

3469674 FAIRCHILD SEMICONDUCTOR

84D 27605 D



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

Voltages & Currents

	5320	5321
V_{CE0} Collector to Emitter Voltage	75 V	50 V
V_{CB0} Collector to Base Voltage	100 V	75 V
V_{EB0} 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

Voltages & Currents

	5322	5323
V_{CE0} Collector to Emitter Voltage	-75 V	-50 V
V_{CB0} Collector to Base Voltage	-100 V	-75 V
V_{EB0} 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_{EB0}	Emitter Cutoff Current		0.1		0.1	mA	$V_{EB} = 7.0$ V
						mA	$V_{EB} = 5.0$ 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 μ s; duty cycle \leq 10%
3. Pulse Rep. Frequency = 1 kHz, pulse width = 20 μ s.
4. 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).
5. Emitter diode is reversed biased.
6. For product family characteristic curves, refer to Curve Set T314 (2N5320 and 2N5321) and Curve Set T414 (2N5322 and 2N5323).

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		$I_C = 1.0\text{ A}, V_{CE} = 2.0\text{ V}$ $I_C = 0.5\text{ A}, V_{CE} = 4.0\text{ V}$
$V_{CE(sus)}$	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			mA	$V_{EB} = -7.0\text{ V}$
					0.1	mA	$V_{EB} = -5.0\text{ V}$
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		$I_C = 1.0\text{ A}, V_{CE} = -2.0\text{ V}$ $I_C = 500\text{ mA}, V_{CE} = -4.0\text{ V}$
$V_{CE(sus)}$	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

2N5336/2N5338

T-33-05

FAIRCHILD

6 Watt NPN Silicon Power

A Schlumberger Company

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

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

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	μA	$V_{EB} = 6.0 \text{ V}, I_C = 0$
I_{C0}	Collector Cutoff Current		10		10	μA	$V_{CE} = 80 \text{ V}, I_E = 0$ $V_{CE} = 100 \text{ V}, I_E = 0$
I_{CEX}	Collector Cutoff Current		10			μA	$V_{CE} = 75 \text{ V}, V_{BE} = 1.5 \text{ V}$ $V_{CE} = 75 \text{ V}, V_{EB} = 1.5 \text{ V},$ $T_C = 150^\circ \text{ C}$
			1.0		10	mA	
h_{FE}	DC Current Gain (Note 2)	30		30			$I_C = 500 \text{ mA}, V_{CE} = 2.0 \text{ V}$ $I_C = 2.0 \text{ A}, V_{CE} = 2.0 \text{ V}$ $I_C = 5.0 \text{ A}, V_{CE} = 2.0 \text{ V}$
		30	120	30	120		
		20		20			

NOTES:

1. These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
2. Pulse conditions: length = 300 μs ; 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		
$V_{CE(sat)}$	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 1.2		0.7 1.2	V V	$I_C = 2.0 \text{ A}, I_B = 200 \text{ mA}$ $I_C = 5.0 \text{ A}, I_B = 500 \text{ mA}$
$V_{BE(sat)}$	Base Saturation Voltage (Pulsed) (Note 2)		1.2 1.8		1.2 1.8	V V	$I_C = 2.0 \text{ A}, I_B = 200 \text{ mA}$ $I_C = 5.0 \text{ A}, I_B = 500 \text{ mA}$
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	μs	$I_C = 2.0 \text{ A}, V_{CC} = 40 \text{ V}, I_{B1} = I_{B2} = 200 \text{ mA}$
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

84D 27611 D

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	μA μA	$V_{EB} = -4.0 V, I_C = 0$ $V_{EB} = -6.0 V, I_C = 0$
I_{CBO}	Collector Cutoff Current		50		50	μA μA	$V_{CB} = -175 V, I_E = 0$ $V_{CB} = -280 V, I_E = 0$
I_{CEV}	Collector Cutoff Current		50		50	μA μA	$V_{CE} = -200 V, V_{BE} = 1.5 V$ $V_{CE} = -300 V, V_{BE} = 1.5 V$
I_{CEO}	Collector Cutoff Current		50		50	μA μA	$V_{CE} = -150 V, I_B = 0$ $V_{CE} = -250 V, I_B = 0$
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 μs ; duty cycle = 2%.
6. For product family characteristic curves, refer to Curve Set T443.

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	$I_C = 50 \text{ mA}$, $I_B = 0$
$V_{CE(sus)}$	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			$I_C = 5.0 \text{ mA}$, $V_{CE} = -10 \text{ V}$, $f = 1.0 \text{ kHz}$
$R_e(h_{ie})$	Real Part of Common Emitter Small Signal Short-Circuit Impedance		300		300	Ω	$I_C = 5.0 \text{ mA}$, $V_{CE} = -10 \text{ V}$, $f = 1.0 \text{ MHz}$
$I_{S/b}$	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 T-29-23
2N5551/MPS5551
FTSO5551
 NPN Small Signal High Voltage
 General Purpose Amplifiers

- V_{CE0} ... 160 V (Min) (MPS/FTSO5551)
- β_{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		
V_{CE0} Collector to Emitter Voltage	5550	5551
(Note 4)	140 V	160 V
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_{CE0}	Collector to Emitter Breakdown Voltage	140		160		V	$I_C = 1.0 \text{ mA}, I_E = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	160		180		V	$I_C = 100 \mu\text{A}, I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	6.0		6.0		V	$I_E = 10 \mu\text{A}, I_C = 0$
I_{EBO}	Emitter Cutoff Current		50		50	nA	$V_{EB} = 4.0 \text{ V}, I_C = 0$
I_{CBO}	Collector Cutoff Current		100		50	nA	$V_{CB} = 100 \text{ V}, I_E = 0$
			100		50	μA	$V_{CB} = 120 \text{ V}, I_E = 0$
					50	μA	$V_{CB} = 100 \text{ V}, I_E = 0, T_A = 100^\circ\text{C}$
					50	μA	$V_{CB} = 120 \text{ V}, I_E = 0, T_A = 100^\circ\text{C}$

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 150° C and (TO-92) junction-to-case thermal resistance of 125° C/W (derating factor of 80 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).
 4. Rating refers to a high current point where collector to emitter voltage is lowest.
 5. Pulse conditions: length = 300 μs ; duty cycle = 1%.
 6. 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

T-33-07
T-33-17

1.0 Amp 10 Watt NPN-PNP
Complementary Power

- 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	μA	$V_{EB} = -4.0$ V, $I_C = 0$
I_{CBO}	Collector Cutoff Current		1.0		1.0	μA	$V_{CB} = -100$ 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 μs ; 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	μA μA	$V_{CB} = -70 V, I_B = 0$ $V_{CB} = -80 V, I_B = 0$
I_{CEX}	Collector Reverse Current (Note 3)		1.0		1.0	mA	$V_{CE} = -100 V, V_{BE} = -1.5 V,$ $T_C = 150^\circ C$
			1.0		1.0	mA	$V_{CE} = -120 V, V_{BE} = -1.5 V,$ $T_C = 150^\circ C$
			1.0		1.0	μA μA	$V_{CE} = -100 V, V_{BE} = -1.5 V$ $V_{CE} = -120 V, V_{BE} = -1.5 V$
h_{FE}	DC Current Gain (Note 5)	5.0		5.0			$I_C = 1.0 A, V_{CE} = -2.0 V$ $I_C = 250 mA, V_{CE} = -2.0 V$
		40	150	40	150		
$V_{CE(sus)}$	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	$I_C = 1.0 mA, I_B = 200 mA$ $I_C = 500 mA, I_B = 50 mA$ $I_C = 250 mA, I_B = 25 mA$
			-1.0		-1.0	V	
			-0.6		-0.6	V	
$V_{BE(ON)}$	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			$I_C = 200 mA, V_{CE} = -1.5 V,$ $f = 1.0 kHz$

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SYMBOL	CHARACTERISTIC	5681		5682		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
I_{EBO}	Emitter Cutoff Current		1.0		1.0	μA	$V_{EB} = 4.0 V, I_C = 0$
I_{CBO}	Collector Cutoff Current		1.0		1.0	μA μA	$V_{CB} = 100 V, I_E = 0$ $V_{CB} = 120 V, I_E = 0$
I_{CEO}	Collector Cutoff Current		10		10	μA μA	$V_{CB} = 70 V, I_B = 0$ $V_{CB} = 80 V, I_B = 0$
I_{CEX}	Collector Cutoff Current		1.0			mA	$V_{CE} = 100 V, V_{BE} = 1.5 V,$ $T_C = 150^\circ C$
					1.0	mA	$V_{CE} = 120 V, V_{BE} = -1.5 V,$ $T_C = 150^\circ C$
			1.0		1.0	μA μA	$V_{CE} = -100 V, V_{BE} = 1.5 V$ $V_{CE} = -120 V, V_{BE} = 1.5 V$
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			$I_C = 200 mA, V_{CE} = 1.5 V,$ $f = 1.0 kHz$