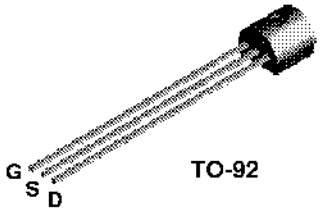
FAIRCHILD SEMICONDUCTOR

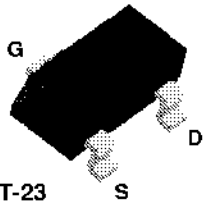
Discrete POWER & Signal Technologies

PN4391 PN4392 PN4393

MMBF4391 MMBF4392 MMBF4393



TO-92



SOT-23

Mark: 6J / 6K / 6G

N-Channel Switch

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

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V_{DG}	Drain-Gate Voltage	30	V
V_{GS}	Gate-Source Voltage	- 30	V
I_{GF}	Forward Gate Current	50	mA
T_J , T_{stg}	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_D	Total Device Dissipation Derate above 25°C	350 2.8	225 1.8	mW mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	125		°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	556	°C/W

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

N-Channel Switch
(continued)

Electrical Characteristics

TA = 25°C unless otherwise noted

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

*Pulse Test: Pulse Width < 300 µs, Duty Cycle < 1.0%