



NES

NEW ENGLAND SEMICONDUCTOR

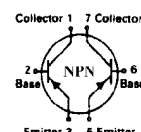
2N2913 2N2917
2N2914 2N2918
2N2915 2N2919*
2N2916 2N2920*

*also available as
JAN, JANTX,
JANTXV

MAXIMUM RATINGS

RATINGS	SYMBOL	2N2913 thru 2N2918	2N2919 2N2920	UNITS
Collector-Emitter Voltage	V_{CE0}	45	60	Vdc
Collector-Base Voltage	V_{CBO}	45	60	Vdc
Emitter-Base Voltage	V_{EBO}	6.0		Vdc
Collector Current -- Continuous	I_C	30		mAdc
		One Die	Both Die	
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate Above 25°C	P_D	300 1.7	500 2.88	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C	P_D	750 4.3	1500 8.6	mW mW/ $^\circ\text{C}$
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		$^\circ\text{C}$

TO-99



DUAL TRANSISTORS
NPN SILICON

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

Characteristics	SYMBOL	Min	Max	UNITS
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage $I_C = 10 \text{ mAdc}, I_B = 0$	$V_{(BR)CEO(sus)}$	45 60		Vdc
Collector-Base Breakdown Voltage $I_C = 10 \mu\text{Adc}, I_E = 0$	$V_{(BR)CBO}$	45 60		Vdc
Emitter-Base Breakdown Voltage $I_E = 10 \mu\text{Adc}, I_C = 0$	$V_{(BR)EBO}$	6.0		Vdc
Collector Cutoff Current $V_{CE} = 5.0 \text{ Vdc}, I_B = 0$	I_{CEO}		0.002	μAdc
Collector Cutoff Current $V_{CB} = 45 \text{ Vdc}, I_E = 0$	I_{CBO}		0.010 0.002 10	μAdc
Emitter Cutoff Current $V_{EB} = 5.0 \text{ Vdc}, I_C = 0$	I_{EBO}		0.002	μAdc

ON CHARACTERISTICS

DC Current Gain(1) $I_C = 10 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$	2N2913, 15, 17, 19 2N2914, 16, 18, 20	h_{FE}	60 150	240 600	-
$I_C = 10 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}, T_A = -55^\circ\text{C}$	2N2913, 15, 17, 19 2N2914, 16, 18 2N2920		15 30 40	- - -	
$I_C = 100 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$	2N2913, 15, 17, 19 2N2914, 16, 18, 20		100 225	- -	
$I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$	2N2913, 15, 17, 19 2N2914, 16, 18, 20		150 300	- -	
Collector-Emitter Saturation Voltage $I_C = 1.0 \text{ mAdc}, I_B = 0.1 \text{ mAdc}$		$V_{CE(sat)}$		0.35	Vdc
Base-Emitter On Voltage $I_C = 100 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$		$V_{BE(on)}$		0.7	Vdc

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

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T4-4.8-860-354 REV: --



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ELECTRICAL CHARACTERISTICS [continued ($T_A = 25^\circ\text{C}$ unless otherwise noted)]

Characteristics	Symbol	Min.	Typ.	Max	Unit
Current-Gain -- Bandwidth Product $I_C = 500 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$, $f = 20 \text{ MHz}$	f_T	60			MHz
Output Capacitance $V_{CB} = 5.0 \text{ V dc}$, $I_E = 0$, $f = 140 \text{ kHz}$	C_{obo}		4.0	6.0	p^F
Input Impedance $I_C = 1.0 \text{ mA dc}$, $V_{CB} = 5.0 \text{ V dc}$, $f = 1.0 \text{ kHz}$	h_{ib}	25	28	32	ohms
Output Admittance $I_C = 1.0 \text{ mA dc}$, $V_{CB} = 5.0 \text{ V dc}$, $f = 1.0 \text{ kHz}$	h_{ob}			1.0	μmhos
Noise Figure $I_C = 10 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V}$, $R_s = 10 \text{ k}\Omega$ 2N2914, 16, 18, 20 $f = 1.0 \text{ kHz}$, $\text{BW} = 200 \text{ Hz}$ 2N2913, 15, 17, 19 $I_C = 10 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V}$, $R_s = 10 \text{ k}\Omega$ 2N2914, 16, 18, 20 $f = 10 \text{ Hz} - 15.7 \text{ kHz}$, $\text{BW} = 10 \text{ kHz}$ 2N2913, 15, 17, 19	NF		2.0 3.0 2.0 3.0	3.0 4.0 3.0 4.0	dB

MATCHING CHARACTERISTICS

DC Current Gain Ratio (2) $I_C = 100 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$ 2N2917, 18 2N2915, 16, 19, 20	h_{FE1}/h_{FE2}	0.8 0.9		1.0 1.0	-
Base-Emitter Voltage Differential $I_C = 10 \mu\text{A dc} - 1.0 \text{ mA dc}$, $V_{CE} = 5.0 \text{ V dc}$ 2N2917, 18 2N2915, 16, 19, 20 $I_C = 100 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$ 2N2917, 18 2N2915, 16, 19, 20	$V_{BE1} - V_{BE2}$			10 5.0 5.0 3.0	mVdc
Base-Emitter Voltage Differential Change Due to Temperature $I_C = 100 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$ 2N2917, 18 $T_A = -55^\circ\text{C}$ to $+25^\circ\text{C}$ 2N2915, 16, 19, 20 $I_C = 100 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$ 2N2917, 18 $T_A = +25^\circ\text{C}$ to $+125^\circ\text{C}$ 2N2915, 16, 19, 20	$\Delta V_{BE1} - V_{BE2}$			1.6 0.8 2.0 1.0	mVdc

(2) The lowest h_{FE} reading is taken as h_{FE1} for this ratio

SX LEVEL RELIABILITY TESTING

100% SCREENING	GROUP A	GROUP B (Sample)	GROUP C (Sample)
Internal Visual Temp Cycle Thermal Response Constant Acceleration PIND Fine and Gross Leak HTRB Power Burn In	Visual and Mechanical DC Static Tests 25°C DC Static Tests High Temp DC Static Tests Low Temp Dynamic Tests @ 25°C	Solderability Temp Cycle Fine and Gross Leak Bond Strength Intermittent Op Life Steady State Op Life Thermal Resistance Hi-Temp (non-operating)	Physical Dimensions Thermal Shock Terminal Strength Hermetic Seal Moisture Resistance Shock Test Vibration Test Constant Acceleration Salt Atmosphere Operation Life

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