

# MOS FIELD EFFECT TRANSISTOR $\mu$ PA2451

## N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

### **DESCRIPTION**

The  $\mu$ PA2451 is a switching device which can be driven directly by a 2.5 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**

- 2.5 V drive available
- · Low on-state resistance

RDS(on)1 = 20 m $\Omega$  MAX. (VGS = 4.5 V, ID = 4.0 A)

RDS(on)2 = 21 m $\Omega$  MAX. (VGS = 4.0 V, ID = 4.0 A)

RDS(on)3 = 25 m $\Omega$  MAX. (VGS = 3.1 V, ID = 4.0 A)

 $RDS(on)4 = 32 \text{ m}\Omega \text{ MAX. } (VGS = 2.5 \text{ V, } ID = 4.0 \text{ A})$ 

• Built-in G-S protection diode against ESD

### ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA2451TL	6PIN HWSON (4521)

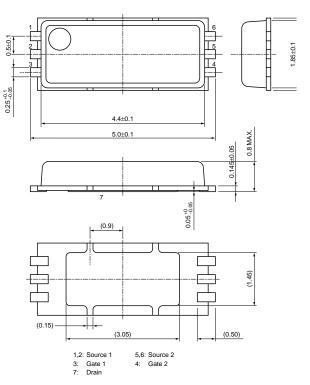
### ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

Drain to Source Voltage (Vgs = 0 V)	VDSS	30	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	Vgss	±12	V
Drain Current (DC) (T <sub>A</sub> = 25°C)	ID(DC)	±8.2	Α
Drain Current (pulse) Note1	ID(pulse)	±80	Α
Total Power Dissipation (2unit) Note2	P <sub>T1</sub>	2.5	W
Total Power Dissipation (2unit) Note3	P <sub>T2</sub>	0.7	W
Channel Temperature	Tch	150	°C
Storage Temperature	Tstg	-55 to +150	°C

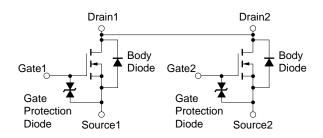
**Notes 1.** PW  $\leq$  10  $\mu$ s, Duty Cycle  $\leq$  1%

- 2. TA = 25°C Mounted on ceramic board
- 3. TA = 25°C Mounted on FR4 board

### PACKAGE DRAWING (Unit: 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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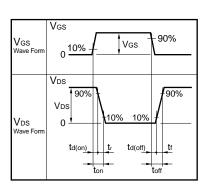


### **ELECTRICAL CHARACTERISTICS (TA = 25°C)**

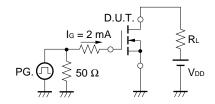
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	IDSS	Vps = 30 V, Vgs = 0 V			10	μΑ
Gate Leakage Current	lgss	Vgs = ±12 V, Vps = 0 V			±10	μΑ
Gate Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1.0 mA	0.5	1.0	1.5	V
Forward Transfer Admittance	yfs	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 4.0 A	5.0			S
Drain to Source On-state Resistance	RDS(on)1	Vgs = 4.5 V, ID = 4.0 A	12	16	20	mΩ
	RDS(on)2	Vgs = 4.0 V, ID = 4.0 A	12.5	16.5	21	mΩ
	RDS(on)3	Vgs = 3.1 V, ID = 4.0 A	14	18.5	25	mΩ
	RDS(on)4	Vgs = 2.5 V, ID = 4.0 A	15.5	22.5	32	mΩ
Input Capacitance	Ciss	Vps = 10 V		540		pF
Output Capacitance	Coss	V <sub>G</sub> s = 0 V		150		pF
Reverse Transfer Capacitance	Crss	f = 1.0 MHz		80		pF
Turn-on Delay Time	td(on)	V <sub>DD</sub> = 15 V, I <sub>D</sub> = 4.0 A		17		ns
Rise Time	tr	Vgs = 10 V		45		ns
Turn-off Delay Time	td(off)	$R_G = 6.0 \Omega$		360		ns
Fall Time	tf			160		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = 24 V		9.0		nC
Gate to Source Charge	Qgs	Vgs = 4.0 V		1.5		nC
Gate to Drain Charge	Q <sub>GD</sub>	I <sub>D</sub> = 8.2 A		4.5		nC
Body Diode Forward Voltage	V <sub>F</sub> (S-D)	IF = 8.2 A, VGS = 0 V		0.84		V
Reverse Recovery Time	trr	IF = 8.2 A, VGS = 0 V		160		ns
Reverse Recovery Charge	Qrr	$di/dt = 100 A/\mu s$		200		nC

### **TEST CIRCUIT 1 SWITCHING TIME**

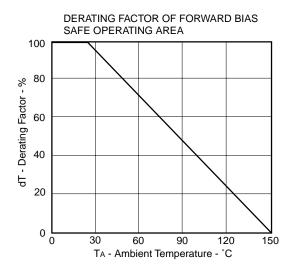
# D.U.T. PG. RG RG VDD $\tau = 1 \mu s$ Duty Cycle $\leq 1\%$

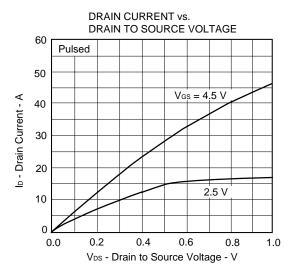


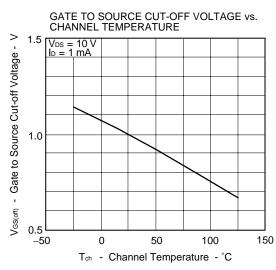
### **TEST CIRCUIT 2 GATE CHARGE**

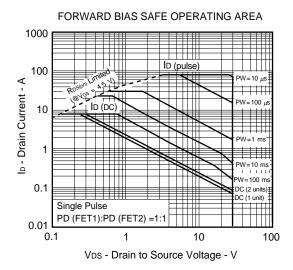


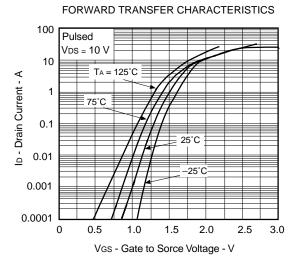
### TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

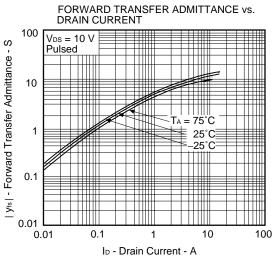




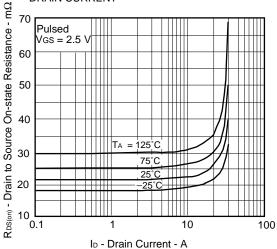




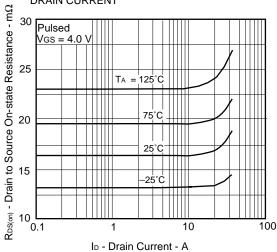




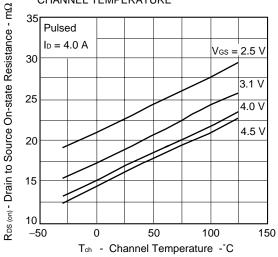
### DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



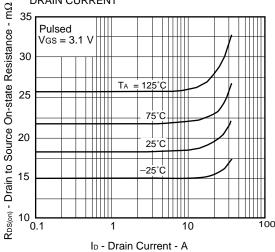
### DRAIN TO SOURCE ON-STATE RESISTANCE vs. **DRAIN CURRENT**



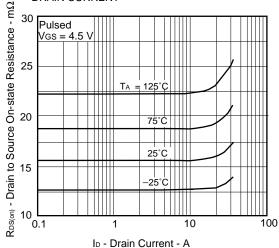
### DRAIN TO SOURCE ON - STATE RESISTANCE vs. CHANNEL TEMPERATURE



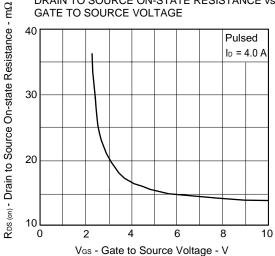
### DRAIN TO SOURCE ON-STATE RESISTANCE vs. **DRAIN CURRENT**

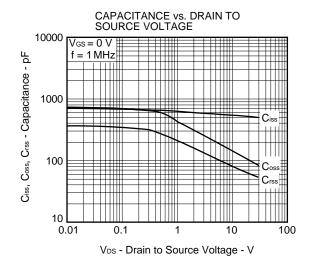


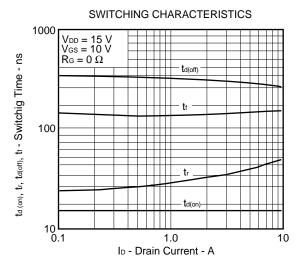
### DRAIN TO SOURCE ON-STATE RESISTANCE vs. **DRAIN CURRENT**

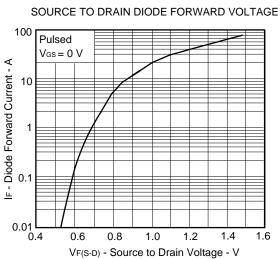


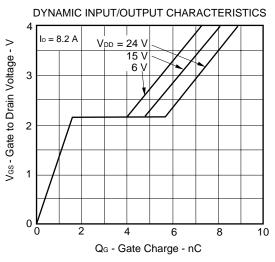
### DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

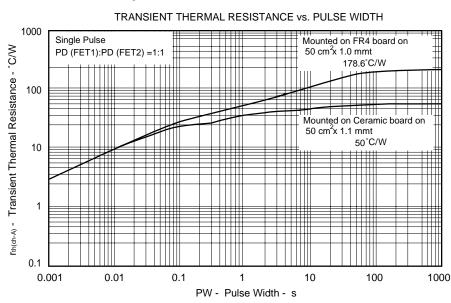












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