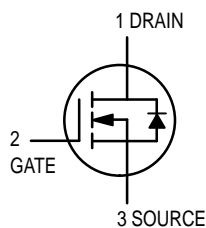
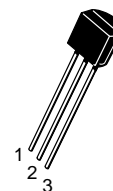


# TMOS FET Switching

## N-Channel — Enhancement



**BS170**



CASE 29-04, STYLE 30  
TO-92 (TO-226AA)

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	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 <sup>(1)</sup>	$I_D$	0.5	Adc
Total Device Dissipation @ $T_A = 25^\circ C$	$P_D$	350	mW
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ C$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Gate Reverse Current ( $V_{GS} = 15 \text{ Vdc}, V_{DS} = 0$ )	$I_{GSS}$	—	0.01	10	nAdc
Drain-Source Breakdown Voltage ( $V_{GS} = 0, I_D = 100 \mu A$ )	$V_{(BR)DSS}$	60	90	—	Vdc

### ON CHARACTERISTICS<sup>(2)</sup>

Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 1.0 \text{ mAdc}$ )	$V_{GS(Th)}$	0.8	2.0	3.0	Vdc
Static Drain-Source On Resistance ( $V_{GS} = 10 \text{ Vdc}, I_D = 200 \text{ mAdc}$ )	$r_{DS(on)}$	—	1.8	5.0	$\Omega$
Drain Cutoff Current ( $V_{DS} = 25 \text{ Vdc}, V_{GS} = 0 \text{ Vdc}$ )	$I_{D(off)}$	—	—	0.5	$\mu A$
Forward Transconductance ( $V_{DS} = 10 \text{ Vdc}, I_D = 250 \text{ mAdc}$ )	$g_{fs}$	—	200	—	mmhos

### SMALL-SIGNAL CHARACTERISTICS

Input Capacitance ( $V_{DS} = 10 \text{ Vdc}, V_{GS} = 0, f = 1.0 \text{ MHz}$ )	$C_{iss}$	—	—	60	pF
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### SWITCHING CHARACTERISTICS

Turn-On Time ( $I_D = 0.2 \text{ Adc}$ ) See Figure 1	$t_{on}$	—	4.0	10	ns
Turn-Off Time ( $I_D = 0.2 \text{ Adc}$ ) See Figure 1	$t_{off}$	—	4.0	10	ns

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  $\leq 2.0\%$ .

## RESISTIVE SWITCHING

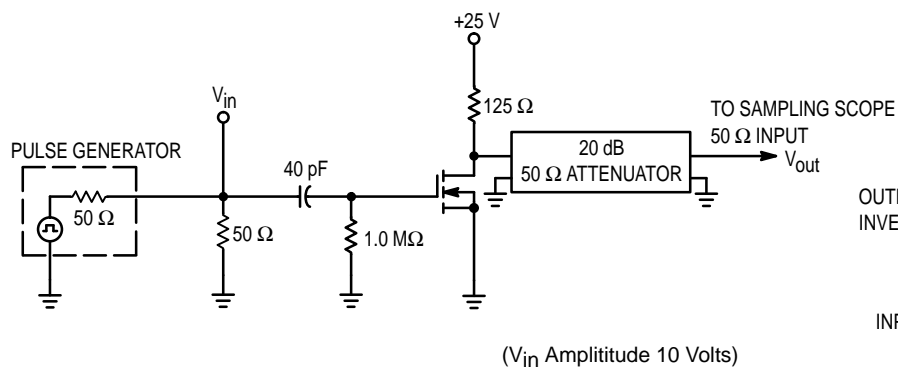


Figure 1. Switching Test Circuit

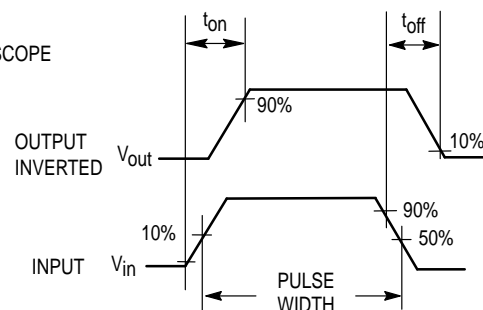


Figure 2. Switching Waveforms

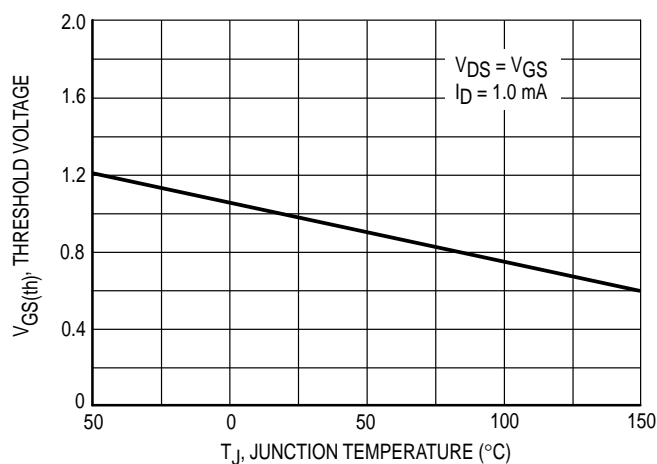
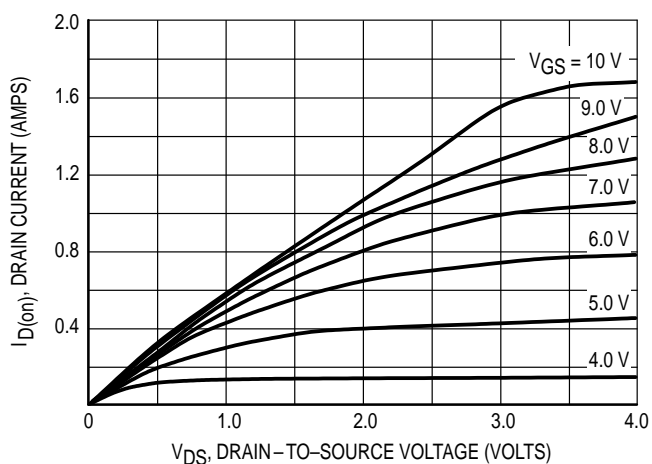
Figure 3.  $V_{GS(th)}$  Normalized versus Temperature

Figure 4. On-Region Characteristics

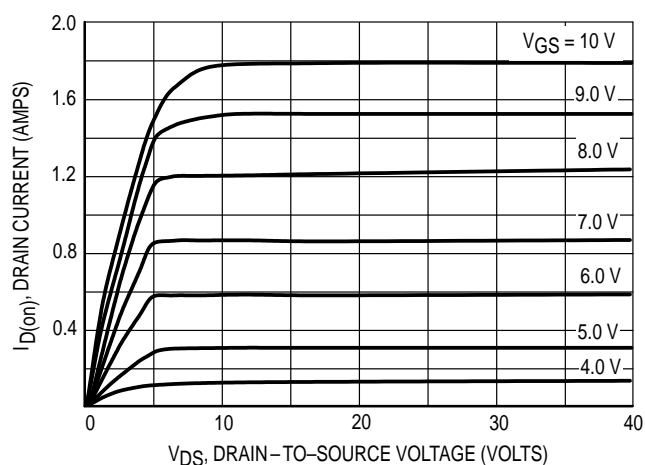


Figure 5. Output Characteristics

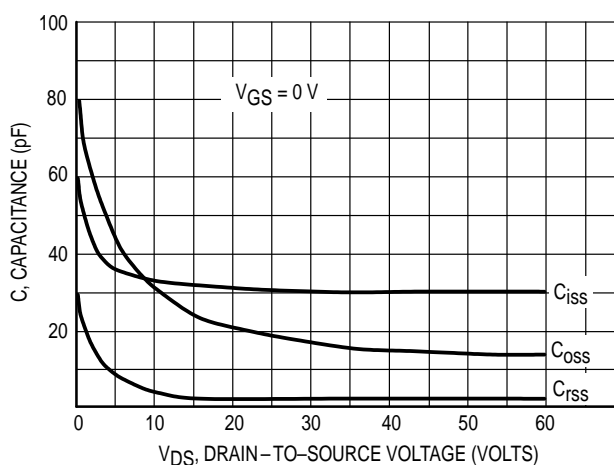
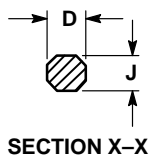
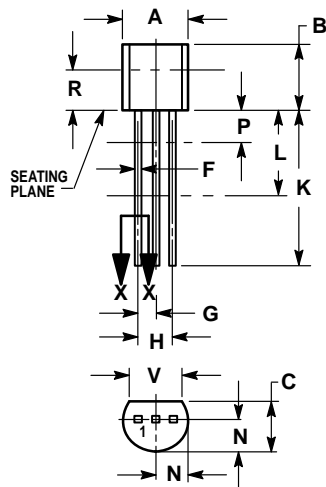


Figure 6. Capacitance versus Drain-To-Source Voltage

## PACKAGE DIMENSIONS



SECTION X-X

**CASE 029-04  
(TO-226AA)  
ISSUE AD**


## 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. DIMENSION 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	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.022	0.41	0.55
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	0.015	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 30:

- PIN 1. DRAIN
- GATE
- SOURCE

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