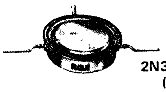
RCA

Solid State Division

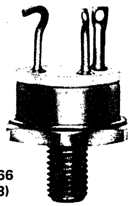
Power Transistors

2N3263 2N3264 2N3265 2N3266



H-1354

2N3263, 2N3264 (RADIAL)



H-1785

2N3265, 2N3266 (JEDEC TO-63)

High-Power, High-Speed, High-Current Silicon N-P-N Power Transistors

Epitaxial Types for Aerospace, Military, and Industrial Applications

Features:

- **Low saturation voltages —**
  - **2N3263 and 2N3265**
    - **$V_{CE}(sat)$ = 0.75 V (max.) at I_C = 15 A**
    - **$V_{BE}(sat)$ = 1.60 V (max.) at I_C = 15 A**
  - **2N3264 and 2N3266**
    - **V_{CE} (sat) = 1.20 V (max.) at I_C = 15 A**
    - **V_{BE} (sat) = 1.80 V (max.) at I_C = 15 A**
- **High reliability and uniformity of characteristics**
- **High power dissipation**
- **Fast rise time at high collector current — 0.2 μs at 10 A (typical)**

RCA-2N3263, 2N3264, 2N3265, and 2N3266● are n-p-n epitaxial silicon power transistors designed for high-reliability aerospace, military, and industrial equipment. Their high current-handling capability and fast switching speed make them desirable in applications where high circuit efficiency is required.

The 2N3263 and 2N3264 are sealed in flat 3/4-inch-diameter packages with radial leads. Types 2N3265 and 2N3266 utilize the JEDEC TO-63 package.

Typical high-speed switching applications for these transistors include switching-control amplifiers, power gates, switching regulators, dc-dc converters, and dc-ac inverters. Other recommended applications include dc-rf amplifiers and power oscillators.

● Formerly RCA Dev. Nos. TA2492, TA2493, TA2494, and TA2495, respectively.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		2N3264 2N3266	2N3263 2N3265	
* COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	120	150	V
COLLECTOR-TO-EMITTER SUSTAINING VOLTAGE:				
With 1.5 volts (V_{BE}) of reverse bias	$V_{CEX}(sus)$	120	150	V
With external base-to-emitter resistance (R_{BE}) $\leq$ 50 Ω	$V_{CER}(sus)$	80	110	V
* With base open	V_{CEO} (sus)	60	90	V
* EMITTER-TO-BASE VOLTAGE	V_{EBO}	7	7	V
* COLLECTOR CURRENT	I_C	25	25	A
* BASE CURRENT	I_B	10	10	A
* TRANSISTOR DISSIPATION	P_T	*See Figs. 1 & 2*		
* TEMPERATURE RANGE:				
Storage and operating (Junction)		−65 to +200		°C
LEAD 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.

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS VOLTAGE V dc V_{CB}	V_{CE}	V_{EB}	CURRENT A dc I_E	I_B	I_C	LIMITS 2N3264 2N3266 MIN.	MAX.	2N3263 2N3265 MIN.	MAX.	UNITS
Collector Cutoff Current: With emitter open	I_{CBO}	60			0			–	10	–	–	mA
		80			0			–	–	–	4	
At T_C = 125°C		60			0			–	10	–	–	
		80			0			–	–	–	4	
* With base reverse-biased	I_{CEX}		120	1.5				–	20	–	–	
			150	1.5				–	–	–	20	
* Emitter Cutoff Current:	I_{EBO}			7			0	–	15	–	5	mA
* At T_C = 125°C				7			0	–	15	–	5	
Emitter-to-Base Voltage	V_{EBO}				0.02		0	7	–	7	–	V
Collector-to-Emitter Sustaining Voltage: * With base open	$V_{CEO}(sus)$●					0	0.2	60	–	90	–	V
With external base-to-emitter resistance (R_{BE}) ≤ 50 Ω	$V_{CER}(sus)$●					0	0.2	80	–	110	–	
* Collector-to-Emitter Saturation Voltage	$V_{CE}(sat)$●					2	20	–	1.6	–	1	V
						1.2	15	–	1.2	–	0.75	
* Base-to-Emitter Saturation Voltage	$V_{BE}(sat)$●					2	20	–	2.2	–	1.8	V
						1.2	15	–	1.8	–	1.6	
* DC Forward Current Transfer Ratio	h_{FE}●		3				5	35	–	40	–	
*			3				15	20	80	25	75	
			2				15	–	–	20	55	
* Second-Breakdown Collector Current: (See Fig. 7) DC forward-biased	$I_{S/b}$▲	50						700	–	–	–	mA
		75						–	–	350	–	
* Pulsed, forward-biased, t_p = 250 μs		75						13.3	–	13.3	–	A
* Second-Breakdown Energy With base reverse-biased, and R_{BE} = 20Ω, L = 40μH	$E_{S/b}$**			6			10	2	–	2	–	mJ
* Saturated Switching Time: (See Figs. 3 & 4) Turn-on (t_d + t_r)	t_{ON}	V_{CC}= 30				1.2♠	15	–	0.5	–	0.5	μs
Storage	t_s					1.2♠	15	–	1.5	–	1.5	
Fall	t_f					1.2♠	15	–	0.5	–	0.5	
* Gain-Bandwidth Product (f = 1 MHz)	f_T		10				3	20	–	20	–	MHz
Collector-to-Base Feedback Capacitance (f = 1 MHz)	C_{ob}	10			0			–	500	–	500	pF
* Thermal Resistance (Junction-to-Case)	$R_{\theta JC}$		10				10	2N3263 2N3264 –	1.5	2N3265 2N3266 –	1	°C/W

* In accordance with JEDEC registration data format.

● Pulsed; pulse duration ≤ 350 μs, duty factor ≤ 2%. CAUTION: The sustaining voltages $V_{CEO}(sus)$ and $V_{CER}(sus)$ MUST NOT be measured on a curve tracer. These sustaining voltages should be measured by means of the test circuit shown in Fig. 5.

▲ $I_{S/b}$ is defined as the current at which second breakdown occurs at a specified collector voltage.

** $E_{S/b}$ is defined as the energy at which second breakdown occurs under specified reverse bias conditions. $E_{S/b}$ = 1/2 LI^2, where L is a series load or leakage inductance and I is the collector current.

♠ $I_{B_1} = I_{B_2}$.

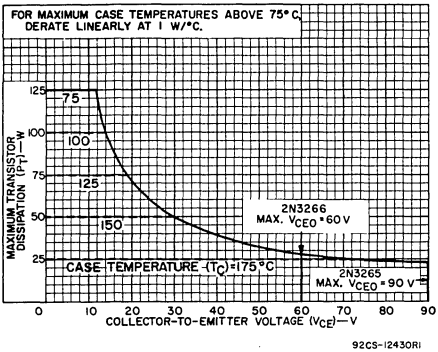


Fig.1—Rating chart for 2N3265 and 2N3266.

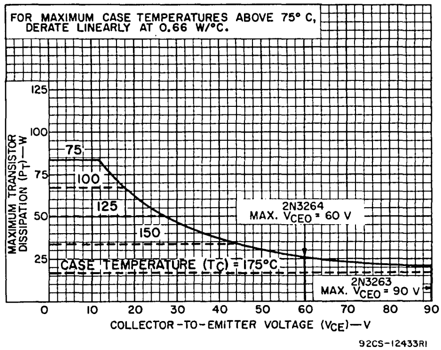


Fig.2—Rating chart for 2N3263 and 2N3264.

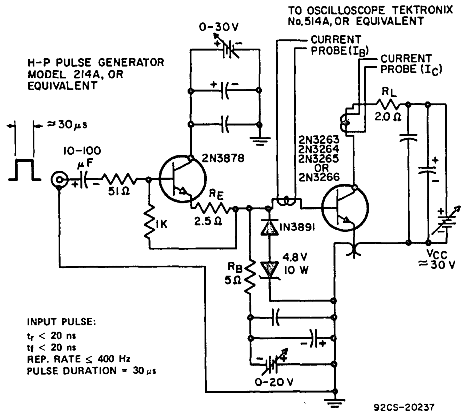


Fig.3—Circuit used to measure saturated switching times.

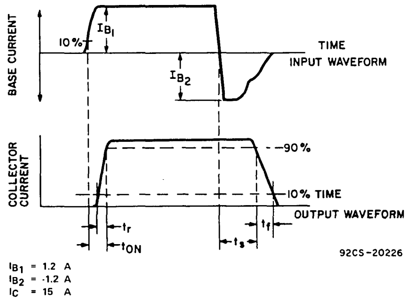


Fig.4—Phase relationship between input and output currents showing reference points for specification of switching times. (Test circuit shown in Fig. 3.)

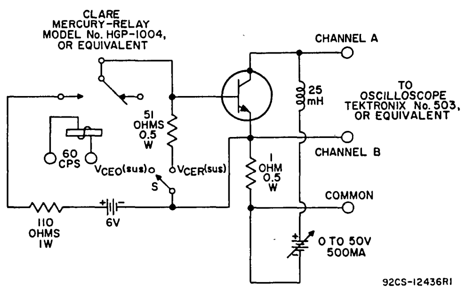
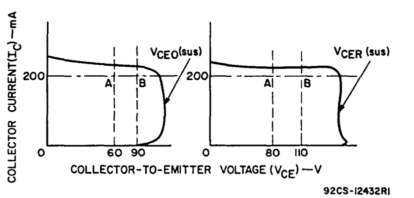


Fig.5—Circuit used to measure sustaining voltages $V_{CEO}(sus)$ and $V_{CER}(sus)$.



The sustaining voltages V_{CEO}(sus) and V_{CER}(sus) are acceptable when the traces fall to the right of point "A" for types 2N3264 and 2N3266. The traces must fall to the right of point "B" for types 2N3263 and 2N3265.

Fig.6—Oscilloscope display for $V_{CEO}(sus)$ and $V_{CER}(sus)$ measurement. (Test circuit shown in Fig. 5.)

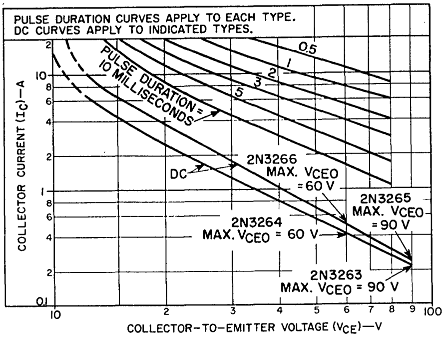


Fig.7—Safe-operating region as a function of pulse width.

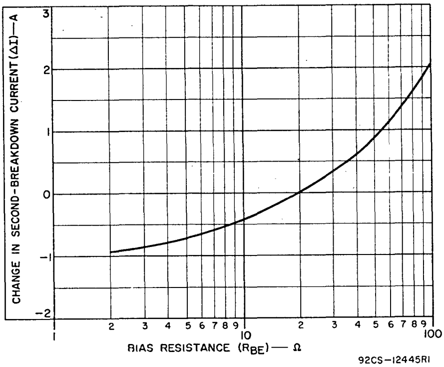


Fig.8—Typical change in $E_{S/b}$ as a function of base-to-emitter resistance.

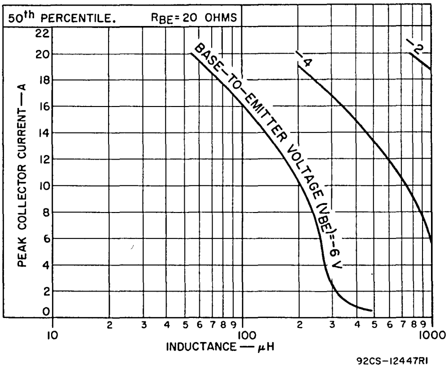


Fig.9—Collector current as a function of inductance (10th percentile).

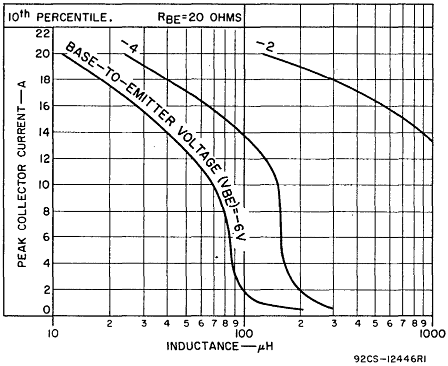


Fig.10—Collector current as a function of inductance (50th percentile).

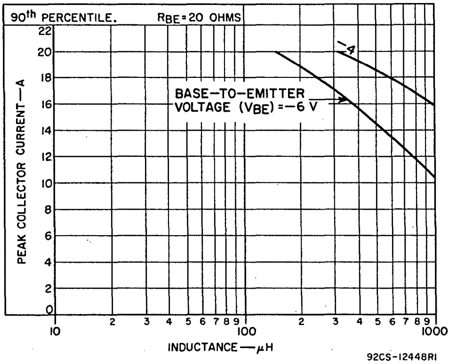


Fig.11—Collector current as a function of inductance (90th percentile).

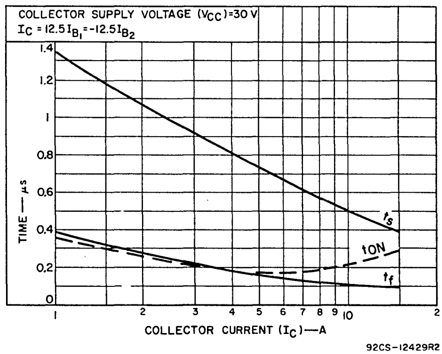


Fig.12—Typical saturated-switching characteristics.

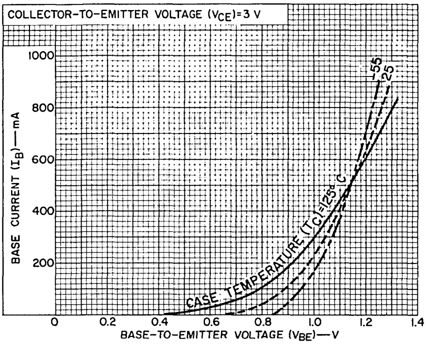


Fig. 13—Typical input characteristics.

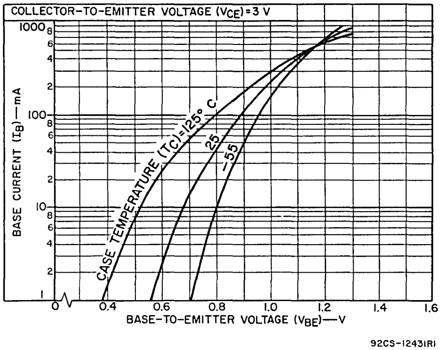


Fig. 14—Typical input characteristics.

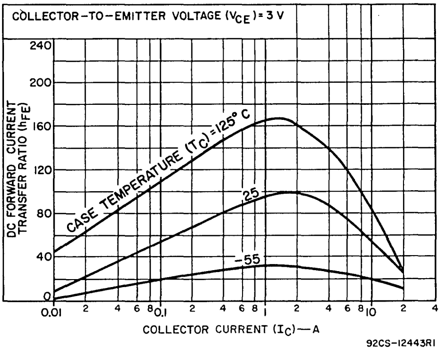


Fig. 15—Typical dc beta characteristics (median values).

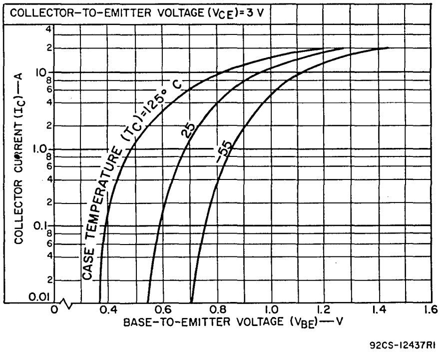


Fig. 16—Typical transfer characteristics.

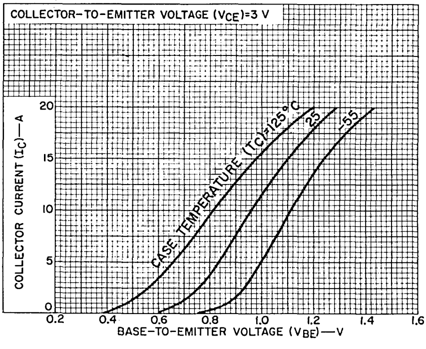


Fig. 17—Typical transfer characteristics.

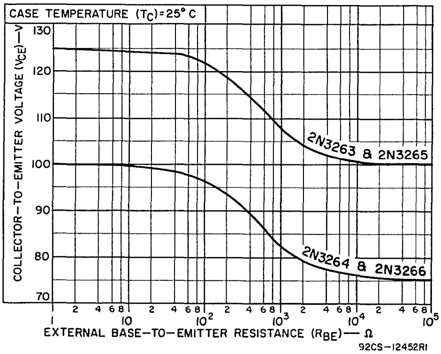


Fig. 18—Typical sustaining voltage vs. base-to-emitter resistance.

TERMINAL CONNECTIONS
2N3263, 2N3264

Lead 1 — Base
Case, Lead 2 — Collector
Lead 3 — Emitter

TERMINAL CONNECTIONS
2N3265, 2N3266

Pin 1 — Emitter
Pin 2 — Base
Case, Pin 3 — Collector