NEC

MOS FIELD EFFECT TRANSISTOR

μPA1902

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μPA1902 is a switching device, which can be driven directly by a 4.5 V power source.

This μPA1902 features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power management switch of portable machine and so on.

FEATURES

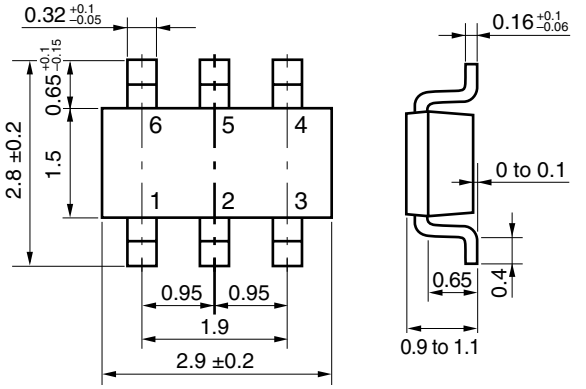
- 4.5 V drive available
- Low on-state resistance
  $R_{DS(on)1}$ = 17 mΩ TYP. (V_{GS} = 10 V, I_D = 3.5 A)
  $R_{DS(on)2}$ = 22 mΩ TYP. (V_{GS} = 4.5 V, I_D = 3.5 A)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1902TE	SC-95 (Mini Mold Thin Type)

Marking: TY

PACKAGE DRAWING (Unit: mm)

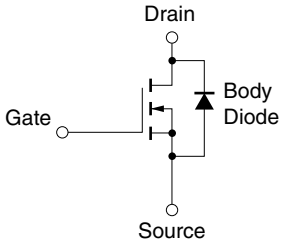


1, 2, 5, 6: Drain
3 : Gate
4 : Source

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	30	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±7.0	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±28	A
Total Power Dissipation	P_{T1}	0.2	W
Total Power Dissipation Note2	P_{T2}	2.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

EQUIVALENT CIRCUIT



Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on FR-4 board of 50 mm x 50 mm x 1.6 mm, t ≤ 5 sec.

Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

Caution This product is electrostatic-sensitive device due to low ESD capability and should be handled with caution for electrostatic discharge. (It does not have built-in G-S protection diode.)
When this product 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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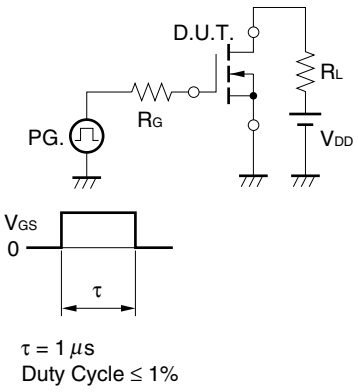
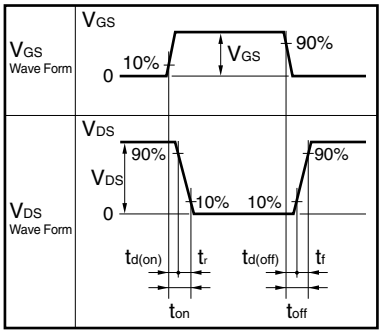
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			1.0	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0 V			±100	nA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1.0 mA	1.5	2.0	2.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 3.5 A	3.0			S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 3.5 A		17	22	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 3.5 A		22	30	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		780		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		180		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		120		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 15 V, I_D = 1.0 A		16		ns
Rise Time	t_r	V_{GS} = 10 V		10		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 6.0 Ω		108		ns
Fall Time	t_f			56		ns
Total Gate Charge	Q_G	V_{DD} = 15 V		8.0		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 5.0 V		2.7		nC
Gate to Drain Charge	Q_{GD}	I_D = 7.0 A		3.4		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 7.0 A, V_{GS} = 0 V		0.84		V

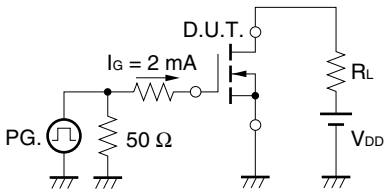
TEST CIRCUIT 1 SWITCHING TIME



τ = 1 μs
Duty Cycle ≤ 1%

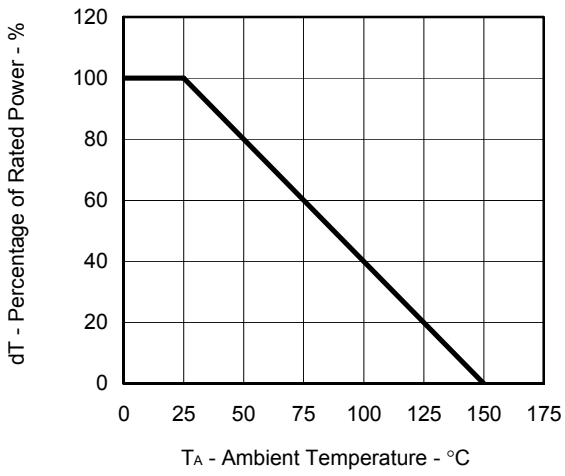


TEST CIRCUIT 2 GATE CHARGE

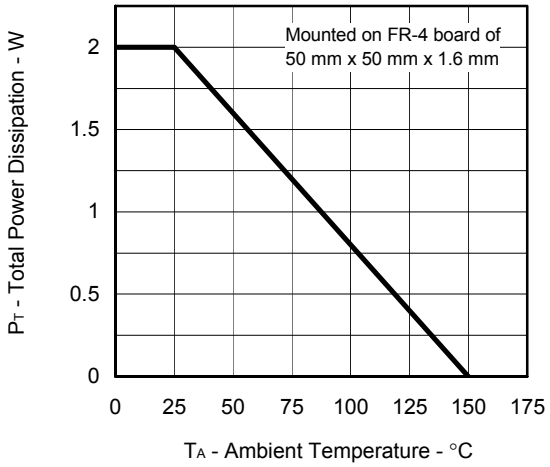


TYPICAL CHARACTERISTICS (T_A = 25°C)

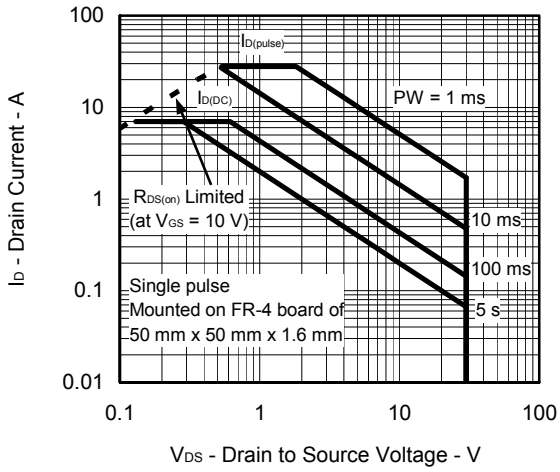
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



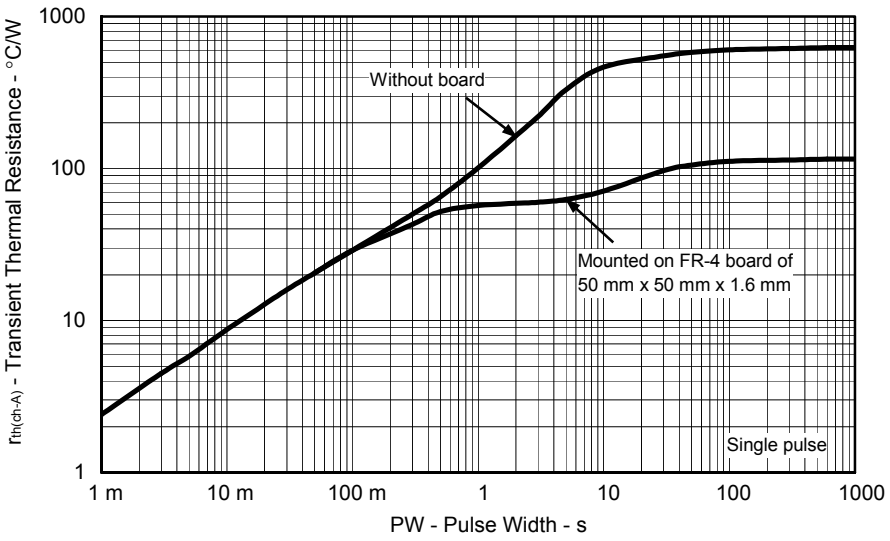
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



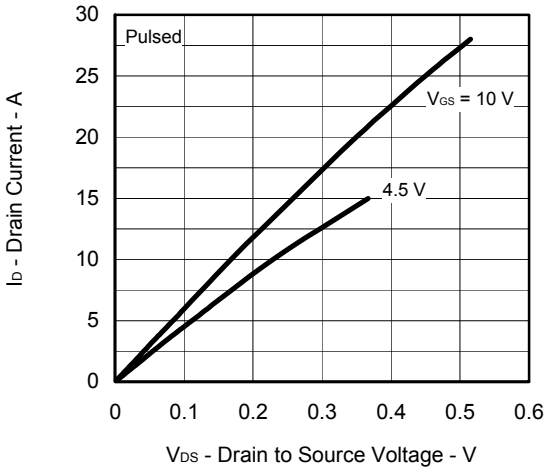
FORWARD BIAS SAFE OPERATING AREA



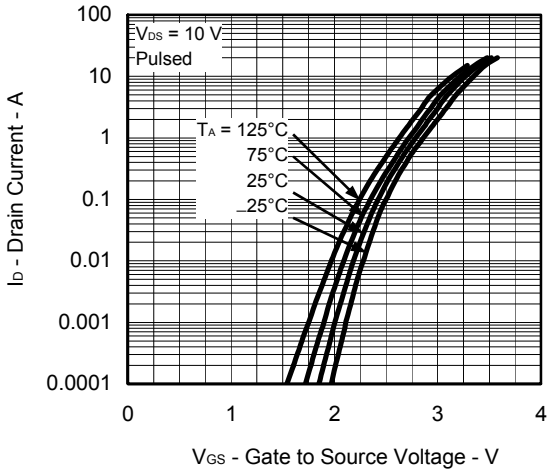
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



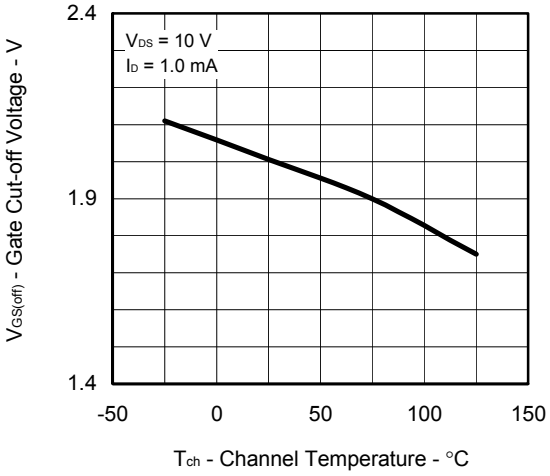
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



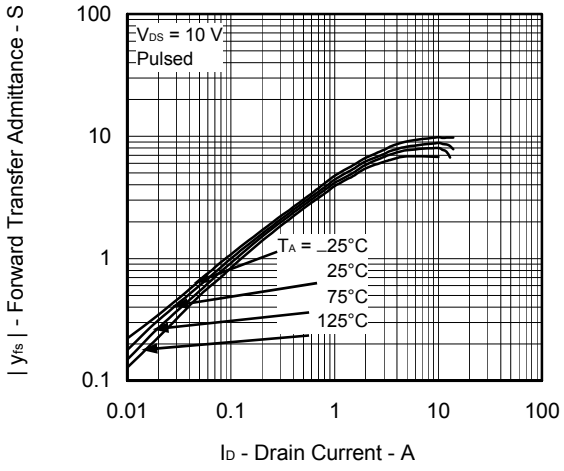
FORWARD TRANSFER CHARACTERISTICS



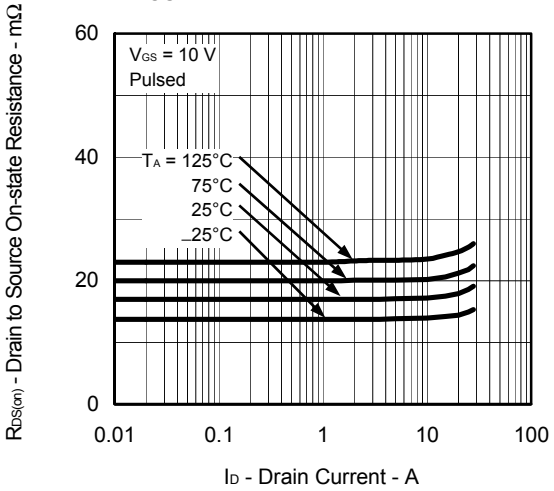
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



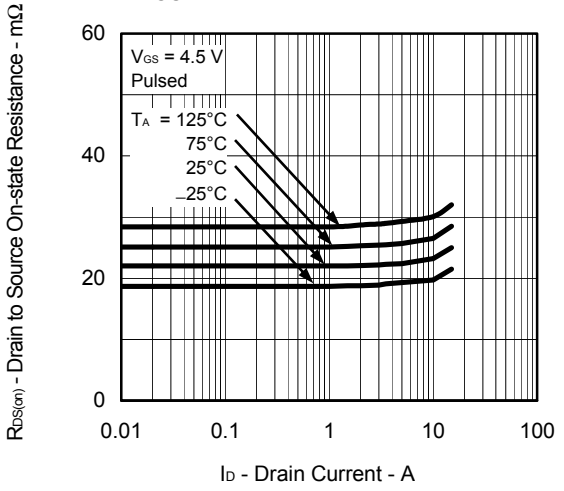
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



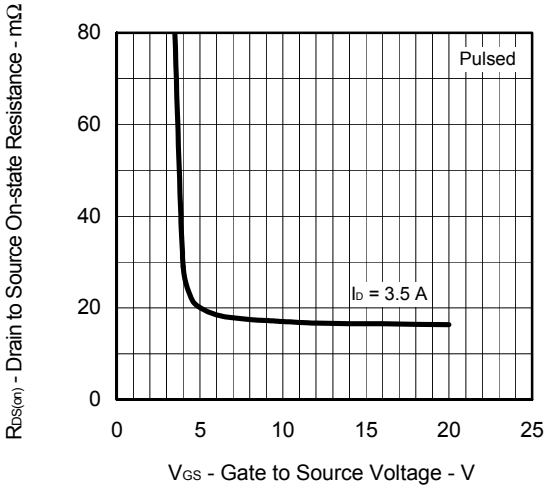
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



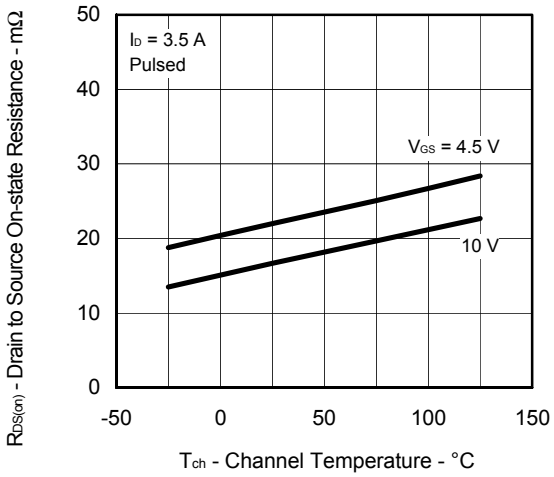
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



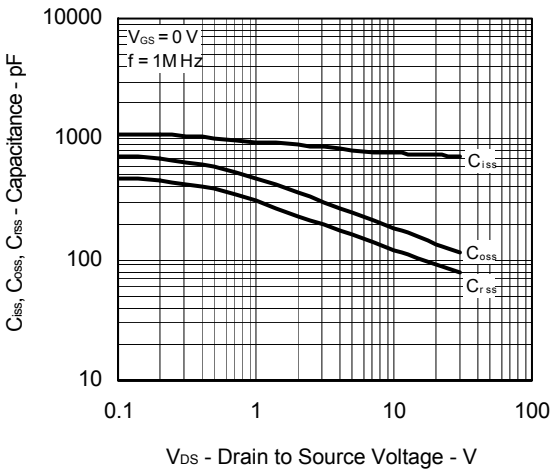
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



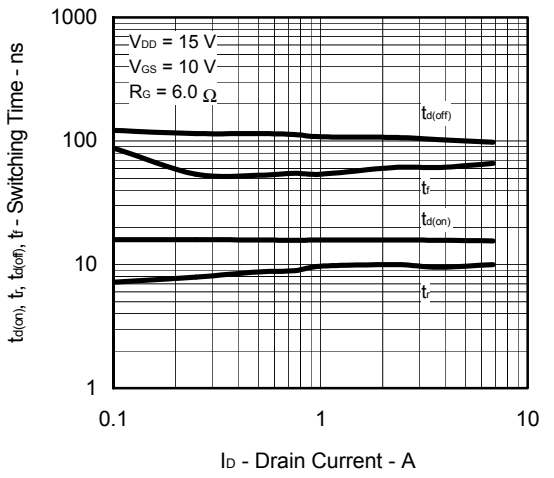
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



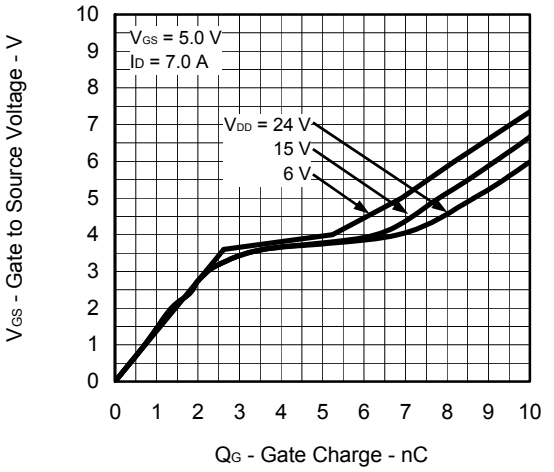
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



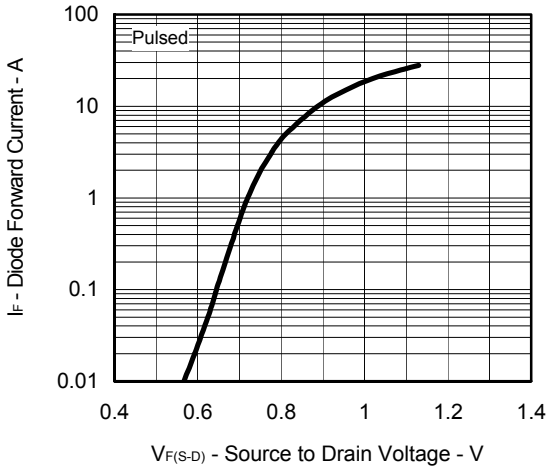
SWITCHING CHARACTERISTICS



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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