55		9.45	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 15\text{ V}$	8.55		9.45	
V_O	Line Regulation	$V_I = 11.5\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$			225	mV
		$V_I = 12\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$			150	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			80	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			40	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
		$T_J = 125^\circ\text{C}$			5.5	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 12\text{ to }23\text{ V}$			1.5	
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$		70		μV
SVR	Supply Voltage Rejection	$V_I = 12\text{ to }23\text{ V}$ $f = 120\text{ Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	37	44		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L10A

refer to the test circuits, $V_I = 16V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	9.6	10	10.4	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 12.5\text{ to }23\text{ V}$	9.5		10.5	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 16\text{ V}$	9.5		10.5	
V_O	Line Regulation	$V_I = 12.5\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$			230	mV
		$V_I = 13\text{ to }23\text{ V}$ $T_J = 25^\circ\text{C}$			170	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			80	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			40	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6	mA
		$T_J = 125^\circ\text{C}$			5.5	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 13\text{ to }23\text{ V}$			1.5	
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$		60		μV
SVR	Supply Voltage Rejection	$V_I = 14\text{ to }23\text{ V}$ $f = 120\text{ Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	37	45		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L12A

refer to the test circuits, $V_I = 19V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	11.5	12	12.5	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 14.5\text{ to }27\text{ V}$	11.4		12.6	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 19\text{ V}$	11.4		12.6	
V_O	Line Regulation	$V_I = 14.5\text{ to }27\text{ V}$ $T_J = 25^\circ\text{C}$			250	mV
		$V_I = 16\text{ to }27\text{ V}$ $T_J = 25^\circ\text{C}$			200	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			100	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			50	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6.5	mA
		$T_J = 125^\circ\text{C}$			6	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 16\text{ to }27\text{ V}$			1.5	
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$		80		μV
SVR	Supply Voltage Rejection	$V_I = 15\text{ to }25\text{ V}$ $f = 120\text{ Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	37	42		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L15A

refer to the test circuits, $V_I = 19V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	14.4	15	15.6	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 17.5\text{ to }30\text{ V}$	14.25		15.75	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 23\text{ V}$	14.25		15.75	
V_O	Line Regulation	$V_I = 17.5\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$			300	mV
		$V_I = 20\text{ to }30\text{ V}$ $T_J = 25^\circ\text{C}$			250	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			150	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			75	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6.5	mA
		$T_J = 125^\circ\text{C}$			6	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 20\text{ to }30\text{ V}$			1.5	
eN	Output Noise Voltage	B = 10Hz to 100KHz $T_J = 25^\circ\text{C}$		90		μV
SVR	Supply Voltage Rejection	$V_I = 18.5\text{ to }28.5\text{ V}$ $f = 120\text{ Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	34	39		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L18A

refer to the test circuits, $V_I = 27V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	17.3	18	18.7	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 22\text{ to }33V$	17.1		18.9	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 27V$	17.1		18.9	
V_O	Line Regulation	$V_I = 21\text{ to }33V$ $T_J = 25^\circ\text{C}$			320	mV
		$V_I = 22\text{ to }33V$ $T_J = 25^\circ\text{C}$			270	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			170	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			85	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6.5	mA
		$T_J = 125^\circ\text{C}$			6	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 23\text{ to }33V$			1.5	
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{kHz}$ $T_J = 25^\circ\text{C}$		120		μV
SVR	Supply Voltage Rejection	$V_I = 23\text{ to }33V$ $f = 120\text{Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	33	38		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L20A

refer to the test circuits, $V_I = 29V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	19.2	20	20.8	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 24\text{ to }33V$	19		21	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 29V$	19		21	
V_O	Line Regulation	$V_I = 22.5\text{ to }34V$ $T_J = 25^\circ\text{C}$			330	mV
		$V_I = 24\text{ to }34V$ $T_J = 25^\circ\text{C}$			280	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			180	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			90	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6.5	mA
		$T_J = 125^\circ\text{C}$			6	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 25\text{ to }33V$			1.5	
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{kHz}$ $T_J = 25^\circ\text{C}$		120		μV
SVR	Supply Voltage Rejection	$V_I = 25\text{ to }35V$ $f = 120\text{Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	32	38		dB
V_d	Dropout Voltage			1.7		V

ELECTRICAL CHARACTERISTICS OF LM78L24A

refer to the test circuits, $V_I = 27V$, $I_O = 40\text{ mA}$, $C_I = 0.33\text{ }\mu\text{F}$, $C_O = 0.1\text{ }\mu\text{F}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_O	Output Voltage	$T_J = 25^\circ\text{C}$	23	24	25	V
V_O	Output Voltage	$I_O = 1\text{ to }40\text{ mA}$ $V_I = 27\text{ to }38V$	22.8		25.2	V
		$I_O = 1\text{ to }70\text{ mA}$ $V_I = 33V$	22.8		25.2	
V_O	Line Regulation	$V_I = 27\text{ to }38V$ $T_J = 25^\circ\text{C}$			350	mV
		$V_I = 28\text{ to }38V$ $T_J = 25^\circ\text{C}$			300	
V_O	Load Regulation	$I_O = 1\text{ to }100\text{ mA}$ $T_J = 25^\circ\text{C}$			200	mV
		$I_O = 1\text{ to }40\text{ mA}$ $T_J = 25^\circ\text{C}$			100	
I_d	Quiescent Current	$T_J = 25^\circ\text{C}$			6.5	mA
		$T_J = 125^\circ\text{C}$			6	mA
I_d	Quiescent Current Change	$I_O = 1\text{ to }40\text{ mA}$			0.1	mA
		$V_I = 28\text{ to }38V$			1.5	
eN	Output Noise Voltage	$B = 10\text{Hz to }100\text{KHz}$ $T_J = 25^\circ\text{C}$		200		μV
SVR	Supply Voltage Rejection	$V_I = 23\text{ to }33V$ $f = 120\text{Hz}$ $I_O = 40\text{ mA}$ $T_J = 25^\circ\text{C}$	31	37		dB
V_d	Dropout Voltage			1.7		V

Figure 1 : LM78L05/12 Output Voltage vs Ambient Temperature

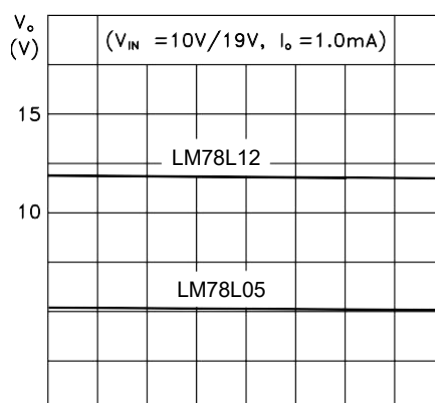
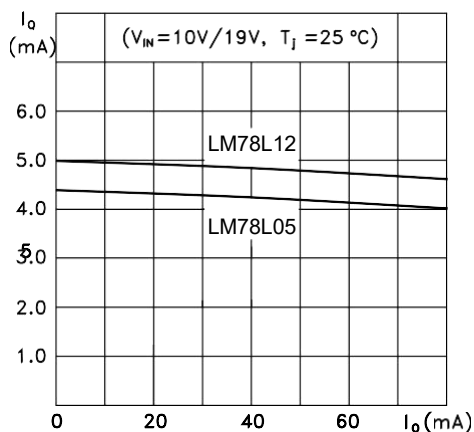
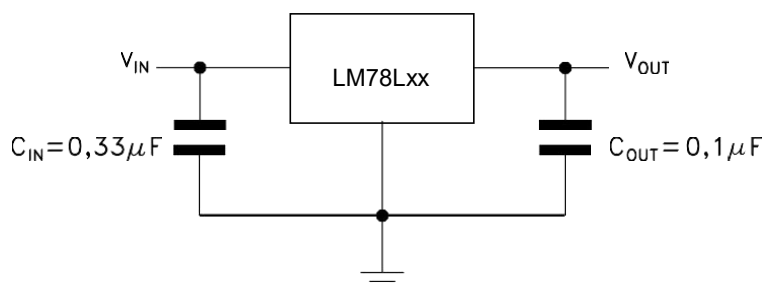


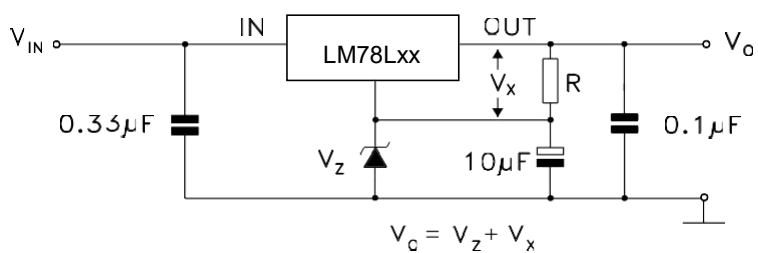
Figure 2: LM78L05/12 Quiescent Current vs Output Current



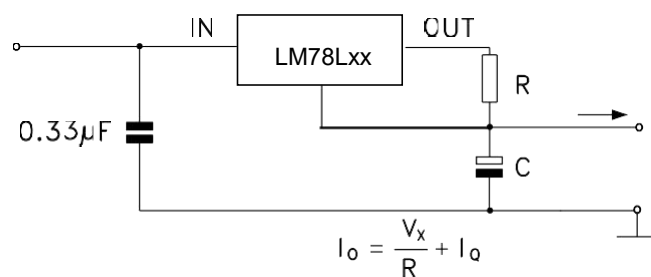
TEST CIRCUITS



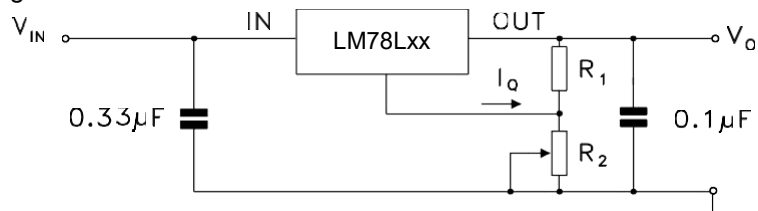
Edit Boost Circuit



Current Regulator

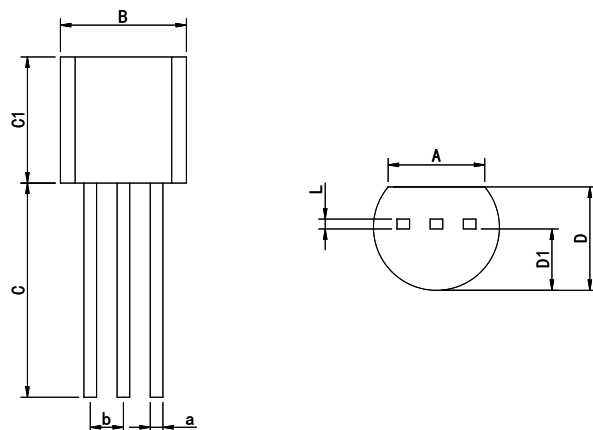


Adjustable Output Regulator



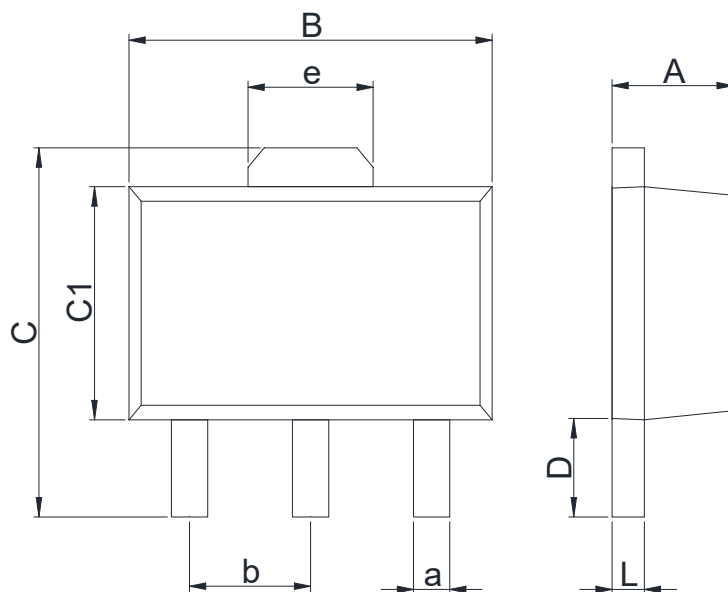
PHYSICAL DIMENSIONS

TO-92



Dimensions In Millimeters(TO-92)									
Symbol:	A	B	C	C1	D	D1	L	a	b
Min:	3.43	4.44	13.5	4.32	3.17	2.03	0.33	0.40	1.27BSC
Max:	3.83	5.21	15.3	5.34	4.19	2.67	0.42	0.52	

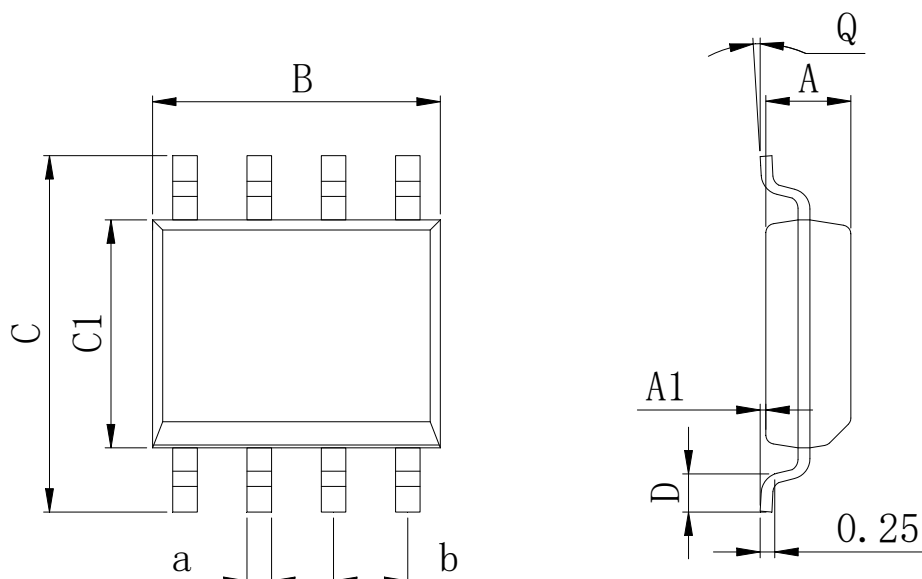
SOT-89-3



Dimensions In Millimeters(SOT-89-3)									
Symbol:	A	B	C	C1	D	L	a	b	e
Min:	1.40	4.40	3.94	2.30	0.90	0.35	0.40	1.50	1.55
Max:	1.60	4.60	4.25	2.60	1.20	0.44	0.50	BSC	BSC

PHYSICAL DIMENSIONS

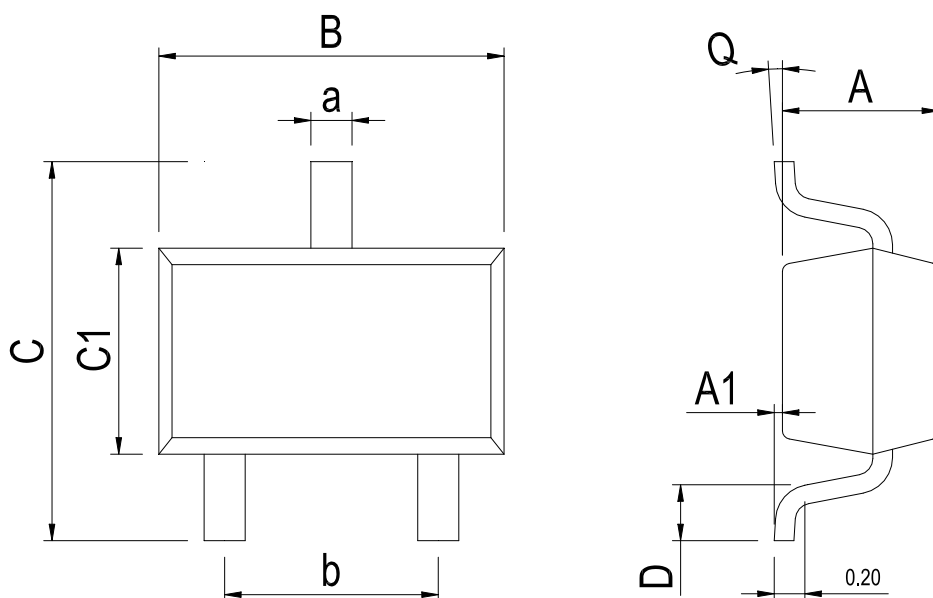
SOP-8



Dimensions In Millimeters(SOP-8)

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

SOT-23-3



Dimensions In Millimeters(SOT-23-3)

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.00	0.00	2.82	2.65	1.50	0.30	0°	0.30	1.90 BSC
Max:	1.15	0.15	3.02	2.95	1.70	0.60	8°	0.50	

REVISION HISTORY

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2018-8	New	1-14
V1.1	2023-9	Modify the package dimension diagram SOT89-3、 Update encapsulation type、 Add annotation for Maximum Ratings.	1、 3、 11
V1.2	2024-10	Update TO-92 Physical Dimensions、 Update SOT-23-3 Physical dimension	11、 12

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