

2N5305, 6, 6A, GES5305, 6, 6A**Silicon Darlington Transistors**

TO-92



TO-98

The GE/RCA 2N5305, 06, 06A and GES5305, 6, and 6A are planar, epitaxial, passivated NPN silicon Darlington transistors designed for preamplifier stages requiring input impedances of several megohms or extremely low-level, high-gain low-noise amplifier applications. These types can

be used in medium-speed switching circuits in consumer and industrial control applications.

The 2N5305, 6, and 6A are supplied in JEDEC TO-98 package, the GES5305, 6, and 6A are supplied in JEDEC TO-92 package.

Devices in TO-98 package are supplied with and without seating flange (see Dimensional Outline).

MAXIMUM RATINGS, Absolute-Maximum Values:

COLLECTOR TO EMITTER VOLTAGE (V_{CE0})	25 V
EMITTER TO BASE VOLTAGE (V_{EB0})	12 V
COLLECTOR TO BASE VOLTAGE (V_{CB0})	25 V
CONTINUOUS COLLECTOR CURRENT (I_C)	300 mA
COLLECTOR CURRENT (PULSED)* (I_C)	500 mA
CONTINUOUS BASE CURRENT (I_B)	50 mA
TOTAL POWER DISSIPATION ($T_A \leq 25^\circ\text{C}$) (P_T)	400 mW
DERATE FACTOR ($T_A > 25^\circ\text{C}$)	4 mW/ $^\circ\text{C}$
OPERATING TEMPERATURE (T_J)	-65° to +125°C
STORAGE TEMPERATURE (T_{STG})	-65° to +150°C
LEAD TEMPERATURE, 1/16" $\pm$ 1/32" (1.58mm $\pm$ 0.8mm) from case for 10s max (T_L)	+260°C

* Pulsed Conditions: Pulse width $\leq 300 \mu\text{s}$, Duty factor $\leq 2\%$.

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ELECTRICAL CHARACTERISTICS, At Ambient Temperature (T_A) = 25°C Unless Otherwise Specified

CHARACTERISTICS	SYMBOL	LIMITS		UNITS
		MIN.	MAX.	
Collector-To-Emitter Breakdown Voltage ($I_C = 10 \text{ mA}$, $I_B = 0$)	BV_{CEO}	25	—	V
Collector-To-Base Breakdown Voltage ($I_C = 0.1 \mu\text{A}$, $I_E = 0$)	BV_{CBO}	25	—	
Emitter-To-Base Breakdown Voltage ($I_E = 0.1 \mu\text{A}$, $I_C = 0$)	BV_{EBO}	12	—	
DC Forward Current Transfer Ratio ($I_C = 2 \text{ mA}$, $V_{CE} = 5 \text{ V}$) 2N5305, GES5305	h_{FE}	2,000	20,000	—
($I_C = 100 \text{ mA}$, $V_{CE} = 5 \text{ V}$) 2N5305, GES5305		6,000	—	
($I_C = 2 \text{ mA}$, $V_{CE} = 5 \text{ V}$) 2N5306, GES5306A		7,000	70,000	
($I_C = 100 \text{ mA}$, $V_{CE} = 5 \text{ V}$) 2N5306, GES5306A		20,000	—	
Collector-To-Emitter Saturation Voltage ($I_C = 200 \text{ mA}$, $I_B = 0.2 \text{ mA}$)	$V_{CE(sat)}$	—	1.4	V
Base-To-Emitter Saturation Voltage ($I_C = 200 \text{ mA}$, $I_B = 0.2 \text{ mA}$)	$V_{BE(sat)}$	—	1.6	
Base-To-Emitter Voltage ($I_C = 200 \text{ mA}$, $V_{CE} = 5 \text{ V}$)	V_{BE}	—	1.5	
Collector-To-Base Cutoff Current ($V_{CB} = 25 \text{ V}$, $I_E = 0$)	I_{CBO}	—	100	nA
($V_{CB} = 25 \text{ V}$, $I_E = 0$, $T_A = 100^\circ\text{C}$)		—	20	μA
Small-Signal Current Transfer Ratio ($V_{CE} = 5 \text{ V}$, $I_C = 2 \text{ mA}$, $f = 1 \text{ KHz}$) 2N5305, GES5305	h_{fe}	2,000	—	—
($V_{CE} = 5 \text{ V}$, $I_C = 2 \text{ mA}$, $f = 1 \text{ KHz}$) 2N5306, 6A, GES5306, 6A		7,000	—	
($V_{CE} = 5 \text{ V}$, $I_C = 2 \text{ mA}$, $f = 10 \text{ MHz}$)	$ h_{fe} $	15.6	—	dB
Input Capacitance ($V_{EB} = 0.5 \text{ V}$, $f = 1 \text{ MHz}$)	C_{eb}	10.5 Typical		pF
Output Capacitance ($V_{CB} = 10 \text{ V}$, $f = 1 \text{ MHz}$)	C_{cb}	7.6 Typical	10	
Input Impedance ($V_{CE} = 5 \text{ V}$, $I_C = 2 \text{ mA}$, $f = 1 \text{ KHz}$)		650 Typical		K Ω
Gain-Bandwidth Product ($V_{CE} = 5 \text{ V}$, $I_C = 2 \text{ mA}$, $f = 10 \text{ MHz}$)	f_T	60	—	MHz
Noise Figure ($V_{CE} = 5 \text{ V}$, $I_C = 0.6 \text{ mA}$, $R_g = 160 \text{ k}\Omega$, $f = 10 \text{ Hz}$, to 10 kHz , Bandwidth = 15.7 kHz) 2N5306A, GES5306A	e_n	195 Typical	230	nV/ $\sqrt{\text{Hz}}$

TERMINAL CONNECTIONS

TO-92 Package
Lead 1 - Emitter
Lead 2 - Base
Lead 3 - Collector

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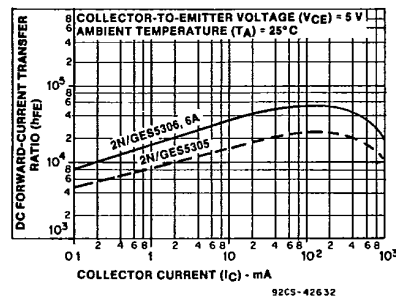


Fig. 1—Typical dc forward-current transfer ratio characteristics.

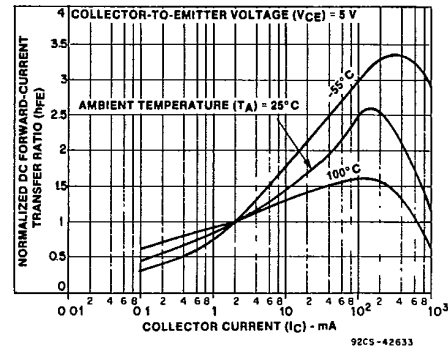


Fig. 2—Normalized dc forward-current transfer ratio characteristics.

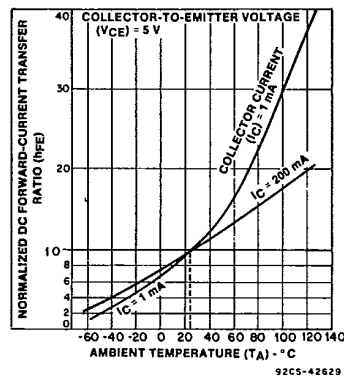


Fig. 3—Normalized dc forward-current transfer ratio characteristics.

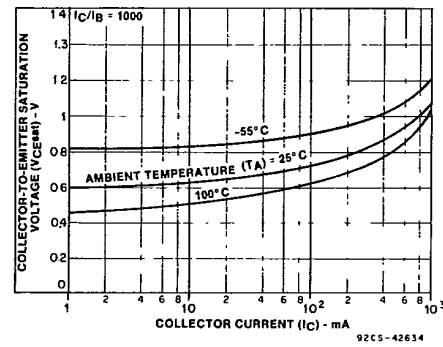


Fig. 4—Typical collector-to-emitter saturation voltage characteristics.

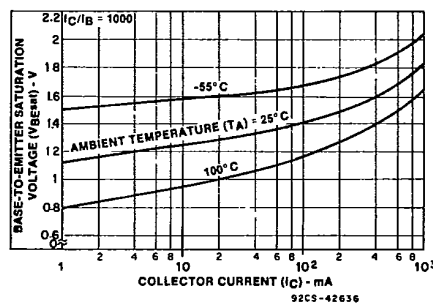


Fig. 5—Typical base-to-emitter saturation voltage characteristics.

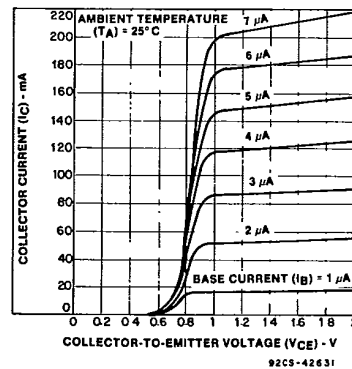
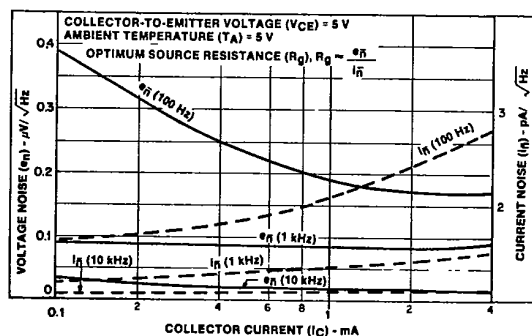
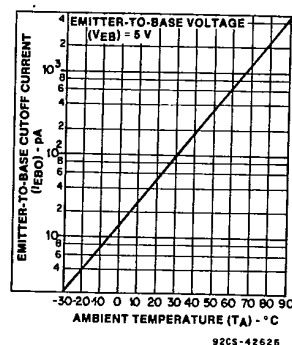
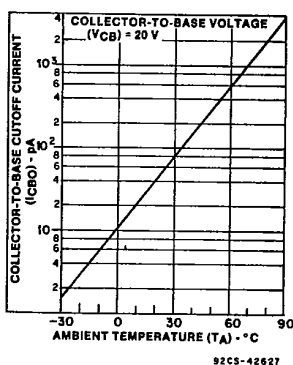
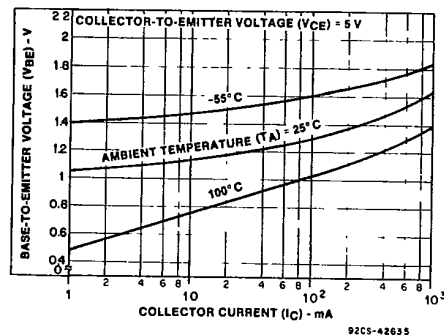
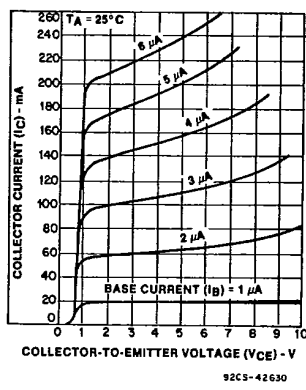


Fig. 6—Typical output characteristics.

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NOTE:
DUE TO THE NOISE CHARACTERISTICS OF THIS DEVICE
VERSUS FREQUENCY, CALCULATION OF NOISE FIGURE
(NF) FROM e_n , i_n VALUES IS NOT ACCURATE [AS IS THE
CASE WITH FIELD-EFFECT TRANSISTORS (FETs)].