Silicon NPN Power Transistors

Silicon NPN power transistors are for use in power amplifier and switching circuits, — excellent safe area limits. Complement to PNP 2N5194, 2N5195.

Features

- ESD Ratings: Machine Model, C; > 400 V Human Body Model, 3B; > 8000 V
- Epoxy Meets UL 94 V-0 @ 0.125 in.
- Pb–Free Packages are Available*

MAXIMUM RATINGS

Rating		Symbol	Value	Unit
Collector–Emitter Voltage	2N5190 2N5191 2N5192	V _{CEO}	40 60 80	Vdc
Collector–Base Voltage	2N5190 2N5191 2N5192	V _{CBO}	40 60 80	Vdc
Emitter-Base Voltage		V _{EBO}	5.0	Vdc
Collector Current		Ι _C	4.0	Adc
Base Current		Ι _Β	1.0	Adc
Total Device Dissipation @ T Derate above 25°C	C = 25°C	PD	40 320	W mW/°C
Operating and Storage Junc Temperature Range	tion	T _J , T _{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.12	°C/W

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



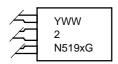
ON Semiconductor®

http://onsemi.com

4.0 AMPERES NPN SILICON POWER TRANSISTORS 40, 60, 80 VOLTS – 40 WATTS



MARKING DIAGRAM



Y	=	Year
WW	=	Work Week
2N519x	=	Device Code
		x = 0, 1, or 2
G	=	Pb-Free Package

ORDERING INFORMATION

Device	Package	Shipping [†]
2N5190	TO-225AA	500 Units/Box
2N5190G	TO-225AA (Pb-Free)	500 Units/Box
2N5191	TO-225AA	500 Units/Box
2N5191G	TO-225AA (Pb-Free)	500 Units/Box
2N5192	TO-225AA	500 Units/Box
2N5192G	TO-225AA (Pb-Free)	500 Units/Box

*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

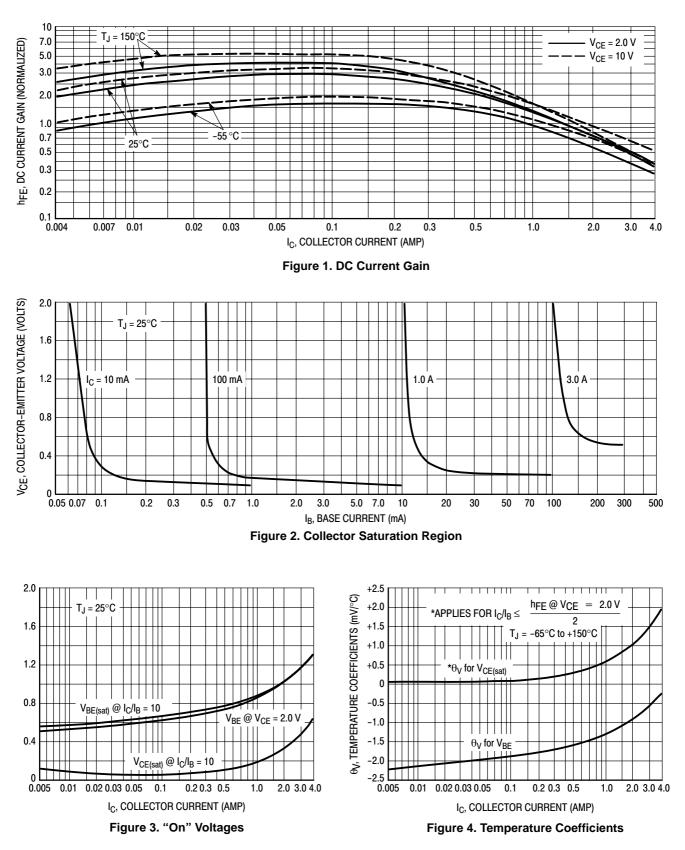
+For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

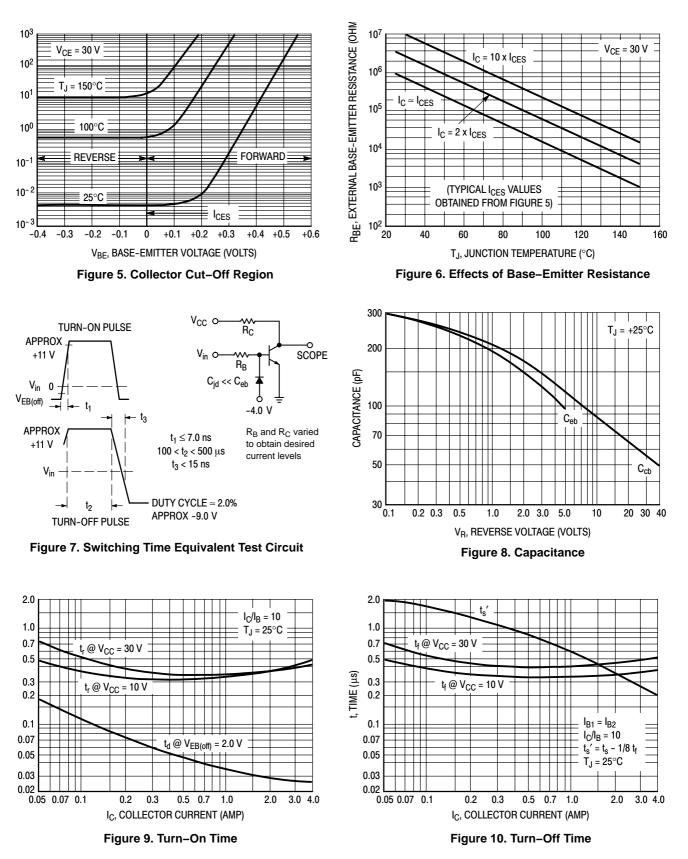
ELECTRICAL CHARACTERISTICS* (T_C = 25° C unless otherwise noted)

Characteristic	Symbol	Min	Мах	Unit	
OFF CHARACTERISTICS					
Collector–Emitter Sustaining Voltage (Note 1) ($I_C = 0.1$ Adc, $I_B = 0$)	2N5190 2N5191 2N5192	V _{CEO(sus)}	40 60 80		Vdc
	2N5190 2N5191 2N5192	I _{CEO}	- - -	1.0 1.0 1.0	mAdc
	2N5190 2N5191 2N5192 2N5190 2N5191 2N5192	I _{CEX}		0.1 0.1 2.0 2.0 2.0	mAdc
	2N5190 2N5191 2N5192	I _{CBO}		0.1 0.1 0.1	mAdc
Emitter Cutoff Current ($V_{BE} = 5.0 \text{ Vdc}, I_C = 0$)		I _{EBO}	-	1.0	mAdc
ON CHARACTERISTICS (Note 1)					-
DC Current Gain (I _C = 1.5 Adc, V _{CE} = 2.0 Vdc) (I _C = 4.0 Adc, V _{CE} = 2.0 Vdc)	2N5190/2N5191 2N5192 2N5190/2N5191 2N5192	h _{FE}	25 20 10 7.0	100 80 - -	-
Collector–Emitter Saturation Voltage $(I_C = 1.5 \text{ Adc}, I_B = 0.15 \text{ Adc})$ $(I_C = 4.0 \text{ Adc}, I_B = 1.0 \text{ Adc})$		V _{CE(sat)}		0.6 1.4	Vdc
Base–Emitter On Voltage (I _C = 1.5 Adc, V _{CE} = 2.0 Vdc)		V _{BE(on)}	_	1.2	Vdc
DYNAMIC CHARACTERISTICS			•	•	•
					1

Current–Gain — Bandwidth Product ($I_C = 1.0 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ MHz}$)	f _T	2.0	-	MHz

*JEDEC Registered Data. 1. Pulse Test: Pulse Width \leq 300 µs, Duty Cycle \leq 2.0%.





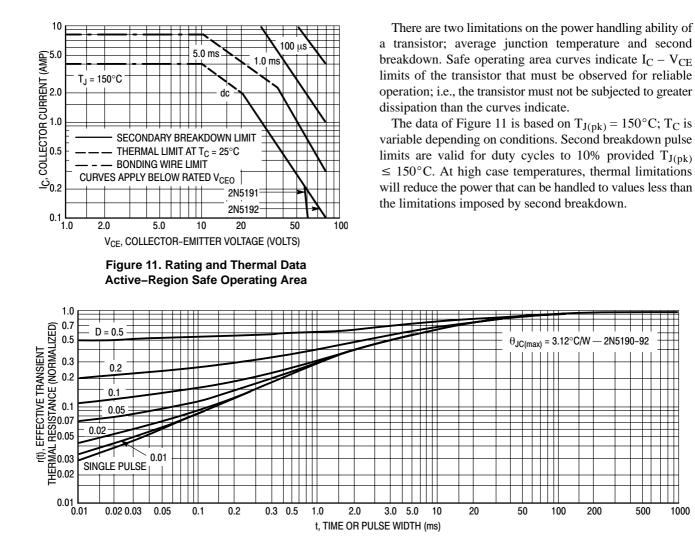
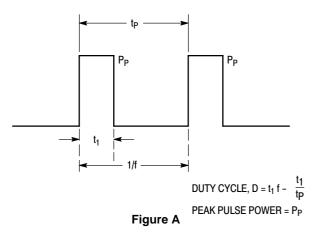


Figure 12. Thermal Response





A train of periodical power pulses can be represented by the model shown in Figure A. Using the model and the device thermal response, the normalized effective transient thermal resistance of Figure 12 was calculated for various duty cycles.

To find $\theta_{JC}(t)$, multiply the value obtained from Figure 12 by the steady state value θ_{JC} .

Example:

The 2N5190 is dissipating 50 watts under the following conditions: $t_1 = 0.1$ ms, $t_p = 0.5$ ms. (D = 0.2).

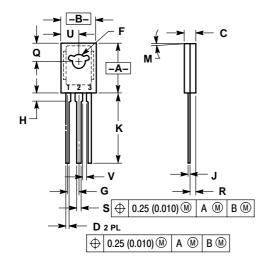
Using Figure 12, at a pulse width of 0.1 ms and D = 0.2, the reading of $r(t_1, D)$ is 0.27.

The peak rise in function temperature is therefore:

 $\Delta T = r(t) \times P_P \times \theta_{JC} = 0.27 \times 50 \times 3.12 = 42.2^{\circ}C$

PACKAGE DIMENSIONS

TO-225AA CASE 77-09 ISSUE Z



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

2. CONTROLLING DIMENSION: INCH. 3. 077-01 THRU -08 OBSOLETE, NEW STANDARD 077-09

	INCHES		MILLIN	IETERS	
DIM	MIN	MAX	MIN	MAX	
Α	0.425	0.435	10.80	11.04	
В	0.295	0.305	7.50	7.74	
С	0.095	0.105	2.42	2.66	
D	0.020	0.026	0.51	0.66	
F	0.115	0.130	2.93	3.30	
G	0.094	BSC	2.39 BSC		
Н	0.050	0.095	1.27	2.41	
J	0.015	0.025	0.39	0.63	
Κ	0.575	0.655	14.61	16.63	
М	5°	ТҮР	5°	ГҮР	
Q	0.148	0.158	3.76	4.01	
R	0.045	0.065	1.15	1.65	
S	0.025	0.035	0.64	0.88	
U	0.145	0.155	3.69	3.93	
٧	0.040		1.02		
STYLE 1: PIN 1. EMITTER 2. COLLECTOR 3. BASE					

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