Die no. C-22

NPN small signal transistor

These are epitaxial planar NPN silicon transistors.

Features

- available in a SST3 (SST, SOT-23) package, see page 300
- collector-to-emitter breakdown voltage, BV_{CEO} = 40 V (min) at I_C = 1.0 mA
- excellent gain linearity from 100 µA to 100 mA
- low noise, NF = 2.0 dB (max) at I_C = 100 µA, f = 10 Hz to 15.7 kHz
- high transistion frequency, typically, f_T = 300 MHz (min) at I_C = 10 mA

Device types

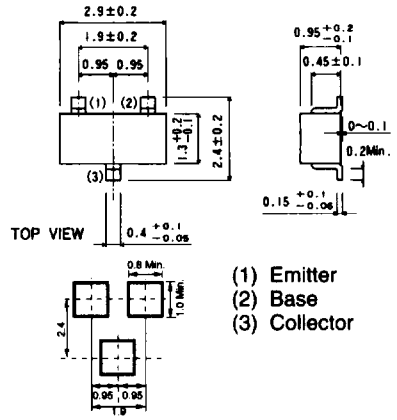
Package style	Part number	Part marking
SST3 (SOT-23)	SST6838	RBR
	BC847B	G1F
	BC848B	G1K
	BC848C	G1L

Applications

- low noise, high gain, general purpose transistor

Dimensions (Units : mm)

SST3



(1) Emitter
(2) Base
(3) Collector

Absolute maximum ratings (T_a = 25°C)

Parameter	Symbol	Limits	Unit	Conditions
Collector-to-base voltage	V_{CBO}	70	V	
Collector-to-emitter voltage	V_{CEO}	40	V	
Emitter-to-base voltage	V_{EBO}	6	V	
Collector current	I_C	200	mA	Direct current (DC)
Power dissipation	P_C	200	mW	For derating, see derating curve following
Junction temperature	T_j	−55 ~ +150	°C	

Electrical characteristics (unless otherwise noted, T_a = 25°C)

Parameter	Symbol	Min	Typical	Max	Unit	Conditions
Collector-to-base breakdown voltage	BV_{CBO}	70			V	I_C = 50 µA
Collector-to-emitter breakdown voltage	BV_{CEO}	40			V	I_C = 1.0 mA
Emitter-to-base breakdown voltage	BV_{EBO}	6			V	I_E = 10 µA
Collector cutoff current	I_{CBO}			10	nA	V_{CB} = 60 V
Emitter cutoff current	I_{EBO}			10	nA	V_{EB} = 5 V
DC current gain	h_{FE}	80	175	500		I_C = 50 µA, V_{CE} = 5.0 V
		80	175	500		I_C = 100 mA, V_{CE} = 5.0 V
		100	200	600		I_C = 500 mA, V_{CE} = 5.0 V
		100	300	1000		I_C = 1 mA, V_{CE} = 5.0 V
		100	300	1000		I_C = 10 mA, V_{CE} = 5.0 V
		100	250	800		I_C = 50 mA, V_{CE} = 5.0 V
Collector-to-emitter saturation voltage	$V_{CE(sat)}$		0.08	0.15	V	I_C/I_B = 10 mA/1.0 mA
			0.18	0.30		I_C/I_B = 50 mA/5.0 mA
Base-to-emitter saturation voltage	$V_{BE(sat)}$		0.70	0.85	V	I_C/I_B = 10 mA/1.0 mA
				1.00		I_C/I_B = 50 mA/5.0 mA
AC current gain	h_{fe}	200	400	950		I_C = 1.0 mA, V_{CE} = 5.0 V, f = 1 kHz
Collector output capacitance	C_{ob}		2.5	3	pF	V_{CB} = 5.0 V, I_E = 0, f = 1 MHz
Collector input capacitance	C_{ib}		8.5	10	pF	V_{EB} = 0.5 V, I_C = 0, f = 1 MHz
Transition frequency	f_T	300			MHz	I_C = 10 mA, V_{CE} = 5.0 V, f = 100 MHz
Noise figure	NF		5	7	dB	I_C = 100 µA, V_{CE} = 5.0 V, R_S = 10 kΩ, f = 10 Hz, bandwidth = 1 Hz
			0.8	2		I_C = 100 µA, V_{CE} = 5.0 V, R_S = 10 kΩ, f = 1 kHz, bandwidth = 1 Hz
			0.8	2		I_C = 100 µA, V_{CE} = 5.0 V, R_S = 10 kΩ, f = 10 kHz, bandwidth = 1 Hz
			1	3		I_C = 100 µA, V_{CE} = 5.0 V, R_S = 10 kΩ, f = 10 Hz to 15.7 kHz

Electrical characteristic curves

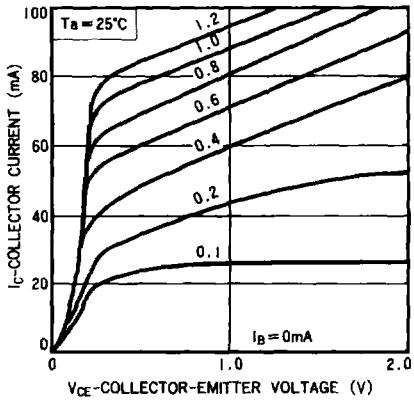


Figure 1

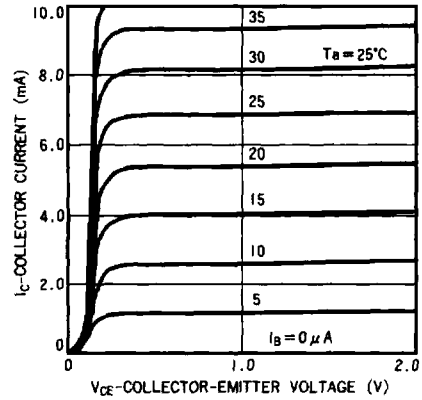
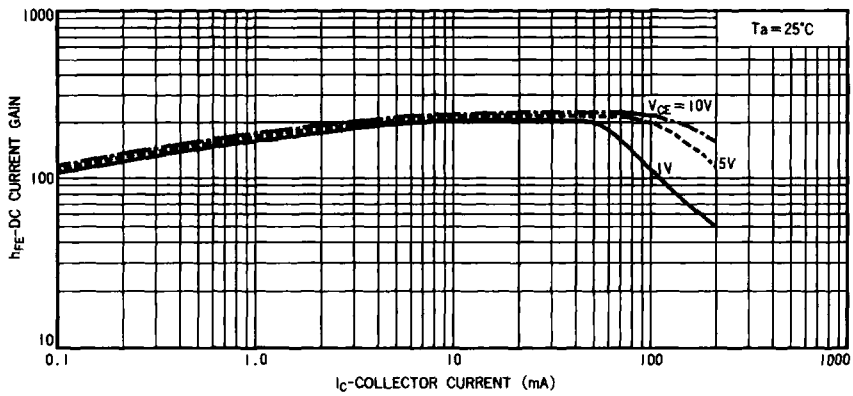


Figure 2



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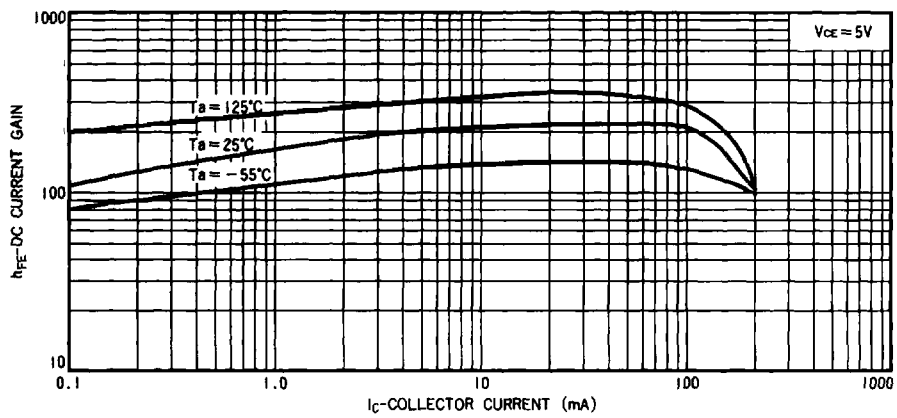

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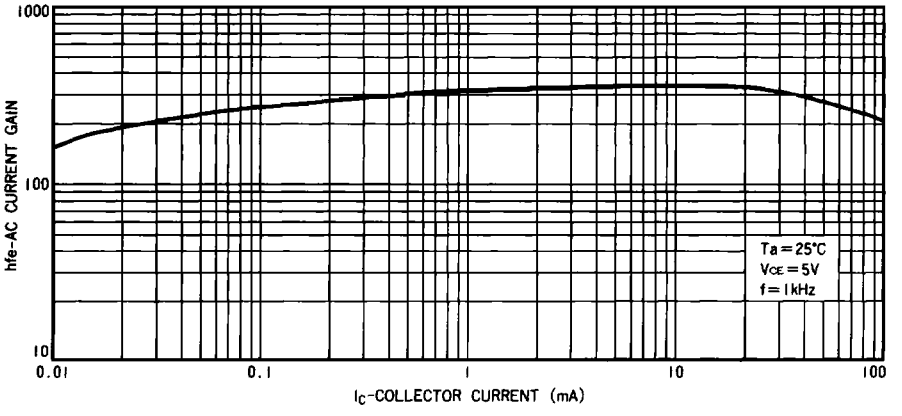

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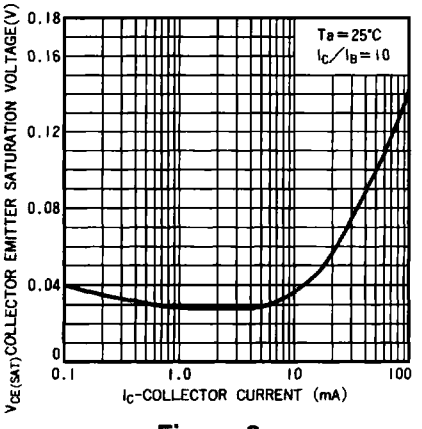

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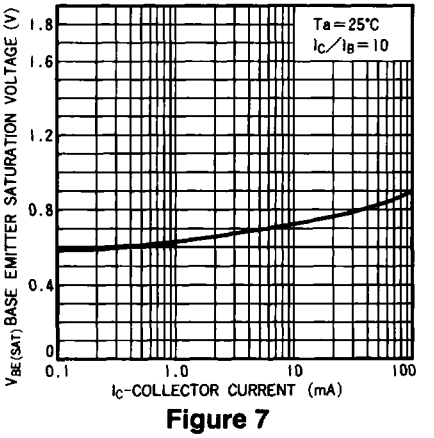

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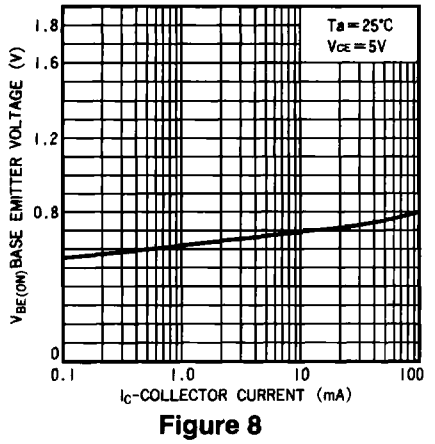

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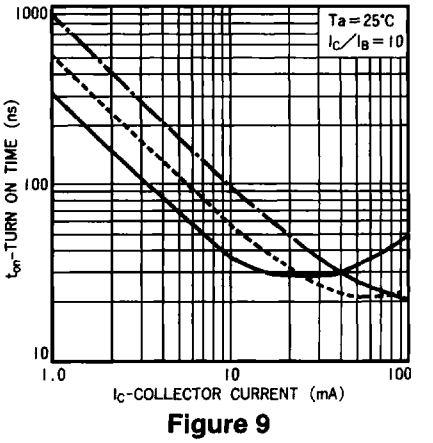

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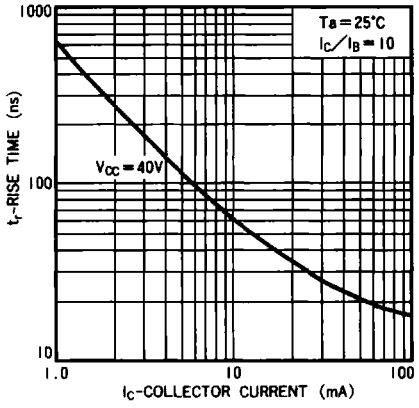

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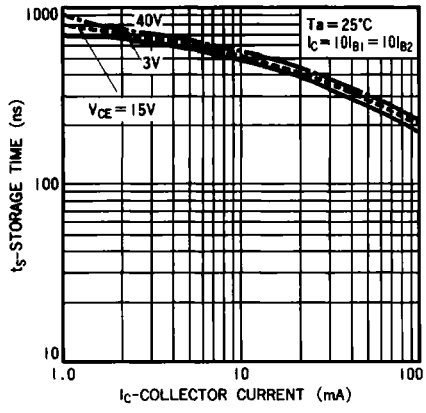

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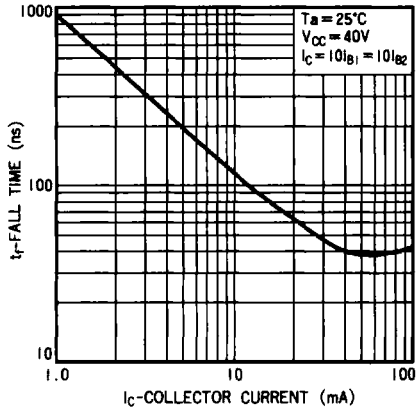

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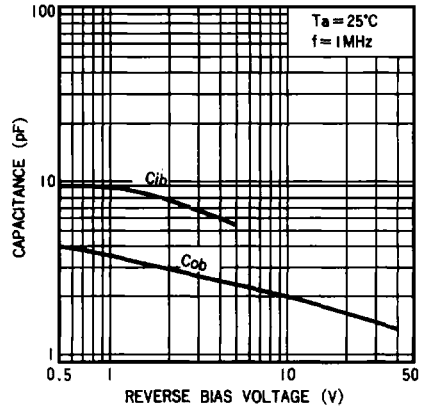

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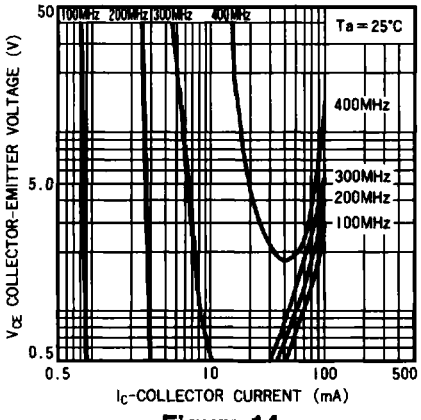

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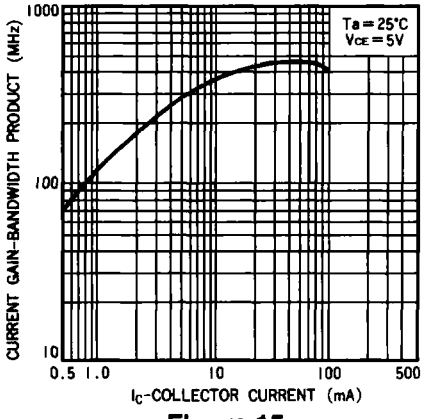

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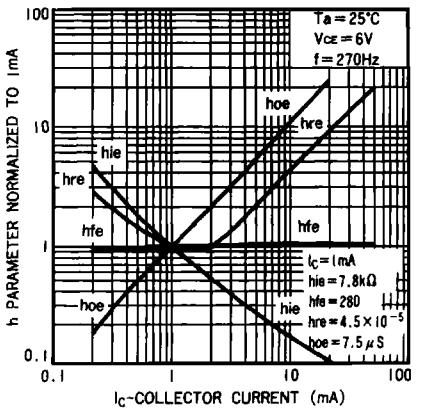

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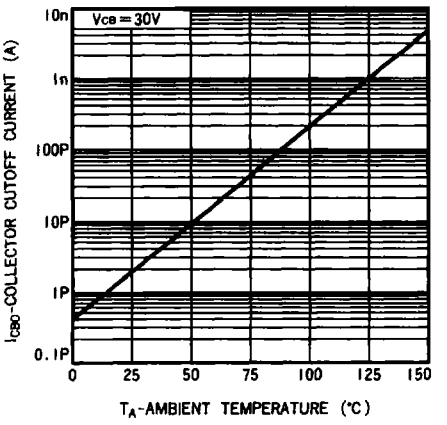

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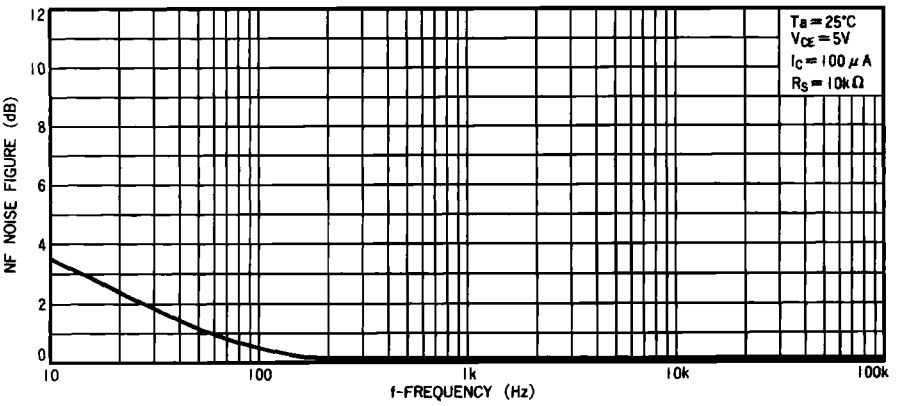

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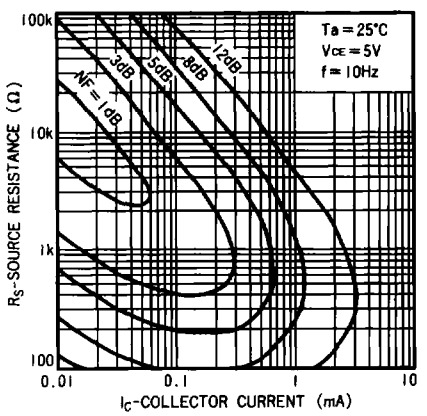

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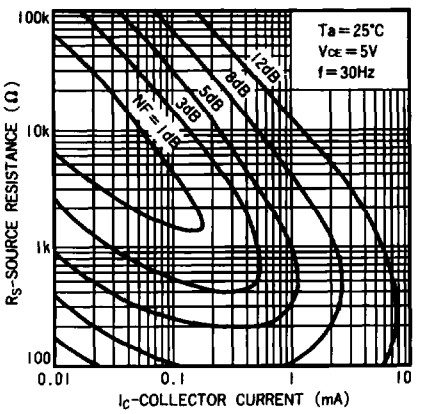

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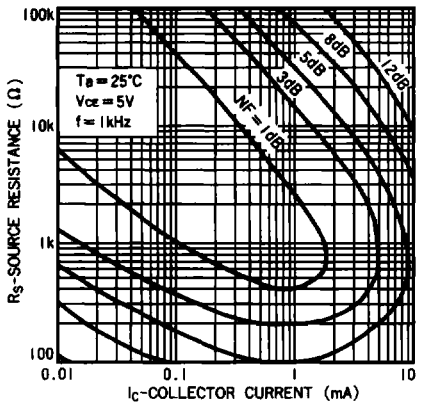

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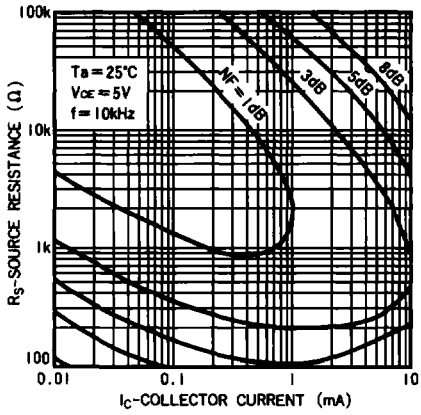

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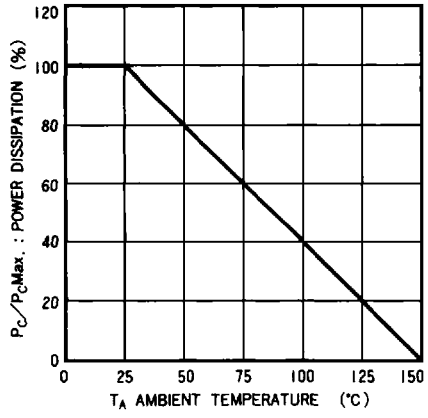

Figure 23