

**SWITCHING**  
**N-CHANNEL POWER MOS FET**  
**INDUSTRIAL USE**

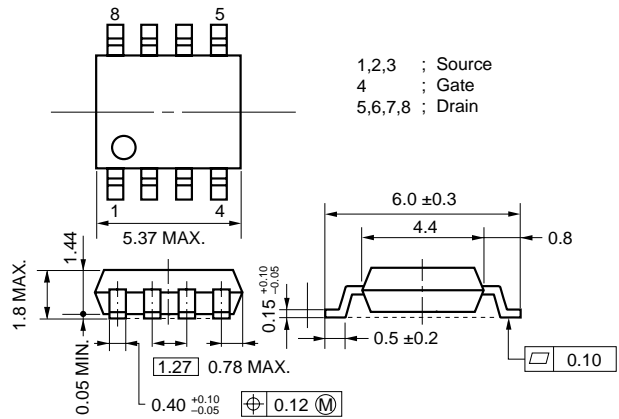
**DESCRIPTION**

This product is N-Channel MOS Field Effect Transistor designed for DC/DC converters and power management applications of notebook computers.

**FEATURES**

- Super Low on-resistance  
 $R_{DS(on)1} = 5.8 \text{ m}\Omega$  (TYP.) ( $V_{GS} = 10 \text{ V}$ ,  $I_D = 7.0 \text{ A}$ )  
 $R_{DS(on)2} = 7.0 \text{ m}\Omega$  (TYP.) ( $V_{GS} = 4.5 \text{ V}$ ,  $I_D = 7.0 \text{ A}$ )  
 $R_{DS(on)3} = 8.0 \text{ m}\Omega$  (TYP.) ( $V_{GS} = 4.0 \text{ V}$ ,  $I_D = 7.0 \text{ A}$ )
- Low  $C_{iss}$  :  $C_{iss} = 3000 \text{ pF}$  (TYP.)
- Built-in G-S protection diode
- Small and surface mount package (Power SOP8)

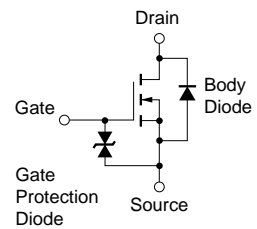
**PACKAGE DRAWING (Unit : mm)**



**ORDERING INFORMATION**

PART NUMBER	PACKAGE
μPA1706G	Power SOP8

**EQUIVALENT CIRCUIT**



**ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ , All terminals are connected)**

Drain to Source Voltage <sup>Note1</sup>	$V_{DSS}$	30	V
Gate to Source Voltage <sup>Note2</sup>	$V_{GSS}$	±20	V
Drain Current (DC)	$I_{D(DC)}$	±13	A
Drain Current (pulse) <sup>Note3</sup>	$I_{D(pulse)}$	±52	A
Total Power Dissipation ( $T_A = 25^\circ\text{C}$ ) <sup>Note4</sup>	$P_T$	2.0	W
Channel Temperature	$T_{ch}$	150	°C
Storage Temperature	$T_{stg}$	-55 to + 150	°C

- Notes**
1.  $V_{GS} = 0 \text{ V}$
  2.  $V_{DS} = 0 \text{ V}$
  3.  $PW \leq 10 \mu\text{s}$ , Duty Cycle  $\leq 1 \%$
  4. Mounted on ceramic substrate of  $1200 \text{ mm}^2 \times 0.7 \text{ mm}$

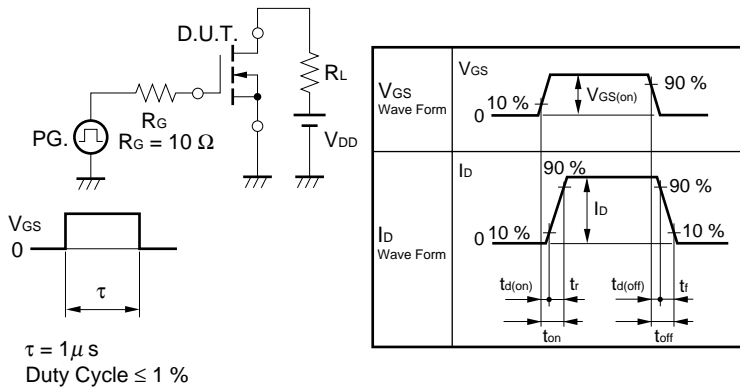
**Remark** The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

The information in this document is subject to change without notice.

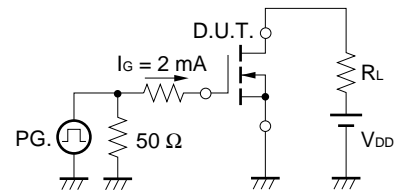
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, All terminals are connected)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 7.0 A		5.8	7.8	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 7.0 A		7.0	10.0	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 7.0 A		8.0	12.0	mΩ
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	1.5	2.0	2.5	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 7.0 A	10	22		S
Drain Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			10	μA
Gate to Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V			±10	μA
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V		3000		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		950		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		380		pF
Turn-on Delay Time	t <sub>d(on)</sub>	I <sub>D</sub> = 7.0 A		40		ns
Rise Time	t <sub>r</sub>	V <sub>GS(on)</sub> = 10 V		220		ns
Turn-off Delay Time	t <sub>d(off)</sub>	V <sub>DD</sub> = 15 V		140		ns
Fall Time	t <sub>f</sub>	R <sub>G</sub> = 10 Ω		90		ns
Total Gate Charge	Q <sub>G</sub>	I <sub>D</sub> = 13 A		56		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>DD</sub> = 24 V		9		nC
Gate to Drain Charge	Q <sub>GD</sub>	V <sub>GS</sub> = 10 V		14		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 13 A, V <sub>GS</sub> = 0 V		0.8		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 13 A, V <sub>GS</sub> = 0 V		43		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100 A/μs		50		nC

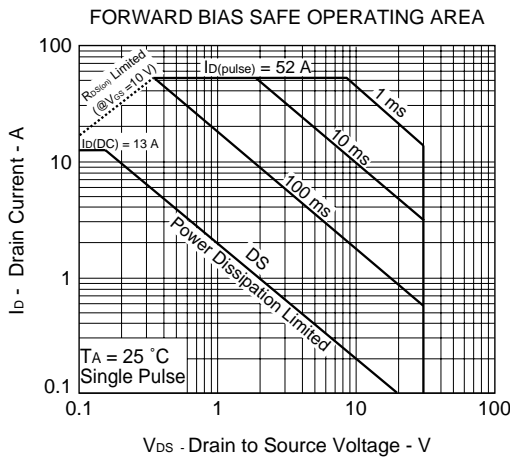
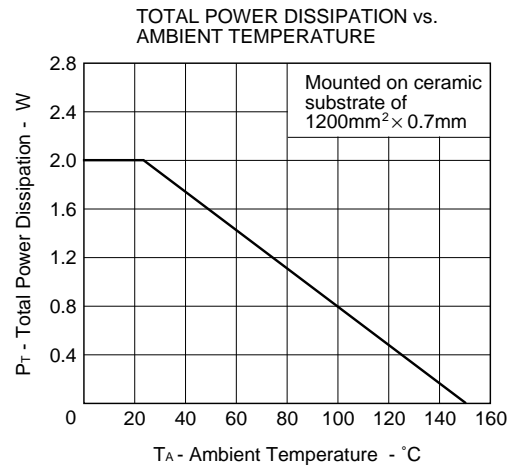
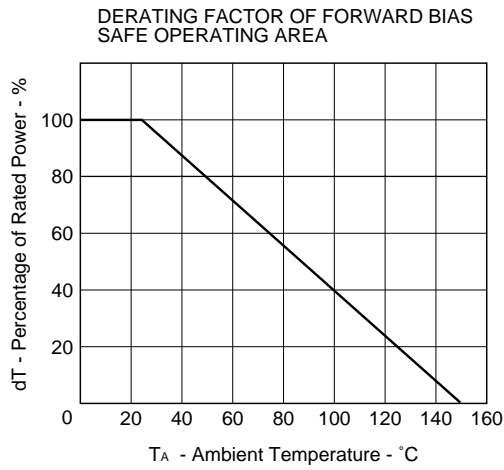
**TEST CIRCUIT 1 SWITCHING TIME**



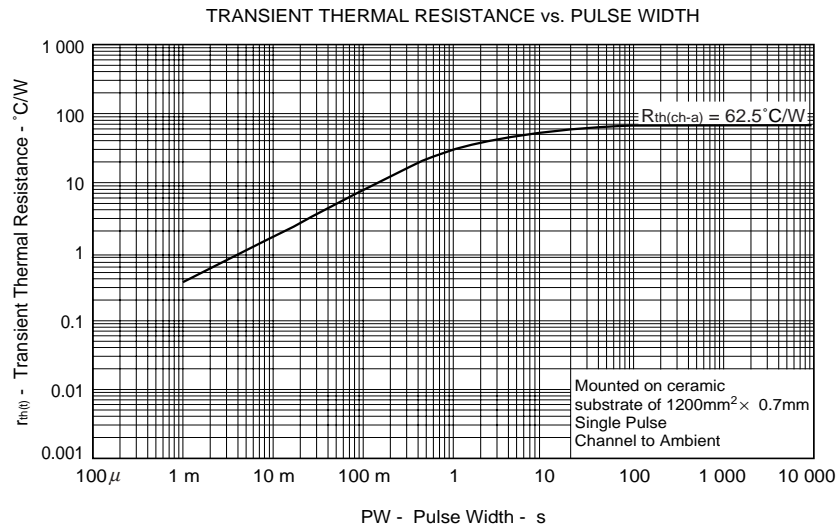
**TEST CIRCUIT 2 GATE CHARGE**

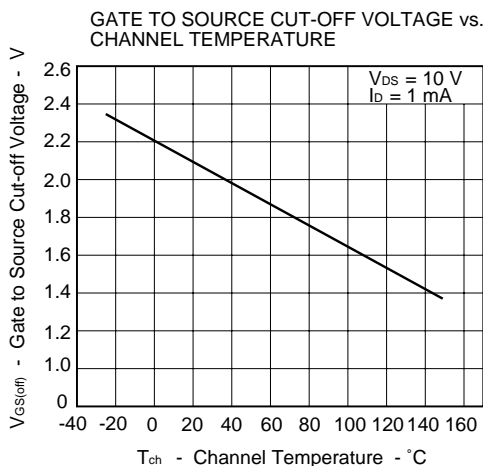
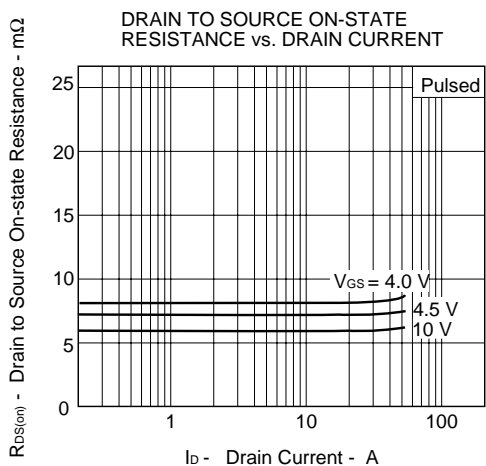
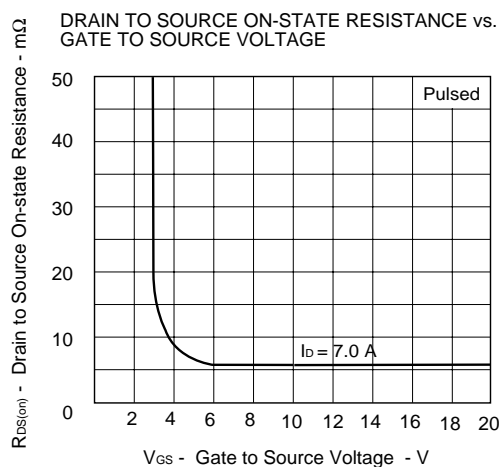
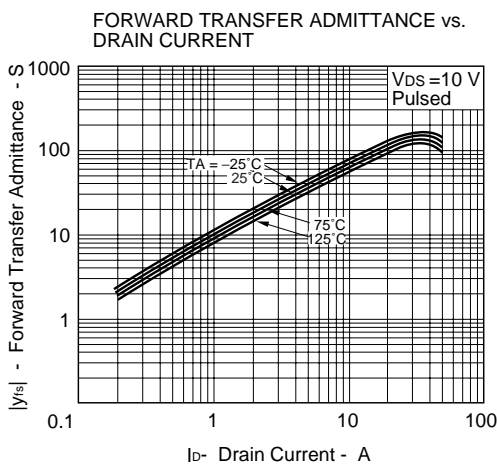
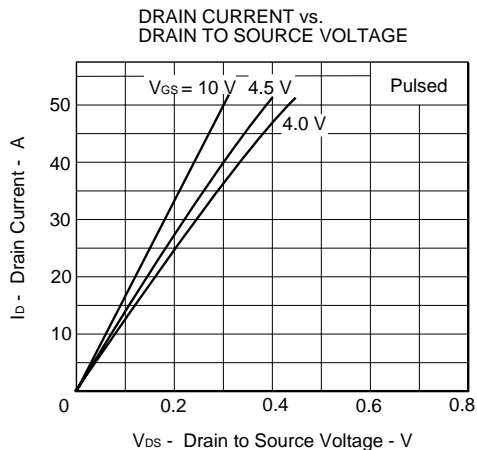
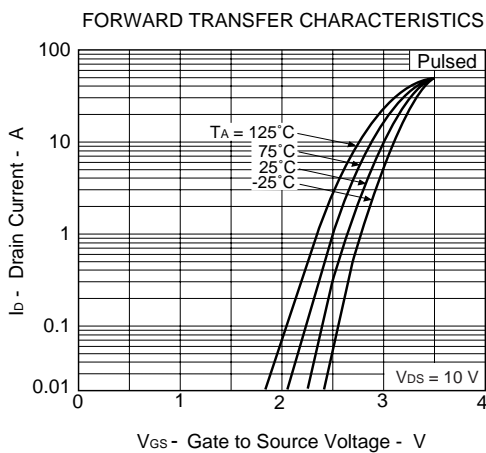


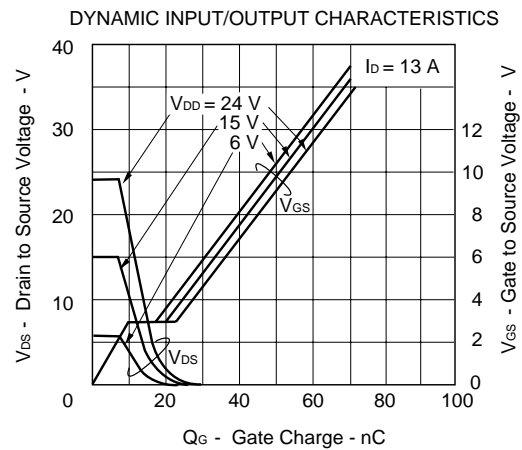
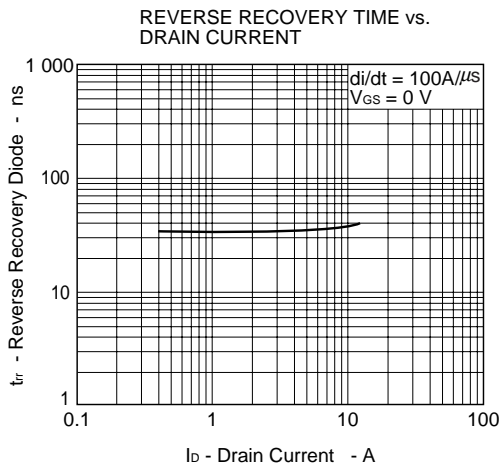
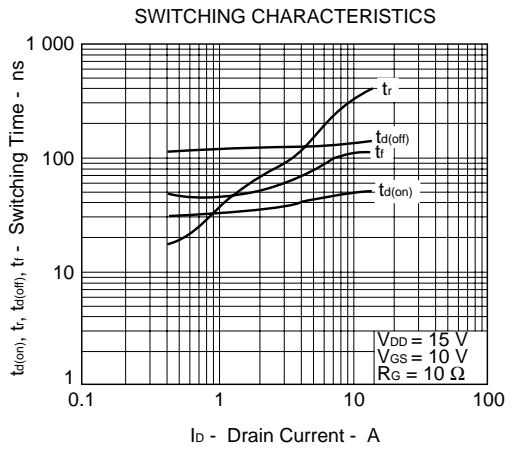
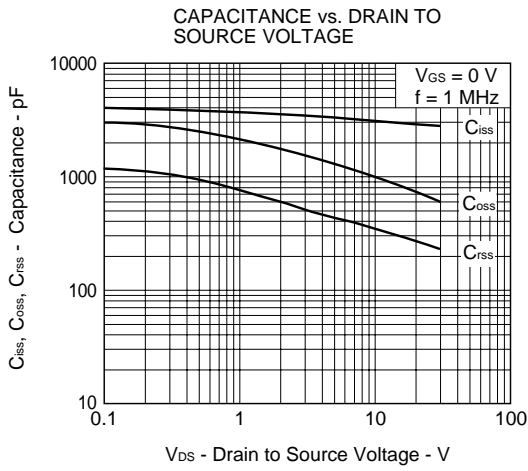
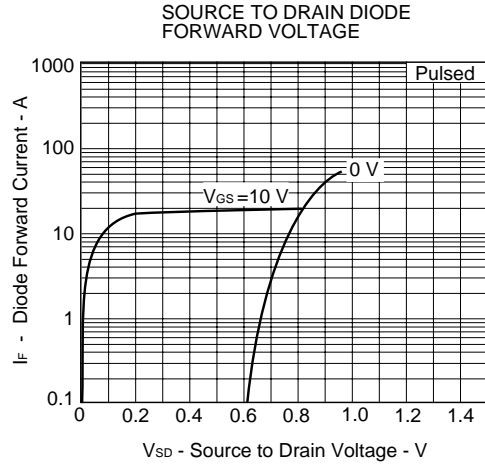
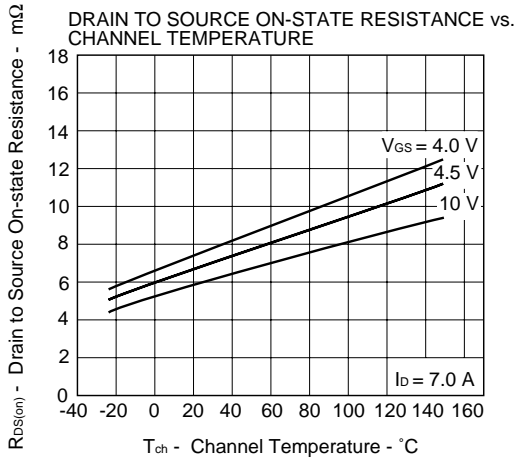
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)



**Remark** Mounted on ceramic substrate of 1200mm<sup>2</sup> × 0.7mm







[MEMO]

[MEMO]

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Anti-radioactive design is not implemented in this product.