

# MOS FIELD EFFECT TRANSISTOR $\mu$ PA1818

### P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

#### **DESCRIPTION**

The  $\mu$  PA1818 is a switching device which can be driven directly by a 2.5 V power source.

This device features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power management of notebook computers and so on.

#### **FEATURES**

- 2.5 V drive available
- · Low on-state resistance

RDS(on)1 = 15.2 m $\Omega$  MAX. (VGS = -4.5 V, ID = -5.0 A)

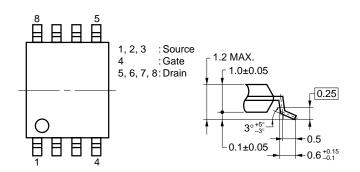
 $R_{DS(on)2} = 16 \text{ m}\Omega \text{ MAX.}$  (Vgs = -4.0 V, ID = -5.0 A) RDS(on)3 = 25 m $\Omega$  MAX. (Vgs = -2.5 V, ID = -5.0 A)

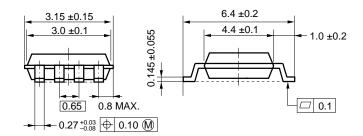
• Built-in G-S protection diode against ESD

#### ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1818GR-9JG	Power TSSOP8

#### PACKAGE DRAWING (Unit: mm)

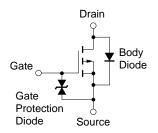




#### ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

Drain to Source Voltage (Vgs = 0 V)	VDSS	-20	V	
Gate to Source Voltage (Vps = 0 V)	Vgss	∓ 12	V	
Drain Current (DC) (TA = 25°C)	ID(DC)	∓ 10	Α	
Drain Current (pulse) Note1	ID(pulse)	<b>∓</b> 40	Α	
Total Power Dissipation Note2	Рт	2.0	W	
Channel Temperature	Tch	150	°C	
Storage Temperature	Tstg	-55 to +150	°C	

### **EQUIVALENT CIRCUIT**



**Notes 1.** PW  $\leq$  10  $\mu$ s, Duty Cycle  $\leq$  1%

2. Mounted on ceramic substrate of 5000 mm<sup>2</sup> x 1.1 mm

Remark

The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

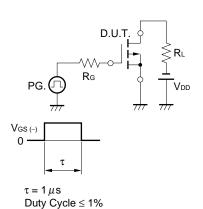
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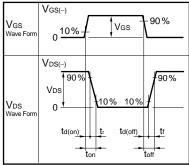


### **ELECTRICAL CHARACTERISTICS (TA = 25°C)**

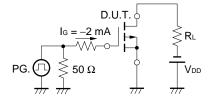
		1				
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	IDSS	V <sub>DS</sub> = -20 V, V <sub>GS</sub> = 0 V			-1.0	μΑ
Gate Leakage Current	Igss	$V_{GS} = \overline{+} 12 V$ , $V_{DS} = 0 V$			∓ 10	μΑ
Gate Cut-off Voltage	V <sub>GS(off)</sub>	$V_{DS} = -10 \text{ V}, I_{D} = -1.0 \text{ mA}$	-0.5	-1.1	-1.5	V
Forward Transfer Admittance	y <sub>fs</sub>	$V_{DS} = -10 \text{ V}, I_{D} = -5.0 \text{ A}$	12	24		S
Drain to Source On-state Resistance	RDS(on)1	$V_{GS} = -4.5 \text{ V}, I_{D} = -5.0 \text{ A}$		12.1	15.2	mΩ
	RDS(on)2	$V_{GS} = -4.0 \text{ V}, I_{D} = -5.0 \text{ A}$		12.7	16	mΩ
	RDS(on)3	$V_{GS} = -2.5 \text{ V}, I_{D} = -5.0 \text{ A}$		18.8	25	mΩ
Input Capacitance	Ciss	V <sub>DS</sub> = −10 V		2200		pF
Output Capacitance	Coss	Vgs = 0 V		510		pF
Reverse Transfer Capacitance	Crss	f = 1.0 MHz		310		pF
Turn-on Delay Time	t <sub>d(on)</sub>	$V_{DD} = -10 \text{ V}, \text{ ID} = -5.0 \text{ A}$		23		ns
Rise Time	tr	Vgs = -4.0 V		207		ns
Turn-off Delay Time	t <sub>d(off)</sub>	$R_G = 10 \Omega$		139		ns
Fall Time	<b>t</b> f			193		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = −16 V		20		nC
Gate to Source Charge	Qgs	Vgs = -4.0 V		5.0		nC
Gate to Drain Charge	Q <sub>GD</sub>	I <sub>D</sub> = −10 A		6.0		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	IF = 10 A, VGS = 0 V		0.82		V
Reverse Recovery Time	trr	IF = 10 A, VGS = 0 V		44		ns
Reverse Recovery Charge	Qrr	di/dt = 100 A / μ s		28		nC

#### **TEST CIRCUIT 1 SWITCHING TIME**

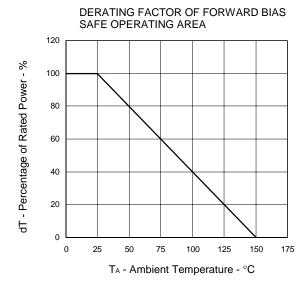




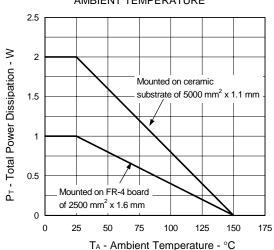
#### **TEST CIRCUIT 2 GATE CHARGE**



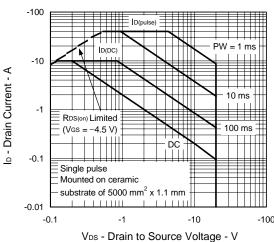
#### TYPICAL CHARACTERISTICS (TA = 25°C)



# TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE

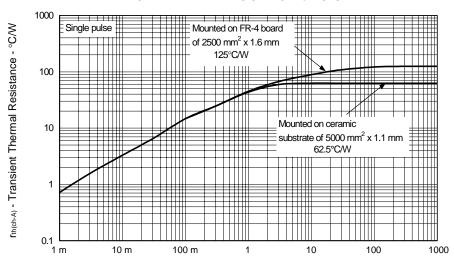


#### FORWARD BIAS SAFE OPERATING AREA



#### 100 ms

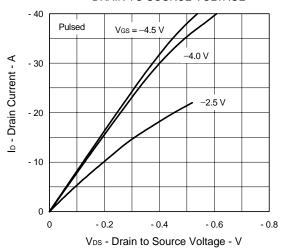
#### TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



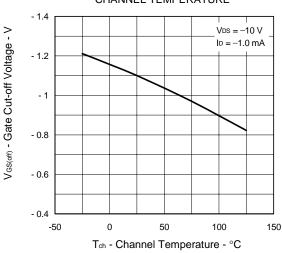
PW - Pulse Width - s

3

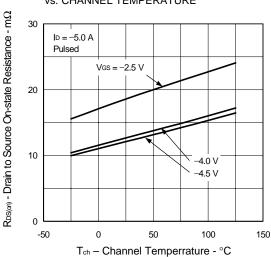
#### DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



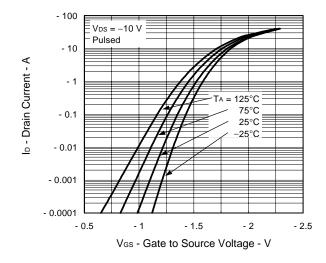
# GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



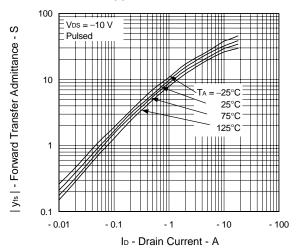
# DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



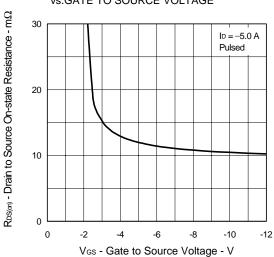
#### FORWARD TRANSFER CHARACTERISTICS



# FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

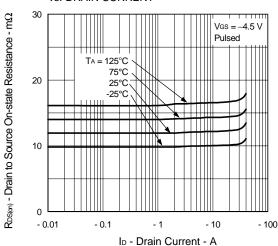


### DRAIN TO SOURCE ON-STATE RESISTANCE VS.GATE TO SOURCE VOLTAGE

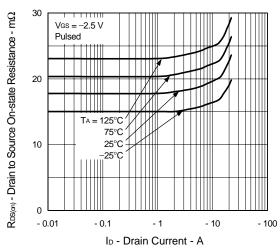




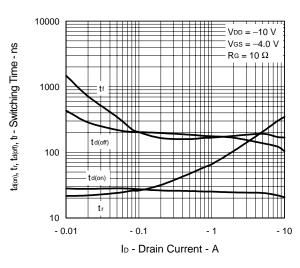
### DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



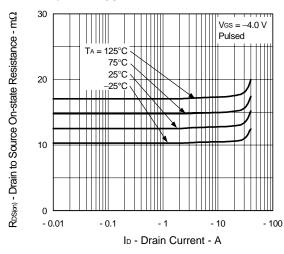
### DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



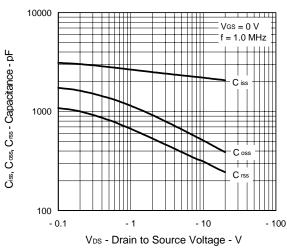
#### SWITCHING CHARACTERISTICS



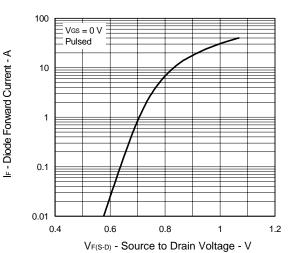
### DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



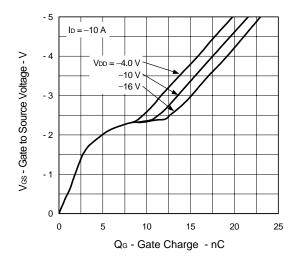
### CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



#### SOURCE TO DRAIN DIODE FORWARD VOLTAGE



### DYNAMIC INPUT/OUTPUT CHARACTERISTICS



NEC  $\mu$ PA1818

[MEMO]

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