

78L33 100-mA Fixed Output Linear Regulator

1. General Description

1.1 Description

The 78L33 is a three terminal positive regulator. Used as a Zener-diode and resistor combination replacement, the 78L33 usually provides an effective output impedance improvement of two orders of magnitude and lower quiescent current. This regulator can provide local, on-card regulation, elimination distribution problems associated with single-point regulation.

With adequate heat sinking, the regulator can deliver 100-mA output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistors is provided to limit internal power dissipation. If internal power dissipation is too high for the heat sinking provided, the thermal shutdown circuit prevents the IC from overheating.

1.2 Features

- Input voltage up to 36 V
- Available output voltages: 3.3V
- Output current of 100 mA
- Internal thermal overload protection
- Internal short-circuit current limit

1.3 Device Information

PART NUMBER	PACKAGE
78L33	SOT89
	SOT23
	TO
	SOP

2. Connection Diagrams and Pin Description

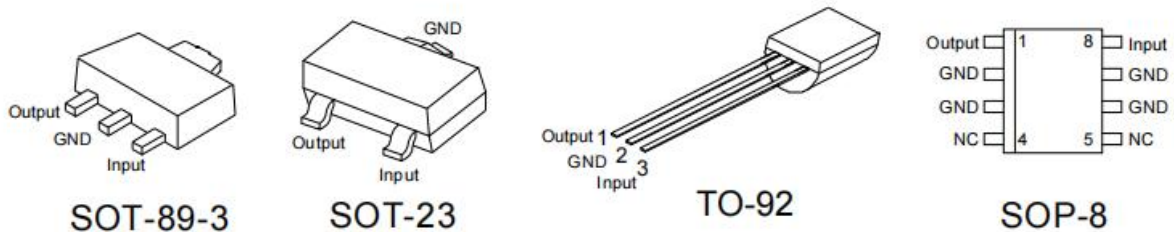


Figure 2.1 Top View

NAME	PIN				I/O	FUNCTION
	No.					
	SOT89	SOT23	TO	SOP		
GND	2	2	2	2,3,6,7	-	Ground
INPUT	3	3	3	8	I	INPUT
OUTPUT	1	1	1	1	O	OUTPUT
NC				4,5	-	No connection

3. System Diagram

3.1 Block Diagram

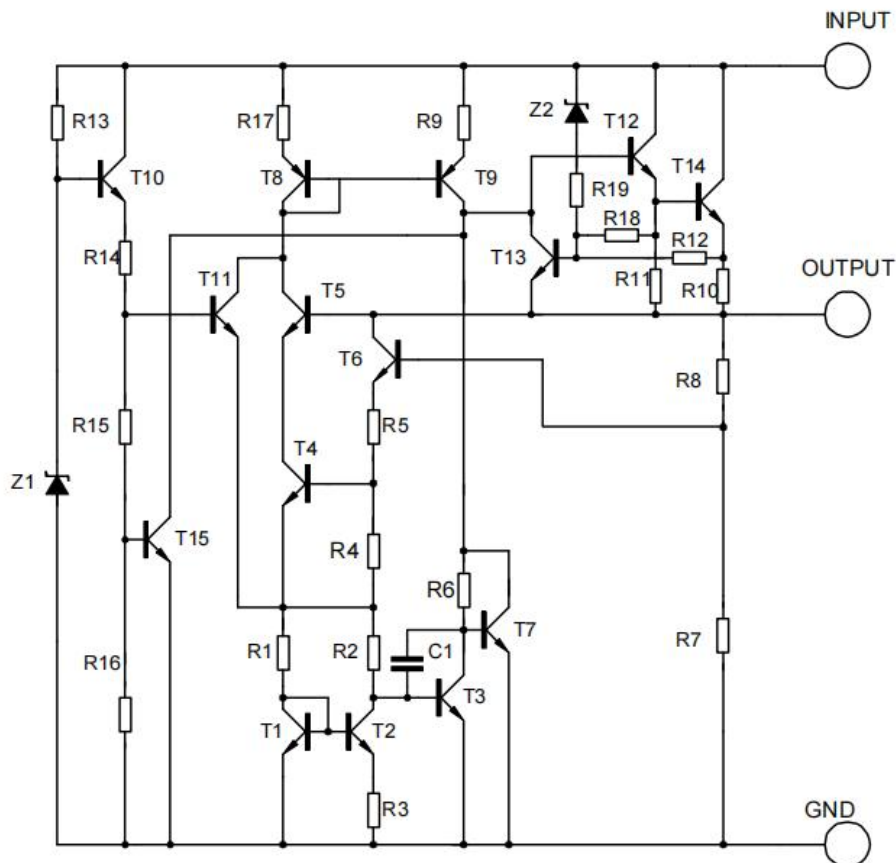


Figure 3.1: Block Diagram



4. Specifications

4.1 Absolute Maximum Ratings

Symbol	Parameter	MIN	MAX	Unit
V _{CC}	Supply Voltage	-	38	V
PD	Power dissipation	Internally limited		
T _{stg}	Storage temperature	-65	150	°C
T _J	Operating Junction Temperature	-40	85	°C

Absolute maximum ratings are those values beyond which the device could be permanently damaged, These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under normal operating conditions.

4.2 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter	MIN	MAX	Unit
V _I	Input voltage		36	V
V _O	Continuous Output current		0.1	A

4.3 Electrical Characteristics

4.3.1 DC Specifications (78L33)

V_{IN} = 8.3 V, I_o = 40 mA, C_{IN} = 0.33 μF, C_O = 0.1 μF, T_J = 25°C (unless otherwise noted).

Symbol	Parameter	Test Condition	MIN	TYP	MAX	Unit
V _o	Output voltage		3.168	3.3	3.432	V
		8.5 V ≤ V _{IN} ≤ 20 V, 1 mA ≤ I _o ≤ 40 mA	3.135	3.3	3.465	V
		1 mA ≤ I _o ≤ 70 mA	3.135	3.3	3.465	V
I _{PK}	Peak output current		-	150	-	mA
V _R LINE	Line regulation	5.3 V ≤ V _{IN} ≤ 20 V	-	-	150	mV
V _R LOAD	Load regulation	1 mA ≤ I _o ≤ 100 mA	-	-	100	mV
		1 mA ≤ I _o ≤ 40 mA	-	-	50	mV
I _Q	Quiescent current		-	-	5.5	mA
ΔI _Q	Quiescent current change	1 mA ≤ I _o ≤ 40 mA	-	-	0.1	mA
		6.3 V ≤ V _{IN} ≤ 20 V, I _o = 0 mA	-	-	1.5	mA
ΔV _{IN} / ΔV _o	Ripple rejection	f = 120 Hz, 6.3 V ≤ V _{IN} ≤ 16.3 V	-	50	-	dB
V _{IN} (min)	Minimum value of input voltage required to maintain line regulation		-	5.3	--	V
ΔV _O /ΔT	Average output voltage temperature coefficient	-40°C ≤ T _J ≤ 85°C, I _o = 5 mA	-	±0.5	-	mV/°C

5. Application Information

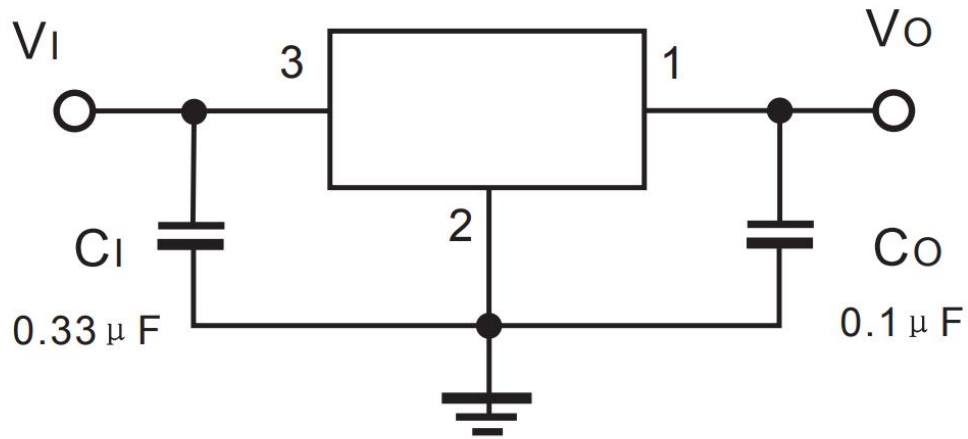


Figure 5.1: Application Circuit

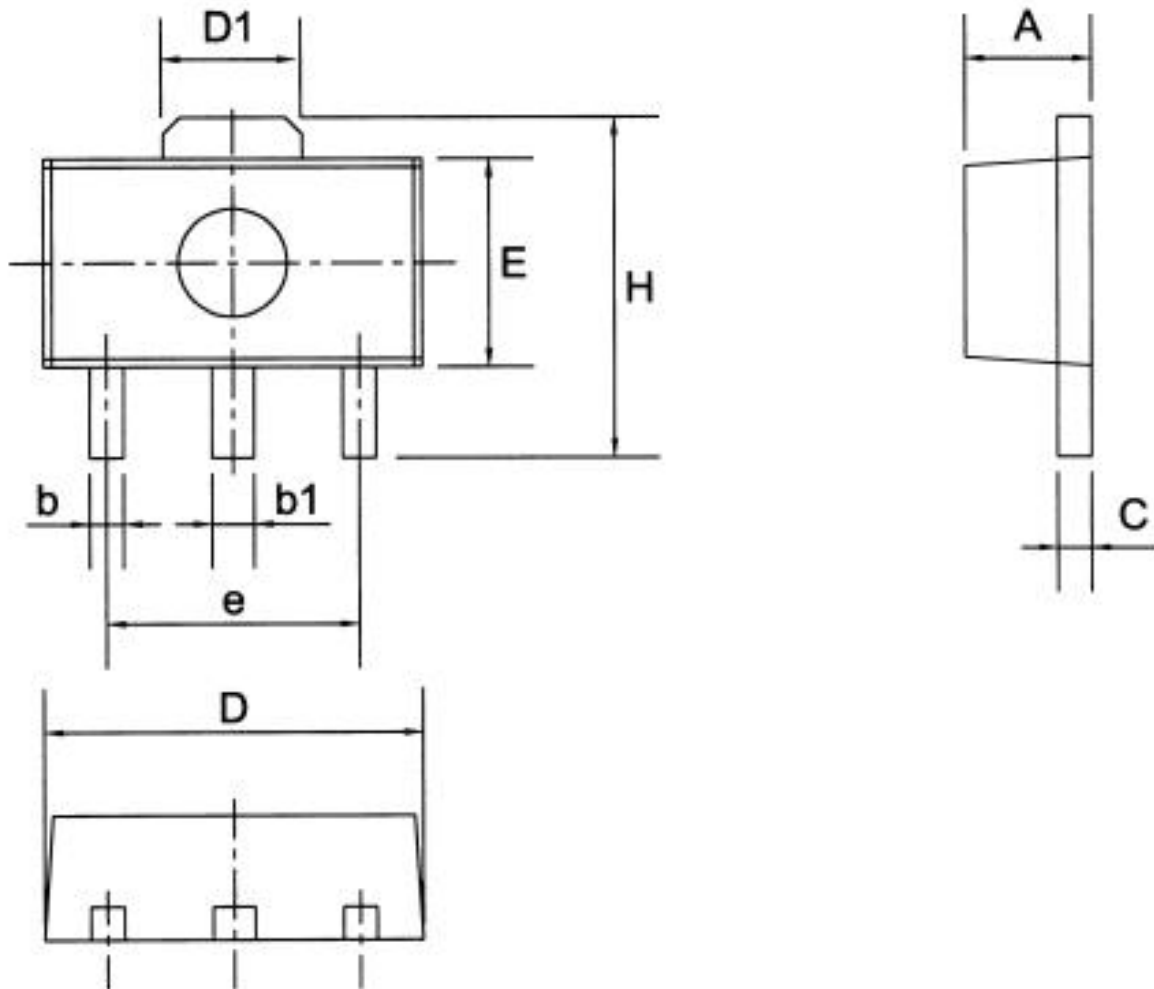


6. Ordering Information

Orderable Device	Package Type	Pins	Packing	Package Qty
78L33GT03ABRAQ	SOT89	3	Tape & Reel	1000
78L33ST03ABRCQ	SOT23	3	Tape & Reel	3000
78L33KW03ABBAQ	TO92	3	Bag	1000
78L33NS08ABRDQ	SOP	8	Tape & Reel	4000

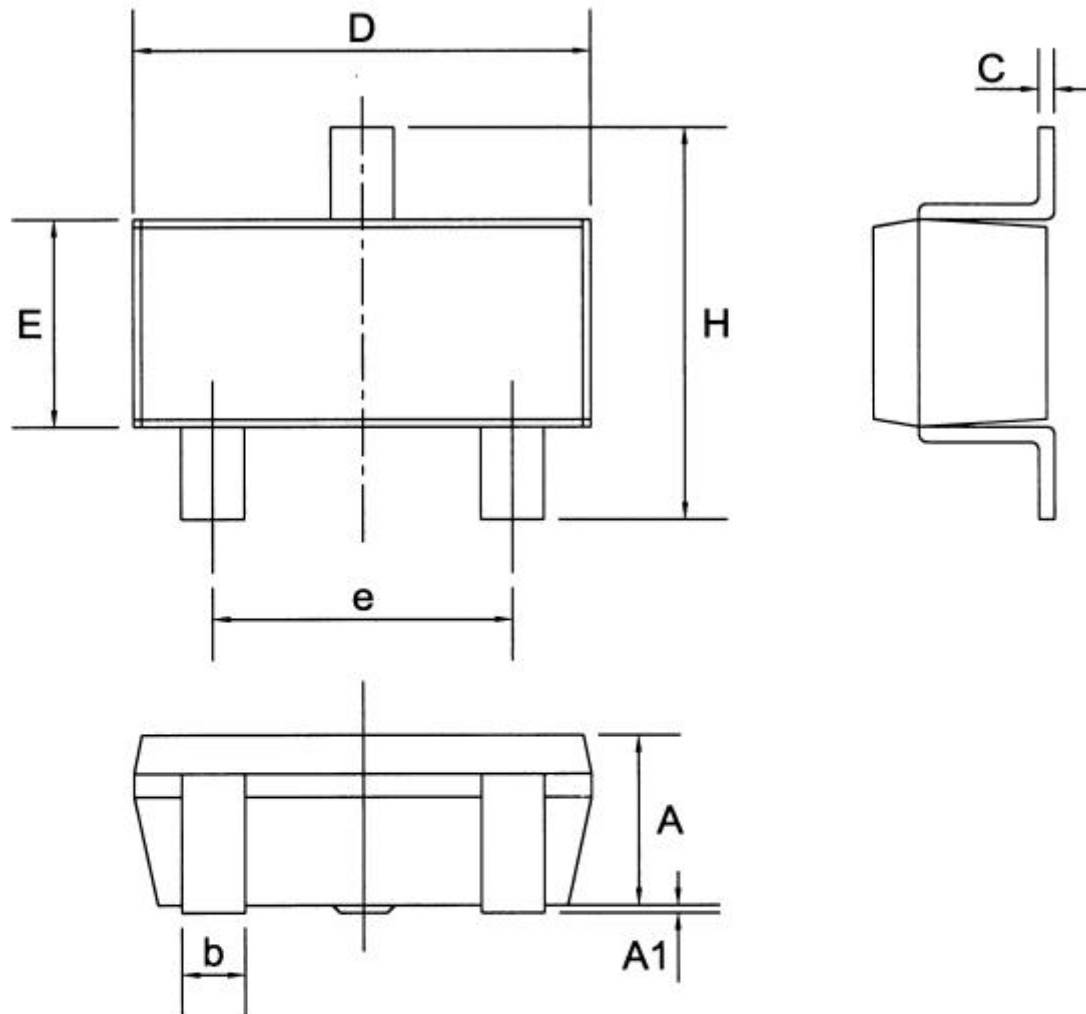
7. Package Information

7.1 SOT89-3



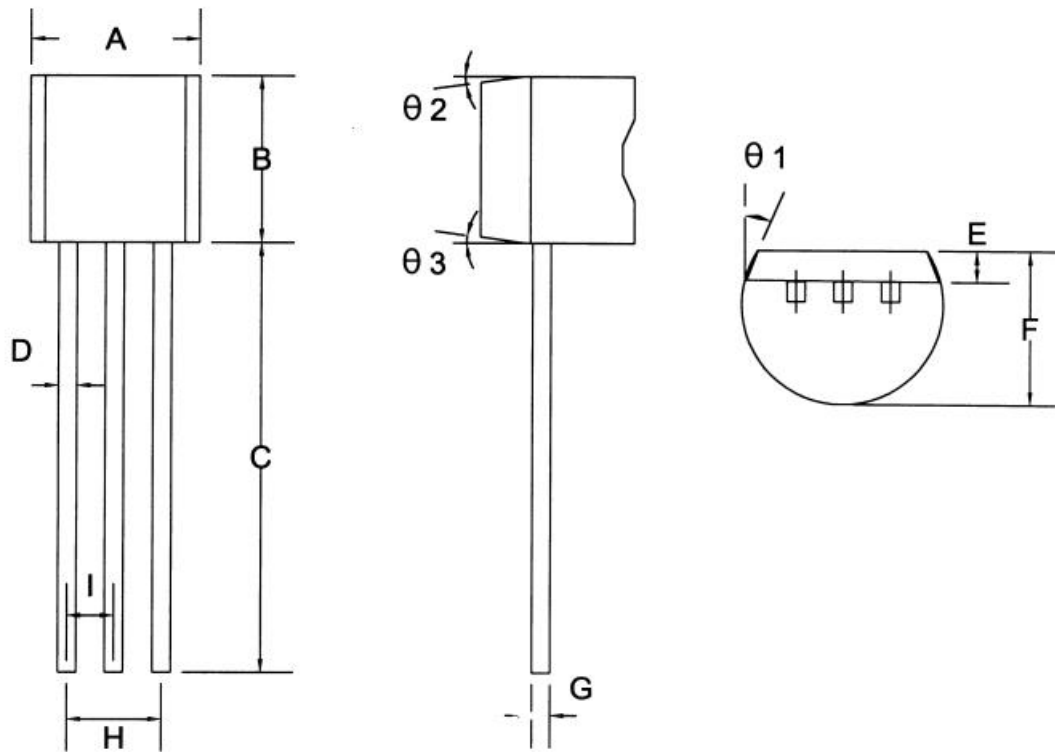
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	1.30	1.50	1.70	0.051	0.059	0.067
b	0.25	0.40	0.55	0.010	0.016	0.022
b1	0.40	0.50	0.60	0.016	0.020	0.024
C	0.30	0.40	0.50	0.012	0.016	0.020
D	4.30	4.50	4.70	0.169	0.177	0.185
D1	1.45	1.65	1.85	0.057	0.065	0.073
E	2.30	2.50	2.70	0.091	0.098	0.106
e	2.90	3.00	3.10	0.114	0.118	0.122
H	3.90	4.10	4.30	0.154	0.161	0.169

7.2 SOT23-3



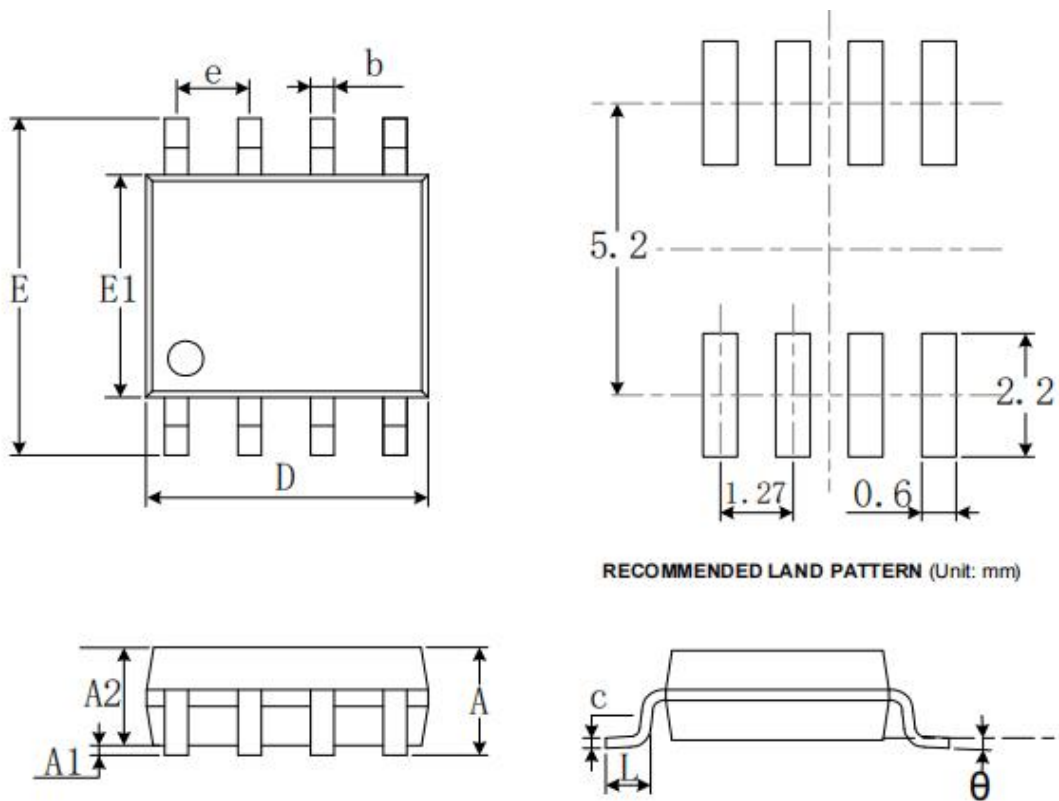
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	1.05	1.15	1.35	0.041	0.045	0.053
A1	—	0.05	0.10	—	0.002	0.004
b	0.35	0.40	0.55	0.014	0.016	0.022
C	0.08	0.10	0.20	0.003	0.004	0.008
D	2.70	2.90	3.10	0.106	0.114	0.122
E	1.20	1.35	1.50	0.047	0.053	0.059
e	1.70	1.90	2.10	0.067	0.075	0.083
H	2.35	2.55	2.75	0.093	0.100	0.108

7.3 TO92



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.33	4.58	4.83	0.170	0.180	0.190
B	4.33	4.58	4.83	0.170	0.180	0.190
C	14.07	14.47	14.87	0.554	0.570	0.585
D	0.34	0.44	0.54	0.013	0.017	0.021
E	0.92	1.02	1.12	0.036	0.040	0.044
F	3.36	3.56	3.76	0.132	0.140	0.148
G	0.34	0.44	0.54	0.013	0.017	0.021
H	2.42	2.54	2.66	0.095	0.100	0.105
I	1.15	1.27	1.39	0.045	0.050	0.055
$\theta 1$	—	5°	—	—	5°	—
$\theta 2$	—	2°	—	—	2°	—
$\theta 3$	—	2°	—	—	2°	—

7.4 SOP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270(BSC)		0.050(BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°