

MOS FIELD EFFECT TRANSISTOR
 μ PA1870B

N-CHANNEL MOS FIELD EFFECT TRANSISTOR
FOR SWITCHING

DESCRIPTION

The μ PA1870B is a switching device which can be driven directly by a 2.5 V power source.

The μ PA1870B 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

- 2.5 V drive available
- Low on-state resistance
 $R_{DS(on)1} = 16.0 \text{ m}\Omega \text{ TYP. (} V_{GS} = 4.5 \text{ V, } I_D = 3.0 \text{ A)}$
 $R_{DS(on)2} = 16.5 \text{ m}\Omega \text{ TYP. (} V_{GS} = 4.0 \text{ V, } I_D = 3.0 \text{ A)}$
 $R_{DS(on)3} = 20.0 \text{ m}\Omega \text{ TYP. (} V_{GS} = 2.5 \text{ V, } I_D = 3.0 \text{ A)}$
- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA1870BGR-9JG	Power TSSOP8

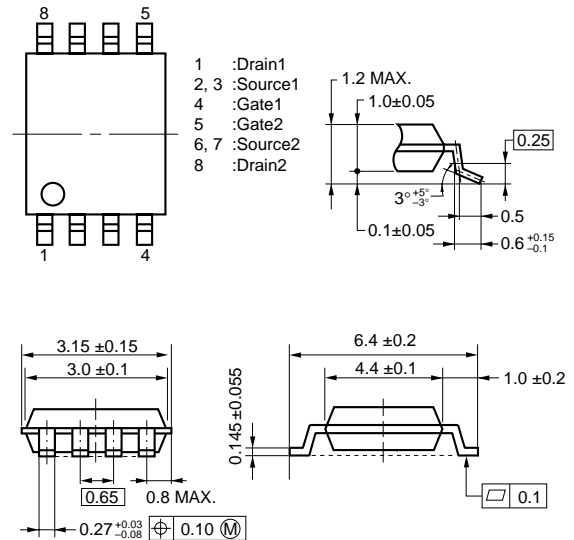
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V _{GS} = 0 V)	V _{DSS}	20.0	V
Gate to Source Voltage (V _{DS} = 0 V)	V _{GSS}	±12.0	V
Drain Current (DC) ^{Note 1}	I _{D(DC)}	±6.0	A
Drain Current (pulse) ^{Note 2}	I _{D(pulse)}	±80.0	A
Total Power Dissipation ^{Note 1}	P _T	2.0	W
Channel Temperature	T _{ch}	150	°C
Storage Temperature	T _{stg}	-55 to +150	°C

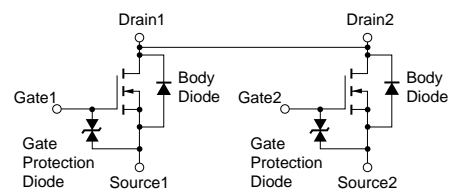
- Notes 1.** Mounted on ceramic substrate of 50 cm² x 1.1 mm
2. PW ≤ 10 μs, Duty Cycle ≤ 1%

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.

PACKAGE DRAWING (Unit: mm)



EQUIVALENT CIRCUIT



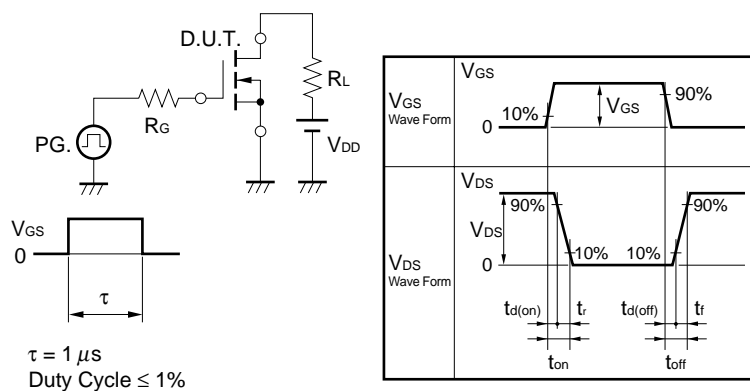
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ELECTRICAL CHARACTERISTICS (TA = 25°C)

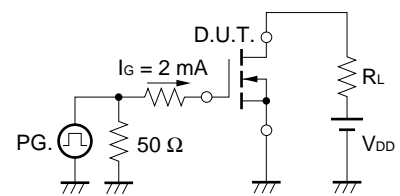
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20.0\text{ V}, V_{GS} = 0\text{ V}$			1.0	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 12.0\text{ V}, V_{DS} = 0\text{ V}$			± 10.0	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = 10.0\text{ V}, I_D = 1.0\text{ mA}$	0.5	1.0	1.5	V
Forward Transfer Admittance ^{Note}	$ y_{fs} $	$V_{DS} = 10.0\text{ V}, I_D = 3.0\text{ A}$	5			S
Drain to Source On-state Resistance ^{Note}	$R_{DS(on)1}$	$V_{GS} = 4.5\text{ V}, I_D = 3.0\text{ A}$	12.0	16.0	20.0	$\text{m}\Omega$
	$R_{DS(on)2}$	$V_{GS} = 4.0\text{ V}, I_D = 3.0\text{ A}$	13.0	16.5	21.0	$\text{m}\Omega$
	$R_{DS(on)3}$	$V_{GS} = 2.5\text{ V}, I_D = 3.0\text{ A}$	15.0	20.0	27.0	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = 10.0\text{ V}$		720		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$		166		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1.0\text{ MHz}$		125		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 10.0\text{ V}, I_D = 3.0\text{ A}$		48		ns
Rise Time	t_r	$V_{GS} = 4.0\text{ V}$		245		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10\ \Omega$		315		ns
Fall Time	t_f			305		ns
Total Gate Charge	Q_G	$V_{DD} = 16.0\text{ V}$		8.0		nC
Gate to Source Charge	Q_{GS}	$I_D = 6.0\text{ A}$		1.7		nC
Gate to Drain Charge	Q_{GD}	$V_{GS} = 4.0\text{ V}$		3.5		nC
Body Diode Forward Voltage ^{Note}	$V_{F(S-D)}$	$I_F = 6.0\text{ A}, V_{GS} = 0\text{ V}$		0.8		V
Reverse Recovery Time	t_{rr}	$I_F = 6.0\text{ A}, V_{GS} = 0\text{ V}$		295		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 50\text{ A}/\mu\text{s}$		450		nC

Note Pulsed: $PW \leq 350\ \mu\text{s}$, Duty Cycle $\leq 2\%$

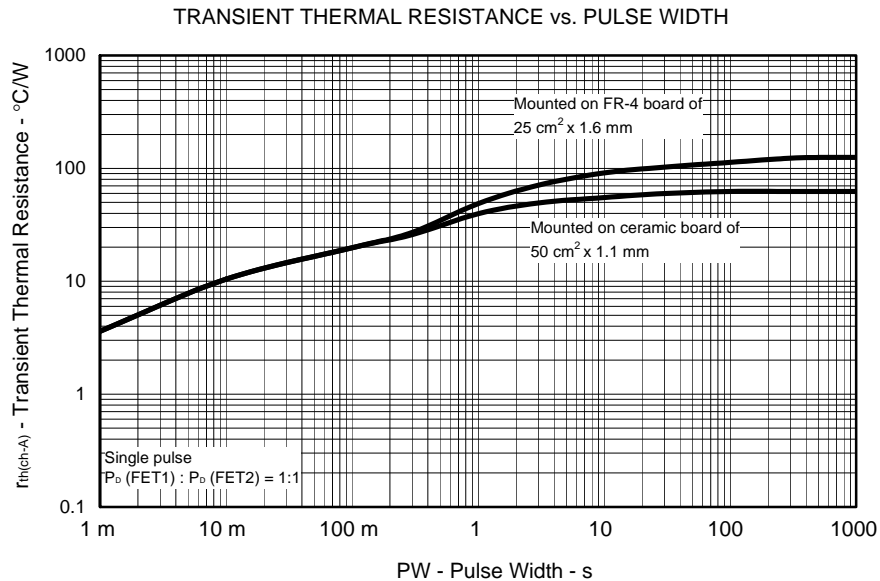
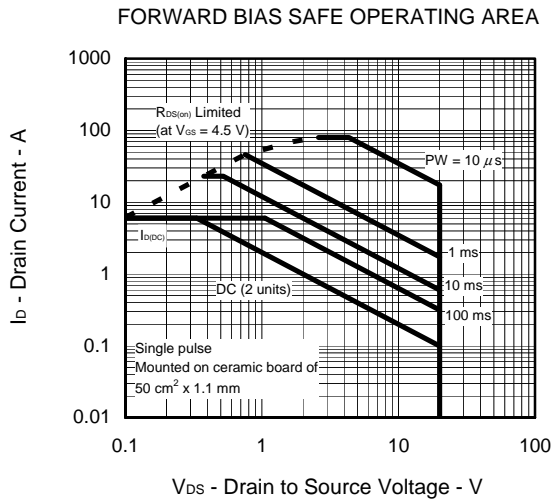
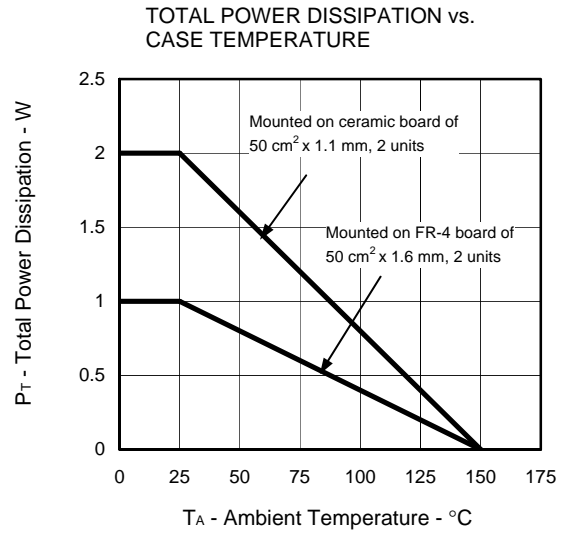
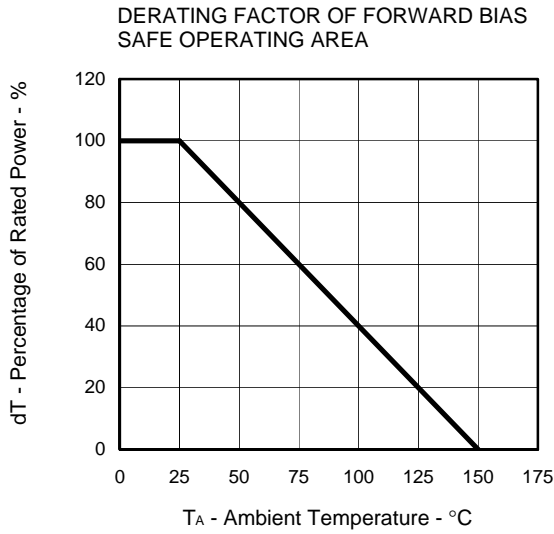
TEST CIRCUIT 1 SWITCHING TIME



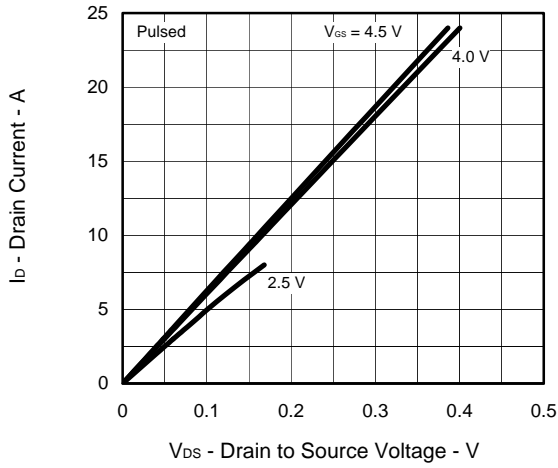
TEST CIRCUIT 2 GATE CHARGE



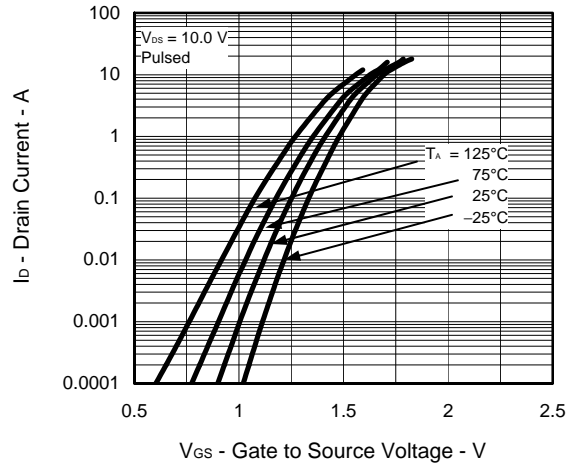
TYPICAL CHARACTERISTICS (T_A = 25°C)



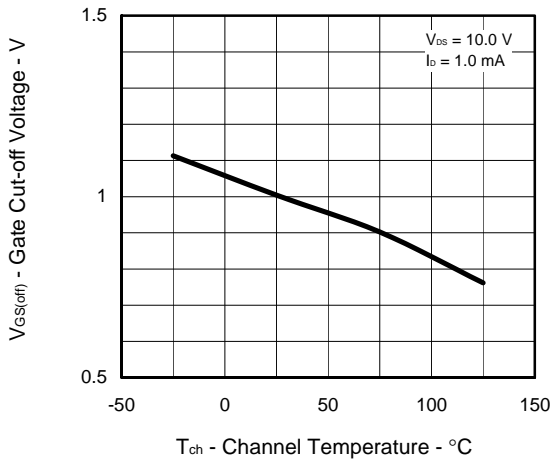
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



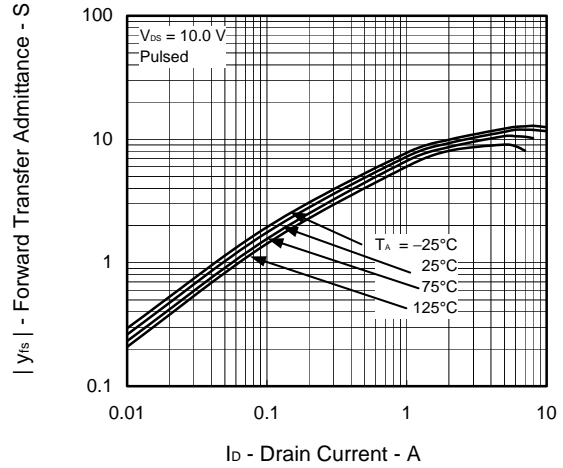
FORWARD TRANSFER CHARACTERISTICS



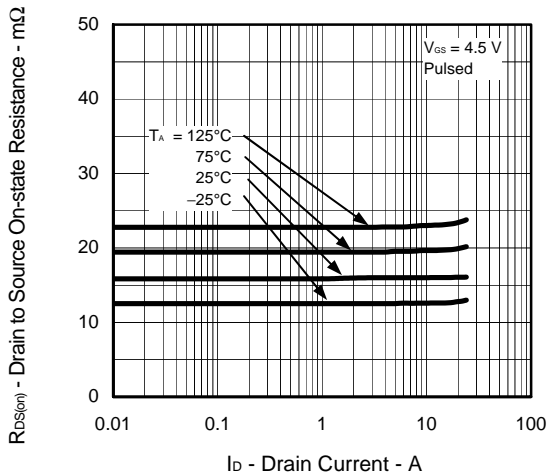
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



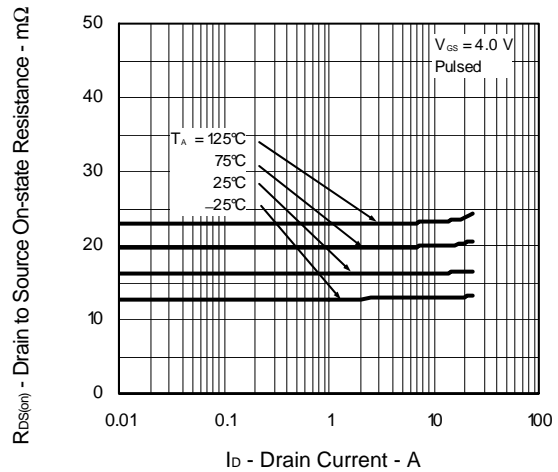
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



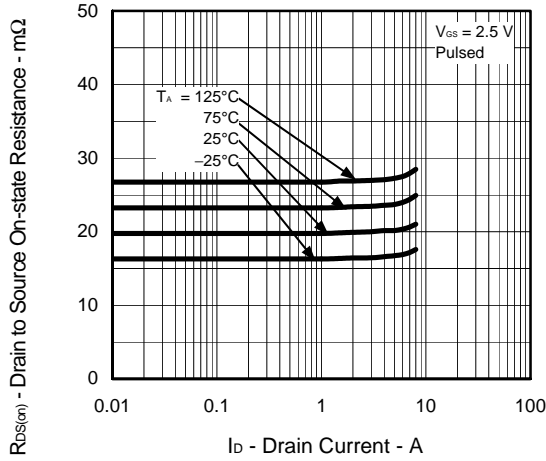
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



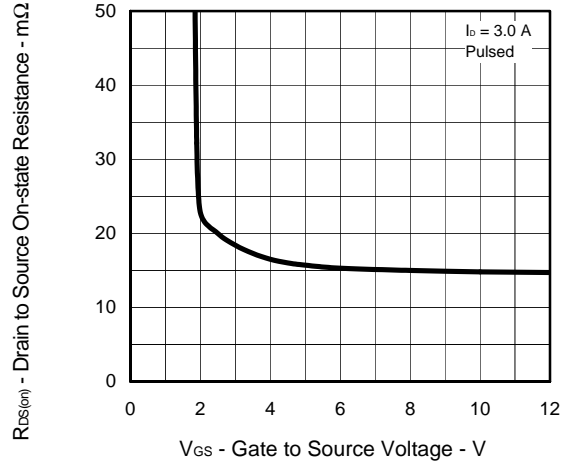
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



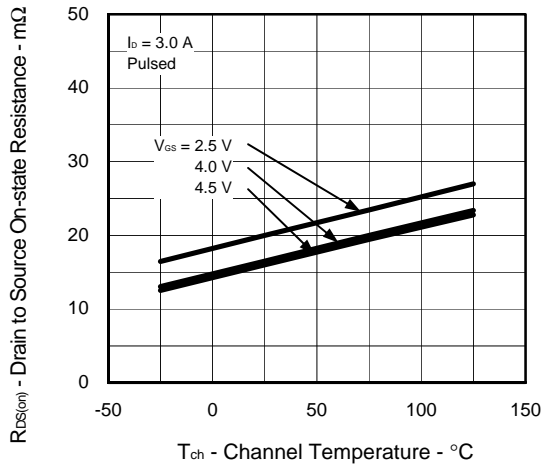
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



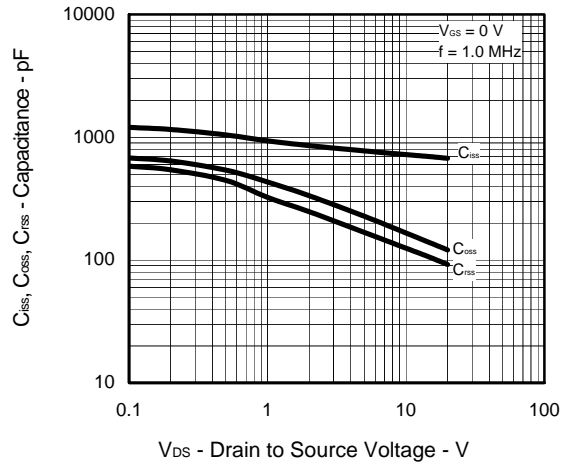
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



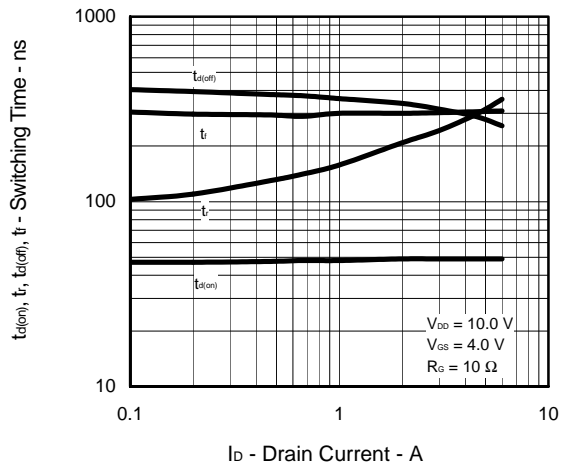
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



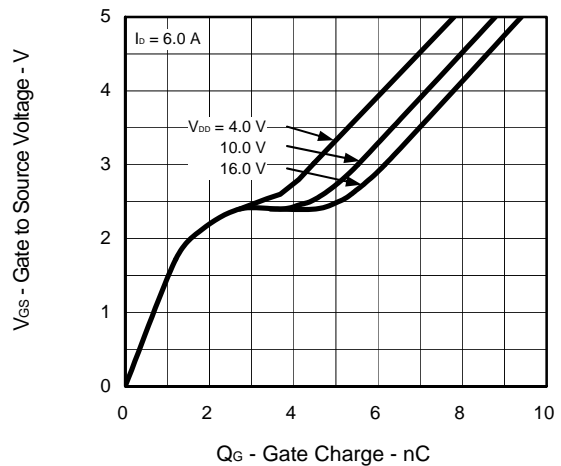
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE

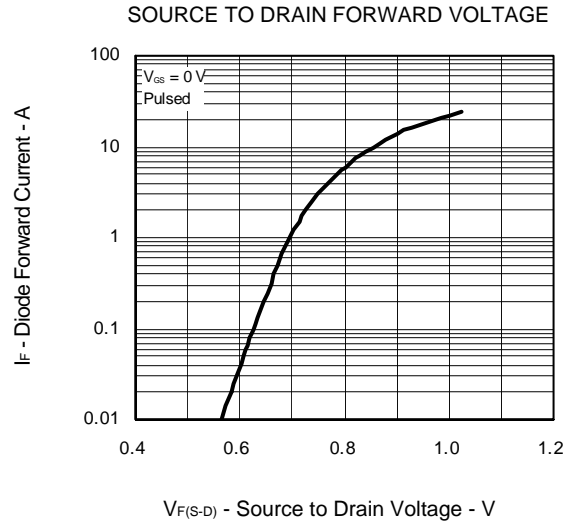


SWITCHING CHARACTERISTICS



DYNAMIC INPUT CHARACTERISTICS





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