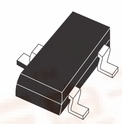
TS432

1.24V ADJUSTABLE SHUNT VOLTAGE REFERENCE

- **1.24V TYP OUTPUT VOLTAGE**
- **ULTRA LOW OPERATING CURRENT : 60µA maximum at 25°C**
- **HIGH PRECISION @ 25°C +/- 1% +/- 0.5%**
- **HIGH STABILITY WHEN USED WITH CAPACITIVE LOADS**
- **INDUSTRIAL TEMPERATURE RANGE: -40 to +85°C**
- **100ppm/°C TEMPERATURE COEFFICIENT**



L
SOT23-3L
(Plastic Micropackage)

DESCRIPTION

The TS432 is an adjustable low power shunt voltage reference providing an output voltage from 1.24V to 10V over the industrial temperature range (-40 to +85°C). Available in SOT23-3 surface mount package, it can be designed in applications where space saving is a critical issue.

The low operating current is a key advantage for power restricted designs. In addition, the TS432 is very stable and can be used in a broad range of application conditions.

APPLICATION

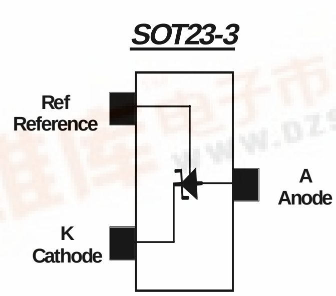
- Computers
- Instrumentation
- Battery chargers
- Switch Mode Power Supply
- Battery operated equipments

ORDER CODE

Precision	SOT23-3	SOT23 Marking
1%	TS432ILT	L235
0.5%	TS432AILT	L236
Single temperature range: -40 to +85°C		

LT = Tiny Package (SOT23-3) - only available in Tape & Reel (LT)

PIN CONNECTIONS (top view)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_K	Cathode voltage		12	V
I_K	Cathode current		-10 to +20	mA
I_{REF}	Reference input current		-0.05 to +3	mA
P_D	Power dissipation [1)]	SOT23-3	340	mW
R_{THJA}	Thermal resistance junction to ambient for	SOT23-3	360	°C/W
T_{LEAD}	Lead temperature (soldering 10 seconds)		250	°C
T_{STG}	Storage temperature		-65 to +150	°C
T_J	Junction temperature		150	°C
ESD	Human Body Model (HBM)		1.5	kV
	Machine Model (MM)		150	V

1. Pd has been calculated with T_{amb} = 25°C, T_j = 150°C and Rthja = 360°C/W for the SOT23-3L package

OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_K	Cathode voltage	1.24 to 10	V
I_K	Cathode current	60µ to 12m	A
T_{AMB}	Ambient temperature	-40 to +85	°C

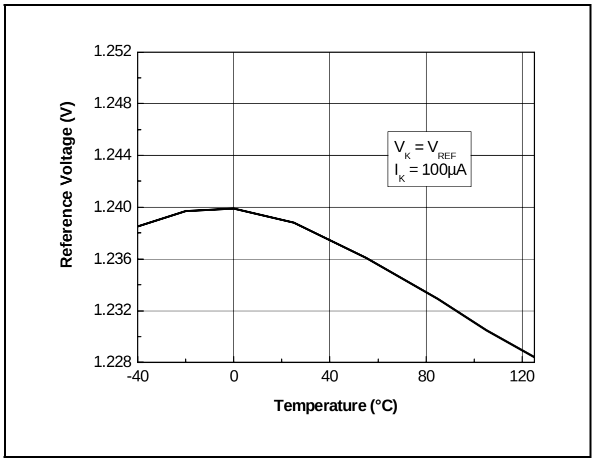
ELECTRICAL CHARACTERISTICS

T_{amb} = 25°C (unless otherwise specified)

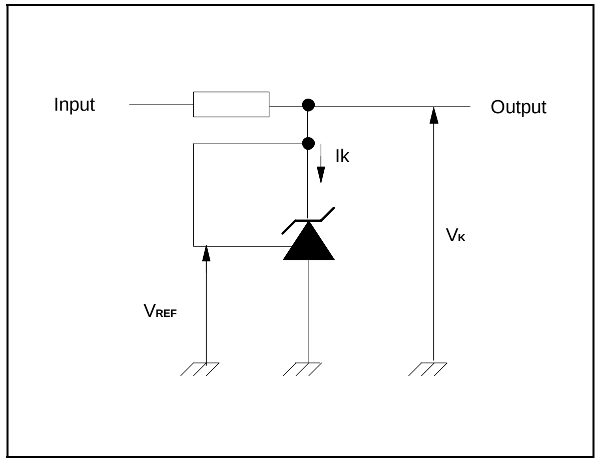
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{REF}	Reference voltage	I_K = 100µA, V_K=V_{REF}		1.24		V
		TS432 (1%)	1.228		1.252	
		TS432A (0.5%)	1.234		1.246	
ΔV_{REF}	Reference voltage tolerance over temperature	I_K = 100µA, V_K=V_{REF}		7	16	mV
I_{KMIN}	Minimum operating current	T_{amb} = 25°C		40	60	µA
		-40°C < T_{AMB} < +85°C			65	
ΔV_{REF}	Reverse breakdown voltage change with operating current range	I_{KMIN} < I_K < 1mA		0.7	1.5	mV
		-40°C < T_{AMB} < +85°C			2	
		1mA < I_K < 12mA		2	4	
		-40°C < T_{AMB} < +85°C			6	
ΔV_{REF}/ ΔV_K	Reference voltage change with output voltage change	I_K = 10mA, V_K=10V to V_{REF}		1.8	2.5	mV/V
		-40°C < T_{AMB} < +85°C			3	
I_{REF}	Reference input current	I_K=10mA, R_1=10KΩ, R_2=+∞		50	100	nA
		-40°C < T_{AMB} < +85°C			200	
I_{OFF}	Off-state cathode current	V_{REF}=0, V_K=10V		1	100	nA
		-40°C < T_{AMB} < +85°C			150	
R_{KA}	Static impedance	ΔI_K = 100µA to 12mA		0.25	0.5	Ω
K_{VH}	Long term stability	I_K = 100µA, t = 1000hrs		120		ppm
E_N	Wide band noise	I_K = 100µA 100Hz < F < 10kHz		200		nV/√Hz

Note : Limits are 100% production tested at 25°C. Limits over temperature are guaranteed through correlation and by design.

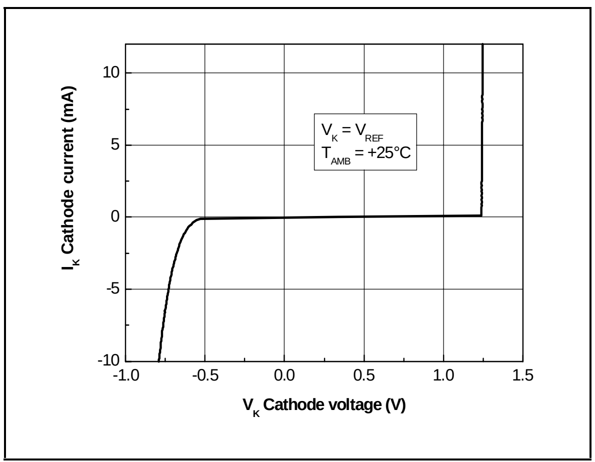
Reference voltage vs temperature



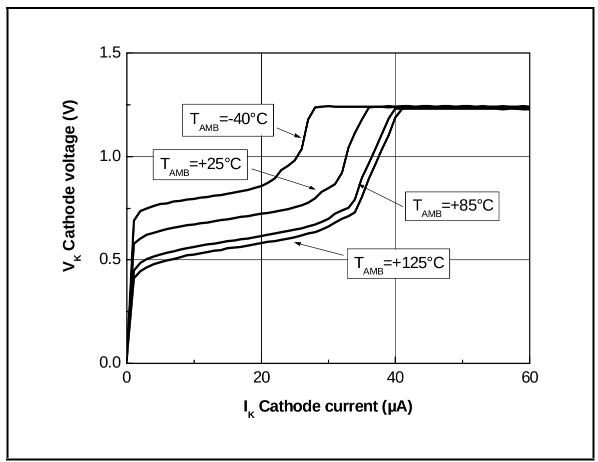
Test circuit for $V_K = V_{REF}$



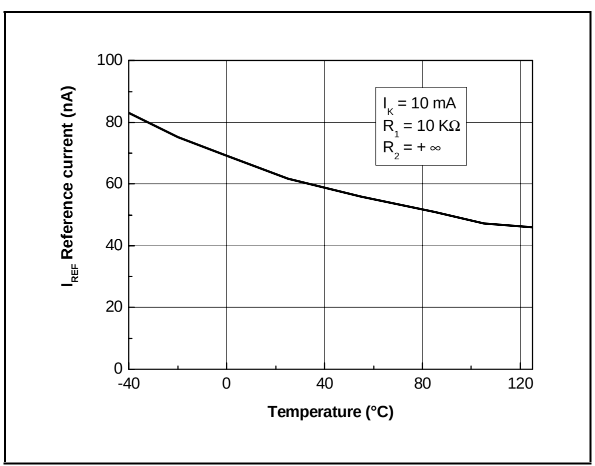
Cathode voltage vs cathode current



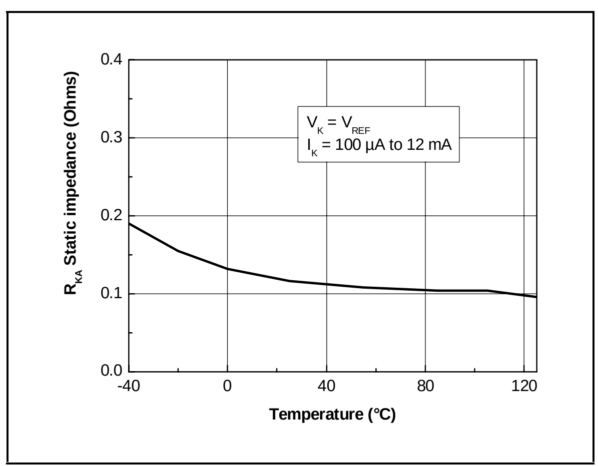
Cathode voltage vs cathode current



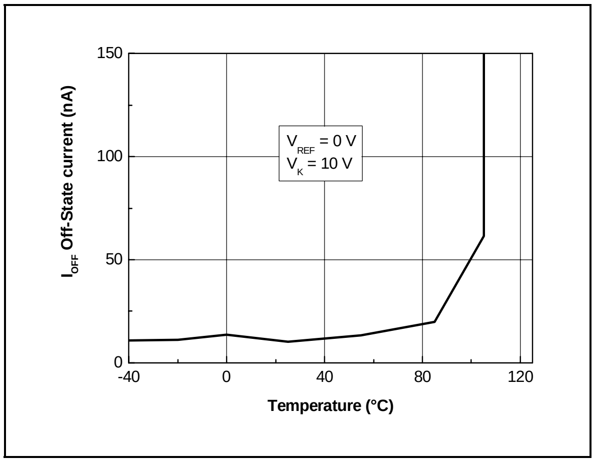
Reference input current vs temperature



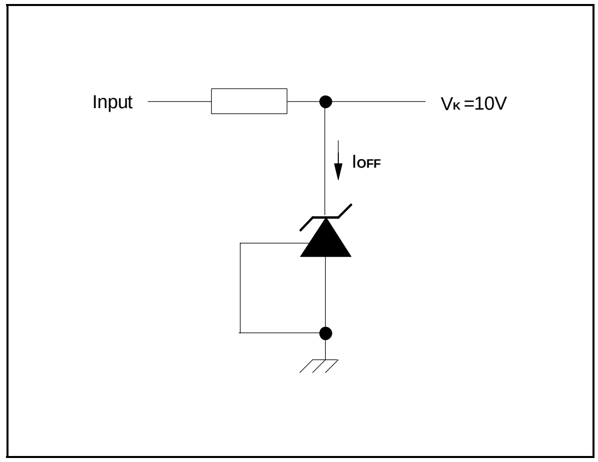
Static impedance vs temperature



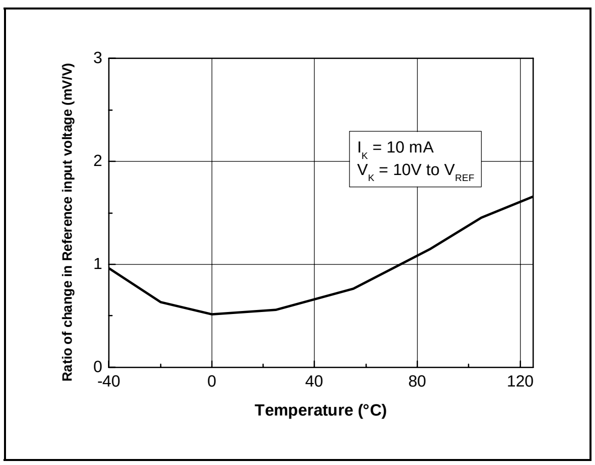
Off-State current vs temperature



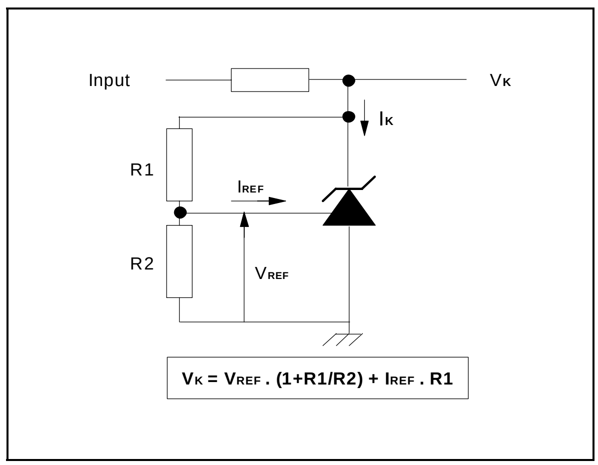
Test circuit for Off-State current measurement



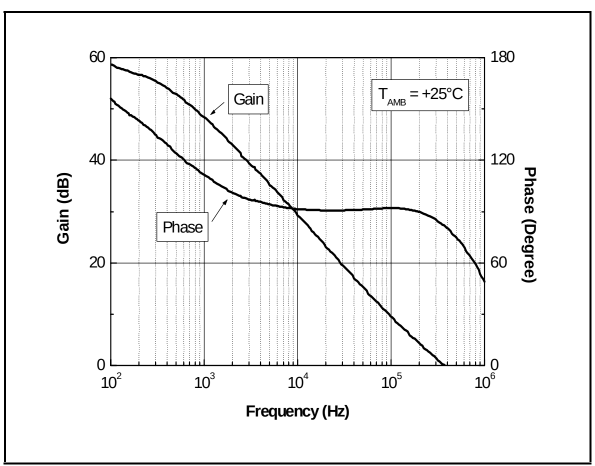
Ratio of change in reference input voltage to change in V_K voltage vs temperature



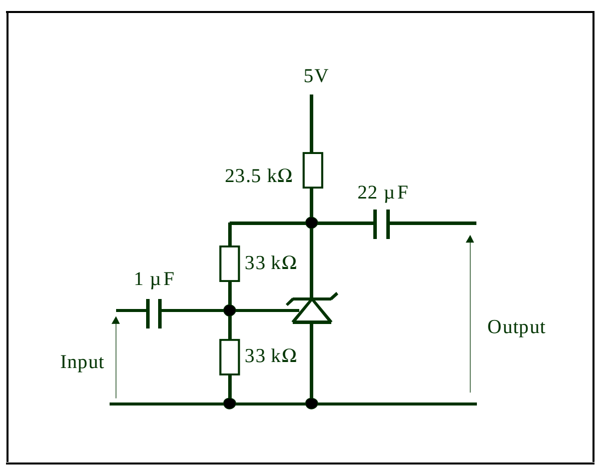
Test circuit for $V_{KA} > V_{REF}$



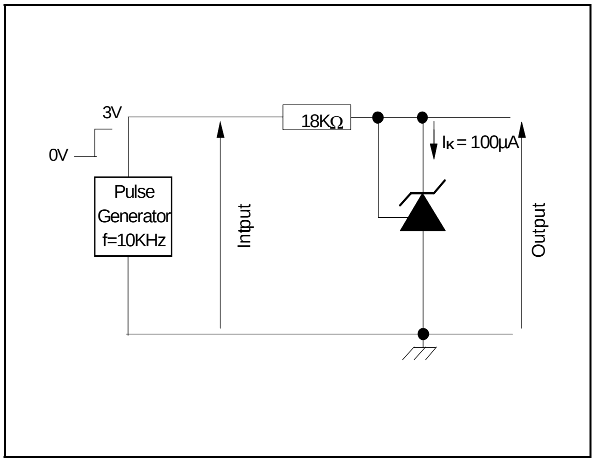
Phase and Gain vs frequency



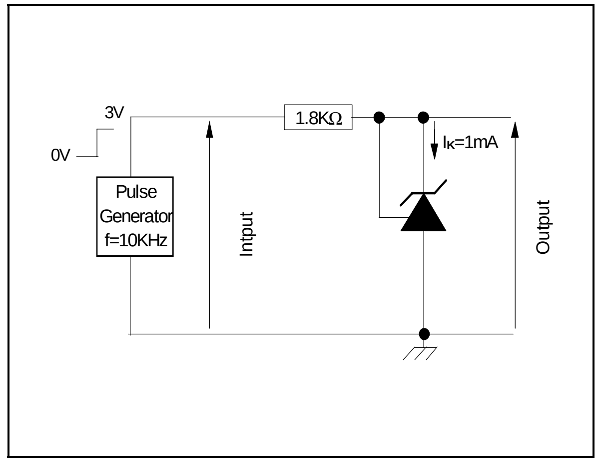
Test circuit for phase and gain measurement



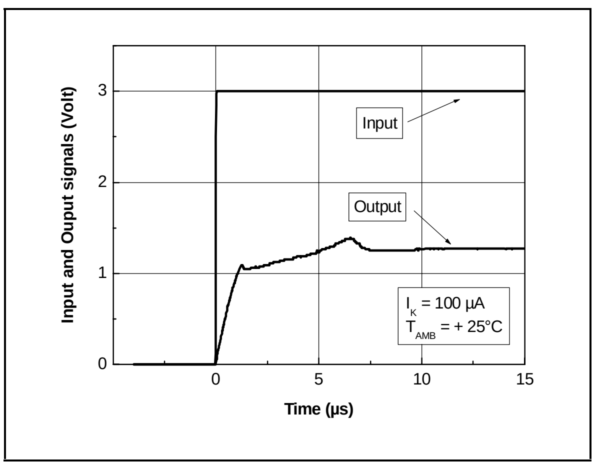
Test circuit for pulse response at I_K=100 µA



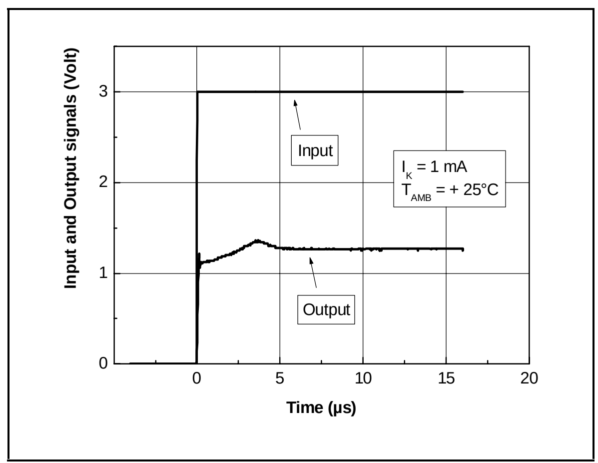
Test circuit for pulse response at I_K = 1 mA



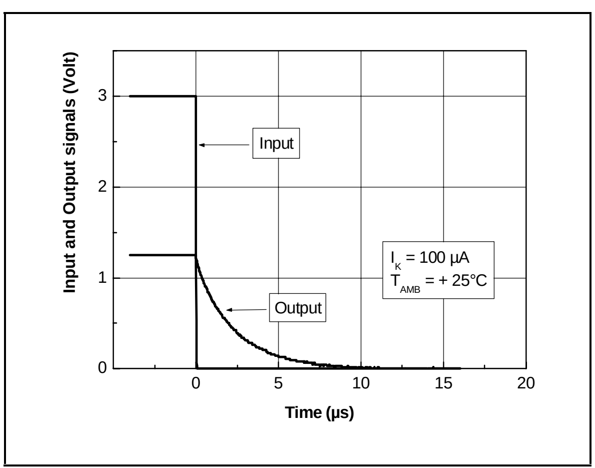
Pulse response at I_K = 100 µA



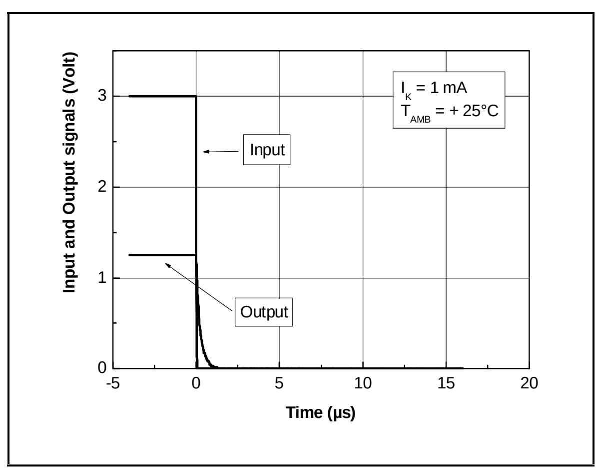
Pulse response at I_K = 1mA



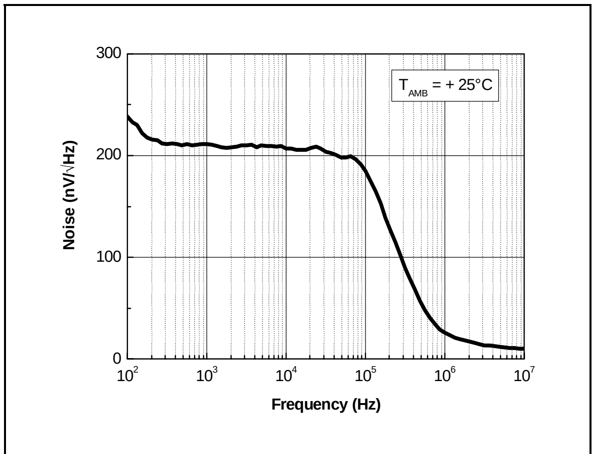
Pulse response at I_K = 100 µA



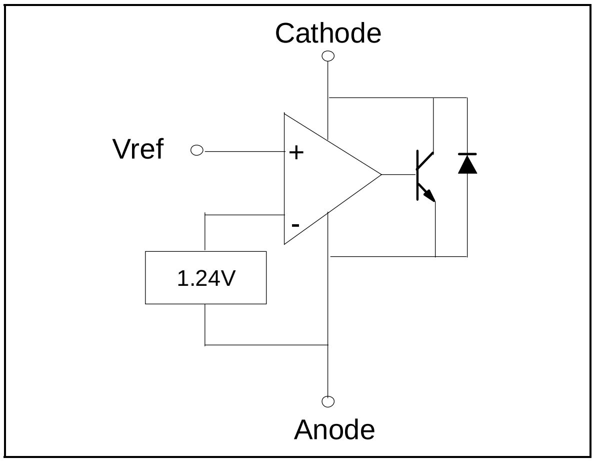
Pulse response at I_K = 1mA



Equivalent input noise vs frequency

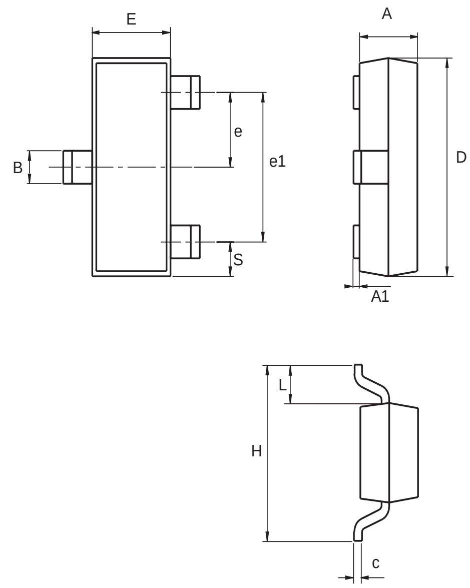


Block diagram



PACKAGE MECHANICAL DATA

3 PINS - TINY PACKAGE (SOT23)



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.890		1.120	0.035		0.044
A1	0.010		0.100	0.0004		0.004
A2	0.880	0.950	1.020		0.037	0.040
b	0.300		0.500	0.012		0.020
c	0.080		0.200	0.003		0.008
D	2.800	2.900	3.040	0.110	0.114	0.120
E	2.100		2.640	0.083		0.104
E1	1.200	1.300	1.400	0.047	0.051	0.055
e		0.950			0.037	
e1		1.900			0.075	
L	0.400	0.500	0.600	0.016	0.020	0.024
L1		0.540			0.021	
k	0°		8°			

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