High-Voltage, Silicon N-P-N Transistors

For High-Speed Switching and Linear-Amplifier Applications in Industrial and Commerical Service

Features:

- *High voltage ratings: V_{CER}[sus]*
  =350 V, $R_{BE} \leq 50\ \Omega$ (2N5240)
  =250 V, $R_{BE} \leq 50\ \Omega$ (2N5239)
- *High power dissipation rating:*
  P_T = 100 W at V_{CE} = 125 V, T_C = 25° C
- *For switching applications where circuit values and operating conditions require a transistor with a high second-breakdown rating ($I_{S/b}$) (limit line begins at 125 V)*
- *Exceptional second-breakdown: 0.8 A at V_{CE} = 125 V*
- *Maximum area-of-operation curves for dc and pulse operation*

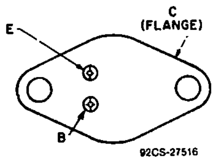
The RCA-2N5239 and 2N5240• are multi epitaxial silicon n-p-n power transistors.

The high breakdown voltage ratings and exceptional second-breakdown capabilities of these transistors make them especially suitable for use in series regulators, power amplifiers, inverters, deflection circuits, switching regulators, and high-voltage bridge amplifiers.

These types differ in breakdown voltage and leakage current values. The 2N5239 and 2N5240 are supplied in steel JEDEC TO-204AA hermetic packages.

• RCA Dev. No. TA2765 and TA2765A, respectively.

TERMINAL DESIGNATIONS



JEDEC TO-204AA

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	2N5239	2N5240	
*V_{CBO}	300	375	V
V_{CER}(sus) $R_{BE} \leq 50\ \Omega$	250	350	V
*V_{CEO}(sus)	225	300	V
*V_{EBO}	6		V
*I_C	5		A
*I_B	2		A
*P_T: $T_C \leq 25$°C and $V_{CE} \leq 125$ V	100		W
$T_C \leq 25$°C and $V_{CE} \leq 125$ V	See Fig. 1		
$T_C > 25$°C and $V_{CE} > 125$ V	See Fig. 1		
*T_{stg}, T_J	-65 to 200		°C
T_L At distance ≥1/32 in. (0.8 mm) from seating plane for 10 s max.	230		°C

* In accordance with JEDEC registration data

ELECTRICAL CHARACTERISTICS, *At Case Temperature (Tc) = 25° C unless otherwise specified*

CHARACTERISTIC	TEST CONDITIONS				LIMITS				UNITS
	VOLTAGE V dc		CURRENT A dc		2N5239		2N5240		
	V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	
* I_{CEO}	200			0	—	5	—	2	mA
* I_{CEV}	300	-1.5			—	4	—	—	
	375	-1.5			—	—	—	2	
(T_C = 150° C)	300	-1.5			—	5	—	3	
I_{EBO} (V_{EB} = 5 V)			0		—	5	—	1	
* (V_{EB} = 6 V)			0		—	20	—	20	
V_{EBO}				0.02	6	—	6	—	V
* $V_{CEO}(sus)^a$			0.2^b		225	—	300	—	
$V_{CER}(sus)^a$ ($R_{BE} \leq 50\ \Omega$)			0.2^b		250	—	350	—	
* h_{FE}	10		0.4^b		20	80	20	80	
*	10		2^b		20	80	20	80	
	10		4.5^b		5	—	5	—	
* V_{BE}	10		2^b		—	3	—	3	V
* $V_{CE}(sat)$			2^b	0.25	—	2.5	—	2.5	
			4.5^b	1.125	—	5	—	5	
* $I_{S/b}$ (t = 1 s)	125				0.8	—	0.8	—	A
* $\lvert h_{fe} \rvert$ (f = 1 MHz)	10		0.2		2	—	2	—	
* h_{fe} (f = 1 kHz)	10		4		20	—	20	—	
f_T	10		0.2		2	—	2	—	MHz
C_{obo} (f = 1 MHz)	10^c		0		—	250	—	250	pF
$R_{\theta JC}$					—	1.75	—	1.75	°C/W

* In accordance with JEDEC registration data.

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

b Pulsed; pulse duration ≤ 350 μs, duty factory ≤ 2%.

c V_{CB} value.

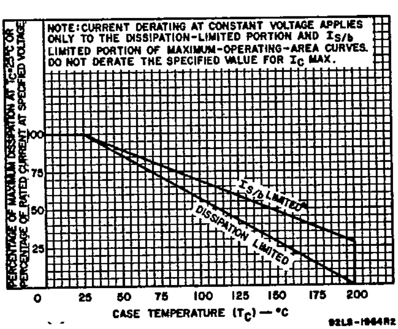


Fig. 1 - Derating curves for both types.

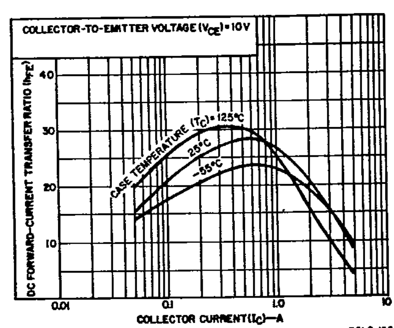


Fig. 2 — Typical dc beta characteristics for both types.

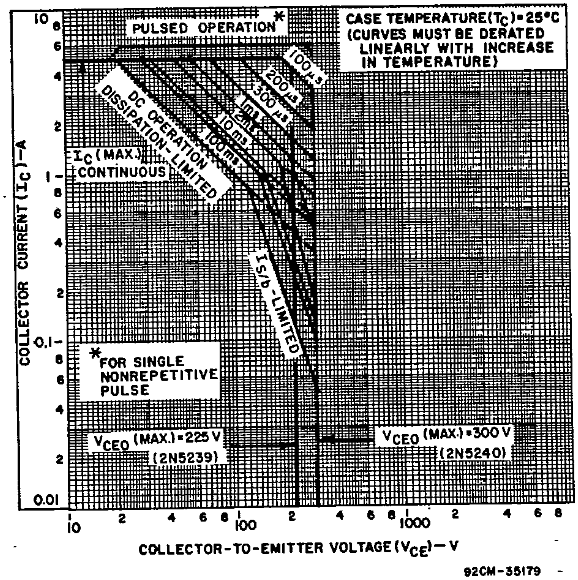


Fig. 3 – Maximum operating areas for both types.

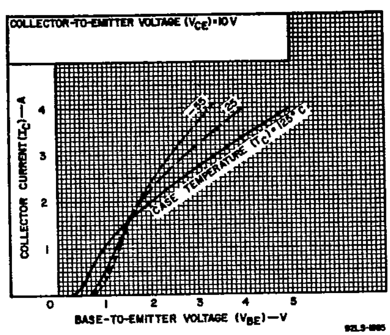


Fig. 4 — Typical transfer characteristics for both types.

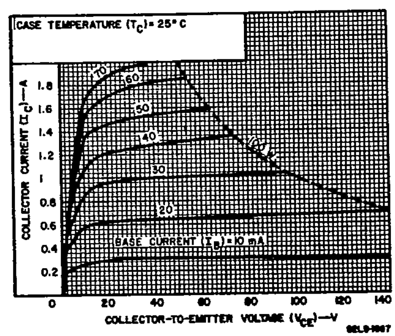


Fig. 5 — Typical output characteristics for both types.

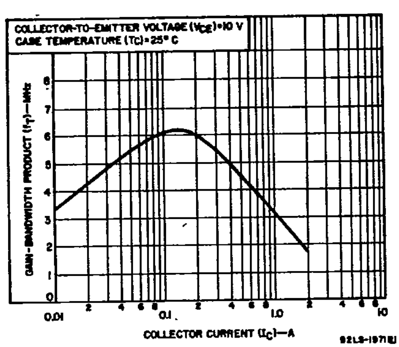


Fig. 6 — Typical gain-bandwidth product as a function of collector current for both types.

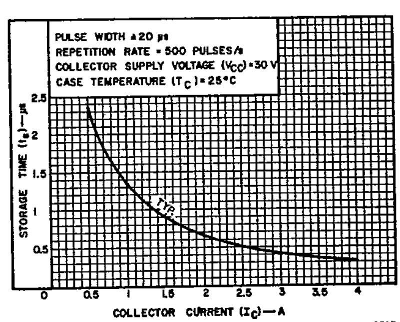


Fig. 7 — Typical saturated-switching time (storage) as a function of collector current for both types.

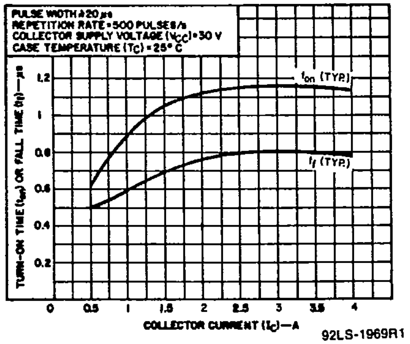


Fig. 8 — Typical saturated-time (turn-on or fall) as a function of collector current for both types.

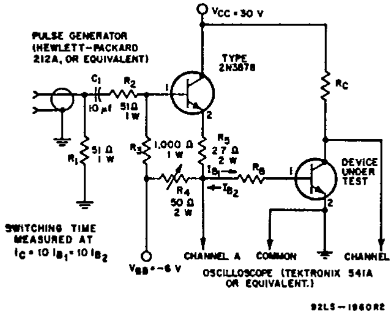


Fig. 9 — Circuit used to measure sustaining voltages, $V_{CEO}(sus)$ and $V_{CER}(sus)$ for both types.

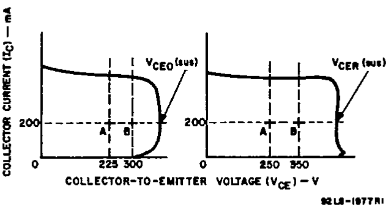


Fig. 10 — Oscilloscope display for $V_{CEO}(sus)$ and $V_{CER}(sus)$ measurement.

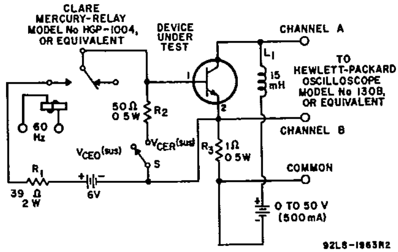


Fig. 11 — Circuit used to measure switching times for both types.

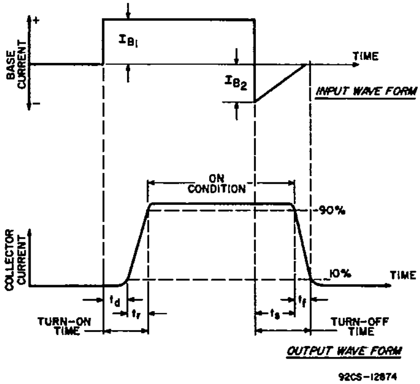


Fig. 12 — Phase relationship between input and output currents showing reference points for specification of switching times.