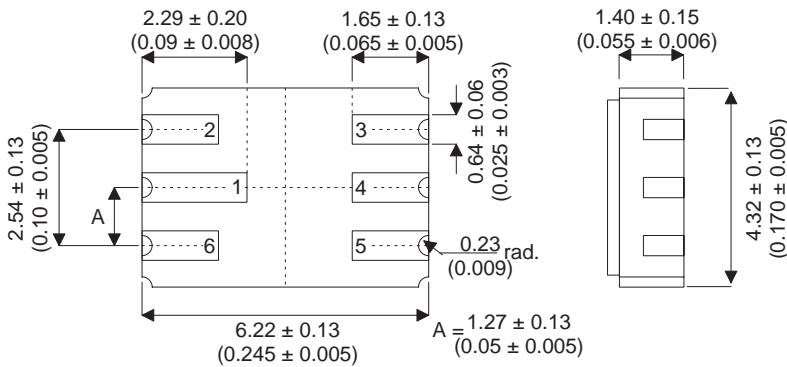


## DUAL HIGH GAIN PNP TRANSISTORS IN A HERMETICALLY SEALED CERAMIC SURFACE MOUNT PACKAGE FOR HIGH RELIABILITY APPLICATIONS

### MECHANICAL DATA

Dimensions in mm (inches)



### FEATURES

- HERMETIC CERAMIC SURFACE MOUNT PACKAGE
- CECC SCREENING OPTIONS
- SPACE QUALITY LEVELS OPTIONS

### LCC2 PACKAGE Underside View

PAD 1 – Collector 1      PAD 4 – Collector 2  
 PAD 2 – Base 1      PAD 5 – Emitter 2  
 PAD 3 – Base 2      PAD 6 – Emitter 1

### APPLICATIONS:

Suitable for use in high gain, low noise differential amplifier applications.

### ABSOLUTE MAXIMUM RATINGS

( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)

		EACH SIDE	TOTAL DEVICE
$V_{CBO}$	Collector – Base Voltage	-60V	
$V_{CEO}$	Collector – Emitter Voltage	-60V	
$V_{EBO}$	Emitter – Base Voltage	-5V	
$I_C$	Collector Current	-50mA	
$P_D$	Total Device Dissipation	500mW	600mW
	Derate above 25°C	2.9mW / °C	3.4mW / °C
$T_{STG}$	Storage Temperature Range	-65 to 200°C	

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**ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)

Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
<b>INDIVIDUAL TRANSISTOR CHARACTERISTICS</b>						
$V_{(BR)CBO}$	Collector – Base Breakdown Voltage	$I_C = -10\mu\text{A}$ $I_E = 0$	-60		V	
$V_{(BR)CEO}^*$	Collector – Emitter Breakdown Voltage	$I_C = -10\text{mA}$ $I_B = 0$	-60			
$V_{(BR)EBO}$	Emitter – Base Breakdown Voltage	$I_E = -10\mu\text{A}$ $I_C = 0$	-5			
$I_{CBO}$	Collector Cut-off Current	$V_{CB} = -50\text{V}$ $I_E = 0$		-10	nA	
			$T_A = 150^{\circ}\text{C}$		-10	$\mu\text{A}$
$I_{EBO}$	Emitter Cut-off Current	$V_{EB} = -4\text{V}$ $I_C = 0$		-20	nA	
$h_{FE}$	DC Current Gain	$I_C = -10\mu\text{A}$ $V_{CE} = -5\text{V}$		225	—	
			$I_C = -100\mu\text{A}$ $V_{CE} = -5\text{V}$	300		900
			$T_A = -55^{\circ}\text{C}$	150		
			$I_C = -500\mu\text{A}$ $V_{CE} = -5\text{V}$	300		900
			$I_C = -1\text{mA}$ $V_{CE} = -5\text{V}$	300		900
$V_{BE}$	Base – Emitter Voltage	$I_C = -100\mu\text{A}$ $V_{CE} = -5\text{V}$		-0.7	V	
			$I_B = -10\mu\text{A}$ $I_C = -100\mu\text{A}$	-0.7		
			$I_B = -100\mu\text{A}$ $I_C = -1\text{mA}$	-0.8		
$V_{CE(sat)}$	Collector – Emitter Saturation Voltage	$I_B = -10\mu\text{A}$ $I_C = -100\mu\text{A}$		-0.2	V	
			$I_B = -100\mu\text{A}$ $I_C = -1\text{mA}$	-0.25		
$h_{ie}$	Small Signal Common – Emitter Input Impedance	$V_{CE} = -10\text{V}$ $I_C = -1\text{mA}$ $f = 1\text{kHz}$	10	40	k $\Omega$	
$h_{fe}$	Small Signal Common – Emitter Current Gain		300	900	—	
$h_{re}$	Small Signal Common – Emitter Reverse Voltage Gain		$25 \times 10^{-4}$			
$h_{oe}$	Small Signal Common – Emitter Output Admittance		5	60	$\mu\text{mho}$	
$ h_{fe} $	Small Signal Common – Emitter Current Gain	$V_{CE} = -5\text{V}$ $f = 30\text{MHz}$	$I_C = -500\mu\text{A}$	1	—	
			$I_C = -1\text{mA}$	1		5
$C_{obo}$	Common – Base Open Circuit Output Capacitance	$V_{CB} = -5\text{V}$ $f = 100\text{kHz}$		4	pF	
$C_{ibo}$	Common – Base Open Circuit Input Capacitance	$V_{EB} = -0.5\text{V}$ $f = 100\text{kHz}$		8		

**NOTES**

\* Pulse Test:  $t_p = 300\mu\text{s}$ ,  $\delta \leq 2\%$ .

1) Terminals not under test are open circuited under all test conditions.

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**ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>TRANSISTOR MATCHING CHARACTERISTICS</b>					
$h_{FE1}$	Static Forward Current Gain	$V_{CE} = -5V$			
$h_{FE2}$	Balance Ratio	$I_C = -100\mu A$	0.9	1	—
$ V_{BE1} - V_{BE2} $	Base – Emitter Voltage Differential	$V_{CE} = -5V$		5	mV
		$I_C = -10\mu A$ to $-10mA$		3	
$ \Delta(V_{BE1} - V_{BE2})\Delta T_A $	Base – Emitter Voltage Differential	$V_{CE} = -5V$		0.8	mV
		$T_{A1} = 25^{\circ}\text{C}$	$T_{A2} = -55^{\circ}\text{C}$		
		$V_{CE} = -5V$		1	
		$T_{A1} = 25^{\circ}\text{C}$	$T_{A2} = 125^{\circ}\text{C}$		

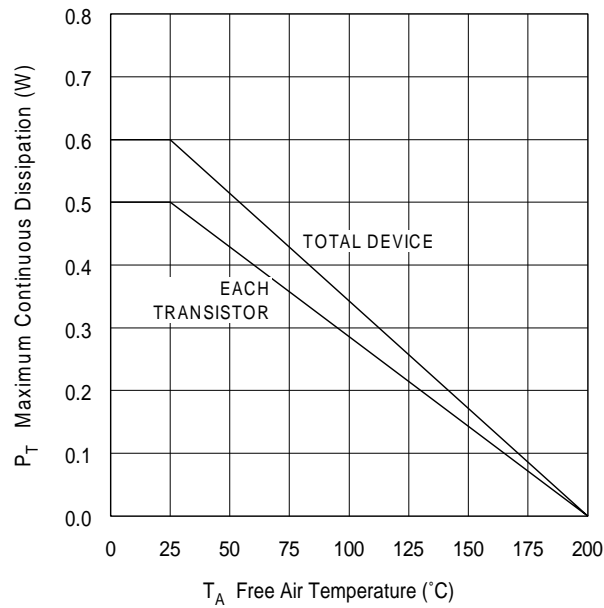
**OPERATING CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>INDIVIDUAL TRANSISTOR CHARACTERISTICS</b>					
F	Spot Noise Figure	$V_{CE} = -10V$		4	dB
		$I_C = -100\mu A$			
		$R_G = 3k\Omega$	$f = 100\text{Hz}$		
		Noise Bandwidth = 20Hz			
		$V_{CE} = -10V$		1.5	
		$I_C = -100\mu A$			
		$R_G = 3k\Omega$	$f = 1\text{kHz}$		
		Noise Bandwidth = 200Hz			
		$V_{CE} = -10V$		1.5	
		$I_C = -100\mu A$			
		$R_G = 3k\Omega$	$f = 10\text{kHz}$		
		Noise Bandwidth = 2kHz			
$\bar{F}$	Average Noise Figure	$V_{CE} = -10V$		2.5	dB
		$I_C = -100\mu A$			
		$R_G = 3k\Omega$			
		Noise Bandwidth = 15.7kHz			
		See Note 2.			

**NOTES**

- 1) The lower of the two readings is taken as  $h_{FE1}$
- 2) Average noise figure is measured in an amplifier with response down 3dB at 10Hz and 10 kHz and a high frequency rolloff of 6dB / octave.

**THERMAL INFORMATION**



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