



MOTOROLA

SEMICONDUCTORS

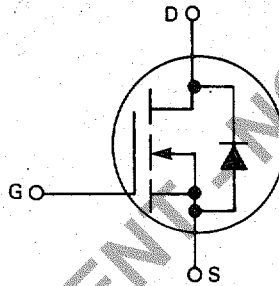
P.O. BOX 20912 • PHOENIX, ARIZONA 85036

2N6659	MPF6659
2N6660	MPF6660
2N6661	MPF6661

N-CHANNEL ENHANCEMENT-MODE TMOS POWER FIELD-EFFECT TRANSISTOR

These TMOS Power FETs are designed for high-current, high-speed power switching applications such as switching power supplies, CMOS logic, microprocessor or TTL-to-high current interface and line drivers.

- Fast Switching Speed — $t_{on} = t_{off} = 5.0$ ns Max
- Low On-Resistance — 1.5 Ohm Typ — 2N6659/MPF6659
2.0 Ohm Typ — 2N6660/2N6661
— MPF6660/MPF6661
- Low Drive Requirement, $V_{GS(th)} = 2.0$ V Max
- Inherent Current Sharing Capability Permits Easy Paralleling of Many Devices

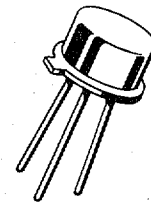


2.0 AMPERE

N-CHANNEL TMOS
POWER FET

35, 60, 90 VOLTS

2N6659
2N6660
2N6661



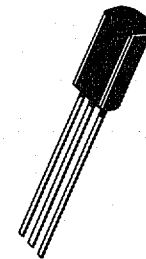
CASE 79-02
TO-205AD
(TO-39)

MAXIMUM RATINGS

Rating	Symbol	2N6659 MPF6659	2N6660 MPF6660	2N6661 MPF6661	Unit
Drain-Source Voltage	V_{DSS}	35	60	90	Vdc
Drain-Gate Voltage	V_{DGO}	35	60	90	Vdc
Gate-Source Voltage	V_{GS}	± 30			Vdc
Drain Current Continuous (1)	I_D	2.0			Adc
Pulsed (2)	I_{DM}	3.0			
		2N6659 2N6660 2N6661	MPF6659 MPF6660 MPF6661		
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	6.25 50	2.5 20		Watts mW/°C
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	— —	1.0 8.0		Watts mW/°C
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to +150			°C

(1) The Power Dissipation of the package may result in a lower continuous drain current.
(2) Pulse Width $\leq 300 \mu\text{s}$ Duty Cycle $\leq 2.0\%$

MPF6659
MPF6660
MPF6661



CASE 29-03
TO-226AE

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

Characteristics	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage ($V_{GS} = 0, I_D = 10 \mu\text{A}$)	$V_{(BR)DSS}$	35 60 90	— — —	— — —	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = \text{Maximum Rating}, V_{GS} = 0$)	I_{DSS}	—	—	10	μAdc
Gate-Body Leakage Current ($V_{GS} = 15 \text{ V}, V_{DS} = 0$)	I_{GSS}	—	—	100	nAdc
ON CHARACTERISTICS*					
Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1.0 \text{ mA}$)	$V_{GS(th)}$	0.8	1.4	2.0	Vdc
Drain-Source On-Voltage ($V_{GS} = 10 \text{ V}, I_D = 1.0 \text{ A}$)	$V_{DS(on)}$	— — —	— — —	1.8 3.0 4.0	Vdc
($V_{GS} = 5.0 \text{ V}, I_D = 0.3 \text{ A}$)		— — —	0.8 0.9 0.9	1.5 1.5 1.6	
Static Drain-Source On-Resistance ($V_{GS} = 10 \text{ Vdc}, I_D = 1.0 \text{ Adc}$)	$r_{DS(on)}$	— — —	— — —	1.8 3.0 4.0	Ohms
On-State Drain Current ($V_{DS} = 25 \text{ V}, V_{GS} = 10 \text{ V}$)	$I_{D(on)}$	1.0	2.0	—	Amps
Forward Transconductance ($V_{DS} = 25 \text{ V}, I_D = 0.5 \text{ A}$)	g_{fs}	170	—	—	mmhos
DYNAMIC CHARACTERISTICS					
Input Capacitance ($V_{DS} = 25 \text{ V}, V_{GS} = 0, f = 1.0 \text{ MHz}$)	C_{iss}	—	30	50	pF
Output Capacitance ($V_{DS} = 25 \text{ V}, V_{GS} = 0, f = 1.0 \text{ MHz}$)	C_{oss}	—	20	40	pF
Reverse Transfer Capacitance ($V_{DS} = 25 \text{ V}, V_{GS} = 0, f = 1.0 \text{ MHz}$)	C_{rss}	—	3.6	10	pF
SWITCHING CHARACTERISTICS*					
Turn-On Time (See Figure 1)	t_{on}	—	—	5.0	ns
Turn-Off Time (See Figure 1)	t_{off}	—	—	5.0	ns
Rise Time	t_r	—	—	5.0	ns
Fall Time	t_f	—	—	5.0	ns

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

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RESISTIVE SWITCHING

FIGURE 1 — SWITCHING TEST CIRCUIT

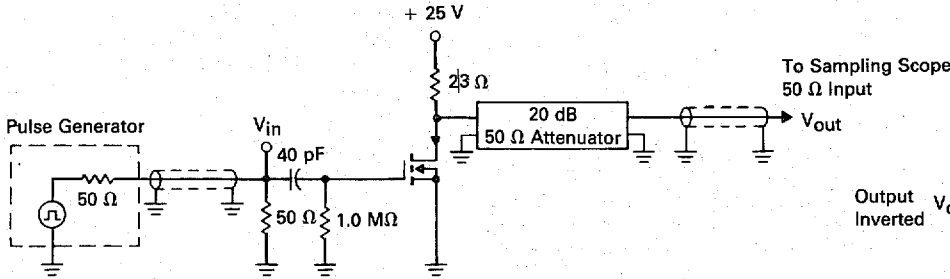


FIGURE 2 — SWITCHING WAVEFORMS

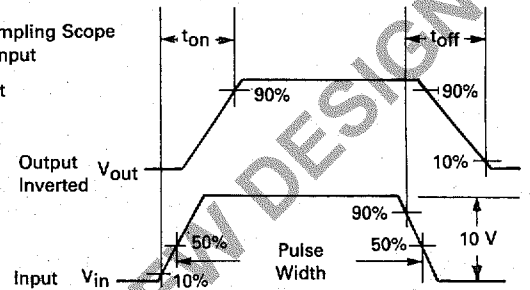


FIGURE 3 — $V_{GS(th)}$ NORMALIZED versus TEMPERATURE

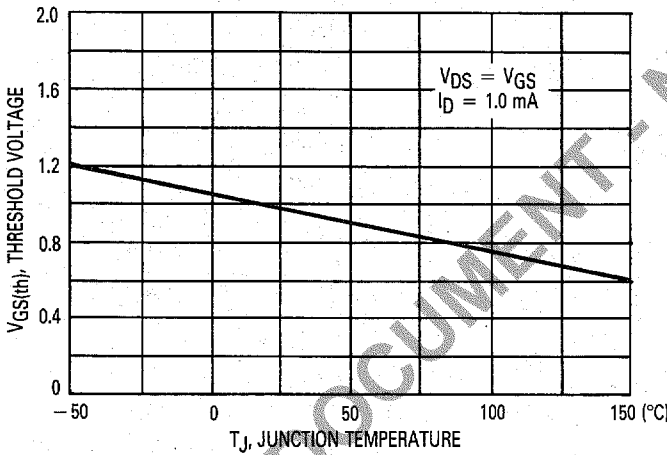


FIGURE 4 — ON-REGION CHARACTERISTICS

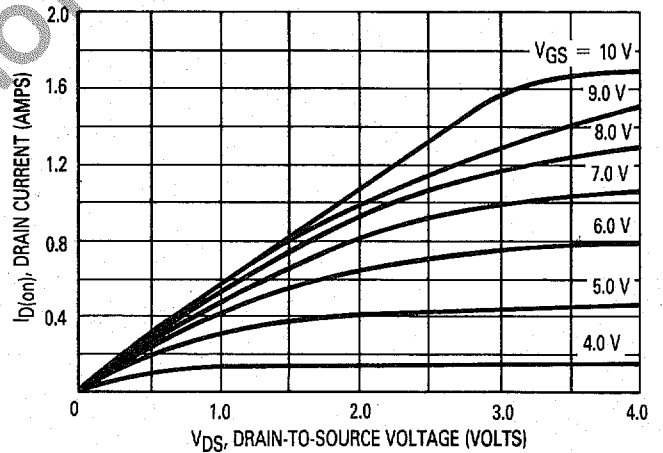


FIGURE 5 — OUTPUT CHARACTERISTICS

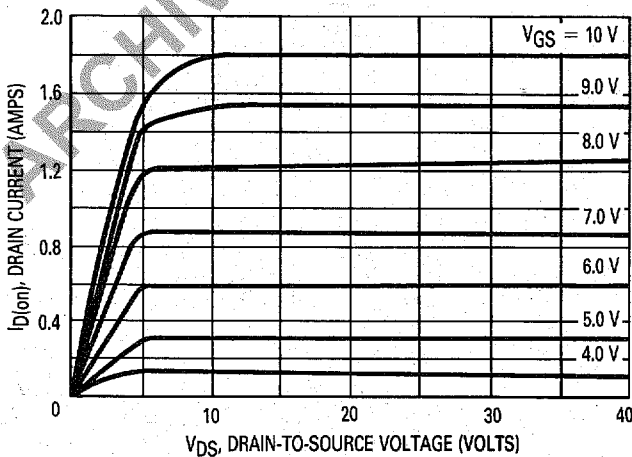


FIGURE 6 — CAPACITANCE versus DRAIN-TO-SOURCE VOLTAGE

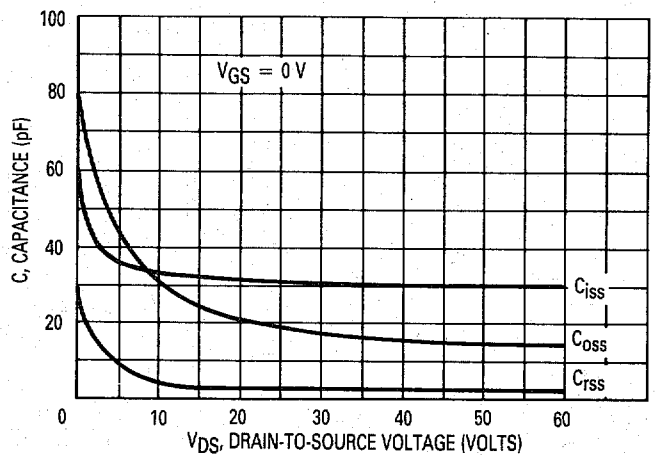
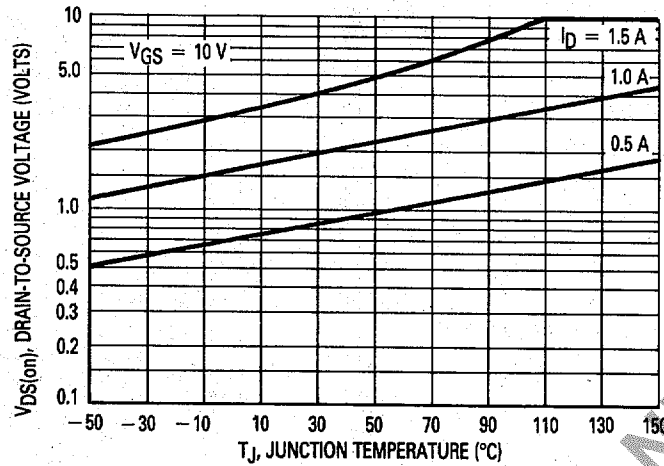
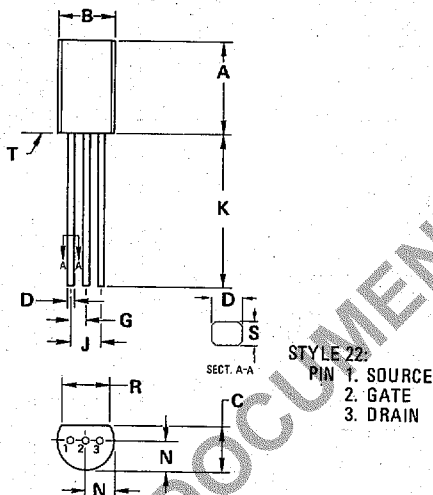


FIGURE 7 — ON-VOLTAGE versus TEMPERATURE



OUTLINE DIMENSIONS



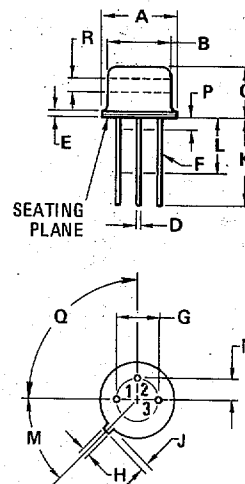
STYLE 22:
PIN 1. SOURCE
2. GATE
3. DRAIN

NOTES:

1. DIMENSIONS -A- AND -B- ARE DATUMS.
2. -T- IS SEATING PLANE.
3. POSITIONAL TOLERANCE FOR LEADS:
 $\pm 0.10 (0.004) \text{ (M)} \text{ T } \text{A} \text{ (M)} \text{ B} \text{ (M)}$
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	7.37	7.87	0.290	0.310
B	4.44	5.21	0.175	0.205
C	3.18	4.19	0.125	0.165
D	0.46	0.61	0.018	0.024
G	1.27 BSC		0.050 BSC	
J	2.54 BSC		0.100 BSC	
K	12.70	—	0.500	—
N	2.03	2.92	0.080	0.115
R	3.43	—	0.135	—
S	0.46	0.61	0.018	0.024

CASE 29-03
TO-226AE



STYLE 6:
PIN 1. SOURCE
2. GATE
3. DRAIN/CASE

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.89	9.40	0.350	0.370
B	8.00	8.51	0.315	0.335
C	6.10	6.60	0.240	0.260
D	0.406	0.533	0.016	0.021
E	0.229	3.18	0.009	0.125
F	0.406	0.483	0.016	0.019
G	4.83	5.33	0.190	0.210
H	0.711	0.864	0.028	0.034
J	0.737	1.02	0.029	0.040
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° NOM		45° NOM	
P	—	1.27	—	0.050
Q	90° NOM		90° NOM	
R	2.54	—	0.100	—

All JEDEC dimensions and notes apply.

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MOTOROLA Semiconductor Products Inc.

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