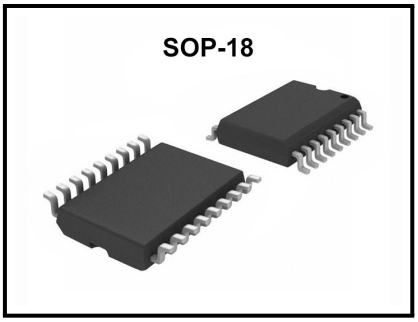
BULN2803LVS

Darlington Transistor Arrays

Features

- Supporting 1.8V low voltage input
- Single 500 mA output current
- Input compatible TTL/CMOS logic signal

Package



Application

- Stepper motor drive
- Relay drive
- Display driver
- Indicator drive

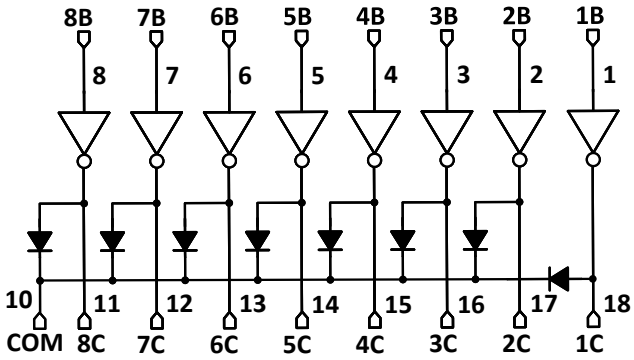
General Description

The BULN2803LVS device is a 20 V, 500 mA Darlington transistor array. The device consists of eight NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector-current rating of each Darlington pair is 500 mA. The Darlington pairs may be connected in parallel for higher current capability.

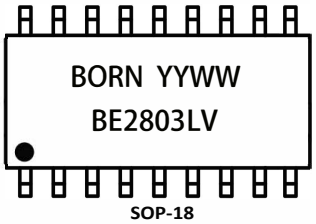
Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED and gas discharge), line drivers, and logic buffers. The BE2803LV device has a 2.7-kΩ series base resistor for each Darlington pair for operation directly

Connection Diagram

Logical Diagram



Marking



SOP-18

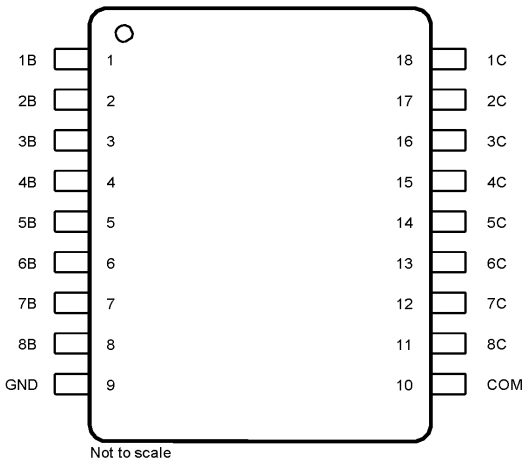
Revision: 2022-Jan-1-A

BULN2803LVS

Darlington Transistor Arrays

Pin Description and Functions

Package
18-Pin SOIC
Top View



Not to scale

Pin Functions

PIN		TYPE	DESCRIPTION
NAME	NO.		
1B	1	I	Channel 1 through 8 Darlington base input
2B	2		
3B	3		
4B	4		
5B	5		
6B	6		
7B	7		
8B	8		
1C	18	O	Channel 1 through 8 Darlington collector output
2C	17		
3C	16		
4C	15		
5C	14		
6C	13		
7C	12		
8C	11		
GND	9	–	Common emitter shared by all channels (typically tied to ground)
COM	10	I/O	Common cathode node for flyback diodes (required for inductive loads)

BULN2803LVS

Darlington Transistor Arrays

Absolute Maximum Ratings (At 25°C free-air temperature unless otherwise noted)(1)

Symbol	Parameter	Min	Max	Units
V_{CE}	Collector to emitter voltage	–	20	V
V_I	Input voltage(2)	–	20	V
I_{CP}	Peak collector current	–	500	mA
I_{OK}	Output clamp current	–	500	mA
I_{TE}	Total substrate-terminal current	–	-2.0	A
T_J	Operating virtual junction temperature	-65	150	°C
T_{STG}	Storage temperature range	-65	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 emitter/substrate terminal E, unless otherwise noted.

ESD Ratings

Symbol	Parameter	VALUE	UNIT
$V_{(ESD)}$	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001(1)	±2000	V
	Charged device model (CDM), per JEDEC specification JESD22-C101(2)	±500	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

Recommended Operating Conditions over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter	MIN.	MAX.	UNIT
$V_{(CE)}$	Collector-emitter voltage	0	18	V
$T_{(A)}$	Ambient temperature	-40	85	°C

Thermal Information

Symbol	Parameter	BULN2803LVS (SOIC) 18 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	66.4	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	29.5	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	33.0	°C/W
ψ_{JT}	Junction-to-top characterization parameter	6.0	°C/W
ψ_{JB}	Junction-to-board characterization parameter	32.5	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	N/A	°C/W

BULN2803LVS

Darlington Transistor Arrays

Electrical Characteristics (T_A=+25°C, unless otherwise specified)

Parameter		Test Figure	Test Conditions		BN2803LV			Unit
					MIN	TYP	MAX	
$V_{I(on)}$	Input current-on condition	Figure 4	V_{CE} = 1.5V	I_C = 100 mA	–	2.0	2.1	V
				I_C = 200 mA	–	2.2	2.3	
$V_{CE(sat)}$	Collector-emitter saturation voltage	Figure 5	V_I = 1.8V	I_C = 100 mA	–	2.0	2.1	V
				I_C = 200 mA	–	3.2	3.3	
			V_I =3.3V	I_C = 300 mA	–	1.5	1.6	
				I_C = 500 mA	–	1.8	1.9	
V_F	Clamp diode forward Voltage	Figure 8	I_F = 350 mA		–	1.4	1.6	V
I_{CEX}	Output leakage current	Figure 1	V_{CE} = 18V	I_{IN} = 0V	–	–	50	μA
	Output leakage current	Figure 2		V_{IN} = 0V	–	–	100	
I_{IN}	Input current	Figure 4	V_{IN} = 1.8V	I_C = 250mA	–	0.6	1.2	mA
			V_{IN} = 2.4V	I_C = 250mA	–	1.6	3.0	
			V_{IN} = 3.3V	I_C = 250mA	–	3.2	4.5	
I_R	Clamp reverse current	Figure 7	V_R = 18 V		–	–	100	μA
C_i	Input capacitance		V_I = 0, f = 1 MHz		–	15	–	pF
t_{PLH}	Propagation delay time, low - to high-level output	Figure 9	V_L = 5 V	R_L = 45Ω	–	0.12	–	μs
t_{PHL}	Propagation delay time, high- to low -level output	Figure 9	V_L = 5 V	R_L = 45Ω	–	0.12	–	

Parameter Measurement Information

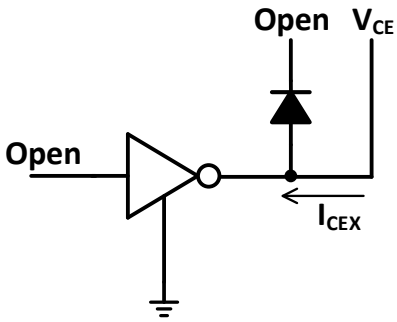


Fig.1 I_{CEX} Test Circuit

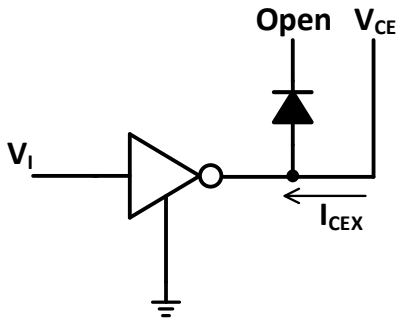


Fig.2 I_{CEX} Test Circuit

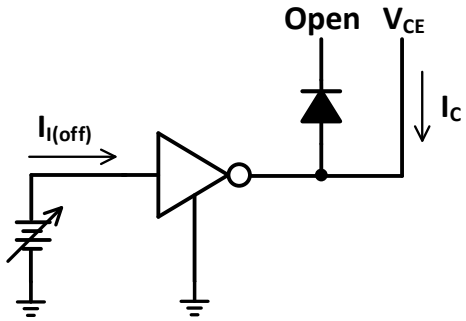


Fig.3 $I_{I(off)}$ Test Circuit

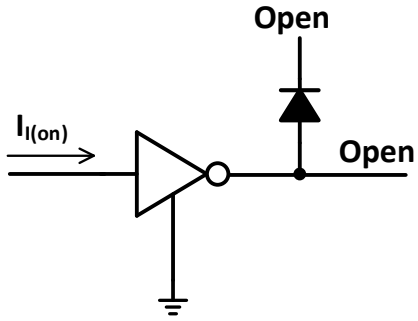


Fig.4 I_I Test Circuit

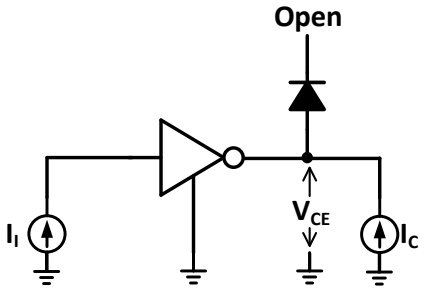


Fig.5 h_{fe}, $V_{CE(sat)}$ Test Circuit

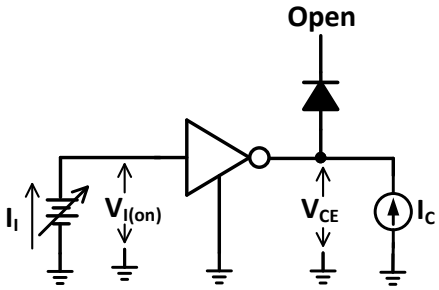


Fig.6 $V_{I(on)}$ Test Circuit

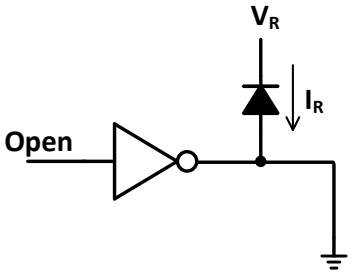


Fig.7 I_R Test Circuit

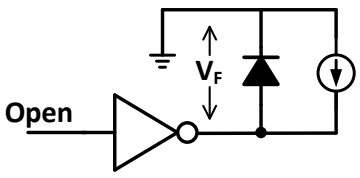
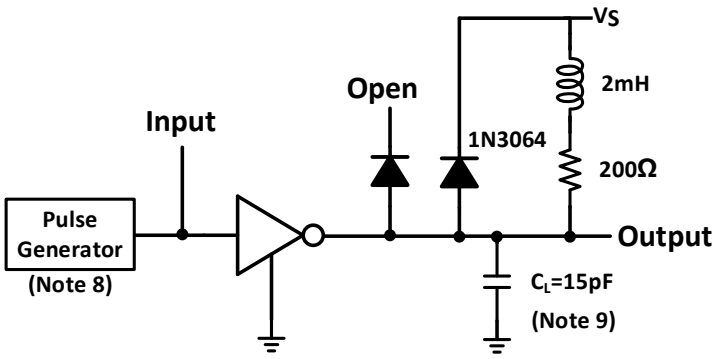


Fig.8 V_F Test Circuit

Parameter Measurement Information



t_{ON}, t_{OFF} Test Circuit

Notes:

8. The pulse generator has the follow ing characteristics: Pulse Width=12.5Hz, output impedance 50Ω, t_f≤5ns, t_f≤10ns.

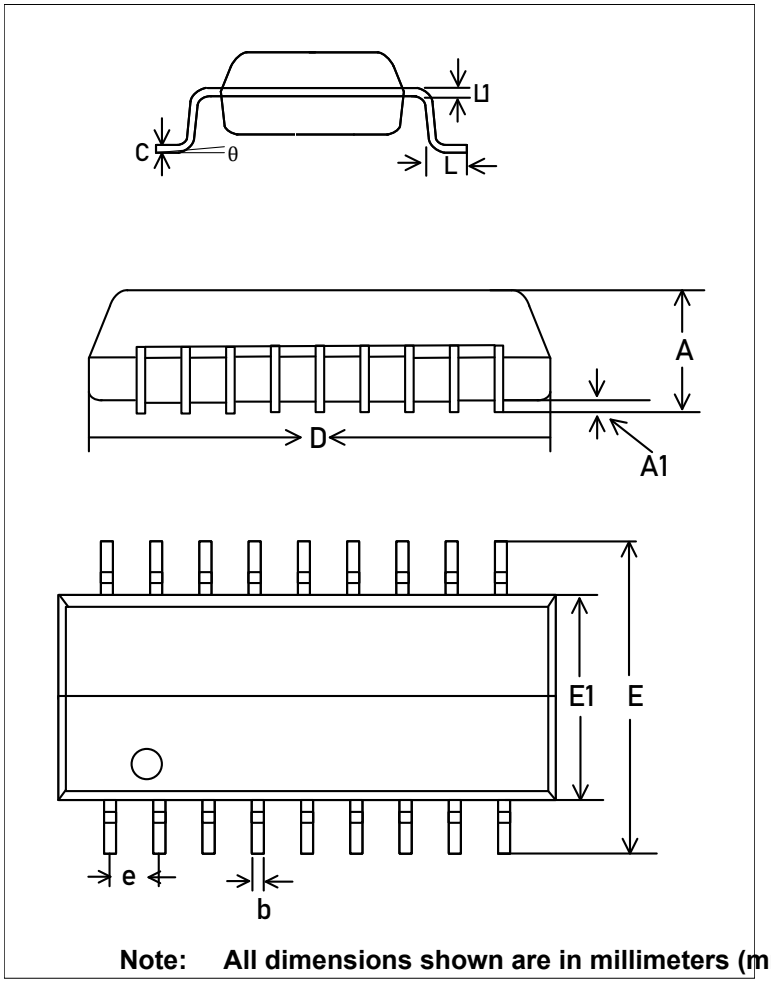
9. C_L includes prove and jig capacitance.

10 V_{IH}=3V

BULN2803LVS

Darlington Transistor Arrays

SOP18 Package Specifications



SYMBOL	MIN.	TYP.	MAX.
A	–	–	2.65
A1	0.10	–	0.3
b	0.31	–	0.51
c	0.15	–	0.25
D	11.35	–	11.75
E	9.97	–	10.63
E1	7.40	–	7.60
e	1.27BSC		
L	0.40	–	1.27
L1	0.20	–	0.33
θ	0°	–	8°

Note: All dimensions shown are in millimeters (mm)