Ultra-Small High-Precision Low Voltage Detector

LR8803 Series

■ INTRODUCTION

The LR8803 Series is a series of high-precision low voltage detectors developed using CMOS process. The detection voltage is fixed internally, with an accuracy of 2.0%. Two output forms, NMOS open-drain and CMOS output, are available.

■ FEATURES

- Ultra-low current consumption: 0.9μA@3.5V(Typ.)
- High-precision detection voltage:±2.0%
- Operating voltage range:0.7 V~ 6.0V
- Hysteresis characteristics: -V_{DET}×5%（Typ.）
- Detection voltage: 0.9V ~ 2.0V(10mV step)
- Output forms:
  NMOS open-drain output (Active Low)
  CMOS output (Active Low)

■ APPLICATIONS

- Memory battery back-up circuits
- Power-on reset circuits
- Power failure detection
- Power monitor for portable equipment such as notebook computers, digital cameras, PDA, and cellular phones.
- Constant voltage power monitors for cameras, video equipment and communication devices.
- Power monitor for microcomputers and reset for CPUs.

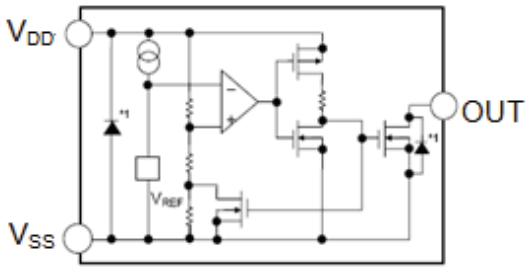
■ ORDER INFORMATION

LR8803①②③④⑤

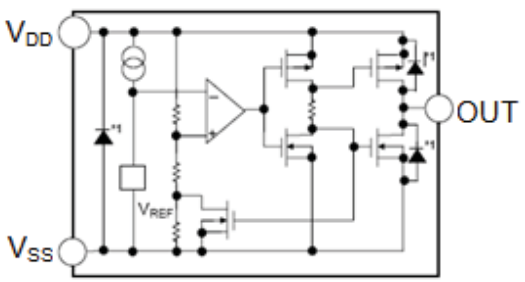
DESIGNATOR	SYMBOL	DESCRIPTION
①	C	CMOS
	N	NMOS open drain
②③④	Integer	Detection Voltage (0.90V~2.00V), "④"elide when it is "0" e.g. 3.0V=②:3, ③:0 2.93V=②:2, ③:9, ④:3
⑤	M/MA/MB/MR	Package：SOT-23,SOT-23-3/5
	N	Package：SOT-343(SC-82)
	P	Package：SOT-89-3

■ BLOCK DIAGRAMS

NMOS open-drain

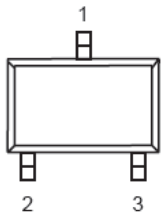


CMOS output



■ PIN CONFIGURATION

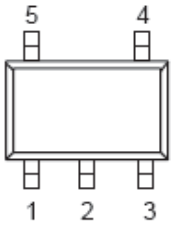
SOT-23-3
Top view



LR8803 Series（SOT-23-3/SOT-23）

PIN NO.	M	MA	MB	FUNCTION
1	V_{DD}	V_{DD}	V_{DD}	Voltage input pin
2	V_{OUT}	-	V_{OUT}	Voltage detection output pin
	-	V_{SS}	-	Ground
3	V_{SS}	-	V_{SS}	Ground
	-	V_{OUT}	-	Voltage detection output pin

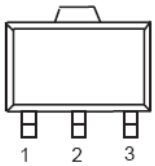
SOT-23-5
Top view



LR8803 Series（SOT-23-5）

PIN NO.	MR	FUNCTION
1	V_{OUT}	Voltage detection output pin
2	V_{DD}	Voltage input pin
3	V_{SS}	Ground
4	NC	No connection
5	NC	No connection

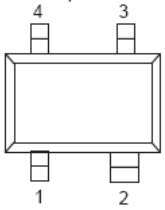
SOT-89-3
Top view



LR8803 Series（SOT-89-3）

PIN NO.	P	FUNCTION
1	V_{OUT}	Voltage detection output pin
2	V_{DD}	Voltage input pin
3	V_{SS}	Ground

SOT343(SC-82)
Top view



LR8803 Series（SOT343）

PIN NO.	N	FUNCTION
1	V_{OUT}	Voltage detection output pin
2	V_{DD}	Voltage input pin
3	NC	No Connection
4	V_{SS}	Ground

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNITS
Power supply voltage		V_{DD}	$V_{SS}-0.3 \sim V_{SS}+8$	V
Output voltage		V_{OUT}	$V_{SS}-0.3 \sim V_{SS}+8$	V
Power dissipation	SOT-23-3	PD	250	mW
	SOT-89		500	mW
	TO-92		500	mW
	SOT343		250	mW
Operating ambient temperature		Topr	−40 ~+85	°C
Storage temperature		Tstg	−40 ~+125	°C
Soldering Temperature & Time		T_{solder}	260℃, 10s	

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Detection voltage*1	$-V_{DET}$	—	$-V_{DET(S)}$ ×0.98	$-V_{DET(S)}$	$-V_{DET(S)}$ ×1.02	V
Hysteresis width	V_{HYS}	—	0.02× $-V_{DET(S)}$	0.05× $-V_{DET(S)}$	0.08× $-V_{DET(S)}$	V
Current consumption	I_{SS}	$V_{DD}=-V_{DET}+0.5V$	—	1.0	2.0	uA
Operating voltage	V_{DD}	—	0.7	—	6	V
Leakage current	I_{LEAK}	Only for NMOS open-drain output products, V_{DD} =8.0 V, V_{OUT} =8.0 V	□	—	1.0	uA
temperature coefficient		Ta=−40°C ~+85°C	—	±120	±360	ppm/°C
Delay time	T_{PLH}				200	uS

***1.** −VDET: Actual detection voltage value, −VDET(S): Specified detection voltage value

■ FUNCTIONAL DESCRIPTION

1. When a voltage higher than the release voltage ($+V_{DET}$) is applied to the voltage input pin (V_{DD}), the voltage will be equal to the input at V_{DD}.

Note that high impedance exists at V_{OUT} with the N-channel open drain configuration. If the pin is pulled up, V_{OUT} will be equal to the pull up voltage.

2. When V_{DD} falls below $-V_{DET}$, V_{OUT} will be equal to the ground voltage (V_{SS}) level (detect state).

Note that this also applies to N-channel open drain configurations.

3. When V_{DD} falls to a level below that of the minimum operating voltage (V_{MIN}) output will become unstable.

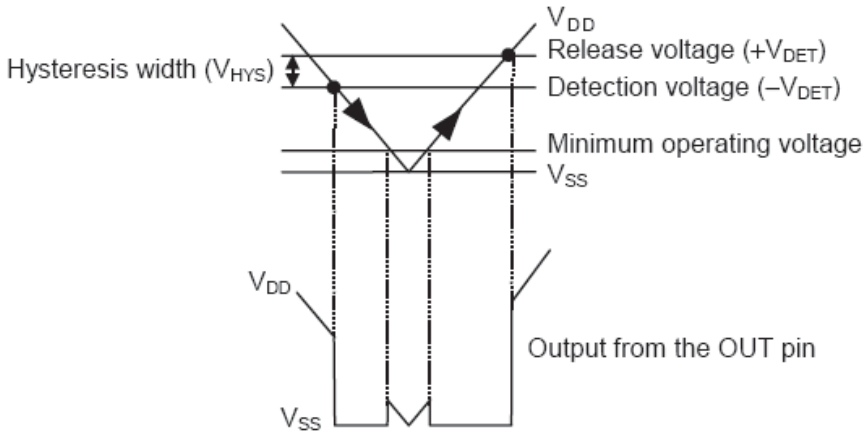
Because the output pin is generally pulled up with N-channel open drain configurations, output will be equal to pull up voltage.

4. When V_{DD} rises above the V_{SS} level (excepting levels lower than minimum operating voltage), V_{OUT} will be equal to V_{SS} until V_{DD} reaches the $+V_{DET}$ level.

5 . Although V_{DD} will rise to a level higher than $+V_{DET}$, V_{OUT} maintains ground voltage level via the delay circuit.

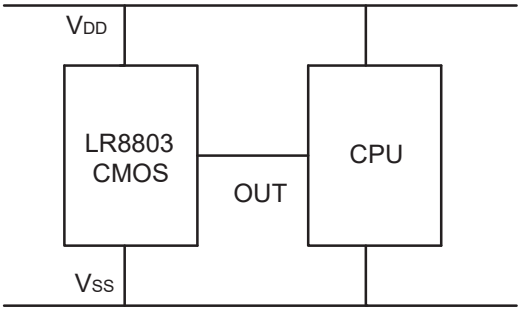
6. Following transient delay time, V_{DD} will be output at V_{OUT}.

Note that high impedance exists with the N-channel open drain configuration and that voltage will be dependent on pull up.

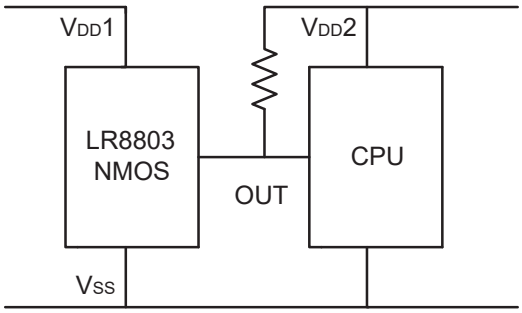


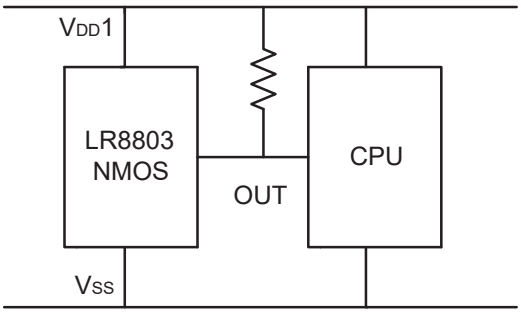
■ TYPICAL APPLICATION CIRCUITS

1、CMOS output：

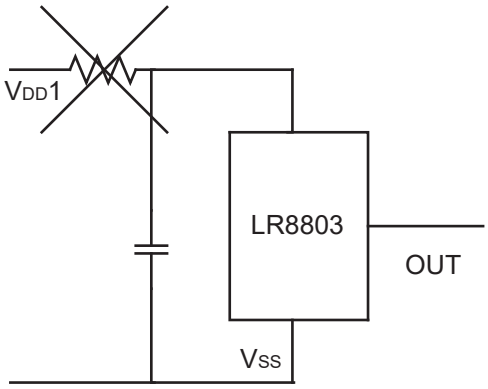


2、NMOS open-drain



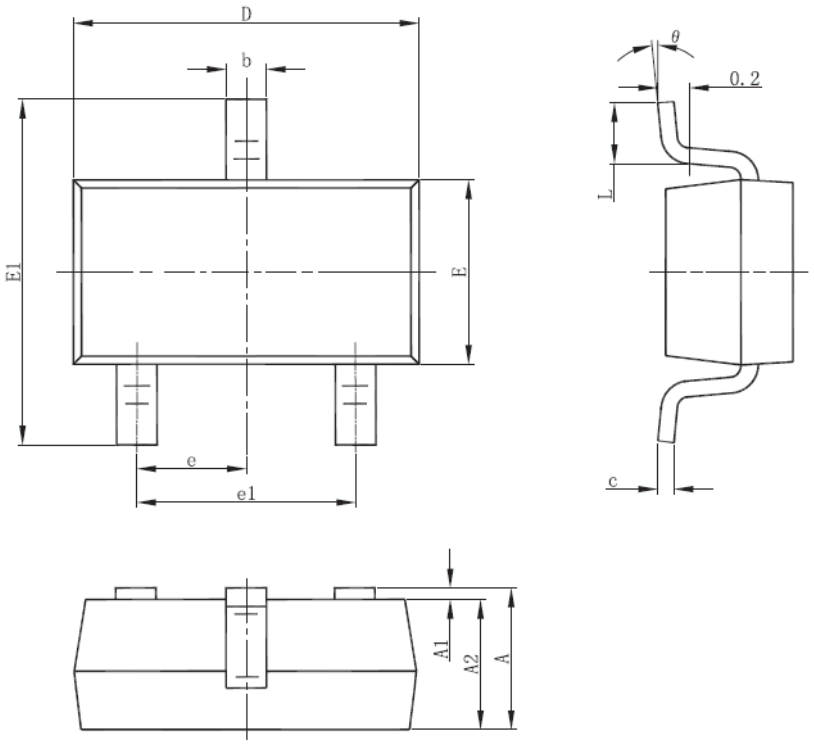


3. Forbidden Circuits



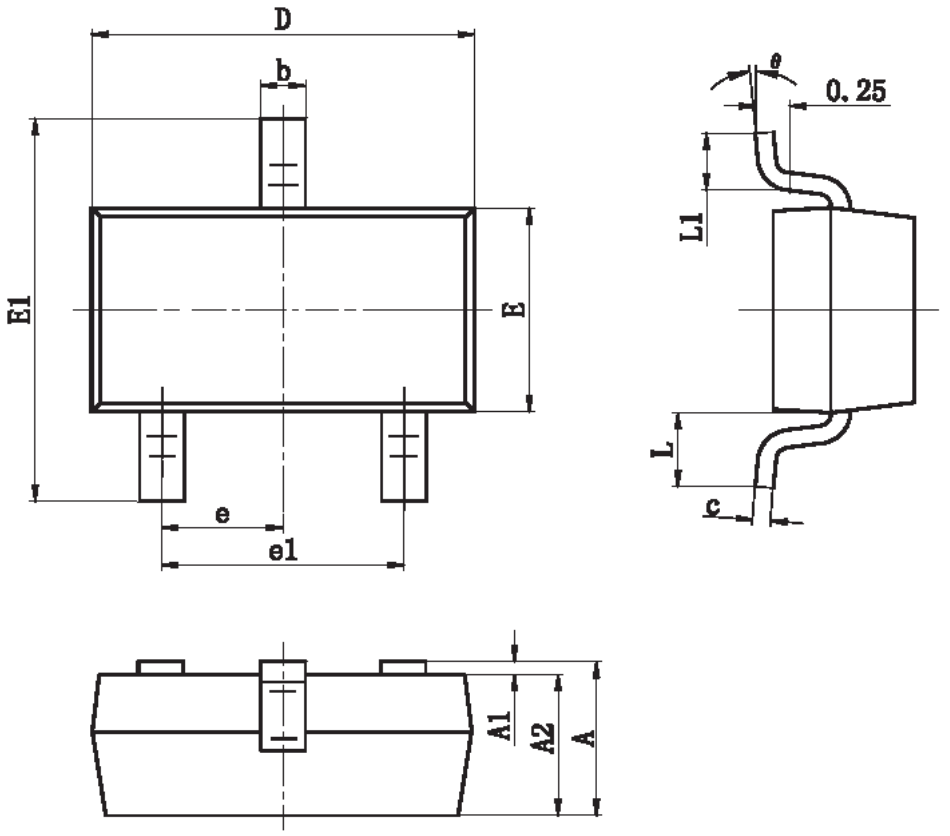
■ PACKAGING INFORMATION

• SOT-23-3



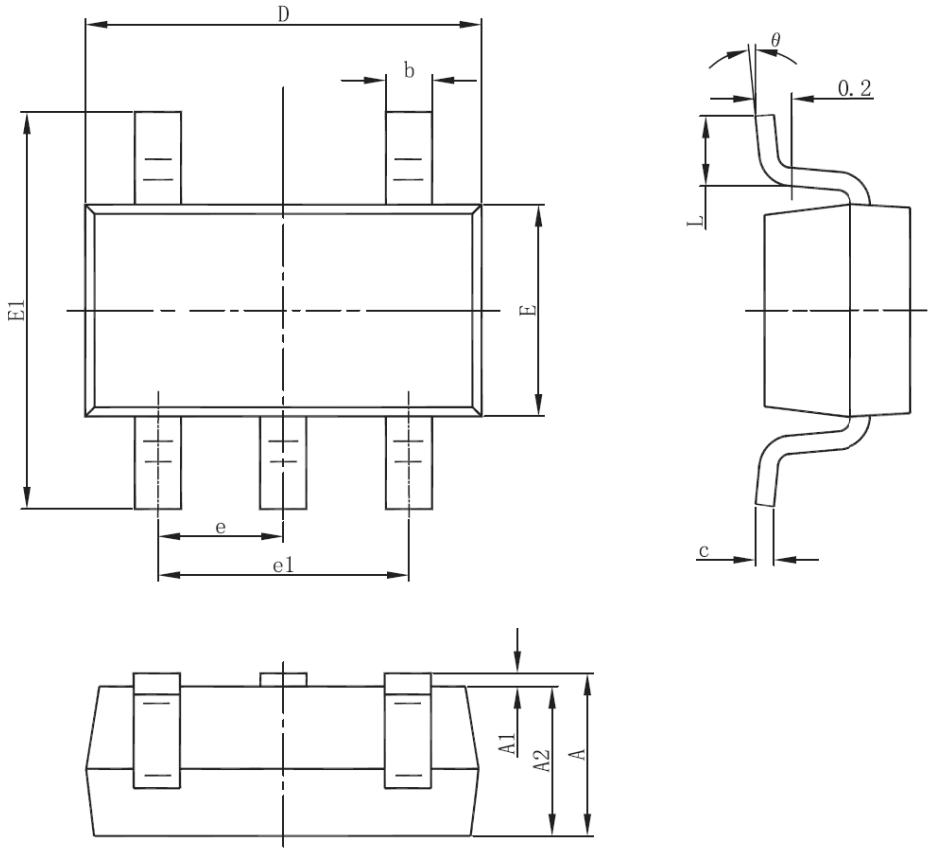
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)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

• SOT-23



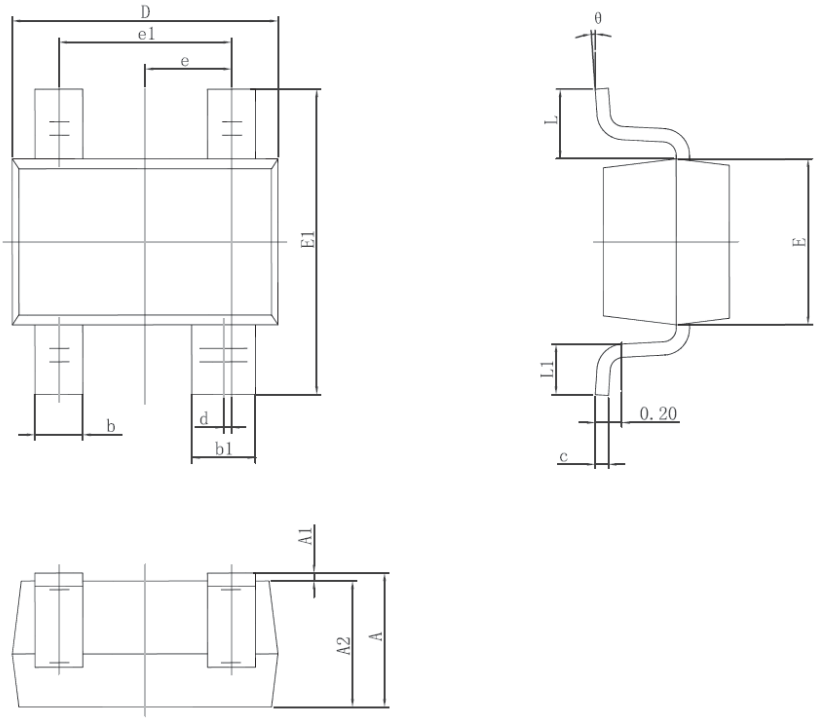
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	6°

● **SOT-23-5**



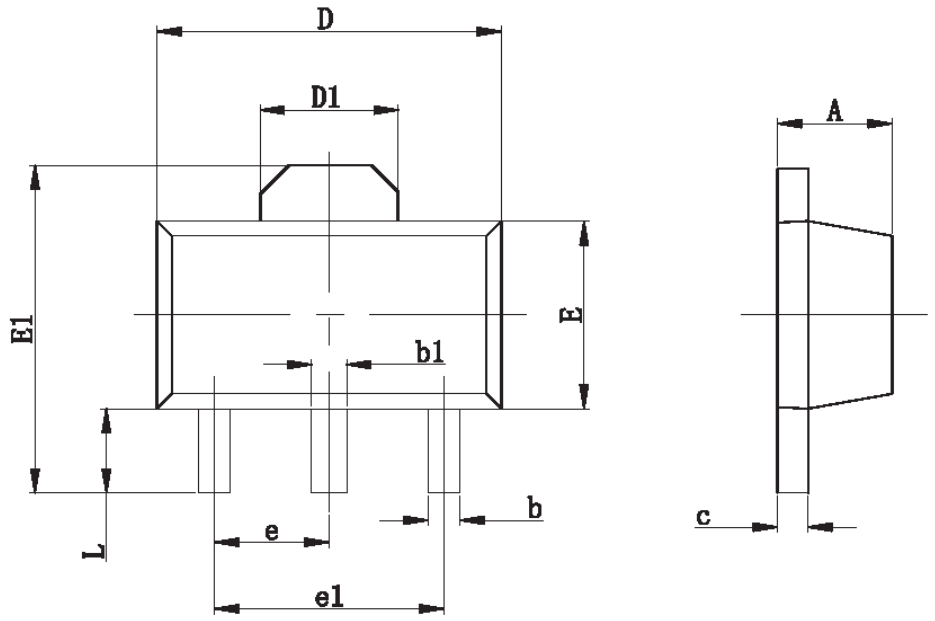
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)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

- **SOT-343**



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	0.250	0.400	0.010	0.016
b1	0.350	0.500	0.014	0.020
c	0.080	0.150	0.003	0.006
d	0.050 TYP.		0.002 TYP.	
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°

- **SOT-89-3**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.200	0.035	0.047