1989

National Semiconductor

400047

Discrete Semiconductor Products

Databook

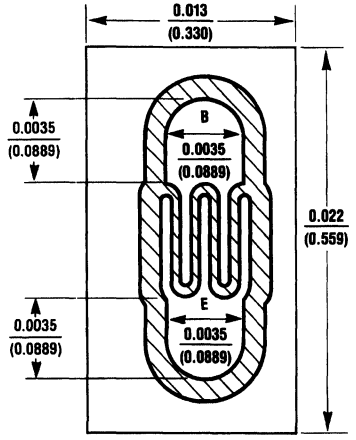
Discrete Semiconductor Products Databook National Semiconductor

General Purpose Amplifiers and Switches (Continued)

Type No.	Case Style	V_{CBO} (V) Min	V_{CEO} (V) Min	V_{EBO} (V) Min	I_{CES}* I_{CBO} (nA) Max @ V_{CB} (V)	h_{FE} Min	h_{FE} Max @ I_C (mA) & V_{CE} (V)	$V_{CE(SAT)}$ (V) Max & $V_{BE(SAT)}$ (V) Min	$V_{BE(SAT)}$ (V) Max @ I_C (mA)	C_{OB} (pF) Max	f_T (MHz) Min	f_T (MHz) Max @ I_C (mA)	t_{OFF} (ns) Max	NF (dB) Max	Test Conditions	Process No.
TN2905A	TO-237 (91)	60	60	5	10 @ 50	50	500 10	0.4	1.3 150	8	200	50	100		(Note 2)	63
						100 300	150 10									
						100	10 10	1.6	2.6 500							
						100	1 10									
						75	0.1 10									
2N3905	TO-92 (92)	40	40	5		15	100 1	0.25 0.65	0.85 10	4.5	200	10	260	5	(Notes 5, 8)	66
						30	50 1									
						50 150	10 1	0.4	0.95 50							
						40	1 1									
						30	0.1 1									
2N3906	TO-92 (92)	40	40	5		30	100 1	0.25 0.65	0.85 10	4.5	250	10	300	4	(Notes 5, 8)	66
						80	50 1									
						100 300	10 1	0.4	0.95 50							
						80	1 1									
						60	0.1 1									
2N4121		Same as PN4121														66
2N4122		Same as PN4122														66
2N4125	TO-92 (92)	30	30	4	50 @ 20	25	50 1	0.4	0.95 50	4.5	200	10		5	(Note 8)	66
						50 150	2 1									
2N4126	TO-92 (92)	25	25	4	50 @ 20	60	50 1	0.4	0.95 50	4.5	250	10		4	(Note 8)	66
						120 360	2 1									
2N4916		Same as PN4916														66
2N4917		Same as PN4917														66
2N5138		Same as PN5138														66
2N5139		Same as PN5139														66
MPQ3906	TO-116	60	40	6	50 @ 30	40	0.1 1	0.25	0.85 10	4.5						66
						60	1 1									
						75	10 1									

National Semiconductor

Process 66
PNP Small Signal



TL/G/10038–19

DESCRIPTION

Process 66 is an overlay, double-diffused, silicon epitaxial device. Complement to Process 23.

APPLICATION

This device was designed for general purpose amplifier and switching applications at collector currents of 10 μA to 100 mA.

PRINCIPAL DEVICE TYPES

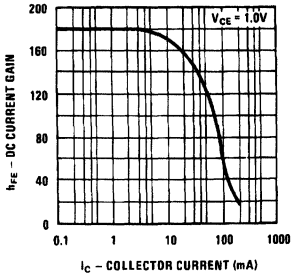
TO-92 EBC: 2N3906, 4126
TO-236: MMBT3906
TO-116: MPQ3906
16-SOIC: MMPQ3906

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

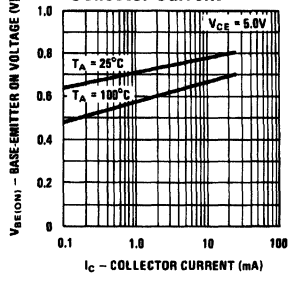
Symbol	Conditions	Min	Typ	Max	Units
t_{OFF}	I_C = 10 mA, I_{B2} = 1 mA		150	300	ns
t_{ON}	I_C = 10 mA, I_{B1} = 1 mA		30	70	ns
C_{ob}	V_{CB} = 5V		3.0	4.5	pF
C_{ib}	V_{EB} = 0.5V			15	pF
h_{fe}	f = 100 MHz, V_{CE} = 20V, I_C = 10 mA	2.5	4.5		
NF (wideband)	I_C = 100 μA, V_{CE} = 5V, R_S = 1 kΩ		2.0		dB
h_{FE}	I_C = 0.1 mA, V_{CE} = 1V I_C = 1 mA, V_{CE} = 1V I_C = 10 mA, V_{CE} = 1V I_C = 50 mA, V_{CE} = 1V I_C = 100 mA, V_{CE} = 1V	40 50 50 40 20	150	350	
$V_{CE(SAT)}$	I_C = 10 mA, I_B = 1 mA I_C = 50 mA, I_B = 5 mA			0.25 0.40	V V
$V_{BE(SAT)}$	I_C = 10 mA, I_B = 1 mA I_C = 50 mA, I_B = 5 mA			0.85 0.95	V V
BV_{CEO}	I_C = 1 mA	35			V
BV_{CBO}	I_C = 10 μA	45			V
BV_{EBO}	I_C = 10 μA	5.0			V
I_{CBO}	V_{CB} = 25V			100	nA
I_{EBO}	V_{EB} = 4V			100	nA

Process 66

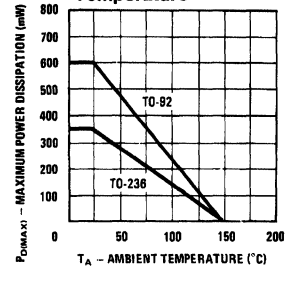
DC Current Gain vs Collector Current



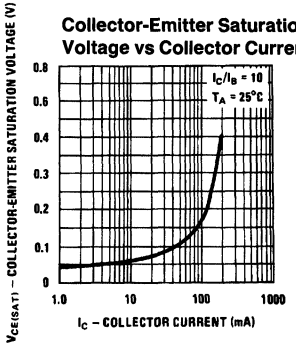
Base-Emitter ON Voltage vs Collector Current



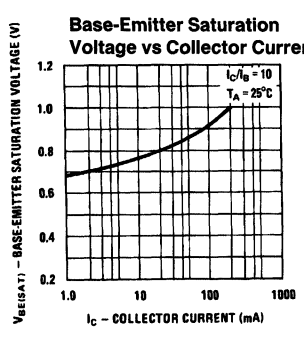
Maximum Power Dissipation vs Ambient Temperature



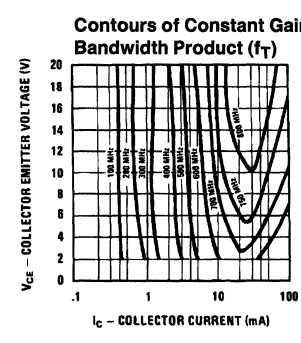
Collector-Emitter Saturation Voltage vs Collector Current



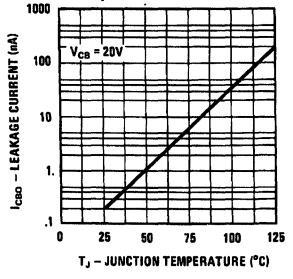
Base-Emitter Saturation Voltage vs Collector Current



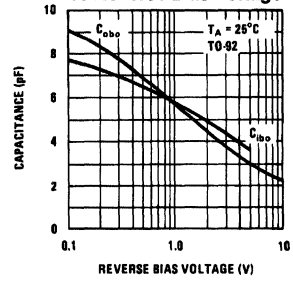
Contours of Constant Gain Bandwidth Product (f_T)



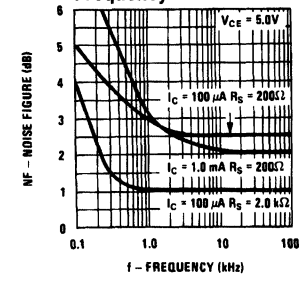
Collector-Base Diode Reverse Current vs Temperature



Common Base Open Circuit Input and Output Capacitance vs Reverse Bias Voltage



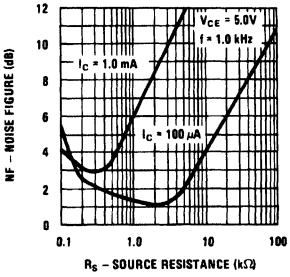
Noise Figure vs Frequency



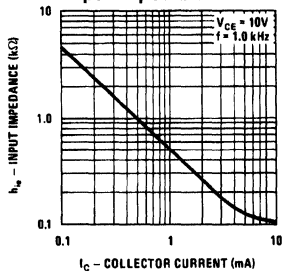
TL/G/10038–21

Process 66

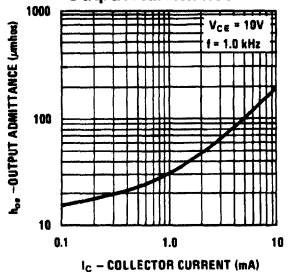
Noise Figure vs Source Resistance



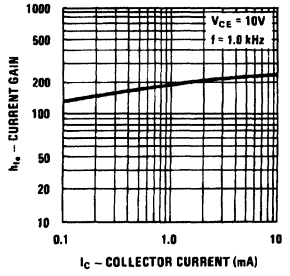
Input Impedance



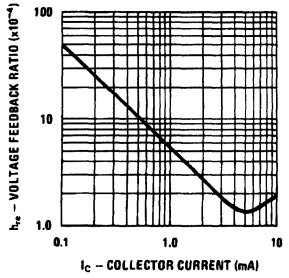
Output Admittance



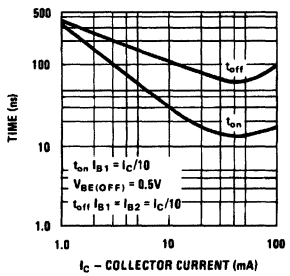
Current Gain



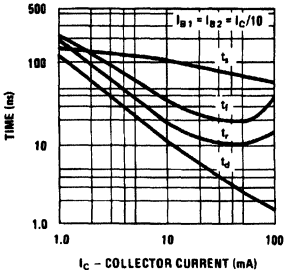
Voltage Feedback Ratio



Turn On and Turn Off Times vs Collector Current



Switching Times vs Collector Current



TL/G/10038–20