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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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P-CHANNEL MOS FIELD EFFECT TRANSISTOR
 FOR SWITCHING

DESCRIPTION

The μ PA1951 is a switching device, which can be driven directly by a 1.8 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

- 1.8 V drive available
 - Low on-state resistance
- $R_{DS(on)1} = 88 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5\text{V, } I_D = -1.5 \text{ A)}$
 $R_{DS(on)2} = 114 \text{ m}\Omega \text{ MAX. (} V_{GS} = -3.0 \text{ V, } I_D = -1.5 \text{ A)}$
 $R_{DS(on)3} = 133 \text{ m}\Omega \text{ MAX. (} V_{GS} = -2.5 \text{ V, } I_D = -1.5 \text{ A)}$
 $R_{DS(on)4} = 234 \text{ m}\Omega \text{ MAX. (} V_{GS} = -1.8 \text{ V, } I_D = -1.0 \text{ A)}$

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA1951TE	SC-95 (Mini Mold Thin Type)

Marking: TN

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

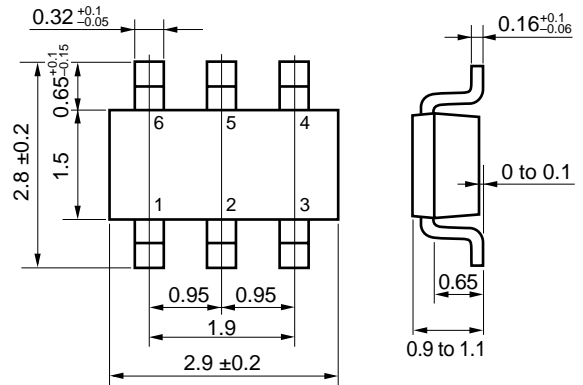
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	-12	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 8.0	V
Drain Current (DC)	$I_{D(DC)}$	± 2.5	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 10	A
Total Power Dissipation (2 units) ^{Note2}	P_{T1}	1.15	W
Total Power Dissipation (1 unit) ^{Note2}	P_{T2}	0.57	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

- Notes** 1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$
 2. Mounted on FR-4 board of $5000 \text{ mm}^2 \times 1.1 \text{ mm}$, $t \leq 5 \text{ sec}$.

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.

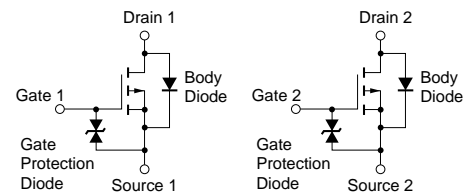
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PACKAGE DRAWING (Unit: mm)



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

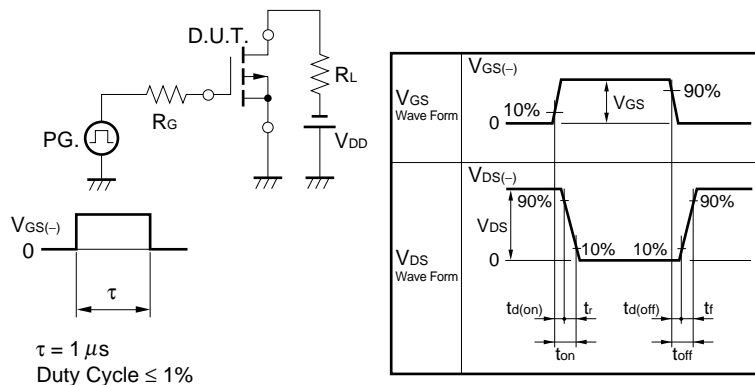
EQUIVALENT CIRCUITS



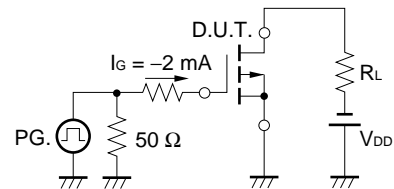
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

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	-0.75	-1.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = -10 V, I _D = -1.5 A	1.0	4.7		S
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = -4.5 V, I _D = -1.5 A		70	88	mΩ
	R _{DS(on)2}	V _{GS} = -3.0 V, I _D = -1.5 A		85	114	mΩ
	R _{DS(on)3}	V _{GS} = -2.5 V, I _D = -1.5 A		100	133	mΩ
	R _{DS(on)4}	V _{GS} = -1.8 V, I _D = -1.0 A		140	234	mΩ
Input Capacitance	C _{iSS}	V _{DS} = -10 V		270		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		90		pF
Reverse Transfer Capacitance	C _{rss}	f = 1.0 MHz		45		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = -6.0 V, I _D = -1.5 A		14		ns
Rise Time	t _r	V _{GS} = -4.0 V		90		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		150		ns
Fall Time	t _f			130		ns
Total Gate Charge	Q _G	V _{DD} = -10 V		2.4		nC
Gate to Source Charge	Q _{GS}	V _{GS} = -4.0 V		0.6		nC
Gate to Drain Charge	Q _{GD}	I _D = -2.5 A		0.8		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 2.5 A, V _{GS} = 0 V		0.87		V

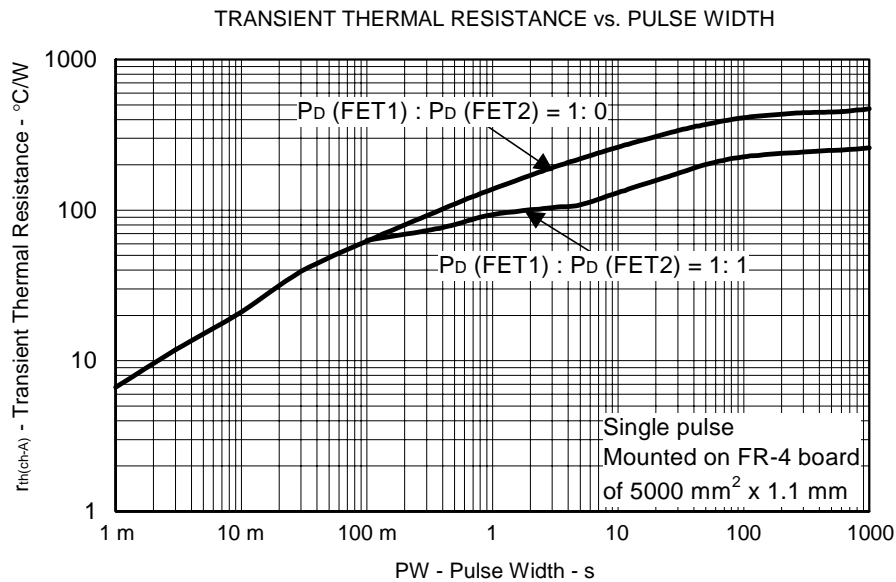
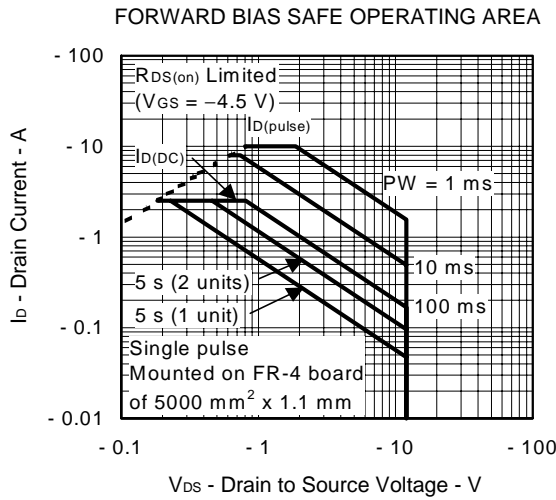
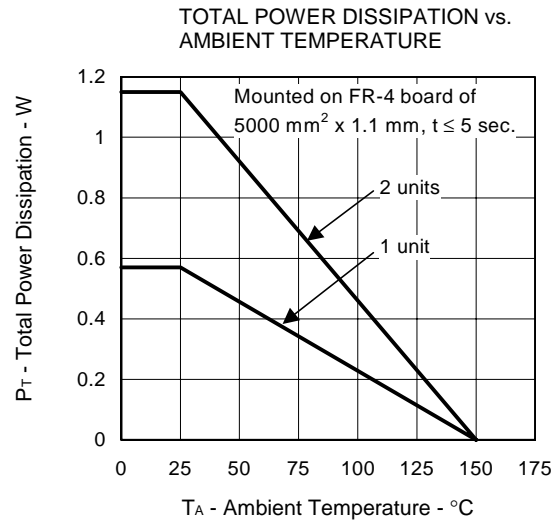
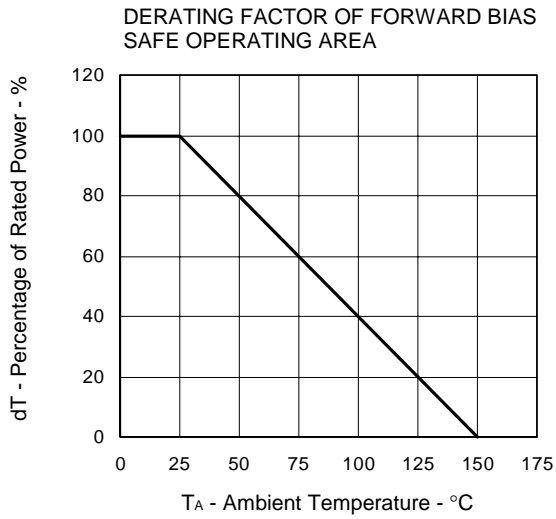
TEST CIRCUIT 1 SWITCHING TIME



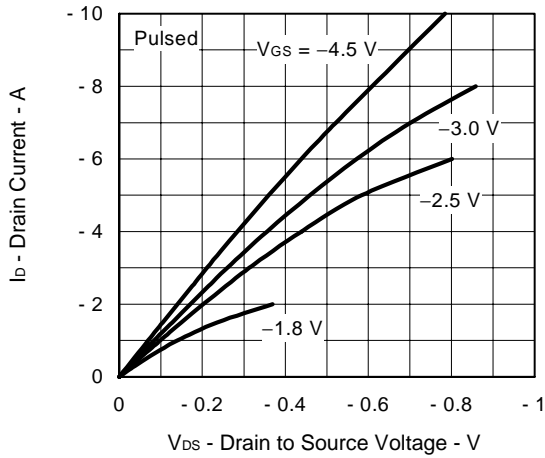
TEST CIRCUIT 2 GATE CHARGE



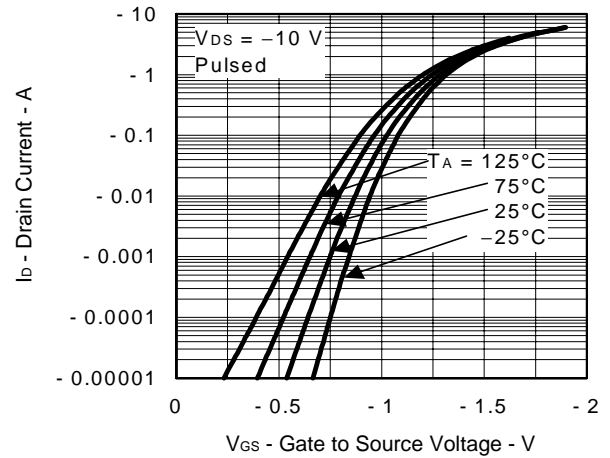
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



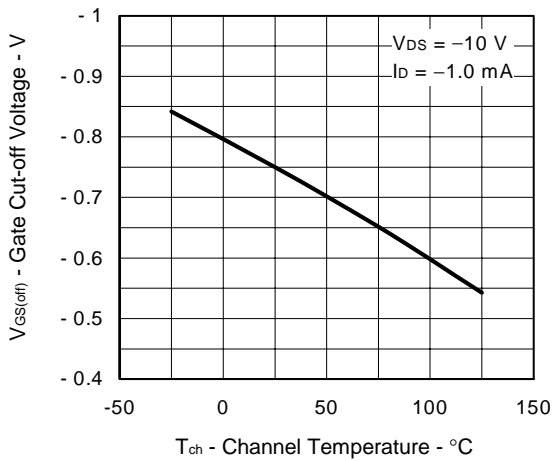
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



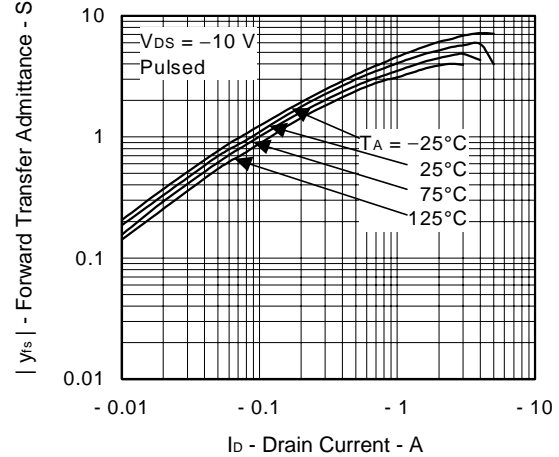
FORWARD TRANSFER CHARACTERISTICS



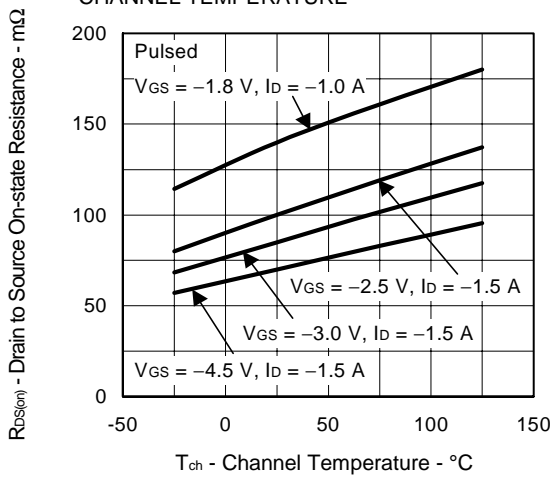
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



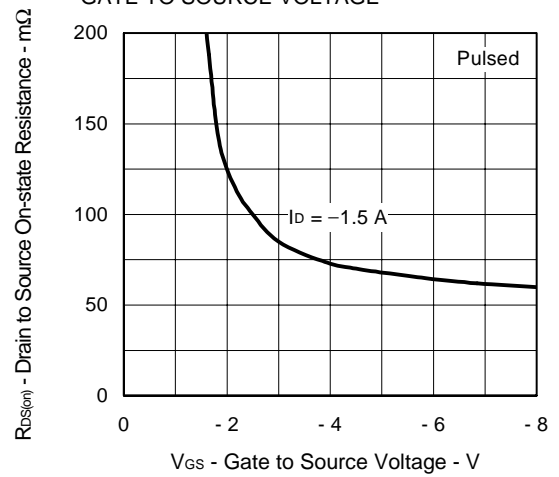
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

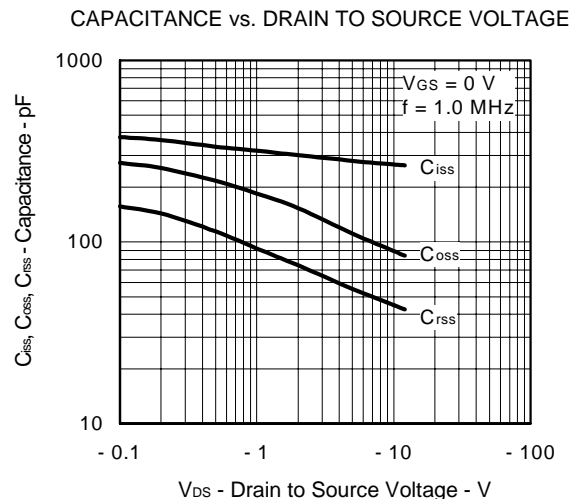
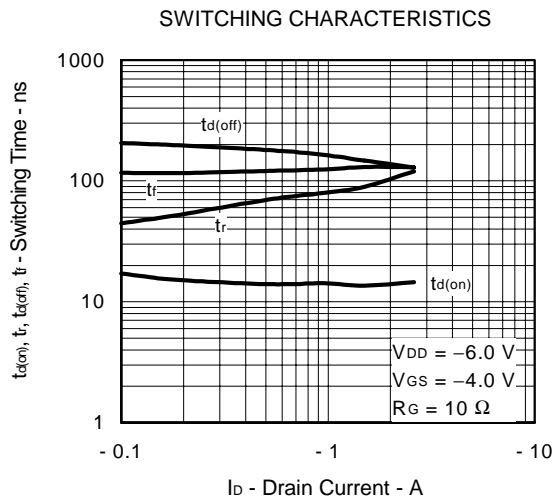
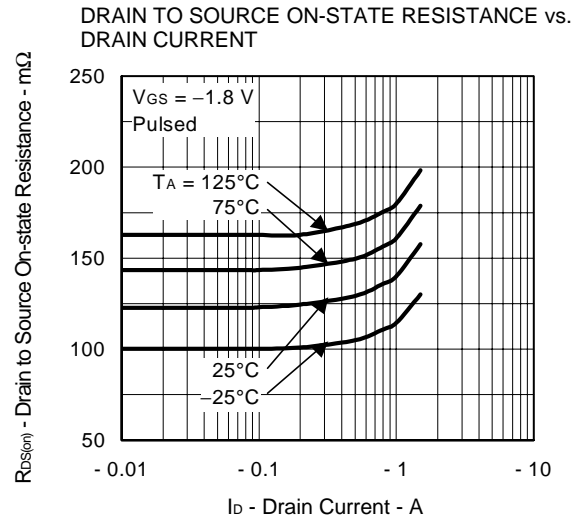
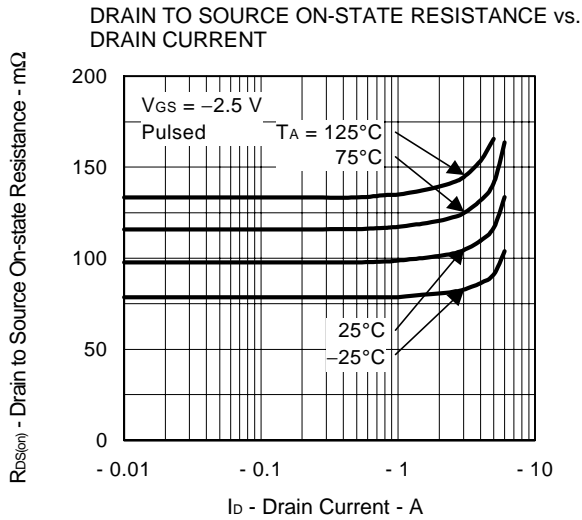
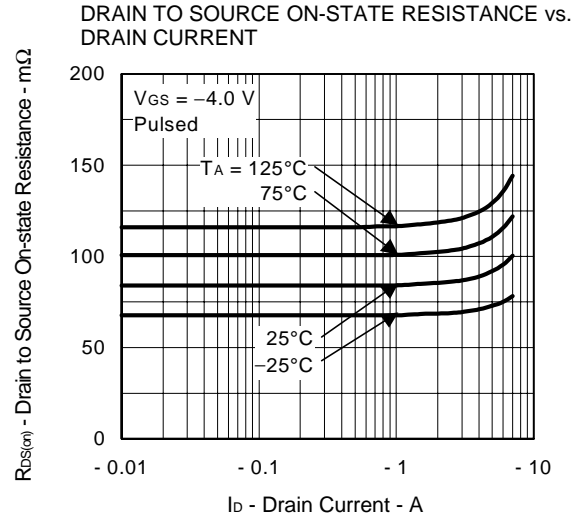
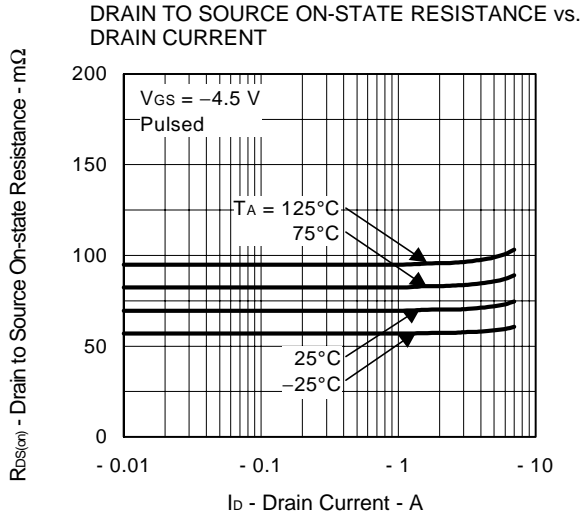


DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE

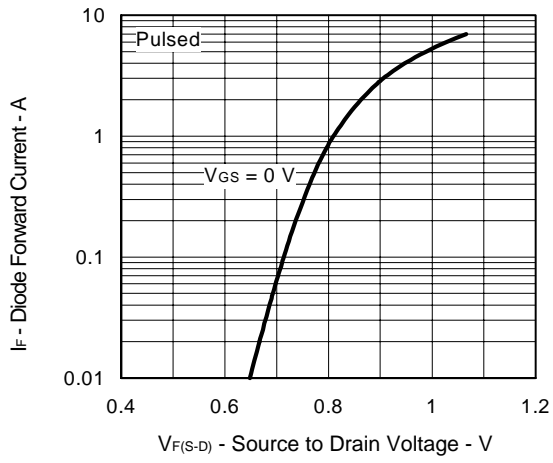


DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

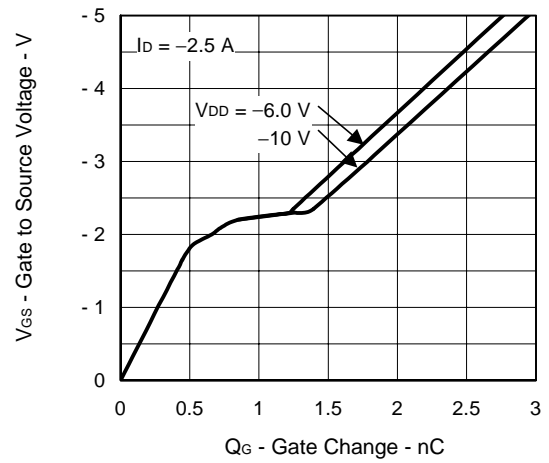




SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



[MEMO]

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