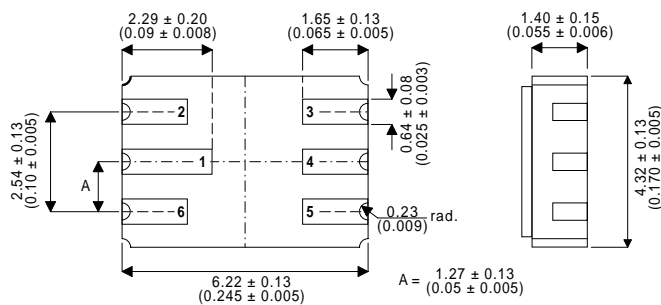


**DUAL NPN TRANSISTORS IN A
HERMETICALLY SEALED
CERAMIC SURFACE MOUNT PACKAGE
FOR HIGH RELIABILITY APPLICATIONS**

MECHANICAL DATA

Dimensions in mm (inches)



**LCC2 PACKAGE
Underside View**

PAD 1 – Collector 1

PAD 2 – Base 1

PAD 3 – Base 2

PAD 4 – Collector 2

PAD 5 – Emitter 2

PAD 6 – Emitter 1

FEATURES

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

APPLICATIONS:

Suitable for use in general purpose 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 ¹	60V	
V_{EBO}	Emitter – Base Voltage	5V	
I_C	Collector Current	50mA	
P_D	Total Device Dissipation	300mW	500mW
	Derate above 25°C	1.72mW / °C	2.86mW / °C
T_{STG}	Storage Temperature Range	-65 to 200°C	

NOTES

1. Base – Emitter Diode Open Circuited.

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

Parameter	Test Conditions ¹	Min.	Typ.	Max.	Unit
INDIVIDUAL TRANSISTOR CHARACTERISTICS					
$V_{(BR)CBO}$ 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	$V_{CB} = -50\text{V}$ $I_E = 0$ $T_A = 150^{\circ}\text{C}$			10	nA
				10	μA
I_{EBO} Emitter Cut-off Current	$V_{EB} = -4\text{V}$ $I_C = 0$			20	nA
h_{FE} DC Current Gain	$I_C = 10\mu\text{A}$ $V_{CE} = 5\text{V}$	100			—
	$I_C = -100\mu\text{A}$ $V_{CE} = 5\text{V}$ $T_A = -55^{\circ}\text{C}$	150		450	
	$I_C = -500\mu\text{A}$ $V_{CE} = -5\text{V}$	150		450	
	$I_C = -1\text{mA}$ $V_{CE} = -5\text{V}$	150		450	
	$I_C = -10\text{mA}$ $V_{CE} = -5\text{V}^*$	125			
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	$V_{CE} = -10\text{V}$ $I_C = -1\text{mA}$ $f = 1\text{kHz}$	3		30	$\text{k}\Omega$
h_{fe} Small Signal Common – Emitter Current Gain		150		600	—
h_{re} Small Signal Common – Emitter Reverse Voltage Gain		25×10^{-4}			
h_{oe} Small Signal Common – Emitter Output Admittance		5		60	μmho
$ h_{fe} $ Small Signal Common – Emitter Current Gain		$V_{CE} = -5\text{V}$ $I_C = -500\mu\text{A}$ $f = 30\text{MHz}$	1		
	$V_{CE} = -5\text{V}$ $I_C = -1\text{mA}$ $f = 100\text{MHz}$	1		5	
C_{obo} Common – Base Open Circuit Output Capacitance	$V_{CB} = -5\text{V}$ $I_E = 0$ $f = 100\text{kHz}$			4	pF
C_{ibo} Common – Base Open Circuit Input Capacitance	$V_{EB} = -0.5\text{V}$ $I_C = 0$ $f = 100\text{kHz}$			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.

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

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
TRANSISTOR MATCHING CHARACTERISTICS					
h_{FE1}	Static Forward Current Gain	$V_{CE} = -5\text{V}$	$I_C = -100\mu\text{A}$	0.9	—
h_{FE2}	Balance Ratio	See Note 2.		1	—
$ V_{BE1} - V_{BE2} $	Base – Emitter Voltage Differential	$V_{CE} = -5\text{V}$	$I_C = -10\mu\text{A}$ to -10mA		mV
		$V_{CE} = -5\text{V}$	$I_C = -100\mu\text{A}$		
$ \Delta(V_{BE1} - V_{BE2})\Delta T_A $	Base – Emitter Voltage Differential	$V_{CE} = -5\text{V}$	$I_C = -100\mu\text{A}$		mV
		$T_{A1} = 25^{\circ}\text{C}$	$T_{A2} = -55^{\circ}\text{C}$		
		$V_{CE} = -5\text{V}$	$I_C = -100\mu\text{A}$		mV
		$T_{A1} = 25^{\circ}\text{C}$	$T_{A2} = 125^{\circ}\text{C}$		

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

Parameter	Test Conditions ¹	Min.	Typ.	Max.	Unit	
INDIVIDUAL TRANSISTOR CHARACTERISTICS						
F	Spot Noise Figure	$V_{CE} = -10\text{V}$	$I_C = -100\mu\text{A}$		dB	
		$R_G = 3\text{k}\Omega$	$f = 100\text{Hz}$			7
		Noise Bandwidth = 20Hz				
		$V_{CE} = -10\text{V}$	$I_C = -100\mu\text{A}$		dB	
		$R_G = 3\text{k}\Omega$	$f = 1\text{kHz}$			3
		Noise Bandwidth = 200Hz				
		$V_{CE} = -10\text{V}$	$I_C = -100\mu\text{A}$		dB	
		$R_G = 3\text{k}\Omega$	$f = 10\text{kHz}$			2.5
		Noise Bandwidth = 2kHz				
\bar{F}	Average Noise Figure	$V_{CE} = -10\text{V}$	$I_C = -100\mu\text{A}$		dB	
		$R_G = 3\text{k}\Omega$				3.5
		Noise Bandwidth = 15.7kHz				
		See Note 3.				

NOTES

- 1) Terminals not under test are open circuited under all test conditions.
- 2) The lower of the two readings is taken as h_{FE1} .
- 3) 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

