



# MPF930, MPF960, MPF990

Preferred Device

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



ON Semiconductor

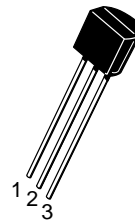
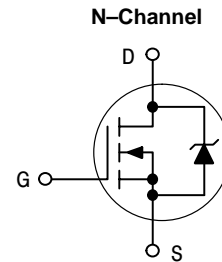
<http://onsemi.com>

**2 AMPERES**  
**35, 60, 90 VOLTS**  
**RDS(on) = 0.7 Ω (MPF930)**  
**RDS(on) = 0.8 Ω (MPF960)**  
**RDS(on) = 1.2 Ω (MPF990)**

### MAXIMUM RATINGS

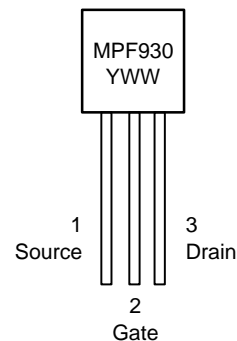
Rating	Symbol	MPF930	MPF960	MPF990	Unit
Drain-Source Voltage	V <sub>DS</sub>	35	60	90	Vdc
Drain-Gate Voltage	V <sub>DG</sub>	35	60	90	Vdc
Gate-Source Voltage - Continuous - Non-repetitive (t <sub>p</sub> ≤ 50 μs)	V <sub>GS</sub> V <sub>GSM</sub>		±20 ±40		Vdc Vpk
Drain Current Continuous (Note 1.) Pulsed (Note 2.)	I <sub>D</sub> I <sub>DM</sub>		2.0 3.0		Adc
Total Device Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>		1.0 8.0		Watts mW/°C
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>		-55 to 150		°C
Thermal Resistance	θ <sub>JA</sub>		125		°C/W

1. The Power Dissipation of the package may result in a lower continuous drain current.
2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.



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 (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 10 μAdc)	MPF930 MPF960 MPF990	V <sub>(BR)DSX</sub>	35 60 90	- - -	- - -	Vdc
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 mAdc, 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)	MPF930 MPF960 MPF990	V <sub>DS(on)</sub>	- - -	0.4 0.6 0.6	0.7 0.8 1.2	Vdc
(I <sub>D</sub> = 1.0 Adc)	MPF930 MPF960 MPF990		- - -	0.9 1.2 1.2	1.4 1.7 2.4	
(I <sub>D</sub> = 2.0 Adc)	MPF930 MPF960 MPF990		- - -	2.2 2.8 2.8	3.0 3.5 4.8	
Static Drain-Source On Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 1.0 Adc)	MPF930 MPF960 MPF990	r <sub>DS(on)</sub>	- - -	0.9 1.2 1.2	1.4 1.7 2.0	Ω
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%.

# MPF930, MPF960, MPF990

## RESISTIVE SWITCHING

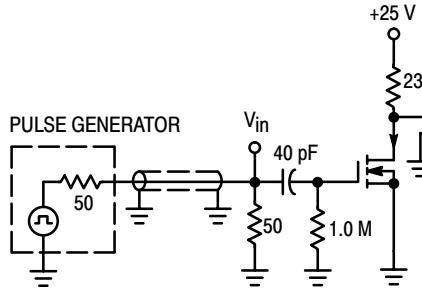


Figure 1. Switching Test Circuit

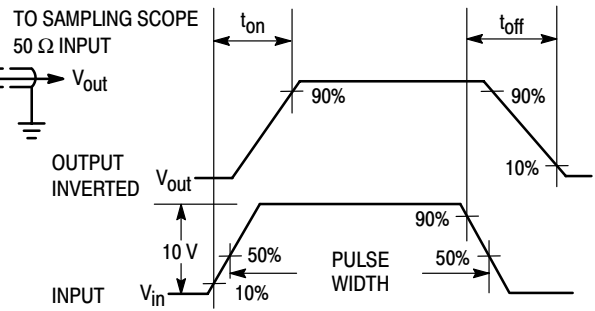


Figure 2. Switching Waveforms

## 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

# MPF930, MPF960, MPF990

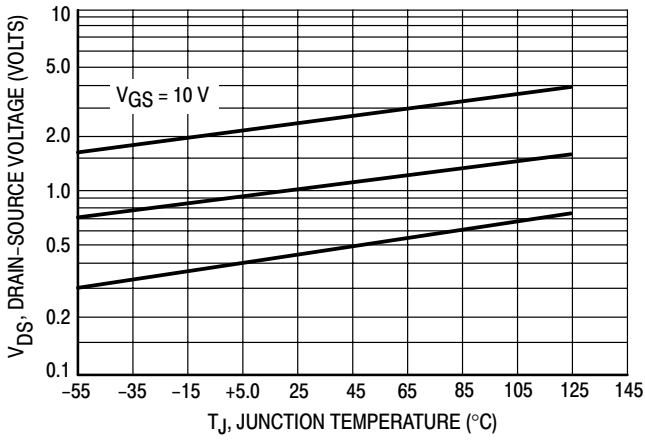


Figure 3. On Voltage versus Temperature

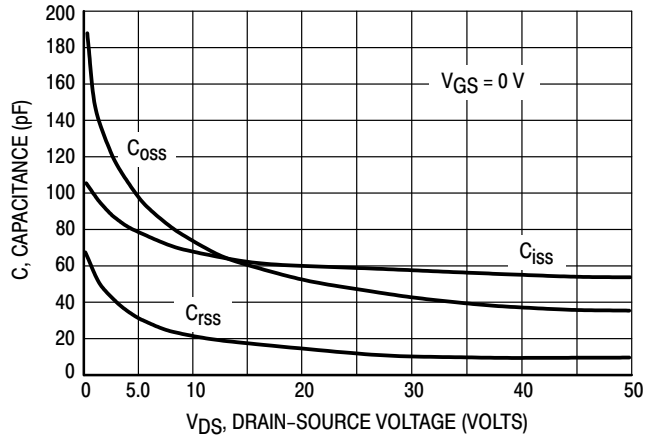


Figure 4. Capacitance Variation

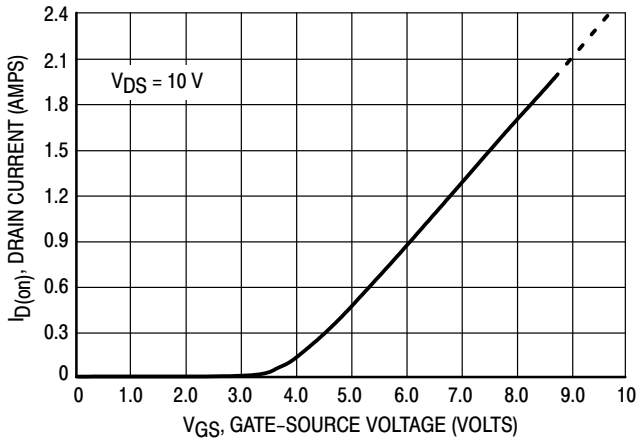


Figure 5. Transfer Characteristic

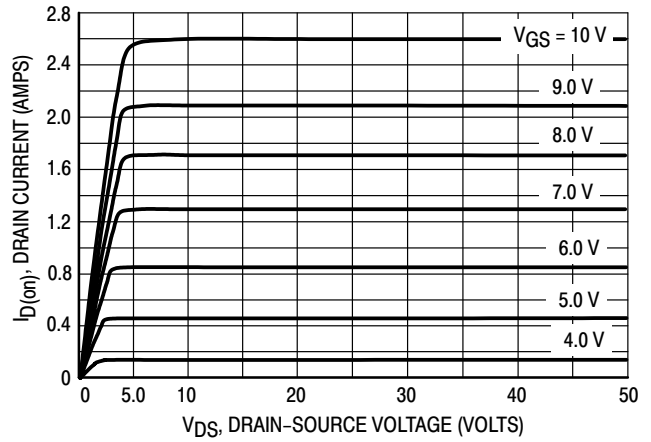


Figure 6. Output Characteristic

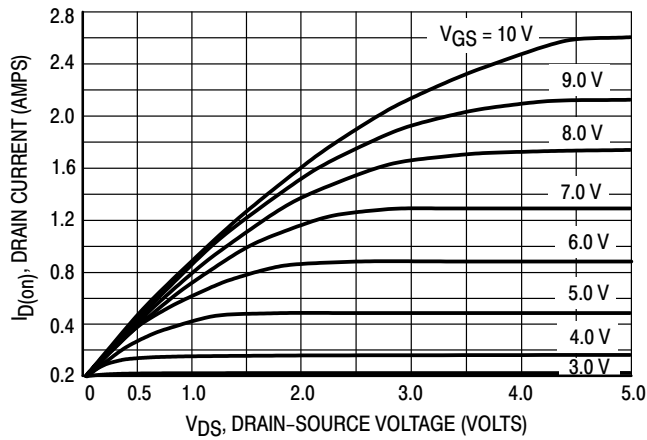
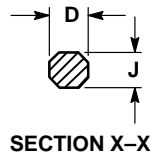
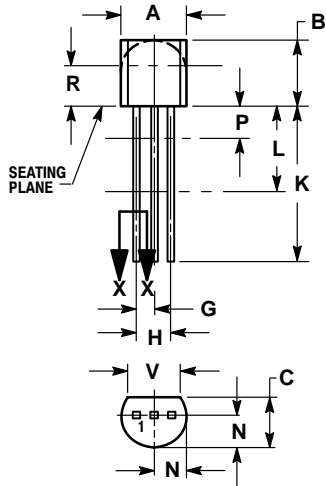


Figure 7. Saturation Characteristic

# MPF930, MPF960, MPF990

## 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
  - GATE
  - DRAIN

## Notes

**Notes**

# MPF930, MPF960, MPF990

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