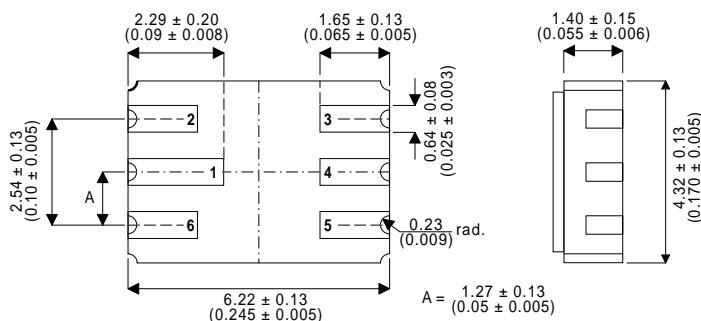


**DUAL NPN TRANSISTORS IN A
HERMETICALLY SEALED
CERAMIC SURFACE MOUNT PACKAGE
FOR HIGH RELIABILITY APPLICATIONS**

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

APPLICATIONS:

Suitable for use in general purpose differential amplifier applications.

ABSOLUTE MAXIMUM RATINGS

($T_{amb} = 25^{\circ}C$ 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	$I_C = 10\mu\text{A}$ $V_{CE} = 5\text{V}$ $I_C = -100\mu\text{A}$ $V_{CE} = 5\text{V}$ $T_A = -55^{\circ}\text{C}$ $I_C = -500\mu\text{A}$ $V_{CE} = -5\text{V}$ $I_C = -1\text{mA}$ $V_{CE} = -5\text{V}$ $I_C = -10\text{mA}$ $V_{CE} = -5\text{V}^*$	100		—	
			150	450		
			75			
			150	450		
			150	450		
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.

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	$V_{CE} = -5V$ $I_C = -100\mu A$	0.9		1	—
h_{FE2}	Balance Ratio	See Note 2.				
$ V_{BE1} - V_{BE2} $	Base – Emitter Voltage Differential	$V_{CE} = -5V$ $I_C = -10\mu A$ to $-10mA$			5	mV
		$V_{CE} = -5V$ $I_C = -100\mu A$			3	
$ \Delta(V_{BE1} - V_{BE2})\Delta T_A $	Base – Emitter Voltage Differential	$V_{CE} = -5V$ $I_C = -100\mu A$ $T_{A1} = 25^{\circ}\text{C}$ $T_{A2} = -55^{\circ}\text{C}$			0.8	mV
		$V_{CE} = -5V$ $I_C = -100\mu A$ $T_{A1} = 25^{\circ}\text{C}$ $T_{A2} = 125^{\circ}\text{C}$			1	

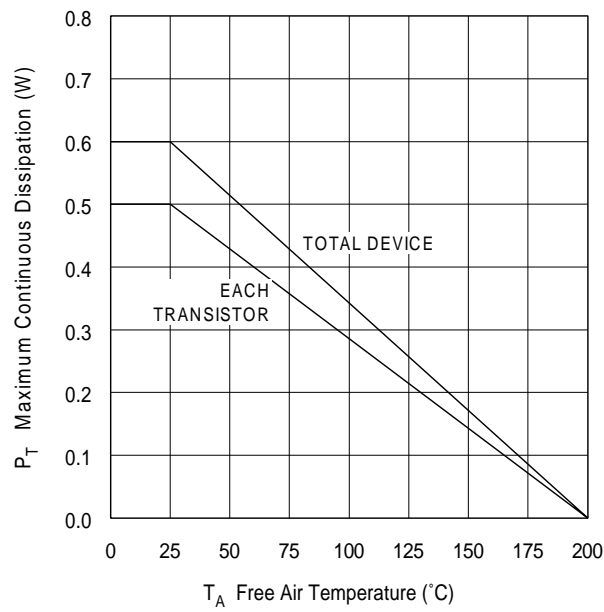
OPERATING CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

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

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





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