NPN Small-Signal Darlington Transistor

BSP52T1G, BSP52T3G, SBSP52T1G

This NPN small signal Darlington transistor is designed for use in switching applications, such as print hammer, relay, solenoid and lamp drivers. The device is housed in the SOT-223 package, which is designed for medium power surface mount applications.

Features

- The SOT-223 Package can be soldered using wave or reflow. The formed leads absorb thermal stress during soldering, eliminating the possibility of damage to the die
- Available in 12 mm Tape and Reel
  Use BSP52T1 to Order the 7 Inch/1000 Unit Reel
- PNP Complement is BSP62T1
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V_{CES}	80	V
Collector-Base Voltage	V_{CBO}	90	V
Emitter-Base Voltage	V_{EBO}	5.0	V
Collector Current	I_C	1.0	A
Total Power Dissipation (Note 1) @ T_A = 25°C Derate above 25°C	P_D	 0.8 6.4	 W mW/°C
Total Power Dissipation (Note 2) @ T_A = 25°C Derate above 25°C	P_D	 1.25 10	 W mW/°C
Operating and Storage Temperature Range	T_J, T_{stg}	−65 to 150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance (Note 1) Junction-to-Ambient	$R_{\theta JA}$	156	°C/W
Thermal Resistance (Note 2) Junction-to-Ambient	$R_{\theta JA}$	100	°C/W
Maximum Temperature for Soldering Purposes Time in Solder Bath	T_L	260 10	°C Sec

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Device mounted on a FR-4 glass epoxy printed circuit board using minimum recommended footprint.
2. Device mounted on a FR-4 glass epoxy printed circuit board using 1 cm^2 pad.

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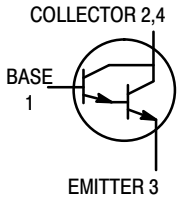
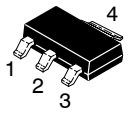
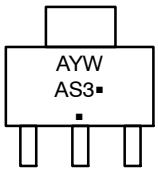
MEDIUM POWER NPN SILICON SURFACE MOUNT DARLINGTON TRANSISTOR



MARKING DIAGRAM



SOT−223
CASE 318E
STYLE 1



A = Assembly Location
Y = Year
W = Work Week
AS3 = Specific Device Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
BSP52T1G, SBSP52T1G	SOT−223 (Pb−Free)	1000 / Tape & Reel
BSP52T3G	SOT−223 (Pb−Free)	4000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Base Breakdown Voltage (I_C = 100 μA, I_E = 0)	$V_{(BR)CBO}$	90	–	–	V
Emitter-Base Breakdown Voltage (I_E = 10 μA, I_C = 0)	$V_{(BR)EBO}$	5.0	–	–	V
Collector-Emitter Cutoff Current (V_{CE} = 80 V, V_{BE} = 0)	I_{CES}	–	–	10	μA
Emitter-Base Cutoff Current (V_{EB} = 4.0 V, I_C = 0)	I_{EBO}	–	–	10	μA
ON CHARACTERISTICS (Note 3)					
DC Current Gain (I_C = 150 mA, V_{CE} = 10 V) (I_C = 500 mA, V_{CE} = 10 V)	h_{FE}	1000 2000	– –	– –	–
Collector-Emitter Saturation Voltage (I_C = 500 mA, I_B = 0.5 mA)	$V_{CE(sat)}$	–	–	1.3	V
Base-Emitter Saturation Voltage (I_C = 500 mA, I_B = 0.5 mA)	$V_{BE(sat)}$	–	–	1.9	V
SWITCHING CHARACTERISTICS					
Rise Time (V_{CC} = 10 V, I_C = 150 mA, I_{B1} = 0.15 mA)	t_r	–	155	–	ns
Delay Time (V_{CC} = 10 V, I_C = 150 mA, I_{B1} = 0.15 mA)	t_d	–	205	–	ns
Storage Time (V_{CC} = 10 V, I_C = 150 mA, I_{B1} = 0.15 mA, I_{B2} = 0.15 mA)	t_s	–	420	–	ns
Fall Time (V_{CC} = 10 V, I_C = 150 mA, I_{B1} = 0.15 mA, I_{B2} = 0.15 mA)	t_f	–	365	–	ns

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

TYPICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

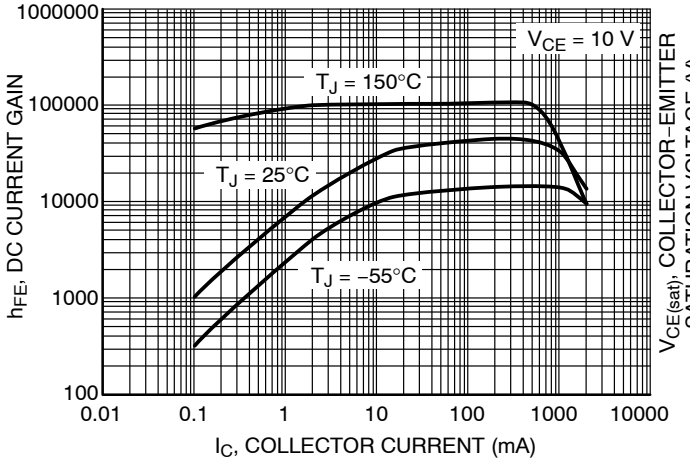


Figure 1. DC Current Gain

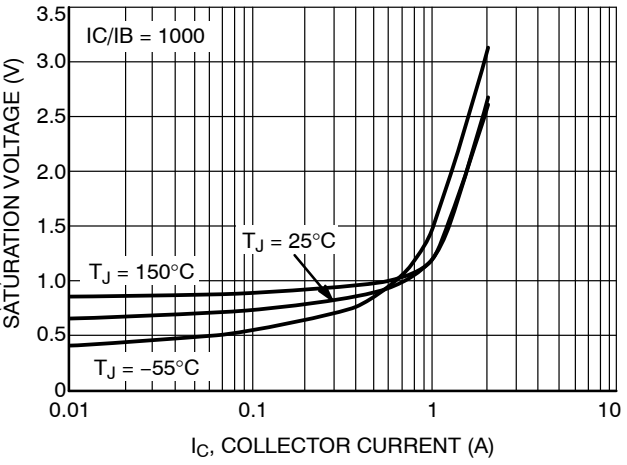


Figure 2. Collector−Emitter Saturation Voltage

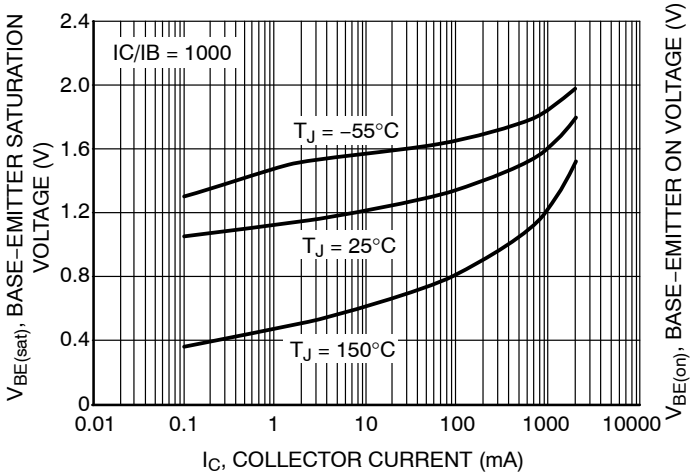


Figure 3. Base−Emitter Saturation Voltage

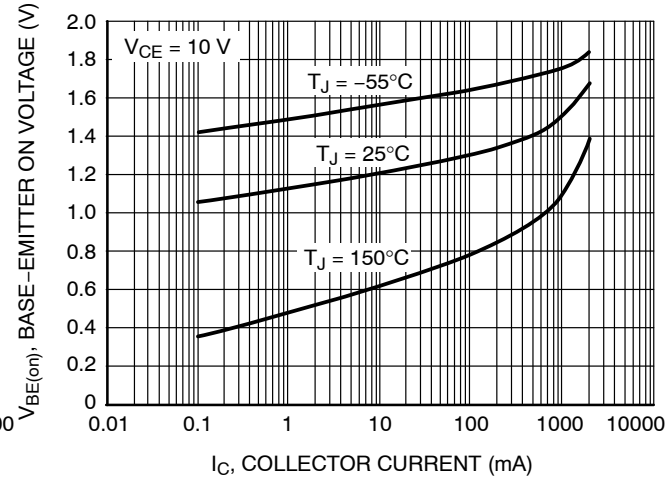


Figure 4. Base−Emitter ON Voltage

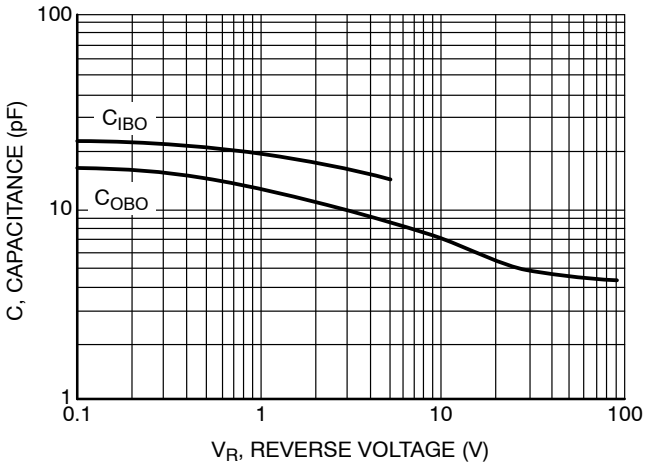


Figure 5. Capacitance

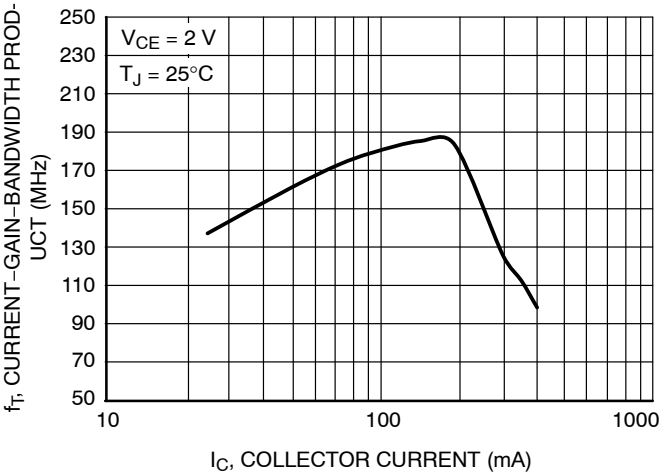
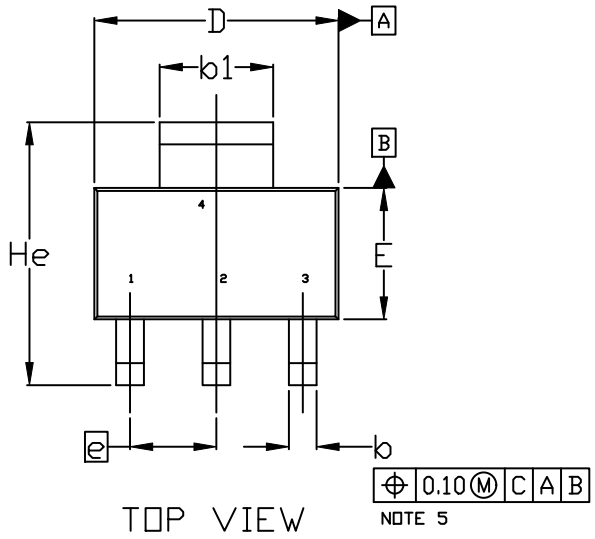


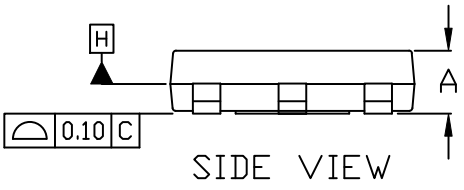
Figure 6. Current Gain Bandwidth Product vs. Collector Current

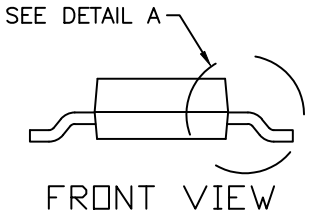
SCALE 1:1

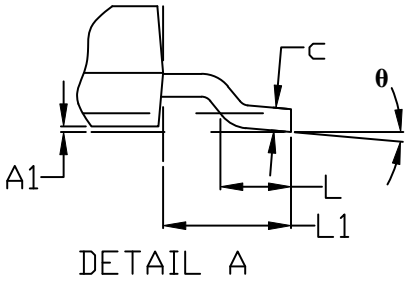
SOT−223 (TO−261)
CASE 318E−04
ISSUE R

DATE 02 OCT 2018



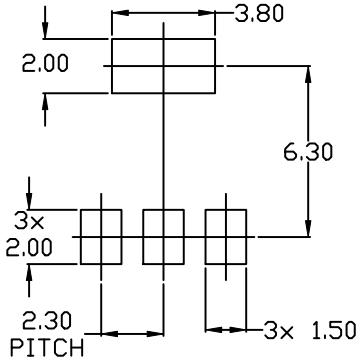






NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.200MM PER SIDE.
4. DATUMS A AND B ARE DETERMINED AT DATUM H.
5. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
6. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
A	1.50	1.63	1.75
A1	0.02	0.06	0.10
b	0.60	0.75	0.89
b1	2.90	3.06	3.20
c	0.24	0.29	0.35
D	6.30	6.50	6.70
E	3.30	3.50	3.70
e	2.30 BSC		
L	0.20	---	---
L1	1.50	1.75	2.00
He	6.70	7.00	7.30
θ	0°	---	10°



RECOMMENDED MOUNTING FOOTPRINT

SOT−223 (TO−261)
CASE 318E−04
ISSUE R

DATE 02 OCT 2018

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 2:
PIN 1. ANODE
2. CATHODE
3. NC
4. CATHODE

STYLE 3:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 4:
PIN 1. SOURCE
2. DRAIN
3. GATE
4. DRAIN

STYLE 5:
PIN 1. DRAIN
2. GATE
3. SOURCE
4. GATE

STYLE 6:
PIN 1. RETURN
2. INPUT
3. OUTPUT
4. INPUT

STYLE 7:
PIN 1. ANODE 1
2. CATHODE
3. ANODE 2
4. CATHODE

STYLE 8:
CANCELLED

STYLE 9:
PIN 1. INPUT
2. GROUND
3. LOGIC
4. GROUND

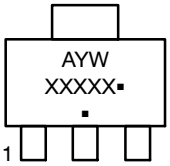
STYLE 10:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 11:
PIN 1. MT 1
2. MT 2
3. GATE
4. MT 2

STYLE 12:
PIN 1. INPUT
2. OUTPUT
3. NC
4. OUTPUT

STYLE 13:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

GENERIC MARKING DIAGRAM*



A = Assembly Location
Y = Year
W = Work Week
XXXXX = Specific Device Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	SOT−223 (TO−261)	PAGE 2 OF 2