

2N5301, 2N5302, 2N5303

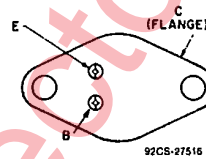
File Number **1029**

**High-Current High-Power
High-Speed N-P-N Power
Transistors**

Features:

- Specification for h_{FE} and $V_{CE(sat)}$ up to 30 A
- Current gain-bandwidth product $f_T = 2$ MHz min. at 1 A
- Low saturation voltage with high beta
- High dissipation capability

TERMINAL DESIGNATIONS



JEDEC TO-204AA

The RCA-2N5301, 2N5302 and 2N5303 are epitaxial-base silicon n-p-n transistors intended for a wide variety of high-power, high-current applications, such as power-switching circuits, driver and output stages for series and shunt regulators, dc-to-dc converters, inverters, and solenoid (hammer)/relay drivers.

These devices differ in maximum voltage ratings and $V_{CE(sat)}$, $V_{BE(sat)}$, and V_{BE} characteristics. All are supplied in JEDEC TO-204AA hermetic steel packages.

MAXIMUM RATINGS, Absolute-Maximum Values:

	2N5301	2N5302	2N5303	
V_{CEO}	40	60	80	V
$V_{CEO(sus)}$	40	60	80	V
V_{EBO}	—	5	—	V
I_C	—	30	—	A
I_{CM}	—	50	—	A
I_B	—	7.5	—	A
I_{BM}	—	15	—	A
P_T	—	—	—	W
At $T_C \leq 25^\circ C$	—	200	—	W
At $T_C > 25^\circ C$	—	1.15	—	W/ $^\circ C$
derate linearly	—	—	—	
T_J, T_{stg}	—	—	—	$^\circ C$
T_L	—	—	—	$^\circ C$
At distance $\geq 1/32$ in. (0.8 mm) from seating plane for 10 s max.	—	230	—	$^\circ C$

* In accordance with JEDEC registration data format JS-6 RDF-2.

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ELECTRICAL CHARACTERISTICS, at Case Temperature (T_C) = 25°C unless otherwise specified

CHARACTERISTIC	TEST CONDITIONS				LIMITS						UNITS		
	VOLTAGE V dc		CURRENT A dc		2N5301		2N5302		2N5303				
	V _{CE}	V _{BE}	I _C	I _B	Min.	Max.	Min.	Max.	Min.	Max.			
* I _{CBO}	40 ^a 60 ^a 80 ^a				-	1	-	-	-	-	1	mA	
* I _{CEX}	40 60 80	-1.5 -1.5 -1.5			-	1	-	-	1	-	1		
* I _{CEX} T _C = 150°C	40 60 80	-1.5 -1.5 -1.5			-	10	-	-	10	-	10		
* I _{CEO}	40 60 80				-	5	-	-	5	-	5		
* I _{EBO}		-5			-	5	-	-	5	-	5		
* h _{FE}	2 2 3 2 3		1 ^b 10 ^b 15 ^b 20 ^b 30 ^b		40 15 5	- 60 -	40 15 5	- 60 -	40 15 5	- 60 -	60		
* V _{CEO(sus)}			0.2		40	-	60	-	80	-	1	V	
* V _{BE}	2 2 4 4		10 ^b 15 ^b 20 ^b 30 ^b		- 1.7 3	- 1.7 -	- 1.7 3	- 1.7 -	- 1.7 3	- 1.7 -	1.5 2.5		
* V _{BE(sat)}			10 ^b 15 ^b 20 ^b 20 ^b	1 1.5 2 4	- 1.8 2.5 -	- 1.8 2.5 -	- 1.8 2.5 -	- 1.8 2.5 -	- 1.8 2.5 -	- 1.8 2.5 -	1.7 2 2.5		
* V _{CE(sat)}			10 ^b 15 ^b 20 ^b 20 ^b 30 ^b	1 1.5 2 4 6	- - 2 - 3	- - 2 - 3	- - 2 - 3	- - 2 - 3	- - 2 - 3	- - 2 - 3	1 1.5 2		
I _{S/b} t _p = 1 s nonrep.	20				10	-	10	-	10	-	10		A
* h _{fe} f = 1 MHz	10		1	-	2	-	2	-	2	-	2		
* h _{fe} f = 1 kHz	10		1	-	40	-	40	-	40	-	40		
* t _r (See Fig.8)	V _{CC} =		10	1 ^c	-	1	-	1	-	1	1		μs
* t _s	30		10	1 ^c	-	2	-	2	-	2	2		
* t _f			10	1 ^c	-	1	-	1	-	1	1		
R _{θJC}	20		5	-	-	0.875	-	0.875	-	0.875	-	0.875	°C/W

^a In accordance with JEDEC registration data format JS-6 RDF-1.

^a V_{CB}

^b Pulsed; pulse duration = 300 μs, duty factor = 1.8%

^c I_{B1} = -I_{B2}

General-Purpose Power Transistors

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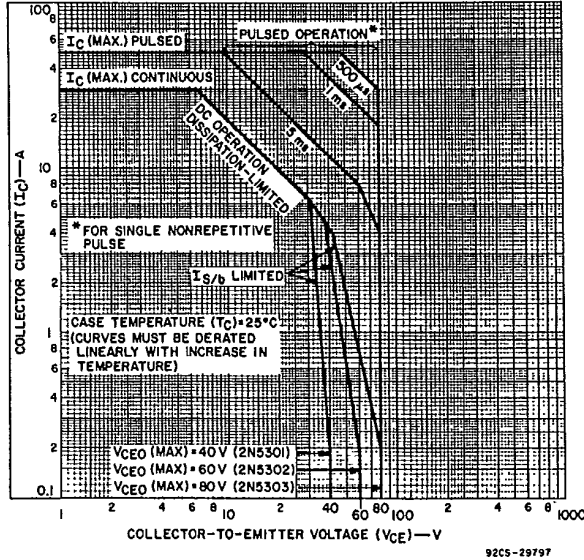


Fig. 1 - Maximum operating areas for 2N5301, 2N5302, and 2N5303.

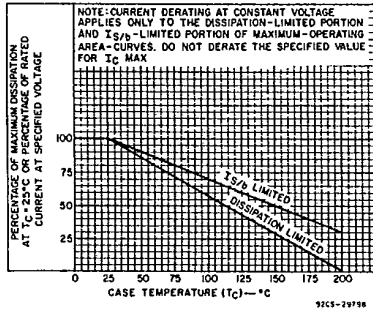


Fig. 2 - Derating curves for 2N5301, 2N5302, and 2N5303.

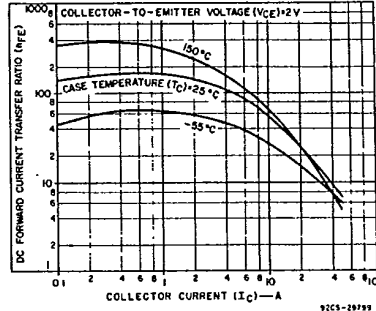


Fig. 3 - Typical dc beta characteristics as a function of collector current for 2N5301, 2N5302, and 2N5303.

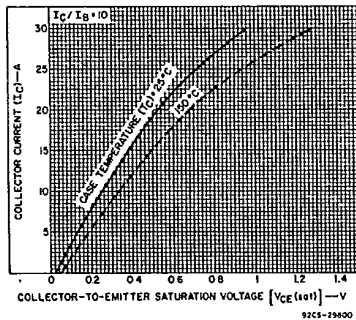


Fig. 4 - Typical saturation voltage characteristics for 2N5301, 2N5302, and 2N5303.

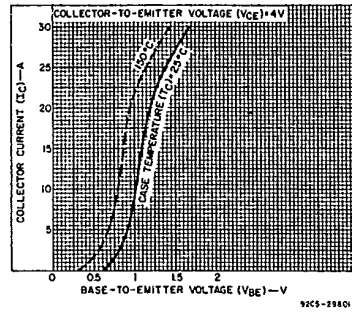


Fig. 5 - Typical transfer characteristics for 2N5301, 2N5302, and 2N5303.

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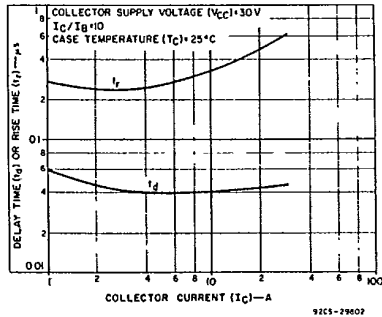


Fig. 6 - Typical delay-time and rise-time characteristics as a function of collector current for 2N5301, 2N5302, and 2N5303.

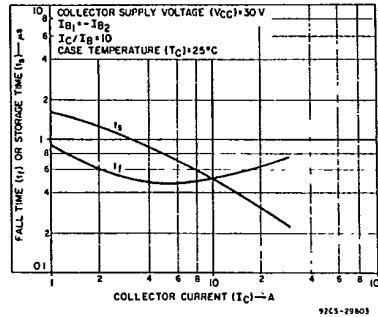


Fig. 7 - Typical storage-time and fall-time characteristics as a function of collector current for 2N5301, 2N5302, and 2N5303.

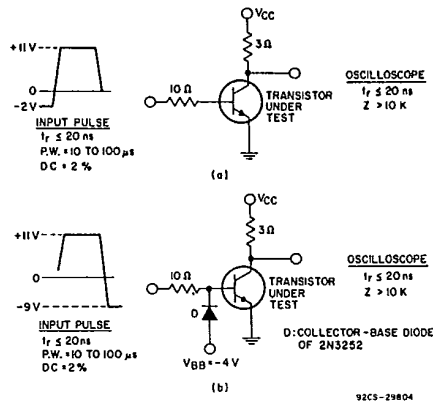


Fig. 8 - Equivalent test circuits for rise-time (a) and fall-time and storage-time (b) measurements for 2N5301, 2N5302, and 2N5303.