300mA Low Dropout CMOS Voltage Regulators

■ General Description

The LN1234 series are highly precise, low noise, positive voltage LDO regulators manufactured using CMOS processes. The series achieves high ripple rejection and low dropout and consists of a standard voltage source, an error correction, current limiter and a phase compensation circuit plus a driver transistor. Output voltage is selectable in 50mV increments within a range of 0.85V ~ 1.8V. The series is also compatible with low ESR ceramic capacitors which give added output stability. This stability can be maintained even during load fluctuations due to the excellent transient response of the series.

The current limiter's feedback circuit also operates as a short protect for the output current limiter and the output pin The CE function enables the output to be turned off, resulting in greatly reduced power consumption.

■ Applications

- Mobile phones
- Cordless phones
- Modem
- Portable games
- Portable AV equipment
- Reference voltage
- Battery powered equipment
- PCMCIA cards

■ Features

- Output Voltage Range: 0.85V to 1.8V (selectable in 50mV steps)
- Highly Accurate : ±2%（less than 1.5V is ±30mV)
- Dropout Voltage : 300mV @ 100mA (1.5V type)
- High Ripple Rejection: 60dB (10kHz)
- Low Power Consumption: 50μA (TYP.)
- Maximum Output Current : 300mA（V_{IN}≥2.5V）
- Standby Current : less than 0.1μA
- Internal protector: current limiter and short protector
- Small packages: SOT-23-5,SOT-353 and other

■ Package

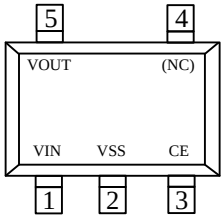
- SOT-23-5L
- SOT-353

■ Ordering Information

LN1234 ①②③④⑤⑥

Designator	Symbol	Description	Designator	Symbol	Description
①		CE Pin Logic	④	A	Output Voltage : 50mV increments e.g. ②=1,③=5,④=A ⇒ 1.55V
	A	Active 'High' (pull-down resistor built in)			
	B	Active 'High' (no pull-down resistor built in)	⑤		Package Type
				M	SOT-23-5L
	C	Active 'Low' (pull-up resistor built in)		K	SOT-353
	D	Active 'Low' (no pull-up resistor built in)	⑥		Device Orientation
② ③	08-18	Output Voltage: eg ②=1,③=5 ⇒ 1.5V		R	Embossed Tape : Standard Feed
④	2	Output Voltage : 100mV increments eg.②=1,③=5 ,④=2 ⇒ 1.5V		L	Embossed Tape : Reverse Feed

■ Pin Configuration

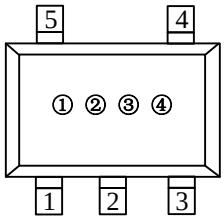


SOT-23-5L/SOT-353
(Top View)

Pin Number SOT-23-5L/SOT-353	Pin Name	Function Description
1	VIN	Power Supply
2	VSS	Ground
3	CE	Chip Enable
4	NC	Not connect
5	VOUT	Output Pin

■ Marking Rule

- SOT-23-5L,SOT-353



SOT-23-5L/SOT-353
(Top View)

① Represents the product name

Symbol	Product Name
4	LN1234◆◆◆◆◆◆

② Represents the range of output voltage

Voltage(V)	0.8～1.8	0.85～1.75	Product Name
Symbol	V	A	LN1234A◆◆◆◆◆
	X	B	LN1234B◆◆◆◆◆
	Y	C	LN1234C◆◆◆◆◆
	Z	D	LN1234D◆◆◆◆◆

③ Represents the Output Voltage

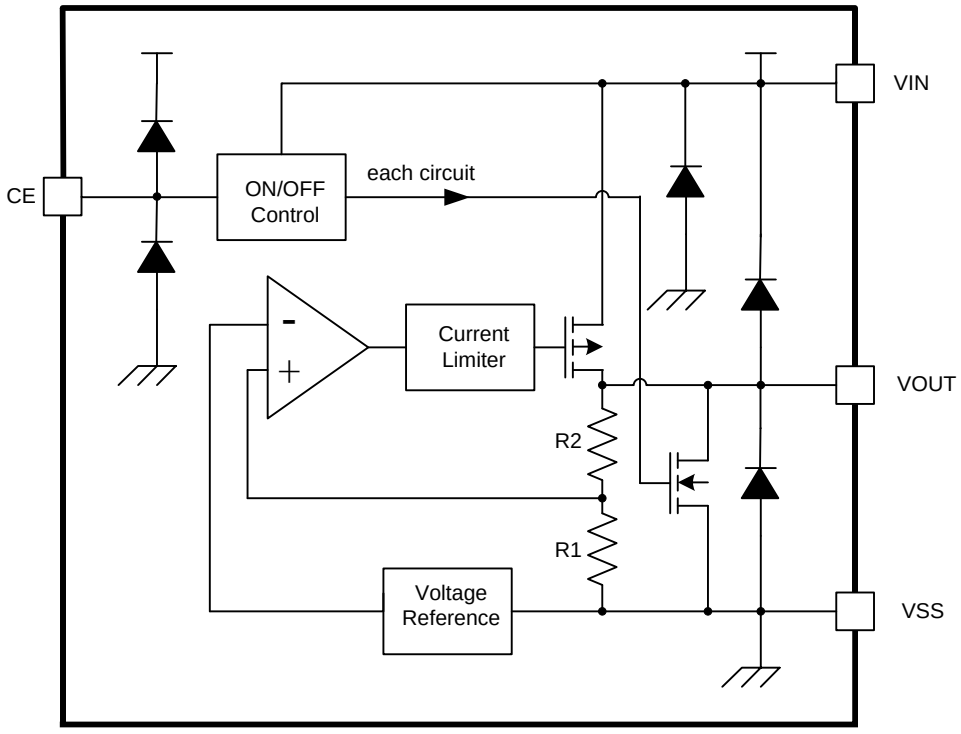
Symbol	Output Voltage（V）	
7	0.8	0.85
8	0.9	0.95
9	1.0	1.05
A	1.1	1.15
B	1.2	1.25
C	1.3	1.35

Symbol	Output Voltage（V）	
D	1.4	1.45
E	1.5	1.55
F	1.6	1.65
H	1.7	1.75
K	1.8	

④ Represents the assembly lot no.

0 to 9，A to Z, reversed character of 0 to 9 and A to Z repeated(G,I,J,O,Q W excepted)

■ Function Block Diagram

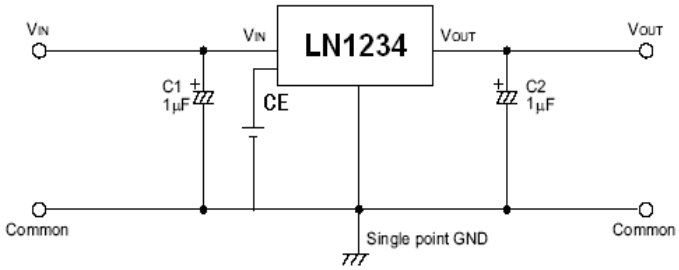


■ Absolute Maximum Ratings

Parameter	Symbol	Maximum Rating		Unit
Input Voltage	V_{IN}	V_{SS}-0.3～V_{SS}+5		V
	$V_{ON/OFF}$	V_{SS}-0.3～V_{IN}+0.3		
Output Current	V_{OUT}	V_{SS}-0.3～V_{IN}+0.3		
Power Dissipation	P_D	SOT-23-5	250	mW
		SOT-353	250	
Operating Ambient Temperature	Topr	-40～+85		°C
Storage Temperature	Tstg	-40～+125		

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

■ Typical Application Circuit



Caution：The above connection diagram and constant will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constant.

■ Application Conditions

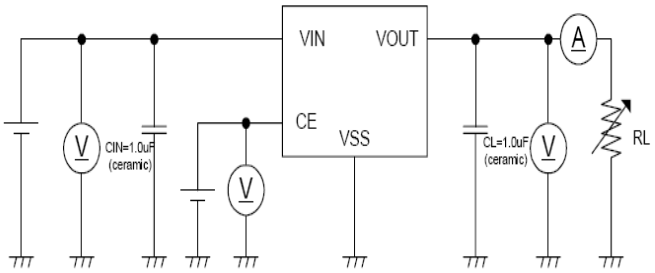
Input capacitor (CIN): 1.0μF or more

Output capacitor (CL): 1.0μF or more (tantalum capacitor)

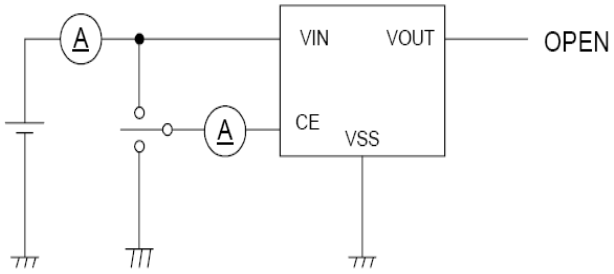
Caution A general series regulator may oscillate, depending on the external components selected. Check that no oscillation occurs with the application using the above capacitor.

■ Test Circuits

Circuit .1



Circuit .2

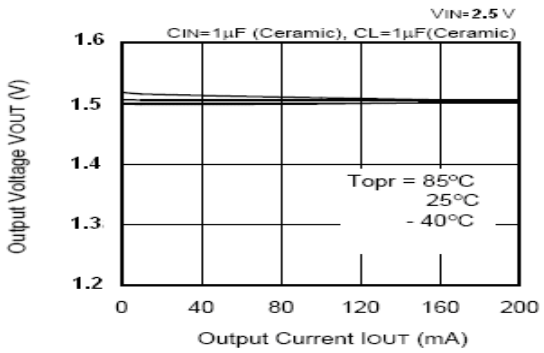


■ Electrical Characteristics

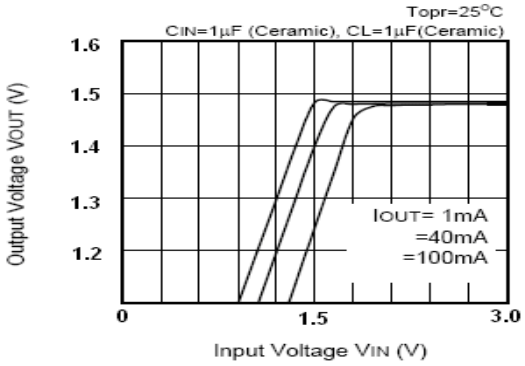
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Circuit
Output Voltage	$V_{OUT(E)}$	V_{IN} =$V_{OUT(S)}$+1.0 V, I_{OUT}=30 mA	$V_{OUT(S)}$ ×0.98	$V_{OUT(S)}$	$V_{OUT(S)}$ ×1.02	V	1
Output Current	I_{OUT}	V_{IN}≥$V_{OUT(S)}$+1.0 V	300	—	—	mA	1
Dropout Voltage	V_{drop}	I_{OUT}=50 mA	—	0.12	0.20	V	1
		I_{OUT}=100 mA	—	0.30	0.45		
Line Regulations	$\frac{\Delta V_{OUT1}}{\Delta V_{IN} \bullet V_{OUT}}$	$V_{OUT(S)}$+0.5 V ≤V_{IN}≤7V I_{OUT}=30 mA	—	0.10	0.20	%/V	
Load Regulation	ΔV_{OUT2}	V_{IN}=$V_{OUT(S)}$+1.0 V 1.0 mA ≤I_{OUT} ≤100 mA	—	50	100	mV	
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Ta \bullet V_{OUT}}$	V_{IN}=$V_{OUT(S)}$+1.0 V, I_{OUT}=10 mA -40°C ≤Ta ≤85°C	—	±100	—	ppm/℃	
Supply Current	I_{SS1}	V_{IN}=$V_{OUT(S)}$+1.0 V	—	50		μ A	2
Input Voltage	V_{IN}	——	1.8	—	5	V	—
Ripple-Rejection	|PSRR|	V_{IN}=$V_{OUT(S)}$+1.0 V，f=10 kHz Vrip=0.5 Vrms, I_{OUT}=50 mA	—	60	—	dB	1
Short-circuit Current	Ishort	V_{IN}=$V_{OUT(S)}$+1.0 V,V_{CE} on V_{OUT}=gnd	—	60	—	mA	1
CE “High” Voltage	V_{CEH}		1.2			V	1
CE “Low” Voltage	V_{CEL}				0.3	V	1
CE “High” Current	I_{CEH}	VIN=VCE=VOUT(T)+1.0V	-0.1		0.1	uA	2
CE “Low” Current	I_{CEH}	VIN= VOUT(T)+1.0V, VCE=VSS	-0.1		0.1	uA	2

■ Typical Performance Characteristics(output voltage=0.3V)

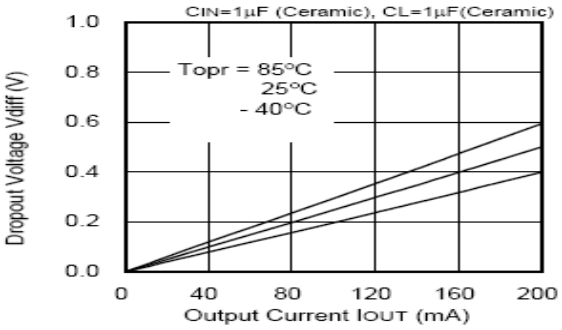
1、Output Voltage vs. Output Current



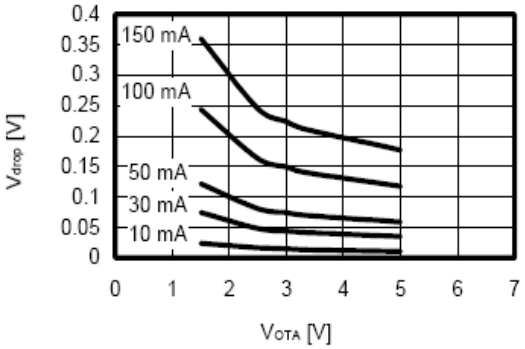
2、Output Voltage vs. Input Voltage (Contd.)



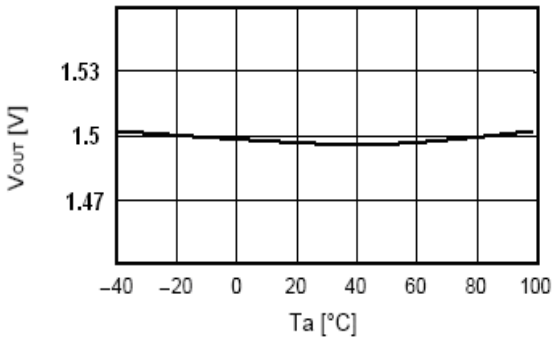
3、Dropout Voltage vs. Output Current



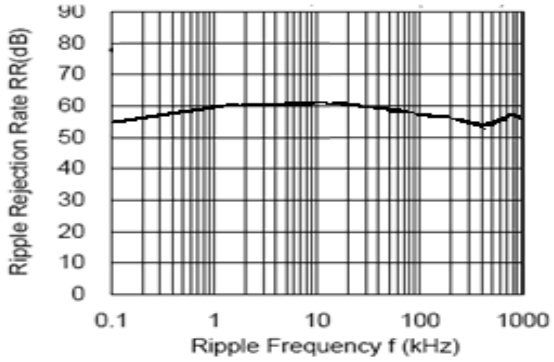
4、Dropout Voltage vs. Output Voltage



5、Output Voltage vs. Ambient Temperature

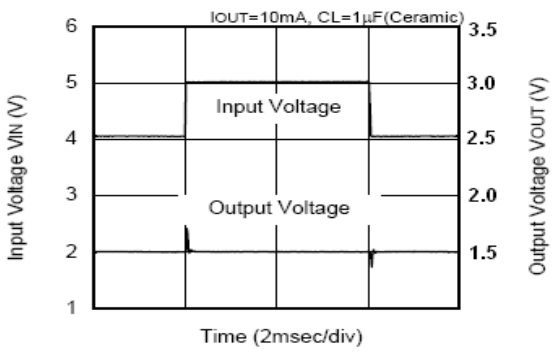


6、Ripple Rejection Rate

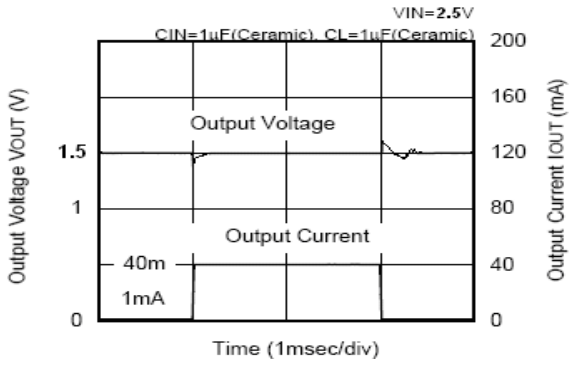


7、Transient Response

Input Transient Response

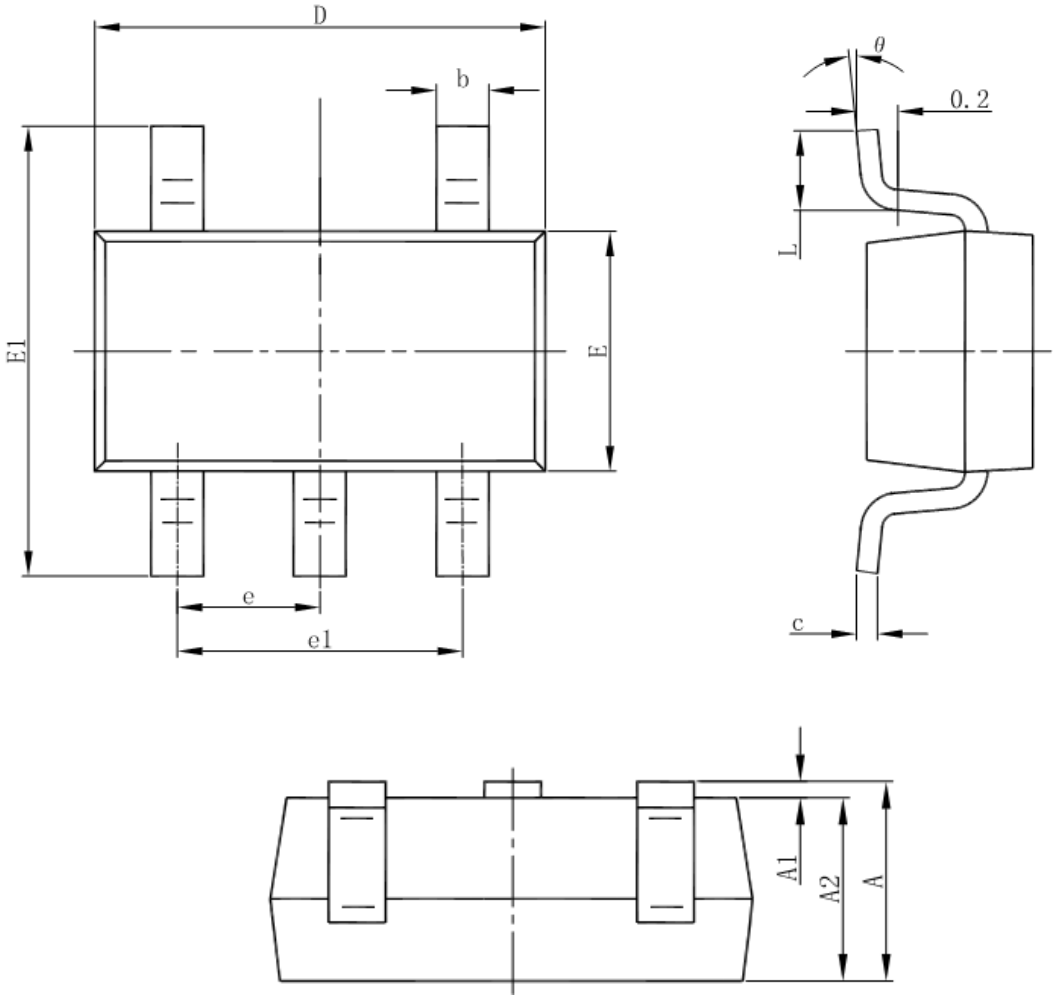


Load Transient Response



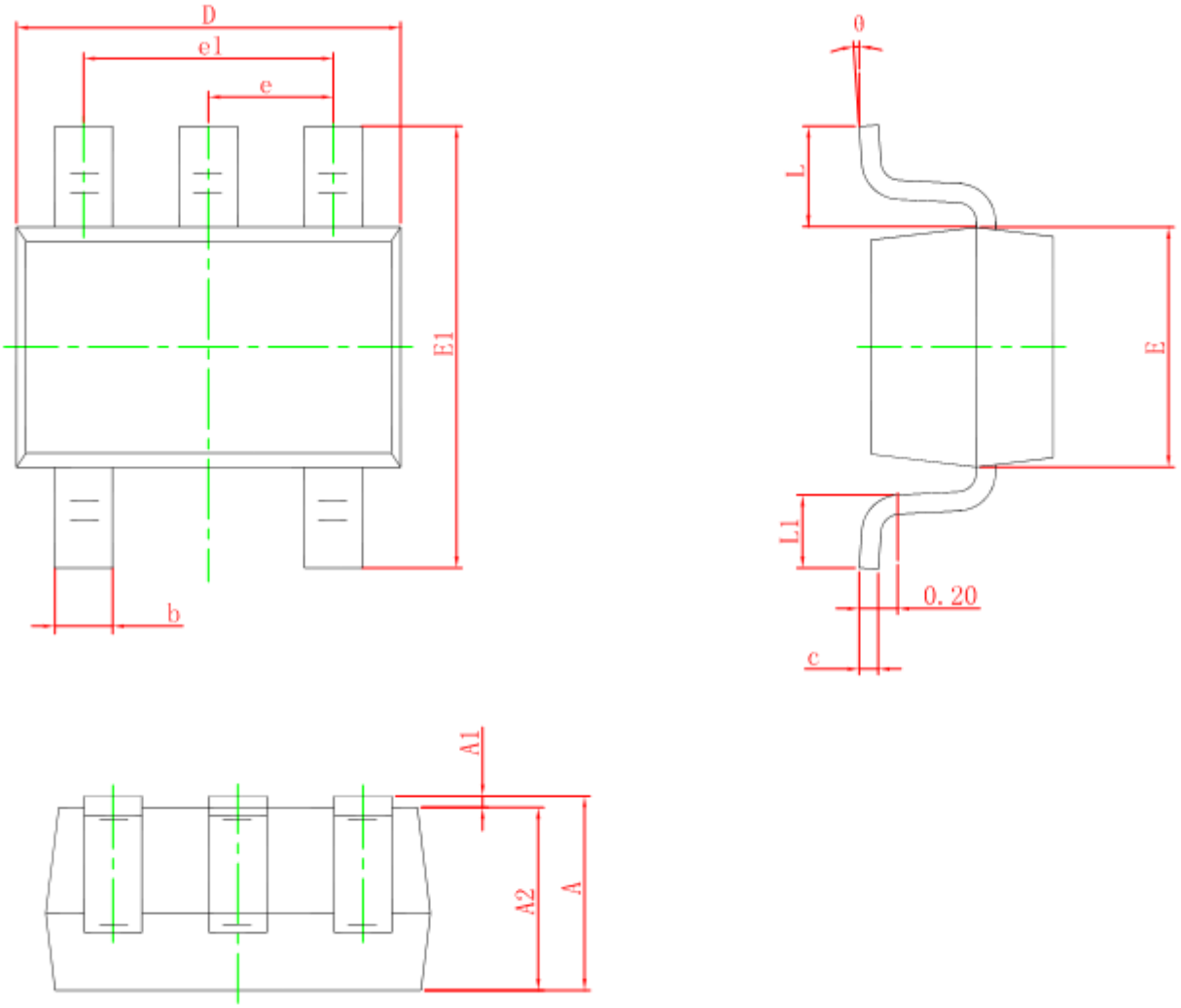
■ Package Information

- **SOT-23-5L**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

- **SOT-353**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°