

SWITCHING

N-CHANNEL POWER MOS FET

INDUSTRIAL USE

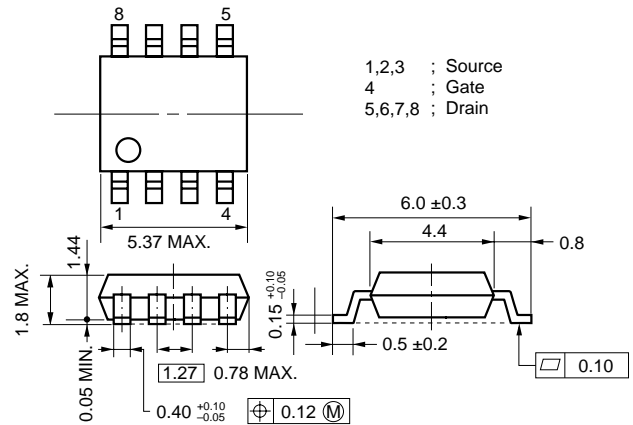
DESCRIPTION

This μ PA1704 is N-Channel MOS Field Effect Transistor designed for power management applications and Li-ion battery application.

FEATURES

- 2.5-V gate drive and low on-resistance
 $R_{DS(on)1} = 13 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 5.0 \text{ A)}$
 $R_{DS(on)2} = 16 \text{ m}\Omega \text{ MAX. (} V_{GS} = 2.5 \text{ V, } I_D = 5.0 \text{ A)}$
- Low C_{iss} : $C_{iss} = 2700 \text{ pF TYP.}$
- Built-in G-S protection diode
- Small and surface mount package (Power SOP8)

PACKAGE DRAWING (Unit : mm)



ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA1704G	Power SOP8

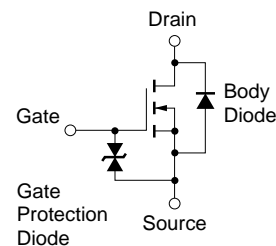
ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, All terminals are connected.)

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	30	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	±12	V
Drain Current (DC)	$I_{D(DC)}$	±10	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	±40	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$) ^{Note2}	P_T	2.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	-55 to + 150	°C

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

2. Mounted on ceramic substrate of $1200 \text{ mm}^2 \times 0.7 \text{ mm}$

EQUIVALENT CIRCUIT



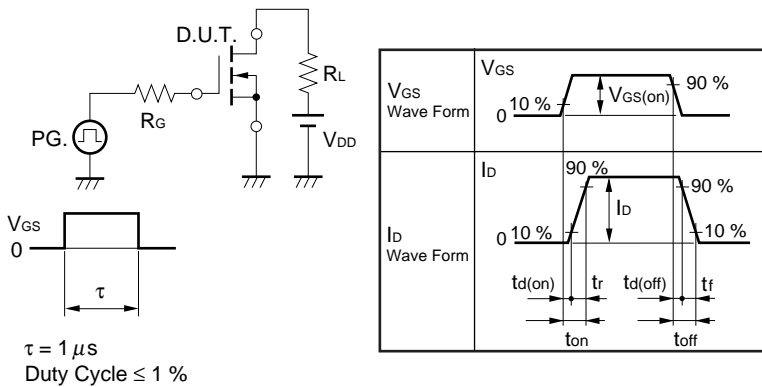
Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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

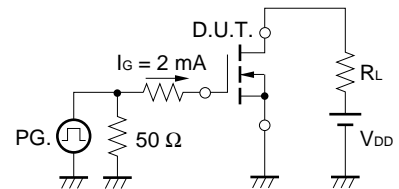
ELECTRICAL CHARACTERISTICS (T_A = 25 °C, All terminals are connected.)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 4.0 V, I _D = 5.0 A		9.8	13	mΩ
	R _{DS(on)2}	V _{GS} = 2.5 V, I _D = 5.0 A		12	16	mΩ
Gate to Source Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	0.5	0.8	1.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 5.0 A	10	25		S
Drain Leakage Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			10	μA
Gate to Source Leakage Current	I _{GSS}	V _{GS} = ±12 V, V _{DS} = 0 V			±10	μA
Input Capacitance	C _{iss}	V _{DS} = 10 V		2700		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		880		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		400		pF
Turn-on Delay Time	t _{d(on)}	I _D = 5.0 A		25		ns
Rise Time	t _r	V _{GS(on)} = 4.0 V		95		ns
Turn-off Delay Time	t _{d(off)}	V _{DD} = 15 V		235		ns
Fall Time	t _f	R _G = 10 Ω		200		ns
Total Gate Charge	Q _G	I _D = 10 A		38		nC
Gate to Source Charge	Q _{GS}	V _{DD} = 24 V		3.3		nC
Gate to Drain Charge	Q _{GD}	V _{GS} = 4.0 V		15		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 10 A, V _{GS} = 0 V		0.8		V
Reverse Recovery Time	t _{rr}	I _F = 10 A, V _{GS} = 0 V		48		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		53		nC

TEST CIRCUIT 1 SWITCHING TIME

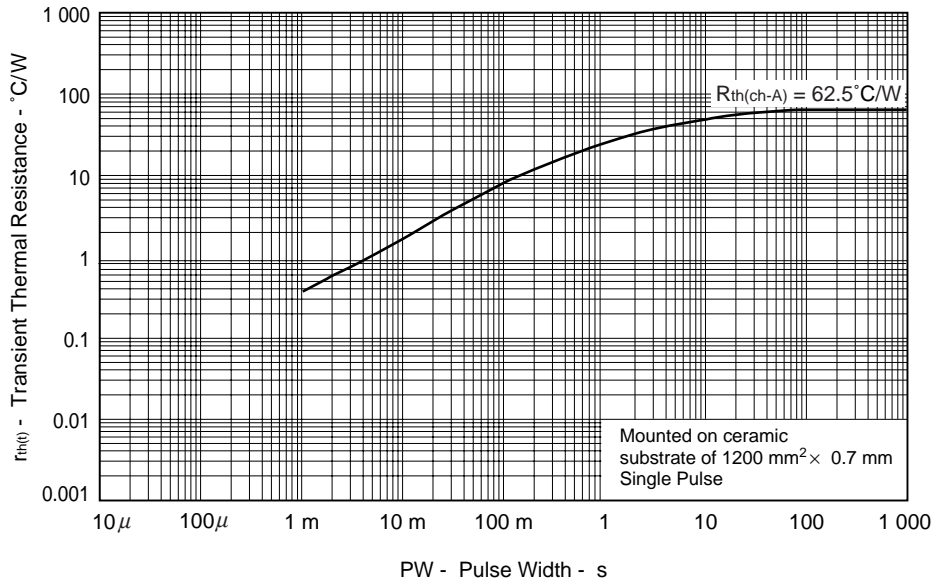


TEST CIRCUIT 2 GATE CHARGE

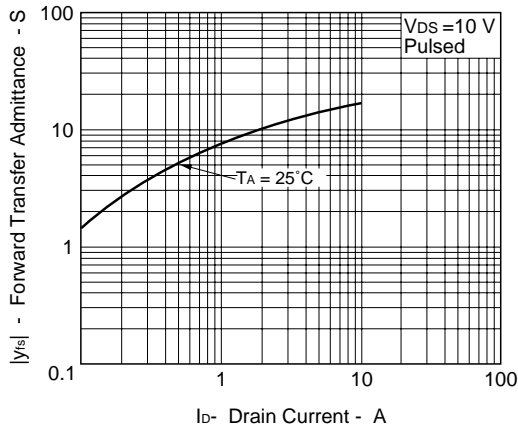


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

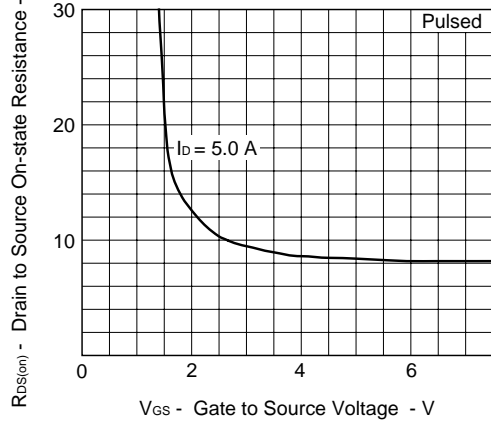
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



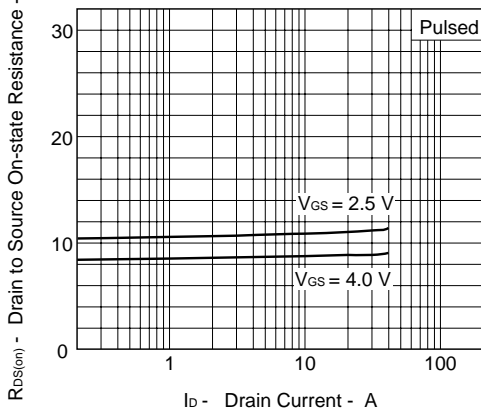
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



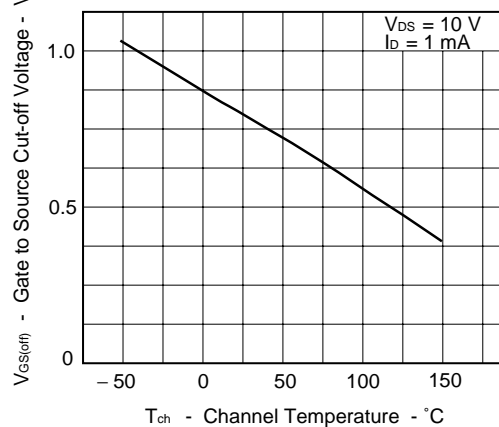
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



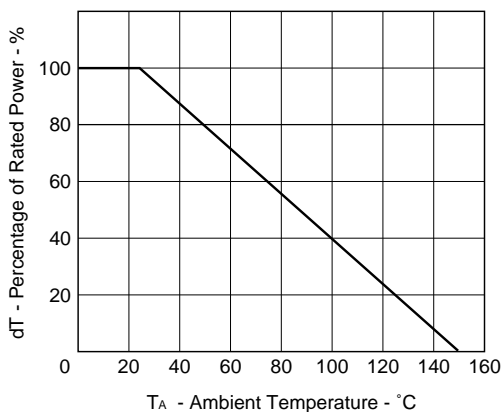
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



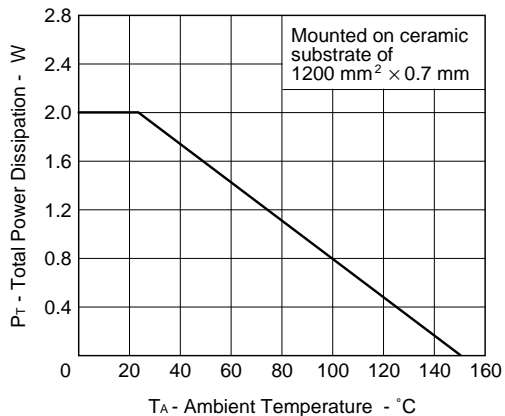
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



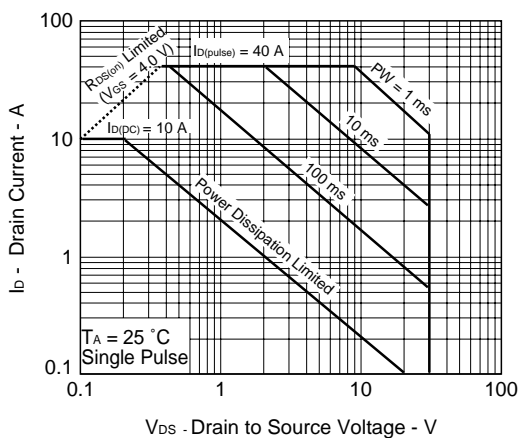
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



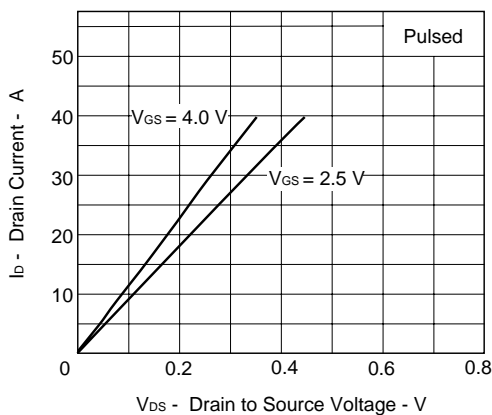
FORWARD BIAS SAFE OPERATING AREA



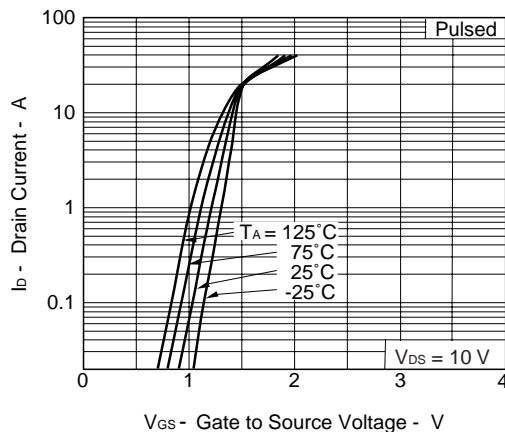
Remark

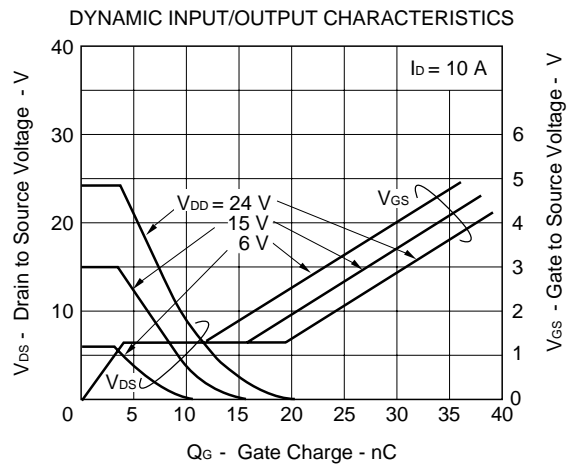
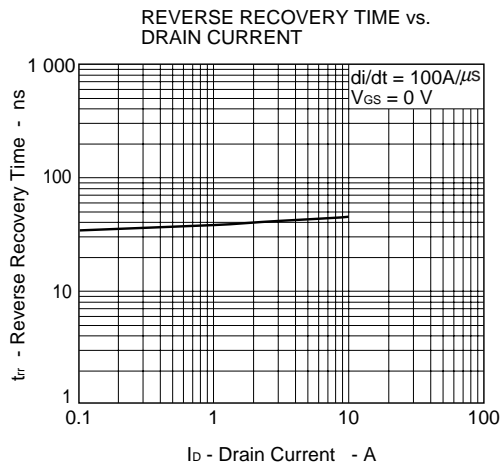
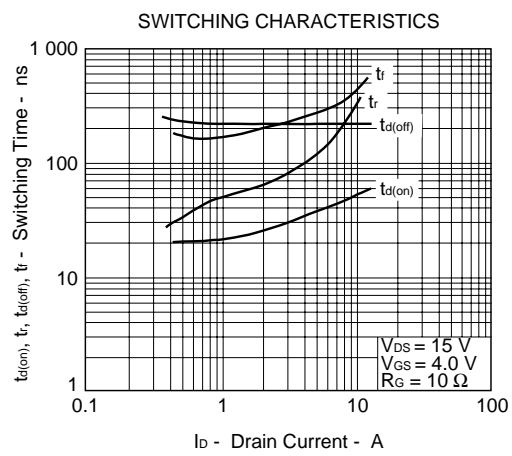
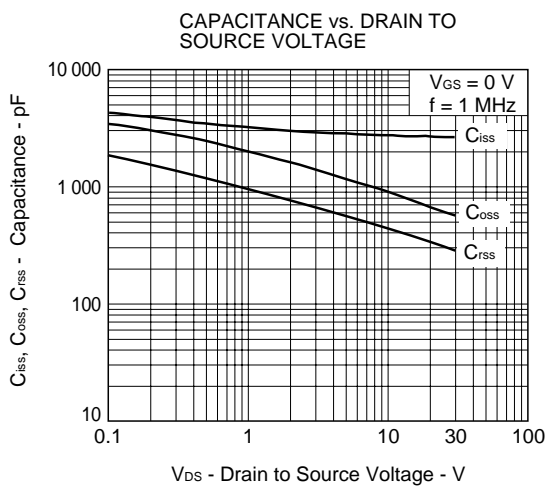
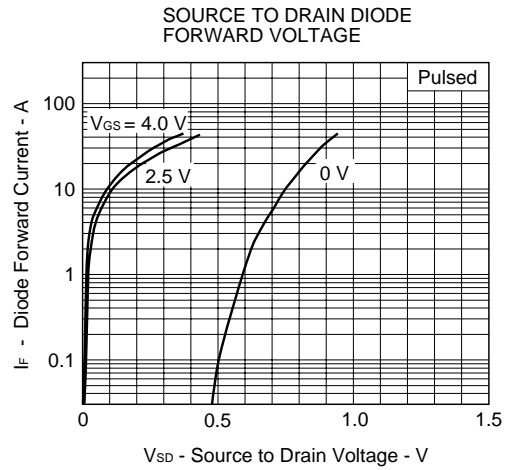
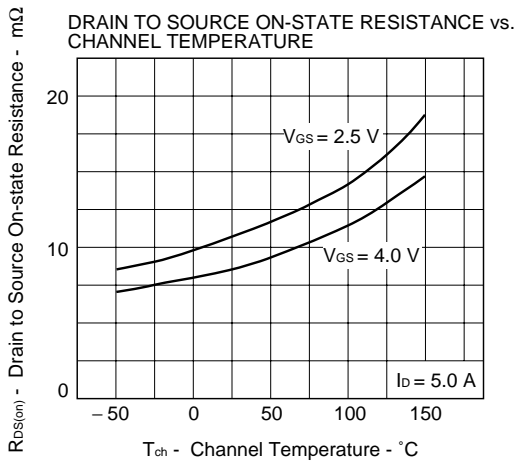
Mounted on ceramic substrate of 1200 mm² x 0.7 mm

DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



FORWARD TRANSFER CHARACTERISTICS





[MEMO]

[MEMO]

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