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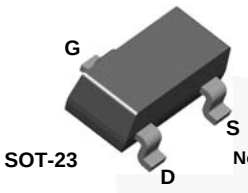
January 2015

MMBF4391 / MMBF4392 / MMBF4393
N-Channel Switch

Description

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.



SOT-23

Note: Source & Drain are interchangeable

Ordering Information

Part Number	Top Mark	Package	Packing Method
MMBF4391	6J	SOT-23 3L	Tape and Reel
MMBF4392	6K	SOT-23 3L	Tape and Reel
MMBF4393	6G	SOT-23 3L	Tape and Reel

Absolute Maximum Ratings[1], [2]

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Value	Unit
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

Notes:

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

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Thermal Characteristics[3]

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Max.	Unit
P_D	Total Device Dissipation	350	mW
	Derate Above 25°C	2.8	mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	357	°C/W

Note:

3. Device mounted on FR-4 PCB 36mm × 18mm × 1.5mm; mounting pad for the collector lead minimum 6cm^2.

Electrical Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Conditions		Min.	Max.	Unit
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 Cut-Off Voltage	V_{DS} = 20 V, I_D = 1.0 nA	MMBF4391	-4.0	-10.0	V
			MMBF4392	-2.0	-5.0	
			MMBF4393	-0.5	-3.0	
$V_{GS(f)}$	Gate-Source Forward Voltage	I_G = 1.0 mA, V_{DS} = 0			1.0	V
$I_{D(off)}$	Drain Cut-Off Leakage Current	V_{DS} = 20 V, V_{GS} = -12 V	MMBF4391		0.1	nA
		V_{DS} = 20 V, V_{GS} = -7.0 V	MMBF4392		0.1	
		V_{DS} = 20 V, V_{GS} = -5.0 V	MMBF4393		0.1	
		V_{DS} = 20 V, V_{GS} = -12 V, T_A = 150°C	MMBF4391		0.2	µA
		V_{DS} = 20 V, V_{GS} = -7.0 V, T_A = 150°C	MMBF4392		0.2	
		V_{DS} = 20 V, V_{GS} = -5.0 V, T_A = 150°C	MMBF4393		0.2	
On Characteristics						
I_{DSS}	Zero-Gate Voltage Drain Current[4]	V_{DS} = 20 V, V_{GS} = 0	MMBF4391	50	150	mA
			MMBF4392	25	75	
			MMBF4393	5.0	30	
$V_{DS(on)}$	Drain-Source On Voltage	I_D = 12 mA, V_{GS} = 0	MMBF4391		0.4	V
		I_D = 6.0 mA, V_{GS} = 0	MMBF4392		0.4	
		I_D = 3.0 mA, V_{GS} = 0	MMBF4393		0.4	
$r_{DS(on)}$	Drain-Source On Resistance	I_D = 1.0 mA, V_{GS} = 0	MMBF4391		30	Ω
			MMBF4392		60	
			MMBF4393		100	

Note:

4. Pulse test: pulse width ≤ 300 µs, duty cycle ≤ 2.0%

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Electrical Characteristics (Continued)

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Conditions		Min.	Max.	Unit
Small Signal Characteristics						
$r_{ds(on)}$	Drain-Source On Resistance	$V_{DS} = V_{GS} = 0$, f = 1kHz	MMBF4391		30	Ω
			MMBF4392		60	
			MMBF4393		100	
C_{iss}	Input Capacitance	V_{DS} = 20 V, V_{GS} = 0, f = 1.0 MHz			14	pF
C_{rss}	Reverse Transfer Capacitance	V_{GS} = -12 V, f = 1.0 MHz	MMBF4391		3.5	pF
		V_{GS} = -7.0 V, f = 1.0 MHz	MMBF4392		3.5	
		V_{GS} = -5.0 V, f = 1.0 MHz	MMBF4393		3.5	
Switching Characteristics						
t_r	Rise Time	$I_{D(on)}$ = 12 mA	MMBF4391		5.0	ns
		$I_{D(on)}$ = 6.0 mA	MMBF4392		5.0	
		$I_{D(on)}$ = 3.0 mA	MMBF4393		5.0	
t_f	Fall Time	$V_{GS(off)}$ = 12 V	MMBF4391		15	ns
		$V_{GS(off)}$ = 6.0 V	MMBF4392		20	
		$V_{GS(off)}$ = 3.0 V	MMBF4393		30	
t_{on}	Turn-On Time	$I_{D(on)}$ = 12 mA	MMBF4391		15	ns
		$I_{D(on)}$ = 6.0 mA	MMBF4392		15	
		$I_{D(on)}$ = 3.0 mA	MMBF4393		15	
t_{off}	Turn-Off Time	$V_{GS(off)}$ = 12 V	MMBF4391		20	ns
		$V_{GS(off)}$ = 6.0 V	MMBF4392		35	
		$V_{GS(off)}$ = 3.0 V	MMBF4393		50	

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Physical Dimensions

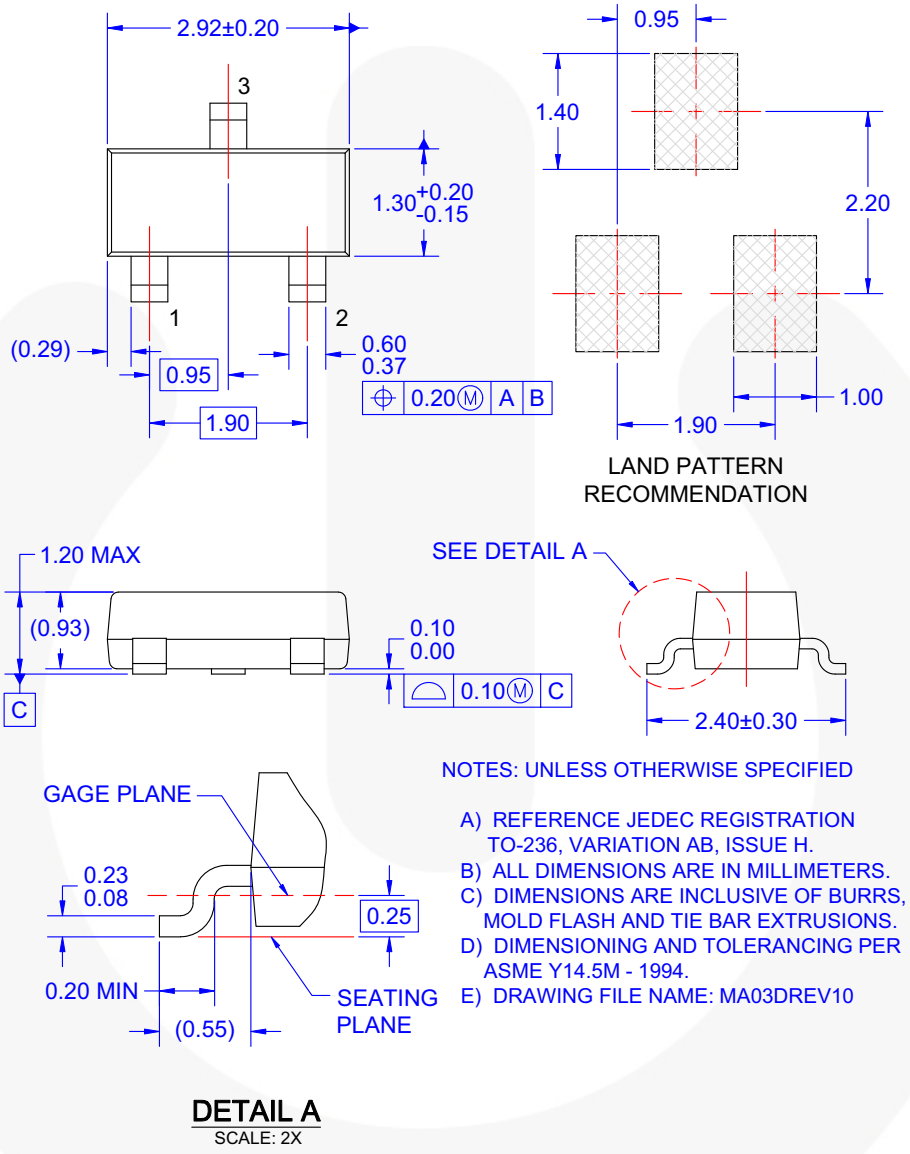

Figure 1. 3-LEAD, SOT23, JEDEC TO-236, LOW PROFILE

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