NPN SURFACE MOUNT DARLINGTON TRANSISTOR IN SOT23

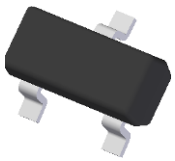
Features

- Epitaxial Planar Die Construction
- Ideal for Medium Power Amplification and Switching
- High Current Gain
- Complementary PNP Types: MMBTA63 / MMBTA64
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

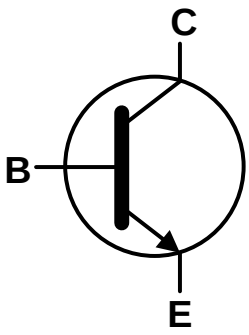
Mechanical Data

- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.008 grams (Approximate)

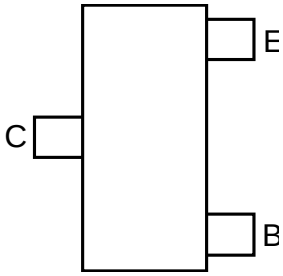
SOT23



Top View



Device Symbol



Top View
Pin-Out

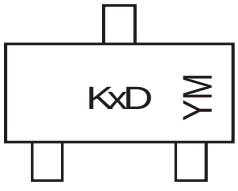
Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
MMBTA13-7-F	Standard	K2D	7	8	3,000
MMBTA14-7-F	Standard	K3D	7	8	3,000
MMBTA14-13-F	Standard	K3D	13	8	10,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SOT23



KxD = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: J = 2022)
M = Month (ex: D = December)

Date Code Key

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	H	I	J	K	L	M	N	O	P	R	S	T

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Absolute Maximum Ratings (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	30	V
Collector-Emitter Voltage	V_{CEO}	30	V
Emitter-Base Voltage	V_{EBO}	10	V
Collector Current	I_C	300	mA

Thermal Characteristics (@ T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Collector Power Dissipation	(Note 5)	P_D	300	mW
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	417	°C/W
Thermal Resistance, Junction to Leads	(Note 6)	$R_{\theta JL}$	—	°C/W
Operating and Storage Temperature Range		T_J,T_{STG}	-55 to +150	°C

ESD Ratings (Note 7)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes: 5. For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
6. Thermal resistance from junction to solder-point (at the end of the leads).
7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Min	Typ.	Max	Unit	Test Condition
OFF CHARACTERISTICS							
Collector-Emitter Breakdown Voltage (Note 8)		BV_{CEO}	30	—	—	V	I_C = 100μA V_{BE} = 0V
Collector Cut-Off Current		I_{CBO}	—	—	100	nA	V_{CB} = 30V, I_E = 0
Emitter Cutoff Current		I_{EBO}	—	—	100	nA	V_{EB} = 10V, I_C = 0
ON CHARACTERISTICS (Note 8)							
DC Current Gain	MMBTA13	h_{FE}	5,000	—	—	—	I_C = 10mA, V_{CE} = 5.0V
	MMBTA14		10,000				I_C = 10mA, V_{CE} = 5.0V
	MMBTA13		10,000				I_C = 100mA, V_{CE} = 5.0V
	MMBTA14		20,000				I_C = 100mA, V_{CE} = 5.0V
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	—	1.5	V	I_C = 100mA, I_B = 100μA
Base-Emitter Saturation Voltage		$V_{BE(sat)}$	—	—	2.0	V	I_C = 100mA, V_{CE} = 5.0V
SMALL SIGNAL CHARACTERISTICS							
Output Capacitance		C_{obo}	—	8.0	—	pF	V_{CB} = 10V, f = 1.0MHz, I_E = 0
Input Capacitance		C_{ibo}	—	15	—	pF	V_{EB} = 0.5V, f = 1.0MHz, I_C = 0
Transition Frequency		f_T	125	—	—	MHz	V_{CE} = 5.0V, I_C = 10mA, f = 100MHz

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

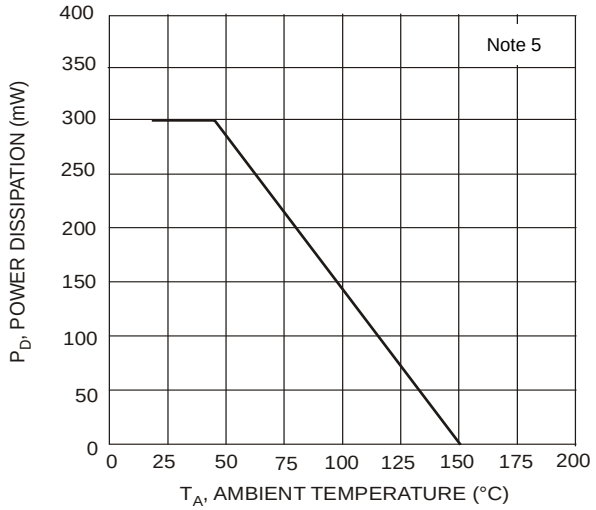


Fig. 1, Max Power Dissipation vs Ambient Temperature

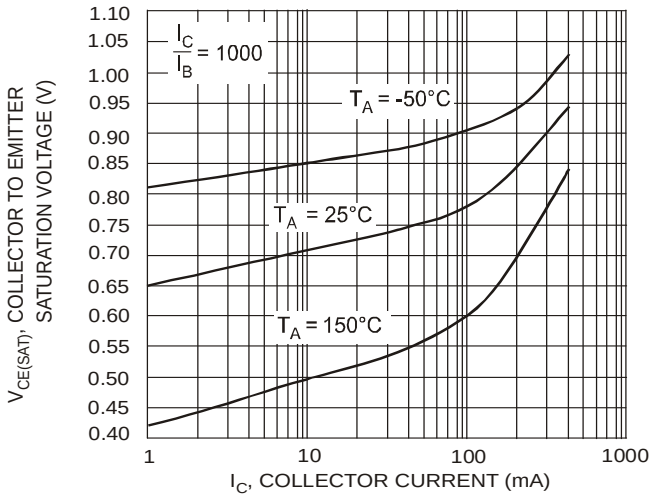


Fig. 2, Collector Emitter Saturation Voltage vs. Collector Current

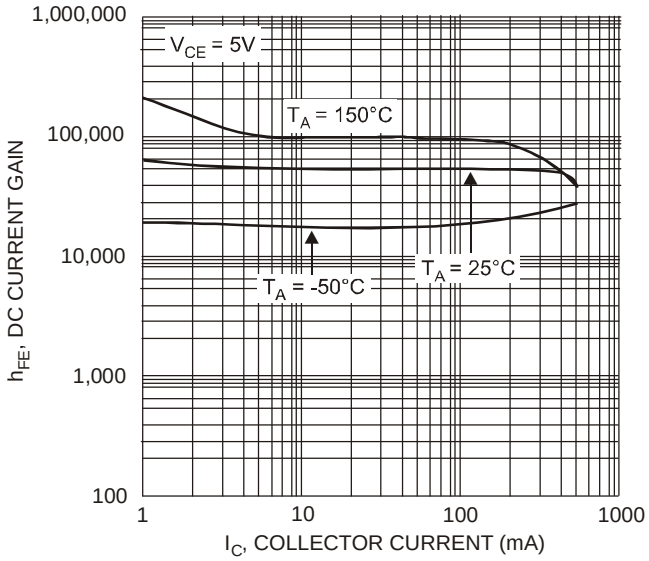


Fig. 3, DC Current Gain vs Collector Current

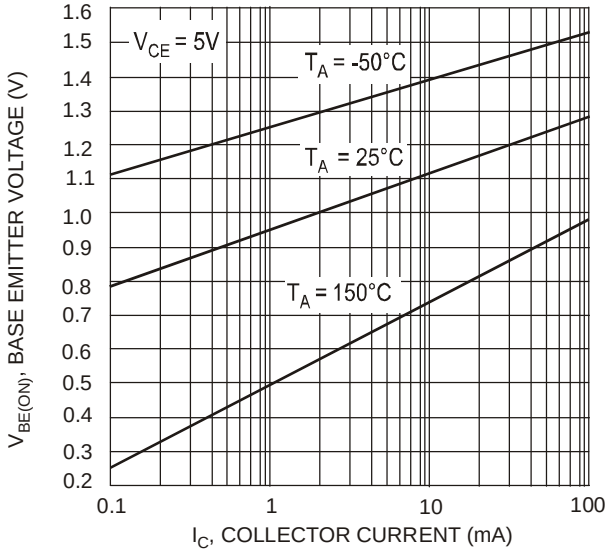


Fig. 4, Base Emitter Voltage vs. Collector Current

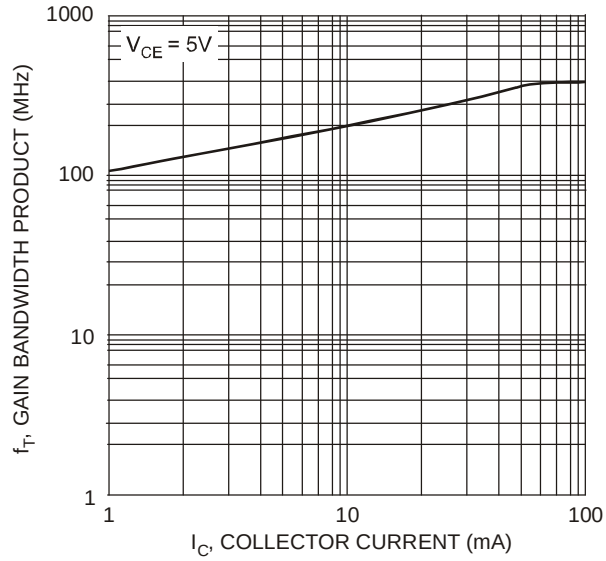


Fig. 5, Gain Bandwidth Product vs Collector Current

Package Outline Dimensions

Please see https://www.diodes.com/design/support/packaging/diodes-packaging/ for the latest version.

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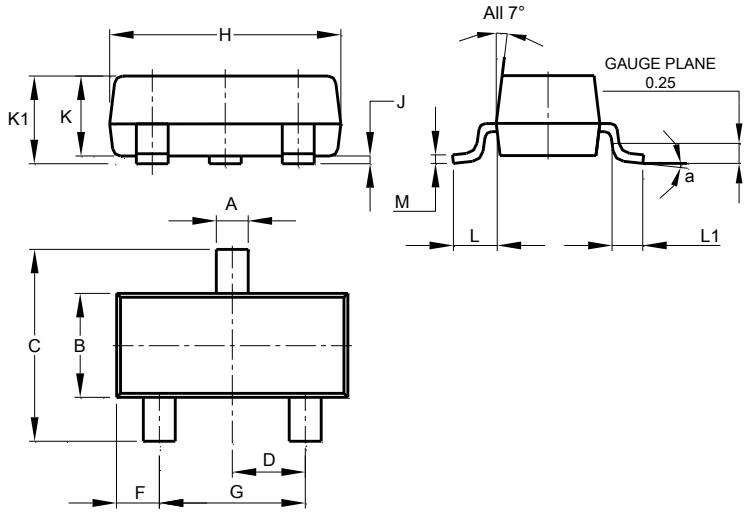
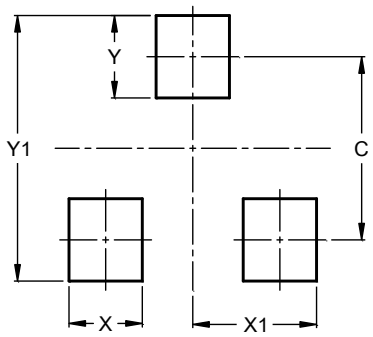


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see https://www.diodes.com/design/support/packaging/diodes-packaging/ for the latest version.

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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