NEC

MOS FIELD EFFECT TRANSISTOR

μPA1914

P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

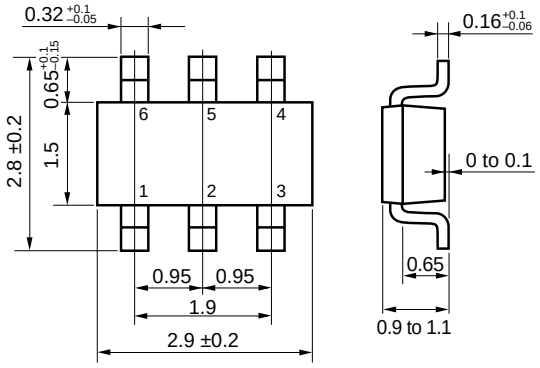
The μPA1914 is a switching device which can be driven directly by a 4 V power source.

The μPA1914 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

- Can be driven by a 4 V power source
- Low on-state resistance
  $R_{DS(on)1}$ = 57 mΩ MAX. (V_{GS} = –10 V, I_D = –2.5 A)
  $R_{DS(on)2}$ = 86 mΩ MAX. (V_{GS} = –4.5 V, I_D = –2.5 A)
  $R_{DS(on)3}$ = 96 mΩ MAX. (V_{GS} = –4.0 V, I_D = –2.5A)

PACKAGE DRAWING (Unit : mm)

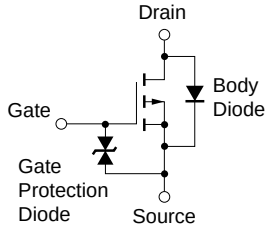


1, 2, 5, 6 : Drain
3 : Gate
4 : Source

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1914TE	SC-95 (Mini Mold Thin Type)

EQUIVALENT CIRCUIT



Marking: TF

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage	V_{DSS}	–30	V
Gate to Source Voltage	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±4.5	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±18	A
Total Power Dissipation	P_{T1}	0.2	W
Total Power Dissipation Note2	P_{T2}	2	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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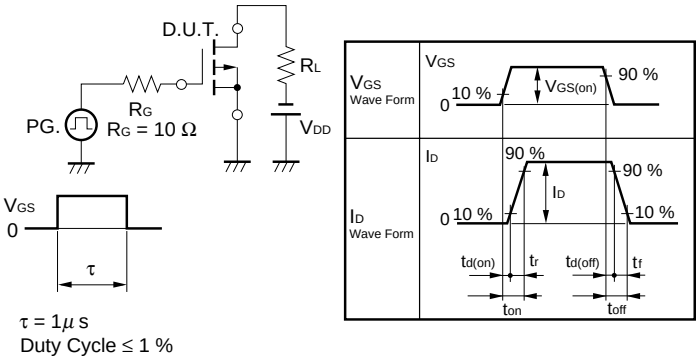
The mark ★ shows major revised points.

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

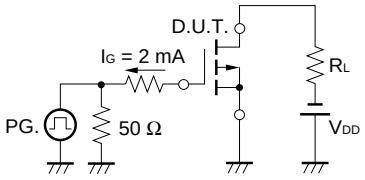
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –30 V, V_{GS} = 0 V			–10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = –10 V, I_D = –1 mA	–1.0	–1.6	–2.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = –10 V, I_D = –2.5 A	1	7.1		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = –10 V, I_D = –2.5 A		43	57	mΩ
	$R_{DS(on)2}$	V_{GS} = –4.5 V, I_D = –2.5 A		58	86	mΩ
	$R_{DS(on)3}$	V_{GS} = –4.0 V, I_D = –2.5 A		64	96	mΩ
Input Capacitance	C_{iss}	V_{DS} = –10 V		589		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		210		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		86		pF
Input Capacitance	C_{iss}	V_{DS} = –25 V		546		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		148		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		65		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = –15 V		16		ns
Rise Time	t_r	I_D = –2.5 A		57		ns
Turn-off Delay Time	$t_{d(off)}$	$V_{GS(on)}$ = –10 V		63		ns
Fall Time	t_f	R_G = 10 Ω		80		ns
Total Gate Charge	Q_G	V_{DD}= –24 V		11		nC
Gate to Source Charge	Q_{GS}	I_D = –4.5 A		1.5		nC
Gate to Drain Charge	Q_{GD}	V_{GS} = –10 V		2.8		nC
Diode Forward Voltage	$V_{F(S-D)}$	I_F = 4.5 A, V_{GS} = 0 V		0.88		V
Reverse Recovery Time	t_{rr}	I_F = 4.5 A, V_{GS} = 0 V		22		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		11		nC

TEST CIRCUIT 1 SWITCHING TIME



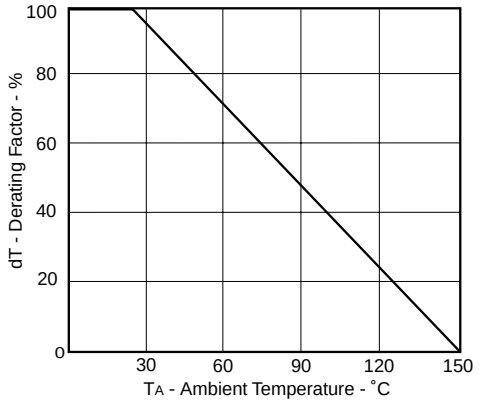
τ = 1μ s
Duty Cycle ≤ 1 %

TEST CIRCUIT 2 GATE CHARGE

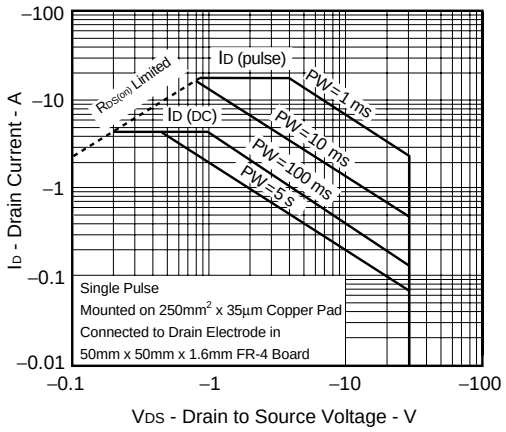


TYPICAL CHARACTERISTICS (T_A = 25°C)

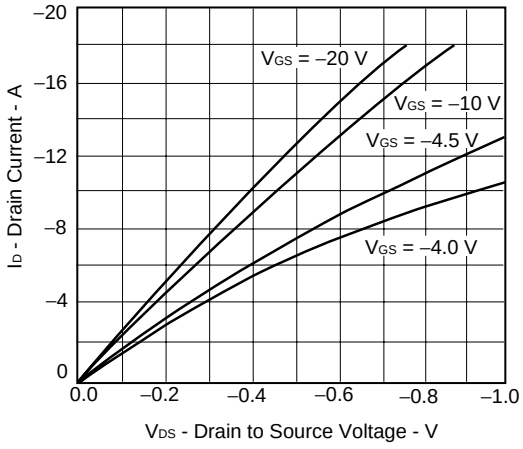
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



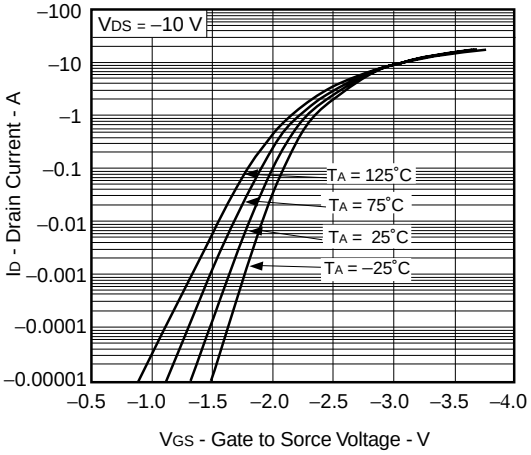
★ FORWARD BIAS SAFE OPERATING AREA



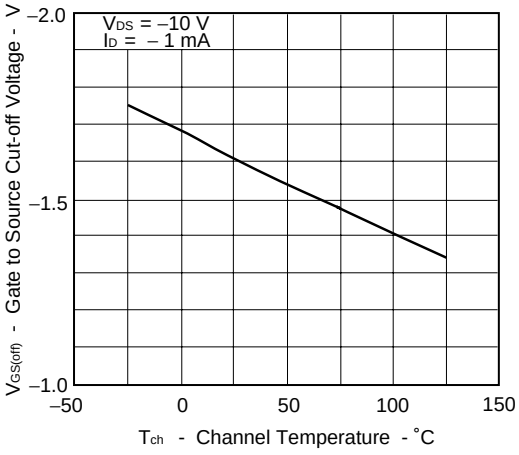
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



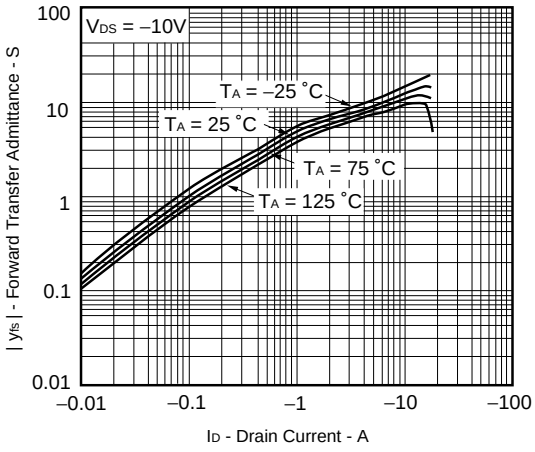
TRANSFER CHARACTERISTICS



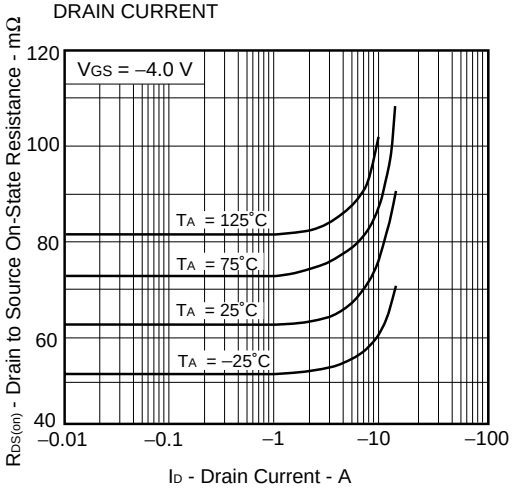
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



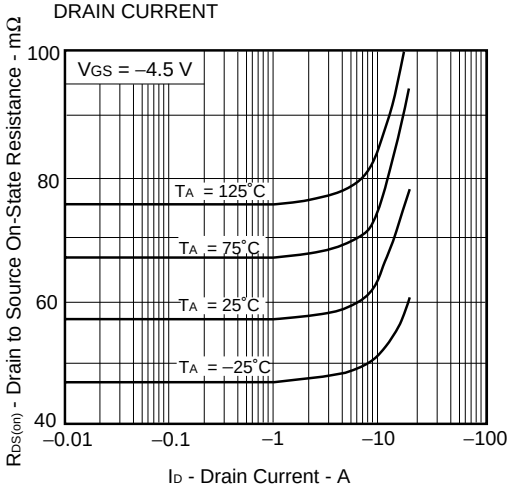
FORWARD TRANSFER ADMITTANCE Vs. DRAIN CURRENT



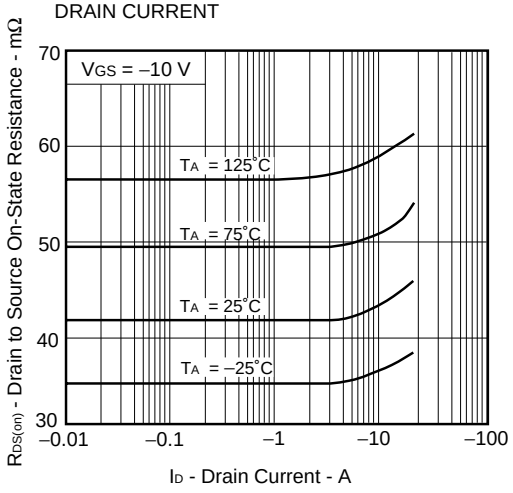
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



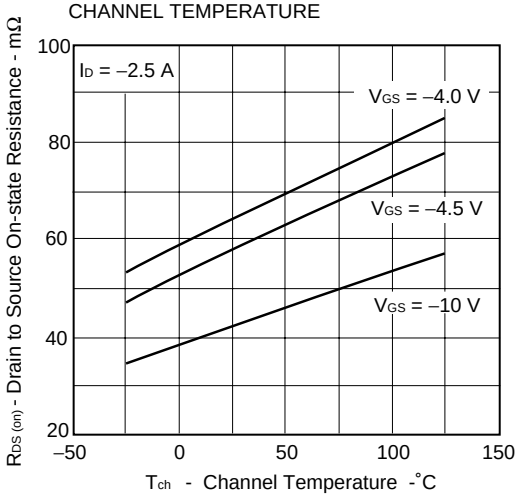
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



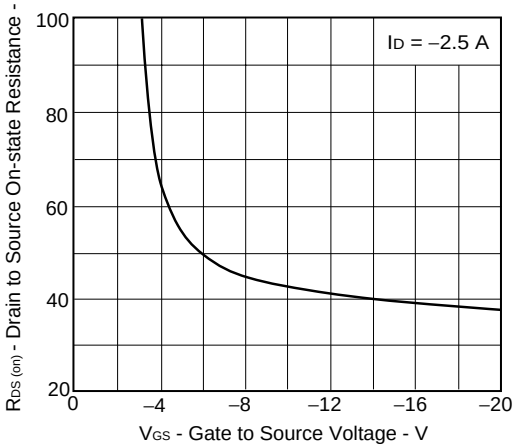
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



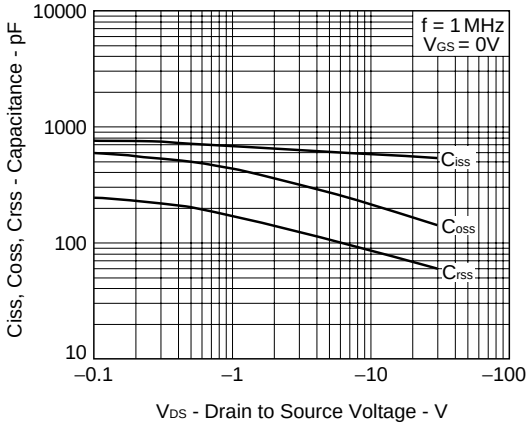
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



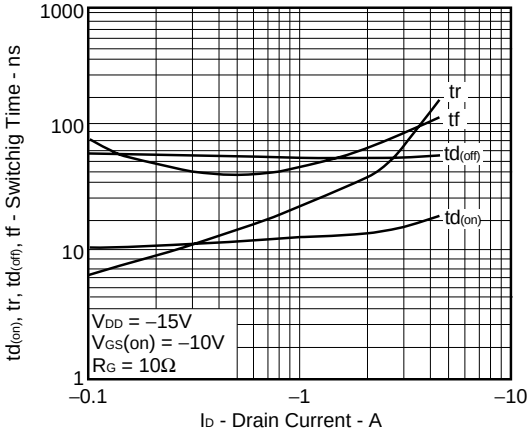
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



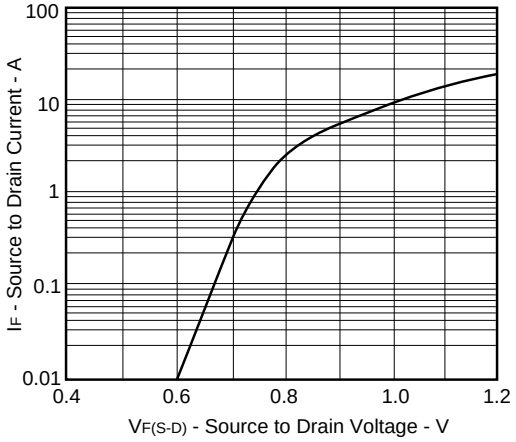
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



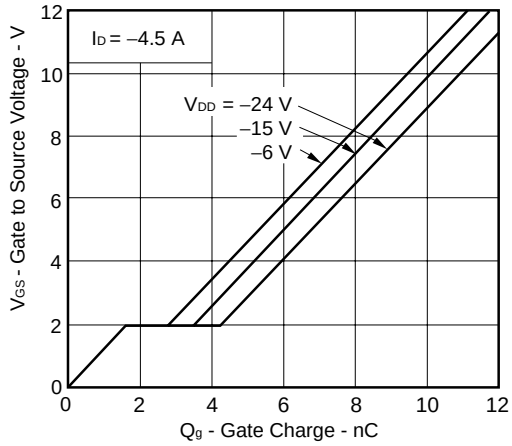
SWITCHING CHARACTERISTICS



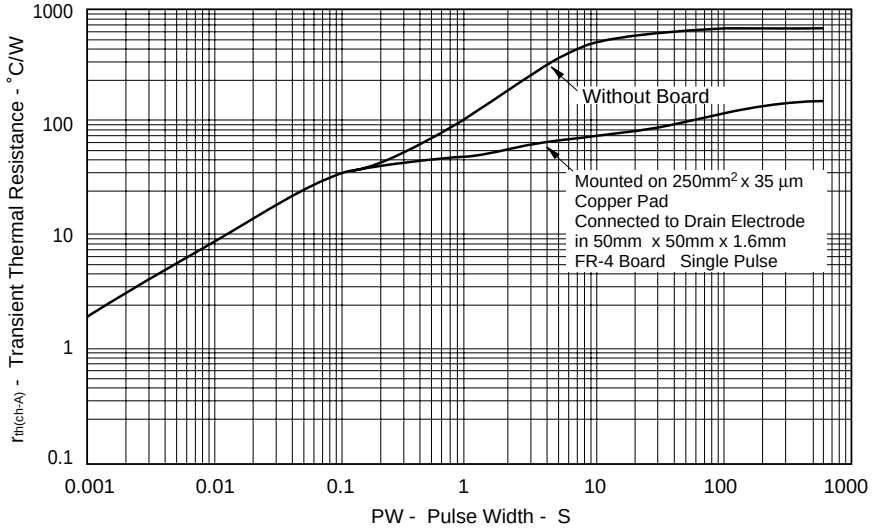
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT CHARACTERISTICS



★ TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



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