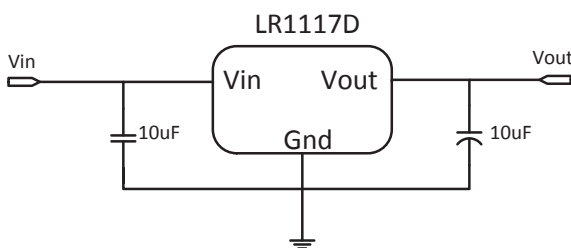*1A Bipolar Linear Regulator*

LR1117D

DESCRIPTION

LR1117D is a series of low dropout three- terminal regulators with a dropout of 1.3V at 1A load current. LR1117D features a very low standby current 2mA compared to 5mA of competitor.

Other than a fixed version, Vout = 1.2V, 1.8V, 2.5V, 2.85V, 3.3V, 5V, LR1117D has an adjustable version, which can provide an output voltage from 125V to 12V with only two external resistors.

LR1117D offers thermal shut down functions, to assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within $\pm2\%$. Other output voltage accuracy can be customized on demand, such as $\pm1\%$

LR1117D is available in SOT-223, TO-252 power package.

FEATURES

- Other than a fixed version and an adjustable version, output value can be customized on demand.
- Maximum output current : 1.4A
- Range of operation input voltage: Max 15V
- Standby current: 2mA (typ.)
- Line regulation: 0.03%/V (typ.)
- Load regulation: 0.2%/A (typ.)
- Environment Temperature: -40°C~85°C

APPLICATIONS

- Power Management for Computer Mother Board, Graphic Card
- BLD Monitor and BLD TV
- DVD Decode Board
- ADSL Modem
- Post Regulators for Switching Supplies

TYPICAL APPLICATION

Application circuit of LR1117D fixed version

NOTE: Input capacitor (Cin=10uF) and Output capacitor (Cout=10uF) are recommended in all application circuit. Tantalum capacitor is recommended.

TYPICAL ELECTRICAL CHARACTERISTIC

LR1117D -ADJ Vout Vs. Temp
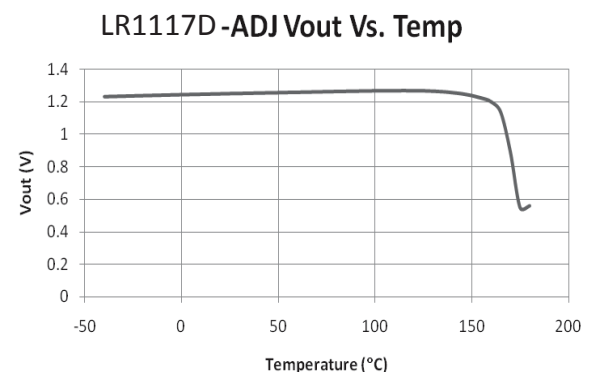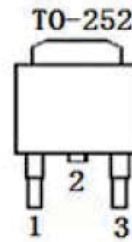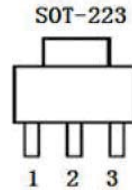
ORDERING INFORMATION

PIN CONFIGURATION AND MARKING

LR1117D_X_ _XX_ _X_

Temp. Range & Rohs Std.
X：85C & Pb-free Rohs
Std,Output voltage accuracy
within ±2％

Output Voltage：
12……1.2V
18……1.8V
25……2.5V
28……2.85V
33……3.3V
50……5.0V
……ADJ

Package Type：
S：SOT-223
D：TO-252

SOT-223

TO-252

Pin Description：

Fixed Version

Pin No.	Symbol	Definition
1	Gnd	Ground
2	Vout	Output
3	Vin	Input

Adjustable Version

Pin No.	Symbol	Definition
1	Adj.	Adjustable
2	Vout	Output
3	Vin	Input

SOT-223
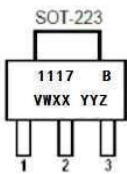
1117 B
VWXX YYZ

Marking	Designator	Description
1117 B VWXX YYZ	1117 B	Product code
	V W	assemble year and week
	XX	Manufacture Lot No.（the end two number）
	YY	Output Voltage
	Z	Version please fixed

ABSOLUTE MAXIMUM RATING

Parameter		Value
Max Input Voltage		18V[①]
Max Operating Junction Temperature(Tj)		150°C
Ambient Operating Temperature(Ta)		-40°C－85°C
Package Thermal Resistance	SOT-223	20°C / W
	TO-252	10°C / W
Storage Temperature(Ts)		-40°C - 150°C
Lead Temperature & Time		260°C, 10S

Note: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

RECOMMENDED WORK CONDITIONS

Parameter	Value
Input Voltage Range	Max. 15V
Operating Junction Temperature(Tj)	-20°C－125°C

ELECTRICAL CHARACTERISTICS

Tj=25°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vref	Reference Voltage	LR1117D-ADJ 10mA≤Iout≤1A , Vin=3.25V	1.225	1.25	1.275	V
Vout	Output Voltage	LR1117D-1.2V 0≤Iout≤1A , Vin=3.2V	1.176	1.2	1.224	V
		LR1117D-1.8V 0≤Iout≤1A , Vin=3.8V	1.764	1.8	1.836	V
		LR1117D-2.5V 0≤Iout≤1A , Vin=4.5V	2.45	2.5	2.55	V
		LR1117D-2.85V 0≤Iout≤1A , Vin=4.85V	2.793	2.85	2.907	V
		LR1117D-3.3V 0≤Iout≤1A , Vin=5.3V	3.234	3.3	3.366	V
		LR1117D-5.0V 0≤Iout≤1A , Vin=7.0V	4.9	5	5.1	V
ΔVout	Line Regulation	LR1117D-ADJ Iout=10mA, 2.75V≤Vin≤12V		0.03	0.2	%/V
		LR1117D-1.2V Iout=10mA, 2.7V≤Vin≤10V		0.03	0.2	%/V
		LR1117D-1.8V out=10mA, 3.0V≤Vin≤12V		0.03	0.2	%/V
		LR1117D-2.5V Iout=10mA, 3.3V≤Vin≤12V		0.03	0.2	%/V
		LR1117D-2.85V Iout=10mA, 4.0V≤Vin≤12V		0.03	0.2	%/V
		LR1117D-3.3V Iout=10mA, 4.8V≤Vin≤12V		0.03	0.2	%/V
		LR1117D-5.0V Iout=10mA, 6.5V≤Vin≤12V		0.03	0.2	%/V
ΔVout	Load Regulation	LR1117D-ADJ Vin =2.75V, 10mA≤Iout≤1A		2	8	mV
		LR1117D-1.2V Vin =2.7V, 10mA≤Iout≤1A		2	8	mV
		LR1117D-1.8V Vin=3.0V, 10mA≤Iout≤1A		3	12	mV
		LR1117D-2.5V Vin=3.3V, 10mA≤Iout≤1A		4	16	mV
		LR1117D-2.85V Vin=4.0V, 10mA≤Iout≤1A		5	20	mV
		LR1117D-3.3V Vin=4.8V, 10mA≤Iout≤1A		6	24	mV
		LR1117D-5.0V Vin=6.5V, 10mA≤Iout≤1A		9	36	mV

ELECTRICAL CHARACTERISTICS continued

Tj=25°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Vdrop	Dropout Voltage	Iout=100mA		1.15	1.3	V
		Iout=1A		1.3	1.5	V
SVR	Supply Voltage Rejection	f = 120Hz, VIN − VOUT = 3V + 1VPP Ripple		60		dB
Imin	Minimum Load Current	LR1117D-ADJ		2	10	mA
Iq	Quiescent Current	LR1117D-1.2V, Vin =10V	1	2	5	mA
		LR1117D-1.8V, Vin =11V	1	2	5	mA
		LR1117D-2.5V, Vin =12V	1	2	5	mA
		LR1117D-2.85V,Vin =12V	1	2	5	mA
		LR1117D-3.3V, Vin =12V	1	2	5	mA
		LR1117D-5.0V, Vin =12V	1	2	5	mA
IAdj	Adjust Pin Current	LR1117D-ADJ Vin =5V, 10mA ≤ Iout ≤ 1A	35	55	120	uA
Ichange	Iadj change	LR1117D-ADJ Vin =5V, 10mA ≤ Iout ≤ 1A		0.2	10	uA
ΔV/ΔT	Temperature coefficient			±100		ppm
θ_{JC}	Thermal Resistance	SOT-223		20		°C/W
		TO-252		10		
θ_{JA}	Thermal Resistance Junction-to-Ambient (No air flow)	SOT-223 (No heat sink)		136		°C/W
		TO-252 (No heat sink)		92		

Note1: All test are conducted under ambient temperature 25°C and within a short period of time 20ms

Note2: Load current smaller than minimum load current of LR1117D-ADJ will lead to unstable or oscillation output.

BLOCK DIAGRAM
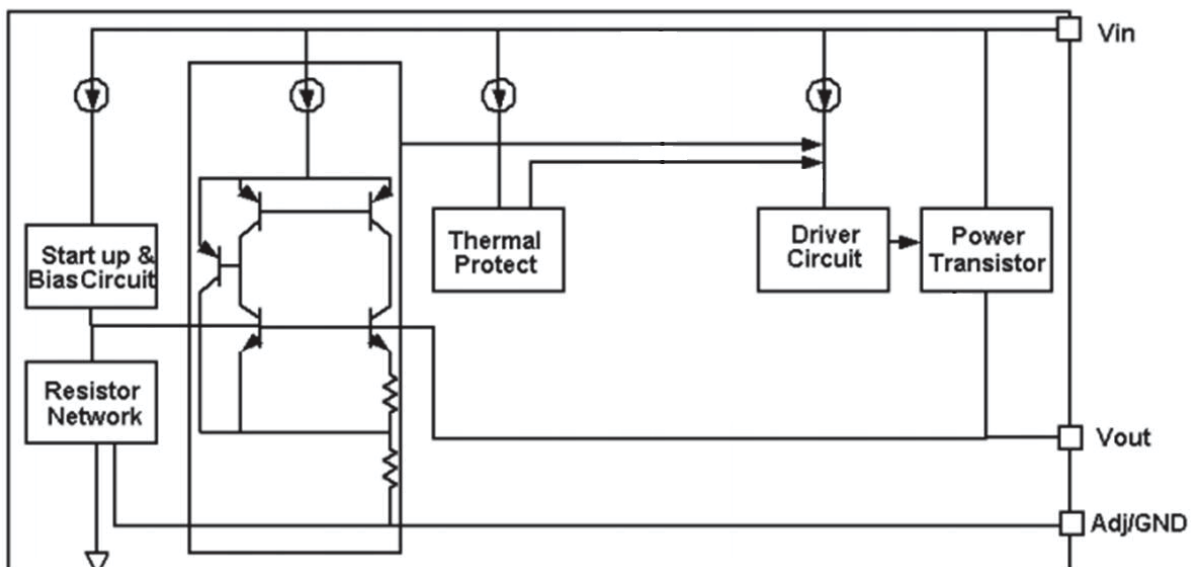
DETAILED DESCRIPTION

LR1117D is a series of low dropout voltage, three terminal regulators. Its application circuit is very simple: the fixed version only needs two capacitors and the adjustable version only needs two resistors and two capacitors to work. It is composed of some modules including start-up circuit, bias circuit, bandgap, thermal shutdown, power transistors and its driver circuit and so on.

The thermal shut down modules can assure chip and its application system working safety when the junction temperature is larger than 140°C.

The bandgap module provides stable reference voltage, whose temperature coefficient is compensated by careful design considerations. The temperature coefficient is under 100 ppm/°C. And the accuracy of output voltage is guaranteed by trimming technique.

TYPICAL APPLICATION

LR1117D has an adjustable version and six fixed versions (1.2V, 1.8V, 2.5V, 2.85V, 3.3V, 5V)
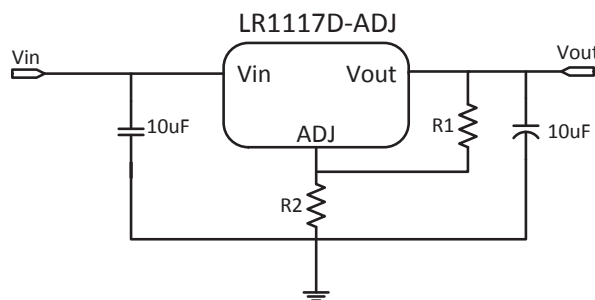
Fixed Output Voltage Version
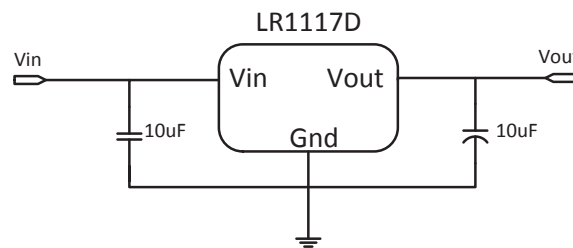
Application circuit of LR1117D fixed version

1)   *Recommend using 10uF tan capacitor or MLCC   capacitor as bypass capacitor (C1) for all application circuit.*
2)   *Recommend using 10uF tan capacitor MLCC   capacitor to assure circuit stability.*
3)   *Capacitor ESR range: 3mΩ   ~ 22Ω*

Adjustable Output Voltage Version

LR1117D-ADJ provides a 1.25V reference voltage. Any output voltage between 1.25V~12V can be achievable by choosing two external resistors (schematic is shown below), R1 and R2

Application Circuit of LR1117D-ADJ

The output voltage of adjustable version follows the equation: $Vout=1.25\times(1+R2/R1)+IAdj\times R2$. We can ignore IAdj because IAdj (about 50uA) is much less than the current of R1 (about 2~10mA).

1) *To meet the minimum load current (>10mA) requirement, R1 is recommended to be 125ohm or lower. As LR1117D-ADJ can keep itself stable at load current about 2mA, R1 is not allowed to be higher than 625ohm.*

2) *Using a bypass capacitor (C_{ADJ}) between the ADJ 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: $1/(2\pi \times f_{ripple} \times C_{ADJ}) < R1$.*
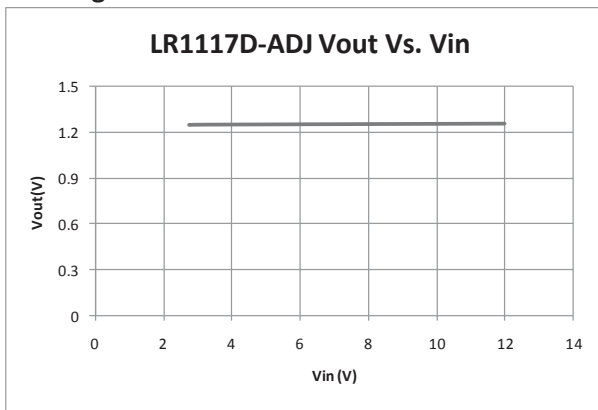
THERMAL CONSIDERATIONS

We have to take heat dissipation into great consideration when output current or differential voltage of input and output voltage is large. Because in such cases, the power dissipation consumed by LR1117D is very large. LR1117D series uses SOT-223 package type and its thermal resistance is about 20°C/W. And the copper area of application board can affect the total thermal resistance. If copper area is 5cm*5cm (two sides), the resistance is about 30°C/W. So the total thermal resistance is about 20°C/W + 30°C/W. We can decrease total thermal resistance by increasing copper area in application board. When there is no good heat dissipation copper are in PCB, the total thermal resistance will be as high as 120°C/W, then the power dissipation of LR1117D could allow on itself is less than 1W. And furthermore, LR1117D will work at junction temperature higher than 125°C under such condition and no lifetime is guaranteed.
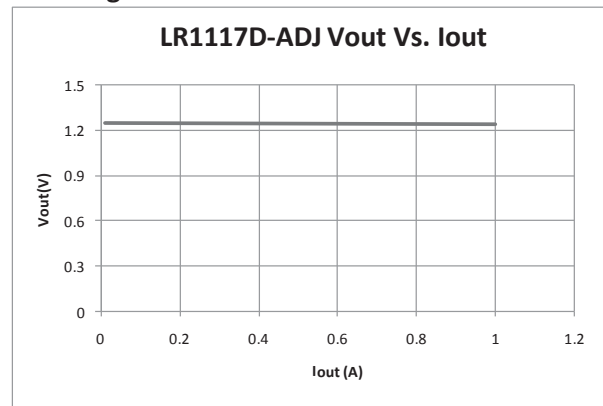
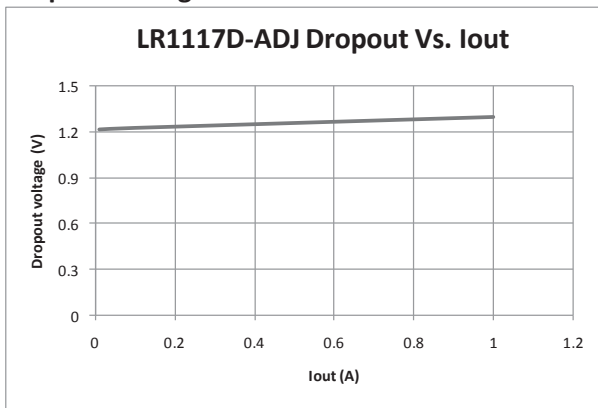## TYPICAL PERFORMANCE CHARACTERISTICS
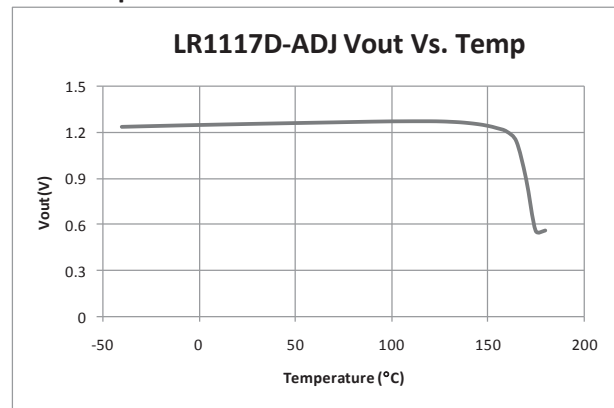
T=25°C unless specified.

Line Regulation

LR1117D-ADJ Vout Vs. Vin

Load Regulation

LR1117D-ADJ Vout Vs. Iout

Dropout Voltage

LR1117D-ADJ Dropout Vs. Iout

Thermal performance with OTP

LR1117D-ADJ Vout Vs. Temp

PACKAGE OUTLINE

SOT-223 PACKAGE OUTLINE DIMENSIONS
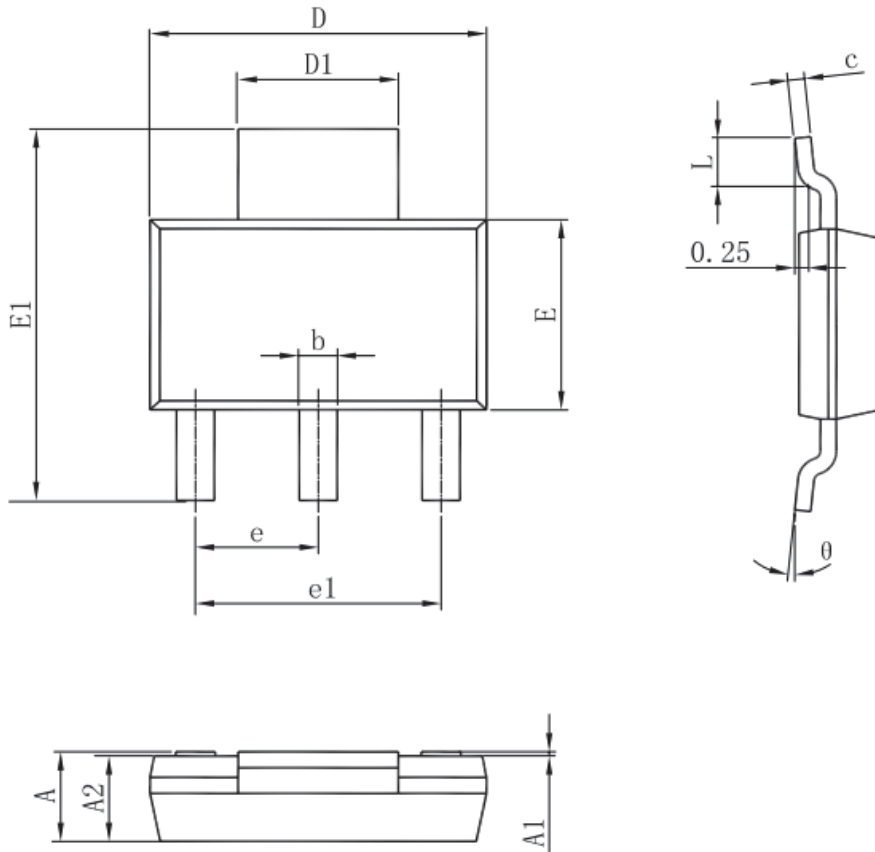
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.200	6.400	0.244	0.252
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	7.070	0.269	0.278
e	2.300(BSC)		0.091(BSC)	
e1	4.500	4.700	0.177	0.185
L	0.900	1.150	0.035	0.045
θ	0°	10°	0°	10°

TO-252-2L PACKAGE OUTLINE DIMENSIONS
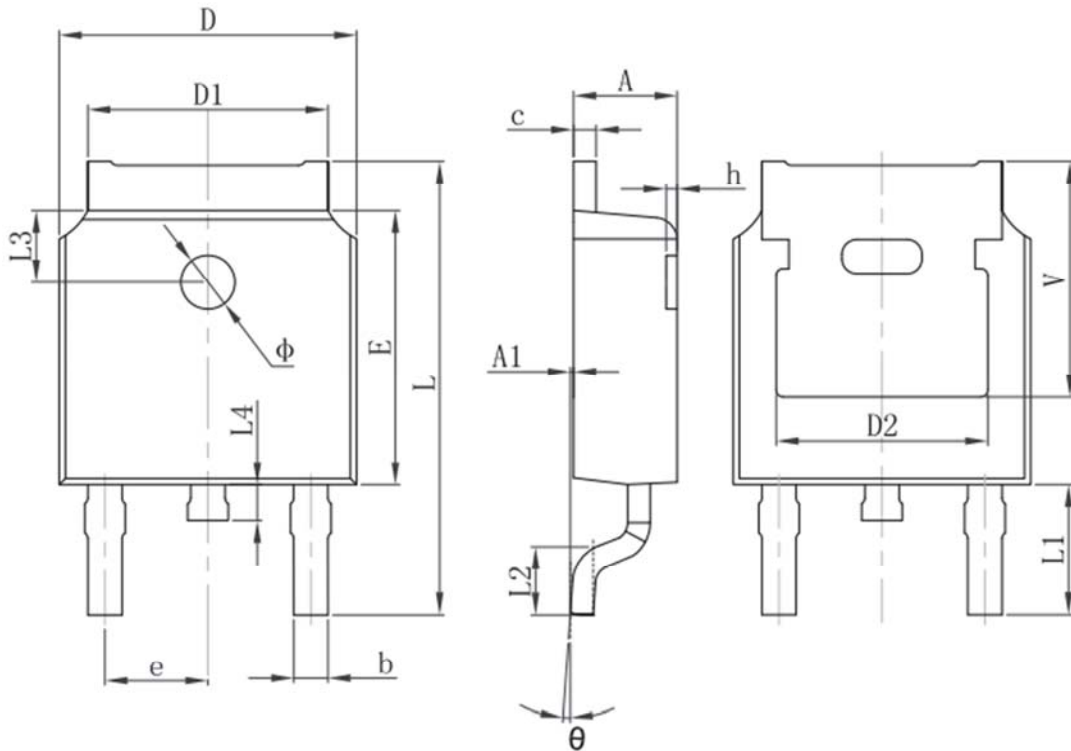
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 REF.		0.211 REF.	

Disclaimer

The product information and the selection guides facilitate the selection of LRC's best suited devices for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet the performance parameters for your application. The information furnished on LRC's Website, due to the constraint of time and certain conditions, may not be updated timely and is only for customer's reference. Therefore, LRC does not assume responsibility arising from inaccuracies or incomplete information. If necessary, customer is requested to contact LRC's service support for confirmation and accurate information. Furthermore, LRC does not assume liability whatsoever, arising out of the improper application or use of any LRC product; neither does it convey any license under its patent rights nor rights of other intellectual properties. LRC strives for continuous improvement and reserves the right to change the specifications of its products without prior notice.

LRC

No. 287 West People Road, Leshan, Sichuan, China.
Telephone: + 86-833-2150227   Fax: + 86-833-2150003
E-mail: market@lrc.cn   Website: www.lrc.cn

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for LDO Voltage Regulators *category:*

Click to view products by Leshan *manufacturer:*

Other Similar products are found below :

M38D29FFHP#U1 702103A 717726C 742457H MP20051DN-LF-Z R5F111PGGFB#30 AP7363-SP-13 NCP103AMX285TCG NCV8664CST33T3G NCV8752AMX28TCG L9454 AP7362-HA-7 LX13043CLD TCR3DF185,LM(CT TCR3DF24,LM(CT TCR3DF285,LM(CT TCR3DF31,LM(CT TCR3DF45,LM(CT TLF4949EJ L9708 L970813TR 030014BB 059985X EAN61387601 EAN61573601 NCP121AMX173TCG NCP4687DH15T1G NCV8703MX30TCG 701326R 702087BB 755078E TCR2EN28,LF(S LM1117DT-1.8/NO LT1086CM#TRPBF AZ1085S2-1.5TRE1 MAX15101EWL+T NCV8170AXV250T2G SCD337BTG TCR3DF27,LM(CT TCR3DF19,LM(CT TCR3DF125,LM(CT TCR2EN18,LF(S MAX15103EWL+T TS2937CZ-5.0 C0 MAX8878EUK30-T MAX663CPA NCV4269CPD50R2G NCV8716MT30TBG AZ1117IH-1.2TRG1 MP2013GQ-P