To our customers,

Old Company Name in Catalogs and Other Documents

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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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RENESAS

MOS FIELD EFFECT TRANSISTOR

μPA1970

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μPA1970 is a switching device which can be driven directly by a 2.5 V power source.

The 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

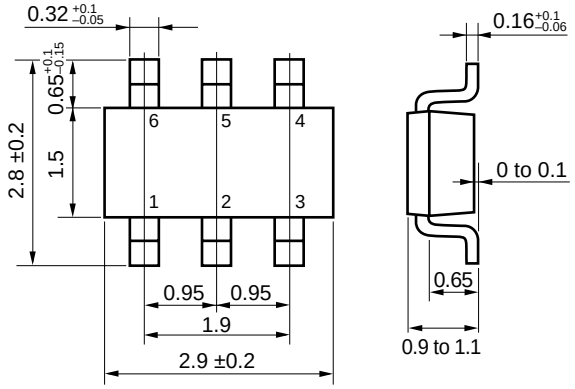
- 2.5 V drive available
- Low on-state resistance
  $R_{DS(on)1}$ = 69 mΩ MAX. (V_{GS} = 4.5 V, I_D = 1.0 A)
  $R_{DS(on)2}$ = 72 mΩ MAX. (V_{GS} = 4.0 V, I_D = 1.0 A)
  $R_{DS(on)3}$ = 107 mΩ MAX. (V_{GS} = 2.5 V, I_D = 1.0 A)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1970TE Note	SC-95 (Mini Mold Thin Type)

Note Marking: TT

PACKAGE DRAWING (Unit: mm)

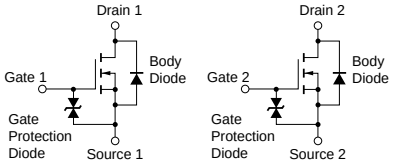


6:	Drain 1	4:	Drain 2
1:	Gate 1	3:	Gate 2
5:	Source 1	2:	Source 2

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	20	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±12	V
Drain Current (DC) (T_A = 25°C)	$I_{D(DC)}$	±2.2	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±8.8	A
Total Power Dissipation (2 units) (T_A = 25°C) Note2	P_{T1}	1.15	W
Total Power Dissipation (1 unit) (T_A = 25°C) Note2	P_{T2}	0.57	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

EQUIVALENT CIRCUITS



Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on FR-4 board of 5000 mm^2 x 1.1 mm, 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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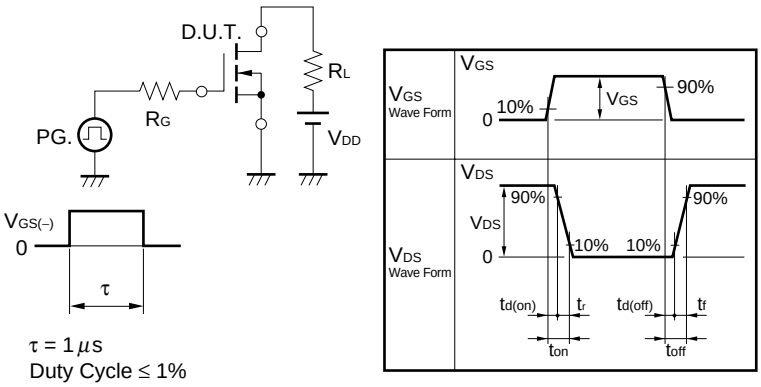
Document No. G15934EJ1V0DS00 (1st edition)
Date Published September 2002 NS CP(K)
Printed in Japan

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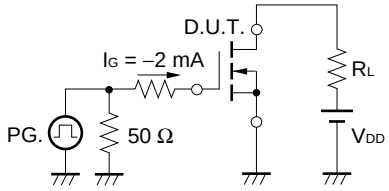
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 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	0.97	1.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 1.0 A	1.0	3.3		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 4.5 V, I_D = 1.0 A		55	69	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.0 V, I_D = 1.0 A		57	72	mΩ
	$R_{DS(on)3}$	V_{GS} = 2.5 V, I_D = 1.0 A		80	107	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		160		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		60		pF
Reverse Transfer Capacitance	C_{rss}	f = 1.0 MHz		40		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 10 V, I_D = 1.0 A		17		ns
Rise Time	t_r	V_{GS} = 4.0 V		90		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		100		ns
Fall Time	t_f			120		ns
Total Gate Charge	Q_G	V_{DD} = 16 V		2.3		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 4.0 V		0.5		nC
Gate to Drain Charge	Q_{GD}	I_D = 2.2 A		1.1		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 2.2 A, V_{GS} = 0 V		0.85		V

TEST CIRCUIT 1 SWITCHING TIME

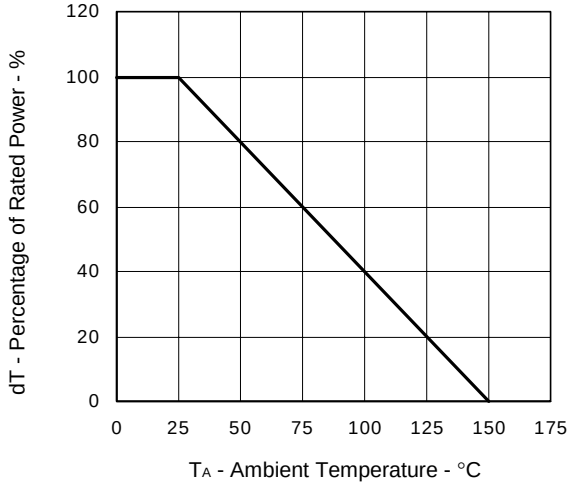


TEST CIRCUIT 2 GATE CHARGE

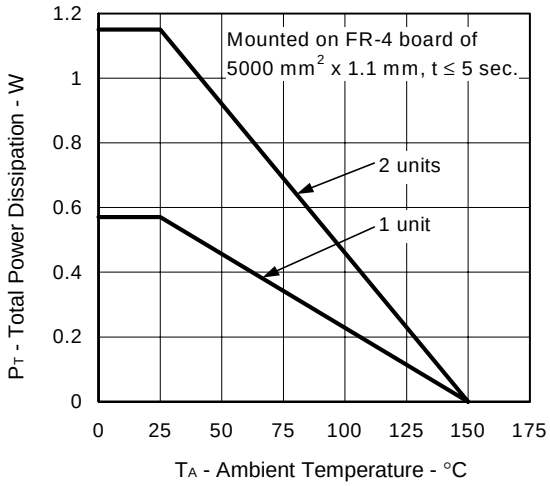


TYPICAL CHARACTERISTICS (T_A = 25°C)

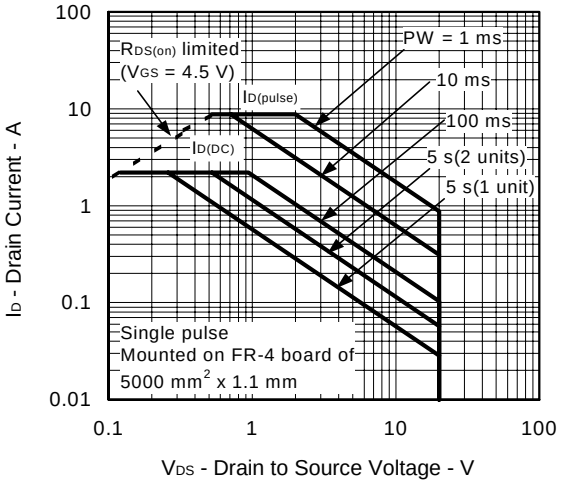
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



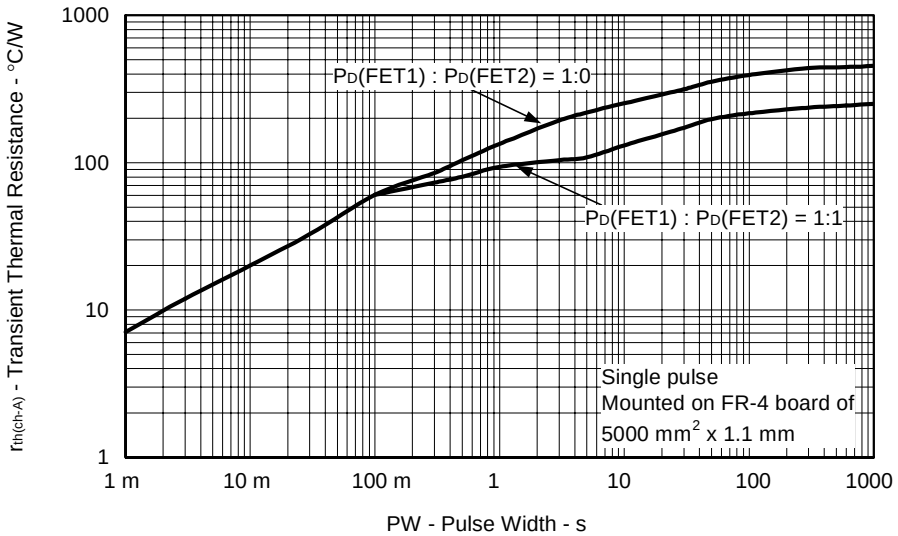
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



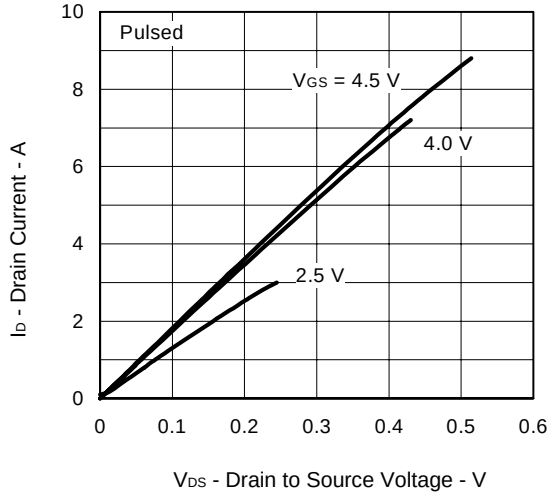
FORWARD BIAS SAFE OPERATING AREA



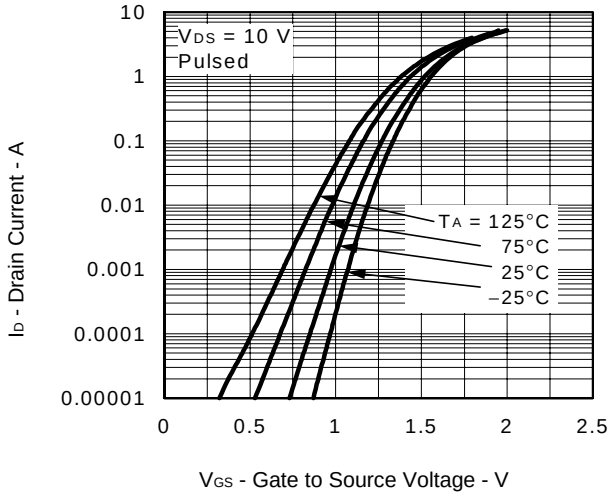
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



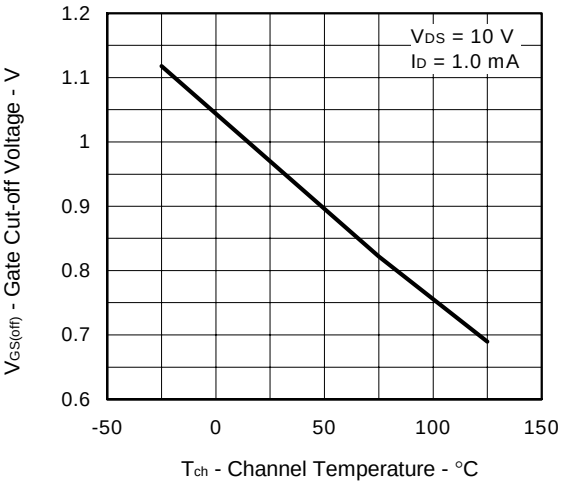
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



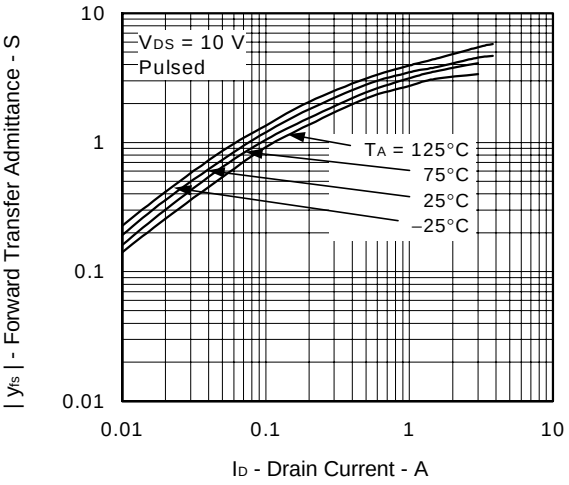
FORWARD TRANSFER CHARACTERISTICS



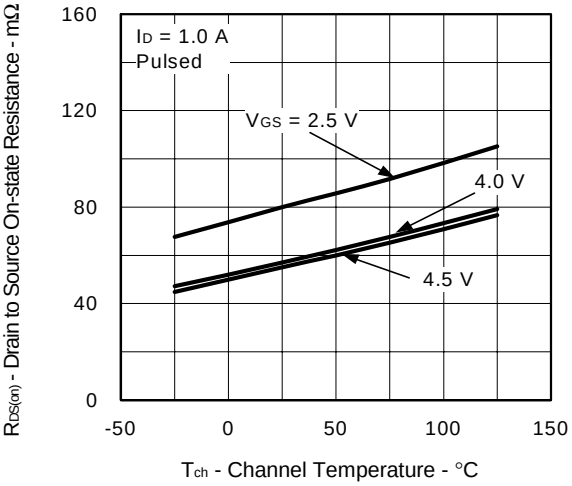
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



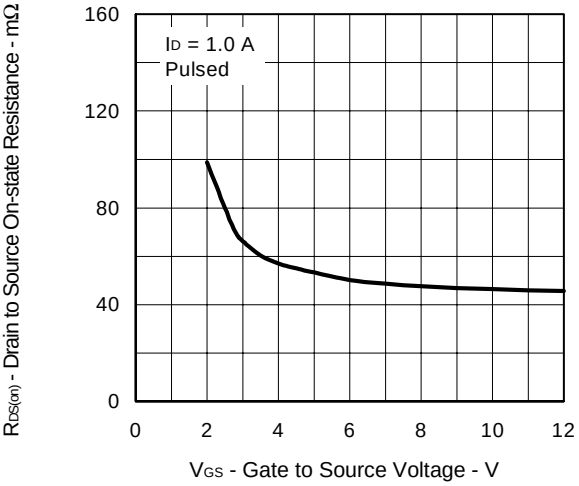
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



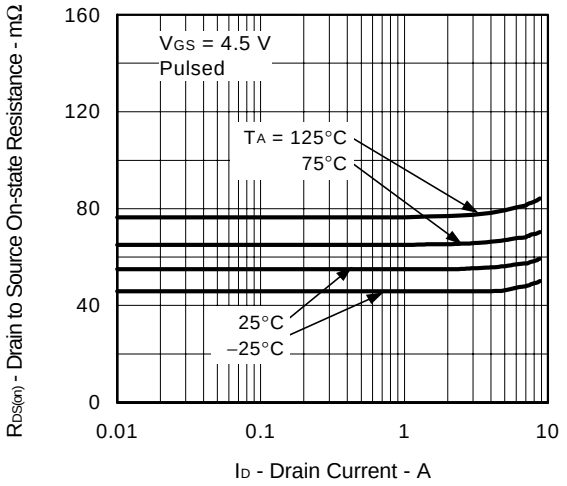
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



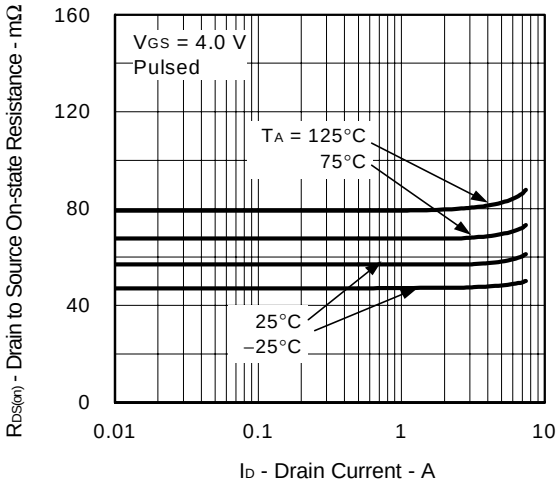
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



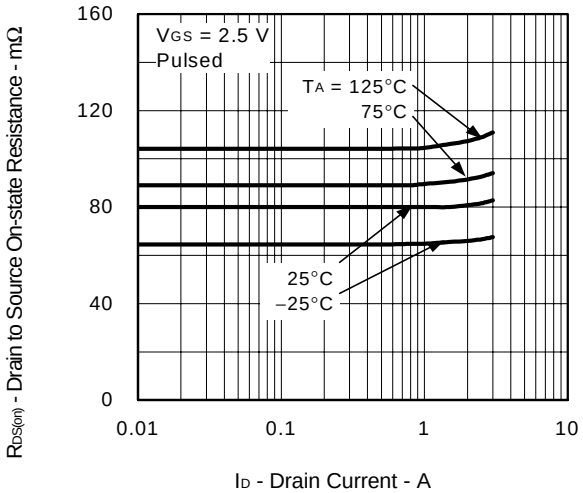
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



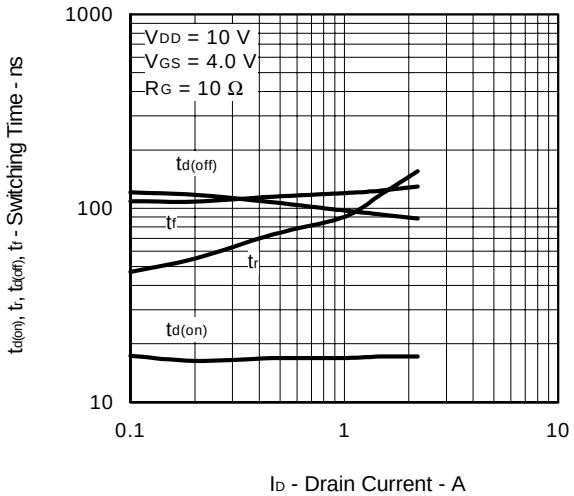
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



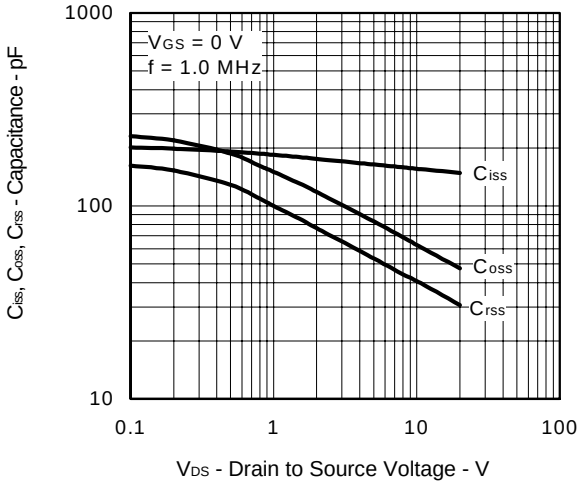
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



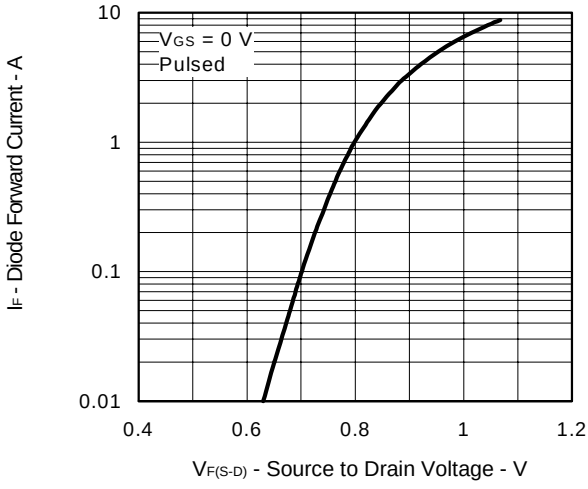
SWITCHING CHARACTERISTICS



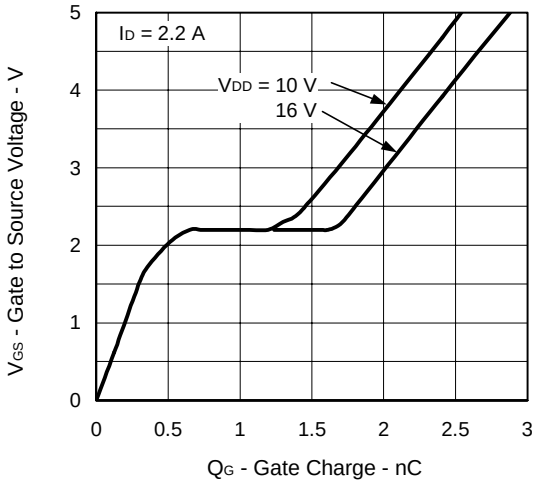
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



[MEMO]

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