

2SC313

**Silicon NPN Transistor  
VHF–UHF Amplifier, Mixer/Osc**

**Features:**

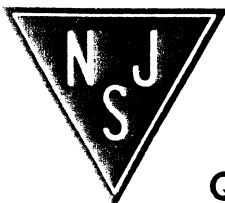
- High Current Gain–Bandwidth Product:  $f_T = 600\text{MHz}$  (Min) @  $f = 100\text{MHz}$
- Low Output Capacitance:  $C_{ob} = 1.7\text{pF}$  (Max) @  $V_{CB} = 10\text{V}$

**Absolute Maximum Ratings:**

Collector–Emitter Voltage, $V_{CES}$ .....	45V
Collector–Base Voltage, $V_{CBO}$ .....	45V
Emitter–Base Voltage, $V_{EBO}$ .....	3V
Continuous Collector Current, $I_C$ .....	50mA
Total Device Dissipation ( $T_A = +25^\circ\text{C}$ ), $P_D$ .....	200mW
Derate Above $25^\circ\text{C}$ .....	1.14mW/ $^\circ\text{C}$
Total Device Dissipation ( $T_C = +25^\circ\text{C}$ ), $P_D$ .....	300mW
Derate Above $25^\circ\text{C}$ .....	1.71mW/ $^\circ\text{C}$
Operating Junction Temperature Range, $T_J$ .....	$-65^\circ$ to $+200^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+200^\circ\text{C}$

**Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 1.0\mu\text{A}$ , $I_E = 0$	30	–	–	V
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10\mu\text{A}$ , $I_C = 0$	3.0	–	–	V
Collector–Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 3\text{mA}$ , $I_B = 0$	15	–	–	V
Collector Cutoff Current	$I_{CBO}$	$V_{CB} = 15\text{V}$ , $I_E = 0$	–	–	0.01	$\mu\text{A}$
		$V_{CB} = 15\text{V}$ , $I_E = 0$ , $T_A = +150^\circ\text{C}$	–	–	1.0	$\mu\text{A}$



**Electrical Characteristics (Cont'd):** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>ON Characteristics</b>						
DC Current Gain	$h_{FE}$	$I_C = 3\text{mA}, V_{CE} = 1\text{V}$	20	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 10\text{mA}, I_B = 1\text{mA}$	–	–	0.4	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 10\text{mA}, I_B = 1\text{mA}$	–	–	1.0	V
<b>Small–Signal Characteristics</b>						
Current Gain–Bandwidth Product	$f_T$	$I_C = 10\text{mA}, V_{CE} = 10\text{V}, f = 100\text{MHz}, \text{Note 1}$	600	–	–	MHz
Output Capacitance	$C_{obo}$	$V_{CB} = 10\text{V}, I_E = 0, f = 140\text{kHz}$	–	–	1.7	pF
		$V_{CB} = 0, I_E = 0, f = 140\text{kHz}$	–	–	3.0	pF
Input Capacitance	$C_{ibo}$	$V_{EB} = 0.5\text{V}, I_C = 0, f = 140\text{kHz}$	–	–	2.0	pF
Noise Figure	NF	$I_C = 1\text{mA}, V_{CE} = 6\text{V}, R_G = 400\Omega, f = 60\text{MHz}$	–	–	6.0	dB
<b>Functional Test</b>						
Amplifier Power Gain	$G_{pe}$	$V_{CB} = 12\text{V}, I_C = 6\text{mA}, f = 200\text{MHz}$	15	–	–	dB
Power Output	$P_o$	$V_{CB} = 15\text{V}, I_C = 8\text{mA}, f = 500\text{MHz}$	30	–	–	mW
Collector Efficiency	$\eta$	$V_{CB} = 15\text{V}, I_C = 8\text{mA}, f = 500\text{MHz}$	25	–	–	%

Note 1.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.

