

3469674 FAIRCHILD SEMICONDUCTOR

84D 27605 D

**FAIRCHILD**

A Schlumberger Company

**2N5320/2N5321**

T-33-07

**2N5322/2N5323**

T-33-17

10 Watt NPN-PNP Silicon Power

- $V_{CE(sat)}$  ... -0.7 V
- $h_{FE}$  ... 40-250 @  $V_{CE} = 4.0$  V,  $I_C = 0.5$  A
- Complements ... 2N5320, NPN (2N5322, PNP); 2N5321, NPN (2N5322, PNP)

**PACKAGE**

2N5320	TO-39
2N5321	TO-39
2N5322	TO-39
2N5323	TO-39

**ABSOLUTE MAXIMUM RATINGS** (Note 1)**Temperatures**

Storage Temperature	-65°C to 200°C
Operating Junction Temperature	200°C

**Power Dissipation** (Notes 2 & 3)

Total Dissipation at 25°C Case Temperature	10 W
Linear Derating Factor	0.057W/°C

<b>Voltages &amp; Currents</b>		<b>5320</b>	<b>5321</b>
$V_{CEO}$	Collector to Emitter Voltage	75 V	50 V
$V_{CBO}$	Collector to Base Voltage	100 V	75 V
$V_{EBO}$	Emitter to Base Voltage	7.0 V	5.0 V
$I_C$	Collector Current	2.0 A	2.0 A
$I_B$	Base Current	1.0 A	1.0 A

<b>Voltages &amp; Currents</b>		<b>5322</b>	<b>5323</b>
$V_{CEO}$	Collector to Emitter Voltage	-75 V	-50 V
$V_{CBO}$	Collector to Base Voltage	-100 V	-75 V
$V_{EBO}$	Emitter to Base Voltage	-7.0 V	-5.0 V
$I_C$	Collector Current	2.0 A	2.0 A
$I_B$	Base Current	1.0 A	1.0 A

**ELECTRICAL CHARACTERISTICS** (25°C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	5320		5321		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{EBO}$	Emitter Cutoff Current		0.1		0.1	mA	$V_{EB} = 7.0$ V
						mA	$V_{EB} = 5.0$ V

**NOTES:**

- These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
- Pulse conditions: length = 300  $\mu$ s; duty cycle  $\leq$  10%.
- Pulse Rep. Frequency = 1 kHz, pulse width = 20  $\mu$ s.
- These ratings give a maximum junction temperature of 200°C and junction-to-case thermal resistance of 0.2°C/W (derating factor of 0.057 W/°C).
- Emitter diode is reversed biased.
- For product family characteristic curves, refer to Curve Set T314 (2N5320 and 2N5321) and Curve Set T414 (2N5322 and 2N5323).

3469674 FAIRCHILD SEMICONDUCTOR

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2N5320/2N5321  
2N5322/2N5323

T 33-17

SYMBOL	CHARACTERISTIC	5320		5321		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{CEX}$	Collector Cutoff Current (Note 3)		5.0			mA	$V_{CE} = 70 \text{ V}$ , $V_{BE} = 1.5 \text{ V}$ , $T_C = 150^\circ\text{C}$
					5.0	mA	$V_{CE} = 45 \text{ V}$ , $V_{BE} = 1.5 \text{ V}$ , $T_C = 150^\circ\text{C}$
			0.1		0.1	mA	$V_{CE} = 100 \text{ V}$ , $V_{BE} = 1.5 \text{ V}$
						mA	$V_{CE} = 75 \text{ V}$ , $V_{BE} = 1.5 \text{ V}$
$h_{FE}$	DC Current Gain (Note 2)	10 30	130	40	250		$I_C = 1.0 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$ $I_C = 0.5 \text{ A}$ , $V_{CE} = 4.0 \text{ V}$
$V_{CEO(sus)}$	Collector to Emitter Sustaining Voltage (Note 2)	75		50		V	$I_C = 100 \text{ mA}$ , $I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 2)		0.5		0.8	V	$I_C = 500 \text{ mA}$ , $I_B = 50 \text{ mA}$
$V_{BE(ON)}$	Base to Emitter "On" Voltage (Note 2)		1.1		1.4	V	$I_C = 500 \text{ mA}$ , $V_{CE} = 4.0 \text{ V}$
$h_{fe}$	Small Signal Current Gain	5.0		5.0			$I_C = 50 \text{ mA}$ , $V_{CE} = 4.0 \text{ V}$ , $f = 10 \text{ MHz}$
$t_{on}$	Turn On Time (Note 3)		80		80	ns	$I_C = 500 \text{ mA}$ , $I_{B1} = 50 \text{ mA}$
$t_{off}$	Turn Off Time (Note 3)		800		800	ns	$I_C = 500 \text{ mA}$ , $I_{B1} = 50 \text{ mA}$ , $I_{B2} = -50 \text{ mA}$

SYMBOL	CHARACTERISTIC	5322		5323		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{EBO}$	Emitter Cutoff Current		0.1		0.1	mA mA	$V_{EB} = -7.0 \text{ V}$ $V_{EB} = -5.0 \text{ V}$
$I_{CEX}$	Collector Cutoff Current		5.0			mA	$V_{CE} = -70 \text{ V}$ , $V_{BE} = -1.5 \text{ V}$ , $T_C = 150^\circ\text{C}$
					5.0	mA	$V_{CE} = -45 \text{ V}$ , $V_{BE} = -1.5 \text{ V}$ , $T_C = 150^\circ\text{C}$
			0.1		0.1	mA	$V_{CE} = -100 \text{ V}$ , $V_{BE} = -1.5 \text{ V}$
						mA	$V_{CE} = -75 \text{ V}$ , $V_{BE} = -1.5 \text{ V}$
$h_{FE}$	DC Current Gain	10 30	130	40	250		$I_C = 1.0 \text{ A}$ , $V_{CE} = -2.0 \text{ V}$ $I_C = 500 \text{ mA}$ , $V_{CE} = -4.0 \text{ V}$
$V_{CEO(sus)}$	Collector to Emitter Sustaining Voltage (Note 2)	-75		-50		V	$I_C = -100 \text{ mA}$ , $I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 2)		-0.7		-1.20	V	$I_C = 50 \text{ mA}$ , $I_B = 50 \text{ mA}$
$V_{BE(ON)}$	Base to Emitter "On" Voltage (Note 2)		-1.1		-1.4	V	$I_C = 500 \text{ mA}$ , $V_{CE} = -4.0 \text{ V}$
$h_{fe}$	Small Signal Current Gain	5.0		5.0			$I_C = 50 \text{ mA}$ , $V_{CE} = 4.0 \text{ V}$ , $f = 10 \text{ MHz}$
$t_{on}$	Turn On Time (Note 3)		100		100	ns	$I_C = 500 \text{ mA}$ , $I_{B1} = -50 \text{ mA}$
$t_{off}$	Turn Off Time (Note 3)		1000		1000	ns	$I_C = 500 \text{ mA}$ , $I_{B1} = -50 \text{ mA}$ , $I_{B2} = 50 \text{ mA}$

3469674 FAIRCHILD SEMICONDUCTOR

84D 27607 D

**FAIRCHILD**

A Schlumberger Company

**2N5336/2N5338**

T-33-05

6 Watt NPN Silicon Power

- $P_D \dots 6.0 \text{ W @ } T_c = 25^\circ \text{C}$
- $LV_{CE0} \dots 80 \text{ V and } 100 \text{ V (Min)}$
- $V_{CE(sat)} \dots 1.2 \text{ V (Max) @ } 5.0 \text{ A}$

**PACKAGE**

2N5336	TO-5
2N5338	TO-5

**ABSOLUTE MAXIMUM RATINGS (Note 1)****Temperatures**

Storage Temperature	-65° C to 200° C
Operating Junction Temperature	200° C

**Power Dissipation**

Total Dissipation at 25° C Case Temperature	6.0 W
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**Voltages & Currents**

	5336	5338
$V_{CE0}$ Collector to Emitter Voltage	80 V	100 V
$V_{CB0}$ Collector to Base Voltage	80 V	100 V
$V_{EB0}$ Emitter to Base Voltage	6.0 V	6.0 V
$I_C$ Collector Current	5.0 A	5.0 A
$I_B$ Base Current	1.0 A	1.0 A

**ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 4)**

SYMBOL	CHARACTERISTIC	5336		5338		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{E0}$	Emitter Cutoff Current		100		100	$\mu\text{A}$	$V_{EB} = 6.0 \text{ V}, I_C = 0$
$I_{C0}$	Collector Cutoff Current		10		10	$\mu\text{A}$	$V_{CE} = 80 \text{ V}, I_E = 0$ $V_{CE} = 100 \text{ V}, I_E = 0$
$I_{CEX}$	Collector Cutoff Current		10 1.0		10 1.0	$\mu\text{A}$	$V_{CE} = 75 \text{ V}, V_{BE} = 1.5 \text{ V}$
						$\text{mA}$	$V_{CE} = 75 \text{ V}, V_{EB} = 1.5 \text{ V},$ $T_C = 150^\circ \text{C}$
						$\text{mA}$	$V_{CE} = 90 \text{ V}, V_{BE} = 1.5 \text{ V}$ $V_{CE} = 90 \text{ V}, V_{BE} = 1.5 \text{ V},$ $T_C = 150^\circ \text{C}$
$h_{FE}$	DC Current Gain (Note 2)	30 30 20	120	30 30 20	120		$I_C = 500 \text{ mA}, V_{CE} = 2.0 \text{ V}$ $I_C = 2.0 \text{ A}, V_{CE} = 2.0 \text{ V}$ $I_C = 5.0 \text{ A}, V_{CE} = 2.0 \text{ V}$

**NOTES:**

1. These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
2. Pulse conditions: length = 300  $\mu\text{s}$ ; duty cycle  $\mu 2\%$ .
3. These ratings give a maximum junction temperature of 200°C and junction-to-case thermal resistance of 33.3°C/W (linear derating factor of 34 mW/°C).
4. For product family characteristic curves, refer to Curve Set T316.

**ELECTRICAL CHARACTERISTICS** (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	5336		5338		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$V_{CE(sus)}$	Collector to Emitter Sustaining Voltage (Note 2)	80		100		V	$I_C = 50 \text{ mA}$ , $I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Pulsed) (Note 2)		0.7		0.7	V	$I_C = 2.0 \text{ A}$ , $I_B = 200 \text{ mA}$
			1.2		1.2	V	$I_C = 5.0 \text{ A}$ , $I_B = 500 \text{ mA}$
$V_{BE(sat)}$	Base Saturation Voltage (Pulsed) (Note 2)		1.2		1.2	V	$I_C = 2.0 \text{ A}$ , $I_B = 200 \text{ mA}$
			1.8		1.8	V	$I_C = 5.0 \text{ A}$ , $I_B = 500 \text{ mA}$
$t_d$	Turn On Delay Time		100		100	ns	$I_C = 2.0 \text{ A}$ , $V_{CC} = 4.0 \text{ V}$ , $I_{B1} = 200 \text{ mA}$
$t_r$	Turn On Rise Time		100		100	ns	$I_C = 2.0 \text{ A}$ , $V_{CC} = 40 \text{ V}$ , $I_{B1} = 200 \text{ mA}$
$t_s$	Turn Off Storage Time		2.0		2.0	$\mu\text{s}$	$I_C = 2.0 \text{ A}$ , $V_{CC} = 40 \text{ V}$ , $I_{B1} = I_{B2} = 200 \text{ mA}$
$t_f$	Turn Off Fall Time		200		200	ns	$I_C = 2.0 \text{ A}$ , $V_{CC} = 40 \text{ V}$ , $I_{B1} = I_{B2} = 200 \text{ mA}$

3469674 FAIRCHILD SEMICONDUCTOR

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**FAIRCHILD**

A Schlumberger Company

**2N5415/2N5416** T-33-17

PNP Silicon Power Transistor

- 10 W Dissipation at 25° C Case
- 1 A (Max) Continuous Collector Current
- Up to 350 V  $V_{CBO}$  Rating (2N5416)
- Complements ... 2N3439, 2N3440

**PACKAGE**

2N5415	TO-39
2N5416	TO-39

**ABSOLUTE MAXIMUM RATINGS** (Note 1)**Temperatures**

Storage Temperature	-65° C to 200° C
Operating Junction Temperature	200° C

**Power Dissipation** (Notes 2 & 3)

Total Dissipation at 25° C Case Temperature	10 W
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**Voltages & Currents** (Note 4)

	5415	5416
$V_{CEO}$ Collector to Emitter Voltage	-200 V	-300 V
$V_{CBO}$ Collector to Base Voltage	-200 V	-350 V
$V_{EBO}$ Emitter to Base Voltage	-4.0 V	-4.0 V
$I_C$ Collector Current (Continuous)	1.0 A	1.0 A
$I_B$ Base Current (Continuous)	0.5 A	0.5 A

**ELECTRICAL CHARACTERISTICS** (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	5415		5416		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{EBO}$	Emitter Cutoff Current		20		20	$\mu A$	$V_{EB} = -4.0 V, I_C = 0$ $V_{EB} = -6.0 V, I_C = 0$
$I_{CBO}$	Collector Cutoff Current		50		50	$\mu A$	$V_{CB} = -175 V, I_E = 0$ $V_{CB} = -280 V, I_E = 0$
$I_{CEV}$	Collector Cutoff Current		50		50	$\mu A$	$V_{CE} = -200 V, V_{BE} = 1.5 V$ $V_{CE} = -300 V, V_{BE} = 1.5 V$
$I_{CEO}$	Collector Cutoff Current		50		50	$\mu A$	$V_{CE} = -150 V, I_B = 0$ $V_{CE} = -250 V, I_B = 0$
$h_{FE}$	DC Current Gain (Note 5)	30	150	30	120		$I_C = 50 mA, V_{CE} = -10 V$

**NOTES:**

1. These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
3. These ratings give a maximum junction temperature of 200° C and junction-to-case thermal resistance of 0.2° C/W (derating factor of 0.057 mW/° C).
4. Rating refers to a high current point where collector to emitter voltage is lowest.
5. Pulse conditions: length = 300  $\mu s$ ; duty cycle = 2%.
6. For product family characteristic curves, refer to Curve Set T443.

3469674 FAIRCHILD SEMICONDUCTOR

84D 27612 D

2N5415/2N5416

T-33-17

**ELECTRICAL CHARACTERISTICS** (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	5415		5416		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$V_{CE(sus)}$	Collector to Emitter Sustaining Voltage (Note 5)	-200		-300		V	$I_C = 50 \text{ mA}$ , $I_B = 0$
$V_{CER(sus)}$	Collector to Emitter Sustaining Voltage (Note 5)			-350		V	$I_C = 50 \text{ mA}$ , $R_{BE} = 50 \Omega$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		-2.5		-2.0	V	$I_C = 50 \text{ mA}$ , $I_B = 5.0 \text{ mA}$
$V_{BE(ON)}$	Base to Emitter "On" Voltage		-1.5		-1.5	V	$I_C = 50 \text{ mA}$ , $V_{CE} = -10 \text{ V}$
$C_{ob}$	Output Capacitance		15		15	pF	$V_{CB} = -10 \text{ V}$ , $I_E = 0$ $f = 1.0 \text{ MHz}$
$C_{ib}$	Input Capacitance		75		75	pF	$V_{EB} = -5.0 \text{ V}$ , $I_C = 0$ $f = 1.0 \text{ MHz}$
$ h_{fe} $	Magnitude of Common Emitter Small Signal Current Gain	3.0		3.0			$I_C = 10 \text{ mA}$ , $V_{CE} = -10 \text{ V}$ , $f = 5.0 \text{ MHz}$
$h_{fe}$	Small Signal Current Gain	25		25			$I_C = 5.0 \text{ mA}$ , $V_{CE} = -10 \text{ V}$ , $f = 1.0 \text{ kHz}$
$R_e(h_{fe})$	Real Part of Common Emitter Small Signal Short-Circuit Impedance		300		300	$\Omega$	$I_C = 5.0 \text{ mA}$ , $V_{CE} = -10 \text{ V}$ , $f = 1.0 \text{ MHz}$
$I_{S/b}$	Second Breakdown Collector Current	100		100		mA	$V_{CE} = -100 \text{ V}$ , $t = 1.0 \text{ s}$ (non repetitive)

3469674 FAIRCHILD SEMICONDUCTOR

84D 27613 D

**FAIRCHILD**

A Schlumberger Company

# 2N5550/FTSO5550

## 2N5551/MPS5551

### FTSO5551

NPN Small Signal High Voltage  
General Purpose Amplifiers

- $V_{CEO}$  ... 160 V (Min) (MPS/FTSO5551)
- $h_{FE}$  ... 80-250 @ 10 mA (MPS/FTSO5551)
- $V_{CE(sat)}$  ... 0.2 V (max) @ 50 mA (MPS/FTSO5551)
- Complements ... 2N5400, 2N5401

**PACKAGE**

2N5550	TO-92
2N5551	TO-92
MPS5551	TO-92
FTSO5550	TO-236AA/AB
FTSO5551	TO-236AA/AB

**ABSOLUTE MAXIMUM RATINGS** (Note 1)**Temperatures**

Storage Temperature	-55° C to 150° C
Operating Junction Temperature	150° C

**Power Dissipation** (Notes 2 & 3)

Total Dissipation at	2N	FTSO
25° C Ambient Temperature	0.625 W	0.350 W*
25° C Case Temperature	1.0 W	

**Voltages & Currents**

	5550	5551
$V_{CEO}$ Collector to Emitter Voltage	140 V	160 V
(Note 4)		
$V_{CBO}$ Collector to Base Voltage	160 V	180 V
$V_{EBO}$ Emitter to Base Voltage	6.0 V	6.0 V
$I_C$ Collector Current	600 mA	600 mA

**ELECTRICAL CHARACTERISTICS** (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	5550		5551		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$BV_{CEO}$	Collector to Emitter Breakdown Voltage	140		160		V	$I_C = 1.0$ mA, $I_E = 0$
$BV_{CBO}$	Collector to Base Breakdown Voltage	160		180		V	$I_C = 100$ $\mu$ A, $I_E = 0$
$BV_{EBO}$	Emitter to Base Breakdown Voltage	6.0		6.0		V	$I_E = 10$ $\mu$ A, $I_C = 0$
$I_{EBO}$	Emitter Cutoff Current		50		50	nA	$V_{EB} = 4.0$ V, $I_C = 0$
$I_{CBO}$	Collector Cutoff Current		100		50	nA	$V_{CB} = 100$ V, $I_E = 0$
			100		50	$\mu$ A	$V_{CB} = 120$ V, $I_E = 0$
					50	$\mu$ A	$V_{CB} = 100$ V, $I_E = 0$ , $T_A = 100^\circ$ C
					50	$\mu$ A	$V_{CB} = 120$ V, $I_E = 0$ , $T_A = 100^\circ$ C

**NOTES:**

- These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
  - These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
  - These ratings give a maximum junction temperature of 150° C and (TO-92) junction-to-case thermal resistance of 125° C/W (derating factor of 8.0 mW/° C); junction-to-ambient thermal resistance of 200° C/W (derating factor of 5.0 mW/° C); (TO-236) junction-to-ambient thermal resistance of 357° C/W (derating factor of 2.8 mW/° C).
  - Rating refers to a high current point where collector to emitter voltage is lowest.
  - Pulse conditions: length = 300  $\mu$ s; duty cycle = 1%.
  - For product family characteristic curves, refer to Curve Set T147.
- \* Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

3469674 FAIRCHILD SEMICONDUCTOR

84D 27614 D

2N5550/FTSO5550  
 2N5551/MPS5551  
 FTSO5551

T-29.23

## ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	5550		5551		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$h_{FE}$	DC Pulse Current Gain (Note 5)	60 60 20	250	80 80 30	250		$I_C = 1.0 \text{ mA}$ , $V_{CE} = 5.0 \text{ V}$ $I_C = 10 \text{ mA}$ , $V_{CE} = 5.0 \text{ V}$ $I_C = 50 \text{ mA}$ , $V_{CE} = 5.0 \text{ V}$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.15 0.25		0.15 0.25	V V	$I_C = 10 \text{ mA}$ , $I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}$ , $I_B = 5.0 \text{ mA}$
$V_{BE(sat)}$	Base to Emitter Saturation Voltage (Note 5)		1.0 1.2		1.0 1.0	V V	$I_C = 10 \text{ mA}$ , $I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}$ , $I_B = 5.0 \text{ mA}$
$C_{ob}$	Output Capacitance		6.0		6.0	pF	$V_{CB} = 10 \text{ V}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$
$C_{ib}$	Input Capacitance (2N/FTSO5550) (MPS/FTSO5551) (2N5551)		30		30 20	pF pF pF	$V_{BE} = 0.5 \text{ V}$ , $I_C = 0$ , $f = 1.0 \text{ MHz}$ $V_{BE} = 0.5 \text{ V}$ , $I_C = 0$ , $f = 1.0 \text{ MHz}$ $V_{BE} = 0.5 \text{ V}$ , $I_C = 0$ , $f = 1.0 \text{ MHz}$
$h_{fe}$	Small Signal Current Gain	50	200	50	200		$I_C = 1.0 \text{ mA}$ , $V_{CE} = -10 \text{ V}$ , $f = 1.0 \text{ kHz}$
$f_T$	Current Gain Bandwidth Product	100	300	100	300	MHz	$I_C = 10 \text{ mA}$ , $V_{CE} = 10 \text{ V}$ , $f = 100 \text{ MHz}$
NF	Noise Figure		10		8.0	dB	$I_C = 250 \mu\text{A}$ , $V_{CE} = 5.0 \text{ V}$ , $f = 10 \text{ Hz to } 15.7 \text{ kHz}$ , $R_S = 1.0 \text{ k}\Omega$



**FAIRCHILD**

A Schlumberger Company

**2N5679/2N5680****2N5681/2N5682**1.0 Amp 10 Watt NPN-PNP  
Complementary Power

T-33-07

T-33-17

- $f_T$  ... 30 MHz @  $I_C = 100$  mA
- $V_{CE(sat)}$  ... 0.6 V @  $I_C = 0.25$  A
- Complements ... 2N5679, PNP (2N5681, NPN);  
2N5680, PNP (2N5682, NPN)

**PACKAGE**

2N5679	TO-39
2N5680	TO-39
2N5681	TO-39
2N5682	TO-39

**ABSOLUTE MAXIMUM RATINGS** (Note 1)**Temperatures**

Storage Temperature	-65° C to 200° C
Operating Junction Temperature	200° C

**Power Dissipation** (Notes 2 & 3)

Continuous Dissipation at 25° C Ambient Temperature	1.0 W
Continuous Dissipation at 25° C Case Temperature	10 W

**Voltages & Currents** (Note 4)

	5679	5680
$V_{CEO}$ Collector to Emitter Voltage	-100 V	-120 V
$V_{CBO}$ Collector to Base Voltage	-100 V	-120 V
$V_{EBO}$ Emitter to Base Voltage	-4.0 V	-4.0 V
$I_C$ Collector Current	1.0 A	1.0 A
$I_B$ Base Current	0.5 A	0.5 A

**Voltages & Currents** (Note 4)

	5681	5682
$V_{CEO}$ Collector to Emitter Voltage	100 V	120 V
$V_{CBO}$ Collector to Base Voltage	100 V	120 V
$V_{EBO}$ Emitter to Base Voltage	4.0 V	4.0 V
$I_C$ Collector Current	1.0 A	1.0 A
$I_B$ Base Current	0.5 A	0.5 A

**ELECTRICAL CHARACTERISTICS** (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	5679		5680		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{EBO}$	Emitter Cutoff Current		1.0		1.0	$\mu A$	$V_{EB} = -4.0$ V, $I_C = 0$
$I_{CBO}$	Collector Cutoff Current		1.0		1.0	$\mu A$	$V_{CB} = -100$ V, $I_E = 0$ $V_{CB} = -120$ V, $I_E = 0$

**NOTES:**

1. These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
3. These ratings give a maximum junction temperature of 200° C and junction-to-case thermal resistance of 0.2° C/W (derating factor of 0.057 mW/° C); junction-to-ambient thermal resistance of 0.02° C/W (derating factor of 0.0057 mW/° C).
4. Rating refers to a high current point where collector to emitter voltage is lowest.
5. Pulse conditions: length = 300  $\mu s$ ; duty cycle = 2%.
6. For product family characteristic curves, refer to Curve Set T415 (2N5679 and 2N5680) and Curve Set T315 (2N5681 and 2N5782)

2N5679/2N5680

2N5681/2N5682

T.33-17

**ELECTRICAL CHARACTERISTICS** (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	5679		5680		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{CEO}$	Collector Cutoff Current		10		10	$\mu A$ $\mu A$	$V_{CB} = -70 V, I_B = 0$ $V_{CB} = -80 V, I_B = 0$
$I_{CEX}$	Collector Reverse Current (Note 3)		1.0		1.0	mA	$V_{CE} = -100 V, V_{BE} = -1.5 V,$ $T_C = 150^\circ C$
						mA	$V_{CE} = -120 V, V_{BE} = -1.5 V,$ $T_C = 150^\circ C$
			1.0		1.0	$\mu A$ $\mu A$	$V_{CE} = -100 V, V_{BE} = -1.5 V$ $V_{CE} = -120 V, V_{BE} = -1.5 V$
$h_{FE}$	DC Current Gain (Note 5)	5.0 40	150	5.0 40	150		$I_C = 1.0 A, V_{CE} = -2.0 V$ $I_C = 250 mA, V_{CE} = -2.0 V$
$V_{CEO(sus)}$	Collector to Emitter Sustaining Voltage (Note 5)	-100		-120		V	$I_C = 10 mA, I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		-2.0		-2.0	V	$I_C = 1.0 mA, I_B = 200 mA$
			-1.0		-1.0	V	$I_C = 500 mA, I_B = 50 mA$
			-0.6		-0.6	V	$I_C = 250 mA, I_B = 25 mA$
$V_{BE(ON)}$	Base to Emitter "On" Voltage (Note 5)		-1.0		-1.0	V	$I_C = 250 mA, V_{CE} = -2.0 V$
$C_{ob}$	Common Base Output Capacitance		50		50	pF	$V_{CB} = -20 mA, I_E = 0$ $f = 1.0 MHz$
$h_{fe}$	High Frequency Current Gain	3.0		3.0			$I_C = 100 mA, V_{CE} = -10 V,$ $f = 10 MHz$
$h_{fe}$	Small Signal Current Gain	40		40			$I_C = 200 mA, V_{CE} = -1.5 V,$ $f = 1.0 kHz$

2N5679/2N5680  
2N5681/2N5682

T. 33-17

SYMBOL	CHARACTERISTIC	5681		5682		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{EBO}$	Emitter Cutoff Current		1.0		1.0	$\mu A$	$V_{EB} = 4.0 V, I_C = 0$
$I_{CBO}$	Collector Cutoff Current		1.0		1.0	$\mu A$	$V_{CB} = 100 V, I_E = 0$ $V_{CB} = 120 V, I_E = 0$
$I_{CEO}$	Collector Cutoff Current		10		10	$\mu A$	$V_{CB} = 70 V, I_B = 0$ $V_{CB} = 80 V, I_B = 0$
$I_{CEX}$	Collector Cutoff Current		1.0		1.0	$mA$	$V_{CE} = 100 V, V_{BE} = 1.5 V,$ $T_C = 150^\circ C$
						$mA$	$V_{CE} = 120 V, V_{BE} = -1.5 V,$ $T_C = 150^\circ C$
						$\mu A$	$V_{CE} = -100 V, V_{BE} = 1.5 V$ $V_{CE} = -120 V, V_{BE} = 1.5 V$
$h_{FE}$	DC Current Gain (Note 5)	5.0 40	150	5.0 40	150		$I_C = 1.0 A, V_{CE} = 2.0 V$ $I_C = 250 mA, V_{CE} = 2.0 V$
$V_{CE(sus)}$	Collector to Emitter Sustaining Voltage (Note 5)	100		120		V	$I_C = 10 mA, I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		2.0		2.0	V	$I_C = 1.0 mA, I_B = 200 mA$
			1.0		1.0	V	$I_C = 500 mA, I_B = 50 mA$
			0.6		0.6	V	$I_C = 250 mA, I_B = 25 mA$
$V_{BE(ON)}$	Base to Emitter "On" Voltage (Note 2)		1.0		1.0	V	$I_C = 250 mA, V_{CE} = 2.0 V$
$C_{ob}$	Output Capacitance		50		50	pF	$V_{CB} = 20 mA, I_E = 0$ $f = 1.0 MHz$
$h_{fe}$	High Frequency Current Gain	3.0		3.0			$I_C = 100 mA, V_{CE} = 10 V,$ $f = 10 MHz$
$h_{fe}$	Small Signal Current Gain	40		40			$I_C = 200 mA, V_{CE} = 1.5 V,$ $f = 1.0 kHz$

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