

# MOS FIELD EFFECT TRANSISTOR

# $\mu$ PA1856

## P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

### DESCRIPTION

The  $\mu$ PA1856 is a switching device which can be driven directly by a 2.5-V power source.

The  $\mu$ PA1856 features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power switch of portable machine and so on.

### FEATURES

- Can be driven by a 2.5-V power source
- Low on-state resistance

$R_{DS(on)1} = 45 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -2.5 \text{ A)}$

$R_{DS(on)2} = 48 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.0 \text{ V, } I_D = -2.5 \text{ A)}$

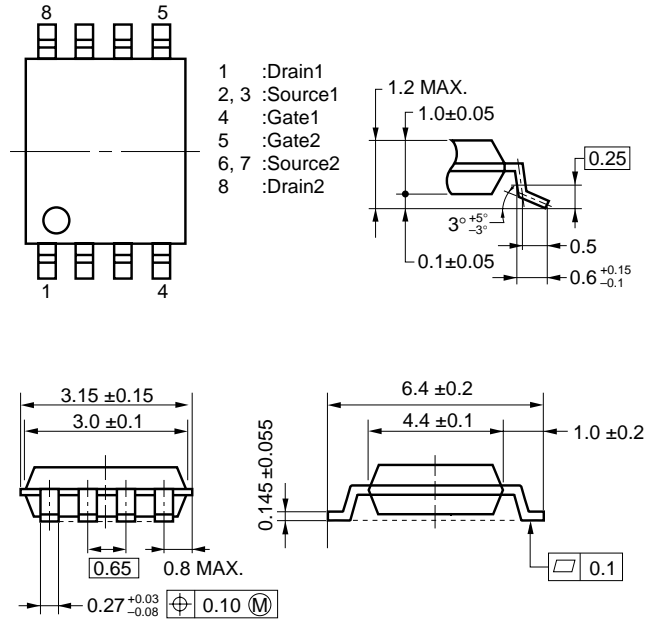
$R_{DS(on)3} = 72 \text{ m}\Omega \text{ MAX. (} V_{GS} = -2.7 \text{ V, } I_D = -2.5 \text{ A)}$

$R_{DS(on)4} = 77 \text{ m}\Omega \text{ MAX. (} V_{GS} = -2.5 \text{ V, } I_D = -2.5 \text{ A)}$

### ORDERING INFORMATION

PART NUMBER	PACKAGE
$\mu$ PA1856GR-9JG	Power TSSOP8

### PACKAGE DRAWING (Unit: mm)



### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

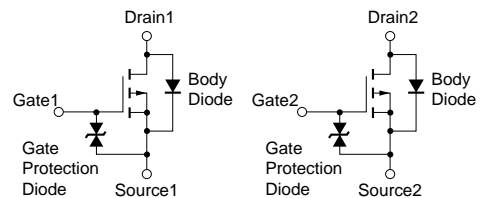
Drain to Source Voltage	$V_{bss}$	-20	V
Gate to Source Voltage	$V_{GSS}$	$\mp 12$	V
Drain Current (DC)	$I_{D(DC)}$	$\mp 4.5$	A
Drain Current (pulse) <sup>Note1</sup>	$I_{D(pulse)}$	$\mp 18$	A
Total Power Dissipation <sup>Note2</sup>	$P_T$	2.0	W
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

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

**2.** Mounted on ceramic substrate of  $5000 \text{ mm}^2 \times 1.1 \text{ mm}$

**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.

### EQUIVALENT CIRCUIT

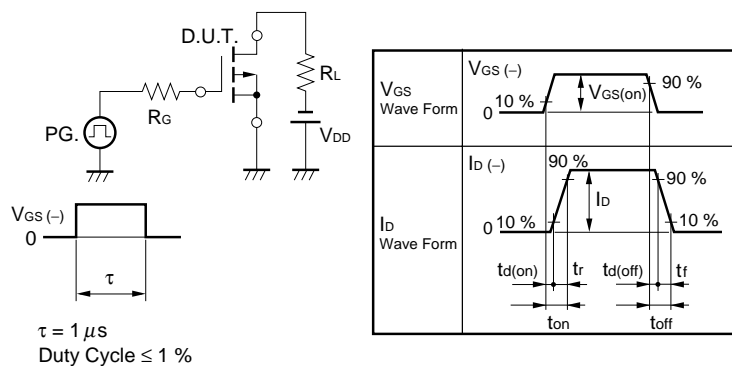


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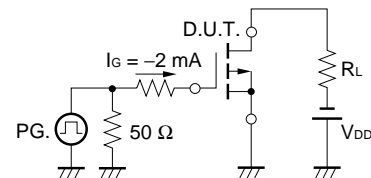
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -20 V, V <sub>GS</sub> = 0 V			-10	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±12 V, V <sub>DS</sub> = 0 V			±10	μA
Gate Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -1 mA	-0.5	-1.1	-1.5	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -2.5 A	3	8.8		S
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -2.5 A		37	45	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = -4.0 V, I <sub>D</sub> = -2.5 A		39	48	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = -2.7 V, I <sub>D</sub> = -2.5 A		52	72	mΩ
	R <sub>DS(on)4</sub>	V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -2.5 A		57	77	mΩ
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -10 V		700		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		208		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		100		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -10 V		300		ns
Rise Time	t <sub>r</sub>	I <sub>D</sub> = -2.5 A		528		ns
Turn-off Delay Time	t <sub>d(off)</sub>	V <sub>GS</sub> = -4.0 V		242		ns
Fall Time	t <sub>f</sub>	R <sub>G</sub> = 10 Ω		698		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> = -16 V		6.0		nC
Gate to Source Charge	Q <sub>GS</sub>	I <sub>D</sub> = -4.5 A		2.1		nC
Gate to Drain Charge	Q <sub>GD</sub>	V <sub>GS</sub> = -4.0 V		2.8		nC
Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 4.5 A, V <sub>GS</sub> = 0 V		0.86		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 4.5 A, V <sub>GS</sub> = 0 V		32		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 10 A/μs		2.2		nC

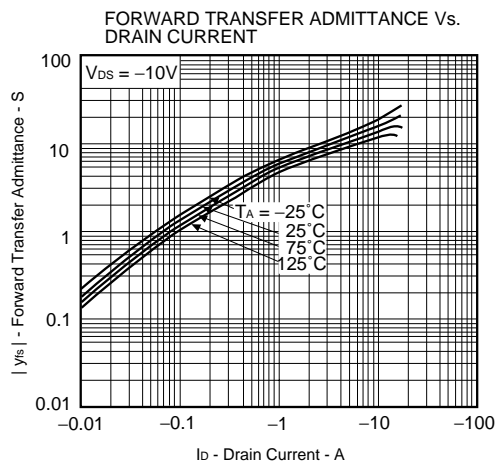
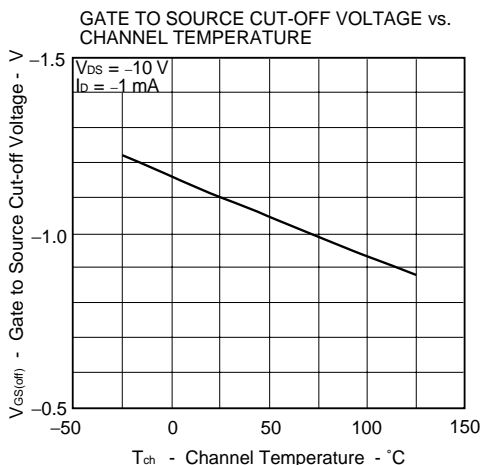
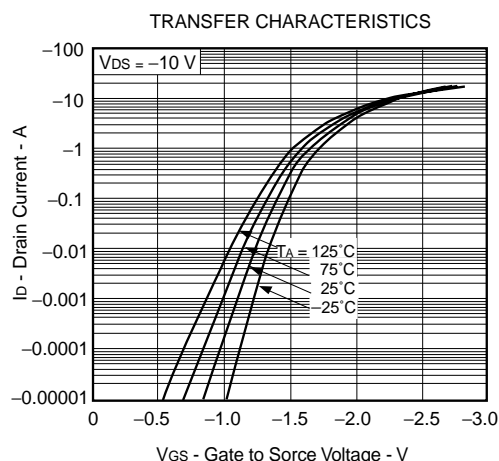
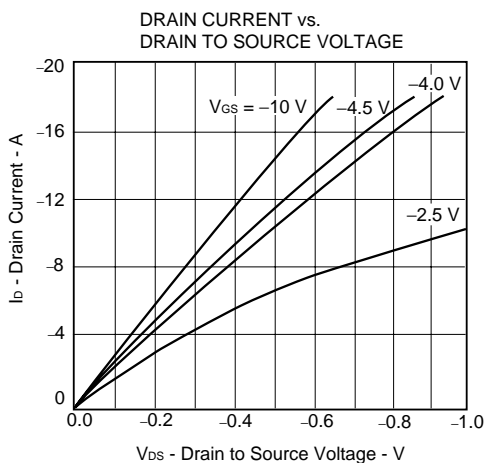
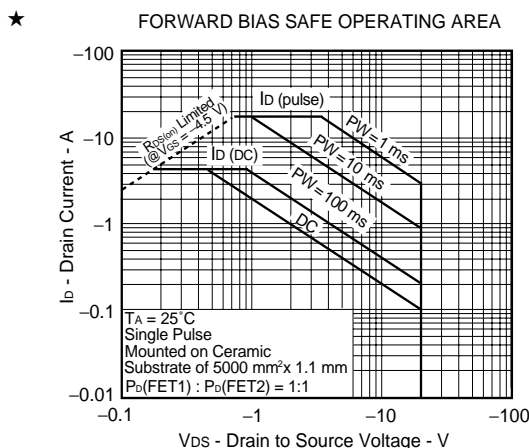
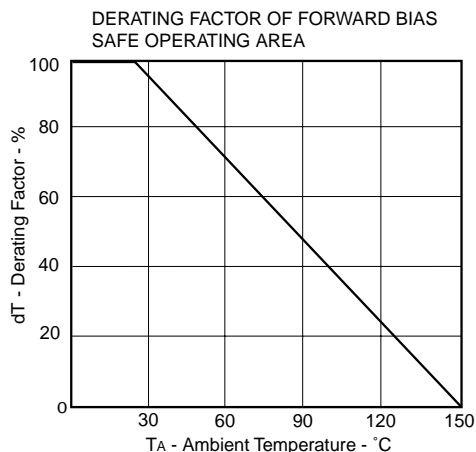
**TEST CIRCUIT 1 SWITCHING TIME**

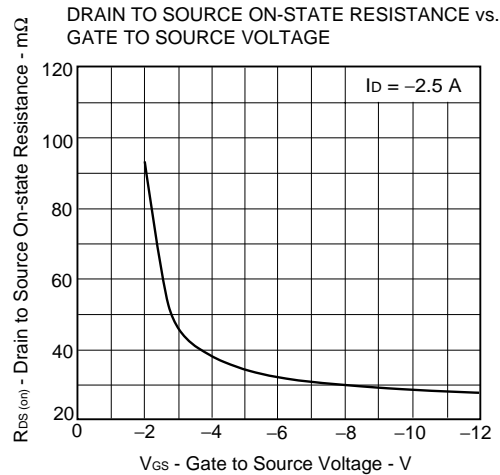
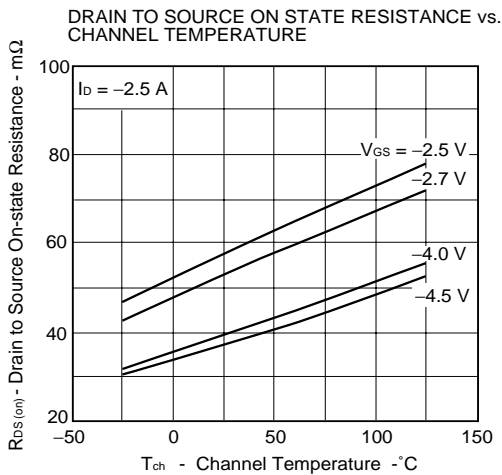
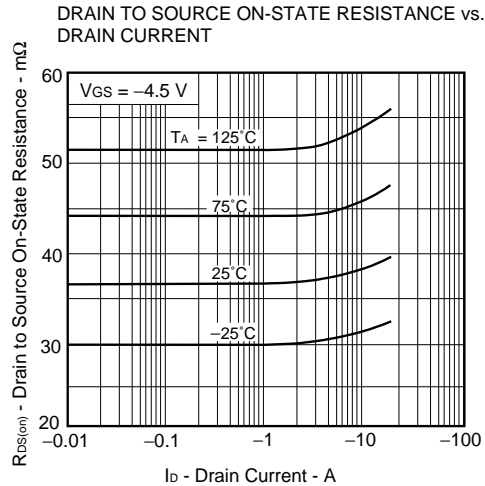
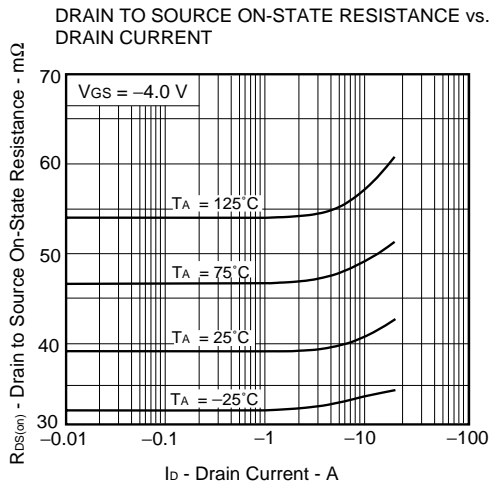
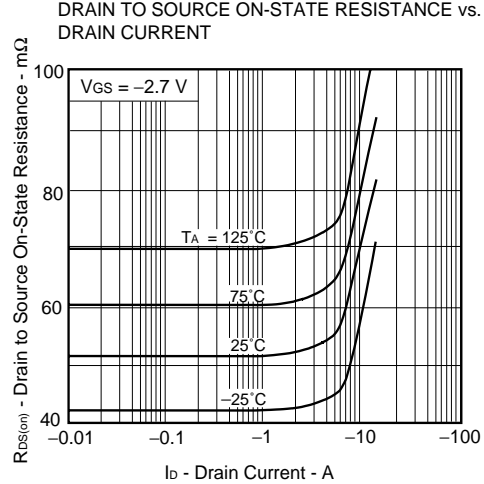
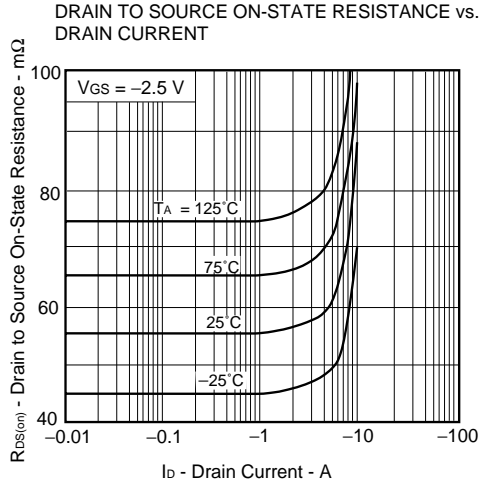


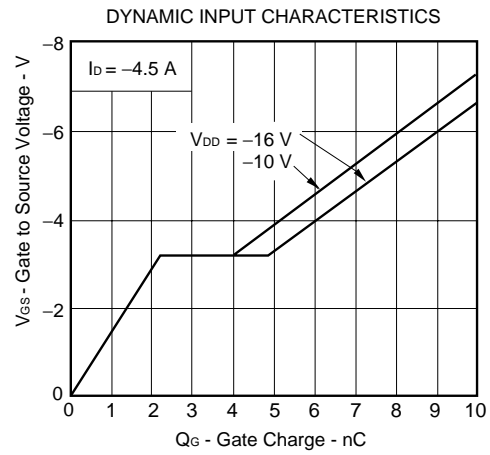
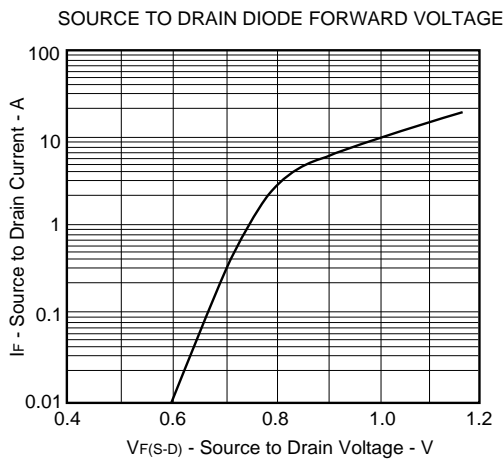
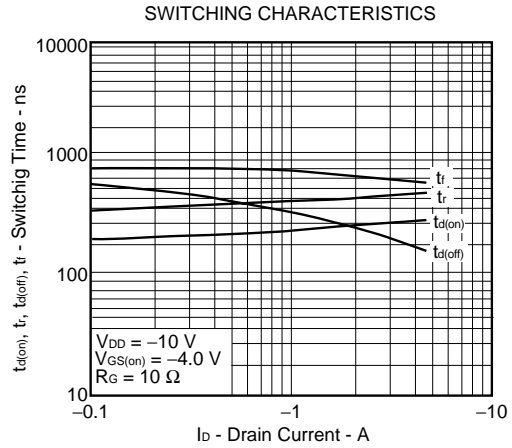
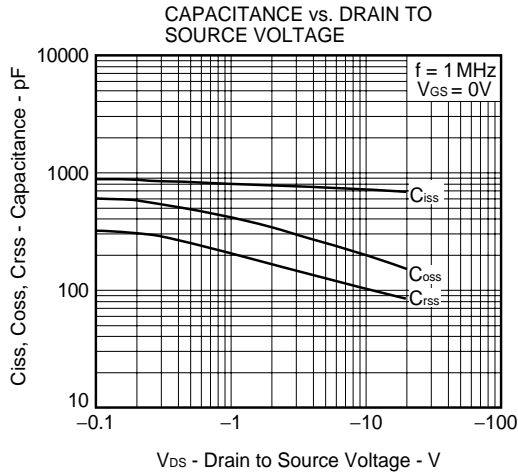
**TEST CIRCUIT 2 GATE CHARGE**



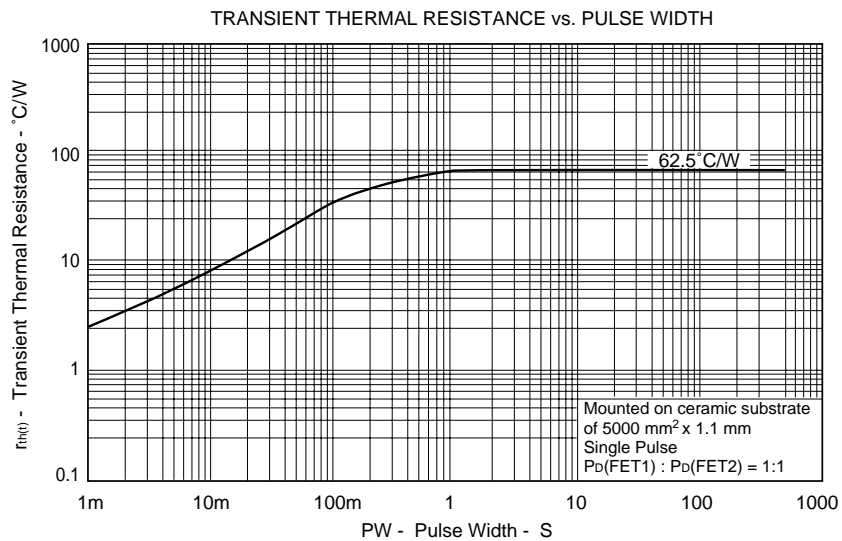
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)







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