

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μ PA1806 is a switching device, which can be driven directly by a 4.0 V power source.

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

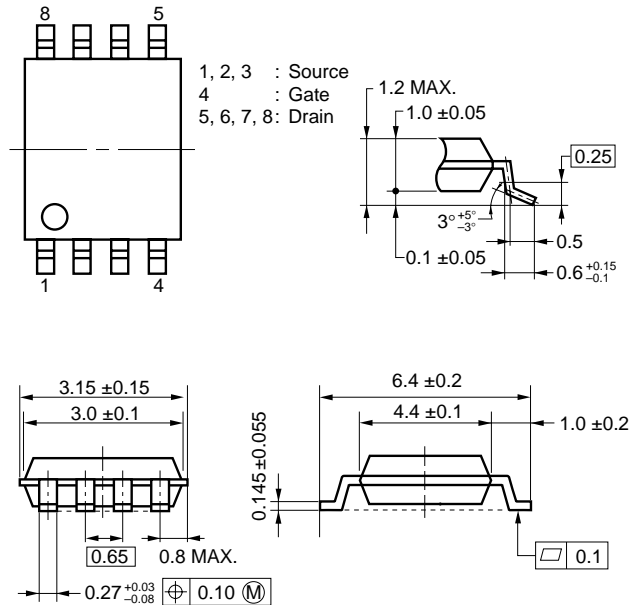
FEATURES

- 4.0 V drive available
- Low on-state resistance
 - $R_{DS(on)1} = 8.5 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 10 \text{ V}$, $I_D = 6.0 \text{ A}$)
 - $R_{DS(on)2} = 11.5 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 4.5 \text{ V}$, $I_D = 6.0 \text{ A}$)
 - $R_{DS(on)3} = 13 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 4.0 \text{ V}$, $I_D = 6.0 \text{ A}$)
- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA1806GR-9JG	Power TSSOP8

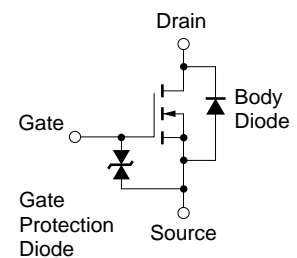
PACKAGE DRAWING (Unit: mm)



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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	30	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_A = 25^\circ\text{C}$)	$I_{D(DC)}$	± 13	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 52	A
Total Power Dissipation ^{Note2}	P_T	2.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

EQUIVALENT CIRCUIT



- Notes**
1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$
 2. Mounted on ceramic substrate of $5000 \text{ mm}^2 \times 1.1 \text{ mm}$

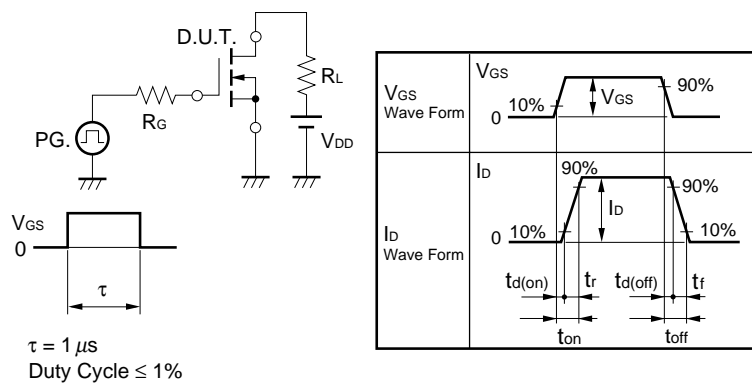
Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

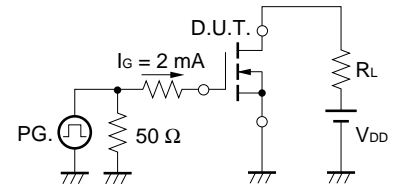
ELECTRICAL CHARACTERISTICS (TA = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1.0	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			± 10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = 10\text{ V}, I_D = 1.0\text{ mA}$	1.5	2.0	2.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 6.0\text{ A}$	9.0	18		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = 10\text{ V}, I_D = 6.0\text{ A}$		6.9	8.5	$\text{m}\Omega$
	$R_{DS(on)2}$	$V_{GS} = 4.5\text{ V}, I_D = 6.0\text{ A}$		8.6	11.5	$\text{m}\Omega$
	$R_{DS(on)3}$	$V_{GS} = 4.0\text{ V}, I_D = 6.0\text{ A}$		9.6	13	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}$		1460		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$		570		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1.0\text{ MHz}$		200		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, I_D = 6.0\text{ A}$		18		ns
Rise Time	t_r	$V_{GS} = 10\text{ V}$		14		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10\ \Omega$		58		ns
Fall Time	t_f			19		ns
Total Gate Charge	Q_G	$V_{DD} = 24\text{ V}$		28		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = 10\text{ V}$		4.1		nC
Gate to Drain Charge	Q_{GD}	$I_D = 13\text{ A}$		7.5		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 13\text{ A}, V_{GS} = 0\text{ V}$		0.82		V
Reverse Recovery Time	t_{rr}	$I_F = 13\text{ A}, V_{GS} = 0\text{ V}$		38		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100\text{ A}/\mu\text{s}$		33		nC

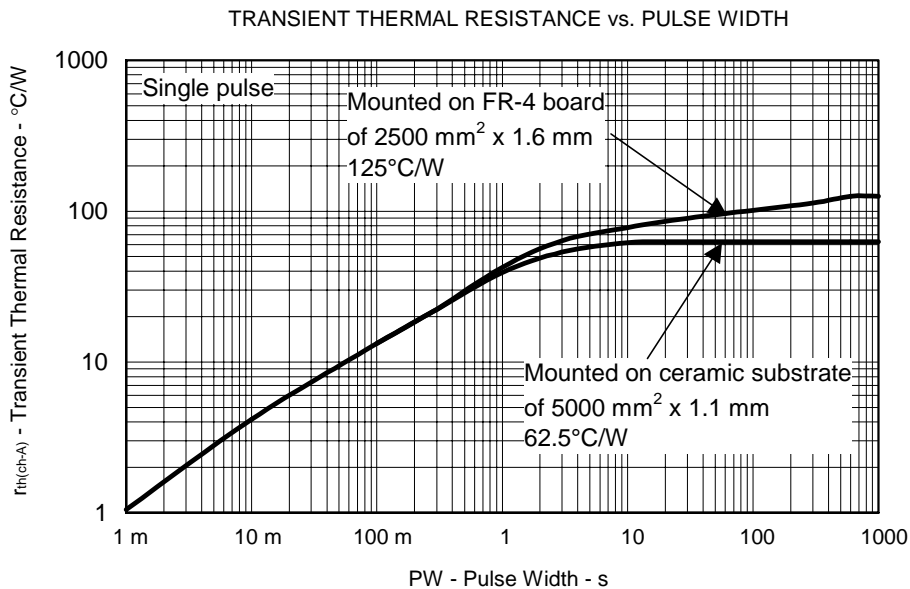
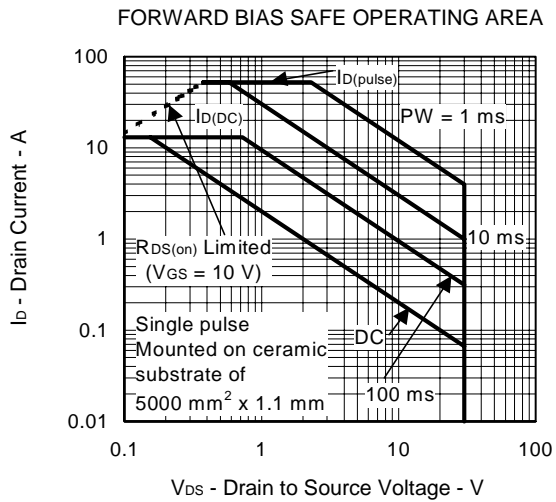
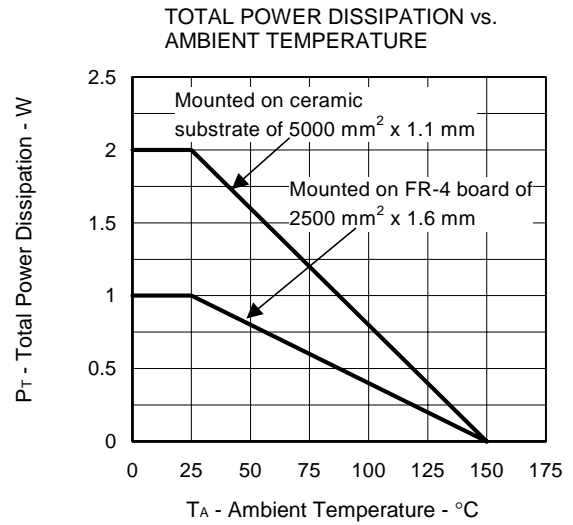
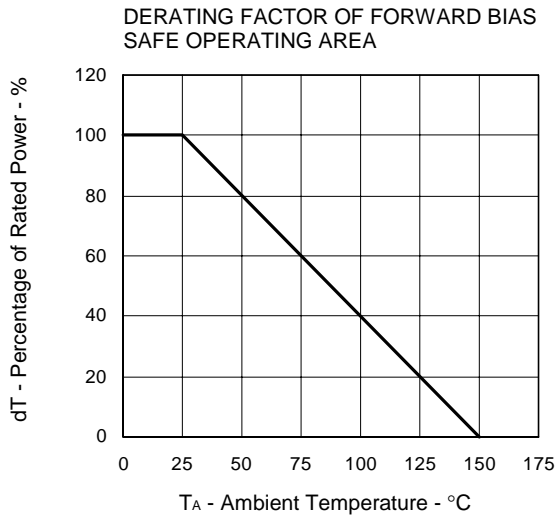
TEST CIRCUIT 1 SWITCHING TIME



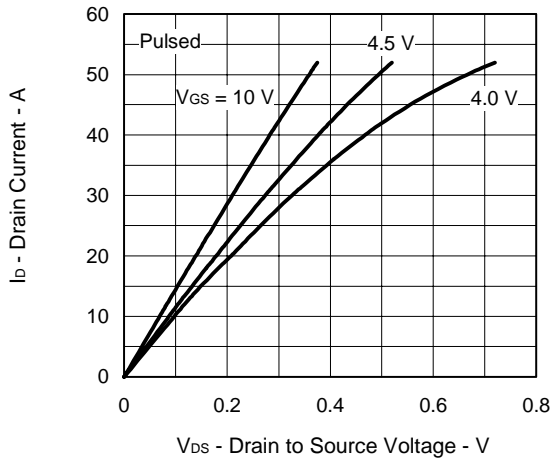
TEST CIRCUIT 2 GATE CHARGE



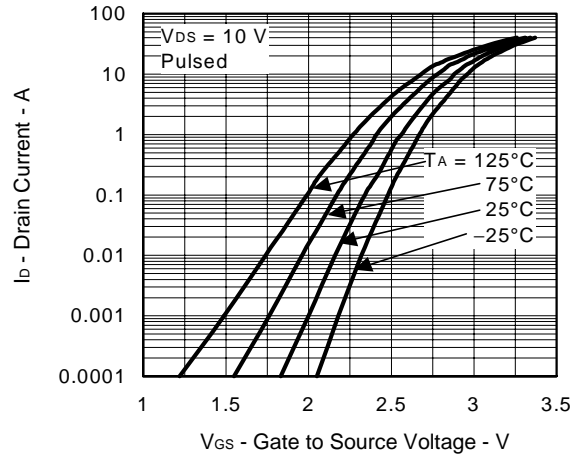
TYPICAL CHARACTERISTICS (T_A = 25°C)



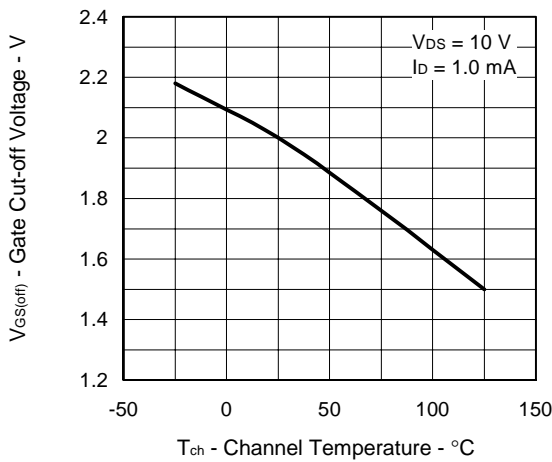
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



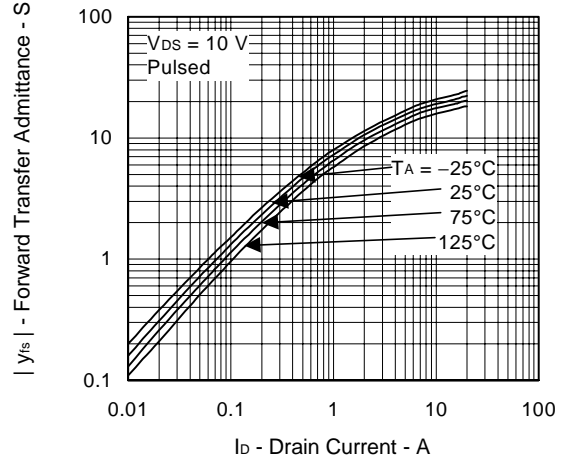
FORWARD TRANSFER CHARACTERISTICS



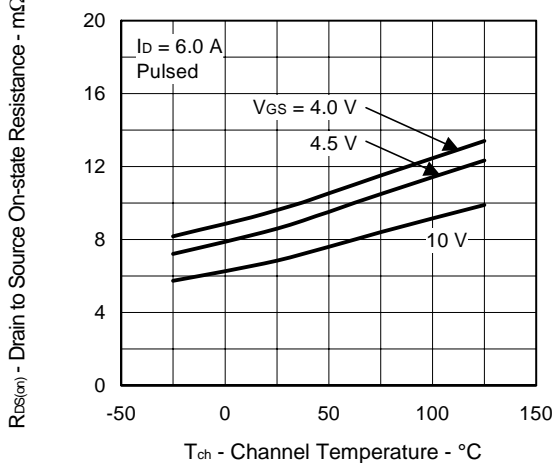
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



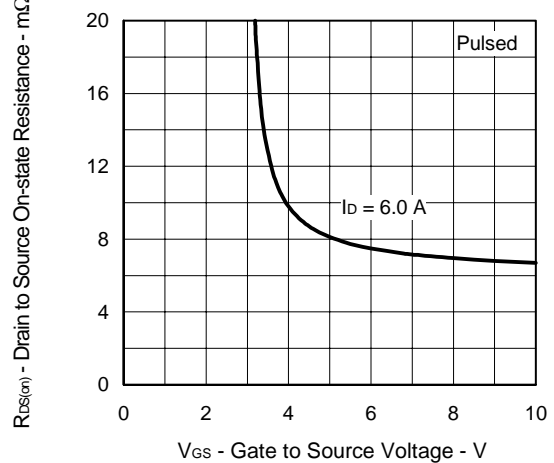
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



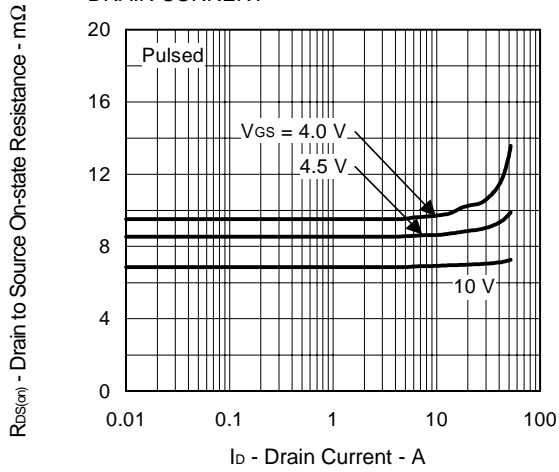
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



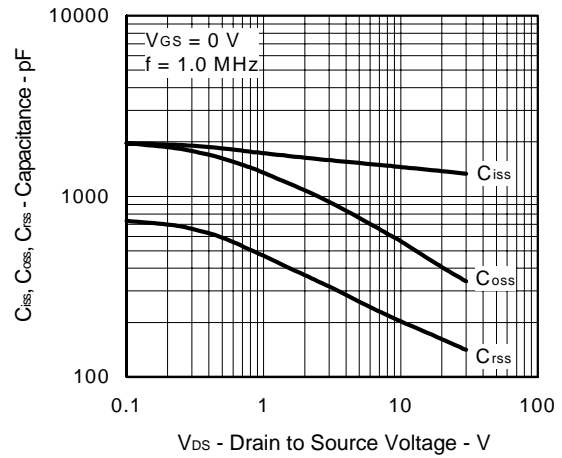
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



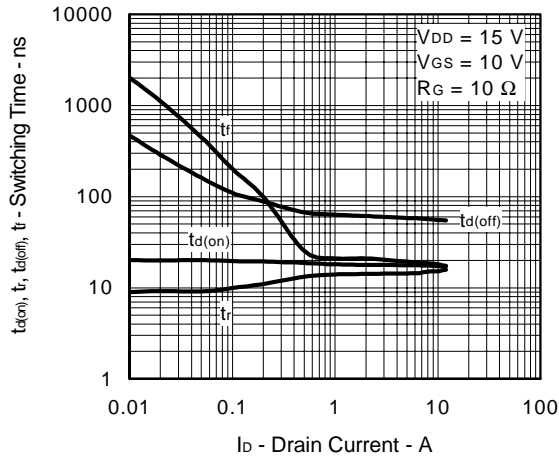
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



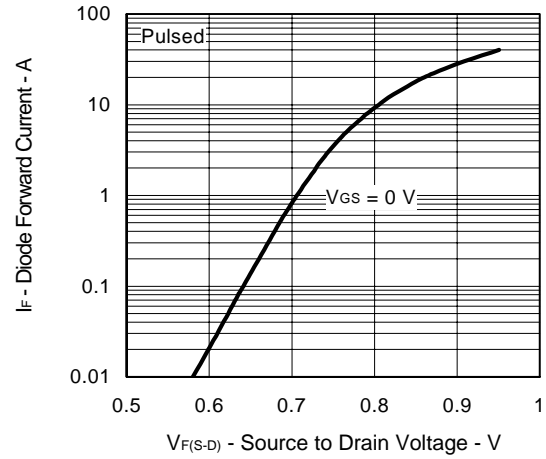
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



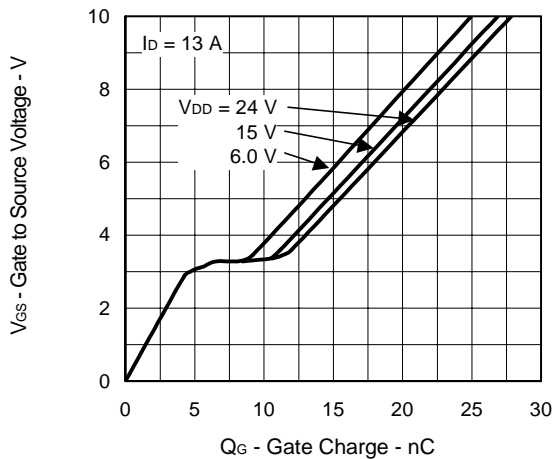
SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



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