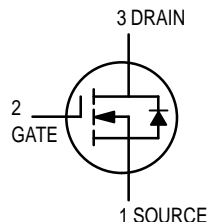
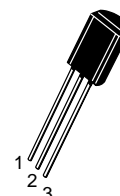


# TMOS Switching

## N-Channel — Enhancement



**MPF930**  
**MPF960**  
**MPF990**



CASE 29-05, STYLE 22  
TO-92 (TO-226AE)

### 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(1) Pulsed(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		$^\circ C/W$

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ C$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage ( $V_{GS} = 0, I_D = 10 \mu A_{dc}$ )	MPF930 MPF960 MPF990	$V_{(BR)DSX}$	35 60 90	— — —	— — —	Vdc
Gate Reverse Current ( $V_{GS} = 15 V_{dc}, V_{DS} = 0$ )		$I_{GSS}$	—	—	50	nAdc

### ON CHARACTERISTICS(2)

Zero-Gate-Voltage Drain Current ( $V_{DS} = \text{Maximum Rating}, V_{GS} = 0$ )		$I_{DSS}$	—	—	10	$\mu A_{dc}$
Gate Threshold Voltage ( $I_D = 1.0 \text{ mAdc}, V_{DS} = V_{GS}$ )		$V_{GS(Th)}$	1.0	—	3.5	Vdc
Drain-Source On-Voltage ( $V_{GS} = 10 V_{dc}$ ) ( $I_D = 0.5 \text{ Adc}$ )	MPF930 MPF960 MPF990	$V_{DS(on)}$	— — —	0.4 0.6 0.6	0.7 0.8 1.2	Vdc
( $I_D = 1.0 \text{ Adc}$ )	MPF930 MPF960 MPF990		— — —	0.9 1.2 1.2	1.4 1.7 2.4	
( $I_D = 2.0 \text{ Adc}$ )	MPF930 MPF960 MPF990		— — —	2.2 2.8 2.8	3.0 3.5 4.8	

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

# MPF930 MPF960 MPF990

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS(2) (Continued)</b>					
Static Drain-Source On Resistance ( $V_{GS} = 10\text{ Vdc}$ , $I_D = 1.0\text{ Adc}$ )	$r_{DS(on)}$	—	0.9	1.4	$\Omega$
	MPF930	—	1.2	1.7	
	MPF960	—	1.2	2.0	
	MPF990	—	—	—	
On-State Drain Current ( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 10\text{ Vdc}$ )	$I_{D(on)}$	1.0	2.0	—	Amps

## SMALL-SIGNAL CHARACTERISTICS

Input Capacitance ( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$	—	70	—	pF
Reverse Transfer Capacitance ( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1.0\text{ MHz}$ )	$C_{rss}$	—	20	—	pF
Output Capacitance ( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1.0\text{ MHz}$ )	$C_{oss}$	—	49	—	pF
Forward Transconductance ( $V_{DS} = 25\text{ Vdc}$ , $I_D = 0.5\text{ Adc}$ )	$g_{fs}$	200	380	—	mmhos

## SWITCHING CHARACTERISTICS

Turn-On Time	$t_{on}$	—	7.0	15	ns
Turn-Off Time	$t_{off}$	—	7.0	15	ns

2. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

## RESISTIVE SWITCHING

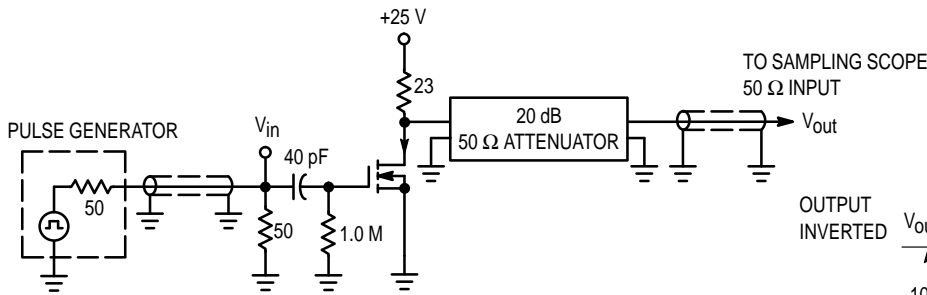


Figure 1. Switching Test Circuit

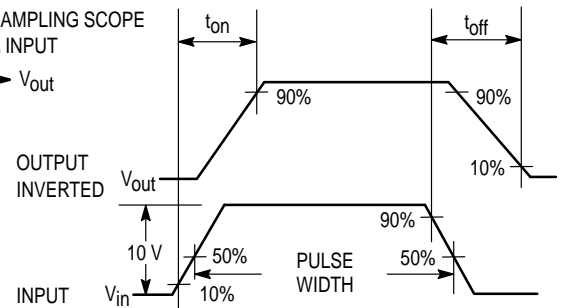


Figure 2. Switching Waveforms

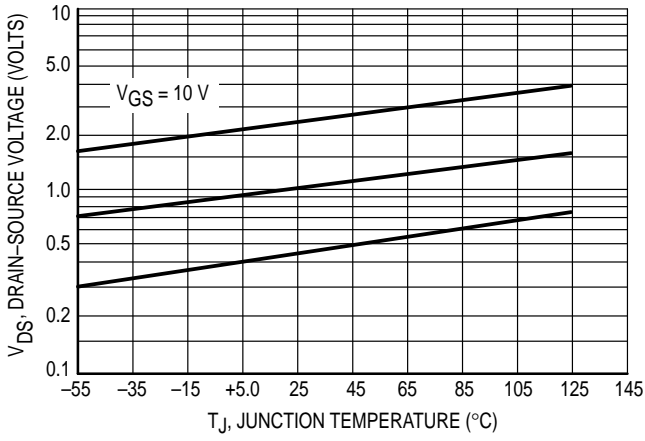


Figure 3. On Voltage versus Temperature

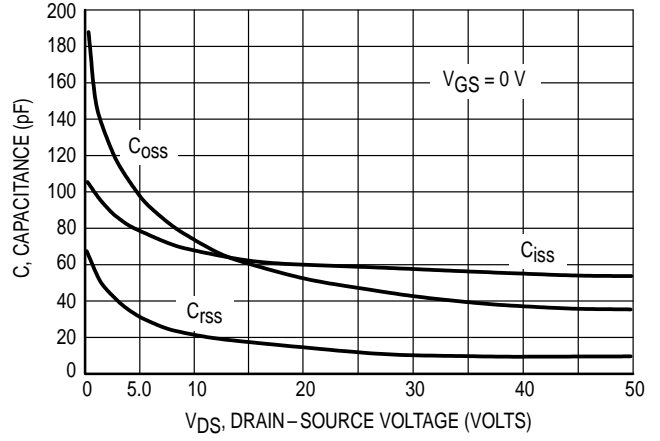


Figure 4. Capacitance Variation

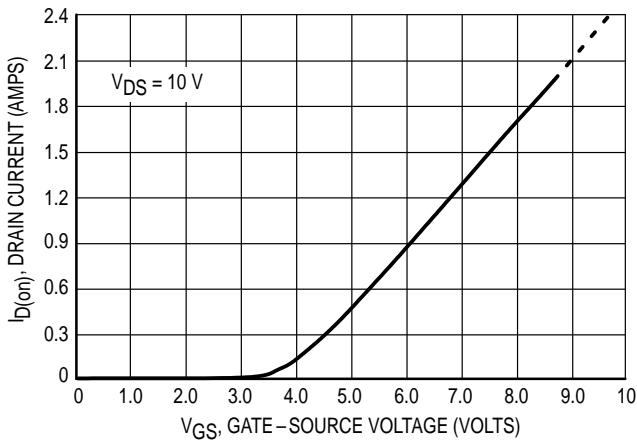


Figure 5. Transfer Characteristic

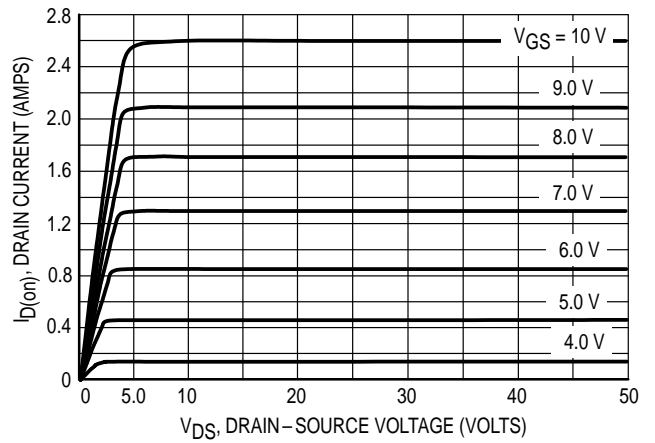


Figure 6. Output Characteristic

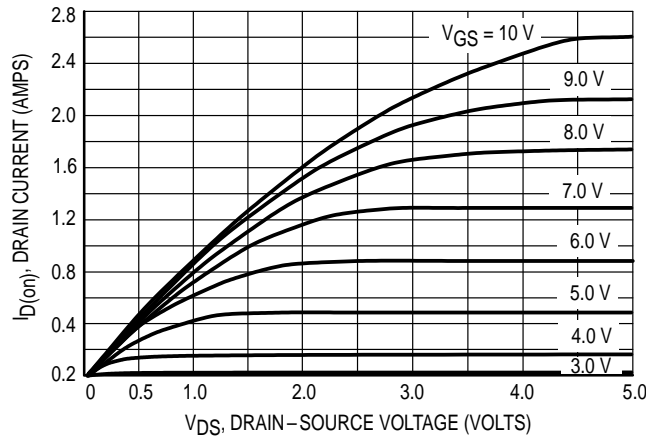
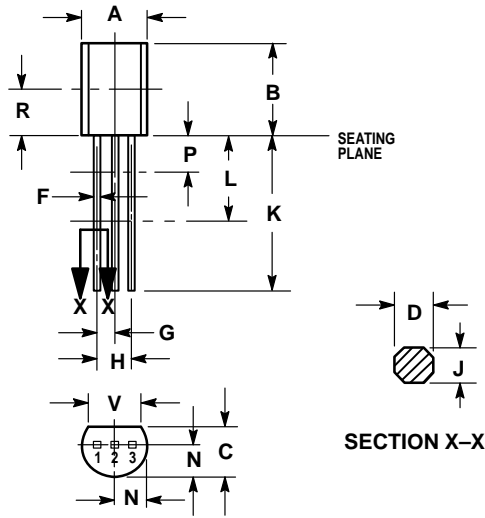


Figure 7. Saturation Characteristic

PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
  4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSIONS D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.44	5.21
B	0.290	0.310	7.37	7.87
C	0.125	0.165	3.18	4.19
D	0.018	0.022	0.46	0.56
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.018	0.024	0.46	0.61
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	0.135	—	3.43	—
V	0.135	—	3.43	—

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

CASE 029-05  
 (TO-226AE)  
 ISSUE AD

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