



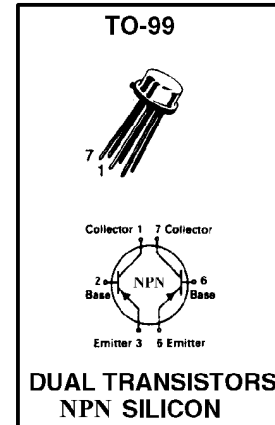
NEW ENGLAND SEMICONDUCTOR

**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	500	mW
		1.7	2.88	$\text{mW}/^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C	P_D	750	1500	mW
		4.3	8.6	$\text{mW}/^\circ\text{C}$
Operating & Storage Junction Temperature Range	T_i, T_{stg}	-65 to +200		$^\circ\text{C}$



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		Vdc		
2N2913 thru 2N2918 2N2919, 2N2920		60				
Collector-Base Breakdown Voltage $I_C = 10 \mu\text{Adc}, I_E = 0$	$V_{(BR)CBO}$	45		Vdc		
2N2913 thru 2N2918 2N2919, 2N2920		60				
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	μAdc		
2N2913 thru 2N2918 2N2919, 2N2920			0.002	μAdc		
$V_{CB} = 45 \text{ Vdc}, I_E = 0, T_A = 150^\circ\text{C}$ All Types			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) $I_C = 10 \mu\text{Adc}, V_{CE} = 5.0 \text{ Vdc}$	h_{FE}	2N2913, 15, 17, 19 2N2914, 16, 18, 20	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 $I_C = 10 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V}$, $R_S = 10 \text{ k}\Omega$ $f = 1.0 \text{ kHz}$, $\text{BW} = 200 \text{ Hz}$ $I_C = 10 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V}$, $R_S = 10 \text{ k}\Omega$ $f = 10 \text{ Hz} - 15.7 \text{ kHz}$, $\text{BW} = 10 \text{ kHz}$	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 $I_C = 10 \mu\text{A dc} - 1.0 \text{ mA dc}$, $V_{CE} = 5.0 \text{ V dc}$ $I_C = 100 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$	2N2917, 18 2N2915,16,19,20 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 $I_C = 100 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$ $T_A = -55^\circ\text{C}$ to $+25^\circ\text{C}$ $I_C = 100 \mu\text{A dc}$, $V_{CE} = 5.0 \text{ V dc}$ $T_A = +25^\circ\text{C}$ to $+125^\circ\text{C}$	2N2917, 18 2N2915,16,19,20 2N2917, 18 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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