INTERSIL

2N3810/A, 2N3811/A Monolithic Dual Matched PNP Transistor

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ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures
- Storage Temperature ..... −65°C to +200°C
- Operating Temperature ..... 200°C
- Lead Temperature (10 seconds) ..... 230°C

Maximum Power Dissipation

	One Side	Both Sides
Total Dissipation at 25°C Ambient Temperature	500 mW	600 mW
Linear Derating Factor	2.9 mW/°C	3.4 mW/°C

Maximum Voltage and Current (One side)
- V_{EBO} Emitter to Base Voltage ..... −5.0V
- V_{CBO} Collector to Base Voltage ..... −60V
- V_{CEO} Collector to Emitter Voltage ..... −60V
- I_C DC Collector Current ..... 50 mA

ELECTRICAL CHARACTERISTICS

TEST CONDITIONS: 25°C Ambient Temperature unless otherwise noted

SYMBOL	CHARACTERISTIC	2N3810 MIN.	2N3810 MAX.	2N3811 MIN.	2N3811 MAX.	UNITS	TEST CONDITIONS
I_{CBO}	Collector Cutoff Current		10		10	nA	V_{CB} = −50V, I_C = 0
			10		10	μA	V_{CB} = −50V, I_E = 0, T_A = 150°C
I_{EBO}	Emitter Cutoff Current		20		20	nA	V_{EB} = −4.0V
BV_{EBO}	Emitter to Base Breakdown Voltage	−5.0		−5.0		V	I_C = 0, I_E = 10μA
BV_{CBO}	Collector to Base Breakdown Voltage	−60		−60		V	I_E = 0, I_C = 10μA
BV_{CEO}	Collector to Emitter Breakdown Voltage	−60		−60		V	I_C = 10 mA
h_{FE}	DC Current Gain	100		225			I_C = 10 μA, V_{CE} = −5.0V
		150	450	300	900		I_C = 100μA, V_{CE} = −5.0V
		150	450	300	900		I_C = 500μA, V_{CE} = −5.0V
		150	450	300	900		I_C = 1.0 mA, V_{CE} = −5.0V
		125		250			I_C = 10 mA, V_{CE} = −5.0V
		75		150			I_C = 100μA, V_{CE} = −5.0V, T_A = −55°C
$V_{BE(ON)}$	Base to Emitter "On" Voltage		−0.7		−0.7	V	I_C = 100μA, V_{CE} = −5.0V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage		−0.2		−0.2	V	I_C = 100μA, I_B = 10μA
			−0.25		−0.25	V	I_C = 1.0 mA, I_B = 100μA
$V_{BE(sat)}$	Base to Emitter Saturation Voltage		−0.7		−0.7	V	I_C = 100μA, I_B = 10μA
			−0.8		−0.8	V	I_C = 1.0 mA, I_B = 100μA
h_{FE1}/h_{FE2}	DC Current Gain Ratio	0.9	1.0	0.9	1.0		V_{CE} = −5.0V, I_C = 0.1 mA
$\lvert V_{BE1}-V_{BE2}\rvert$	Base to Emitter Voltage Differential		−5.0		−5.0	mV	V_{CE} = −5.0V, I_C = 10μA to 10 mA
			−3.0		−3.0	mV	V_{CE} = −5.0V, I_C = 100μA
$\lvert\Delta(V_{BE1}-V_{BE2})\rvert$	Base to Emitter Voltage Differential Gradient		−1.0		−1.0	mV	V_{CE} = −5.0V, I_C = 0.1 mA
							T_A = 25°C to 125°C
			−0.8		−0.8	mV	V_{CE} = −5.0V, I_C = 0.1 mA
							T_A = −55°C to +25°C
C_{ob}	Output Capacitance		4.0		4.0	pF	V_{CB} = −5.0V, I_E = 0, f = 100 kHz
C_{ib}	Input Capacitance		8.0		8.0	pF	V_{EB} = 0.5V, I_C = 0, f = 100 kHz
$\lvert h_{fe}\rvert$	Magnitude of Common Emitter Small Signal Current Gain	1.0		1.0			I_C = 500μA, V_{CE} = −5.0V, f = 30 MHz
		1.0	5.0	1.0	5.0		I_C = 1.0 mA, V_{CE} = −5.0V, f = 100 MHz
h_{ie}	Input Impedance	3.0	30	10	40	kΩ	V_{CE} = −10V, I_C = 1.0 mA, f = 1.0 kHz
h_{re}	Reverse Voltage Feedback Ratio		25		25	x 10−4	V_{CE} = −10V, I_C = 1.0 mA, f = 1.0 kHz
h_{oe}	Output Conductance	5.0	60	5.0	60	μmho	V_{CE} = −10V, I_C = 1.0 mA, f = 1.0 kHz
h_{fe}	Small Signal Current Gain	150	600	300	900		V_{CE} = −10V, I_C = 1.0 mA, f = 1.0 kHz
$RE(h_{ie})$	Real Part of Common Emitter Small Signal Input Impedance	3.0	30	10	40	kΩ	V_{CE} = −10V, I_C = 1.0 mA, f = 1.0 kHz
NF	Noise Figure		3.0		1.5	dB	I_C = 100μA, V_{CE} = −10V, f = 1.0 kHz, PBW = 200 Hz, R_G = 3.0 kΩ
			2.5		1.5	dB	I_C = 100μA, V_{CE} = −10V, f = 10 kHz, PBW = 2.0 kHz, R_G = 3.0 kΩ
			7.0		4.0	dB	I_C = 100μA, V_{CE} = − 10V, f = 100 Hz, PBW = 20 Hz, R_G = 3.0 kΩ
			3.5		2.5	dB	I_C = 100μA, V_{CE} = −10V, R_G = 3.0 kΩ 3.0 dB down at 10 Hz and 10 kHz PBW = 15.7 kHz

INTERSIL

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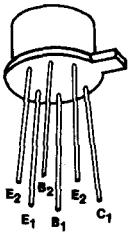
PIN CONFIGURATION

TO-78



CHIP TOPOGRAPHY

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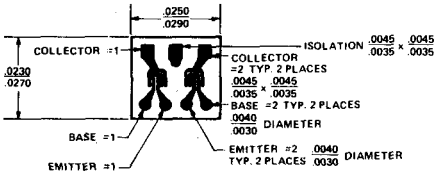

ORDERING INFORMATION

TO-78	WAFER	DICE
2N3810	2N3810/W	2N3810/D
2N3810A	2N3810A/W	2N3810A/D
2N3811	2N3811/W	2N3811/D
2N3811A	2N3811A/W	2N3811A/D

ELECTRICAL CONDITIONS

TEST CONDITIONS: 25°C Ambient Temperature unless otherwise noted

SYMBOL	CHARACTERISTIC	2N3810A MIN.	2N3810A MAX.	2N3811A MIN.	2N3811A MAX.	UNITS	TEST CONDITIONS
I_{CBO}	Collector Cutoff Current		10		10	nA	V_{CB} = -50V, I_C = 0
			10		10	μA	V_{CB} = -50V, I_E = 0, T_A = 150°C
I_{EBO}	Emitter Cutoff Current		20		20	nA	V_{EB} = -4.0V
BV_{EBO}	Emitter to Base Breakdown Voltage	-5.0		-5.0		V	I_C = 0, I_E = 10μA
BV_{CBO}	Collector to Base Breakdown Voltage	-60		-60		V	I_E = 0, I_C = 10μA
BV_{CEO}	Collector to Emitter Breakdown Voltage	-60		-60		V	I_C = 10 mA
h_{FE}	DC Current Gain	100		225			I_C = 10μA, V_{CE} = -5.0V
		150	450	300	900		I_C = 100μA, V_{CE} = -5.0V
		150	450	300	900		I_C = 500μA, V_{CE} = -5.0V
		150	450	300	900		I_C = 1.0 mA, V_{CE} = -5.0V
		125		250			I_C = 10 mA, V_{CE} = -5.0V
		75		150			I_C = 100μA, V_{CE} = -5.0V, T_A = -55°C
$V_{BE(ON)}$	Base to Emitter "On" Voltage		-0.7		-0.7	V	I_C = 100μA, V_{CE} = -5.0V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage		-0.2		-0.2	V	I_C = 100μA, I_B = 10μA
			-0.25		-0.25	V	I_C = 1.0 mA, I_B = 100μA
$V_{BE(sat)}$	Base to Emitter Saturation Voltage		-0.7		-0.7	V	I_C = 100μA, I_B = 10 μA
			-0.8		-0.8	V	I_C = 1.0 mA, I_B = 100μA
h_{FE1}/h_{FE2}	DC Current Gain Ratio	0.95	1.0	0.95	1.0		V_{CE} = -5.0V, I_C = 0.1 mA
		0.85	1.0	0.85	1.0		V_{CE} = -5.0V, I_C = 0.1 mA,
							T_A = -55°C to +125°C
$\lvert V_{BE1}-V_{BE2}\rvert$	Base to Emitter Voltage Differential		-5.0		-5.0	mV	V_{CE} = -5.0V, I_C = 10μA to 10 mA
			-1.5		-1.5	mV	V_{CE} = -5.0V, I_C = 100μA
$\lvert\Delta(V_{BE1}-V_{BE2})\rvert$	Base to Emitter Voltage Differential Gradient		-0.5		-0.5	mV	V_{CE} = -5.0V, I_C = 0.1 mA
							T_A = 25°C to 125°C
			-0.4		-0.4	mV	V_{CE} = -5.0V, I_C = 0.1 mA
							T_A = -55°C to +25°C
C_{ob}	Output Capacitance		4.0		4.0	pF	V_{CB} = -5.0V, I_E = 0, f = 100 kHz
C_{ib}	Input Capacitance		8.0		8.0	pF	V_{EB} = 0.5V, I_C = 0, f = 100 kHz
$\lvert h_{fe}\rvert$	Magnitude of Common Emitter Small Signal Current Gain	1.0		1.0			I_C = 500μA, V_{CE} = -5.0V, f = 30 mHz
		1.0	5.0	1.0	5.0		I_C = 1.0 mA, V_{CE} = 5.0V, f = 100 MHz
h_{ie}	Input Impedance	3.0	30	10	40	kΩ	V_{CE} = -10V, I_C = 1.0 mA, f = 1.0 kHz
h_{re}	Reverse Voltage Feedback Ratio		25		25	x 10^{-4}	V_{CE} = -10V, I_C = 1.0 mA, f = 1.0 kHz
h_{oe}	Output Conductance	5.0	60	5.0	60	μmho	V_{CE} = -10V, I_C = 1.0 mA, f = 1.0 kHz
h_{fe}	Small Signal Current Gain	150	600	300	900		V_{CE} = -10V, I_C = 1.0 mA, f = 1.0 kHz
$RE(h_{ie})$	Real Part of Common Emitter Small Signal Input Impedance	3.0	30	10	40	kΩ	V_{CE} = -10V, I_C = 1.0 mA, f = 1.0 kHz
NF	Noise Figure		3.0		1.5	dB	I_C = 100μA, V_{CE} = -10V, f = 1.0 kHz, PBW = 200 Hz, R_G = 3.0 kΩ
			2.5		1.5	dB	I_C = 10μA, V_{CE} = -10V, f = 10 kHz, PBW = 2.0 kHz, R_G = 3.0 kΩ
			7.0		4.0	dB	I_C = 100μA, V_{CE} = -10V, f = 100 Hz, PBW = 20 Hz, R_G = 3.0 kΩ
			3.5		2.5	dB	I_C = 100μA, V_{CE} = -10V, R_G = 3.0 kΩ, 3 dB down at 10 Hz and 10 kHz PBW = 15.7 kHz