

## Linear Systems High Voltage Super-Beta Monolithic Dual NPN

The LS311 is a monolithic pair of NPN transistors mounted in a single P-DIP package. The monolithic dual chip design reduces parasitics and gives better performance while ensuring extremely tight matching.

The 8 Pin P-DIP provides ease of manufacturing, and the symmetrical pinout prevents improper orientation.

(See Packaging Information).

- Very high gain
- Tight matching
- Low Output Capacitance

### FEATURES

HIGH GAIN	$h_{FE} \geq 150 @ 10\mu A-1mA$
TIGHT $V_{BE}$ MATCHING	$ V_{BE1} - V_{BE2}  = 0.2mV TYP.$
HIGH $f_t$	250MHz TYP. @ 1mA

**ABSOLUTE MAXIMUM RATINGS**<sup>1</sup>  
@ 25°C (unless otherwise noted)

### Maximum Temperatures

Storage Temperature	-65°C to +200°C
Operating Junction Temperature	-55°C to +150°C

### Maximum Power Dissipation

Continuous Power Dissipation (One side)	250mW
Continuous Power Dissipation (Both sides)	500mW
Linear Derating factor (One side)	2.3mW/°C
Linear Derating factor (Both sides)	4.3mW/°C

### Maximum Currents

Collector Current	10mA
-------------------	------

### MATCHING CHARACTERISTICS @ 25°C (unless otherwise stated)

SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	CONDITIONS
$ V_{BE1} - V_{BE2} $	Base Emitter Voltage Differential	--	0.4	1	mV	$I_C = 10\mu A, V_{CE} = 5V$
$\Delta  (V_{BE1} - V_{BE2})  / \Delta T$	Base Emitter Voltage Differential Change with Temperature	--	1	5	$\mu V/^\circ C$	$I_C = 10\mu A, V_{CE} = 5V$ $T_A = -55^\circ C$ to $+125^\circ C$
$ I_{B1} - I_{B2} $	Base Current Differential	--	--	10	nA	$I_C = 10\mu A, V_{CE} = 5V$
$ \Delta (I_{B1} - I_{B2})  / ^\circ C$	Base Current Differential Change with Temperature	--	--	0.5	$nA/^\circ C$	$I_C = 10\mu A, V_{CE} = 5V$ $T_A = -55^\circ C$ to $+125^\circ C$
$h_{FE1} / h_{FE2}$	DC Current Gain Differential	--	5	--	%	$I_C = 10\mu A, V_{CE} = 5V$

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

SYMBOL	CHARACTERISTICS	MIN.	TYP.	MAX.	UNITS	CONDITIONS
$BV_{CBO}$	Collector to Base Voltage	45	--	--	V	$I_C = 10\mu A, I_E = 0$
$BV_{CEO}$	Collector to Emitter Voltage	45	--	--	V	$I_C = 10\mu A, I_B = 0$
$BV_{EBO}$	Emitter-Base Breakdown Voltage	6.2	--	--	V	$I_E = 10\mu A, I_C = 0^2$
$BV_{CCO}$	Collector to Collector Voltage	100	--	--	V	$I_C = 10\mu A, I_E = 0$
$h_{FE}$	DC Current Gain	150	--	--		$I_C = 10\mu A, V_{CE} = 5V$
		150	--	--		$I_C = 100\mu A, V_{CE} = 5V$
		150	--	--		$I_C = 1mA, V_{CE} = 5V$
$V_{CE(SAT)}$	Collector Saturation Voltage	--	--	0.25	V	$I_C = 1mA, I_B = 0.1mA$
$I_{EBO}$	Emitter Cutoff Current	--	--	0.2	nA	$I_E = 0, V_{CB} = 3V$
$I_{CBO}$	Collector Cutoff Current	--	--	0.2	nA	$I_E = 0, V_{CB} = 30V$
$C_{OBO}$	Output Capacitance	--	--	2	pF	$I_E = 0, V_{CB} = 5V$
$C_{C1C2}$	Collector to Collector Capacitance	--	--	2	pF	$V_{CC} = 0V$
$I_{C1C2}$	Collector to Collector Leakage Current	--	--	0.5	nA	$V_{CC} = \pm 45V$
$f_T$	Current Gain Bandwidth Product	200	--	--	MHz	$I_C = 1mA, V_{CE} = 5V$
NF	Narrow Band Noise Figure	--	--	3	dB	$I_C = 100\mu A, V_{CE} = 5V, BW=200Hz, R_G = 10K\Omega, f = 1KHz$

Notes:

1. Absolute Maximum ratings are limiting values above which serviceability 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 $\mu A$ .

Available Packages:

LS311 in P-DIP  
LS311 available as bare die

Please contact Micross for full package and die dimensions:

Email: [chipcomponents@micross.com](mailto:chipcomponents@micross.com)  
Web: [www.micross.com/distribution.aspx](http://www.micross.com/distribution.aspx)

Information furnished by Linear Integrated Systems and Micross Components is believed to be accurate and reliable. However, no responsibility is assumed for its use; nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Linear Integrated Systems.

P-DIP (Top View)

