**FAIRCHILD**
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# PN/MPS/FTSO3638 T-37-15
# PN/MPS/FTSO3638A

## PNP Small Signal General Purpose Amplifiers & Switches

- **$V_{CEO}$ ... -25 V (Min)**
- **$h_{FE}$ ... 30 (Min) (PN/MPS/FTSO3638), 100 (Min) (PN/MPS/FTSO3638A) @ 50 mA**
- **$t_{on}$ ... 75 ns (Max) @ 300 mA; $t_{off}$ ... 170 ns (Max) @ 300 mA**
- **Complements ... PN3641, PN3643**

**PACKAGE**

| | |
|---|---|
| PN3638 | TO-92 |
| PN3638A | TO-92 |
| MPS3638 | TO-92 |
| MPS3638A | TO-92 |
| FTSO3638 | TO-236AA/AB |
| FTSO3638A | 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 | PN/MPS | FTSO |
|---|---|---|
| 25° C Ambient Temperature | 0.625 W | 0.350 W* |
| 25° C Case Temperature | 1.0 W | |

**Voltages & Currents**

| | | |
|---|---|---|
| $V_{CEO}$ | Collector to Emitter Voltage (Note 4) | −25 V |
| $V_{CBO}$ | Collector to Base Voltage | −25 V |
| $V_{CES}$ | Collector to Emitter Voltage | −25 V |
| $V_{EBO}$ | Emitter to Base Voltage | −4.0 V |
| $I_C$ | Collector Current (Note 2) | 500 mA |

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

| SYMBOL | CHARACTERISTIC | 3638 MIN | 3638 MAX | 3638A MIN | 3638A MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|---|
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | −25 | | −25 | | V | $I_C = 100\ \mu A$, $V_{BE} = 0$ |
| $BV_{CBO}$ | Collector to Base Breakdown Voltage | −25 | | −25 | | V | $I_C = 100\ \mu A$, $V_{BE} = 0$ |
| $BV_{EBO}$ | Emitter to Base Breakdown Voltage | −4.0 | | −4.0 | | V | $I_E = 100\ \mu A$, $I_C = 0$ |
| $I_{CES}$ | Collector Reverse Current | | 35<br>2.0 | | 35<br>2.0 | nA<br>µA | $V_{CE} = -15$ V, $V_{BE} = 0$<br>$V_{CE} = -15$ V, $V_{BE} = 0$, $T_A = 65°$ 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 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 µs; duty cycle = 1%.
6. For product family characteristic curves, refer to Curve Set T212.

* Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

# PN/MPS/FTSO3638
# PN/MPS/FTSO3638A

T-37-15

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

| SYMBOL | CHARACTERISTIC | 3638<br>MIN | 3638<br>MAX | 3638A<br>MIN | 3638A<br>MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|---|
| $h_{FE}$ | DC Pulse Current Gain (Note 5) | | | | | | |
| | (MPS3638) | 20 | | | | | $I_C = 10$ mA, $V_{CE} = -10$ V |
| | | | | 100 | | | $I_C = 10$ mA, $V_{CE} = -10$ V |
| | | | | 80 | | | $I_C = 1.0$ mA, $V_{CE} = -10$ V |
| | | 30 | | 100 | | | $I_C = 50$ mA, $V_{CE} = -1.0$ V |
| | | 20 | | 20 | | | $I_C = 300$ mA, $V_{CE} = -2.0$ V |
| $V_{CEO(sus)}$ | Collector to Emitter Sustaining Voltage (Notes 4 & 5) | −25 | | −25 | | V | $I_C = 10$ mA, $I_B = 0$ |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Pulsed) (Note 5) | | −0.25 | | −0.25 | V | $I_C = 50$ mA, $I_B = 2.5$ mA1 |
| | | | −1.0 | | −1.0 | V | $I_C = 300$ mA, $I_B = 30$ mA |
| $V_{BE(sat)}$ | Base to Emitter Saturation Voltage (Note 5) | | −1.1 | | −1.1 | V | $I_C = 50$ mA, $I_B = 2.5$ mA |
| | | −0.8 | −2.0 | −0.8 | −2.0 | V | $I_C = 300$ mA, $I_B = 30$ mA |
| $C_{ob}$ | Common Base Open Circuit, Output Capacitance | | 20 | | 10 | pF | $V_{CB} = -10$ V, $I_E = 0$, f = 140 kHz |
| $C_{ib}$ | Common Base Open Circuit, Input Capacitance (PN3638A) | | | | 35 | pF | $V_{EB} = -0.5$ V, $I_C = 0$, f = 140 kHz |
| | (MPS3638A) | | 65 | | 25 | pF | $V_{EB} = -0.5$ V, $I_C = 0$, f = 140 kHz |
| $h_{fe}$ | Magnitude of Small Signal Current Gain | 1.0 | | 1.5 | | | $I_C = 50$ mA, $V_{CE} = -3.0$ V,<br>f = 100 MHz |
| $h_{fe}$ | Small Signal Current Gain | | | | | | |
| | (PN3638) | 25 | | | | | $I_C = 10$ mA, $V_{CE} = -10$ V,<br>f = 1.0 kHz |
| | (MPS3638) | 25 | 180 | | | | $I_C = 10$ mA, $V_{CE} = -10$ V,<br>f = 1.0 kHz |
| | | | | 100 | | | $I_C = 10$ mA, $V_{CE} = -10$ V,<br>f = 1.0 kHz |
| $h_{ie}$ | Input Resistance | | 2000 | | 2000 | Ω | $I_C = 10$ mA, $V_{CE} = 10$ V, |
| | (MPS3638) | | 1500 | | | Ω | f = 1.0 kHz |
| $h_{oe}$ | Output Conductance | | 1200 | | 1200 | μmhos | $I_C = 10$ mA, $V_{CE} = -10$ V,<br>f = 1.0 kHz |
| $h_{re}$ | Voltage Feedback Ratio | | 2600 | | 1500 | $\times 10^{-6}$ | $I_C = 10$ mA, $V_{CE} = -10$ V,<br>f = 1.0 kHz |
| $t_{on}$ | Turn On Time (test circuit no. 536) | | 75 | | 75 | ns | $I_C \approx 300$ mA, $I_{B1} \approx 30$ mA,<br>$V_{CC} = 10$ V |
| $t_{off}$ | Turn Off Time (test circuit no. 536) | | 170 | | 170 | ns | $I_C \approx 300$ mA, $I_{B1} \approx I_{B2} \approx 30$ mA,<br>$V_{CC} = 10$ V |

# PN/MPS/FTSO3639
# PN/MPS/FTSO3640

## PNP High Speed Saturated Logic Switches

T-37-15

- $V_{CEO}$ ... **12 V (Min) (PN/MPS3640)**
- $t_{on}$ ... **25 ns (Max) @ 50 mA, 60 ns (Max) @ 10 mA;**
  $t_{off}$ ... **35 ns (Max) @ 50 mA, 75 ns (Max) @ 10 mA**
- **Complements ... PN4274, 2N5769**

| **PACKAGE** | |
|---|---|
| PN3639 | TO-92 |
| PN3640 | TO-92 |
| MPS3639 | TO-92 |
| MPS3640 | TO-92 |
| FTSO3639 | TO-236AA/AB |
| FTSO3640 | 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 | **PN/MPS** | **FTSO** |
| 25° C Ambient Temperature | 0.625 W | 0.350 W* |
| 25° C Case Temperature | 1.0 W | |

| **Voltages & Currents** | | **3639** | **3640** |
|---|---|---|---|
| $V_{CEO}$ | Collector to Emitter Voltage (Note 4) | –6 V | –12 V |
| $V_{CBO}$ | Collector to Base Voltage | –6 V | –12 V |
| $V_{EBO}$ | Emitter to Base Voltage | –4.0 V | –4.0 V |
| $I_C$ | Collector Current | 80 mA | 80 mA |

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

| SYMBOL | CHARACTERISTIC | PN3639 MIN | PN3639 MAX | PN3640 MIN | PN3640 MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|---|
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | –6.0 | | –12.0 | | V | $I_C = 100\ \mu A$, $V_{BE} = 0$ |
| $BV_{CBO}$ | Collector to Base Breakdown Voltage | –6.0 | | –12.0 | | V | $I_C = 100\ \mu A$, $I_E = 0$ |
| $BV_{EBO}$ | Emitter to Base Breakdown Voltage | –4.0 | | –4.0 | | V | $I_E = 100\ \mu A$, $I_C = 0$ |
| $I_{CES}$ | Collector Reverse Current | | 50 | | | nA | $V_{CE} = -3.0$ V, $V_{BE} = 0$ |
| | | | | | 50 | nA | $V_{CE} = -6.0$ V, $V_{BE} = 0$ |
| | | | 1.0 | | | μA | $V_{CE} = -3.0$ V, $V_{BE} = 0$, $T_A = 65°$ C |
| | | | | | 1.0 | μA | $V_{CE} = -6.0$ V, $V_{BE} = 0$, $T_A = 65°$ C |
| $h_{FE}$ | DC Pulse Current Gain (Note 5) | 30 | 120 | 30 | 120 | | $I_C = 10$ mA, $V_{CE} = -0.3$ V |
| | | 20 | | 20 | | | $I_C = 50$ mA, $V_{CE} = -1.0$ 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 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 μs; 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.

## PN/MPS/FTSO3639
## PN/MPS/FTSO3640

T-37-15

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

| SYMBOL | CHARACTERISTIC | PN3639 MIN | PN3639 MAX | PN3640 MIN | PN3640 MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|---|
| $V_{CEO(sus)}$ | Collector to Emitter Sustaining Voltage (Note 5) | −6.0 | | −12 | | V | $I_C = 10$ mA, $I_B = 0$ |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Note 4) | | −0.16<br>−0.5<br>−0.25<br>−0.23 | | −0.2<br>−0.6<br>−0.3<br>−0.25 | V<br>V<br>V<br>V | $I_C = 10$ mA, $I_B = 1.0$ mA<br>$I_C = 50$ mA, $I_B = 5.0$ mA<br>$I_C = 10$ mA, $I_B = 0.5$ mA<br>$I_C = 10$ mA, $I_B = 1.0$ mA, $T_A = 65°$ C |
| $V_{BE(sat)}$ | Base to Emitter Saturation Voltage (Note 5) | −0.75<br>−0.8 | −0.95<br>−1.0<br>1.5 | −0.75<br>−0.8 | −0.95<br>−1.0<br>1.5 | V<br>V<br>V | $I_C = 10$ mA, $I_B = 0.5$ mA<br>$I_C = 10$ mA, $I_B = 1.0$ mA<br>$I_C = 50$ mA, $I_B = 5.0$ mA |
| $C_{ob}$ | Output Capacitance | | 3.5<br>5.5 | | 3.5<br>5.5 | pF<br>pF | $V_{CB} = -5.0$ V, $I_E = 0$, f = 140 kHz<br>$V_{CB} = 0$, $I_E = 0$, f = 140 kHz |
| $C_{ib}$ | Input Capacitance | | 3.5 | | 3.5 | pF | $V_{EB} = -0.5$ V, $I_C = 0$, f = 140 kHz |
| $h_{fe}$ | High Frequency Current Gain | 3.0<br>5.0 | | 3.0<br>5.0 | | | $I_C = 10$ mA, $V_{CB} = 0$, f = 100 MHz<br>$I_C = 10$ mA, $V_{CE} = -5.0$ V, f = 100 MHz |
| $\tau_s$ | Storage Time (test circuit no. 234) | | 30 | | 50 | ns | $I_C \simeq 10$ mA, $I_{B1} \simeq I_{B2} \simeq 10$ mA, $V_{CC} = 3.0$ V |
| $t_{on}$ | Turn On Time<br>(test circuit no. 235)<br>(test circuit no. 219) | | 25<br>60 | | 25<br>60 | ns<br>ns | $I_C \simeq 50$ mA, $I_{B1} \simeq 5.0$ mA, $V_{CC} = 6.0$ V<br>$I_C \simeq 10$ mA, $I_{B1} \simeq 0.5$ mA, $V_{CC} = -1.5$ V |
| $t_{off}$ | Turn Off Time<br>(test circuit no. 235)<br>(test circuit no. 219) | | 25<br>60 | | 35<br>75 | ns<br>ns | $I_C \simeq 50$ mA, $I_{B1} \simeq I_{B2} \simeq 5.0$ mA, $V_{CC} = 6.0$ V<br>$I_C \simeq 10$ mA, $I_{B1} \simeq I_{B2} \simeq 0.5$ mA, $V_{CC} = 1.5$ V |

| SYMBOL | CHARACTERISTIC | MPS3639 MIN | MPS3639 MAX | MPS3640 MIN | MPS3640 MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|---|
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | −6.0 | | −12.0 | | V | $I_C = 100$ $\mu$A, $V_{BE} = 0$ |
| $BV_{CBO}$ | Collector to Base Breakdown Voltage | −6.0 | | −12.0 | | V | $I_C = 100$ $\mu$A, $I_E = 0$ |
| $BV_{EBO}$ | Emitter to Base Breakdown Voltage | −4.0 | | −4.0 | | V | $I_E = 100$ $\mu$A, $I_C = 0$ |
| $I_{CES}$ | Collector Reverse Current | | 10<br><br>1.0<br> | | <br>10<br><br>1.0 | nA<br>nA<br>$\mu$A<br>$\mu$A | $V_{CE} = -3.0$ V, $V_{BE} = 0$<br>$V_{CE} = -6.0$ V, $V_{BE} = 0$<br>$V_{CE} = -3.0$ V, $V_{BE} = 0$, $T_A = 65°$ C<br>$V_{CE} = -6.0$ V, $V_{BE} = 0$, $T_A = 65°$ C |

## PN/MPS/FTSO3639
## PN/MPS/FTSO3640

T-37-15

| SYMBOL | CHARACTERISTIC | MPS3639 MIN | MPS3639 MAX | MPS3640 MIN | MPS3640 MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|---|
| $h_{FE}$ | DC Pulse Current Gain (Note 5) | 30 | 120 | 30 | 120 | | $I_C$ = 10 mA, $V_{CE}$ = –0.3 V |
| | | 20 | | 20 | | | $I_C$ = 50 mA, $V_{CE}$ = –1.0 V |
| $V_{CEO(sus)}$ | Collector to Emitter Sustaining Voltage (Note 5) | –6.0 | | –12 | | V | $I_C$ = 10 mA, $I_B$ = 0 |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Note 5) | | –0.16 | | –0.2 | V | $I_C$ = 10 mA, $I_B$ = 1.0 mA |
| | | | –0.5 | | –0.6 | V | $I_C$ = 50 mA, $I_B$ = 5.0 mA |
| | | | –0.23 | | –0.25 | V | $I_C$ = 10 mA, $I_B$ = 1.0 mA, $T_A$ = 65° C |
| $V_{BE(sat)}$ | Base to Emitter Saturation Voltage (Note 5) | –0.75 | –0.95 | –0.75 | –0.95 | V | $I_C$ = 10 mA, $I_B$ = 0.5 mA |
| | | –0.8 | –1.0 | –0.8 | –1.0 | V | $I_C$ = 10 mA, $I_B$ = 1.0 mA |
| | | | 1.5 | | 1.5 | V | $I_C$ = 50 mA, $I_B$ = 5.0 mA |
| $C_{ob}$ | Output Capacitance | | 3.5 | | 3.5 | pF | $V_{CB}$ = –5.0 V, $I_E$ = 0, f = 140 kHz |
| $C_{ib}$ | Input Capacitance | | 3.5 | | 3.5 | pF | $V_{EB}$ = –0.5 V, $I_C$ = 0, f = 140 kHz |
| $h_{fe}$ | High Frequency Current Gain | 3.0 | | | | | $I_C$ = 10 mA, $V_{CB}$ = 0, f = 100 MHz |
| | | 5.0 | | 5.0 | | | $I_C$ = 10 mA, $V_{CE}$ = –5.0, f = 100 MHz |
| $t_{on}$ | Turn On Time (test circuit no. 235) | | 25 | | 25 | ns | $I_C \simeq$ 50 mA, $I_{B1} \simeq$ 5.0 mA, $V_{CC}$ = 6.0 V |
| | (test circuit no. 219) | | 60 | | 60 | ns | $I_C \simeq$ 10 mA, $I_{B1} \simeq$ 0.5 mA, $V_{CC}$ = –1.5 V |
| $t_{off}$ | Turn Off Time (test circuit no. 235) | | 25 | | 35 | ns | $I_C \simeq$ 50 mA, $I_{B1} \simeq I_{B2} \simeq$ 5.0 mA, $V_{CC}$ = –6.0 V |
| | (test circuit no. 219) | | 60 | | 75 | ns | $I_C \simeq$ 10 mA, $I_{B1} \simeq I_{B2} \simeq$ 0.5 mA, $V_{CC}$ = 1.5 V |

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# PN3641/FTSO3641 T-29-23
# PN3642/FTSO3642
# PN3643/FTSO3643
## NPN General Purpose Small Signal Amplifiers

- $V_{CEO}$ ... **30 V (Min) (PN/FTSO3641, PN/FTSO3643), 45 V (Min) (PN/FTSO3642)**
- $h_{FE}$ ... **100 (Min) @ 150 mA, 25 (Min) @ 500 mA (PN/FTSO3643)**
- $P_G$ ... **400 mW RF Power Out at 30 MHz**
- $f_T$ ... **250 MHz (Min) (PN3643)**
- $t_{on}$ ... **60 ns (Max) @ 300 mA,** $t_{off}$ ... **150 ns (Max) @ 300 mA**
- **Complements ... MPS3638/A, PN3644**

| **PACKAGE** | |
|---|---|
| PN3641 | TO-92 |
| PN3642 | TO-92 |
| PN3643 | TO-92 |
| FTSO3641 | TO-236AA/AB |
| FTSO3642 | TO-236AA/AB |
| FTSO3643 | TO-236AA/AB |

3

### ABSOLUTE MAXIMUM RATINGS (Note 1)

| **Temperatures** | |
|---|---|
| Storage Temperature | -55° C to 150° C |
| Operating Junction Temperature | 150° C |

| **Power Dissipation** (Notes 2 & 3) | **PN** | **FTSO** |
|---|---|---|
| Total Dissipation at | | |
| 25° C Ambient Temperature | 0.625 W | 0.350 W* |
| 25° C Case Temperature | 1.0 W | |

| **Voltages & Currents** | | **3641/3** | **3642** |
|---|---|---|---|
| $V_{CEO}$ | Collector to Emitter Voltage (Note 4) | 30 V | 45 V |
| $V_{CBO}$ | Collector to Base Voltage | 60 V | 60 V |
| $V_{EBO}$ | Emitter to Base Voltage | 5.0 V | 5.0 V |
| $I_C$ | Collector Current | 500 mA | 500 mA |

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

| | | 3641 | | 3642 | | | |
|---|---|---|---|---|---|---|---|
| SYMBOL | CHARACTERISTIC | MIN | MAX | MIN | MAX | UNITS | TEST CONDITIONS |
| $BV_{CEO(sus)}$ | Collector to Emitter Breakdown Voltage (Notes 4 & 5) | 30 | | 45 | | V | $I_C = 10$ mA, $I_B = 0$ |
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | 60 | | 60 | | V | $I_C = 10\ \mu A$, $V_{BE} = 0$ |
| $BV_{CBO}$ | Collector to Base Breakdown Voltage | 60 | | 60 | | V | $I_C = 10\ \mu A$, $I_E = 0$ |
| $BV_{EBO}$ | Emitter to Base Breakdown Voltage | 5.0 | | 5.0 | | V | $I_E = 10\ \mu A$, $I_C = 0$ |

**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 μs; duty cycle = 1%.
6. For product family characteristic curves, refer to Curve Set T145.

* Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

# PN3641/FTSO3641
# PN3642/FTSO3642
# PN3643/FTSO3643

T-29-23

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

| SYMBOL | CHARACTERISTIC | 3641 MIN | 3641 MAX | 3642 MIN | 3642 MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|---|
| $I_{CES}$ | Collector Cutoff Current (Note 5) | | 50<br>1.0 | | 50<br>1.0 | nA<br>μA | $V_{CE} = 50$ V, $V_{BE} = 0$<br>$V_{CE} = 50$ V, $V_{BE} = 0$, $T_A = 65°$ C |
| $h_{FE}$ | DC Pulse Current Gain (Note 5) | 40<br>15 | 120 | 40<br>15 | 120 | | $I_C = 150$ mA, $V_{CE} = 10$ V<br>$I_C = 500$ mA, $V_{CE} = 10$ V |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Note 5) | | 0.22 | | 0.22 | V | $I_C = 150$ mA, $I_B = 15$ mA |
| $C_{ob}$ | Output Capacitance | | 8.0 | | 8.0 | pF | $V_{CB} = 10$ V, $I_E = 0$, f = 140 kHz |
| $h_{fe}$ | Magnitude of Common Emitter, Short Circuit Small Signal Current Gain | 1.5 | | 1.5 | | | $I_C = 50$ mA, $V_{CE} = 5.0$ V, f = 100 MHz |
| $G_{PE}$ | Amplifier Power Gain (test circuit no. 238) | 10 | | 10 | | dB | (Zero Signal) $V_{CE} = 15$ V, $I_C = 0$, $R_G = 140\ \Omega$, $R_L = 260\ \Omega$, f = 30 MHz, $P_{IN} = 40$ mW |
| $\eta$ | Collector Efficiency (test circuit no. 238) | 60 | | 60 | | % | (Zero Signal) $V_{CE} = 15$ V, $I_C = 0$, $R_G = 140\ \Omega$, $R_L = 260\ \Omega$, f = 30 MHz, $P_{IN} = 40$ mW |
| $t_{on}$ | Turn On Time (test circuit no. 241) | | 60 | | 60 | ns | $I_C \approx 300$ mA, $I_{B1} \approx 30$ mA, |
| $t_{off}$ | Turn Off Time (test circuit no. 242) | | 150 | | 150 | ns | $I_C \approx 300$ mA, $I_{B1} \approx I_{B2} = 30$ mA |

| SYMBOL | CHARACTERISTIC | 3643 MIN | 3643 MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|
| $BV_{CEO(sus)}$ | Collector to Emitter Breakdown Voltage (Notes 4 & 5) | 30 | | V | $I_C = 10$ mA, $I_B = 0$ |
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | 60 | | V | $I_C = 10\ \mu$A, $V_{BE} = 0$ |
| $BV_{CBO}$ | Collector to Base Breakdown Voltage | 60 | | V | $I_C = 10\ \mu$A, $I_E = 0$ |
| $BV_{EBO}$ | Emitter to Base Breakdown Voltage | 5.0 | | V | $I_E = 10\ \mu$A, $I_C = 0$ |
| $I_{CES}$ | Collector Cutoff Current (Note 5) | | 50<br>1.0 | nA<br>μA | $V_{CE} = 50$ V, $V_{BE} = 0$<br>$V_{CE} = 50$ V, $V_{BE} = 0$, $T_A = 65°$ C |
| $h_{FE}$ | DC Pulse Current Gain (Note 5) | 100<br>25 | 300 | | $I_C = 150$ mA, $V_{CE} = 10$ V<br>$I_C = 500$ mA, $V_{CE} = 10$ V |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage (Note 5) | | 0.22 | V | $I_C = 150$ mA, $I_B = 15$ mA |

# PN3641/FTSO3641
# PN3642/FTSO3642
# PN3643/FTSO3643

T-29-23

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

| SYMBOL | CHARACTERISTIC | 3643 MIN | 3643 MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|
| $C_{ob}$ | Output Capacitance | | 8.0 | pF | $V_{CB} = 10$ V, $I_E = 0$, f = 140 kHz |
| $h_{fe}$ | Magnitude of Common Emitter, Short Circuit Small Signal Current Gain | 2.5 | | | $I_C = 50$ mA, $V_{CE} = 5.0$ V, f = 100 MHz |
| $G_{PE}$ | 'Amplifier Power Gain (test circuit no. 238) | 10 | | dB | (Zero Signal) $V_{CE} = 15$ V, $I_C = 0$, $R_G = 140\ \Omega$, $R_L = 260\ \Omega$, f = 30 MHz, $P_{IN} = 40$ mW |
| $\eta$ | Collector Efficiency (test circuit no. 238) | 60 | | % | (Zero Signal) $V_{CE} = 15$ V, $I_C = 0$, $R_G = 140\ \Omega$, $R_L = 260\ \Omega$, f = 30 MHz, $P_{IN} = 40$ mW |
| $t_{on}$ | Turn On Time (test circuit no. 241) | | 60 | ns | $I_C \approx 300$ mA, $I_{B1} \approx 30$ mA, |
| $t_{off}$ | Turn Off Time (test circuit no. 242) | | 150 | ns | $I_C \approx 300$ mA, $I_{B1} \approx I_{B2} = 30$ mA |