DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR

μPA1901

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μPA1901 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
  $R_{DS(on)1}$ = 39 mΩ MAX. (V_{GS} = 4.5 V, I_D = 3.5 A)
  $R_{DS(on)2}$ = 40 mΩ MAX. (V_{GS} = 4.0 V, I_D = 3.5 A)
  $R_{DS(on)3}$ = 54 mΩ MAX. (V_{GS} = 2.5 V, I_D = 3.5 A)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1901TE	SC-95 (Mini Mold Thin Type)

Marking : TQ

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

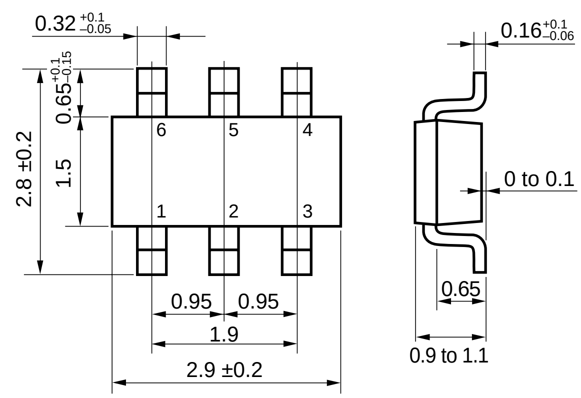
Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	30	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±12	V
Drain Current (DC) (T_A = 25°C)	$I_{D(DC)}$	±6.5	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±26	A
Total Power Dissipation	P_{T1}	0.2	W
Total Power Dissipation Note2	P_{T2}	2.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on FR-4 board, t ≤ 5 sec.

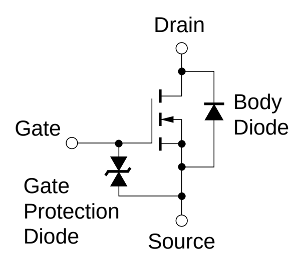
Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

PACKAGE DRAWING (Unit : mm)



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

EQUIVALENT CIRCUIT



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

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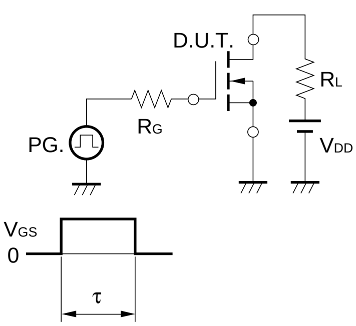
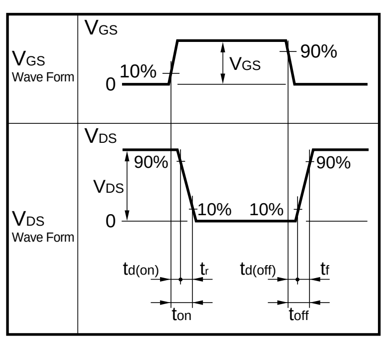
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±12 V, V_{DS} = 0 V			±10	μA
Gate to Source Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1.0 mA	0.5	1.0	1.5	V
Forward Transfer Admittance	$\| y_{fs} \|$	V_{DS} = 10 V, I_D = 3.5 A	3.0	7.9		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 4.5 V, I_D = 3.5 A		31	39	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.0 V, I_D = 3.5 A		32	40	mΩ
	$R_{DS(on)3}$	V_{GS} = 2.5 V, I_D = 3.5 A		40	54	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		470		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		100		pF
Reverse Transfer Capacitance	C_{rss}	f = 1.0 MHz		60		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 10 V, I_D = 3.5 A		35		ns
Rise Time	t_r	V_{GS} = 4.0 V		110		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		170		ns
Fall Time	t_f			130		ns
Total Gate Charge	Q_G	V_{DD} = 24 V		5.4		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 4.0 V		1.1		nC
Gate to Drain Charge	Q_{GD}	I_D = 6.5 A		2.4		nC
Diode Forward Voltage	$V_{F(S-D)}$	I_F = 6.5 A, V_{GS} = 0 V		0.9		V

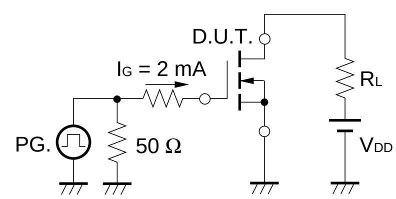
TEST CIRCUIT 1 SWITCHING TIME



τ = 1 μs
Duty Cycle ≤ 1%

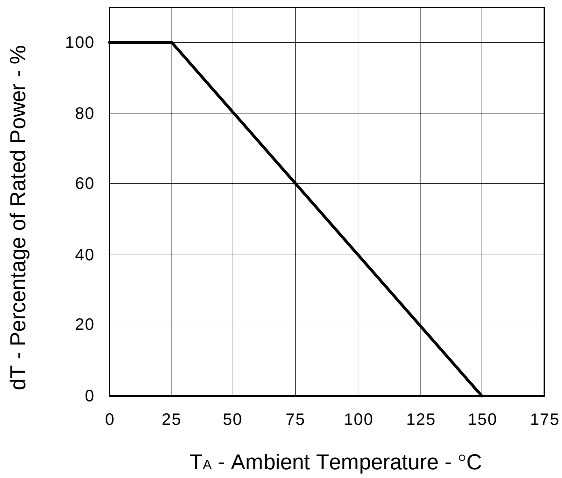


TEST CIRCUIT 2 GATE CHARGE

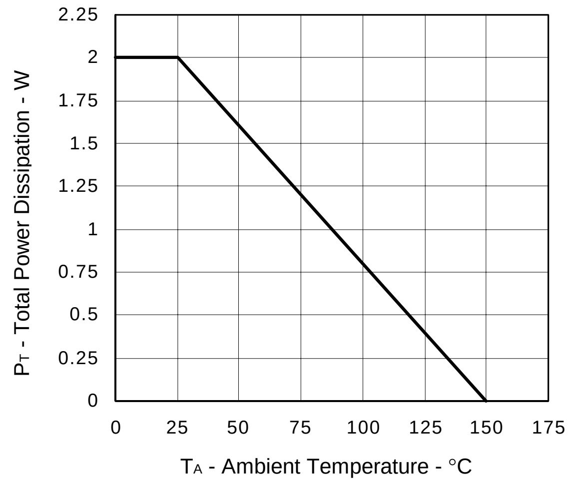


TYPICAL CHARACTERISTICS (T_A = 25°C)

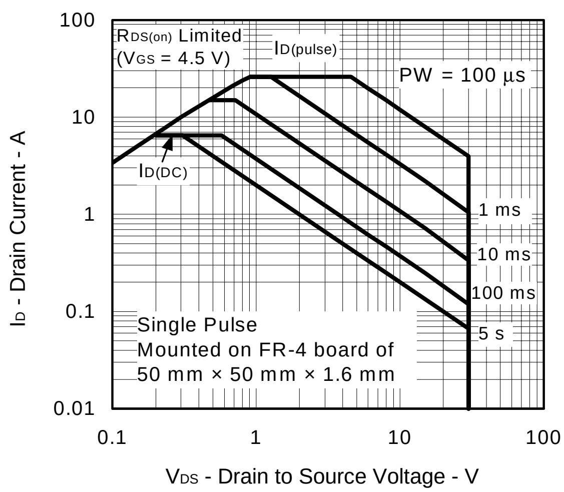
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



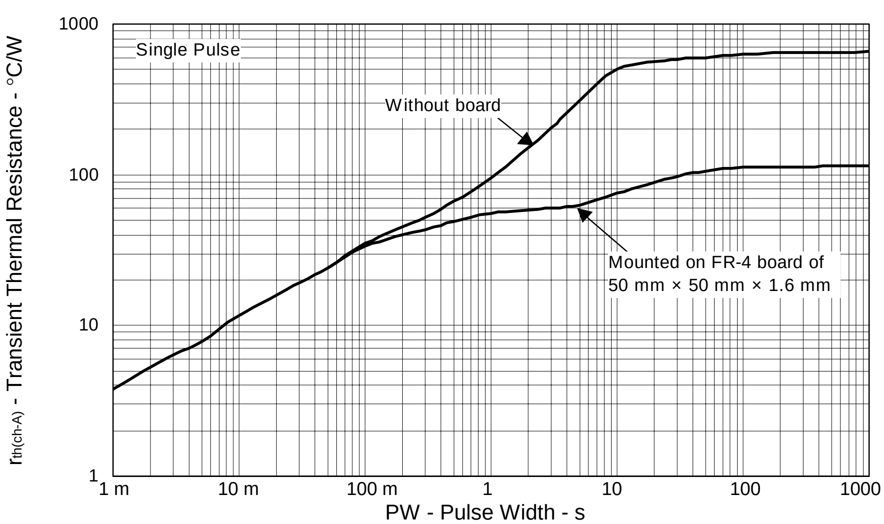
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



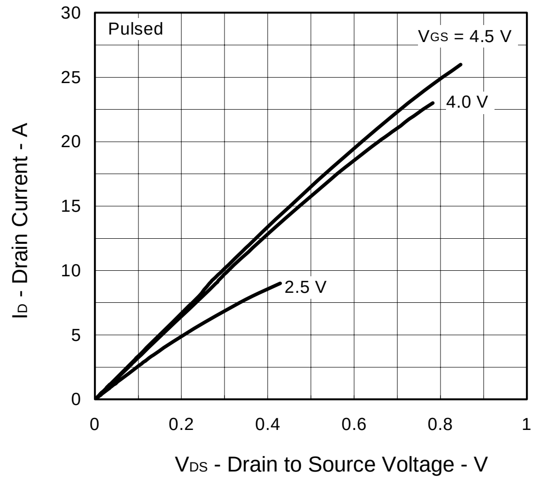
FORWARD BIAS SAFE OPERATING AREA



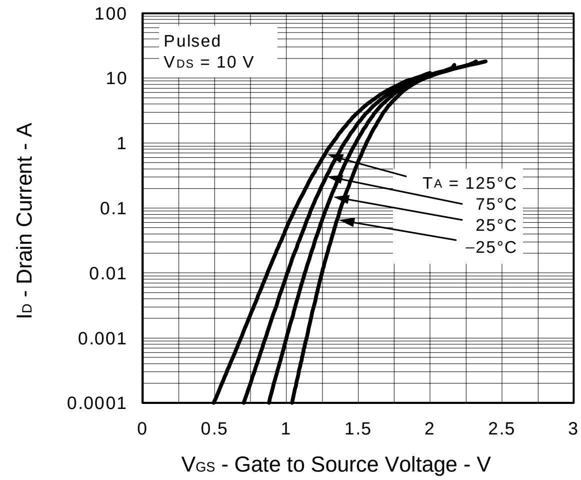
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



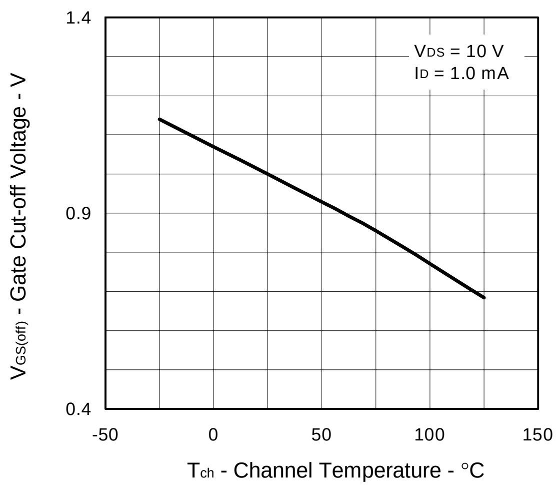
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



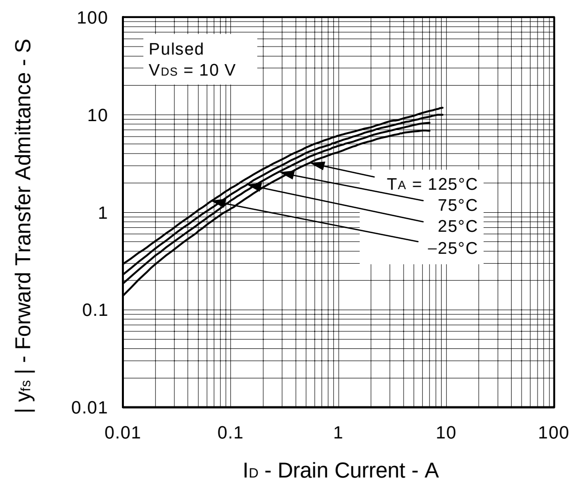
FORWARD TRANSFER CHARACTERISTICS



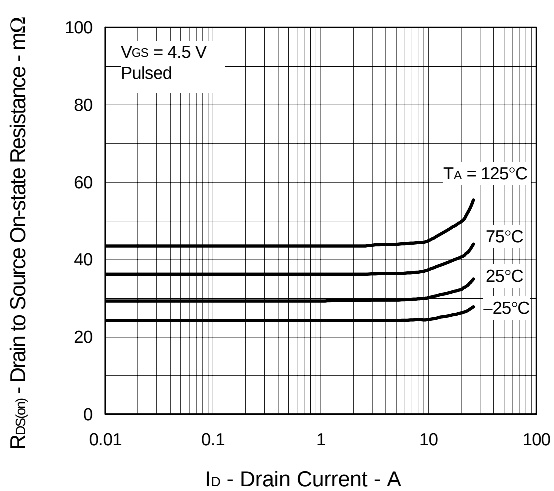
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



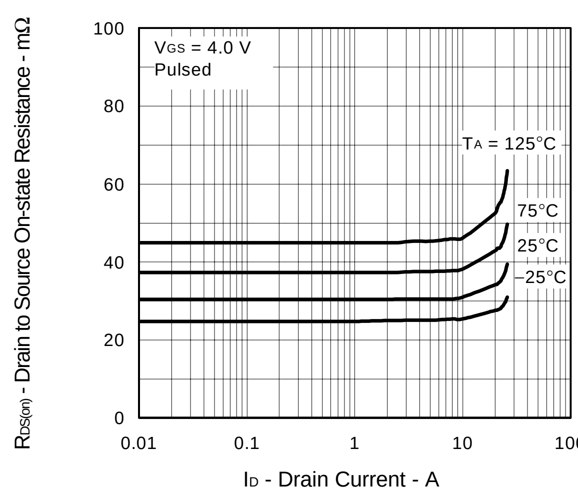
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



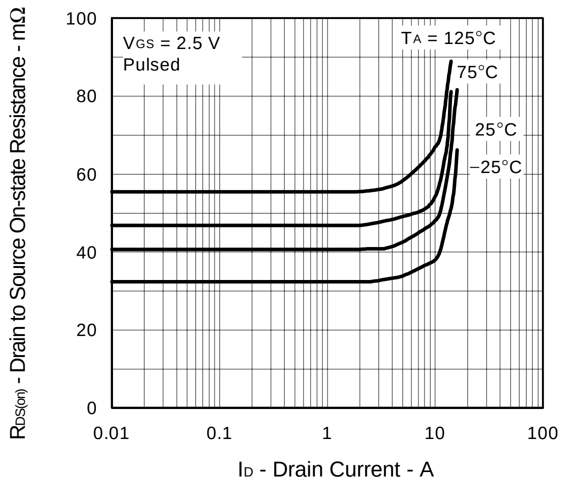
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



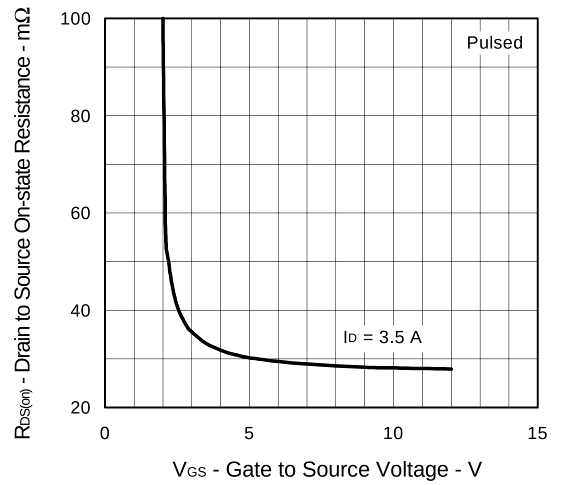
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



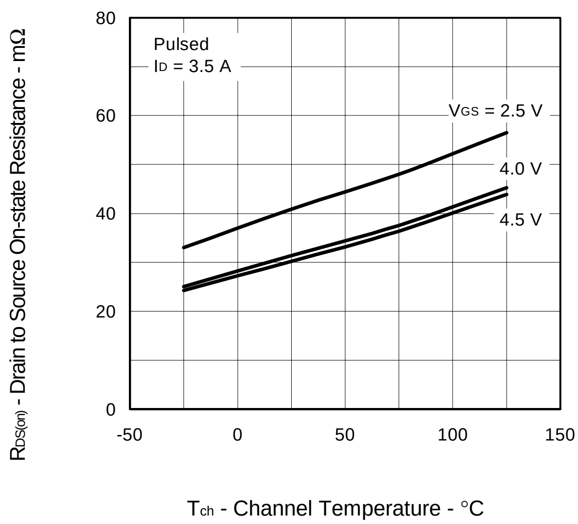
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



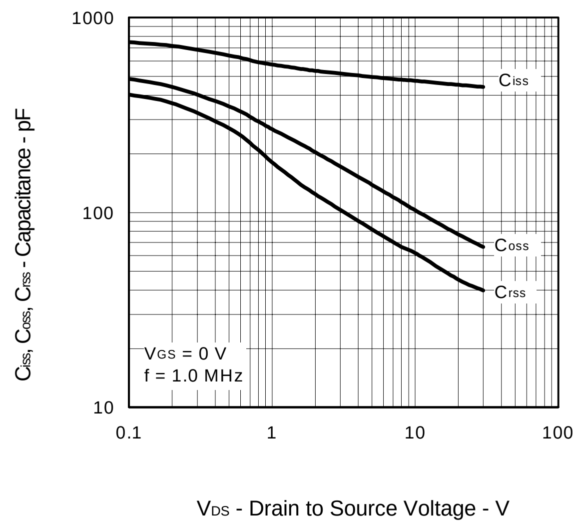
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



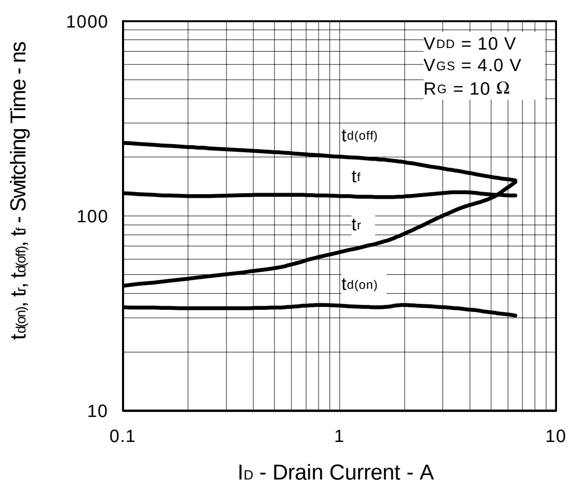
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



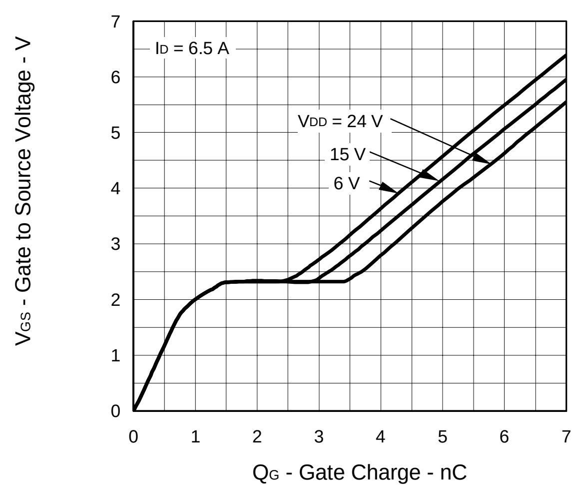
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



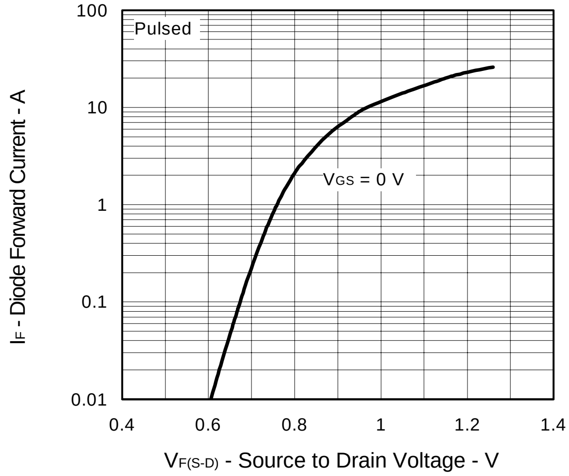
SWITCHING CHARACTERISTICS



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE
FORWARD VOLTAGE



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