MPF4392, MPF4393

Preferred Devices

JFET Switching Transistors

N−Channel − Depletion

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain−Source Voltage	V_{DS}	30	Vdc
Drain−Gate Voltage	V_{DG}	30	Vdc
Gate−Source Voltage	V_{GS}	30	Vdc
Forward Gate Current	$I_{G(f)}$	50	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	 350 2.8	 mW mW/°C
Operating and Storage Channel Temperature Range	$T_{channel}$, T_{stg}	−65 to +150	°C

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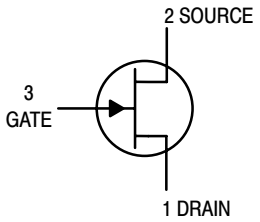
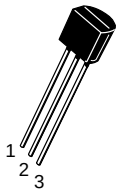




TO−92 (TO−226AA)
CASE 29−11
STYLE 5

Preferred devices are recommended choices for future use and best overall value.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Gate−Source Breakdown Voltage (I_G = 1.0 μAdc, V_{DS} = 0)		$V_{(BR)GSS}$	30	−	−	Vdc
Gate Reverse Current		I_{GSS}				
(V_{GS} = 15 Vdc, V_{DS} = 0)			−	−	1.0	nAdc
(V_{GS} = 15 Vdc, V_{DS} = 0, T_A = 100°C)			−	−	0.2	μAdc
Drain−Cutoff Current		$I_{D(off)}$				
(V_{DS} = 15 Vdc, V_{GS} = 12 Vdc)			−	−	1.0	nAdc
(V_{DS} = 15 Vdc, V_{GS} = 12 Vdc, T_A = 100°C)			−	−	0.1	μAdc
Gate Source Voltage		V_{GS}				Vdc
(V_{DS} = 15 Vdc, I_D = 10 nAdc)	MPF4392		−2.0	−	−5.0	
	MPF4393		−0.5	−	−3.0	
ON CHARACTERISTICS						
Zero−Gate−Voltage Drain Current[1]		I_{DSS}				mAdc
(V_{DS} = 15 Vdc, V_{GS} = 0)	MPF4392		25	−	75	
	MPF4393		5.0	−	30	
Drain−Source On−Voltage		$V_{DS(on)}$				Vdc
(I_D = 6.0 mAdc, V_{GS} = 0)	MPF4392		−	−	0.4	
(I_D = 3.0 mAdc, V_{GS} = 0)	MPF4393		−	−	0.4	
Static Drain−Source On Resistance		$r_{DS(on)}$				Ω
(I_D = 1.0 mAdc, V_{GS} = 0)	MPF4392		−	−	60	
	MPF4393		−	−	100	
SMALL−SIGNAL CHARACTERISTICS						
Forward Transfer Admittance		$\|y_{fs}\|$				mmhos
(V_{DS} = 15 Vdc, I_D = 25 mAdc, f = 1.0 kHz)	MPF4392		−	17	−	
(V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 1.0 kHz)	MPF4393		−	12	−	
Drain−Source “ON” Resistance		$r_{ds(on)}$				Ω
(V_{GS} = 0, I_D = 0, f = 1.0 kHz)	MPF4392		−	−	60	
	MPF4393		−	−	100	
Input Capacitance (V_{GS} = 15 Vdc, V_{DS} = 0, f = 1.0 MHz)		C_{iss}	−	6.0	10	pF
Reverse Transfer Capacitance		C_{rss}				pF
(V_{GS} = 12 Vdc, V_{DS} = 0, f = 1.0 MHz)			−	2.5	3.5	
(V_{DS} = 15 Vdc, I_D = 10 mAdc, f = 1.0 MHz)			−	3.2	−	
SWITCHING CHARACTERISTICS						
Rise Time (See Figure 2)		t_r				ns
($I_{D(on)}$ = 6.0 mAdc)	MPF4392		−	2.0	5.0	
($I_{D(on)}$ = 3.0 mAdc)	MPF4393		−	2.5	5.0	
Fall Time (See Figure 4)		t_f				ns
($V_{GS(off)}$ = 7.0 Vdc)	MPF4392		−	15	20	
($V_{GS(off)}$ = 5.0 Vdc)	MPF4393		−	29	35	
Turn−On Time (See Figures 1 and 2)		t_{on}				ns
($I_{D(on)}$ = 6.0 mAdc)	MPF4392		−	4.0	15	
($I_{D(on)}$ = 3.0 mAdc)	MPF4393		−	6.5	15	
Turn−Off Time (See Figures 3 and 4)		t_{off}				ns
($V_{GS(off)}$ = 7.0 Vdc)	MPF4392		−	20	35	
($V_{GS(off)}$ = 5.0 Vdc)	MPF4393		−	37	55	

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 3.0%.

TYPICAL SWITCHING CHARACTERISTICS

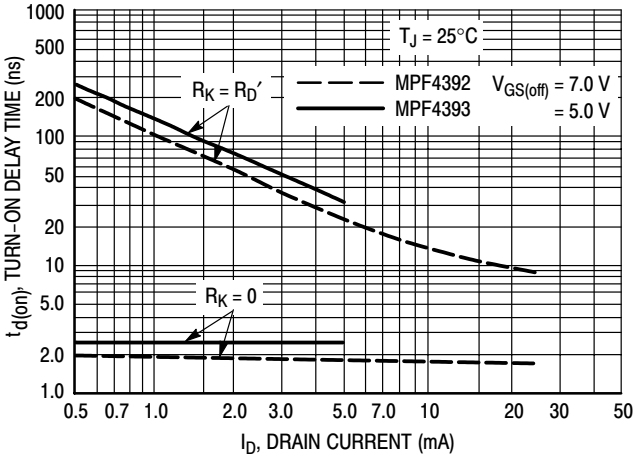


Figure 1. Turn−On Delay Time

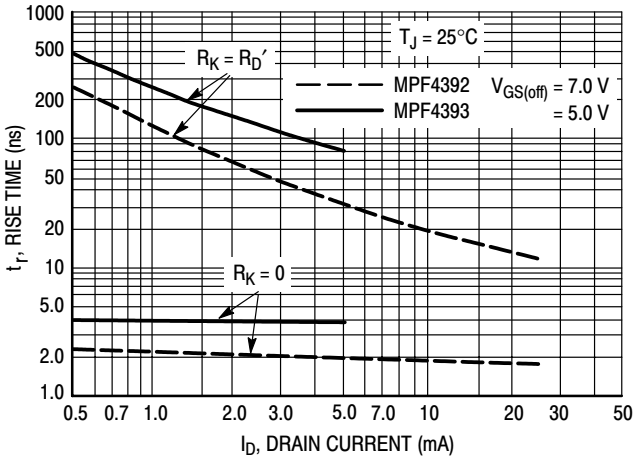


Figure 2. Rise Time

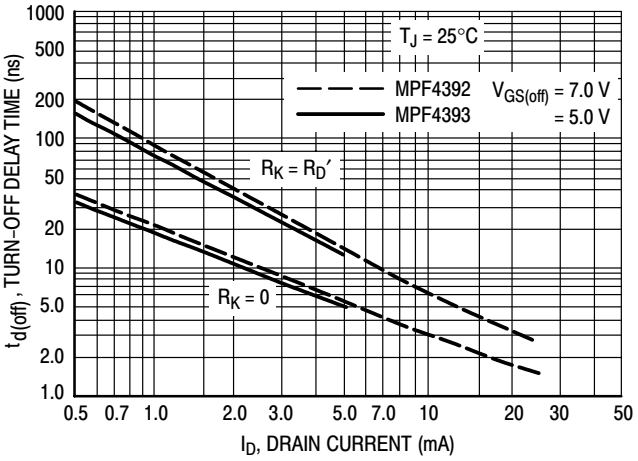


Figure 3. Turn−Off Delay Time

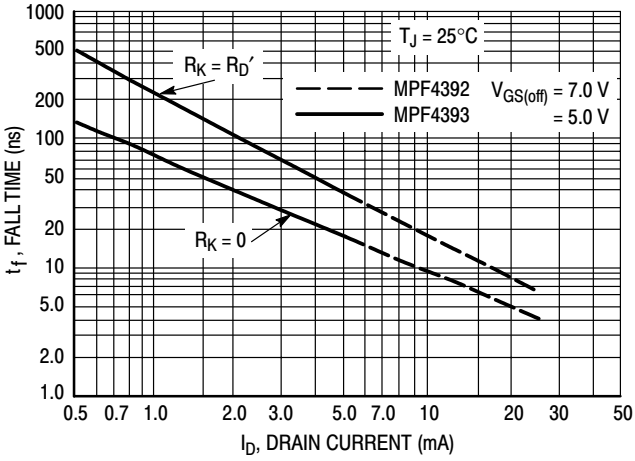


Figure 4. Fall Time

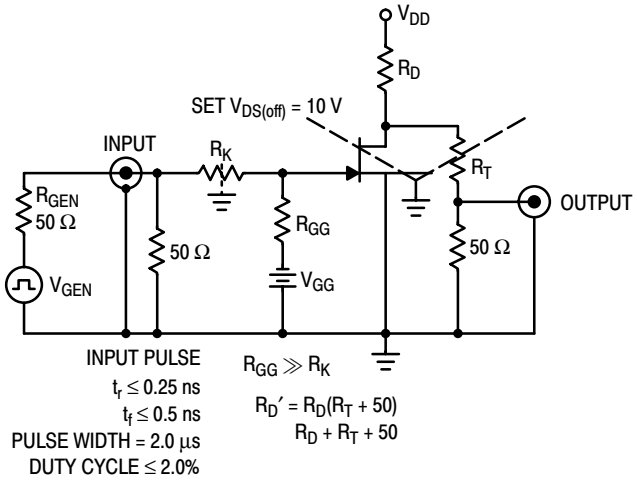


Figure 5. Switching Time Test Circuit

NOTE 1

The switching characteristics shown above were measured using a test circuit similar to Figure 5. At the beginning of the switching interval, the gate voltage is at Gate Supply Voltage ($-V_{GG}$). The Drain−Source Voltage (V_{DS}) is slightly lower than Drain Supply Voltage (V_{DD}) due to the voltage divider. Thus Reverse Transfer Capacitance (C_{rss}) or Gate−Drain Capacitance (C_{gd}) is charged to $V_{GG} + V_{DS}$.

During the turn−on interval, Gate−Source Capacitance (C_{gs}) discharges through the series combination of R_{Gen} and R_K. C_{gd} must discharge to $V_{DS(on)}$ through R_G and R_K in series with the parallel combination of effective load impedance (R'_D) and Drain−Source Resistance (r_{ds}). During the turn−off, this charge flow is reversed.

Predicting turn−on time is somewhat difficult as the channel resistance r_{ds} is a function of the gate−source voltage. While C_{gs} discharges, V_{GS} approaches zero and r_{ds} decreases. Since C_{gd} discharges through r_{ds}, turn−on time is non−linear. During turn−off, the situation is reversed with r_{ds} increasing as C_{gd} charges.

The above switching curves show two impedance conditions: 1) R_K is equal to R_D' which simulates the switching behavior of cascaded stages where the driving source impedance is normally the load impedance of the previous stage, and 2) $R_K = 0$ (low impedance) the driving source impedance is that of the generator.

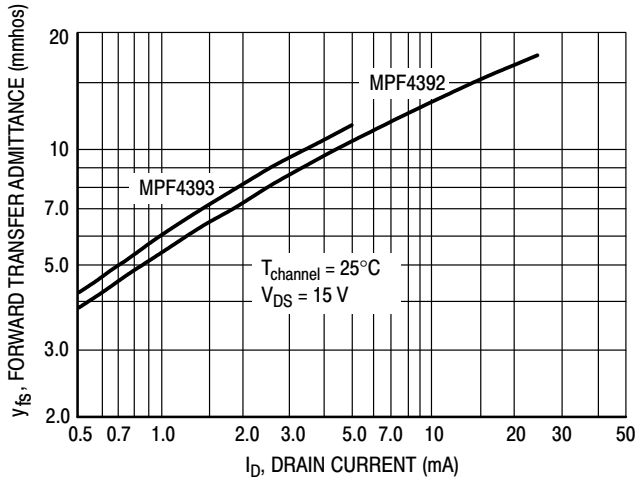


Figure 6. Typical Forward Transfer Admittance

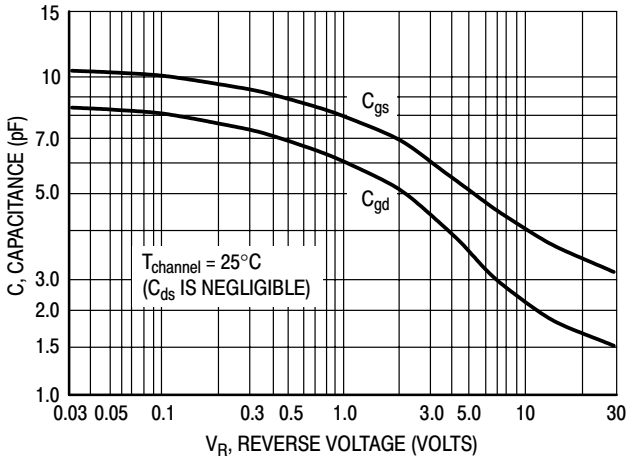


Figure 7. Typical Capacitance

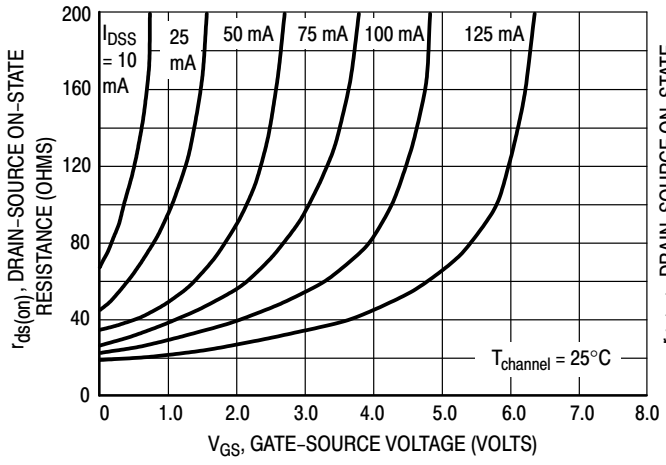


Figure 8. Effect of Gate−Source Voltage On Drain−Source Resistance

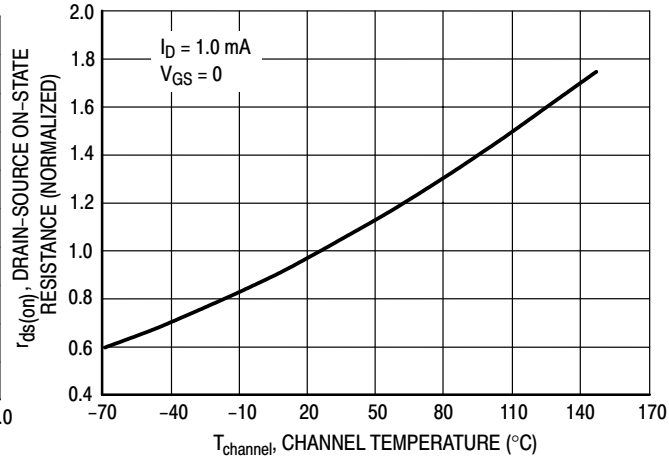


Figure 9. Effect of Temperature On Drain−Source On−State Resistance

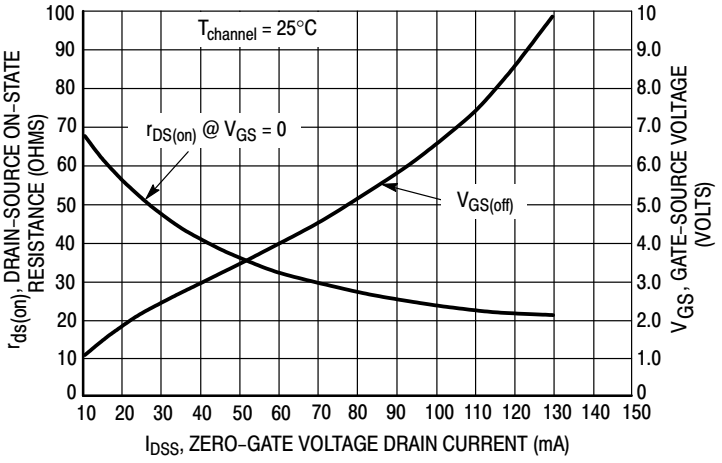


Figure 10. Effect of I_{DSS} On Drain−Source Resistance and Gate−Source Voltage

NOTE 2

The Zero−Gate−Voltage Drain Current (I_{DSS}), is the principle determinant of other J−FET characteristics. Figure 10 shows the relationship of Gate−Source Off Voltage ($V_{GS(off)}$) and Drain−Source On Resistance ($r_{ds(on)}$) to I_{DSS}. Most of the devices will be within ±10% of the values shown in Figure 10. This data will be useful in predicting the characteristic variations for a given part number.

For example:

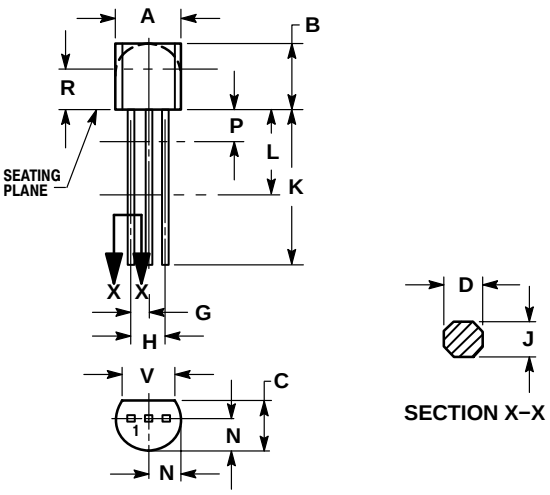
Unknown

$r_{ds(on)}$ and V_{GS} range for an MPF4392

The electrical characteristics table indicates that an MPF4392 has an I_{DSS} range of 25 to 75 mA. Figure 10 shows $r_{ds(on)}$ = 52 Ohms for I_{DSS} = 25 mA and 30 Ohms for I_{DSS} = 75 mA. The corresponding V_{GS} values are 2.2 volts and 4.8 volts.

PACKAGE DIMENSIONS

TO−92 (TO−226)
CASE 29−11
ISSUE AL



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---

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