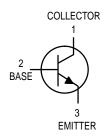
Amplifier Transistors NPN Silicon



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	VCEO	40	Vdc
Collector-Base Voltage	V _{CBO}	75	Vdc
Emitter-Base Voltage	VEBO	6.0	Vdc
Collector Current — Continuous	IC	600	mAdc
Total Device Dissipation @ T _A = 25°C Derate above 25°C	PD	625 5.0	mW mW/°C
Total Device Dissipation @ T _C = 25°C Derate above 25°C	PD	1.5 12	Watts mW/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-55 to +150	°C

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THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{ heta JA}$	200	°C/W
Thermal Resistance, Junction to Case	$R_{ heta JC}$	83.3	°C/W

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit	
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage $(I_C = 10 \text{ mAdc}, I_B = 0)$	V(BR)CEO	40	_	Vdc	
Collector-Base Breakdown Voltage (IC = 10 μAdc, IE = 0)	V(BR)CBO	75	_	Vdc	
Emitter-Base Breakdown Voltage (IE = 10 μAdc, IC = 0)	V(BR)EBO	6.0	_	Vdc	
Collector Cutoff Current (VCE = 60 Vdc, VEB(off) = 3.0 Vdc)	ICEX	_	10	nAdc	
Collector Cutoff Current $(V_{CB} = 60 \text{ Vdc}, I_E = 0)$ $(V_{CB} = 60 \text{ Vdc}, I_E = 0, T_A = 150^{\circ}\text{C})$	ІСВО	_ _	0.01 10	μAdc	
Emitter Cutoff Current (VEB = 3.0 Vdc, IC = 0)	IEBO	_	10	nAdc	
Collector Cutoff Current (VCE = 10 V)	ICEO	_	10	nAdc	
Base Cutoff Current (VCE = 60 Vdc, VEB(off) = 3.0 Vdc)	IBEX	_	20	nAdc	



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ELECTRICAL CHARACTERISTICS ($T_A = 25^{\circ}C$ unless otherwise noted) (Continued)

	Symbol	Min	Max	Unit	
ON CHARACTERISTICS					
DC Current Gain (IC = 0.1 mAdc, V (IC = 1.0 mAdc, V (IC = 10 mAdc, V (IC = 150 mAdc, V (IC = 150 mAdc, V (IC = 500 mAdc, V	hFE	35 50 75 35 100 50 40		_	
Collector-Emitter S (I _C = 150 mAdc, I (I _C = 500 mAdc, I	B = 15 mAdc)	VCE(sat)		0.3 1.0	Vdc
Base-Emitter Satur (I _C = 150 mAdc, I (I _C = 500 mAdc, I	B = 15 mAdc)	VBE(sat)	0.6 —	1.2 2.0	Vdc
SMALL-SIGNAL	CHARACTERISTICS				
Current-Gain — Ba (I _C = 20 mAdc, V ₀	andwidth Product(2) CE = 20 Vdc, f = 100 MHz)	fΤ	300	_	MHz
Output Capacitance (V _{CB} = 10 Vdc, I _E	= 0, f = 1.0 MHz)	C _{obo}	_	8.0	pF
Input Capacitance (VEB = 0.5 Vdc, I	C = 0, f = 1.0 MHz)	C _{ibo}	_	25	pF
	CE = 10 Vdc, f = 1.0 kHz) CE = 10 Vdc, f = 1.0 kHz)	h _{ie}	2.0 0.25	8.0 1.25	kΩ
Voltage Feedback Ratio (IC = 1.0 mAdc, VCE = 10 Vdc, f = 1.0 kHz) (IC = 10 mAdc, VCE = 10 Vdc, f = 1.0 kHz)		h _{re}		8.0 4.0	X 10 ⁻⁴
	nt Gain /CE = 10 Vdc, f = 1.0 kHz) CE = 10 Vdc, f = 1.0 kHz)	h _{fe}	50 75	300 375	_
Output Admittance (IC = 1.0 mAdc, VCE = 10 Vdc, f = 1.0 kHz) (IC = 10 mAdc, VCE = 10 Vdc, f = 1.0 kHz)		h _{oe}	5.0 25	35 200	μmhos
Collector Base Time (I _E = 20 mAdc, V ₀	rb′C _C	_	150	ps	
Noise Figure (I _C = 100 μAdc, V	NF	_	4.0	dB	
SWITCHING CHA	RACTERISTICS	•		•	•
Delay Time	(V _{CC} = 30 Vdc, V _{BE(off)} = -2.0 Vdc,	t _d	_	10	ns
Rise Time	I _C = 150 mAdc, I _{B1} = 15 mAdc) (Figure 1)	t _r	_	25	ns
Storage Time	(V _{CC} = 30 Vdc, I _C = 150 mAdc,	t _S	_	225	ns
Fall Time	I _{B1} = I _{B2} = 15 mAdc) (Figure 2)	tf	_	60	ns

^{1.} Pulse Test: Pulse Width \leq 300 $\mu s,$ Duty Cycle \leq 2.0%.

^{2.} f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

SWITCHING TIME EQUIVALENT TEST CIRCUITS

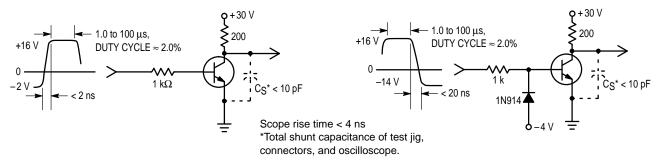


Figure 1. Turn-On Time

Figure 2. Turn-Off Time

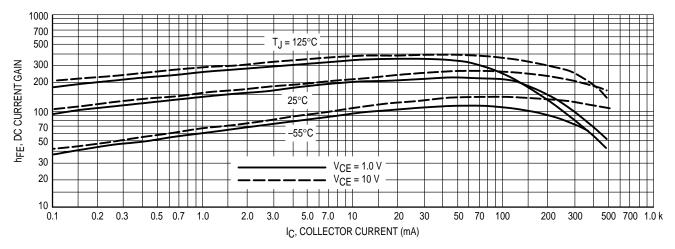


Figure 3. DC Current Gain

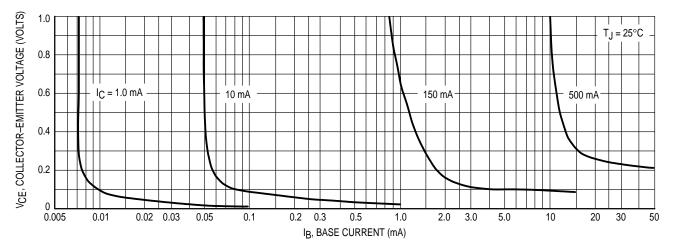


Figure 4. Collector Saturation Region

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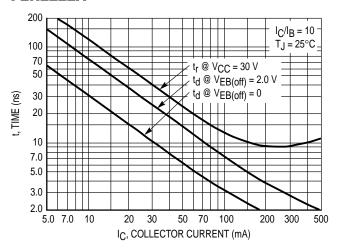
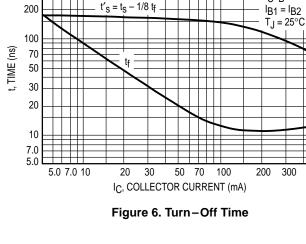


Figure 5. Turn-On Time



300

VCC = 30 V

500

 $I_C/I_B = 10$

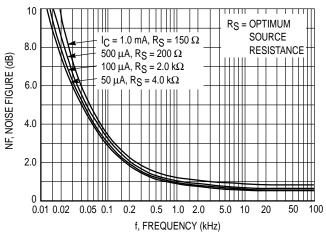


Figure 7. Frequency Effects

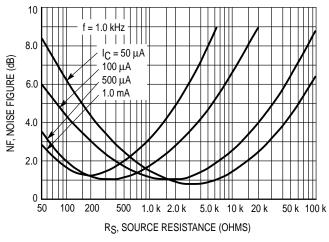


Figure 8. Source Resistance Effects

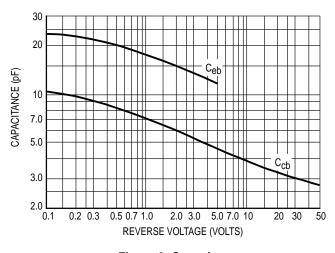


Figure 9. Capacitances

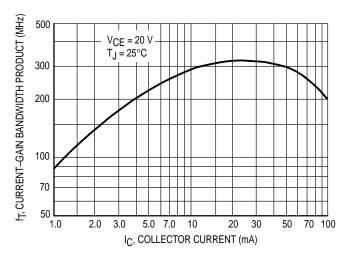


Figure 10. Current-Gain Bandwidth Product

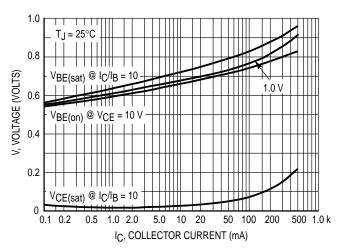


Figure 11. "On" Voltages

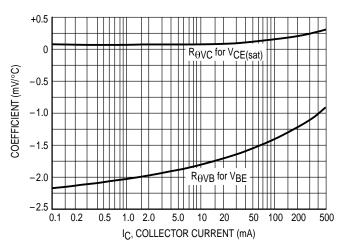
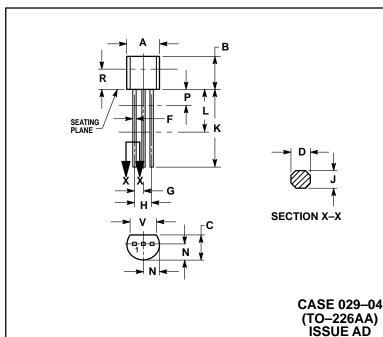


Figure 12. Temperature Coefficients

PACKAGE DIMENSIONS



NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
- DIMENSION F APPLIES BETWEEN P AND L. DIMENSION F APPLIES BETWEEN F AND L.
 DIMENSION D AND J APPLY BETWEEN L AND K
 MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIM	MILLIMETERS	
DIM	MIN	MAX	MIN	MAX	
Α	0.175	0.205	4.45	5.20	
В	0.170	0.210	4.32	5.33	
С	0.125	0.165	3.18	4.19	
D	0.016	0.022	0.41	0.55	
F	0.016	0.019	0.41	0.48	
G	0.045	0.055	1.15	1.39	
Н	0.095	0.105	2.42	2.66	
J	0.015	0.020	0.39	0.50	
K	0.500		12.70		
L	0.250		6.35		
N	0.080	0.105	2.04	2.66	
Р		0.100		2.54	
R	0.115		2.93		
٧	0.135	_	3.43		

STYLE 17: PIN 1. COLLECTOR 2. BASE 3. EMITTER

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