



A Schlumberger Company

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

PNP Small Signal General Purpose  
 Amplifiers & Switches

- $V_{CE0} \dots -25 \text{ V (Min)}$
- $h_{FE} \dots 30 \text{ (Min) (PN/MPS/FTSO3638)}$ ,  
 $100 \text{ (Min) (PN/MPS/FTSO3638A) @ } 50 \text{ mA}$
- $t_{on} \dots 75 \text{ ns (Max) @ } 300 \text{ mA}$ ;  $t_{off} \dots 170 \text{ ns (Max) @ } 300 \text{ mA}$
- 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**

$V_{CE0}$ 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		3638A		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$BV_{CES}$	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 2.0		35 2.0	nA $\mu A$	$V_{CE} = -15 \text{ V}, V_{BE} = 0$ $V_{CE} = -15 \text{ V}, V_{BE} = 0,$ $T_A = 65^\circ \text{ C}$

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

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**PN/MPS/FTSO3639**  
**PN/MPS/FTSO3640**

PNP High Speed Saturated Logic  
Switches

T-37-15

- $V_{CE0}$  ... 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	<b>PN/MPS</b>	<b>FTSO</b>
25° C Ambient Temperature	0.625 W	0.350 W*
25° C Case Temperature	1.0 W	

**Voltages & Currents**

	<b>3639</b>	<b>3640</b>
$V_{CE0}$ Collector to Emitter Voltage	-6 V	-12 V
(Note 4)		
$V_{CBO}$ 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		PN3640		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$BV_{CES}$	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	$V_{CE} = -3.0 V, V_{BE} = 0$
			1.0		50	nA	$V_{CE} = -6.0 V, V_{BE} = 0$
					1.0	$\mu A$	$V_{CE} = -3.0 V, V_{BE} = 0, T_A = 65^\circ C$
						$\mu A$	$V_{CE} = -6.0 V, V_{BE} = 0, T_A = 65^\circ C$
$h_{FE}$	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  $\mu s$ ; 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.

PN/MPS/FTSO3639

PN/MPS/FTSO3640

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

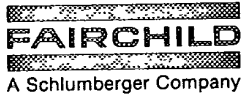
SYMBOL	CHARACTERISTIC	PN3639		PN3640		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$V_{CE(sus)}$	Collector to Emitter Sustaining Voltage (Note 5)	-6.0		-12		V	$I_C = 10 \text{ mA}, I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 4)		-0.16		-0.2	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{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

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

PN/MPS/FTSO3639  
PN/MPS/FTSO3640

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



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

- $V_{CE0}$  ... 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

**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
$V_{CE0}$ 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)

SYMBOL	CHARACTERISTIC	3641		3642		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$BV_{CE0(sus)}$	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  $\mu$ s; 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

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

SYMBOL	CHARACTERISTIC	3641		3642		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$I_{CES}$	Collector Cutoff Current (Note 5)		50 1.0		50 1.0	nA $\mu$ A	$V_{CE} = 50$ V, $V_{BE} = 0$ $V_{CE} = 50$ V, $V_{BE} = 0$ , $T_A = 65^\circ$ C
$h_{FE}$	DC Pulse Current Gain (Note 5)	40 15	120	40 15	120		$I_C = 150$ mA, $V_{CE} = 10$ V $I_C = 500$ 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		UNITS	TEST CONDITIONS
		MIN	MAX		
$BV_{CEO(sus)}$	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 1.0	nA $\mu$ A	$V_{CE} = 50$ V, $V_{BE} = 0$ $V_{CE} = 50$ V, $V_{BE} = 0$ , $T_A = 65^\circ$ C
$h_{FE}$	DC Pulse Current Gain (Note 5)	100 25	300		$I_C = 150$ mA, $V_{CE} = 10$ V $I_C = 500$ 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

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

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