

T-31-19  
Signal Transistors

2N3858-60, 2N3858A, 2N3859A

Silicon Transistors



TO-98

The GE/RCA 2N3858, 2N3859 and 2N3860 are planar epitaxial passivated NPN silicon transistors designed primarily for

AM radio I.F. and converter applications. These types are supplied in JEDEC TO-98 package.

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

MAXIMUM RATINGS, Absolute-Maximum Values:

	2N3858 2N3859 2N3860	2N3858A 2N3859A	
COLLECTOR TO EMITTER VOLTAGE ( $V_{CE0}$ )	30	60	V
EMITTER TO BASE VOLTAGE ( $V_{EB0}$ )	4	6	V
COLLECTOR TO BASE VOLTAGE ( $V_{CB0}$ )	30	60	V
CONTINUOUS COLLECTOR CURRENT ( $I_C$ )(Note 1)	100	100	mA
TOTAL POWER DISSIPATION ( $T_A \leq 25^\circ\text{C}$ ) ( $P_T$ ) (Note 2)	360	360	mW
OPERATING TEMPERATURE ( $T_J$ )		-55 to +125	$^\circ\text{C}$
STORAGE TEMPERATURE ( $T_{stg}$ )		-55 to +150	$^\circ\text{C}$
LEAD TEMPERATURE, $1/16" \pm 1/32"$ (1.58mm $\pm$ 0.8mm) from case for 10s max ( $T_L$ )		+260	$^\circ\text{C}$

NOTES:

1. Determined from power limitations due to saturation voltage at this current.
2. Derate 3.6 mW/ $^\circ\text{C}$  increase in ambient temperature above 25 $^\circ\text{C}$ .

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

CHARACTERISTICS	SYMBOL	LIMITS			UNITS
		MIN.	TYP.	MAX.	
Collector Cutoff Current ( $V_{CB} = 40V$ ) ( $V_{CB} = 40V, T_A = 100^\circ C$ )	$I_{CBO}$	—	—	50	nA
Emitter Cutoff Current ( $V_{EBO} = 5V$ )	$I_{EBO}$	—	—	100	nA
DC Forward Current Transfer Ratio 2N3858A ( $V_{CE} = 1V, I_C = 10mA$ )	$h_{FE}$	60	—	—	—
2N3859A ( $V_{CE} = 1V, I_C = 10mA$ )		100	—	—	—
2N3858, 58A ( $V_{CE} = 4.5V, I_C = 2mA$ )		60	—	120	—
2N3859, 59A ( $V_{CE} = 4.5V, I_C = 2mA$ )		100	—	200	—
2N3860 ( $V_{CE} = 4.5V, I_C = 2mA$ )		150	—	300	—
Collector—Base Breakdown Voltage ( $I_C = 0.1mA$ )	$BV_{CBO}$	40	—	—	V
Emitter—Base Breakdown Voltage ( $I_E = 0.1mA$ )	$BV_{EBO}$	5	—	—	
Collector—Emitter Breakdown Voltage ( $I_C = 1mA$ )	$BV_{CEO}$	40	—	—	
Collector Saturation Voltage ( $I_C = 10mA, I_B = 1mA$ )	$V_{CE(SAT)}$	—	—	0.125	
Gain Bandwidth Product ( $V_{CE} = 10V, I_C = 2mA$ ) 2N3858, A	$f_T$	90	125	250	MHz
2N3859, A		90	140	250	
2N3860		90	170	250	
Collector—Base Time constant ( $V_{CE} = 10V, I_C = 2mA$ )		$\tau_b C_c$	—	65	
Output Capacitance, Common Base ( $V_{CB} = 10V, I_E = 0, f = 1Mc$ )	$C_{cbo}$	2	2.7	4	pF
Input Capacitance, Common Base ( $V_{EB} = 0.5V, I_E = 0, f = 1Mc$ )	$C_{ibo}$	—	10	—	
Case Capacitance	—	—	0.66	—	

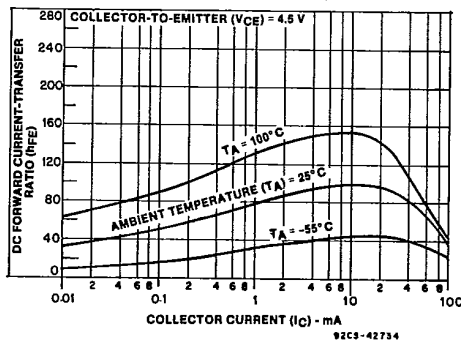


Fig. 1—Typical dc forward current transfer ratio characteristics for 2N3858 and 2N3858A.

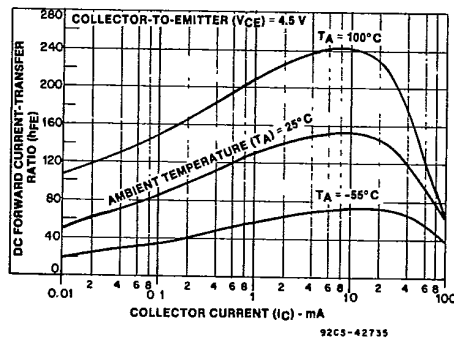


Fig. 2—Typical dc forward-current transfer ratio characteristics for 2N3859 and 2N3859A.

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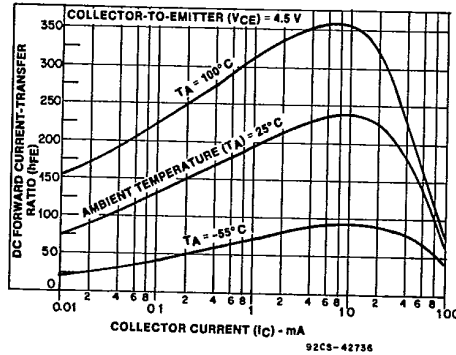


Fig. 3—Typical dc forward-current transfer ratio characteristics for 2N3860.

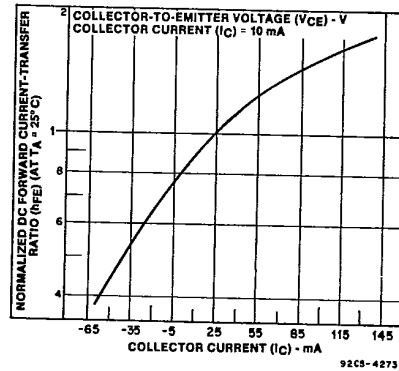


Fig. 4—Normalized dc forward current transfer ratio characteristic for all types.

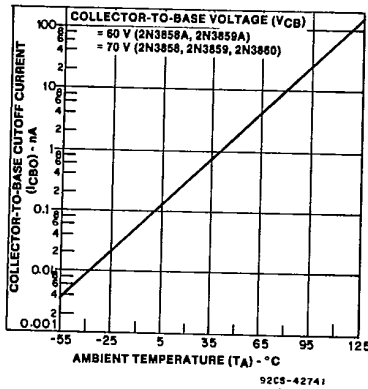


Fig. 5—Typical collector-to-base cutoff current characteristic for all types.

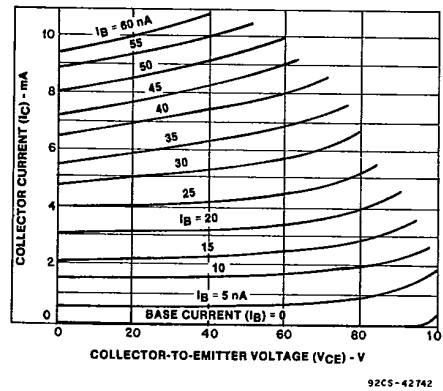


Fig. 6—Typical collector characteristics for 2N3858.

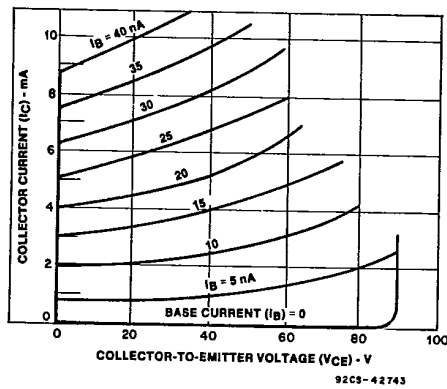


Fig. 7—Typical collector characteristics for 2N3859.

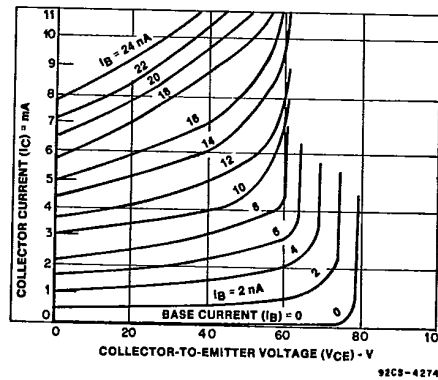


Fig. 8—Typical collector characteristics for 2N3860.

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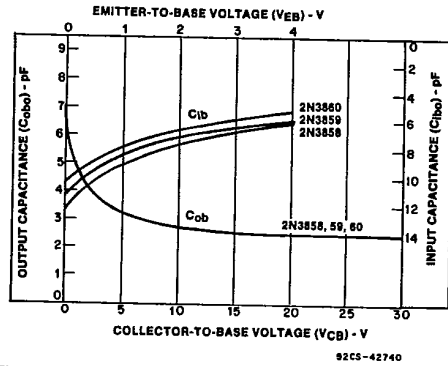


Fig. 9—Typical output and input characteristics for 2N3858, 2N3859 and 2N3860.

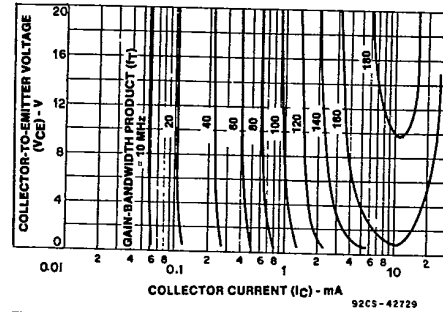


Fig. 10—Typical gain-bandwidth characteristics for 2N3858 and 2N3859A.

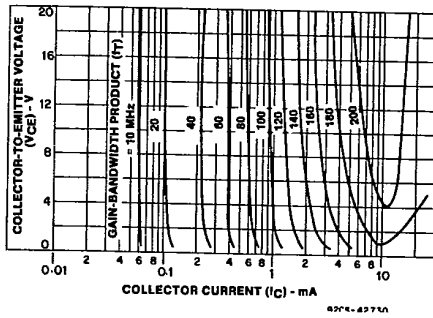


Fig. 11—Typical gain-bandwidth product characteristics for 2N3858 and 2N3859A.

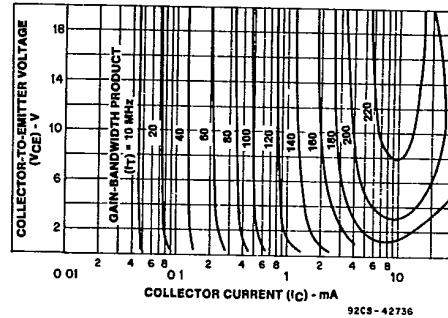


Fig. 12—Typical gain-bandwidth product characteristics for 2N3860.

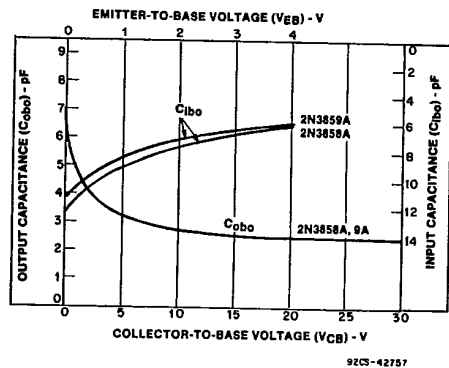


Fig. 13—Typical output and input capacitance characteristics for 2N3858A and 2N3859A.

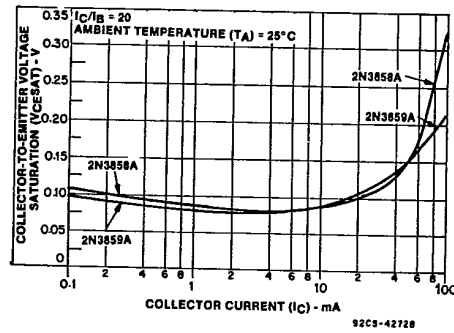


Fig. 14—Typical collector-to-emitter saturation voltage characteristics 2N3858A and 2N3859A.

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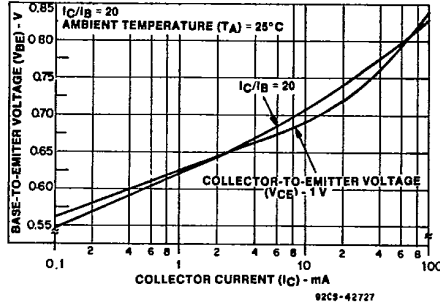


Fig. 15—Typical base-to-emitter voltage characteristics for 2N3858A and 2N3859A.

**TERMINAL CONNECTIONS**

- Lead 1 - Emitter
- Lead 2 - Collector
- Lead 3 - Base