

**12V LOW VCE(SAT) PNP SURFACE MOUNT TRANSISTOR**

**Features**

- Low Collector-Emitter Saturation Voltage,  $V_{CE(sat)}$
- Ultra-Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

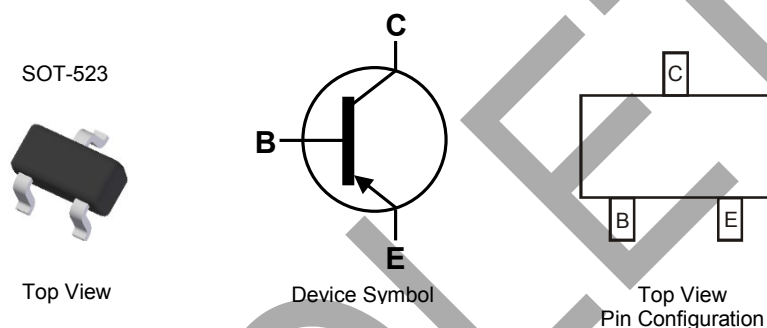
**Applications**

- DC-DC Converter
- Portable Equipment
- Power Management Units

**Mechanical Data**

- Case: SOT523
- Case Material: Molded Plastic, "Green" Molding Compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208  $\text{e3}$
- Weight: 0.002 grams (Approximate)

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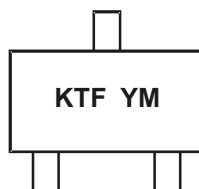


**Ordering Information (Note 4)**

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
2DA2018-7	AEC-Q101	KTF	7	8mm	3,000

- 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 [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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 <http://www.diodes.com/products/packages.html>.

**Marking Information**



KTF = Product Type Marking Code  
 YM = Date Code Marking  
 Y or Y = Year (ex: F = 2018)  
 M = Month (ex: 9 = September)

**Date Code Key**

Year	2018	2019	2020	2021	2022	2023	2024	2025
Code	F	G	H	I	J	K	L	M

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

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**Absolute Maximum Ratings** (@T<sub>A</sub> = 25°C unless otherwise specified)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	-15	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-12	V
Emitter-Base Voltage	V <sub>EBO</sub>	-7	V
Collector Current - Continuous	I <sub>C</sub>	-500	mA
Peak Pulse Collector Current	I <sub>CM</sub>	-1	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5) @ T <sub>A</sub> = 25°C	P <sub>D</sub>	150	mW
Thermal Resistance, Junction to Ambient (Note 5) @ T <sub>A</sub> = 25°C	R <sub>θJA</sub>	833	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

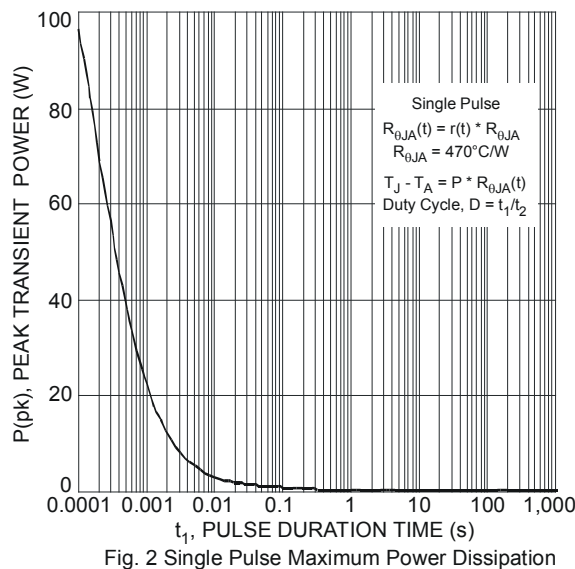
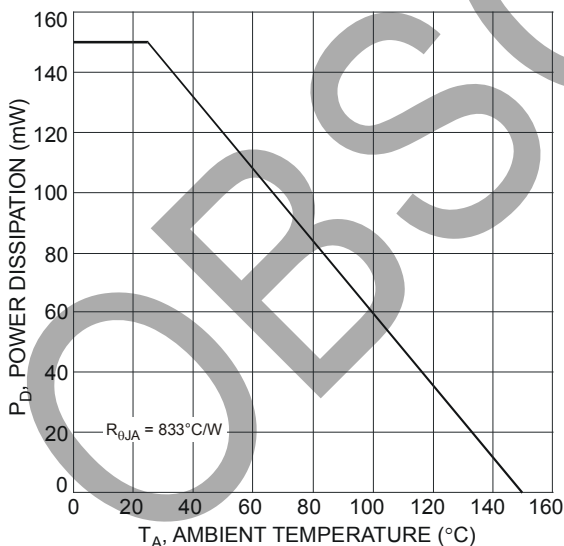
Note: 5. Device mounted on FR-4 PCB with minimum recommended pad layout.

**ESD Ratings** (Note 6)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Note: 6. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**



**Thermal Characteristics and Derating Information** (continued)

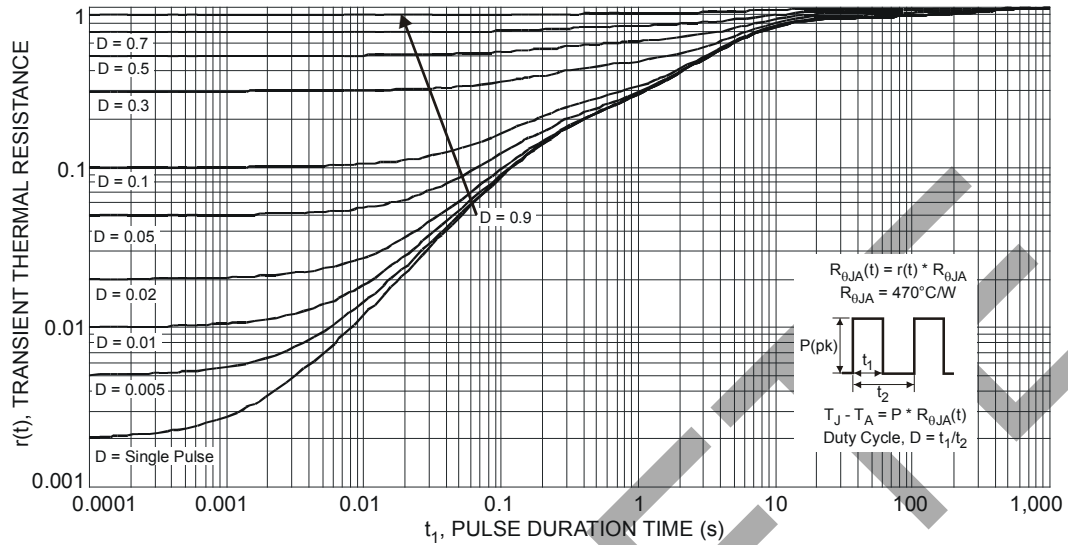


Fig. 3 Transient Thermal Response

**Electrical Characteristics** (@ $T_A = 25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	-15	—	—	V	$I_C = -100\mu\text{A}, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 7)	$BV_{CEO}$	-12	—	—	V	$I_C = -1\text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	-7	—	—	V	$I_E = -100\mu\text{A}, I_C = 0$
Collector Cutoff Current	$I_{CBO}$	—	—	-20 -50	nA $\mu\text{A}$	$V_{CB} = -15\text{V}, I_E = 0$ $V_{CB} = -15\text{V}, I_E = 0, T_A = 150^\circ\text{C}$
Emitter Cutoff Current	$I_{EBO}$	—	—	-20	nA	$V_{EB} = -6\text{V}, I_C = 0$
DC Current Gain (Note 7)	$h_{FE}$	270	—	680	—	$V_{CE} = -2\text{V}, I_C = -10\text{mA}$
Collector-Emitter Saturation Voltage (Note 7)	$V_{CE(sat)}$	—	—	-250	mV	$I_C = -200\text{mA}, I_B = -10\text{mA}$
Output Capacitance	$C_{obo}$	—	7.4	—	pF	$V_{CB} = -10\text{V}, f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	$f_T$	—	260	—	MHz	$V_{CE} = -2\text{V}, I_C = -10\text{mA}, f = 100\text{MHz}$
Turn-On Time	$t_{on}$	—	40	—	ns	$V_{CC} = -6\text{V}$ $I_C = -200\text{mA}, I_{B1} = -I_{B2} = -10\text{mA}$
Delay Time	$t_d$	—	18	—	ns	
Rise Time	$t_r$	—	22	—	ns	
Turn-Off Time	$t_{off}$	—	106	—	ns	
Storage Time	$t_s$	—	87	—	ns	
Fall Time	$t_f$	—	19	—	ns	

Note: 7. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

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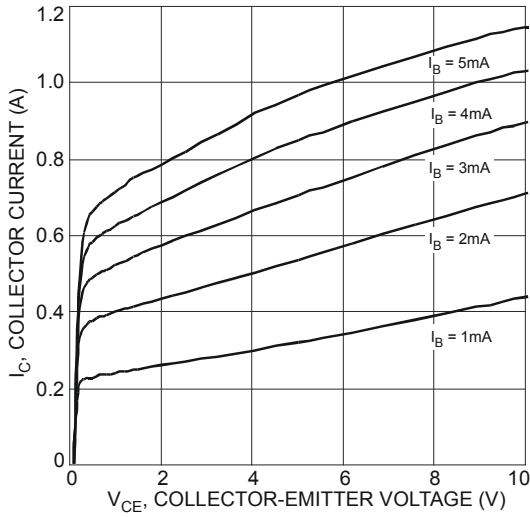


Fig. 4 Typical Collector Current vs. Collector-Emitter Voltage

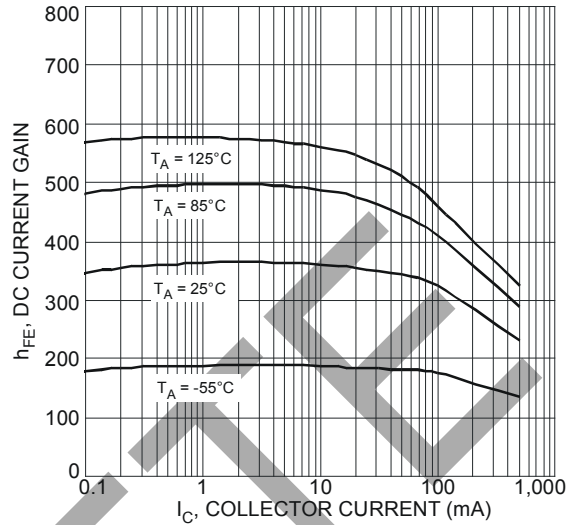


Fig. 5 Typical DC Current Gain vs. Collector Current

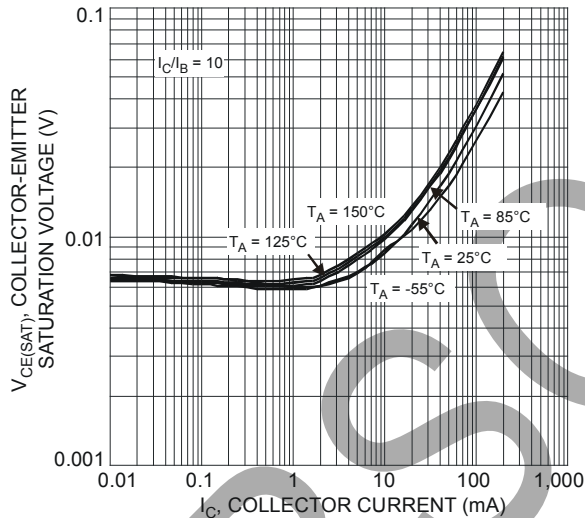


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

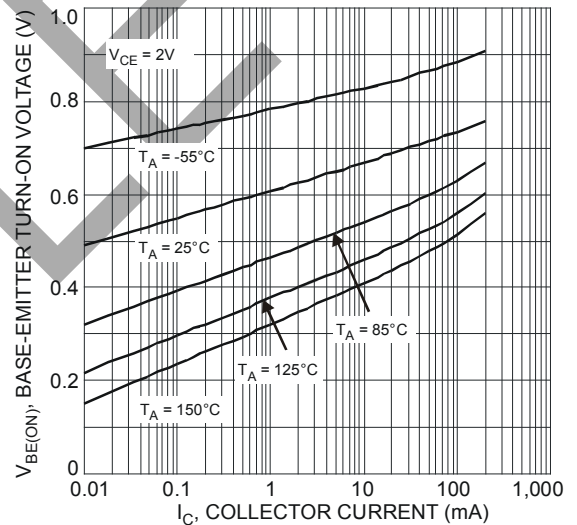


Fig. 7 Typical Base-Emitter Turn-On Voltage vs. Collector Current

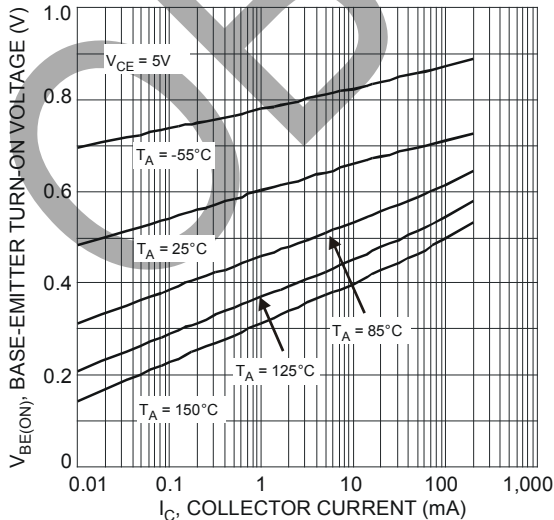


Fig. 8 Typical Base-Emitter Turn-On Voltage vs. Collector Current

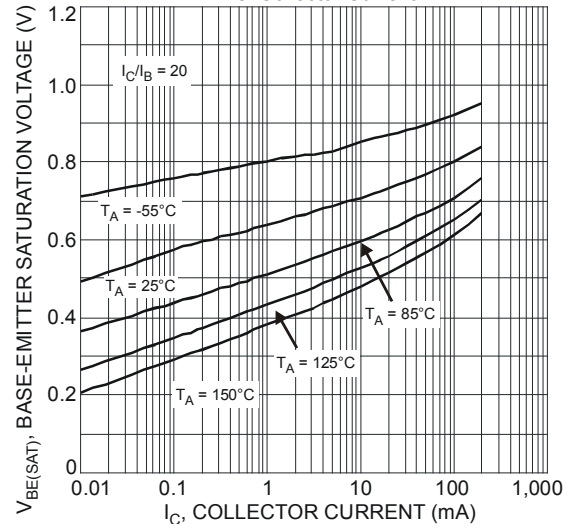


Fig. 9 Typical Base-Emitter Saturation Voltage vs. Collector Current

**Typical Electrical Characteristics** (continued)

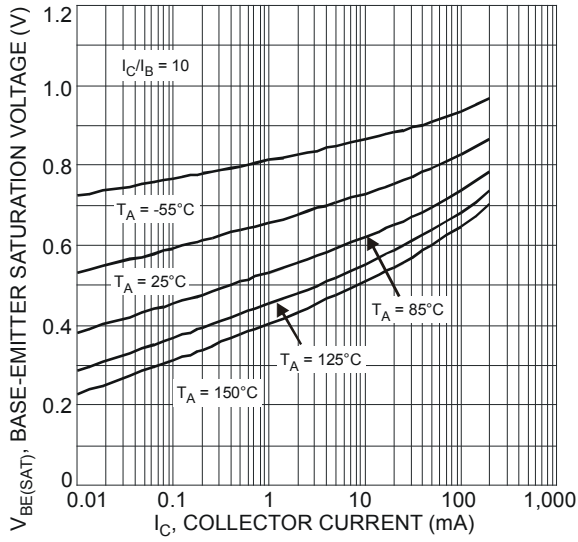


Fig. 10 Typical Base-Emitter Saturation Voltage vs. Collector Current

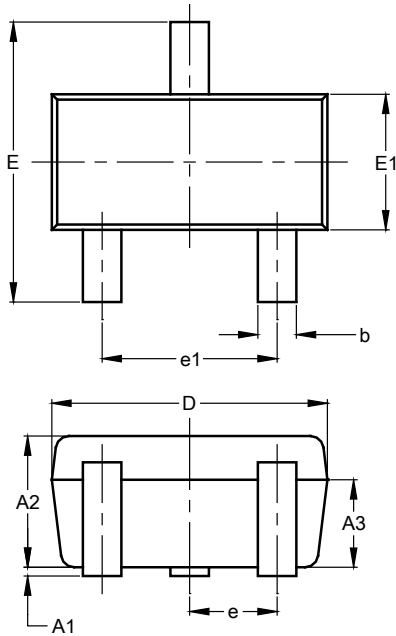
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**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT523



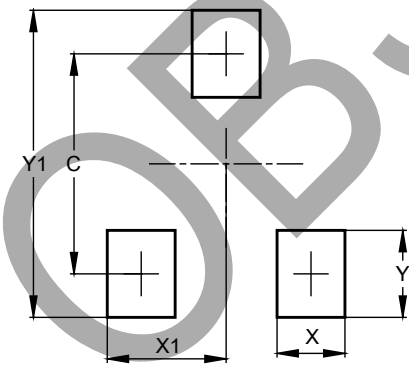
SOT523			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

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**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT523



Dimensions	Value
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80

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