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# MMBF4091/MMBF4092/MMBF4093 N-Channel Switch

## Features

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



## Ordering Information

Part Number	Top Mark	Package	Packing Method
MMBF4091	61J	SOT 23	Tape and Reel
MMBF4092	61K	SOT 23	Tape and Reel
MMBF4093	61L	SOT 23	Tape and Reel

## Absolute Maximum Ratings<sup>(1), (2)</sup>

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  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$V_{DG}$	Drain-Gate Voltage	40	V
$V_{GS}$	Gate-Source Voltage	-40	V
$I_{GF}$	Forward Gate Current	50	mA
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to 150	$^\circ\text{C}$

### Notes:

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

## Thermal Characteristics

Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Max.	Unit
$P_D$	Total Device Dissipation	350	mW
	Derate Above $25^\circ\text{C}$	2.8	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient <sup>(3)</sup>	357	$^\circ\text{C}/\text{W}$

### Notes:

3. Device mounted on FR-4 PCB, 1.6" x 1.6" x 0.06".

## Electrical Characteristics

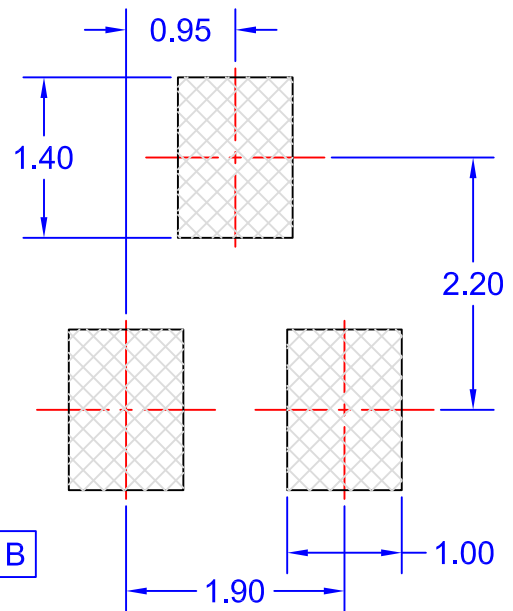
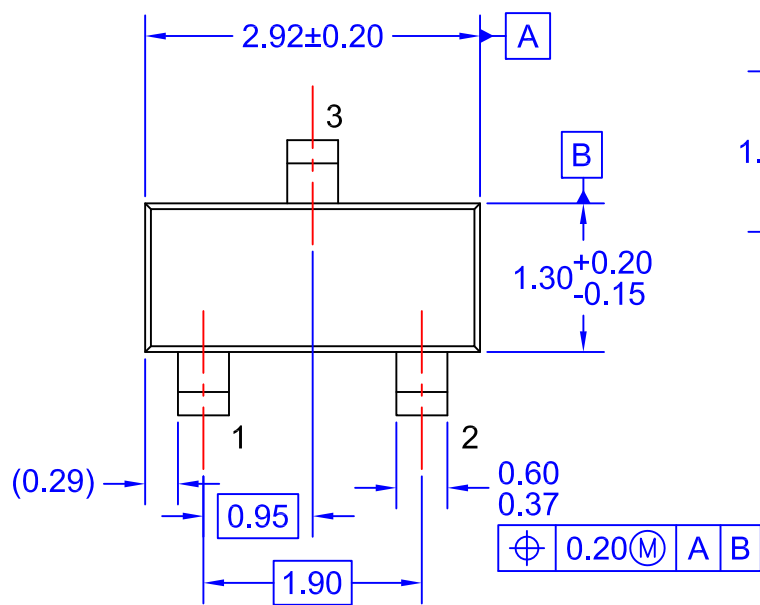
Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Max.	Unit	
<b>Off Characteristics</b>						
$V_{(BR)GSS}$	Gate-Source Breakdown Voltage	$I_G = 1 \mu\text{A}$ , $V_{DS} = 0$	-40		V	
$V_{GS(off)}$	Gate-Source Cut-Off Voltage	$V_{DS} = 20 \text{ V}$ , $I_D = 1 \text{ nA}$	MMBF4091	-5.0	-10.0	V
			MMBF4092	-2.0	-7.0	
			MMBF4093	-1.0	-5.0	
$I_{DGO}$	Drain-Gate Leakage Current	$V_{DS} = 20 \text{ V}$ , $I_s = 0$		-200	pA	
		$V_{DS} = 20 \text{ V}$ , $I_s = 0$ , $T_A = 150^\circ\text{C}$		-400	nA	
$I_D(off)$	Drain Cutoff Leakage Current	$V_{DS} = 20 \text{ V}$ , $V_{GS} = -12 \text{ V}$	MMBF4091		200	pA
		$V_{DS} = 20 \text{ V}$ , $V_{GS} = -8 \text{ V}$	MMBF4092		200	pA
		$V_{DS} = 20 \text{ V}$ , $V_{GS} = -6 \text{ V}$	MMBF4093		200	pA
		$V_{DS} = 20 \text{ V}$ , $V_{GS} = -12 \text{ V}$ , $T_A = 150^\circ\text{C}$	MMBF4091		400	nA
		$V_{DS} = 20 \text{ V}$ , $V_{GS} = -8 \text{ V}$ , $T_A = 150^\circ\text{C}$	MMBF4092		400	nA
		$V_{DS} = 20 \text{ V}$ , $V_{GS} = -6 \text{ V}$ , $T_A = 150^\circ\text{C}$	MMBF4093		400	nA
<b>On Characteristics</b>						
$I_{DSS}$	Zero-Gate Voltage Drain Current <sup>(4)</sup>	$V_{DS} = 20 \text{ V}$ , $I_{GS} = 0$	MMBF4091	30		mA
			MMBF4092	15		
			MMBF4093	8		
$V_{DS(on)}$	Drain-Source On Voltage	$I_D = 6.6 \text{ mA}$ , $V_{GS} = 0$	MMBF4091		0.2	V
		$I_D = 4.0 \text{ mA}$ , $V_{GS} = 0$	MMBF4092		0.2	
		$I_D = 2.5 \text{ mA}$ , $V_{GS} = 0$	MMBF4093		0.2	
$r_{DS(on)}$	Drain-Source On Resistance	$I_D = 1 \text{ mA}$ , $V_{GS} = 0$	MMBF4091		30	$\Omega$
			MMBF4092		50	
			MMBF4093		80	
<b>Small Signal Characteristics</b>						
$r_{DS(on)}$	Drain-Source On Resistance	$V_{DS} = V_{GS} = 0$ , $f = 1 \text{ kHz}$	MMBF4091		30	$\Omega$
			MMBF4092		50	
			MMBF4093		80	
$C_{iss}$	Input Capacitance	$V_{DS} = 20 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1.0 \text{ MHz}$		16	pF	
$C_{rss}$	Reverse Transfer Capacitance	$V_{DS} = -20 \text{ V}$ , $f = 1.0 \text{ MHz}$		5	pF	

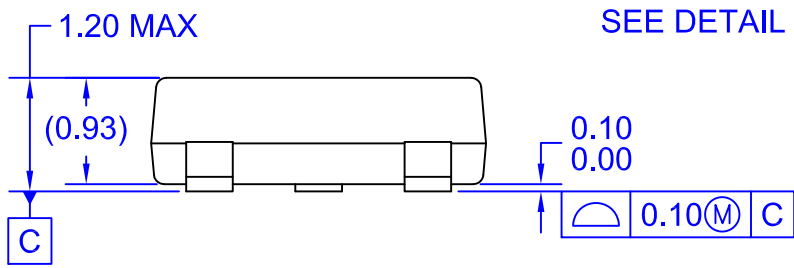
Symbol	Parameter	Conditions	Min.	Max.	Unit	
<b>Switching Characteristics</b>						
$t_{On}$	Turn-On Time	$I_{D(on)} = 12\text{ mA}$	MMBF4091		25	ns
		$I_{D(on)} = 6.0\text{ mA}$	MMBF4092		35	ns
		$I_{D(on)} = 3.0\text{ mA}$	MMBF4093		60	ns
$t_{Off}$	Turn-Off Time	$V_{GS(off)} = 12\text{ V}$	MMBF4091		40	ns
		$V_{GS(off)} = 6.0\text{ V}$	MMBF4092		60	ns
		$V_{GS(off)} = 3.0\text{ V}$	MMBF4093		80	ns

**Note:**

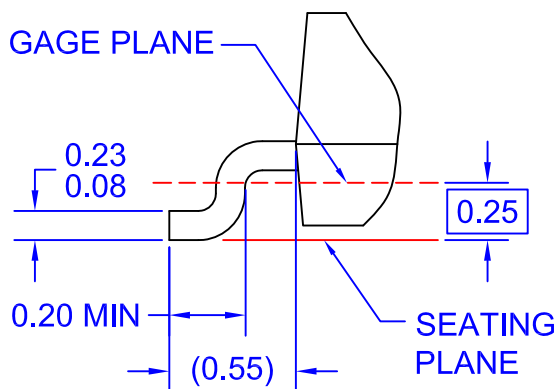
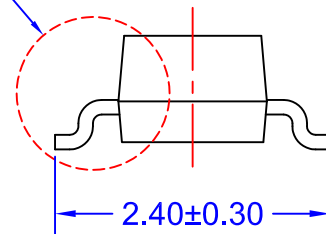
4. Pulse test: pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 1\%$ .



LAND PATTERN  
RECOMMENDATION



SEE DETAIL A




**DETAIL A**  
SCALE: 2X

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