NEC

MOS FIELD EFFECT TRANSISTOR

μPA1950

P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

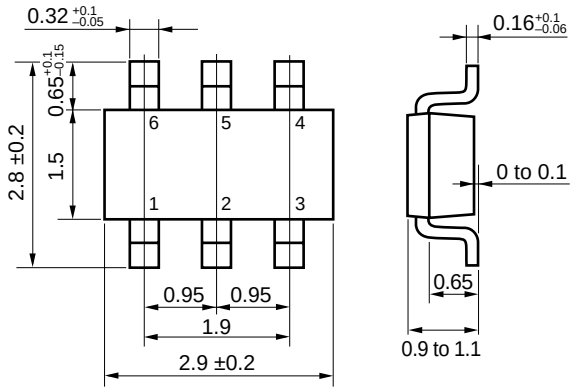
The μPA1950 is a switching device which can be driven directly by a 1.8 V power source.

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
  $R_{DS(on)1}$ = 130 mΩ MAX. (V_{GS} = –4.5 V, I_D = –1.5 A)
  $R_{DS(on)2}$ = 176 mΩ MAX. (V_{GS} = –3.0 V, I_D = –1.5 A)
  $R_{DS(on)3}$ = 205 mΩ MAX. (V_{GS} = –2.5 V, I_D = –1.5 A)
  $R_{DS(on)4}$ = 375 mΩ MAX. (V_{GS} = –1.8 V, I_D = –1.0 A)

PACKAGE DRAWING (Unit : mm)



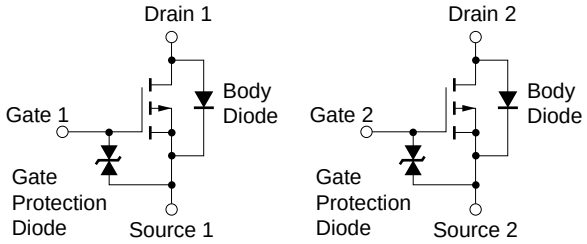
6: Drain1 4: Drain2
1: Gate1 3: Gate2
5: Source1 2: Source2

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1950TE[Note]	SC-95 (Mini Mold Thin Type)

Note Marking: TM

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	–12	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	∓8.0	V
Drain Current (DC) (T_A = 25°C)	$I_{D(DC)}$	∓2.5	A
Drain Current (pulse) [Note1]	$I_{D(pulse)}$	∓7.0	A
Total Power Dissipation (2unit) [Note2]	P_{T1}	1.15	W
Total Power Dissipation (1unit) [Note2]	P_{T2}	0.57	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.

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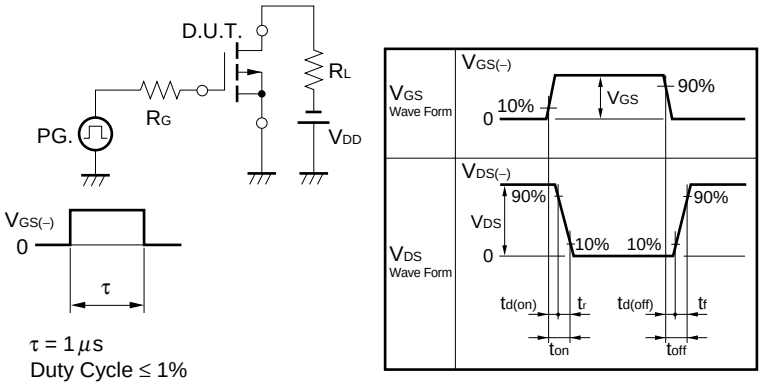
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

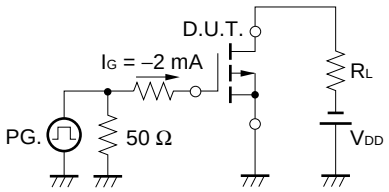
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –12 V, V_{GS} = 0 V			–10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ∓8.0 V, V_{DS} = 0 V			∓10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = –10 V, I_D = –1.0 mA	–0.45		–1.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = –10 V, I_D = –1.5 A	1.0			S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = –4.5 V, I_D = –1.5 A		105	130	mΩ
	$R_{DS(on)2}$	V_{GS} = –3.0 V, I_D = –1.5 A		135	176	mΩ
	$R_{DS(on)3}$	V_{GS} = –2.5 V, I_D = –1.5 A		160	205	mΩ
	$R_{DS(on)4}$	V_{GS} = –1.8 V, I_D = –1.0 A		225	375	mΩ
Input Capacitance	C_{iss}	V_{DS} = –10 V		220		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		90		pF
Reverse Transfer Capacitance	C_{rss}	f = 1.0 MHz		40		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = –6.0 V, I_D = –1.5 A		15		ns
Rise Time	t_r	V_{GS} = –4.0 V		80		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		150		ns
Fall Time	t_f			120		ns
Total Gate Charge	Q_G	V_{DD} = –10 V		1.9		nC
Gate to Source Charge	Q_{GS}	V_{GS} = –4.0 V		0.5		nC
Gate to Drain Charge	Q_{GD}	I_D = –2.5 A		0.7		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 2.5 A, V_{GS} = 0 V		0.86		V

TEST CIRCUIT 1 SWITCHING TIME



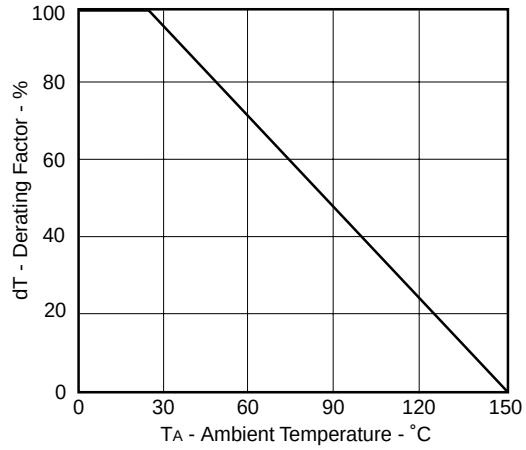
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 2 GATE CHARGE

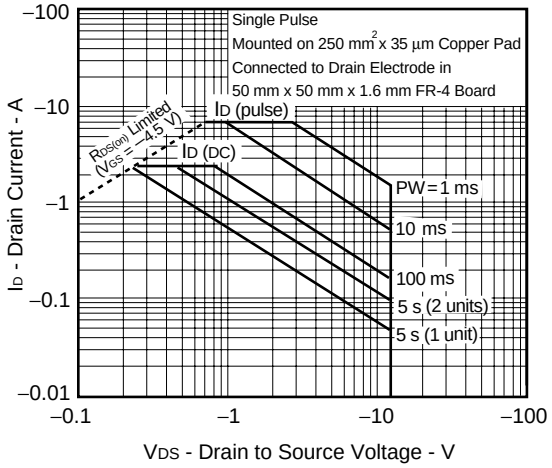


TYPICAL CHARACTERISTICS (T_A = 25°C)

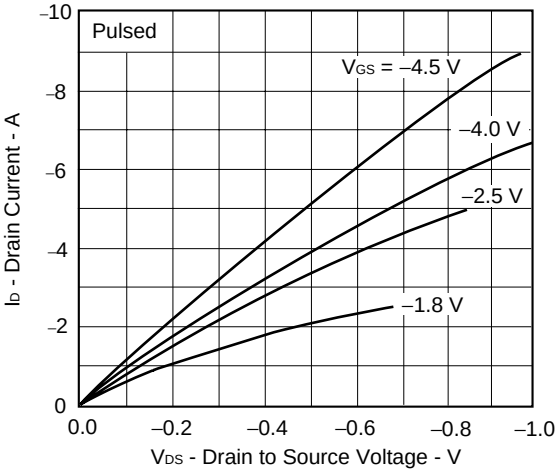
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



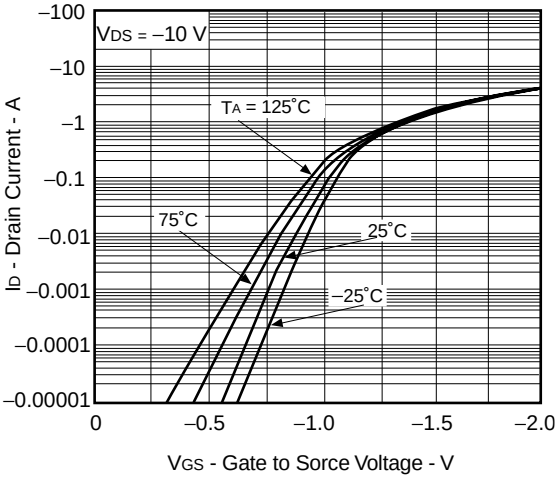
FORWARD BIAS SAFE OPERATING AREA



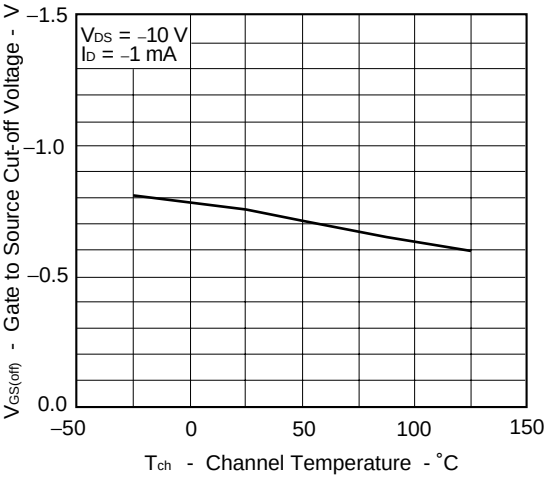
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



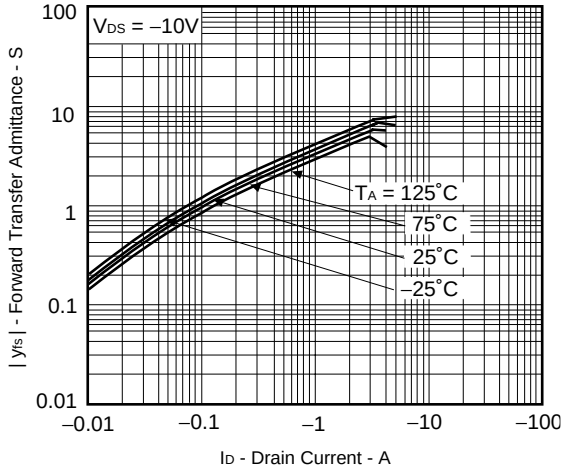
FORWARD TRANSFER CHARACTERISTICS



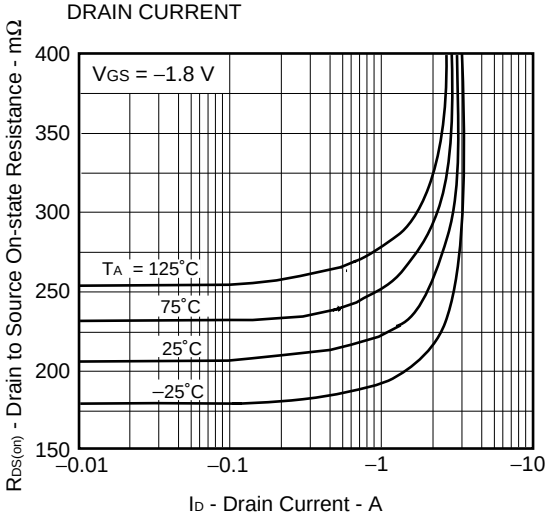
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



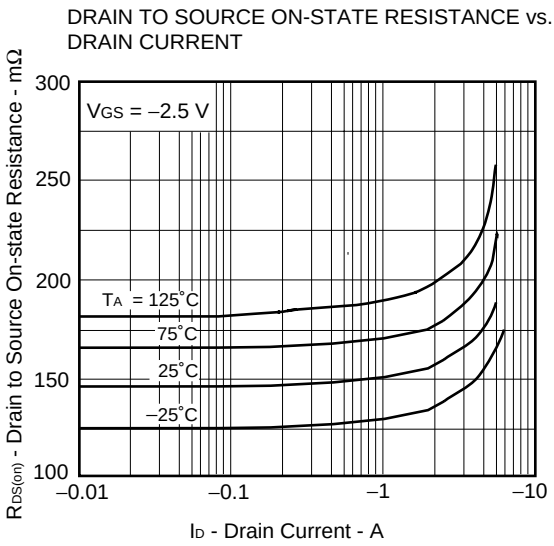
FORWARD TRANSFER ADMITTANCE Vs. DRAIN CURRENT



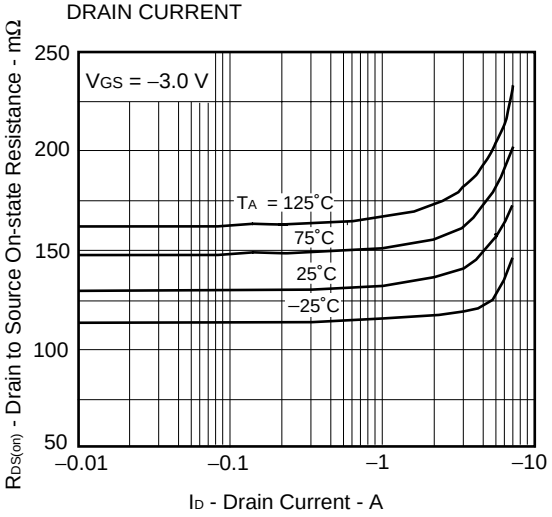
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



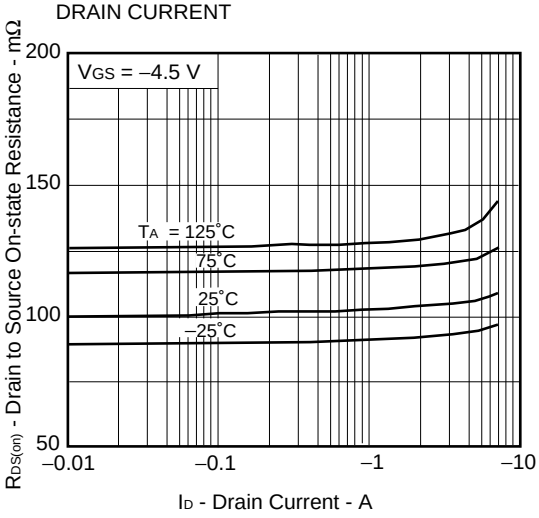
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



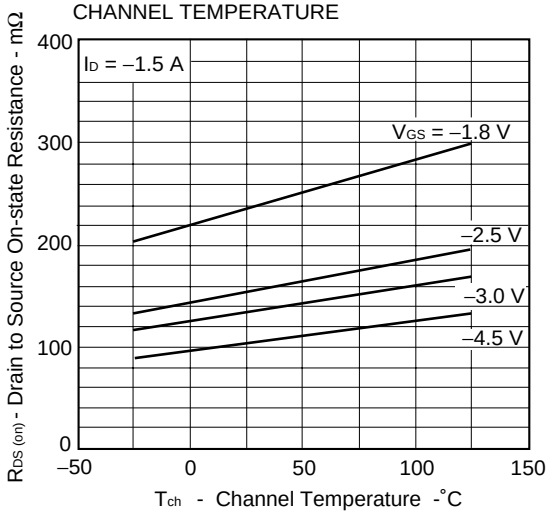
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



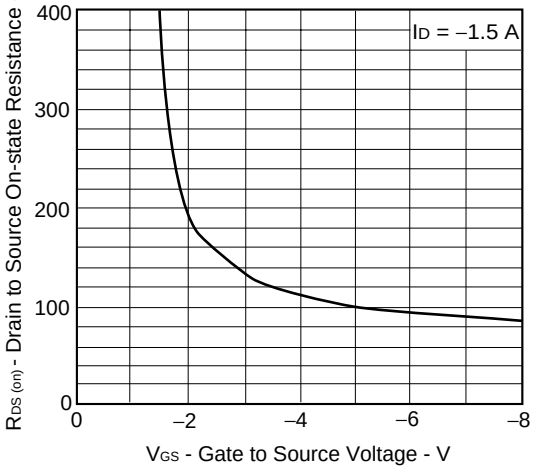
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



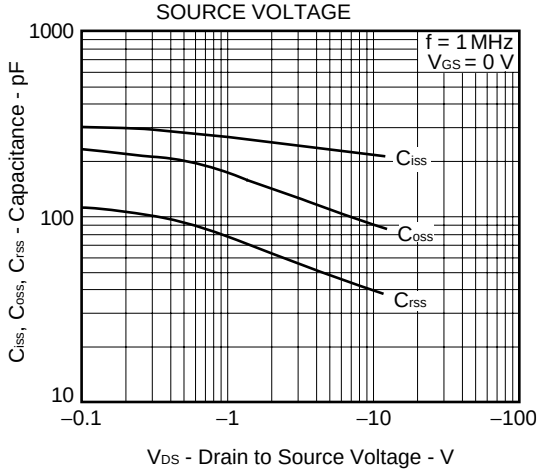
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



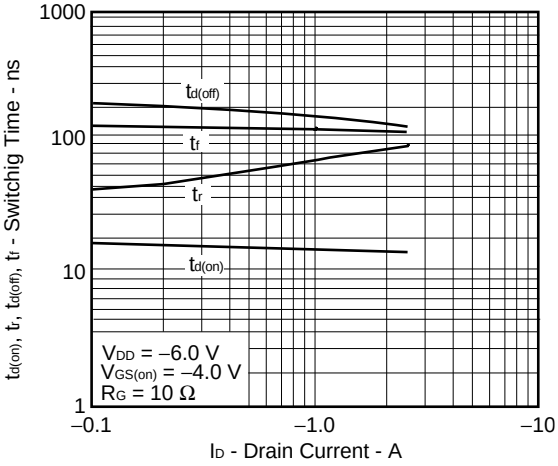
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



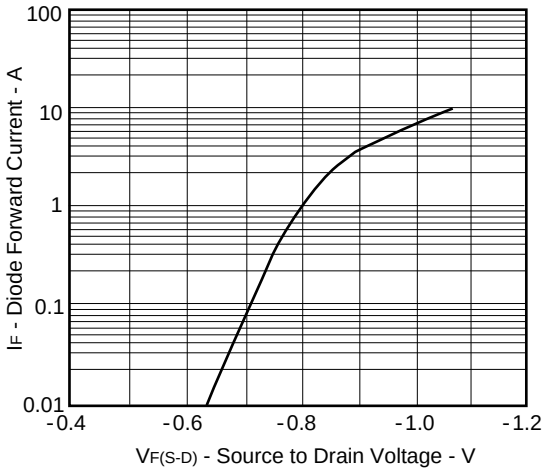
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



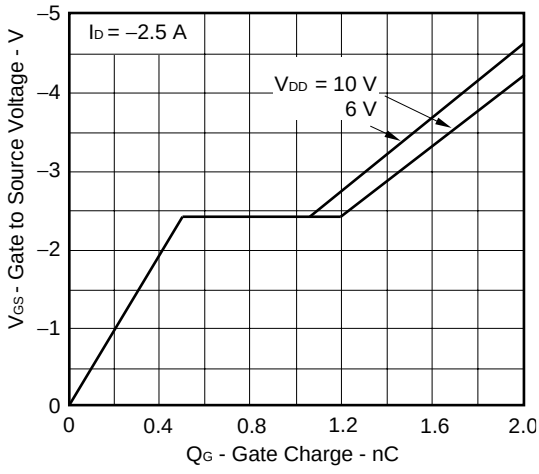
SWITCHING CHARACTERISTICS



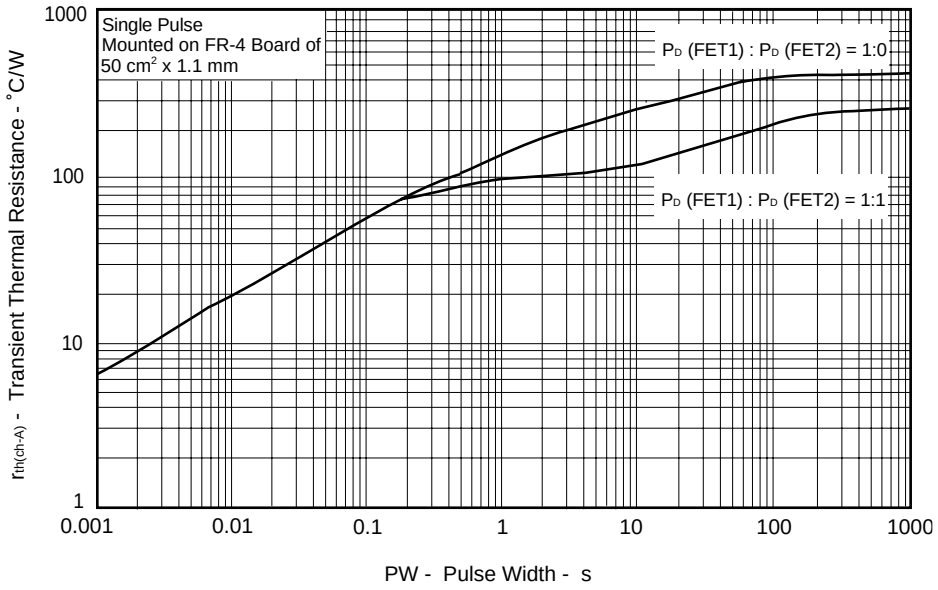
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



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