

# MPF930, MPF960, MPF990

Preferred Device

## Small Signal MOSFET 2 Amps, 35, 60, 90 Volts N-Channel TO-92

### MAXIMUM RATINGS

Rating	Symbol	MPF930	MPF960	MPF990	Unit
Drain-Source Voltage	$V_{DS}$	35	60	90	Vdc
Drain-Gate Voltage	$V_{DG}$	35	60	90	Vdc
Gate-Source Voltage – Continuous – Non-repetitive ( $t_p \leq 50 \mu s$ )	$V_{GS}$ $V_{GSM}$		$\pm 20$ $\pm 40$		Vdc Vpk
Drain Current Continuous (Note 1.) Pulsed (Note 2.)	$I_D$ $I_{DM}$		2.0	3.0	Adc
Total Device Dissipation @ $T_A = 25^\circ C$ Derate above $25^\circ C$	$P_D$		1.0 8.0		Watts mW/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$		–55 to 150		$^\circ C$
Thermal Resistance	$\theta_{JA}$		125		$^\circ C/W$

1. The Power Dissipation of the package may result in a lower continuous drain current.
2. Pulse Test: Pulse Width  $\leq 300 \mu s$ , Duty Cycle  $\leq 2.0\%$ .

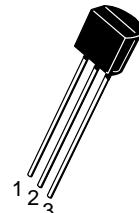
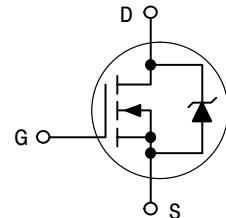


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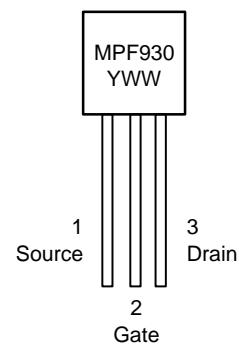
**2 AMPERES**  
**35, 60, 90 VOLTS**  
 **$R_{DS(on)} = 0.7 \Omega$  (MPF930)**  
 **$R_{DS(on)} = 0.8 \Omega$  (MPF960)**  
 **$R_{DS(on)} = 1.2 \Omega$  (MPF990)**

N-Channel



TO-92  
CASE 29  
Style 22

### MARKING DIAGRAM & PIN ASSIGNMENT



Y = Year  
WW = Work Week

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

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

# MPF930, MPF960, MPF990

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 10 µAdc)	V <sub>(BR)DSX</sub>	35	—	—	Vdc
MPF930		60	—	—	
MPF960		90	—	—	
MPF990					
Gate Reverse Current (V <sub>GS</sub> = 15 Vdc, V <sub>DS</sub> = 0)	I <sub>GSS</sub>	—	—	50	nAdc

ON CHARACTERISTICS (Note 2.)

Zero-Gate-Voltage Drain Current (V <sub>DS</sub> = Maximum Rating, V <sub>GS</sub> = 0)	I <sub>DSS</sub>	—	—	10	µAdc
Gate Threshold Voltage (I <sub>D</sub> = 1.0 mA, V <sub>DS</sub> = V <sub>GS</sub> )	V <sub>GS(Th)</sub>	1.0	—	3.5	Vdc
Drain-Source On-Voltage (V <sub>GS</sub> = 10 Vdc) (I <sub>D</sub> = 0.5 Adc)	V <sub>DS(on)</sub>	—	0.4	0.7	Vdc
MPF930		—	0.6	0.8	
MPF960		—	0.6	1.2	
MPF990		—	0.9	1.4	
(I <sub>D</sub> = 1.0 Adc)	MPF930	—	1.2	1.7	
MPF960		—	1.2	2.4	
MPF990		—	2.2	3.0	
(I <sub>D</sub> = 2.0 Adc)	MPF930	—	2.8	3.5	
MPF960		—	2.8	4.8	
MPF990		—	2.8		
Static Drain-Source On Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 1.0 Adc)	r <sub>DS(on)</sub>	—	0.9	1.4	Ω
MPF930		—	1.2	1.7	
MPF960		—	1.2	2.0	
MPF990		—			
On-State Drain Current (V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 10 Vdc)	I <sub>D(on)</sub>	1.0	2.0	—	Amps

## SMALL-SIGNAL CHARACTERISTICS

Input Capacitance (V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0, f = 1.0 MHz)	C <sub>iss</sub>	—	70	—	pF
Reverse Transfer Capacitance (V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0, f = 1.0 MHz)	C <sub>rss</sub>	—	20	—	pF
Output Capacitance (V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0, f = 1.0 MHz)	C <sub>oss</sub>	—	49	—	pF
Forward Transconductance (V <sub>DS</sub> = 25 Vdc, I <sub>D</sub> = 0.5 Adc)	g <sub>fs</sub>	200	380	—	mmhos

## SWITCHING CHARACTERISTICS

Turn-On Time	t <sub>on</sub>	—	7.0	15	ns
Turn-Off Time	t <sub>off</sub>	—	7.0	15	ns

2. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%.

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## RESISTIVE SWITCHING

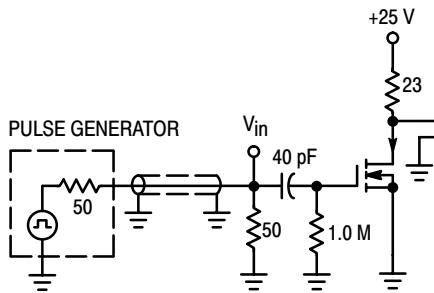


Figure 1. Switching Test Circuit

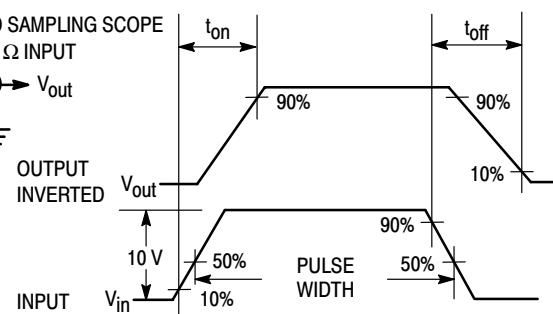


Figure 2. Switching Waveforms

## ORDERING INFORMATION

Device	Package	Shipping
MPF930	TO-92	1000 Unit/Box
MPF930RLRE	TO-92	2000 Tape & Reel
MPF930A	TO-92	1000 Unit/Box
MPF930ARLRE	TO-92	2000 Tape & Reel
MPF960	TO-92	1000 Unit/Box
MPF960RLRA	TO-92	2000 Tape & Reel
MPF990	TO-92	1000 Unit/Box
MPF990RLRA	TO-92	2000 Tape & Reel
MPF990RLRP	TO-92	2000 Ammo Pack

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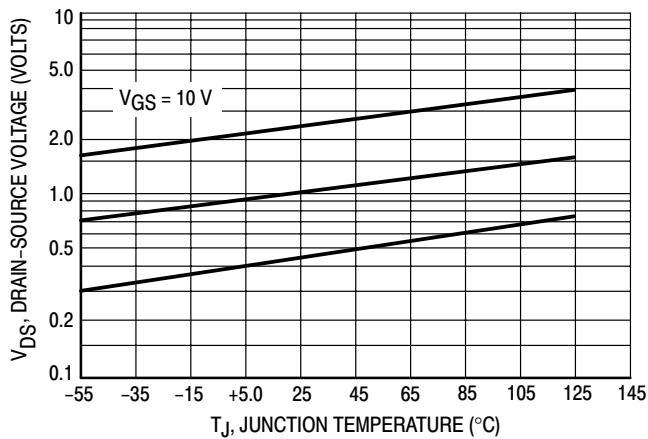


Figure 3. On Voltage versus Temperature

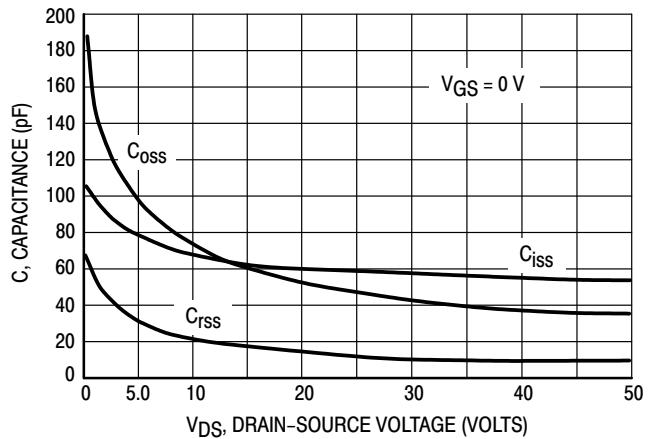


Figure 4. Capacitance Variation

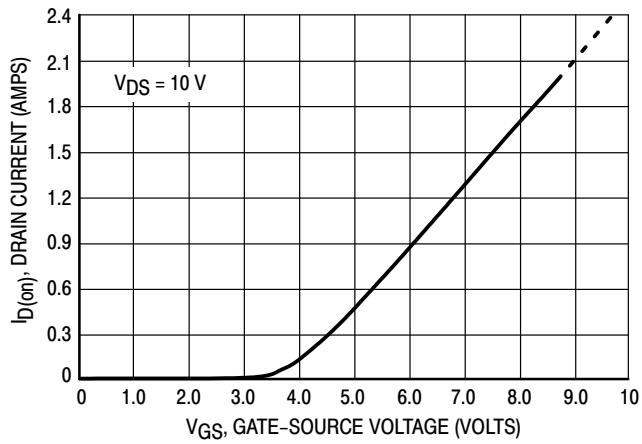


Figure 5. Transfer Characteristic

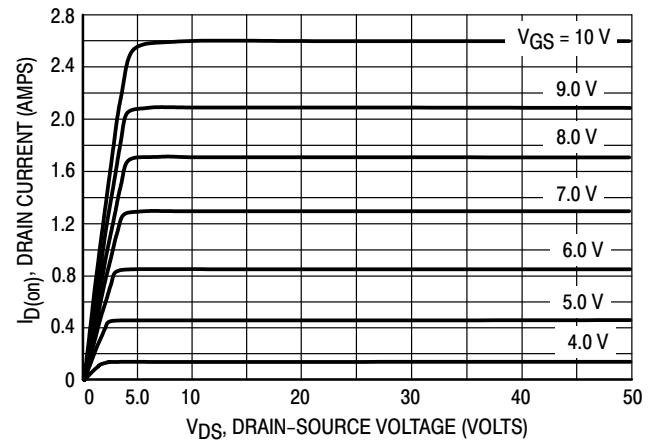


Figure 6. Output Characteristic

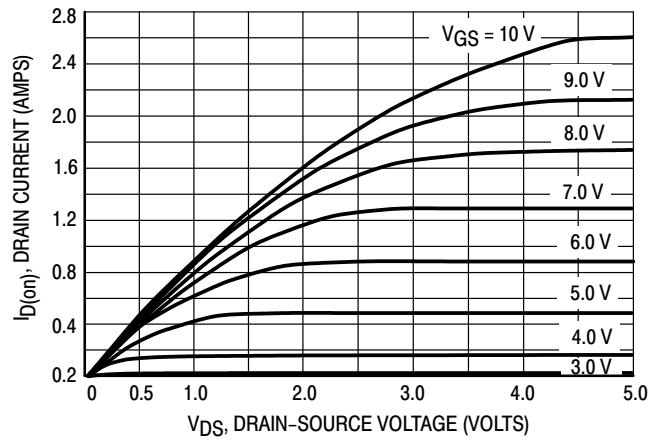
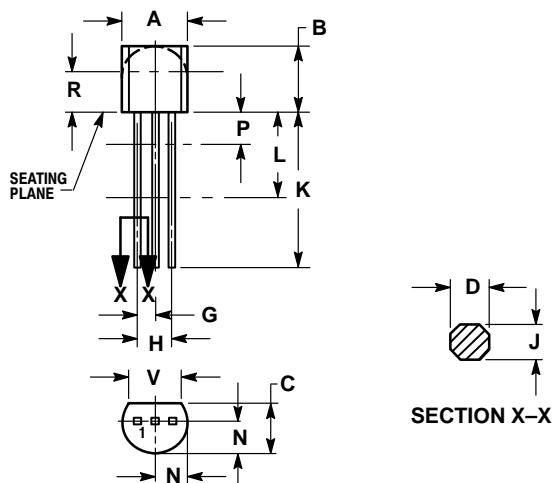


Figure 7. Saturation Characteristic

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## PACKAGE DIMENSIONS

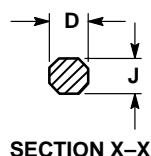
TO-92  
CASE 29-11  
ISSUE AL



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.

DIM	INCHES		MILLIMETERS	
	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	---



STYLE 22:  
PIN 1. SOURCE  
2. GATE  
3. DRAIN

## **Notes**

## **Notes**

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