2803

DATASHEET

Specification Revision History:

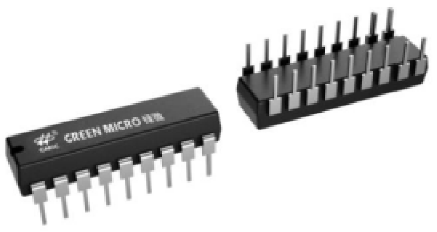
Version	Date	Description
V1.0	2019/05	New
V1.1	2021/03	Modify Ordering Information
V1.2	2025/02	Modify Ordering Information
V1.3	2025/03	Add application precautions and overall typesetting.

General Description

The ULN2803 is high-voltage high-current Darlington transistor arrays each containing eight open collector common emitter pairs. Each pair is rated at 500mA.Suppression diodes are included for inductive load driving, the inputs and outputs are pinned in opposition to simplify board layout.Features These devices are capable of driving a wide range of loads including solenoids,relays,DC motors,LED displays,filament lamps,thermal print-heads and high-power buffers.

The ULN2803 is available in both a small outline 18-pin package(SOP18).

- 500-mA-Rated Collector Current(single output)
- High-Voltage Outputs:50V
- Output Clamp Diodes
- Inputs Compatible With Various Types of Logic
- Relay-Driver Applications



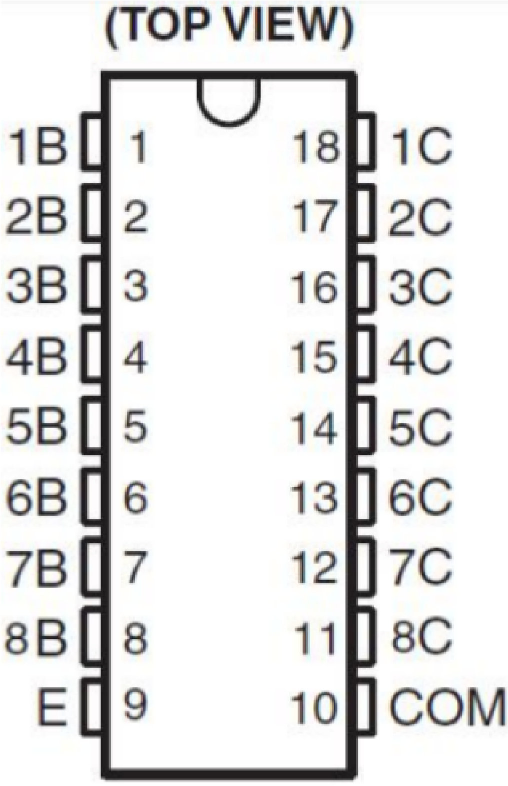
DIP-18

SOP-18

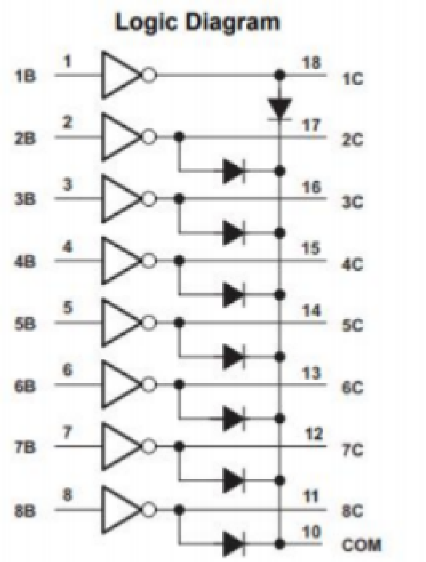
Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
ULN2803AN(GMIC)	DIP-18	ULN2803 237	TUBE	1000PCS/BOX
ULN2803AFWG(GMIC)	SOP-18	ULN2803 237	REEL	2000PCS/REEL
ULN2803AG(GMIC)	SOP-18	ULN2803 237	REEL	2000PCS/REEL
2803AN(GMIC)	DIP-18	2803 B37	TUBE	1000PCS/BOX
2803AFWG(GMIC)	SOP-18	2803 237	REEL	2000PCS/REEL
2803AG(GMIC)	SOP-18	2803 B37	REEL	2000PCS/REEL

Pin Assignments



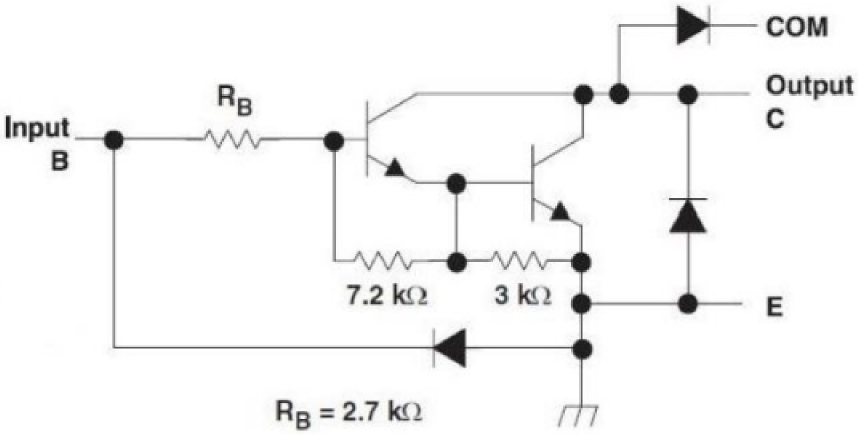
Connection Diagram



Pin Descriptions

Pin Number	Pin Name	Function
1	1B	Input pair1
2	2B	Input pair2
3	3B	Input pair3
4	4B	Input pair4
5	5B	Input pair5
6	6B	Input pair6
7	7B	Input pair7
8	8B	Input pair8
9	E	Common Emitter (ground)
10	COM	Common Clamp Diodes
11	8C	Output pair8
12	7C	Output pair7
13	6C	Output pair6
14	5C	Output pair5
15	4C	Output pair4
16	3C	Output pair3
17	2C	Output pair2
18	1C	Output pair1

Functional Block Diagram



Note:All resistor values shown are nominal.

The collentor-emitter diode is a parasitic structure and should not be used to conduct current.If the collector(s)go below ground an external Schoottky diode should be added to clamp negative undershoots.

Absolute Maximum Ratings(1)

At 25°C free-air temperature (unless otherwise noted)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Collector to emitter voltage			50	V
V_R	Clamp diode reverse voltage(2)			50	V
V_I	Input voltage(2)			30	V
I_{CP}	Peak collector current	See typical characteristics		500	mA
I_{OK}	Output clamp current			500	mA
I_{TE}	Total emitter-terminal current			-2.5	A
T_A	Operating free-air temperature range	2803	-30	+105	°C
θ_{JA}	Thermal Resistance Junction-to-Ambient(3)			63	°CM
θ_{JC}	Thermal Resistance Junction-to-Case(4)			12	
T_J	Operating virtual junction temperature			150	°C
T_{STG}	Storage temperature range		-40	150	°C

(1)Stresses beyond those listed under "absolute maximum ratings"may cause permanent damage to the device.

These are stress ratings only,and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions"is not implied.Exposure to

absolute-maximum-rated conditions for extended periods may affect device reliability.

(2)All voltage values are with respect to the emitterl/substrate terminal E,unless otherwise noted.

(3)Maximum power dissipation is a function of TJ(max),QJA,and TA.The maximum allowable power dissipation at any allowable ambient temperature is PD=(TJ(max)-TA)/θJA.Operating at the absolute maximum TJ of 150°°C can affect reliability.

(4)Maximum power dissipation is a function of TJ(max),θJC,and TA.The maximum allowable power dissipation at any allowable ambient temperature is PD=(TJ(max)-TA)/θJC.Operating at the absolute maximum TJ of 150°°C can affect reliability.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
VCC	Collector to Emitter voltage		50	V
TA	Operating Ambient Temperature	-30	+105	°C

Electrical Characteristics(TA=+25℃,unless otherwise specified)

Parameter		Test Figure	Test Conditions		MIN	TYP	MAX	Unit
$V_{I(on)}$	On-state input voltage	Figure 6	V_{CE}=2V	I_C=200mA	--	--	2.4	V
				I_C=250mA	--	--	2.7	
				I_C=300mA	--	--	3	
$V_{CE(sat)}$	Collector-emitter saturation voltage	Figure 5	I_I=250μA,	I_C=100mA	--	0.9	1.1	V
			I_I=350μA,	I_C=200mA	--	1	1.3	
			I_I=500μA,	I_C=350mA	--	1.2	1.6	
I_{CEX}	Collector cutoff current	Figure 1	V_{CE}=50V,	I_I=0	--	--	50	μA
		Figure 2	V_{CE}=50V, T_A=+105°C	I_I=0	--	--	100	
V_F	Clamp forward voltage	Figure 8	I_F=350mA		--	1.7	2	V
$I_{I(off)}$	Off-state input current	Figure 3	V_{CE}=50V,I_C=500μA		50	65	--	μA
I_I	Input current	Figure 4	V_I=3.85V		--	0.93	1.35	mA
			V_I=5V		--	--	--	
			V_I=12V		--	--	--	
I_R	Clamp reverse current	Figure 7	V_R=50V		--	--	50	μA
				T_A=70°C	--	--	100	
C_i	Input capacitance		V_I=0,f=1MHz		--	15	25	pF

Switching Characteristics(TA=+25℃,unless otherwise specifed)

Parameter		Test Conditions	MIN	TYP	MAX	UNIT
P_{LH}	Propagation delay time, low-to high-level output	See Figure 9		0.25	1	us
P_{HL}	Propagation delay time, high-to low-level output	See Figure 9		0.25	1	us
V_{OH}	High-level output voltage after switching	V_S=50V,I_O=300 mA, See Figure 9	VS-20			mV

Parameter Measurement Information

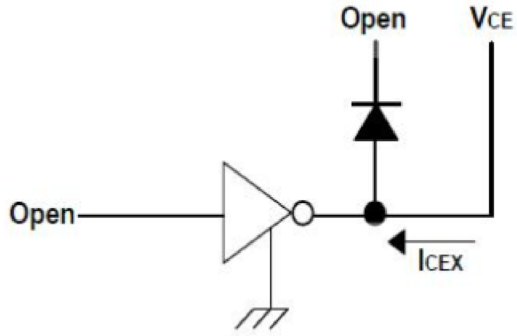


Fig.1 I_{CEX} Test Circuit

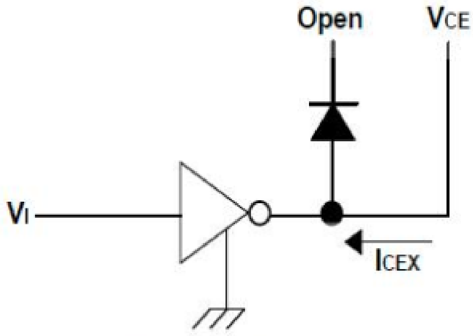


Fig.2 I_{CEX} Test Circuit

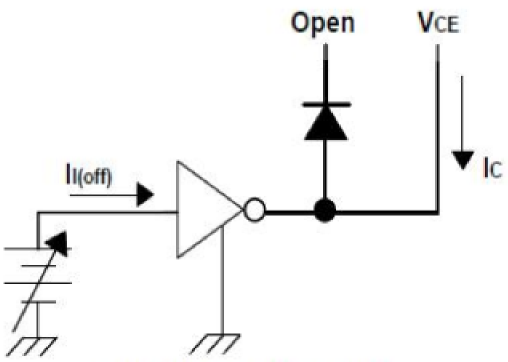


Fig.3 $I_{I(off)}$ Test Circuit

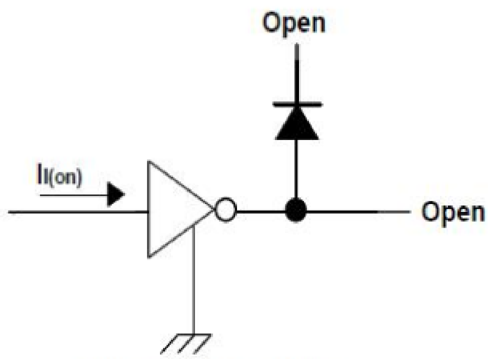


Fig.4 I_I Test Circuit

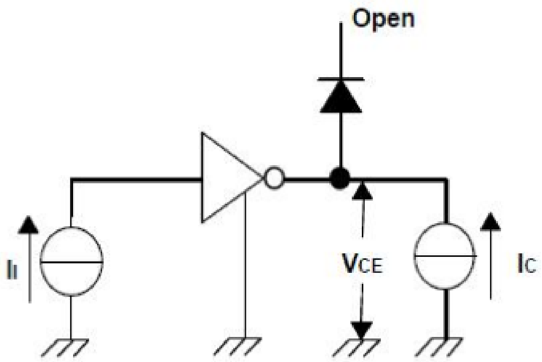


Fig. 5 h_{FE} , $V_{CE(sat)}$ Test Circuit

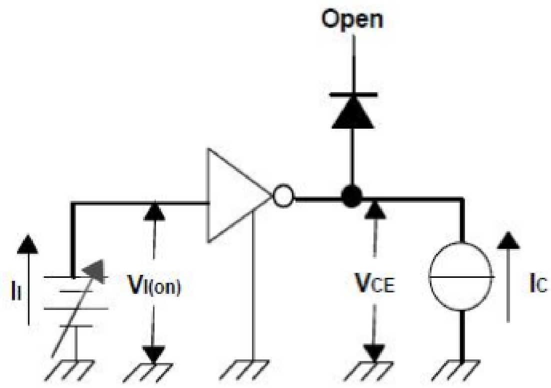


Fig. 6 $V_{I(on)}$ Test Circuit

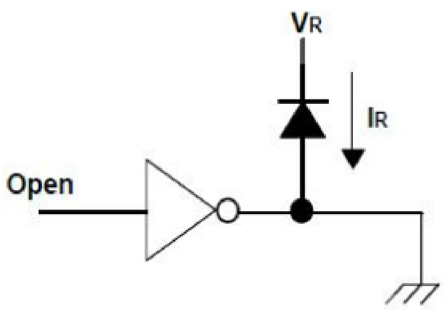


Fig. 7 I_R Test Circuit

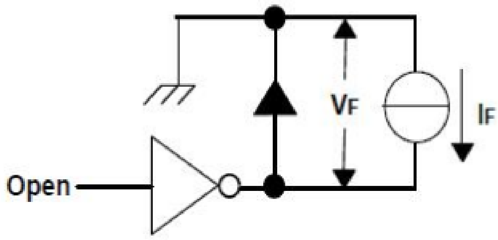
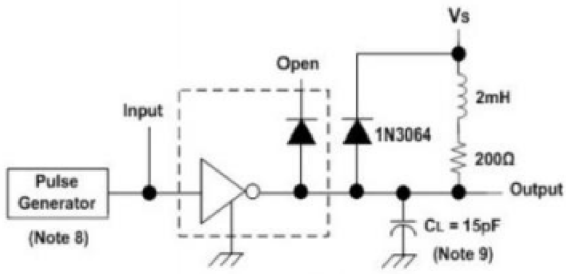
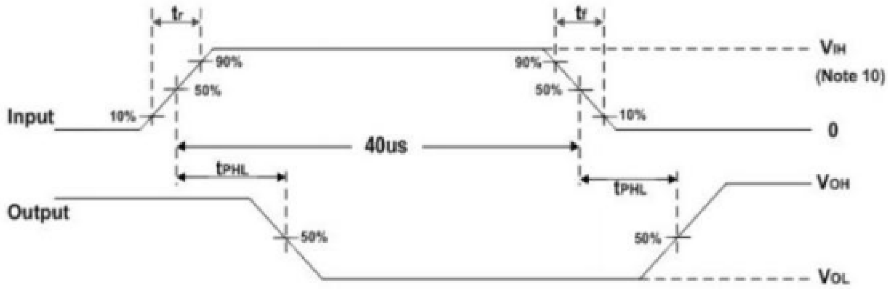


Fig. 8 V_F Test Circuit



ton,toFF Test Circuit



Voltage Waveform

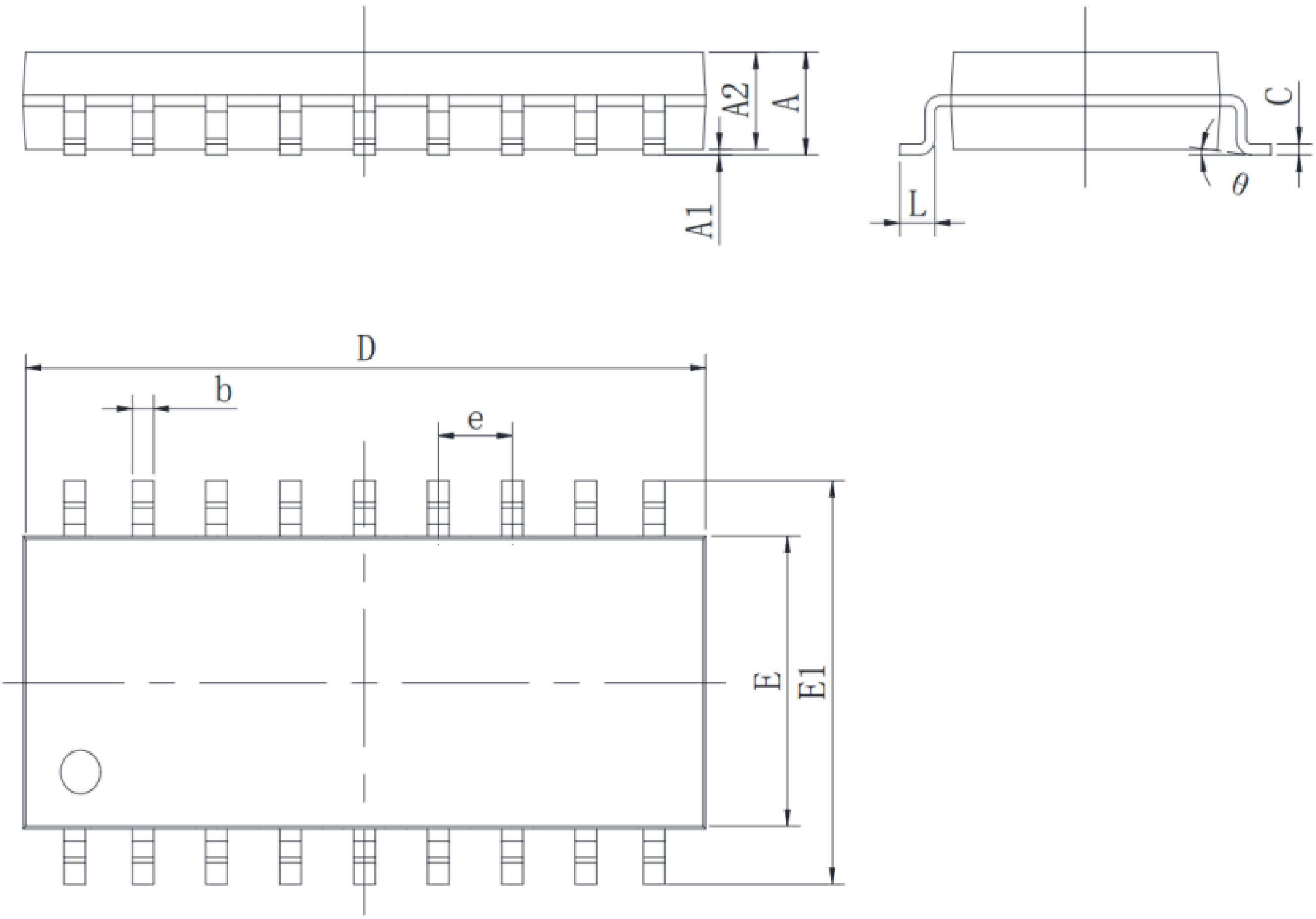
Fig.9 Latch-Up Test Circuit and Voltage Waveform

Notes: 9.C_L includes prove and jig capacitance.

10.V_{IH}=3V

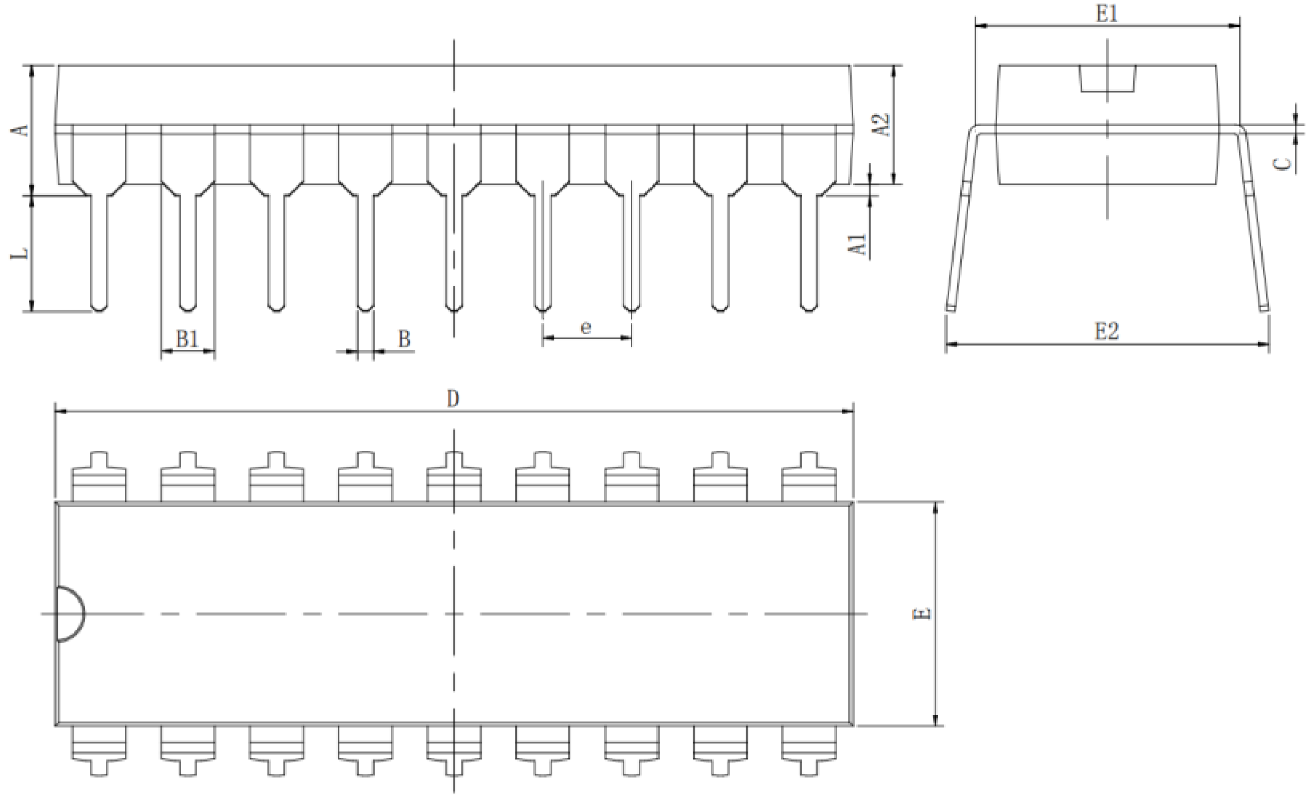
Outline Dimensions

SOP-18 **Unit : mm**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A		2.650		0.104
A1	0.100	0.300	0.004	0.012
A2	2.100	2.500	0.083	0.098
b	0.330	0.510	0.013	0.020
c	0.204	0.330	0.008	0.013
D	11.250	11.750	0.442	0.462
E	7.400	7.600	0.291	0.299
E1	10.210	10.610	0.402	0.418
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0 °	8 °	0 °	8 °

DIP-18 Unit : mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	22.640	23.040	0.891	0.907
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

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