

NPN HIGH SPEED SATURATED SWITCHES

**2N930**

NPN LOW LEVEL LOW NOISE AMPLIFIER  
DIFFUSED SILICON PLANAR\* EPITAXIAL TRANSISTOR

- $V_{CE0} \dots 45 \text{ V (MIN)}$
- $h_{FE} \dots 100\text{--}300 @ 10 \mu\text{A}$
- $NF \dots 3.0 \text{ dB (MAX)} @ 1.0 \text{ kHz}$

ABSOLUTE MAXIMUM RATINGS (Note 1)

Maximum Temperatures

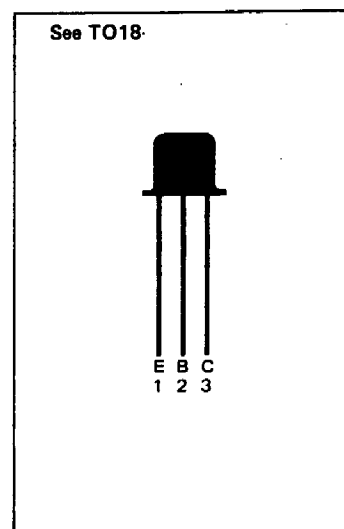
Storage Temperature	-65°C to +200°C
Operating Junction Temperature	175°C
Lead Temperature (10 seconds)	300°C

Maximum Power Dissipation (Notes 2 & 3)

Total Dissipation at 25°C Case Temperature	0.6 W
at 25°C Ambient Temperature	0.3 W

Maximum Voltages and Current

$V_{CBO}$ Collector to Base Voltage	45 V
$V_{CEO}$ Collector to Emitter Voltage (Note 4)	45 V
$V_{EBO}$ Emitter to Base Voltage	5.0 V
$I_C$ Collector Current	30 mA



ELECTRICAL CHARACTERISTICS (25°C Ambient Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	MIN.	MAX.	UNITS	TEST CONDITIONS
$h_{FE}$	DC Pulse Current Gain (Note 5)		600		$I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ V}$
$h_{FE}$	DC Current Gain	150	300		$I_C = 500 \mu\text{A}, V_{CE} = 5.0 \text{ V}$
		100	300		$I_C = 10 \mu\text{A}, V_{CE} = 5.0 \text{ V}$
		20			$I_C = 10 \mu\text{A}, V_{CE} = 5.0 \text{ V}, T_A = -55^\circ\text{C}$
$V_{BE(sat)}$	Base to Emitter Saturation Voltage (Note 5)	0.6	1.0	V	$I_C = 10 \text{ mA}, I_B = 0.5 \text{ mA}$
$V_{CE(sat)}$	Collector Saturation Voltage (Note 5)		1.0	V	$I_C = 10 \text{ mA}, I_B = 0.5 \text{ mA}$
$h_{ib}$	Input Resistance	25	32	$\Omega$	$I_C = 1.0 \text{ mA}, V_{CB} = 5.0 \text{ V}, f = 1.0 \text{ kHz}$
$h_{ob}$	Output Conductance		1.0	$\mu\text{mho}$	$I_C = 1.0 \text{ mA}, V_{CB} = 5.0 \text{ V}, f = 1.0 \text{ kHz}$
$h_{rb}$	Voltage Feedback Ratio		600	$\times 10^{-6}$	$I_C = 1.0 \text{ mA}, V_{CB} = 5.0 \text{ V}, f = 1.0 \text{ kHz}$
$h_{fe}$	Small Signal Current Gain	150	600		$I_C = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}, f = 1.0 \text{ kHz}$
$h_{fe}$	High Frequency Current Gain	1.0			$I_C = 500 \mu\text{A}, V_{CE} = 5.0 \text{ V}, f = 30 \text{ MHz}$
$I_{CBO}$	Collector to Base Cutoff Current		10	nA	$I_E = 0, V_{CB} = 45 \text{ V}$
$I_{CES}$	Collector to Emitter Cutoff Current		10	nA	$V_{CE} = 45 \text{ V}, V_{EB} = 0$
			10	$\mu\text{A}$	$V_{CE} = 45 \text{ V}, V_{EB} = 0, T_A = 170^\circ\text{C}$
$I_{EBO}$	Emitter to Base Cutoff Current		10	nA	$I_C = 0, V_{EB} = 5.0 \text{ V}$
$I_{CEO}$	Collector to Emitter Cutoff Current		2.0	nA	$I_B = 0, V_{CE} = 5.0 \text{ V}$
$C_{ob}$	Output Capacitance		8.0	pF	$I_E = 0, V_{CB} = 5.0 \text{ V}$
$F$	Noise Figure		3.0	dB	$I_C = 10 \mu\text{A}, V_{CE} = 5.0 \text{ V}, f = 1.0 \text{ kHz}, R_S = 10 \text{ k}\Omega, BW = 15.7 \text{ kHz}$
$V_{EO(sus)}$	Collector to Emitter Sustaining Voltage (Notes 4 & 5)	45		V	$I_C = 10 \text{ mA}, I_B = 0 \text{ (pulsed)}$
$V_{BO}$	Emitter to Base Breakdown Voltage	5.0		V	$I_C = 0, I_E = 10 \text{ nA}$