
HIGH SPEED LOW DROPOUT
MIDDLE CURRENT VOLTAGE REGULATORS

< A%% (Series

■ **DESCRIPTION**

The HM1134 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 100mV increments within a range of 1.5V ~ 5.0V. 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 foldback 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.

■ **FEATURES**

- Output Voltage Range 1.0V to 5.0V (selectable in 100mV steps)
- Highly Accurate ± 2%
- Dropout Voltage 300mV @ 100mA (3.0V type)
- High Ripple Rejection 70dB (10 kHz)
- Low Power Consumption 70 μ A (TYP.)
- Maximum Output Current 300mA
- Standby Current less than 2μA
- Internal protector current limiter and short protector
- Small packages SOT-25, USP-6B, SOT-353/SC70-5 and other required

■ **APPLICATIONS**

- Mobile phones
- Cordless phones
- Cameras, Video cameras
- Portable games
- Portable AV equipment
- Reference voltage
- Battery powered equipment

■ **PACKAGE**

- SOT-25
- USP-6B
- SOT-353/SC70-5
- Other required

■ BLOCK DIAGRAM

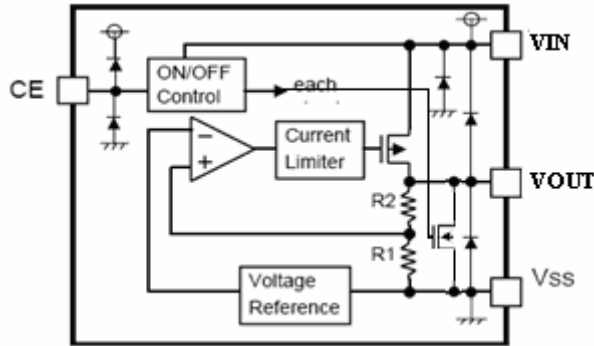


Figure 1

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MAXIMUM RATING		UNIT
Input Voltage	V_{IN}	$V_{SS}-0.3 \sim V_{SS}+8$		V
	$V_{ON/OFF}$	$V_{SS}-0.3 \sim V_{IN}+0.3$		
Output Current	V_{OUT}	$V_{SS}-0.3 \sim V_{IN}+0.3$		
Power Dissipation	P_D	SOT-25,SOT-353/SC70-5	250	mW
		USP-6B	100	
Operating Ambient Temperature	T_{opr}	-40~+85		°C
Storage Temperature	T_{stg}	-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.

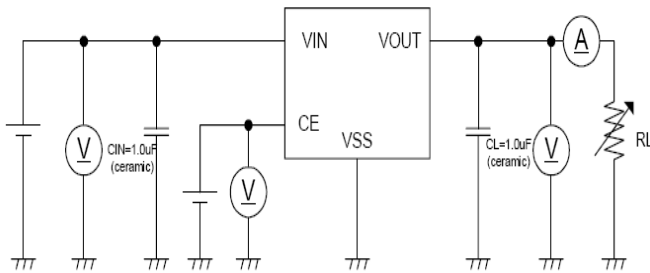
■ Electrical Characteristics

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	CIRCUIT
Output Voltage	$V_{OUT(E)}$	$V_{IN} = V_{OUT(S)} + 1.0 \text{ V}$, $I_{OUT} = 30 \text{ mA}$	$V_{OUT(S)} \times 0.98$	$V_{OUT(S)}$	$V_{OUT(S)} \times 1.02$	V	1
Output Current	I_{OUT}	$V_{IN} \geq V_{OUT(S)} + 1.0 \text{ V}$	300	—	—	mA	1
Dropout Voltage	V_{drop}	$I_{OUT} = 50 \text{ mA}$	—	0.12	0.20	V	1
		$I_{OUT} = 100 \text{ mA}$	—	0.30	0.45		
Line Regulations	$\frac{\Delta V_{OUT1}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{OUT(S)} + 0.5 \text{ V} \leq V_{IN} \leq 8 \text{ V}$ $I_{OUT} = 30 \text{ mA}$	—	0.10	0.2	%/V	
Load Regulation	ΔV_{OUT2}	$V_{IN} = V_{OUT(S)} + 1.0 \text{ V}$ $1.0 \text{ mA} \leq I_{OUT} \leq 100 \text{ mA}$	—	50	100	mV	
Output Voltage Temperature	$\frac{\Delta V_{OUT}}{\Delta T_a \cdot V_{OUT}}$	$V_{IN} = V_{OUT(S)} + 1.0 \text{ V}$, $I_{OUT} = 10 \text{ mA}$	—	± 100	—	ppm/°C	

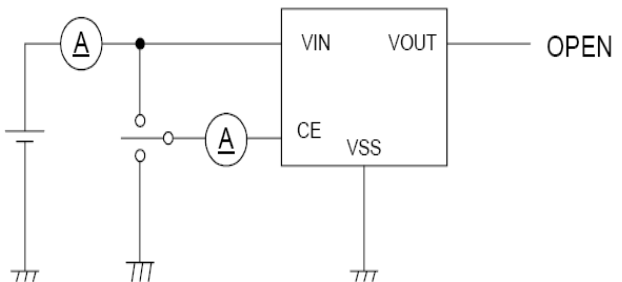
Characteristics		$-40^{\circ}\text{C} \leq T_a \leq 85^{\circ}\text{C}$					
Supply Current	I_{SS1}	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$	—	70		$\mu\text{ A}$	2
Input Voltage	V_{IN}	—	2.0	—	8	V	—
Ripple-Rejection	PSRR	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$, $f=10\text{ kHz}$ $V_{rip}=0.5\text{ Vrms}$, $I_{OUT}=50\text{ mA}$	—	70	—	dB	1
Short-circuit Current	I_{short}	$V_{IN}=V_{OUT(S)}+1.0\text{ V}$, V_{CE} on $V_{OUT}=\text{gnd}$	—	40	—	mA	1
CE “High” Voltage	V_{CEH}		1.6		V_{IN}	V	1
CE “Low” Voltage	V_{CEL}				0.25	V	1
CE “High” Current	I_{CEH}	$V_{IN}=V_{CE}=V_{OUT(T)}+1.0\text{ V}$	-0.1		0.1	$\mu\text{ A}$	2
CE “Low” Current	I_{CEL}	$V_{IN}=V_{OUT(T)}+1.0\text{ V}$, $V_{CE}=V_{SS}$	-0.1		0.1	$\mu\text{ A}$	2

■ TEST CIRCUITS

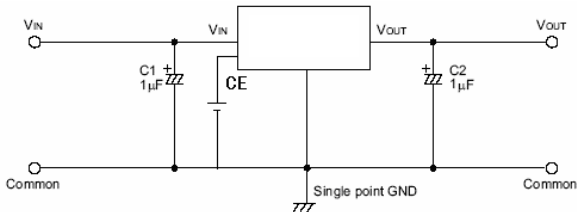
1、



2、



■ 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

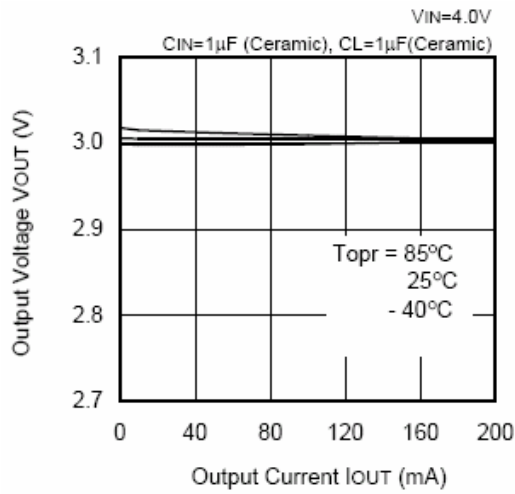
Input capacitor (C_{IN}): 1.0 μF or more

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

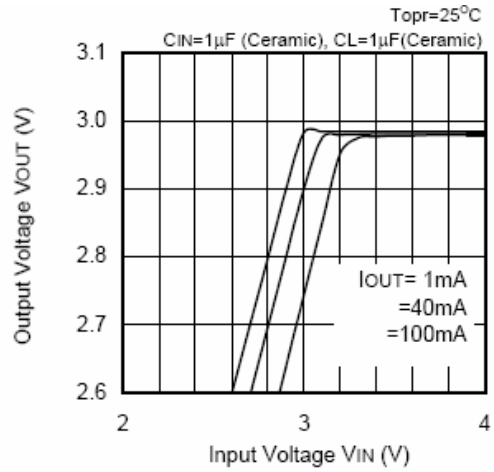
Caution A general series regulator may oscillate, depending on the external components selected. Check that no oscillation occurs with the application using the above capacitor.

■ **TYPICAL PERFORMANCE CHARACTERISTICS** (3.0V output)

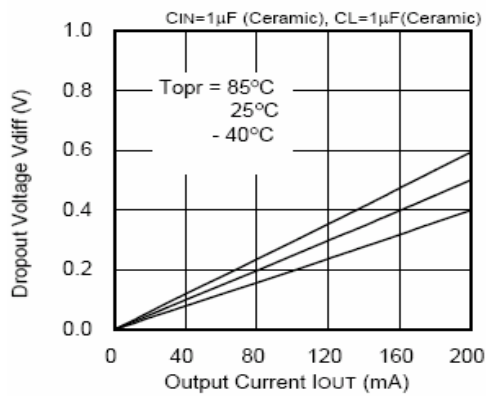
1、Output Voltage vs. Output Current



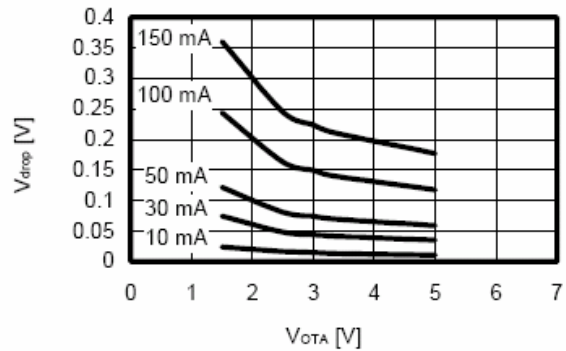
2、Output Voltage vs. Input Voltage (Contd.)



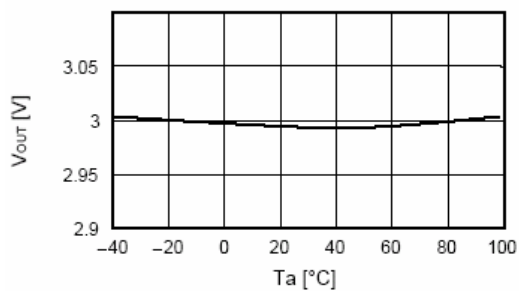
3、Dropout Voltage vs. Output Current



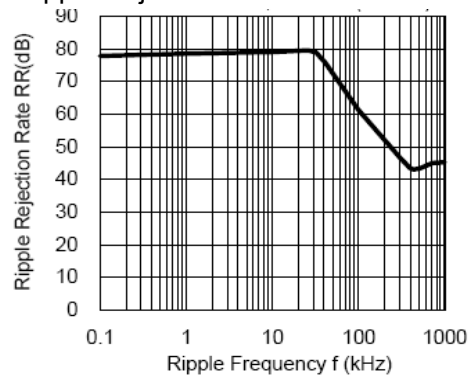
4、Dropout Voltage vs. Output Voltage



5、Output Voltage vs. Ambient Temperature

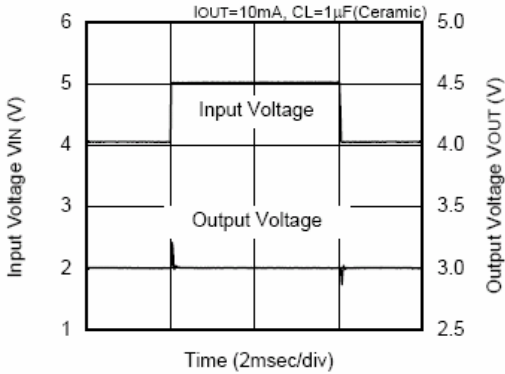


6、Ripple Rejection Rate

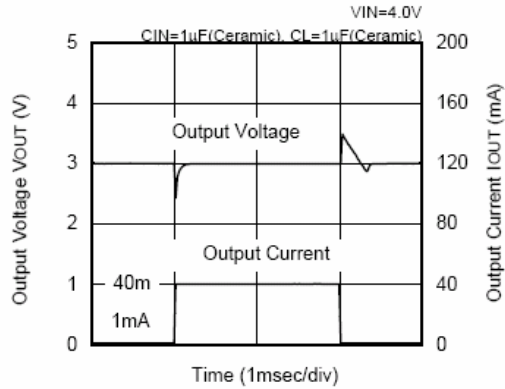


7、Transient Response

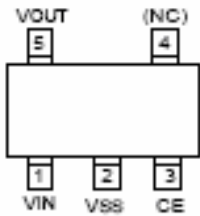
Input Transient Response



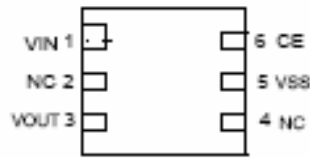
Load Transient Response



■ PIN CONFIGURATION



SOT-25 SOT-353
 (TOP VIEW)



USP-6B
 (TOP VIEW)

■ PIN ASSIGNMENT

PIN NUMBER			PIN NAME	FUNCTION
SOT25	USP-6B	SOT-353/SC70-5		
1	1	1	VIN	SUPPLY POWER
2	5	2	VSS	GROUND
3	6	3	CE	ENABLE PIN
4	2, 4	4	NC	NC
5	3	5	VOUT	VOLTAGE OUTPUT

■ Ordering Information

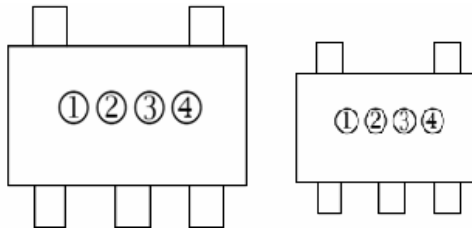
HM1134①②③④⑤⑥

DESIGNATOR	SYMBOL	DESCRIPTION
①		CE Pin Logic :
	A	Active 'High' (pull-down resistor built in)
	B	Active 'High' (no pull-down resistor built in)
	C	Active 'Low' (pull-up resistor built in)
②③	10-60	Output Voltage: e.g. 20 = 2.0V 30 = 3.0V etc.
		Output Voltage : 100mV increments e.g. ②=3, ③=8, ④=2 ⇒ 3.8V
④	2	

	A	Output Voltage : 50mV increments e.g. ②=3, ③=8, ④=A ⇒ 3.85V
⑤		Package Type :
	M	SOT-25 (SOT-23-5)
	U	SOT-353/SC70-5
	D	USP-6B
⑥		Device Orientation :
	R	Embossed Tape : Standard Feed
	L	Embossed Tape : Reverse Feed

■ Marking Rule

- SOT-25, SOT-353



① Represents the product name

SYMBOL	PRODUCT NAME
4	HM1134◆◆◆◆◆◆◆◆

② Represents the type of regulator

VOLTAGE (V)	1.0~3.0	3.1~6.0	1.05~3.05	3.15~6.05		
SYMBOL	X	B	E	L	Product Name	HM1134A◆◆◆◆◆◆◆◆
	V	A	F	M		HM1134B◆◆◆◆◆◆◆◆
	Y	C	H	N		HM1134C◆◆◆◆◆◆◆◆
	Z	D	K	P		HM1134D◆◆◆◆◆◆◆◆

③ Represents the Output Voltage

SYMBOL	OUTPUT VOLTAGE (V)			
0		3.1		3.15
1		3.2		3.25
2		3.3		3.35
3		3.4		3.45
4		3.5		3.55
5		3.6		3.65
6		3.7		3.75
7		3.8		3.85
8		3.9		3.95
9	1.0	4.0	1.05	4.05
A	1.1	4.1	1.15	4.15
B	1.2	4.2	1.25	4.25

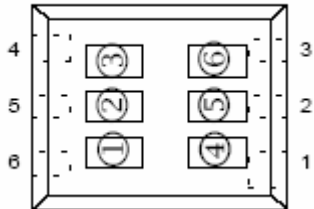
SYMBOL	OUTPUT VOLTAGE (V)			
F	1.6	4.6	1.65	4.65
H	1.7	4.7	1.75	4.75
K	1.8	4.8	1.85	4.85
L	1.9	4.9	1.95	4.95
M	2.0	5.0	2.05	5.05
N	2.1		2.15	
P	2.2		2.25	
R	2.3		2.35	
S	2.4		2.45	
T	2.5		2.55	
U	2.6		2.65	
V	2.7		2.75	

C	1.3	4.3	1.35	4.35	X	2.8		2.85	
D	1.4	4.4	1.45	4.45	Y	2.9		2.95	
E	1.5	4.5	1.55	4.55	Z	3.0		3.05	

- ④ Represents the assembly lot no.
 0~9, A~Z repeated (G, I, J, O, Q, W excepted)

● USP-6B

USP-6B



- ① ② Represents the product name

SYMBOL		PRODUCT NAME
①	②	
3	4	HM1134xxxxDx

- ③ Represents the type of regulator

SYMBOL	TYPE	PRODUCT NAME
A	Active 'High' (pull-down resistor built in)	HM1134AxxxDx
B	Active 'High' (no pull-down resistor built in)	HM1134BxxxDx
C	Active 'Low' (pull-up resistor built in)	HM1134CxxxDx
D	Active 'Low' (no pull-up resistor built in)	HM1134DxxxDx

- ④ Represents the integers of Output Voltage
 Example: 3 represents 3. x, 5 represents 5. x;

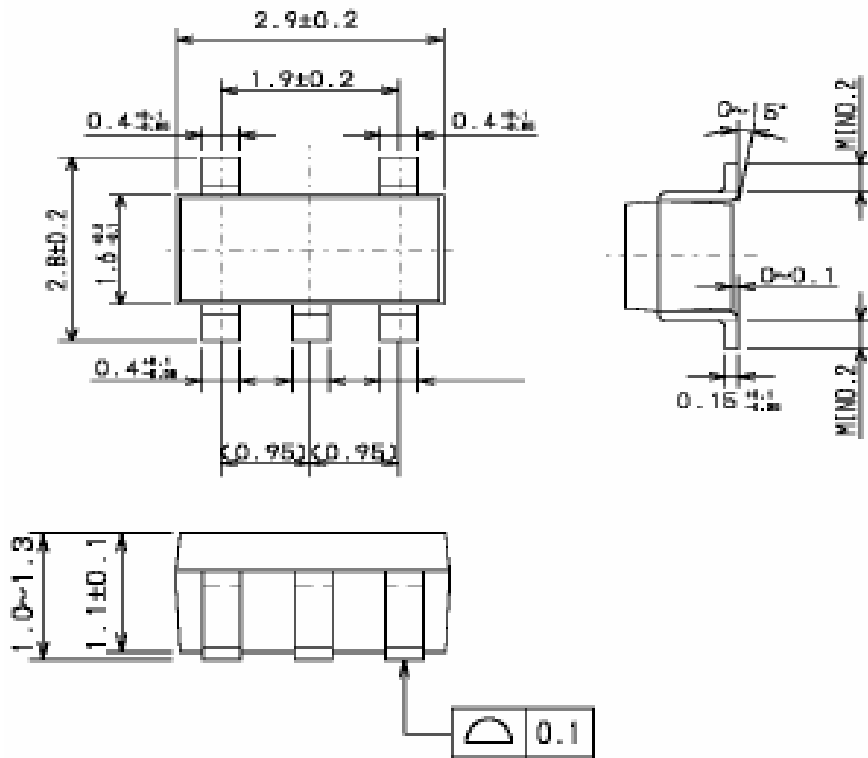
- ⑤ Represents the decimals of Output Voltage

SYMBOL	VOLTAGE (V)	PRODUCT NAME	SYMBOL	VOLTAGE (V)	PRODUCT NAME
0	X. 0	HM1134 xx0xDx	A	X. 05	HM1134 xxAxDx
1	X. 1	HM1134 xx1xDx	B	X. 15	HM1134 xxBxDx
2	X. 2	HM1134 xx2xDx	C	X. 25	HM1134 xxCx Dx
3	X. 3	HM1134 xx3xDx	D	X. 35	HM1134 xxDxDx
4	X. 4	HM1134 xx4xDx	E	X. 45	HM1134 xxEx Dx
5	X. 5	HM1134 xx5xDx	F	X. 55	HM1134 xxFx Dx
6	X. 6	HM1134 xx6xDx	H	X. 65	HM1134 xxHxDx
7	X. 7	HM1134 xx7xDx	K	X. 75	HM1134 xxKxDx
8	X. 8	HM1134 xx8xDx	L	X. 85	HM1134 xxLxDx
9	X. 9	HM1134 xx9xDx	M	X. 95	HM1134 xxMxDx

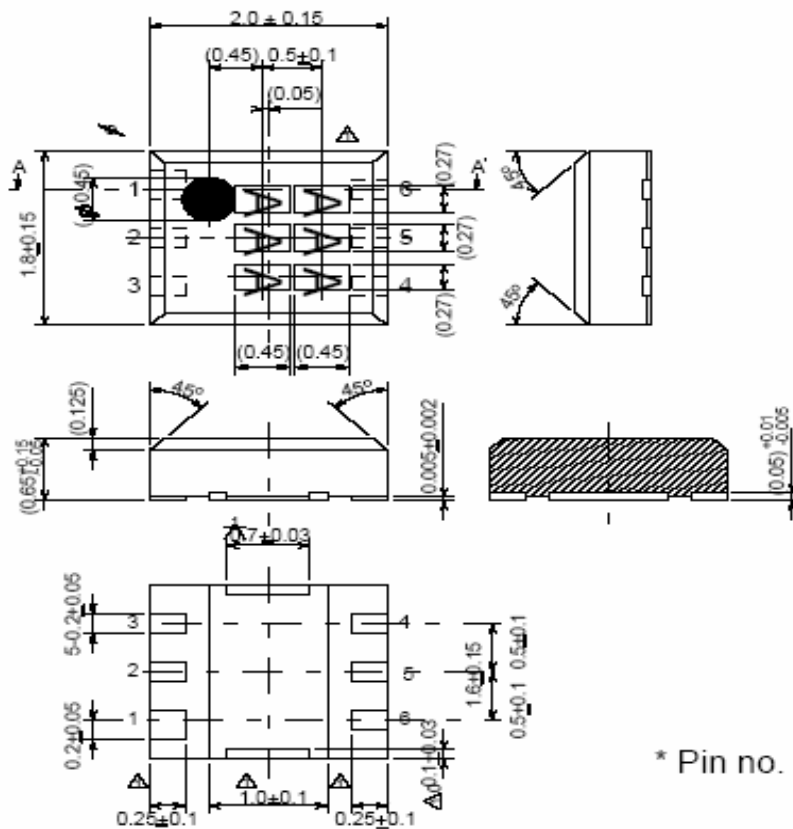
- ⑥ Represents the assembly lot No.
 0~9, A~Z repeated (G, I, J, O, Q, W excepted)

■ PACKAGE INFORMATION

- SOT25

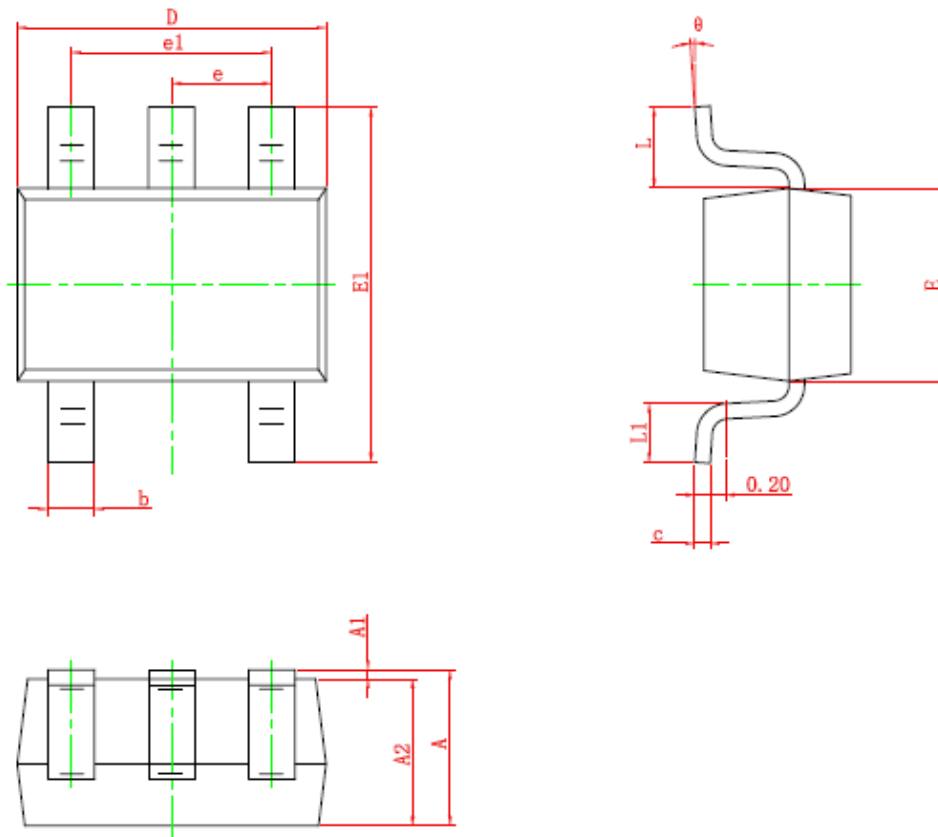


- USP-6B



* Pin no. 1 is thicker than other pins.

● SOT-353/SC70-5



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
theta	0°	8°	0°	8°