

**FAIRCHILD**

A Schlumberger Company

**2N4123/FTSO4123**  
**2N4124/FTSO4124**

T-35-11

**NPN Small Signal General Purpose Amplifiers & Switches**

- $V_{CEO}$  ... 25 V (Min) (2N/FTSO4124)
- $h_{FE}$  ... 120-360 @ 2.0 mA (2N/FTSO4124)
- NF ... 5.0 dB (Max) Wide Band (2N/FTSO4124)
- Complements ... 2N4125, 2N4126

**PACKAGE**

2N4123	TO-92
2N4124	TO-92
FTSO4123	TO-236AA/AB
FTSO4124	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	<b>2N</b>	<b>FTSO</b>
25° C Ambient Temperature	0.625 W	0.350 W*
70° C Ambient Temperature	0.400 W	
25° C Case Temperature	1.0 W	

**Voltages & Currents**

	<b>4123</b>	<b>4124</b>
$V_{CEO}$ Collector to Emitter Voltage (Note 4)	30 V	25 V
$V_{CBO}$ Collector to Base Voltage	40 V	30 V
$V_{EBO}$ Emitter to Base Voltage	5.0 V	5.0 V
$I_C$ Collector Current	200 mA	200 mA

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

SYMBOL	CHARACTERISTIC	4123		4124		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$BV_{CEO}$	Collector to Emitter Breakdown Voltage (Note 5)	30		25		V	$I_C = 1.0$ mA, $I_B = 0$
$BV_{CBO}$	Collector to Base Breakdown Voltage	40		30		V	$I_C = 10$ $\mu$ A, $I_E = 0$
$BV_{EBO}$	Emitter to Base Breakdown Voltage	5.0		5.0		V	$I_E = 10$ $\mu$ A, $I_C = 0$
$I_{EBO}$	Emitter Cutoff Current		50		50	nA	$V_{EB} = 3.0$ V, $I_C = 0$
$I_{CBO}$	Collector Cutoff Current		50		50	nA	$V_{CB} = 20$ V, $I_E = 0$
$h_{FE}$	DC Pulse Current Gain (Note 5)	50 25	150	120 60	360		$I_C = 2.0$ mA, $V_{CE} = 1.0$ V $I_C = 50$ mA, $V_{CE} = 1.0$ V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.3		0.3	V	$I_C = 50$ mA, $I_B = 5.0$ mA

**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 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).
  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 T144.
- \* Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.



**2N4125/FTSO4125**  
**2N4126/FTSO4126**

PNP Small Signal General Purpose Amplifiers & Switches

T-35-11

- $V_{CE0}$  ... -25 V (Min) (2N/FTSO4126)
- $h_{FE}$  ... 120-360 @ 2.0 mA (2N/FTSO4126)
- NF ... 4.0 dB (Max) Wide Band (2N/FTSO4126)
- Complements ... 2N4123, 2N4124

<b>PACKAGE</b>	
2N4125	TO-92
2N4126	TO-92
FTSO4125	TO-236AA/AB
FTSO4126	TO-236AA/AB

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

<b>Temperatures</b>	
Storage Temperature	-55° C to 150° C
Operating Junction Temperature	150° C

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

Total Dissipation at	<b>2N</b>	<b>FTSO</b>
25° C Ambient Temperature	0.625 W	0.350 W*
70° C Ambient Temperature	0.400 W	
25° C Case Temperature	1.0 W	

<b>Voltages &amp; Currents</b>	<b>4125</b>	<b>4126</b>
$V_{CE0}$ Collector to Emitter Voltage (Note 4)	-30 V	-25 V
$V_{CBO}$ Collector to Base Voltage	-30 V	-25 V
$V_{EBO}$ Emitter to Base Voltage	-4.0 V	-4.0 V
$I_C$ Collector Current	200 mA	200 mA

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

SYMBOL	CHARACTERISTIC	4125		4126		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$BV_{CE0}$	Collector to Emitter Breakdown Voltage (Note 5)	-30		-25		V	$I_C = 1.0 \text{ mA}, I_B = 0$
$BV_{CBO}$	Collector to Base Breakdown Voltage	-30		-25		V	$I_C = 10 \mu\text{A}, I_E = 0$
$BV_{EBO}$	Emitter to Base Breakdown Voltage	-4.0		-4.0		V	$I_E = 10 \mu\text{A}, I_C = 0$
$I_{EBO}$	Emitter Cutoff Current		50		50	nA	$V_{EB} = -3.0 \text{ V}, I_C = 0$
$I_{CBO}$	Collector Cutoff Current		50		50	nA	$V_{CB} = -20 \text{ V}, I_E = 0$
$h_{FE}$	DC Pulse Current Gain (Note 5)		150	120	360		$I_C = 2.0 \text{ mA}, V_{CE} = -1.0 \text{ V}$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		-0.4		-0.4	V	$I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$
$V_{BE(sat)}$	Base to Emitter Saturation Voltage (Note 5)		-0.95		-0.95	V	$I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$

**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 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).
  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 T215.
- \* Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

**2N4125/FTSO4125**  
**2N4126/FTSO4126**

T-35-11

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

SYMBOL	CHARACTERISTIC	4125		4126		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$C_{cb}$	Collector to Base Capacitance		4.5		4.5	pF	$V_{CB} = -5.0 \text{ V}$ , $I_E = 0$ , $f = 100 \text{ kHz}$
$C_{ib}$	Input Capacitance		10		10	pF	$V_{EB} = -0.5 \text{ V}$ , $I_C = 0$ , $f = 100 \text{ kHz}$
$ h_{fe} $	Magnitude of Small Signal Current Gain	2.0		2.0			$I_C = 10 \text{ mA}$ , $V_{CE} = -20 \text{ V}$ , $f = 100 \text{ MHz}$
$h_{fe}$	Small Signal Current Gain	50	200	120	480		$I_C = 2.0 \text{ mA}$ , $V_{CE} = -1.0 \text{ V}$ , $f = 1.0 \text{ kHz}$
NF	Noise Figure		5.0		4.0	dB	$I_C = 100 \mu\text{A}$ , $V_{CE} = -5.0 \text{ V}$ , $f = 10 \text{ Hz to } 15.7 \text{ kHz}$ , $R_E = 1.0 \text{ k}\Omega$

3469674 FAIRCHILD SEMICONDUCTOR

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**FAIRCHILD**

A Schlumberger Company

**2N4208/FTSO4208** T-37-07  
**2N4209/FTSO4209**

PNP Small Signal Ultra High Speed Saturated Switches

- $V_{CE0}$  ... 15 V (Min) (2N/FTSO4209)
- $V_{CE}$  ... 0.18 V (Max) @  $I_C = 10$  mA (2N/FTSO4209)
- $\tau_B$  ... 20 ns (Max)
- $t_{on}$  ... 15 ns (Max),  $t_{off}$  ... 20 ns (Max)
- $C_{ob}$  ... 3.0 pF (Max)
- $C_{ib}$  ... 3.5 pF (Max)
- $f_T$  ... 850 MHz (Min) (2N/FTSO4209)
- Complement ... 2N2369A

PACKAGE	
2N4208	TO-18
2N4209	TO-18
FTSO4208	TO-236AA/AB
FTSO4209	TO-236AA/AB

**ABSOLUTE MAXIMUM RATINGS** (Note 1)

Temperatures	2N	FTSO
Storage Temperature	-65° C to 200° C	-55° C to 150° C
Operating Junction Temperature	200° C	150° C

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

Total Dissipation at	2N	FTSO
25° C Ambient Temperature	0.3 W	0.350 W*
25° C Case Temperature	0.7 W	

**Voltages & Currents**

	4208	4209
$V_{CE0}$ Collector to Emitter Voltage (Note 4)	-12 V	-15 V
$V_{CBO}$ Collector to Base Voltage	-12 V	-15 V
$V_{EBO}$ Emitter to Base Voltage	-4.5 V	-4.5 V
$I_C$ Collector Current	50 mA	50 mA

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

SYMBOL	CHARACTERISTIC	4208		4209		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$BV_{CES}$	Collector to Emitter Breakdown Voltage	-12		-15		V	$I_C = 100 \mu A, V_{BE} = 0$
$BV_{CBO}$	Collector to Base Breakdown Voltage	-12		-15		V	$I_C = 100 \mu A, I_E = 0$
$BV_{EBO}$	Emitter to Base Breakdown Voltage	-4.5		-4.5		V	$I_E = 100 \mu A, I_C = 0$

**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 (TO-92) junction-to-case thermal resistance of 250° C/W (derating factor of 4.0 mW/° C); junction-to-ambient thermal resistance of 583° C/W (derating factor of 1.72 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  $\mu s$ ; duty cycle = 1%.
  6. For product family characteristic curves, refer to Curve Set T292.
- \* Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

2N4208/FTSO4208

2N4209/FTSO4209

T-37-07

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

SYMBOL	CHARACTERISTIC	4208		4209		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{CES}$	Collector Reverse Current (Note 5)		10		10	nA	$V_{CE} = -6.0 \text{ V}, V_{BE} = 0$ $V_{CE} = -8.0 \text{ V}, V_{BE} = 0$ $V_{CE} = -6.0 \text{ V}, V_{BE} = 0,$ $T_A = 125^\circ \text{ C}$ $V_{CE} = -8.0 \text{ V}, V_{BE} = 0,$ $T_A = 125^\circ \text{ C}$
			5.0		5.0	$\mu\text{A}$	
						$\mu\text{A}$	
$h_{FE}$	DC Current Gain	15		35			$I_C = 1.0 \text{ mA}, V_{CE} = -0.5 \text{ V}$
$h_{FE}$	DC Pulse Current Gain (Note 5)	30	120	50	120		$I_C = 10 \text{ mA}, V_{CE} = -0.3 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = -1.0 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = -0.3 \text{ V},$ $T_A = -55^\circ \text{ C}$
		30		40			
		12		20			
$V_{CE(sust)}$	Collector to Emitter Sustaining Voltage (Note 5)	-12		-15		V	$I_C = 3.0 \text{ mA}, I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage		-0.13		-0.15	V	$I_C = 1.0 \text{ mA}, I_B = 0.1 \text{ mA}$
$V_{CE(sat)}$	Pulsed Collector to Emitter Saturation Voltage (Note 5)		-0.15		-0.18	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$
			-0.5		-0.6	V	
$V_{BE(sat)}$	Base to Emitter Saturation Voltage		-0.8		-0.8	V	$I_C = 1.0 \text{ mA}, I_B = 0.1 \text{ mA}$
$V_{BE(sat)}$	Pulsed Base to Emitter Saturation Voltage (Note 5)	-0.8	-0.95	-0.8	-0.95	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$
			-1.5		-1.5	V	
$C_{ob}$	Output Capacitance		3.0		3.0	pF	$V_{CB} = -5.0 \text{ V}, I_E = 0$
$C_{ib}$	Input Capacitance		3.5		3.5	pF	$V_{BE} = -0.5 \text{ V}, I_C = 0$
$f_{tfe}$	High Frequency Current Gain		7.0		8.5		$I_C = 10 \text{ mA}, V_{CE} = -10 \text{ V},$ $f = 100 \text{ MHz}$
$\tau_s$	Charge Storage Time Constant (test circuit no. 234)		20		20	ns	$I_C = 10 \text{ mA}, I_{B1} = I_{B2} \approx 10 \text{ mA},$ $V_{CC} = -3.0 \text{ V}$
$t_{on}$	Turn On Time (test circuit no. 348)		15		15	ns	$I_C = 10 \text{ mA}, I_{B1} \approx 1.0 \text{ mA},$ $V_{CC} = -1.5 \text{ V}$
$t_{off}$	Turn Off Time (test circuit no. 348)		20		20	ns	$I_C = 10 \text{ mA}, I_{B1} = I_{B2} \approx 1.0 \text{ mA},$ $V_{CC} = -1.5 \text{ V}$



**2N4234/2N4235** T-33-05  
**2N4236**  
 6 Watt PNP Power

- $V_{CE(sat)}$  ... 0.6 V @  $I_C = 1.0$  A
- Complements ... 2N4237 through 2N4239

PACKAGE	
2N4234	TO-39
2N4235	TO-39
2N4236	TO-39

**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	4234	4235	4236
$V_{CEO}$ Collector to Emitter Voltage	-40 V	-60 V	-80 V
$V_{CBO}$ Collector to Base Voltage	-40 V	-60 V	-80 V
$V_{EBO}$ Emitter to Base Voltage	-7.0 V	-7.0 V	-7.0 V
$I_C$ Collector Current (Continuous)	1.0 A	1.0 A	1.0 A
$I_B$ Base Current (Continuous)	0.2 A	0.2 A	0.2 A

**ELECTRICAL CHARACTERISTICS** (25° C Ambient Temperature unless otherwise noted) (Note 3)

SYMBOL	CHARACTERISTIC	MIN	MAX	UNITS	TEST CONDITIONS
$I_{EBO}$	Emitter Cutoff Current		500	$\mu A$	$V_{EB} = -7.0$ V, $I_C = 0$
$I_{CBO}$	Collector Cutoff Current (2N4234) (2N4235) (2N4236)		100	$\mu A$	$V_{CB} = -40$ V, $I_E = 0$
			100	$\mu A$	$V_{CB} = -60$ V, $I_E = 0$
			100	$\mu A$	$V_{CB} = -80$ V, $I_E = 0$
$I_{CEO}$	Collector Cutoff Current (2N4235) (2N4236)		1.0	mA	$V_{CE} = -30$ V, $I_B = 0$
			1.0	mA	$V_{CE} = -40$ V, $I_B = 0$
			1.0	mA	$V_{CE} = -60$ V, $I_B = 0$
$I_{CEX}$	Collector Cutoff Current (2N4234) (2N4234) (2N4235) (2N4235) (2N4236) (2N4237)		100	$\mu A$	$V_{CE} = -40$ V, $V_{EB} = -1.5$ V
			1.0	mA	$V_{CE} = -30$ V, $V_{EB} = -1.5$ V, $T_C = 150^\circ C$
			100	$\mu A$	$V_{CE} = -60$ V, $V_{EB} = -1.5$ V
			1.0	mA	$V_{CE} = -40$ V, $V_{EB} = -1.5$ V, $T_C = 150^\circ C$
			100	$\mu A$	$V_{CE} = -80$ V, $V_{EB} = -1.5$ V
			1.0	mA	$V_{CE} = -60$ V, $V_{EB} = -1.5$ V, $T_C = 150^\circ C$

**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 200° C and junction-to-case thermal resistance of 33.3° C/W (derating factor of 34 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 T414.

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2N4234/2N4235  
2N4236

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**ELECTRICAL CHARACTERISTICS** (25°C Ambient Temperature unless otherwise noted) (Note 3)

SYMBOL	CHARACTERISTIC	MIN	MAX	UNITS	TEST CONDITIONS
$h_{FE}$	DC Pulse Current Gain (Note 5)	40 30 20 10	150		$I_C = 100 \text{ mA}, V_{CE} = -1.0 \text{ V}$ $I_C = 250 \text{ mA}, V_{CE} = -1.0 \text{ V}$ $I_C = 500 \text{ mA}, V_{CE} = -1.0 \text{ V}$ $I_C = 1.0 \text{ A}, V_{CE} = -1.0 \text{ V}$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		-0.6	V	$I_C = 1.0 \text{ A}, I_B = 125 \text{ mA}$
$V_{BE(ON)}$	Base to Emitter "On" Voltage		-1.0	V	$I_C = 250 \text{ mA}, V_{CE} = -1.0 \text{ V}$
$V_{BE(sat)}$	Base to Emitter Saturation Voltage (Note 5)		-1.5	V	$I_C = 1.0 \text{ A}, I_B = 100 \text{ mA}$
$C_{ob}$	Output Capacitance		100	pF	$V_{CB} = -10 \text{ V}, I_E = 0, f = 100 \text{ kHz}$
$ h_{fe} $	Magnitude of Common Emitter Small Signal Current Gain	3.0			$I_C = 100 \text{ mA}, V_{CE} = -10 \text{ V}, f = 1.0 \text{ MHz}$
$h_{fe}$	Small Signal Current Gain	25			$I_C = 50 \text{ mA}, V_{CE} = -10 \text{ V}, f = 1.0 \text{ kHz}$

**FAIRCHILD**

A Schlumberger Company

**2N4237/2N4238****2N4239**

5 Watt NPN Power

T-33-05

- $V_{CE(sat)}$  ... 0.6 V @  $I_C = 1.0$  A
- Complements ... 2N4234 through 2N4236

**PACKAGE**

2N4237	TO-39
2N4238	TO-39
2N4239	TO-39

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

Storage Temperature	-55°C to 200°C
Operating Junction Temperature	200°C

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

Total Dissipation at	
25°C Ambient Temperature	0.8 W
25°C Case Temperature	5.0 W

**Voltages & Currents**

	4237	4238	4239
$V_{CE0}$ Collector to Emitter Voltage (Note 4)	40 V	60 V	80 V
$V_{CB0}$ Collector to Base Voltage	50 V	80 V	100 V
$V_{EB0}$ Emitter to Base Voltage	6.0 V	6.0 V	6.0 V
$I_C$ Collector Current	1.0 A	1.0 A	1.0 A
$I_B$ Base Current (Note 2)	0.5 A	0.5 A	0.5 A

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

SYMBOL	CHARACTERISTIC	MIN	MAX	UNITS	TEST CONDITIONS
$I_{EBO}$	Emitter Cutoff Current		0.5	mA	$V_{EB} = 6.0$ V, $I_C = 0$
$I_{CBO}$	Collector Cutoff Current (4237) (4238) (4239)		0.1	mA	$V_{CB} = 50$ V, $I_E = 0$
			0.1	mA	$V_{CB} = 80$ V, $I_E = 0$
			0.1	mA	$V_{CB} = 100$ V, $I_E = 0$
$I_{CEO}$	Collector Cutoff Current (4237) (4238) (4239)		1.0	mA	$V_{CE} = 30$ V, $I_B = 0$
			1.0	mA	$V_{CE} = 40$ V, $I_B = 0$
			1.0	mA	$V_{CE} = 60$ V, $I_B = 0$
$I_{CEX}$	Collector Cutoff Current (4237) (4238) (4238) (4239) (4239) (4239)		0.1	mA	$V_{CE} = 50$ V, $V_{EB} = 1.5$ V
			1.0	mA	$V_{CE} = 30$ V, $V_{EB} = 1.5$ V, $T_C = 150^\circ$ C
			0.1	mA	$V_{CE} = 80$ V, $V_{EB} = 1.5$ V
			0.1	mA	$V_{CE} = 50$ V, $V_{EB} = 1.5$ V, $T_C = 150^\circ$ C
			0.1	mA	$V_{CE} = 100$ V, $V_{EB} = 1.5$ V
			0.1	mA	$V_{CE} = 70$ V, $V_{EB} = 1.5$ V, $T_C = 150^\circ$ C
$h_{FE}$	DC Pulse Current Gain (Note 5) (4237) (4238) (4239)	30	150		$I_C = 250$ mA, $V_{CE} = 1.0$ V
		30			$I_C = 500$ mA, $V_{CE} = 4.0$ V
		15			$I_C = 1.0$ A, $V_{CE} = 1.0$ V

**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 200°C and junction-to-case thermal resistance of 35°C/W (derating factor of 28.5 mW/°C), junction-to-ambient thermal resistance of 218 8°C/W (derating factor of 4.5 mW/°C).
- Rating refers to a high current point where collector to emitter voltage is lowest.
- Pulse conditions: length = 300  $\mu$ s; duty cycle = 2%.
- For product family characteristic curves, refer to Curve Set T315.



2N4237/2N4238  
2N4239

T.33-05

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

SYMBOL	CHARACTERISTIC	MIN	MAX	UNITS	TEST CONDITIONS
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Pulsed) (Note 4)		0.6	V	$I_C = 1.0 \text{ A}, I_B = 100 \text{ mA}$
			0.3	V	$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$
$V_{BE(on)}$	Base to Emitter "On" Voltage (Pulsed) (Note 4)		1.0	V	$I_C = 250 \text{ mA}, V_{CE} = 1.0 \text{ V}$
$V_{BE(sat)}$	Base to Emitter Saturation Voltage (Pulsed) (Note 4)		1.5	V	$I_C = 1.0 \text{ A}, I_B = 100 \text{ mA}$
$C_{ob}$	Output Capacitance		100	pF	$V_{CB} = 10 \text{ V}, I_C = 0, f = 0.1 \text{ MHz}$
$ h_{fe} $	Magnitude of Common Emitter Small Signal Current Gain	1.0			$I_C = 100 \text{ mA}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ kHz}$
$h_{fe}$	Small Signal Current Gain	30			$I_C = 100 \text{ mA}, V_{CE} = 10 \text{ V}, f = 1.0 \text{ kHz}$