

**P-CHANNEL MOS FIELD EFFECT TRANSISTOR  
FOR SWITCHING**

**DESCRIPTION**

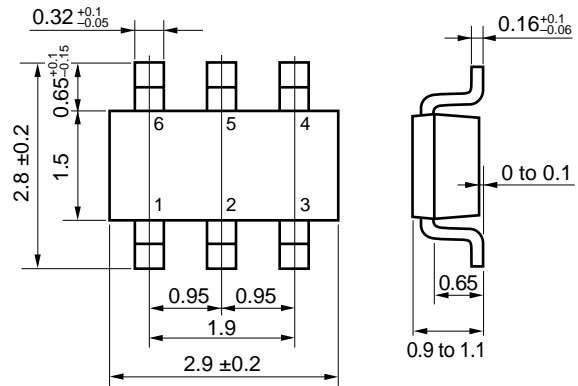
The  $\mu$ PA1916 is a switching device which can be driven directly by a 1.8 V power source.

This device 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**

- 1.8 V drive available
- Low on-state resistance  
 $R_{DS(on)1} = 39 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -2.5 \text{ A)}$   
 $R_{DS(on)2} = 49 \text{ m}\Omega \text{ MAX. (} V_{GS} = -3.0 \text{ V, } I_D = -2.5 \text{ A)}$   
 $R_{DS(on)3} = 55 \text{ m}\Omega \text{ MAX. (} V_{GS} = -2.5 \text{ V, } I_D = -2.5 \text{ A)}$   
 $R_{DS(on)4} = 98 \text{ m}\Omega \text{ MAX. (} V_{GS} = -1.8 \text{ V, } I_D = -1.5 \text{ A)}$

**PACKAGE DRAWING (Unit: mm)**



1, 2, 5, 6 : Drain  
3 : Gate  
4 : Source

**ORDERING INFORMATION**

PART NUMBER	PACKAGE
$\mu$ PA1916TE <sup>Note</sup>	SC-95 (Mini Mold Thin Type)

**Note** Marking: TL

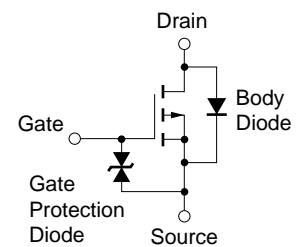
**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)**

Drain to Source Voltage (V <sub>GS</sub> = 0 V)	V <sub>BSS</sub>	-12	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	V <sub>GSS</sub>	±8.0	V
Drain Current (DC) (T <sub>A</sub> = 25°C)	I <sub>D(DC)</sub>	±4.5	A
Drain Current (pulse) <sup>Note1</sup>	I <sub>D(pulse)</sub>	±18	A
Total Power Dissipation (T <sub>A</sub> = 25°C)	P <sub>T1</sub>	0.2	W
Total Power Dissipation (T <sub>A</sub> = 25°C) <sup>Note2</sup>	P <sub>T2</sub>	2.0	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

- Notes** 1. PW ≤ 10 μs, Duty Cycle ≤ 1%  
2. Mounted on FR-4 board, t ≤ 5 sec.

**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.

**EQUIVALENT CIRCUIT**

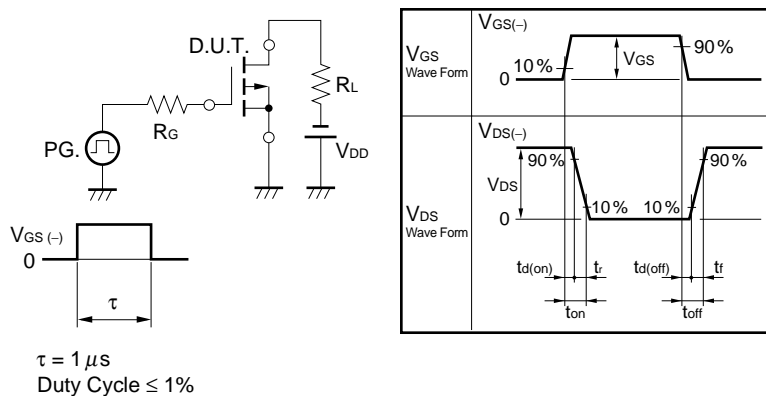


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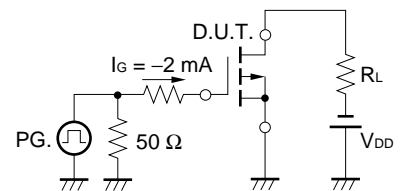
**ELECTRICAL CHARACTERISTICS (TA = 25°C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -12\text{ V}, V_{GS} = 0\text{ V}$			-10	μA
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \mp 8.0\text{ V}, V_{DS} = 0\text{ V}$			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = -10\text{ V}, I_D = -1.0\text{ mA}$	-0.45	-0.8	-1.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -2.5\text{ A}$	3.0			S
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = -4.5\text{ V}, I_D = -2.5\text{ A}$		30	39	mΩ
	$R_{DS(on)2}$	$V_{GS} = -3.0\text{ V}, I_D = -2.5\text{ A}$		36	49	mΩ
	$R_{DS(on)3}$	$V_{GS} = -2.5\text{ V}, I_D = -2.5\text{ A}$		41	55	mΩ
	$R_{DS(on)4}$	$V_{GS} = -1.8\text{ V}, I_D = -1.5\text{ A}$		59	98	mΩ
Input Capacitance	$C_{iss}$	$V_{DS} = -10\text{ V}$		950		pF
Output Capacitance	$C_{oss}$	$V_{GS} = 0\text{ V}$		330		pF
Reverse Transfer Capacitance	$C_{rss}$	$f = 1.0\text{ MHz}$		170		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -6.0\text{ V}, I_D = -2.5\text{ A}$		15		ns
Rise Time	$t_r$	$V_{GS} = -4.0\text{ V}$		15		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10\ \Omega$		140		ns
Fall Time	$t_f$			120		ns
Total Gate Charge	$Q_G$	$V_{DD} = -10\text{ V}$		8.0		nC
Gate to Source Charge	$Q_{GS}$	$V_{GS} = -4.0\text{ V}$		1.5		nC
Gate to Drain Charge	$Q_{GD}$	$I_D = -4.5\text{ A}$		2.5		nC
Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 4.5\text{ A}, V_{GS} = 0\text{ V}$		0.84		V

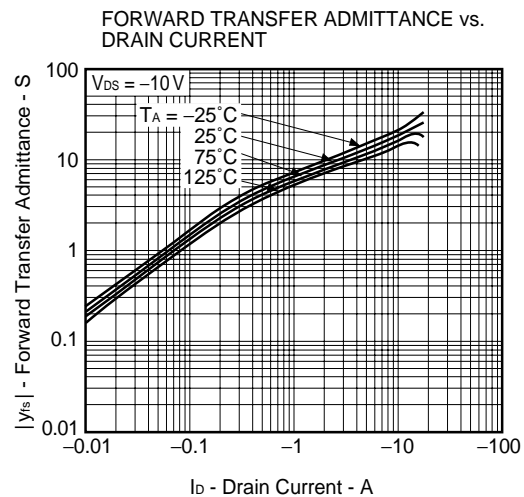
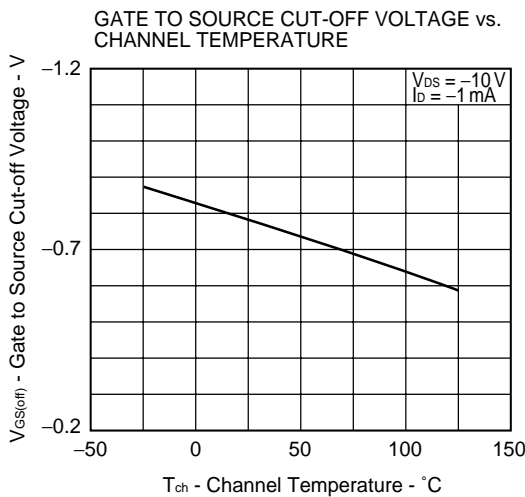
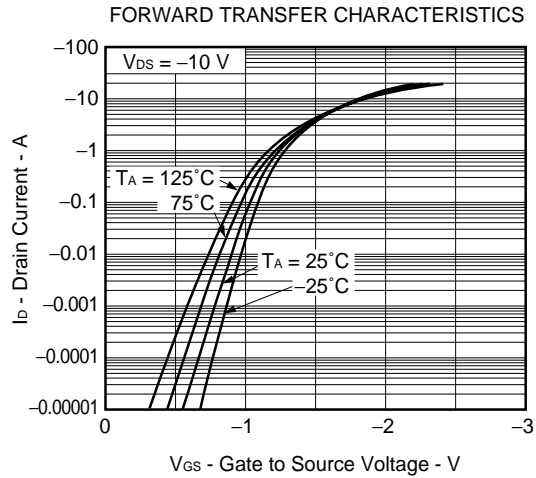
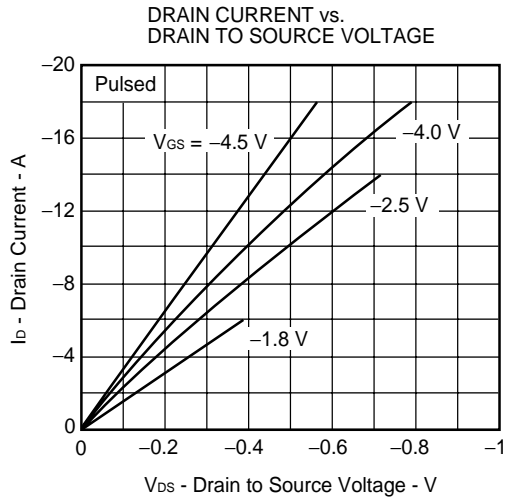
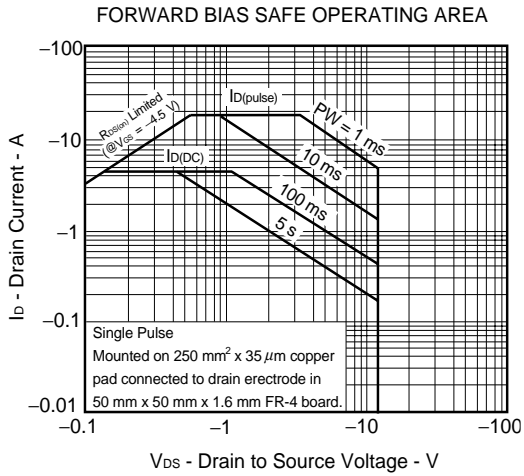
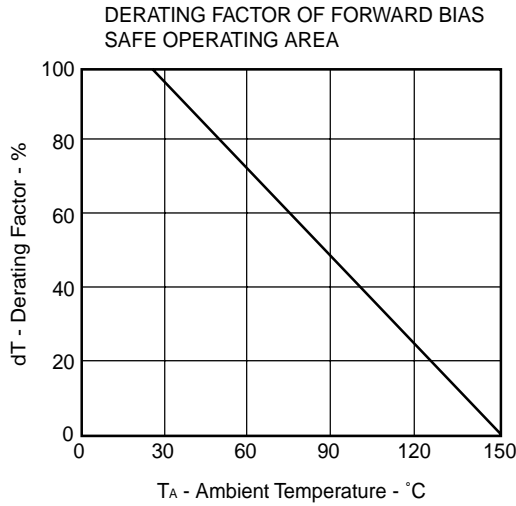
**TEST CIRCUIT 1 SWITCHING TIME**

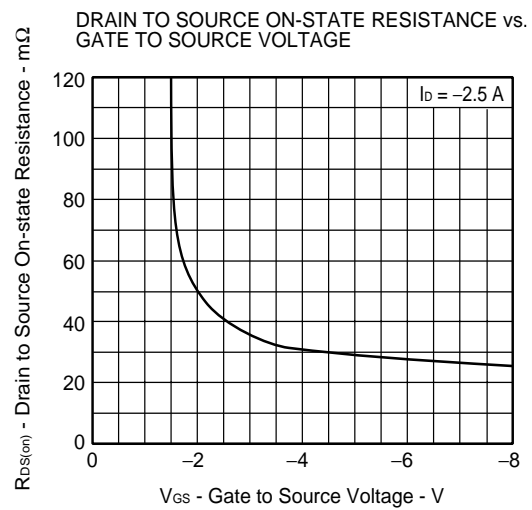
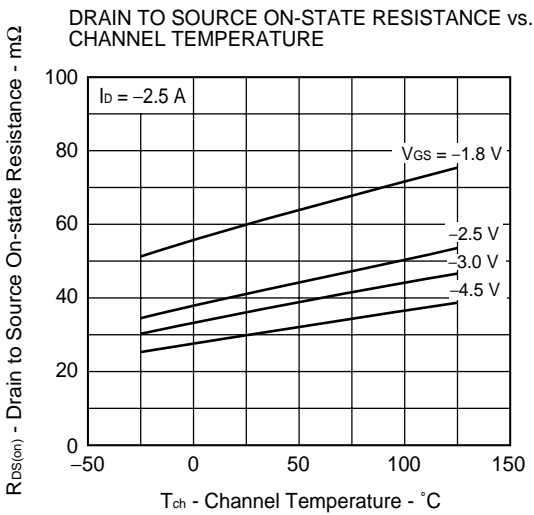
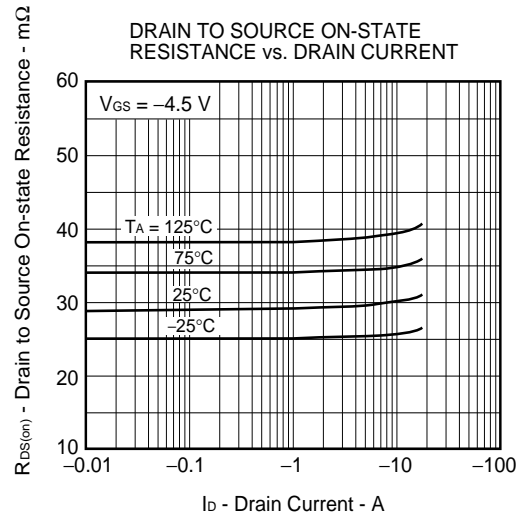
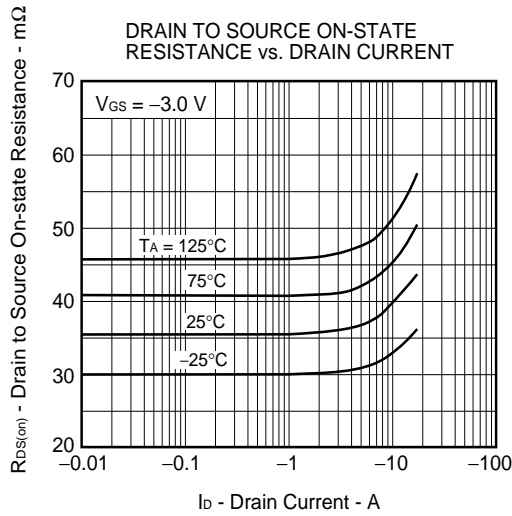
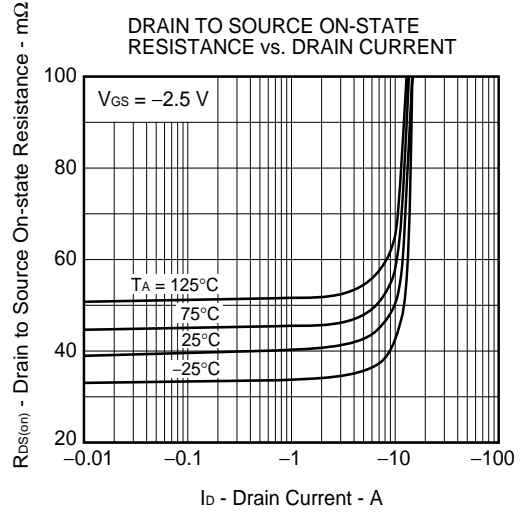
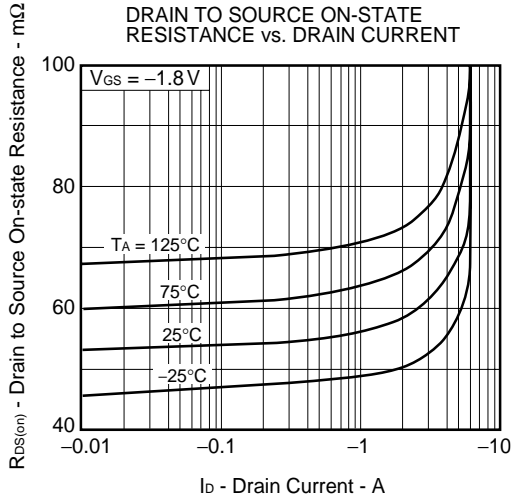


**TEST CIRCUIT 2 GATE CHARGE**

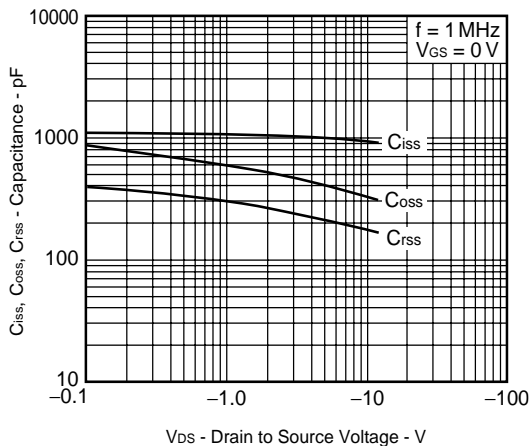


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

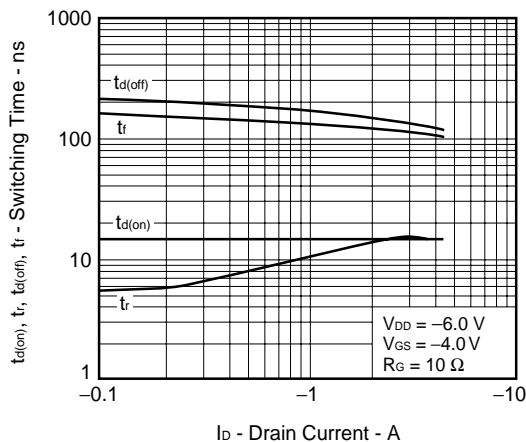




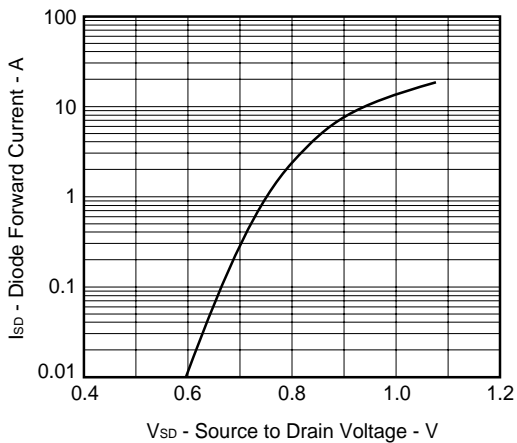
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



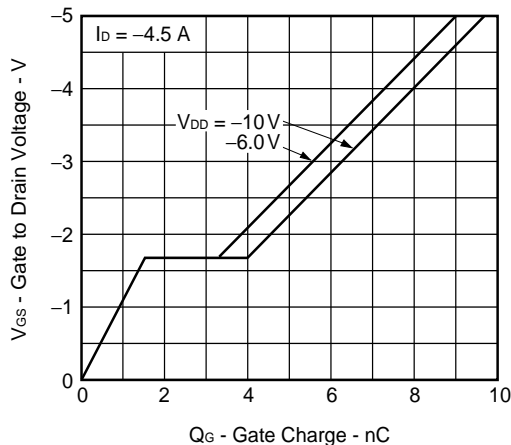
SWITCHING CHARACTERISTICS



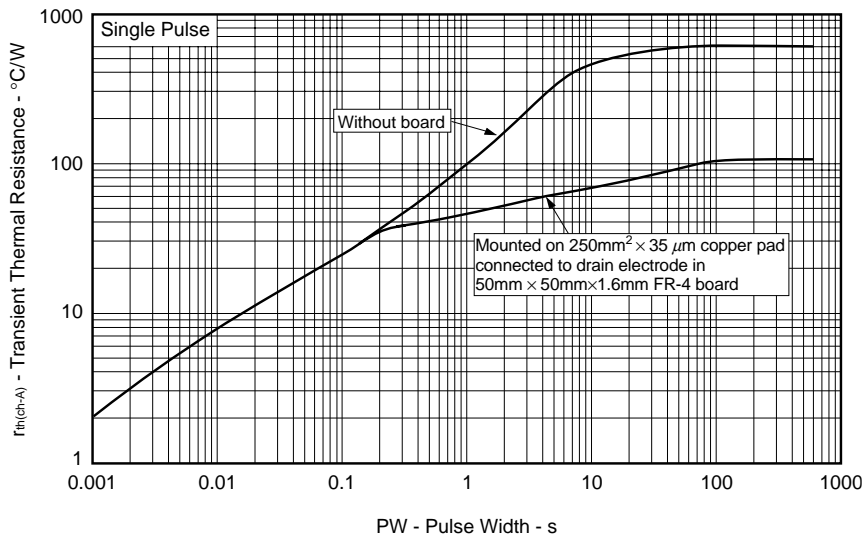
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



[MEMO]

[MEMO]

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