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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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MOS FIELD EFFECT TRANSISTOR

μ PA2451

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μ 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
 - $R_{DS(on)1} = 20 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 4.0 \text{ A)}$
 - $R_{DS(on)2} = 21 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 4.0 \text{ A)}$
 - $R_{DS(on)3} = 25 \text{ m}\Omega \text{ MAX. (} V_{GS} = 3.1 \text{ V, } I_D = 4.0 \text{ A)}$
 - $R_{DS(on)4} = 32 \text{ m}\Omega \text{ MAX. (} V_{GS} = 2.5 \text{ V, } I_D = 4.0 \text{ A)}$
- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA2451TL	6PIN HWSON (4521)

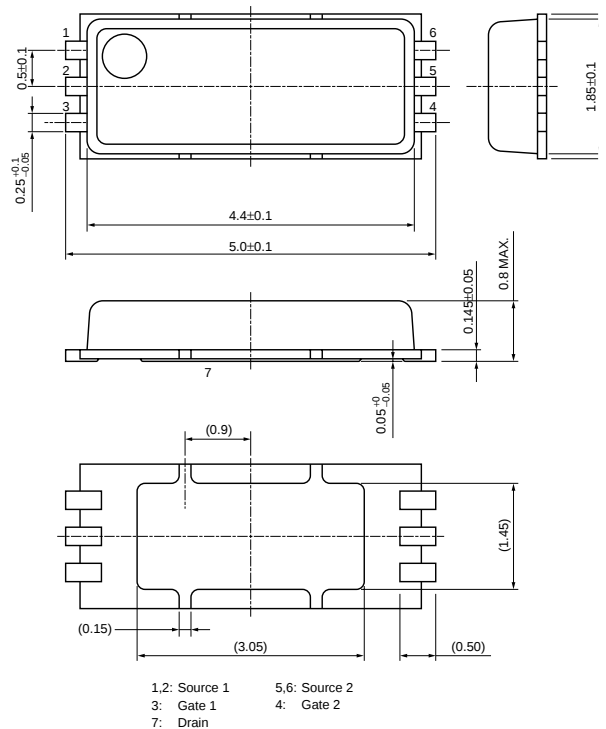
ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	30	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 12	V
Drain Current (DC) ($T_A = 25^\circ\text{C}$)	$I_{D(DC)}$	± 8.2	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 80	A
Total Power Dissipation (2unit) ^{Note2}	P_{T1}	2.5	W
Total Power Dissipation (2unit) ^{Note3}	P_{T2}	0.7	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	$-55 \text{ to } +150$	$^\circ\text{C}$

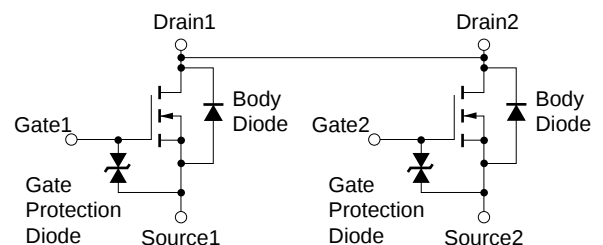
- Notes**
1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$
 2. $T_A = 25^\circ\text{C}$ Mounted on ceramic board
 3. $T_A = 25^\circ\text{C}$ Mounted on FR4 board

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)



EQUIVALENT CIRCUIT

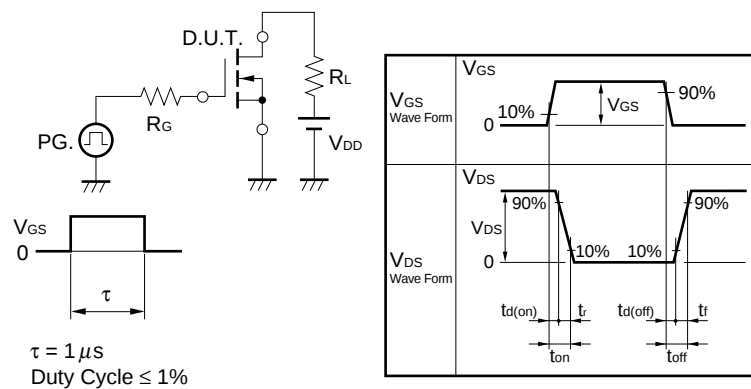


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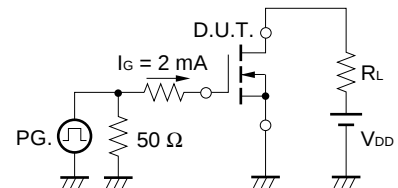
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

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 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 = 4.0 A	5.0			S
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 4.5 V, I _D = 4.0 A	12	16	20	mΩ
	R _{DS(on)2}	V _{GS} = 4.0 V, I _D = 4.0 A	12.5	16.5	21	mΩ
	R _{DS(on)3}	V _{GS} = 3.1 V, I _D = 4.0 A	14	18.5	25	mΩ
	R _{DS(on)4}	V _{GS} = 2.5 V, I _D = 4.0 A	15.5	22.5	32	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		540		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		150		pF
Reverse Transfer Capacitance	C _{rss}	f = 1.0 MHz		80		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 15 V, I _D = 4.0 A		17		ns
Rise Time	t _r	V _{GS} = 10 V		45		ns
Turn-off Delay Time	t _{d(off)}	R _G = 6.0 Ω		360		ns
Fall Time	t _f			160		ns
Total Gate Charge	Q _G	V _{DD} = 24 V		9.0		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 4.0 V		1.5		nC
Gate to Drain Charge	Q _{GD}	I _D = 8.2 A		4.5		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 8.2 A, V _{GS} = 0 V		0.84		V
Reverse Recovery Time	t _{rr}	I _F = 8.2 A, V _{GS} = 0 V		160		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		200		nC

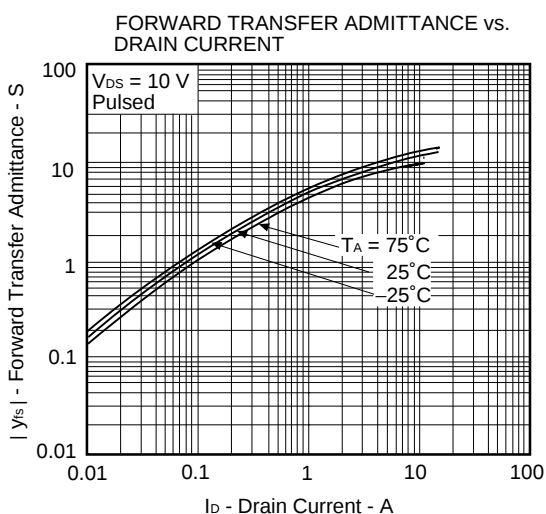
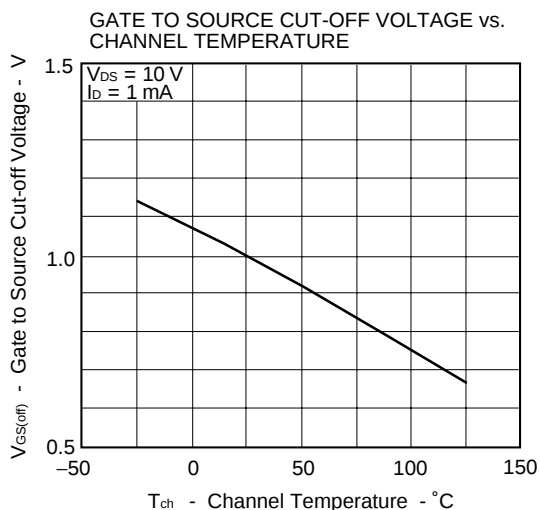
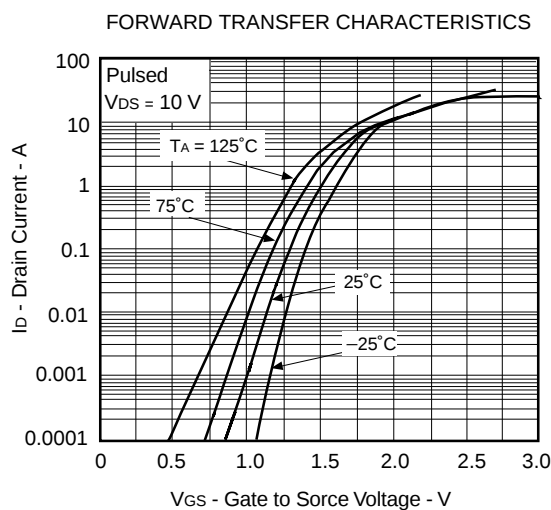
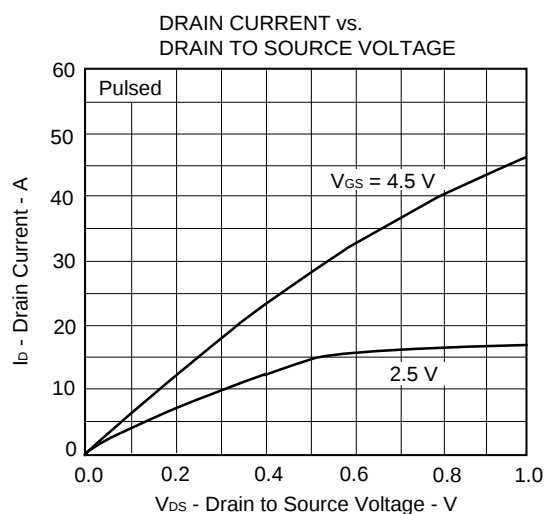
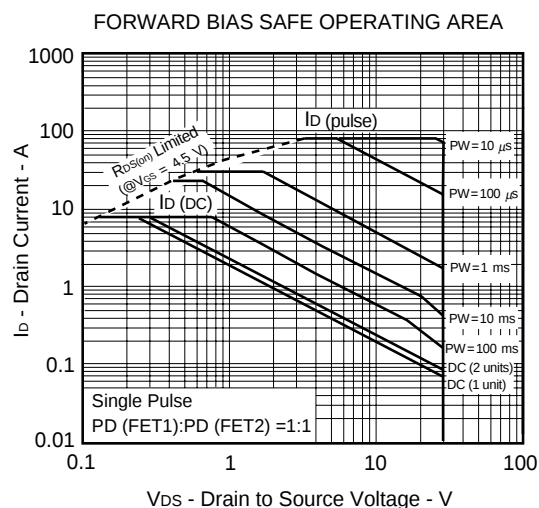
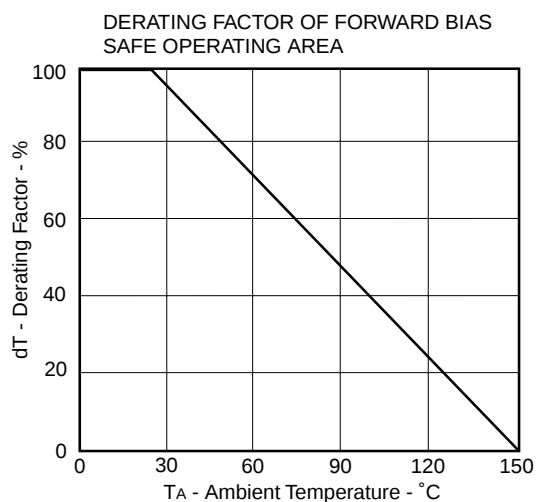
TEST CIRCUIT 1 SWITCHING TIME



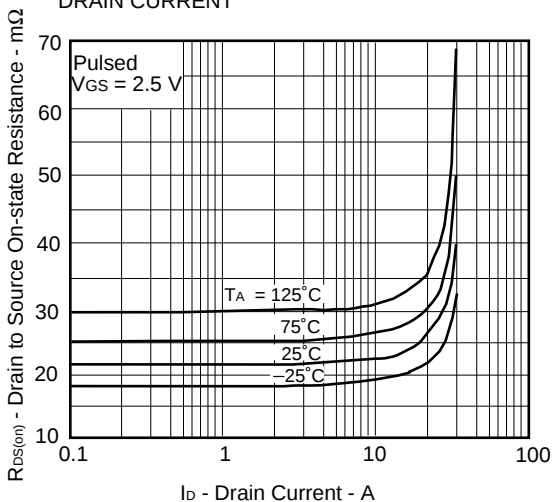
TEST CIRCUIT 2 GATE CHARGE



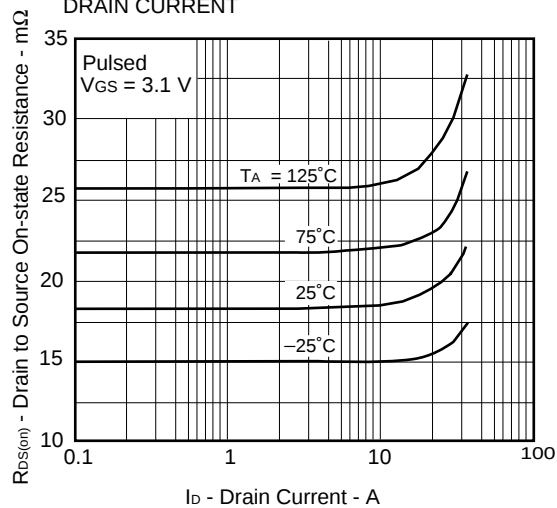
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



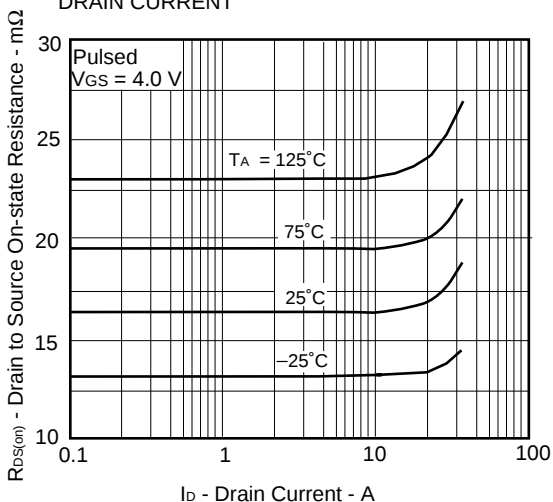
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



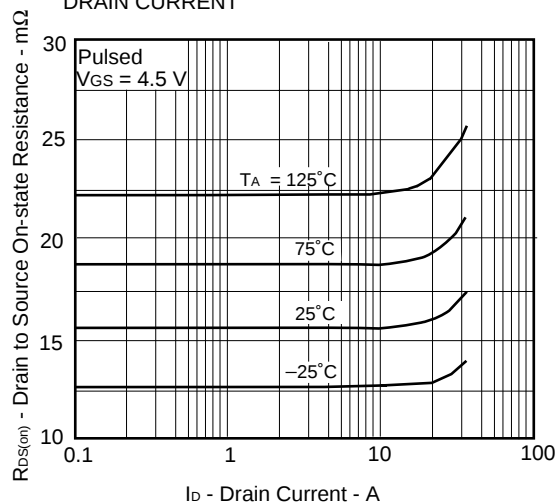
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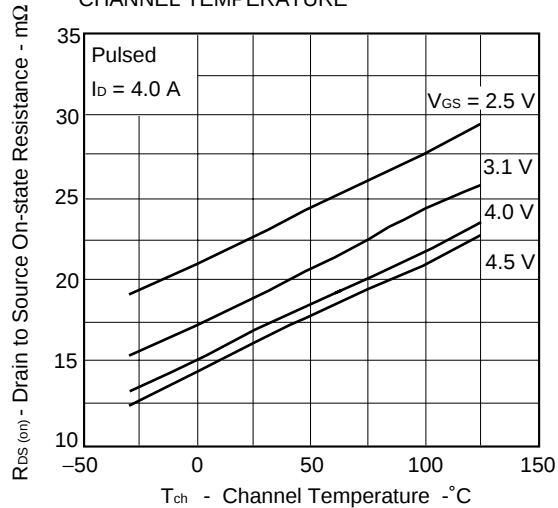
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



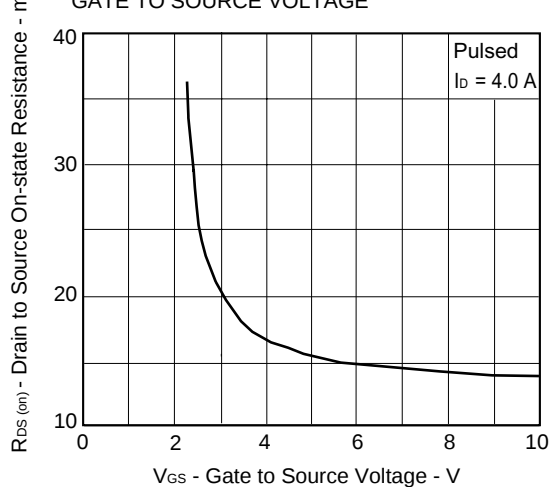
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

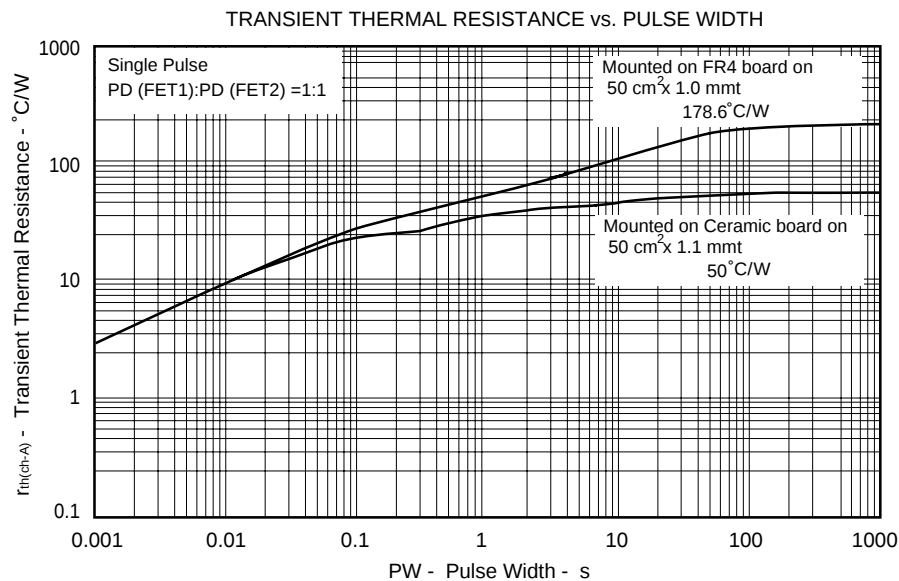
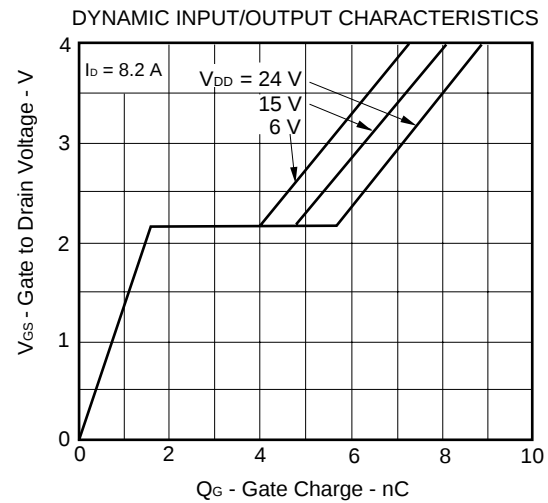
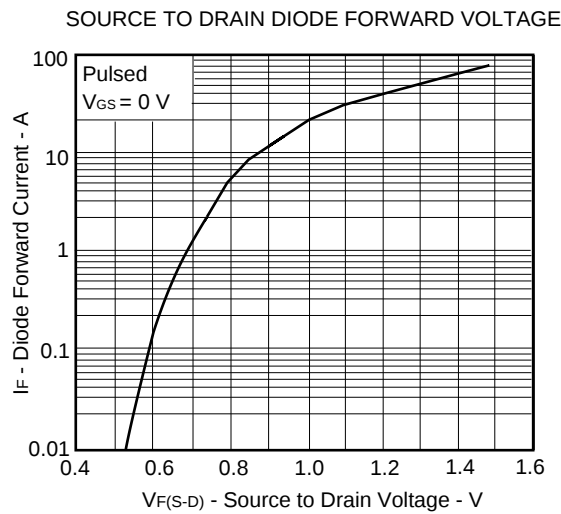
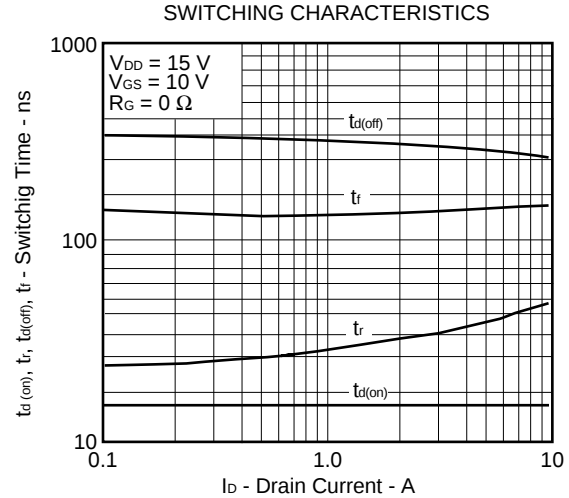
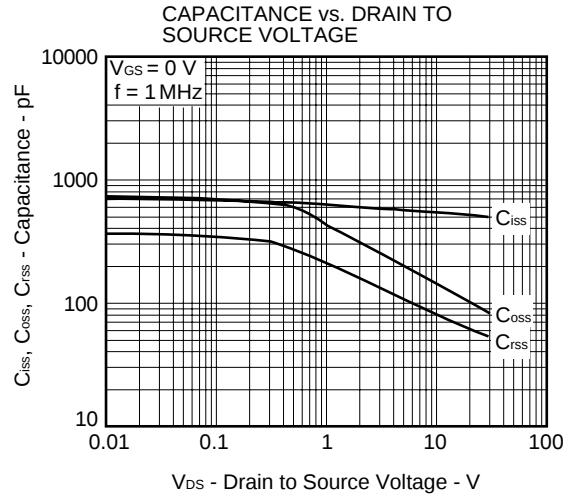


DRAIN TO SOURCE ON - STATE RESISTANCE vs. CHANNEL TEMPERATURE



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





[MEMO]

[MEMO]

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