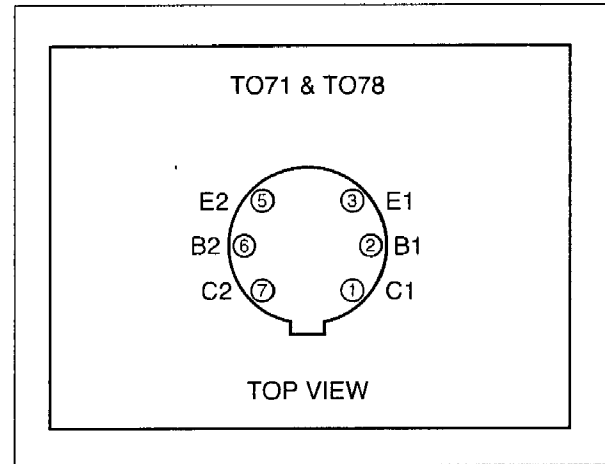


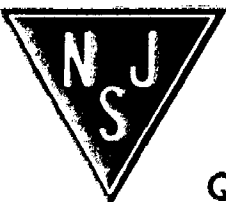
LS310 – LS313  
MONOLITHIC DUAL NPN TRANSISTORS

FEATURES		
VERY HIGH GAIN	$h_{FE} \geq 200 @ 10\mu A - 1mA$	
TIGHT $V_{BE}$ MATCHING	$ V_{BE1} - V_{BE2}  = 0.2mV$ TYP.	
HIGH $f_T$	250MHz TYP. @ 1mA	
<b>ABSOLUTE MAXIMUM RATINGS NOTE 1</b> @ 25°C (unless otherwise noted)		
$I_C$	Collector Current	10mA
<b>Maximum Temperatures</b>		
Storage Temperature	-55° to +150°C	
Operating Junction Temperature	-55° to +150°C	
<b>Maximum Power Dissipation</b>	<b>ONE SIDE</b>	<b>BOTH SIDES</b>
Device Dissipation @ Free Air	250mW	500mW
Linear Derating Factor	2.3mW/°C	4.3mW/°C



**ELECTRICAL CHARACTERISTICS @ 25°C (unless otherwise noted)**

SYMBOL	CHARACTERISTICS	LS310	LS311	LS312	LS313		UNITS	CONDITIONS
$BV_{CBO}$	Collector to Base Voltage	25	45	60	45	MIN.	V	$I_C = 10\mu A, I_E = 0$
$BV_{CEO}$	Collector to Emitter Voltage	25	45	60	45	MIN.	V	$I_C = 1mA, I_B = 0$
$BV_{EBO}$	Emitter-Base Breakdown Voltage	6.0	6.0	6.0	6.0	MIN.	V	$I_E = 10\mu A, I_C = 0$ <b>NOTE 2</b>
$BV_{CCO}$	Collector to Collector Voltage	45	45	60	45	MIN.	V	$I_C = 10\mu A, I_E = I_B = 0A$
$h_{FE}$	DC Current Gain	150	150	200	400	MIN. MAX.		$I_C = 10\mu A, V_{CE} = 5V$
$h_{FE}$	DC Current Gain	150	150	200	400	MIN.		$I_C = 100\mu A, V_{CE} = 5V$
$h_{FE}$	DC Current Gain	150	150	200	400	MIN.		$I_C = 1mA, V_{CE} = 5V$
$V_{CE(SAT)}$	Collector Saturation Voltage	0.25	0.25	0.25	0.25	MAX.	V	$I_C = 1mA, I_B = 0.1mA$
$I_{CBO}$	Collector Cutoff Current	0.2	0.2	0.2	0.2	MAX.	nA	$I_E = 0, V_{CB} = \text{NOTE 3}$
$I_{EBO}$	Emitter Cutoff Current	0.2	0.2	0.2	0.2	MAX.	nA	$I_C = 0, V_{CB} = 3V$
$C_{OBO}$	Out put Capacitance	2	2	2	2	MAX.	pF	$I_E = 0, V_{CB} = 5V$
$C_{C1C2}$	Collector to Collector Capacitance	2	2	2	2	MAX.	pF	$V_{CC} = 0V$
$I_{C1C2}$	Collector to Collector Leakage Current	1.0	1.0	1.0	1.0	MAX.	$\mu A$	$V_{CC} = \text{NOTE 4}$
$f_T$	Current Gain Bandwidth Product	200	200	200	200	MIN.	MHz	$I_C = 1mA, V_{CE} = 5V$
NF	Narrow Band Noise Figure	3	3	3	3	MAX.	dB	$I_C = 100\mu A, V_{CE} = 5V$ $BW = 200Hz, R_G = 10K\Omega$ $F = 1KHz$



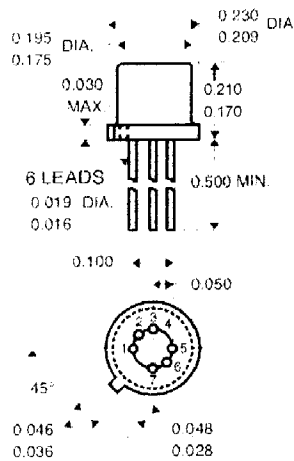
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**ELECTRICAL CHARACTERISTICS @ 25°C**

SYMBOL	CHARACTERISTICS	LS310	LS311	LS312	LS313	MIN.	UNITS	CONDITIONS
$ V_{BE1}-V_{BE2} $	Base Emitter Voltage Differential	1 3	0.4 1	0.2 0.5	0.4 1	TYP. MAX.	mV mV	$I_C = 10\mu A, V_{CE} = 5V$
$\Delta(V_{BE1}-V_{BE2})/^\circ C$	Base Emitter Voltage Differential Change with Temperature	2 15	1 5	0.5 2	1 5	TYP. MAX.	$\mu V/^\circ C$	$I_C = 10\mu A, V_{CE} = 5V$ $T_A = -55^\circ C$ to $+125^\circ C$
$ I_{B1}-I_{B2} $	Base Current Differential		10	5	1.25 5	TYP. MAX.	nA nA	$I_C = 10\mu A, V_{CE} = 5V$
$ \Delta(I_{B1}-I_{B2})/^\circ C$	Base Current Differential Change with Temperature		0.5	0.3	0.5	MAX.	$nA/^\circ C$	$I_C = 10\mu A, V_{CE} = 5V$ $T_A = -55^\circ C$ to $+125^\circ C$
$h_{FE1}/h_{FE2}$	Current Gain Differential	10	5	5	5	TYP.	%	$I_C = 10\mu A, V_{CE} = 5V$

**TO-71**  
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**TO-78**

