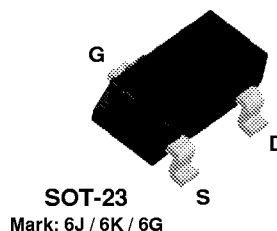
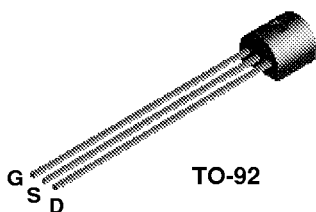


**PN4391  
PN4392  
PN4393**

**MMBF4391  
MMBF4392  
MMBF4393**



## N-Channel Switch

This device is designed for low level analog switching, sample and hold circuits and chopper stabilized amplifiers. Sourced from Process 51. See J111 for characteristics.

### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>DS</sub>	Drain-Gate Voltage	30	V
V <sub>GS</sub>	Gate-Source Voltage	- 30	V
I <sub>GF</sub>	Forward Gate Current	50	mA
T <sub>J</sub> , T <sub>stg</sub>	Operating and Storage Junction Temperature Range	-55 to +150	°C

\*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations

### Thermal Characteristics

TA = 25°C unless otherwise noted

Symbol	Characteristic	Max		Units
		PN4391	*MMBF4391	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	350	225	mW
		2.8	1.8	mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	125		°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	357	556	°C/W

\*Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

PN4391 / PN4392 / PN4393 / MMBF4391 / MMBF4392 / MMBF4393

## N-Channel Switch

(continued)

### Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
<b>OFF CHARACTERISTICS</b>					
$V_{(BR)GSS}$	Gate-Source Breakdown Voltage	$I_G = 1.0 \mu A, V_{DS} = 0$	- 30		V
$I_{GSS}$	Gate Reverse Current	$V_{GS} = 15 V, V_{DS} = 0$ $V_{GS} = 15 V, V_{DS} = 0, T_A = 150^\circ C$		- 1.0 - 0.2	nA $\mu A$
$V_{GS(off)}$	Gate-Source Cutoff Voltage	$V_{DS} = 20 V, I_D = 1.0 nA$	- 4.0 - 2.0 - 0.5	- 10 - 5.0 - 3.0	V V V
$V_{GS(f)}$	Gate-Source Forward Voltage	$I_G = 1.0 mA, V_{DS} = 0$		1.0	V
$I_{D(off)}$	Drain Cutoff Leakage Current	$V_{DS} = 20 V, V_{GS} = 12 V$ <b>PN4391</b> $V_{DS} = 20 V, V_{GS} = 7.0 V$ <b>PN4392</b> $V_{DS} = 20 V, V_{GS} = 5.0 V$ <b>PN4393</b> $V_{DS} = 20 V, V_{GS} = 12 V, T_A = 150^\circ C$ <b>PN4391</b> $V_{DS} = 20 V, V_{GS} = 7.0 V, T_A = 150^\circ C$ <b>PN4392</b> $V_{DS} = 20 V, V_{GS} = 5.0 V, T_A = 150^\circ C$ <b>PN4393</b>		0.1 0.1 0.1 0.2 0.2 0.2	nA nA nA $\mu A$ $\mu A$ $\mu A$
<b>ON CHARACTERISTICS</b>					
$I_{DSS}$	Zero-Gate Voltage Drain Current*	$V_{DS} = 20 V, V_{GS} = 0$	<b>PN4391</b> <b>PN4392</b> <b>PN4393</b>	50 25 5.0	150 75 30 mA mA mA
$V_{DS(on)}$	Drain-Source On Voltage	$I_D = 12 mA, V_{GS} = 0$ <b>PN4391</b> $I_D = 6.0 mA, V_{GS} = 0$ <b>PN4392</b> $I_D = 3.0 mA, V_{GS} = 0$ <b>PN4393</b>		0.4 0.4 0.4	V V V
$r_{DS(on)}$	Drain-Source On Resistance	$I_D = 1.0 mA, V_{GS} = 0$	<b>PN4391</b> <b>PN4392</b> <b>PN4393</b>	30 60 100	$\Omega$ $\Omega$ $\Omega$
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
$r_{ds(on)}$	Drain-Source On Resistance	$V_{DS} = V_{GS} = 0, f = 1.0 kHz$	<b>PN4391</b> <b>PN4392</b> <b>PN4393</b>	30 60 100	$\Omega$ $\Omega$ $\Omega$
$C_{iss}$	Input Capacitance	$V_{DS} = 20, V_{GS} = 0, f = 1.0 MHz$		14	pF
$C_{rss}$	Reverse Transfer Capacitance	$V_{GS} = 12 V, f = 1.0 MHz$ <b>PN4391</b> $V_{GS} = 7.0 V, f = 1.0 MHz$ <b>PN4392</b> $V_{GS} = 5.0 V, f = 1.0 MHz$ <b>PN4393</b>		3.5 3.5 3.5	pF pF pF
<b>SWITCHING CHARACTERISTICS</b>					
$t_r$	Rise Time	$I_{D(on)} = 12 mA$ <b>PN4391</b> $I_{D(on)} = 6.0 mA$ <b>PN4392</b> $I_{D(on)} = 3.0 mA$ <b>PN4393</b>		5.0 5.0 5.0	ns ns ns
$t_f$	Fall Time	$V_{GS(off)} = 12 V$ <b>PN4391</b> $V_{GS(off)} = 6.0 V$ <b>PN4392</b> $V_{GS(off)} = 3.0 V$ <b>PN4393</b>		15 20 30	ns ns ns
$t_{on}$	Turn-On Time	$I_{D(on)} = 12 mA$ <b>PN4391</b> $I_{D(on)} = 6.0 mA$ <b>PN4392</b> $I_{D(on)} = 3.0 mA$ <b>PN4393</b>		15 15 15	ns ns ns
$t_{off}$	Turn-Off Time	$V_{GS(off)} = 12 V$ <b>PN4391</b> $V_{GS(off)} = 6.0 V$ <b>PN4392</b> $V_{GS(off)} = 3.0 V$ <b>PN4393</b>		20 35 50	ns ns ns

\*Pulse Test: Pulse Width  $\leq 300 \mu s$ , Duty Cycle  $\leq 1.0\%$

PN4391 / PN4392 / PN4393 / MMBF4391 / MMBF4392 / MMBF4393