

TL/G/10034-61

DESCRIPTION

Process 07 is a non-overlay, double-diffused, silicon epitaxial device. Complement to Process 62.

APPLICATION

This device was designed for low noise, high gain, general purpose amplifier applications from 1 μ A to 25 mA collector current.

PRINCIPAL DEVICE TYPES

- TO-18:** 2N930
- TO-92 EBC:** 2N5088, PN2484
- TO-236:** MMBT5088

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

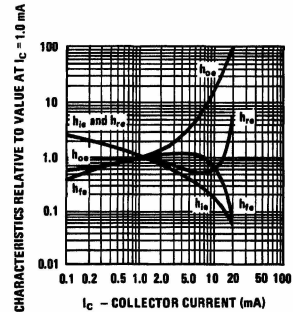
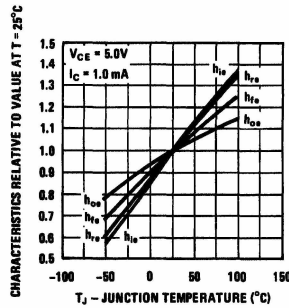
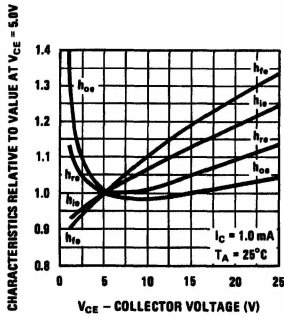
Symbol	Conditions	Min	Typ	Max	Units
NF (spot)	$I_C = 10 \mu\text{A}, V_{CE} = 5\text{V}, R_S = 10\text{k}, f = 100 \text{KHz}$		3	10	dB
NF (spot)	$I_C = 10 \mu\text{A}, V_{CE} = 5\text{V}, R_S = 10\text{k}, f = 1 \text{kHz}$		1.5	4	dB
NF (spot)	$I_C = 10 \mu\text{A}, V_{CE} = 5\text{V}, R_S = 10\text{k}, f = 10 \text{kHz}$		1.5	4	dB
NF (wideband)	$I_C = 10 \mu\text{A}, V_{CE} = 5\text{V}, R_S = 10\text{k}, P_{BW} = 15.7 \text{kHz}$		1.5	4	dB
h_{fe}	$I_C = 500 \mu\text{A}, V_{CE} = 5\text{V}, f = 20 \text{MHz}$	3	6		
C_{ob}	$V_{CB} = 5\text{V}, f = 1 \text{MHz}$		1.7	3.0	pF
$C_{\phi b}$	$V_{EB} = 0.50\text{V}, f = 1 \text{MHz}$		5.5	8.0	pF
h_{FE}	$I_C = 1 \mu\text{A}, V_{CE} = 5\text{V}$ $I_C = 10 \mu\text{A}, V_{CE} = 5\text{V}$ $I_C = 100 \mu\text{A}, V_{CE} = 5\text{V}$ $I_C = 500 \mu\text{A}, V_{CE} = 5\text{V}$ $I_C = 1 \text{mA}, V_{CE} = 5\text{V}$ $I_C = 20 \text{mA}, V_{CE} = 5\text{V}$	35 50 70 80 100 50	360	1000	
$V_{CE(SAT)}$	$I_C = 1 \text{mA}, I_B = 0.10 \text{mA}$ $I_C = 10 \text{mA}, I_B = 1 \text{mA}$			0.10 0.15	V V
$V_{BE(SAT)}$	$I_C = 1 \text{mA}, I_B = 0.1 \text{mA}$ $I_C = 10 \text{mA}, I_B = 1 \text{mA}$			0.75 0.85	V V

Symbol	Conditions	Min	Typ	Max	Units
BV_{CEO}	$I_C = 1 \text{ mA}$	60			V
BV_{CBO}	$I_C = 10 \text{ } \mu\text{A}$	60			V
BV_{EBO}	$I_E = 10 \text{ } \mu\text{A}$	8			V
I_{CBO}	$V_{CB} = 45\text{V}$			100	nA
I_{EBO}	$V_{EB} = 6\text{V}$			100	nA
$P_{D(max)}$	TO-18	$T_A = 25^\circ\text{C}$	600		mW
	TO-92	$T_A = 25^\circ\text{C}$	600		mW
	TO-236	$T_C = 25^\circ\text{C}$	350		mW

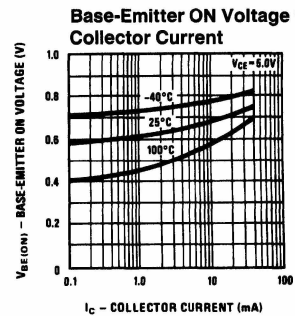
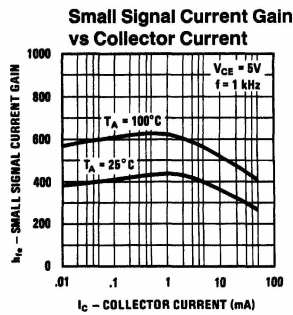
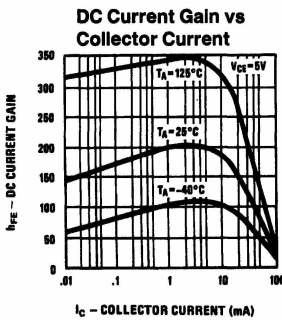
SMALL SIGNAL CHARACTERISTICS (f = 1.0 kHz)

Symbol	Parameter	Conditions	Typ	Units
h_{ie}	Input Resistance	$I_C = 1.0 \text{ mA}, V_{CE} = 5.0\text{V}$	15	$\text{k}\Omega$
h_{oe}	Output Conductance	$I_C = 1.0 \text{ mA}, V_{CE} = 5.0\text{V}$	15	μmho
h_{re}	Voltage Feedback Ratio	$I_C = 1.0 \text{ mA}, V_{CE} = 5.0\text{V}$	425	$\times 10^{-6}$
h_{fe}	Small Signal Current Gain	$I_C = 1.0 \text{ mA}, V_{CE} = 5.0\text{V}$	400	
h_{ib}	Input Resistance	$I_C = 1.0 \text{ mA}, V_{CE} = 5.0\text{V}$	27	Ω

TYPICAL COMMON EMITTER CHARACTERISTICS (f = 1.0 kHz)

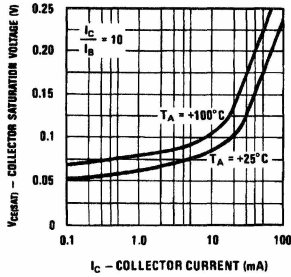


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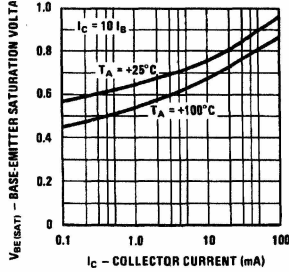


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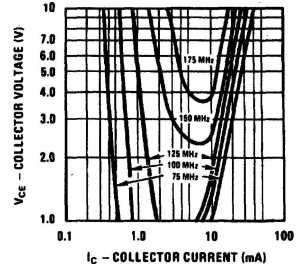
Collector Saturation Voltage vs Collector Current



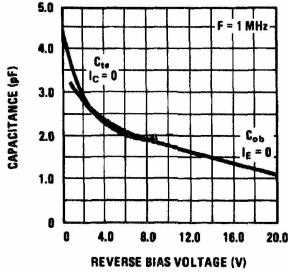
Base-Emitter Saturation Voltage vs Collector Current



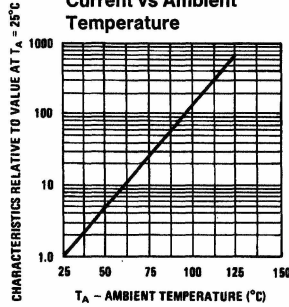
Contours of Constant Gain Bandwidth Product (f_T)



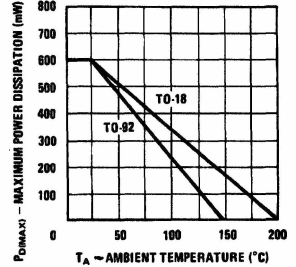
Input and Output Capacitance vs Reverse Bias Voltage



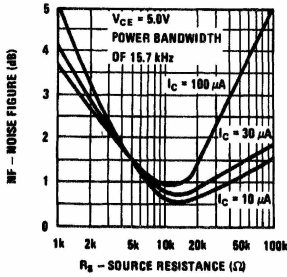
Normalized Collector Cutoff Current vs Ambient Temperature



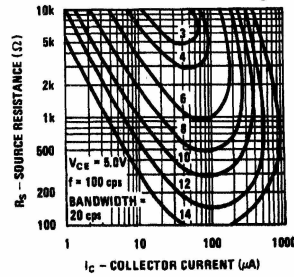
Maximum Power Dissipation vs Ambient Temperature



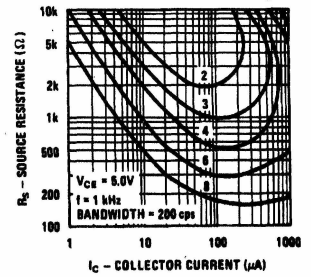
Wideband Noise Figure vs Source Resistance



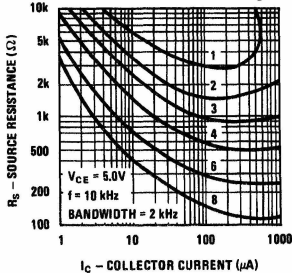
Contours of Constant Narrow Band Noise Figure



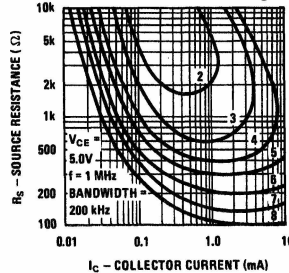
Contours of Constant Narrow Band Noise Figure



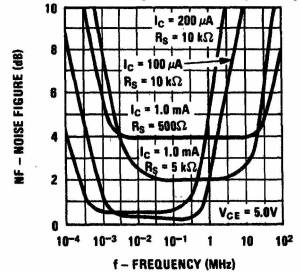
Contours of Constant Narrow Band Noise Figure



Contours of Constant Narrow Band Noise Figure



Noise Figure vs Frequency



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