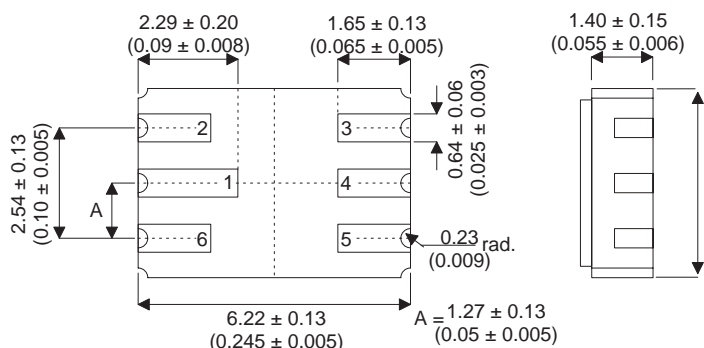


**DUAL NPN TRANSISTORS IN A
HERMETICALLY SEALED
CERAMIC SURFACE MOUNT PACKAGE
FOR HIGH RELIABILITY APPLICATIONS**

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

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.

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

INDIVIDUAL TRANSISTOR CHARACTERISTICS						
Parameter	Test Conditions ¹	Min.	Typ.	Max.	Unit	
$V_{(BR)CBO}$	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	$I_C = 10\mu\text{A}$ $V_{CE} = 5\text{V}$ $I_C = -100\mu\text{A}$ $V_{CE} = 5\text{V}$ $T_A = -55^{\circ}\text{C}$ $I_C = -500\mu\text{A}$ $V_{CE} = -5\text{V}$ $I_C = -1\text{mA}$ $V_{CE} = -5\text{V}$ $I_C = -10\text{mA}$ $V_{CE} = -5\text{V}^*$	100			—
			150		450	
			75			
			150		450	
			300			
V_{BE}	Base – Emitter Voltage	$I_C = -100\mu\text{A}$ $V_{CE} = -5\text{V}$ $I_B = -10\mu\text{A}$ $I_C = -100\mu\text{A}$ $I_B = -100\mu\text{A}$ $I_C = -1\text{mA}$			-0.7	V
					-0.7	
					-0.8	
$V_{CE(sat)}$	Collector – Emitter Saturation Voltage	$I_B = -10\mu\text{A}$ $I_C = -100\mu\text{A}$ $I_B = -100\mu\text{A}$ $I_C = -1\text{mA}$			-0.2	V
					-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
$ h_{fe} $	Small Signal Common – Emitter Current Gain	$V_{CE} = -5\text{V}$ $I_C = -500\mu\text{A}$ $f = 30\text{MHz}$ $V_{CE} = -5\text{V}$ $I_C = -1\text{mA}$ $f = 100\text{MHz}$	1			—
			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.

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

Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
TRANSISTOR MATCHING CHARACTERISTICS						
h_{FE1} h_{FE2}	Static Forward Current Gain Balance Ratio	$V_{CE} = -5\text{V}$ See Note 2.	$I_C = -100\mu\text{A}$	0.9	1	—
$ V_{BE1} - V_{BE2} $	Base – Emitter Voltage Differential	$V_{CE} = -5\text{V}$	$I_C = -10\mu\text{A}$ to -10mA		5	mV
		$V_{CE} = -5\text{V}$		$I_C = -100\mu\text{A}$		
$ \Delta(V_{BE1} - V_{BE2})\Delta T_A $	Base – Emitter Voltage Differential	$V_{CE} = -5\text{V}$	$I_C = -100\mu\text{A}$		0.8	mV
		$T_{A1} = 25^{\circ}\text{C}$	$T_{A2} = -55^{\circ}\text{C}$			
		$V_{CE} = -5\text{V}$	$I_C = -100\mu\text{A}$		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 ¹	Min.	Typ.	Max.	Unit	
INDIVIDUAL TRANSISTOR CHARACTERISTICS						
F	Spot Noise Figure	$V_{CE} = -10\text{V}$	$I_C = -100\mu\text{A}$		7	dB
		$R_G = 3\text{k}\Omega$	$f = 100\text{Hz}$			
		Noise Bandwidth = 20Hz				
		$V_{CE} = -10\text{V}$	$I_C = -100\mu\text{A}$		3	
		$R_G = 3\text{k}\Omega$	$f = 1\text{kHz}$			
		Noise Bandwidth = 200Hz				
		$V_{CE} = -10\text{V}$	$I_C = -100\mu\text{A}$		2.5	
		$R_G = 3\text{k}\Omega$	$f = 10\text{kHz}$			
		Noise Bandwidth = 2kHz				
\bar{F}	Average Noise Figure	$V_{CE} = -10\text{V}$	$I_C = -100\mu\text{A}$		3.5	dB
		$R_G = 3\text{k}\Omega$				
		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

