

FAIRCHILD
A Schlumberger Company

MPS3392/FTSO3392
MPS3393/FTSO3393

NPN Small Signal General Purpose
Amplifiers

T-29-23

- V_{CEO} ... 25 V (Min)
- h_{FE} ... 150-300 (MPS/FTSO3392), 90-180 (MPS/FTSO3393)
@ 2.0 mA
- Complements ... 2N4125, 2N4126

PACKAGE

MPS3392	TO-92
MPS3393	TO-92
FTSO3392	TO-236AA/AB
FTSO3393	TO-236AA/AB

ABSOLUTE MAXIMUM RATINGS (Note 1)

Temperatures

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

Power Dissipation (Notes 2 & 3)

Total Dissipation at	MPS	FTSO
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

V_{CEO} Collector to Emitter Voltage (Note 4)	25 V
V_{CBO} Collector to Base Voltage	25 V
V_{EBO} Emitter to Base Voltage	5.0 V
I_C Collector Current	100 mA

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

SYMBOL	CHARACTERISTIC	3392		3393		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{CEO}	Collector to Emitter Breakdown Voltage	25		25		V	$I_C = 1.0$ mA, $I_B = 0$
I_{EBO}	Emitter Cutoff Current		100		100	nA	$V_{EB} = 5.0$ V, $I_C = 0$
I_{CBO}	Collector Cutoff Current		100		100	nA	$V_{CB} = 18$ V, $I_E = 0$
h_{FE}	DC Current Gain (Note 5)	150	300	90	180		$I_C = 2.0$ mA, $V_{CE} = 4.5$ V
C_{ob}	Output Capacitance		3.5		3.5	pF	$V_{CB} = 10$ V, $I_E = 0$, $f = 1.0$ MHz
h_{fe}	Small Signal Current Gain	150	500	90	400		$I_C = 2.0$ mA, $V_{CE} = 4.5$ V, $f = 1.0$ kHz

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 μ s, duty cycle = 1%
- For product family characteristic curves, refer to Curve Set T144.



MPS3702/FTSO3702
MPS3703/FTSO3703
 PNP Small Signal General
 Purpose Amplifier

T-29-23

- $V_{CEO} \dots -30 \text{ V (Min) (MPS/FTSO3703)}$
- $h_{FE} \dots 60-300 @ 50 \text{ mA (MPS/FTSO3702)}$
- $V_{CE(sat)} \dots -0.25 \text{ V (Max) @ 50 mA}$
- Complements ... MPS/FTSO3704, MPS/FTSO3705

PACKAGE

MPS3702	TO-92
MPS3703	TO-92
FTSO3702	TO-236AA/AB
FTSO3703	TO-236AA/AB

ABSOLUTE MAXIMUM RATINGS (MPS3702, MPS3703) (Note 1)**Temperatures**

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

Power Dissipation (Notes 2 & 3)

	MPS	FTSO
Total Dissipation at		
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

	3702	3703
V_{CEO} Collector to Emitter Voltage	-25 V	-30 V
(Note 4)		
V_{CBO} Collector to Base Voltage	-40 V	-50 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	3702		3703		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{CEO}	Collector to Emitter Breakdown Voltage (Note 5)	-25		-30		V	$I_C = 10 \text{ mA}, I_E = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	-40		-50		V	$I_C = 100 \mu\text{A}, I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	-5.0		-5.0		V	$I_E = 100 \mu\text{A}, I_C = 0$
I_{CBO}	Collector Cutoff Current		100		100	nA	$V_{CB} = -20 \text{ V}, I_E = 0$
I_{EBO}	Emitter Cutoff Current		100		100	nA	$V_{EB} = -3.0 \text{ V}, I_C = 0$

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 μs ; duty cycle = 1%.
- 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.

MPS3702/FTSO3702
MPS3703/FTSO3703

T-29-23

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

SYMBOL	CHARACTERISTIC	3702		3703		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
h_{FE}	DC Current Gain (Note 5)	60	300	30	150		$I_C = 50 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		-0.25		-0.25	V	$I_C = 50 \text{ mA}$, $I_B = 5.0 \text{ mA}$
$V_{BE(ON)}$	Base to Emitter "On" Voltage (Note 5)	-0.6	-1.0	-0.6	-1.0	V	$I_C = 50 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$
f_T	Current Gain Bandwidth Product	100		100		MHz	$I_C = 50 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$, $f = 20 \text{ MHz}$
C_{ob}	Output Capacitance		12		12	pF	$V_{CB} = -10 \text{ V}$, $f = 1.0 \text{ MHz}$



A Schlumberger Company

MPS3704/FTSO3704
MPS3705/FTSO3705

 NPN Small Signal General
 Purpose Amplifiers

T-29-23

- V_{CEO} ... 30 V (Min)
- h_{FE} ... 100-300 @ 50 mA (MPS/FTSO3704)
- $V_{CE(sat)}$... -0.6 V (Max) @ 100 mA (MPS/FTSO3704)
- Complements ... MPS/FTSO3702, MPS/FTSO3703

PACKAGE

MPS3704	TO-92
MPS3705	TO-92
FTSO3704	TO-236AA/AB
FTSO3705	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)

	MPS	FTSO
Total Dissipation at		
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

V_{CEO} Collector to Emitter Voltage	30 V
(Note 4)	
V_{CBO} Collector to Base Voltage	50 V
V_{EBO} Emitter to Base Voltage	5.0 V
I_C Collector Current	600 mA

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

SYMBOL	CHARACTERISTIC	3704		3705		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{CEO}	Collector to Emitter Breakdown Voltage (Note 5)	30		30		V	$I_C = 10$ mA, $I_E = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	50		50		V	$I_C = 100$ μ A, $I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	5.0		5.0		V	$I_E = 100$ μ A, $I_C = 0$
I_{CBO}	Collector Cutoff Current		100		100	nA	$V_{CB} = 20$ V, $I_E = 0$
I_{EBO}	Emitter Cutoff Current		100		100	nA	$V_{EB} = 3.0$ V, $I_C = 0$
h_{FE}	DC Current Gain (Note 5)	100	300	50	150		$I_C = 50$ mA, $V_{CE} = 2.0$ 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 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 μ s; duty cycle = 1%
 - 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.

MPS3704/FTSO3704
MPS3705/FTSO3705

T-29-23

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

SYMBOL	CHARACTERISTIC	3704		3705		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.6		0.8	V	$I_C = 100 \text{ mA}$, $I_B = 5.0 \text{ mA}$
$V_{BE(ON)}$	Base to Emitter "On" Voltage (Note 5)	0.5	1.0	0.5	1.0	V	$I_C = 100 \text{ mA}$, $V_{CE} = 2.0 \text{ V}$
f_T	Current Gain Bandwidth Product	100		100		MHz	$I_C = 50 \text{ mA}$, $V_{CE} = 2.0 \text{ V}$, $f = 20 \text{ MHz}$
C_{ob}	Output Capacitance		12		12	pF	$V_{CB} = 10 \text{ V}$, $I_E = 0$, $f = 1.0 \text{ MHz}$

**MPS5172/FTSO5172**NPN Small Signal General
Purpose Amplifier

T-29-23

- h_{FE} ... 100-500 @ $I_C = 10$ mA
- $V_{CE(sat)}$... 0.25 V (Max) @ $I_C = 10$ mA
- Complements ... 2N4126, FTSO4126

PACKAGE

MPS5172

TO-92

FTSO5172

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)

	MPS	FTSO
Total Dissipation at 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

V_{CEO} Collector to Emitter Voltage (Note 4)	25 V
V_{CBO} Collector to Base Voltage	25 V
V_{EBO} Emitter to Base Voltage	5.0 V
I_C Collector Current	100 mA

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

SYMBOL	CHARACTERISTIC	MIN	MAX	UNITS	TEST CONDITIONS
BV_{CEO}	Collector to Emitter Breakdown Voltage	25		V	$I_C = 10$ mA, $I_B = 0$
I_{CES}	Collector Cutoff Current		100	nA	$V_{CE} = 25$ V, $V_{BE} = 0$
I_{CBO}	Collector Cutoff Current		100 10	nA μ A	$V_{CB} = 25$ V, $I_E = 0$ $V_{CB} = 25$ V, $I_E = 0$, $T_A = 100^\circ$ C
I_{EBO}	Emitter Cutoff Current		100	nA	$V_{BE} = 5.0$ V, $I_C = 0$
h_{FE}	DC Current Gain (Note 5)	100	500		$I_C = 10$ mA, $V_{CE} = 10$ V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.25	V	$I_C = 10$ mA, $I_B = 1.0$ mA
$V_{BE(ON)}$	Base to Emitter "On" Voltage	0.5	1.2	V	$I_C = 10$ mA, $V_{CE} = 10$ V
C_{cb}	Collector to Base Capacitance	1.6	10	pF	$V_{CB} = 0$, $I_E = 0$, $f = 1.0$ MHz
h_{fe}	Small Signal Current Gain	100	750		$I_C = 10$ mA, $V_{CE} = 10$ V, $f = 1.0$ kHz

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 μ s; duty cycle = 1%.
- 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.

FAIRCHILD

A Schlumberger Company

MPS6514/FTSO6514
MPS6515/FTSO6515NPN Small Signal General
Purpose Amplifiers

T-29.23

- V_{CEO} ... 25 V (Min)
- h_{FE} ... 150-300 (MPS/FTSO6514), 250-500 (MPS/FTSO6515)
@ 2.0 mA
- h_{FE} ... 90 (Min) (MPS/FTSO6514), 150 (Min)
(MPS/FTSO6515) @ 100 mA

PACKAGE

MPS6514	TO-92
MPS6515	TO-92
FTSO6514	TO-236AA/AB
FTSO6515	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	MPS	FTSO
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

V_{CEO} Collector to Emitter Voltage (Note 4)	25 V
V_{CBO} Collector to Base Voltage	40 V
V_{EBO} Emitter to Base Voltage	4.0 V
I_C Collector Current	100 mA

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

SYMBOL	CHARACTERISTIC	6514		6515		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{CEO}	Collector to Emitter Breakdown Voltage	30		30		V	$I_C = 0.5$ mA, $I_B = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	4.0		4.0		V	$I_E = 100$ μ A, $I_C = 0$
I_{CBO}	Collector Cutoff Current		50 1.0		50 1.0	nA μ A	$V_{CB} = 30$ V, $I_E = 0$ $V_{CB} = 30$ V, $I_E = 0$, $T_A = 60^\circ$ C
h_{FE}	DC Current Gain (Note 5)	150 90	300	250 150	500		$I_C = 2.0$ mA, $V_{CE} = 10$ V $I_C = 100$ mA, $V_{CE} = 10$ V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage (Note 5)		0.5		0.5	V	$I_C = 50$ mA, $I_B = 5.0$ mA
C_{ob}	Output Capacitance		3.5		3.5	pF	$V_{CB} = 10$ V, $I_E = 0$, $f = 100$ kHz

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 μ s; duty cycle = 1%.
- For product family characteristic curves, refer to Curve Set T144 for MPS6514 & T-155 for MPS6515
- * Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

**MPS6518/FTSO6518**

PNP Small Signal General Purpose Amplifier

T-29.23

- $V_{CEO} \dots 40 \text{ V (Min)}$
- $h_{FE} \dots 150\text{-}300 @ 2.0 \text{ mA, } 90 \text{ (Min) @ } 100 \text{ mA}$

PACKAGEMPS6518
FTSO6518TO-92
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	MPS	FTSO
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

V_{CEO} Collector to Emitter Voltage (Note 4)	-40 V
V_{CBO} Collector to Base Voltage	-40 V
V_{EBO} Emitter to Base Voltage	-4.0 V
I_C Collector Current	100 mA

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

SYMBOL	CHARACTERISTIC	MIN	MAX	UNITS	TEST CONDITIONS
BV_{CEO}	Collector to Emitter Breakdown Voltage	-40		V	$I_C = 0.5 \text{ mA, } I_B = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	-4.0		V	$I_E = 10 \mu\text{A, } I_C = 0$
I_{CBO}	Collector Cutoff Current		50 1.0	nA μA	$V_{CB} = -30 \text{ V, } I_E = 0$ $V_{CB} = -30 \text{ V, } I_E = 0, T_A = 60^{\circ}\text{C}$
h_{FE}	DC Current Gain (Note 5)	150 90	300		$I_C = 2.0 \text{ mA, } V_{CE} = -10 \text{ V}$ $I_C = 100 \text{ mA, } V_{CE} = -10 \text{ V}$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		-0.5	V	$I_C = 50 \text{ mA, } I_B = 5.0 \text{ mA}$
C_{ob}	Output Capacitance		4.0	pF	$V_{CB} = -10 \text{ V, } I_E = 0, f = 100 \text{ kHz}$

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 $8.0 \text{ mW}^{\circ}\text{C}$); junction-to-ambient thermal resistance of 200°C/W (derating factor of $5.0 \text{ mW}^{\circ}\text{C}$); (TO-236) junction-to-ambient thermal resistance of 357°C/W (derating factor of $2.8 \text{ mW}^{\circ}\text{C}$).
 - Rating refers to a high current point where collector to emitter voltage is lowest.
 - Pulse conditions: length = $300 \mu\text{s}$; duty cycle = 1%.
 - For product family characteristic curves, refer to Curve Set T215.
- * Package mounted on 99.5% alumina $8 \text{ mm} \times 8 \text{ mm} \times 0.6 \text{ mm}$.


MPS6520/FTSO6520
MPS6521/FTSO6521

 NPN Small Signal General
 Purpose Amplifiers

T-29-23

- $V_{CE0} \dots 25 \text{ V (Min)}$
- $h_{FE} \dots 100 \text{ (Min) (MPS/FTSO6520), 150 (Min) (MPS/FTSO6521) @ } 100 \mu\text{A}$
- $h_{FE} \dots 200\text{-}400 \text{ (MPS/FTSO6520), 300-600 (MPS/FTSO6521) @ } 2.0 \text{ mA}$
- $NF \dots 3.0 \text{ dB (Max) @ } I_C = 10 \mu\text{A, Wide Band}$

PACKAGE

MPS6520	TO-92
MPS6521	TO-92
FTSO6520	TO-236AA/AB
FTSO6521	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)

	MPS	FTSO
Total Dissipation at		
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

V_{CE0} Collector to Emitter Voltage	25 V
(Note 4)	
V_{CBO} Collector to Base Voltage	40 V
V_{EBO} Emitter to Base Voltage	4.0 V
I_C Collector Current	100 mA

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

SYMBOL	CHARACTERISTIC	6520		6521		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{CE0}	Collector to Emitter Breakdown Voltage	25		25		V	$I_C = 0.5 \text{ mA}, I_B = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	4.0		4.0		V	$I_E = 10 \mu\text{A}, I_C = 0$
I_{CBO}	Collector Cutoff Current		50 1.0		50 1.0	nA μA	$V_{CB} = 30 \text{ V}, I_E = 0$ $V_{CB} = 30 \text{ V}, I_E = 0,$ $T_A = 60^\circ\text{C}$

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 μs ; duty cycle = 1%.
 - 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.

MPS6520/FTSO6520

MPS6521/FTSO6521

T-29.23

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

SYMBOL	CHARACTERISTIC	6520		6521		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
h_{FE}	DC Current Gain	100 200	400	150 300	600		$I_C = 100 \mu A$, $V_{CE} = 10 V$ $I_C = 2.0 mA$, $V_{CE} = 10 V$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.5		0.5	V	$I_C = 50 mA$, $I_B = 5.0 mA$
C_{ob}	Output Capacitance		3.5		3.5	pF	$V_{CB} = 10 V$, $I_E = 0$, $f = 100 kHz$
NF	Noise Figure		3.0		3.0	dB	$V_{CE} = 5.0 V$, $I_C = 10 \mu A$, $R_g = 10 k\Omega$, Power Bandwidth $\pm 15.7 kHz$, 3.0 dB pts @ 10 Hz & 10 kHz

FAIRCHILD

A Schlumberger Company

MPS6535M T-29-23PNP Small Signal General
Purpose Amplifier

- P_D 625 mW @ $T_A = 25^\circ\text{C}$
- V_{CE0} ... -30 V (Min)
- h_{FE} ... 30 (Min) @ 100 mA

PACKAGE
MPS6535M TO-92
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
 25°C Ambient Temperature 0.625 W
 70°C Ambient Temperature 0.400 W
 25°C Case Temperature 1.0 W
Voltages & Currents
 V_{CE0} Collector to Emitter Voltage -30 V
(Note 4)
 V_{CBO} Collector to Base Voltage -30 V
 V_{EBO} Emitter to Base Voltage -4.0 V
 I_C Collector Current 600 mA
ELECTRICAL CHARACTERISTICS (25°C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	MIN	MAX	UNITS	TEST CONDITIONS
BV_{CE0}	Collector to Emitter Breakdown Voltage	-30		V	$I_C = 10\text{ mA}$, $I_E = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	-30		V	$I_C = 10\text{ }\mu\text{A}$, $I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	-4.0		V	$I_E = 10\text{ }\mu\text{A}$, $I_C = 0$
I_{CBO}	Collector Cutoff Current		100 5.0	nA μA	$V_{CB} = -20\text{ V}$, $I_E = 0$ $V_{CB} = -20\text{ V}$, $I_E = 0$, $T_A = 60^\circ\text{C}$
h_{FE}	DC Current Gain (Note 5)	30			$I_C = 100\text{ mA}$, $V_{CE} = -1.0\text{ V}$
$V_{CE(sat)}$	Collector Saturation Voltage (Note 5)		-0.5	V	$I_C = 100\text{ mA}$, $I_B = 10\text{ mA}$
$V_{BE(sat)}$	Base Saturation Voltage (Note 5)		-1.2	V	$I_C = 100\text{ mA}$, $I_B = 10\text{ mA}$
C_{ob}	Output Capacitance		8.0	pF	$V_{CB} = -10\text{ V}$, $I_E = 0$, $f = 100\text{ kHz}$

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 $8.0\text{ mW}/^\circ\text{C}$); junction-to-ambient thermal resistance of 200°C/W (derating factor of $5.0\text{ mW}/^\circ\text{C}$).
- Rating refers to a high current point where collector to emitter voltage is lowest.
- Pulse conditions: length = $300\text{ }\mu\text{s}$; duty cycle = 2%.
- For product family characteristic curves, refer to Curve Set T202.

FAIRCHILD

A Schlumberger Company

MPS6560/FTSO6560
MPS6561/FTSO6561
MPS6562/FTSO6562
 NPN-PNP Small Signal General
 Purpose Complementary Amplifiers

- V_{CEO} ... **MPS/FTSO6560/2),**
20 V (MPS/FTSO6561)
- h_{FE} ... **50-200 @ 500 mA (MPS/FTSO6560/2),**
@ 350 mA (MPS/FTSO6561)
- $V_{CE(sat)}$... **0.5 V (Max) @ 500 mA (MPS/FTSO6560/2),**
@ 350 mA (MPS/FTSO6561)
- Complements ... **MPS/FTSO6560, MPS/FTSO6561 (NPN);**
MPS/FTSO6562 (PNP)

PACKAGE

MPS6560	TO-92
MPS6561	TO-92
MPS6562	TO-92
FTSO6560	TO-236AA/AB
FTSO6561	TO-236AA/AB
FTSO6562	TO-236AA/AB

T-29-23

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

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

Power Dissipation (Notes 2 & 3)

	MPS	FTSO
Total Dissipation at		
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

	6560/62	6561
V_{CEO} Collector to Emitter Voltage	25 V	20 V
(Note 4)		
V_{CBO} Collector to Base Voltage	25 V	20 V
V_{EBO} Emitter to Base Voltage	4.0 V	4.0 V
I_C Collector Current	600 mA	600 mA

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

SYMBOL	CHARACTERISTIC	6560/62		6561		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{EBO}	Emitter to Base Breakdown Voltage	5.0		-5.0		V	$I_E = 100 \mu A, I_C = 0$
I_{CEO}	Collector Cutoff Current		100		100	nA	$V_{CE} = 25 V, I_B = 0$ $V_{CE} = 20 V, I_B = 0$
I_{CBO}	Collector Cutoff Current		100		100	nA	$V_{CB} = 20 V, I_E = 0$
I_{EBO}	Emitter Cutoff Current		100		100	nA	$V_{EB} = 4.0 V, I_C = 0$

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 μs ; duty cycle = 1%.
- For product family characteristic curves, refer to Curve Set T124 for MPS6560, MPS6561 & T12 for MPS6562.

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

MPS6560/FTSO6560
MPS6561/FTSO6561
MPS6562/FTSO6562

T-29.23

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

SYMBOL	CHARACTERISTIC	6560/62		6561		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
h_{FE}	DC Current Gain (Note 5)	35 50 50	200	35 50 50	200		$I_C = 10 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$ $I_C = 100 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$ $I_C = 500 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$ $I_C = 350 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.5		-0.5	V V	$I_C = 500 \text{ mA}$, $I_B = 50 \text{ mA}$ $I_C = 350 \text{ mA}$, $I_B = 35 \text{ mA}$
$V_{BE(on)}$	Base to Emitter "On" Voltage (Note 5)		1.2		-1.2	V V	$I_C = 500 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$ $I_C = 350 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$
f_T	Current Gain Bandwidth Product	60		60		MHz	$I_C = 10 \text{ mA}$, $V_{CE} = 10 \text{ V}$, $f = 30 \text{ MHz}$
C_{ob}	Output Capacitance		30		30	pF	$V_{CB} = 10 \text{ V}$, $I_E = 0$, $f = 100 \text{ kHz}$



MPS6571/FTSO6571

NPN Low Level High Gain Amplifier

T-29-23

- $V_{CEO} \dots -20 \text{ V (Min)}$
- $h_{FE} \dots 250-1000 @ 100 \mu\text{A}$

PACKAGE

MPS6571
FTSO6571

TO-92

TO236AA/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	MPS	FTSO
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

V_{CEO} Collector to Emitter Voltage (Note 4)	20 V
V_{CBO} Collector to Base Voltage	20 V
V_{EBO} Emitter to Base Voltage	3.0 V
I_C Collector Current (Continuous)	50 mA

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

SYMBOL	CHARACTERISTIC	MIN	MAX	UNITS	TEST CONDITIONS
BV_{CEO}	Collector to Emitter Breakdown Voltage	20		V	$I_C = 1.0 \text{ mA}$, $I_B = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	25		V	$I_C = 100 \mu\text{A}$, $I_E = 0$
I_{CBO}	Collector Cutoff Current		50	nA	$V_{CB} = 20 \text{ V}$, $I_E = 0$
I_{EBO}	Emitter Cutoff Current		50	nA	$V_{EB(ON)} = 3.0 \text{ V}$, $I_C = 0$
h_{FE}	DC Current Gain (Note 5)	250	1000		$I_C = 100 \mu\text{A}$, $V_{CE} = 5.0 \text{ V}$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.5	V	$I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$
$V_{BE(ON)}$	Base to Emitter "On" Voltage (Note 5)		0.8	V	$I_C = 10 \text{ mA}$, $V_{CE} = 5.0 \text{ V}$
f_T	Current Gain Bandwidth Product	50		MHz	$I_C = 500 \mu\text{A}$, $V_{CE} = 5.0 \text{ V}$, $f = 20 \text{ MHz}$
C_{ob}	Output Capacitance		4.5	pF	$V_{CB} = 5.0 \text{ V}$, $I_E = 0$, $f = 100 \text{ kHz}$

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 $8.0 \text{ mW}/^\circ\text{C}$); junction-to-ambient thermal resistance of 200°C/W (derating factor of $5.0 \text{ mW}/^\circ\text{C}$); (TO-236) junction-to-ambient thermal resistance of 357°C/W (derating factor of $2.8 \text{ mW}/^\circ\text{C}$).
- Rating refers to a high current point where collector to emitter voltage is lowest.
- Pulse conditions: length = $300 \mu\text{s}$; duty cycle = 1%.
- For product family characteristic curves, refer to Curve Set T144.
- Package mounted on 99.5% alumina $8 \text{ mm} \times 8 \text{ mm} \times 0.6 \text{ mm}$.



MPSA05/FTSOA05
MPSA06/FTSOA06
 NPN Small Signal General
 Purpose Amplifiers

T-29-23

- V_{CE0} ... 60 V (Min) (MPS/FTSOA05), 80 V (Min) (MPS/FTSOA06)
- h_{FE} ... 50 (Min) @ 10 mA and 100 mA
- $V_{CE(sat)}$... 0.25 V (Max) @ 100 mA
- Complements ... MPS/FTSOA55, MPS/FTSOA56, (PNP)

PACKAGE

MPSA05	TO-92
MPSA06	TO-92
FTSOA05	TO-236AA/AB
FTSOA06	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)

	MPS	FTSO
Total Dissipation at		
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

	A05	A06
V_{CE0} Collector to Emitter Voltage	60 V	80 V
(Note 4)		
V_{CBO} Collector to Base Voltage	60 V	80 V
V_{EBO} Emitter to Base Voltage	4.0 V	4.0 V
I_C Collector Current	500 mA	500 mA

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

SYMBOL	CHARACTERISTIC	A05		A06		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{CE0}	Collector to Emitter Breakdown Voltage	60		80		V	$I_C = 1.0$ mA, $I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	4.0		4.0		V	$I_E = 100$ μ A, $I_C = 0$
I_{CBO}	Collector Cutoff Current		100		100	nA	$V_{CB} = 60$ V, $I_E = 0$ $V_{CB} = 80$ V, $I_E = 0$

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 μ s; duty cycle = 1%.
 - For product family characteristic curves, refer to Curve Set T149.
- * Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

MPSA05/FTSOA05
MPSA06/FTSOA06

7-29-23

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

SYMBOL	CHARACTERISTIC	A05		A06		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
h_{FE}	DC Current Gain (Note 5)	50		50			$I_C = 100 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$ $I_C = 10 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.25		0.25	V	$I_C = 100 \text{ mA}$, $I_B = 10 \text{ mA}$
$V_{BE(on)}$	Base to Emitter "On" Voltage		1.2		1.2	V	$I_C = 100 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$
f_T	Current Gain Bandwidth Product	50		50		MHz	$I_C = 100 \text{ mA}$, $V_{CE} = 1.0 \text{ V}$, $f = 100 \text{ MHz}$

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