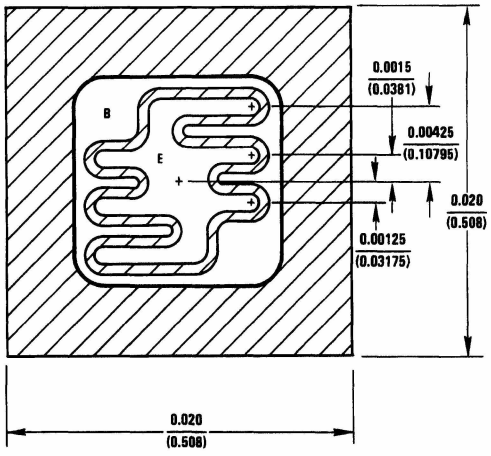
National Semiconductor

Process 13
NPN Medium Power



TL/G/10034–16

DESCRIPTION

Process 13 is a non-overlay, double-diffused, silicon epitaxial device.

APPLICATION

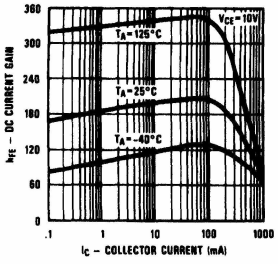
This device is designed for use as medium power amplifiers and switches requiring collector currents of 100 μA to 500 mA.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

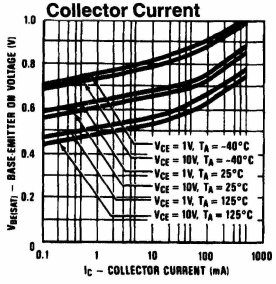
Symbol	Conditions	Min	Typ	Max	Units
t_{ON}	I_C = 150 mA, I_{B1} = 15 mA		35		ns
t_{OFF}	I_C = 150 mA, I_{B2} = 15 mA		250		ns
h_{fe}	I_C = 20 mA, V_{CE} = 20V, f = 100 MHz	2.0	3.0		
NF (spot)	I_C = 100 μA, V_{CE} = 10V, R_S = 1 kΩ, f = 1 kHz		2.0		dB
C_{ob}	V_{CB} = 10V, f = 1 MHz		4.5	8.0	pF
C_{ib}	V_{EB} = 0.5V, f = 1 MHz			35	pF
h_{FE}	V_{CE} = 1.0V, I_C = 1.0 mA V_{CE} = 1.0V, I_C = 10 mA V_{CE} = 1.0V, I_C = 100 mA V_{CE} = 1.0V, I_C = 500 mA	30 40 50 25	150	300	
$V_{CE(SAT)}$	I_C = 150 mA, I_B = 15 mA I_C = 500 mA, I_B = 50 mA			0.2 0.5	V V
$V_{BE(SAT)}$	I_C = 150 mA, I_B = 15 mA I_C = 500 mA, I_B = 50 mA			1.0 1.2	V V
BV_{CBO}	I_C = 100 μA	60			V
BV_{CEO}	I_C = 10 mA	35			V
BV_{EBO}	I_C = 10 μA	6.0			V
I_{CBO}	V_{CB} = 40V			100	nA
I_{EBO}	V_{EB} = 4V			100	nA

Process 13

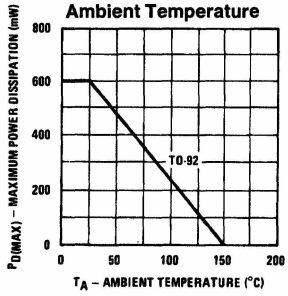
DC Current Gain vs Collector Current



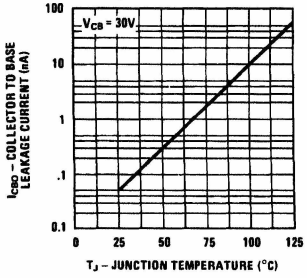
Base-Emitter ON Voltage vs Collector Current



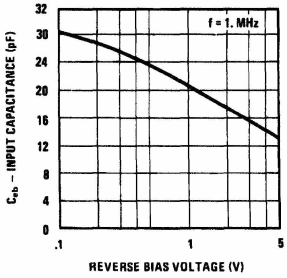
Maximum Power Dissipation vs Ambient Temperature



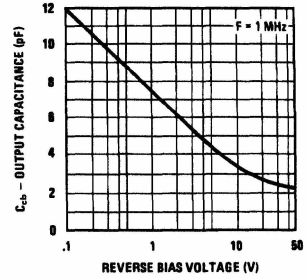
Collector-Base Diode Reverse Current vs Temperature



Input Capacitance vs Reverse Bias Voltage



Output Capacitance vs Reverse Bias Voltage



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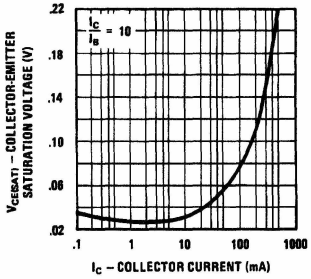
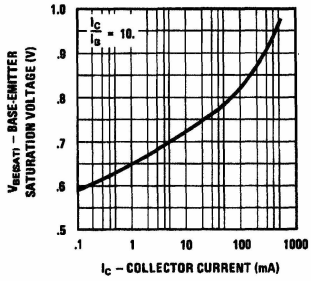
Collector-Emitter Saturation Voltage vs Collector Current



Base-Emitter Saturation Voltage vs Collector Current



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