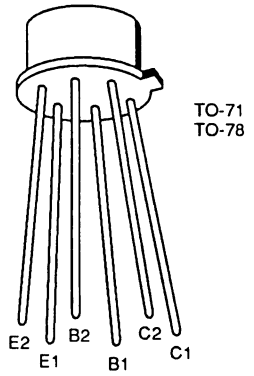
Dielectrically Isolated Monolithic Dual NPN General Purpose Amplifier

2N4044 / 2N4045 / 2N4100 / 2N4878 / 2N4879 / 2N4880

FEATURES

- High Gain at Low Current
- Low Output Capacitance
- Good h_{FE} Match
- Tight V_{BE} Tracking
- Dielectrically Isolated Matched Pairs for Differential Amplifiers

PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

(T_A = 25°C unless otherwise noted)

Collector-Base or Collector-Emitter Voltage (Note 1)
- 2N4044, 2N4878 ..... 60V
- 2N4100, 2N4879 ..... 55V
- 2N4045, 2N4880 ..... 45V

Collector-Collector Voltage 100V
Emitter Base Voltage (Note 2) 7V
Collector Current (Note 1) 10mA
Storage Temperature Range ..... -65°C to +175°C
Operating Temperature Range ..... -55°C to +175°C
Lead Temperature (Soldering, 10sec) ..... +300°C

	TO-71		TO-78	
	One Side	Both Sides	One Side	Both Sides
Power Dissipation	200mW	400mW	250mW	500mW
Derate above 25°C (mW/°C)	1.3	2.7	1.7	3.3

NOTE: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

SYMBOL	PARAMETER	2N4044 2N4878		2N4100 2N4879		2N4045 2N4880		UNITS	TEST CONDITIONS	
		MIN	MAX	MIN	MAX	MIN	MAX			
h_{FE}	DC Current Gain	200	600	150	600	80	800		I_C = 10µA, V_{CE} = 5V	
		225		175		100			I_C = 1.0mA, V_{CE} = 5V	
		75		50		30			I_C = 10µA, V_{CE} = 5V	T_A = -55°C
$V_{BE(on)}$	Emitter-Base On Voltage		0.7		0.7		0.7	V		
$V_{CE(sat)}$	Collector Saturation Voltage		0.35		0.35		0.35		I_C = 1.0mA, I_B = 0.1mA	
I_{CBO}	Collector Cutoff Current		0.1		0.1		0.1	nA	I_E = 0, V_{CB} = 45V, 30V	T_A = 150°C
			0.1		0.1		0.1	µA		
I_{EBO}	Emitter Cutoff Current		0.1		0.1		0.1	nA	I_C = 0, V_{EB} = 5V	
C_{obo}	Output Capacitance (Note 4)		0.8		0.8		0.8	pF	I_E = 0, V_{CB} = 5V, f = 1MHz	
C_{ie}	Emitter Transition Capacitance (Note 4)		1		1		1	pF	I_C = 0, V_{EB} = 0.5V, f = 1MHz	
C_{C_1, C_2}	Collector to Collector Capacitance (Note 4)		0.8		0.8		0.8	pF	V_{CC} = 0, f = 1MHz	
I_{C_1, C_2}	Collector to Collector Leakage Current		5		5		5	pA	V_{CC} = ±100V	
$V_{CEO(sust)}$	Collector to Emitter Sustaining Voltage	60		55		45		V	I_C = 10mA, I_B = 0	
f_t	Current Gain Bandwidth Product (Note 4)	200		150		150		MHz	I_C = 10mA, V_{CE} = 10V	
f_t	Current Gain Bandwidth Product (Note 4)	20		15		15		MHz	I_C = 10µA, V_{CE} = 10V	
NF	Narrow Band Noise Figure (Note 4)		2		3		3	dB	I_C = 10µA, V_{CE} = 5V R_G = 10kΩ	f = 1kHz BW = 200Hz
BV_{CBO}	Collector Base Breakdown Voltage	60		55		45		V	I_C = 10µA, I_E = 0	
BV_{EBO}	Emitter Base Breakdown Voltage (Note 2)	7		7		7		V	I_E = 10µA, I_C = 0	

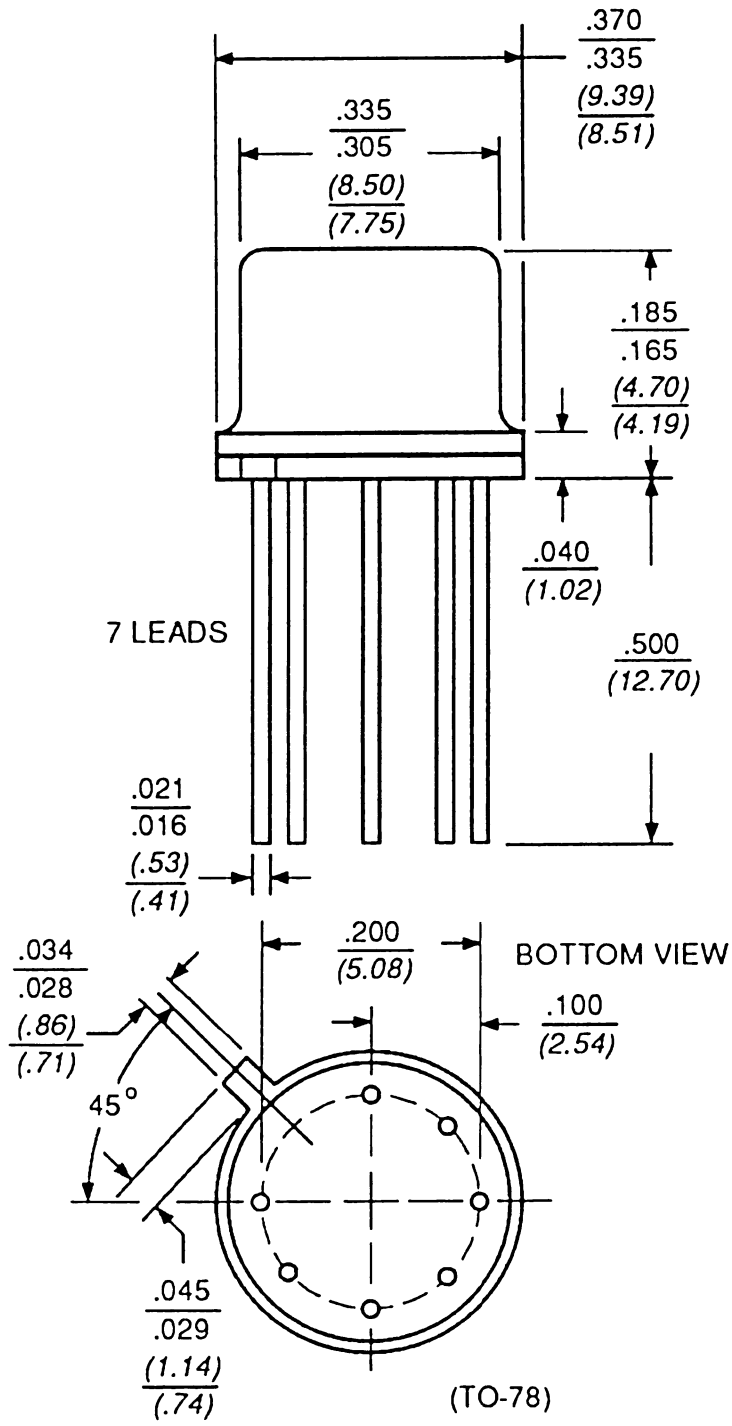
MATCHING CHARACTERISTICS (T_A = 25°C unless otherwise specified)

h_{FE_1}/h_{FE_2}	DC Current Gain Ratio (Note 3)	0.9	1	0.85	1	0.8	1		I_C = 10µA to 1mA, V_{CE} = 5V
$\lvert V_{BE_1} - V_{BE_2} \rvert$	Base Emitter Voltage Differential		3		5		5	mV	I_C = 10µA, V_{CE} = 5V
$\lvert I_{B_1} - I_{B_2} \rvert$	Base Current Differential		5		10		25	nA	I_C = 10µA, V_{CE} = 5V
$\lvert \Delta(V_{BE_1} - V_{BE_2}) \rvert/\Delta T$	Base Emitter Voltage Differential Change with Temperature		3		5		10	µV/°C	I_C = 10µA, V_{CE} = 5V T_A = -55°C to +125°C
$\lvert \Delta(I_{B_1} - I_{B_2}) \rvert/\Delta T$	Base Current Differential Change with Temperature		0.3		0.5		1	nA/°C	

SMALL SIGNAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

SYMBOL	PARAMETER	TYP. VALUE	UNITS	TEST CONDITIONS
h_{ib}	Input Resistance	28	Ω	I_C = 1mA, V_{CB} = 5V (Note 4)
h_{rb}	Voltage Feedback Ratio	43	x 10^{-3}	
h_{fe}	Small Signal Current Gain	250		I_C = 1mA, V_{CE} = 5V (Note 4)
h_{ob}	Output Conductance	60	µS	
h_{ie}	Input Resistance	9.6	kΩ	
h_{re}	Voltage Feedback Ratio	42	x 10^{-3}	
h_{oe}	Output Conductance	12	µS	

NOTES: 1. Per transistor.
2. The reverse base-emitter voltage must never exceed 7.0 volts and the reverse base-emitter current must never exceed 10µA.
3. The lowest of two h_{FE} readings is taken as h_{FE_1} for purposes of this ratio.
4. For design reference only, not 100% tested.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(8.50)
(7.75)
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(4.19)
.040
(1.02)
7 LEADS
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(12.70)
.021
.016
(.53)
(.41)
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(5.08)
BOTTOM VIEW
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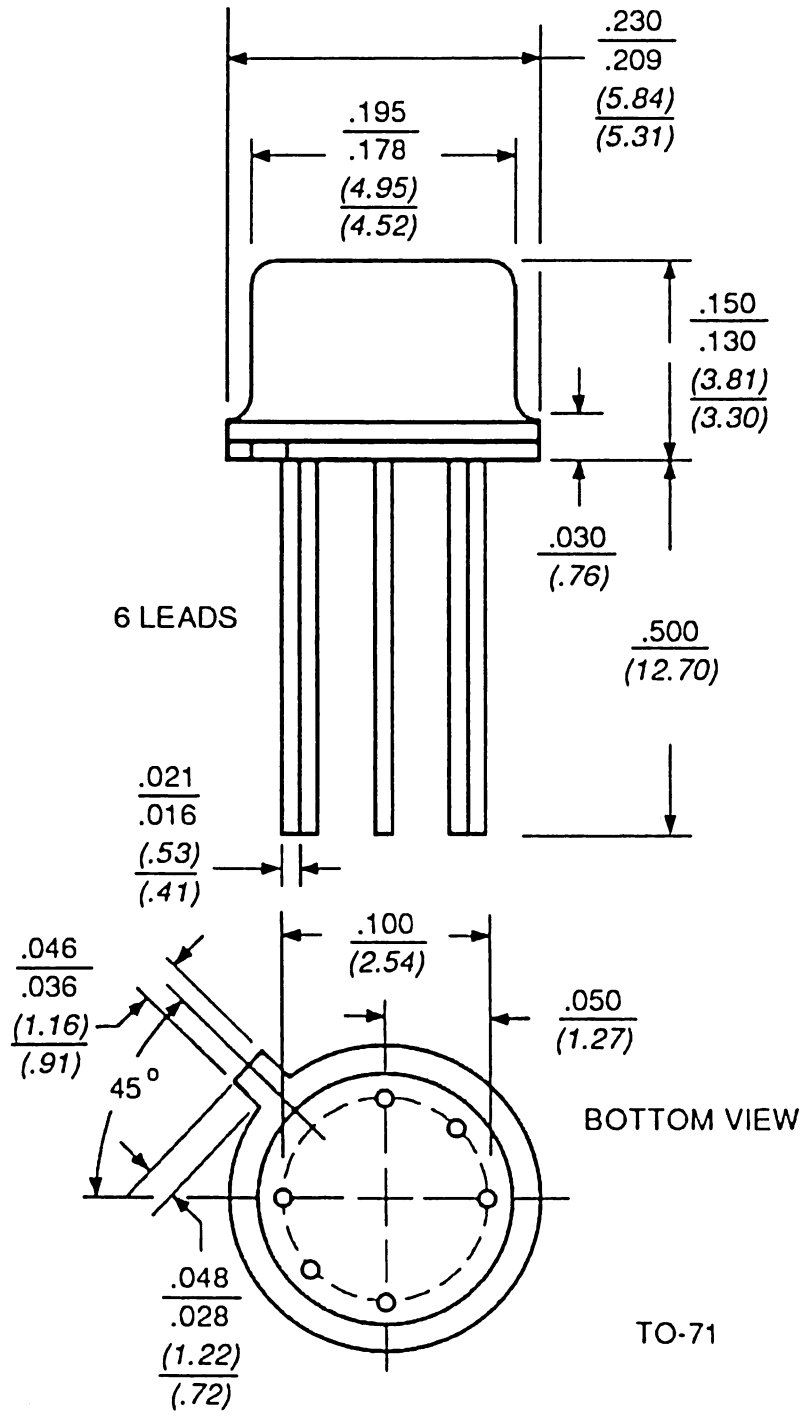
.029
(1.14)
(.74)
(TO-78)

TO-78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6 LEADS
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(.53)
(.41)
.100
(2.54)
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.036
(1.16)
(.91)
45°
.050
(1.27)
BOTTOM VIEW
.048
.028
(1.22)
(.72)
TO-71

TO-71