

MOS FIELD EFFECT TRANSISTOR

μ PA1816

P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μ PA1816 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 management of notebook computers and so on.

FEATURES

- 1.8 V drive available
- Low on-state resistance
 $R_{DS(on)1} = 15 \text{ m}\Omega \text{ MAX. } (V_{GS} = -4.5 \text{ V}, I_D = -4.5 \text{ A})$
 $R_{DS(on)2} = 16 \text{ m}\Omega \text{ MAX. } (V_{GS} = -4.0 \text{ V}, I_D = -4.5 \text{ A})$
 $R_{DS(on)3} = 22.5 \text{ m}\Omega \text{ MAX. } (V_{GS} = -2.5 \text{ V}, I_D = -4.5 \text{ A})$
 $R_{DS(on)4} = 41.5 \text{ m}\Omega \text{ MAX. } (V_{GS} = -1.8 \text{ V}, I_D = -2.5 \text{ A})$
- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA1816GR-9JG	Power TSSOP8

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

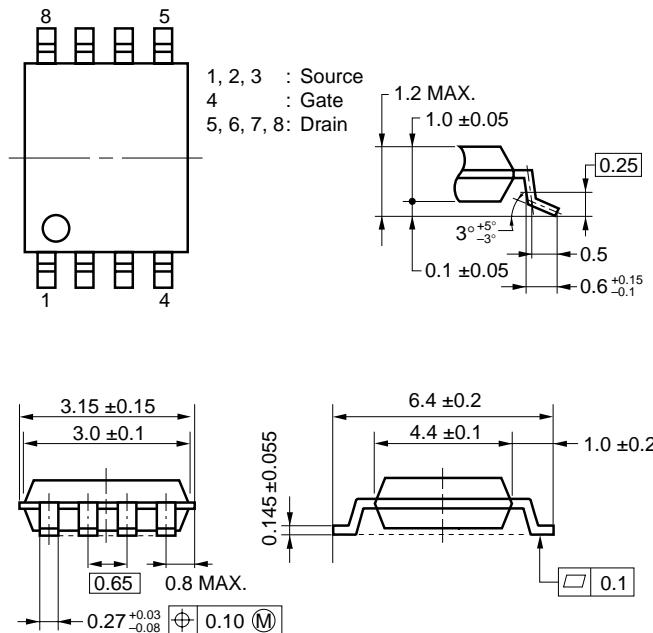
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	-12	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	∓ 8.0	V
Drain Current (DC) ($T_A = 25^\circ\text{C}$)	$I_D(\text{DC})$	∓ 9.0	A
Drain Current (pulse) ^{Note1}	$I_D(\text{pulse})$	∓ 36	A
Total Power Dissipation ^{Note2}	P_T	2.0	W
Channel 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 $\leq 1\%$

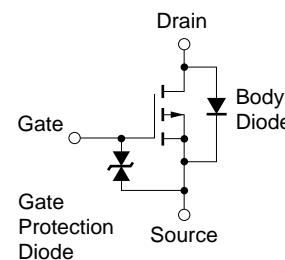
2. Mounted on ceramic substrate of 5000 mm² x 1.1 mm

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

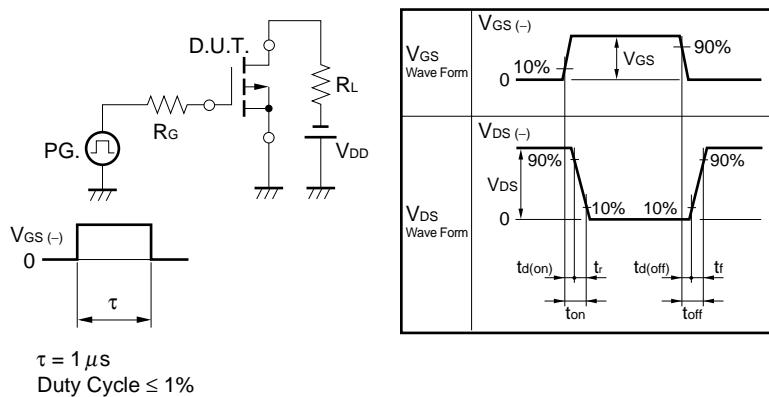


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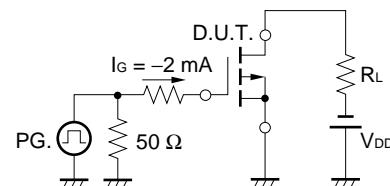
ELECTRICAL CHARACTERISTICS (TA = 25°C)

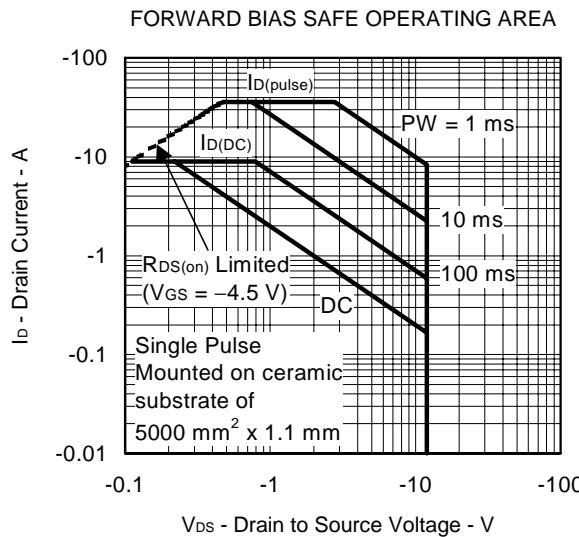
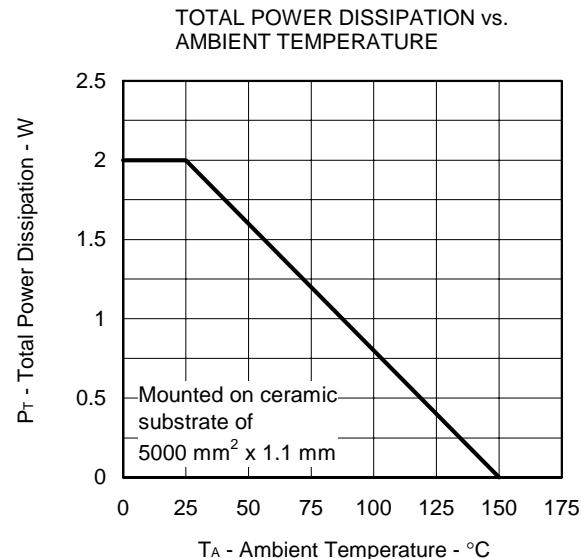
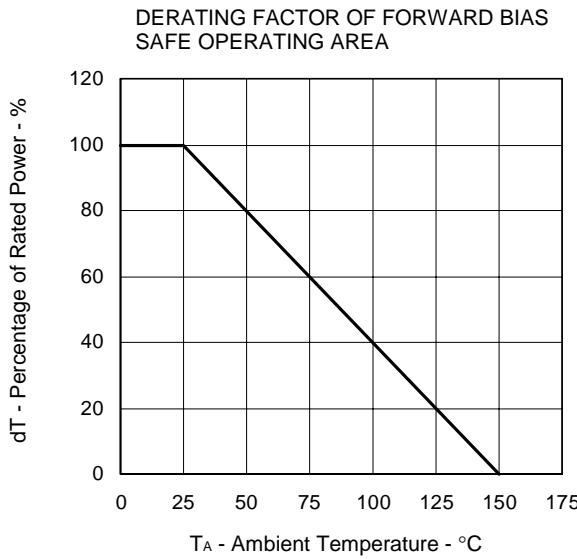
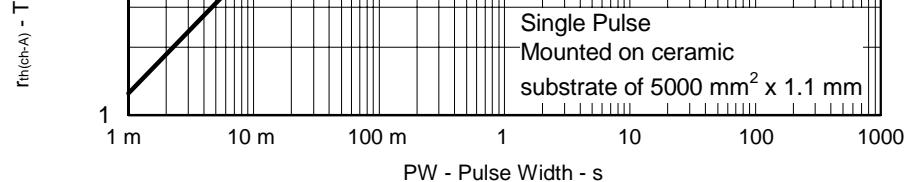
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -12 \text{ V}$, $V_{GS} = 0 \text{ V}$			-1.0	μA
Gate Leakage Current	I_{GS}	$V_{GS} = \pm 8.0 \text{ V}$, $V_{DS} = 0 \text{ V}$			± 10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = -10 \text{ V}$, $I_D = -1.0 \text{ mA}$	-0.45	-0.75	-1.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = -10 \text{ V}$, $I_D = -4.5 \text{ A}$	11	22		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = -4.5 \text{ V}$, $I_D = -4.5 \text{ A}$		12.0	15	$\text{m}\Omega$
	$R_{DS(on)2}$	$V_{GS} = -4.0 \text{ V}$, $I_D = -4.5 \text{ A}$		12.5	16	$\text{m}\Omega$
	$R_{DS(on)3}$	$V_{GS} = -2.5 \text{ V}$, $I_D = -4.5 \text{ A}$		16.2	22.5	$\text{m}\Omega$
	$R_{DS(on)4}$	$V_{GS} = -1.8 \text{ V}$, $I_D = -2.5 \text{ A}$		23.7	41.5	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = -10 \text{ V}$		1570		pF
Output Capacitance	C_{oss}	$V_{GS} = 0 \text{ V}$		400		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1.0 \text{ MHz}$		240		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -10 \text{ V}$, $I_D = -4.5 \text{ A}$		16		ns
Rise Time	t_r	$V_{GS} = -4.0 \text{ V}$		132		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10 \Omega$		223		ns
Fall Time	t_f			295		ns
Total Gate Charge	Q_G	$V_{DD} = -10 \text{ V}$		15		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = -4.0 \text{ V}$		3.0		nC
Gate to Drain Charge	Q_{GD}	$I_D = -9.0 \text{ A}$		4.5		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 9.0 \text{ A}$, $V_{GS} = 0 \text{ V}$		0.82		V
Reverse Recovery Time	t_{rr}	$I_F = 9.0 \text{ A}$, $V_{GS} = 0 \text{ V}$		490		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100 \text{ A}/\mu\text{s}$		580		nC

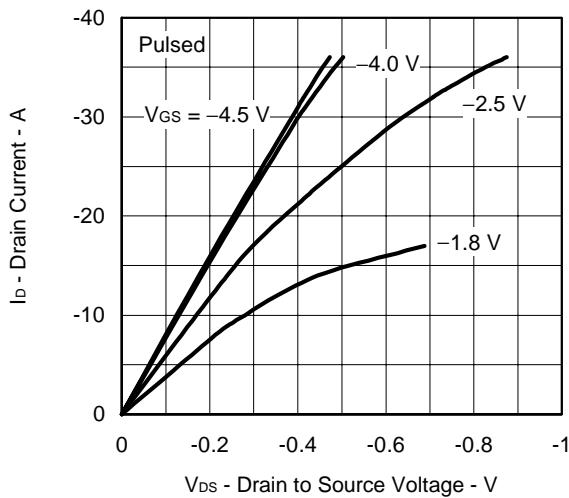
TEST CIRCUIT 1 SWITCHING TIME



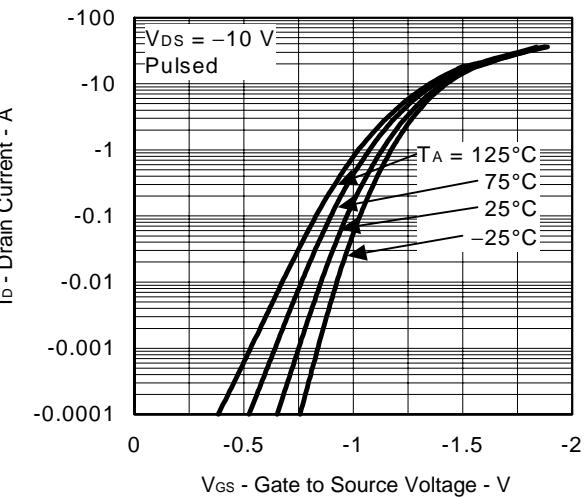
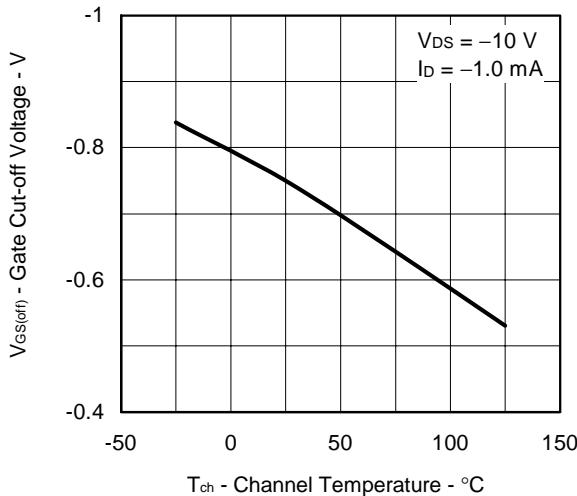
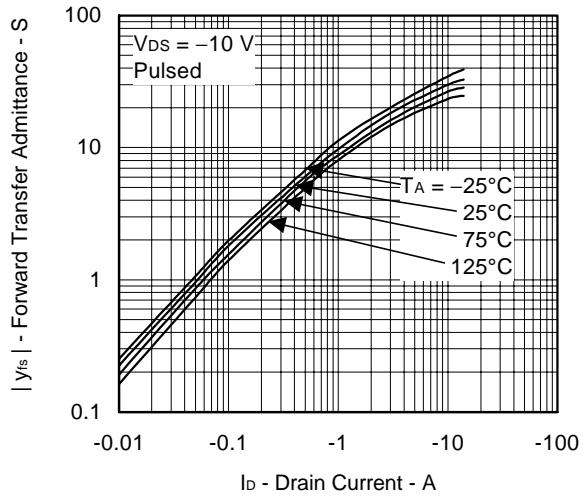
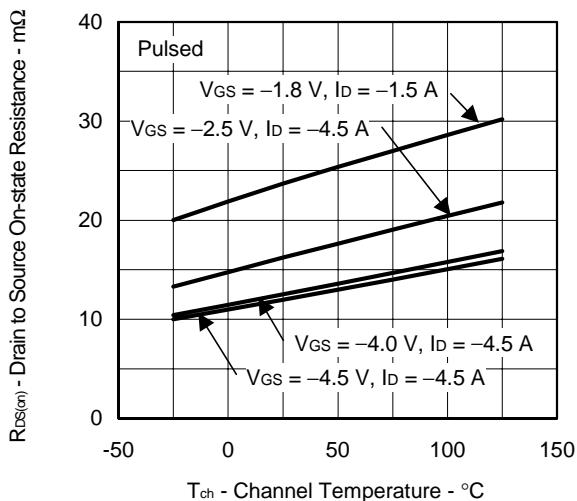
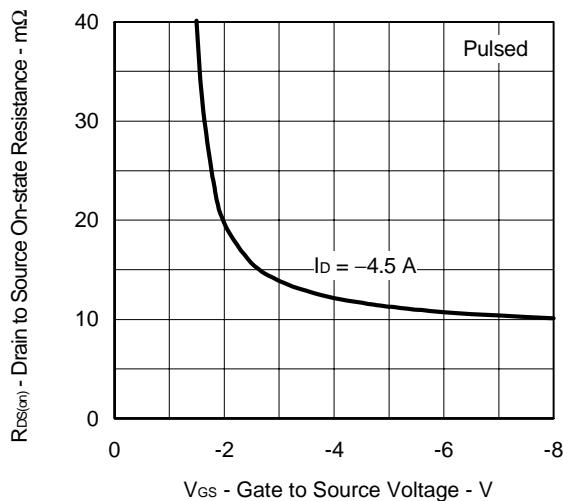
TEST CIRCUIT 2 GATE CHARGE

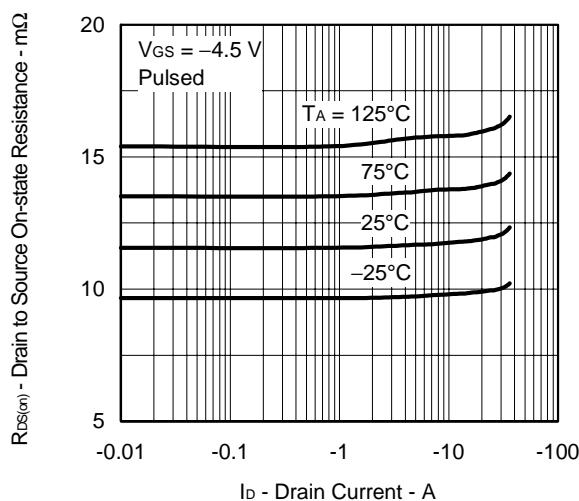
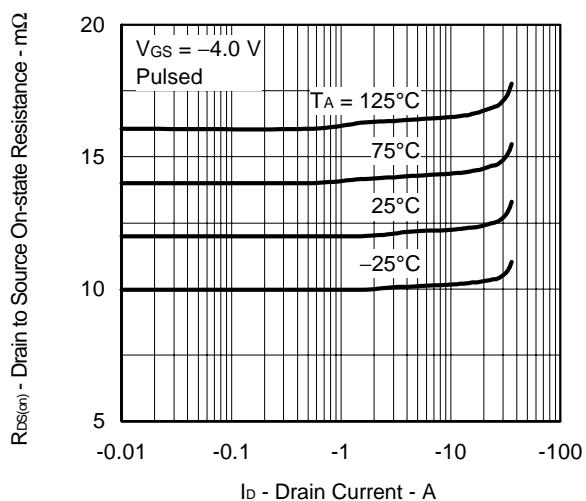
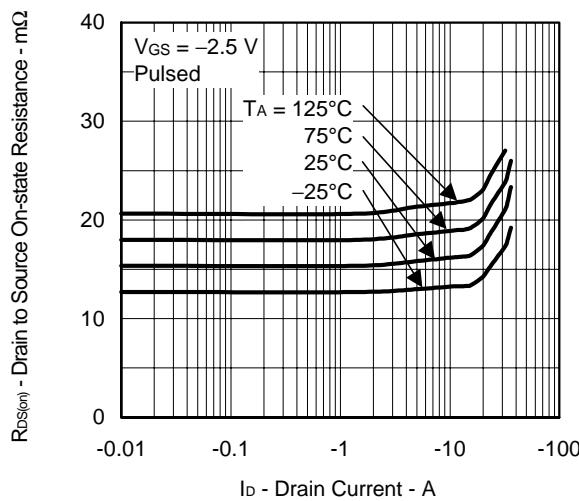
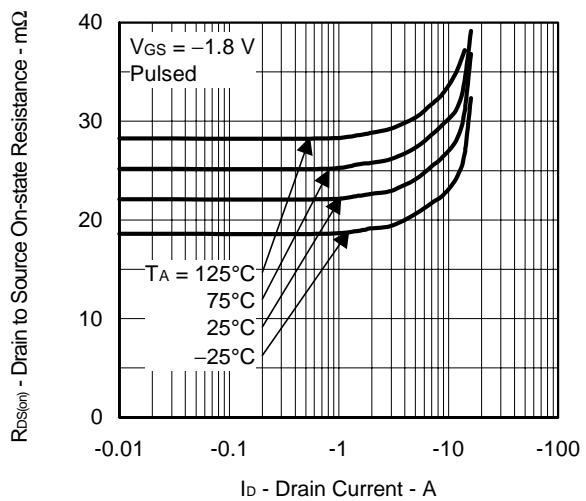


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)Single Pulse
Mounted on ceramic
substrate of
 $5000 \text{ mm}^2 \times 1.1 \text{ mm}$ 

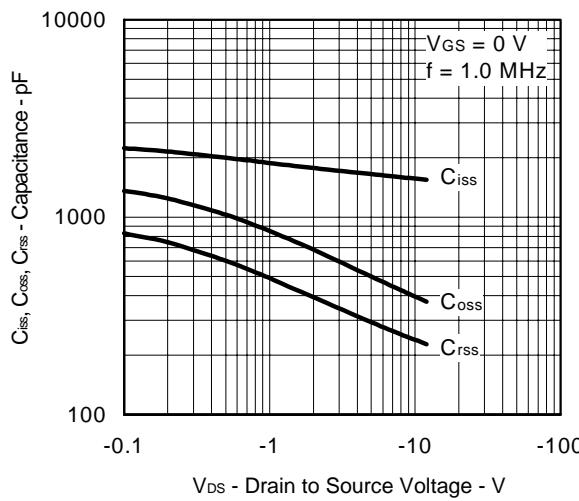
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE

FORWARD TRANSFER CHARACTERISTICS

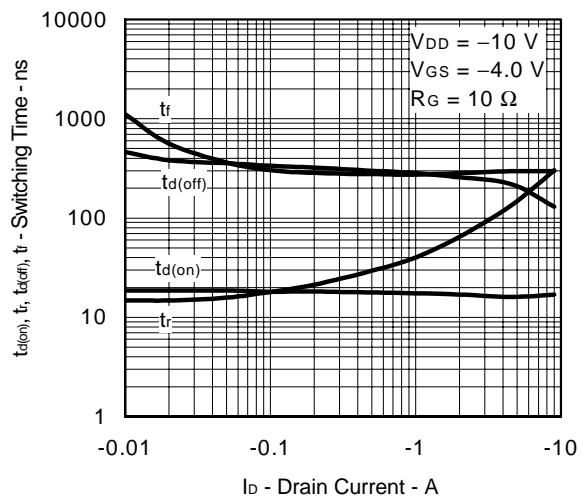
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATUREFORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENTDRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATUREDRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE

DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENTDRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENTDRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENTDRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT

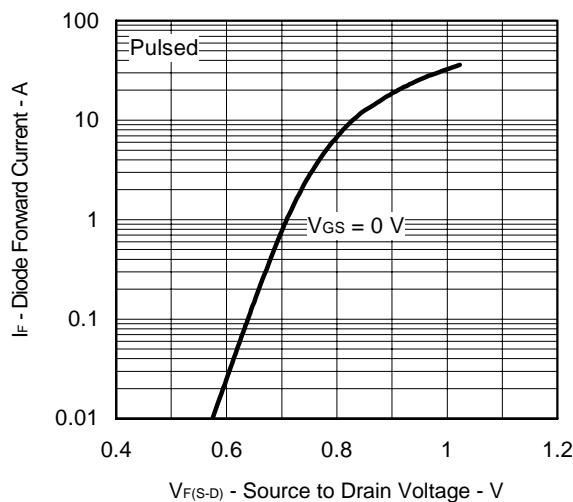
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



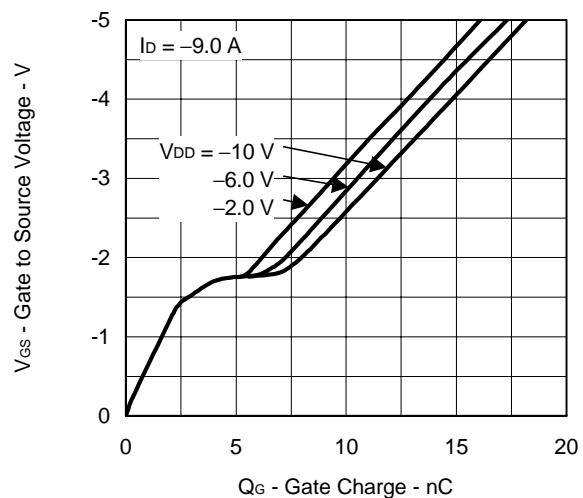
SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



[MEMO]

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