

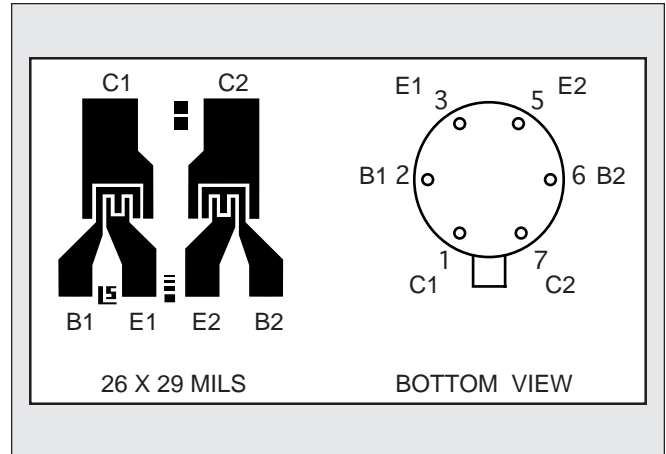
# LINEAR SYSTEMS

Linear Integrated Systems

## LS301 LS302 LS303

### HIGH VOLTAGE SUPER-BETA MONOLITHIC DUAL NPN TRANSISTORS

FEATURES		
VERY HIGH GAIN	$h_{FE} \geq 2000$ @ 1.0 $\mu$ A TYP.	
LOW OUTPUT CAPACITANCE	$C_{OBO} \leq 2.0$ pF	
TIGHT $V_{BE}$ MATCHING	$ V_{BE1} - V_{BE2}  = 0.2$ mV TYP.	
HIGH $f_T$	100MHz	
ABSOLUTE MAXIMUM RATINGS NOTE 1 @ 25°C (unless otherwise noted)		
$I_C$	Collector Current	5mA
Maximum Temperatures		
Storage Temperature		-65° to +200°C
Operating Junction Temperature		+150°C
Maximum Power Dissipation		ONE SIDE
Device Dissipation @ Free Air		250mW
Linear Derating Factor		2.3mW/°C
		BOTH SIDES
		500mW
		4.3mW/°C



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

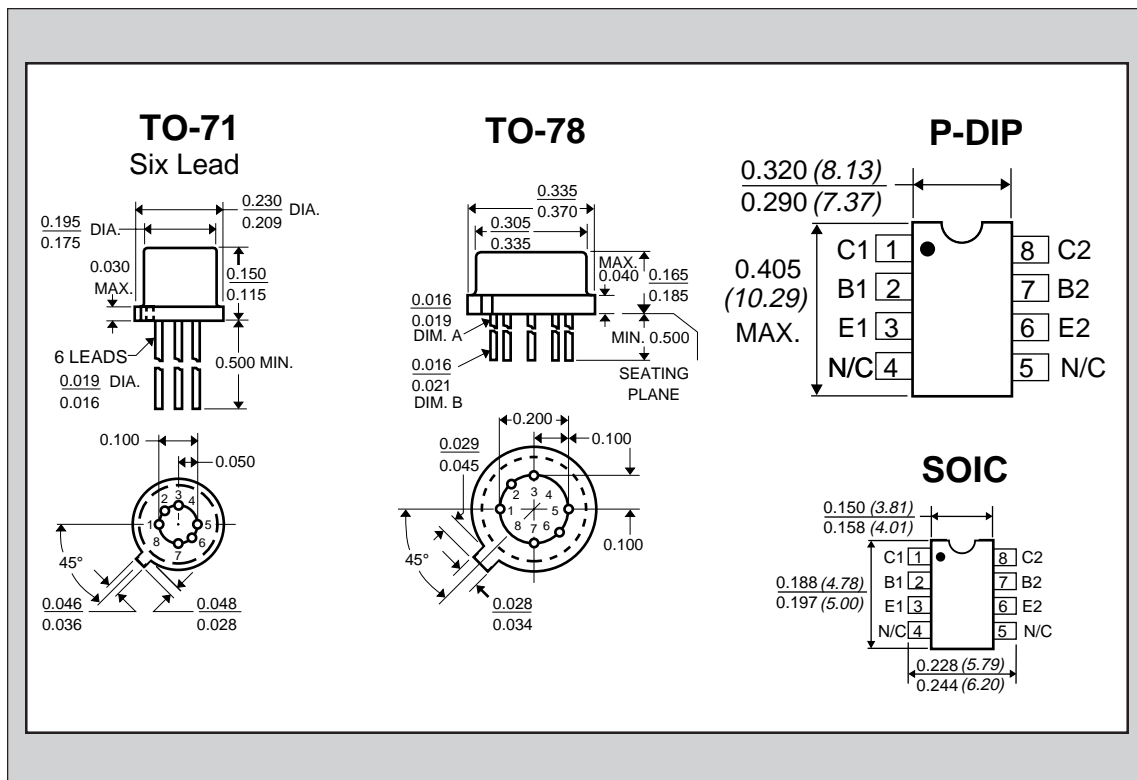
SYMBOL	CHARACTERISTICS	LS301	LS302	LS303		UNITS	CONDITIONS
$BV_{CBO}$	Collector to Base Voltage	18	35	10	MIN.	V	$I_C = 10\mu A$ $I_E = 0$
$BV_{CEO}$	Collector to Emitter Voltage	18	35	10	MIN.	V	$I_C = 10\mu A$ $I_B = 0$
$BV_{EBO}$	Emitter-Base Breakdown Voltage	6.2	6.2	6.2	MIN.	V	$I_E = 10\mu A$ $I_C = 0$ NOTE 2
$BV_{CCO}$	Collector to Collector Voltage	100	100	100	MIN.	V	$I_C = 10\mu A$ $I_E = 0$
$h_{FE}$	DC Current Gain	2000	1000	2000	TYP.		$I_C = 1\mu A$ $V_{CE} = 5V$
$h_{FE}$	DC Current Gain	2000	1000	2000	MIN.		$I_C = 10\mu A$ $V_{CE} = 5V$
$h_{FE}$	DC Current Gain	2000	1000	2000	TYP.		$I_C = 500\mu A$ $V_{CE} = 5V$
$V_{CE(SAT)}$	Collector Saturation Voltage	0.5	0.5	0.5	MAX.	V	$I_C = 1mA$ $I_B = 0.1mA$
$I_{CBO}$	Collector Cutoff Current	100	100	100	MAX.	pA	$I_E = 0$ $V_{CB} = \text{NOTE 3}$
$I_{EBO}$	Emitter Cutoff Current	0.2	0.2	0.2	MAX.	pA	$I_E = 0$ $V_{EB} = 3V$
$C_{OBO}$	Output Capacitance	2	2	2	MAX.	pF	$I_E = 0$ $V_{CB} = 1V$
$C_{C1C2}$	Collector to Collector Capacitance	2	2	2	MAX.	pF	$V_{CC} = 0$
$I_{C1C2}$	Collector to Collector Leakage Current	0.5	0.5	0.5	MAX.	nA	$V_{CC} = \text{NOTE 4}$
$f_T$	Current Gain Bandwidth Product	100	100	100	MIN.	MHz	$I_C = 200\mu A$ $V_{CE} = 5V$
NF	Narrow Band Noise Figure	3	3	3	MAX.	dB	$I_C = 10\mu A$ $V_{CE} = 3V$ BW = 200Hz $R_G = 10 K\Omega$ f = 1KHz

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## MATCHING CHARACTERISTICS

SYMBOL	CHARACTERISTICS	LS301	LS302	LS303		UNITS	CONDITIONS
$ V_{BE1} - V_{BE2} $	Base Emitter Voltage Differential	0.2	0.2	0.2	TYP.	mV	$I_C = 10 \mu A$ $V_{CE} = 5V$
		1	1	1	MAX.	mV	
$\Delta (V_{BE1} - V_{BE2}) /^\circ C$	Base Emitter Voltage Differential Change with Temperature	1	1	1	TYP.	$\mu V/^\circ C$	$I_C = 10 \mu A$ $V_{CE} = 5V$
		5	5	5	MAX.	$\mu V/^\circ C$	$T = -55^\circ C$ to $+125^\circ C$
$ I_{B1} - I_{B2} $	Base Current Differential	0.5	1	0.5	TYP.	nA	$I_C = 10 \mu A$ $V_{CE} = 1V$
		1	5	1.5	MAX.	nA	$I_C = 10 \mu A$ $V_{CE} = 5V$
$h_{FE1}/h_{FE2}$	DC Current Gain Differential	5	5	5	TYP.	%	$I_C = 10 \mu A$ $V_{CE} = 5V$



### 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  $\mu A$ mps.
3. For LS301 & LS302:  $V_{CB} = 10V$ ; for LS303:  $V_{CB} = 5V$ .
4. For LS301 & LS302:  $V_{CC} = \pm 80V$ ; for LS303:  $V_{CC} = \pm 20V$ .