AP1117

1A Low Dropout Positive Adjustable or Fixed-Mode Regulator

■ Features

- 1.4V maximum dropout at full load current
- Fast transient response
- Output current limiting
- Built-in thermal shutdown
- Packages: SOT223, TO252, TO220, SOT89
- Good noise rejection
- 3-Terminal Adjustable or Fixed 1.5V, 1.8V,2.5V, 3.3V, 5.0V

■ Applications

- PC peripheral
- Communication

■ General Description

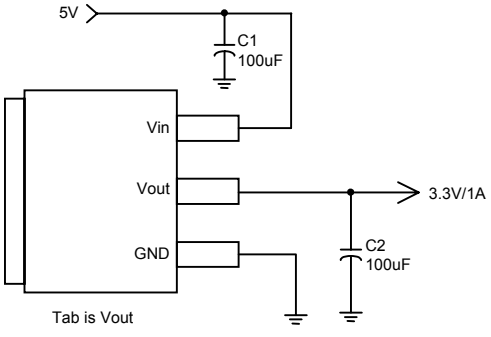
AP1117 is a low dropout positive adjustable or fixed-mode regulator with minimum of 1A output current capability. The product is specifically designed to provide well-regulated supply for low voltage IC applications such as high-speed bus termination and low current 3.3V logic supply. AP1117 is also well suited for other applications such as VGA cards. AP1117 is guaranteed to have <1.3V dropout at full load current making it ideal to provide well regulated outputs of 1.25 to 5.0 with 6.3 to 12V input supply.

■ Ordering Information

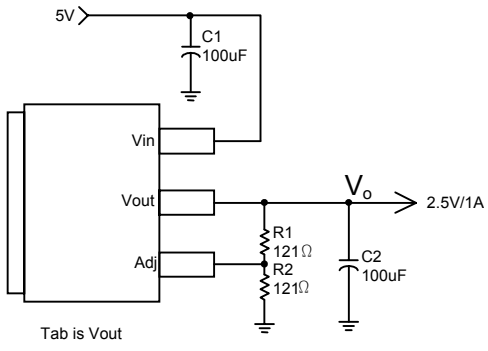
AP 1117 X XX X

Low Dropout Regulator	Package	Vout	Packing
	E : SOT223-3L	Blank : ADJ	Blank : Tube
	D : TO252-3L	15 : 1.5V	A : Taping
	T : TO220-3L	18 : 1.8V	
	Y : SOT89-3L	25 : 2.5V	
		33 : 3.3V	
		50 : 5.0V	

■ Typical Circuit



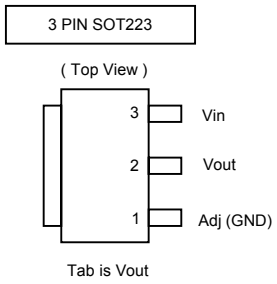
(5V/3.3V fixed output)

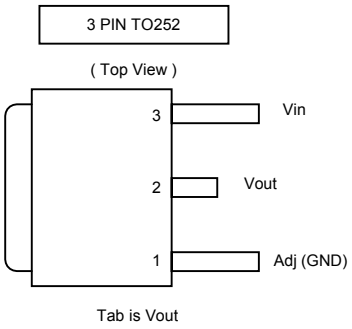


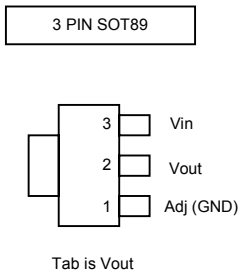
(5V/2.5V ADJ output)

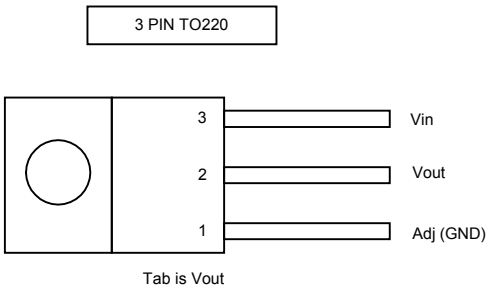
Note: $V_o = V_{REF} * (1 + \frac{R_2}{R_1})$

■ Connection Diagram

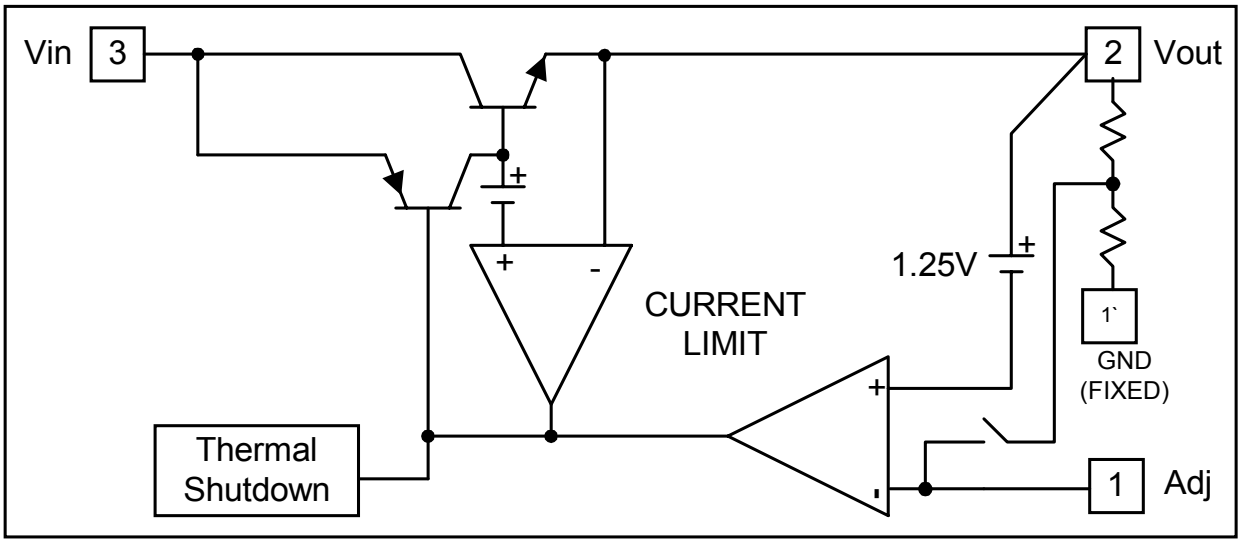








■ Block Diagram



■ Pin Descriptions

NAME	I/O	PIN #	FUNCTION
Adj (GND)	I	1	A resistor divider from this pin to the Vout pin and ground sets the output voltage. (Ground only for Fixed-Mode)
Vout	O	2	The output of the regulator. A minimum of 10uF capacitor must be connected from this pin to ground to insure stability.
Vin	I	3	The input pin of regulator. Typically a large storage capacitor is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.3V higher than Vout in order for the device to regulate properly.

■ Absolute Maximum Ratings

DC Supply Voltage (Vin) ..... -0.3 to 12 V
Power Dissipation ..... Internally Limited
Storage Temperature ..... -65 to +150 ^{O}C
Operating Junction Temperature Range ..... 0 to +150 ^{O}C

■ Electrical Characteristics (Under Operating Conditions)

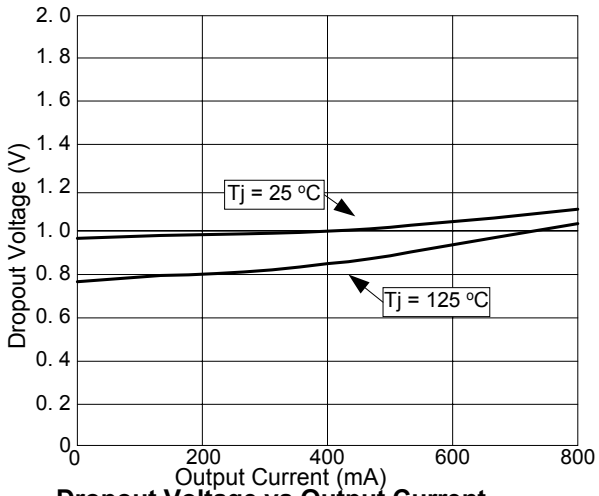
PARAMETER	CONDITIONS		MIN	TYP	MAX	UNIT
Reference Voltage	AP1117-ADJ	T_J=25°C,(V_{IN}-V_{OUT})=1.5V I_O=10mA	1.225	1.250	1.275	V
Output Voltage	AP1117-1.5	I_{OUT} = 10mA, T_J = 25°C, 3V≦V_{IN}≦12V	1.470	1.500	1.530	V
	AP1117-1.8	I_{OUT} = 10mA, T_J = 25°C, 3.3V≦V_{IN}≦12V	1.764	1.800	1.836	V
	AP1117-2.5	I_{OUT} = 10mA, T_J = 25°C, 4V≦V_{IN}≦12V	2.450	2.500	2.550	V
	AP1117-3.3	I_{OUT} = 10mA, T_J = 25°C, 4.8V≦V_{IN}≦12V	3.235	3.300	3.365	V
	AP1117-5.0	I_{OUT} = 10mA, T_J = 25°C, 6.5V≦V_{IN}≦12V	4.900	5.000	5.100	V
Line Regulation	AP1117-XXX	I_O=10mA,V_{OUT}+1.5V<V_{IN}<12V, T_J=25°C			0.2	%
Load Regulation	AP1117-ADJ	V_{IN}=3.3V,Vadj=0,0mA<Io<1A, T_J=25°C (Note 1,2)			1	%
	AP1117-1.5	V_{IN}=3V, 0mA<Io<1A, T_J=25°C (Note 1,2)		12	15	mV
	AP1117-1.8	V_{IN}=3.3V, 0mA<Io<1A, T_J=25°C (Note 1,2)		15	18	mV
	AP1117-2.5	V_{IN}=4V, 0mA<Io<1A, T_J=25°C (Note 1,2)		20	25	mV
	AP1117-3.3	V_{IN} = 5V, 0≦I_{OUT}≦1A, T_J=25°C (Note 1,2)		26	33	mV
	AP1117-5.0	V_{IN} = 8V, 0≦I_{OUT}≦1A, T_J=25°C (Note 1,2)		40	50	mV
Dropout Voltage (V_{IN}-V_{OUT})	AP1117-ADJ/1.5/1.8 2.5/3.3/5.0	I_{OUT} = 1A ,ΔV_{OUT}=0.1%V_{OUT}		1.3	1.4	V
Current Limit	AP1117-ADJ/1.5/1.8 2.5/3.3/5.0	(V_{IN}-V_{OUT}) = 5V	1. 1			A
Minimum Load Current	AP1117-XXX	0°C≦Tj≦125°C		5	10	mA
Thermal Regulation	T_A=25℃, 30ms pulse			0.008	0.04	%/W
Ripple Rejection	F=120Hz,C_{OUT}=25uF Tantalum, I_{OUT}=1A					
	AP1117-XXX	V_{IN}=V_{OUT}+3V		60	70	dB
Temperature Stability	I_O=10mA			0.5		%
θ_{JA} Thermal Resistance Junction-to-Ambient(No heat sink ;No air flow)	SOT89 SOT-223 TO-252 TO-220			300 117 92 85		°C/W
θ_{JC} Thermal Resistance Junction-to-Case	SOT89 : Control Circuitry/Power Transistor SOT-223 : Control Circuitry/Power Transistor TO-252 : Control Circuitry/Power Transistor TO-220 : Control Circuitry/Power Transistor			100 15 10 0.65/2.7		°C/W

Note1: See thermal regulation specifications for changes in output voltage due to heating effects. Line and load regulation are measured at a constant junction temperature by low duty cycle pulse testing. Load regulation is measured at the output lead = 1/18" from the package.

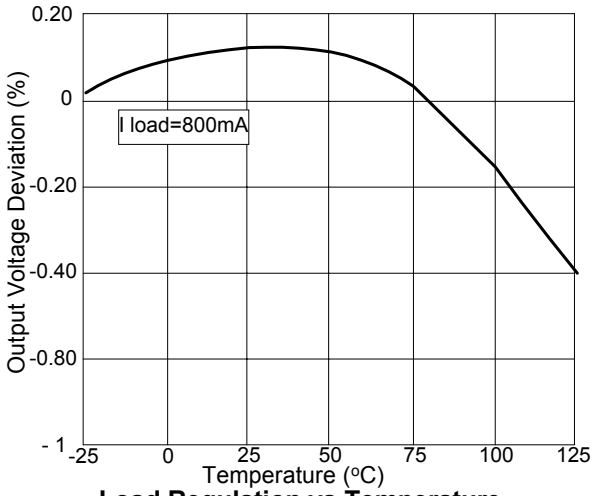
Note2: Line and load regulation are guaranteed up to the maximum power dissipation of 15W. Power dissipation is determined by the input/output differential and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range.

Note3: Quiescent current is defined as the minimum output current required to maintain regulation. At 12V input/output differential the device is guaranteed to regulate if the output current is greater than 10mA.

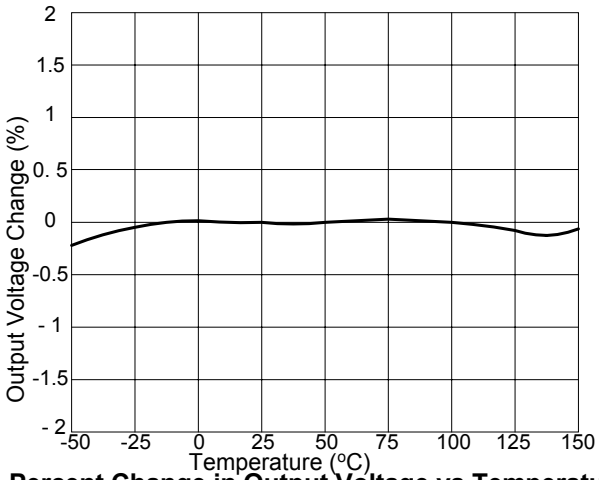
■ Typical Performance Characteristics



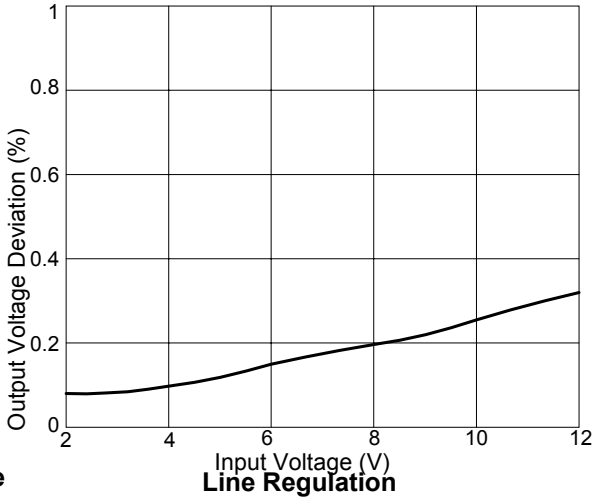
Dropout Voltage vs Output Current



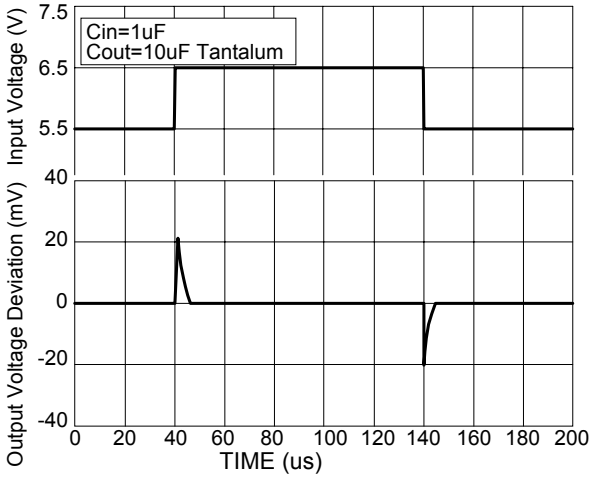
Load Regulation vs Temperature



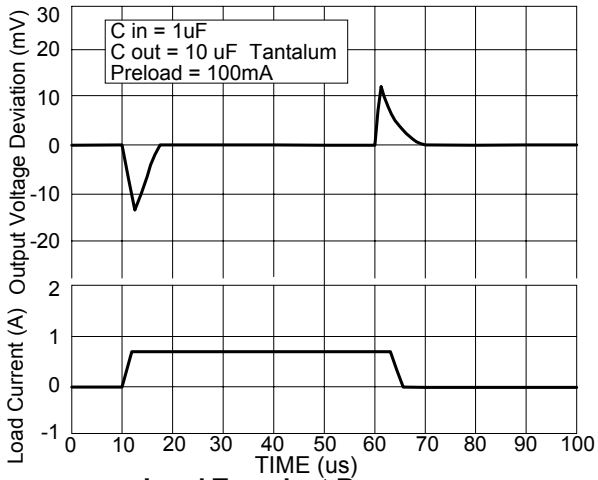
Percent Change in Output Voltage vs Temperature



Line Regulation



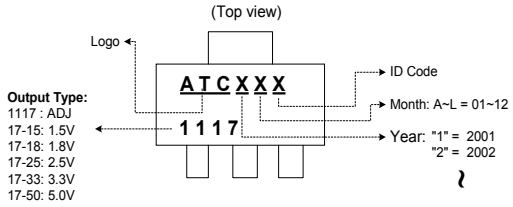
Line Transient Response



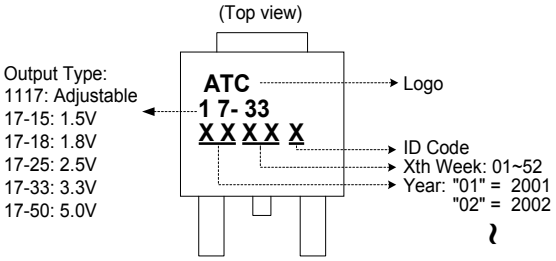
Load Transient Response

■ Marking Information

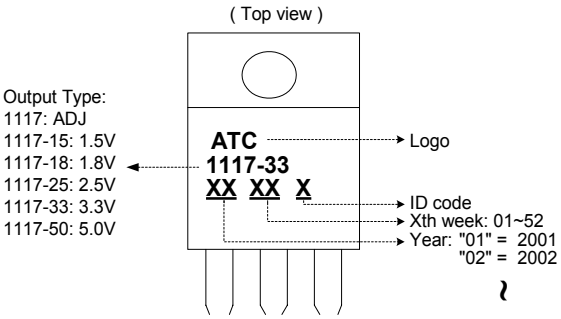
(1) SOT223-3L



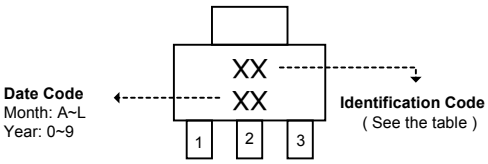
(2) TO252-3L



(3) TO220-3L



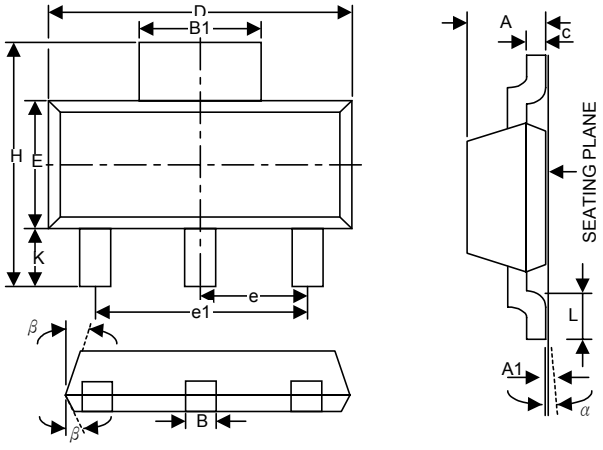
(4) SOT89-3L



Identification code	Output version
DA	AP1117-ADJ
DB	AP1117-1.5V
DC	AP1117-1.8V
DD	AP1117-2.5V
DE	AP1117-3.3V
DF	AP1117-5.0V

■ Package Dimension

(1) SOT223-3L

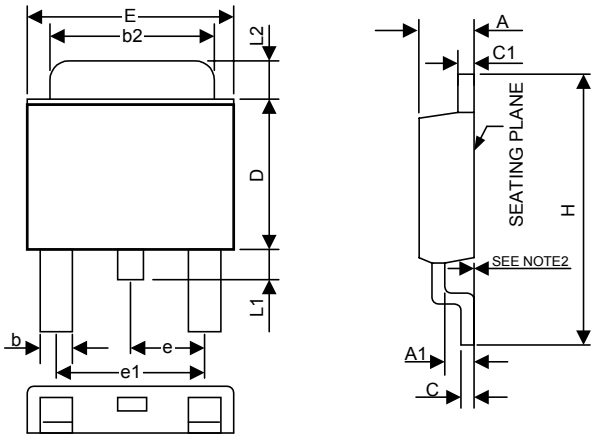


SYMBOLS	DIMENSIONS IN INCH		
	MIN	NOM	MAX
A	0.059	0.065	0.071
A1	0.0008	0.002	0.003
B	0.024	0.028	0.031
B1	0.114	—	0.124(REF)
c	0.011	0.012	0.013
D	0.248	0.256	0.264
E	0.13	0.138	0.146
e		0.09 BSC	
e1		0.181 BSC	
H	0.264	0.276	0.287
L	0.036	0.039	0.043
K	0.059	0.069	0.079
α	0°	5°	10°
β	—	13°	—

Notes:
1. JEDEC Outline: TO-261AA

(2) TO252-3L

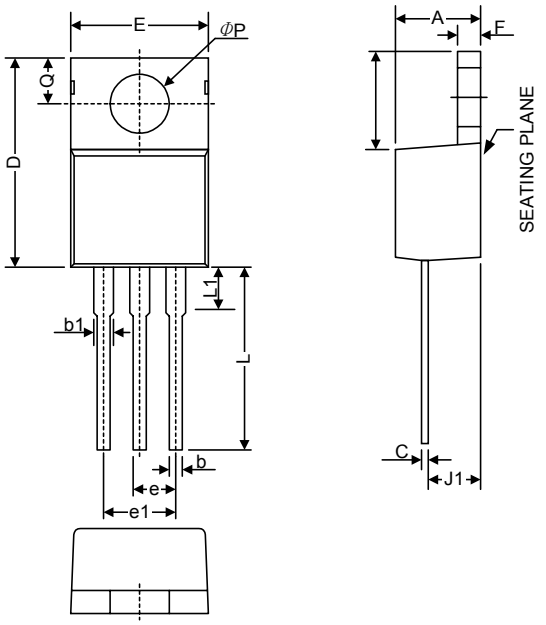
Variations (Dimensions show in inch)



SYMBOLS	DIMENSIONS IN INCH	
	MIN	MAX
A	0.086	0.094
A1	0.040	0.050
b	0.024 TYP.	
b2	0.205	0.215
C	0.018	0.023
C1	0.018	0.023
D	0.210	0.220
E	0.250	0.265
e	0.090 BSC.	
e1	0.180 BSC.	
H	0.370	0.410
L	0.020	—
L1	0.025	0.040
L2	0.06	0.08

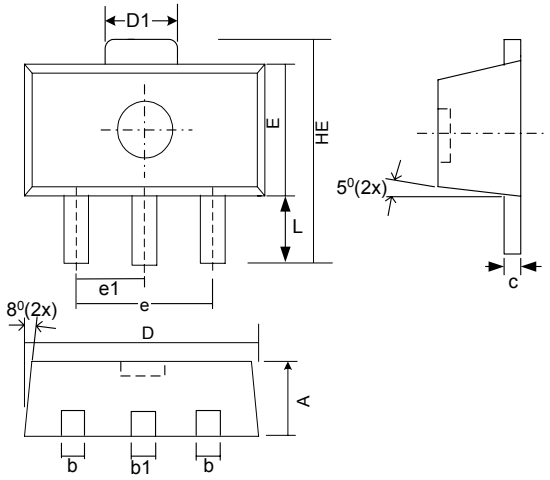
Notes:
1. JEDEC Outline: TO-252 AB
2. Mils suggested for positive contact at mounting.

(3) TO220-3L



SYMBOLS	DIMENSIONS IN INCH	
	MIN	MAX
A	0.14	0.19
b1	0.045	0.07
b	0.02	0.045
C	0.012	0.045
D	0.56	0.65
E	0.38	0.42
e	0.09	0.11
e1	0.19	0.21
F	0.02	0.055
H1	0.23	0.27
J1	0.08	0.115
L	0.5	0.58
øP	0.139	0.161
Q	0.1	0.135

(4) SOT89



SYMBOLS	DIMENSIONS IN MILLIMETER			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.40	1.50	1.60	0.055	0.059	0.063
B	0.36	0.42	0.48	0.014	0.016	0.018
b1	0.41	0.47	0.53	0.016	0.043	0.051
C	0.38	0.40	0.43	0.014	0.015	0.017
D	4.40	4.50	4.60	0.173	0.177	0.181
D1	1.40	1.60	1.75	0.055	0.062	0.069
E	2.90	3.00	3.10	0.114	0.118	0.122
e1	1.45	1.50	1.55	0.057	0.059	0.061
E	2.40	2.50	2.60	0.094	0.098	0.102
HE	3.94	------	4.25	0.155	------	0.167
L	0.80	------	1.20	0.031	------	0.047