

SILICON EPITAXIAL DUAL NPN TRANSISTORS

2N3904DCSM

- Dual Silicon Planar NPN Transistors.
- Hermetic Ceramic Surface Mount Package.
- Designed For General Purpose and Switching Applications.
- Screening Options Available.



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise stated)

		Each Side	Total Device
V _{CB0}	Collector – Base Voltage	60V	
V _{CEO}	Collector – Emitter Voltage	40V	
V _{EBO}	Emitter – Base Voltage	6V	
I _C	Continuous Collector Current	200mA	
P _D	Total Power Dissipation at T _A = 25°C Derate Above 25°C	500mW 2.86mW/°C	600mW ⁽¹⁾ 3.43mW/°C
T _J	Junction Temperature Range	-55 to +200°C	
T _{stg}	Storage Temperature Range	-55 to +200°C	

THERMAL PROPERTIES (Each Side)

Symbols	Parameters	Min.	Typ.	Max.	Units
R _{θJA}	Thermal Resistance, Junction To Ambient			350	°C/W

Notes

(1) Total device power dissipation limited by package.

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ELECTRICAL CHARACTERISTICS (Each Side, $T_A = 25^\circ\text{C}$ unless otherwise stated)

Symbols	Parameters	Test Conditions	Min.	Typ	Max.	Units
I_{CBO}	Collector-Cut-Off Current	$V_{CB} = 30V$ $I_E = 0$			30	nA
I_{EBO}	Emitter Cut-Off Current	$V_{EB} = 3V$ $I_C = 0$			30	
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 10\mu A$	60			V
$V_{(BR)CEO}^{(2)}$	Collector-Emitter Breakdown Voltage	$I_C = 1.0mA$	40			
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10\mu A$	6			
$h_{FE}^{(2)}$	Forward-current transfer ratio	$I_C = 0.1mA$	$V_{CE} = 1.0V$	40		
		$I_C = 1.0mA$		70		
		$I_C = 10mA$		100	300	
		$I_C = 50mA$		60		
		$I_C = 100mA$		30		
$V_{BE(sat)}^{(2)}$	Base-Emitter Saturation Voltage	$I_C = 10mA$ $I_B = 1.0mA$	0.65		0.85	V
		$I_C = 50mA$ $I_B = 5mA$			0.95	
$V_{CE(sat)}^{(2)}$	Collector-Emitter Saturation Voltage	$I_C = 10mA$ $I_B = 1.0mA$			0.2	
		$I_C = 50mA$ $I_B = 5mA$			0.3	
$V_{BE(f)}^{(2)}$	Forward Base-Emitter Voltage	$I_B = 500mA$			1.45	
		$I_B = 200mA$ $T_A = 100^\circ\text{C}$			2	

DYNAMIC CHARACTERISTICS

f_T	Transition Frequency	$I_C = 10mA$ $V_{CE} = 20V$ $f = 100MHz$	300			MHz
h_{fe}	Small-Signal Current Gain	$I_C = 1.0mA$ $V_{CE} = 10V$ $f = 1.0KHz$	100		400	
C_{obo}	Output Capacitance	$V_{CB} = 5V$ $I_E = 0$ $f = 1.0MHz$			4	pF
C_{ibo}	Input Capacitance	$V_{EB} = 0.5V$ $I_C = 0$ $f = 1.0MHz$			8	
$NF^{(3)}$	Noise Figure	$I_C = 100\mu A$ $V_{CE} = 5V$ $R_S = 1.0K\Omega$ $f = 10Hz$ To $15.7KHz$			5	dB
t_d	Delay Time	$V_{CC} = 3V$ $V_{BE} = 0.5V$			35	ns
t_r	Rise Time	$I_C = 10mA$ $I_{B1} = 1.0mA$			35	
t_s	Storage Time	$V_{CC} = 3V$ $I_C = 10mA$			200	
t_f	Fall Time	$I_{B1} = I_{B2} = 1.0mA$			50	

Notes

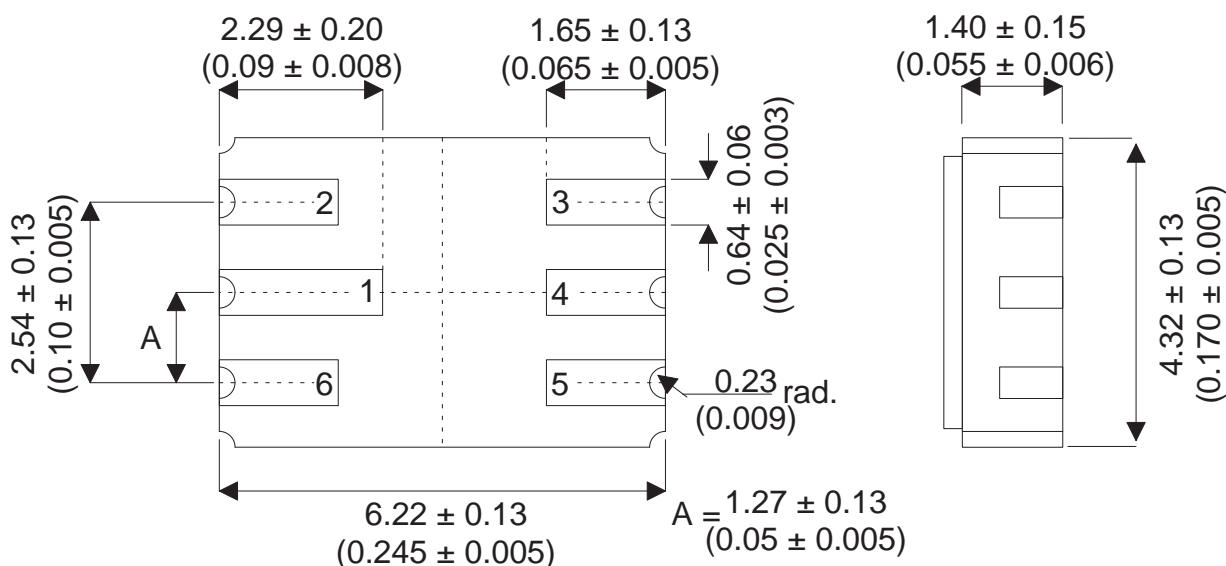
(2) Pulse Width $\leq 300\mu s$, $\delta \leq 2\%$

(3) By design only, not a production test.

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MECHANICAL DATA

Dimensions in mm (inches)



LCC2 (MO-041BB)

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