

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μ PA1870 is a switching device which can be driven directly by a 2.5-V power source.

The μ PA1870 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.

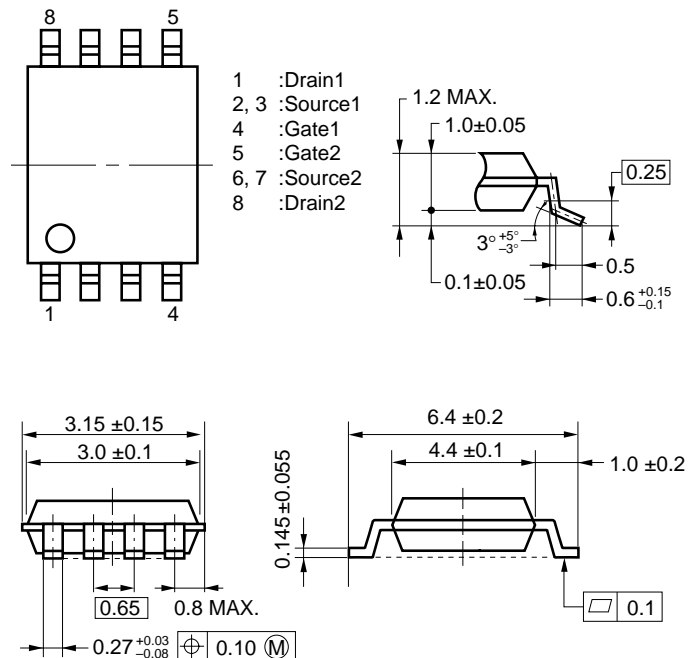
FEATURES

- Can be driven by a 2.5-V power source
- Low on-state resistance
 - $R_{DS(on)1} = 20.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 3.0 \text{ A)}$
 - $R_{DS(on)2} = 21.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 3.0 \text{ A)}$
 - $R_{DS(on)3} = 27.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 2.5 \text{ V, } I_D = 3.0 \text{ A)}$
- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA1870GR-9JG	Power TSSOP8

PACKAGE DRAWING (Unit: mm)



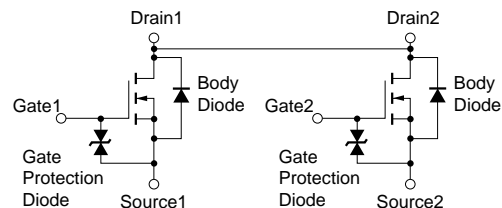
ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Drain to Source Voltage	V_{DS}	20	V
Gate to Source Voltage	V_{GS}	± 12	V
Drain Current (DC)	$I_{D(DC)}$	± 6.0	A
Drain Current (pulse) ^{Note 1}	$I_{D(pulse)}$	± 80	A
Total Power Dissipation ^{Note 2}	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 $50 \text{ cm}^2 \times 1.1 \text{ mm}$

EQUIVALENT CIRCUIT



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.

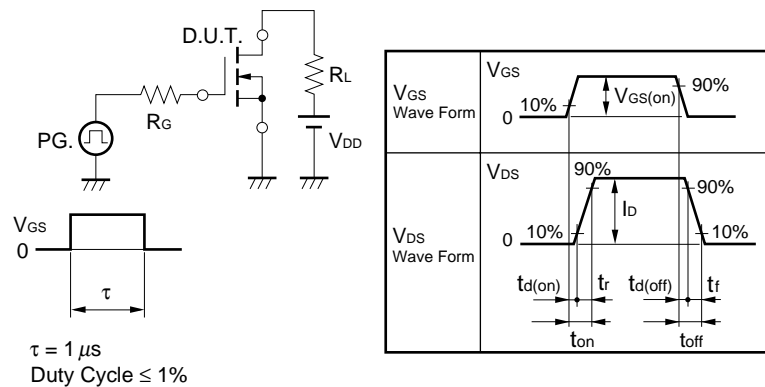
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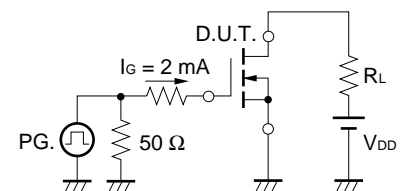
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±12 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	0.5	1.0	1.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 3.0 A	5			S
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 4.5 V, I _D = 3.0 A	12.0	15.0	20.0	mΩ
	R _{DS(on)2}	V _{GS} = 4.0 V, I _D = 3.0 A	13.0	15.5	21.0	mΩ
	R _{DS(on)3}	V _{GS} = 2.5 V, I _D = 3.0 A	15.0	20.8	27.0	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		900		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		295		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		170		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 10 V, I _D = 3.0 A V _{GS(on)} = 4.0 V R _G = 10 Ω		55		ns
Rise Time	t _r			210		ns
Turn-off Delay Time	t _{d(off)}			300		ns
Fall Time	t _f			340		ns
Total Gate Charge	Q _G	V _{DD} = 16 V		10		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 4.0 V		2		nC
Gate to Drain Charge	Q _{GD}	I _D = 6.0 A		6		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 6.0 A, V _{GS} = 0 V		0.80		V
Reverse Recovery Time	t _{rr}	I _F = 6.0 A, V _{GS} = 0 V		400		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 50 A/μs		1000		nC

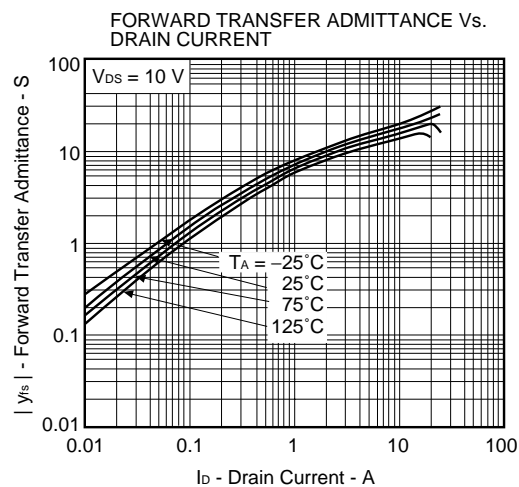
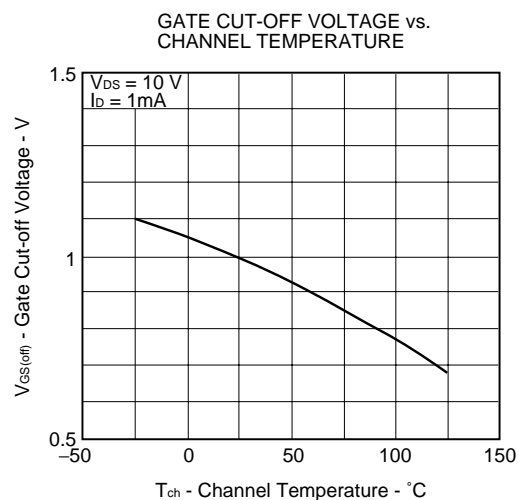
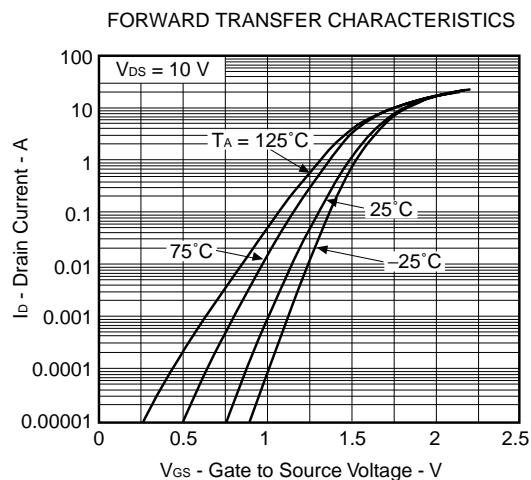
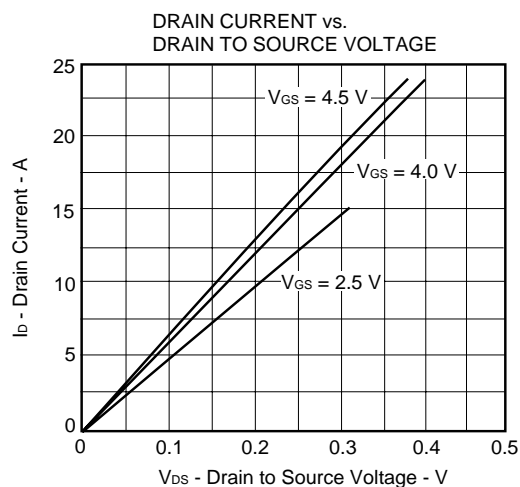
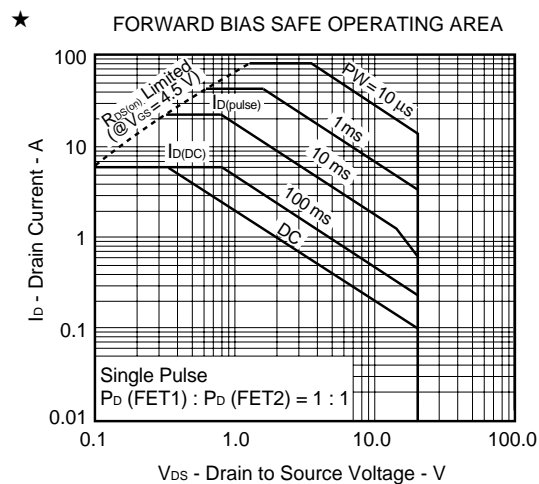
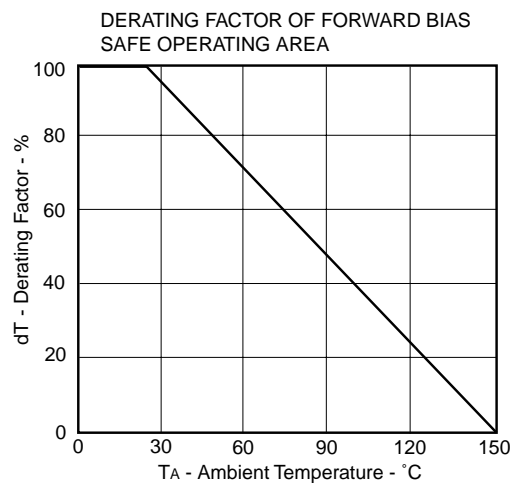
TEST CIRCUIT 1 SWITCHING TIME

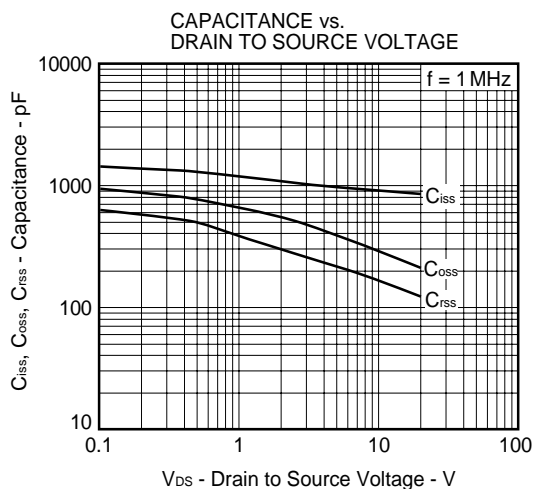
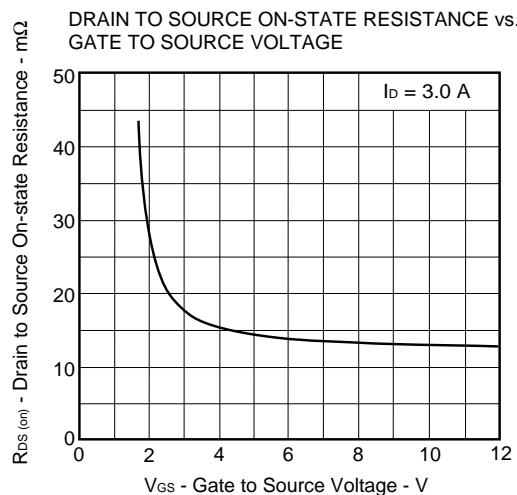
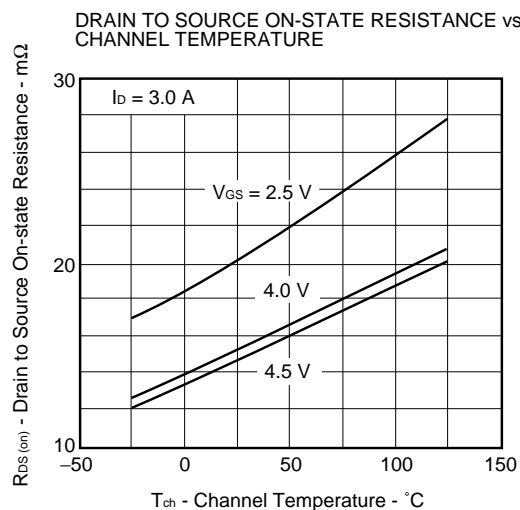
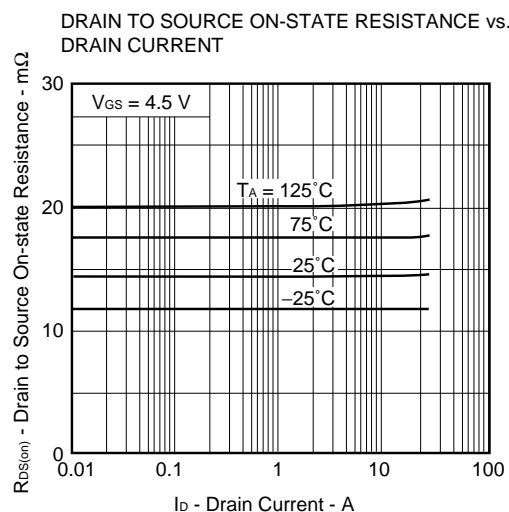
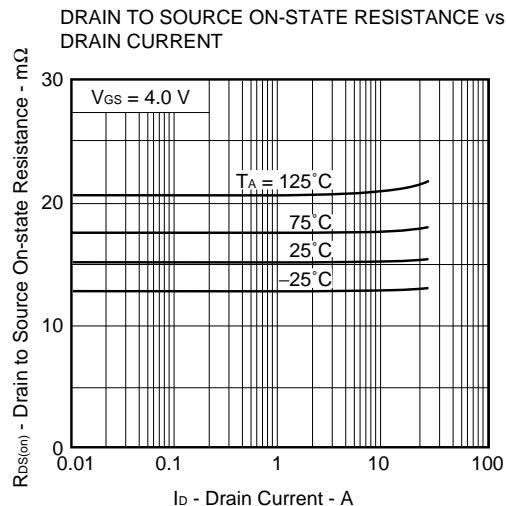
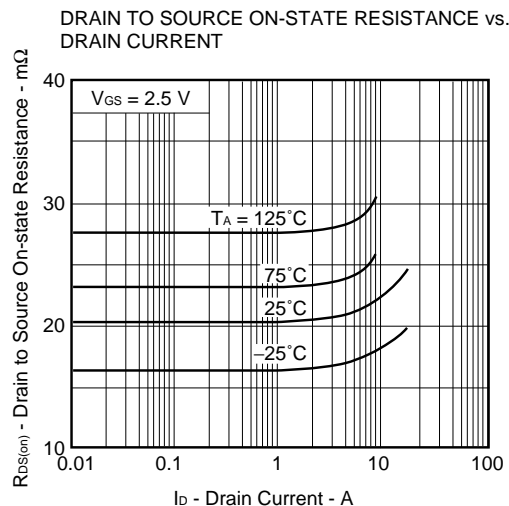


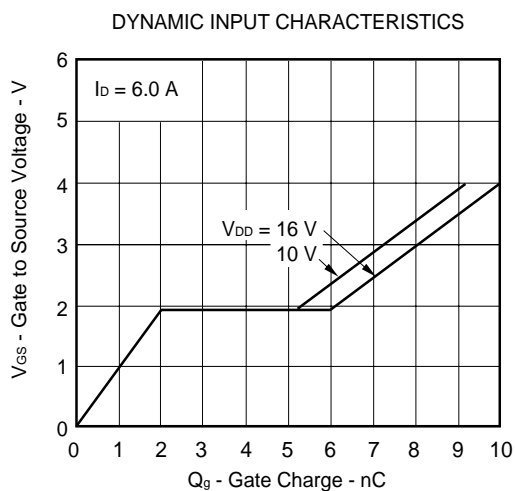
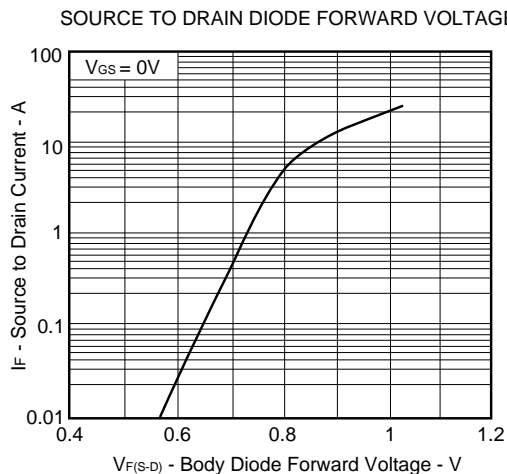
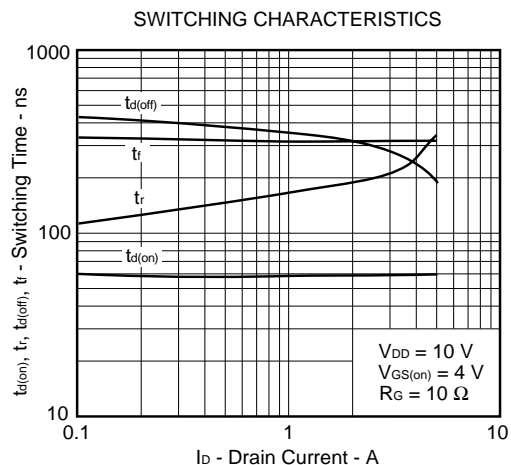
TEST CIRCUIT 2 GATE CHARGE



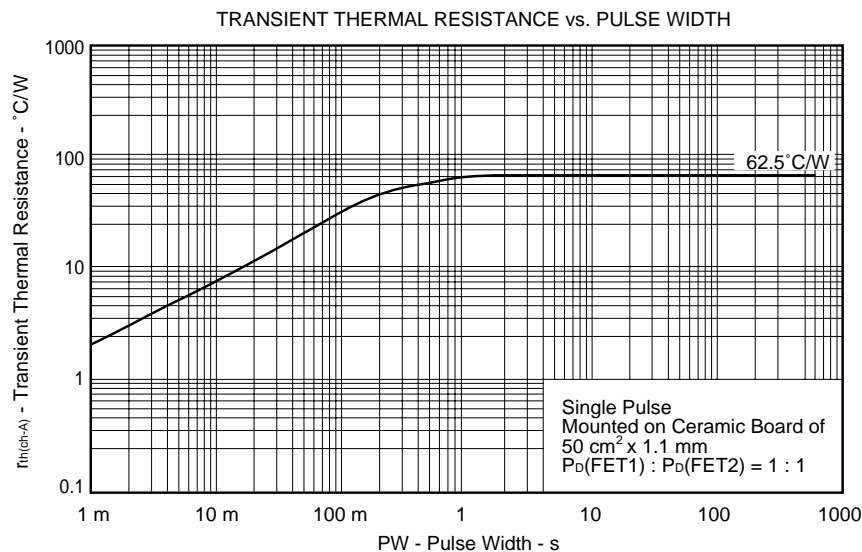
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)







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