

2N6032, 2N6033

File Number 462

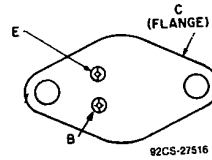
High-Current, High-Speed High-Power Transistors

Silicon N-P-N Types for High-Speed Switching and Linear-Amplifier Applications in Military, Industrial and Commercial Equipment

Features:

- Low $V_{ce(sat)}=1$ V max. at 40 A, 1.3 V max. at 50 A
- Maximum safe-area-of-operation curves
 $I_{B/Ic}$ limit line beginning at 24 V
- Fast storage time:
 $t_s=1.5\mu s$ max. at $I_c=40$ A (2N6033), 50 A (2N6032)

TERMINAL DESIGNATIONS



JEDEC TO-204AE

The RCA-2N6032 and 2N6033* are epitaxial silicon n-p-n transistors having high-current and high-power handling capability and fast switching speed. The 2N6033 is similar to the 2N6032; they differ in maximum values for continuous collector current and sustaining voltage.

They are supplied in the JEDEC TO-204AE hermetic steel package with 0.060-inch diameter pins.

*Formerly RCA Dev. Types TA7337 and TA7337A, respectively.

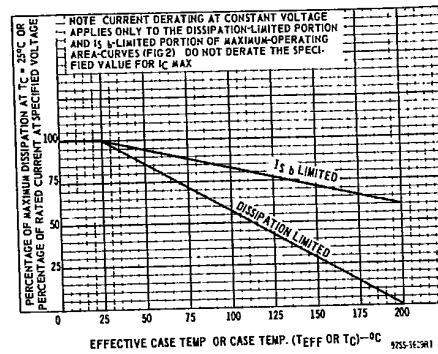


Fig. 1 - Derating curves for both types.

MAXIMUM RATINGS, Absolute-Maximum Values:

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• COLLECTOR-TO-BASE VOLTAGE, V_{cbo}	120	150	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE:			
With base open, $V_{ceo(sus)}$	90	120	V
With external base-to-emitter resistance ($R_{BE} \leq 50 \Omega$), $V_{cer(sus)}$	110	140	V
• With external base-to-emitter resistance ($R_{BE} \leq 50 \Omega$ & $V_{BE} = -1.5$ V, $V_{ce(sus)}$	120	150	V
• EMITTER-TO-BASE VOLTAGE, V_{EBO}	7	7	V
• CONTINUOUS COLLECTOR CURRENT, I_c	50	40	A
• BASE CURRENT, I_B	10	10	A
• EMITTER CURRENT, I_E	50	40	A
• TRANSISTOR DISSIPATION, P_T :			
At case temperatures up to 25°C and V_{CE} up to 24 V	140	140	W
At case temperatures up to 25°C and V_{CE} above 24 V	See Fig. 2		
At case temperatures above 25°C and V_{CE} above 24 V	See Figs. 2 & 3		
• TEMPERATURE RANGE:			
Storage & Operating (Junction)	-65 to +200		°C
• PIN TEMPERATURE (During Soldering):			
At distance $\geq 1/32$ in. (0.8 mm) from seating plane for 10 s max.	230		°C

*In accordance with JEDEC registration data format (JS-6 RDF-1).

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ELECTRICAL CHARACTERISTICS, Case Temperature (T_C) = 25°C Unless Otherwise Specified

CHARACTERISTIC	SYMBOL	TEST CONDITIONS							LIMITS				UNITS
		DC Collector Voltage (V)		DC Emitter or Base Voltage (V)		DC Current (A)			Type 2N6032		Type 2N6033		
		V _{CB}	V _{CE}	V _{EB}	V _{BE}	I _C	I _E	I _B	Min.	Max.	Min.	Max.	
Collector-Cutoff Current: With base open	I _{CEO}	-	80	-	-	-	-	0	-	10	-	10	mA
* With base-emitter junction reverse biased (T _C = 150°C)	I _{CEV}	-	110	-	-1.5	-	-	-	-	12	-	-	mA
		-	135	-	-1.5	-	-	-	-	-	-	10	mA
		-	100	-	-1.5	-	-	-	-	15	-	10	mA
* Emitter-Cutoff Current	I _{EBO}	-	-	7	-	0	-	-	-	10	-	10	mA
Collector-to-Emitter Sustaining Voltage: (See Figs. 12 & 13) With base open	V _{CEO(sus)}	-	-	-	-	0.2	-	0	90 ^a	-	120 ^a	-	V
* With external base to emitter resistance (R _{BE}) ≤ 50 Ω	V _{CER(sus)}	-	-	-	-	0.2	-	0	110 ^a	-	140 ^a	-	V
With base-emitter junction reverse biased & R _{BE} ≤ 50 Ω	V _{CEX(sus)}	-	-	-	-1.5	0.2	-	0	120 ^a	-	150 ^a	-	V
* Base-to-Emitter Saturation Voltage ^c	V _{BE(sat)}	-	-	-	-	50 40	-	5 4	-	2 -	-	2 -	V
Base-to-Emitter Voltage	V _{BE}	-	2 2	-	-	50 40	-	-	-	2 -	-	2 -	V
* Collector-to-Emitter Saturation Voltage ^c	V _{CE(sat)}	-	-	-	-	50 40	-	5 4	-	1.3 -	-	1 -	V
* DC Forward-Current Transfer Ratio ^c	h _{FE}	-	2.6 2	-	-	50 40	-	-	10 -	50 -	-	10 50	
Second-Breakdown Collector Current With base forward biased	I _{S/b} ^b	-	24 40	-	-	-	-	-	-	5.8 ^c 0.9 ^c	-	5.8 ^c 0.9 ^c	A
* Magnitude of common-emitter small-signal, short-circuit, forward-current transfer ratio (at 5 MHz)	h _{fe}	-	10	-	-	2	-	-	10	-	10	-	
Gain-Bandwidth Product	f _T	-	10	-	-	2	-	-	50	-	50	-	MHz
Output Capacitance (at 1 MHz)	C _{obo}	10	-	-	-	-	0	-	-	800	-	800	pF
Saturated Switching Time: Turn-On (Delay Time + Rise Time)	t _{on}	V _{CC} = 30V	-	-	-	50 40	-	5 ^e 4 ^e	-	1 -	-	1 -	μs
* Rise	t _r	V _{CC} = 30V	-	-	-	50 40	-	5 ^e 4 ^e	-	1 -	-	1 -	μs
* Storage	t _s	V _{CC} = 30V	-	-	-	50 40	-	5 ^e 4 ^e	-	1.5 -	-	1.5 -	μs
* Fall	t _f	V _{CC} = 30V	-	-	-	50 40	-	5 ^e 4 ^e	-	0.5 -	-	0.5 -	μs
Thermal Resistance (Junction-to-Case)	θ _{J-C}	-	20	-	-	2.5	-	-	-	1.25	-	1.25	°C/W

^a CAUTION: The sustaining voltages V_{CEO(sus)}, V_{CER(sus)}, and V_{CEX(sus)} MUST NOT be measured on a curve tracer.

^b I_{S/b} is defined as the current at which second breakdown occurs at a specified collector voltage with the emitter-base junction forward biased for transistor operation in the active region.

^c Pulsed; 1-s, non-repetitive pulse.

^e I_{B1} = I_{B2} *In accordance with JEDEC registration format JS-6 RDF-1.

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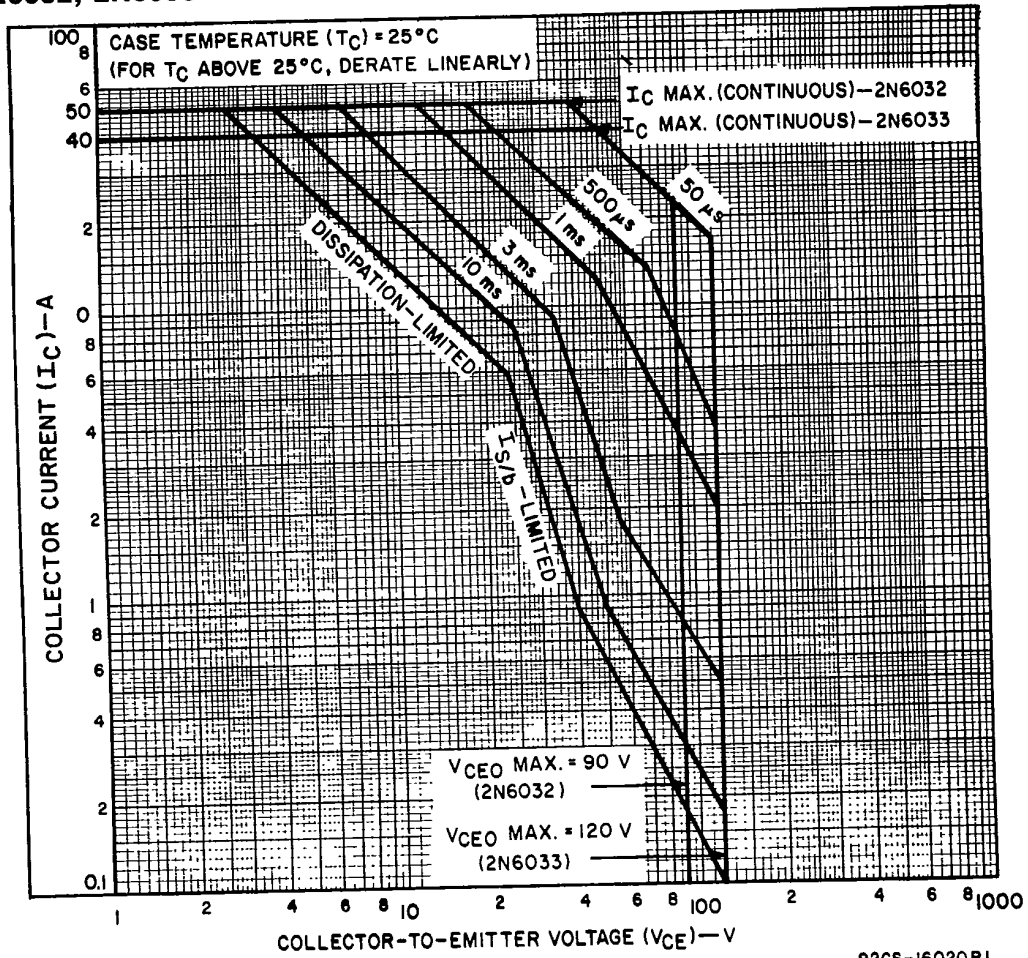


Fig. 2 - Maximum operating area for both types.

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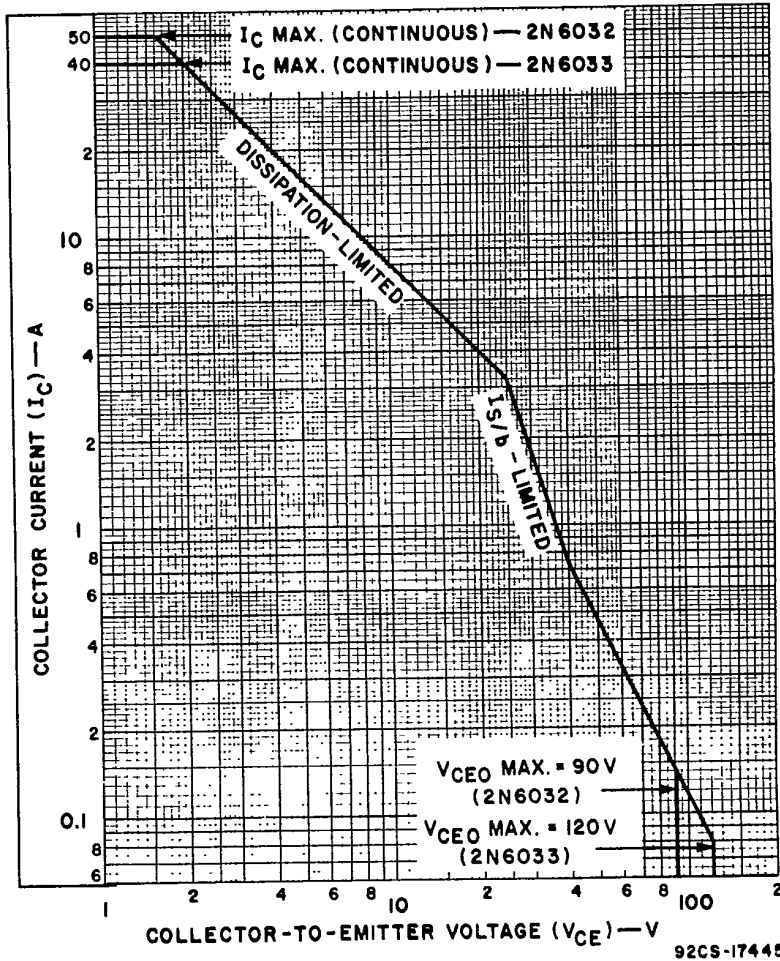


Fig. 3 - Maximum operating areas for both types at case temperature (T_c) = 100°C.

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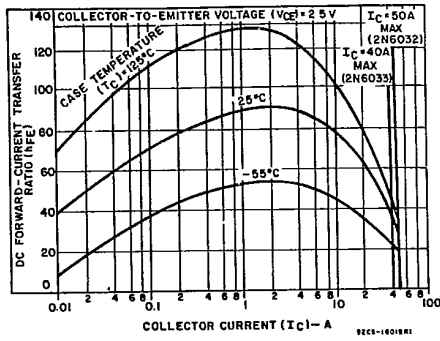


Fig. 4 - Typical dc-beta characteristics for both types.

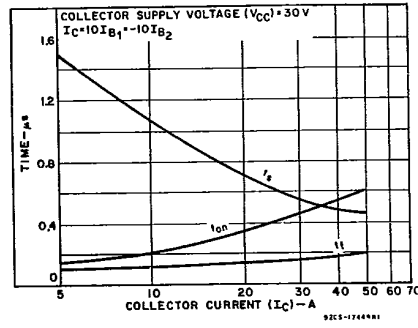


Fig. 5 - Typical saturated switching characteristics for both types.

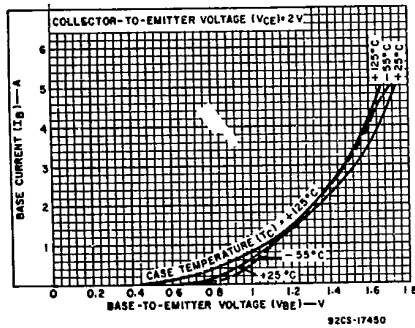


Fig. 6 - Typical input characteristics for both types.

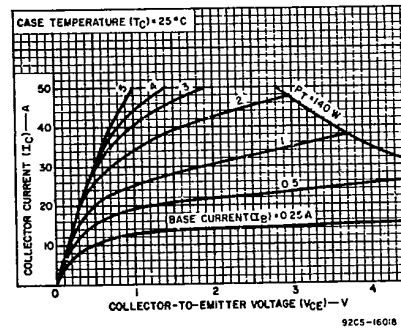


Fig. 7 - Typical collector characteristics for both types.

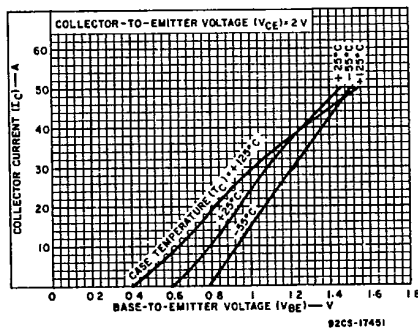


Fig. 8 - Typical transfer characteristics for both types.

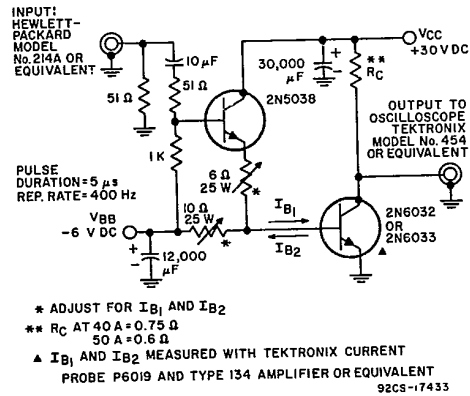


Fig. 9 - Switching-time test set.