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FEATURES

- High Gain At Low Current $h_{FE} \geq 200 @ 10 \mu A$
- Low Output Capacitance $C_{obo} \leq 0.8 \text{ pF}$
- h_{FE} Match $h_{FE1} / h_{FE2} \leq 10\%$
- Tight V_{BE} Tracking
 $\Delta(V_{BE1} - V_{BE2}) \leq 3 \mu V / ^\circ C -55^\circ C \text{ to } +125^\circ C$
- Dielectrically isolated matched pairs for differential amplifiers.

GENERAL DESCRIPTION

Dual monolithic matched NPN silicon planar transistors used for differential amplifier applications.

ABSOLUTE MAXIMUM RATINGS.

@ 25°C (unless otherwise noted)

Maximum Temperatures

Storage Temperature $-65^\circ C \text{ to } +200^\circ C$

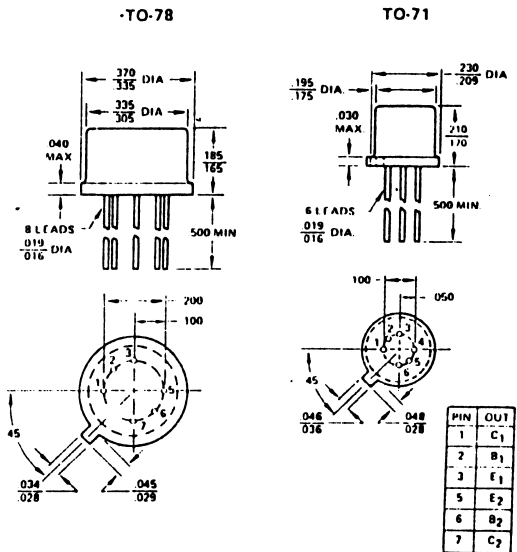
Operating Junction Temperature $+200^\circ C$

Maximum Power Dissipation

	TO-71		TO-78	
	ONE SIDE	BOTH SIDES	ONE SIDE	BOTH SIDES
Total Dissipation at 25°C	0.3 Watt	0.5 Watt	0.4 Watt	0.75 Watt
Case Temperature				
Derating Factor	1.7mW/°C	2.9mW/°C	2.3mW/°C	4.3mW/°C

	2N4044	2N4100	2N4045
	2N4878	2N4879	2N4880
V_{CBO} Collector to Base Voltage	60 V	55 V	45 V
V_{CEO} Collector to Emitter Voltage	60 V	55 V	45 V
V_{EBO} Emitter to Base Voltage (Note 2)	7 V	7 V	7 V
V_{CCO} Collector to Collector Voltage	100 V	100 V	100 V
I_C Collector Current	10mA	10mA	10mA

PACKAGE DIMENSIONS



ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

PARAMETER	2N4044		2N4100		2N4045		UNIT	TEST CONDITIONS
	MIN	MAX	MIN	MAX	MIN	MAX		
h_{FE} DC Current Gain	200	600	150	600	80	800		$I_C = 10 \mu A, V_{CE} = 5V$
h_{FE} DC Current Gain	225		175		100			$I_C = 1.0 \text{ mA}, V_{CE} = 5V$
$h_{FE}(-55^\circ C)$ DC Current Gain	75		50		30			$I_C = 10 \mu A, V_{CE} = 5V$
$V_{BE(on)}$ Emitter-Base On Voltage		0.7		0.7		0.7	V	$I_C = 10 \mu A, V_{CE} = 5V$
$V_{CE(sat)}$ Collector Saturation Voltage		0.35		0.35		0.35	V	$I_C = 1.0 \text{ mA}, I_B = 0.1 \text{ mA}$
I_{CBO} Collector Cutoff Current		0.1		0.1		0.1*	nA	$I_E = 0, V_{CB} = 45V, 30V^*$
$I_{CBO}(+150^\circ C)$ Collector Cutoff Current		0.1		0.1		0.1*	μA	$I_E = 0, V_{CB} = 45V, 30V^*$
I_{EBO} Emitter Cutoff Current		0.1		0.1		0.1	nA	$I_C = 0, V_{EB} = 5V$
C_{obo} Output Capacitance		0.8		0.8		0.8	pF	$I_E = 0, V_{CB} = 5V$

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

PARAMETER	2N4044 2N4878		2N4100 2N4879		2N4045 2N4880		UNIT	TEST CONDITIONS
	MIN	MAX	MIN	MAX	MIN	MAX		
C _{TE}	1		1		1		pF	I _C = 0, V _{EB} = 0.5 V
C _{C1, C2}	0.8		0.8		0.8		pF	V _{CC} = 0
I _{C1, C2}	5		5		5		μA	V _{CC} = ±100 V
V _{CEO(sust)}	60		55		45		V	I _C = 1 mA, I _B = 0
f _T	200		150		150		MHz	I _C = 1 mA, V _{CE} = 10 V
f _T	20		15		15		MHz	I _C = 10 μA, V _{CE} = 10 V
NF		2		3		3	dB	I _C = 10 μA, V _{CE} = 5 V R _G = 10 ohms f = 1 kHz BW = 200 Hz
BV _{CBO}	60		55		45		V	I _C = 10 μA, I _E = 0
BV _{EBO}	7		7		7		V	I _E = 10 μA, I _C = 0

MATCHING CHARACTERISTICS (25°C unless otherwise noted)

h _{FE1} /h _{FE2}	DC Current Gain Ratio (Note 3)	0.9	1	0.85		0.8	1		I _C = 10 μA to 1 mA, V _{CE} = 5 V
V _{BE1} - V _{BE2}	Base Emitter Voltage Differential		3		5		5	mV	I _C = 10 μA, V _{CE} = 5 V
I _{B1} - I _{B2}	Base Current Differential		5		10		25	nA	I _C = 10 μA, V _{CE} = 5 V
Δ(V _{BE1} - V _{BE2})/°C	Base-Emitter Voltage Differential Change with Temperature		3		5		10	μV/°C	I _C = 10 μA, V _{CE} = 5 V T _A = -55°C to +125°C
Δ(I _{B1} - I _{B2})/°C	Base Current Differential Change with Temperature		0.3		0.5		1	nA/°C	I _C = 10 μA, V _{CE} = 5 V T _A = -55°C to +125°C

SMALL SIGNAL CHARACTERISTICS

PARAMETER	TYPICAL VALUE	UNIT	TEST CONDITIONS
h _{ib}	28	ohms	I _C = 1 mA, V _{CB} = 5 V
h _{rb}	4.3	x 10 ⁻⁴	I _C = 1 mA, V _{CB} = 5 V
h _{fe}	250		I _C = 1 mA, V _{CE} = 5 V
h _{ob}	0.6	x 10 ⁻⁷ mhos	I _C = 1 mA, V _{CB} = 5 V
h _{ie}	9.6	k ohms	I _C = 1 mA, V _{CE} = 5 V
h _{re}	4.2	x 10 ⁻⁴	I _C = 1 mA, V _{CE} = 5 V
h _{oe}	12	μmhos	I _C = 1 mA, V _{CE} = 5 V

NOTES:

1. These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.
2. The reverse base-to-emitter voltage must never exceed 7.0 volts and the reverse base-to-emitter current must never exceed 10 μamps.
3. The lowest of two h_{FE} readings is taken as h_{FE1} for purposes of this ratio.