LINEAR SYSTEMS

Linear Integrated Systems

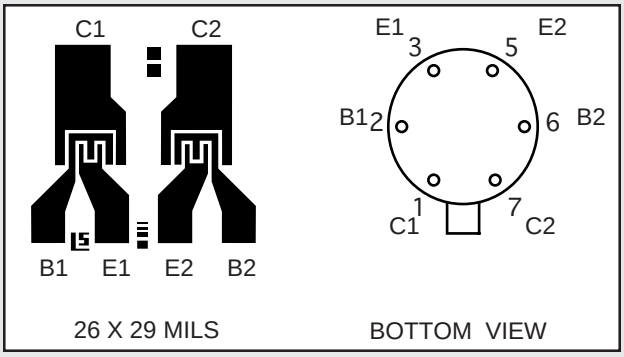
LS310 LS311 LS312 LS313

MONOLITHIC DUAL NPN TRANSISTORS

FEATURES	
VERY HIGH GAIN	$h_{FE} \geq 200$ @ 10µA-1mA
TIGHT V_{BE} MATCHING	$\lvert V_{BE1}-V_{BE2}\rvert$ = 0.2mV TYP.
HIGH f_T	250MHz TYP. @ 1mA

ABSOLUTE MAXIMUM RATINGS NOTE 1 @ 25°C (unless otherwise noted)		
I_C	Collector Current	10mA
Maximum Temperatures		
Storage Temperature		-65° to +200°C
Operating Junction Temperature		+150°C

Maximum Power Dissipation	ONE SIDE	BOTH SIDES
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 = 10µA I_E = 0
BV_{CEO}	Collector to Emitter Voltage	25	45	60	45	MIN.	V	I_C = 10µA I_B = 0
BV_{EBO}	Emitter-Base Breakdown Voltage	6.2	6.2	6.2	6.2	MIN.	V	I_E = 10µA I_C = 0 NOTE 2
BV_{CCO}	Collector to Collector Voltage	30	100	100	100	MIN.	V	I_C = 10µA I_E = 0
h_{FE}	DC Current Gain	150	150	200	400 1000	MIN. MAX.		I_C = 10µA V_{CE} = 5V
h_{FE}	DC Current Gain	150	150	200	400	MIN.		I_C = 100µA 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} = NOTE 3
I_{EBO}	Emitter Cutoff Current	0.2	0.2	0.2	0.2	MAX.	nA	I_E = 0 V_{CB} = 3V
C_{OBO}	Output 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} = 0
I_{C1C2}	Collector to Collector Leakage Current	0.5	0.5	0.5	0.5	MAX.	nA	V_{CC} = 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 = 100µA V_{CE} = 5V BW = 200Hz, R_G = 10 KΩ f=1KHz

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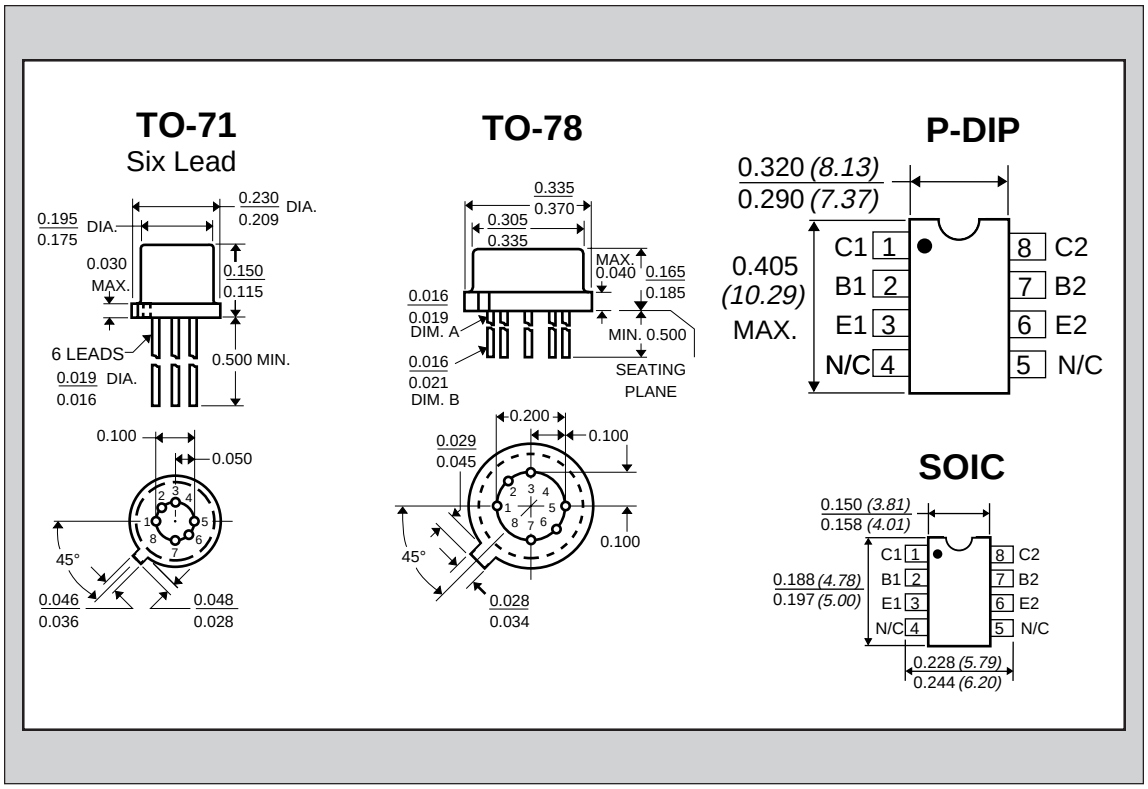
ELECTRICAL CHARACTERISTICS @ 25°C (unless otherwise noted)

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



NOTES:

1. These ratings are limiting values above which the serviceability of any semiconductor may be impaired.
2. The reverse base-to-emitter voltage must never exceed 6.2 volts; the reverse base-to-emitter current must never exceed 10 µA.
3. For LS310: V_{CB}= 20V; for LS311, LS312 & LS313: V_{CB} = 30V.
4. For LS310, LS311 & LS313: V_{CC}= ±45V; for LS312: V_{CC}= ±100V.