1000mA Linear Voltage Regulators

Features

- Quiescent Current: 2mA(Typ.)
- Input Voltage Range: 15V(Max.)
- Output Current: 1000mA(Max.)
- Low Dropout Voltage: 1.3V@1A
- Output Voltage: 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V
- Operation Ambient Temperature: -40~85° C
- Typical accuracy: 2%

Applications

- PC Motherboard
- LCD Monitor
- Graphic Card
- Modem
- Printer

General Description

LD1117 Series are low-dropout three-terminal Linear regulators with a dropout of 1.15V(typ.)at 1A output current. They are divided into two versions, fixed voltage output version and adjustable voltage output version. The fixed output voltage is 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and the adjustable version can provide the output voltage from 1.25V to 12V with only 2 extemal resistors.

Reference News

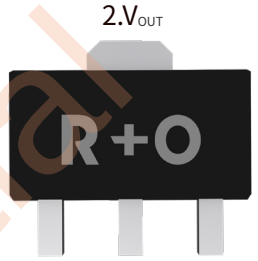
SOT-89 Marking:
LD1117-ADJV: 1117-Adj
LD1117-1.2V: 1117-1.2
LD1117-1.5V: 1117-1.5
LD1117-1.8V: 1117-1.8
LD1117-2.5V: 1117-2.5
LD1117-3.3V: 1117-3.3
LD1117-5.0V: 1117-5.0

SOT-223 Marking:
LD1117-ADJ: 1117-ADJ
LD1117-1.2: 1117C+12+DC
LD1117-1.5: 1117+15+DC
LD1117-1.8: 1117-1.8
LD1117-2.5: 1117C+25+DC
LD1117-3.3: 1117-3.3
LD1117-5.0: 1117-5.0

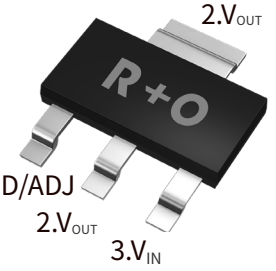
TO-252 Marking:
LD1117-ADJB: R+O 1117-ADJ + DC
LD1117-1.2B: R+O 1117-1.2 + DC
LD1117-1.5B: R+O 1117-1.5 + DC
LD1117-1.8B: R+O 1117-1.8 + DC
LD1117-2.5B: R+O 1117-2.5 + DC
LD1117-3.3B: R+O 1117-3.3 + DC
LD1117-5.0B: R+O 1117-5.0 + DC

Output Current
1000mA
Input Voltage
15V(Max.)

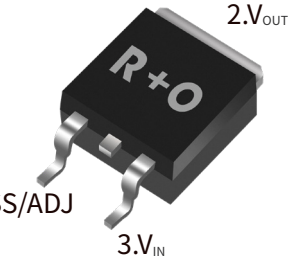
SOT-89



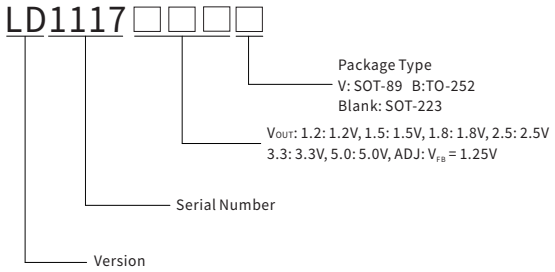
SOT-223



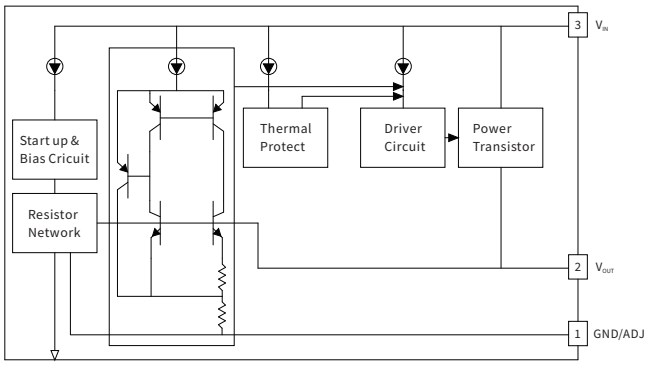
TO-252



Part Numbering



Block Diagram



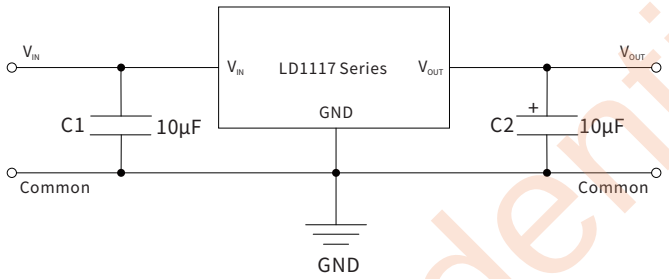
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Ordering Information

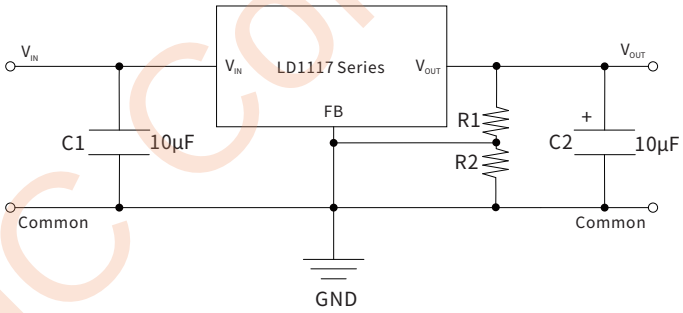
Package	Package Code	Unit Weight(g)	Reel(pcs)	Box(pcs)	Carton(pcs)	Delivery Mode	MSL
SOT-89	R1	0.045	1000	8000	48000	7''	3
SOT-223	R3	0.231	3000	6000	30000	13''	3
TO-252	R3	0.305	2500	2500	25000	13"	3

Typical Application Circuit

Fixed Output Voltage Version



Adjustable Fixed Output Voltage Version



$$V_{OUT}=V_{REF}\times(1+R2/R1)+I_{ADJ}\times R2$$

The output voltage of adjustable version follows the equation:

$$V_{OUT}= 1.25 \times (1+R2/R1) + I_{ADJ} \times R2.$$

We can ignore I_{ADJ} because I_{ADJ} (approximately 50uA) is much less than the current of R1 (approximately 2~10mA).

(1) To meet the minimum load current (>10mA) requirement, R1 is recommended to be 125Ω or lower. As LD1117XX-ADJ can keep itself stable at load current about 2mA, R1 is not allowed to be higher than 625Ω.

(2) Using a bypass capacitor (C_{ADJ}) between the FB pin and ground can improve ripple rejection. This bypass capacitor prevents ripple from being amplified as the output voltage is increased. The impedance of C_{ADJ} should be less than R1 to prevent ripple from being amplified. As R1 is normally in the range of 100Ω~500Ω, the value of C_{ADJ} should satisfy this equation:

$$1/(2\pi\times fripple\times C_{ADJ}) < R1$$

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Absolute Maximum Ratings (T_A = 25°C Unless otherwise specified)[1][2]

Parameter	Symbol	Value	Unit
Input Voltage Limit	V_{IN}	15	V
Operating Current	I_O	1000	mA
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	100	°C /W
Solder Temperature/Time	T_d	260/10	°C /S
Operating Ambient Temperature	T_A	+85	°C
Junction and Storage Temperature	T_J, T_{stg}	-40 to +125	°C

Note:
(1)These are stress ratings only. Stresses exceeding the range specified under Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.
(2)The Power Dissipation is : $P_D = (T_{J(MAX)}-T_C)/R_{\theta JC}$.

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Electrical Characteristics ($V_I \leqslant 10V$, $T_J = 25°C$ Unless otherwise specified)

Parameter	Symbol	Part No.	Conditions	Min.	Typ.	Max.	Unit
Reference Voltage	V_{Ref}	ADJ	I_{OUT} = 10mA $V_{IN} = V_{OUT} + 2V$	1.231	1.25	1.268	V
			I_{OUT} = 10mA to 1A $V_{IN} = V_{OUT} + 2V$	1.225	1.25	1.275	
Output Voltage	V_{OUT}	1.2 to 5.0V	I_{OUT} = 10mA $V_{IN} = V_{OUT} + 2V$	$V_{OUT} \times 0.985$	V_{OUT}	$V_{OUT} \times 1.015$	V
			I_{OUT} = 10mA to 1A $V_{IN} = V_{OUT} + 2V$	$V_{OUT} \times 0.98$	V_{OUT}	$V_{OUT} \times 1.02$	
Line Regulation	LNR	ADJ	I_{OUT} = 10mA $V_{IN} = V_{OUT} + 1.5V$ ot 10V	--	5	30	mV
		1117-1.2	I_{OUT} = 10mA $V_{IN} = V_{OUT} + 1.5V$ to 12V	--	4	20	mV
		1117-1.5	I_{OUT} = 10mA $V_{IN} = V_{OUT} + 1.5V$ to 12V	--	4	30	
		1117-1.8	I_{OUT} = 10mA $V_{IN} = V_{OUT} + 1.5V$ to 12V	--	5	40	
		1117-2.5	I_{OUT} = 10mA $V_{IN} = V_{OUT} + 1.5V$ to 12V	--	8	50	
		1117-3.3	I_{OUT} = 10mA $V_{IN} = V_{OUT} + 1.5V$ to 12V	--	9	60	
		1117-5.0	I_{OUT} = 10mA $V_{IN} = V_{OUT} + 1.5V$ to 12V	--	10	70	
Load Regulation	LDR	1117-ADJ	$V_{IN} = V_{OUT} + 1.5V$ I_{OUT} = 10mA to 1A	--	2	25	mV
		1117-1.2		--	2	24	
		1117-1.5		--	2	30	
		1117-1.8		--	3	36	
		1117-2.5		--	4	50	
		1117-3.3		--	6	66	
		1117-5.0		--	9	100	
Dropout Voltage	V_D	LD1117 Series	I_{OUT} = 100mA, $\triangle V_R$ = 1%	--	1.2	1.3	V
			I_{OUT} = 1A, $\triangle V_R$ = 1%	--	1.3	1.5	
Quiescent Current	I_Q	LD1117-1.2	V_{IN} = 10V	--	2	5	mA
		1.5V to 5.0V	V_{IN} = 12V	--	2	5	mA
Min Load Current	I_L	LD1117-ADJ	V_{IN} = 5V, V_{ADJ} = 0V	--	2	10	mA
Adjust Pin Current	I_{ADJ}	LD1117-ADJ	V_{IN} = 5V, I_{OUT} = 10mA to 1A	--	55	120	uA
Adjust Current Change	$\triangle I_{ADJ}$	LD1117-ADJ	V_{IN} = 5V, I_{OUT} = 10mA to 1A	--	0.2	10	uA
Temperature Coefficien	LD1117 Series		--	--	±100	--	PPM

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Ratings And Characteristics Curves (T_A = 25°C Unless otherwise specified)

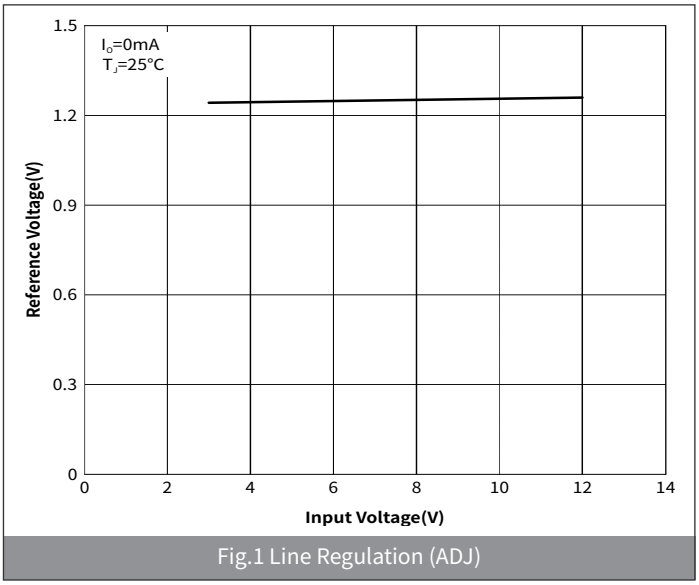


Fig.1 Line Regulation (ADJ)

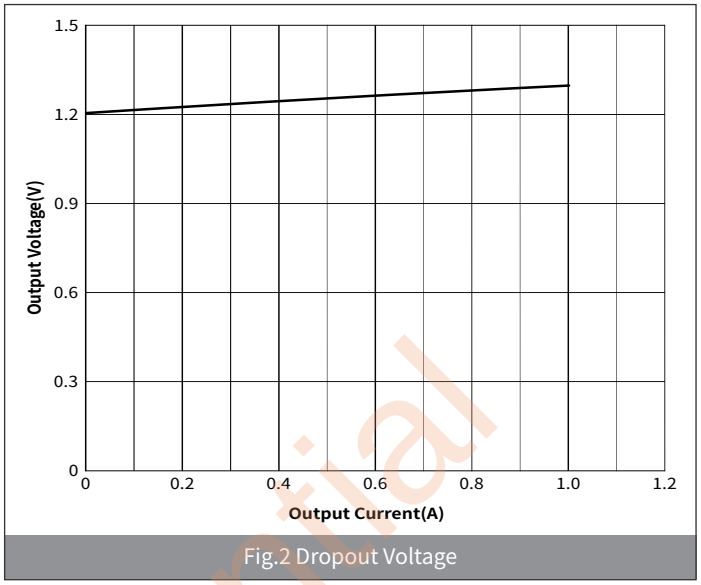


Fig.2 Dropout Voltage

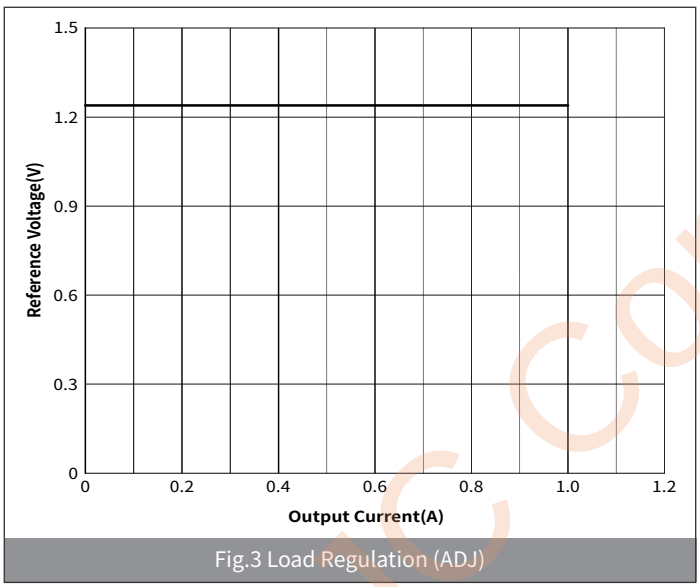


Fig.3 Load Regulation (ADJ)

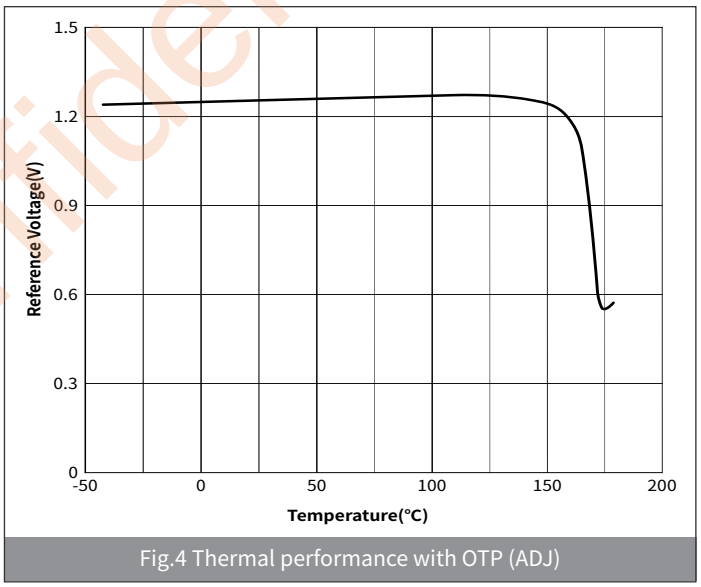
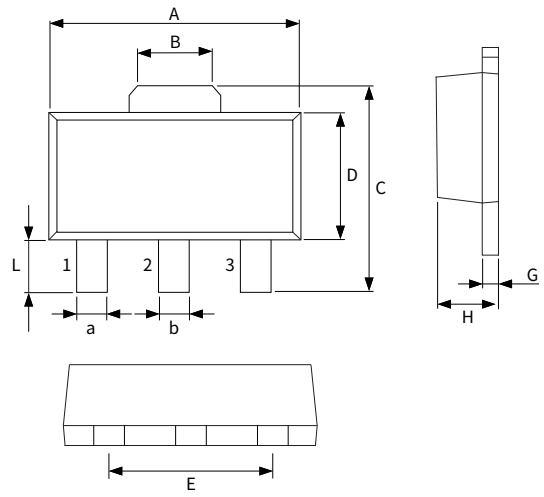


Fig.4 Thermal performance with OTP (ADJ)

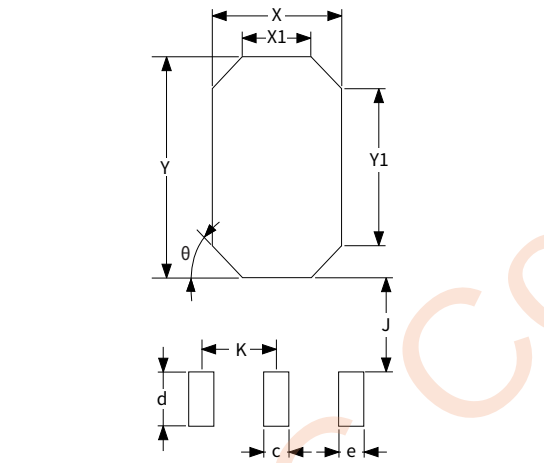
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Package Outline Dimensions (SOT-89)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	1.35	1.83	0.053	0.072
C	3.75	4.25	0.148	0.167
D	2.29	2.60	0.090	0.102
E	2.95	3.05	0.116	0.120
a	0.35	0.48	0.014	0.019
b	0.40	0.56	0.016	0.022
L	0.80	1.20	0.031	0.047
G	0.35	0.44	0.014	0.017
H	1.40	1.60	0.055	0.063

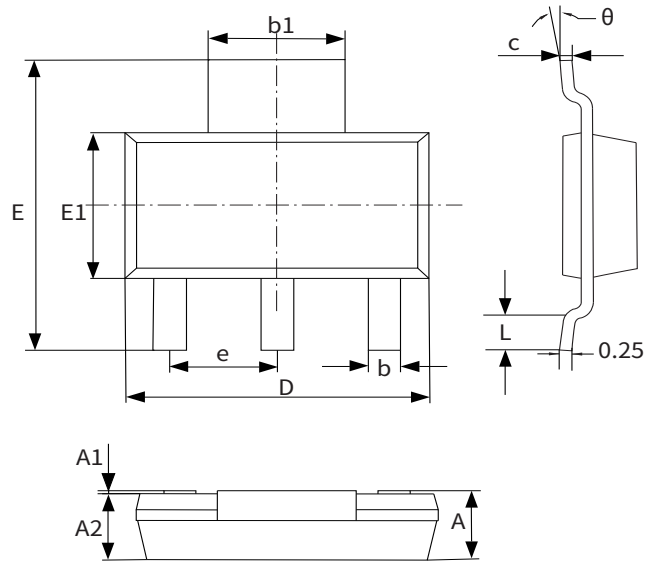
Suggested Pad Layout



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
c	0.80	1.00	0.032	0.04
d	1.30	1.50	0.052	0.060
e	0.70	0.90	0.028	0.036
J	1.80	2.00	0.072	0.080
K	1.40	1.60	0.056	0.064
X	2.50	2.70	0.100	0.108
X1	1.30	1.50	0.052	0.060
Y	4.30	4.50	0.172	0.180
Y1	3.10	3.30	0.124	0.132
θ	-	45°	-	45°

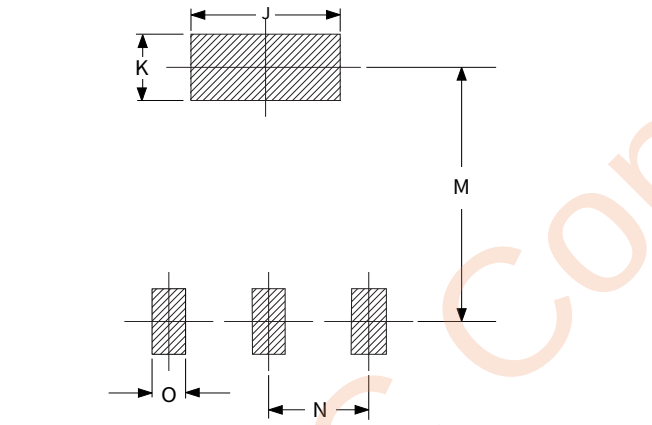
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Package Outline Dimensions (SOT-223)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	-	1.8	-	0.071
A1	0.020	0.100	0.001	0.004
A2	1.50	1.700	0.059	0.067
b	0.660	0.840	0.026	0.033
b1	2.900	3.100	0.114	0.122
c	0.230	0.350	0.009	0.014
D	6.300	6.700	0.248	0.264
E	6.700	7.300	0.264	0.287
E1	3.300	3.700	0.130	0.146
e	2.300(BSC)		0.091TYP	
L	0.750	-	0.030	-
θ	0°	10°	0°	10°

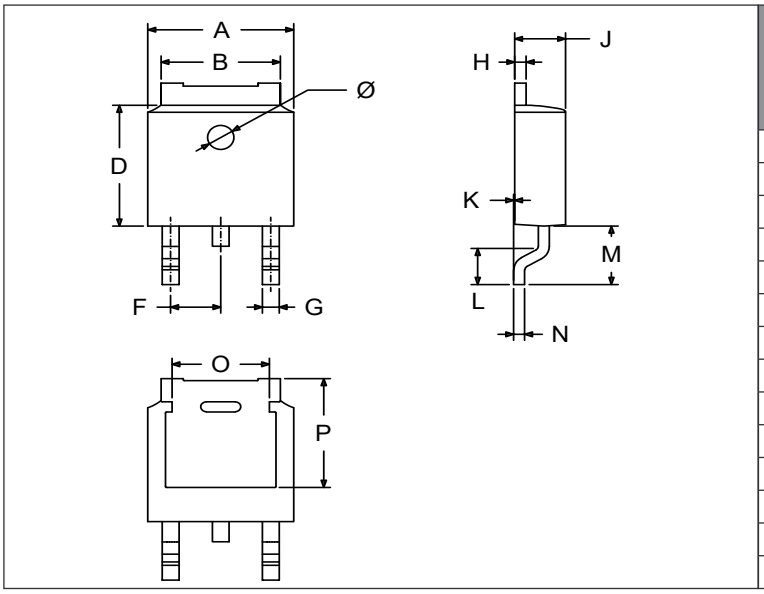
Suggested Pad Layout



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
J	3.20	3.60	0.126	0.142
K	1.40	1.80	0.055	0.071
M	5.90	6.30	0.23	0.25
N	2.15	2.45	0.085	0.096
O	0.60	0.85	0.024	0.033

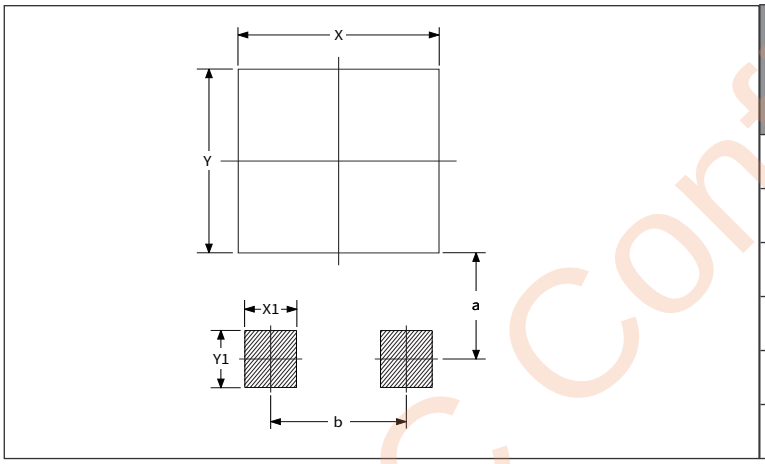
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Package Outline Dimensions (TO-252)



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	6.50	6.70	0.256	0.264
B	5.10	5.46	0.201	0.215
C	1.40	1.80	0.055	0.071
D	6.00	6.20	0.236	0.244
E	10.00	10.40	0.394	0.409
F	2.16	2.36	0.085	0.093
G	0.66	0.86	0.026	0.034
ϕ	1.05	1.35	0.041	0.053
H	0.46	0.58	0.018	0.023
J	2.20	2.40	0.087	0.094
K	-	0.30	-	0.012
L	0.89	2.29	0.035	0.090
M	2.73	3.08	0.107	0.121
N	0.43	0.58	0.017	0.023

Suggested Pad Layout



Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
a	3.70	-	0.146	-
b	4.37	-	0.172	-
X	-	5.80	-	0.228
X1	-	1.20	-	0.047
Y	-	5.85	-	0.230
Y1	-	2.00	-	0.079

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