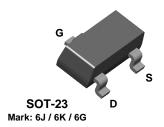


PN4391 PN4392 PN4393 MMBF4391 MMBF4392 **MMBF4393**





NOTE: Source & Drain are interchangeable

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.

Thermal Characteristics TA = 25°C unless otherwise noted

Symbol	Characteristic	Max		Units
		PN4391-4393	*MMBF4391-4393	
P_D	Total Device Dissipation Derate above 25°C	625 5.0	350 2.8	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."

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

N-Channel Switch (continued)

Symbol	Parameter		Min	Max	Units	
OFF CHAF	RACTERISTICS					
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			- 1.0	nA
1000		$V_{GS} = -15 \text{ V}, V_{DS} = 0, T_A = 0$	150°C		- 0.2	μA
V _{GS(off)}	Gate-Source Cutoff Voltage	$V_{DS} = 20 \text{ V}, I_{D} = 1.0 \text{ nA}$	4391	- 4.0	- 10	·V
			4392	- 2.0	- 5.0	V
\ /	Cotto Conses Francis IV allege	1 1 2 3 4 2 4 2	4393	- 0.5	- 3.0	V
V _{GS(f)}	Gate-Source Forward Voltage	$I_G = 1.0 \text{ mA}, V_{DS} = 0$			1.0	V
I _{D(off)}	Drain Cutoff Leakage Current	V _{DS} = 20 V, V _{GS} = -12 V	4391		0.1	nA
		$V_{DS} = 20 \text{ V}, V_{GS} = -7.0 \text{ V}$ $V_{DS} = 20 \text{ V}, V_{GS} = -5.0 \text{ V}$	4392 4393		0.1 0.1	nA nA
		V _{DS} = 20 V, V _{GS} = -3.0 V V _{DS} = 20 V, V _{GS} = -12 V,	4333		0.1	11/4
		$T_A = 150^{\circ}C$	4391		0.2	μΑ
		$V_{DS} = 20 \text{ V}, V_{GS} = -7.0 \text{ V},$				
		T _A = 150°C	4392		0.2	μΑ
		$V_{DS} = 20 \text{ V}, V_{GS} = -5.0 \text{ V},$	4000		0.2	μА
		T _A = 150°C	4393		0.2	μΑ
ON CHARA	ACTERISTICS					
I _{DSS}	Zero-Gate Voltage Drain Current*	$V_{DS} = 20 \text{ V}, V_{GS} = 0$	4391	50	150	mA
			4392	25	75	mA
			4393	5.0	30	mA
$V_{DS(on)}$	Drain-Source On Voltage	$I_D = 12 \text{ mA}, V_{GS} = 0$	4391		0.4	V
		$I_D = 6.0 \text{ mA}, V_{GS} = 0$	4392		0.4	V
_	Drain-Source On Resistance	$I_D = 3.0 \text{ mA}, V_{GS} = 0$	4393		0.4	V
r _{DS(on)}	Drain-Source On Resistance	$I_D = 1.0 \text{ mA}, V_{GS} = 0$	4391 4392		30 60	Ω
			4393		100	Ω
CMALL CI	GNAL CHARACTERISTICS	•				
r _{ds(on)}	Drain-Source On Resistance	$V_{DS} = V_{GS} = 0$, f= 1.0 kHz	4391		30	Ω
rus(on)		1 50 1 60 0,1 110 111 12	4392		60	Ω
			4393		100	Ω
Ciss	Input Capacitance	$V_{DS} = 20, V_{GS} = 0, f = 1.0 M$	Hz		14	pF
C _{rss}	Reverse Transfer Capacitance	V _{GS} = - 12 V, f = 1.0 MHz	4391		3.5	pF
		$V_{GS} = -7.0 \text{ V}, f = 1.0 \text{ MHz}$	4392		3.5	pF
		$V_{GS} = -5.0 \text{ V}, f = 1.0 \text{ MHz}$	4393		3.5	pF
SWITCHIN	NG CHARACTERISTICS					
t _r	Rise Time	I _{D(on)} = 12 mA	4391		5.0	ns
		$I_{D(on)} = 6.0 \text{ mA}$	4392		5.0	ns
		$I_{D(on)} = 3.0 \text{ mA}$	4393		5.0	ns
t _f	Fall Time	V _{GS(off)} = 12 V	4391		15	ns
		$V_{GS(off)} = 6.0 \text{ V}$	4392		20	ns
		$V_{GS(off)} = 3.0 \text{ V}$	4393		30	ns
ton	Turn-On Time	$I_{D(on)} = 12 \text{ mA}$	4391		15	ns
		$I_{D(on)} = 6.0 \text{ mA}$	4392		15	ns
		$I_{D(on)} = 3.0 \text{ mA}$	4393		15	ns
t _{off}	Turn-Off Time	$V_{GS(off)} = 12 V$	4391		20	ns
		$V_{GS(off)} = 6.0 \text{ V}$	4392		35 50	ns ns
	ĺ	$V_{GS(off)} = 3.0 \text{ V}$	4393		50	115

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

TO-92 Tape and Reel Data FAIRCHILD SEMICONDUCTOR TM **TO-92 Packaging** Configuration: Figure 1.0 **TAPE and REEL OPTION** FSCINT Label sample See Fig 2.0 for various Reeling Styles CBVK//418019 **FSCINT** Label 5 Reels per Intermediate Box Customized F63TNR Label sample Label F63TNR LOT: CBVK741B019 QTY: 2000 FSID: PN222N Customized QTY1: QTY2: Label 375mm x 267mm x 375mm Intermediate Box TO-92 TNR/AMMO PACKING INFROMATION **AMMO PACK OPTION** See Fig 3.0 for 2 Ammo Packing Style Quantity EOL code **Pack Options** 2,000 D26Z Е 2,000 D27Z Ammo М 2,000 D74Z D75Z 2,000 **FSCINT** Unit weight = 0.22 gm Reel weight with components = 1.04 kg Ammo weight with components = 1.02 kg Max quantity per intermediate box = 10,000 units Label 5 Ammo boxes per Intermediate Box 327mm x 158mm x 135mm Immediate Box Customized F63TNR Customized Label Label 333mm x 231mm x 183mm Intermediate Box (TO-92) BULK PACKING INFORMATION **BULK OPTION** See Bulk Packing DESCRIPTION QUANTITY Information table J18Z TO-18 OPTION STD 2.0 K / BOX Anti-static Bubble Sheets TO-5 OPTION STD NO LEAD CLIP 1.5 K / BOX J05Z **FSCINT Label** NO EOL TO-92 STANDARD STRAIGHT FOR: PKG 92, NO LEADCLIP 2.0 K / BOX 94 (NON PROELECTRON SERIES), 96 TO-92 STANDARD STRAIGHT FOR: PKG 94 (PROELECTRON SERIES BCXXX, BFXXX, BSRXXX), 97, 98 L34Z NO LEADCLIP 2.0 K / BOX 2000 units per 114mm x 102mm x 51mm EO70 box for std option Immediate Box 5 EO70 boxes per intermediate Box 530mm x 130mm x 83mm Customized Intermediate box Label FSCINT Label 10,000 units maximum per intermediate box for std option

TO-92 Tape and Reel Data, continued

TO-92 Reeling Style Configuration: Figure 2.0

Machine Option "A" (H)



Style "A", D26Z, D70Z (s/h)

Machine Option "E" (J)

Style "E", D27Z, D71Z (s/h)

TO-92 Radial Ammo Packaging Configuration: Figure 3.0



FIRST WIRE OFF IS EMITTER (ON PKG. 92) ADHESIVE TAPE IS ON BOTTOM SIDE FLAT OF TRANSISTOR IS ON BOTTOM



FIRST WIRE OFF IS COLLECTOR (ON PKG. 92) ADHESIVE TAPE IS ON BOTTOM SIDE FLAT OF TRANSISTOR IS ON TOP



TO-92 Package Dimensions



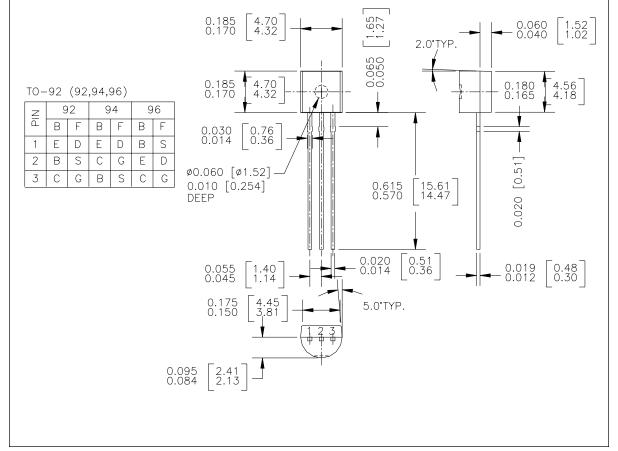
TO-92 (FS PKG Code 92, 94, 96)





Scale 1:1 on letter size paper
Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.1977

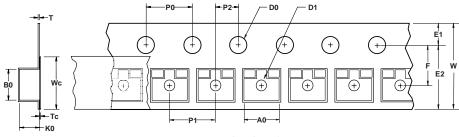




SOT-23 Tape and Reel Data, continued

SOT-23 Embossed Carrier Tape

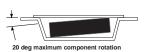
Configuration: Figure 3.0



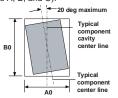
User Direction of Feed	

	Dimensions are in millimeter													
Pkg type	Α0	В0	w	D0	D1	E1	E2	F	P1	P0	K0	Т	Wc	Тс
SOT-23 (8mm)	3.15 +/-0.10	2.77 +/-0.10	8.0 +/-0.3	1.55 +/-0.05	1.125 +/-0.125	1.75 +/-0.10	6.25 min	3.50 +/-0.05	4.0 +/-0.1	4.0 +/-0.1	1.30 +/-0.10	0.228 +/-0.013	5.2 +/-0.3	0.06 +/-0.02

Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation

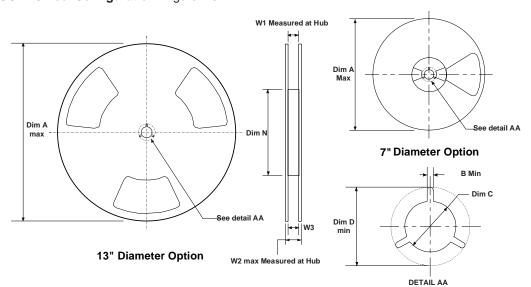


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

SOT-23 Reel Configuration: Figure 4.0



	Dimensions are in inches and millimeters								
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 - 0.429 7.9 - 10.9
8mm	13" Dia	13.00 330	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	4.00 100	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 - 0.429 7.9 - 10.9



SOT-23 (FS PKG Code 49)

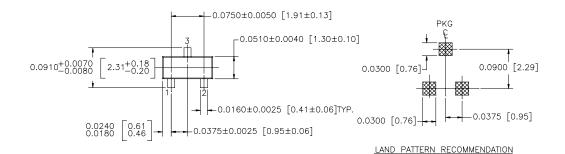


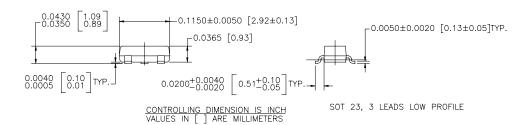


Scale 1:1 on letter size paper

Dimensions shown below are in: inches [millimeters]

Part Weight per unit (gram): 0.0082





NOTE: UNLESS OTHERWISE SPECIFIED

- 1. STANDARD LEAD FINISH 150 MICROINCHES / 3.81 MICROMETERS MINIMUM TIN / LEAD (SOLDER) ON ALLOY 42
- 2. REFERENCE JEDEC REGISTRATION TO-236, VARIATION AB, ISSUE G, DATED JUL 1993

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