2N6542, 2N6544, 2N6545, 2N6546

File Number **1096**

3-, 5-, and 10-A Power-Switching Transistors

High-Voltage N-P-N Type for Off-Line Power Supplies and Other High-Voltage Switching Applications

Features:

- *100% High Temperature Tested for 100°C Parameters*
- *Fast Switching Speed*
- *High voltage rating*
  V_{CEX} = *350 V*
  = *450 V [2N6545]*
- *Low V_{CE}[sat] at IC = 3-, 5-, and 10-A*

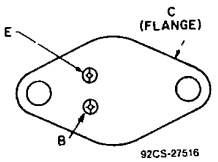
Applications:

- *Off-Line Power Supplies*
- *High Voltage Inverters*
- *Switching Regulators*

The RCA-2N6542, 2N6544, 2N6545, and 2N6546 series of silicon n-p-n power transistors feature high-voltage capability, fast switching speeds, and low saturation voltages, together with high safe-operating area (SOA) ratings. They are specially designed for off-line power supplies, converter circuits and pulse-width-modulated regulators. These high-voltage, high-speed transistors are 100-percent tested for parameters that are essential to the design of high-power switching circuits. Switching times, including inductive turn-off time, and saturation voltages are characterized at 100°C; as well as at 25°C, to provide information necessary for worst-case design.

The 2N6542, 2N6544, 2N6545, and 2N6546 transistors are supplied in steel JEDEC TO-204AA hermetic packages.

TERMINAL DESIGNATIONS



JEDEC TO-204AA

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	2N6542	2N6544	2N6545	2N6546	
*V_{CEV}					
V_{BE} = −1.5 V	650	650	850	650	V
*V_{CEX} (Clamped)					
V_{BE} = −1.5 V	350	350	450	350	V
*V_{CEO}	300	300	400	300	V
*V_{EBO}	8				V
Ic(sat)	3	5	5	10	A
*I_C	5	8	8	15	A
*I_{CM}	10	16	16	30	A
*I_B	5	8	8	10	A
*P_T					
T_C up to 25°C	100	125	125	175	W
T_C above 25°C, derate linearly	0.57	0.714	0.714	1	W/°C
*T_{stg}, T_J		−65 to 200			°C
*T_L					
At distance ≥ 1/8 in. (3.17 mm) from seating plane for 5 s max.		275			°C

* In accordance with JEDEC registration data.

2N6542, 2N6544, 2N6545, 2N6546

ELECTRICAL CHARACTERISTICS Tc = 25°C

	CHARACTERISTIC	TEST CONDITIONS				LIMITS								UNITS
		VOLTAGE V dc		CURRENT A dc		2N6542		2N6544		2N6545		2N6546		
		V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
*	I_{CEV}	650	-1.5	—	—	—	0.5	—	0.5	—	—	—	1	mA
		850	-1.5	—	—	—	—	—	—	—	0.5	—	—	
*	I_{EBO}	—	-8	0	—	—	1	—	1	—	1	—	1	
*	$V_{CEO(sus)}$[b]	—	—	0.1[a]	—	300	—	300	—	400	—	300	—	V
*	hFE	2	—	3[a]	—	7	35	—	—	—	—	—	—	
		2	—	1.5[a]	—	12	60	—	—	—	—	—	—	
		3	—	5[a]	—	—	—	7	35	7	35	—	—	
		3	—	2.5[a]	—	—	—	12	60	12	60	—	—	
		2	—	10[a]	—	—	—	—	—	—	—	6	30	
		2	—	5[a]	—	—	—	—	—	—	—	12	60	
*	$V_{BE(sat)}$	—	—	3[a]	0.6	—	1.4	—	—	—	—	—	—	
		—	—	5[a]	1	—	—	—	1.6	—	1.6	—	—	
		—	—	10[a]	2	—	—	—	—	—	—	—	1.6	
*	$V_{CE(sat)}$	—	—	3[a]	0.6	—	1	—	—	—	—	—	—	V
		—	—	5[a]	1	—	5	—	1.5	—	1.5	—	—	
		—	—	8[a]	2	—	—	—	5	—	5	—	—	
		—	—	10[a]	2	—	—	—	—	—	—	—	1.5	
		—	—	15[a]	3	—	—	—	—	—	—	—	5	
*	$I_{S/b}$ t = 1 s	100	—	—	—	0.2	—	0.2	—	0.2	—	0.2	—	A
	f_T f = 1 MHz	10	—	0.2	—	6	28	—	—	—	—	—	—	
		10	—	0.3	—	—	—	6	28	6	28	—	—	MHz
		10	—	0.5	—	—	—	—	—	—	—	6	28	
*	C_{obo} f = 1 MHz	10[d]	—	—	—	50	200	75	300	75	300	125	500	pF
*	t_d[e,g]	—	—	3	0.6	—	0.05	—	—	—	—	—	—	
		—	—	5	1	—	—	—	0.05	—	0.05	—	—	
		—	—	10	2	—	—	—	—	—	—	—	0.05	
*	t_r[e,g]	—	—	3	0.6	—	0.7	—	—	—	—	—	—	
		—	—	5	1	—	—	—	1	—	1	—	—	
		—	—	10	2	—	—	—	—	—	—	—	1	μS
*	t_s[e,g]	—	—	3	0.6	—	4	—	—	—	—	—	—	
		—	—	5	1	—	—	—	4	—	4	—	—	
		—	—	10	2	—	—	—	—	—	—	—	4	
*	t_f[e,g]	—	—	3	0.6	—	0.8	—	—	—	—	—	—	
		—	—	5	1	—	—	—	1	—	1	—	—	
		—	—	10	2	—	—	—	—	—	—	—	—	

* In accordance with JEDEC registration data.

2N6542, 2N6544, 2N6545, 2N6546

ELECTRICAL CHARACTERISTICS Tc = 100° C

	CHARACTERISTIC	TEST CONDITIONS				LIMITS								UNITS
		VOLTAGE V dc		CURRENT A dc		2N6542		2N6544		2N6545		2N6546		
		V_{CE}	V_{BE}	I_C	I_B	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
*	I_{CEV}	650	-1.5	—	—	—	2.5	—	2.5	—	—	—	4	mA
		850	-1.5	—	—	—	—	—	—	—	2.5	—	—	
*	I_{CER} R_{BE} = 50 Ω	650	—	—	—	—	3	—	3	—	—	—	5	
		850	—	—	—	—	—	—	—	—	3	—	—	
*	$V_{CEX(sus)}$[b,c]													V
	V_{CC} = 20 V	—	—	2.6[a]	—	350	—	—	—	—	—	—	—	
	L = 180 μH,													
	R_C = 0.05 Ω	—	—	4.5[a]	—	—	—	350	—	450	—	—	—	
	V_{clamp} = Rated													
	V_{CEX}	—	—	8[a]	—	—	—	—	—	—	—	350	—	
	V_{clamp} = Rated													
	V_{CEO} — 100 V	—	—	5[a]	—	200	—	—	—	—	—	—	—	
		—	—	8[a]	—	—	—	200	—	300	—	—	—	
		—	—	15[a]	—	—	—	—	—	—	—	200	—	
*	$V_{BE(sat)}$	—	—	3[a]	0.6	—	1.4	—	—	—	—	—	—	V
		—	—	5[a]	1	—	—	—	1.6	—	1.6	—	—	
		—	—	10[a]	2	—	—	—	—	—	—	—	1.6	
*	$V_{CE(sat)}$	—	—	3[a]	0.6	—	2	—	—	—	—	—	—	
		—	—	5[a]	1	—	—	—	2.5	—	2.5	—	—	
		—	—	10[a]	2	—	—	—	—	—	—	—	2.5	
*	t_s[f,g]	—	-5	3	0.6	—	4	—	—	—	—	—	—	μS
		—	-5	5	1	—	—	—	4	—	4	—	—	
		—	-5	10	2	—	—	—	—	—	—	—	5	
*	t_f[f,g]	—	-5	3	0.6	—	0.8	—	—	—	—	—	—	
		—	-5	5	1	—	—	—	0.9	—	0.9	—	—	
		—	-5	10	2	—	—	—	—	—	—	—	1.5	
*	RθJC	—	—	—	—	—	1.75	—	1.4	—	1.4	—	1	°C/W

* In accordance with JEDEC registration data.
[a] Pulsed: pulse duration = 300 μs, duty factory ≤ 2%.
[b] **CAUTION:** The sustaining voltage $V_{CEO(sus)}$ and $V_{CEX(sus)}$ *MUST NOT* be measured on a curve tracer.
[c] V_{CC} = 20 V, L = 180 μH, R_C = 0.05 Ω
[d] V_{CB} value
[e] Resistive load, V_{CC} = 250 V, t_p = 100 μs, $I_{B_1} = -I_{B_2}$
[f] Inductive load, V_{clamp} = Rated $V_{CEX(sus)}$, $I_{B_1} = -I_C/5$, L = 180 μH, R_C = 0.05 Ω, V_{CC} = 20 V
[g] For switching speed test methods, see Application Note AN-6820.

2N6542, 2N6544, 2N6545, 2N6546

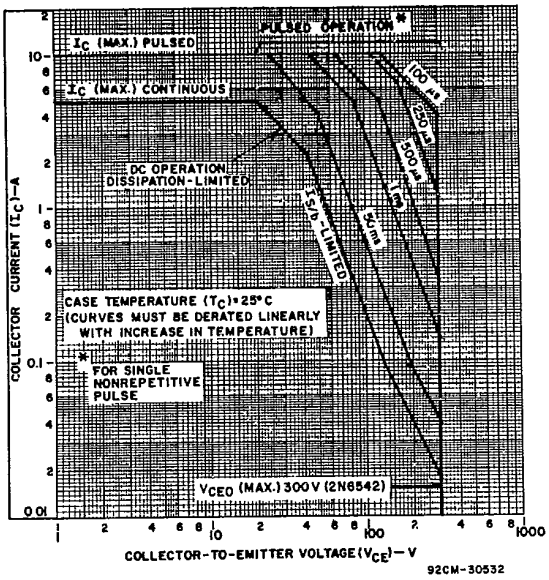


Fig. 1 - Maximum operating areas for type 2N6542 (Tc = 25°).

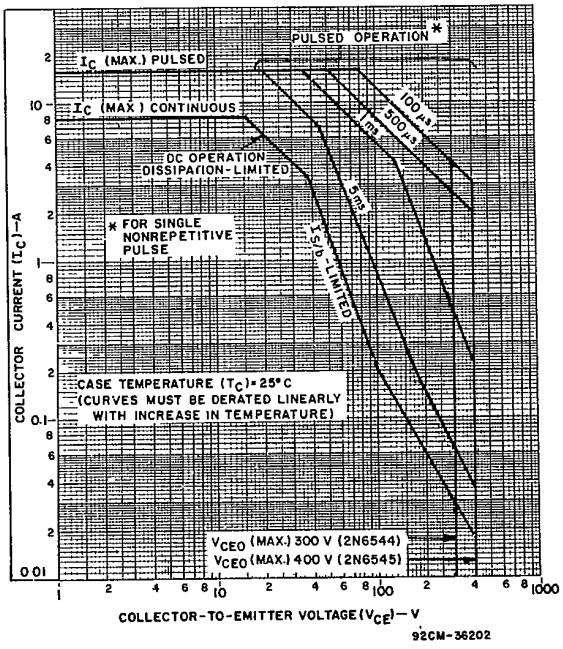


Fig. 2 - Maximum operating areas for type 2N6544 and 2N6545 (Tc = 25°C).

2N6542, 2N6544, 2N6545, 2N6546

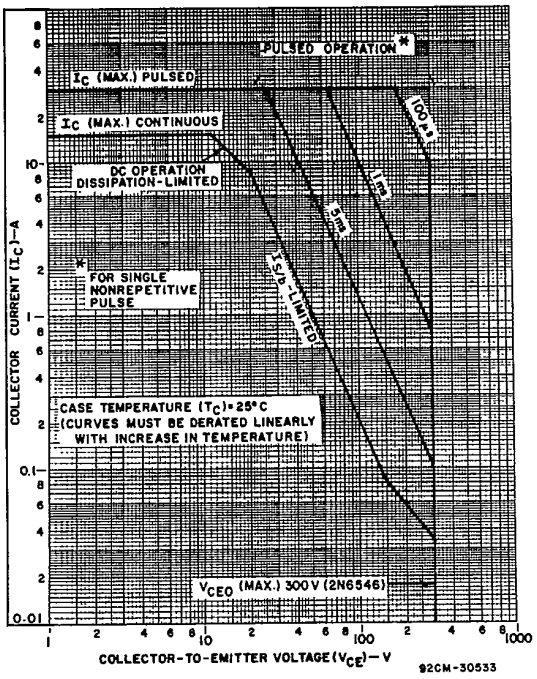


Fig. 3 - Maximum operating areas for type 2N6546 (Tc = 25°)

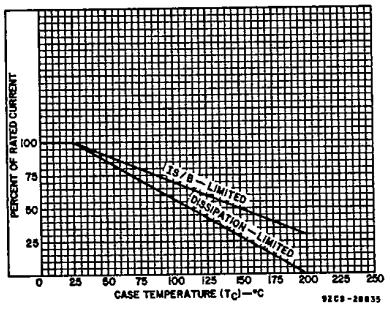


Fig. 4 - Dissipation and $I_{S/B}$ derating curves for all types.

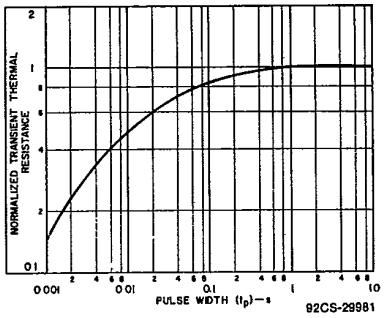


Fig. 5 — Typical thermal-response characteristics for types 2N6542, 2N6544 and 2N6545.

2N6542, 2N6544, 2N6545, 2N6546

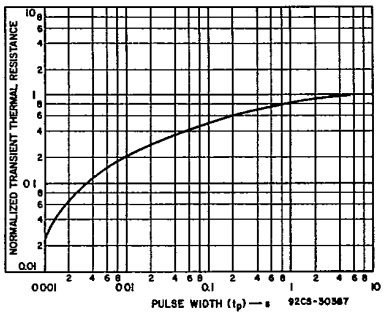


Fig. 6 — Typical thermal-response characteristics for type 2N6546.

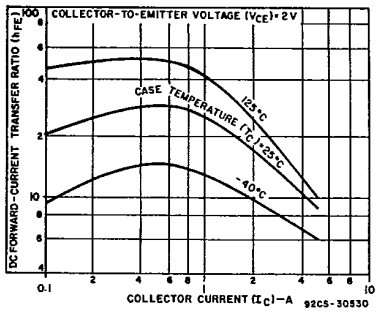


Fig. 7 — Typical dc beta characteristics for type 2N6542.

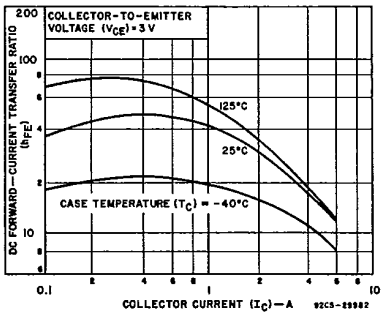


Fig. 8 — Typical dc beta characteristics for type 2N6544.

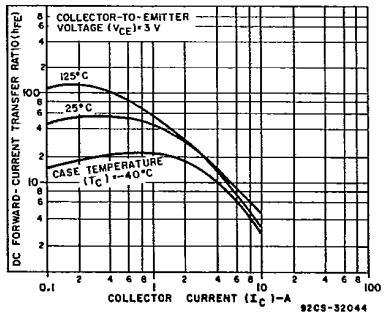


Fig. 9 — Typical dc beta characteristics for type 2N6545.

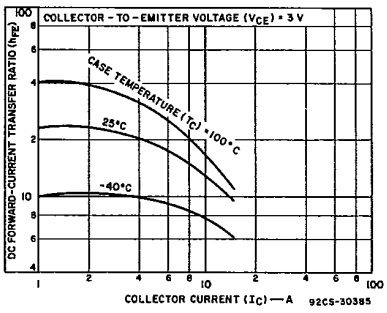


Fig. 10 — Typical dc beta characteristics for type 2N6546.

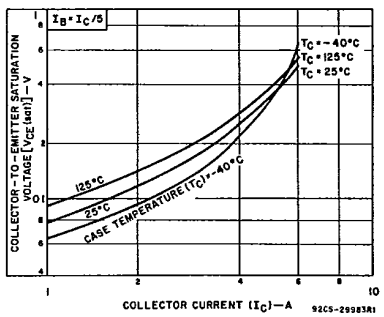


Fig. 11 — Typical collector-to-emitter saturation voltage as a function of collector current for types 2N6542 and 2N6544.

2N6542, 2N6544, 2N6545, 2N6546

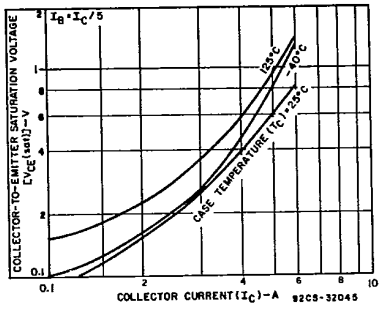


Fig. 12 — Typical collector-to-emitter saturation voltage as a function of collector current for type 2N6545.

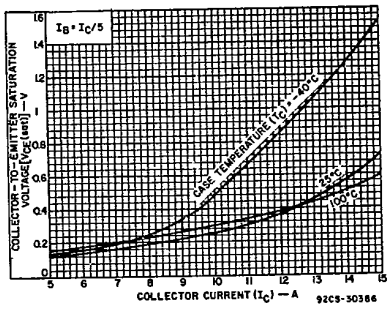


Fig. 13 — Typical collector-to-emitter saturation voltage characteristics for type 2N6546.

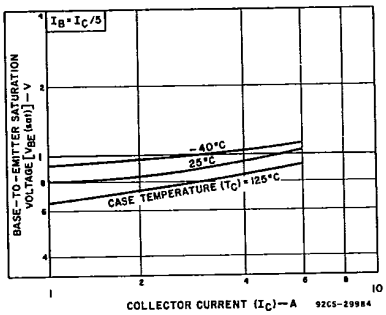


Fig. 14 — Typical base-to-emitter saturation voltage as a function of collector current for types 2N6542 and 2N6544.

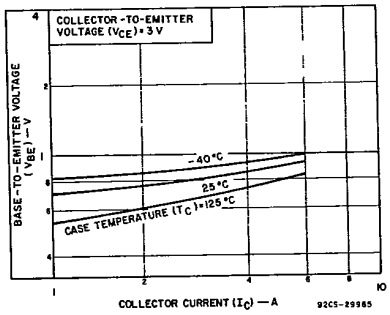


Fig. 15 — Typical base-to-emitter voltage as a function of collector current for types 2N6542 and 2N6544.

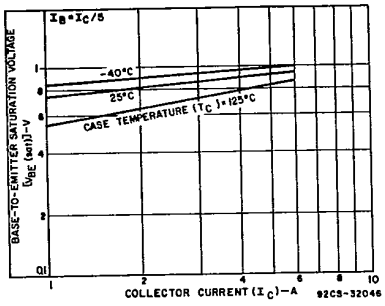


Fig. 16 — Typical base-to-emitter saturation voltage as a function of collector current for type 2N6545.

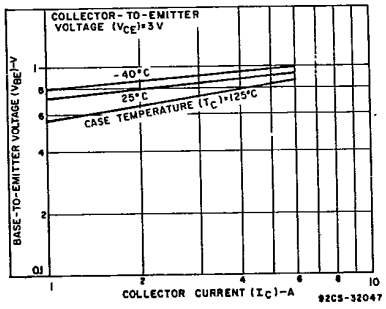


Fig. 17 — Typical base-to-emitter voltage as a function of collector current for type 2N6545.

2N6542, 2N6544, 2N6545, 2N6546

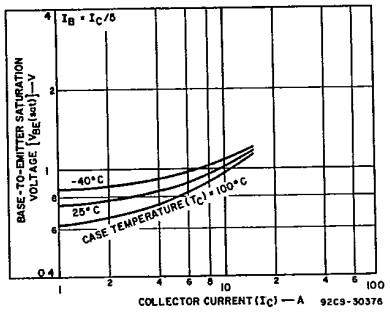


Fig. 18 — Typical base-to-emitter saturation voltage characteristics for type 2N6546.

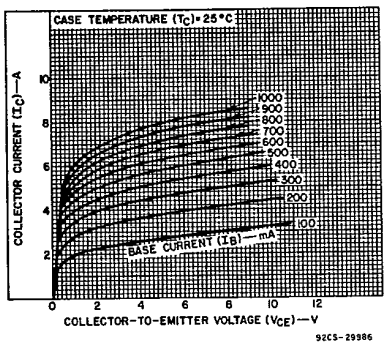


Fig. 19 — Typical output characteristics for types 2N6542 and 2N6544.

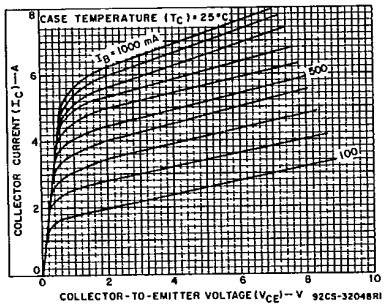


Fig. 20 — Typical output characteristics for type 2N6545.

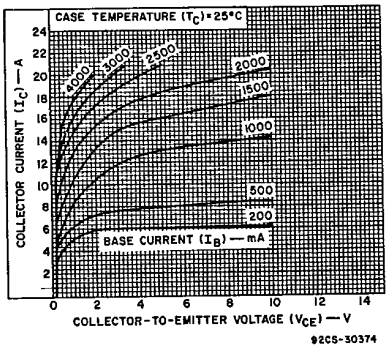


Fig. 21 — Typical output characteristics for type 2N6546.

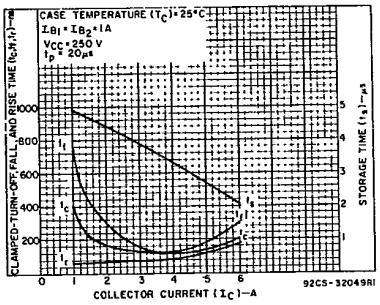


Fig. 22 — Typical saturated switching time characteristics for type 2N6545.

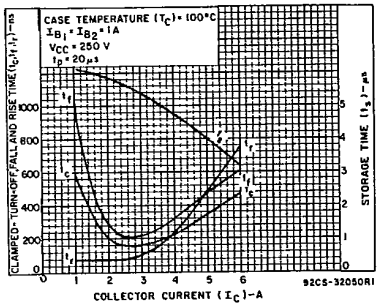


Fig. 23 — Typical saturated switching time characteristics for type 2N6545.

2N6542, 2N6544, 2N6545, 2N6546

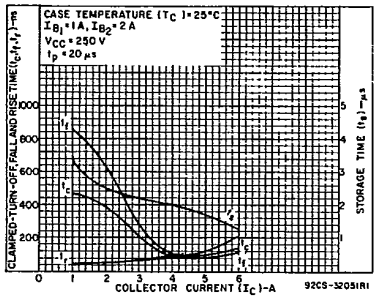


Fig. 24 — Typical saturated switching time characteristics for type 2N6545.

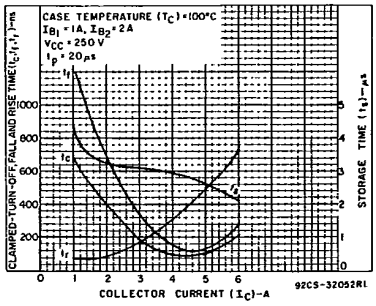


Fig. 25 — Typical saturated switching time characteristics for type 2N6545.

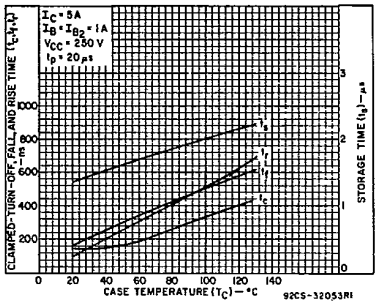


Fig. 26 — Typical saturated switching time characteristics as a function of case temperature for type 2N6545.

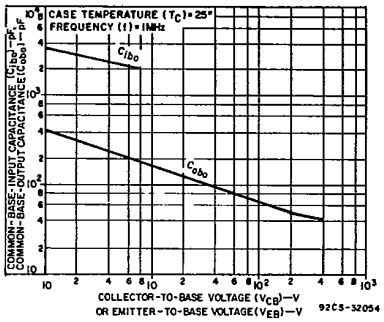


Fig. 27 — Typical common-base input or output capacitance characteristics as a function of collector-to-base voltage or emitter-to-base voltage for type 2N6545.